SERVICE MANUAL

DATSUN 260Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION BR

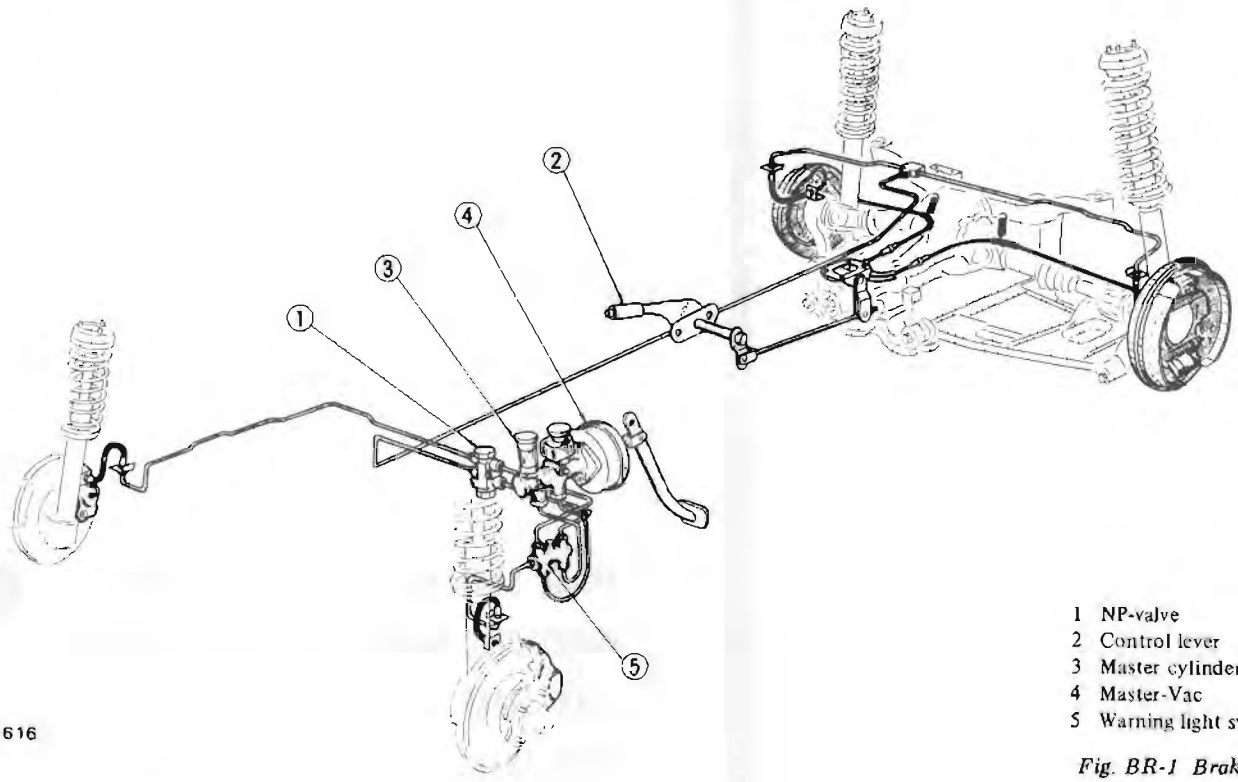
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BRAKE SYSTEM

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1 NP-valve
2 Control lever
3 Master cylinder
4 Master-Vac
5 Warning light switch

Fig. BR-1 Brake system

DESCRIPTION

The S30 series cars are equipped with disc brake for front, drum brake for rear, and a 7.5 inch Master-Vac, to get great braking force.

The front disc brake is Girling-Sumitomo model S-16, and the pad is operated with two pistons.

The leading-trailing type rear drum brake is equipped with auto-adjuster, and in order to get enough cooling effect, aluminum finned brake drums are used.

Moreover, the brake system is equipped with a NP-valve to prevent skid due to early rear wheel locking.

The hand brake is of a mechanical type, which brakes rear wheels, and is operated by the control lever through linkage and wire.

The control lever is located in the seat side center, and is operated easily. The hand brake force satisfies the M.V.S.S. sufficiently, and it may also be used as an emergency brake.

BRAKE PEDAL

The brake pedal is installed on the bracket which also supports the steering column, and the bracket is secured on the dash panel together with the master cylinder. The stop lamp switch is installed on the pedal bracket, and is operated by pedal arm.

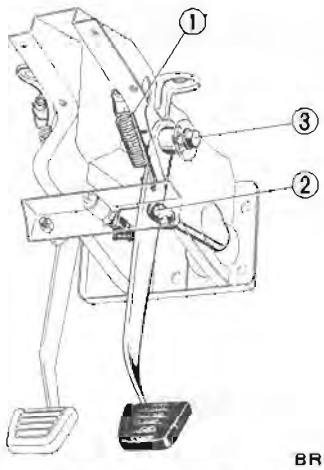


Fig. BR-2 Brake pedal mounting

REMOVAL

(For parts item numbers, refer to Fiugre BR-2.)

1. Remove return spring ①.
2. Remove clevis pin ② from the push rod, and separate pedal from Master-Vac.
3. Remove fulcrum pin ③ and remove the pedal.

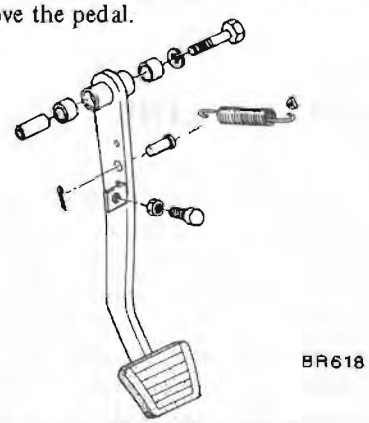


Fig. BR-3 Brake pedal components

INSPECTION

Check brake pedal for the following items, and correct or replace if required.

1. Pedal bushing and sleeve for wear, deformation, and/or damage.
2. Pedal arm for twisting, bending, and/or cracking.

INSTALLATION

Install brake pedal in reverse sequence of removal, noting the following:

1. Be sure to fill pedal shaft sleeve unit and clevis pin unit with recommended multi-purpose grease sufficiently.
2. Be sure to tighten fulcrum pin under tightening torque of 3.5 to 4.0 kg-m (25 to 29 ft-lb).

ADJUSTMENT

ADJUSTING BRAKE PEDAL

1. Loosen lock nut, turn the push rod clevis, and adjust push rod length properly so that height of pedal pad upper surface is 206 mm (8.11 in) with pedal stopper non-effected.
2. Next, turn back stopper, and depress pedal so that pedal pad height is reduced from 206 mm (8.11 in) to 203 mm (7.99 in). See Figure BR-4.

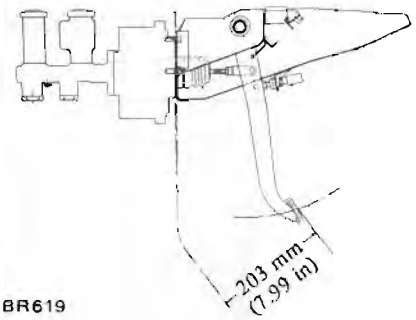


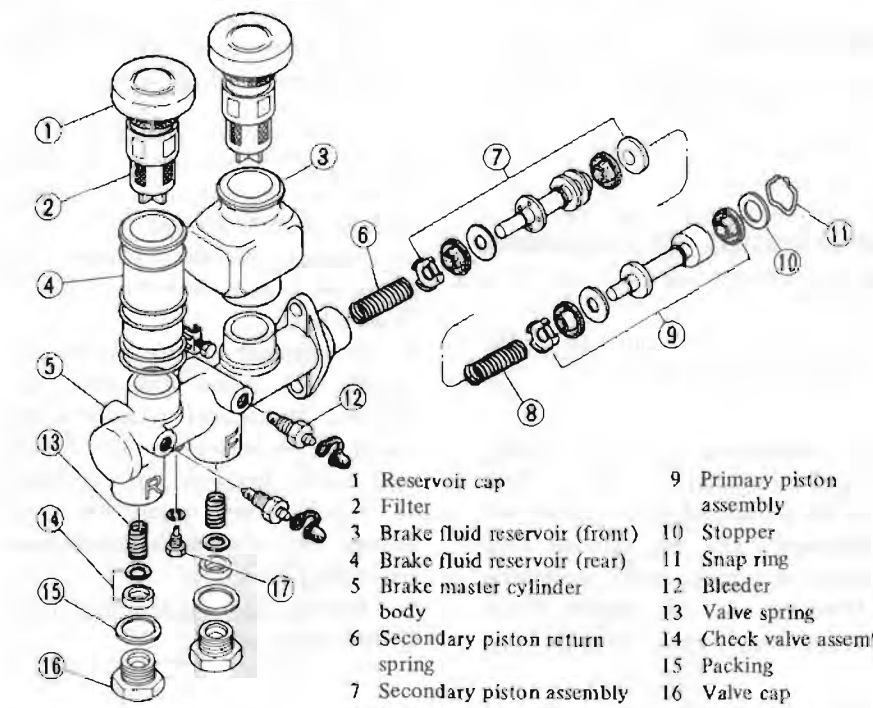
Fig. BR-4 Adjusting brake pedal

Notes:

a. Install stop lamp switch so that installation screw end surface is flush against bracket.
b. After the above processes, make sure that lamp is on when pedal is pushed down by 15 mm (0.59 in) at the place of the brake pedal pad and it is off when pedal is released. Repeat it for several times.

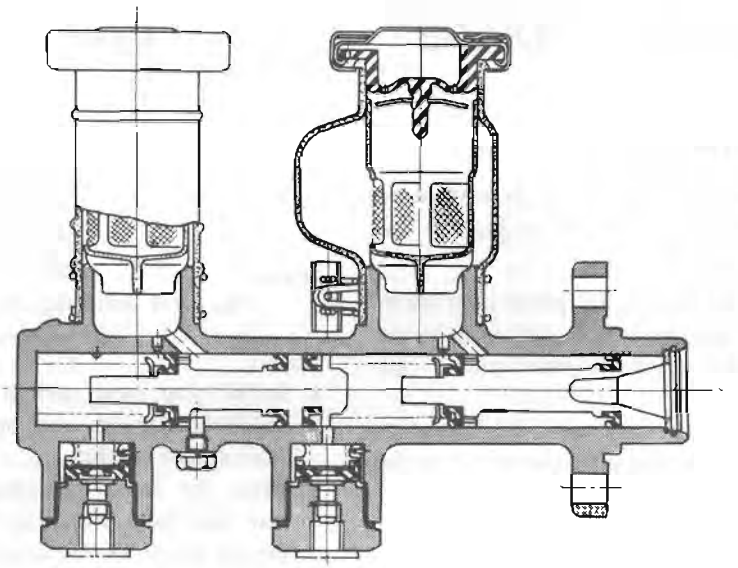
MASTER CYLINDER

The brake system adopts a tandem type master cylinder. Even the front or rear hydraulic circuit falls into a faulty condition, sufficient braking force can be obtained by another. For the front wheels, the disc brake is used, and thus, a large capacity reservoir is used.



1 Reservoir cap
2 Filter
3 Brake fluid reservoir (front)
4 Brake fluid reservoir (rear)
5 Brake master cylinder body
6 Secondary piston return spring
7 Secondary piston assembly
8 Primary piston return spring
9 Primary piston assembly
10 Stopper
11 Snap ring
12 Bleeder
13 Valve spring
14 Check valve assembly
15 Packing
16 Valve cap
17 Stopper screw

Fig. BR-5 Master cylinder



BR212

Fig. BR-6 Cross-sectional view of master cylinder

REMOVAL

1. Disconnect brake tubes from master cylinder.
2. Remove master cylinder installation nuts, and remove master cylinder from Master-Vac.

DISASSEMBLY

(For parts item numbers refer to Figure BR-5)

1. Drain brake fluid, and remove stopper screw ⑰ .
2. Remove snap ring ⑪ , and remove primary piston assembly, secondary piston assembly, and other parts.
3. Remove valve cap ⑯ , and remove check valve ⑭ .

Note: Disassemble master cylinder carefully so that the sliding surface of the piston and piston cup are not damaged. Do not remove fluid reservoir unless really necessary. Moreover, do not remove piston cup unless piston is replaced.

INSPECTION

Thoroughly clean all disassembled parts, check for wear, damage, and other faulty conditions, and replace if necessary.

Note: Do not clean rubber parts with mineral oil since they are deteriorated. Use brake fluid or alcohol. When alcohol is used, however, do not immerse rubber parts under alcohol longer than 30 seconds. After parts are cleaned, dry them with compressed air.

1. Check cylinder and piston for damage and uneven wear on the sliding surface and for other faulty conditions. Replace as required.
2. Replace, if the cylinder and piston clearance is more than 0.15 mm (0.0059 in).
3. In principle replace piston cup, packing and valves with new ones whenever the master cylinder is disassembled. Be sure to replace, if damaged, worn, weakened, or expanded.
4. Check return springs for wear, damage and other faulty conditions, and replace as required.
5. Replace others, if deformed, damaged, or faulty.

ASSEMBLY

Assemble master cylinder in reverse sequence of disassembly, noting the following:

Apply brake fluid to component parts such as cylinder bore, piston, etc., and install carefully so as not to damage them. Moreover, for rubber parts such as piston cup, etc., apply rubber grease slightly.

Tightening torque:
- Stopper screw
  - 0.4 to 0.5 kg-m
  - (2.9 to 3.6 ft-lb)
- Valve cap
  - 8 to 9 kg-m
  - (58 to 65 ft-lb)

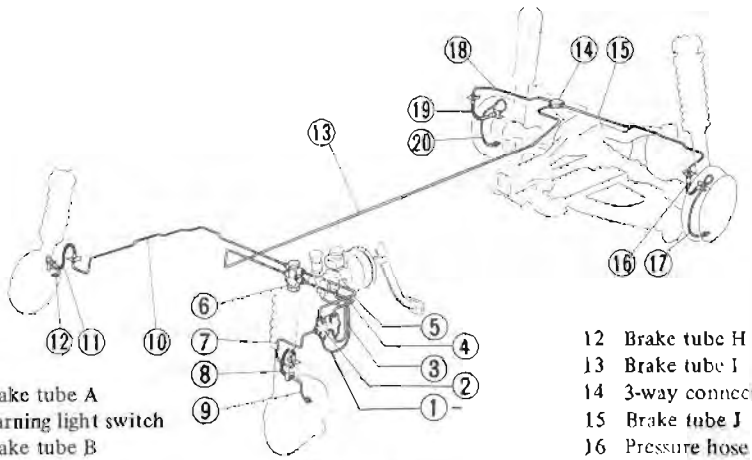
INSTALLATION

Install master cylinder in reverse sequence of removal. After air bleeding, make sure that no brake fluid leaks from the circuit. For pedal height adjustment, refer to the paragraph of pedal adjustment.

Tightening toruqe:
- Brake tube
  - 1.5 to 1.8 kg-m
  - (11 to 13 ft-lb)
- Master cylinder installation nut
  - 0.8 to 1.1 kg-m
  - (5.8 to 8.0 ft-lb)

BRAKE LINE

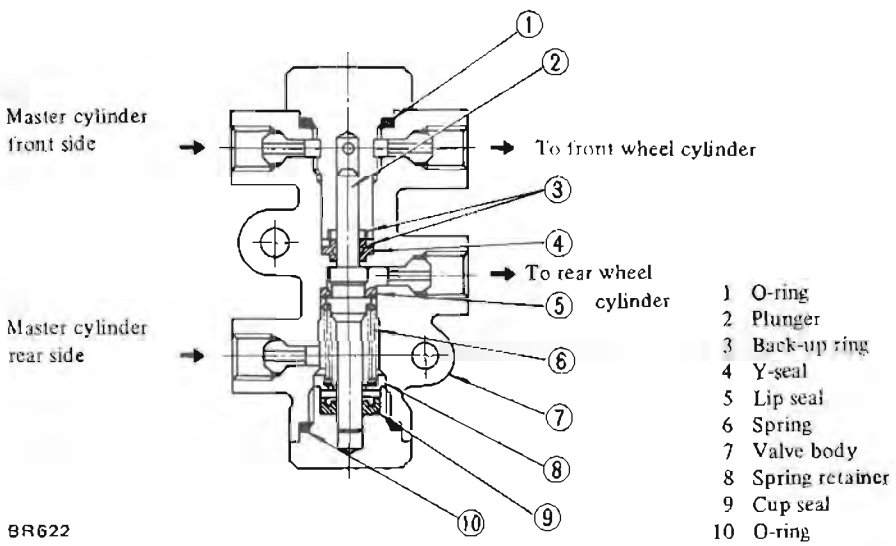
The brake lines branched from the tandem type master cylinder are extended to the front and rear wheels, forming independent hydraulic circuits. An indicator switch is equipped for warning faulty condition in brake line. In addition, the rear wheel side circuit is equipped with the proportioning valve in front of the 3-way connector so as to protect the rear wheels from locking during rapid braking. The brake line is a galvanized double-layer steel tube.



1 Brake tube A
2 Warning light switch
3 Brake tube B
4 Brake tube C
5 Brake tube D
6 NP-valve
7 Brake tube E
8 Pressure hose
9 Brake tube F
10 Brake tube G
11 Pressure hose
12 Brake tube H
13 Brake tube I
14 3-way connector
15 Brake tube J
16 Pressure hose
17 Brake tube K
18 Brake tube L
19 Pressure hose
20 Brake tube M

BR621

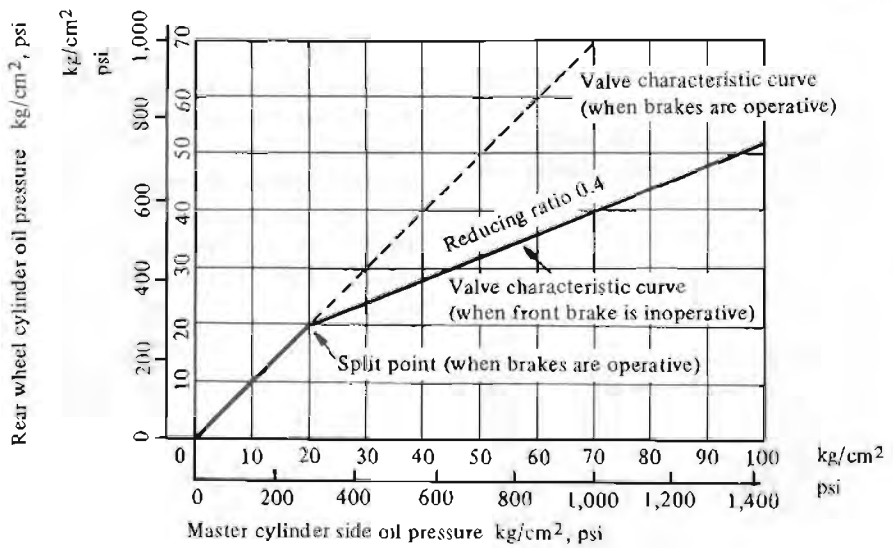
Fig. BR-7 Brake line



1 O-ring
2 Plunger
3 Back-up ring
4 Y-seal
5 Lip seal
6 Spring
7 Valve body
8 Spring retainer
9 Cup seal
10 O-ring

BR622

Fig. BR-8 Cross-sectional view of NP-valve



BR623

Fig. BR-9 Characteristic curves

INSPECTION

Check brake lines (tubes and hoses) for crack and/or damage, and replace, if faulty. When brake fluid leaks from joint, retighten or replace.

Pay attention to the following when installing brake lines.

1. Provide a sufficient space between brake lines and other parts so that brake lines are not interfered with other parts due to vibration during driving.
2. Be careful not to warp or twist brake hose, and particularly be careful not to bring brake hose into contact with tires and suspension components.
3. Using Brake Pipe Torque Wrench GG94310000, tighten each connector to the specified torque.
4. Upon completion of brake line installation, be sure to bleed the air.

NP-VALVE

This valve controls the pressure of the rear wheel cylinder to prevent the earilier locking of the rear wheel. The valve serves as a mere connector earlier locking of the rear wheel. The valve serves as a mere connector independently of the rear system.

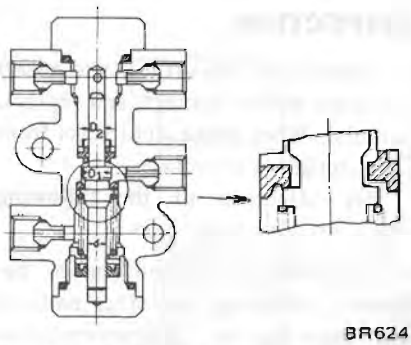
When the front brake is leaking, the split point becomes much higher. This causes the rear brake to behave as if it were without the NP-valve.

PRINCIPLE OF OPERATION

1. Front and rear brakes in good order

(1) When pressure is applied (under split point)

P_1 : Master cylinder oil pressure (Front side pressure is equal to rear side pressure.)
P_2 : Rear wheel cylinder oil pressure
a : Cross-sectional area of diameter d of plunger
A_1 : Cross-sectional area of diameter D_1 of plunger
A_2 : Cross-sectional area of diameter D_2 of plunger
F : Spring and friction forces



BR624

Fig. BR-10 Plunger and seal operation when pressure is applied (under split point)

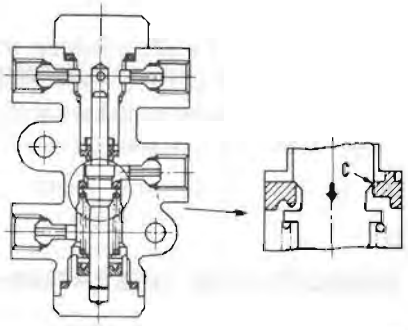
The plunger is depressed downward by force of $P_1 \times a$, passage of seal is opened until it overcomes spring and frictional force F, and hence, oil pressure in the master cylinder side is balanced with that in the rear wheel cylinder side.

$$P_1 = P_2 \quad \text{..... (1)}$$

Consequently, oil pressure at the split point is expressed as follows:

$$P_s = F/a \quad \text{..... (2)}$$

(2) When pressure is applied (over split point)



BR625

Fig. BR-11 Plunger and seal operation when pressure is applied (over split point)

When oil pressure rises to split point, the plunger lowers, and the circuit is sealed at "C" periphery. When oil pressure further rises, the seal is released, the plunger finely rises and lowers so that pressures are balanced under the following equation, and thus seal opening and closing are repeated.

$$P_1 \times A_2 + P_1 \times a + P_2 \times A_1 = P_2 \times A_2 + P_1 \times A_1 \quad \text{..... (3)}$$

$$P_2 = \frac{A_1 - A_2 - a}{A_1 - A_2} P_1 + \frac{F}{A_1 - A_2} \quad \text{..... (4)}$$

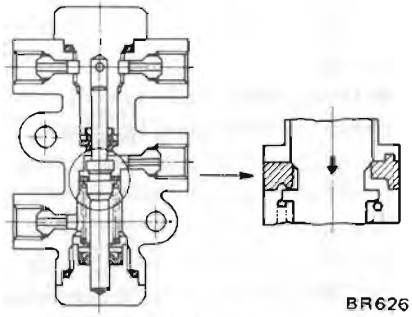
As the result, rear wheel cylinder side oil pressure rises in a ratio lower than that in the master cylinder side (reducing ratio).

$$\text{Reducing ratio} = \frac{A_1 - A_2 - a}{A_1 - A_2}$$

(3) When releasing

When master cylinder side oil pressure is reduced, the plunger drops to contact the stopper [refer to Figure BR-12(a)] depressing oil seal down.

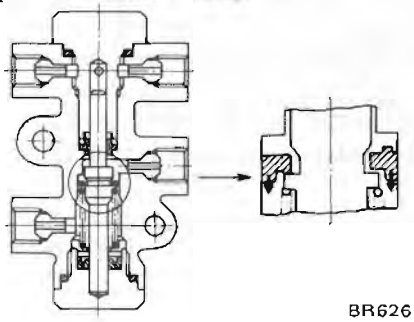
And keeping balance of equation (3) the wheel cylinder side pressure is reduced also. But on this situation the wheel cylinder side pressure drops no more.



BR626

Fig. BR-12(a) Plunger and seal operation when releasing

As master cylinder side pressure is reduced further lower than the rear wheel cylinder side, the seal drops some more [refer to Figure BR-12(b)], and keeping balance of equation (1) the wheel cylinder side pressure is reduced also.



BR626

Fig. BR-12(b) Plunger and seal operation when releasing

When pressure further drops down to the split point, the plunger is pushed by spring force, the condition recovers to the original condition, and with the balance of equation (1) being maintained, oil pressure drops. (Refer to Figure BR-10.)

OIL LEAKAGE IN FRONT FRAKE

1. When pressure is applied (under split point)

When oil leakage takes place in front brake, pressure on front brake side becomes 0, depressing the plunger downward by force of $(P_1 \times 9 - P_1 \times A_2)$. Passage is opened until it overcomes spring and friction forces F, and hence, oil pressure on the master cylinder rear side is balanced with that on the rear wheel cylinder side. (Refer to Figure BR-10.)

$$P_1 = P_2 \quad \text{..... (5)}$$

Consequently, oil pressure at the split point is expressed as follows:

$$P_s = \frac{F}{a - A_2} \quad \text{..... (6)}$$

As explained above, split point when front brake is in faulty condition becomes much higher than that when front and rear brakes are in good order.

2. When pressure is applied (over split point)

When pressure rises to split point, the plunger lowers and the passage is sealed at point "C". (See Figure BR-11.) When oil pressure further rises, the seal is released, the plunger finely rises and lowers so that pressures are balanced under the following equation.

$$P_2 \times A_1 + P_1 \times a = P_1 \times A_1 + P_2 \times A_2 + F \quad \text{..... (7)}$$

$$P_2 = \frac{A_1 - a}{A_1 - A_2} P_1 + \frac{F}{A_1 - A_2} \quad \text{..... (8)}$$

When oil leakage takes place in front brake, reducing ratio is

$$\frac{A_1 - a}{A_1 - A_2}$$

3. When releasing

Operation is same as that taking place within the system when front and rear brakes are in good order.

OPERATING TEST

Conduct the following periodic test at every 40,000 km (24,000 miles).

At the test, place the car on dry concrete road with only driver laden and apply a sudden brake at 50 km/h (31 MPH).

1. NP-valve functions normally when rear wheels lock simultaneously with front wheels lock ahead of rear wheels.
2. If the rear, instead of front, wheels have locked in advance, it may be attributable to malfunctioning of NP-valve. Replace NP-valve with a new one as an assembly.

Note: When this test is conducted, pay attention to other cars.

REMOVAL AND INSTALLATION

NP-valve can be removed easily by removing installation bolts. When installing, however, note the following:

1. Appearance of NP-valve for S30 series is the same as 610 series cars. However, the performance differs. Be careful not to mix up.
2. Connect brake lines with "F" mark toward front brake side and with arrow mark toward the rear brake side.

Note: Identification for inlet and outlet is facilitated by an arrow mark.

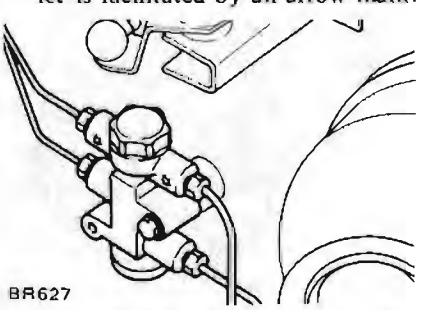


Fig. BR-13 Proportioning valve

BRAKE LINE PRESSURE DIFFERENTIAL WARNING LIGHT SWITCH

A warning light is located on the instrument panel to warn the driver when a pressure difference of 13 to 17 kg-cm² (185 to 242 psi) exists between the front and rear brake systems.

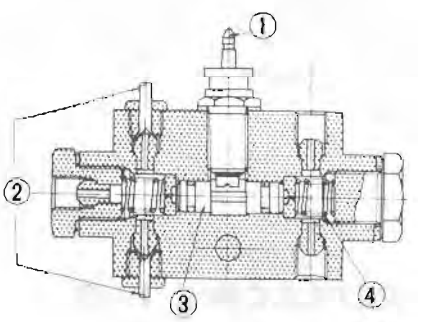
A hydraulically actuated warning light switch is positioned in the engine compartment. Both front and rear brake systems are connected to this switch assembly.

When a pressure difference of 13 to 17 kg/cm² (185 to 242 psi) occurs between the front and rear brake systems, the valves will shuttle toward the side with the low pressure. The valve contacts with the switch terminal and the ground circuit for the warning light is completed, thus the warning light lights.

The hydraulic brake problem must then be corrected and bleed the brakes.

Check the warning light switch assembly for a proper operation. Check the switch assembly for fluid leakage.

DO NOT ATTEMPT TO REPAIR SWITCH FOR ANY REASON: REPLACE COMPLETE SWITCH ASSEMBLY.



1 Wire terminal
2 Brake tubes
3 Valve assembly
4 Piston load spring

Fig. BR-14 Sectional view of warning light switch

BLEEDING HYDRAULIC SYSTEM

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

When pedal action has a "spongy" feel, it is an indication that air has entered the system.

Bleeding the hydraulic system is an essential part of regular brake service.

1. Clean all dirt around master cylinder reservoir, remove cap and top up reservoir with recommended brake fluid.
2. Thoroughly clean mud and dust from bleeder valve so that outlet hole is free from any foreign material. Install a bleeder hose on bleeder valve.

Place the other end of hose in a container filled with brake fluid.

3. Depress brake pedal two or three times, then keep pedal fully depressed.
4. With brake pedal fully depressed, open bleeder valve to expel air.

Notes:

a. Pay attention to brake fluid level in master cylinder reservoir during bleeding operation.
b. Do not reuse brake fluid drained during bleeding operation.
c. Bleed air as follows;
   Rear wheels ⟶ Front wheels
d. Exercise care not to splash brake fluid on exterior finish as it will damage the paint.

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.

Notes:

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

8. Repeat above steps on the remaining brake lines to expel all air.

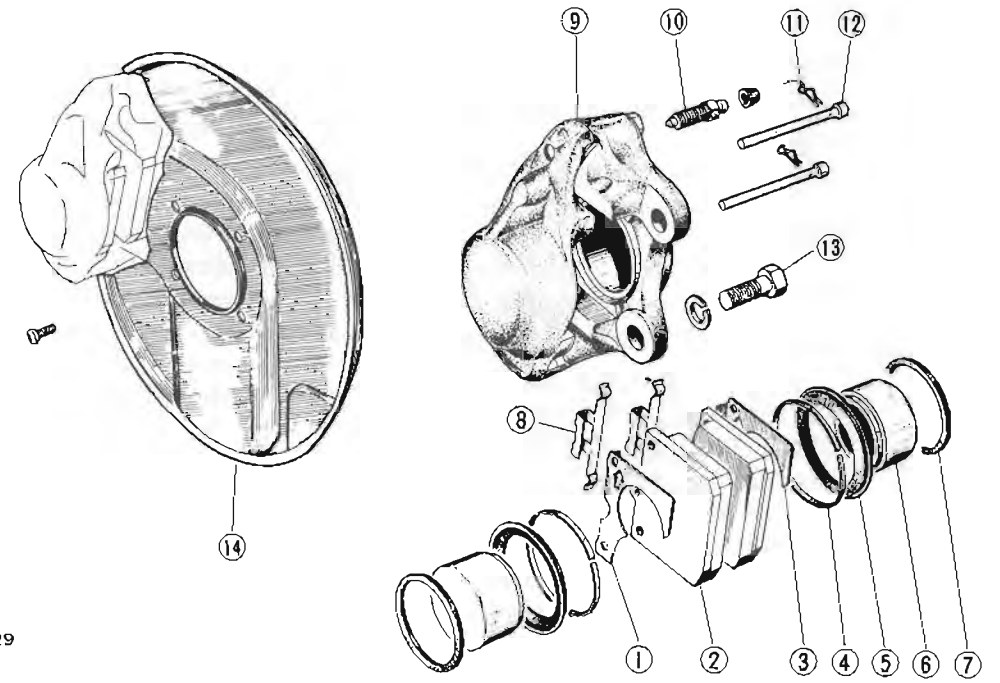
FRONT DISC BRAKE

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Girling-Sumitomo model S-16 disc brake is used. Rigidity of the caliper is high, brake pedal feeling is adequate, and the pad dragging is minimized. The pad is returned by elasticity of the piston seal. When the pad is worn, the piston operating stroke increases, slipping occurs on the piston seal surface, and thus, clearance is adjusted automatically. See Figure BR-16.

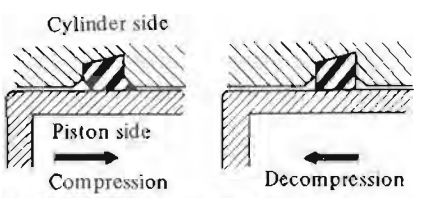
Moreover, in order to prevent brake squealing, a shim is inserted behind the pad.



BR629

1 Anti-squeal shim R.H.
2 Pad
3 Anti-squeal shim L.H.
4 Retaining ring
5 Dust cover
6 Piston
7 Piston seal
8 Anti-squeal spring
9 Caliper assembly
10 Bleeder
11 Clip
12 Retaining pin
13 Caliper fixing bolt
14 Baffle plate

Fig. BR-15 Front disc brake



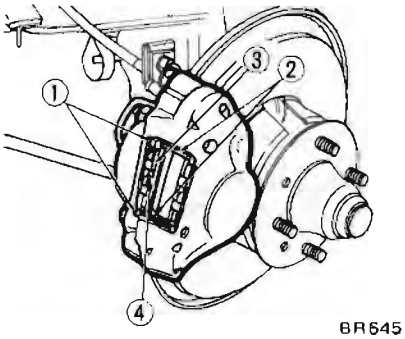
BR055

Fig. BR-16 Piston seal automatic adjusting operation

REPLACING PAD

REMOVAL

1. Jack up the front side of car, and remove wheel.
2. Remove clip ①, retaining pin ②, and anti-squeal spring ③, and remove pad ④ together with the shim as shown in Figure BR-17.



BR645

Fig BR-17 Removing pad

INSPECTION

1. Clean pad with carbon tetrachloride or gasoline.
2. When oil and/or grease is heavily sticked on pad, or when deteriorated or deformed due to overheating, replace pad with a new one.
3. When thickness of the friction material is less than 2 mm (0.079 in), replace. (Replace, when total pad thickness is less than 7.5 mm (0.295 in).

Note: Replace pads as a set. Replacement at only one position may cause uneven brake effect. Rotation of pads is recommended to be made periodically.

INSTALLATION

1. Clean calipers and piston pad installing parts.

Note: Do not use mineral oil. Be careful not to apply oil on rotor.

2. Depress piston into cylinder so that new pad can be installed.

Note: Note that brake fluid may overflow from reservoir. Carry out operation by loosening breather to release brake fluid.

3. Install pad and anti-squeal shim, assemble anti-squeal spring and retaining pin, and secure them with clip.

Note: Install shim so that the arrow mark points to rotor forward rotating direction.

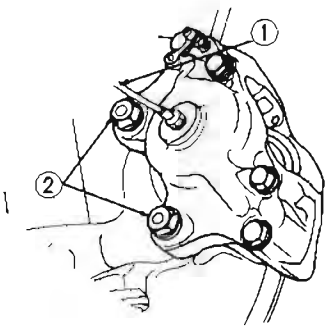
4. When pad is installed, depress brake pedal several times so as to settle down the pad in its position.

REPLACING PISTON SEAL

If brake fluid leaks from piston unit or pad does not return properly, replace piston seal with a new one in accordance with the following instructions. It should be noted that components should be maintained under clean state while disassembling.

REMOVAL

1. Remove pad.
2. Disconnect the brake line ① and caliper installation bolt ② , and remove caliper assembly from knuckle spindle. See Fiugre BR-18.



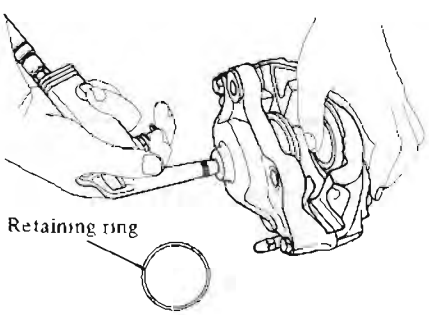
BR057

Fig. BR-18 Removing calipers

DISASSEMBLY

1. Remove mud and dust from caliper assembly before disassembly.
2. Remove retaining ring ④ and dust cover ⑤ in that order. (Refer to Figure BR-15.)
3. Hold piston in one side with finger, apply compressed air from brake line joint, and remove other piston. See Figure BR-19.

Notes:
a. In feeding air, feed air a little at first. If only one piston move smoothly, hold smoother side piston with finger, and remove both pistons evenly.
b. Take special care not to damage your finger during the operation.



BR059

Fig. BR-19 Removing piston

4. Remove piston seal from cylinder, and clean inside.

Note: Remove piston seal carefully with finger so that cylinder wall is not damaged.

INSPECTION

Thoroughly clean all disassembled parts, and check them for the following items.

Note: When cleaning rubber parts, use alcohol or brake fluid. If rubber parts are cleaned with mineral oil, they will be deteriorated.

1. Calipers

If cylinder wall is damaged or worn, replace. If cylinder wall is rusted or foreign matters are accumulated on cylinder wall, carefully polish with fine emery paper so that cylinder wall is not damaged. If rusted or roughened excessively, replace.

2. Pad

See paragraph covering replacement of pad.

3. Piston

Replace, if unevenly worn, damaged, and/or rusted.

Note: Piston sliding surface is plated. Thus, although rusted or foreign matters are sticked on the sliding surface, do not use emery paper.

4. Seals

Primarily, replace both piston and dust seals whenever overhauling.

Note: The piston seal affects not only leaking but also piston return. For this reason, replace although damage is minor.

ASSEMBLY

1. Install the piston seal carefully so that the seal is not damaged.

Note: Be sure to apply rubber grease to the piston seal before installing.

2. Install dust seal on the piston, and the piston into the cylinder. Clamp the dust seal with the retaining ring.

Note: When inserting the piston, apply brake fluid to the piston sliding unit.

3. After assembly is completely accomplished on one cylinder, assemble another side in the same manner.

INSTALLATION

Reinstallation is in reverse sequence of removal. After pad is installed completely, bleed hydraulic line.

Tightening torque:
Caliper installation bolt:
7.3 to 9.9 kg-m
(53 to 72 ft-lb)

DISASSEMBLING CALIPERS

Do not remove bridge bolt.

If brake fluid leaks from bridge seal, replace a new assembly: **(Be sure to replace calipers as an assembly.)**

INSPECTING ROTOR

Remove caliper assembly, check rotor for deflection and damage, and correct or replace as required.

1. Deflection

With wheel bearing adjusted correctly, measure deflection at the center of rotor pad contact surface using dial gauge. See Figure BR-20.

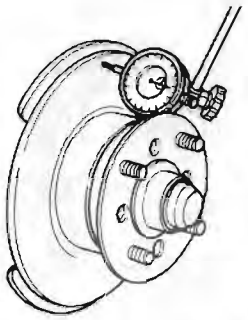


Fig. BR-20 Measuring deflection

Deflection

Total deflection:
Less than 0.15 mm (0.0059 in)
Limit 0.20 mm (0.0079 in)

2. Parallelism

Measure thickness toward the entire periphery on the same circumference using a micrometer. See Figure BR-21.

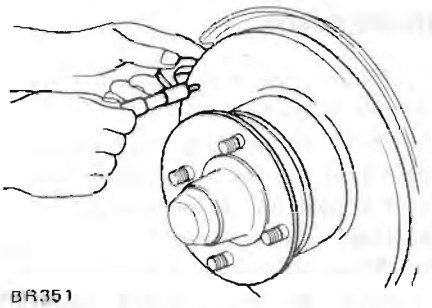


Fig. BR-21 Measuring parallelism

Parallelism (when new):
Less than 0.03 mm (0.0012 in)
Usage limit 0.07 mm (0.0028 in)

3. Thickness

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

Standard thickness: 12.5 mm (0.492 in)
Wear limit: 10.5 mm (0.413 in)

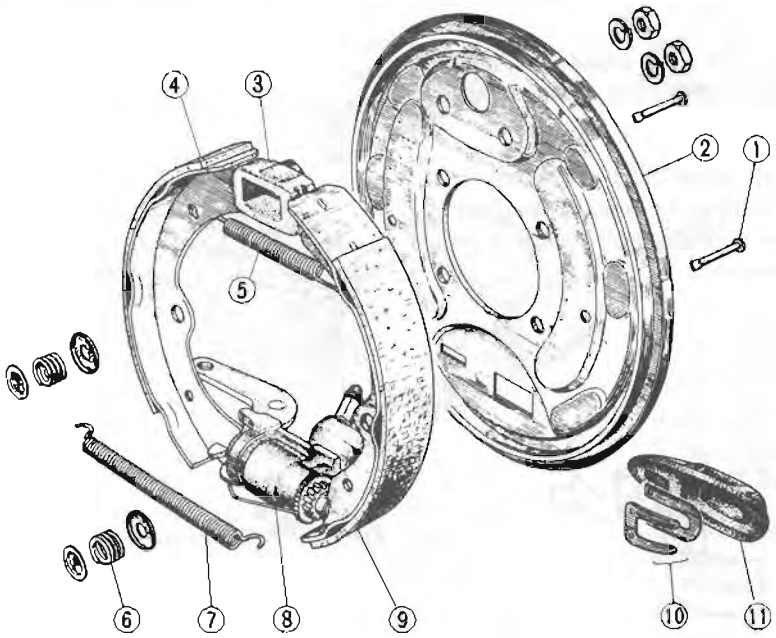
ADJUSTING FRONT BRAKE

Ordinarily, adjustment is not required because clearance between pad and rotor is adjusted automatically by elasticity of piston seal.

REAR BRAKE

CONTENTS

REPLACING BRAKE SHOE BR-11
REMOVAL BR-11
INSTALLATION BR-12
DISASSEMBLY AND INSPECTION BR-12
REMOVAL BR-12
INSPECTION BR-13
ASSEMBLY AND INSTALLATION BR-13
ADJUSTING REAR BRAKE BR-13

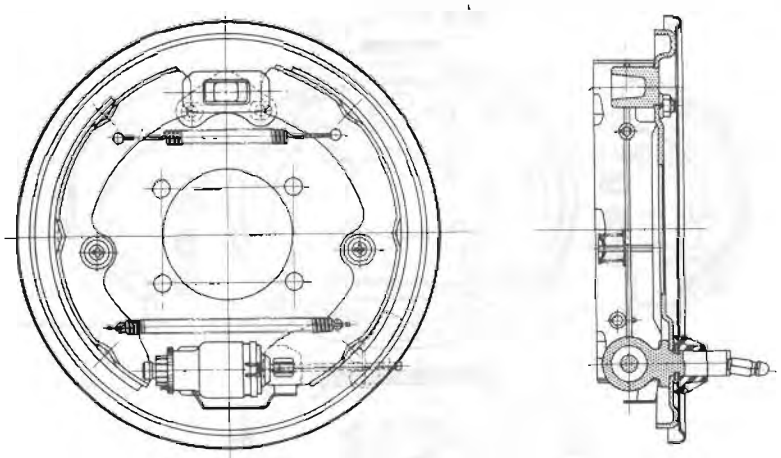


1 Anti-rattle pin
2 Brake disc
3 Anchor block
4 After shoe assembly
5 Return spring
6 Anti-rattle spring
7 Return spring
8 Wheel cylinder
9 Fore shoe assembly
10 Retaining shim
11 Dust cover

BR630

Fig. BR-22 Rear brake

The leading-trailing system rear brake adopts sliding system cylinder. When the hand brake is operated, the wheel cylinder lever turns the adjust wheel, and thus, clearance between the brake shoe and brake drum is adjusted automatically.



BR631

Fig. BR-23 Sectional view of rear brake

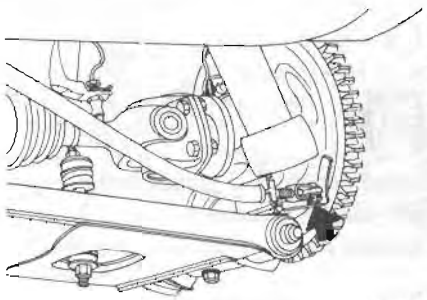
REPLACING BRAKE SHOE

REMOVAL

1. Jack up car, support it with a stand, and remove tire.
2. Remove brake drum. When it is hard to remove brake drum, the following instructions apply.

(1) Remove clevis pin (indicated by arrow mark) from wheel cylinder lever, and disconnect hand brake cable. See Figure BR-24.

(2) Remove brake drum adjust hole plug, and remove adjust lever from adjust wheel with a screwdriver.

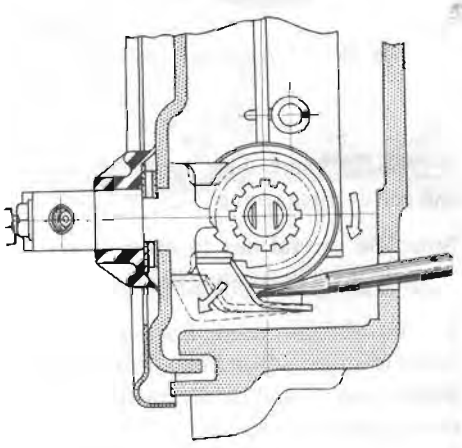


RA286

Fig. BR-24 Removing hand brake wire

(3) Turn adjust wheel downward with a screwdriver, loosen brake shoe, and remove brake drum. See Figure BR-25.

3. Remove anti-rattling spring, and then remove both brake shoes together.



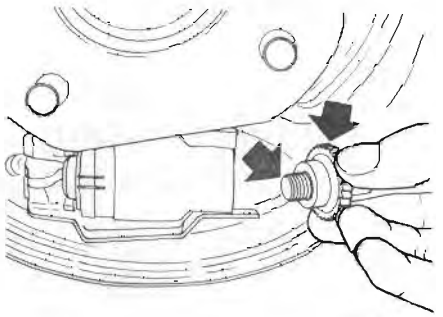
BR632

Fig. BR-25 Turning adjust wheel

INSTALLATION

Before installing brake shoe, check wheel cylinder for operating and sliding condition, and disassemble and adjust if operation is faulty. For details, see the paragraph covering disassembly. When replacing brake shoe lining, be sure to match new brake shoe lining with the mark on brake shoe.

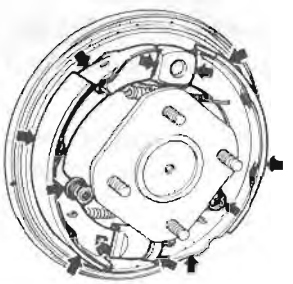
1. Apply brake grease to adjust wheel, and threaded portion and sliding portion (indicated by arrow marks) of the adjust screw sufficiently.



BR633

Fig. BR-26 Adjust wheel

2. Apply brake grease to the brake disc, anchor block, and wheel cylinder sliding portions (indicated by arrow marks).



BR634

Fig. BR-27 Applying brake grease

3. Install brake shoe, return spring, and anti-rattling spring.

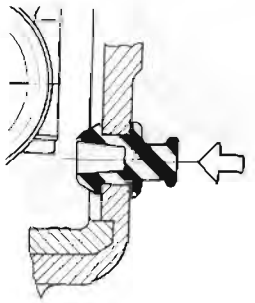
Note: **Be careful not to allow grease sticking on brake shoe lining.**

4. Install brake drum, insert a screwdriver from the adjust hole, turn adjust wheel upward, and lightly apply brake shoe to brake drum.

5. Reconnect hand brake cable to wheel cylinder lever, pull hand lever several times, and with the automatic adjusting operation, adjust brake shoe and brake drum clearance.

Note: **Continue the adjustment until click is eliminated from adjust wheel claw.**

6. Install adjust hole plug. Depress the plug head in the center powerfully and make sure that the lip has been fitted completely.



BR635

Fig. BR-28 Adjust hole plug

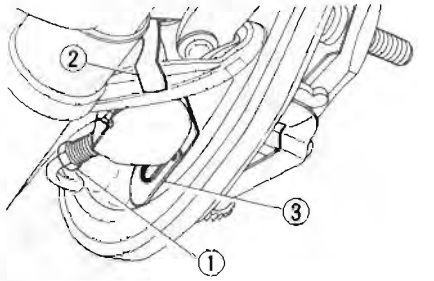
DISASSEMBLY AND INSPECTION

REMOVAL

1. Jack up car, and remove wheels, brake drum and brake shoe.

Note: For details, refer to the paragraph covering brake shoe replacement.

2. Remove brake tube ① and dust cover ② , drive out lock plate ③ toward the front, withdraw the adjust plate rearward, and remove wheel cylinder. See Figure BR-29.



BR636

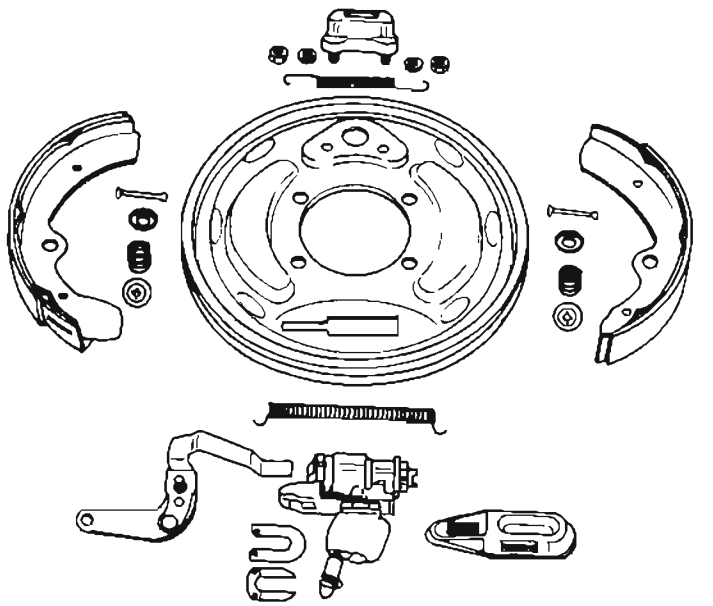
Fig. BR-29 Removing wheel cylinder

3. Remove anchor block installation nuts from reverse side of brake disc, and remove anchor block.

4. When removing brake disc, withdraw axle shaft, and remove attaching bolts.

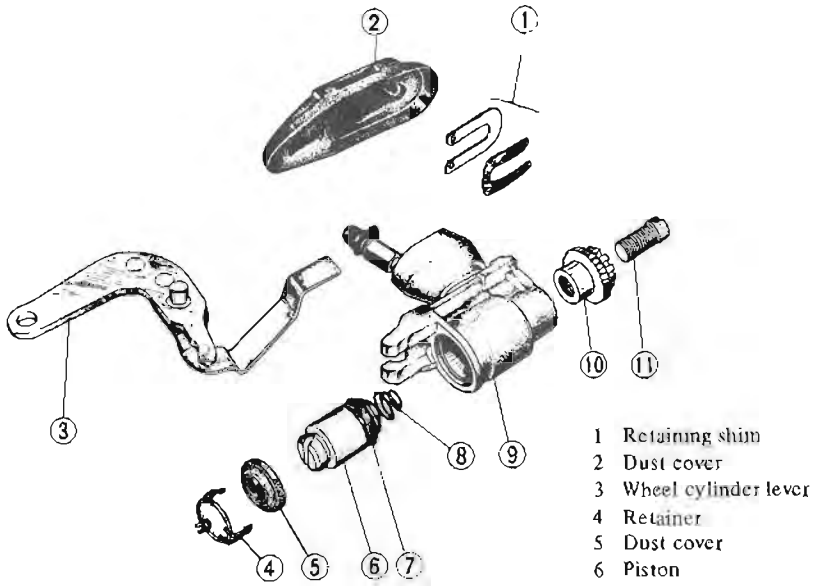
5. Disassemble wheel cylinder (Refer to Figure BR-31)

Remove retainer and dust cover. Withdraw piston, and remove adjust wheel and adjust screw.



BR637

Fig. BR-30 Rear brake component parts



BR638

Fig. BR-31 Wheel cylinder component parts

INSPECTION

1. Inspect wheel cylinder and piston in the same manner as for master cylinder.
2. When adjust wheel and/or adjust lever is damaged, replace.
3. Check return spring for wear, damage, breakdown, etc., and replace as required.

Return spring

	Free length mm (in)	Coating color
Cylinder side	122 (4.80)	Black
Anchor block side	120.4 (4.740)	Green

4. Replace brake shoe lining if cracked, loosened or unevenly worn. When brake shoe lining surface is contaminated with grease, oil, etc., clean with carbon tetrachloride or gasoline. When excessively contaminated, replace. When thickness of brake shoe lining is less than 1.5 mm (0.0591 in), replace.
5. Check brake drum, and repair or replace if unevenly worn, worn in step or other faulty condition exists.

Brake drum

Standard inner diameter:
228.6 mm (9.000 in)
Wear limit:
230.0 mm (9.055 in)
Out-of-round drum inner diameter:
0.05 mm (0.0020 in)

6. Replace brake disc and/or other parts, if faulty

ASSEMBLY AND INSTALLATION

The rear brake is assembled and installed in reverse sequence of disassembly and removal. However, note the following:

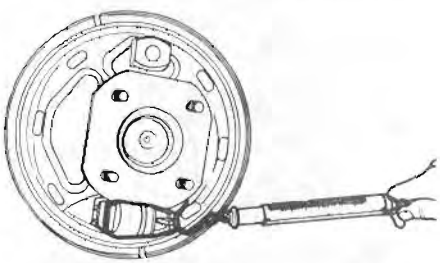
1. When assembling wheel cylinder, be sure to apply rubber grease to piston cup and other rubber parts slightly.
2. When installing wheel cylinder to brake disc, apply brake grease to cylinder, disc, and adjust plate sliding surfaces and to wheel cylinder lever fulcrum portion sufficiently so that wheel cylinder slides smoothly.
3. Measure wheel cylinder sliding resistance without installing brake tube as shown in Figure BR-32, and make sure that sliding resistance is in range from 2 to 7 kg (4.41 to 15.43 lb).

Note: When sliding is improper, brake shoe does not return smoothly or automatic adjuster does not operate correctly.

4. Tighten anchor block installation nut under 1.4 to 1.8 kg-m (10 to 13 ft-lb) tightening torque.

ADJUSTING REAR BRAKE

Ordinarily, adjustment is not required because brake shoe clearance is adjusted automatically by operating the hand brake, as well as front brake.

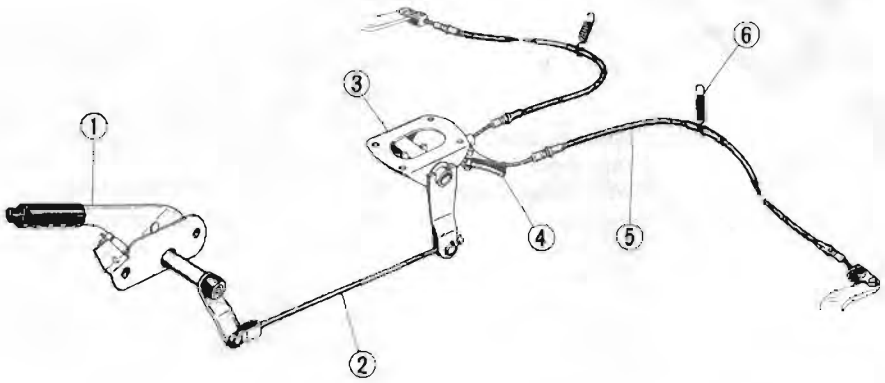


BR357

Fig. BR-32 Measuring sliding resistance

HAND BRAKE

The hand brake linkage is in floor tunnel. Hence, removal and other operations must be done after removing propeller shaft.



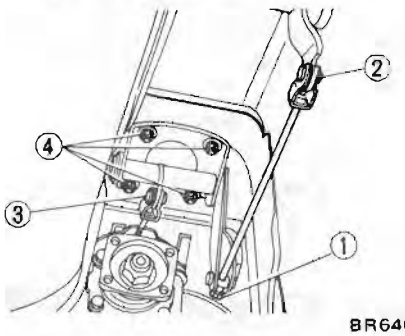
BR639

1 Control lever
2 Front rod
3 Center lever
4 Equalizer
5 Rear cable
6 Hanger spring

Fig. BR-33 Hand brake linkage

REMOVAL

1. Remove lock nut and adjust nut ① from the rear end of front rod, clevis pin ② from the front end, and remove front rod. See Figure BR-34.
2. Remove hanger spring and clevis pin ③. See Figure BR-34.

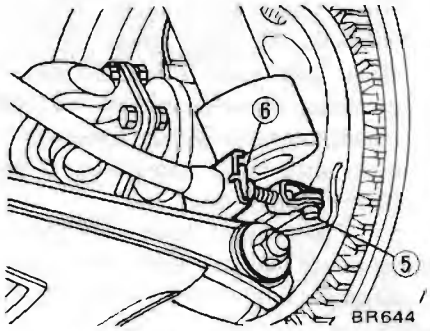


BR640

Fig. BR-34 Removal of hand brake

3. Remove clevis pin ⑤ and separate rear cable from lever.

Remove wheel side retainers ⑥ from both sides, and remove equalizer side retainer in the same manner. Rear cable can be removed. See Figure BR-35.



BR644

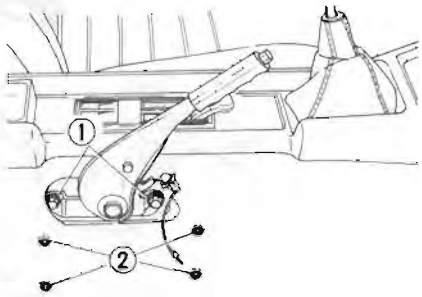
Fig. BR-35 Removing rear cable

4. Remove four bolts ④ (shown in the Figure BR-34), and remove center arm assembly from floor.

Note: Nuts are secured on floor panel by means of welding.

5. Remove front rod end and attaching bolt ①, and remove control lever toward passenger's compartment. See Figure BR-36.

Note: When removing control lever, first, remove right side seat. Boot is secured with four fasteners ②.



BR641

Fig. BR-36 Removing control lever

INSPECTION

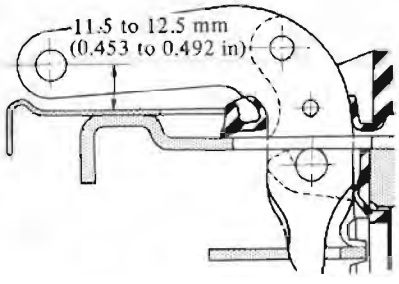
Check all parts for excessive wear and damage, and replace, if necessary.

INSTALLATION

Install hand brake in reverse sequence of removal, noting the following.

1. Be sure to apply recommended multi-purpose grease to the pivot on control lever head and other sliding portions sufficiently.
2. When adjusting hand brake, first, make sure that distance between wheel cylinder lever pin hole center and buffer plate is in range from 11.5 to 12.5 mm (0.453 to 0.492 in), and reduce the linkage play with adjust nut on front rod. See Figure BR-37.

Note: Be sure to perform this adjustment with the control lever released fully.



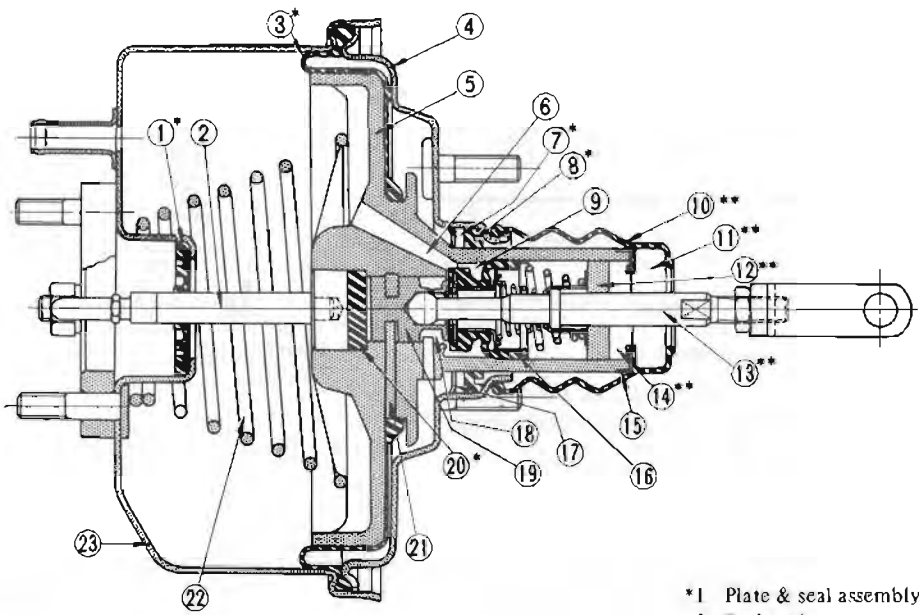
BR642

Fig. BR-37 Adjusting hand brake

MASTER-VAC

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INSPECTING CHECK VALVE BR-15
REMOVAL BR-15
DISASSEMBLY BR-15
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ASSEMBLY AND ADJUSTMENT BR-16
INSTALLATION BR-17



*1 Plate & seal assembly
2 Push rod
*3 Diaphragm
4 Rear shell
5 Power piston (valve body and diaphragm plate)
6 Vacuum route
*7 Bearing
*8 Seal
9 Vacuum valve
**10 Valve body guard
**11 Air silencer filter
**12 Air silencer filter
**13 Valve operating rod assembly
**14 Silencer
15 Air silencer retainer
16 Poppet assembly
17 Retainer
18 Air valve
19 Valve plunger
* 20 Reaction disc
21 Valve plunger stop key
22 Diaphragm return spring
23 Front shell

Fig. BR-38 Cross-sectional view of Master-Vac

DESCRIPTION

A Master-Vac which decreases the pedal operating force and effectively and certainly brakes all wheels is installed between the brake pedal and the master cylinder. As the brake pedal is depressed, fluid is forced under high pressure through the brake pipes to the wheel cylinders to retard or stop the car.

The tandem master cylinder is capable of producing high pressure even if the Master-Vac is faulty.

Parts required in replacing are available as Master-Vac repair kit. See Figures BR-39 and BR-40.

Note:
Repair Kit A:
Parts to be replaced every two years
Repair Kit B:
Parts to be replaced every four years (including the Kit A)

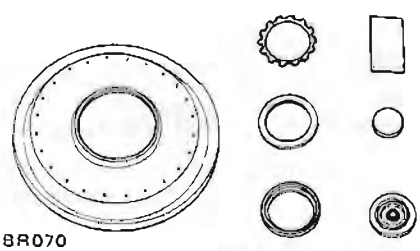


Fig. BR-39 Repair kit A

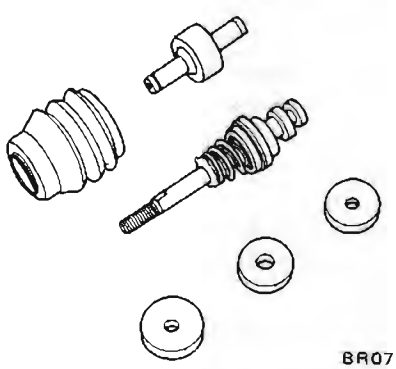


Fig. BR-40 Repair kit B

INSPECTING VACUUM PRESSURE

1. Install a vacuum gauge between check valve and Master-Vac.
2. Increase engine speed, and stop the engine when the vacuum gauge indicates 500 mmHg (196.9 in Hg). See Figure BR-41.

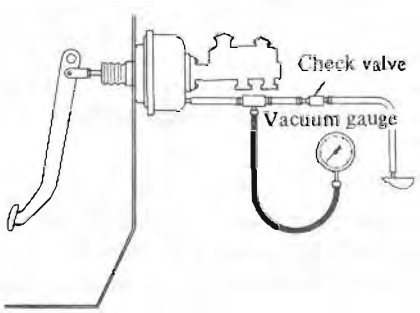


Fig. BR-41 Installing vacuum gauge

(1) When 15 seconds are elapsed after stopping the engine without braking and pressure drops more than 25 mmHg (0.98 in Hg);

Possible cause	Corrective action
1. Faulty check valve airtightness.	Replace.
2. Faulty push rod seal airtightness.	Replace.
3. Faulty airtightness between valve body and seal.	Repair or replace.
4. Faulty valve plunger seat airtightness.	Repair or replace.
5. Damaged piping or faulty joint airtightness.	Repair or replace.

(2) When 15 seconds are elapsed after stopping the engine by applying full braking force, and pressure drops more than 25 mmHg (0.98 in Hg);

Possible cause	Corrective action
1. Faulty check valve airtightness.	Replace.
2. Damaged diaphragm.	Replace.
3. Dropped off reaction disc.	Reinstall and check the push rod for returning.
4. Faulty airtightness on poppet assembly seat surface and valve body surface.	Repair or replace.

Note: When a replacement is required, be sure to replace Master-Vac as an assembly.

INSPECTING CHECK VALVE

1. Remove clip and disconnect the hoses from both ends. Check valve can be removed.

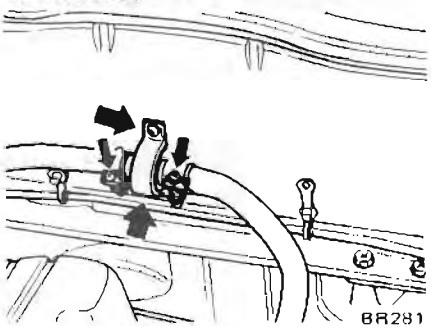


Fig. BR-42 Removing check valve

2. Using a Master-Vac tester, apply vacuum pressure of 500 mmHg (19.69 in Hg) to Master-Vac side of check valve. When pressure drops more than 10 mmHg (0.39 in Hg) within 15 seconds replace check valve with a new one.

3. When pressure is applied to Master-Vac side of check valve and valve does not open, replace check valve with a new one. See Figure BR-43.

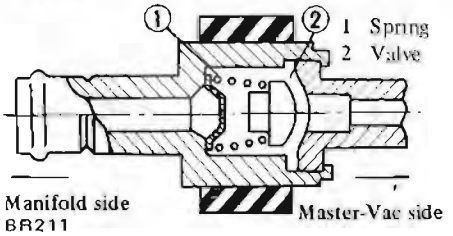


Fig. BR-43 Cross-sectional view of check valve

REMOVAL

1. Remove clevis pin from push rod connected with brake pedal, and disengage Master-Vac from brake pedal.
2. Disconnect brake tube from master cylinder.
3. Disconnect vacuum hose from Master-Vac.
4. Unscrew master cylinder fixing nuts and remove master cylinder from the Master-Vac.
5. Unscrew four fixing nuts of Master-Vac from dashboard and remove Master-Vac.

DISASSEMBLY

Remove dust and mud from Master-Vac, and disassemble it at a clean place.

1. Before disassembling Master-Vac, put marks on the front shell, rear shell and stud assembly to make sure their relative positions.
2. Secure flange and bolt assembly in a vise.
3. Remove clevis ① , lock nut ② and valve body guard ③ . See Figure BR-44.

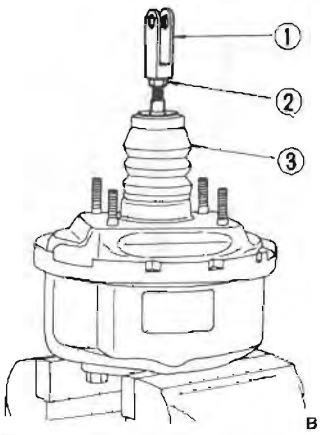


Fig. BR-44 Removing clevis, lock nut and body guard

4. When separating front shell from rear shell use Master-Vac Wrench Set ST08080000.

Push rear shell and stud assembly down and slide them off by rotating them approximately 17 degrees counterclockwise. See Figure BR-45.

Note: When the valve body and diaphragm plate are detached together with rear shell and stud assembly from front shell, be careful not to drop them while disassembling Master-Vac.

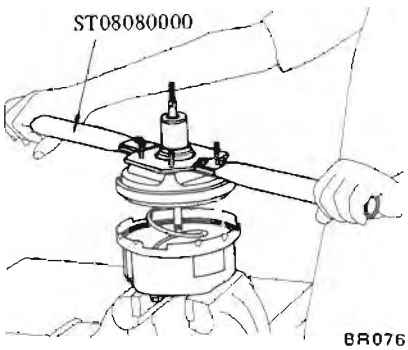


Fig. BR-45 Removing rear shell

5. Remove push rod from diaphragm plate.
6. Detach valve body and diaphragm from rear shell and stud assembly. See Figure BR-46. Then Master-Vac is disassembled in three subassemblies as shown below:

Rear shell & seal assembly
Diaphragm plate assembly
Front shell & stud assembly

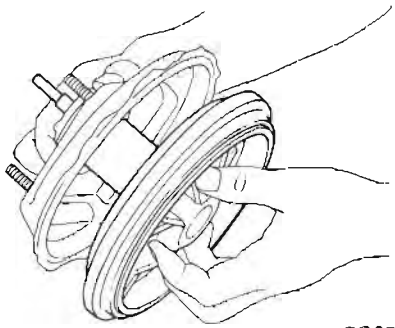

BR077

Fig. BR-46 Removing valve body

7. Disassembly of rear shell and seal assembly. Remove retainer using a screwdriver and detach bearing and seal. See Figure BR-47.

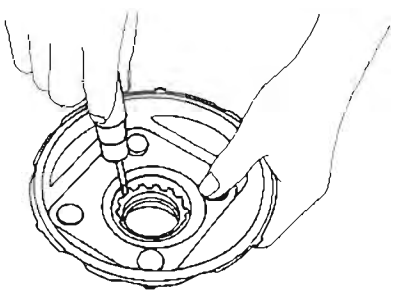

BR078

Fig. BR-47 Removing retainer

8. Disassembly of diaphragm plate assembly. Work on a clean bench.
(1) Pull out diaphragm from the groove of the diaphragm plate. See Figure BR-48.

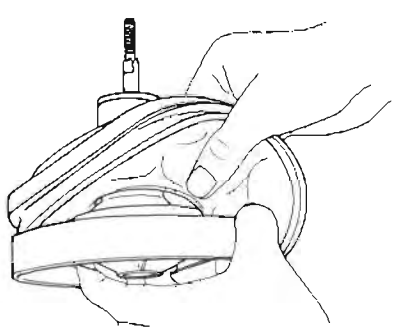

BR079

Fig. BR-48 Pulling out diaphragm

(2) Remove air silencer retainer by tapping the periphery with a screwdriver and a hammer lightly and evenly. See Figure BR-49.

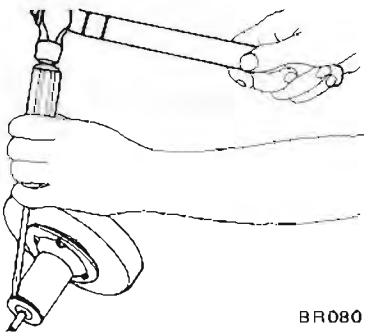

BR080

Fig. BR-49 Removing air silencer retainer

Note: Do not tap rapidly, otherwise valve body may be cracked.

(3) Depress valve operating rod, face key hole downward, and give a vibration. Valve plunger stop key will come out.
(4) After removing valve plunger stop key, detach valve operating rod assembly, and air silencer filter from valve body and diaphragm plate. See Figure BR-50.

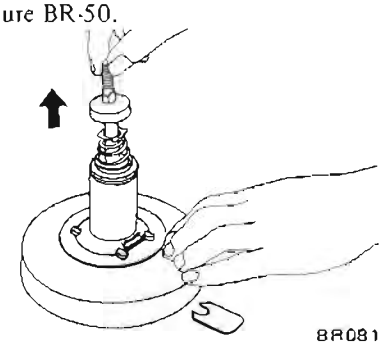
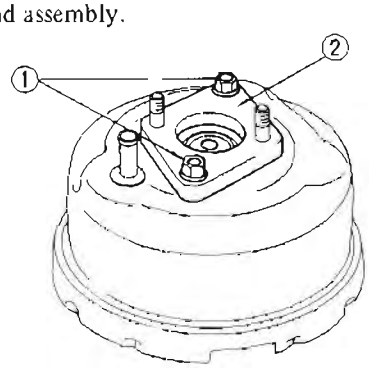

BR081

Fig. BR-50 Removing valve operating rod assembly

(5) Push out reaction disc from valve body side.

9. Disassembly of the front shell and stud assembly.



BR082

Fig. BR-51 Removing flange

(1) Remove nuts ① and flange ②. See Figure BR-51.
(2) Remove plate and seal assembly.

INSPECTION

1. Check poppet assembly.
If wear or abnormal conditions are found, replace it as a valve operating rod assembly.
2. Check components.
If abnormal conditions are found, replace them with new ones.

ASSEMBLY AND ADJUSTMENT

Assemble in reverse sequence of disassembly.

1. Apply silicone grease thinly to the following:

- Seal: lip and face contacting with rear shell and seal assembly.
- Poppet: lip
- Reaction disc: both faces
- Diaphragm: edge contacting with front and rear shells
- Plate and seal assembly: face contacting with front shell and push rod
- Push rod: face contacting with diaphragm plate

Note: Grease is contained in repair kit.

2. Insert valve operating rod assembly correctly and perpendicularly so that it is not tilted against the valve body. When inserting stop key, depress valve operating rod assembly. See Figure BR-52.

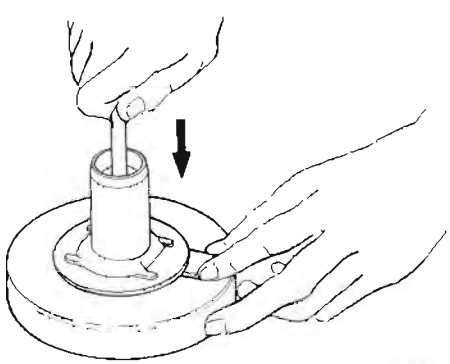

BR083

Fig. BR-52 Inserting stop key

3. When installing retainer on rear shell, use Press Fit Tool ST08060000 and fit it completely down to such an extent that tool flange surface comes into contact with the bottom. See Figure BR-53.

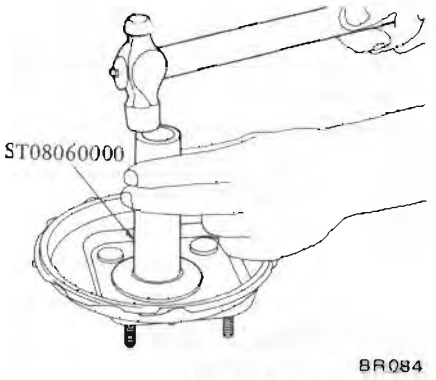


Fig. BR-53 Fitting retainer

4. Upon completion of assembly, adjust push rod end height so that depth from flange surface to push rod end is 3.5 to 4.0 mm (0.138 to 0.157 in). See Figure BR-54.

Note: When adjusting the depth, face push rod end upward so that reaction disc is not dropped off into Master-Vac.

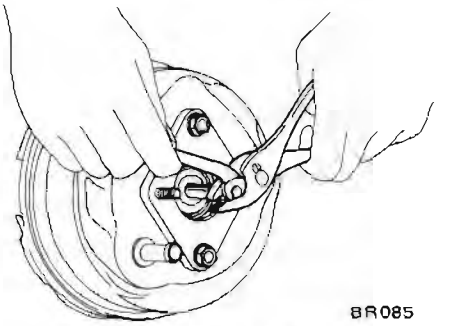


Fig. BR-54 Adjusting push rod length

INSTALLATION

Installation is in reverse sequence of removal.

Tightening torque:

Lock nut of operating rod:
1.6 to 2.2 kg-m
(12 to 16 ft-lb)

Master-Vac installation nut:
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)

Flange installation nut:
0.8 to 1.1 kg-m
(5.8 to 8.0 ft-lb)

SERVICE DATA AND SPECIFICATIONS

Brake pedal		
Pedal free height	mm (in)	203 (7.99)
Full stroke of pedal head	mm (in)	140 (5.51)
Master cylinder		
Inner diameter of master cylinder	mm (in)	22.22 (0.8748)
Allowable maximum clearance between cylinder wall and piston	mm (in)	0.15 (0.0059)
Wheel cylinder		
Inner diameter of wheel cylinder	mm (in)	
Front		53.98 (2.1252)
Rear		22.22 (0.8748)
Allowable maximum clearance between cylinder wall and piston	mm (in)	0.15 (0.0059)
Rear wheel cylinder sliding resistance	kg (lb)	2 to 7 (4.4 to 15.4)
Brake drum and rotor		
Rear brake drum inner diameter	mm (in)	228.6 (9.000)
Front brake rotor outer diameter	mm (in)	271 (10.67)
Drum inside out-of-round	mm (in)	less than 0.05 (0.0020)
Limit of reconditioning drum in diameter	mm (in)	230.0 (9.055)
Run-out of the rotor	mm (in)	less than 0.15 (0.0059)
Limit of reconditioning rotor in thickness	mm (in)	10.5 (0.413)
Lining dimensions		
Rear (width x thickness x length)	mm (in)	40 x 4.1 x 219.5 (1.575 x 0.161 x 8.642)
Material		B701
Pad (width x thickness x length)	mm (in)	51.6 x 10 x 77.4 (2.031 x 0.394 x 3.064)
Pad material		M33S
Total braking area		
Front	cm^2 (sq in)	161.6 (25.0)
Rear	cm^2 (sq in)	351 (54.4)

Tightening torque

Fulcrum pin of brake pedal	kg-m (ft-lb)	3.5 to 4.0 (25 to 29)
Flange to front shell cover	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Master-Vac installation nut	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Master cylinder installation nut	kg-m (ft-lb)	0.8 to 1.1 (5.8 to 8.0)
Connection of brake tube	kg-m (ft-lb)	1.5 to 1.8 (11 to 13)
Connection of brake hose	kg-m (ft-lb)	1.7 to 2.0 (12 to 14)
Rotor fixing bolts	kg-m (ft-lb)	3.9 to 5.3 (28 to 38)
Caliper to knuckle flange	kg-m (ft-lb)	7.3 to 9.9 (53 to 72)
Disc to bearing housing	kg-m (ft-lb)	2.7 to 3.7 (20 to 27)
Anchor block installation nut	kg-m (ft-lb)	1.4 to 1.8 (10 to 13)
Master cylinder stopper screw	kg-m (ft-lb)	0.4 to 0.5 (2.9 to 3.6)
Valve cap	kg-m (ft-lb)	8 to 9 (58 to 65)
Spindle nut	kg-m (ft-lb)	2.5 to 3.0 (18 to 22)

TROUBLE DIAGNOSES AND CORRECTIONS

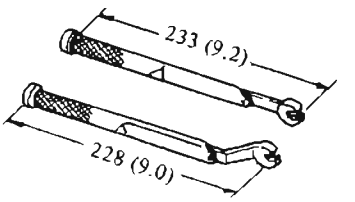
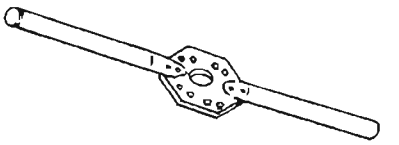
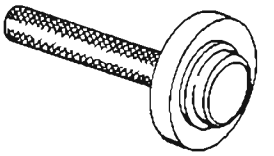
Condition	Possible causes	Corrective action
Locked brake pedal	Swollen master cylinder seals due to poor fluid quality or contamination by kerosene, gasoline or mineral oil.	Flush the system, replace all rubber parts, refill with new fluid and air bleed the lines.
	Pistons or valve carrier locked by deposits of fluid, foreign matter, etc.	Clean and bleed the system.
	Seized master cylinder piston due to infiltrations of water through rear end due to faulty boot or seals.	Service the master cylinder, replace the piston and the boot and/or seals, to prevent water infiltration.
	Seized pedal shaft.	Smooth bushings, or if other sliding parts are damaged to a remarkable extent, replace them and lubricate.
	Clogged transfer port.	Disassemble and clean master cylinder.
	No compensation takes place. Weak return spring.	Replace faulty spring.

Condition	Probable cause	Corrective action
Spongy pedal	Air in brake system because of imperfect bleeding.	Bleed thoroughly.
	Swollen hose due to deterioration.	Replace the hose and bleed the system.
	Hose swells under fluid pressure due to poor hose quality.	Fit new hoses and bleed the system.
	Use of a poor quality brake fluid (boiling point of which is too low).	Replace the fluid with the specified brake fluid and bleed the system.
	Clogged reservoir filler cap vent hole. This promotes a vacuum in master cylinder that sucks air through rear seal.	Clean reservoir filler cap and bleed the system.
Pedal yields under slight pressure	Deteriorated check valve.	Fit a new check valve, make sure that there are no burrs, roughness or blow holes in master cylinder, and bleed the system.
	Fluid leaks through connection.	Tighten connections, and if necessary, replace faulty parts. Bleed the system.
	Fluid leaks at wheel cylinders.	Replace the seals and packings being damaged. Wipe and clean brake shoe linings.
	Fluid leaks through hoses.	Replace the damaged hose, and bleed the system.
	Low fluid level in reservoir.	Add specified fluid up to correct level.
Poor pedal reserve	Master cylinder relief port clogged with foreign matter.	Clean and bleed the system.
	System has not been bled.	Bleed the system.
	Excessive clearance between shoes and drum.	Adjust auto-adjuster operation.
Excessive pedal reserve	Fluid level in reservoir is too low.	Top up with specified brake fluid, bleed the system, if required.
	Deteriorated rubber seals in master cylinder or in wheel cylinders.	Replace seals and bleed the system.
	Excessively swollen hoses due to poor hose quality.	Replace by designated hoses and bleed the system.
	Thermal expansion of drums due to excessive overheating.	Allow drums to cool off. Check brake shoe linings and drums. Replace damaged parts.

Condition	Probable cause	Corrective action
Brake locked after pedal return	Worn or broken return spring.	Replace faulty springs.
	Improper brake shoe return.	Grease brake shoe and wheel cylinder sliding surface.
	Clogged master cylinder relief port.	Clean and bleed the system.
	Swollen or stuck rubber seals due to contamination by kerosene, mineral oil, gasoline, etc.	Flush the system, replace all rubber parts, refill with new brake fluid and bleed the system.
Unbalanced brakes	Fluid leakage at one wheel cylinder only.	Wipe, clean or replace the brake shoe linings or lining pads, service the wheel cylinder and bleed the system.
	Rusted or corroded edges of a wheel cylinder.	Eliminate rust and replace the boots.
	Seized piston in wheel cylinder or caliper assembly.	Service the wheel cylinder, replace the rear wheel cylinder piston or caliper assembly and bleed the system.
	Hose obstructed due to swollen or clogged inner lining.	Replace or clean the hose and bleed the system.
	Obstructed flow in metal pipe due to crushing or clogging (if the brakes on one axle are excluded, weak braking may result).	Replace or clean the pipe and bleed the system.
	Faulty seals at one half caliper.	Take down and strip the half caliper, replace seals and dust covers.
Brake linings dragging all the time on drums or brake discs	Insufficient shoe-to-drum clearance.	Adjust clearance.
	Weak shoe return springs.	Replace the springs.
	Brake pedal has no free travel.	Set the push rod length as prescribed.
	Seized master cylinder piston.	Service the master cylinder, replace the piston and bleed the system.
	Master cylinder flooded due to clogged relief port.	Service the master cylinder, replace the check valve if deteriorated, clean the relief port and bleed the system.
	Brake disc run-out.	Check brake disc for run-out, and replace Faulty parts, if necessary.

Condition	Probable cause	Corrective action
Weak brakes	Fluid leakage from wheel cylinders.	Wipe and clean the brake shoe linings, service the wheel cylinder replacing damaged parts, and bleed the system.
	Fluid leakage from caliper cylinders.	Take down and strip the calipers; replace all rubber seals and clean lining pads.
	——Master-Vac——	
	This problem mainly results from improper function of Master-Vac. Please check as follows:	
	Improper master vac function due to poor vacuum.	Check the pipe or hose connections, and fasten if necessary. Or replace a faulty vacuum hose.
	Required vacuum is not maintained.	Wipe, clean or replace the check valve and check the grommet for loose fit, re-fit or replace it. Replace seal or retighten plate and seal assembly-to-front shell bolts. Clean or replace poppet rubber. Replace diaphragm and diaphragm plate.
	Weak pressure on shoes due to use of too thick fluid.	Flush the system and refill with specified fluid. Bleed the system.
	Dust on drums or linings soiled with oil.	Remove and clean drums thoroughly.
	Weak shoe return springs.	Check springs and replace as required.
	Drum out of round.	Correct drums by means of a lathe.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	GG94310000 Brake pipe torque wrench	This tools is used to tighten and loosen brake tube flare nut. A built-in torque limiting wrench is provided to assure torque accuracy.  SE227	All models	Page BR-5
2.	ST08080000 Master-Vac wrench	This tool is used to remove rear shell after aligning rear shell stud bolt with the opening in this tool.  SE073	S30 610 510	Fig. BR-45
3.	ST08060000	This tool is used when rear shell seal is driven into position. Note: Make sure that this tool is pushed in until rear guide of this tool touches rear shell.  SE115	S30 610 510	Fig. BR-53