

BRAKES

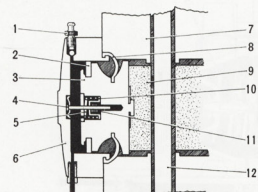
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DESCRIPTION

The disc brake is a fixed caliper, opposed piston, non-self energizing disc type, actuated by a hydraulic system. The caliper assembly consists of two cylinder assemblies bolted to the caliper body, and each cylinder bore contains a piston with a molded rubber cylinder boot to seal the cylinder bore from contamination. A piston seal is mounted around each piston to provide hydraulic sealing between the cylinder bore, and the piston. The cylinders are connected hydraulically by means of an external bridge tube. One bleeder screw is provided on the No.2 cylinder. The brake pads are located in between the abutments in the caliper, and slide axially by means of the piston when hydraulic pressure is applied. On each brake pad a groove is provided at the upper end to indicate limit of wear. Radial movement of the brake pads is prevented by the pad support plates, and the keep-plate installed at the lower and upper ends of the brake pads respectively.

In the caliper body, the piston bore is made such that the piston is prevented from advancing to avoid damage to the disc. One end of the withhead pin is fixed to the cylinder body through the retractor pin cap, while the other end extends into the piston. The compression spring, bushing housing, and retractor bushing are enclosed in the piston with spring retaining plate which is locked to the piston. While there is no hydraulic pressure in the system, the bushing housing is forced against the piston by the compression spring, and provides a clearance between the bushing housing, and the spring retaining plate.

The retractor bushing fits over the withhead pin, and slides along the pin only when compensation of pad-to-disc clearance is required as the brake pads wear.

Automatic Adjustment

1. Bleeder screw
2. Piston seal
3. Piston
4. Withhead pin
5. Compression spring
6. Cylinder
7. Caliper body
8. Cylinder boot
9. Brake pad
10. Bushing housing
11. Retractor bushing
12. Disc

Fig.13-1 Section View of X3470
Piston Assembly

Automatic adjustment of clearance between the brake pads, and the disc is achieved by the piston sliding outward from the cylinder bores.

As the brake pedal is depressed, hydraulic pressure built up in the system forces the pistons out of the cylinder bores. As the piston moves forward, the compression spring is compressed between the spring retaining plate, and the bushing housing, and the spring retaining plate comes in contact with the bushing housing. As the hydraulic pressure builds up higher resistance existing between the retractor bushing, and the withhead pin is overcome by the hydraulic pressure, therefore, the piston assembly slides over the withhead pin until the brake finally contact the disc to effect braking.

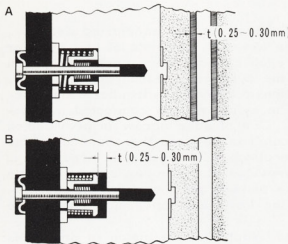


Fig. 13-2 Automatic Adjuster X4194

When the brake pedal is released, and the hydraulic pressure fades out, compression spring pushes back the piston assembly which in turn draws back the lug on the piston fitted in the vertical groove of the brake pads, and provides necessary running clearance of 0.25 ~ 0.30 (0.01 ~ 0.012") which is equal to the clearance between the bushing housing and the piston. Excessive clearance produced between the brake pads, and the disc will be compensated as the retractor bushing gradually changes its position relative to the withhead pin, and appropriate clearance is automatically maintained at all times.

The brake booster provides the driver with a greater pressure on the hydraulic brake system than he could possibly exert by foot pressure on the brake pedal, enabling to stop the car quickly when at high speed driving or stopping on steep grades. The brake booster is used as standard equipment, mounted on the right side of the service lid.

In order to simplify the explanation of the brake booster, the following illustration will be helpful.

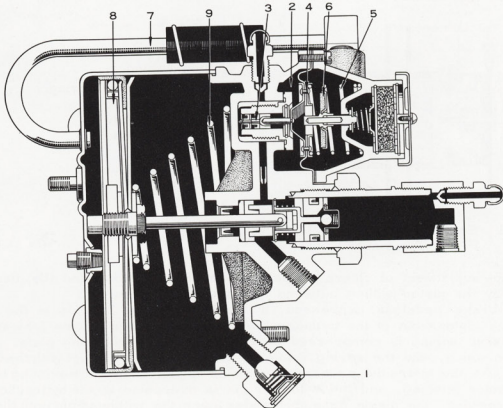


Fig. 13-3 Brake Booster Cross Section View

When the engine is operated, the vacuum is transmitted through the vacuum line to the check valve (1) on the booster end plate, and through the cast opening in the booster end plate to the vacuum chamber (2) in the control valve body.

The control valve piston (3) and the diaphragm (4) are hold in the off position by the valve seat spring (5), and the vacuum valve (6) of the poppet valve is in open position.

This allows the vacuum to pass into the rear end of the power cylinder through the pipe (7). With the vacuum acting on each side of the power piston (8), the pressure on each side is equal, and the power piston is suspended in the vacuum as illustrated in figure 13-3. The piston return spring (9) holds the power piston at the brake released position.

Control Valve

This system is a combination of a poppet valve (10), diaphragm (11) and the control valve piston (12), and operates with the brake fluid pressure. The control valve piston is installed inside the valve fitting (13). When depressing the brake pedal, the pressure builds up high enough to move the control valve piston against the pressure of the valve seat spring (14), and the vacuum valve (15) of the poppet valve closes by the diaphragm.

Further movement of the diaphragm unseats the air valve (16) of the poppet valve, allowing air to pass around the poppet valve through the pipe (7) and into the power cylinder to the rear side of the power piston (8). The force of air on the power piston, working with vacuum on the front side of the power piston, pushes the hydraulic piston forward.

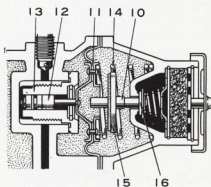


Fig.13-4 Valve Control Y1856
Operation

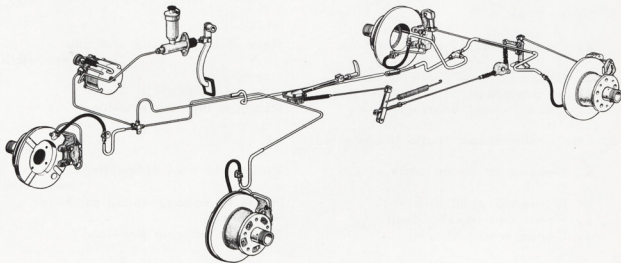


Fig.13-5 Brake Piping

13-4 BRAKES - Description, Trouble Shooting

Specification:

Type - Front & rear	Fixed caliper type with two cylinders and discs
Disc diameter - Front	280.0 mm (11.0")
Rear	266.5 mm (10.5")
Disc thickness - Front & rear	10.4 mm (0.41")
Brake pad diameter - Front & rear	47.5 x 16 x .54 mm
width x thickness x length	(1.87 x 0.63 x 2.13")
Brake pad area - Front & rear	51 cm ² x 2 (7.9 sq in x 2)
Wheel cylinder bore - Front	53.975 mm (2.125")
Rear	38.100 mm (1.500")
Master cylinder bore	22.22 mm (0.8748")
Max. hydraulic pressure at foot pressure of 100 kg (220 lb)	126 kg/cm ² (1,792 psi)
Hydraulic servo type	Vacuum servo
Parking brake	
Type	Mechanical, acting on two rear wheels
Pad diameter	41.2 x 11.7 x 31.8 mm
width x thickness x length	(1.62 x 0.46 x 1.25")
Brake pad area	21.6 cm ² x 2 (3.35 sq in x 2)

TRUBLE SHOOTING

Symptoms & Probable Causes

Remedies

1. Excessive pedal effort
 - a. Leakage in hydraulic system
 - b. Inoperative vacuum booster
 - c. Excessively worn brake pads
 - d. Grease or oil on pads

Repair or replace
Repair or replace
Replace brake pads
Clean and recondition brake pads and disc
2. Noisy brakes
 - a. Carbon stuck on pad surface
 - b. Brake pads not properly seated or positioned
 - c. Loose wheel bearings

Recondition surface with file or emery cloth
Correct fit
Readjust bearing pre-load
3. One brake drags (pulls to one side)
 - a. Grease or oil on pads
 - b. Uneven tire inflation
 - c. Front end misalignment
 - d. Loose wheel bearing

Clean and recondition brake pads and disc
Inflate to recommended pressure
Readjust
Readjust bearing pre-load

Symptoms & Probable CausesRemedies

4. Excessive pedal travel

- | | |
|-------------------------------------------------|---------------------------|
| a. Air in hydraulic system | Bleed air |
| b. Excessive master cylinder push rod clearance | Readjust clearance |
| c. Leakage in hydraulic system | Repair or replace |
| d. Poor function of automatic adjuster | Replace cylinder assembly |

Brake Booster

1. No braking effect when pedal is depressed or excessive pedal effort

- | | |
|----------------------------------------------------------------|---------------------|
| a. No vacuum or slow vacuum development | |
| (1) Loose vacuum pipe joint | Correct |
| (2) Crooked or burst vacuum pipe to the intake manifold | Replace |
| (3) Crushed or burst vacuum hose | Replace |
| b. Insufficient preservation of vacuum | |
| (1) Same as (1), (2), and (3) in foregoing symptom, and remedy | Correct or replace |
| (2) Damaged or dust in check valve or seat | Correct or replace |
| (3) Damaged or dust in air valve or seat | Correct or replace |
| (4) Damaged or dust in vacuum valve or seat | Correct or replace |
| (5) Damaged booster gasket or diaphragm | Correct or replace |
| c. Improper valve operation | |
| (1) clogged insert orifice | Replace brake fluid |

2. Brakes applied but insufficient or slow brake application

- | | |
|---------------------------------------------|--------------------|
| a. Improper sealing | |
| (1) Damaged or dust in vacuum valve or seat | Correct or replace |
| (2) Damaged booster gasket or diaphragm | Replace |
| b. Poor air flow | |
| (1) Clogged air cleaner | Clean or replace |

3. Brake pedal goes down

- | | |
|-----------------------------------|---------|
| a. Brake fluid leakage | |
| (1) Damaged booster push rod seal | Replace |

<u>Symptoms & Probable Causes</u>	<u>Remedies</u>
(2) Damaged contact valve piston cup	Replace
(3) Loose or defective control valve fitting, hydraulic cylinder body or related gasket/s	Tighten or replace
4. Pedal pumping	
a. Hydraulic pressure reversing from wheel cylinder to master cylinder	
(1) Damaged hydraulic piston cup	Replace
(2) Poor sealing of ball check valve in hydraulic piston	Replace
5. Brakes drag or do not return	
a. Poor control valve operation	
(1) Poor sliding control valve piston (poor return)	Correct or replace
(2) Improper length between poppet valve seat, and seal or insufficient calking	Correct or replace
b. Poor booster piston operation	
(1) Improper lubricant on booster gasket	Lubricate
6. Air in hydraulic system	
a. Poor oil sealing	
(1) Improper direction of piston cup for control valve piston	Correct
(2) Poor oil sealing of brake pipe connector	Correct
7. Brake will apply when engine starts	
a. Poor control valve operation	
(1) Poor sliding control valve piston (poor return)	Correct or replace
(2) Improper length of poppet valve (too long)	Correct or replace

ADJUSTMENT

1. Brake pedal.

a. Adjust the brake pedal height with the stop light switch to specified height of 190 ~ 200 mm or 7.5 ~ 7.9", and toe-board to pedal clearance should be 70 mm or 2.8" when depressed.

b. There should be a clearance preferably of 0.3 ~ 1.0 mm or 0.01 ~ 0.04" between the push rod, and the master cylinder piston.

Loosen the push rod lock nut, and shorten or lengthen the rod by turning it until a slight clearance is obtained between the push rod and the piston.

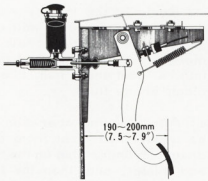


Fig.13-6 Brake Pedal Adjustment Y5299

2. Brake pad replacement.

Adjustment of clearance between the disc, and the brake pads is automatically maintained by means of the automatic adjuster built in the cylinder assembly until the brake pads wear down to the wear limit mark.

Beyond the wear limit, the piston in the cylinder is prevented from advancing by the casting in the caliper body. Therefore, replacement of the brake pads will be necessary when the wear exceeds the limit mark on each brake pad.

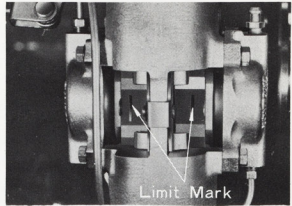


Fig.13-7 Wear Limit Mark V1343

a. Remove the wheel and tire assembly from the axle hub.

b. Remove the "E" ring from the retaining pin, then remove the pin from the keep-plate.

Remove the keep-plate from the caliper.

c. Attach the Disc Brake Pad Remover & Replacer 09719-20010 onto the lug on the pad, and pull out the pad from the caliper.

d. Check the condition of the cylinder boots, and inspect each piston for damage or corrosion. Thoroughly clean the cylinder boots pistons, and surrounding area before installing the new brake pads.

e. To facilitate the installation of the brake pads, the pistons may be pushed into their respective bores.

Using the SST 09719-20010, apply inward pressure against each cylinder on each side of the disc. At this same time, unscrew the bleeder screw slowly to allow the escape of brake fluid, and to help the return of the piston into the cylinder bore. Close the bleeder screw before releasing the pressure on the piston.

f. Place both pads, then install

the keep-plate, retaining pin, and "E" ring.
 Refill the reservoir to specified level.

3. Parking brake.

a. Adjust the pad to disc clearance of the parking brake caliper by adjusting screw (1) for specified clearance on both sides.

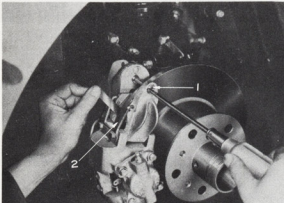


Fig.13-8 Parking Brake V1787
 Clearance Adjustment

b. If both sides clearances differ, remove the retractor plate (2), and then adjust by bending it. Specified clearance should be 0.05 to 0.15 mm (0.002 ~ 0.006").

Note: Brake pad serviceable thickness limit is 7 mm (0.28").

c. Remove the access hole cover (1).
 Position the parking brake plunger in fully released position, then ad-

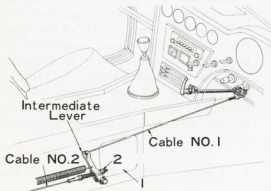


Fig.13-9 Parking Brake G0409
 Adjustment

just the nut (2) to tighten the looseness of parking brake cable No.1, and No.2.

d. After the parking brake has been adjusted, pull in the parking brake plunger.

The plunger should have a little play at the start of the pull, and should travel about 8 ~ 9 notches when fully pulled.

4. Air bleeding.

When any part of the hydraulic system has been disconnected or presence of air in the system is detected, the system must be bled. Check and fill the reservoir from time to time so as not to run empty. Also do not allow the fluid to get on any painted surface.

a. Remove the rubber cap from the bleeder screw, and connect a vinyl tube onto the screw. Submerge the other end of the tube into a container half filled with clean brake fluid.

Note: Air bleeding operation should be performed first from the hydraulic cylinder plug on the booster end plate, and then the farthest disc brake cylinder from the master cylinder.

b. Depress the brake pedal slowly several times to bleed the air, and with the brake pedal depressed, loosen the bleeder plug 1/3 to 1/2 of a turn, then close the plug immediately.

c. Repeat this operation until the brake fluid flows into the container without any air.

d. Install the bleeder plug rubber cap onto the plug, and replenish the brake fluid in the reservoir up to the specified level.

BRAKE PEDAL

As the brake pedal, and the clutch pedal use the same shaft, the work must be performed at the same time.

Refer to Clutch, and Brake Pedals.

MASTER CYLINDER

1. Union seat
2. Master cylinder body
3. Bolt
4. Lock washer
5. Nut
6. Piston return spring
7. Cylinder cup
8. Cup spacer
9. Cylinder cup
10. Master cylinder piston
11. Washer
12. Hole snap ring
13. Boot
14. Push rod
15. Lock nut
16. Push rod clevis
17. Reservoir filler cap
18. Reservoir cap
19. Float
20. Reservoir set bolt
21. Washer
22. Master cylinder reservoir

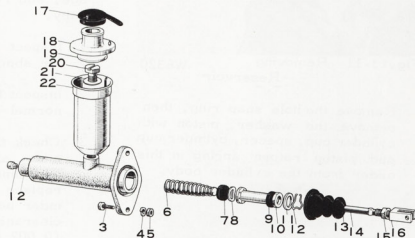


Fig.13-10 Master Cylinder Components

Y5300

Removal

Note: Do not spill any brake fluid on painted surface during the work.

1. Plug the reservoir inlet.
2. Disconnect the brake tube from the brake master cylinder
3. Remove the brake pedal tension spring.
4. Remove the cotter pin, then remove the push rod pin to disconnect the push rod clevis and pedal.

5. Remove the two bolts mounting the master cylinder onto the dash board, and remove the master cylinder from the engine compartment.

Disassembly

1. Remove the master cylinder boot from the cylinder body.
2. Remove the filler cap, and drain the fluid.
3. Remove the reservoir cap, and the float.

13-10 BRAKES - Master Cylinder

- Remove the bolt attaching the reservoir onto the master cylinder body, and remove the reservoir from the body.

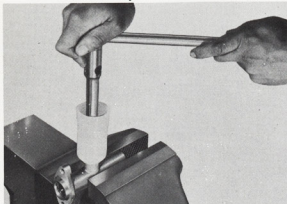


Fig.13-11 Removing Reservoir W6320

- Remove the hole snap ring, then remove the washer, piston with cylinder cup, spacer, cylinder cup and piston return spring in this order from the cylinder body.

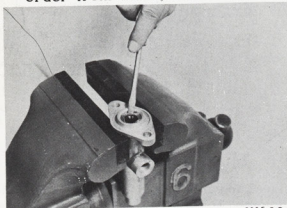


Fig.13-12 Removing Hole Snap Ring W6321

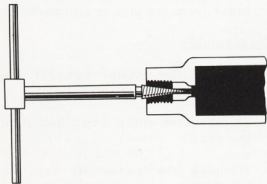


Fig.13-13 Removing Union Seat X6220

- Remove the cylinder cup from the piston, taking care not to scratch or score the piston or the cup.
- Remove the union seat from the cylinder body using a reverse threaded tap if necessary.

Inspection

Clean all the parts in clean brake fluid, and dry with compressed air. Inspect the parts for wear or damage, and replace the part/s if necessary.

- Inspect the master cylinder bore for abnormal wear or scores.
- Inspect the piston exterior for abnormal wear or scores.
- Check the cylinder to piston clearance, and if it exceeds the specified limit of 0.15 mm (0.006"), replace the piston and/or the cylinder body to obtain the specified clearance of 0.040 ~ 0.125 mm (0.002 to 0.005").
- Inspect the cylinder cup, and the cup spacer for wear, scores or distortion.
- Inspect the piston return spring for weakness. If too weak, replace the spring.

Spring specification:

Free length	81.3 mm (3.2")
Installed length	55.4 mm (2.2")
Installed pressure	2.2 kg (4.8 lb)

- Inspect the reservoir for cracks, and deformation at the base.

Assembly

- Assemble the cylinder cup onto the piston.
- Insert the return spring, cylinder cup, cup spacer, piston with the cylinder cup, and washer, then

- lock it in position with the hole snap ring.
- Install a washer onto the reservoir attaching bolt, then assemble the reservoir onto the master cylinder with the bolt. Tighten the bolt to 1.6 m-kg or 12 ft-lb.
 - Place the float into the reservoir, and install the cap onto the reservoir.
 - Install the master cylinder boot onto the cylinder body.

Installation

- Install the master cylinder assembly onto the dash board with two mounting bolts.
- Install the push rod, and connect the push rod clevis and pedal with the rod pin, then install the cotter pin into the rod pin. Install the brake pedal tension spring.
- Adjust the brake pedal height. Refer to Brake Pedal Adjustment on page 13-7.
- Adjust the push rod length for proper clearance.
- Connect the brake tube onto the master cylinder.
- Replenish the reservoir with clean brake fluid up-to the specified level.
- Bleed the hydraulic system. Refer to Air Bleeding.

DISC BRAKE CALIPER & DISC

Removal

- Remove the wheel and tire assembly from the disc and hub assembly.

- Plug up the master cylinder inlet to prevent the brake fluid from running out of the system when disconnecting the hydraulic line from the master cylinder.
- Disconnect the wheel cylinder tube (1) from the 2-way on the disc brake dust front cover.
- Cut off the wire (2), and remove the bolts (3) mounting the caliper onto the knuckle. Withdraw the disc brake caliper assembly, and the caliper support shim/s which fit between the caliper and the knuckle. Keep the shim/s separated so that the reassembly may be facilitated.

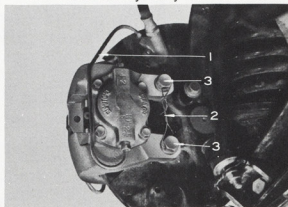
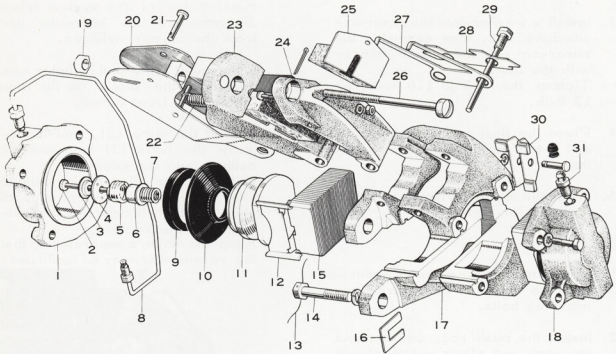


Fig.13-14 Disc Brake V1788
Caliper Removal

- Remove the axle hub, and disc assembly from the knuckle. For detail operation, refer to Removal of Axle Hub.
- Remove the brake dust cover from the knuckle.

Disassembly

- Remove the bridge pipe (6).
- Remove the bolts that retain each cylinder assembly onto the caliper body, and remove the No.2 (7), and No.1 (1) cylinder assemblies with the brake pads from the caliper body. Remove the pads (4)



- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Disc brake cylinder No.1 2. Withhead pin 3. Retractor pin cap 4. Spring retaining plate 5. Compression spring 6. Bushing housing 7. Retractor bushing 8. Cylinder tube 9. Piston seal 10. Cylinder boot 11. Disc brake piston 12. Pad support plate 13. Lock wire 14. Bolt 15. Disc brake pad 16. Shim | <ol style="list-style-type: none"> 17. Disc brake caliper body 18. Disc brake cylinder No.2 19. Nut 20. Parking brake lever 21. Pin 22. Tension spring 23. Parking brake pad No.2 carrier 24. Parking brake pad No.1 carrier 25. Parking brake pad 26. Screw 27. Retractor plate 28. Lock plate 29. Set bolt 30. Keep plate 31. Bleeder plug |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Fig.13-15 Rear Disc Brake Caliper Components Y5301

from the cylinder body.

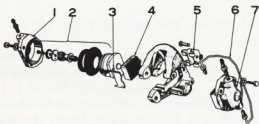


Fig.13-16 Disassembling Y5302 Caliper Assembly

Note: The cylinder assembly should not be disassembled as it is precisely fitted at the factory using special equipment, therefore, it is supplied as a unit.

3. Remove the "E" ring, and pin from the keep-plate, and then remove the keep-plate (5) from the caliper body.

4. Remove the pad support (3).
5. Remove the disc with axle hub.

Inspection

Clean all disassembled parts with clean shop towel, and clean out, and dry the grooves, and passages with compressed air, then inspect the parts for the following.

1. Inspect the caliper, and caliper support bracket of the knuckle for cracks, and deformation.
2. Inspect the brake pipes for cracks, union for crossed threads or stripped threads.
3. Replace the cylinder if it shows brake fluid leak or has a malfunctioning automatic adjuster.
4. Inspect the disc for run-out. If the run-out exceeds 0.15 mm (0.006") replace the disc.

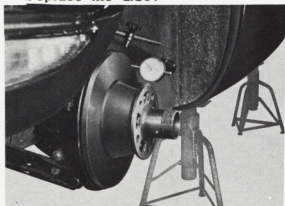


Fig.13-17 Checking for Run-Out V1789

5. Inspect the disc surfaces for scores, warpage or abnormal wear. Correct or replace the disc if defective. Specified thickness is 10.4 mm (0.41") Thickness limit is 10 mm (0.39")

Assembly & Installation

Follow the disassembly, and removal procedures in the reverse order.

1. If the disc, and axle hub were disassembled, reassemble the parts, align the mating marks, and tighten the disc-to-hub attaching bolts to 3.0 ~ 4.5 m-kg (22 to 33 ft-lb) torque.
2. Cylinder to caliper body attaching bolts tightening torque is 1.5 to 1.7 m-kg (11 ~ 12 ft-lb).
3. Install the axle hub, and disc assembly, and adjust the bearing pre-load. For adjustment details, refer to Axle Hub in SUSPENSION.
4. Looking from the top of the caliper, check whether the widths of the disc observed on each side of the caliper bridge are equal. If not, remove the adjusting shims from the caliper to knuckle mounting bolts, and select fit the shims so that the caliper assembly will be centrally positioned over the disc.

The caliper support shims are available in the following thicknesses.

Part No.	47755-20010
Thickness:	0.8 mm (0.0315")
Part No.	47756-20010
Thickness:	0.4 mm (0.0157")

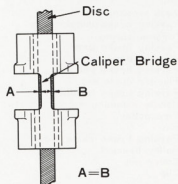


Fig.13-18 Adjustment of G0410 Caliper Installation

13-14 BRAKES - Disc Brake Caliper & Disc, Parking Brake

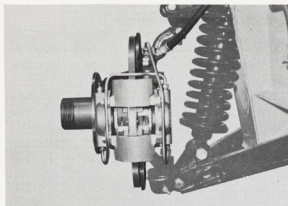


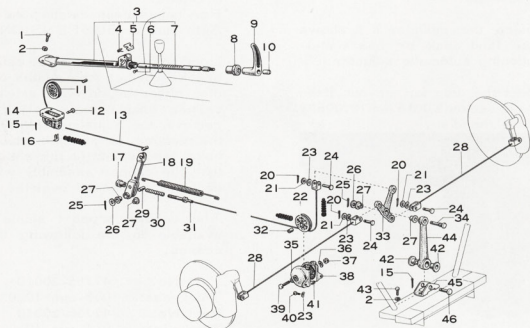
Fig.13-19 Disc Brake V1790 Assembly

Part No. 47757-20010
Thickness: 0.2 mm (0.0079")

Caliper to knuckle tightening torque is 9.3 ~ 12 m-kg (67 ~ 87 ft-lb).

- When installing the wire onto the rear caliper mounting bolts, do not allow the wire to touch with the rear axle hub.

PARKING BRAKE



- | | | |
|--------------------------------|------------------------------|-----------------------------|
| 1. Bolt | 17. Wire adjusting nut | 33. Parking brake equalizer |
| 2. Lock washer | 18. Intermediate lever | 34. Equalizer pivot pin |
| 3. Parking brake plunger assy. | 19. Tension spring | 35. Pulley bracket LH |
| 4. Torsion spring | 20. Cotter pin | 36. Washer |
| 5. Parking brake pawl | 21. Washer | 37. Nut |
| 6. Plunger pin | 22. Wire pulley | 38. Pulley bracket RH |
| 7. Parking brake plunger | 23. Washer | 39. Bolt |
| 8. Plunger guide nut | 24. Pin | 40. Bolt |
| 9. Parking brake handle | 25. Cotter pin | 41. Straight pin |
| 10. Handle retaining nut | 26. Washer | 42. Bushing |
| 11. Wire pulley | 27. Bushing | 43. Bolt |
| 12. Pin | 28. Parking brake cable No.3 | 44. Equalizer support |
| 13. Parking brake cable No.1 | 29. Link lever pin | 45. Equalizer bracket |
| 14. Pulley bracket | 30. Compression spring | 46. Pin |
| 15. Cotter pin | 31. Parking brake cable No.2 | |
| 16. Clip | 32. Collar | |

Fig.13-20 Parking Brake Components

Y5303

Parking Brake Plunger and Cable No. 1

Removal

1. Remove the driver's seat, and then remove the access hole cover.
2. Remove the propeller shaft, and the tension spring.
3. Disconnect the cable No.1 from the intermediate lever.
4. Remove the instrument side panel right or left side.
5. Remove the heater blower assembly, and remove the bolts attaching the pulley bracket.
6. Remove the parking brake handle nut, handle, and the plunger guide nut.
7. Lift the parking brake pawl, and fully release the plunger, then disconnect the cable No.1 from the plunger.



Fig.13-21 Disconnection of X6222 Cable No.1

8. Remove the parking brake plunger assembly, wire pulley with bracket, and the cable No.1.

Disassembly

1. Remove the cotter pin, and pin from the pulley bracket, and remove the wire pulley.

Pull out the clip, and then remove the cable No.1 from the pulley bracket.

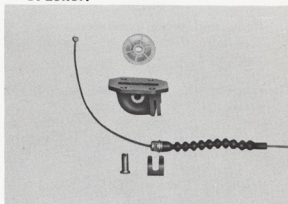


Fig.13-22 Pulley Bracket V1350 & Cable No.1

2. Drive out the plunger pin from the plunger.

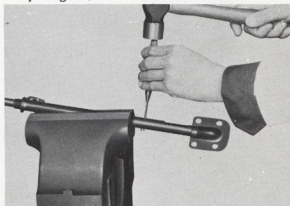


Fig.13-23 Removing Plunger Pin V1351

3. Remove the parking brake pawl and spring, and pull out the plunger from the plunger guide tube.

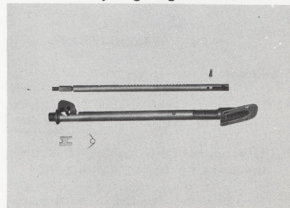


Fig.13-24 Plunger Assembly V1352

Inspection

1. Inspect the plunger, and the plunger guide tube for smooth operation, and tooth condition. Replace the plunger assembly if required.
2. Inspect the pawl, and spring for wear.
3. Inspect the cable No.1 for rust or damage.

Parking Brake Cables No.2
and No. 3

Assembly & Installation

Follow the disassembly, and removal procedures in the reverse order.

1. Lubricate the plunger, pulley, and the cable No.1 with multipurpose grease.
2. After installation, adjust the cable No.1 tension properly. To adjust, refer to Parking Brake Adjustment.

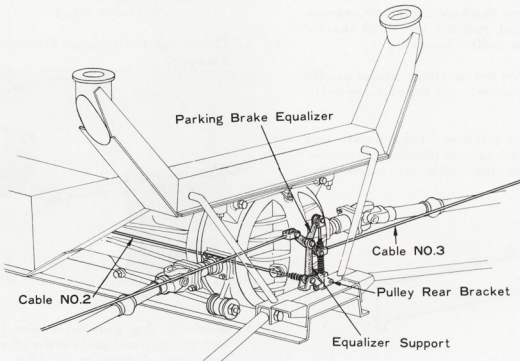


Fig.13-25 Parking Brake Cables No.2 & No.3

G0412

Removal

1. Disconnect the cable No.3 from right and left parking brake lever.
2. Disconnect the cable No.2 from the parking brake equalizer.
3. Remove the equalizer support to-

gether with the equalizer, and the cable No.3.

4. Remove the pulley rear bracket.
5. Remove the driver's seat, and the access hole cover, and then remove the propeller shaft.

- Pull the plunger, and remove the cable No.2 adjusting nut from the intermediate lever, and then remove the cable No.2, and the compression spring.

Inspection

- Check the cables No.2, and No.3 for rust or damage. If necessary, replace.
- Check the bushings for wear, and the pulley movement. If necessary, replace.

Installation

Follow the removal procedures in the reverse order. Apply multipurpose grease on the sliding portion.

BRAKE BOOSTER

Removal

- Remove the right side service lid upper panel.
- Remove the sliding lock of the service lid lower panel from the inside.

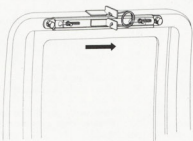


Fig.13-26 Removing Service Lid Lower Panel X6224 No.1

- Remove the hinge of the service lid lower panel, and then remove the service lid lower panel.



Fig.13-27 Removing Service Lid Lower Panel V1353 No.2

- Remove the battery assembly.
- Disconnect the brake tubes (1), and the vacuum hose (2) from the brake booster. Remove the bracket mounting bolts (3), then remove the brake booster assembly.

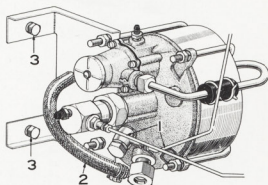
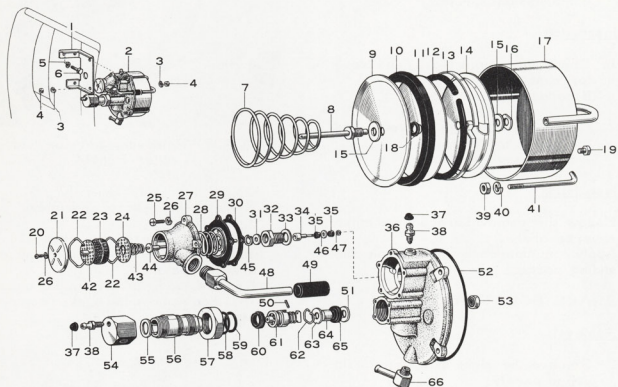


Fig.13-28 Brake Booster G0413 Removal

Disassembly

- Remove the clamp (1), and then remove the control valve body (2).
- Remove the hydraulic cylinder body (3).
- Blow in a low pressure air less than 1 kg/cm² (14 psi) into the power cylinder from the power cylinder connector tube with an



- | | | |
|-------------------------|------------------------------|-------------------------------|
| 1. Bracket | 23. Air filter element | 45. Retainer ring |
| 2. Brake booster assy. | 24. Screw & cover supporter | 46. Piston cup retainer |
| 3. Lock washer | 25. Screw | 47. Washer |
| 4. Nut | 26. Lock washer | 48. Power cylinder connector |
| 5. Lock washer | 27. Control valve body | 49. Hose |
| 6. Bolt | 28. Valve seat spring | 50. Push rod pin |
| 7. Piston return spring | 29. Diaphragm | 51. Washer |
| 8. Push rod | 30. Valve body gasket | 52. Cylinder seal |
| 9. Piston front plate | 31. Piston stop washer | 53. Push rod seal |
| 10. Piston gasket | 32. Control valve fitting | 54. Hydraulic cylinder plug |
| 11. Piston rear plate | 33. Fitting seal | 55. Gasket |
| 12. Gasket wick | 34. Control valve piston | 56. Hydraulic cylinder body |
| 13. Gasket ring | 35. Piston cup No.1 | 57. Piston cup retainer |
| 14. Wick retainer | 36. Booster end plate | 58. Seal |
| 15. Washer | 37. Cap | 59. Seal |
| 16. Nut | 38. Air bleeder plug | 60. Hydraulic piston cup No.2 |
| 17. Power cylinder | 39. Nut | 61. Hydraulic piston |
| 18. Piston rod seal | 40. Lock washer | 62. Snap ring |
| 19. Plug | 41. Hook bolt | 63. Piston stop washer |
| 20. Screw | 42. Screen & cover supporter | 64. Seal retainer |
| 21. Booster cover | 43. Poppet spring | 65. Hydraulic piston cup No.2 |
| 22. Snap ring | 44. Poppet valve | 66. Check valve |

Fig.13-29 Brake Booster Components

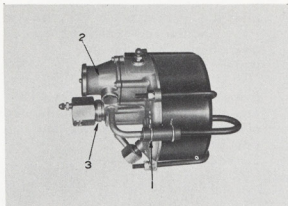


Fig. 13-30 Brake Booster V1354 Disassembly

air gun, and then disconnect the push rod by removing the push rod pin (2), and the hydraulic piston (1).

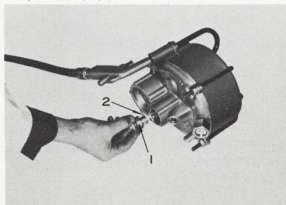


Fig. 13-31 Removing Hydraulic Piston V1791

4. Remove the hook bolts, and then remove the end plate, piston return spring, and power piston assembly.



Fig. 13-32 Disassembling Booster V1792

5. Secure the power piston nut in a vise, then loosen and remove the push rod, and disassemble the power piston.

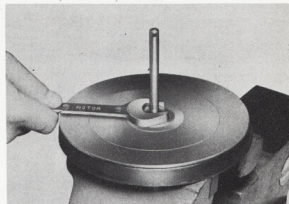


Fig. 13-33 Disassembling W2534 Booster Piston

6. Remove the snap ring (2), piston stop washer (3), seal retainer (4), piston cup (5), push rod washer (6), and push rod seal (7) from the hydraulic cylinder body (1) of the end plate.

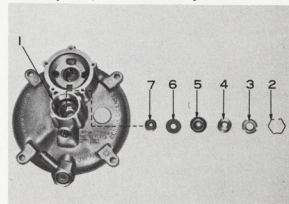


Fig. 13-34 Removing V1793 Piston Cup

7. Remove the valve fitting (1) from the control valve chamber of the end plate, and disassemble the valve piston (4).

Note: Also the valve piston can be removed by removing the retaining ring (2), and the stop washer (3).

8. Disassemble the valve body.

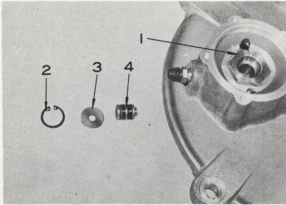


Fig. 13-35 Removing Control W7101 Valve Piston

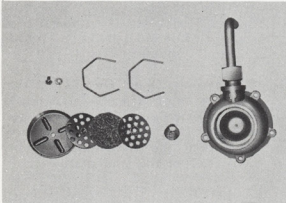


Fig. 13-36 Disassembling V1795 Valve Body

Inspection

Wash all parts except the rubber parts in cleaning solvent, and the rubber parts in clean brake fluid. Dry them thoroughly, and inspect for the following.

1. Inspect the push rod (2) for bend,

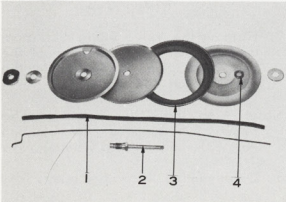


Fig. 13-37 Inspection of V1358 Power Piston

and the gasket wick (1), gasket (3), and the rod seal (4) for wear deformation or damage. If necessary, replace.

2. Inspect the bushing (1), cup (2), and piston ball (3) of the hydraulic piston for wear, scores, and operation. If necessary, replace.

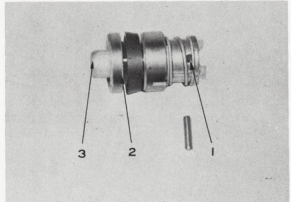


Fig. 13-38 Inspection of W7104 Hydraulic Piston

3. Inspect the control valve piston (1), cups (2) valve fitting inner surface (3) and diaphragm (4) for wear or damage. If necessary, replace.

Note: When replacing the piston cup, check the direction of the cup.

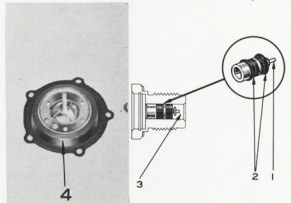


Fig. 13-39 Control Valve Inspection V1794 G0414

4. Inspect the hydraulic piston cup (1), and the push rod seal (2) for scores, wear or damage. If necessary, replace.

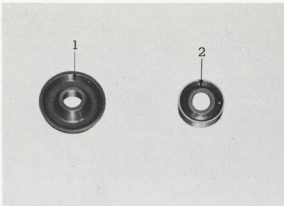


Fig. 13-40 Seal & Cup V1360
Inspection

Assembly

It is recommended that all gaskets, cups, and seals are to be replaced upon assembly.

1. Assemble the poppet valve, poppet spring (2), screen (3), snap ring (4), air element (5), screen (6), snap ring (7), and cover (8) into the valve body (1).

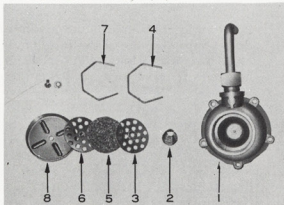


Fig. 13-41 Valve Body V1795
Assembly

2. Drive in the push rod seal (1) on the end plate, and assemble the push rod washer (2), piston cup (3), seal retainer (4), and stop washer (5), and then assemble the snap ring (6).

Caution: The push rod washer (2) cutted surface must be installed towards the push rod seal (1) side. The retainer (4) concave

portion must be installed towards the piston cup (3) side.

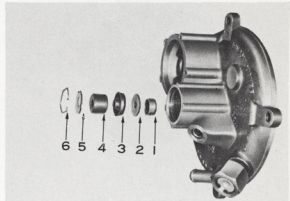


Fig. 13-42 Assembling V1796
Hydraulic Piston Cup

3. Fix the power piston push rod in a vise. Install the washer, piston front plate, piston gasket, and rod seal onto the push rod. Next, fill with brake booster oil of 30 cc or 0.06 US pt., 0.05 Imp. pt. onto the piston front plate, then assemble the piston rear plate, gasket wick, gasket ring, and wick retainer. Install the piston plate nut, and tighten it fit firmly.



Fig. 13-43 Assembling V1797
Power Piston

4. Install the power piston assembly, and the return spring into the power cylinder, then install the end plate onto the power cylinder. Install the booster hook bolt, and tighten them firmly.

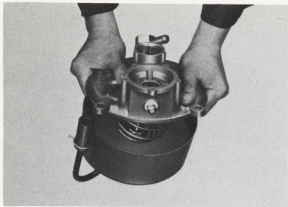


Fig.13-44 Assembling V1792 Power Piston

5. Push the push rod out of the end plate by blowing in low pressure air into the power cylinder from the power cylinder connector tube with an air gun, then install the hydraulic piston to the push rod with the push rod pin.

Note: If compressed air is not used, operate as follows:

- a. Place the return spring, and the end plate onto the power piston.
- b. Push the push rod out of the end plate by compressing the end plate, then install the hydraulic piston onto the push rod with the rod pin.
- c. Install the end plate with the power piston into the power cylinder.

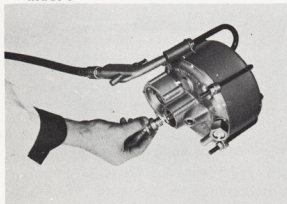


Fig.13-45 Assembling V1791 Hydraulic Piston

6. Assemble the control valve piston into the valve fitting, and then assemble them onto the end plate.
7. Assemble the diaphragm with the gasket onto the end plate.
8. Place the valve seat spring on the diaphragm, then assemble the valve body onto the end plate. Install the valve body attaching screws, and tighten them securely.

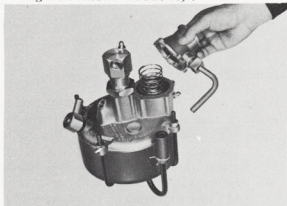


Fig.13-46 Assembling Valve V1798 Body

9. Assemble the hydraulic cylinder body onto the end plate finger tight, and the air bleeder plug on the hydraulic cylinder body facing upward.
10. Clamp the vacuum hose on the power cylinder connector.
11. Fill with brake booster oil of 30 cc (0.06 US pt., 0.05 Imp. qt.) from the oil plug.

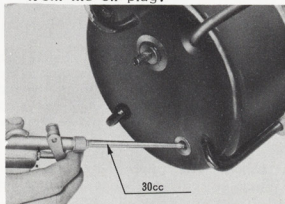


Fig.13-47 Filling Booster W2547 Oil

Installation

1. Follow the removal procedures in the reverse order.
2. To bleed the entire hydraulic system, the brake booster unit must be bled at both bleeder plugs before attempting to bleed at the wheel cylinder.

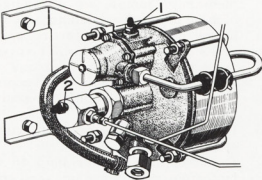


Fig. 13-48 Brake Booster Air Bleeder Plugs G0413

Caution: The entire bleeding operation must be performed without running the engine, and no vacuum in the power system.

a. Remove the filler cap from the brake master cylinder, and fill with hydraulic brake fluid.

b. Attach a bleeder drain hose onto the bleeder screw (1), keeping the end of the drain hose submerged in the fluid inside the jar.

c. Loosen the bleeder screw (1) 1/2 to 3/4 of a turn.

Depress the brake pedal slowly by hand to expel the air. When the pedal reaches the toe-board, close the bleeder screw before releasing the pedal to the original position. Repeat this procedure until all air bubbles cease to exhaust from the drain hose end into the jar, and a stream of solid fluid is exhausted. Tighten the bleeder screw, and remove the drain hose. During this operation, the brake master

cylinder must be replenished with brake fluid.

Following the above procedures, bleed at the bleeder screw (2), then proceed to bleed at the wheel cylinder.

Performance Test

The following method of diagnosing the brake booster trouble may lack in accuracy, but it enables service men to roughly understand the condition of the brake booster by inspecting it in the following orders. Adjust all the brakes before proceeding to the inspection.

1. With the engine stopped, depress the brake pedal in the normal manner, then start the engine with the pedal depressed. If the brake pedal stroke, after a period of time, sinks a little, it indicates that the brake booster is in the satisfactory working condition.
2. With the engine running, fully depress the brake pedal. If the pumping of the brake pedal is noted, it indicates that the booster is defective in the hydraulic lines.
3. With the engine at idle speed, remove the booster air element cover on the control valve body, and bring a piece of string near the inlet of the air cleaner. If the string tends to be drawn into the air cleaner, it indicates that there is a leak in the poppet valve. If the string is rapidly drawn towards the air cleaner only when the brake pedal is depressed, the poppet valve is satisfactory.
4. With the engine running at idle speed, depress the brake pedal, and place a hand over the air cleaner inlet. If the hand gets a feel of being drawn in the air cleaner, it indicates that the vacuum valve is leaking, the power piston is leaking or diaphragm is faulty.

Diagnosis with the tester.

1. Vacuum test when the brake pedal is not depressed.

Remove the plug on the power cylinder, and connect a vacuum gauge there.

With the engine idling, adjust the idle speed so that the vacuum reading may be 500 mmHg or 19.69 inHg.

Now stop the engine, and note the vacuum drop on the gauge, which should not exceed the limit of 25 mmHg (1 inHg) within 15 seconds. If exceeds this limit, recheck the poppet valve, connection of power cylinder connector, and the control valve fitting portion.

2. Control valve operation test.

- a. Connect the vacuum gauge to the power cylinder rear chamber. Start the engine, and adjust the engine speed so that the vacuum reading may be 500 mmHg or 19.69 inHg, and then depress the brake pedal fully.

At this time, the vacuum should be zero at a moment. If does not, check the air element of the booster for clog or poppet valve and the diaphragm.

- b. Connect one pressure gauge to the bleeder plug on the top of the booster end plate, and connect the other pressure gauge to the bleeder plug on the hydraulic cylinder plug.

Connect the vacuum gauge to the rear chamber of the power cylinder.

Start the engine, and set the vacuum gauge reading at 500 mmHg or (19.69 inHg).

Both pressure gauges begin to register as the brake pedal is slowly depressed. But when the poppet valve opens, the pressure gauge on the hydraulic cylinder plug momentarily jumps up to indicate higher pressure reading. At this time, check the pressure gauge of the control valve side. The pressure should be 3 ~ 5 kg/cm² or 43 ~ 71 psi, and this is the control valve piston operating pressure.

3. Hydraulic leakage test with engine stopped.

Remove the bleeder plug on the hydraulic cylinder plug, and connect a pressure gauge with it.

Place the hydraulic cylinder under the pressure of 12 kg/cm² or 171 psi by depressing the brake pedal. With the brake pedal maintained in this position, check for pressure drop in the hydraulic cylinder.

The time required for the pressure to drop to 10 kg/cm² (142 psi) should be more than 10 seconds. If the time does not exceed 10 seconds, the cylinder cup in the master cylinder is defective or the hydraulic line (brake booster to wheel cylinders) are leaking.