

Brakes

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11-2 BRAKES

Exploded View

T1: 25 N-m (2.5 kg-m, 18.0 ft-lb)

T2: 5.9 N-m (0.6 kg-m, 52 in-lb)

T3: 8.8 N-m (0.9 kg-m, 78 in-lb)

T4: 7.8 N-m (0.8 kg-m, 69 in-lb)

T5: 23 N-m (2.3 kg-m, 16.5 ft-lb)

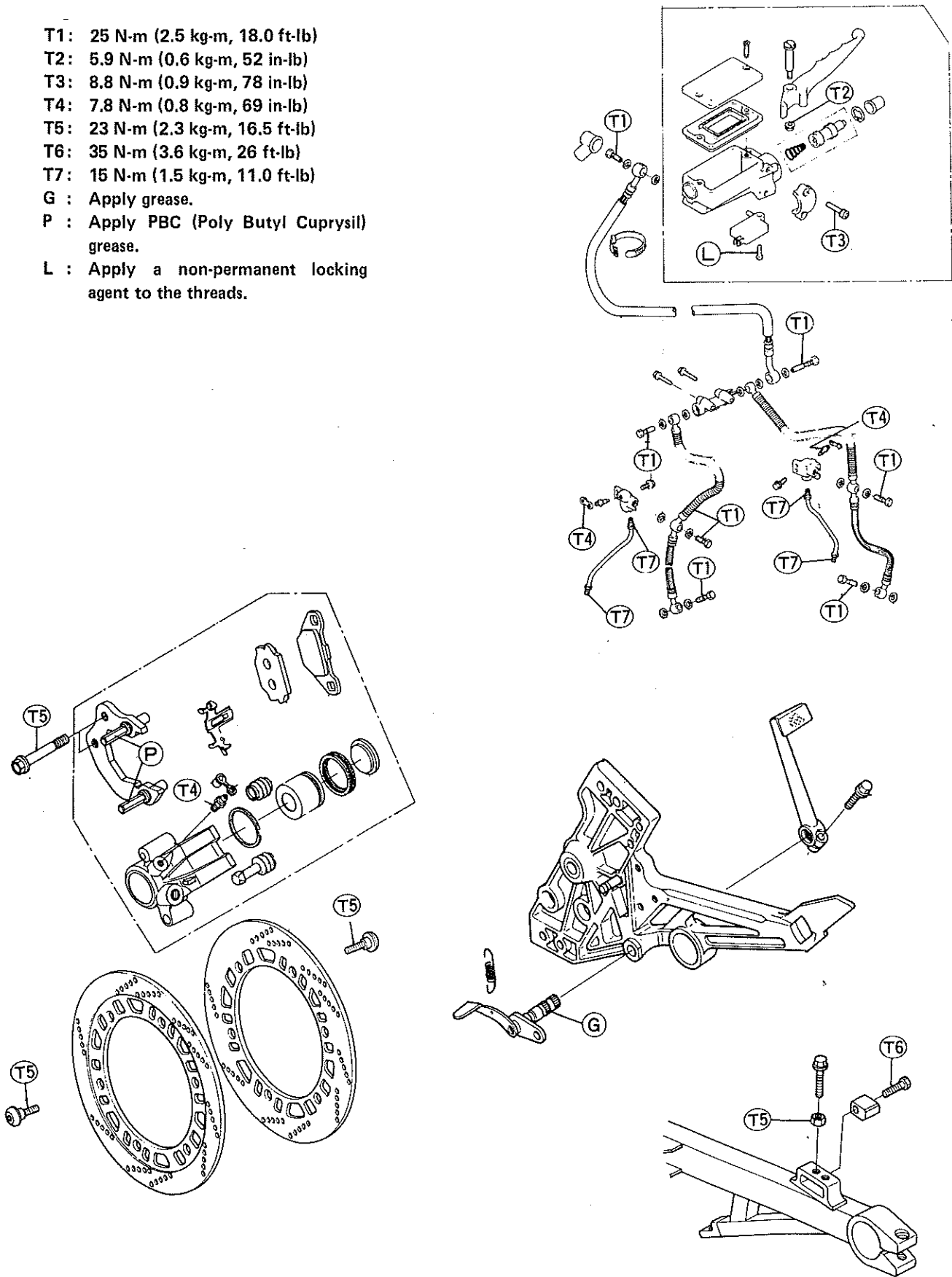
T6: 35 N-m (3.6 kg-m, 26 ft-lb)

T7: 15 N-m (1.5 kg-m, 11.0 ft-lb)

G : Apply grease.

P : Apply PBC (Poly Butyl Cuprysil) grease.

L : Apply a non-permanent locking agent to the threads.

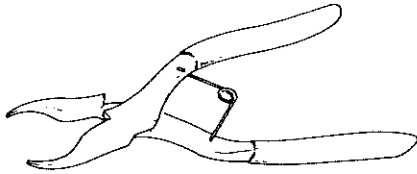


Specifications

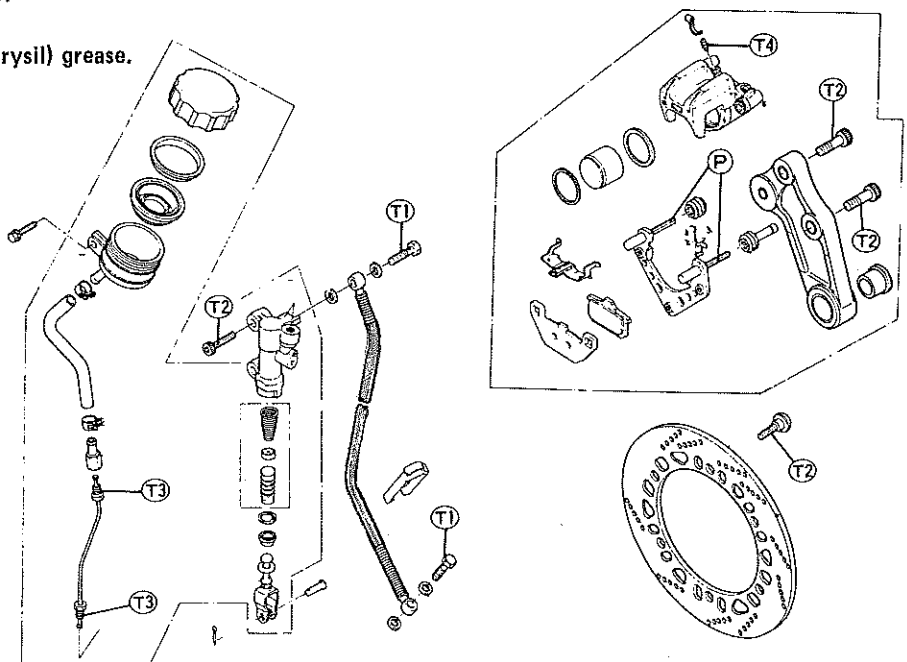
Item	Standard	Service Limit
Brakes:		
Brake fluid grade	D.O.T.3	---
Brake lever	Non adjustable	---
Brake pedal position	27 – 37 mm (lower than the footpeg top)	---
Brake light switch:	Non adjustable	---
Front	ON after about 5 – 6 mm pedal travel	---
Rear		---
Front disc brake		
Pad lining thickness	4.5 mm	1 mm
Disc thickness	3.8 – 4.1 mm	3.5 mm
Disc runout	0.2 mm	0.3 mm
Rear disc brake		
Pad lining thickness	4.85 mm	1 mm
Disc thickness	5.8 – 6.1 mm	5 mm
Disc runout	not more than 0.2 mm	0.3 mm

Special Tools

Circlip Pliers: 57001-143



- T1: 25 N-m (2.5 kg-m, 18.0 ft-lb)
- T2: 23 N-m (2.3 kg-m, 16.5 ft-lb)
- T3: 15 N-m (1.5 kg-m, 11.0 ft-lb)
- T4: 7.8 N-m (0.8 kg-m, 69 in-lb)
- P : Apply PBC (Poly Butyl Cuprysil) grease.



11-4 BRAKES

Brake Adjustment

Front Brake Adjustment

Disc and disc pad wear is automatically compensated for and has no effect on brake lever action. So there are no parts that require adjustment on the front brake. However if the brake lever has a soft, or "spongy feeling", check the brake fluid level in the master cylinder and bleed the air from the brake line (see Bleeding the Brake Line).

NOTE

○Check the brake fluid level in accordance with the Periodic Maintenance Chart.

Rear Brake Pedal Position Inspection

Disc and disc pad wear is automatically compensated for and has no effect on brake pedal action. However, the brake pedal position may occasionally require adjustment due to wear of the pedal pivot, or in case of disassembly. If the brake pedal has a soft, or "spongy feeling", check the brake fluid level in the reservoir and bleed the air from the brake line (see Bleeding the Brake).

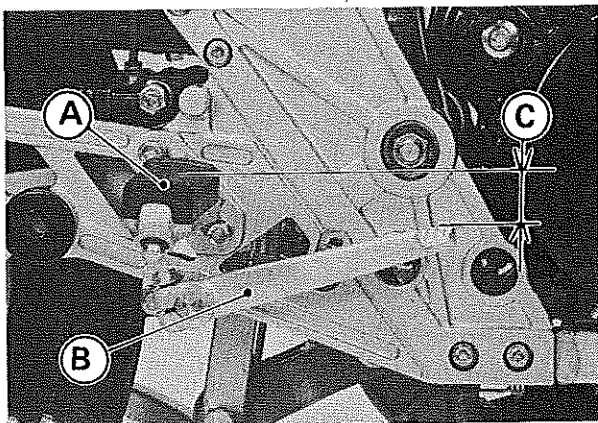
NOTE

○Check the brake fluid level in accordance with the Periodic Maintenance Chart.

●When the brake pedal is in its position, it should be at the correct position.

Pedal Position

Pedal Position 27 – 37 mm below top of footpeg



A. Footpeg
B. Brake Pedal

C. Pedal position

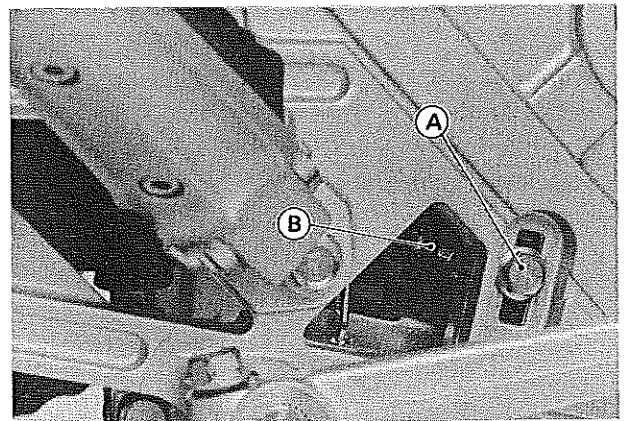
●If it is not, adjust the brake pedal position as follows.

Brake Pedal Position Adjustment

NOTE

○It is not necessary to remove the right footpeg bracket for the pedal position adjustment.

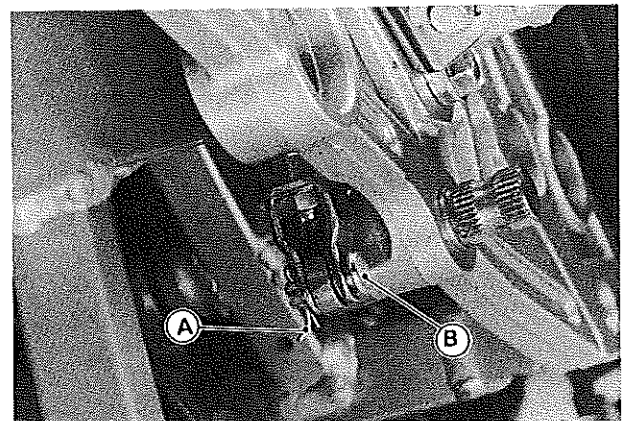
- Remove the front muffler (see Front Muffler Removal in Engine Top chapter).
- Separate the brake switch by removing the mounting bolt.



A. Mounting Bolt

B. Brake Switch

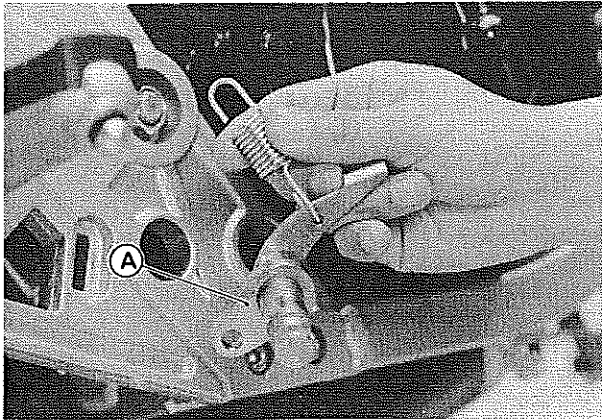
- Remove the brake pedal by taking off the mounting bolt.
- Pull out the cotter pin and the pin joint.



A. Cotter Pin

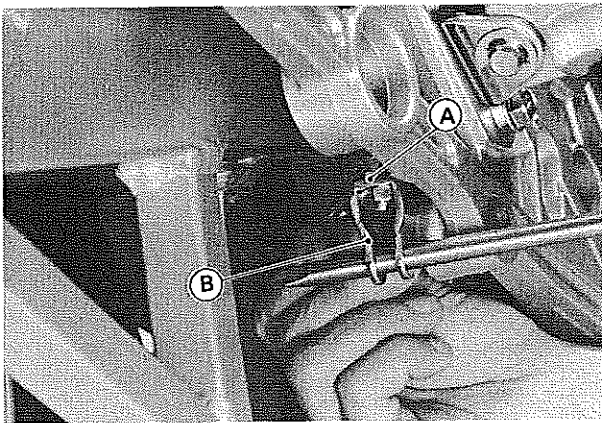
B. Pin Joint

- After removing the return spring from top hook, push out the pedal shaft.



A. Pedal Shaft

- Loosen the locknut of the master cylinder.
- Turn up or turn down the locknut and clevis to adjust the brake pedal position.
- After the adjustment is made, tighten the locknut with the clevis held.

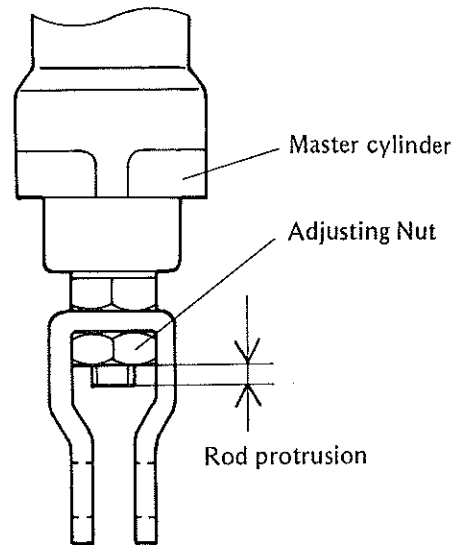


A. Locknut

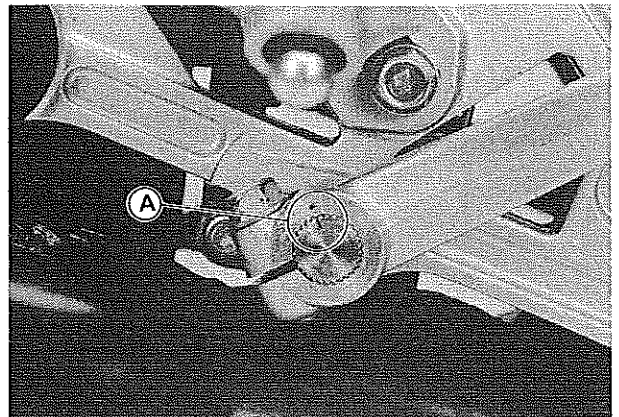
B. Clevis

NOTE

- If the pedal position cannot be adjusted by turning the clevis, the brake pedal may be deformed or incorrectly installed.
- If the brake rod protrusion is 3.5 – 5.5 mm below the adjusting nut, the pedal position will be within the standard range (27 – 37 mm).



- Install the brake pedal on the shaft so that the mark on the pedal is aligned with the mark on the shaft.



A. Marks

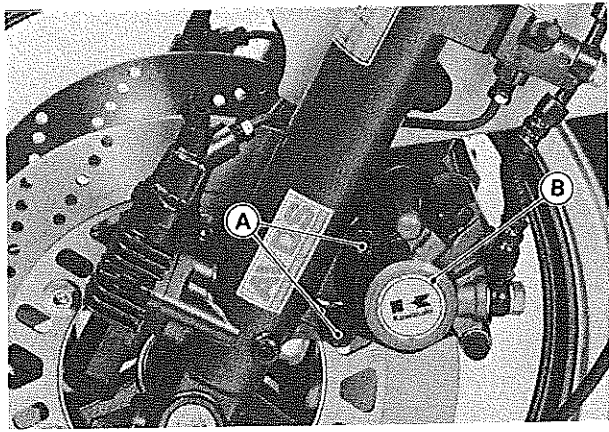
- Check the brake pedal position, and readjust it if necessary.
- Check the brake light switch operation and adjust the switch if necessary (see Electrical System chapter).

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Calipers

Front Caliper Removal

- Separate the brake hose from the caliper by taking off the banjo bolt.
- Remove the caliper mounting bolts, and take off the calipers.

11-6 BRAKES

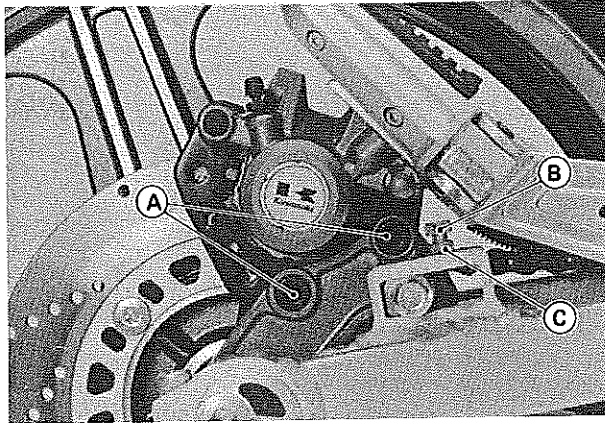


A. Mounting Bolts

B. Caliper

Rear Caliper Removal

- Remove the brake hose from the caliper by taking off the banjo bolt.
- Remove the front muffler.
- Loosen the locknut and remove the collar fixing bolt.
- Remove the caliper mounting bolts, and take off the caliper.



A. Mounting Bolts

B. Collar Fixing Bolt

C. Locknut

- If the caliper is to be disassembled after removal and if compressed air is not available, remove the piston using the following two steps before disconnecting the brake hose from the caliper.
- Remove the pads.
- Pump the brake lever or pedal to remove the caliper piston.
- Immediately wipe up any brake fluid that spills.

Caliper Installation Notes

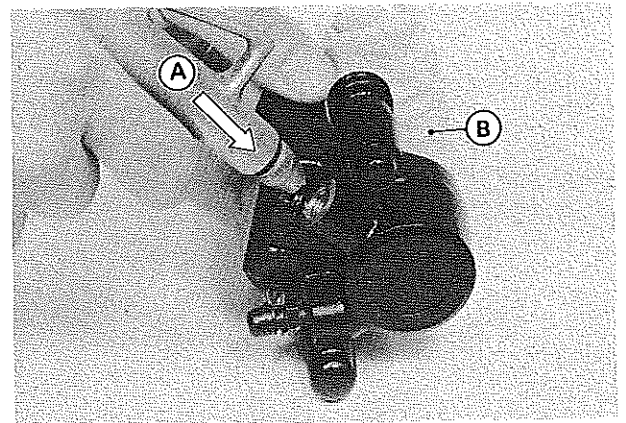
- Connect the brake hose to the caliper putting a new flat washer on each side of the brake hose fitting.
- Check the fluid level in the master cylinder, and bleed the brake line (see Bleeding the Brake Line).
- Check the brake for weak braking power, brake drag, and fluid leakage.

Caliper Disassembly Notes

- Using compressed air, remove the piston.
- Cover the caliper opening with a clean, heavy cloth.
- Remove the piston by lightly applying compressed air to where the brake line fits into the caliper.

WARNING

- To avoid serious injury, never place your fingers or palm inside the caliper opening. If you apply compressed air into the caliper, the piston may crush your hand or fingers.

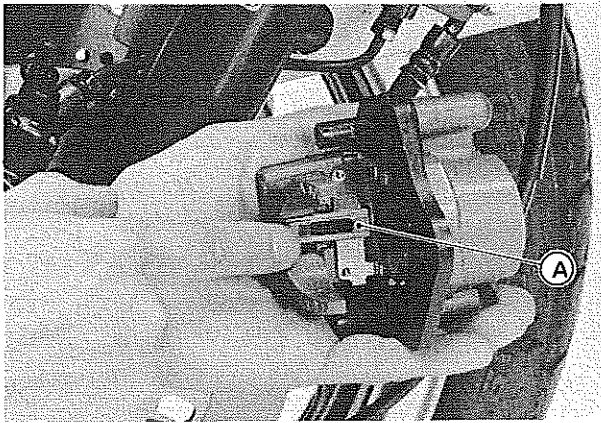


A. Apply compressed air.

B. Cloth

Caliper Assembly Notes

- Apply brake fluid to the outside of the piston and the fluid seal, and push the piston into the cylinder by hand. Take care that neither the cylinder nor the piston skirt get scratched.
- Apply a thin coat of PBC (Poly Butyl Cuprysil) grease to the caliper holder shafts and holder holes. (PBC is a special high temperature, water-resistant grease).
- Install the anti-rattle spring in the calipers as shown.



A. Anti-rattle spring

Fluid Seal Damage:

The fluid seal around the piston maintains the proper pad/disc clearance. If this seal is not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

Replace the fluid seals under any of the following conditions: (a) fluid leakage around the pad; (b) brakes overheat; (c) there is a large difference in left and right pad wear; (d) the seal is stuck to the piston. If the fluid seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.

Dust Seal and Cover Damage

- Check that the dust seals and covers are not cracked, worn, swollen, or otherwise damaged.
- ★If they show any damage, replace them.

Piston, Cylinder Damage

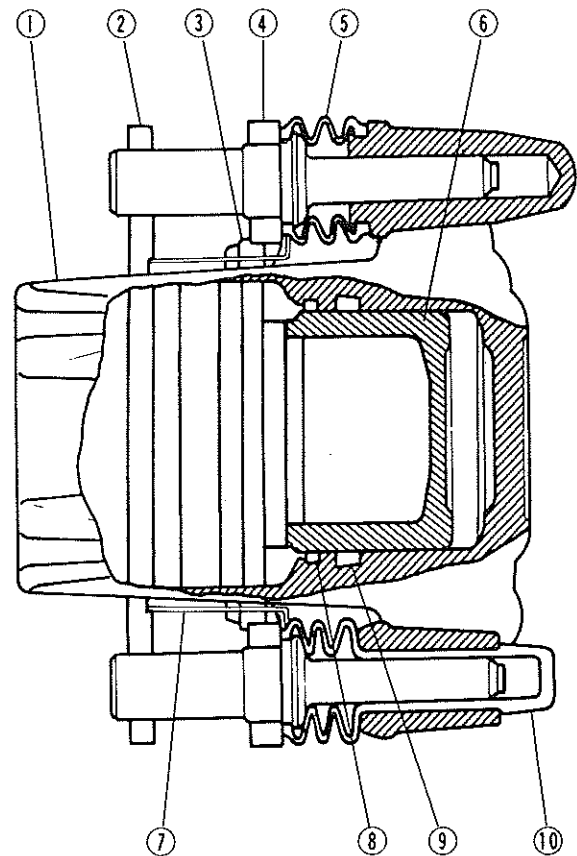
- Visually inspect the piston and cylinder surfaces.
- ★Replace the cylinder and piston if they are badly scored or rusty.

Caliper Holder Shaft Wear

The caliper body must slide smoothly on the caliper holder shafts. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see if the caliper holder shafts are not badly worn or stepped, or rubber friction boot are not damaged.
- ★If the shafts rubber friction boot are damaged, replace the rubber friction boot, and the caliper holder.

Caliper (rear)



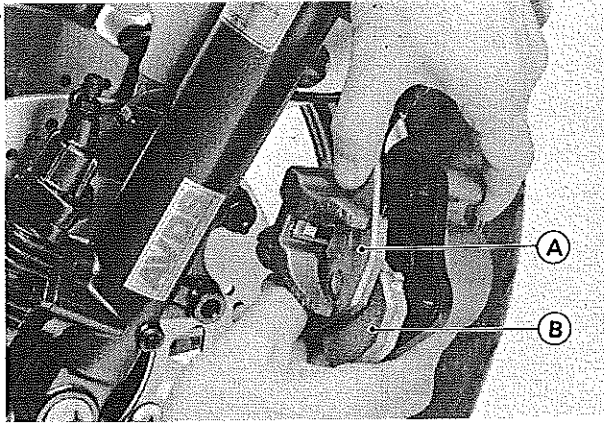
- | | |
|-------------------|-----------------------|
| 1. Caliper | 6. Piston |
| 2. Brake Pad | 7. Anti-Rattle Spring |
| 3. Brake Pad | 8. Dust Seal |
| 4. Caliper Holder | 9. Fluid Seal |
| 5. Dust Cover | 10. Friction Boot |

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Brake Pads

Pad Removal

- Lift off the caliper by taking off the mounting bolts.
- Push the caliper holder toward the piston side, and then remove the pads.

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A. Pad

B. Pad

Pads Installation Notes

- Push the caliper piston in by hand as far as it will go.

WARNING

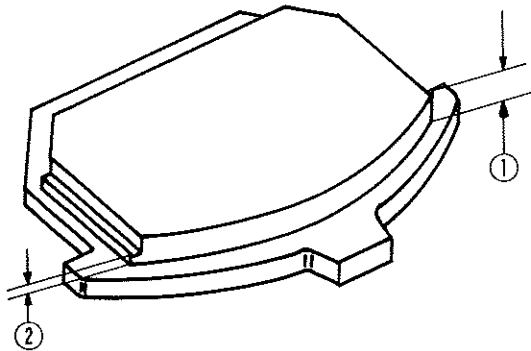
- Do not attempt to drive the motorcycle until a full brake lever or pedal is obtained by pumping the brake lever or pedal until the pads are against the disc. The brake will not function on the first application of the lever or pedal if this is not done.

Lining Wear

In accordance with the Periodic Maintenance Chart, inspect the front and rear brakes for wear.

- Check the lining thickness of the pads in each caliper.
- ★ If the lining thickness of either pad is less than the service limit, replace both pads in the caliper as a set.

Brake Pad



1. Lining Thickness

2. Service Limit

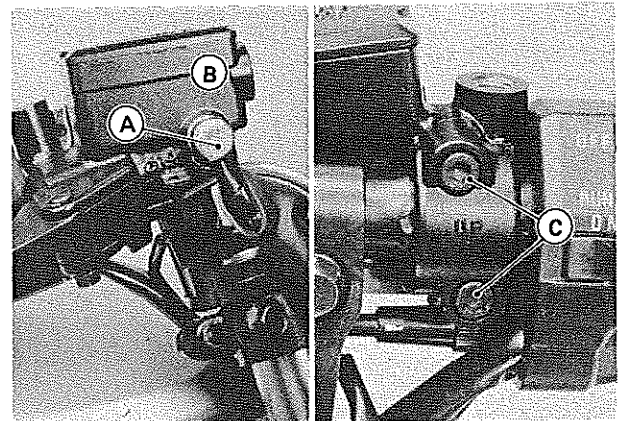
Pad Lining Thickness

Standard	4.5 mm (front)
	4.85 mm (rear)
Service Limit	1 mm

Master Cylinders

Front Master Cylinder Removal

- Pull back the dust cover, and remove the banjo bolt to disconnect the upper brake hose from the master cylinder. There is a flat washer on each side of the hose fitting.



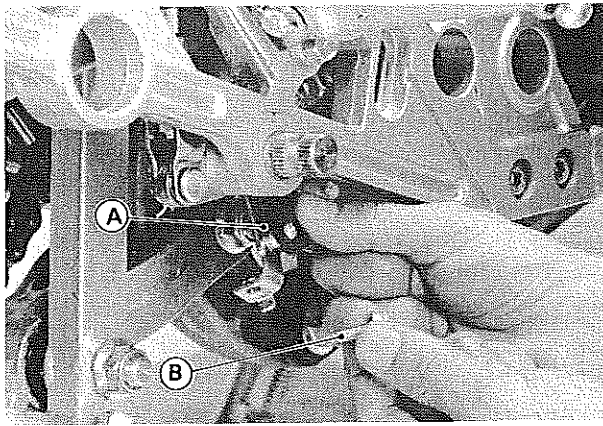
A. Banjo Bolt
B. Master Cylinder

C. Clamp Bolts

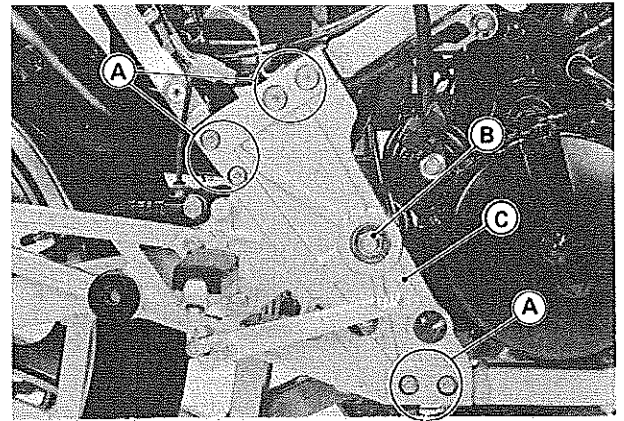
- Remove the clamp bolts and take off the master cylinder. Immediately wipe up any brake fluid that spills.

Rear Master Cylinder Removal

- Remove the front muffler.
- Remove the right side cover.
- Separate the brake switch by removing the mounting bolt.



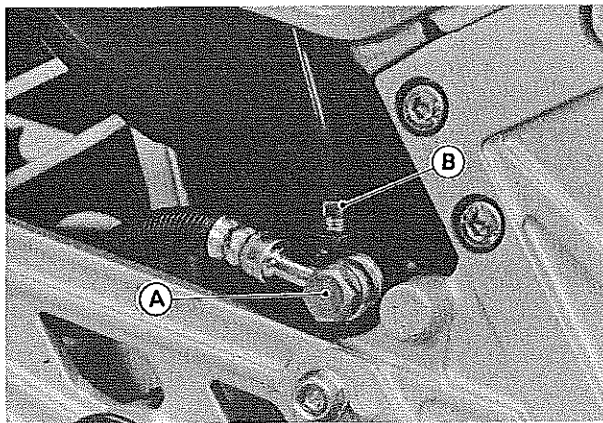
A. Brake Switch B. Mounting Bolt



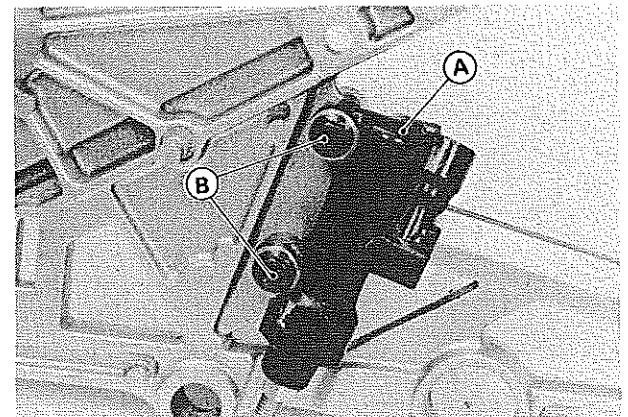
A. Footpeg Bracket Bolts and Nuts
B. Pivot Shaft
C. Footpeg Bracket

- Place a container beneath the master cylinder.
- Remove the banjo bolt to disconnect the brake hose from the master cylinder. There is a flat washer on each side of the hose fittings.
- Remove the lower pipe joint to disconnect the brake pipe from the master cylinder.

- Remove the cotter pin and the pin joint of the master cylinder.
- Remove the master cylinder by taking off the mounting bolts.



A. Banjo Bolt B. Lower Pipe Joint



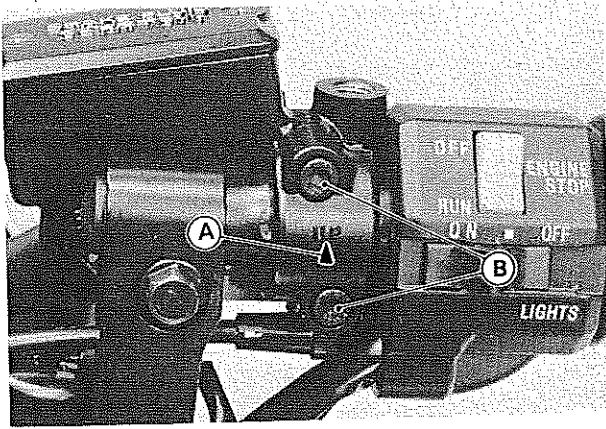
A. Master Cylinder B. Mounting Bolts

- Remove the footpeg bracket bolts and nuts.
- Remove the pivot shaft.
- Remove the footpeg bracket with the rear master cylinder.

Front Master Cylinder Installation Notes

- Master Cylinder Clamp Installation:
 - The master cylinder clamp must be installed with the arrow mark upward.
 - Torque the upper clamp bolt first, and then the lower clamp bolt to the specification. There will be a gap at the lower part of the clamp after tightening.
- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolt to the specified torque.

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- A. Tighten upper clamp bolt first.
- B. Arrow Mark

Rear Master Cylinder Installation Notes

- Use a new flat washer on each side of the brake hose fitting, and tighten the banjo bolts to the specified torque.
- Tighten the rear master cylinder mounting bolts (2) to the specified torque.
- Check and adjust the following items.
- Rear brake light switch (see Rear Brake Light Switch Adjustment in Electrical System chapter).

Inspection After Installation

- Bleed the brake line after master cylinder installation.
- Check the brake for weak braking power, brake drag, and fluid leakage.

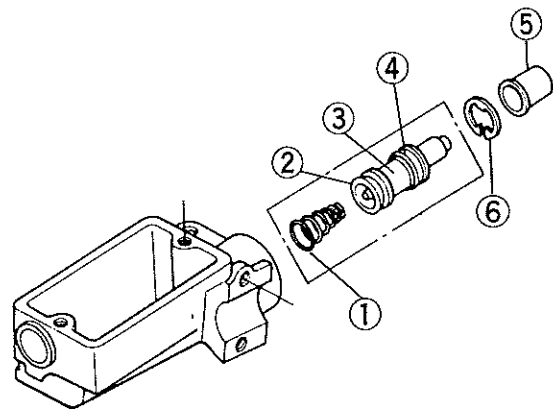
Front Master Cylinder Disassembly Notes

- Remove the front master cylinder from the handlebar.
- Remove the master cylinder cap and diaphragm, and empty out the brake fluid.
- Remove the locknut and pivot bolt, and remove the brake lever.
- Slide out the dust seal.
- Remove the stopper with a circlip pliers.
- Remove the piston with the secondary cup, primary cup and spring.

NOTE

- Do not remove the secondary cup from the piston since removal will damage it.

Front Master Cylinder



- 1. Spring
- 2. Primary Cup
- 3. Piston
- 4. Secondary Cup
- 5. Dust Seal
- 6. Stopper

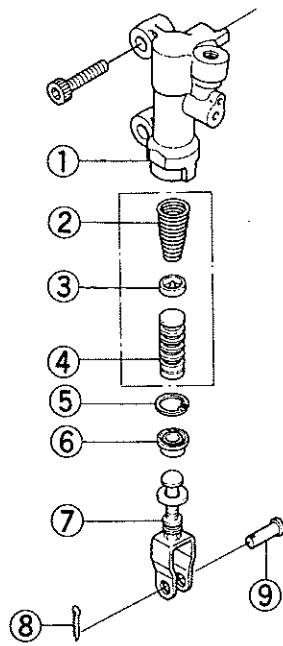
Rear Master Cylinder Disassembly Notes

- Remove the rear master cylinder from the right footpeg bracket.
- Slide the dust cover out of its place.
- Remove the stopper with a circlip pliers and the push rod.
- Then remove the piston and secondary cup, spring and primary cup.

NOTE

- Do not remove the secondary cup, from the piston since removal will damage it.

Rear Master Cylinder



1. Master Cylinder
2. Spring
3. Primary Cup
4. Piston and
Secondary Cup
5. Stopper
6. Dust Seal
7. Rod and Yoke
8. Cotter Pin
9. Pin Joint

Front Master Cylinder Assembly Notes

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION

○ Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Apply brake fluid to the removed parts and to the inner wall of the cylinder.
- Tighten the brake lever pivot bolt and tighten the locknut to the specified torque.

Rear Master Cylinder Assembly Notes

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

CAUTION

○ Except for the disc pads and disc; use only disc brake fluid, isopropyl alcohol, or ethyl alcohol, for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Take care not to scratch the piston or the inner wall of the cylinder.
- When assembling the rear master cylinder parts, they must be assembled correctly.

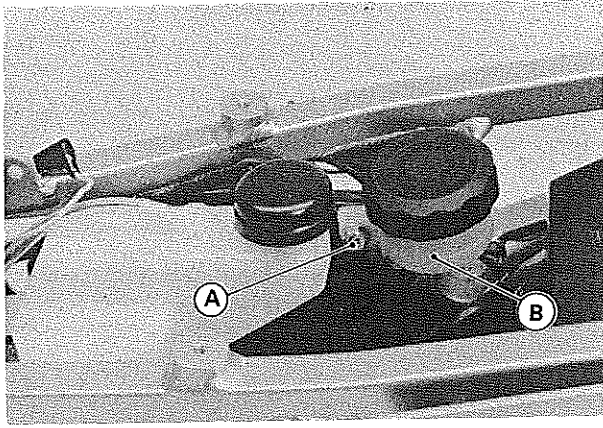
*Master Cylinder Inspection
(Visual Inspection)*

- Disassemble the front and rear master cylinders.
- Check that there are no scratches, rust or pitting on the inside of the master cylinder and on the outside of the piston.
- ★ If the master cylinder or piston shows any damage, replace them.
- Inspect the primary cups and secondary cups.
- ★ If a cup is worn, damaged, softened (rotted), or swollen, replace the piston assembly.
- ★ If fluid leakage is noted, the piston assembly should be replaced to renew the cup.
- Check the dust covers for damage.
- ★ If they are damaged, replace them.
- Check that the relief and supply ports are not plugged.
- ★ If the small relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.
- Check the piston return springs for any damage.
- ★ If the spring is damaged, replace the piston assembly.

Reservoir Disassembly Notes

- Remove the rear brake reservoir mounting bolt, and take the reservoir off the frame (see Rear Muffler Removal in Engine Top End).

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A. Bolt

B. Reservoir

- Take off the reservoir cap and diaphragm, and empty the brake fluid into a suitable container.
- Loosen the hose clamps, and pull the brake hose off the reservoir. Immediately wipe up any brake fluid that spills.

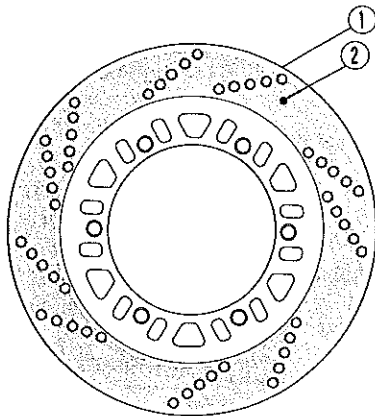
Reservoir Assembly Notes

- Fill the reservoir with fresh brake fluid, and bleed the brake line (see Bleeding the Brake).

Discs

Disc Wear

Measure the thickness of each disc at the point where it has worn the most. Replace the disc if it has worn past the service limit.



1. Brake Disc
2. Measuring Points

Front Disc Thickness

Standard	3.8 – 4.1 mm
Service Limit	3.5 mm

Rear Disc Thickness

Standard	5.8 – 6.1 mm
Service Limit	5.0 mm

Disc Cleaning

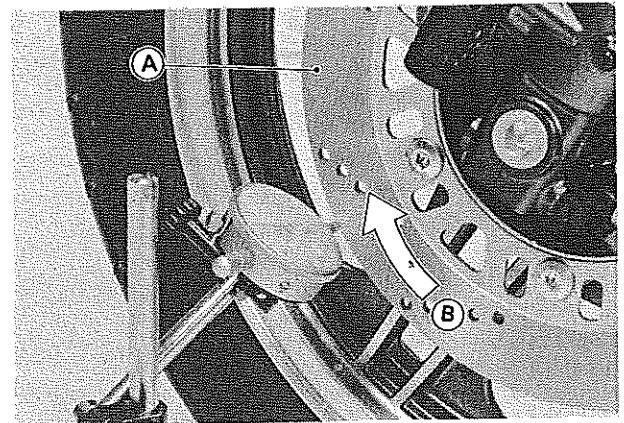
Poor braking can be caused by oil on the disc. Oil on the disc must be cleaned off with an oilless cleaning fluid such as trichloroethylene or acetone.

WARNING

- These cleaning fluid are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturers warnings.

Disc Warp

- Jack up the motorcycle so that the front wheel is off the ground (see Front Fork Air Pressure Adjustment in Suspension chapter).
- Turn the handlebar fully to one side.
- Set up a dial gauge against the front disc as shown, and measure disc runout.
- Remove the jack, and raise the rear wheel off the ground, and then measure the rear disc runout.
- If runout exceeds the service limit, replace the disc.



A. Brake Disc

B. Turn the disc by hand

Disc Runout

Standard	Under 0.2 mm
Service Limit	0.3 mm

Brake Fluid

Fluid Level Inspection

In accordance with the Periodic Maintenance Chart, inspect the brake fluid level in the front and rear brake fluid reservoirs.

- Check the brake fluid level in the reservoir.

NOTE

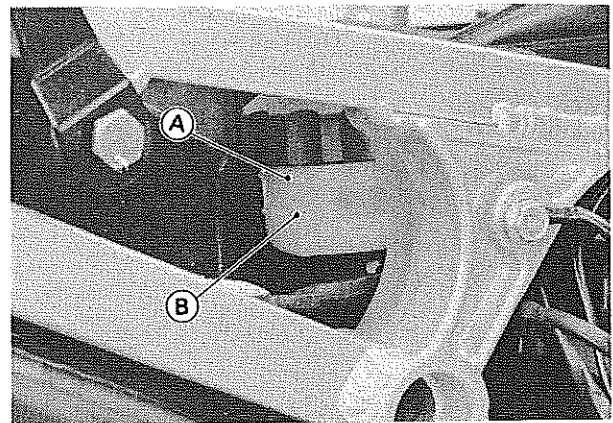
○ Hold the reservoir horizontal when checking brake fluid level.

- ★ The fluid level must be kept above the lower level lines. If the fluid level is under the lower level line, fill the reservoir to the upper level line in the reservoir.

WARNING

○ Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that already is in the reservoir are unidentified. After changing the fluid, use only the same type and brand of fluid thereafter. Mixing different types and brands of brake fluid lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.

Rear Brake Fluid Reservoir



A. Upper Level Line

B. Lower Level Line

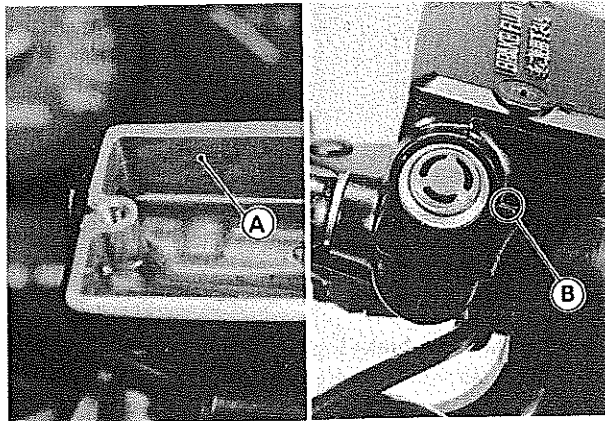
Brake Fluid Recommendation

Recommended fluids are given in the table below. If none of the recommended brake fluids are available, use extra heavy-duty brake fluid only from a container marked D.O.T.3.

Recommended Brake Fluid

- Atlas Extra Heavy Duty
- Shell Super Heavy Duty
- Taxaco Super Heavy Duty
- Wagner Lockheed Heavy Duty
- Castrol Girling – Universal
- Castrol GT (LMA)
- Castrol Disc Brake Fluid

Front Brake Fluid Reservoir



A. Upper Level Line

B. Lower Level Line

Brake Fluid Change

In accordance with the Periodic Maintenance Chart, change the brake fluid. The brake fluid should also be changed if it becomes contaminated with dirt or water.

- Remove the reservoir cap, and remove the rubber cap on the bleed valve on the caliper.
- Attach a clear plastic hose to the bleed valve, and run the other end of the hose into a container.
- Open the bleed valve (counterclockwise to open), and pump the brake lever or pedal until all the fluid is drained from the line.
- Close the bleed valve.
- Front brake: Since a dual disc brake is used, repeat the above 4 steps one more time for the other side.

11-14 BRAKES

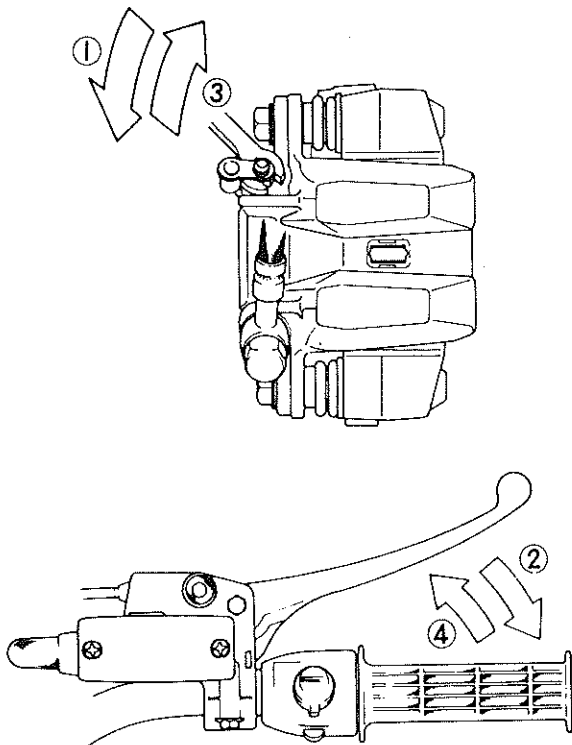
- Fill the reservoir with fresh brake fluid.
- Open the bleed valve, apply the brake by the brake lever or pedal, close the valve with the brake held applied, and then quickly release the lever or pedal. Repeat this operation until the brake line is filled and fluid starts coming out of the plastic hose.

NOTE

○ Replenish the fluid in the reservoir as often as necessary to keep it from running completely out.

- Front brake: Repeat the above 2 steps one more time for the other side.
- Bleed the air from the lines (continue with Bleeding the Brake).

Filling up the Brake Line



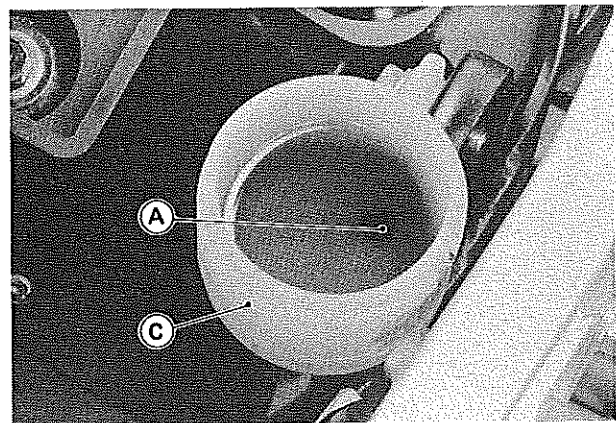
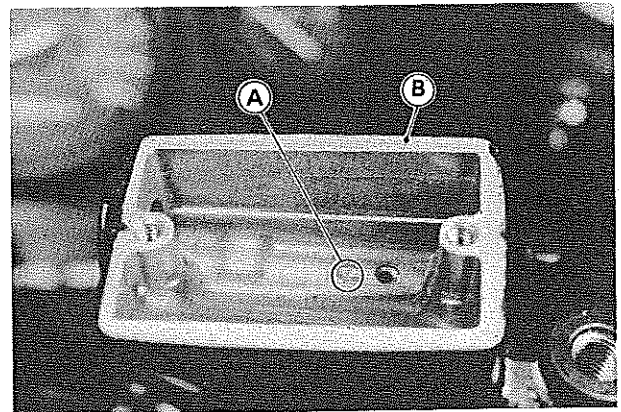
1. Open the bleed valve.
2. Apply the brake and hold it.
3. Close the bleed valve
4. Then release the brake suddenly.

Bleeding the Brake Line

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

Bleed the air from the brake whenever brake lever or pedal action feels soft or spongy, after the brake fluid is changed, or whenever a brake line fitting has been loosened for any reason.

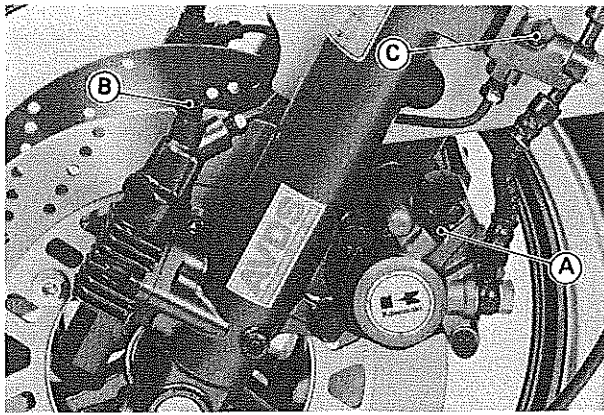
- Remove the reservoir cap, and check that there is plenty of fluid in the reservoir. The fluid level must be checked several times during the bleeding operation and replenished as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.
- With the reservoir cap off, slowly pump the brake lever or pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir. This bleeds the air from the master cylinder end of the line.



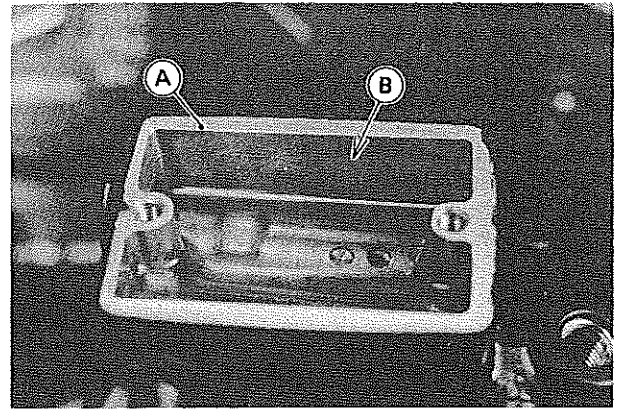
- A. Hole
B. Reservoir (Front)
C. Reservoir (Rear)

Bleeding the front brake line:

- Bleed the air from the front brake line, first using the bleed valves on the brake calipers and the antidive units, and then using the bleed valves on the junction blocks.



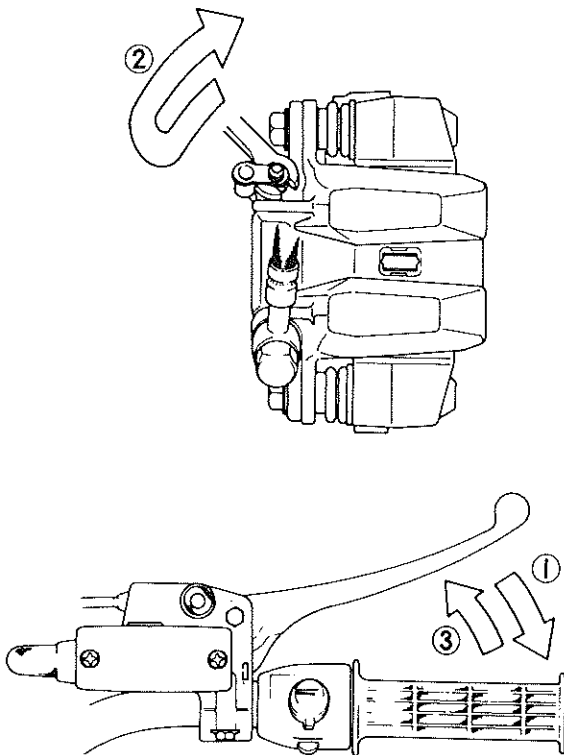
A. Bleed Valve (caliper)
 B. Bleed Valve (anti-dive unit)
 C. Bleed Valve (junction block)



A. Front Brake Reservoir B. Upper Level Line

- Repeat the previous step one more time for the other side.
- When air bleeding is finished, install the rubber cap(s) on the bleed valve, and check that the brake fluid is filled to the upper level line marked in the reservoir (handlebar turned so that the reservoir is level).

Bleeding the Brake Line



1. Hold the brake applied.
2. Quickly open and close the valve.
3. Release the brake.

Bleeding the rear brake line:

- Install the reservoir cap, and connect a clear plastic hose to the bleed valve at the caliper, running the other end of the hose into a container. Pump the brake pedal a few times until it becomes hard and then, holding the pedal pushed down, quickly open (turn counterclockwise) and close the bleed valve. Then release the pedal. Repeat this operation until no more air can be seen coming out into the plastic hose. Check the fluid level in the reservoir every so often, replenishing it as necessary.

WARNING

○ When working with the disc brake, observe the precautions listed below.

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.

11-16 BRAKES

7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE.**

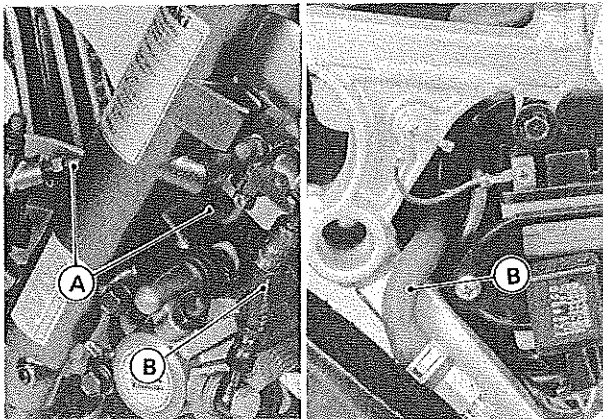
Brake Hose Replacement

- Pump the brake fluid out of the line as explained in the Brake Fluid Change in Brake Fluid Section.
- Remove the banjo bolts at both ends of the brake hose, and pull the hose off the motorcycle. Especially, for the brake hose between the rear master cylinder and the reservoir, loosen the clamps at both ends of the hose, and take off the hose.
- Install the new brake hose in its place, and tighten the banjo bolts to the specified torque, noting the following:
 - Use a new flat washer for each side of the fittings.

Brake Hoses

Brake Hose, Pipe Inspection

- The high pressure inside the brake line can cause fluid to leak or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it. Replace it if any cracks or bulges are noticed.
- The brake pipes which feed the brake fluid to the anti-dive units are made of plated steel, and will rust if the plating is damaged. Replace the pipe if it is rusted, cracked (especially check the fittings), or if the plating is badly scratched.



A. Brake Pipe

B. Brake Hose