CHAPTER TWELVE

BRAKES

The brake system on all models consists of a single disc on the front wheel and a drum brake on the rear. This chapter describes repair and replacement procedures for all brake components.

Table 1 contains the brake system torque specifications and **Table** 2 contains brake system specifications. **Tables 1-2** are located at the end of this chapter.

DISC BRAKES

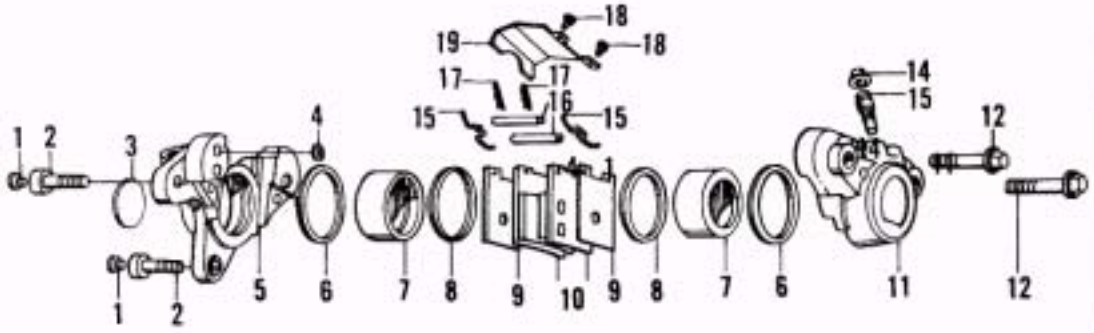
The disc brake is actuated by hydraulic fluid and is controlled by a hand lever that is attached to the front master cylinder. As the brake pads wear, the brake fluid level drops in the reservoir and automatically adjusts for wear.

When working on hydraulic brake systems, it is necessary that the work area and all tools be absolutely clean. Any tiny particles of foreign matter and grit in the caliper assembly or the master cylinder can damage the components. Also, sharp tools must not be used inside the caliper or on the piston. If there is any doubt about your ability to correctly and safely carry out major service on the brake components, take the job to a Suzuki dealer or brake specialist.

NOTE

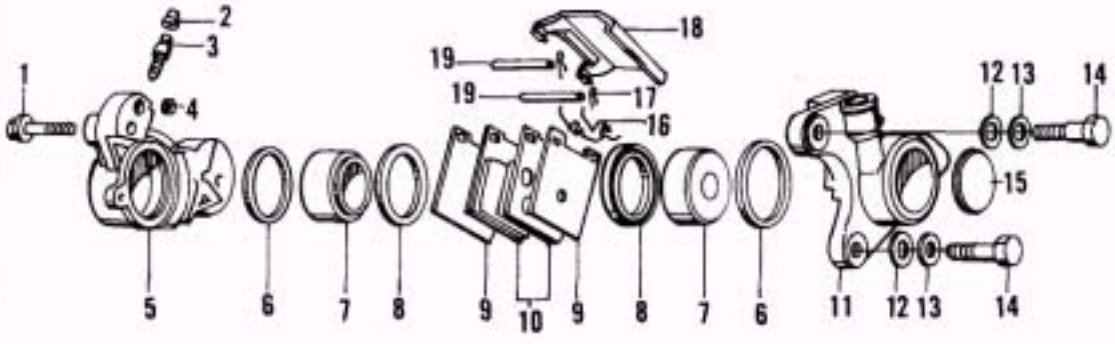
If you recycle your old engine oil ***never*** *add used brake fluid to the old engine oil. Most oil retailers who recycle old oil will not accept the oil if contaminated with other fluids (fork oil, brake fluid or any other type of petroleum based fluids).*

1 FRONT CALIPER (1986-1987 U.S. AND 1985-1986 U.K.)



1. **Bolt**
2. Cap
3. Bleed valve
4. O-ring
5. Inner body
6. Piston seal
7. Piston
8. **Dust seal**
9. Shim
10. Brake pads
11. Outer body
12. Washer
13. Lockwasher
14. **Bolt**
15. Trim cap
16. Spring
17. Clip
18. Cover
19. Pad pin

2 FRONT CALIPER (1988-ON U.S. AND 1987-ON U.K.)



1. Trim cap
2. Bolt
3. Trim cap
4. O-ring
5. Outer body
6. **Piston seal**
7. **Piston**
8. Dust seal
9. Shim
10. Brake pads
11. Inner body
12. Bolt
13. **Bleed valve**
14. Cap
15. Spring
16. Pad pin
17. Clip
18. Screw
19. **Cover**

Consider the following when servicing the disc brake system.

1. Disc brake components rarely require disassembly, so do not disassemble them unless necessary.

WARNING

Do not intermix silicone based (DOTS) brake fluid as it can cause brake component damage leading to brake system failure.

1. Use only DOT 3 or DOT 4 brake fluid from a sealed container.

3. Do not allow disc brake fluid to contact any plastic, painted or plated surfaces or surface damage will occur.

4. Always keep the master cylinder reservoir and spare cans of brake fluid closed to prevent dust or moisture from entering. If moisture enters the brake fluid it would result in brake fluid contamination and brake problems.

5. Use only disc brake fluid (DOT 3 or DOT 4) to wash parts. Never clean any internal brake compo nents with solvent or any other petroleum base cleaners.

6. Whenever *any* component has been removed from the brake system the system is considered "opened" and must be bled to remove air bubbles. Also, if the brake feels "spongy," this usually means there are air bubbles in the system and it must be bled. For safe brake operation, refer to *Bleeding the System* in this chapter.

CAUTION

Do not use solvents of any kind on the brake system's internal components. Solvents will cause the seals to swell and distort. When disassembling and cleaning brake components (except brake pads) use new DOT 3 or DOT 4 brake fluid.

WARNING

When working on the brake system, do ***not*** *inhale brake dust. It may contain asbestos, which can cause lung injury and cancer. Wear a face mask that meets OSHA requirements for trapping asbestos particles, and wash your hands and forearms thoroughly after completing the work.*

FRONT BRAKE PAD REPLACEMENT

There is no recommended mileage interval for changing the friction pads in the disc brakes. Pad wear depends greatly on riding habits and conditions. The pads should be checked for wear every 6 months and replaced when the wear indicator reaches the edge of the brake disc. To maintain an even brake pressure on the disc, always replace both pads in the caliper at the same time.

Disconnecting the hydraulic brake hose from the brake caliper is not necessary for brake pad replacement. Disconnect the hose only if the caliper assembly is going to be removed.

CAUTION

Check the pads more frequently when the wear line approaches the disc. On some pads the wear line is very close to the metal backing plate. If pad wear happens to be uneven for some reason the backing plate may come in contact with the disc and cause damage.

Front Brake Pad Replacement

Refer to the following illustrations for this procedure:

a. Figure 1: U.S. 1986-1987, U.K. 1985 and 1986.

b. Figure 2: U.S. 1988-on, U.K. 1987-on.

1. Remove the dust cover **(Figure** 3) from the brake caliper.
2. Remove the clips securing both pad pins.
3. Withdraw both pad pins and remove the pad springs.
4. Withdraw both brake pads and shims from the caliper assembly.

5. Check the brake pad friction surface **(Figure** 4) for oil contamination or fraying. Check the pad plates for cracks or other damage. If the brake pads appear okay, measure the friction thickness with a Vernier caliper. Replace the pads as a set if the friction thickness is worn to the service limit listed in **Table** 2 or less.

WARNING

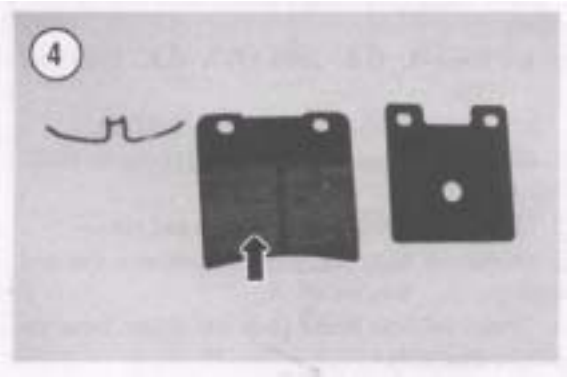
The brake pads must be replaced as a set. When servicing the front brakes, both the left- and right-hand brake pads must be replaced at the same time to maintain brake effectiveness

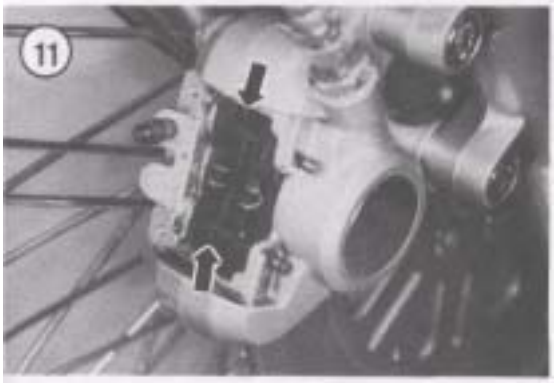
6. Clean the pad recess and the end of the pistons with a soft brush. Do not use solvent, a wire brush or any hard tool which would damage the cylinders or pistons.
7. Carefully remove any rust or corrosion from the disc.
8. Lightly coat the end of the pistons, the backs of the new pads *(not* the friction material), and the shims with disc brake lubricant.

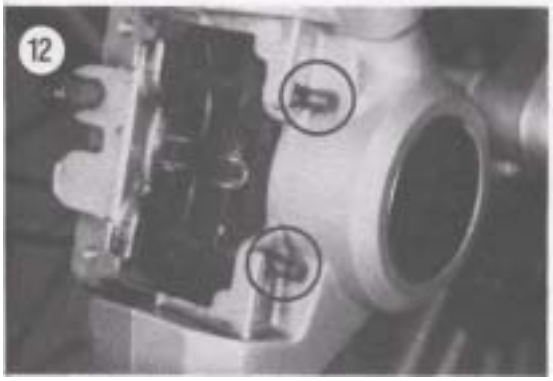
NOTE

When purchasing new pads, check with your dealer to make sure the friction compound of the new pad is compatible with the disc material. Remove any roughness from the backs of the new pads with a fine-cut file; blow them clean with compressed air.

9. When new pads are installed in the caliper, the master cylinder brake fluid level will rise as the caliper pistons are repositioned. Perform the follow ing:
   a. Clean the top of the master cylinder of all dirt and foreign matter.







b. Remove the screws securing the cover **(Figure** 5). Remove the cover and the diaphragm from the master cylinder and slowly push the caliper pistons into the caliper. Constantly check the reservoir to make sure brake fluid does not overflow. Remove brake fluid, if necessary, before it overflows.

c. The pistons should move freely. If they don't and there is evidence of them sticking in the cylinder, the caliper should be removed and serviced as described in this chapter.

10. Push the caliper pistons in all the way to allow room for the new pads.

11. Position a shim against the back of each brake pad and install the spring to hold the 2 parts together.

12. Install the inboard pad **(Figure 6)** into the caliper. Push it all the way down until it stops **(Figure** 7).

13. Install the outboard pad into the caliper **(Figure** 8). Push it all the way down until it stops **(Figure** 9).

14. Partially install both pad pins **(Figure 10).**

15. Push the ends of the outboard pad spring down, then push both pad pins through the shim and out board brake pad. Make sure the spring ends are below both pad pins. This is necessary for proper brake operation.

16. Push the ends of the inboard pad spring down, then push both pad pins through the shim and in board brake pad. Make sure the spring ends are below both pad pins **(Figure** 11). This is necessary for proper brake operation.

17. Rotate both pad pins until the clip holes **(Figure** 12) are facing up, then push both pad pins in until they stop.

18. Use needlenose pliers and install the clip **(Fig ure** 13) into the hole in the upper pad pin. Push the clip in until it seats completely on the pad pin.

19. Install the remaining clip **(Figure** 14) into the hole in the lower pad pin. Push the clip in until it seats completely on the pad pin.
20. Install the dust cap **(Figure** 3). Make sure it snaps into place otherwise it will fly off when you hit the first bump in the road.
21. Block up under the engine, then tie the back of the bike down or have an assistant sit on the pillion seat to raise the front wheel off the ground.
22. Spin the front wheel and activate the front brake lever as many times as it takes to refill the cylinders in the caliper and correctly locate the brake pads.

WARNING

Use brake fluid clearly marked DOT 3 or DOT4 from a sealed container. Other types may vaporize and cause brake failure. Always use the same brand name; do not intermix as many brands are not compatible. Do not intermix silicone based (DOT 5) brake fluid as it can cause brake component damage leading to brake system failure.

23. Refill the master cylinder reservoir, if necessary, to maintain the correct fluid level as seen through the viewing port **(Figure** 15) on the side. Install the diaphragm and cover. Tighten the screws securely.

WARNING

Do not ride the motorcycle until you are sure the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brake as described under ***Bleeding the System*** *in this chapter.*

24. Bed the pads in gradually for the first 10 days of riding by using only light pressure as much as possible. Immediate hard application will glaze the new friction pads and greatly reduce the effective ness of the brake.

FRONT BRAKE CALIPER

Removal

Refer to the following illustrations for this procedure:

a. Figure 1: U.S. 1986-1987, U.K. 1985 and 1986.

b. Figure 2: U.S. 1988-on, U.K. 1987-on.

It is not necessary to remove the front wheel in order to remove the caliper assembly.

CAUTION

Do not spill any brake fluid on the front fork or front wheel. Wash off any spilled brake fluid immediately, as it will destroy the finish. Use soapy water and rinse completely.

1. Clean the top of the master cylinder of all dirt and foreign matter.

2. If the caliper assembly is going to be disassem bled for service, perform the following:

NOTE

By performing Step 2, compressed air may not be necessary for piston removal during caliper disassembly.

a. Remove the brake pads as described in this chapter.

CAUTION

Do not allow the pistons to travel out far enough to come in contact with the brake disc. If this happens the pistons may scratch the disc during caliper removal.

b. Slowly apply the brake lever to push the pistons part way out of the caliper assembly for ease of removal during caliper service.

3. Loosen the screws securing the master cylinder cover **(Figure** 5). Slightly loosen the cover and the diaphragm. This will allow air to enter the reservoir and allow the brake fluid to drain out more quickly in the next step.
4. Hold onto the brake hose fitting (A, **Figure 16)** with an open-end wrench. Loosen the brake hose adaptor nut (B, **Figure 16)** securing the brake hose to the caliper assembly.
5. Remove the brake hose (A, **Figure** 17) and seal ing washer from the brake hose adaptor nut and let the brake fluid drain out into the container. Dispose of this brake fluid—never reuse brake fluid.
6. Loosen, then remove the bolts (B, **Figure** 17) securing the brake caliper assembly to the front fork.
7. Remove the caliper assembly (C, **Figure** 17) from the brake disc.
8. Place the loose end of the brake hose in a reclosable plastic bag **(Figure** 18) to prevent brake fluid from dribbling out.

Installation

1. Carefully install the caliper assembly onto the disc being careful not to damage the leading edge of the brake pads.
2. Install the bolts (B, **Figure** 17) securing the brake caliper assembly to the front fork and tighten to the torque specifications listed in **Table 1.**
3. Install the brake hose (A, **Figure** 17) and new sealing washer onto the caliper.
4. Screw the brake hose into the brake hose adaptor nut on the caliper.
5. Hold onto the brake hose fitting (A, **Figure 19)** with an open-end wrench. Tighten the brake hose adaptor nut (B, **Figure 19)** securing the brake hose to the caliper assembly. Tighten the brake hose adap tor nut securely.
6. Remove the master cylinder top cover and dia phragm.

WARNING

Use brake fluid clearly marked DOT 3 or DOT 4 from a sealed container. Other types may vaporize and cause

brake failure. Always use the same brand name; because some brands are not compatible. Do not intermix silicone-based (DOT 5) brake fluid as it can cause brake component damage leading to brake system failure.

7. If removed, install the brake pads as described in this chapter.
8. Tie the back of the bike down or have an assistant sit on the pillion seat to raise the front wheel off the ground.
9. Spin the front wheel several times and activate the front brake lever as many times as it takes to refill the cylinders in the caliper and correctly locate the pads.
10. Refill the master cylinder reservoir. Install the diaphragm and cover. Do not tighten the screws at this time.
11. Bleed the brake as described under *Bleeding the System* in this chapter.

WARNING

Do not ride the motorcycle until you are sure that the brakes are operating properly.

Front Caliper Rebuilding

Refer to the following illustrations for this procedure:

a. Figure 1: U.S. 1986-1987, U.K. 1985" and 1986.

b. Figure 2: U.S. 1988-on, U.K. 1987-on.

1. Remove the caliper- and brake pads as described in this chapter.
2. Remove the caliper housing bolts **(Figure** 20) securing the caliper inner body to the caliper outer body.
3. Separate the 2 caliper bodies.
4. Remove the O-ring seal **(Figure** 21) from the caliper inner body. Discard this O-ring seal as it must be replaced every time the caliper is disassembled.
5. Remove the dust seal **(Figure** 22) from each piston and discard both seals.

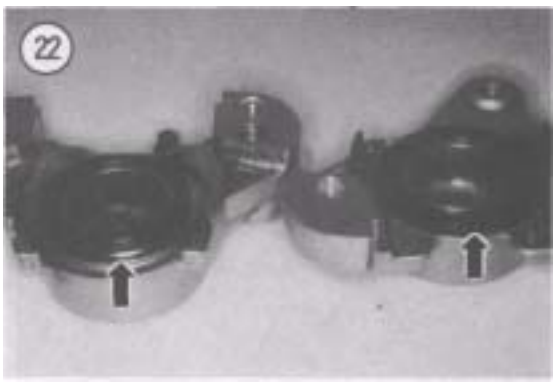
NOTE

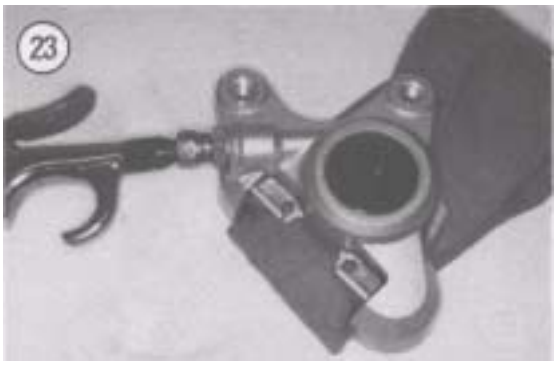
If the pistons were partially forced out of the caliper body during removal, . Steps 6-8 may not be necessary. If the piston or caliper bore is corroded or very dirty, additional compressed air may be necessary to completely remove the pistons.

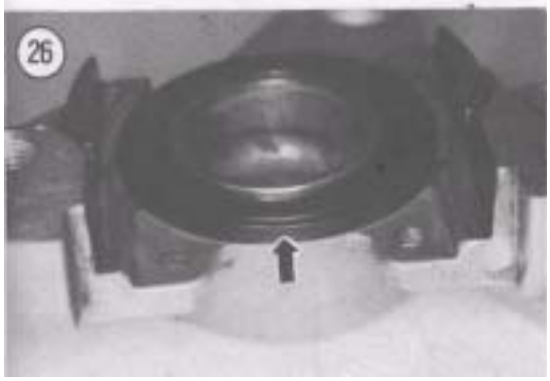
6. Place a shop cloth or piece of soft wood over the end of the piston.
7. Perform this step over and close to a workbench top. Hold the caliper body with the pistons facing away from you.

WARNING

In the next step, the piston may shoot out of the caliper body like a bullet. Keep







*your fingers out of the way. Wear shop gloves and apply air pressure gradually. Do **not** use high pressure air or place the air hose nozzle directly against the hydraulic line fitting inlet in the caliper body. Hold the air nozzle away from the inlet allowing some of the air to escape.*

8. Apply the air pressure in short spurts to the hydraulic fluid passageway or brake hose inlet **(Figure** 23) and force the piston out. Use a service station air hose if you don't have an air compressor.

CAUTION

In the following step, do not use a sharp tool to remove the dust and piston seals from the caliper cylinders. Do not damage the cylinder surface.

9. Use a piece of plastic or wood and carefully push the piston seal **(Figure** 24) in toward the caliper cylinder and out of its grooves. Remove the piston seal from both caliper halves and discard both seals.

10. Inspect the caliper as described in this chapter.

NOTE

Never reuse the old dust seals or piston seals. Very minor damage or age deterioration can make the seals useless.

11. Coat the new dust seals and piston seals with fresh DOT 3 or DOT 4 brake fluid.

12. Carefully install the new pistons seals in the grooves in each caliper cylinder. Make sure the seals are properly seated in their respective grooves **(Figure** 24).

13. Coat the pistons and caliper cylinders with fresh DOT 3 or DOT 4 brake fluid.

14. Position the pistons with the open sends facing out toward the brake pads and install the pistons into the caliper cylinders. Push the pistons in until they bottom out **(Figure** 25).

15. Install a hew dust seal **(Figure** 22) onto each piston. Make sure it seats properly on the piston and caliper **(Figure** 26).

16. Install a new O-ring seal **(Figure** 21) onto the caliper inner body.

17. Assemble the 2 caliper bodies and install the caliper housing bolts **(Figure** 20). Tighten the bolts to the torque specification listed in **Table 1.**

18. Install the caliper and brake pads as described in this chapter.

Front Caliper Inspection

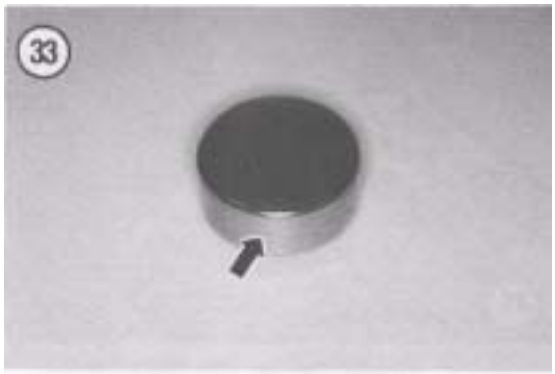
1. Inspect the piston seal groove in each caliper body **(Figure** 27) for damage. If damaged or cor roded, replace the caliper assembly.

2. Inspect each caliper body **(Figure** 28) for cracks or damage. Replace the caliper assembly if either is damaged.

3. Inspect the hydraulic fluid passageway **(Figure 29** and **Figure** 30) at the end of the caliper body and in the passageway in the base of the piston bore **(Figure** 31). Make sure they are clean and open. Apply compressed air to the openings and make sure they are clear. Clean out if necessary with fresh brake fluid.

4. Inspect the cylinder walls **(Figure** 32) and the pistons **(Figure** 33) for scratches, scoring or other damage. If either is rusty or corroded, replace either the pistons or the caliper assembly.

5. Measure the cylinder bore with a bore gauge or vernier caliper **(Figure** 34). Replace the brake cali per if the inside diameter(s) are worn to the service limit dimension listed in **Table** 2 or greater.



6. Measure the outside diameter of the pistons with a micrometer or vernier caliper **(Figure** 35). Replace the brake piston(s) if the outside diameter(s) are worn to the service limit dimension listed in **Table** 2 or less.

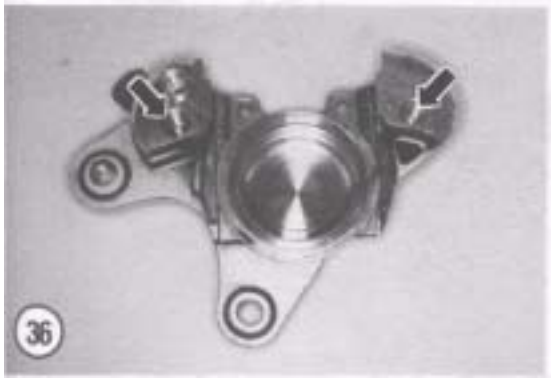
7. Inspect the caliper mounting bolt hole threads on the outer body **(Figure 36)** for wear or damaged. Clean up with a suitable size metric tap or replace the caliper assembly.

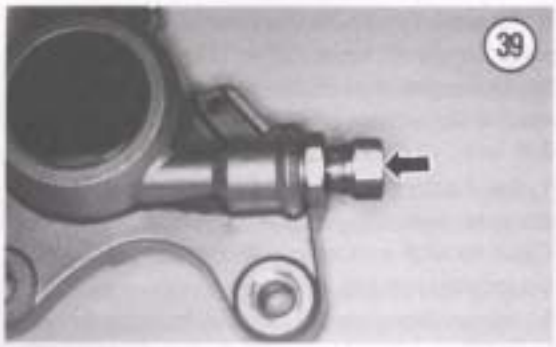
8. Inspect the caliper housing bolt holes on the outer body **(Figure** 37). If worn or damaged, replace the caliper assembly.

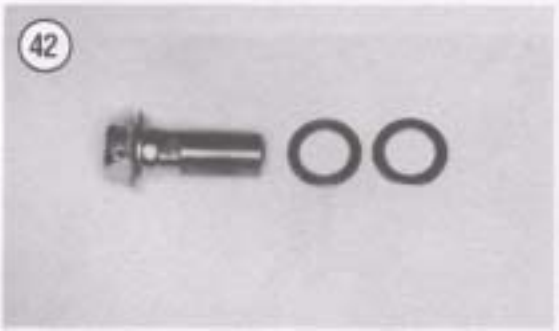
9. Remove the bleed screw **(Figure** 38). Make sure it is clean and open. Apply compressed air to the opening and make sure it is clear. Clean out if necessary with fresh brake fluid.

10. Remove the brake hose adaptor nut **(Figure 39)** from the caliper body. Make sure it is clean and open. Apply compressed air to the opening and make sure it is clear. Clean out if necessary with fresh brake fluid. Make sure the opening in the caliper is clean and open.

11. If serviceable, clean the caliper bodies with rubbing alcohol and rinse with clean brake fluid.



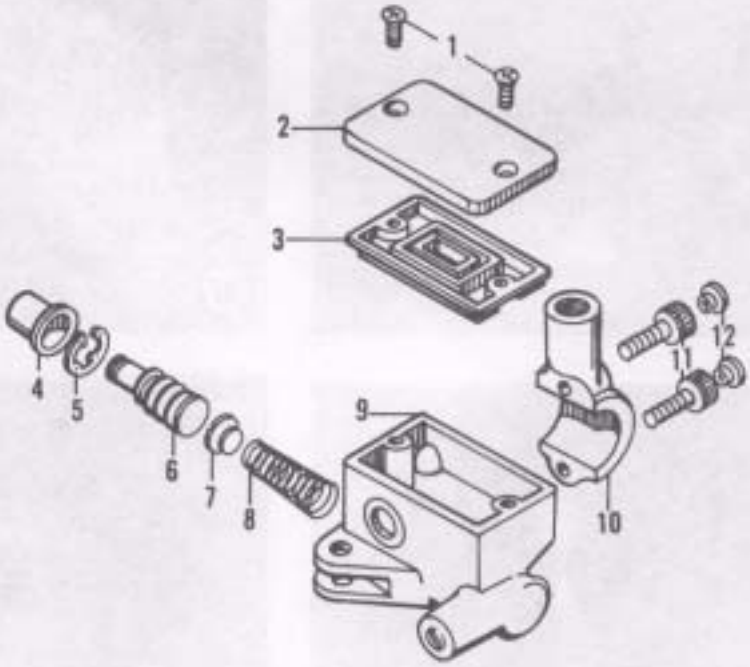




43

FRONT BRAKE MASTER CYLINDER

1. Screw
2. Cover
3. Diaphragm
4. Dust cap
5. Circlip
6. Piston
7. Primary cap
8. Spring
9. Body



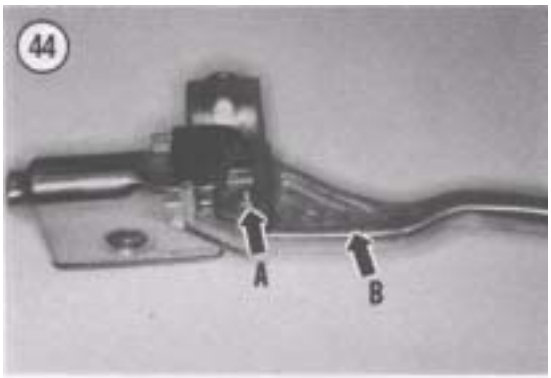
10. Clamp
11. Bolt
12. Trim cap

FRONT MASTER CYLINDER

Removal/Installation

CAUTION

Cover the surrounding areas with a heavy cloth or plastic tarp to protect them from accidental brake fluid spills. Wash brake fluid off any painted or plated surfaces or plastic parts immediately, as it will destroy the finish. Use soapy water and rinse completely.



1. Clean the top of the master cylinder of all dirt and foreign matter.
2. Remove the screws securing the cover (Figure 40). Remove the cover and the diaphragm.
3. If you have a shop syringe, draw all of the brake fluid out of the master cylinder reservoir.
4. Disconnect the brake light switch electrical con nector (A, Figure 41) from the brake switch.
5. Place a shop cloth under the union bolt to catch any spilled brake fluid that will leak out.
6. Unscrew the union bolt (B, Figure 41) securing the brake hose to the master cylinder. Don't lose the sealing washer on each side of the hose fitting. Tie the loose end of the hose up to the handlebar and cover the end to prevent the entry of moisture and foreign matter.
7. Unscrew the rear view mirror (C, Figure 41) from the master cylinder.
8. Remove the clamping bolts and clamp (D, Fig ure 41) securing the master cylinder to the handle bar.
9. Remove the master cylinder (E, Figure 41) from the handlebar.
10. Install by reversing these removal steps, noting the following:
    a. Install the master cylinder, clamp and bolts. Tighten the upper bolt first, then the lower to the torque specification listed in Table 1.
    b. Place a sealing washer on each side of the brake hose fitting (Figure 42) and install the union bolt.
    c. Tighten the union bolt to the torque specifica tion listed in Table 1.
    d. Bleed the front brakes as described under *Bleeding the System* in this chapter.

Disassembly

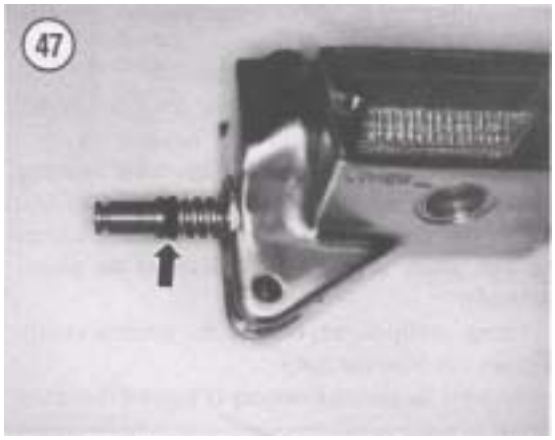
Refer to Figure 43 for this procedure.

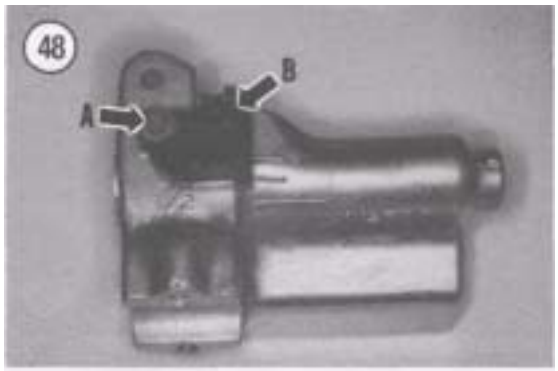
1. Remove the master cylinder as described in this chapter.
2. Remove the bolt and nut (A, Figure 44) securing the hand lever and remove the lever (B, Figure 44).
3. Remove the rubber dust boot (Figure 45) from the area where the hand lever actuates the piston assembly.
4. Using circlip pliers, remove the internal circlip (Figure 46) from the body.
5. Remove the piston assembly (Figure 47) and the spring.

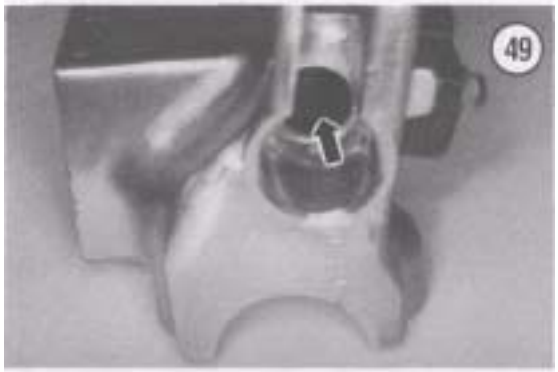
6. If necessary, remove the screw (A, **Figure** 48) securing the brake light switch to the master cylinder and remove the switch assembly (B, **Figure** 48).

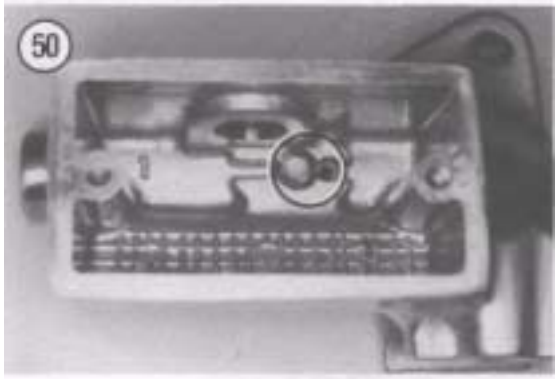
Inspection

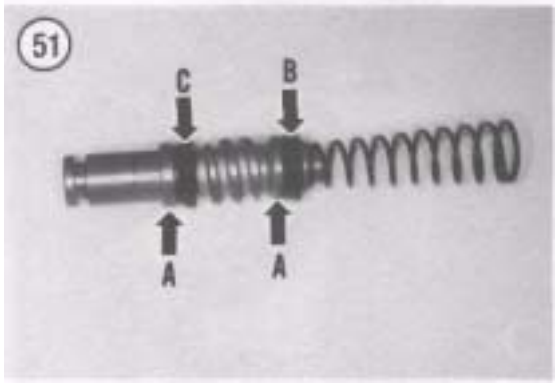
1. Clean all parts in fresh brake fluid.
2. Inspect the body cylinder bore **(Figure 49)** sur face for signs of wear and damage. If less than perfect, replace the master cylinder assembly. The body cannot be replaced separately.
3. Measure the cylinder bore with a bore gauge. Replace the master cylinder if the inside diameter is worn to the service limit dimension listed in **Table** 2 or greater.
4. Make sure the passage **(Figure** 50) in the bottom of the master cylinder body is clear. Clean out if necessary.
5. Inspect the piston contact surfaces (A, **Figure** 51) for signs of wear and damage. If less than perfect, replace the piston assembly.
6. Check the end of the piston **(Figure** 52) for wear caused by the hand lever. If worn, replace the piston assembly.
7. Measure the outside diameter of the piston with a micrometer **(Figure** 53). Replace the piston assem bly if the outside diameter is worn to the service limit dimension listed in **Table** 2 or less.
8. Replace the piston assembly if either the primary (B, **Figure** 51) or secondary cups (C, **Figure** 51) require replacement. The cups cannot be replaced separately.
9. Check the hand lever pivot lugs **(Figure** 54) on the master cylinder body for cracks or elongation. If damaged, replace the master cylinder assembly.

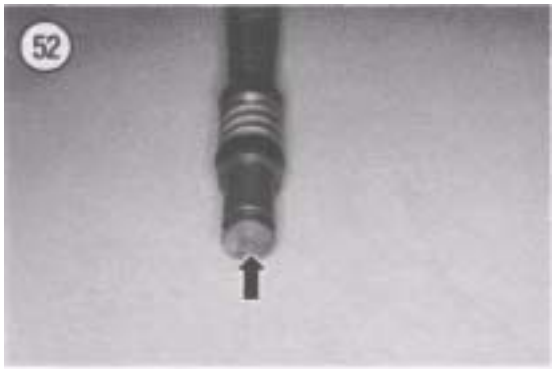












10. Inspect the pivot hole in the hand lever. If worn or elongated the lever must be replaced.

11. Inspect the threads in the bore **(Figure** 55) for the union bolt. If worn or damaged, clean out with a metric thread tap or replace the master cylinder assembly.

12. Inspect the O-ring seal on the hose connector. If starting to harden or deteriorate, replace the O-ring.

Assembly

1. Soak the new cups in fresh brake fluid for at least 15 minutes to make them pliable. Coat the inside of the cylinder bore with fresh hydraulic fluid prior to the assembly of parts.

CAUTION

When installing the piston assembly, do not allow the cups to turn inside out as they will be damaged and allow brake fluid leakage within the cylinder bore.

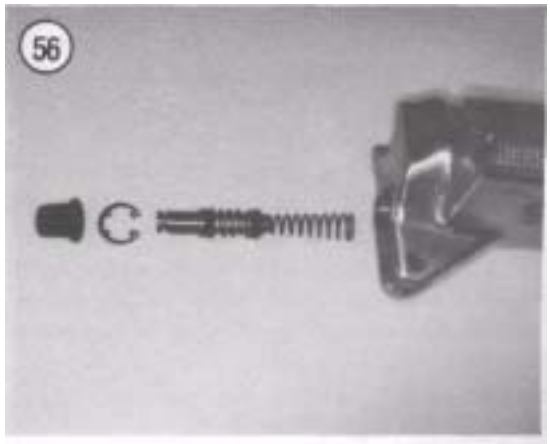
2. Position the spring with the tapered end going in last, facing toward the primary cup on the piston **(Figure 56).**

3. Install the spring, primary cup and piston assem bly into the cylinder **(Figure** 47). Push them in until they bottom out.

4. Install the circlip **(Figure 46)** and slide in the rubber boot **(Figure 45).**

5. Install the hand lever, the bolt and nut and tighten securely.

6. If removed, install the brake light switch and screws to the master cylinder. Tighten the screw securely.



7. Install the master cylinder as described in this chapter.

FRONT BRAKE HOSE REPLACEMENT

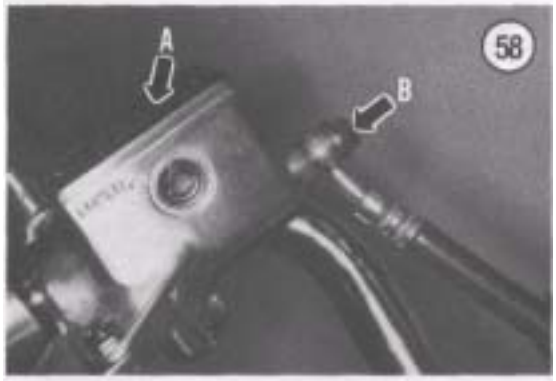
Suzuki recommends replacing the brake hose every four years or when it shows signs of cracking or damage.

Removal/Installation

CAUTION

Cover the surrounding area with a heavy cloth or plastic tarp to protect them from accidental brake fluid spills. Wash brake fluid off any painted or plated surfaces or plastic parts immediately, as it will destroy the finish. Use soapy water and rinse completely.

1. Remove the cap from the bleed screw **(Figure** 57) on the front caliper.
2. Attach a piece of hose to the bleed screw and place the loose end in a container.
3. Open the bleed screw and operate the master cylinder lever to pump the brake fluid out of the master cylinder, the brake hose and the caliper as sembly. Operate the lever until the system is clear of brake fluid.
4. Clean the top of the master cylinder of all dirt and foreign matter.
5. Remove the screws securing the cover (A, **Figure** 58). Remove the cover and the diaphragm.
6. If you have a shop syringe, draw all of any residual brake fluid from the master cylinder reser voir.
7. Unscrew the union bolt (B, **Figure** 58) securing the brake hose to the master cylinder. Don't lose the sealing washer on each side of the hose fitting.
8. At the brake caliper, hold onto the brake hose fitting (A, **Figure** 59) with an open-end wrench. Loosen the brake hose adaptor nut (B, **Figure** 59) securing the brake hose to the caliper assembly.
9. Remove the brake hose and sealing washer from the brake hose adaptor nut and let the brake fluid drain out into the container. Dispose of this brake fluid—never reuse brake fluid.
10. Unhook the brake hose from the clamp on the right-hand fork leg.



11. Pull the brake hose assembly up through the lower fork bridge **(Figure 60)** and the upper fork bridge **(Figure 61)** and remove the brake hose from the frame.

12. Install new hoses, sealing washers and union bolts in the reverse order of removal while noting the following:

a. Be sure to install new sealing washers **(Figure** 42) and in their correct positions.

b. Hold onto the brake hose fitting (A, **Figure** 62) with an open-end wrench. Tighten the brake hose adaptor nut (B, **Figure** 62) securing the brake hose to the caliper assembly. Tighten the brake hose adaptor nut securely.

c. Tighten the fittings and union bolts to the torque specifications listed in **Table 1.**

d. Bleed the brake as described under *Bleeding the System* in this chapter.

FRONT BRAKE DISC

Removal/Installation

1. Remove the front wheel as described in Chapter Ten.

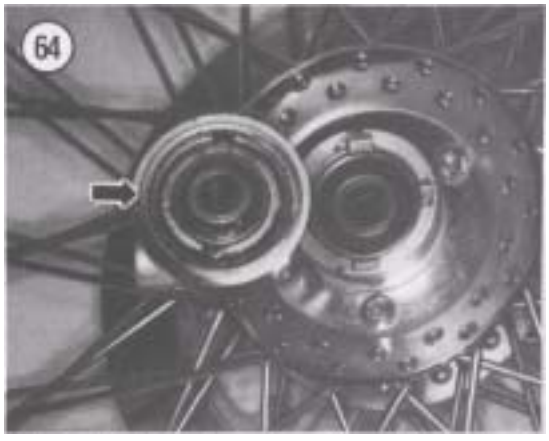
NOTE

Place a piece of wood or vinyl tube in the caliper in place of the disc. This way, if the brake lever is inadvertently squeezed the pistons will not be forced out of the cylinders. If this does happen, the caliper might have to be disassembled to reseat the pistons and the system will have to be bled. By using the wood or vinyl tube, bleeding the system is not necessary when installing the wheel.

CAUTION

Do not set the wheel down on the disc surface, as it may get scratched or warped. Set the wheel on 2 blocks of wood ***(Figure 63).***

2. Remove the speedometer housing **(Figure 64)** from the left-hand side.



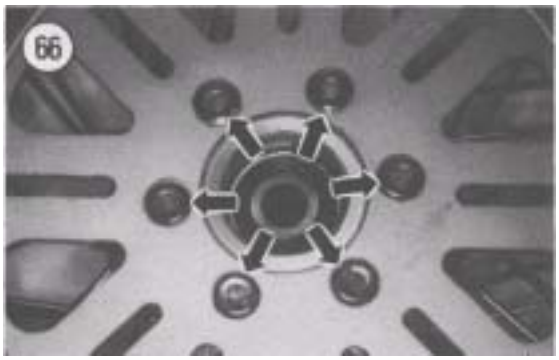
3. Turn the wheel over and remove the side collar **(Figure** 65) from the right-hand side.
4. Remove the bolts **(Figure 66)** securing the brake disc to the hub and remove the disc.
5. Install by reversing these removal steps, noting the following:.

a. Apply blue Loctite (No. 271) to the disc mount ing bolts prior to installation.
b. Tighten the disc mounting bolts to the torque specifications listed in **Table 1.**

Inspection

It is not necessary to remove the disc from the wheel to inspect it. Small marks on the disc are not important, but radial scratches deep enough to snag a fingernail reduce braking effectiveness and increase brake pad wear. If these grooves are found, the disc should be replaced.

1. Measure the thickness of the disc at several loca tions around the disc with a micrometer **(Figure** 67) or vernier caliper. The disc must be replaced if the thickness in any area is less than that specified in **Table 2.**
2. Make sure the disc bolts are tight prior to running this check. Check the disc runout with a dial indica tor as shown in **Figure 68.** Slowly rotate the wheel and watch the dial indicator. If the runout exceeds that listed in **Table** 2 the disc(s) must be replaced.
3. Clean the disc **(Figure 69)** of any rust or corro sion and wipe clean with lacquer thinner. Never use an oil-based solvent that may leave an oil residue on the disc.



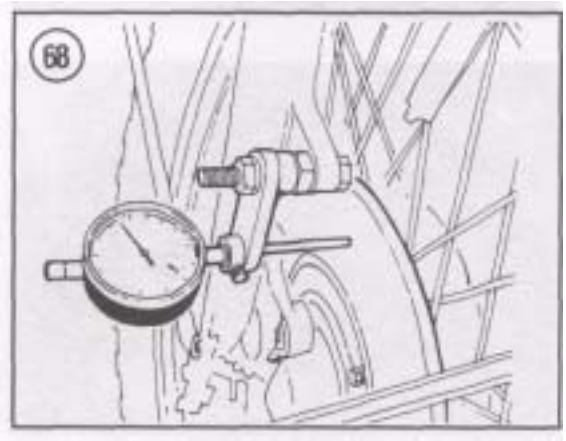
BLEEDING THE SYSTEM

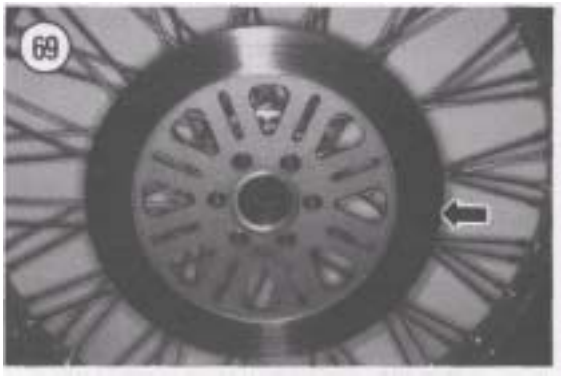
This procedure is not necessary unless the brakes feel spongy, there has been a leak in the system, a component has been replaced or the brake fluid has been replaced.

1. Remove the dust cap from the bleed valve **(Fig ure** 70) on the caliper assembly.
2. Connect a piece of clear tubing to the bleed valve on the caliper assembly.

CAUTION

Cover the wheel with a heavy cloth or plastic tarp to protect it from the acci dental spilling of brake fluid. Wash any brake fluid off of any plastic, painted or





plated surface immediately; as it will destroy the finish. Use soapy water and rinse completely.

3. Clean the top cover or cap of the master cylinder of all dirt and foreign matter.
4. Remove the screws securing the cover **(Figure** 71). Remove the cover and the diaphragm.
5. Fill the reservoir almost to the top lip; install the diaphragm and the cover, or cap, loosely. Leave the cover, or cap, in place during this procedure to prevent the entry of dirt.
6. Place the other end of the tube into a clean con tainer.
7. Fill the container with enough fresh brake fluid to keep the end submerged.

WARNING

Use brake fluid from a sealed container marked DOT 3 or DOT 4 only (specified for disc brakes). Other types may vaporize and cause brake failure. Do not intermix different brands or types as they may not be compatible. Do not intermix a silicone based (DOT 5) brake fluid as it can cause brake component damage leading to brake system failure.

NOTE

During this procedure, it is very important to check the fluid level in the brake master cylinder reservoir often. If the reservoir runs dry, you'll introduce more air in the system which will require starting over.

8. If the master cylinder was drained, it must be bled first as follows:
   a. Remove the union bolt (A, **Figure** 72) and hose from the master cylinder.
   b. Slowly apply the brake lever (B, **Figure** 72) several times while holding your thumb over the opening in the master cylinder and perform the following:
   c. With the lever applied, slightly release your thumb pressure. Some of the brake fluid and air bubbles will escape.
   d. Apply thumb pressure and pump lever once more.
   e. Repeat this procedure until you can feel resis tance at the lever.
9. Quickly reinstall the hose, sealing washers and the union bolt. Refill the master cylinder.

10. Tighten the union bolt and pump the lever again and perform the following:

a. Loosen the union bolt 1/4 turn. Some brake fluid and air bubbles will escape.

b. Tighten the union bolt and repeat this proce dure until no air bubbles escape.

11. Tighten the union bolts to the torque specifica tion listed in Table 1.

12. Slowly apply the brake lever several times as follows:

a. Pull the lever in and hold it in the applied position.

b. Open the bleed valve about one-half turn. Al low the lever, or pedal, to travel to its limit.

c. When this limit is reached, tighten the bleed valve.

13. As the fluid enters the system, the level will drop in the reservoir. Maintain the level to just about the top of the reservoir to prevent air from being drawn into the system.

14. Continue to pump the lever and fill the reservoir until the fluid emerging from the hose is completely free of bubbles.

NOTE

Do not allow the reservoir to empty during the bleeding operation or more air will enter the system. If this occurs, the entire procedure must be repeated.

NOTE

If you are having trouble getting all of the bubbles out of the system, refer to the Reverse Flow Bleeding at the end of this section.

15. Hold the lever in, tighten the bleed valve, re move the bleed tube and install the bleed valve dust cap.

16. If necessary, add fluid to correct the level in the reservoir.

17. Install the diaphragm and the cover.

18. Test the feel of the brake lever, or pedal. It should be firm and should offer the same resistance each time it is operated. If it feels spongy, it is likely that there is still air in the system and it must be bled again. When all air has been bled from the system and the fluid level is correct in the reservoir, double-check for leaks and tighten all fittings and connec tions.

WARNING

Before riding the bike, make certain that the brakes are operating correctly. Spin the front wheel and apply the lever several times. The wheel must come to a complete stop each time.

19. Test ride the bike slowly at first to make sure that the brakes are operating properly.

Reverse Flow Bleeding

This bleeding procedure can be used if you are having a difficult time freeing the system all of bubbles.

Using this procedure, the brake fluid will be forced into the system in a reverse direction. The fluid will enter the caliper, flow through the brake hose and into the master cylinder reservoir. If the system is already filled with brake fluid, the existing fluid will be flushed out of the top of the master cylinder by the new brake fluid being forced into the caliper. Siphon the fluid from the reservoir, then hold a shop cloth under the master cylinder reservoir to catch any addition fluid that will be forced out.

A special reverse flow tool called the EZE Bleeder is available or a home made tool can be fabricated for this procedure.

To make this home made tool, perform the following:

NOTE

The brake fluid container must be plastic—not metal. Use vinyl tubing of the correct inner diameter to ensure a tight fit on the caliper bleed valve.

a. Purchase a 12 oz. (345 ml) *plastic* bottle of DOT 3 or DOT 4 brake fluid.

b. Remove the cap, drill an appropriate size hole and adapt a vinyl hose fitting onto the cap.

c. Attach a section of vinyl hose to the hose fitting on the cap and secure it with a hose clamp. This joint must be a tight fit as the plastic brake fluid bottle will be squeezed to force the brake fluid out past this fitting and through the hose.

d. Remove the moisture seal from the plastic bot tle of brake fluid and screw the cap and hose assembly onto the bottle.

1. Remove the dust cap from the bleed valve (Figure 70) on the caliper assembly.

2. Clean the top cover of the master cylinder of all dirt and foreign matter.
3. Remove the screws securing the cover **(Figure** 71). Remove the cover and the diaphragm.
4. Attach the vinyl hose to the bleed valve on the caliper. Make sure the hose is tight on the bleed valve.
5. Open the bleed valve and squeeze the plastic bottle forcing this brake fluid into the system.

NOTE
If necessary, siphon brake fluid from the reservoir to avoid overflow of fluid.

6. Observe the brake fluid entering the master cyl inder reservoir. Continue to apply pressure from the tool, or bottle, until the fluid entering the reservoir is free of all air bubbles.
7. Close the bleed valve and disconnect the bleeder or hose from the bleed valve.
8. Install the dust cap onto the bleed valve on the caliper.
9. At this time the system should be free of bubbles. Apply the brake lever and check for proper brake operation. If the system still feels spongy, perform the typical bleeding procedure in the beginning of this section.

REAR DRUM BRAKE

Pushing down on the brake foot pedal pulls the rod, or cable, pulling the brake arm that in turn rotates the camshaft. This forces the brake shoes out into contact with the brake drum.

Pedal free play must be maintained to minimize brake drag and premature brake wear and maximize braking effectiveness. Refer to Chapter Three for complete adjustment procedure.

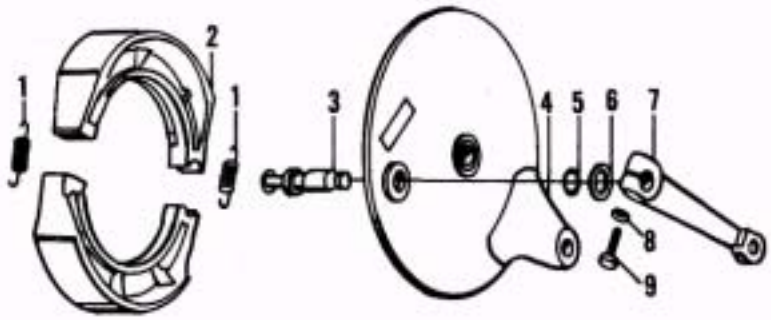
Disassembly Refer to **Figure** 73 for this

procedure.

WARNING
When working on the brake system, do not inhale brake dust. It may contain asbestos, which can cause lung injury and cancer. Wear a face mask that meets OSHA requirements for trapping asbestos particles, and wash your hands and

73

REAR DRUM BRAKE



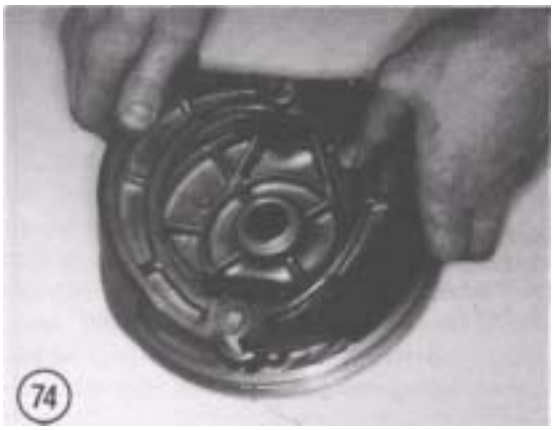
1. **Return spring**
2. **Brake shoes**
3. **Camshaft**
4. **Brake panel**
5. **O-ring**
6. **Dust seal**
7. **Brake arm**
8. **Washer**
9. **Bolt**

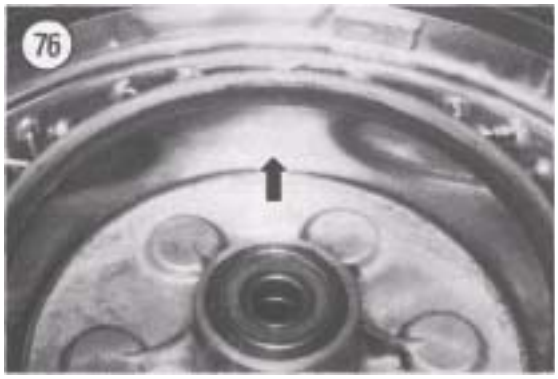
forearms thoroughly after completing the work.

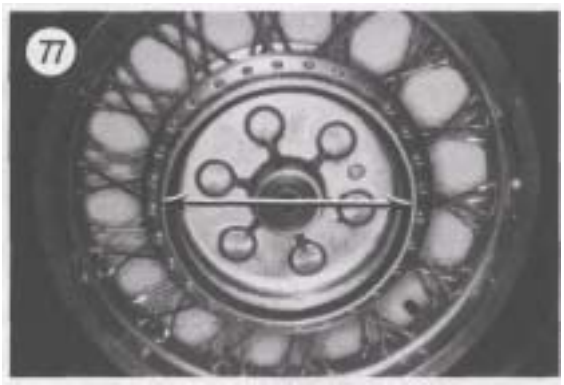
1. Remove the rear wheel as described in Chapter Eleven.
2. Pull the brake assembly straight up and out of the brake drum.
3. Carefully pull up on both brake shoes in a V-formation **(Figure** 74) and remove the brake shoes and return springs as an assembly.
4. Disconnect the return springs from the brake shoes.
5. If necessary, remove the bolt **(Figure** 75) securing the brake arm and remove the brake arm, spring, washer and O-ring. Withdraw the camshaft from the backing plate.

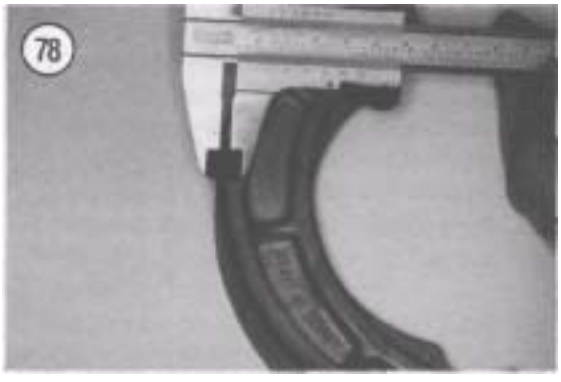
Inspection

1. Thoroughly clean and dry all parts except the brake linings.
2. Check the contact surface of the drum for scoring **(Figure** 76). If there are grooves deep enough to snag your fingernail the drum should be reground.
3. Measure the inside diameter of the brake drum **(Figure** 77). If the measurement is greater than the service limit listed in **Table** 2, either the rear hub or the rear wheel must be replaced.
4. If the drum can be turned and still stay within the maximum service limit diameter, the linings will have to be replaced and the new ones arced to conform to the new drum contour.
5. Measure the brake lining thickness with a vernier caliper **(Figure** 78). They should be replaced if the









lining portion is worn to the service limit dimension or less. Refer to specifications listed in **Table 2.**

6. Inspect the linings **(Figure** 79) for imbedded foreign material. Dirt can be removed with a stiff wire brush. Check for any traces of oil or grease; if they are contaminated they must be replaced.

7. Inspect the brake shoe assemblies **(Figure** 80) for wear, cracks or other damage. Replace as a set if necessary.

8. Inspect the cam lobe and pivot pins **(Figure** 81) for wear or corrosion. Minor roughness can be re moved with fine emery cloth.

9. Inspect the backing plate **(Figure** 82) for wear, cracks or other damage. Replace if necessary.

10. Inspect the rear axle bushing **(Figure** 83) in the backing plate for wear, scoring or other damage. Replace the backing plate if necessary, the bushing cannot be replaced.

11. Inspect the brake shoe return springs for wear. If they are stretched, they will not fully retract the brake shoes. Replace as necessary.

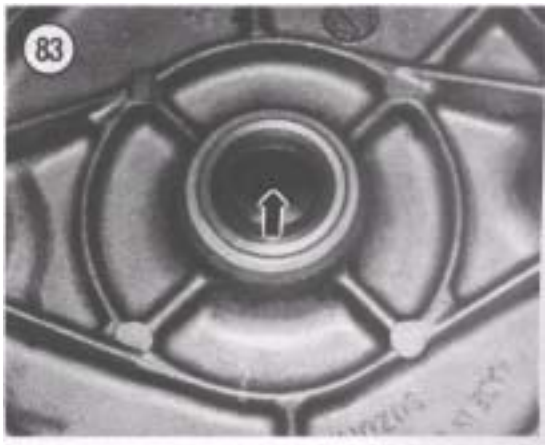
Assembly

1. If removed, grease the camshaft with a light coat of molybdenum disulfide grease. Install the cam into the backing plate from the backside.

2. From the outside of the backing plate install a new O-ring and washer onto the camshaft.

3. Install the spring and the camshaft. When install ing the brake arm onto the camshaft, align the gap in the arm with the dimple on the camshaft (A, **Figure 84).**

4. Index the spring onto the brake arm (B, **Figure** 84) as shown.



5. Install and tighten the bolt to the torque specifi cation listed in **Table 1.**
6. Grease the camshaft and pivot post **(Figure 81)** with a light coat of molybdenum disulfide grease; avoid getting any grease on the brake backing plate where the brake linings may come in contact with it.
7. Assemble the return springs onto the brake shoes.
8. Hold the brake shoes in a "V" formation with the return springs attached **(Figure** 74) and snap them into place on the brake backing plate. Make sure they are firmly seated on it **(Figure 85).**
9. Install the brake panel assembly into the brake drum.
10. Install the rear wheel as described in Chapter Eleven.
11. Adjust the rear brake as described in Chapter Three.

REAR BRAKE PEDAL AND LINKAGE

Removal/Installation (Rod Type)

Refer to **Figure 86** for this procedure.

NOTE

The brake pedal and rod link No. 2 are attached to the footpeg assembly and come off as an assembly. All other components of the rear brake pedal assembly are attached to the frame. The 2 different assemblies are covered separately in this procedure.

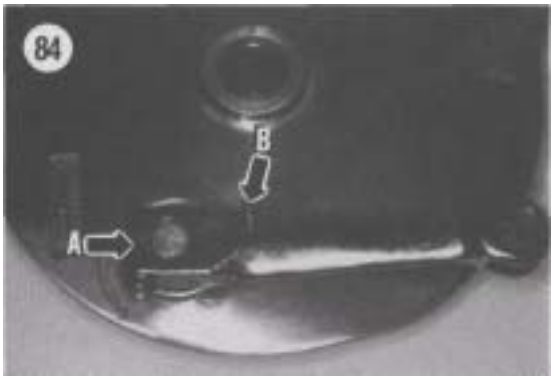
Brake pedal

1. Place wood block(s) under the engine to support the bike securely. The sidestand is part of the front footpeg assembly and cannot be used to support the bike.
2. Remove the clips from the bolts securing the front footpeg assembly to the frame.
3. Remove the bolts and lower the footpeg assem bly down.
4. Remove the cotter pin, washer and pivot pin, then unhook the rod link No. 2 from the brake pedal link No. 2 arm.
5. Remove the cotter pin, washer and pivot pin securing the rod link No. 2 to the brake pedal link No. 1 arm. Remove the rod link No. 2.
6. Remove the cotter pins, washers and pivot pins securing the rod link No. 1 to the brake pedal link No. 1 arm and to the brake pedal. Remove the rod link No. 1.
7. Remove the cotter pin and cap securing the brake pedal to the pivot post on the footpeg assembly and remove the brake pedal.
8. Install by reversing these removal steps, noting the following:

a. Apply clean engine oil to all pivot areas prior to installing any parts and again after all parts have been installed.

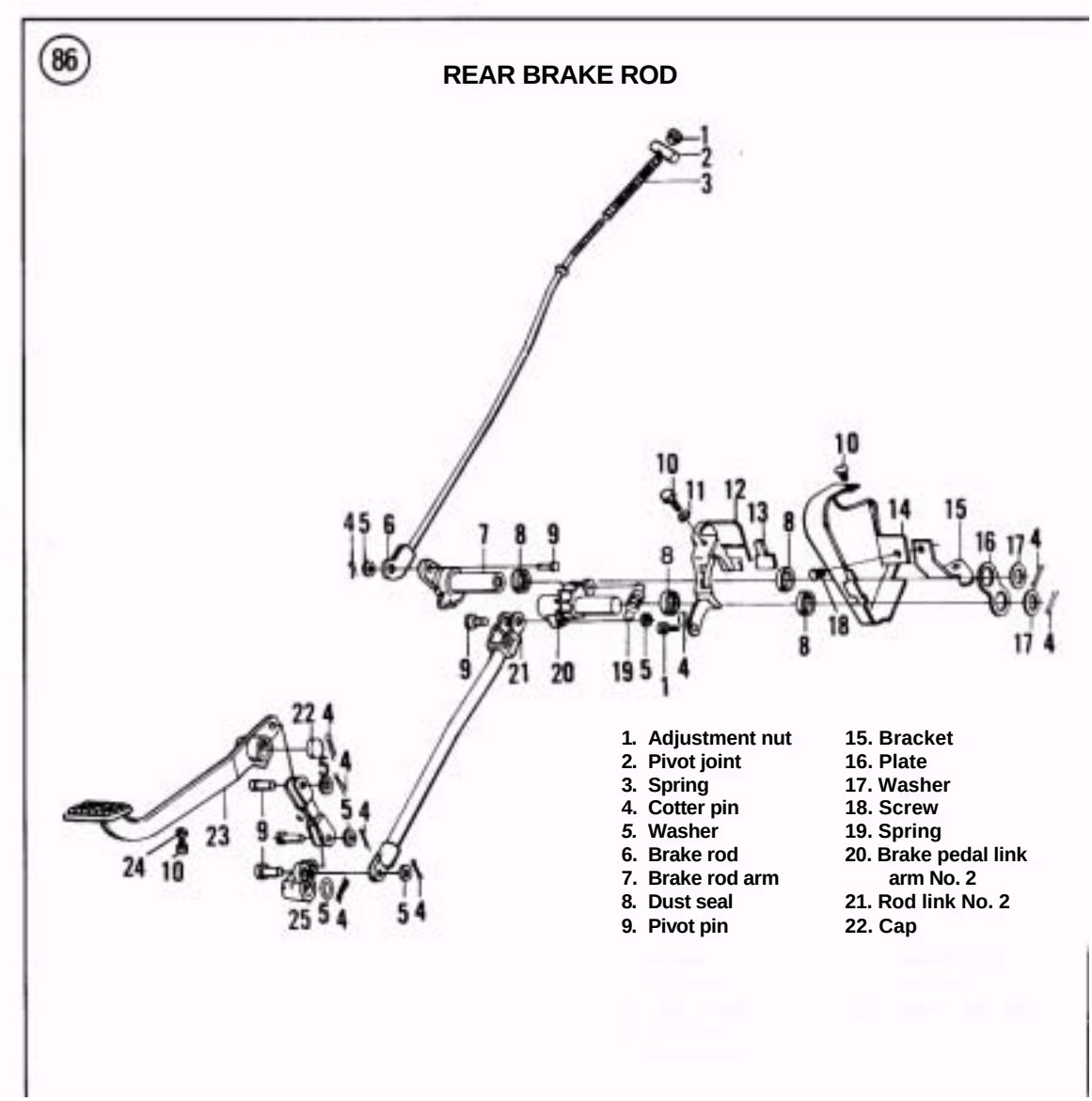
b. Always install new cotter pins—never reuse a cotter pin as the ends may break off and the cotter pin could fall out disabling the brake system.

c. Tighten the bolts securing the footpeg assem bly to the torque specification listed in **Table 1** and install the clips on the 2 outboard bolts on each side.



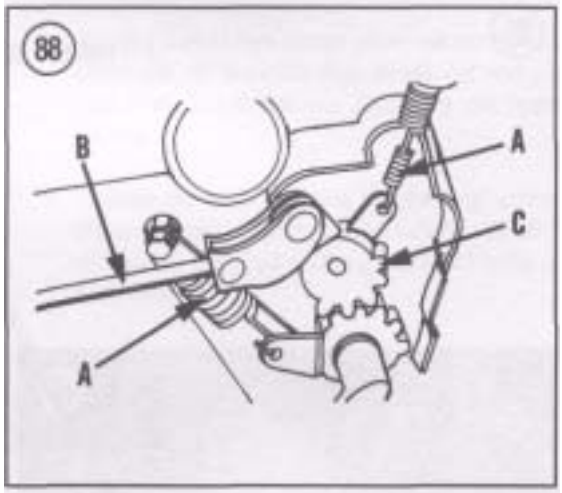
Brake pedal linkage

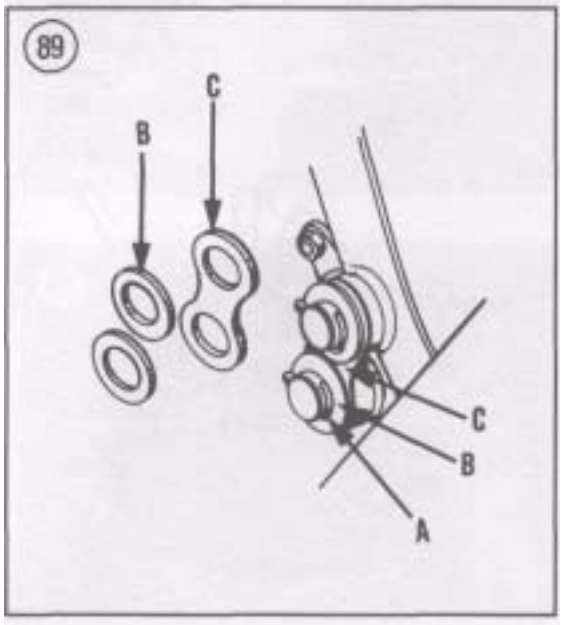
1. Place wood block(s) under the engine to support the bike securely. The sidestand is part of the front footpeg assembly and cannot be used to support the bike.
2. Remove the clips from the bolts securing the front footpeg assembly to the frame.
3. Remove the bolts and lower the footpeg assembly down.
4. Remove the exhaust system for the front cylinder as described under *Exhaust System Removal!Installation* in Chapter Seven.
5. Remove the battery case as described under *Battery Case Removal/Installation* in Chapter Eight.
6. Remove the regulator/rectifier as described under *Regulator/Rectifier Removall/Installation* in Chapter Eight.
7. Completely unscrew the adjustment nut **(Figure** 87) on the brake rod.
8. Push down on the brake pedal and remove the brake rod from the pivot joint in the brake arm. With the spring still in place on the rod, install the pivot joint onto the brake rod and reinstall the adjustment nut to avoid misplacing the small parts.



10. Screw
11. Washer
12. Outer cover
13. Grommet
14. Inner cover
23. Brake pedal
24. Locknut
25. Brake pedal link arm No. 1

9. Remove the cotter pin, washer and pivot pin, then unhook the rod link No. 2 from the brake pedal link No. 2 arm.
10. Remove the bolts and washers securing the outer cover and remove the outer cover.
11. Unhook the springs (A, **Figure** 88) from the brake rod arm and brake pedal link No. 2 arm.
12. Remove the cotter pin, washer and pivot pin, then unhook the brake pedal rod (B, **Figure** 88) from the brake rod arm (C, **Figure** 88). Remove the brake rod arm from the frame.
13. To remove the brake rod arm and the brake pedal link No. 2 arm from the frame, perform the following:
   a. Remove the cotter pins (A, **Figure 89),** washers (B, **Figure** 89) and the plate (C, **Figure 89)** from the backside of the pivot pins.
   b. Withdraw the brake rod arm and the brake pedal link No. 2 arm from the frame receptacles.
14. Install by reversing these removal steps, noting the following:
   a. Apply clean engine oil to all pivot areas prior to installing any parts and again after all parts have been installed.
   b. When installing the brake rod arm and the brake pedal link No. 2 arm into the frame receptacles; align the punch mark on both parts. This is necessary for proper brake operation.
   c. Always install new cotter pins—never reuse a cotter pin, because the ends may break off allowing the cotter pin to fall out, disabling the brake system.
   d. Tighten the bolts securing the footpeg assembly to the torque specification listed in **Table** 2 and install the clips on the 2 outboard bolts on each side.
   e. Adjust the rear brake as described in Chapter Three.

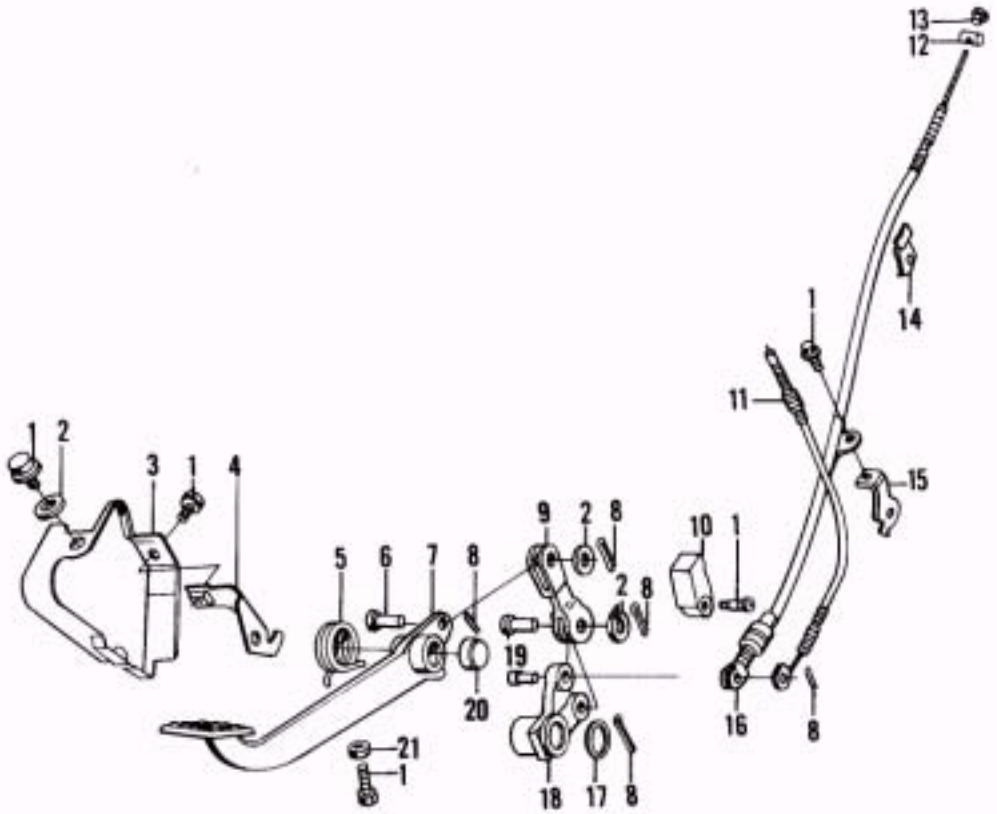




Removal/Installation (Cable Type)

Refer to **Figure 90** for this procedure. 1. Place wood block(s) under the engine to support the bike securely. The sidestand is part of the front footpeg assembly and cannot be used to support the bike.

REAR BRAKE CABLE



1. **Bolt**
2. Washer
3. Cover
4. Bracket
5. Spring
6. Pivot pin
7. Brake pedal
8. Cotter pin
9. Brake pedal link
10. Pad
11. Brake light switch cable
12. Pivot joint
13. Adjustment nut
14. Clamp
15. Clamp
16. Brake pedal cable
17. Washer
18. Brake pedal arm
19. Pivot pin
20. Cap
21. Locknut

2. Completely unscrew the adjustment nut **(Figure** 87) on the end of the brake cable.

3. Push down on the brake pedal and remove the brake rod from the pivot joint in the brake arm. Install the pivot joint onto the brake cable and rein stall the adjustment nut to avoid misplacing the small parts.

4. Remove the brake cable from the receptacle **(Fig ure 91)** on the brake panel.

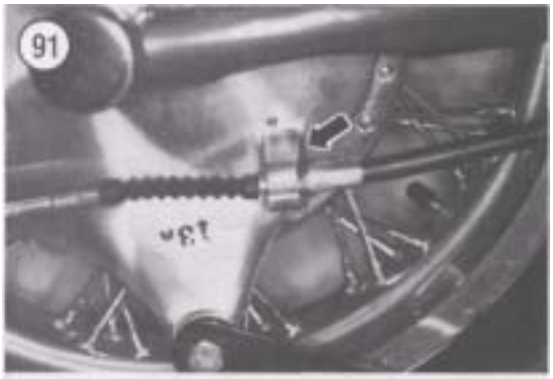
5. Remove the bolts and washers securing the cover **(Figure** 92) and remove the cover.

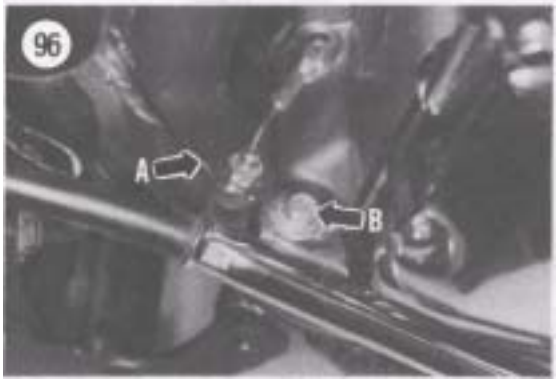
6. Disconnect the brake light switch return spring **(Figure** 93) from the brake light switch cable.

7. Slide the rubber boot **(Figure 94)** off the end of the brake light switch cable.

8. Loosen the locknut **(Figure** 95) and remove the brake light switch cable and the brake panel cable assembly to the frame mounting tab (A, **Figure 96).**

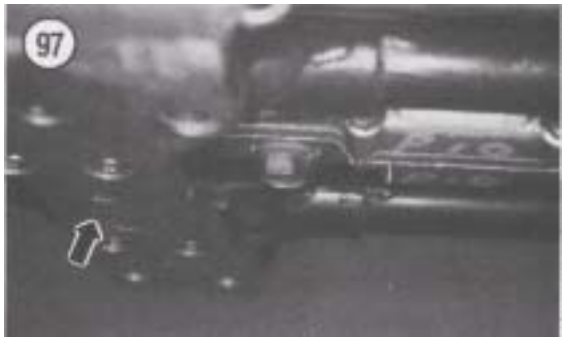
9. Remove the bolt (B, **Figure 96)** securing the brake pedal cable assembly to the frame. Remove the brake light switch cable and the brake panel cable assembly from the frame mounting tab.

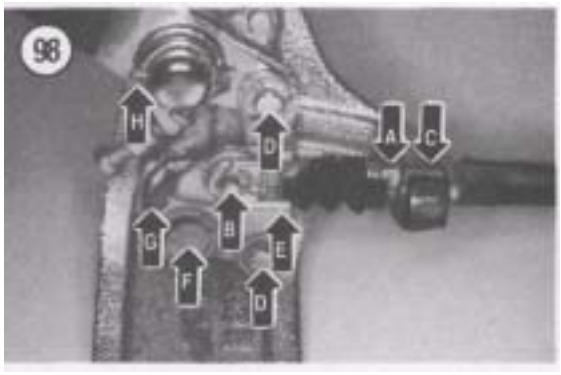




10. Remove the clips from the bolts securing the front footpeg assembly **(Figure** 97) to the frame. Lower the footpeg assembly from the frame.

11. To remove the brake rod arm and the brake pedal link No. 2 arm from the frame, perform the follow ing:





a. Loosen the locknut (A, **Figure** 98) on the brake panel cable.
b. Remove the cotter pin (B, **Figure** 98) securing both cables to the brake pedal arm.
c. Disconnect the cables from the receptacles (C, **Figure** 98) on the footpeg assembly. Remove both cables.
d. Remove both cotter pins and washers (D, **Fig ure 98)** securing the brake pedal link and re move the brake pedal link (E, **Figure 98).**
e. Remove the cotter pin and washer (F, **Figure 98)** securing the brake pedal arm and remove the brake pedal arm (G, **Figure 98).**
f. Remove the cotter pin and cap (H, **Figure** 98) securing the brake pedal and remove the brake pedal and spring.

12. Install by reversing these removal steps, noting the following:

a. Apply clean engine oil to all pivot areas prior to installing any parts, then oil pivots again after all parts have been installed.
b. Always install new cotter pins—never reuse a cotter pin as the ends may break off and the cotter pin could fall out disabling the brake system.
c. Tighten the bolts securing the footpeg assem bly to the torque specification listed in **Table** 2 and install the clips on the 2 outboard bolts on each side.
d. Adjust the rear brake as described in Chapter Three.

Table 1 BRAKE SYSTEM TIGHTENING TORQUES

item	N.m	ft.-lb.
Front master cylinder		
Clamping bolts	5-8	3-6
Union bolt	20-25	14-18
Front caliper		
Bleed valve	6-9	4.5-6.5
Mounting bolts	18-28	13-20
Housing assembly bolts	15-20	11-14.5
Brake disc bolts	15-25	11-18
Rear drum brake arm bolt	5-8	3.5-6.0
Front footpeg assembly bolts	15-25	11-18

Table 2 BRAKE SYSTEM SPECIFICATIONS

Item	Specifications	Wear limit
Front master cylinder Cylinder bore ID	15.870-15.913 mm	
— (0.6248-0.6265 in.) Piston OD	15.827-1 5.854 mm	
— (0.6231-0.6242 in.) Front caliper Cylinder bore ID		38.180-38.256 mm
— (1.5031-1.5061 in.) Piston OD	38.098-38.1 48 mm	
— (1.4999-1 .501 9 in.) Front brake disc Thickness		4.8-5.2 mm
4.5 mm (0.18 in.) (0.1 89-205 in.) Disc runout		—
0.3 mm (0.012 in.) Rear brake Drum I.D.		—
180.7 mm (7.11 in.) Lining thickness	—	
1.5mm (0.06 in.)		