

**Table 3 TIRE SIZE AND PRESSURE (continued)**

	<b>Front tires kPa (psi)</b>	<b>Rear tires kPa (psi)</b>
<b>1995 (continued)</b>		
<b>Sportsman 4 × 4 W958040</b>		
Size	25 × 8.00 × 12	25 × 12.00 × 10
Pressure	27.6 (4)	20.7 (3)
<b>Xplorer 4 × 4 W959140</b>		
Size	25 × 8.00 × 12	25 × 12.00 × 10
Pressure	27.6 (4)	20.7 (3)
<b>Magnum 2 × 4 W957444</b>		
Size	23 × 7.00 × 10	24 × 11.00 × 10
Pressure	27.6 (4)	20.7 (3)
<b>Magnum 4 × 4 W958144</b>		
Size	25 × 8.00 × 12	25 × 12.00 × 10
Pressure	27.6 (4)	20.7 (3)
<b>400 6 × 6 W958740</b>		
Size	25 × 8.00 × 12	25 × 12.00 × 10
Pressure	34.5 (5)	34.5 (5)

This chapter describes front and rear brake used on the front wheel with only rear wheel is used to stop models with only front brakes are used to 1987 models with models. The rear brake shaft or transmission Table 1 for brake at the end of this c

The drum type hand lever attached

## CHAPTER FOURTEEN

### BRAKES

This chapter describes service procedures for the front and rear brakes. Mechanical drum brakes are used on the front wheels on all 1985-1987 models with only rear wheel drive. A mechanical disc brake is used to stop the rear wheels on all 1985-1987 models with only rear wheel drive. Hydraulic disc brakes are used to stop the front and rear wheels of 1987 models with all wheel drive and all 1988-on models. The rear wheel brake disc is installed on a brake shaft or transmission output shaft. Refer to **Table 1** for brake application. **Tables 1-3** are located at the end of this chapter.

#### FRONT BRAKES (DRUM TYPE)

The drum type front brakes are operated by the hand lever attached to the right side of the handlebar.

Refer to Chapter Three for the adjustment procedure.

#### Removal/Inspection/Installation

1. Refer to Chapter Twelve and remove the front brake drum and wheel hub (**Figure 1**). Procedures for both 4-Wheel and tricycle (Scrambler) models are described.
2. Pull the brake shoes and springs (**Figure 2**) from the anchor and cam.
3. Clean the backing plate (**Figure 3**) thoroughly.
4. Check the inner seal (A, **Figure 3**) for damage.
5. Check the cam (B, **Figure 3**) to make sure that it operates freely.
6. Measure the thickness of the lining on the brake shoes (**Figure 4**) and install new shoes if worn excessively.

7. Clean and inspect the brake drum (A, **Figure 5**) for wear, scoring or rust.

**NOTE**

*Do not remove parts from the hub and drum unless new parts are to be installed. Removal will almost certainly damage the seal and bearings.*

7. Clean and inspect the inner wheel bearing (B, **Figure 5**). If damaged, refer to Chapter Twelve for removing the wheel bearings. Bearings can be cleaned and repacked with fresh grease without removing them from the hub and brake drum.

8. Inspect the outer bearing and seal (**Figure 6**). If replacement is required, remove the seal, then remove the outer bearing.

9. Reinstall the brake shoes and return springs as shown in **Figure 7**.

10. Install the brake drum and wheel hub.

**NOTE**

*If necessary, tighten the castellated nut to align the slots in the nut with the hole in the axle. Do not loosen the nut after tightening to the correct torque.*

11. Tighten the castellated nut to the torque listed in **Table 2**, then install a new cotter pin. Bend the ends of the cotter pin as shown in **Figure 8**.

12. Refer to **Table 2** for recommended tightening torques.

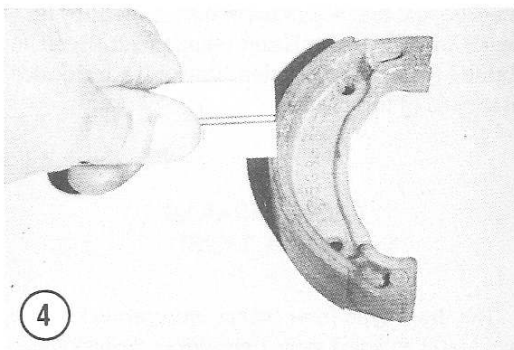
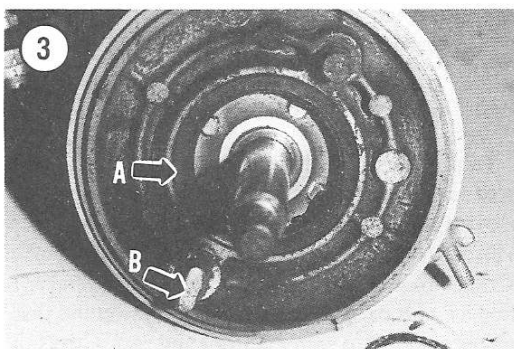
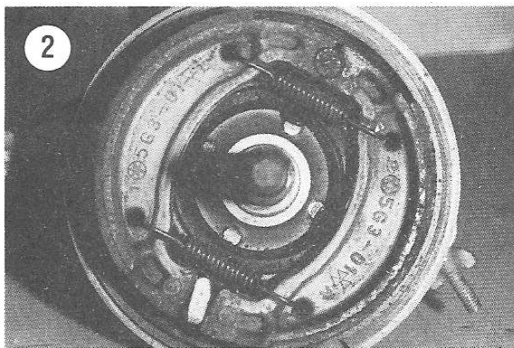
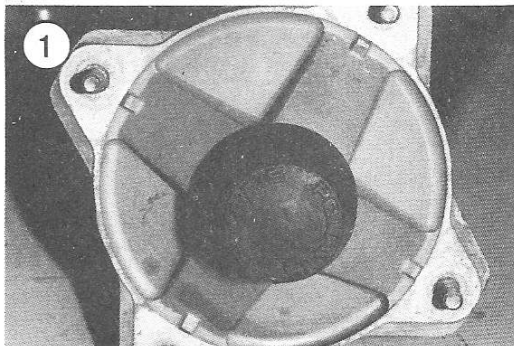
## HYDRAULIC BRAKES

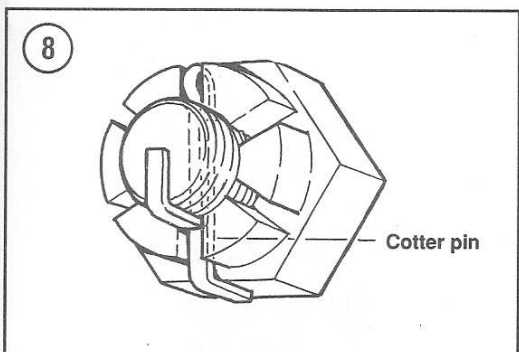
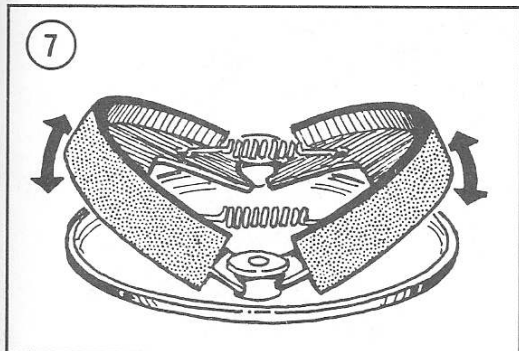
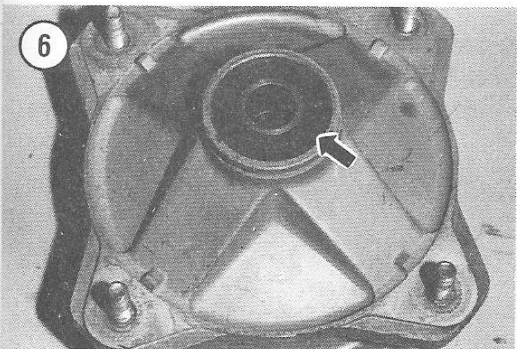
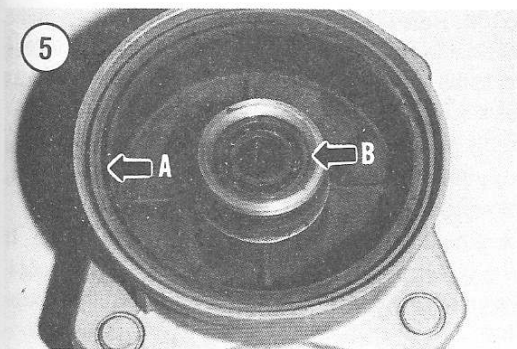
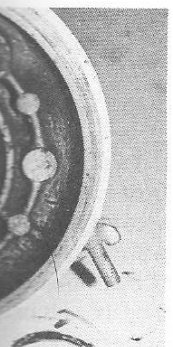
The brakes on all 1988-on models and 1987 all wheel drive models are actuated by hydraulic fluid and controlled by a hand lever and master cylinder attached to the left side of the handlebar. As the brake pads wear, the brake calipers will automatically adjust the position of the pads and the fluid level in the reservoir will lower. Always be sure the reservoir is filled. Refer to Chapter Three.

When working on the hydraulic brake system, it is necessary that the work area and all tools be absolutely clean. Even very small particles of foreign matter and grit in the caliper or master cylinder can damage the components.

Observe the following when servicing the hydraulic disc brakes.

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





2. Do not allow disc brake fluid to contact any plastic parts or painted surfaces as damage will result.

3. Always keep the master cylinder reservoir and extra containers of brake fluid closed to prevent dust or moisture from entering. Filling a brake system reservoir with contaminated fluid will be more costly than buying new fluid.

4. Use only disc brake fluid (DOT 3) to wash rubber parts. Never clean brake components with any petroleum base cleaners.

5. Whenever any component has been removed from the brake system the system is considered opened and must be bled to remove air bubbles. Refer to *Brake Bleeding* in this chapter for complete details.

6. A brake that feels spongy or soft, probably has air bubbles in the system and should be bled. Refer to *Brake Bleeding* in this chapter for complete details.

**CAUTION**

*Disc brake components rarely require disassembly, so do not disassemble unless absolutely necessary. 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 brake fluid.*

**CAUTION**

*Never reuse brake fluid. Contaminated brake fluid can cause brake failure. Dispose of brake fluid according to local EPA regulations.*

**FRONT BRAKE CALIPER  
(1987 MODELS WITH ALL-WHEEL  
DRIVE)**

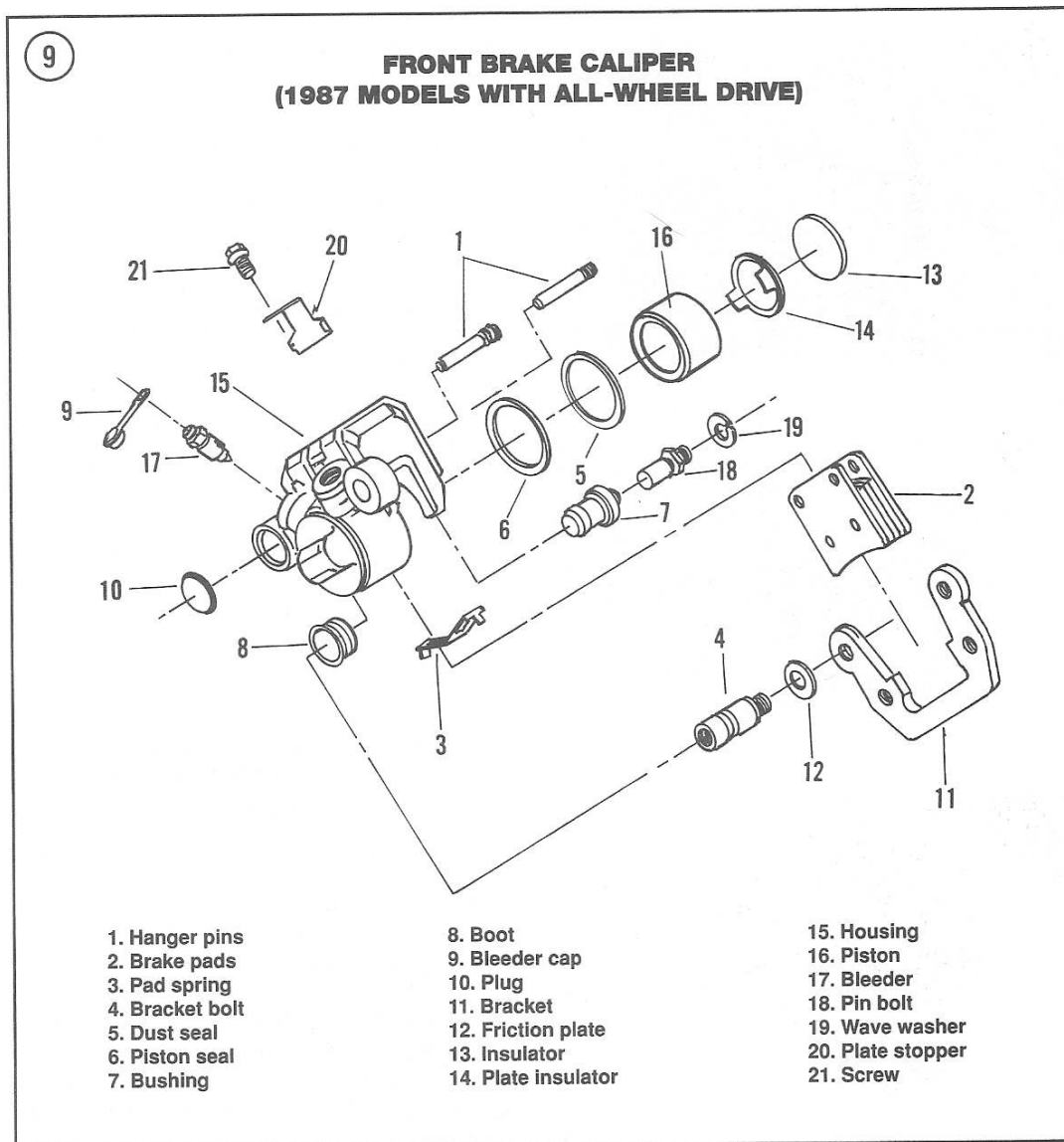
Refer to **Figure 9** when replacing the front brake pads or servicing the front brake caliper.

**Front Brake Pad Replacement**

There is no recommended time interval for changing the friction pads in the front brakes. Pad wear depends greatly on riding habits and conditions. Always replace both pads in both calipers at the same time.

1. Read the preceding information *Hydraulic Brakes* in this chapter.
2. Remove the front wheel as described in Chapter Twelve.
3. Remove the brake caliper mounting bolts, then move the caliper away from the brake disc.
4. Check the condition of the brake rotor (disc). If it requires removal, refer to Chapter Ten to remove the front drive hub.
5. Remove the 2 hanger pins (A, **Figure 10**) and brake pads (B, **Figure 10**).

6. Measure the thickness of each brake pad. Replace the brake pads if the thickness of any one pad is less than the service limit in **Table 3**. Replace brake pads as a set.
7. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
8. Check the end of the piston for fluid leakage. If the seal is damaged and/or if there is fluid leakage, overhaul the brake caliper as described in this chapter.



4. To make sure  
back into the caliper  
backing through the  
reservoir. To prevent  
it may be necessary  
fluid as follows:

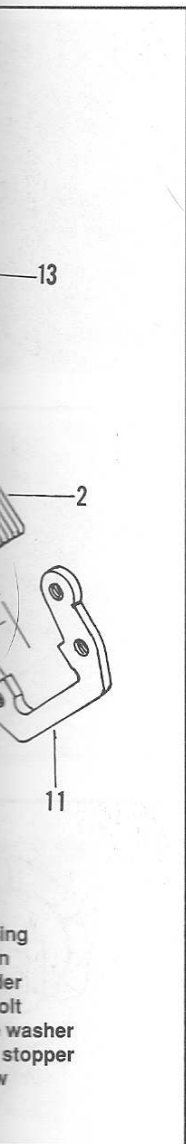
- a. Clean the
- b. Remove the
- c. Temporarily  
the caliper  
into the caliper



brake pad. Replace any one pad if less than the other. Replace brake pads

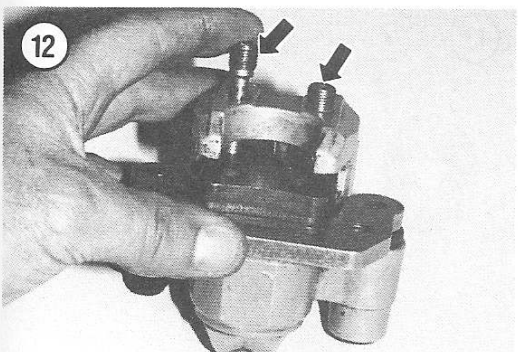
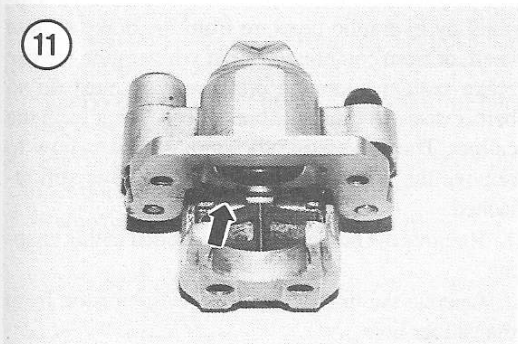
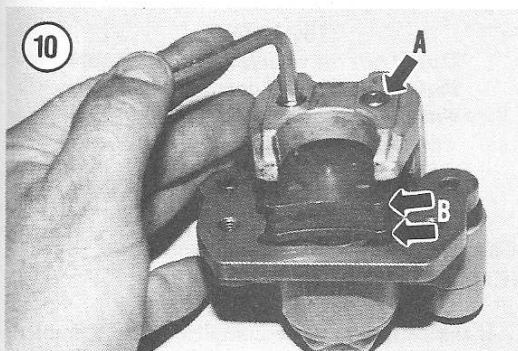
even wear, damage or uneven wear. Replace the pads as a set,

for fluid leakage. If there is fluid leakage, bleed the brakes as described in this chapter.



9. To make room for the new pads, push the piston back into the caliper. This will force brake fluid to backup through the hose into the master cylinder reservoir. To prevent the reservoir from overflowing, it may be necessary to remove some of the brake fluid as follows:

- a. Clean the top of the master cylinder of all dirt.
- b. Remove the cover from the master cylinder.
- c. Temporarily install the inside brake pad into the caliper and slowly push the piston back into the caliper.



- d. Check the reservoir frequently to make sure brake fluid does not overflow. Siphon fluid from the reservoir, if necessary, before it overflows.

**WARNING**

*Brake fluid is poisonous. Do not siphon with your mouth.*

- e. The caliper piston should move freely in the caliper. If it does not, remove and overhaul the caliper as described in this chapter.
  - f. Push the caliper piston in all the way to allow room for the new pads.
10. Check to be sure that the spring (Figure 11) is correctly in place and install new pads.
  11. Install the hanger pins (Figure 12) and tighten to the torque listed in Table 2.
  12. Install the caliper and tighten the retaining bolts to the torque listed in Table 2.
  13. Repeat the procedure for the other front brake caliper.

**WARNING**

*Use new brake fluid clearly marked DOT 3 from a sealed container.*

14. Pull and release the brake lever a few times to seat the pads against each disc, then recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.
15. Install the cover on the master cylinder reservoir and tighten the cover screws securely.
16. Install the front wheels as described in Chapter Twelve.

**WARNING**

*Do not ride the vehicle until you are sure that all of the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.*

**Removal/Installation  
(Caliper Will Not Be Disassembled)**

If the brake caliper is to be completely removed but not disassembled, perform this procedure. If the caliper will be disassembled, refer to *Caliper Removal/Piston Removal* in this section.

If the caliper is being only partially removed, it is not necessary to disconnect the brake line from

the caliper. A wooden or plastic spacer block should be inserted in the caliper between the brake pads to keep the brake pads and piston in place.

**NOTE**

*The spacer block prevents the piston from being forced out of the caliper if the brake lever is squeezed while the caliper is removed from the brake disc. If the brake lever is squeezed, the piston may be forced from its bore. If this happens, the caliper will have to be disassembled then reassembled to properly reseal the piston. Bleeding the system will also be required.*

1. Remove the front wheel(s) as described in Chapter Twelve.
2. If the caliper is to be completely removed from the vehicle, loosen the brake hose fitting before removing the caliper.
3. Remove the brake caliper mounting bolts and pull the caliper assembly from the brake disc (rotor).
4. Remove the 2 hanger pins (A, **Figure 10**) and brake pads (B, **Figure 10**). New brake pads should be installed if the pads are contaminated with brake fluid.

**NOTE**

*Prepare a container to catch the brake fluid released in Step 5.*

5. Hold the brake hose fitting and turn the caliper to remove it from the brake hose.
6. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
7. Place the caliper in a plastic bag and tie the bag closed. Remove the pads so the brake fluid cannot run down the side of the caliper and contaminate the pads.
8. Install the caliper by reversing these steps, noting the following.
- 9A. If the caliper was removed from the vehicle:
  - a. Remove the caliper from the bag and install the brake pads. Make sure the brake pads are not contaminated with brake fluid.
  - b. Attach the brake hose fitting to the caliper handtight.
  - c. Slide the caliper into position on the brake disc.
  - d. Install the caliper mounting bolt and tighten to the torque specification in **Table 2**.
  - e. Tighten the brake hose fitting securely.

- f. Refill the master cylinder and bleed the brakes as described in this chapter.

9B. If the caliper was only partially removed from the vehicle:

- a. Remove the spacer block from between the brake pads.
- b. Slide the caliper into position over the brake disc.
- c. Install the caliper mounting bolts and tighten to the torque specification in **Table 2**.

10. Operate the brake lever a few times to seat the pads against the brake disc.

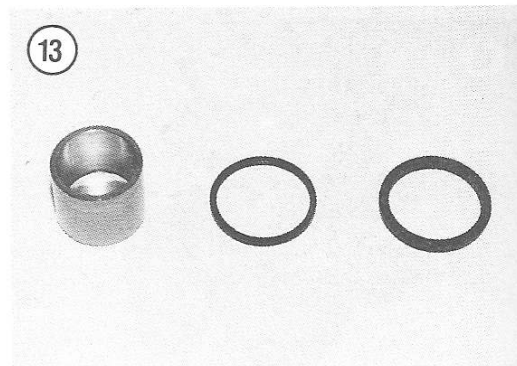
**WARNING**

*Do not ride the vehicle until you are sure that the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.*

**Caliper Removal/Piston Removal  
(Caliper Will Be Disassembled)**

If the caliper is to be completely disassembled, force from inside the caliper will be required to push the piston from the caliper. This force can be supplied by hydraulic pressure from the brake system itself, or from compressed air. If you are going to use brake system hydraulic pressure, you must do so before disconnecting the brake hose fitting from the caliper. The following procedure describes how to remove the piston while the brake hose is still attached.

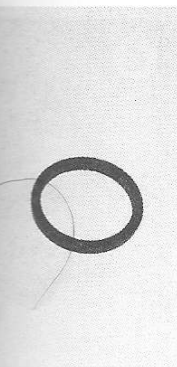
1. Remove the brake pads as described in this chapter.
2. Operate the brake lever to force the piston from the caliper bore.



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 describes how to  
 ke hose is still at-  
 rcribed in this chap-  
 ce the piston from



**NOTE**  
*If the piston will not come out, you may have to use compressed air. Refer to Disassembly in this chapter.*

3. Support the caliper and loosen the attached brake hose fitting. After the hose fitting is loosened, hold the hose and turn the caliper to remove it from the brake hose. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
4. Take the caliper to a workbench for further disassembly.

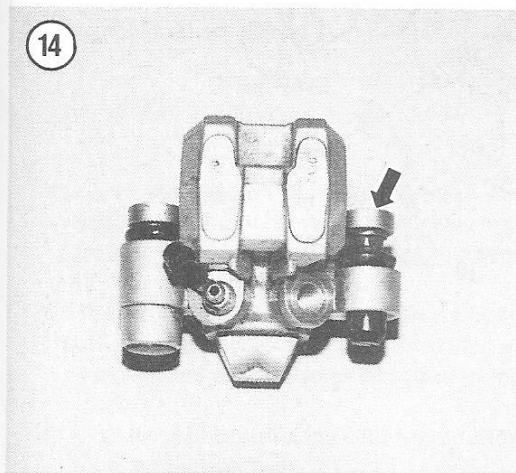
**Disassembly**

1. Remove the caliper as described in this chapter.

**NOTE**  
*If you have removed the piston, proceed to Step 3.*

**WARNING**  
*Considerable force is required to force the caliper piston from its bore. Do not try to cushion the piston with your fingers, as injury could result.*

2. Cushion the piston with a shop rag. Do not place your hand or fingers in the piston area.
3. Apply compressed air through the brake line port to force the piston out.
4. Remove the dust seal and piston seal from the caliper bore. Do not damage the bore.
5. Remove the bleed valve from the caliper.



**Inspection**

1. Clean the caliper housing and dry thoroughly. Clean the dust and piston seal grooves with a soft-faced tool to avoid damaging the bore.
2. Discard the caliper seals. The seals should be replaced whenever the caliper is disassembled.
3. Clean the piston in clean DOT 3 brake fluid.
4. Inspect the piston and the caliper piston bore for deep scratches or other wear marks. Do not hone the piston bore. Replace the caliper if questionable.
5. Clean the bleed valve with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.
6. Measure the thickness of each brake pad and compare to the specification listed in Table 3. If the pad thickness is equal to or less than the wear limit, replace all 4 brake pads at the same time.

**Assembly**

Install a new caliper piston seal and dust seal (Figure 13) during reassembly.

**NOTE**  
*Use new, DOT 3 brake fluid when brake fluid is called for in the following steps.*

1. Soak the piston seal (Figure 13) in brake fluid for approximately 5 minutes.
2. Coat the caliper bore lightly with brake fluid.
3. Install the new piston seal into the caliper bore groove.
4. Install the new dust seal into the caliper bore groove.
5. Wipe the piston O.D. lightly with brake fluid.
6. Insert the piston into the caliper bore.
7. Push the piston all the way into the bore.
8. Install and tighten the bleed screw.
9. Install the brake pads as described in this chapter.

**Caliper Bracket  
 Removal/Inspection/Installation**

1. Remove the brake caliper as described in this chapter.
2. Remove the caliper bracket mounting bolts (4, Figure 9) and remove the caliper bracket (Figure 14).
3. Inspect the bracket for cracks or other damage.



4. Install by reversing these steps. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease (or equivalent) to sides of the caliper bracket mounting bolts (4, **Figure 9**). Be sure to install the dust cover and boot over the caliper mounting bolts.

**CAUTION**

*PBC grease is a special high-temperature, water-resistant grease that can be used in braking systems. Do not use any other kind of lubricant as it may thin out and contaminate the brake pads.*

**FRONT BRAKE CALIPER  
(1988-ON)**

Refer to **Figure 15** when replacing the front brake pads or servicing the front brake caliper. This caliper is also used for the brake on the rearmost axle of 6-wheel models.

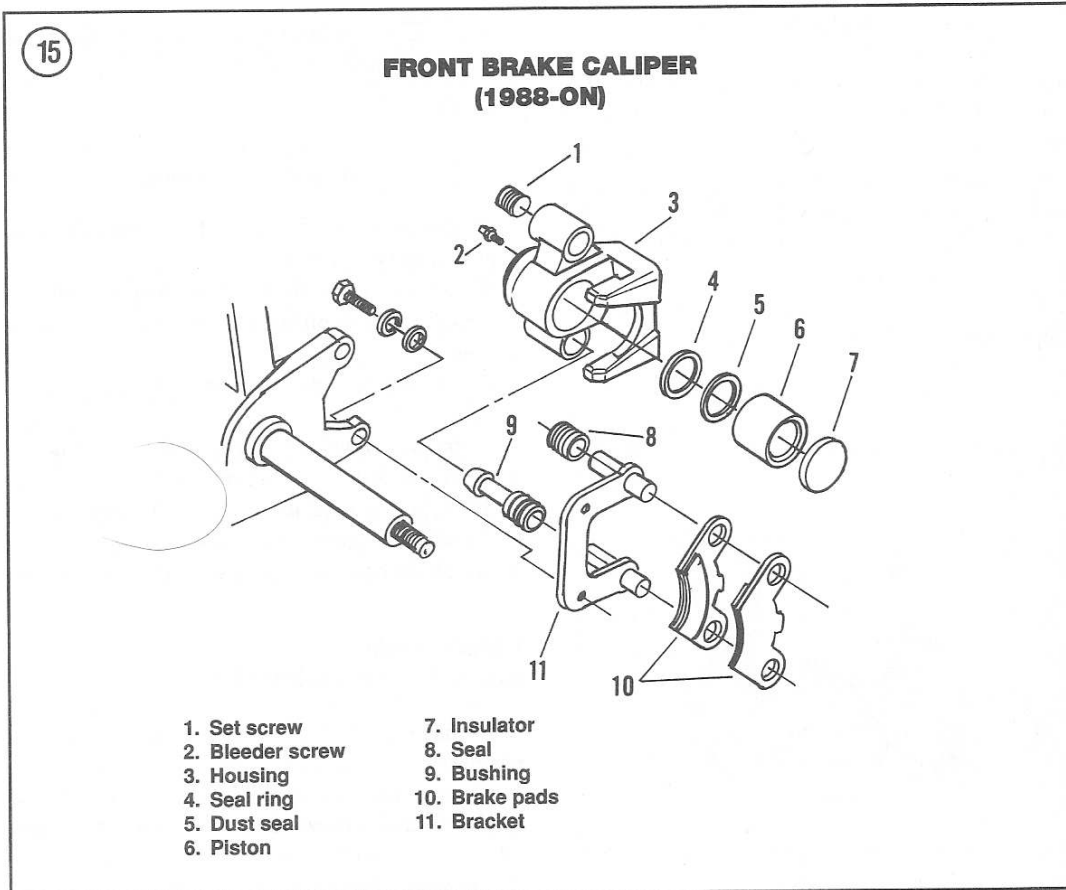
**Brake Pad Inspection**

Measure brake pad wear with the brake caliper installed on the vehicle as follows.

1. Remove the front wheels as described in Chapter Twelve.
2. Measure the distance from the disc surface to the back of the pad's friction material. Replace the brake pads if the friction material thickness is equal to or less than the service limit specification in **Table 3**.
3. Install the front wheels as described in Chapter Twelve, or replace the brake pads as described in the following section.

**Front Brake Pad Replacement**

There is no recommended time interval for changing the friction pads in the front brakes. Pad wear depends greatly on riding habits and conditions.



To maintain an  
place pads in the  
same time.

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Brakes in this cha
2. Remove the  
Twelve.
3. Remove the  
move the caliper
4. Remove the  
5. Push the piston  
remove the brake
6. Check the  
it requires remove  
Twelve to remove
7. Measure the  
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than the service li
- as a set.

8. Inspect the  
or grease contain  
if necessary.

9. Check the  
seal is damaged  
load the brake cal

10. To make room  
back into the cali  
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fluid as follows:

- a. Clean the top
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Brake fluid  
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and conditions.

To maintain an even brake pressure, always re-  
place pads in the calipers for both front wheels at the  
same time.

1. Read the information listed under *Hydraulic Brakes* in this chapter.
2. Remove the front wheel as described in Chapter Twelve.
3. Remove the brake caliper mounting bolts, then move the caliper away from the brake disc.
4. Remove the set screw (1, **Figure 15**).
5. Push the mounting bracket toward the piston and remove the brake pads.
6. Check the condition of the brake rotor (disc). If it requires removal, refer to Chapter Ten or Chapter Twelve to remove the front wheel hub.
7. Measure the thickness of each brake pad. Replace the brake pads if the thickness of any one pad is less than the service limit in **Table 3**. Replace brake pads as a set.
8. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
9. Check the end of the piston for fluid leakage. If the seal is damaged and/or if there is fluid leakage, overhaul the brake caliper as described in this chapter.
10. To make room for the new pads, push the piston back into the caliper. This will force brake fluid to backup through the hose into the master cylinder reservoir. To prevent the reservoir from overflowing, it may be necessary to remove some of the brake fluid as follows:
  - a. Clean the top of the master cylinder of all dirt.
  - b. Remove the cover from the master cylinder.
  - c. Temporarily install the inside brake pad into the caliper and slowly push the piston back into the caliper.

**WARNING**

*Brake fluid is poisonous. Do not siphon with your mouth.*

- d. Check the reservoir frequently to make sure brake fluid does not overflow. Siphon fluid from the reservoir, if necessary, before it overflows.
- e. The caliper piston should move freely in the caliper. If it does not, the caliper should be removed and overhauled as described in this chapter.
- f. Push the caliper piston in all the way to allow room for the new pads.

11. Install the caliper and tighten the retaining bolts to the torque listed in **Table 2**.
12. Repeat the procedure for the other front brake caliper.

**WARNING**

*Use new brake fluid clearly marked DOT 3 from a sealed container.*

13. Pull and release the brake lever a few times to seat the pads against each disc, then recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.
14. Install the cover on the master cylinder reservoir and tighten the cover screws securely.
15. Install the front wheels as described in Chapter Twelve.

**WARNING**

*Do not ride the vehicle until you are sure that the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.*

**Removal/Installation  
(Caliper Will Not Be Disassembled)**

If the brake caliper is to be completely removed but not disassembled, perform this procedure. If the caliper will be disassembled, refer to *Caliper Removal/Piston Removal* in this section.

If the caliper is being only partially removed, it is not necessary to disconnect the brake line from the caliper. A wooden or plastic spacer block should be inserted in the caliper between the brake pads to keep the brake pads and piston in place.

**NOTE**

*The spacer block prevents the piston from being forced out of the caliper if the brake lever is squeezed while the caliper is removed from the brake disc. If the brake lever is squeezed, the piston may be forced from its bore. If this happens, the caliper must be disassembled then reassembled to properly reseal the piston. Bleeding the system will also be required.*

1. Remove the front wheel(s) as described in Chapter Twelve.

2. If the caliper is to be completely removed from the vehicle, loosen the brake hose fitting before removing the caliper.
3. Remove the brake caliper mounting bolts and pull the caliper assembly from the brake disc (rotor).
4. Remove the two hanger pins (A, **Figure 10**) and brake pads (B, **Figure 10**). Replace the brake pads if the pads are contaminated with brake fluid.

**NOTE**

*Prepare a container for catching the brake fluid released in Step 5.*

5. Hold the brake hose fitting and turn the caliper to remove it from the brake hose.
6. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
7. Place the caliper in a plastic bag and tie the bag closed. Remove the pads so the brake fluid cannot run down the side of the caliper and contaminate the pads.
8. Install the caliper by reversing these steps, noting the following.
  - 9A. If the caliper was removed from the vehicle:
    - a. Remove the caliper from the bag and install the brake pads. Make sure the brake pads are not contaminated with brake fluid.
    - b. Attach the brake hose fitting to the caliper hand-tight.
    - c. Slide the caliper into position on the brake disc.
    - d. Install the caliper mounting bolt and tighten to the torque specification in **Table 2**.
    - e. Tighten the brake hose fitting securely.
    - f. Refill the master cylinder and bleed the brakes as described in this chapter.
  - 9B. If the caliper was only partially removed from the vehicle:
    - a. Remove the spacer block from between the brake pads.
    - b. Slide the caliper into position over the brake disc.
    - c. Install the caliper mounting bolts and tighten to the torque specification in **Table 2**.
10. Operate the brake lever a few times to seat the pads against the brake disc.

**WARNING**

*Do not ride the vehicle until you are sure that the brakes are operating correctly with full hydraulic advantage. If neces-*

*sary, bleed the brakes as described in this chapter.*

### Caliper Removal/Piston Removal (Caliper Will Be Disassembled)

If the caliper is to be completely disassembled, force from inside the caliper will be required to push the piston from the caliper. This force can be supplied by hydraulic pressure from the brake system itself, or from compressed air. If you are going to use brake system hydraulic pressure, you must do so before disconnecting the brake hose from the caliper. The following procedure describes how to remove the piston while the brake hose is still attached.

1. Remove the brake pads as described in this chapter.
2. Operate the brake lever to force the piston from the caliper bore.

**NOTE**

*If the piston will not come out, use compressed air to remove it. Refer to Disassembly in this chapter.*

3. Support the caliper and loosen the attached brake hose fitting. After the hose fitting is loosened, hold the hose and turn the caliper to remove it from the brake hose. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
4. Take the caliper to a workbench for further disassembly.

**Disassembly**

1. Remove the caliper as described in this chapter.

**WARNING**

*Considerable force is required to force the piston from the caliper bore. Do not try to cushion the piston with your fingers, as injury could result.*

2. Cushion the caliper piston with a shop rag, making sure to keep your fingers and hand away from the piston area. Apply compressed air through the brake line port to remove the piston.
3. Remove the dust seal and piston seal from the inside of the cylinder.
4. If necessary, remove the support bracket from the caliper.

- Remove the bleed valve and its cover from the caliper.

### Inspection

- Clean the caliper housing. Remove stubborn dirt with a soft brush, but do not brush the cylinder bore as this may damage it. Clean the dust and piston seal grooves with a plastic tipped tool so that you do not damage them or the cylinder bore. Clean the caliper in hot soapy water and rinse in clear, cold water. Dry with compressed air.
- Clean the piston with clean DOT 3 brake fluid.
- Check the piston and cylinder bore for deep scratches or other obvious wear marks. Do not hone the cylinder. If the piston or cylinder is damaged, replace the caliper assembly.
- Clean the bleed valve with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.
- Clean and check the threads in the housing for damage.
- Check the friction boot and dust cover. If swollen, cracked or worn, the entire brake caliper may have to be replaced.
- Check the support bracket shafts for excessive wear, damage or uneven wear (steps). The shafts must be in good condition for the caliper to slide back and forth. Remove all grease residue from the bracket. If the support bracket is damaged, the entire brake caliper will have to be replaced.
- Measure the thickness of each brake pad and compare to the specification listed in **Table 3**. If the pad thickness is less than the wear limit, install new pads.
- Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
- Replace the piston seal and dust seal as a set.

### Assembly

#### NOTE

*Use only new, DOT 3 brake fluid when brake fluid is called for in the following steps.*

- Soak the piston seal and dust seal in brake fluid for approximately 5 minutes.

- Lightly coat the piston and cylinder bore with brake fluid.
- Install a new piston seal into the second groove in the cylinder bore.
- Install a new dust seal into the front groove in the cylinder bore.

#### NOTE

*Check that both seals fit squarely into their respective cylinder bore grooves. If a seal is not installed properly, the caliper assembly will leak and braking performance will be reduced.*

- Install the piston—closed end first—into the cylinder bore.
- If the support bracket was removed, perform the following:
  - Apply a thin coat of PBC (Poly Butyl Cuprysil) grease or equivalent to the caliper bracket shafts.

#### CAUTION

*PBC grease is a special high temperature, water-resistant grease that can be used in braking systems. Do not use any other kind of lubricant as it may thin out and contaminate the brake pads.*

- Slide the support bracket shafts into the caliper. Slide the bracket back and forth, without removing it, to distribute the grease and to check the shafts for binding. The bracket must move smoothly; if any binding is noted, remove the bracket and inspect the shafts for damage. Wipe off any excess grease from the outside of the caliper or bracket.
- If necessary, install the bleed screw and its dust cover. Tighten securely.
  - Install the brake caliper assembly and brake pads as described in this chapter.

## MECHANICAL REAR BRAKE CALIPER (1985-1987 MODELS WITH REAR WHEEL DRIVE ONLY)

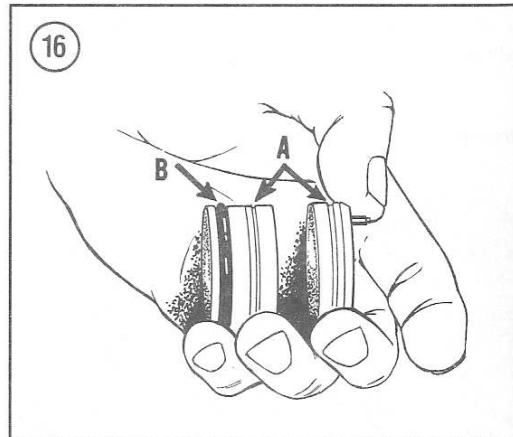
### Disassembly/Inspection/Assembly

The rear brake caliper is attached to the transmission housing and surrounds the brake disc located on the brake shaft.

1. Remove the two bolts that attach the caliper housing to the transmission housing.
2. Remove the disc from the transmission brake shaft.
3. Remove the three caliper assembly screws.
4. Detach the brake cable from the operating lever.
5. Remove the adjusting ratchet from the caliper.
6. Use a screwdriver between the brake pads to push the pad from the housing.

**NOTE**

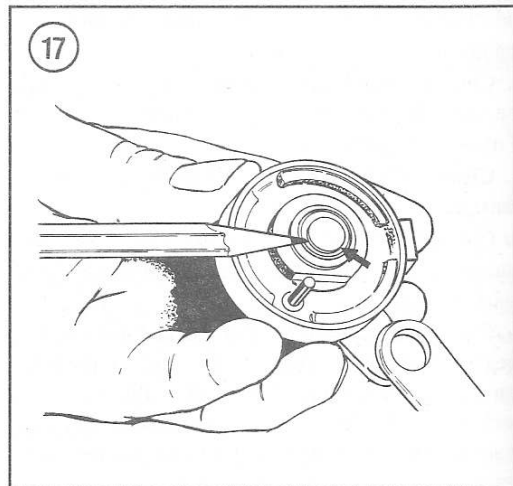
*The brake pads may be corroded and stuck in the housing. Be careful not to damage the assembly when removing the brake pads.*



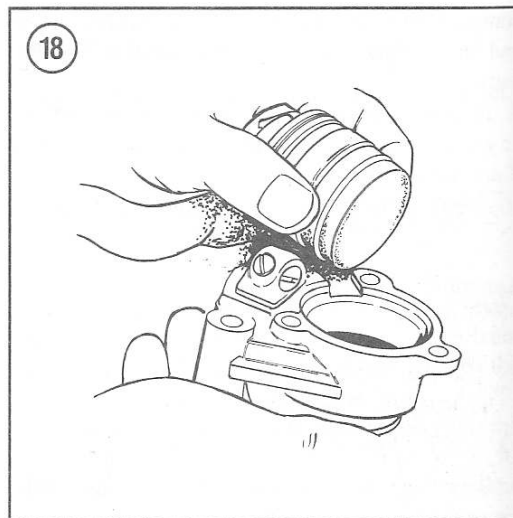
7. Inspect the brake pads for wear and corrosion. Install new pads if worn to the indicator groove (A, **Figure 16**) near the base of the brake pad.
8. Remove the O-ring (B, **Figure 16**) from the movable brake pad, then polish the movable pad and the bore in the caliper with light abrasive cloth.
9. Clean the caliper housing and the brake pad thoroughly, then install the O-ring (B, **Figure 16**).
10. Apply a thin coat of PBC (Poly Butyl Cuprysil) grease or equivalent to the housing bore, O-ring and sides of the brake pads.

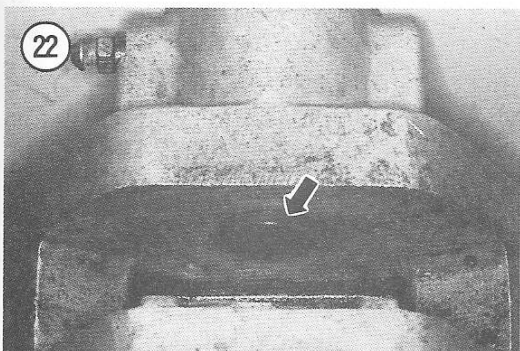
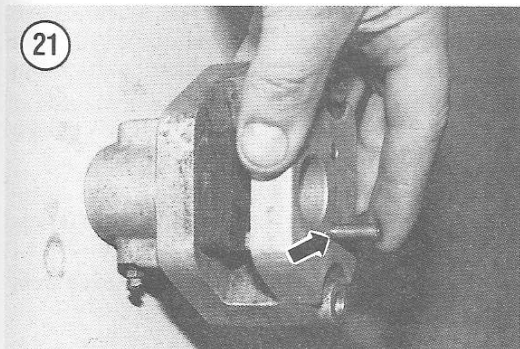
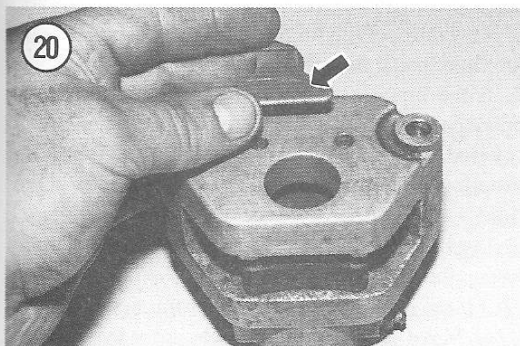
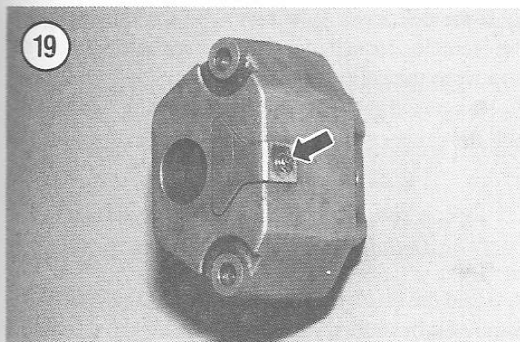
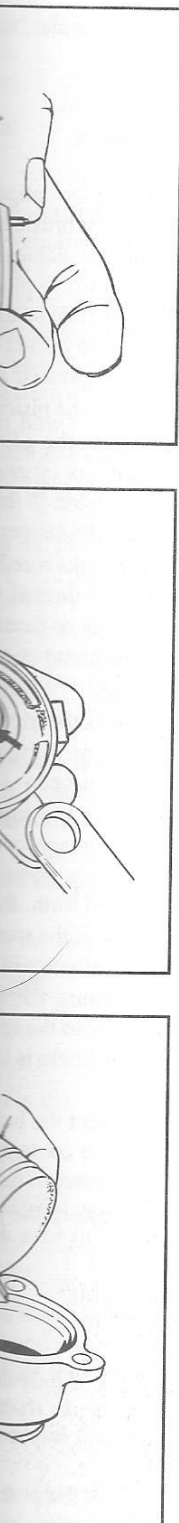
**CAUTION**

*PBC grease is a special high-temperature, water-resistant grease that can be used in braking systems. Do not use any other kind of lubricant as it may thin out and contaminate the brake pads.*



11. Reinstall the brake pads in the housing.
12. Rotate the ratchet clockwise until it is flush (**Figure 17**) with the housing.
13. Reattach the cable to the housing and ratchet arm.
14. Install the brake pads and the adjuster unit into the housing as an assembly. Refer to **Figure 18**.
15. Install cover and tighten the three assembly screws.
16. Reinstall the brake caliper and disc. Install and tighten the 2 attaching screws.
17. Adjust the brake cable by turning the adjuster located at the lever mounted on the right handlebar.
18. Apply the brake several times, then readjust the cable as necessary to obtain slight freeplay at the handlebar lever.





### HYDRAULIC REAR CALIPER (1987 MODELS WITH ALL-WHEEL DRIVE AND ALL 1988 MODELS)

The rear wheel brake on 1987 models with all wheel drive (AWD) and all 1988 models is equipped with a hydraulic caliper that operates against the brake disc on the transmission.

#### Brake Pad Inspection

Measure brake pad wear with the brake caliper installed on the vehicle. Replace the brake pads if the friction material thickness is equal to or less than the service limit specification in **Table 3**.

#### Brake Pad Replacement

There is no recommended time interval for changing the friction pads in the front brakes. Pad wear depends greatly on riding habits and conditions. Always replace both pads at the same time.

1. Remove the brake caliper mounting bolts, then move the caliper away from the brake disc.
2. Check the condition of the brake rotor (disc). Install a new disc if it is damaged.
3. Remove the screw (**Figure 19**) and retainer plate (**Figure 20**).
4. Push the pad hanger pins (**Figure 21**) from the housing and remove the brake pads.
5. Inspect the brake pads for uneven wear, damage or grease contamination. Measure the thickness of each brake pad. Replace the brake pads if the thickness of any one pad is less than the service limit in **Table 3**. Replace brake pads as a set.
6. Check the end of the piston (**Figure 22**) for fluid leakage. If the seal is damaged as indicated by fluid leakage, overhaul the brake caliper as described in this chapter.
7. To make room for the new pads, push the piston back into the caliper. This will force brake fluid to backup through the hose into the master cylinder reservoir. To prevent the reservoir from overflowing, it may be necessary to remove some of the brake fluid.
8. Push the caliper piston in all the way to allow room for the new pads. The caliper piston should move freely in the caliper. If it does not, overhaul the caliper as described in this chapter.

9. Position new brake pads in the caliper and install the hanger pins.
10. Install the retainer plate (**Figure 20**) and screw (**Figure 19**).
11. Separate the brake pads and install the caliper over the brake disc.
12. Tighten the retaining screws to the torque listed in **Table 2**.
13. Pull and release the brake lever a few times to seat the pads against the disc.

**WARNING**

Use new brake fluid clearly marked DOT 3 from a sealed container.

14. Recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.

**WARNING**

Do not ride the vehicle until you are sure the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.

### Removal/Installation (Caliper Will Not Be Disassembled)

If the brake caliper is to be completely removed but not disassembled, perform this procedure. If the caliper will be disassembled, refer to *Caliper Removal/Piston Removal* in this section.

If the caliper is being only partially removed, it will not be necessary to disconnect the brake line from the caliper. Insert a wooden or plastic spacer block between the brake pads to keep the brake pads in place.

**NOTE**

The spacer block prevents the piston from being forced out of the caliper if the brake lever is squeezed while the caliper is removed from the brake disc. If the piston is forced from its bore, the caliper must be disassembled then reassembled to properly reseat the piston. Bleeding the system will also be required.

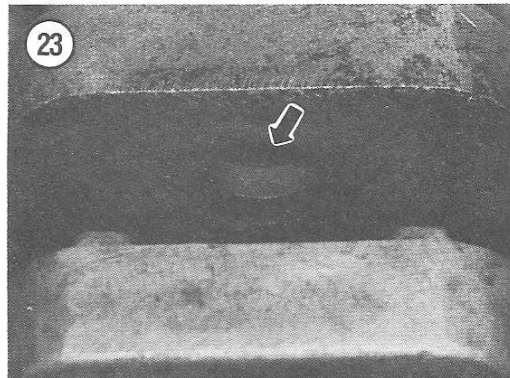
1. Remove any panels that interfere with the removal of the brake caliper.

2. If the caliper is to be completely removed from the vehicle, loosen the brake hose fitting before removing the caliper.
3. Remove the brake caliper mounting bolts and pull the caliper assembly from the brake disc (rotor).

**NOTE**

Prepare a container for catching the brake fluid released in Step 4.

4. Hold the brake hose fitting and turn the caliper to remove it from the brake hose.
5. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
6. Plug the opening for the brake hose fitting to keep the fluid inside the caliper and to keep dirt out.
7. If the brake pads are to be reused, remove the brake pads or protect the brake pads from becoming covered with brake fluid. New brake pads must be installed if the pads are contaminated with brake fluid.
8. Install the caliper by reversing these steps, while noting the following.
  - 9A. If the caliper was removed from the vehicle:
    - a. Make sure the brake pads are not contaminated with brake fluid.
    - b. Attach the brake hose fitting to the caliper hand-tight.
    - c. Slide the caliper into position on the brake disc.
    - d. Install the caliper mounting bolts and tighten to the torque specification in **Table 2**.
    - e. Tighten the brake hose fitting securely.
    - f. Refill the master cylinder and bleed the brakes as described in this chapter.
  - 9B. If the caliper was only partially removed from the vehicle:



- a. Remove the brake pads.
- b. Slide the caliper disc.
- c. Install the caliper to the rotor.
10. Operate the brake pads against the rotor.

Disconnect the brake hose from the caliper. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.

### Caliper Removal (Caliper Will Be Disassembled)

1. Remove the brake hose fitting from the caliper. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
2. Operate the brake lever to force the piston from the caliper bore.
3. Support the caliper assembly from the vehicle.
4. Take the caliper assembly to the workbench.

If the piston is forced from its bore, the caliper must be disassembled then reassembled to properly reseat the piston. Bleeding the system will also be required.

3. Support the caliper assembly from the vehicle.
4. Take the caliper assembly to the workbench.

### Disassembly

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- a. Remove the spacer block from between the brake pads.
  - b. Slide the caliper into position over the brake disc.
  - c. Install the caliper mounting bolts and tighten to the torque specification in **Table 2**.
10. Operate the brake lever a few times to seat the pads against the brake disc.

**WARNING**

*Do not ride the vehicle until you are sure that the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.*

**Caliper Removal/Piston Removal  
(Caliper Will Be Disassembled)**

If the caliper is to be completely disassembled, force from inside the caliper is required to push the piston from the caliper. This force can be supplied by hydraulic pressure from the brake system itself, or from compressed air. If you are going to use brake system hydraulic pressure, you must do so before disconnecting the brake hose from the caliper. The following procedure describes how to remove the piston while the brake hose is still attached.

1. Remove the brake pads as described in this chapter.
2. Operate the brake lever about 3 times to force the piston from the caliper bore.

**NOTE**

*If the piston will not come out, remove it using compressed air. Refer to Disassembly in this chapter.*

3. Support the caliper and loosen the attached brake hose fitting. After the hose fitting is loosened, hold the hose and turn the caliper to remove it from the brake hose. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
4. Take the caliper to a workbench for further disassembly.

**Disassembly**

1. Remove the caliper as described in this chapter.

**WARNING**

*Considerable force is required to force the piston from the caliper bore. Do not try to cushion the piston with your fingers, as injury could result.*

2. Cushion the caliper piston with a shop rag, making sure to keep your fingers and hand away from the piston area. Apply compressed air through the brake line port to remove the piston.

**CAUTION**

*Do not remove the seal rings unless new rings are available to be installed. Removing the rings from grooves in the caliper housing will damage even new rings. If the seals are removed, be extremely careful not to scratch or nick the bore. If the bore is scratched or nicked, it may be impossible to seal properly the brake.*

**NOTE**

*A suitably shaped seal pick can be used to remove the seal rings. A wire paper clip or similar stiff wire can also be bent to remove the seal rings.*

3. Use an appropriate tool to remove the 2 seal rings from the caliper bore. Refer to **Figure 23**.
4. Remove the bleed valve and its cover from the caliper.

**Inspection**

1. Clean the caliper housing. Remove stubborn dirt with a soft brush, but do not brush the cylinder bore as this may damage it. Clean the dust and piston seal grooves with a plastic tipped tool so that you do not damage them or the cylinder bore. Clean the caliper in hot soapy water and rinse in clear, cold water. Dry with compressed air.
2. Clean the piston (**Figure 24**) with clean DOT 3 brake fluid.
3. Check the piston and cylinder bore for deep scratches or other obvious wear marks. Do not hone the cylinder. If the piston or cylinder is damaged, replace the caliper assembly.
4. Clean the bleed valve with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.
5. Clean and check the threads in caliper housing for damage.



6. Check the pad hanger pins (**Figure 21**) for excessive wear, damage or uneven wear (steps). The pins must be clean and in good condition for proper operation.
7. Measure the thickness of each brake pad and compare to the specification listed in **Table 3**. If the pad thickness is less than the wear limit, install new pads.
8. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
9. Replace both of the piston seals as a set.

### Assembly

#### NOTE

Use only new, DOT 3 brake fluid when brake fluid is called for in the following steps.

1. Soak the piston seals in brake fluid for approximately 5 minutes.
2. Coat the piston and cylinder bore with brake fluid.
3. Install the larger piston seal into the second (farthest) groove in the cylinder bore.
4. Install smaller seal into the front groove in the cylinder bore.

#### NOTE

Make certain both seals fit squarely into their respective cylinder bore grooves. If a seal is not installed properly, the seals will be ruined when the piston is installed, the caliper assembly will leak and braking performance will be reduced.

5. Install the piston in the cylinder bore with the tapered end (**Figure 24**) first.
6. Install the bleed screw and its dust cover.
7. Install the brake caliper assembly and brake pads as described in this chapter.

## HYDRAULIC REAR BRAKE CALIPER (ALL 1989-ON MODELS)

### Brake Pad Inspection

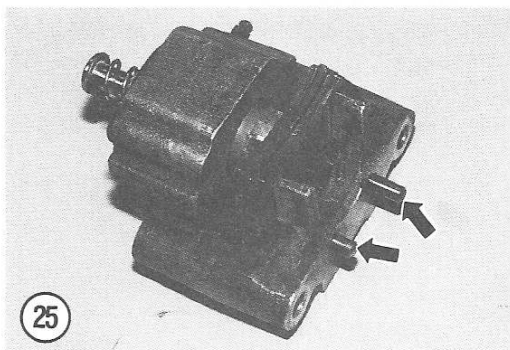
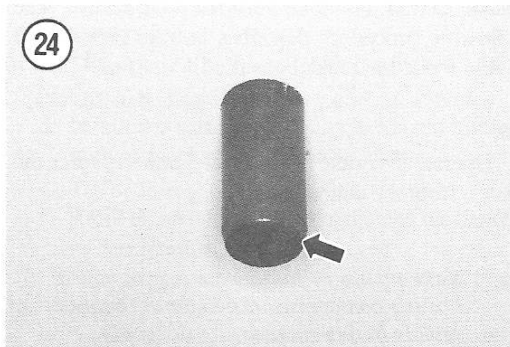
Measure brake pad wear with the brake caliper installed on the vehicle. Replace the brake pads if

the friction material thickness is equal to or less than the service limit specification in **Table 3**.

### Brake Pad Replacement

There is no recommended time interval for changing the friction pads in the front brakes. Pad wear depends greatly on riding habits and conditions. Always replace both pads at the same time.

1. Disconnect the foot brake linkage.
2. Remove the brake caliper mounting bolts, then move the caliper away from the brake disc.
3. Check the condition of the brake rotor (disc). Install a new disc if it is damaged.
4. Push the pad hanger pins (**Figure 25**) from the housing and remove the brake pads.
5. Inspect the brake pads (**Figure 26**) for uneven wear, damage or grease contamination. Measure the thickness of each brake pad. Replace the brake pads if the thickness of any one pad is less than the service limit in **Table 3**. Replace brake pads as a set.
6. Check the end of the piston for fluid leakage. If leaking, overhaul the brake caliper as described in this chapter.



7. To make room for the caliper, push the caliper back into the cylinder bore through the reservoir. To prevent it from moving forward, it may be necessary to use a...

8. Push the caliper back into the cylinder bore for the new pads. The caliper should move freely in the cylinder bore as described in the following steps.

9. Position new pads on the hanger pins. 10. Separate the caliper from the brake disc.

11. Tighten the nuts on the caliper bolts as shown in Table 2.

12. Reattach the caliper to the brake disc.

13. Operate the brake pedal to seat the pads against the disc.

Use new DOT 3 brake fluid.

14. Recheck the brake fluid level. If necessary, add fresh fluid.

Do not ride the brakes until the brake fluid has fully bled. See the chapter on bleeding the brakes.

Removal/Installation (Caliper Will Not Move)

If the brake caliper does not move, but not disassemble it.



equal to or less than Table 3.

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7. To make room for the new pads, push the piston back into the caliper. This will force brake fluid to backup through the hose into the master cylinder reservoir. To prevent the reservoir from overflowing, it may be necessary to remove some of the brake fluid.

8. Push the caliper piston in all the way to allow room for the new pads. The caliper piston should move freely in the caliper. If it does not, overhaul the caliper as described in this chapter.

9. Position new brake pads in the caliper and install the hanger pins.

10. Separate the brake pads and install over the brake disc.

11. Tighten the retaining screws to the torque listed in Table 2.

12. Reattach the foot brake linkage.

13. Operate the brake lever and pedal a few times to seat the pads against the disc.

**WARNING**

*Use new brake fluid clearly marked DOT 3 from a sealed container.*

14. Recheck the brake fluid level in the reservoir. If necessary, add fresh DOT 3 brake fluid.

**WARNING**

*Do not ride the vehicle until you are sure that the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.*

**Removal/Installation  
(Caliper Will Not Be Disassembled)**

If the brake caliper is to be completely removed but not disassembled, perform this procedure. If the

caliper will be disassembled, refer to *Caliper Removal/Piston Removal* in this section.

If the caliper is being only partially removed, it is not necessary to disconnect the brake line from the caliper. Insert a wooden or plastic spacer block between the brake pads to keep the brake pads in place.

**NOTE**

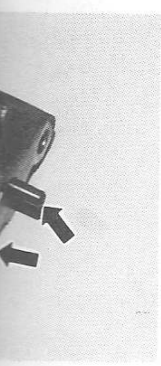
*The spacer block prevents the piston from being forced out of the caliper if the brake lever is squeezed while the caliper is removed from the brake disc. If the piston is forced from its bore, the caliper must be disassembled then reassembled to properly reseat the piston. Bleeding the system will also be required.*

1. Remove any panels that interfere with the removal of the brake caliper.
2. If the caliper is to be completely removed from the vehicle, loosen the brake hose fitting to the caliper before removing the caliper.
3. Disconnect the foot brake linkage.
4. Remove the brake caliper mounting bolts and pull the caliper assembly from the brake disc (rotor).

**NOTE**

*Prepare a container for catching the brake fluid released in Step 5.*

5. Hold the brake hose fitting and turn the caliper to remove it from the brake hose.
6. Place the end of the brake hose in a container to prevent brake fluid from dripping onto the vehicle.
7. Plug the opening for the brake hose fitting to keep the fluid inside the caliper and to keep dirt out.
8. If the brake pads are to be reused, remove the brake pads or carefully protect the brake pads from becoming covered with brake fluid. Replace the brake pads if the pads are contaminated with brake fluid.
9. Install the caliper by reversing these steps, noting the following.
  - 10A. If the caliper was removed from the vehicle:
    - a. Make sure the brake pads are not contaminated with brake fluid.
    - b. Attach the brake hose fitting to the caliper hand-tight.
    - c. Slide the caliper into position on the brake disc.



- d. Install the caliper mounting bolts and tighten to the torque specification in **Table 2**.
  - e. Tighten the brake hose fitting securely.
  - f. Refill the master cylinder and bleed the brakes as described in this chapter.
- 10B. If the caliper was only partially removed from the vehicle:
- a. Remove the spacer block from between the brake pads.
  - b. Slide the caliper into position over the brake disc.
  - c. Install the caliper mounting bolts and tighten to the torque specification in **Table 2**.
11. Reattach the foot brake linkage.
  12. Operate the brake lever and pedal a few times to seat the pads against the brake disc.

#### WARNING

*Do not ride the vehicle until you are sure that the brakes are operating correctly with full hydraulic advantage. If necessary, bleed the brakes as described in this chapter.*

#### Caliper Removal/Piston Removal (Caliper Will Be Disassembled)

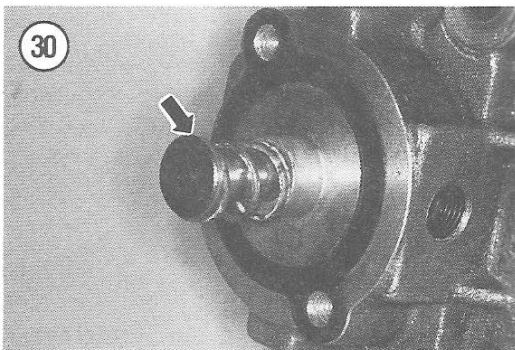
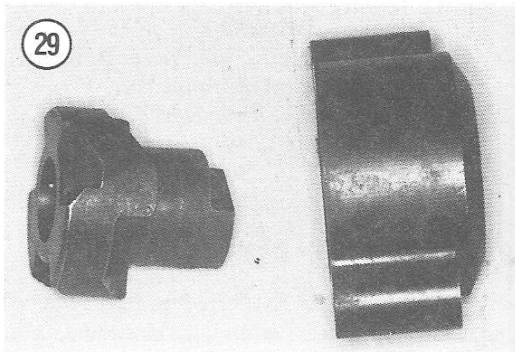
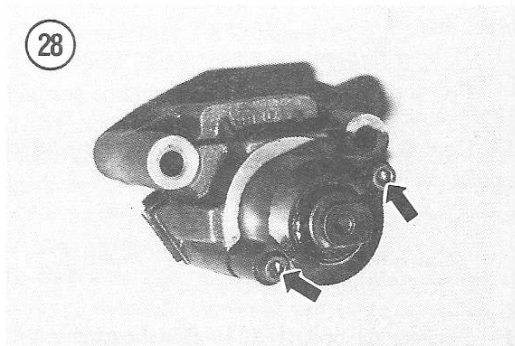
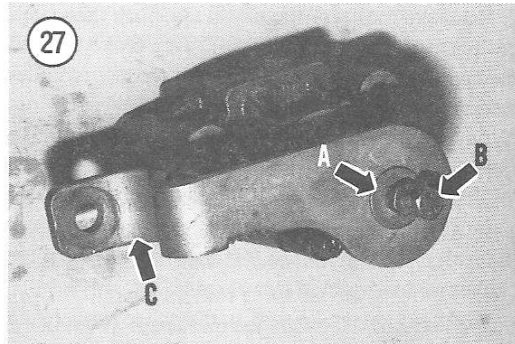
If the caliper is to be completely disassembled, force from inside the caliper can be used to push the piston from the caliper. This force can be supplied by hydraulic pressure from the brake system itself, or by compressed air. If you are going to use brake system hydraulic pressure, you must do so before disconnecting the brake hose fitting from the caliper. The following procedure describes how to remove the piston while the brake hose is still attached.

1. Remove the brake pads as described in this chapter.
2. Operate the brake lever about 3 times to force the piston from the caliper bore.

#### NOTE

*If the piston will not come out, remove it using compressed air. Refer to **Disassembly** in this chapter.*

3. Support the caliper and loosen the attached brake hose fitting. After the hose fitting is loosened, hold the hose and turn the caliper to remove it from the brake hose. Place the end of the brake hose in a



container to prevent  
the vehicle.  
4. Take the caliper  
assembly.

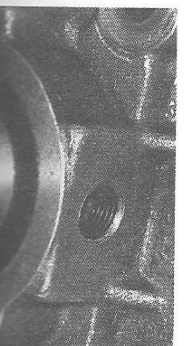
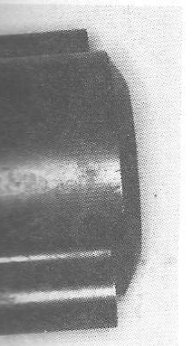
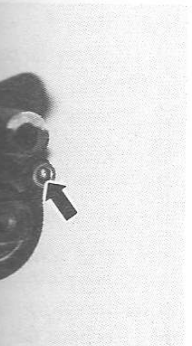
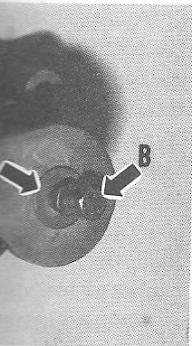
#### Disassembly

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3. Loosen the lock  
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lever (C, Figure 2





container to prevent brake fluid from dripping onto the vehicle.

4. Take the caliper to a workbench for further disassembly.

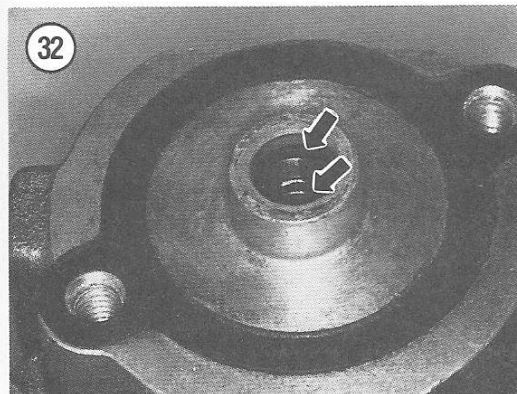
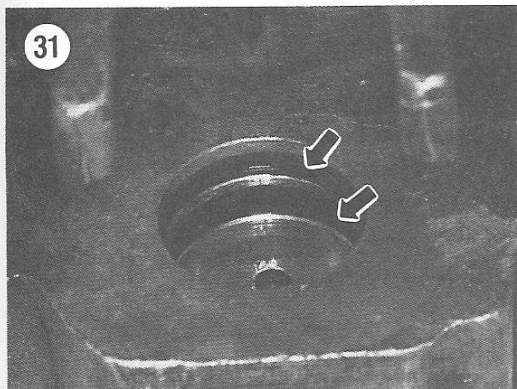
### Disassembly

1. Remove the caliper as described in this chapter.

#### WARNING

*Considerable force is required to force the piston from the caliper bore. Do not try to cushion the piston with your fingers, as injury could result.*

2. Cushion the caliper piston with a shop rag, making sure to keep your fingers and hand away from the piston area. Apply compressed air through the brake line port to remove the piston.
3. Loosen the locknut (A, **Figure 27**), remove the adjusting screw (B, **Figure 27**), then remove the lever (C, **Figure 27**).



4. Remove the two screws (**Figure 28**), then remove the stationary ramp and movable ramp (**Figure 29**).
5. Remove the brake apply pin and spring (**Figure 30**).

#### CAUTION

*Do not remove the seal rings unless new rings are available. Removing the rings from grooves in the caliper housing will damage even new rings. If the seals are removed, be extremely careful not to scratch or nick the bore. If the bore is scratched or nicked, it may be impossible to seal properly the brake.*

#### NOTE

*A suitably shaped seal pick can be used to remove the seal rings. A wire paper clip or similar stiff wire can also be bent to remove the seal rings.*

6. Use an appropriate tool to remove the 2 seal rings from each of the caliper bores. Refer to **Figure 31** and **Figure 32**.
7. Remove the bleed valve and its cover from the caliper.

### Inspection

1. Clean the caliper housing. Remove stubborn dirt with a soft brush, but do not brush the cylinder bore as this may damage it. Clean the dust and piston seal grooves with a plastic tipped tool so that you do not damage them or the cylinder bore. Clean the caliper in hot soapy water and rinse in clear, cold water. Dry with compressed air.
2. Clean the piston (**Figure 33**) with clean DOT 3 brake fluid.
3. Check the piston and cylinder bore for deep scratches or other obvious wear marks. Do not hone the cylinder. If the piston or cylinder is damaged, replace the caliper assembly.
4. Clean the bleed valve with compressed air. Check the valve threads for damage. Replace the dust cap if missing or damaged.
5. Clean and check the threads in caliper housing for damage.
6. Check the pad hanger pins (**Figure 25**) for excessive wear, damage or uneven wear (steps). The pins must be clean and in good condition for proper operation.

7. Measure the thickness of each brake pad (**Figure 26**) and compare to the specification listed in **Table 3**. If the pad thickness is less than the wear limit, install new pads.
8. Inspect the brake pads for uneven wear, damage or grease contamination. Replace the pads as a set, if necessary.
9. Replace both of the piston seals as a set.

### Assembly

#### NOTE

*Use only new, DOT 3 brake fluid when brake fluid is called for in the following steps.*

1. Soak the piston seals in brake fluid for approximately 5 minutes.
2. Coat the piston and cylinder bore with brake fluid.
3. Install the thicker piston seal into the second (farthest) groove in the cylinder bore. Refer to **Figure 31**.
4. Install thinner seal into the outside groove in the cylinder bore. Refer to **Figure 31**.
5. Install the thicker seal ring into the inside groove of the bore for the pedal piston. Refer to **Figure 32**.
6. Install the thinner seal ring in the outside groove of the bore for the pedal piston. Refer to **Figure 32**.

#### NOTE

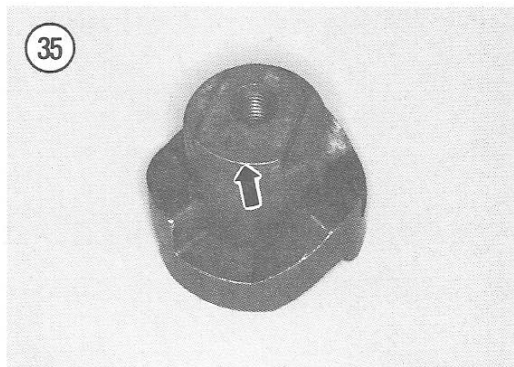
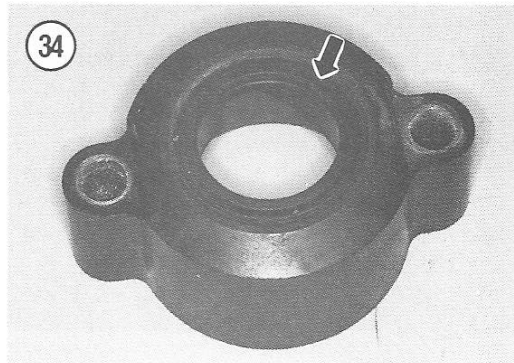
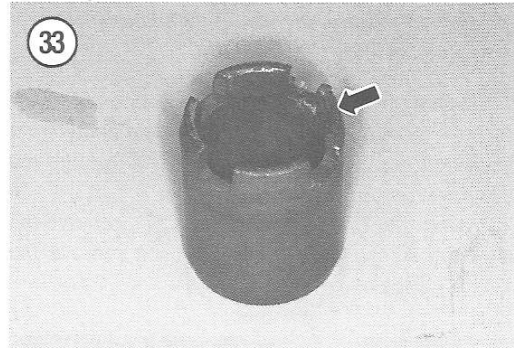
*Make sure all 4 seals (**Figure 31** and **Figure 32**) fit squarely into their respective cylinder bore grooves. If a seal is not installed properly, the seals will be ruined when the piston is installed, the caliper assembly will leak and braking performance will be reduced.*

7. Coat the piston (**Figure 33**) with clean DOT 3 brake fluid and install the piston in the cylinder bore with the tapered and open end first.
8. Coat the brake apply pin (**Figure 30**) with clean DOT 3 brake fluid and install the pin and spring for the pedal.
9. Check the condition of the seal in the stationary ramp (**Figure 34**). If damaged, install a new seal.
10. Inspect the condition of the movable ramp (**Figure 35**) and if not damaged, install inside the stationary ramp.

#### NOTE

*In Step 11, the longer side of the movable ramp (**Figure 35**) will point toward the bleeder valve.*

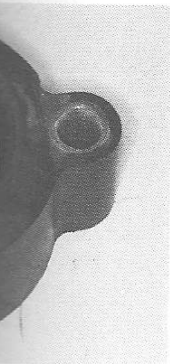
11. Install the ramps with the flats of the movable ramp (**Figure 35**) perpendicular (90°) to the stationary ramp mounting holes (**Figure 34**).
- 12A. On models without an adjuster screw, install the brake lever (**Figure 36**), retaining washer and screw.



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point toward

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(90°) to the station-  
34).

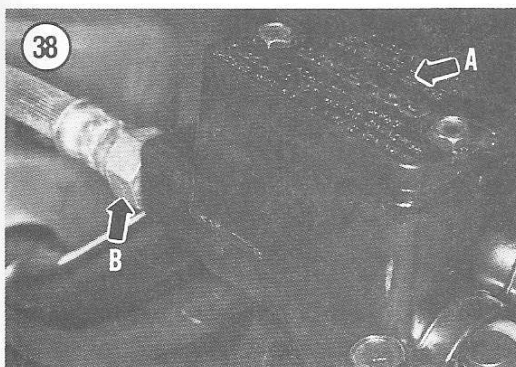
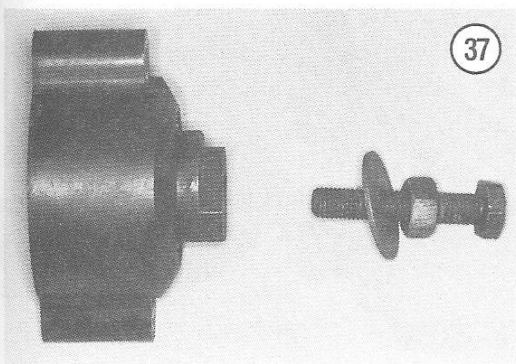
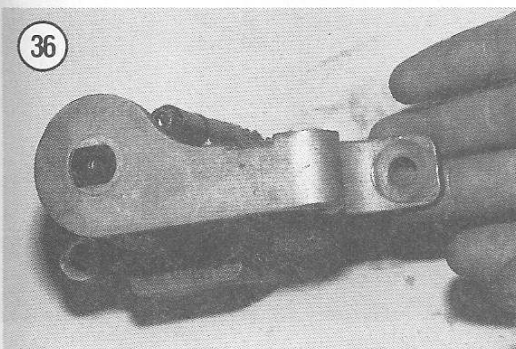
ster screw, install  
aining washer and



12B. On models with a brake adjuster screw (Figure 37), install the brake lever (Figure 36), retaining washer, lock nut and adjusting screw (Figure 37). Turn the adjuster screw in only far enough to just contact the pedal piston, then tighten the lock nut enough to hold the lever in place. Adjust the brake as described in Step 16 after the brake is installed.

13. Install the bleed screw and its dust cover.

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



15. Operate the brake several times and check for leaks.

16. If foot pedal travel is excessive, proceed as follows:

- a. Place the transmission in neutral.
- b. Tighten the adjusting screw (Figure 37) until the brake pads rub on the disc.
- c. Loosen the adjusting screw (Figure 37) approximately 1/2 turn until the disc is free to rotate, then tighten the lock nut.

17. Check the brake fluid level in the handlebar mounted reservoir as described in Chapter Three.

### MASTER CYLINDER

The handlebar on early (1987-1988) models passes through the master cylinder. The master cylinder and lever of these early models is clamped to the handlebar with a set screw that enters from the bottom of the master cylinder casting.

The master cylinder on later models is attached to the handlebar with 2 screws and a removable clamp.

Read the information listed under *Hydraulic Brakes* in this chapter before servicing the master cylinder.

### Removal/Installation

1. Park the vehicle on level ground and block the wheels so the vehicle cannot roll.
2. Cover the area under the master cylinder to prevent brake fluid from damaging any component that it might contact.

#### CAUTION

*If brake fluid should contact any surface, wash the area immediately with soapy water and rinse completely. Brake fluid will damage plastic, painted and plated surfaces.*

3. Remove the master cylinder cover (A, Figure 38) and diaphragm.

4. Use a clean syringe to remove the brake fluid from the reservoir. Discard the brake fluid.

5. Detach the brake hose (B, Figure 38) from the master cylinder, then seal the brake hose to prevent brake fluid from draining out.

6A. On models without a clamp (1987-1988), it is necessary to remove the grip and interfering switches from the handlebars. Loosen the set screw

located under the master cylinder and slide the master cylinder from the handlebar.

6B. On models with the clamp shown in **Figure 39**, remove the two screws and the clamp that attach the master cylinder to the handlebar, then remove the master cylinder.

7. If necessary, service the master cylinder as described in this chapter.

8. Clean the handlebar, master cylinder and clamp mating surfaces.

9A. On early (1987-1988) models, slide the master cylinder onto the handlebar, then install the grip and switches.

9B. On later models with clamp (**Figure 39**), position the master cylinder against the handlebar, then install the two screws and clamp.

10. Move the master cylinder to a position where the brake lever suits your riding position, then tighten the set screw or the two mounting screws securely.

11. Attach the brake hose to the master cylinder and tighten the fitting securely.

12. Refill the master cylinder with DOT 3 brake fluid and bleed the brake as described in this chapter.

#### WARNING

*Do not ride the vehicle until the brakes are working properly. Make sure that the brake lever travel is not excessive and that the lever does not feel soft or spongy. If either condition exists, bleed the system again.*

#### Disassembly

1. Remove the master cylinder as described in this chapter.

2. Remove the brake lever pivot bolt (**Figure 40**) from the master cylinder and remove the brake lever.

3. If not already removed, remove the screws attaching the master cylinder cover, then remove the cover and diaphragm (**Figure 41**).

#### NOTE

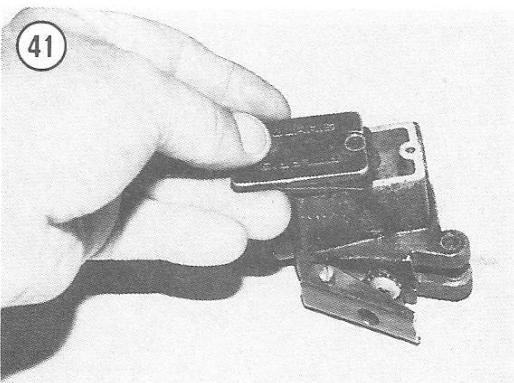
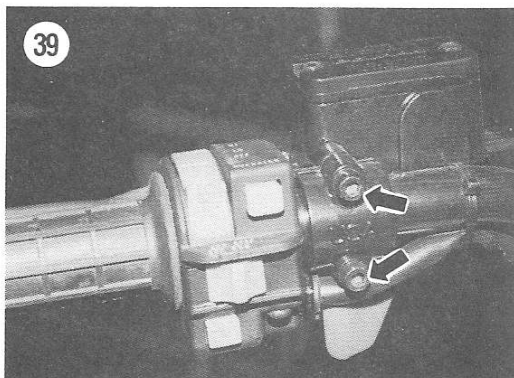
*If there is brake fluid leaking from the piston bore, the piston cups are worn or damaged. Replace the piston assembly during reassembly.*

4A. On early (1987-1988) models, carefully remove the piston and spring (**Figure 42**) from the master cylinder bore.

4B. On 1989-on models, insert the push rod from special service tool (part No. 2870962) into the opening for the hose fitting as shown in **Figure 43**.

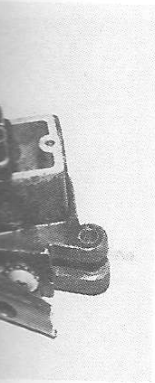
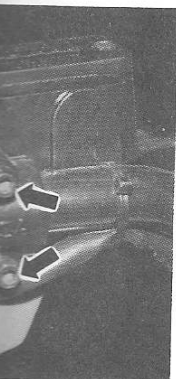
#### CAUTION

*Do not remove the seals from the piston (**Figure 42**). The seals are not available separately and will be destroyed by removing from the piston.*



the push rod from (870962) into the down in **Figure 43**.

the piston not available destroyed by re-



**Inspection**

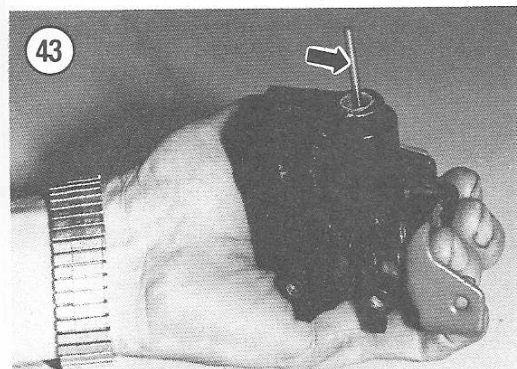
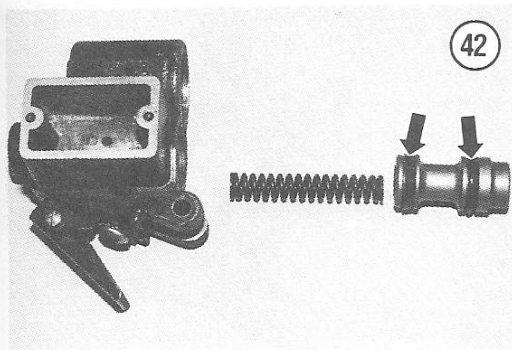
Worn or damaged master cylinder components will prevent the master cylinder from building enough pressure to stop the vehicle. Proper brake operation will result in a feel that is firm, solid and sure. Air in the system, internal leakage or external leakage will cause the brake to feel soft, weak and indistinct.

1. Wash the piston and cylinder with clean DOT 3 brake fluid.

**CAUTION**

*Do not attempt to remove the seals (Figure 42) from the piston. Removal will damage the seals, which are not available separately from the piston.*

2. Install a new return spring (Figure 42) if broken, distorted or collapsed.
3. Inspect the piston assembly for the following defects:
  - a. Worn, cracked, damaged or swollen seals (Figure 42).
  - b. Scratched, scored or damaged piston.



4. Install a new piston and seal assembly if either of the seals or the piston is damaged.
5. Inspect the master cylinder bore. If the bore is corroded, scored or damaged in any way, replace the master cylinder assembly. Do not hone the master cylinder bore to remove scratches or other damage.
6. Check for plugged supply and relief ports in the master cylinder. Clean with compressed air.

**NOTE**

*A plugged relief port will cause the pads to drag on the disc.*

7. Check the brake lever and pivot bolt for worn or damaged parts.
8. Check the reservoir cover and diaphragm for damage. Check the diaphragm for cracks or deterioration. Replace damaged parts as required.
9. Check all of the threaded holes in the master cylinder housing. Clean with compressed air. The small screws used to secure the reservoir cover are easily damaged. Check the screw heads and threads for damage and replace or repair if necessary.

**Assembly**

Use new DOT 3 brake fluid when brake fluid is called for in the following steps.

1. If you are installing a piston repair kit, note the following:
  - a. Check the repair kit to make sure that it contains all of the necessary new parts.
  - b. Wash the new parts in new brake fluid. It is important to remove all paper and dust from the new parts.
2. Coat the piston assembly and cylinder bore lightly with brake fluid.

**CAUTION**

*When installing the piston assembly in Step 3, make sure the primary and secondary seals (cups) do not tear or turn inside out; both seals are slightly larger than the bore.*

- 3A. On early (1987-1988) models, install the piston and spring as shown in **Figure 42**. Compress the piston into the bore and install the brake lever (**Figure 40**). Push and release the piston a few times to make sure it moves smoothly in the cylinder bore.
- 3B. On 1989-on models, assemble the piston and related parts as follows:



- a. Lubricate the piston, seals (A, **Figure 44**) and the special installing tool (B) (part No. 2870962) shown in **Figure 44**.
- b. Install the piston in the installing tool. The inner end of the piston and the return spring should be at the undercut end of the installing tool.
- c. Install the inner washer at the inside of the master cylinder bore.
- d. Slide the special installing tool, piston and spring into the master cylinder bore (**Figure 45**), and push the piston into the bore.
- e. Hold the piston in place and remove the special tool.
- f. Install the dust seal with its lips toward the outside, then press the seal into place with the end of the special tool that is not under cut. Refer to **Figure 46**.
- g. Reinstall the brake lever.
- h. Operate the hand lever several times to make sure the lever moves freely with no sign of binding.

### BRAKE HOSE REPLACEMENT

Replace the brake hoses if they show signs of wear or damage.

1. Place a container under the brake line.
- 2A. If the fitting is a banjo bolt, remove the banjo bolt and sealing washers.
- 2B. To detach a compression fitting, hold the stationary fitting with a wrench and loosen the fitting on the brake hose with another wrench. It may be necessary to hold the brake hose with a wrench. If the hose fitting can not be turned without twisting the hose, it may be necessary to either loosen the other end of the hose first or to turn the component to detach it from the hose.
3. Place the end of the brake hose in a clean container. Operate the brake lever to drain fluid from the master cylinder and brake hose.

#### CAUTION

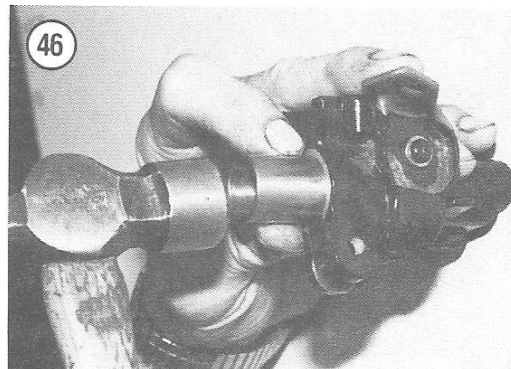
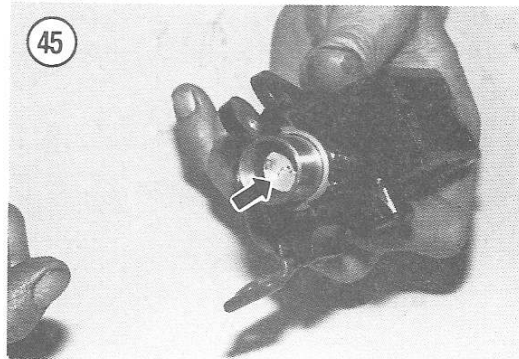
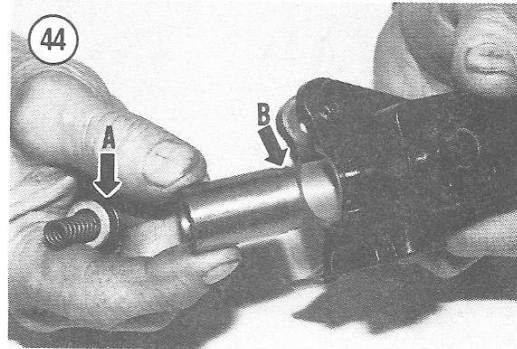
*Dispose of all used brake fluid. Never reuse brake fluid that has been drained from the system. Old fluid contains contaminants that can damage the brake system components.*

5. Install new sealing washers and banjo bolts if necessary.

#### CAUTION

*Do not overtighten or crossthread banjo bolts or compression fittings. Overtightening will distort the fitting and may cause leakage.*

6. Tighten the banjo bolts and compression fittings securely.



4. Install a new brake hose in the reverse order of removal.

7. Refill the master cylinder with the clearly marked fluid in this chapter.

Disconnect the brake lines from the master cylinder.

From the brake line, the rear brake line exits the right side of the master cylinder, while the front transmission.

#### Inspection

It is not necessary to inspect it. Small grooves are visible unless they are caused by using a fingernail. If the grooves are visible, replace the hose. When servicing the discs to remove wear or warpage.



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compression fittings



7. Refill the master cylinder with fresh brake fluid clearly marked DOT 3. Bleed the brake as described in this chapter.

#### WARNING

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

### BRAKE DISC

Front brake discs are attached to the front hubs. The rear brake disc is located on a splined shaft that exits the right side of the transmission. On some models, the rear brake disc is located on the output shaft, while a separate brake shaft is used on some transmissions.

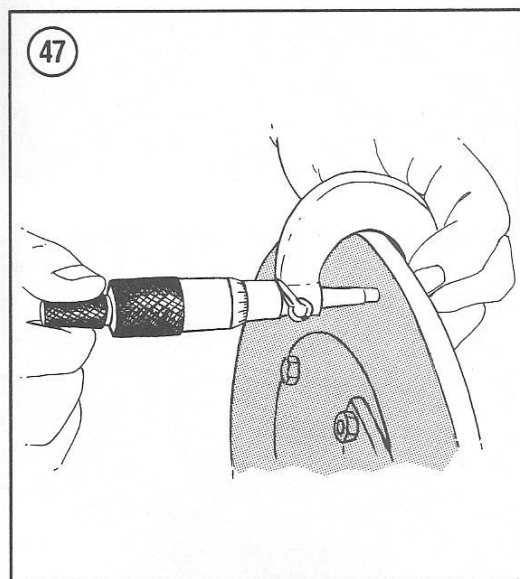
#### Inspection

It is not necessary to remove any brake disc to inspect it. Small marks on the disc are not important unless they are cracks. Radial scratches deep enough to snag a fingernail will reduce braking effectiveness and cause the brake pads to wear too quickly. If deep grooves are evident and the brake pads are wearing rapidly, replace the disc.

When servicing the brake discs, do not machine the discs to remove scratches or to compensate for wear or warpage. The discs are thin and grinding will

reduce their thickness, causing them to warp quite rapidly. If a disc is warped, the brake pads may be dragging on the disc, causing the disc to overheat. Overheating can also be caused by unequal brake pad pressure on both sides of the disc. The main causes of unequal pad pressure are: the floating caliper is binding on the caliper bracket shafts, thus preventing the caliper from floating (side-to-side) on the disc; the brake caliper piston seal is worn or damaged; the small master cylinder relief port is plugged; and the primary cup on the master cylinder piston is worn or damaged.

1. Support the vehicle with all 4 wheels off the ground.
2. Remove the front wheels as described in Chapter Twelve.
3. Measure the thickness around the disc at several locations with a micrometer. Refer to **Figure 47**. Replace the disc if the thickness varies at different locations around the disc.
4. On the front wheel discs, make sure the disc bolts are tight prior to performing this check. Use a magnetic stand with the dial indicator stem against the brake disc. Turn the hub and measure the runout. If the runout exceeds 0.15 mm (0.006 in.), replace the disc.
5. Clean any rust or corrosion from the disc and wipe the disc clean with lacquer thinner. Never use oil based solvent that may leave an oil residue on the disc and do not touch the disc with fingers after cleaning.



#### Removal/Installation

- 1A. To remove the front brake disc:
  - a. Remove the non-driven front hub(s) as described in Chapter Twelve.
  - b. Remove the driven front hub(s) as described in Chapter Ten.
  - c. Remove the screws securing the disc to the wheel and remove the disc.
- 1B. To remove the rear brake disc:
  - a. On All Wheel Drive models, remove the front drive chain guard, chain and sprocket (A, **Figure 48**) as described in Chapter Ten.
  - b. Remove the brake caliper assembly (B, **Figure 48**) as described in this chapter.
  - c. On models with only rear wheel drive, remove the bolt or snap ring retaining the disc on the splined transmission shaft.

- d. Pull the disc from the shaft splines.
2. Install by reversing the removal steps. Tighten the front wheel disc screws to the torque listed in **Table 2**.

### BRAKE BLEEDING

This procedure removes air bubbles and pockets of air from the brake fluid. Bleed air from the fluid if the brakes feel spongy, a component has been replaced, a leak in the hydraulic system has been repaired or the brake fluid has been replaced.

#### NOTE

*During this procedure, it is important to check the fluid level in the master cylinder frequently. If the reservoir runs dry, air will enter the system which will require starting over.*

1. Locate the brake bleeder valve at each brake caliper. Flip the dust cap from the bleeder valve (**Figure 49**) and wipe off the valve.
2. Bleed the rear caliper first, then bleed each of the front calipers.
3. Connect a length of clear tubing to the bleeder valve on the caliper. Place the other end of the tube into a clean container. Fill the container with enough fresh brake fluid to keep the end submerged. The tube should be long enough so that a loop can be made higher than the bleeder valve to prevent air from being drawn into the caliper during bleeding.

#### CAUTION

*Cover all parts which could become damaged by accidentally spilling brake fluid. Use soapy water to wash any spilled brake fluid immediately and rinse area completely with freshwater.*

4. Clean the top of the reservoir cover, then remove the cover and diaphragm. Fill the reservoir to the level listed in **Table 3**. Install the diaphragm and cover to prevent the entry of dirt and moisture.

#### WARNING

*Use brake fluid clearly marked DOT 3 only. Others may vaporize and cause brake failure. Always use the same brand and type. Do not intermix brake fluids, because some brands are not compatible.*

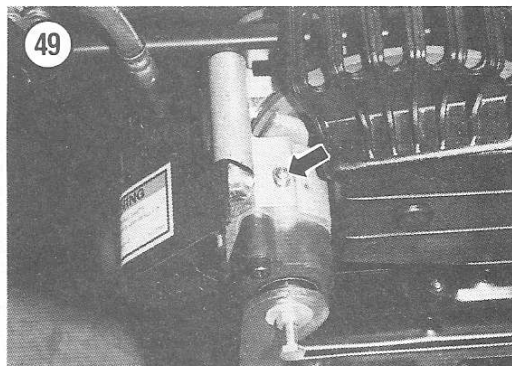
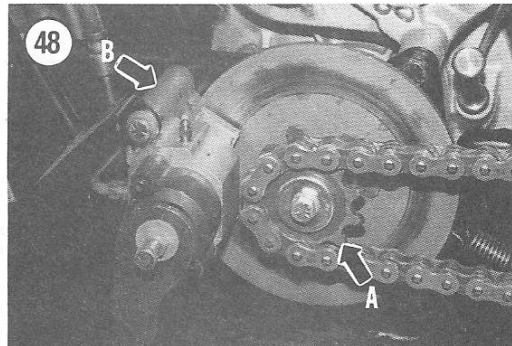
#### NOTE

*During this procedure, it is important to check the reservoir fluid level periodically to make sure it does not run dry. If the reservoir should run dry, air will enter the system and the bleeding procedure must be started over.*

5. Bleed air from the bleeder valve as follows:
  - a. Hold the brake lever in the applied position.
  - b. Open the bleeder valve (**Figure 49**) by turning counterclockwise about 1/2 turn. Do not release the brake lever or pedal while the bleeder valve is open.
  - c. As the bleeder valve just opens, you will feel the lever loosen a bit as it moves to the limit of its travel.
  - d. Tighten the bleeder screw, then release the brake lever. Do not release the brake lever or pedal while the bleeder valve is open.

#### NOTE

*As the brake fluid enters the system, the fluid level in the reservoir will drop. Maintain the correct level specified in*



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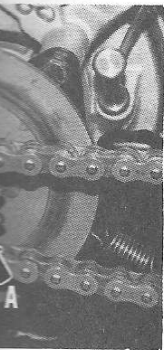
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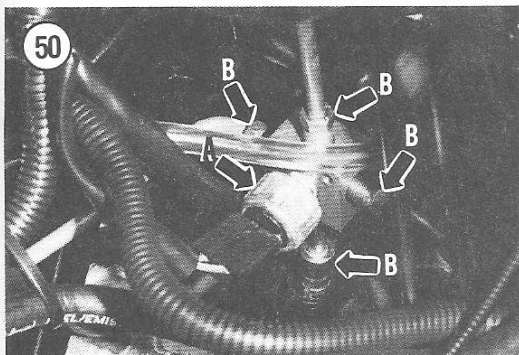


*Table 3 to prevent air from being forced into the system.*

- Repeat Step 5 until no more air can be expelled from this bleeder. If you are replacing the fluid, continue until the fluid emerging from the hose is clean.

#### NOTE

*If bleeding is difficult, it may be necessary to allow the fluid to stabilize for a few hours. The air in the system will collect and form larger bubbles which must then be bled from the system. Repeat the bleeding procedure when the tiny bubbles in the system settle out.*



- Hold the lever in the applied position and tighten the bleeder valve. Remove the bleeder tube and install the bleeder valve dust cap.
- Check the fluid level in the reservoir and add fluid to the master cylinder reservoir if necessary.
- Attach the bleeder hose to the next bleeder valve and bleed air from that valve following the procedure beginning with Step 3. Bleeding should begin with the rear caliper, proceed to one of the front calipers, then the other front caliper.
- Test the feel of the brake lever. It should feel firm and should offer the same resistance each time it's operated.
- If the brake lever doesn't yet feel solid, allow the fluid in the system to stabilize for a few hours. The air in the system will collect and form larger bubbles which are easier to bleed from the system. Repeat the bleeding procedure.
- If air continues to enter the system, check for a leak. Check the brake switch (A, Figure 50) and all of the fittings for tightness, including those at T-connections (B, Figure 50).

#### WARNING

*Before riding the vehicle, make certain that the brakes are working correctly by operating the lever. Make the test ride (a slow one at first) to make sure the brakes are working correctly.*

**Tables 1-3 are on the following page.**

**Table 1 BRAKE TYPE**

1985-1986	Mech. Drum
1987	
Trail Boss W877527 & Cyclone W877828	Mech. Drum
Trail Boss 4 × 4 W878027, W878127 & W878327	Hyd. Disc
1988-0n	Hyd. Disc

**Table 2 TORQUE SPECIFICATIONS**

	N-m	ft.-lb.
Front axle nut (3-wheel models)	48.8	36
Front brake caliper bolts	24.4	18
Front brake disc screws	24.4	18
Front brake hanger pins	16.3	12
Front hub nut (2 × 4)	54.2	40
Front wheel lug nuts	20.3	15
Master cylinder clamp screws	5.08-6.21	3.75-4.58 45-55 in.-lb.

**Table 3 BRAKE SPECIFICATIONS**

	mm	In.
Minimum disc brake pad thickness	2.0	0.075
Fluid level in reservoir, measured from top		
1987-1988	3	1/8
1989-on	6-8	1/4-5/16

This chapter covers  
install the body panel  
as soon as the part  
mounting hardware  
washers) be minimal

Refer to Figure 1

Removal/Installation

1. Lift the seat base  
remove the seat.
2. To install the seat  
with the frame, then  
to lock it in place.

## CHAPTER FIFTEEN

### BODY

This chapter contains procedures to remove and install the body panels and seat. It is suggested that as soon as the part is removed from the vehicle, all mounting hardware (small brackets, bolts, nuts and washers) be reinstalled so they will not be lost.

#### SEAT

Refer to **Figure 1**.

#### Removal/Installation

1. Lift the seat latch at the rear of the seat and remove the seat.
2. To install the seat, engage the front seat bracket with the frame, then push the rear of the seat down to lock it in place.

3. Lift up on the seat and make sure it is properly secured at the front and rear.

#### FUEL TANK COVER

Refer to **Figure 1**.

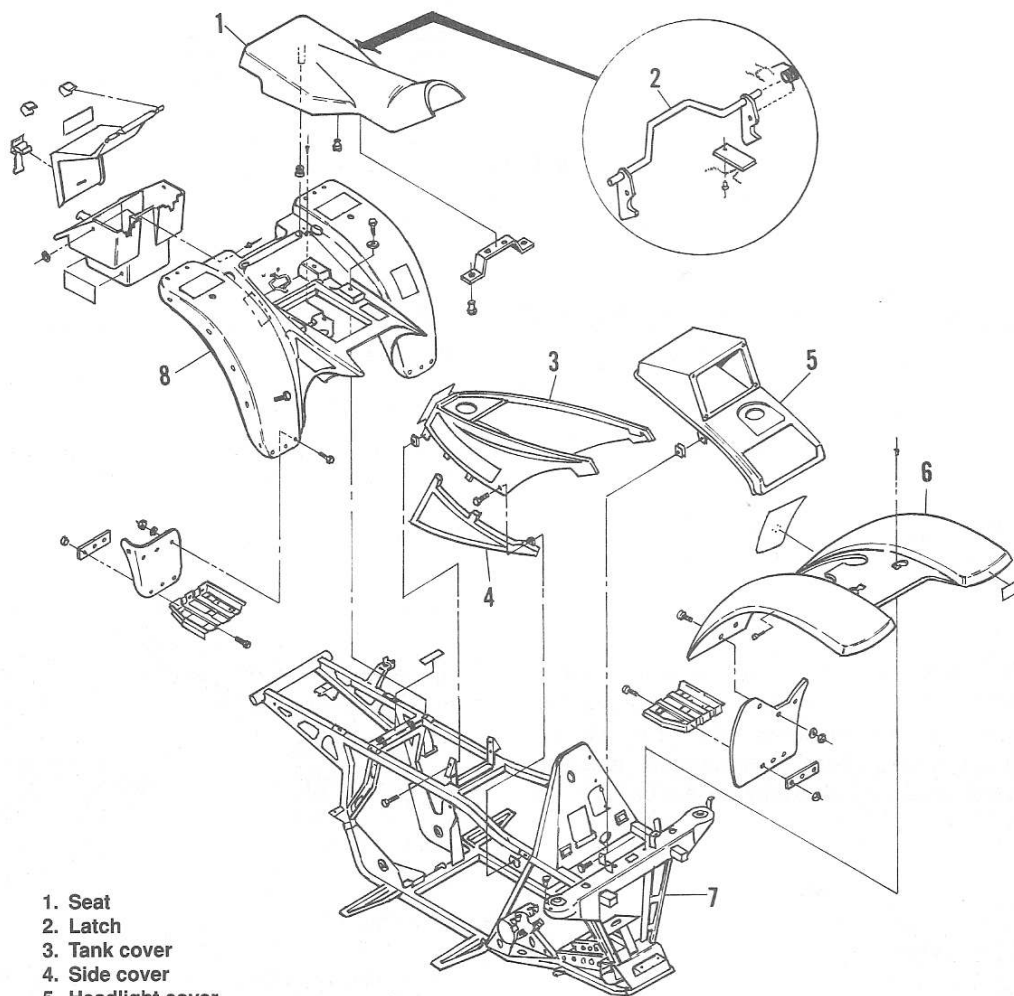
#### Removal/Installation

The fuel tank on some models is covered and this trim material must be removed before removing the fuel tank. Refer to **Figures 2-4**.

1. Remove the seat as described in this chapter.
2. Remove the front and rear screws (**Figures 2-4**) that attach the fuel tank cover.
3. Remove the fuel cap and remove the fuel tank cover. Reinstall the fuel tank cap.
4. Lift the fuel tank cover from the vehicle.

1

### BODY AND FRAME (MAGNUM MODELS)



1. Seat
2. Latch
3. Tank cover
4. Side cover
5. Headlight cover
6. Front fenders
7. Frame
8. Rear cab and fenders

BODY

5. Install the fuel

6. Install the reverse

Refer to Figure

Removal/Installation

1. Remove the fuel

2. Detach wire from



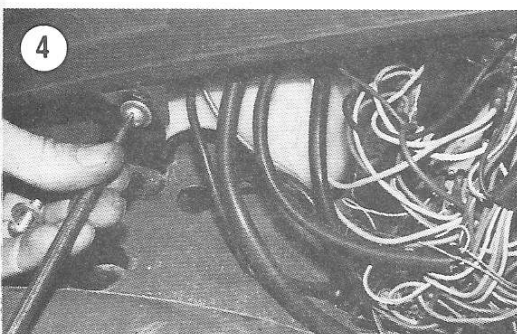
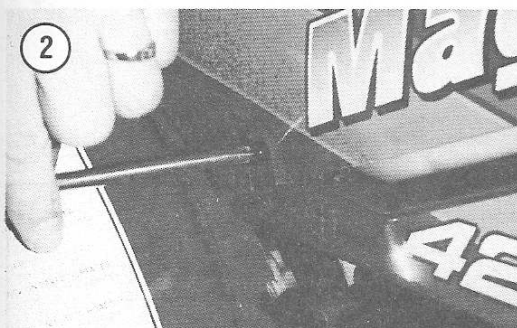
5. Install the fuel tank cap.
6. Install by reversing these steps.

### FRONT PANEL

Refer to **Figure 1**.

#### Removal/Installation

1. Remove the fuel tank cover as described in this chapter.
2. Detach wires from the headlight.



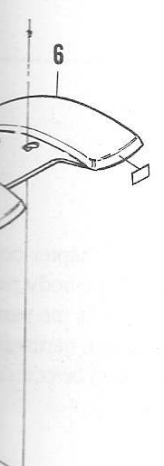
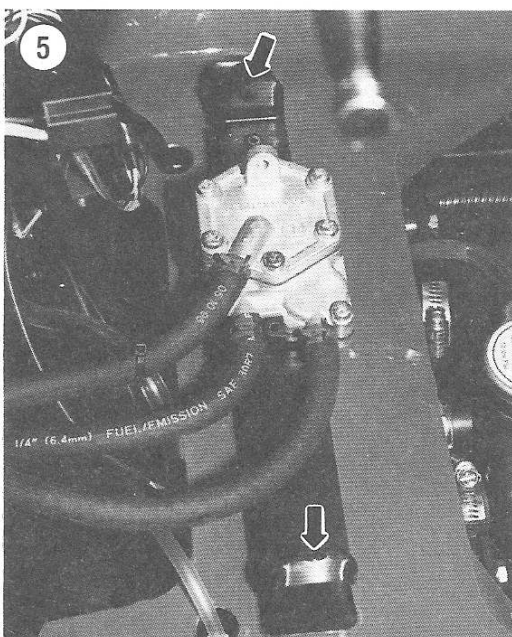
3. Remove the screws attaching the front panel (**Figure 3** and **Figure 4**), then remove the panel.
4. Install by reversing these removal steps.

### FRONT FENDER (EXCEPT XPLORER AND SCRAMBLER)

Refer to **Figure 1**.

#### Removal/Installation

1. Remove the fuel tank cover and front panel as described in this chapter.
2. Remove the bolts and washers securing the front fender to the frame.
3. On models with a fuel pump mounted as shown in **Figure 5**, proceed as follows
  - a. Unbolt the fuel pump bracket from the frame rails and move the fuel pump out of the way.
  - b. Drill out the rivets (**Figure 6**) attaching the front fenders to the frame.
4. Carefully pull the front fender away from the frame, then toward the front.
5. Install by reversing these removal steps, noting the following.
6. Do not overtighten the bolts as the plastic fender may fracture.



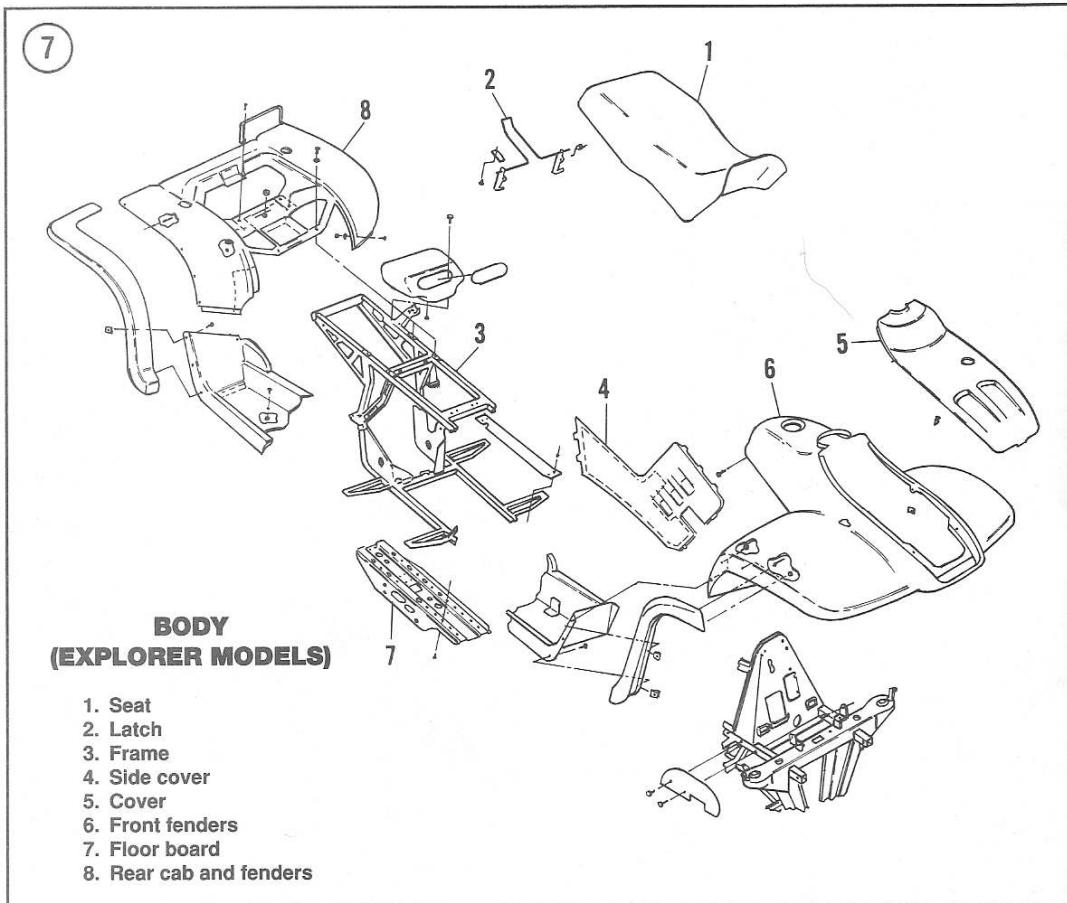
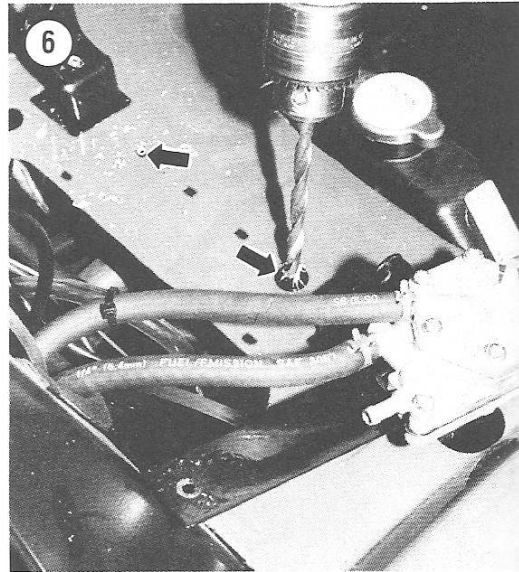


## FRONT FENDER (XPLOER)

Refer to **Figure 7**.

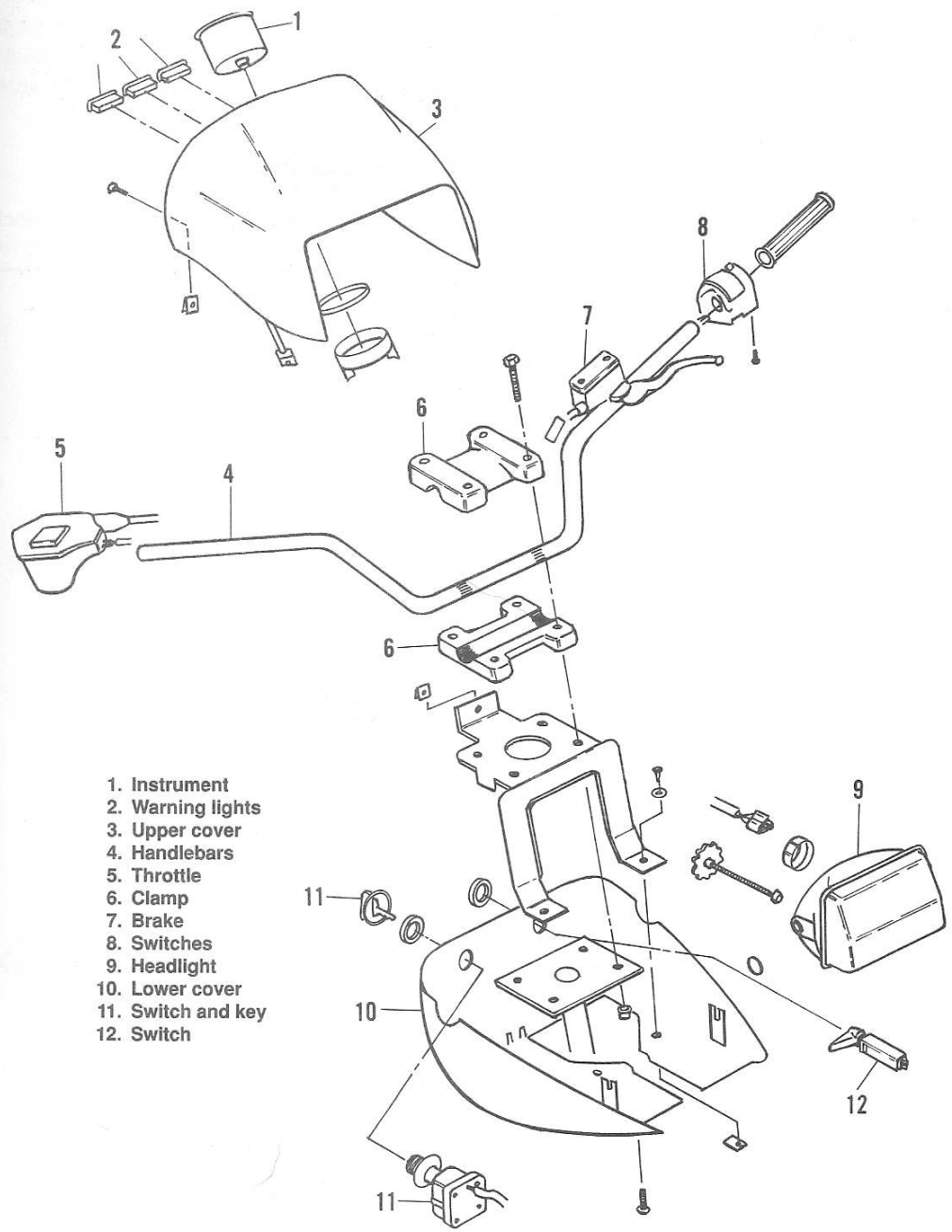
### Removal/Installation

1. Remove the side panels.
2. Remove the front panel.
3. Remove the handlebar assembly (**Figure 8**).
4. Remove the fuel cap.
5. Remove the screws, rivets, bolts and washers securing the front fender.
6. Carefully pull the front fender up, away from the frame, then lift the fender off.
7. Reinstall the fuel tank cap.
8. Install by reversing these removal steps. Do not overtighten the bolts as the plastic fender may fracture.

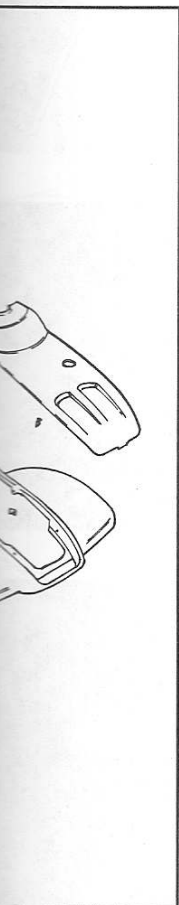


8

**HEADLIGHT COWLING  
(EXPLORER MODELS)**



- 1. Instrument
- 2. Warning lights
- 3. Upper cover
- 4. Handlebars
- 5. Throttle
- 6. Clamp
- 7. Brake
- 8. Switches
- 9. Headlight
- 10. Lower cover
- 11. Switch and key
- 12. Switch



## FRONT FENDER (SCRAMBLER)

Refer to **Figure 9**.

### Removal/Installation

1. Remove the front panel.
2. Remove the handlebar assembly.
3. Remove the the fuel cap.
4. Remove the screws securing the front fender.
5. Carefully pull the front fender up, away from the frame, then lift the fender off.

6. Reinstall the fuel tank cap.

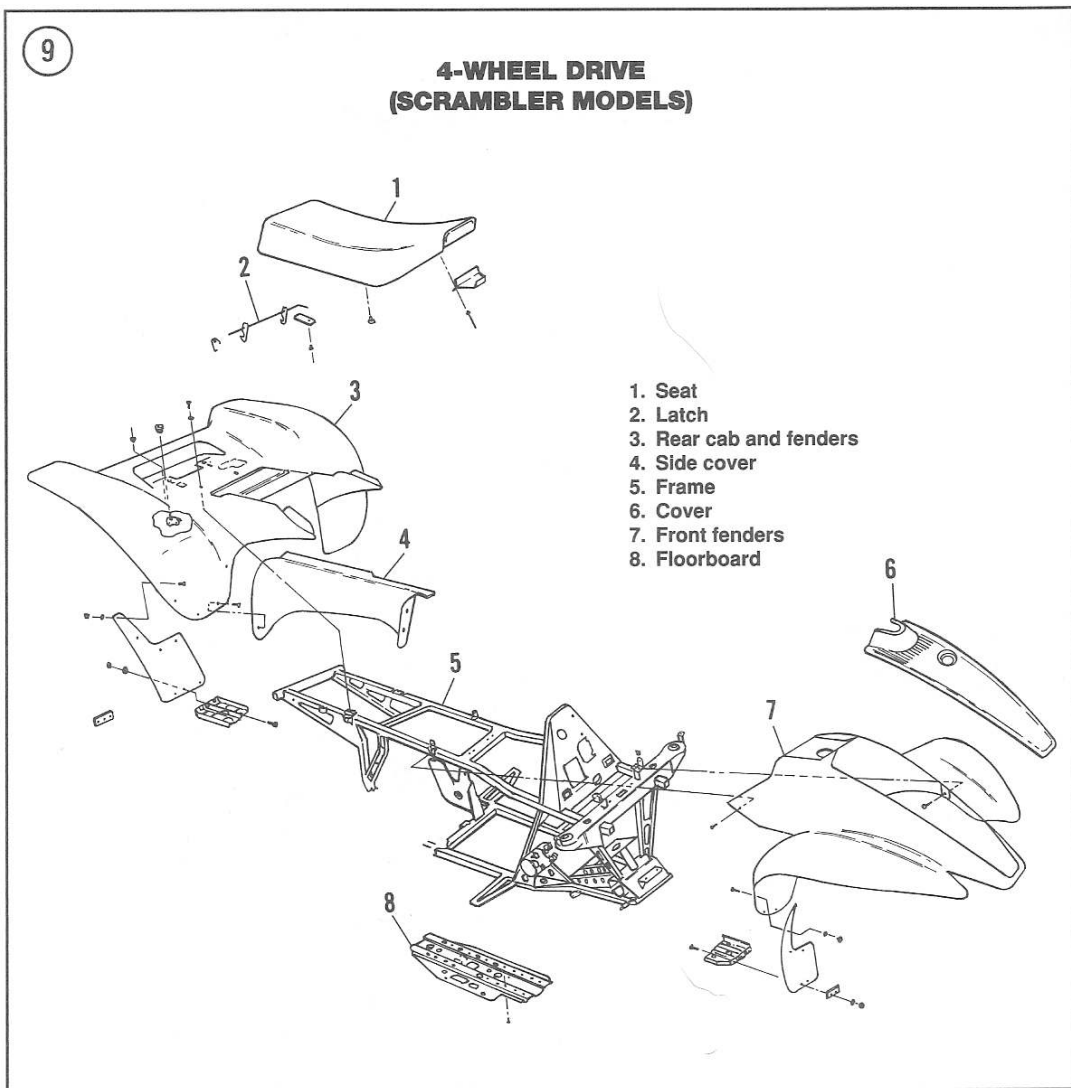
7. Install by reversing these removal steps. Do not overtighten the attaching screws as the plastic fender may fracture.

## REAR FENDER

Refer to **Figure 1, Figure 7 or Figure 9**

### Removal/Installation

1. Remove the seat and any interfering side panels.



removal steps. Do not  
as the plastic fender

ER

Figure 9

erfering side panels.



2. On some models the rear frame or other attachments may need to be removed before the rear fenders.
3. Remove the screws attaching the rear fender.
4. Lift the rear fender up slightly and remove the rear fender.
5. Install by reversing these steps, noting the following.

#### SIDE PANELS (EXPLORER MODELS)

Refer to **Figure 7**.

#### Removal/Installation

The side panels may be difficult to remove until they have been removed several times.

1. Remove the seat.
2. Hold the side panel near the rear and pull the panel forward and toward the outside to disengage the two rear tabs.
3. Push the panel down to disengage the front and top tabs.
4. When assembling, align the front and top tabs.
5. Push the panel forward and up until the tabs lock.
6. Bend the panel and insert the rear tabs.
7. Push the panel in until the tabs are all locked.

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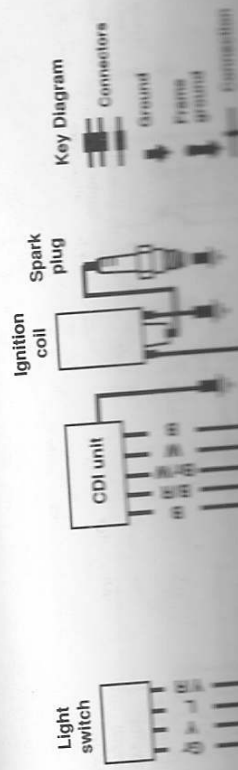
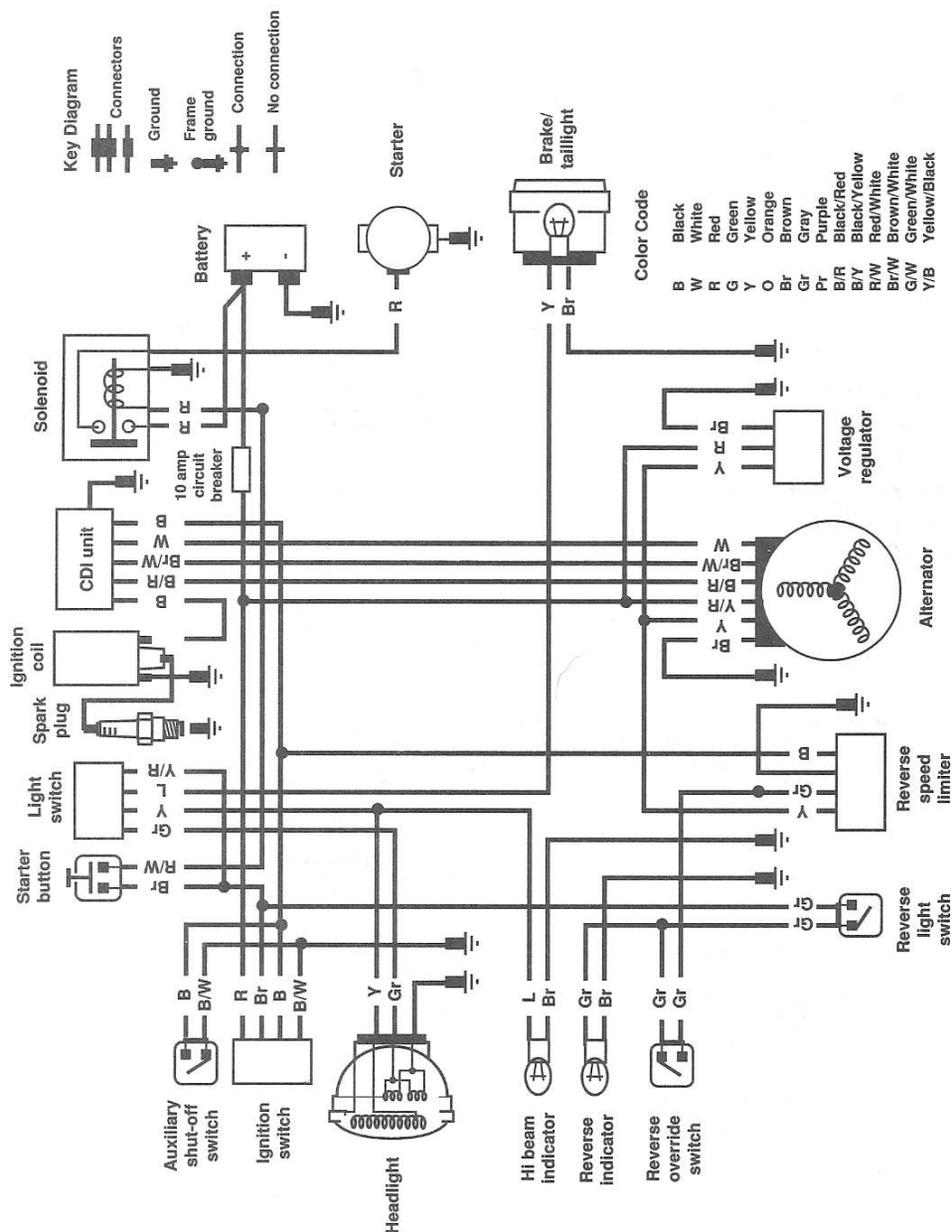
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### 1985-1988 MODELS (EXCEPT CYCLONE)



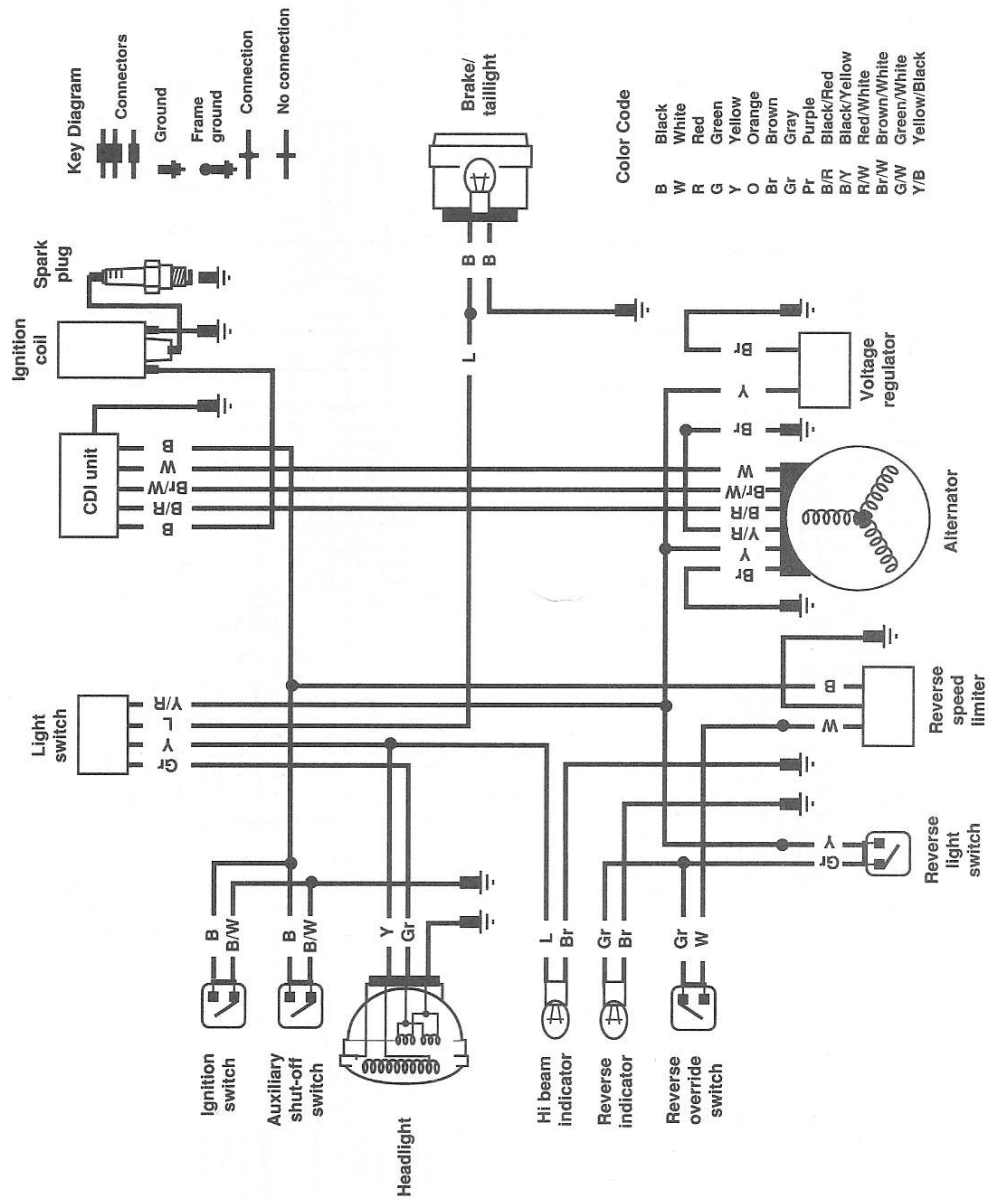
# 1987 CYCLONE

B/Y Black/Yellow  
 R/W Red/White  
 Br/W Brown/White  
 G/W Green/White  
 Y/B Yellow/Black

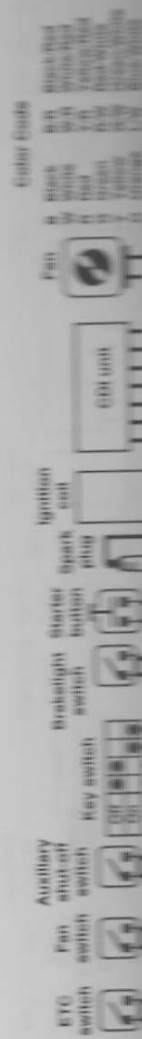
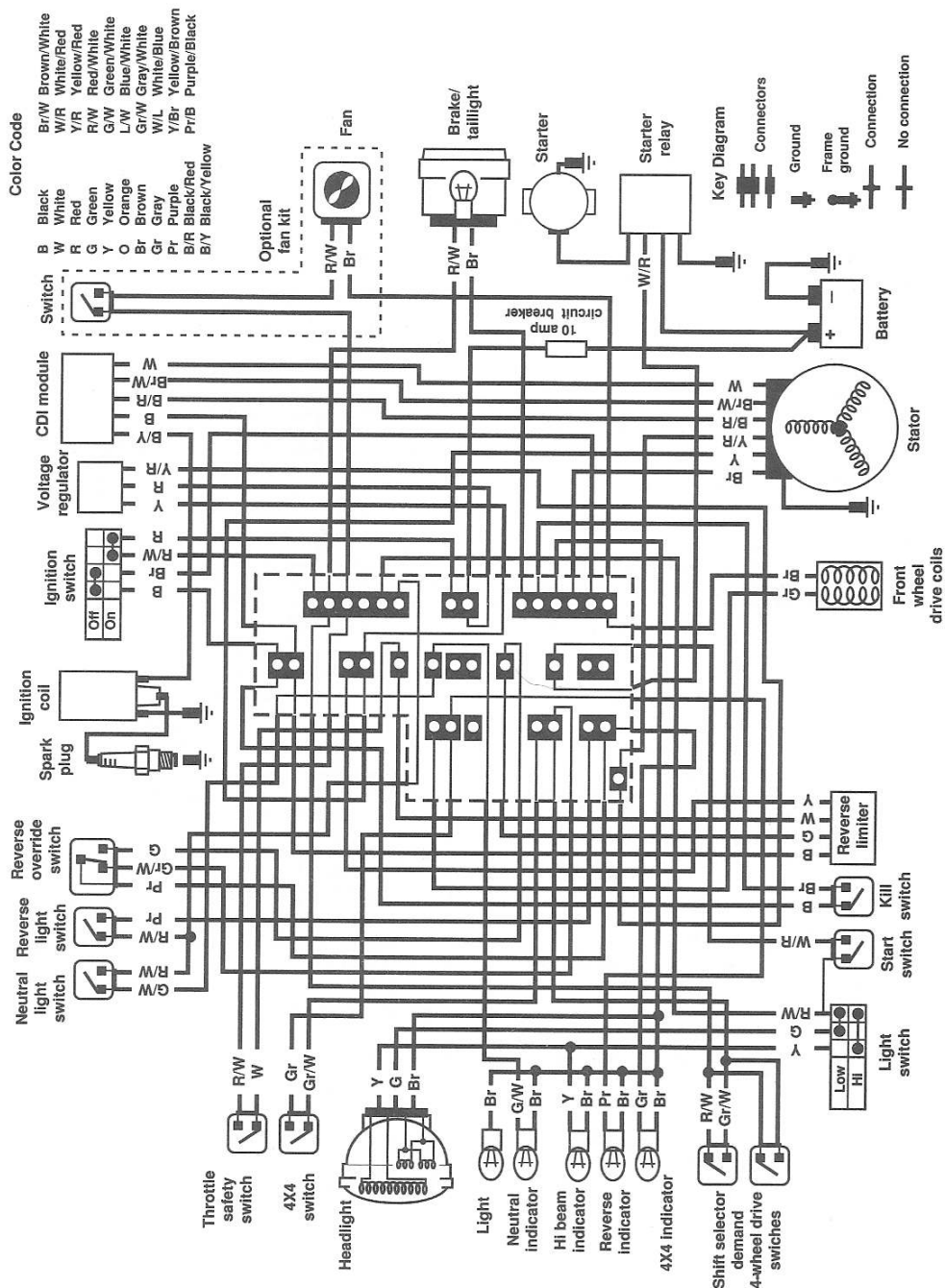
Alternator

Reverse speed limiter

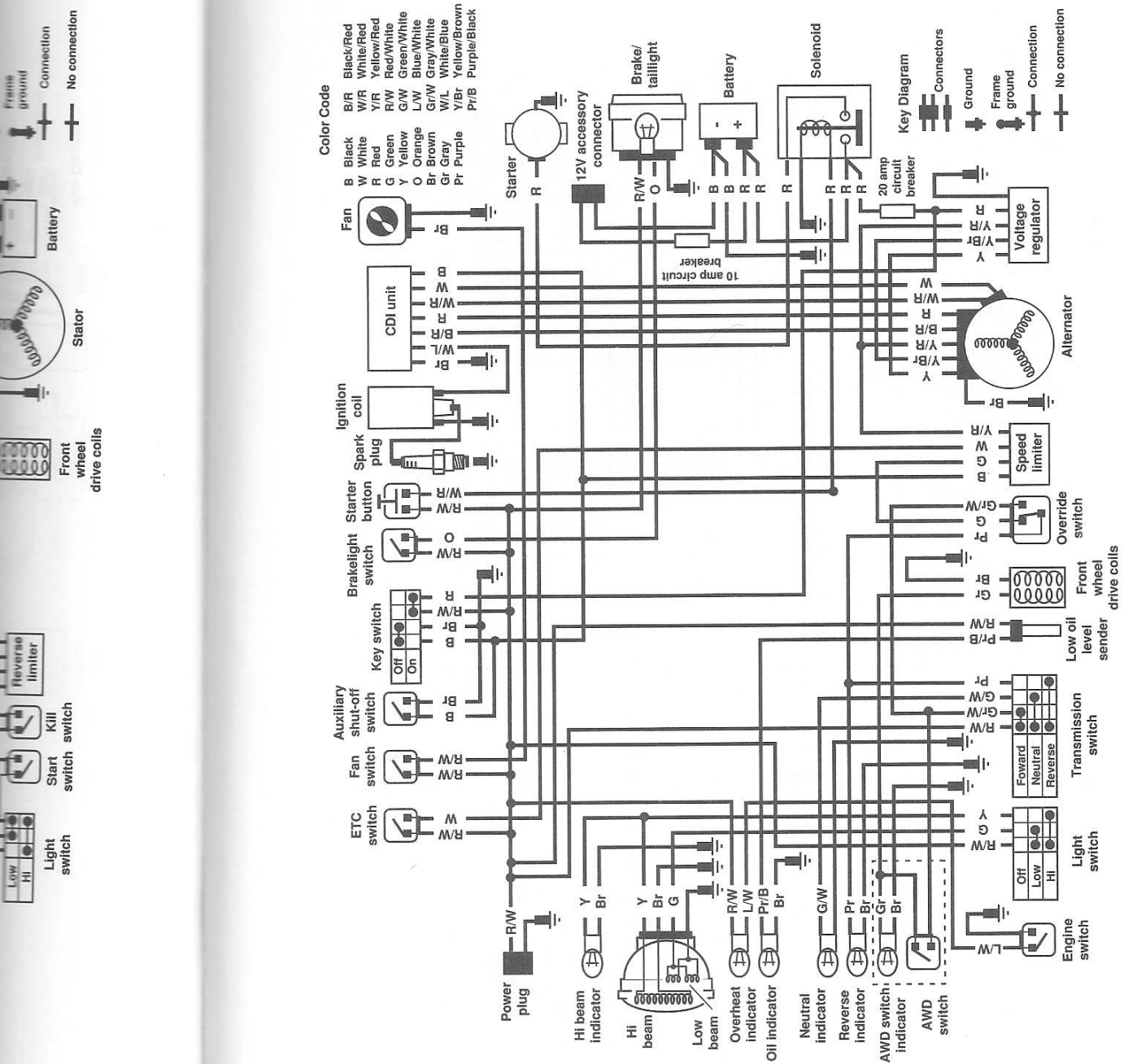
Reverse light switch



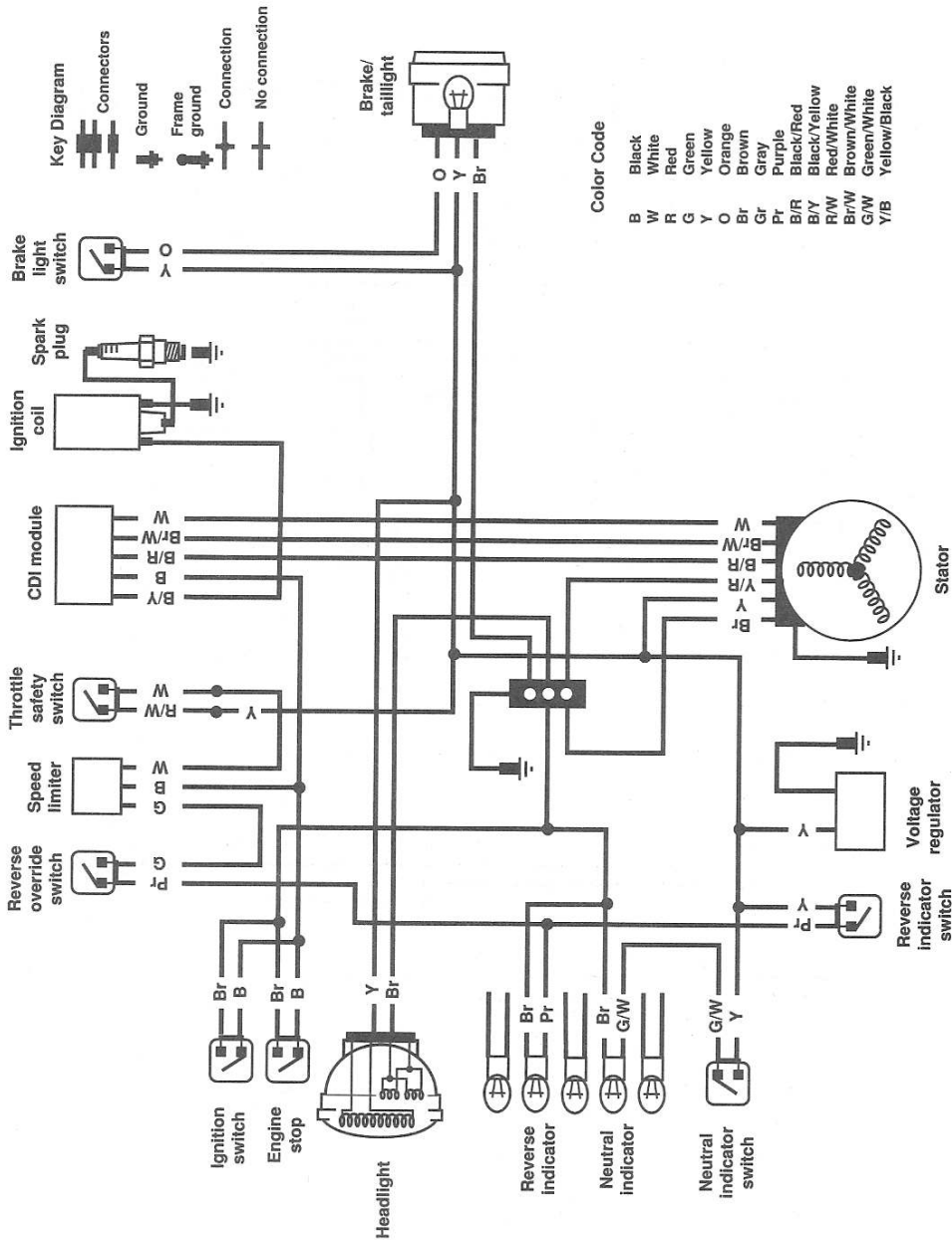
# 1989-1994 TRAIL BOSS MODELS



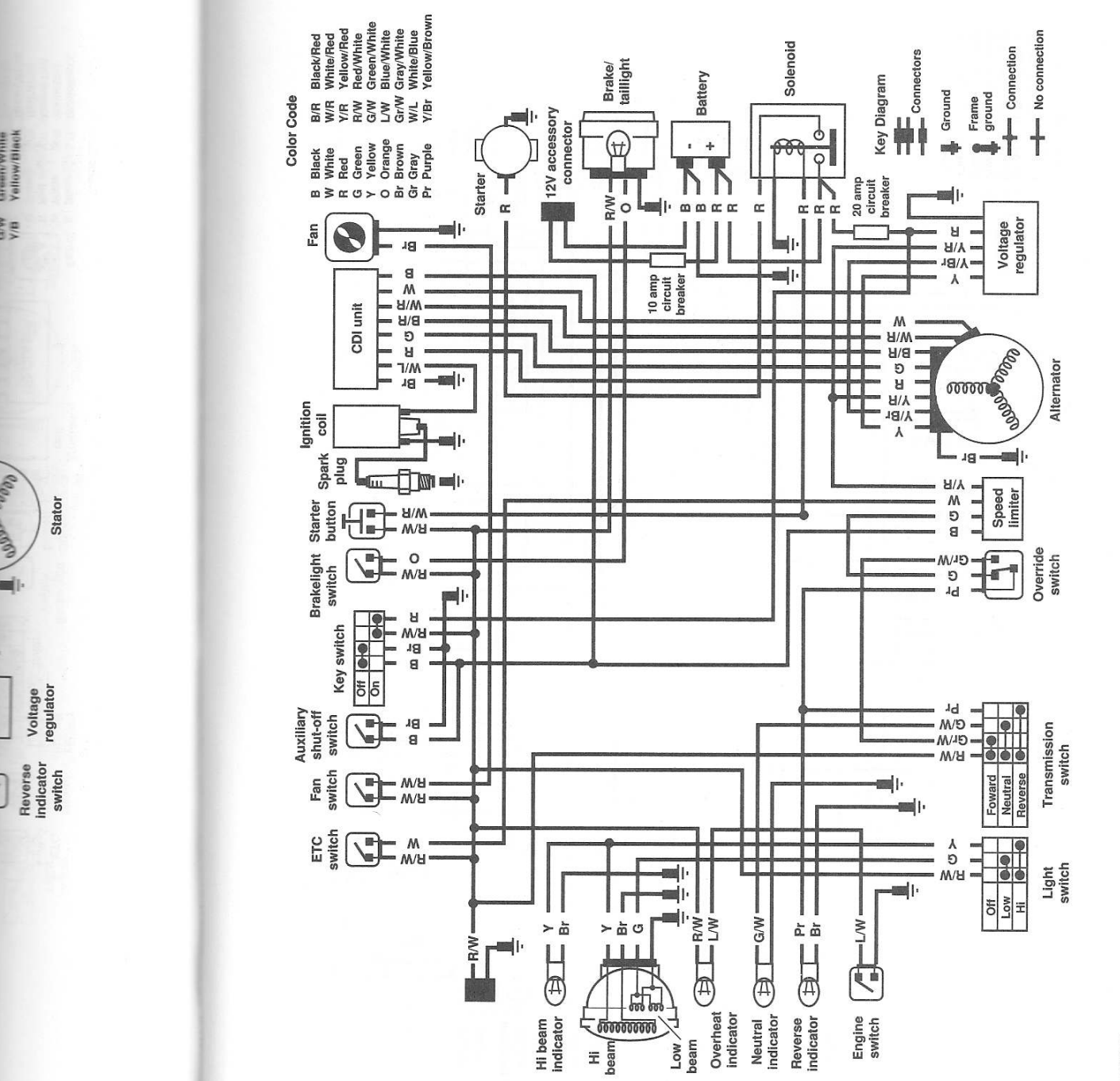
# 1993-ON 300, 400L 4x4, SPORTSMAN 6x6 AND 1995 EXPLORER



# 1990-1995 TRAIL BLAZER



# MAGNUM 2-WHEEL DRIVE



# MAGNUM 4x4

