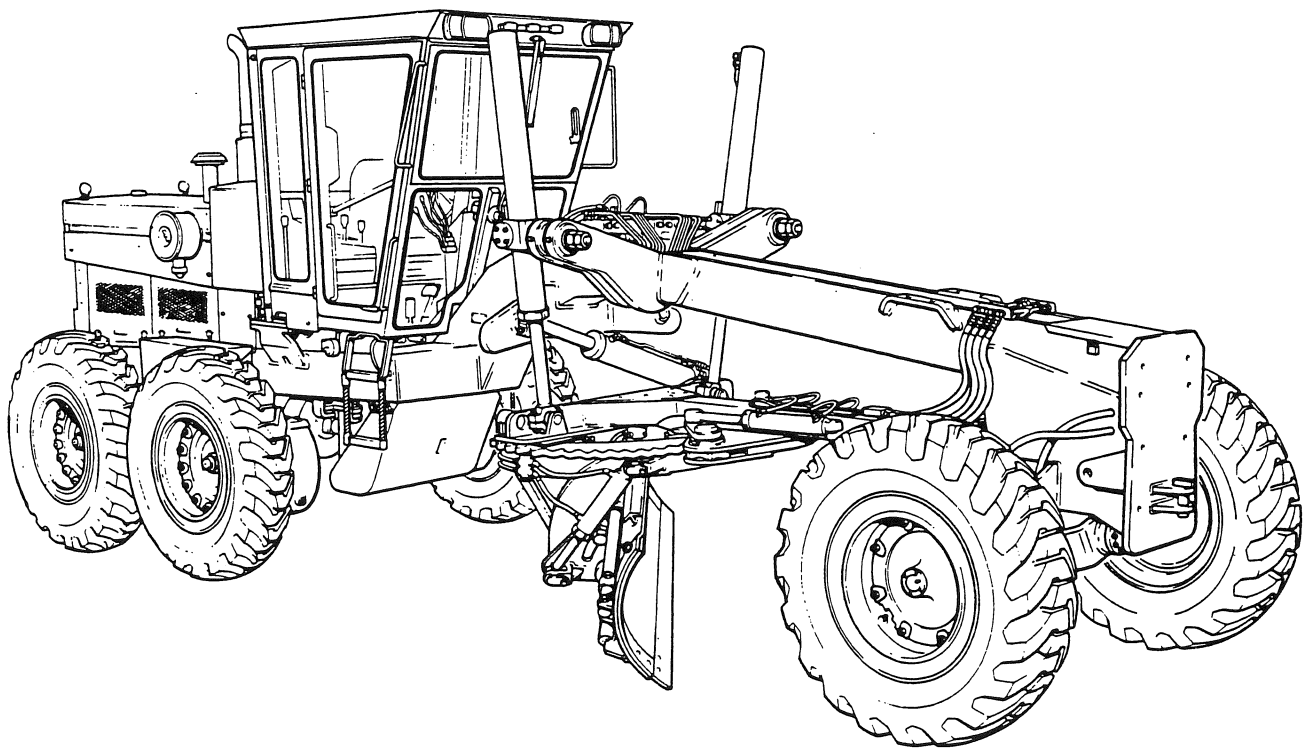


700 SERIES SHOP MANUAL

SECTION 6

**CLUTCH
MASTER CYLINDER**



700 SERIES SHOP MANUAL
 MASTER CYLINDER AND BOOSTER ASSEMBLY

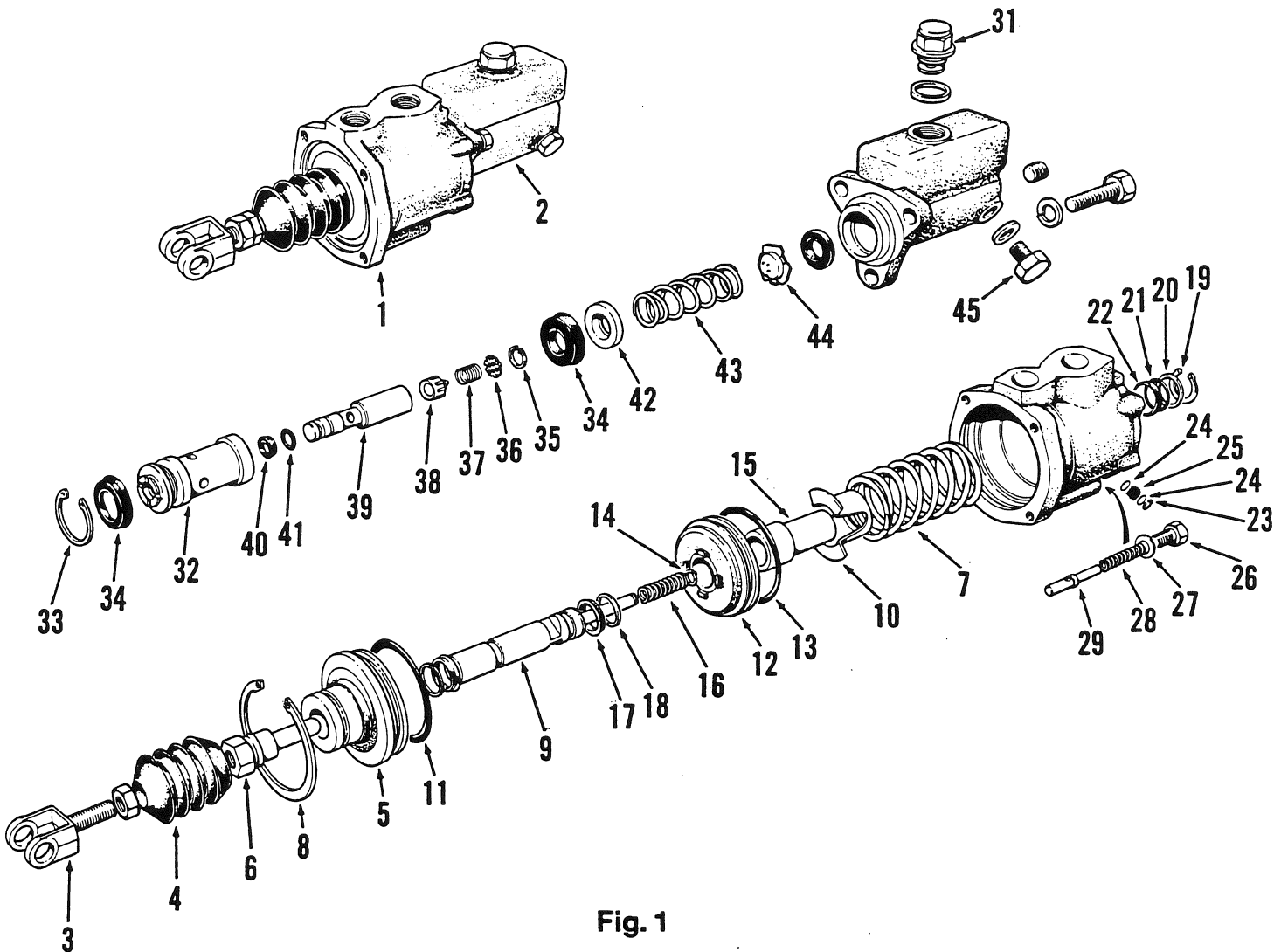


Fig. 1

KEY TO FIG. 1		
item	description	item description
1	booster	17 seals
2	master cylinder	18 back-up washers
3	yoke	19 snap ring
4	boot	20 back-up ring
5	end cover	21 back-up washer
6	push rod	22 seal
7	return spring	23 snap ring
8	snap ring	24 strainers
9	valve piston	25 hair filter
10	spring retainer	26 plug
11	O ring	27 washer
12	piston	28 spring
13	O ring	29 plunger
14	retaining ring	30 O ring fittings
15	connector	31 reservoir cap
16	inner return spring	32 piston
		33 snap ring
		34 piston cup seals
		35 retaining ring
		36 retainer
		37 return spring
		38 check valve assembly
		39 reaction piston
		40 seal
		41 O ring
		42 retainer
		43 spring
		44 residual check valve
		45 plugs
		46 sending unit
		47 fitting

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- Assembly	16

NOTE

The following Section applies to graders with serial no.s 8512 to 15858 and U.S. serial no.s 101-2 to 1786-2. It can be used as a guide for servicing graders serial no. 15859 and after and U.S. serial no. 1787-2 and after.

GENERAL

Before starting any service procedure, make sure the work area is clean and safe. A clean work area will reduce the chance of foreign matter entering the hydraulic system.

Make sure proper tools are available and in good working order. You will require normal shop tools to service the master cylinder and booster assemblies.

DESCRIPTION AND OPERATION

Both the brake and the clutch circuits incorporate master cylinders equipped with hydraulic boosters. The boosters receive oil from the steering circuit (see Section 5). The master cylinders used in the brake and clutch circuits are essentially the same.

If the grader is equipped with the Mark III cab, the master cylinder assemblies are located beneath the cab. Graders equipped with previous model cabs have the master cylinder assemblies mounted in front of the cab.

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REMOVAL

BOOSTER



CAUTION

Wear eye protection when working on the master cylinders.
Brake fluid can harm your eyes.

Removal from the Grader

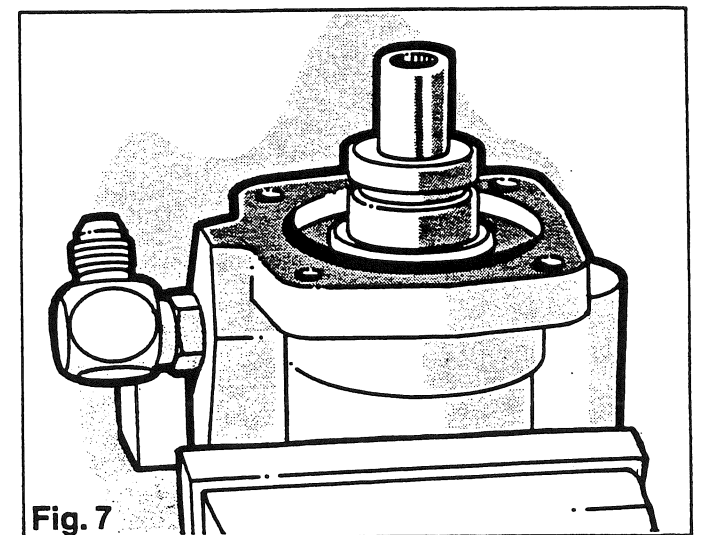
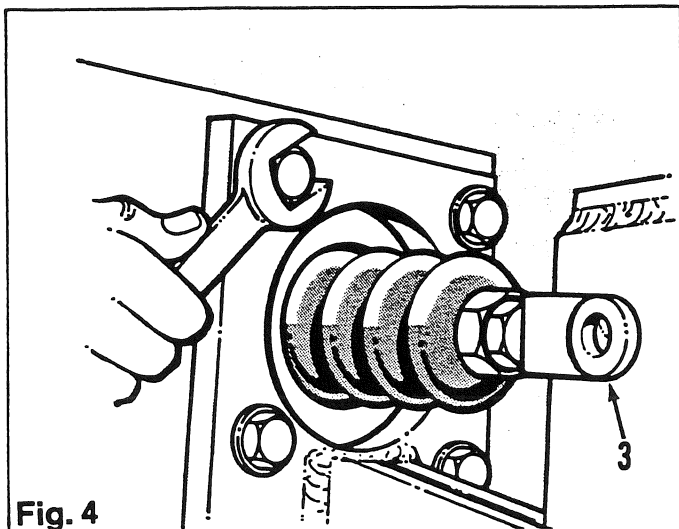
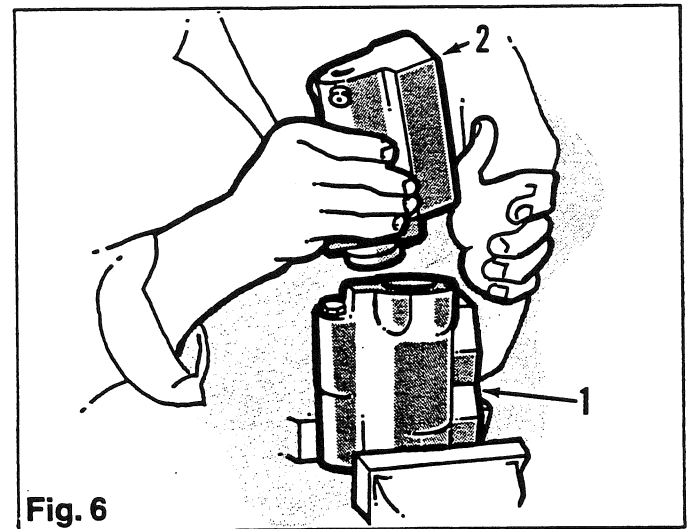
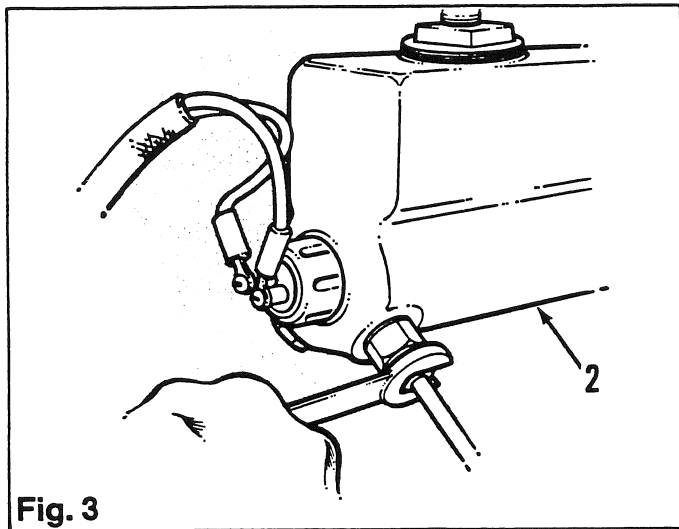
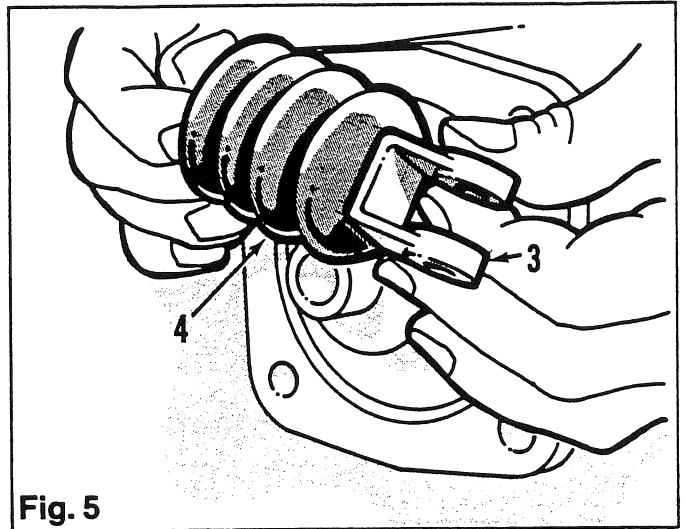
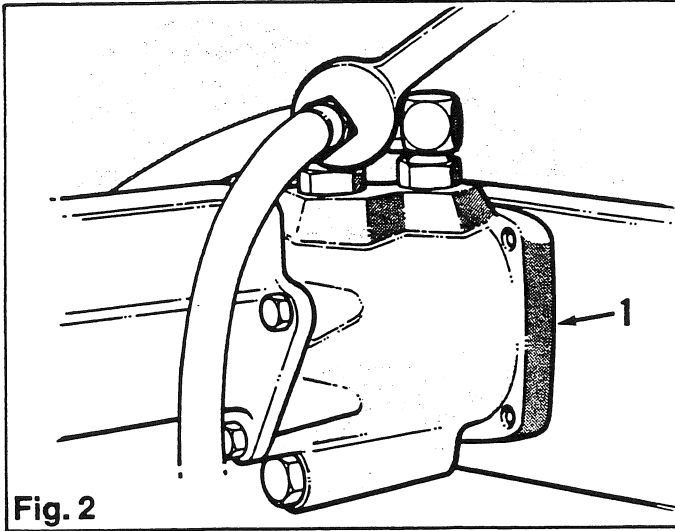
Booster - Disassembly

1. Remove the hydraulic hoses from the fittings on top of the booster (1). (Fig. 2) Install plugs in the hoses to prevent dirt from entering the system.
2. Remove the lines and hoses from the master cylinder (2). (Fig. 3) Drain the remaining fluid into a suitable container.
3. Disconnect the linkage from the yoke (3).
4. Remove the capscrews that fasten the booster and master cylinder assembly to the grader. Remove the assembly. (Fig. 4)

1. Allow any oil remaining in the booster (1) to drain out.
2. Slide the boot (4) out of the groove in the end cover (5) and remove it, along with the push rod (6) and yoke (3). (Fig. 5)
3. Place the booster (1) in a vise. Remove the capscrews retaining the master cylinder (2) to the booster. Remove the master cylinder and set it aside. (Fig. 6)
4. Turn the assembly over in the vise. (Fig. 7)

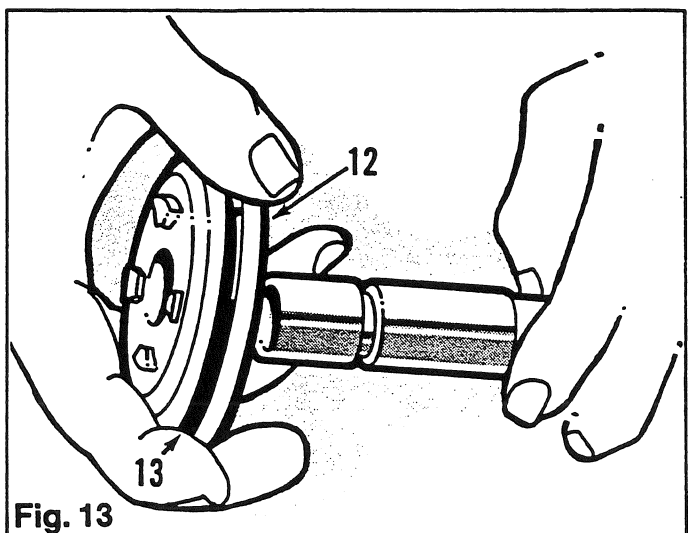
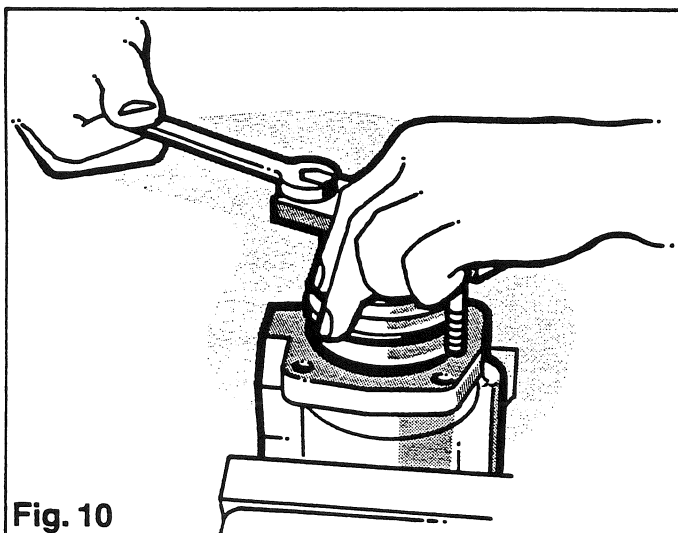
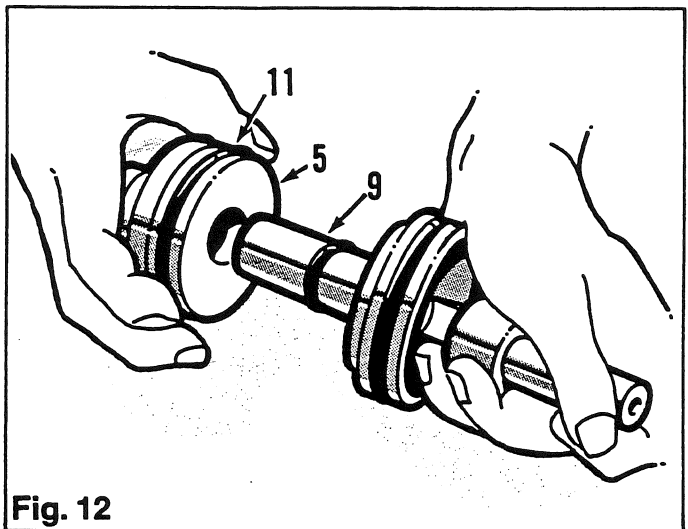
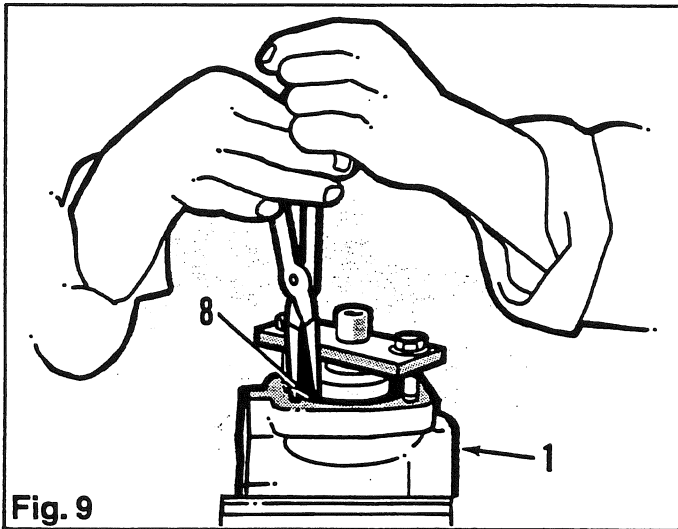
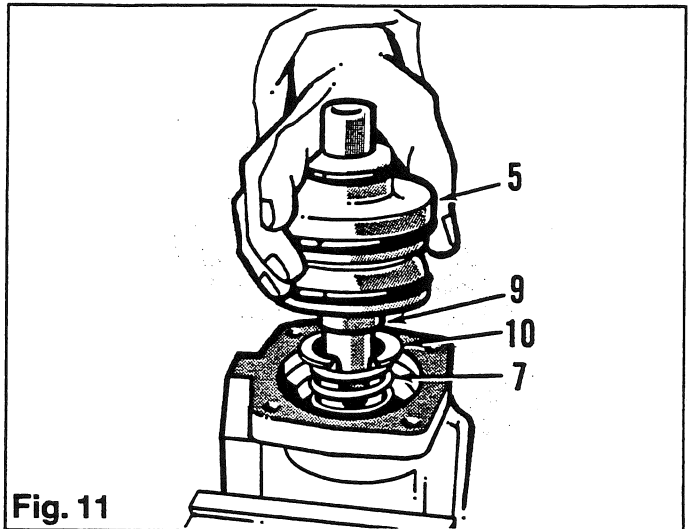
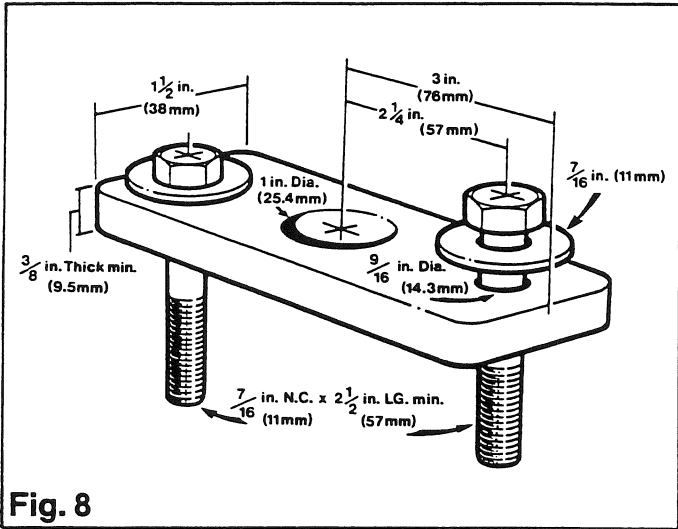
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MASTER CYLINDER AND BOOSTER ASSEMBLY

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BOOSTER

Disassembly (cont.)

5. If you do not already have one, make a tool according to the illustration in Fig. 8.
6. Install the tool on the booster (1) as shown in Fig. 9. It will compress the return spring (7) slightly while you remove the snap ring (8).
7. Carefully loosen the capscrews to release the spring tension. Remove the tool. (Fig. 10)
8. Remove the end cover (5), valve piston (9) assembly, return spring (7) and spring retainer (10). (Fig. 11)
9. Remove the end cover (5) from the valve piston (9) and discard the O ring (11). (Fig. 12)
10. Remove the piston (12) and discard the O ring (13). (Fig. 13)

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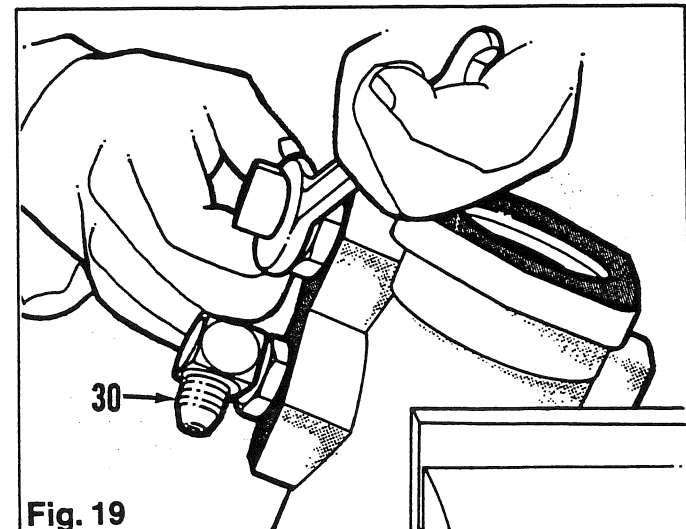
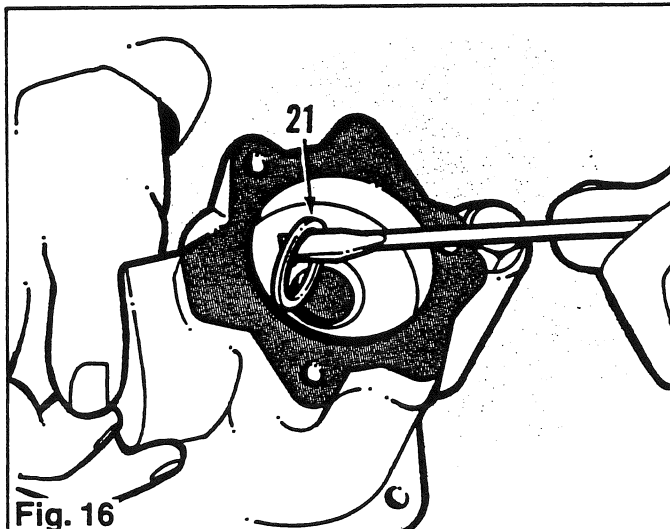
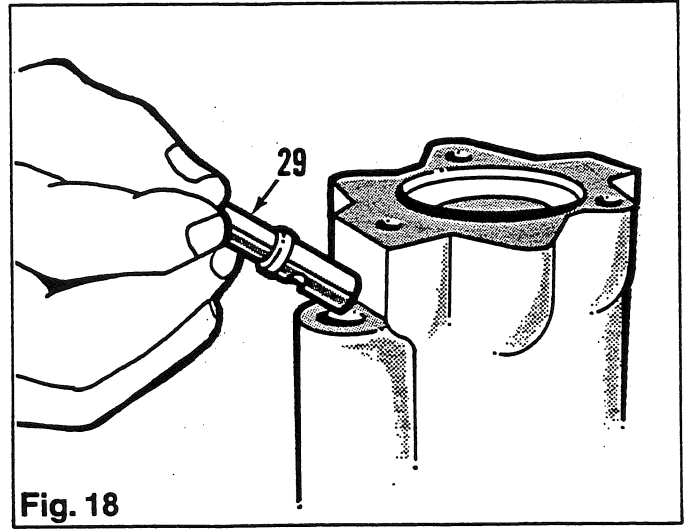
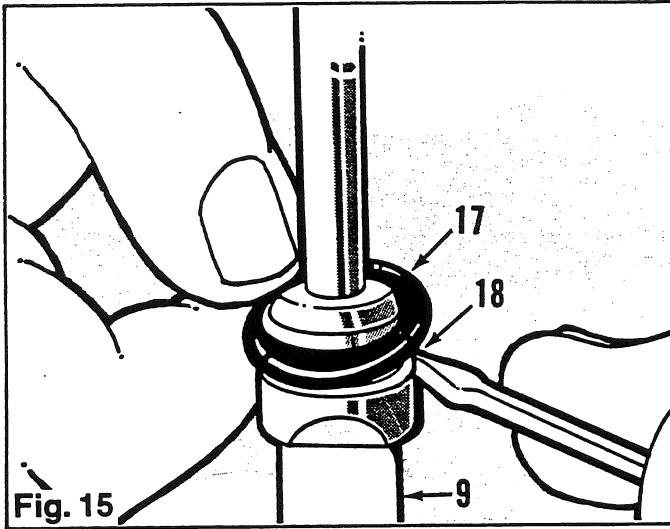
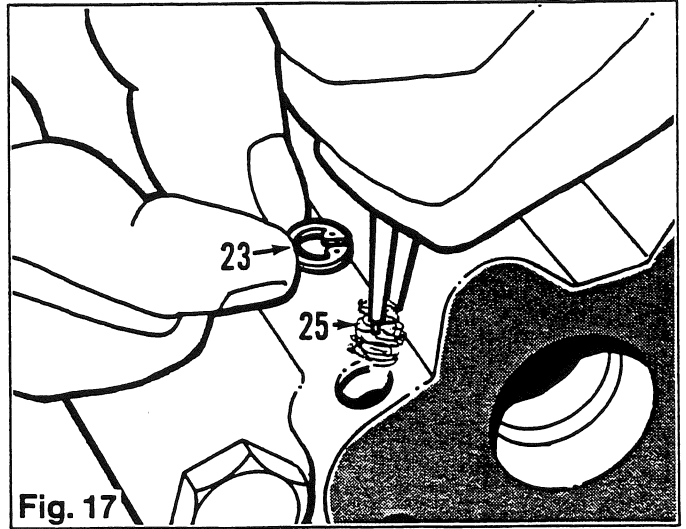
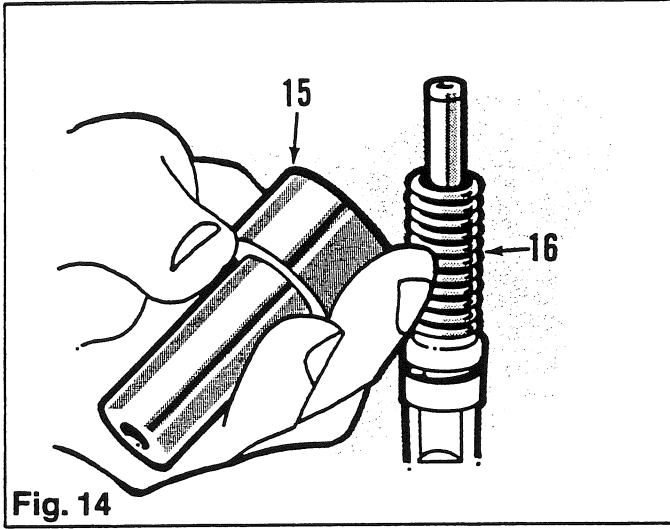
BOOSTER

Disassembly (cont.)

11. Remove the retaining ring (14), the connector (15) and the inner return spring (16). (Fig. 14)
 12. Use a screwdriver or similar tool to pry the seals (17) and back-up washers (18) from the valve piston (9). (Fig. 15)
 13. Turn the housing on its end and remove the snap ring (19), back-up ring (20) back-up washer (21) and seal (22). (Fig. 16)
 14. Remove the snap ring (23), strainers (24) and hair filter (25) from the housing. (Fig. 17)
 15. Remove the plug (26), washer (27), spring (28) and plunger (29) from the housing. (Fig. 18)
 16. Remove the O ring fittings (30) from the housing. (Fig. 19)
- Discard all seals O rings and snap rings. Wash all components in solvent and dry them with compressed air. Check all surfaces for damage or wear.

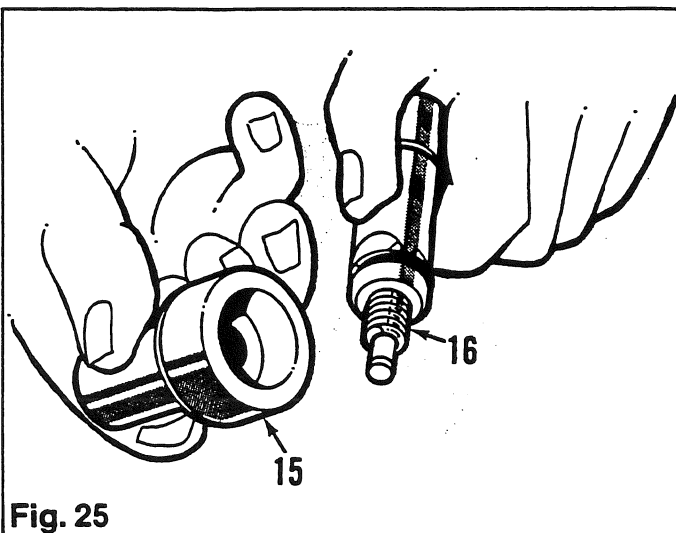
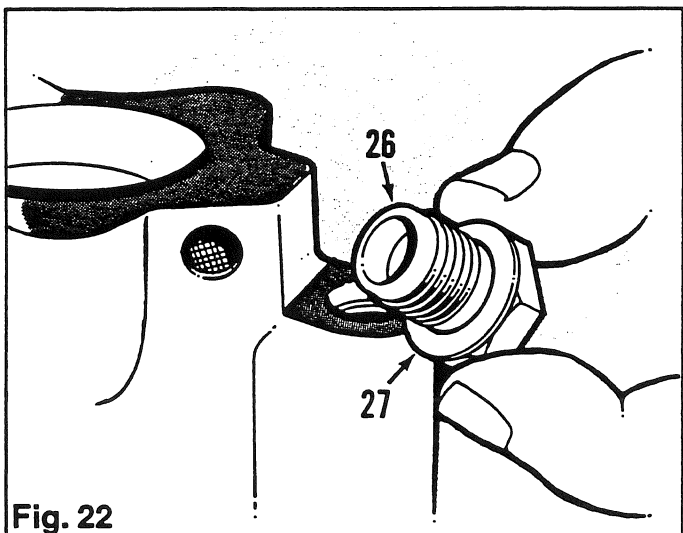
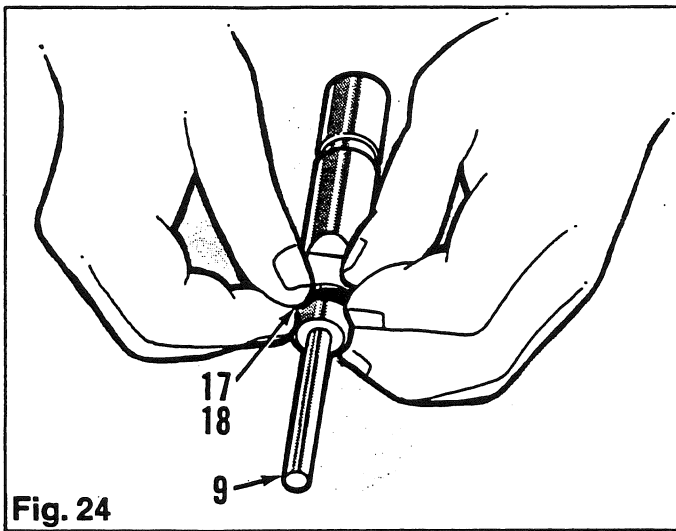
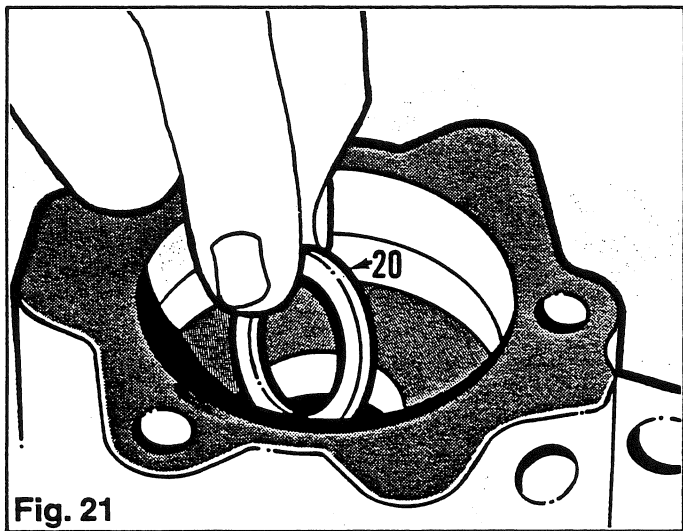
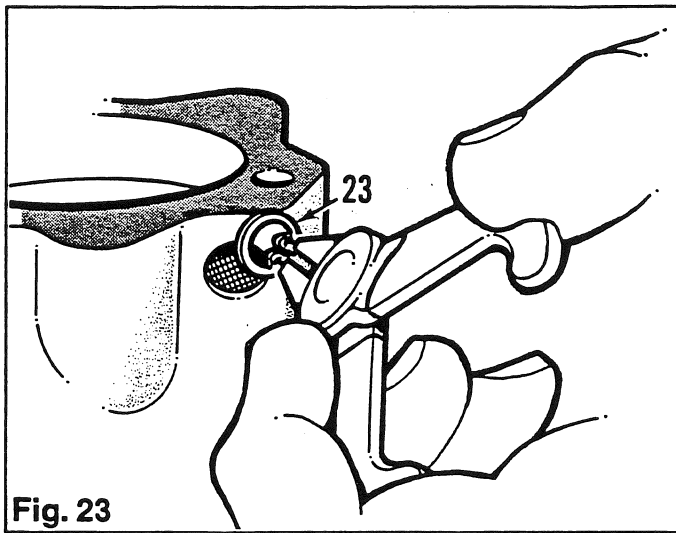
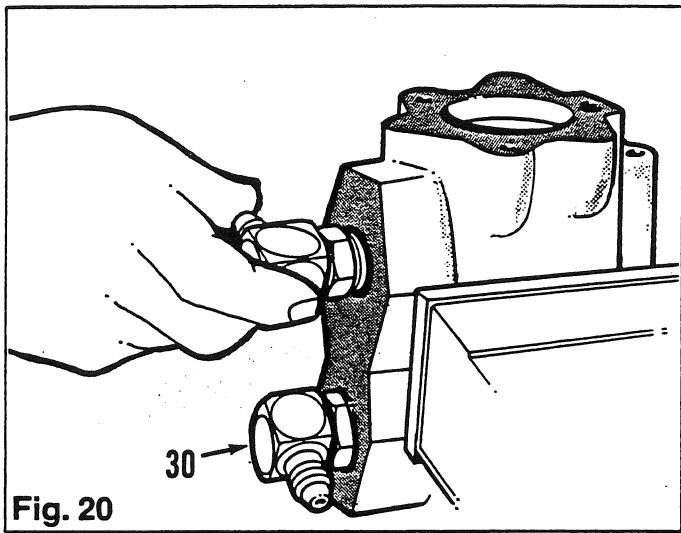
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BOOSTER

Assembly

1. Re-install the O ring fittings (30).
(Fig. 20)
2. Install the seal (22), back-up washer (21) back-up ring (20) and snap ring (19) into the housing.
(Fig. 21)
3. Install the plunger (29) and spring (28). Retain them with a new copper washer (27) and plug (26).
(Fig. 22)
4. Install a new hair filter (25) complete with the strainers (24) and retain it with a new snap ring (23).
(Fig. 23)
5. Lubricate and install a new seal (17) and back-up washer (18) onto the spring end of the valve piston (9). (Fig. 24)
6. Install the inner return spring (16) and connector (15) and retain them with a new retaining ring (14).
(Fig. 25)

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BOOSTER

Assembly (cont.)

7. Lubricate a new O ring (13) and install it on the piston (12).
(Fig. 26)
8. Lubricate the piston (12) and install it on the valve piston (9).
(Fig. 27)
9. Install the other valve piston seal (17) and back-up washer (18).
(Fig. 28)
10. Install the return spring (7) and spring retainer (10) in the housing, followed by the valve piston assembly. (Fig. 29)
11. Lubricate a new "O" ring (11) and install it in the end cover (5).
(Fig. 30)
12. Install the end cover (5) over the valve piston (9) and install the assembly tool. (Fig. 31)

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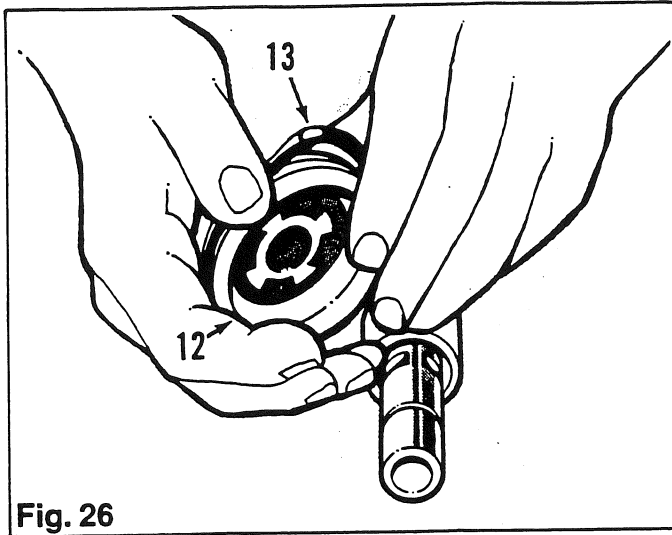


Fig. 26

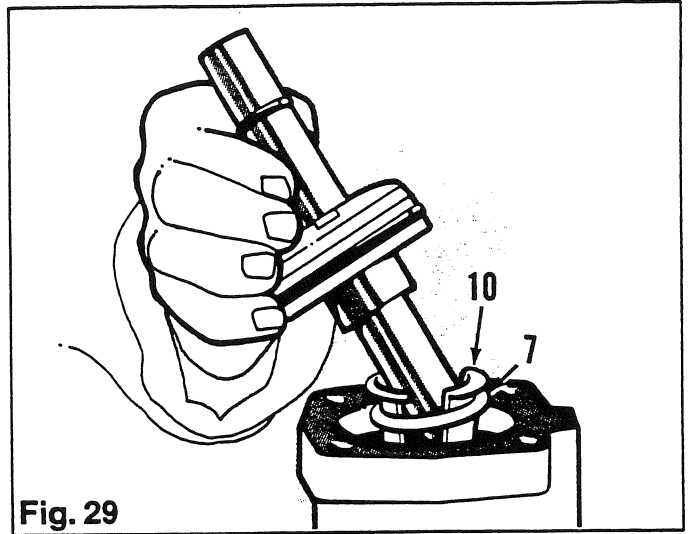


Fig. 29

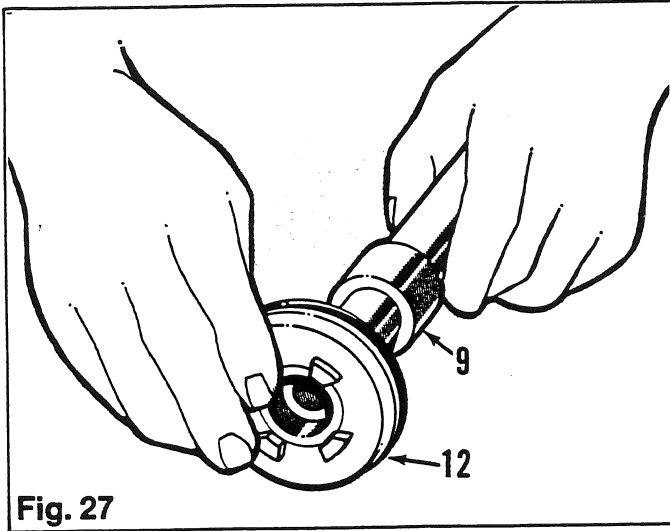


Fig. 27

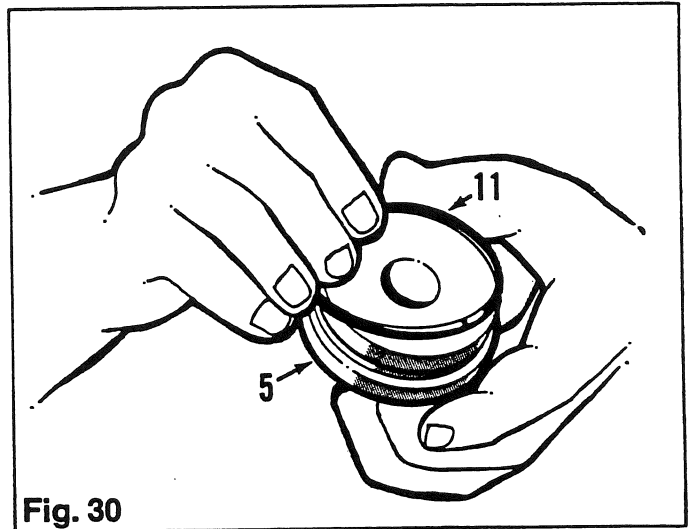


Fig. 30

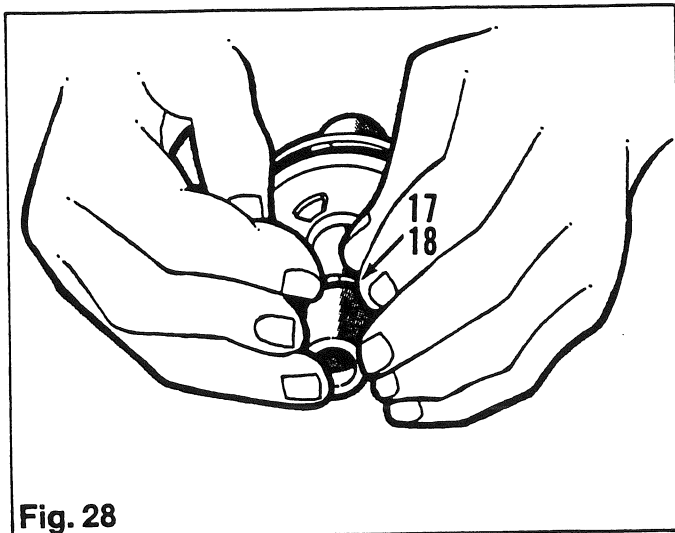


Fig. 28

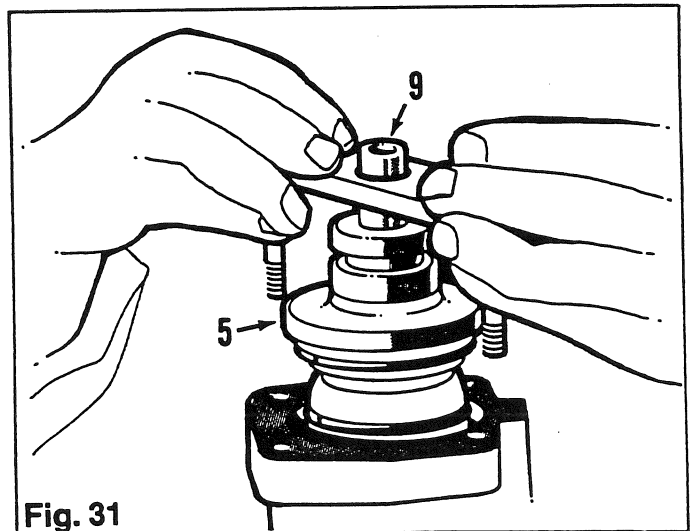
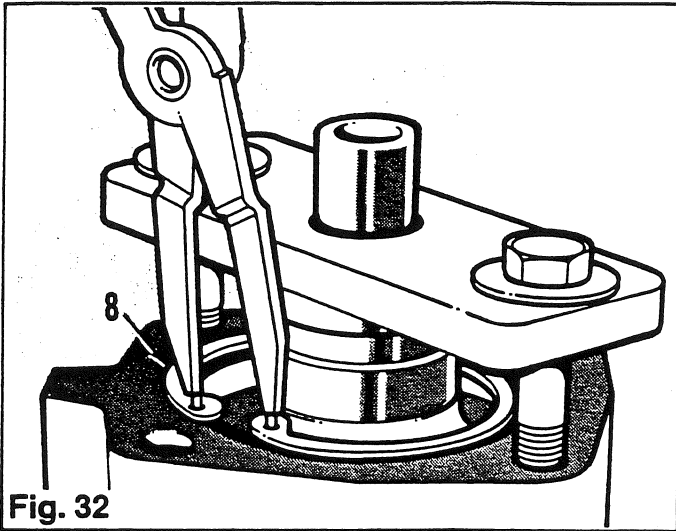


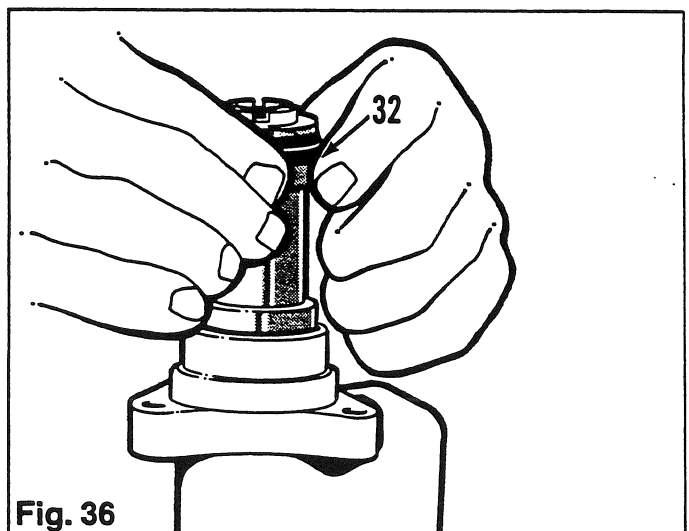
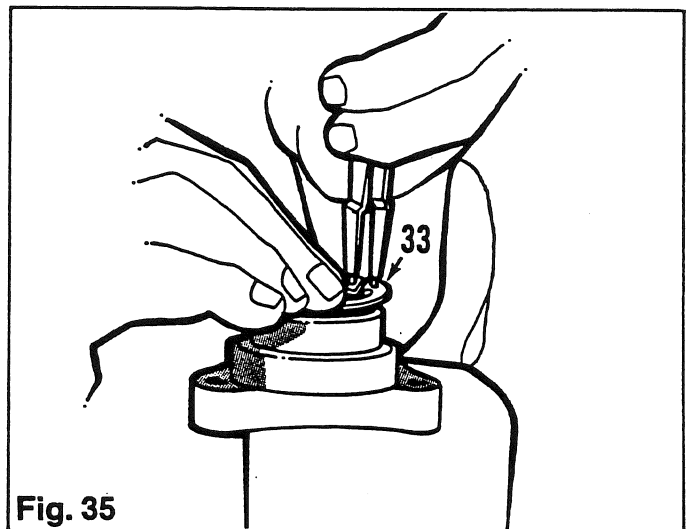
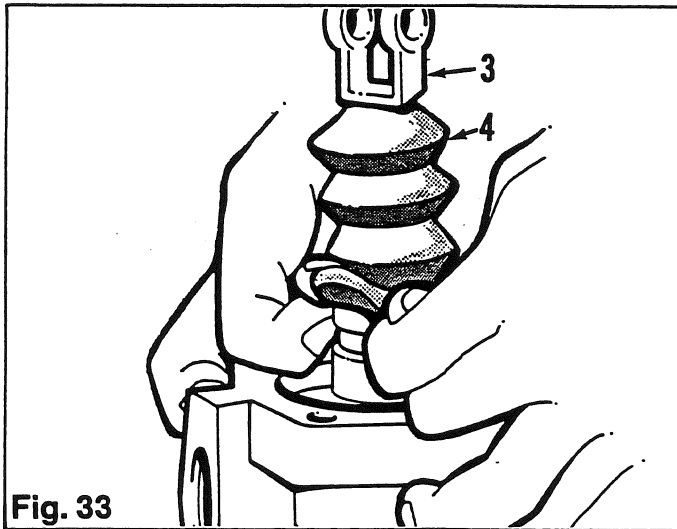
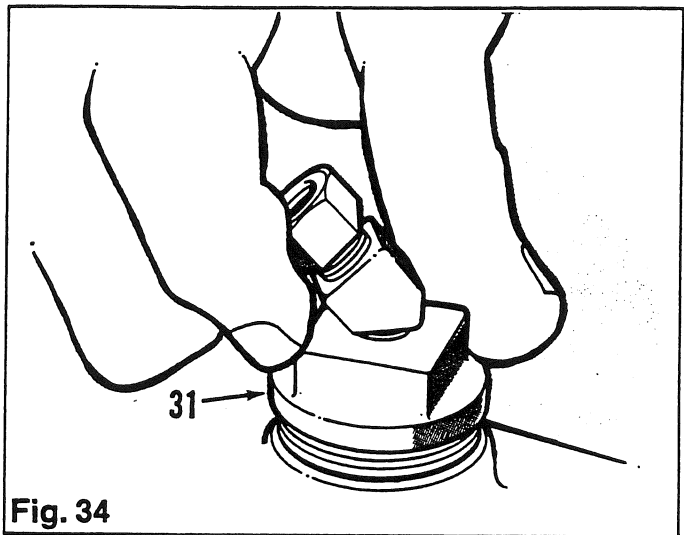
Fig. 31

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BOOSTER



MASTER CYLINDER



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MASTER CYLINDER AND BOOSTER ASSEMBLY

BOOSTER

Assembly (cont.)

13. Tighten the capscrews until the tool compresses the return spring (7). Install the snap ring (8) and remove the assembly tool. (Fig. 32)
14. Install the push rod (6), boot (4) and adjusting yoke (3) on the front of the booster cylinder. (Fig. 33) The booster is now ready for installation on the master cylinder.

MASTER CYLINDER

Disassembly

1. Remove the master cylinder reservoir cap (31). Empty any fluid into a suitable container. (Fig. 34)
2. Compress the piston (32) slightly. Remove the snap ring (33). (Fig. 35)
3. Release the spring tension slowly and remove the piston assembly. (Fig. 36)

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MASTER CYLINDER

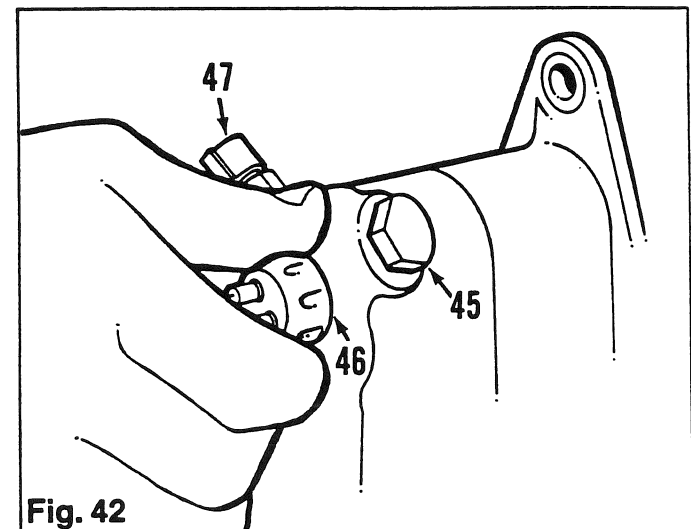
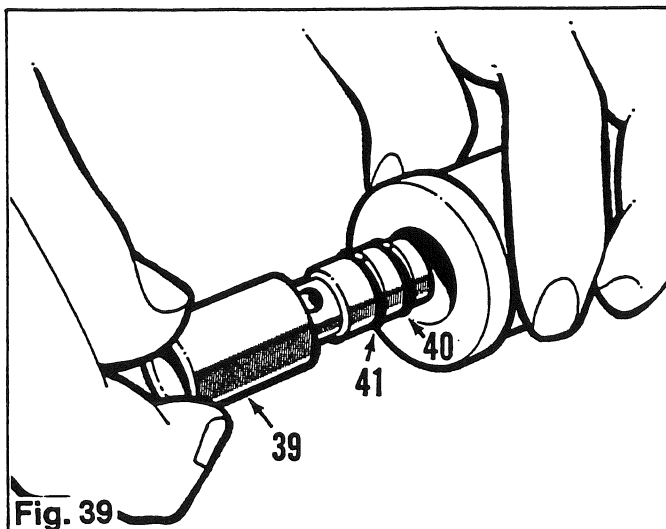
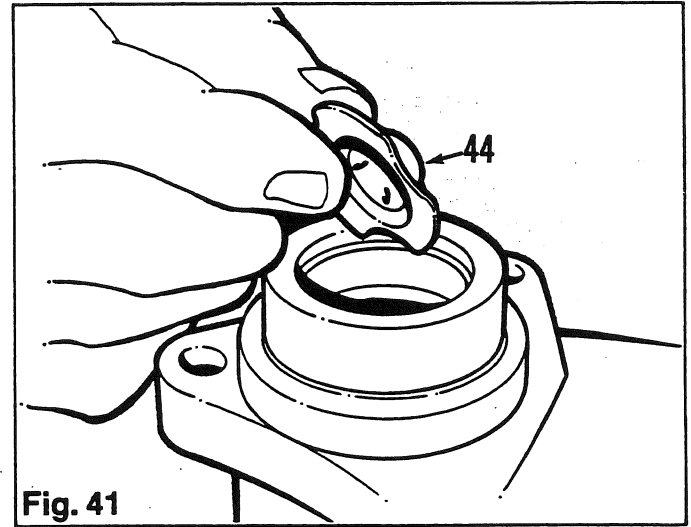
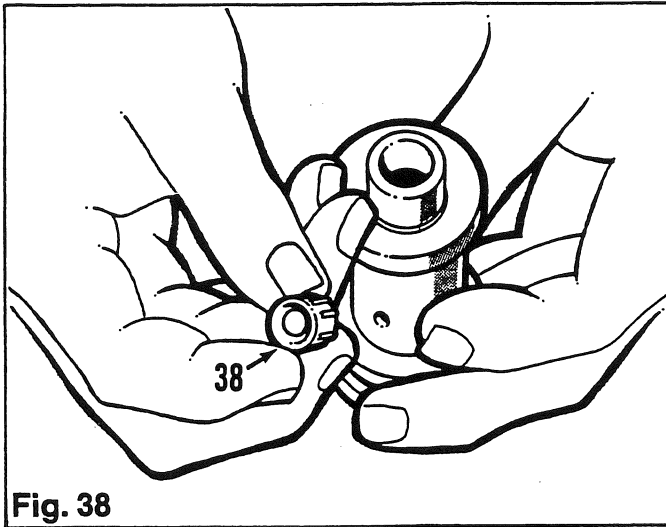
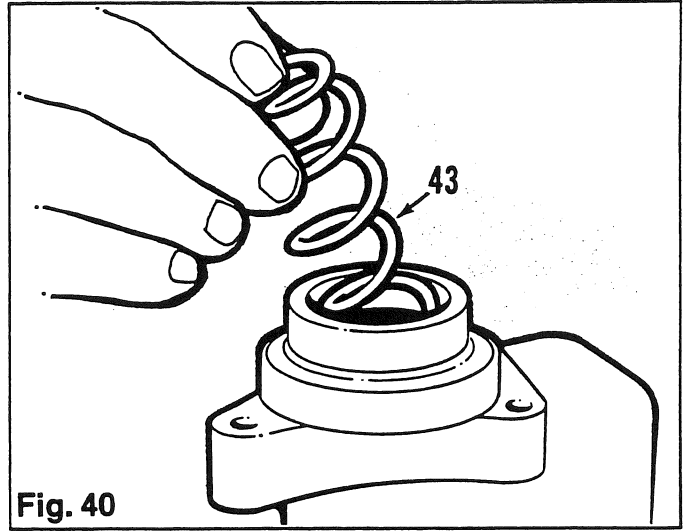
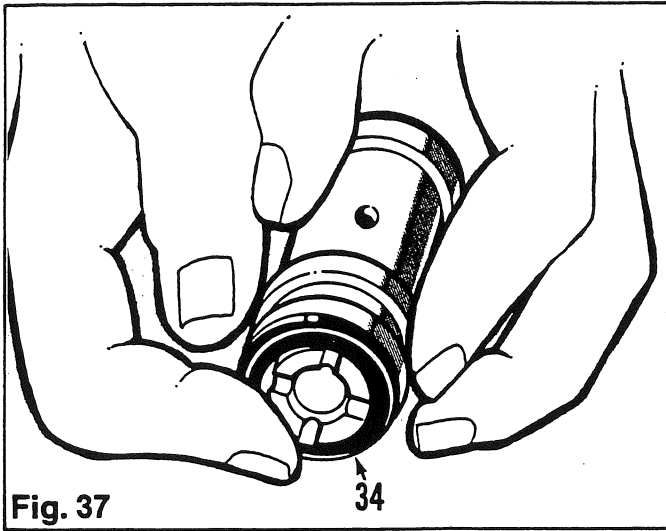
Disassembly (cont.)

4. Remove and discard the piston cup seals (34). (Fig. 37)
5. Remove the retaining ring (35), retainer (36), return spring (37) and check valve assembly (38). (Fig. 38)
6. Remove the reaction piston (39). Discard the seal (40) and O ring (41). (Fig. 39)
7. Remove the retainer (42) and spring (43). (Fig. 40)
8. Discard the residual check valve (44). (Fig. 41)
9. Remove the remaining plugs (45), sending unit (46) and fitting (47) from the cylinder. (Fig. 42)

Thoroughly clean the pistons and housing with alcohol and dry them with compressed air. Ensure that no residue is present on any of the parts. You can remove scratches or light scores from the cylinder with a hone. Be sure to clean the cylinder thoroughly after using the hone.

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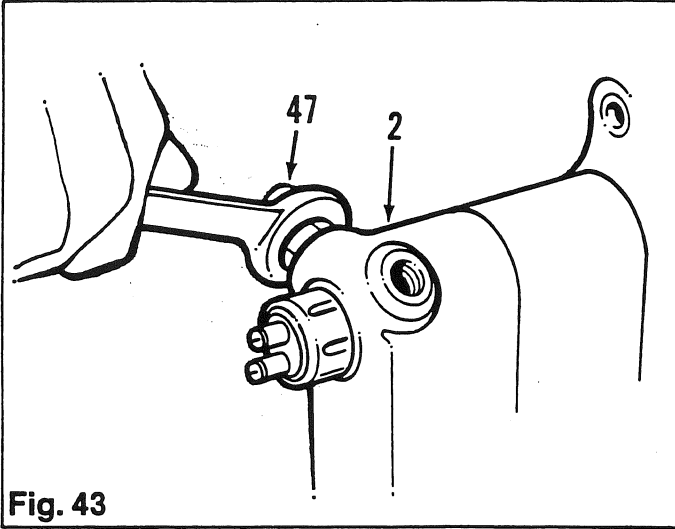


Fig. 43

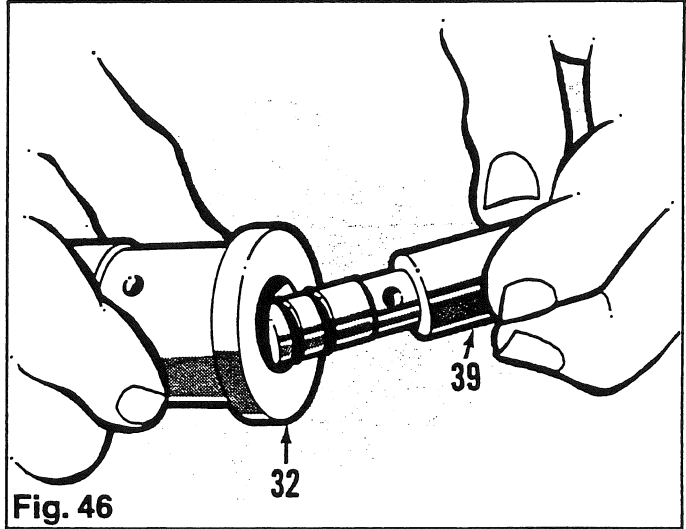


Fig. 46

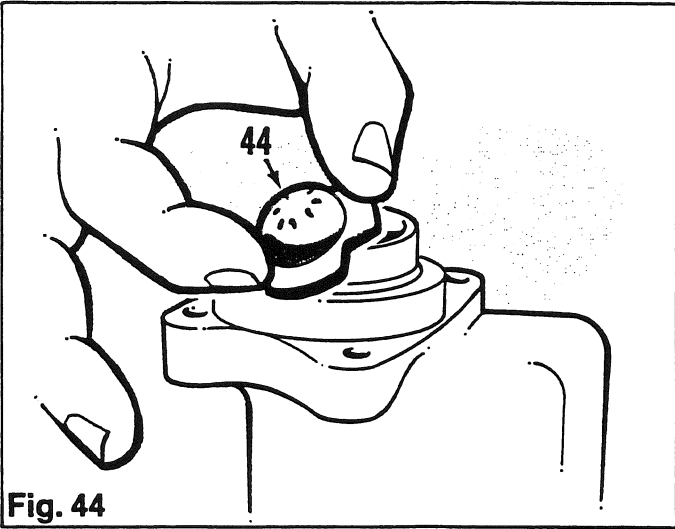


Fig. 44

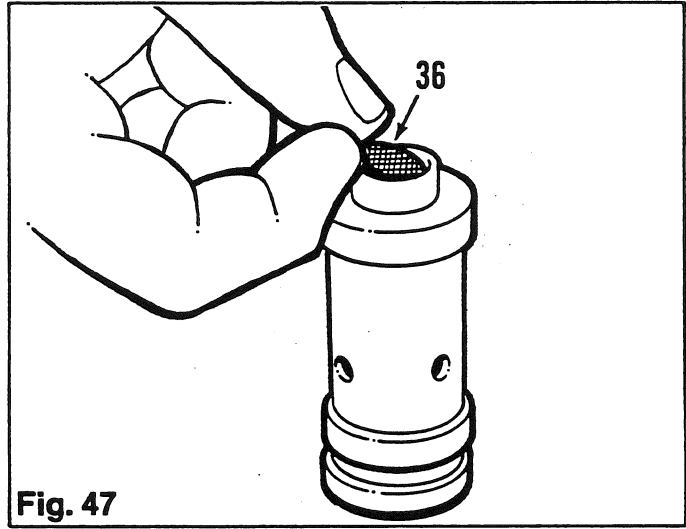


Fig. 47

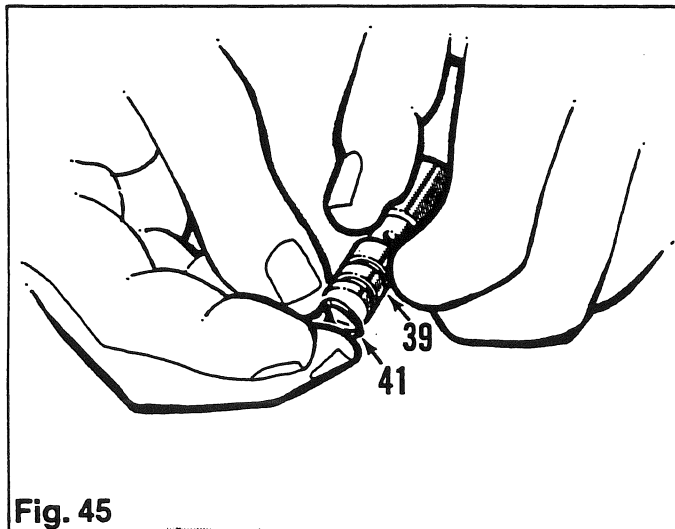


Fig. 45

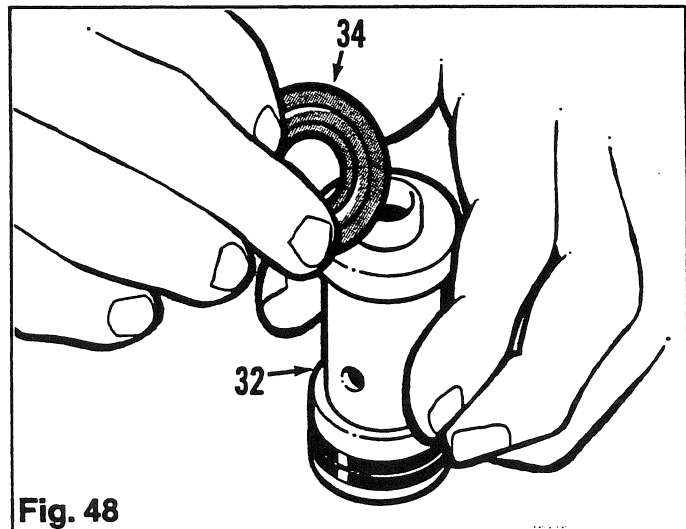


Fig. 48

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MASTER CYLINDER

Assembly

1. Install the plugs (45) and fittings (47) in the cylinder body (2).
(Fig. 43)
2. If you are working on a brake master cylinder, install the residual check valve (44). **Do Not** use the residual check valve in a clutch master cylinder. (Fig. 44)
3. Apply clean brake fluid to a new seal (40) and O ring (41). Install them on the reaction piston (39).
(Fig. 45)
4. Install the reaction piston (39) into the main piston (32). (Fig. 46)
5. Install the check valve assembly (38), spring (37), retainer (36) and snap ring (35). (Fig. 47)
6. Apply clean brake fluid to new cups (34) and install them on the piston (32). (Fig. 48)

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MASTER CYLINDER

Assembly (cont.)

7. Carefully install the piston assembly into the cylinder body.
(Fig. 49)

8. Compress the spring (43) and retain the piston (32) with a new snap ring (33). (Fig. 50) Install the reservoir cap.

9. Fasten the master cylinder (2) to the booster (1) with the three cap-screws. (Fig. 51) The master cylinder and booster assembly is now ready for installation to the grader.

INSTALLATION

Installation to the Grader

1. Install the master cylinder and booster assembly on the grader.

2. Connect the linkage to the yoke (3).
(Fig. 52)

3. Connect the lines and hoses to the master cylinder (2). (Fig. 53)

4. Connect the hydraulic hoses to the fittings on top of the booster (1).
(Fig. 54)

Fill the brake fluid reservoir located on the back side of the cab with clean, fresh brake fluid (see your 700 Series Operator's Manual). Purge the brake system of air using the procedure as detailed in the Brake section of this manual.

Check the oil level in the hydraulic tank as described in the 700 Series Operator's Manual. Add fresh oil as necessary.

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