

TROUBLE SHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	REMEDY
Hydraulic lift inoperative	<ol style="list-style-type: none"> 1. No charge pressure 2. System low on oil 3. Implement relief valve stuck open (Sundstrand) 4. Weak implement relief spring (Sundstrand) 5. Oil line leaking 6. Defective lift valve 7. Defective lift cylinder 	<ol style="list-style-type: none"> 1. Install gage and check pressure 2. Check level and refill 3. Check valve, clean or replace if necessary 4. Replace spring 5. Replace line 6. Repair or replace valve 7. Repair or replace cylinder
Load drops when control valve is in neutral position	<ol style="list-style-type: none"> 1. Leaking hose from valve to cylinder 2. Oil leaking past lift cylinder "O" rings 3. Lift valve "O" rings leaking 	<ol style="list-style-type: none"> 1. Replace hose 2. Repair lift cylinder 3. Repair lift valve
Lift valve or lift cylinder leaking	<ol style="list-style-type: none"> 1. Leaking "O" rings 	<ol style="list-style-type: none"> 1. Replace "O" rings

HYDRAULIC SYSTEM (Continued)

PRINCIPLE OF OPERATION

The hydraulic system uses the hydrostatic charge pump as its power source. Its oil supply is also that of the transaxle and hydrostatic transmission. The oil is pumped by the hydrostatic to the hydraulic control valve. When the controls are actuated the oil flow can be directed to the hydraulic cylinder or auxiliary hydraulic connections in either direction.

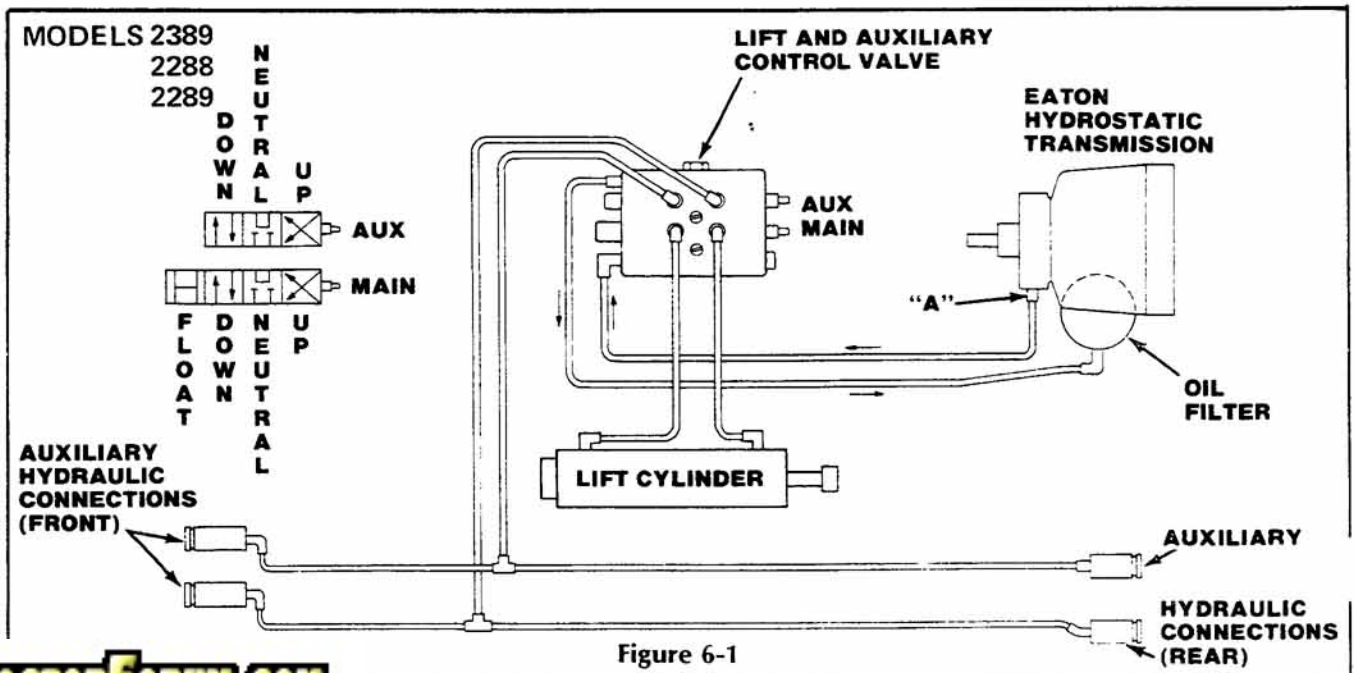
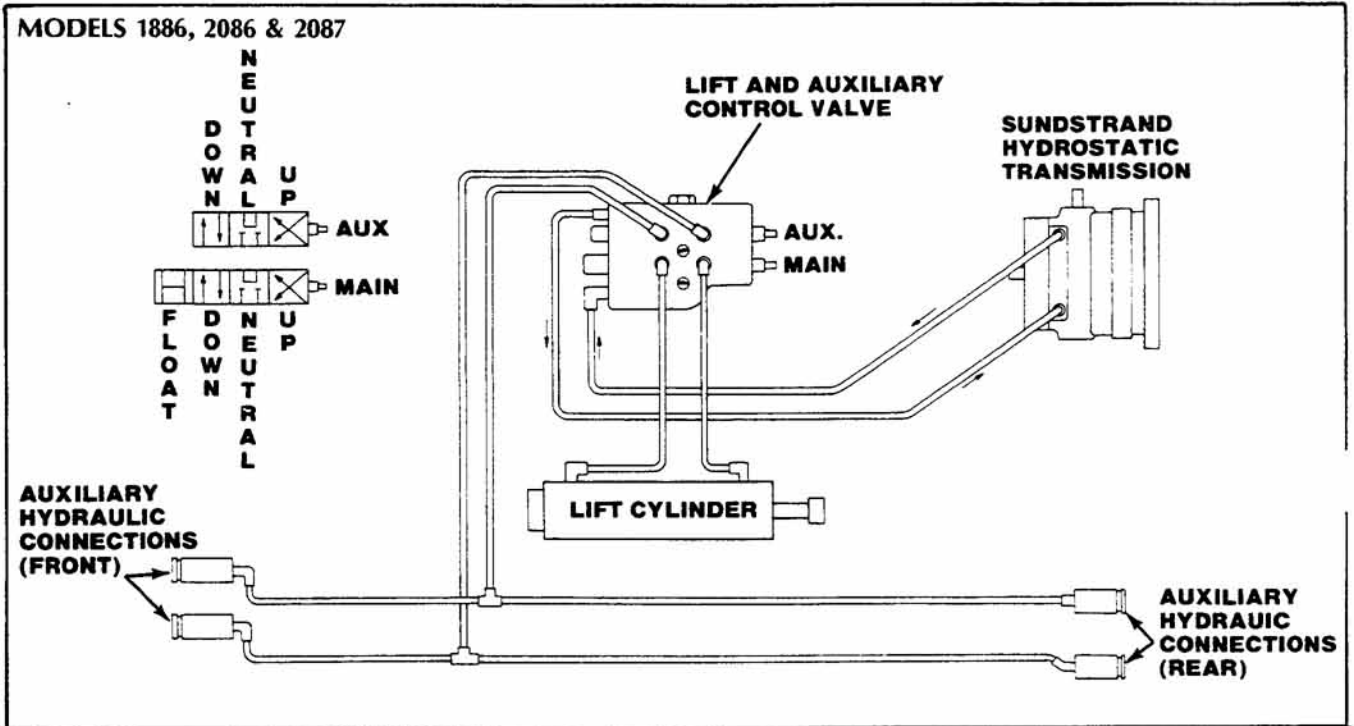
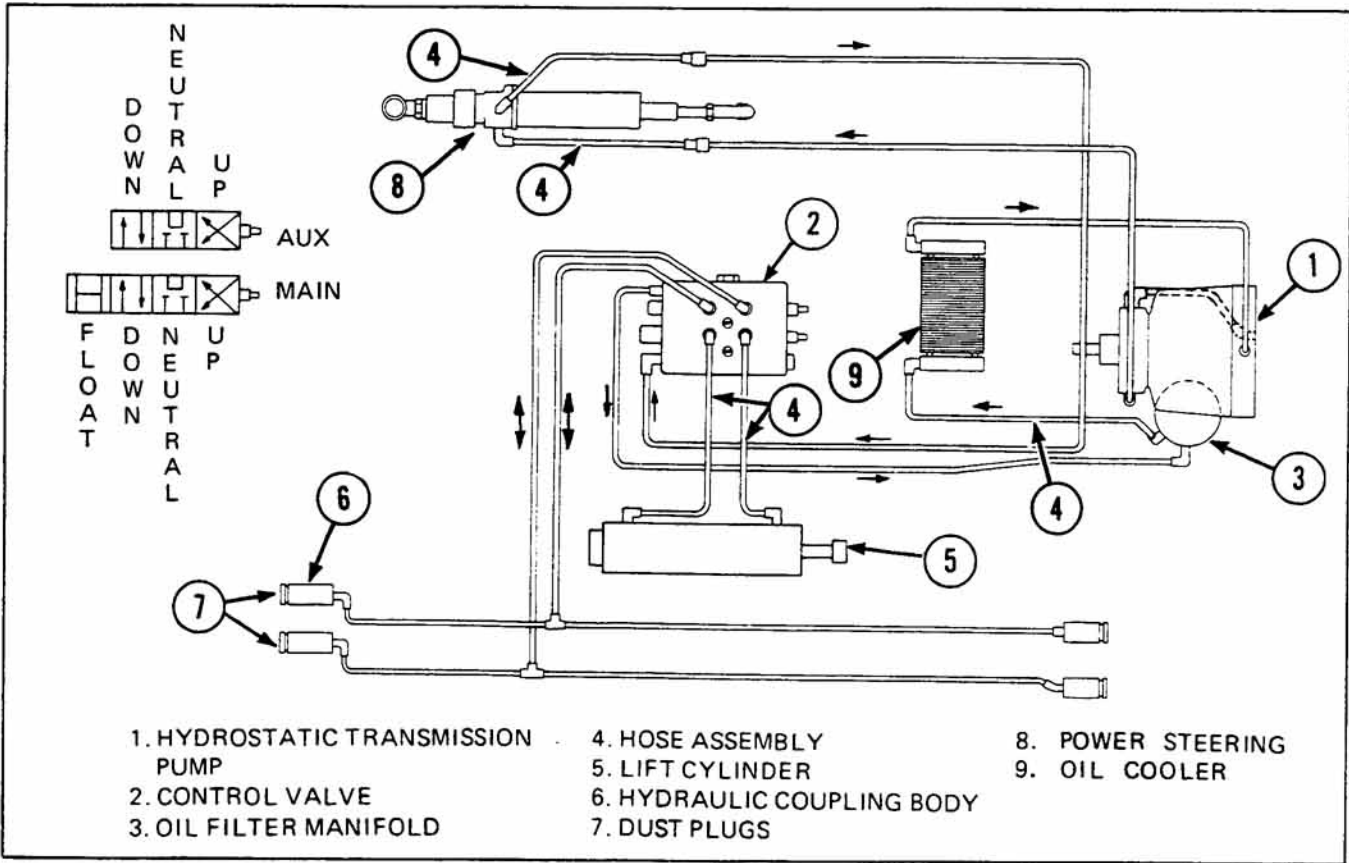


Figure 6-1

MODELS 2388s and 2389s S/N 0100101 and later



TESTING HYDRAULIC SYSTEM (SUNDSTRAND)

The implement pressure can be checked using a pressure gauge which reads at least 1000 P.S.I. To check the implement pressure install the gauge into the hydrostatic Figure 6-2. Start the engine and run at full R.P.M. Move the hydraulic control valve lever to the lift position until the hydraulic cylinder reaches the end of its travel. The pressure reading should be no less than 500 P.S.I.

If the pressure reading is 500 to 800 P.S.I. and the hydraulic cylinder does not operate properly, check the following:

1. Load too heavy.
2. Restriction in line from hydro to hydraulic cylinder.
3. Malfunctioning cylinder or valve.

If the pressure reading is below 500 P.S.I. and the hydraulic cylinder does not operate, check the following:

1. System low on oil.
2. Plugged oil filter or pickup tube line.
3. Hydraulic oil line leaking.
4. Malfunctioning implement relief valve.
5. Hydraulic valve or cylinder leaking.

CHECKING THE IMPLEMENT RELIEF VALVE

Remove the implement relief valve from the hydro Figure 6-3 and inspect for a damaged valve or distorted spring. The relief valve spring could be too weak or the valve not seating properly. If the valve or spring is pitted, wore uneven, or distorted, replace.

NOTE: Shims are available to increase implement relief valve pressure. 1 Shim .012" in thickness will increase pressure approximately 50 psi.

If no pressure reading is picked up on the gauge the charge pump relief valve could be stuck open or the charge pump inoperative. For further information on trouble shooting the hydrostatic, refer to the drive train, Group III.

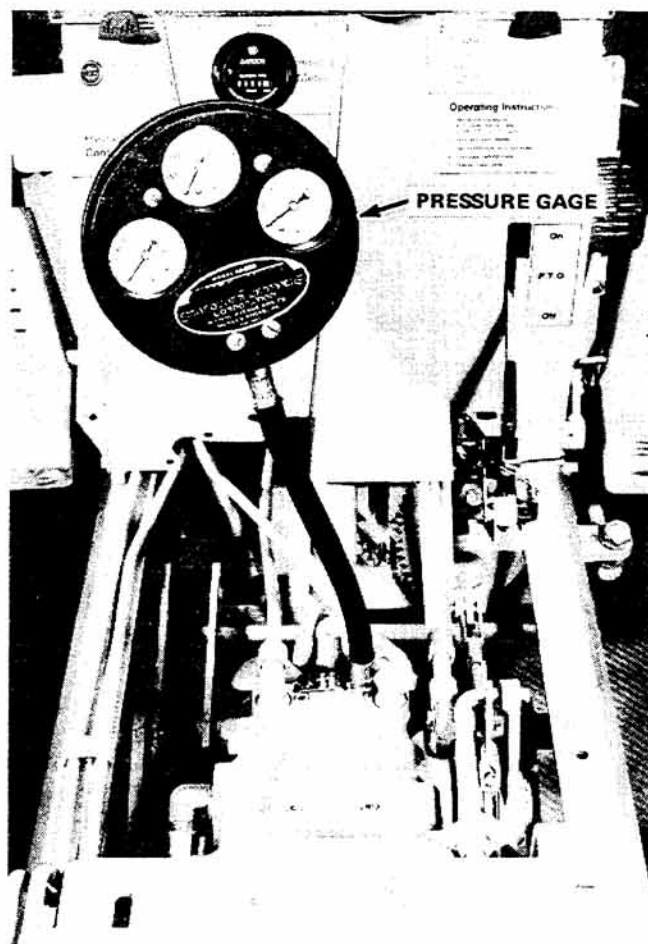


FIGURE 6-2

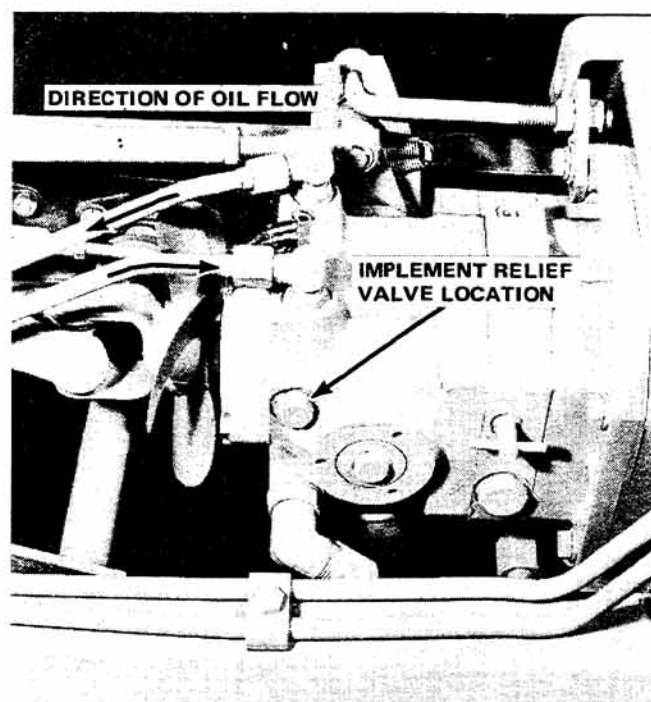


FIGURE 6-3

TESTING HYDRAULIC SYSTEM

EATON MODELS

The hydrostatic pressure can be checked using a pressure gauge which reads at least 1000 P.S.I. (6890 kPa).

To check the hydrostatic pressure install the gauge into a tee hydraulic fitting between hydrostatic port (A) Figure 6-4 and existing hydraulic tube. Start engine and run for 5-10 minutes. At full R.P.M. the pressure reading should be 140 PSI \pm 50 (964 kPa).

The lift pressure can be checked using a pressure gauge which reads at least 1000 PSI (6890 kPa). To check

the lift pressure, install the gauge between the control valve and the lift cylinder.

Start the engine and run at full R.P.M. Move the hydraulic control valve lever to the lift position until the hydraulic cylinder reaches the end of its travel. The pressure reading should be no less than 450 PSI (3100 kPa).

If the pressure reading is 450 to 550 PSI (3100 - 3790 kPa) and the hydraulic cylinder does not operate properly, check the following:

1. Load too heavy.
2. Restriction in line from hydro to hydraulic cylinder.
3. Malfunctioning cylinder or valve.

If the pressure reading is below 450 to 500 PSI (3100 - 3790 kPa) and the hydraulic cylinder does not operate, check the following:

1. System low on oil.
2. Plugged oil filter or pickup tube line.
3. Hydraulic oil line leaking.
4. Hydraulic valve or cylinder leaking.

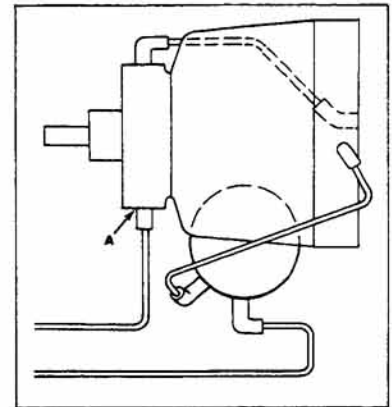


FIGURE 6-4

HYDRAULIC POWER LIFT

ALL MODELS REPAIRING THE HYDRAULIC CYLINDER FIGURE 6-3

To remove the piston rod assembly (A) from the cylinder, the internal snap ring (B) and the hose fitting, which goes through hole (C) in the cylinder tube, must be removed.

PISTON ROD REMOVAL

1. Remove 90° elbow from cylinder tube.
2. Pull the piston rod out until it is fully extended.
3. Pinch snap ring together and pull on piston rod until the assembly slides out of the cylinder housing.

When the piston rod assembly is removed from the cylinder tube hex nut (D) can be loosened and the piston, cylinder head, and related "O" ring washers removed. All parts should be inspected and new "O" rings installed. **IMPORTANT:** Grease "O" rings to prevent damage during assembly.

REPAIRING THE HYDRAULIC CONTROL VALVE (MODELS 1886, 2086 AND 2087)

The hydraulic control valve regulates and changes the direction of oil flow to the hydraulic cylinder when the control lever is actuated. "O" rings are used on the spools to provide a seal in the bore.

DISASSEMBLY

When removing spools make sure the location is noted as they are matched to the bore in the valve body. If the spool or valve body, is damaged the complete valve assembly must be replaced.

Remove the filter caps. (When removing the float detent cap which is the longest one, be careful not to lose the spring loaded steel balls.) Remove the spools by pushing them out the filter cap end of the valve body.

Disassembly spools, removing springs and washers. The spool without detent uses the spacer.

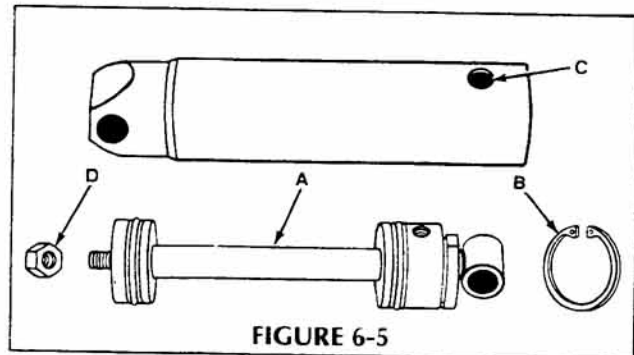


FIGURE 6-5

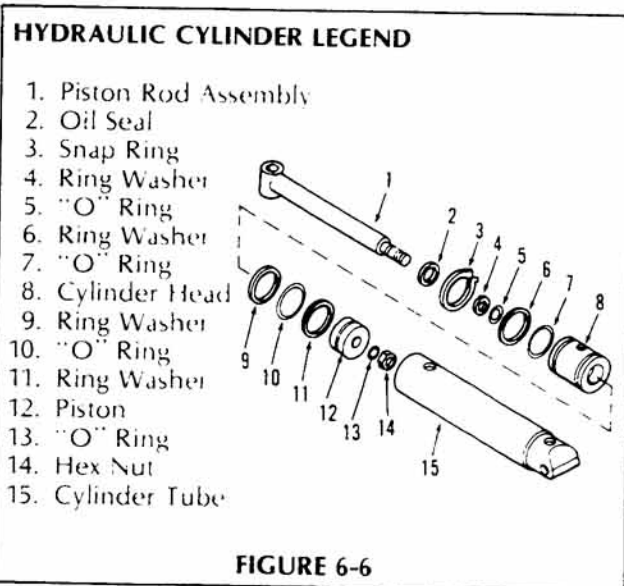


FIGURE 6-6

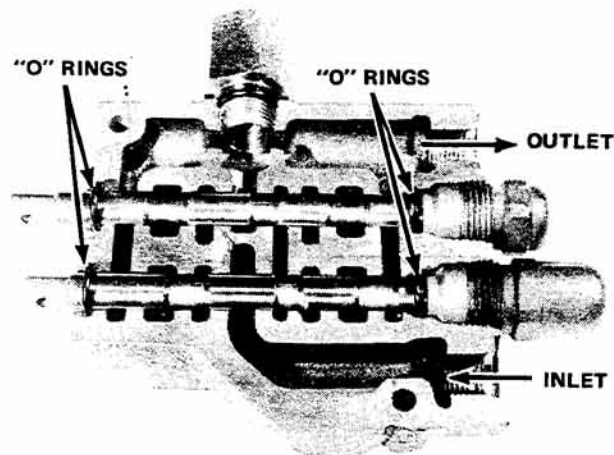


FIGURE 6-7

MODELS 1886, 2086 & 2087 VALVE

Remove lift check plugs and the temperatures switch adapter fitting.

MODELS 2288, 2289, 2388s, 2389s & 2389 VALVE

Remove relief valve plug, shims, spring poppet and seat.

ALL MODELS

Remove "O" rings from spools, lower ends of spool bores, adaptor fitting and lift check plugs.

An "O" ring kit is available for repair of the lift valve. On 1886, 2086 & 2087 Models use Bolens No. 1723215. On models 2288, 2289, 2388s, 2389s & 2389 use Repair Kit 1738514 for Cessna Valves and Kit 1742238 for AICO valves. Before reassembling inspect all parts thoroughly.

Small burrs and scratches can be removed from the spools with fine emery cloth. Clean all parts before assembly.

ASSEMBLY

1. Install new "O" rings in valve body, apply a coat of grease over the "O" rings.
2. Install new "O" rings on lift check plugs.
3. Install lift check plunger, spring and plug in valve body.
4. Install new "O" rings, springs, and washers on spools. Apply Loctite to screw threads and tighten securely into spool.
5. Install spools into valve body. Be careful not to damage "O" rings.
6. Install detent spring and balls. Hold in place and install filter cap.
7. Install other filter cap and check spools to make sure they are free in the bore.

(MODELS 2288, 2289, 2388s, 2389s, & 2389 VALVE ONLY)

8. Install relief valve seat, poppet spring, shims and plug, Fig. 6-8A.

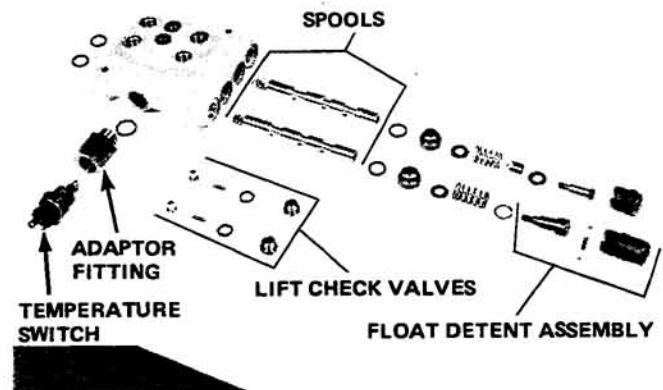


FIGURE 6-8

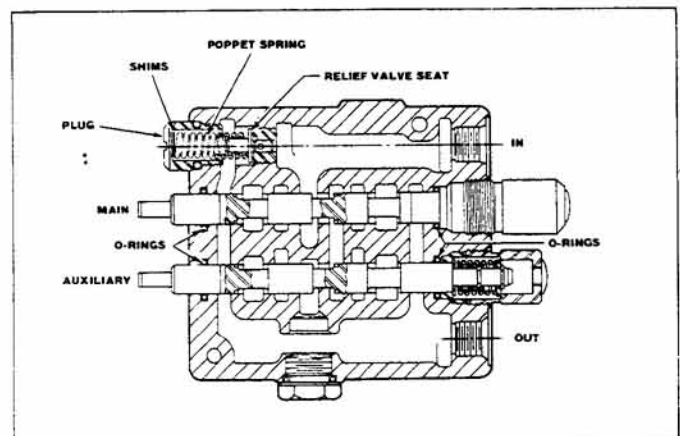


FIGURE 6-8A

OIL COOLER

The oil cooler kit should be installed if the hydrostatic oil temperature exceeds 250°, the temperature at which the hydrostatic oil temperature warning light comes on. In most cases the oil cooler is only needed when the unit is subjected to heavy drawbar loads.

OIL COOLER (Model 18087-NLA)
Fits Models 1886s, 2086, & 2087.

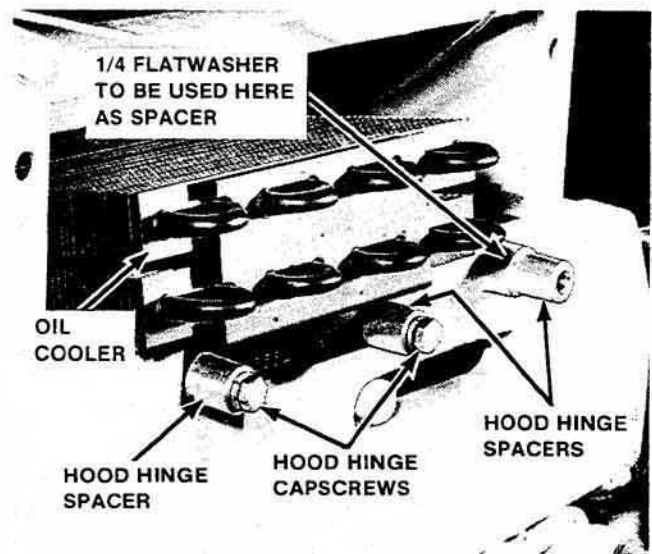


FIGURE 6-9

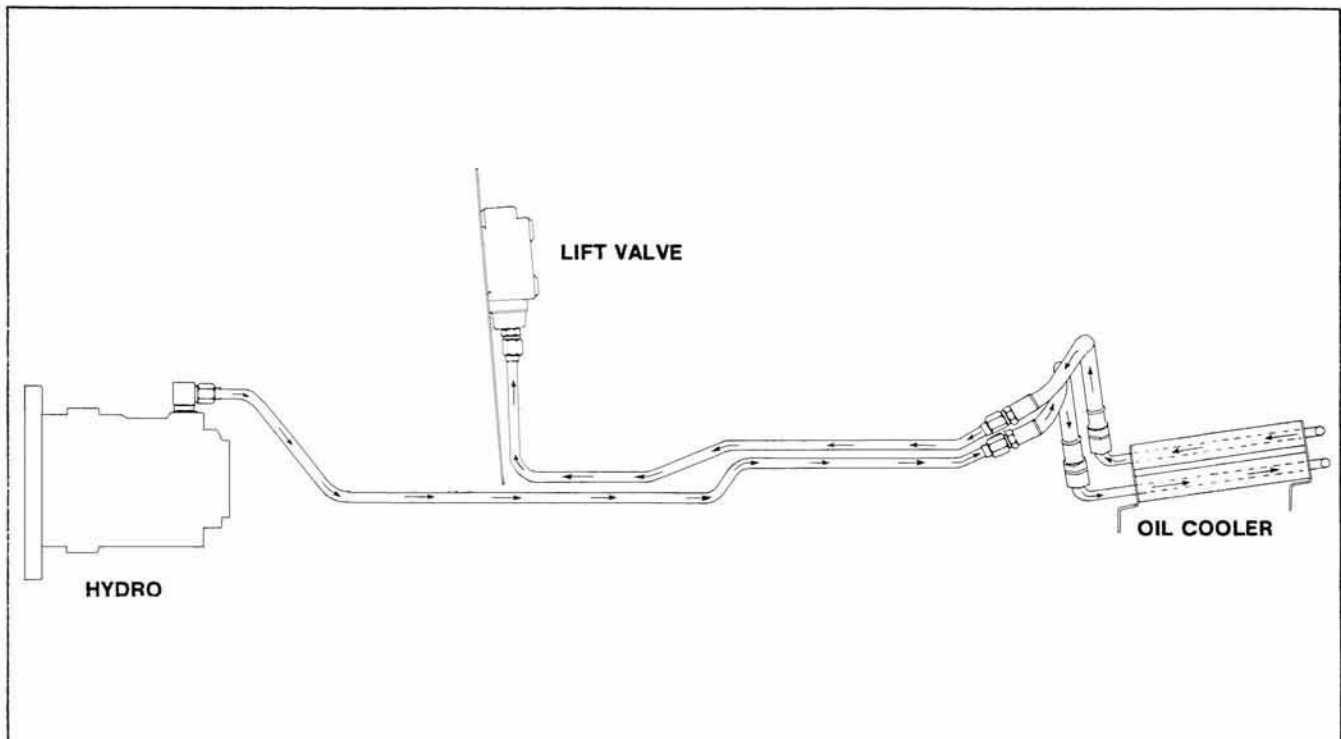


FIGURE 6-10

The oil cooler is located in the hydraulic system as shown in the flow diagram. All the hydrostatic oil flows through the oil cooler before going to the control valve.

**OIL COOLER (Model 18111
S/N 0100101 - 0199999)**

Fits Models 2289, 2389 & 2389s

This kit consists of the following parts:

- (A) 1737716 Support Assy1
- (B) 1185739 Elbow 90°1
- (C) 1185903 Elbow 45°1
- (D) 1735815 Oil Cooler1
- (E) 1186308 Flange Screw,
1/4-20 x 1/24
- (F) 1186389 Flange Nut, 1/4-20 .4
- (G) 1185737 Elbow 90°1
- (H) 1738862 Tube Assy1
- (I) 1738861 Tube Assy1

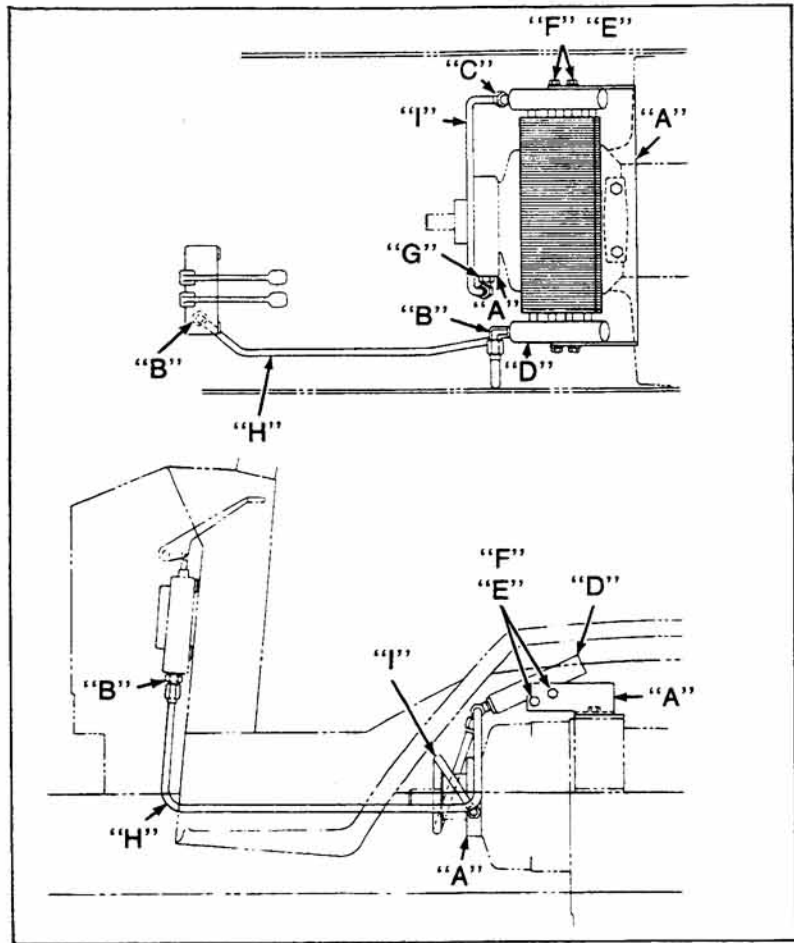


FIGURE 6-11

**OIL COOLER (Model 18111
S/N 0200101 and later)**

**Fits Models 2289 & 2389
Standard on 2389s**

This kit consists of the following parts:

- (D) 1737716 Support Assy1
- (E) 1185739 90° Elbow1
- (F) 1721989 Connector1
- (G) 1735815 Oil Cooler1
- (H) 1186308 Flange Screw, 1/4-20
x 1/24
- (I) 1186389 Flange Nut, 1/4-20 .4
- (J) 1738876 Tube Assy1
- (K) 1738877 Tube Assy1

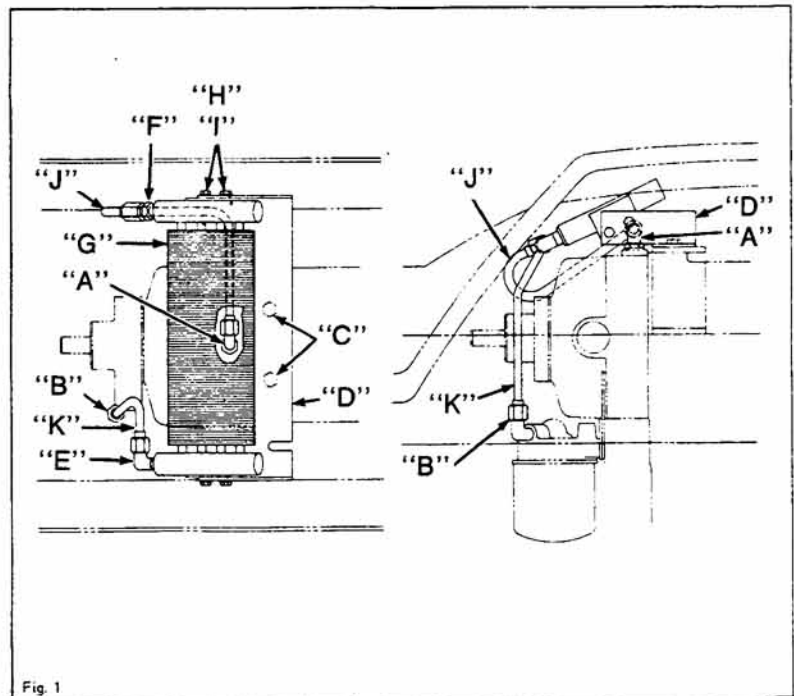


Fig. 1

FIGURE 6-12

HYDRAULIC SYSTEM (Continued)

POWER STEERING (Standard on some models)

The power steering kit is an option available to customers who prefer the reduced steering effort. In most cases the power steering kit is used with heavy front mounted attachments such as a front end loader, or snow throwers.

Model 18088 Installation

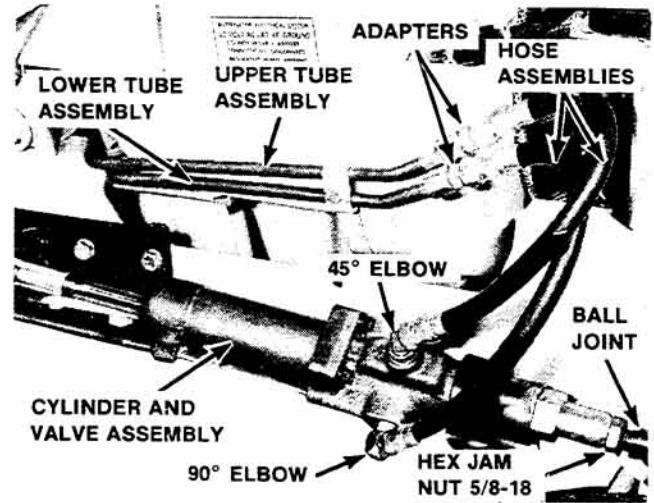


FIGURE 6-13

The oil pressure needed to operate the power steering cylinder is obtained from the Hydrostatic charge pump. The oil flows to the power steering control section as shown in the flow diagram. All the hydrostatic oil flows through the power steering unit before going to the control valve.

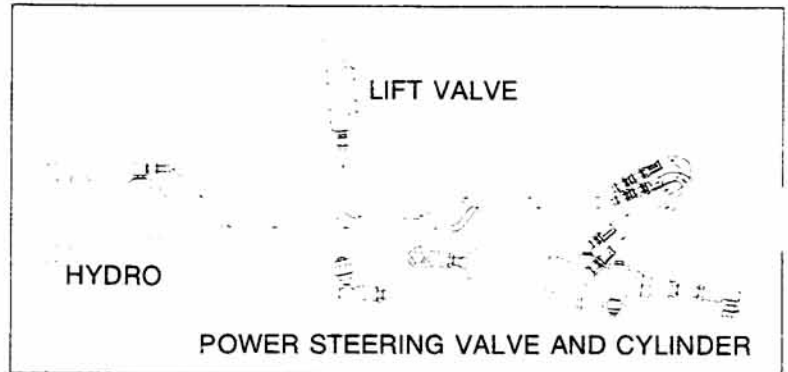


FIGURE 6-14

When the power steering and oil cooler is installed on the same unit all the hydrostatic oil flows to the power steering, then to the oil cooler before going to the control valve. It is important that the complete system is free of leaks to assure proper operation of the hydraulic system.

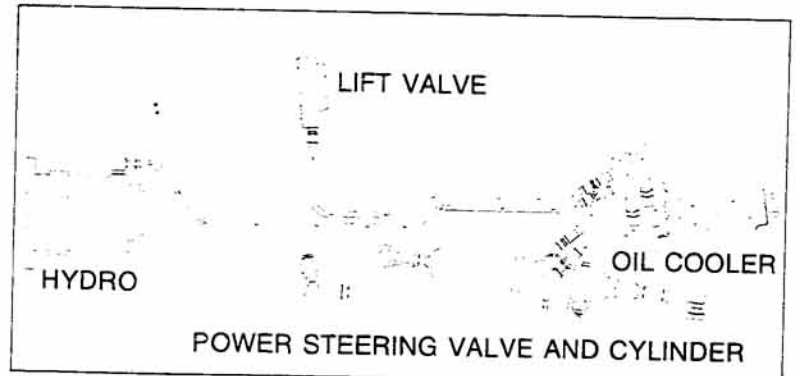


FIGURE 6-15

Models 18112 & 18114

INSTALLATION

The oil pressure need to operate the power steering cylinder is obtained from the Hydrostatic charge pump. The oil flows to the power steering control section as shown in the flow diagram. All the hydrostatic oil flows through the power steering unit before going to the control valve.

ADJUSTMENT OF STEERING UNIT

The cylinder should be adjusted so the piston rod extends $2\text{-}1/4''$ (5.7 cm) when the front wheels are parallel to the tractor. Below dimensions apply to all power steering kits.

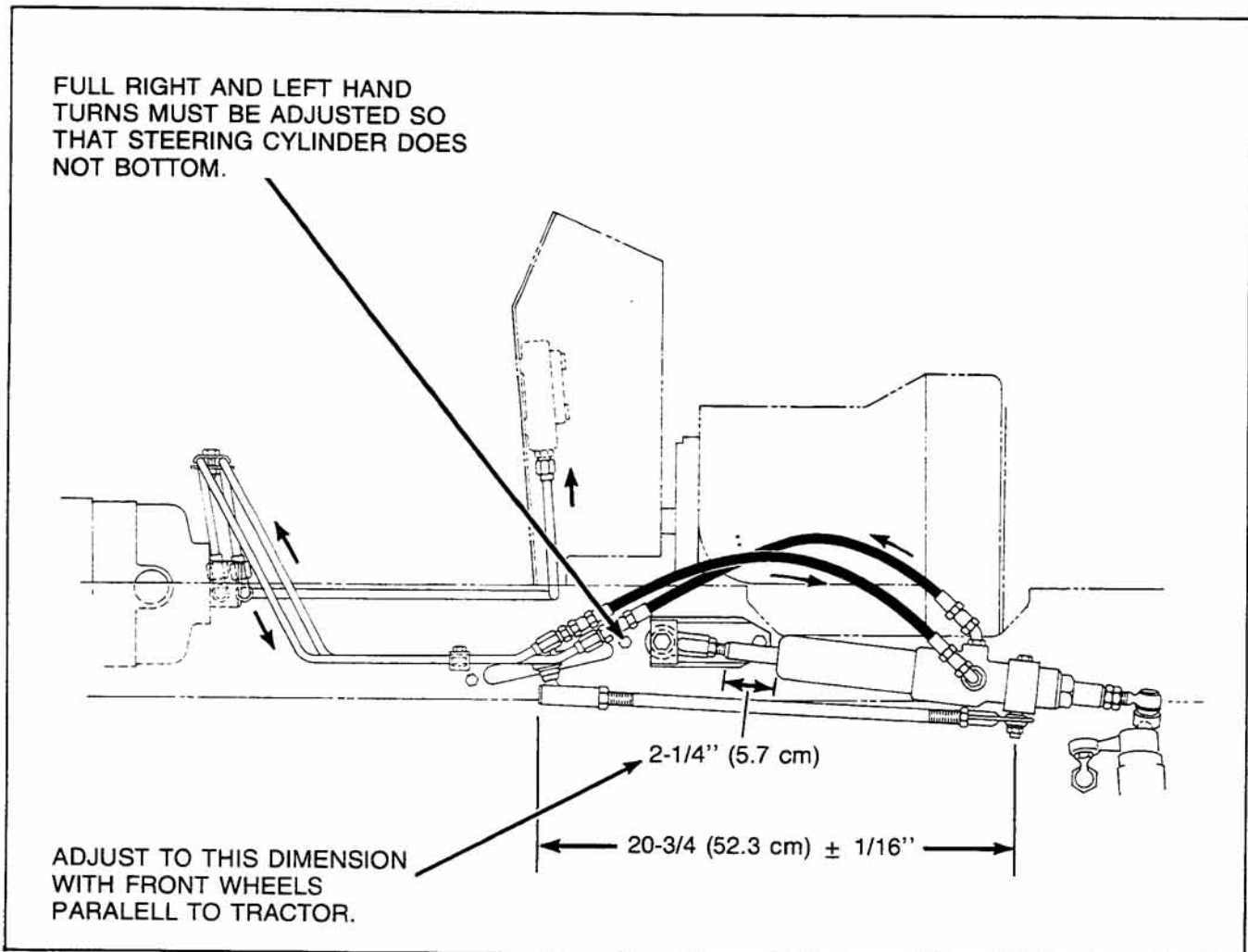


FIGURE 6-16

HYDRAULIC SYSTEM (Continued)

PRINCIPLE OF OPERATION

The power steering unit can be broken down into two principal assemblies: The control section and the cylinder section. The control section directs the oil to either the front or back side of the cylinder when the steering linkage is moved. The cylinder then pushes or pulls on the drag link to help reduce the steering effort.

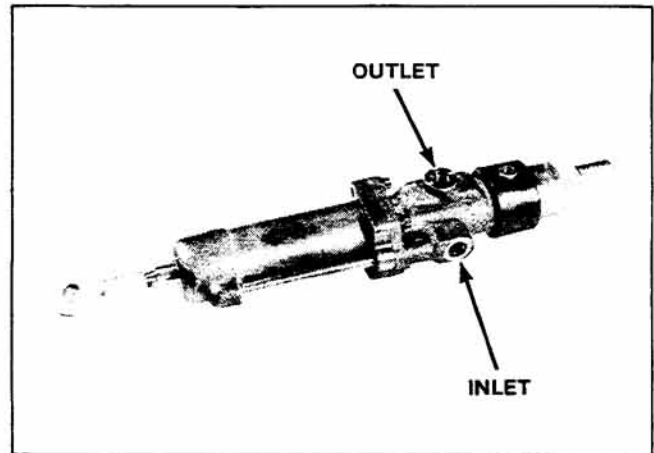


FIGURE 6-17

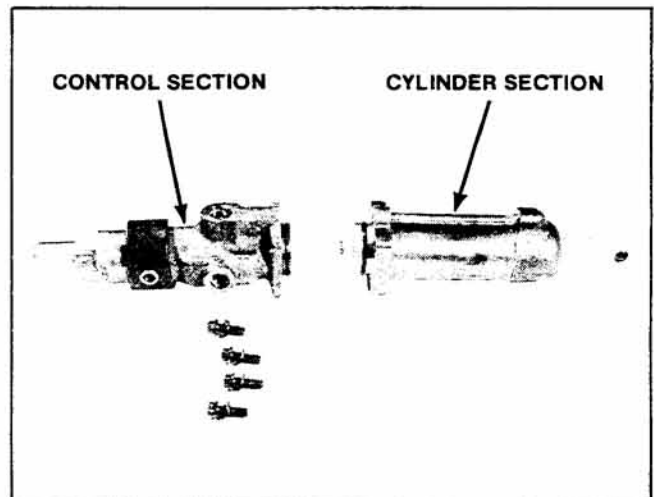
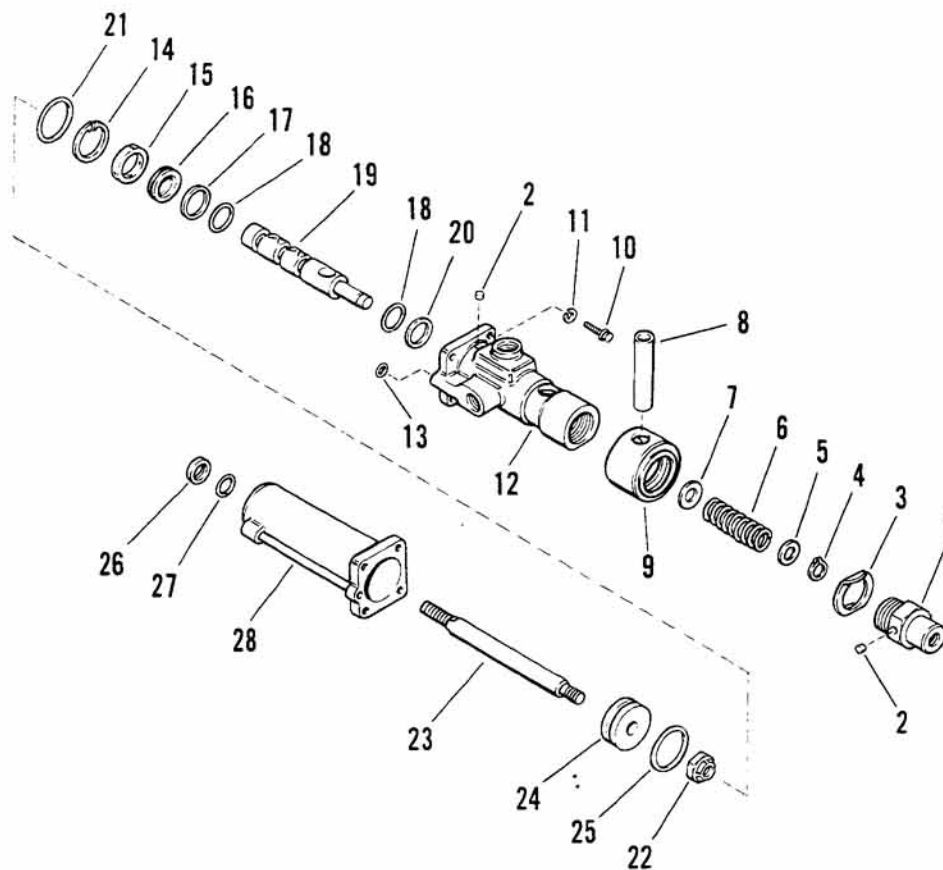


FIGURE 6-18

REPAIRING CYLINDER

The cylinder can be disassembled and repaired if necessary. An improperly operating power steering unit is usually caused by leaking "O" rings. If the unit is repaired all "O" rings should be replaced. Care must also be taken during re-assembly to prevent damage to the "O" rings. A light coat of grease on the "O" rings will help prevent damage.



Exploded view of power steering valve and cylinder.

POWER STEERING ASSEMBLY

- | | | |
|-----------------------------|--------------------------------------|--------------------|
| 1 Cap and Breather Assembly | 10 Capscrew, 12 pt.
5/16—18 x 7/8 | 19 Spool |
| 2 Filter | 11 Lockwasher, 5/16 | 20 Back-up Washer |
| 3 Washer | 12 Valve Body | 21 "O" Ring |
| 4 Retaining Ring | 13 "O" Ring | 22 Locknut, 1/2—20 |
| 5 Washer | 14 Retaining Ring | 23 Piston Rod |
| 6 Spring | 15 Spacer | 24 Piston |
| 7 Washer | 16 Plug | 25 "O" Ring |
| 8 Sleeve | 17 "O" Ring | 26 Seal |
| 9 Rubber Seal | 18 "O" Ring | 27 "O" Ring |
| | | 28 Barrel Assembly |

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