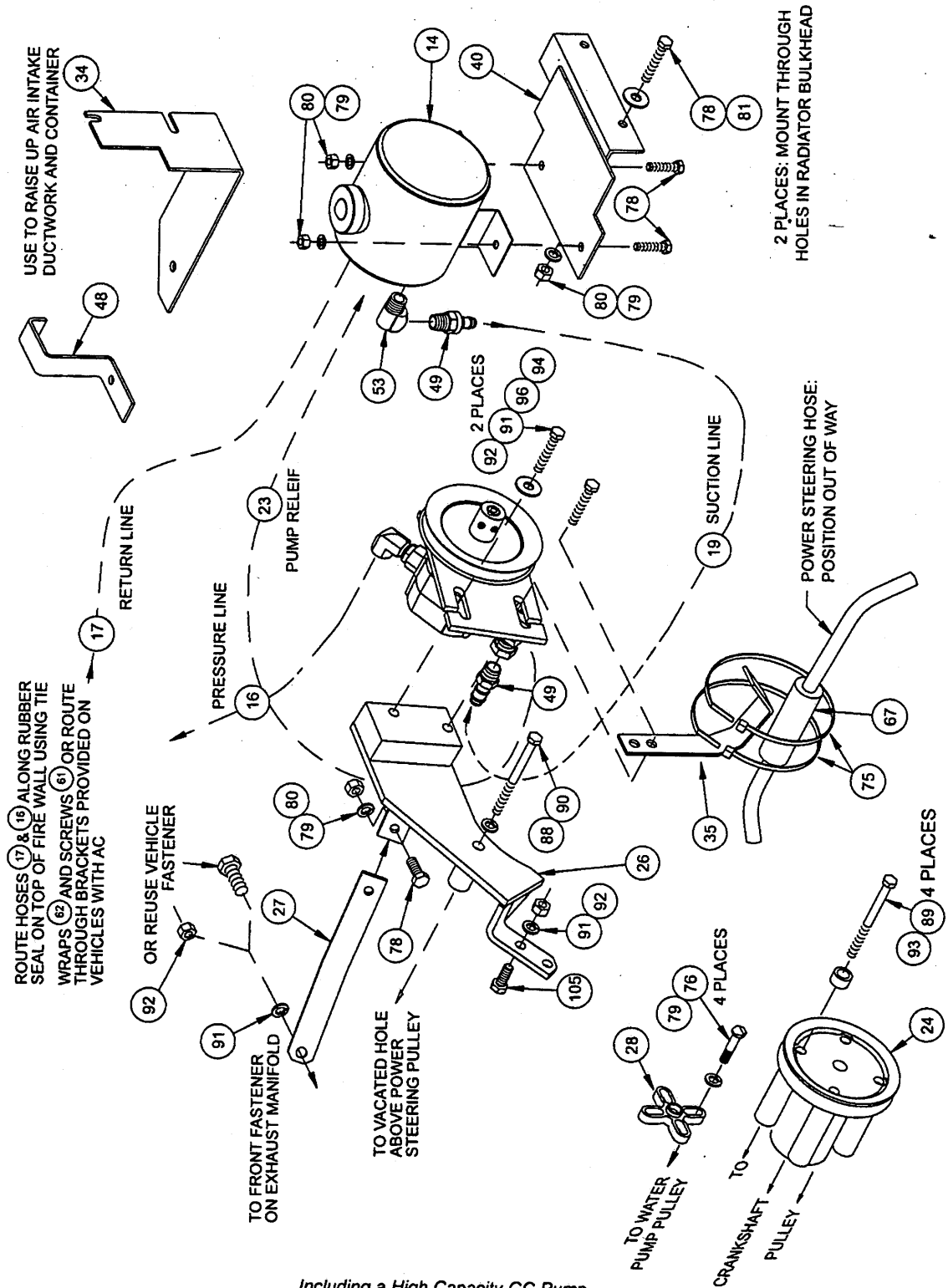
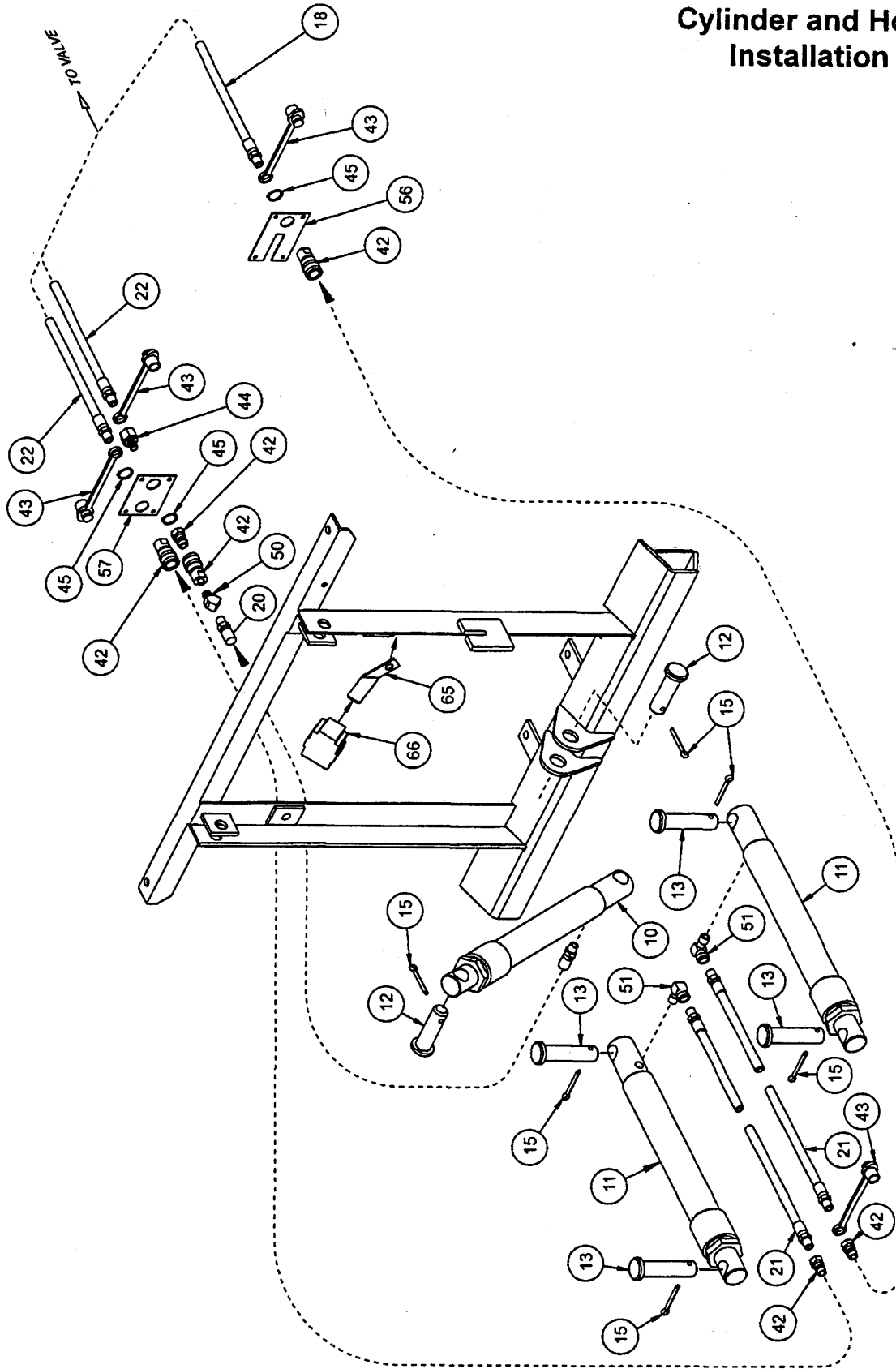


Installation Diagram

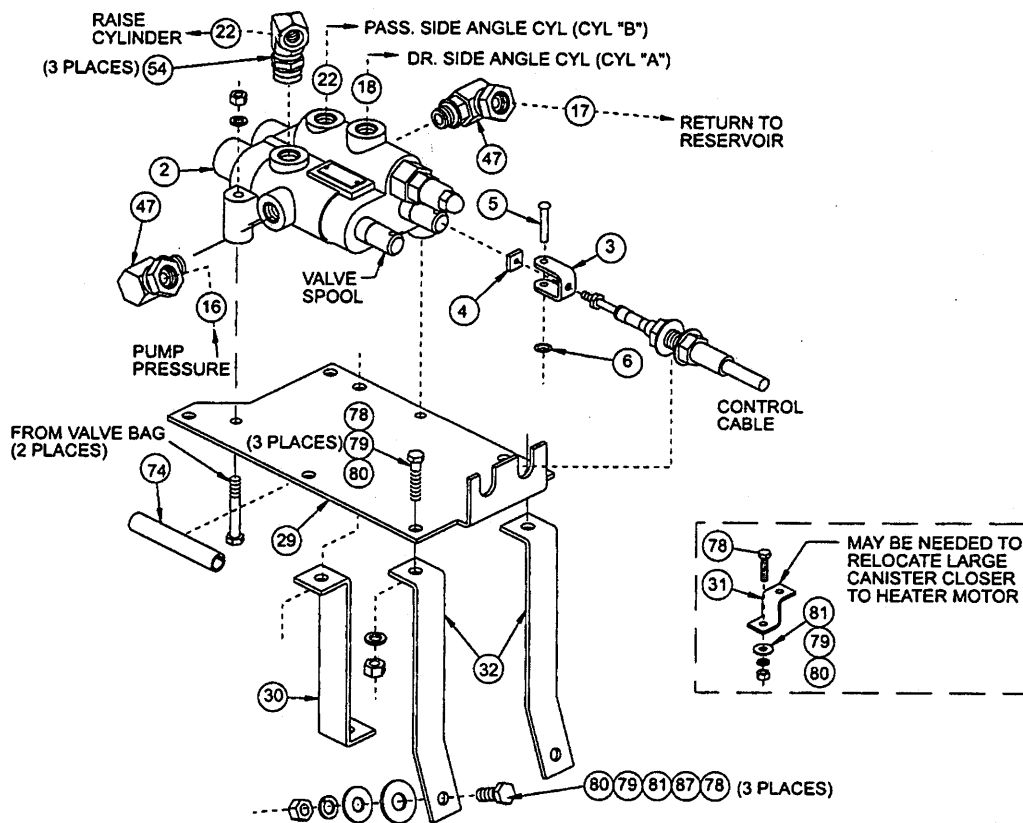


Including a High Capacity GC Pump

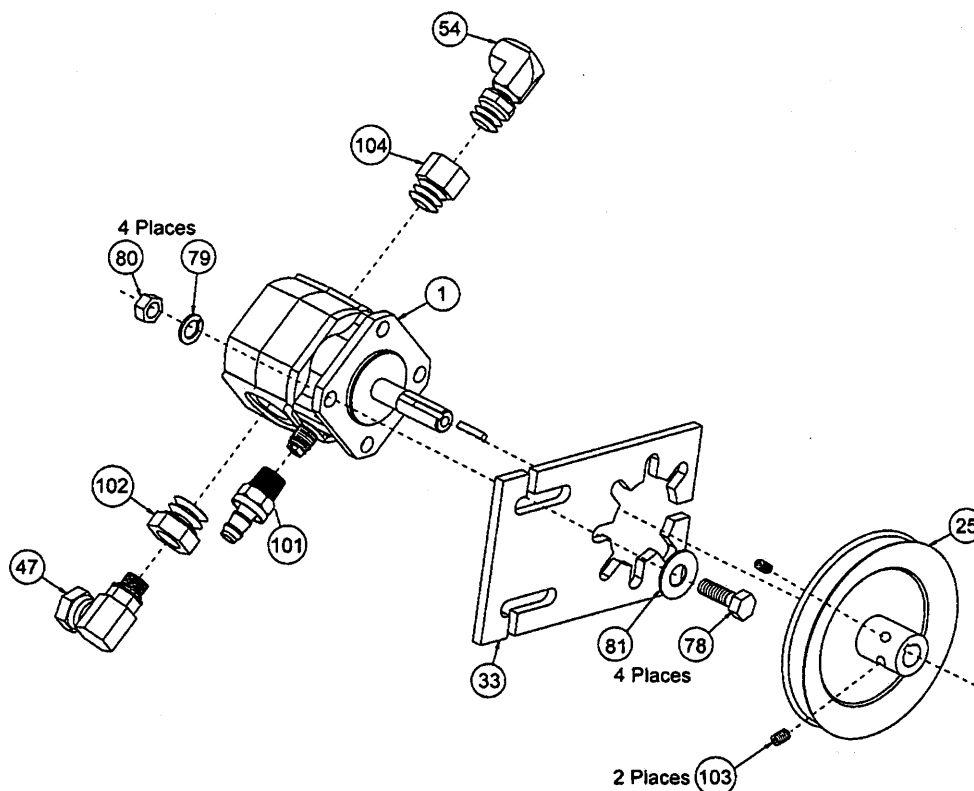
Cylinder and Hose Installation



Valve Installation



Pump Assembly



Parts List

Qty				Qty			
Ref #	21937	7557	Part # Description	Ref #	21937	7557	Part # Description
1	1		21981 Pump Assembly Kit	46	1		*319 1/4" x 90° Swivel Adapter
2	1		A4486-40 Control Valve Assembly	47	3		2315 9/16"-18 w/ O-ring x 3/8" F Pi Swivel
3	2		4483 Clevis - VM	48	1		6514 Fender Bracket
4	2		4494 10-32 Square Nut - VM	49	2		*22071 Quill-3/8" NPT to 5/8" ID Hose
5	2		4491 3/16 x 1" Clevis Pin	50	1		*8476 1/4" x 45° Street Elbow
6	2		4493 3/16" Push Nut	51	2		2780 1/4" NPT x 90° Street Elbow
8		1	4419 SLC Head - Belt Drive	53	1		*3979 3/8" NPT x 90° Street Elbow
9		2	A4490 90° SLC Cable	54	4		*20316 9/16" O-ring to 1/4" NPT 90° Elbow
10	1		20116 1-1/2 x 10" Cylinder Assy-XL	56	1		*8599 QD/Electric Plate-Long
11	2		20117 1-1/2 x 12" Cylinder Assy-XL	57	1		*8600 2 QD Plate- Long
12	2		6814 1 x 3-5/16" Clevis Pin	59	8		*8324 3/16 x 14" Hose Tie
13	4		6816 1 x 4" Anchor Pin	61	2		*90659 #12 x 3/4" Phillips Pan Head Screw
14	1		22066 Oil Reservoir	62	2		*8011 Hose Tie
15	6		90601 1/4 x 1-1/2" Cotter Pin	65	1		*8741 Cable Boot Bracket
16		1	2516 72" HP Hose - 1/4P - 3/8P	66	1		*8284 Cable Boot
17		1	22105 1/2 x 78" HP Hose - 3/8P - 3/8P	67	1		6595 Split Hose Grommet
18		1	6066 66" HP Hose - 1/4P to 1/4P	73	2		3042 Grommet - Rubber, Split
19		1	22106 5/8 x 24" LP Hose	74	1	1	*4477 Grommet - Split Hose
20		1	3074 22" HP Hose - 1/4P - 1/4P	75	3	12	*3666 3/16 x 8" Nylon Tie Wrap
21		2	4424 36" HP Hose - 1/4P - 1/4P	76		4	*9015 5/16 x 1-1/2" (NF) Gr. 5 Cap Screw Ground
22		2	375 42" HP Hose - 1/4P - 1/4P	77	1		90054 5/16 x 1-1/2" (NC) Gr. 5 Cap Screw
23		1	1681 24" LP Hose - 3/8"	78	5	12	*90042 5/16 x 1" (NC) Gr. 5 Cap Screw
24		1	5786 Drive Sheave **	79	7	14	*90360 5/16" Lock Washer
25		1	21917 Pump Sheave	80	8	9	*90332 5/16" (NC) Nut
26		1	21986 Pump Bracket	81	4	3	*90313 5/16" Flat Washer
27		1	6511 Pump Bracket Brace	84	1		90614 1/4 x 1-1/4" (NC) Gr. 5 Cap Screw
28		1	*3677 Fan Spacer	85	1		90359 1/4" Lock Washer
29		1	5329 Valve Plate	86	1		90330 1/4" (NC) Nut
30		1	7966 Valve Plate Brace	87		4	*4433 1/2" Special Washer
31		1	7968 Vacuum Canister Brace	88		1	*90362 7/16" Lock Washer
32		2	7965 Brace	89		4	*90156 3/8 x 4-1/4" (NC) Gr. 5 Cap Screw
33		1	8380 Pump Plate	90		1	*90706 7/16 x 8" Gr. 5 Cap Screw
34		1	6154 Air Intake Bracket	91		4	*90361 3/8" Lock Washer
35		1	21983 Hose Support Bracket	92		4	*90334 3/8" (NC) Nut
40		1	8988 Reservoir Bracket	93		4	*4268 5/8" Spacer Washer
42		3	A1587 Hose Disconnect Assembly	94		2	*91167 3/8 x 2-1/4" (NC) Gr. 5 Cap Screw
43		2	*1588 Dust Plug - Closure/Male	96		2	*90315 3/8" Flat Washer
44		1	*4486 1/4" NPT Bulkhead Adapter	101		1	8399 Relief Quill
45		3	*4485 Snap Ring- 7/8" External Bowed	102		1	8846 Red. Bushing 7/8" - 9/16" O-ring

* Part of 21998 Bolt Bag ** Order PN 21081 Drive Sheave w/Bushing for service ns = not shown

Parts List											
Ref #	Qty	21937	7557	Part #	Description	Ref #	Qty	21937	7557	Part #	Description
103	2			9447	1/4"-20 Socket Head Set Screw	ns	1			1118	56" V-Belt
104	1			8079	Red. Bushing 3/4" - 9/16" O-ring	ns	1			7991	Dash Bracket Kit
105	1			*90103	3/8 x 1" Gr. 5 Cap Screw						
* Part of 21998 Bolt Bag ** Order PN 21081 Drive Sheave w/Bushing for service ns = not shown											

1. Cylinder and Cylinder Hose Assembly

- A. Attach female disconnect half (42) and a 1/4" NPT 45° elbow (50) to a 22" HP hose (20). Using bench vise to hold lift cylinder (10), remove closure from port and screw the other end of the hose directly into this port. Place lift cylinder into ears on lift arm and upper gear with the hose pointing toward the passenger side. Secure with clevis pins (12) and cotter pins (15).
- B. Attach a male disconnect half (42) to one end of a 36" HP hose (21). Place a dust cover (43) and a male disconnect half (42) on the end of the other 36" HP hose (21).
- C. Using bench vise to hold angle cylinders (11), remove closures from ports. Screw brass forged street elbows (51) into ports. The street elbows should point forward toward live end of cylinder and slightly upward as they will be installed on the A-frame. The driver-side cylinder uses the 36" HP hose with the dust cover and male disconnect half. The passenger-side cylinder uses the 36" HP hose with the male disconnect half and no dust cover. Install cylinders to their respective sides so that street elbows are between the cylinders and A-frame. Secure cylinders with anchor pins (13) and cotter pins (15) at each end.

2. Oil Reservoir Installation

⚠ CAUTION
Reservoir tank fill must be vertical to engine.

- A. Install oil reservoir bracket (40) on radiator bulkhead between radiator and radiator coolant over flow container bracket about 5" up from the bottom of the bulkhead. Place two 5/16 x 1" cap screws (78) with flat washers (81) out through holes in bulkhead and bracket and fasten with two 5/16" lock washers (79) and nuts (80). Attach reservoir (14) to reservoir bracket with two 5/16 x 1" (NC) Gr. 5 cap screws (78), lock washers (79) and nuts (80). Make sure that quills are facing toward the cab.
- B. Place a brass street elbow (53) into the top threaded fitting in reservoir. Tighten street elbow to a 6 o'clock position. Install a 5/8" quill (49) to street elbow. Remove and save flexible plastic pipe from molded plastic air intake duct.




⚠ CAUTION
Keep hoses away from hot or moving engine components. Failure to do so may cause hose to burst resulting in a possible engine fire.

- C. Install the hoses into the reservoir at this time. Install the 24" LP Hose (23) onto the 3/8" quill and the 78" HP Hose (17) into the bottom threaded port. Install the 24" LP Hose (19) on the 5/8" quill. The 78" HP hose will be routed to the valve on the passenger side. Do not shorten LP hoses. Bends in all hoses must have sufficient radius to prevent crimping. A crimped hose may cause overheating of the hydraulic system, hose failure, and possible engine fire.

3. Drive Sheave Installation

NOTE: Apply a removable loosening prevention compound (such as "Lock-tite") to all drive sheave fasteners prior to installation.

- A. Remove serpentine belt. Remove and discard the four cap screws holding fan to water pump shaft flange. Remove and discard four cap screws from crankshaft pulley. Install drive sheave (24) into center of the crankshaft pulley with machined pilot of drive sheave seating fully into crankshaft pulley. Fasten drive sheave with four 3/8 x 4-1/4" cap screws (89) and spacer washers (93). Tighten and torque these fasteners to 31 ft-lb.
- B. Place fan spacer (28) on front of water pump serpentine pulley and reinstall fan. Fasten with four modified 5/16 x 1-1/2" (NF) cap screws (76) and lock washers (79). Tighten and reinstall serpentine belt.

DIAMETER- THREADS PER INCH	NF FASTENER TORQUE (FT-LB)		
	GRADE		
			
	G2	G5	G8
1/4 - 28	6	10	14
5/16 - 24	12	19	27
3/8 - 24	23	35	50
7/16 - 20	38	55	80
1/2 - 20	55	85	120
9/16 - 18	80	120	170
5/8 - 18	110	170	240
3/4 - 16	200	300	420
7/8 - 14	180	470	670
1 - 12	270	700	980

4. Pump Assembly and Pump Bracket Installation

- A. Remove plastic air intake filter assembly until pump assembly is installed. Remove and discard bolt above power steering pulley. Position pump bracket (26) behind serpentine belt with tab on end of pump bracket over stud in engine block. Install a 3/8 x 1" cap screw (105) through hole and engine mount and fasten with a lock washer (91) and nut (92). Do not tighten fasteners at this time. Install a 7/16 x 8" cap screw (90) with lock washer (88) in hole in pump bracket with pipe spacer. Place cropped end of pump bracket brace (27) onto front exhaust manifold stud. If nut is present, remove and reuse it to attach brace, otherwise attach brace with a 3/8" lock washer (91) and nut (92). Fasten other end of brace to pump bracket with one 5/16 x 1" cap screw (78), lock washer (79) and nut (80). Tighten all fasteners.
- B. Mount the pump (1) to the pump plate (33) with four 5/16 x 1" (NC) Gr. 5 cap screws (78), flat washers (81), lock washers (79) and nuts (80) in the orientation shown in the Pump Assembly diagram. The bolts and flat washers will be inserted from the pump plate side as shown. Slide the pump pulley (25) onto the pump shaft. Make sure the shaft key remains in the key slot so it contacts both the pump shaft and the pump pulley. **Slide the pulley on until the end of the pump shaft is even with the hub of the pulley.** Apply a removable loosening prevention compound, such as "Lock-tite", to the set screws (103). Tighten the set screws onto the pump shaft. Torque the set screws to 10 ft-lb.
- C. Remove the dust plugs and covers from the pump ports. Screw the 7/8" - 9/16" O-ring bushing (102) into the suction port beside the relief valve adjustment. Screw the 9/16"-18 with O-ring x 3/8" NPTF swivel elbow (47) into the previously installed bushing. The elbow should point away from the pump shaft. Screw the 3/4" - 9/16" O-ring bushing (104) into the pressure port. Screw the 9/16"-18 with O-ring x 1/4" NPTF elbow (54) into the pressure port bushing. The elbow should point away from the pump shaft.

Carefully remove the jam nut from the relief valve adjustment stem. Hold the adjustment stem from turning with a screw driver. Save the copper gasket under the jam nut. Carefully screw the relief quill (101) on to the relief stem making sure the stem does not move. Tighten the quill down until just snug. The stem can easily be pulled out of the pump.

- D. Place fender bracket (48) in the driver-side fender well around coil spring bracket on F150 models or shock mount bracket on F250/F350 models. With inner fender attached to it, position bracket where adequate clearance will result. Using hole in bracket as a guide, drill a 11/32" hole through fender. Install a 5/16 x 1" cap screw (78), flat washer (81) and a 1/2" special washer (87) out through fender. Fasten to the bracket with a 5/16" lock washer (79) and nut (80). Note: The plastic inner fender well must be pulled outward to provide clearance for hydraulic pump.
- E. Place pump plate portion of pump assembly against pump bracket as shown and place the 56" v-belt over both drive and pump sheaves. Insert a 3/8 x 2 1/4" cap screw (94) through the bottom hole in the hose support bracket (35) and through the bottom hole in the pump plate and pump bracket as shown. Insert a 3/8 x 2 1/4" cap screw (94) with a 3/8" flat washer (96) through the top holes in the pump plate and the pump bracket. Loosely place 3/8" lock washers (91) and nuts (92) onto the cap screws. Adjust hose support bracket and place a 3/4" split hose grommet (67) onto power steering hose beneath the hose support bracket and attach hose and grommet to hose support bracket with two tie wraps (75). Position the power steering hose and support bracket to minimize hose twist and bend radius. Adjust for proper v-belt tension by pivoting pump plate on top bolt and tighten pump plate fasteners. There should be a minimum of 1/2" clearance between hose support bracket and drive sheave v-belt. Bend bracket to increase clearance if necessary.
- D. Loosen the two brass colored nuts on the coolant reservoir and catalyst filter container brace. With the long leg of air intake bracket (34) towards fire wall, slide top slot of bracket between catalyst brace and tab on reservoir. Rotate bracket counter clockwise and slide lower slot onto remaining fastener. Tighten fasteners. Reinstall catalyst filter container. The container should rest on top of the air intake bracket.
- E. Place the previously installed 3/8 x 24" LP hose (23) onto the quill on the pump relief. Install 5/8" quill (49) to 90° swivel fitting on side of pump next to relief quill. Place the previously install 5/8" x 24" LP hose (19) onto the 5/8" quill. This hose is long to provide for sufficient bend radius. Install the 1/4" end of the 72" HP hose (16) to 90° elbow in the pressure port of the pump. Attach a split hose grommet (74) over the top of this fitting with tie wraps (75). Reinstall previously removed air filter duct. Check to insure that all hoses are not crimped and free of all hot or moving engine parts.

5. Control Head and Control Cables

- A. Drill two 5/8" holes in the firewall for the control cables using drilling guide as a reference only. Be sure both sides of the firewall are clear of obstructions before drilling.
- B. Install the dash bracket according to the dash bracket instructions.
- C. Loosen the "jam nuts" on control head end of cables (9) and install into slots in control head (8). The raise cable centers in the beginning of the lower slot. Snap cable ends onto ball studs and tighten jam nuts to secure cables to control head. Remove the nuts and washers from the valve end of the cables. Route the cables out through the firewall up to top of the driver-side fender well. Attach control head to dash bracket according to the dash bracket instructions. Install rubber grommets (73) around cables where they pass through the fire wall.

6. Valve and Valve Plate

- A. Using a bench vise to hold the control valve assembly (2), remove closures from valve ports. Screw the 90° swivel adapter unions (47), located in the valve bag, into the "in" and "out" ports. Install three 9/16" O-ring to 1/4" NPT 90° elbows (54) in lift and angle ports. When tight, elbows should point at 2 o'clock, away from cable end of valve.

- B. Mount valve to valve plate (29) using two 1/4 x 1-3/4" cap screws, lock washers and nuts located in the valve bag. Install cap screws from bottom of valve plate, with lock washer and nut on top of valve. Attach the two long valve leg braces (32) to the two holes in the cable attaching end of valve plate. Attach with two 5/16 x 1" cap screws Gr. 5 (NC) (78), lock washers (79) and nuts (80). Attach rear leg brace (30) to hole in rear of valve plate on "out" port side with one 5/16" x 1" cap screw Gr. 5 (NC) (78), lock washer (79) and nut (80). Turn the positive battery cables toward the engine. Place the valve plate with braces over the vacuum canister beside the battery. The vacuum canister, with a plastic hose next to the battery, may have to be moved closer to the battery and the larger canister will have to be relocated closer to the heater motor and parallel with the fire wall. This requires a brace (31) for offset on the fender. Mount the brace by drilling a 1 1/32" hole and installing it with a 5/16 x 1 cap screw (78), flat washer (81), lock washer (79) and nut (80). Locate the valve plate with braces attached to it on top of the passenger-side inner fender so that the valve plate is near level and not contacting any vehicle equipment. Using the holes in the valve plate braces as guides, drill three 11/32" holes through the inner fender and attach the braces with three 5/16 x 1" cap screws (78), flat washers (81), lock washers (79) and nuts (80). Place a 3/8" split hose grommet (74) over the end of valve plate which is over the vacuum canister.

⚠ CAUTION

Valve spools must be free and self centering when cables and control head are attached. Failure to center spools will restrict fluid flow through valve. This may cause hydraulic hose failure. Hose failures can cause engine fires. When adjusted, the control lever must be in the neutral position to allow enough spool travel each way for proper valve actuation. Use three nylon ties (75) to run cables along air intake hoses.

- C. Install the control cables to the valve plate by reinstalling the jam nuts and washers on the cables. Place the control cables in their respective slots on the valve plate bulkhead with one nut and one washer on each side of the bulkhead. Center the cables in the slots so that they are exactly in line with the valve spool centers. Attach the cable clevis (3) to the cables using square nuts (4). Slip the cable clevis over the spools. Install the clevis pin (5) through the clevis and spool and secure it with a push nut (6) on the clevis pin. Adjust the cables so the control lever is centered between both angle and raise/lower positions. If the cable clevis does not allow enough adjustment, reposition the cable at the valve plate bulkhead. After checking to see that the valve spools are in the centered position. Tighten the cable clevis nuts.

7. Hydraulic Hose Installation**⚠ CAUTION**

Keep hoses away from hot or moving engine components. Failure to do so may cause hose to burst resulting in possible engine fire.

- A. Route the previously installed 72" HP hose (16) and the 78" HP hose (17) from the pump and the reservoir across the fire wall to the valve. Place both hoses along the rubber seal on the top of the fire wall. Remove the two rubber hood screws from the seals that are approximately eight inches apart and centered on the vehicle. Replace them with two nylon mounting tie wraps (62) and #12 sheet metal screws (61). Secure the hoses with ties. OEM air conditioner hoses can be routed through the brackets provided.




Install the 78" HP Hose (17) into the 90° elbow in the "out" port of the valve, and the 3/8" end of the 72" Hp hose (16) into the "in" port. Install the 66" HP hose (18) into the elbow in the angle port closest to the cables on valve. Pass this hose by the battery and out through the core support near the radiator. Pass the hose out through the grille low and about 14" off center on the driver side. Attach a female QD half (42) to the long QD/electric grille plate (56) with a snap ring (45). Pass the 66" hose through a rubber dust cover (43) and

attach it to the female disconnect half. Put a dust cover on the plug of the vehicle harness and slide it into the slot of the grille plate. Attach the grille plate to the grille with four long tie wraps (59).

- B. Attach a 42" hose (22) to the raise port elbow and one 42" hose (22) to the angle port elbow farthest from the cables. Pass these hoses out through the core support by the radiator, low about 14" off center on the passenger side of the grille. Attach a bulkhead adapter (44) to one hole of the long QD/QD grille plate (57) with a snap ring (45). Attach a male half of a QD (42) to this adapter. Secure a female QD (42) half to the other hole in the grille plate with a snap ring (45). Slide a rubber dust cover (43) over the end of the raise hose and attach this to the male disconnect on the in-board side of the grille plate. Slide a dust cover (43) over the angle hose and attach it to the female QD half on the outboard side of the plate. Slide the plate back to the grille and attach it with four long tie wraps (59).
- C. Install cable boot bracket (65) on driver-side headgear brace, between brace and fasteners. Insert cable boot (66) on over bracket.

8. Operations

- A. Check all fittings and fasteners for tightness. Secure hoses with nylon tie wraps (75).
- B. Attach hose disconnects. Push lift arm all the way down and fill reservoir with FISHER® High Performance Hydraulic Fluid (recommended for superior cold-weather performance) or Type "A" automatic transmission fluid. Start the engine. Lift and angle the blade several times. With the lift cylinder fully retracted check the oil level in the reservoir. Angle the blade with lift cylinder retracted to remove air from system. Recheck reservoir oil level.

NIC FASTENER TORQUE (FT-lbB)			
DIAMETER- THREADS PER INCH	GRADE		
			
	G2	G5	G8
1/4 - 20	6	9	13
5/16 - 18	11	18	28
3/8 - 16	19	31	46
7/16 - 14	30	50	75
1/2 - 13	45	75	115
9/16 - 12	66	110	165
5/8 - 11	93	150	225
3/4 - 10	150	250	370
7/8 - 9	150	378	591
1 - 8	220	583	893

NOTE: The installer must inform the end user of the proper procedure for removing any residual hydraulic pressure that may be trapped in the raise or angle hoses. The plow will be much easier to install or remove if the proper procedures are followed.

Before coupling or uncoupling the hydraulic disconnects you must turn off the engine and move the control to the four plowing positions. Place the control in lower/float before removing or installing the plow.

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