



the
snowplow
professionals

**Solenoid Electric
Hydraulic Pak**

OWNER'S MANUAL

FISHER ENGINEERING • PO BOX 529 • ROCKLAND, MAINE 04841

PREFACE

The FISHER Solenoid Electric Hydraulic Pak (SEHP) is the ideal alternative to belt driven hydraulics.

This manual has been prepared to acquaint you with the operation and maintenance of your new FISHER snowplow and to provide safety information. We urge you to read this manual carefully and to follow its recommendations. This will help ensure profitable and trouble-free operation of your snowplow. Keep this manual accessible as a handy reference in case a minor service problem arises.

When service is necessary, your local FISHER Dealer, Service Center, or Distributor knows your plow best and is interested in your complete satisfaction. Return your snowplow there for maintenance service or any other assistance you may require.

Your FISHER Solenoid Electric Hydraulic Pak is serialized. For your information and protection, it is wise to record this serial number and keep it in a safe place.



SAFETY NOTE: Whenever you see this symbol, it notes a SAFETY WARNING. For your own protection and safety, these warnings must be followed. Failure to do so could result in serious bodily injury to yourself or others.

FISHER offers a one year limited warranty for all snowplows and accessories. See separately printed page for this important information. FISHER does not warranty non-Fisher Service Parts or Accessories or the damage caused by the use of these unauthorized items.

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The procedures and illustrations in this guide are based on latest production information available at time of publication. Fisher Engineering reserves the right under its product improvement policy to change construction or design details and furnish equipment when so altered without reference to illustrations or specifications used herein.

SAFETY GUIDELINES

TO PREVENT ACCIDENTS THAT COULD RESULT IN SERIOUS INJURY AND/OR DAMAGE TO YOUR VEHICLE OR EQUIPMENT, CAREFULLY FOLLOW THESE SAFETY RULES AND TEST PROCEDURES.

GENERAL

Be sure to disconnect the plow prior to performing any tests or making adjustments.

Scratching, denting or marring machined surfaces can make parts unserviceable. Cleanliness is essential when servicing the unit.

SAFETY EQUIPMENT

Fire Extinguisher

Never work on your vehicle without having a suitable fire extinguisher handy. A 5-lb. or larger CO₂ or dry chemical unit specified for gasoline/chemical/electrical fires is recommended.

SAFETY GOGGLES

We recommend wearing safety goggles when working on your vehicle to protect your eyes from battery acid, gasoline, and dust and dirt flying off moving engine parts.

LOOSE CLOTHING AND LONG HAIR

Be very careful not to get your hands, hair, or clothing near any moving parts such as fan blades, belts, and pulleys. Never wear neckties or loose clothing when working on your vehicle.

JEWELRY

Never wear wrist watches, rings, or other jewelry when working on your vehicle. You'll avoid the possibility of catching on moving parts or causing an electrical short circuit which could shock or burn you.

NOTE: Manufacturer assumes no liability for accidents or damages notwithstanding the fact that suggestions have been followed.

VENTILATION

The carbon monoxide in exhaust gas is highly toxic. To avoid asphyxiation, always operate vehicle in a well ventilated area. If vehicle is in an enclosed area, exhaust should be routed directly to the outside via leakproof exhaust hose.

SETTING THE BRAKE

Make sure that your vehicle is in park or neutral and that the parking brake is firmly set.

HOT SURFACES

Avoid contact with hot surfaces such as the engine, radiator, and hoses.

SMOKING AND OPEN FLAMES

Never smoke while working on your vehicle. Gasoline vapor is highly flammable, and the gas formed in a charging battery is explosive.

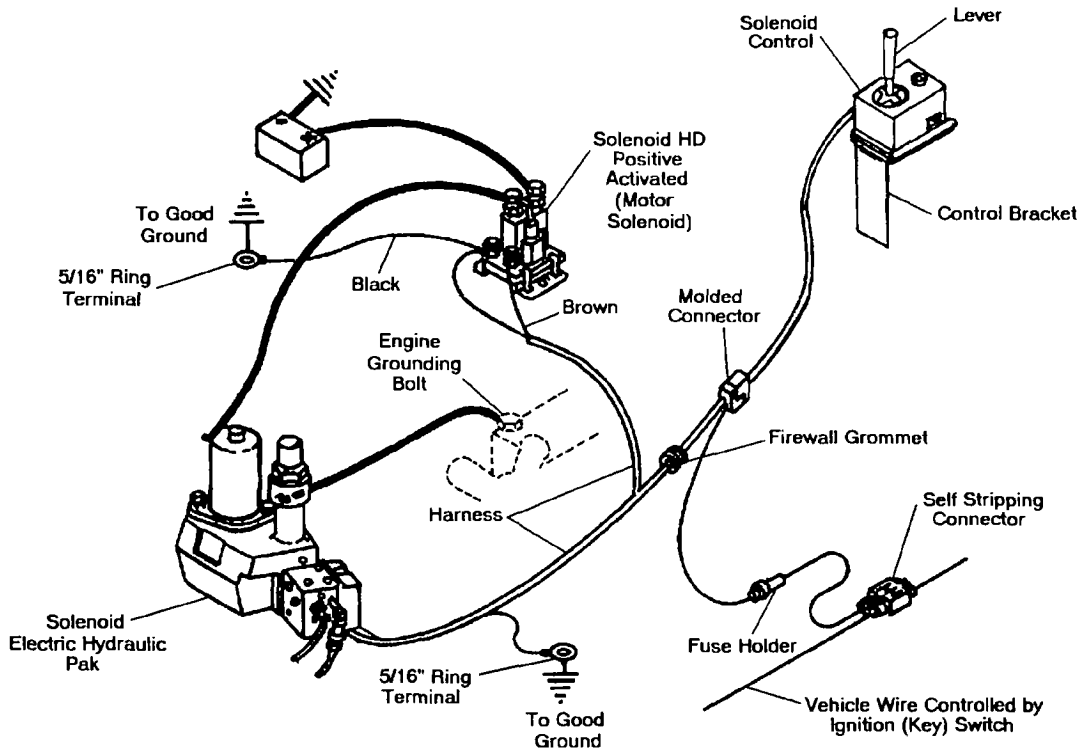
BATTERY

Do not lay tools or equipment on the battery. Accidentally grounding the "POS +" battery terminal can shock or burn you and damage wiring, the battery, or your tools and testers. Battery acid can burn holes in your clothing and burn your skin or eyes. Disconnect the cable from the negative battery terminal before replacing the motor, motor solenoid, or Solenoid Control.



WARNING: Protect top of battery, sparks from testing operations could cause battery gases to explode causing severe eye or body burns, or other personal injury.

SOLENOID ELECTRIC HYDRAULIC PAK ASSEMBLY DIAGRAM



THEORY OF OPERATION

The Solenoid Electric Hydraulic Pak Performs four functions:

RAISE the snowplow ANGLE snowplow RIGHT

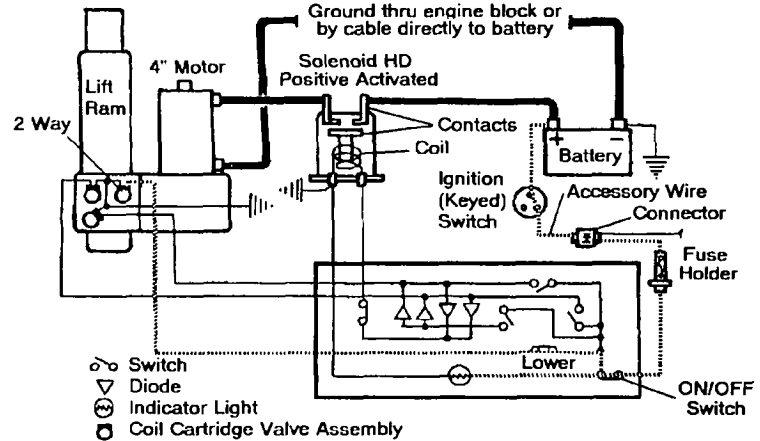
LOWER the snowplow ANGLE snowplow LEFT

All functions require that the vehicle ignition (key) switch be in the run position or the accessory position and the ON/OFF Switch on the Solenoid Control be in the "ON" position. Three functions - RAISE, ANGLE RIGHT, ANGLE LEFT- require the operation of the 4 1/2" Motor to drive the hydraulic pump, and the shifting of cartridge valve spools. The fourth function, LOWERING, requires only the shifting of a cartridge valve spool.

ELECTRICAL OPERATION OF MOTOR

To run the 4 1/2" Motor, the motor Solenoid must be activated to allow a large current flow from the battery to the 4 1/2" Motor. When the Solenoid Control is moved to the RAISE, LEFT, or RIGHT position, a switch inside the control is closed to allow electrical current to flow thru the switch, thru the coil of the motor Solenoid, thru the ground and back to the battery. The current flow thru the motor Solenoid coil causes a magnetic field which will close the motor Solenoid contacts. These contacts connect heavy cables between the 4 1/2" Motor and the battery. The cables carry a large current flow which enables the motor to run.

NOTE: It is easier to connect and disconnect angling cylinder quick disconnect if the oil pressure is relieved in these hoses. To relieve the pressure deactivate the pump motor operation by separate switch while activating the valve angling control.

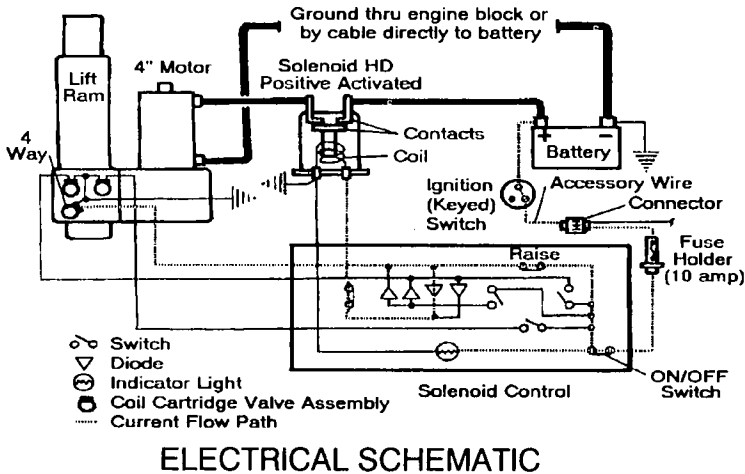


ELECTRICAL SCHEMATIC

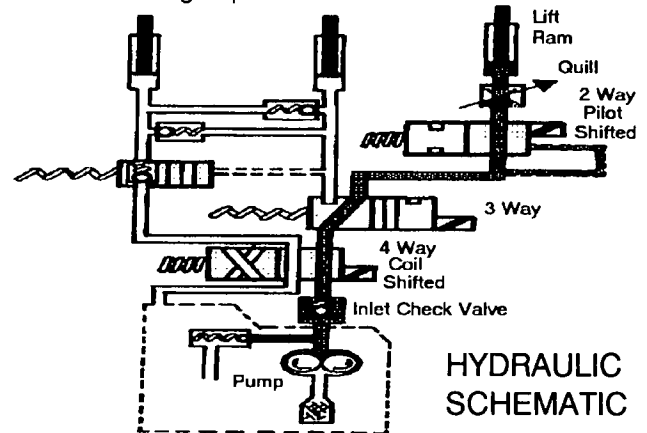
THEORY OF OPERATION

RAISING PLOW

Moving the Solenoid Control lever into the RAISE position closes a switch in the control. This switch provides current flow to the motor Solenoid coil to operate the 4 1/2" Motor. It also provides current to the coil of the 4 way cartridge valve. This current causes a magnetic field that will shift the spool of the valve directing flow



of oil from the pump thru the shifted 4 way spool, thru the 3 way cartridge valve, to the 2 way cartridge valve spool. The fluid pushes open the spring loaded spool of the 2 way cartridge and flows into the lift ram to push the plunger up. When the control lever is moved back to neutral, the motor Solenoid and the 4 way cartridge valve coil are deactivated, stopping the flow of oil to the lift ram. The spool of the 2 way valve will close and trap the oil in the lift ram holding it up.

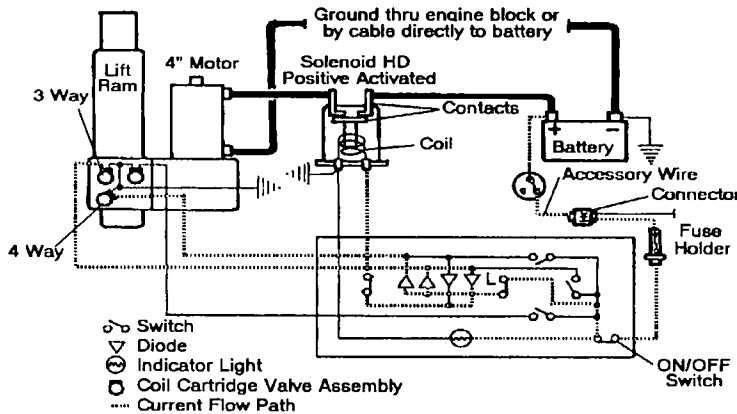


THEORY OF OPERATION

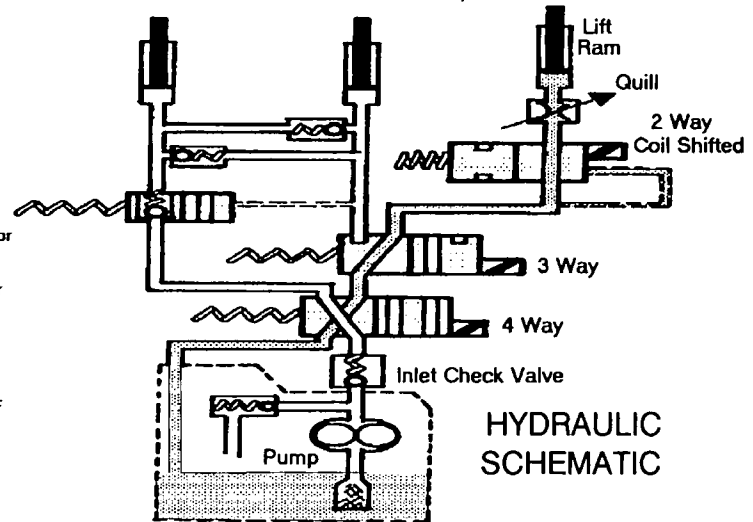
LOWERING FLOW

Moving the Solenoid Control lever into the LOWER (float) position closes a switch. This switch allows current to flow only to the 2-way cartridge valve coil. The current flow causes a magnetic field which shifts the 2-way spool to allow oil to escape from the lift ram. The oil passes the adjustable Quill, which controls the rate of blade

lowering, thru the 3-way and 4-way cartridge valves, back to the reservoir. Leaving the control in the detent position (float) will keep the spool shifted, allowing the blade to follow the road contour. Returning the control to neutral will deactivate the valve to hold oil in the lift ram and maintain the blade position.



ELECTRICAL SCHEMATIC



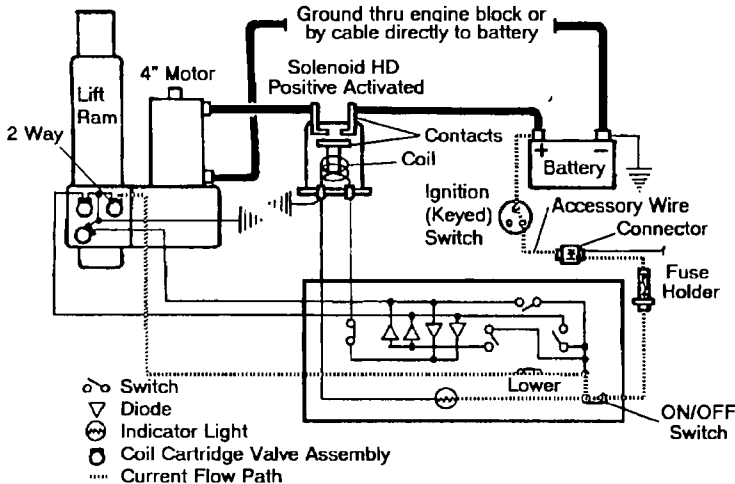
HYDRAULIC SCHEMATIC

THEORY OF OPERATION

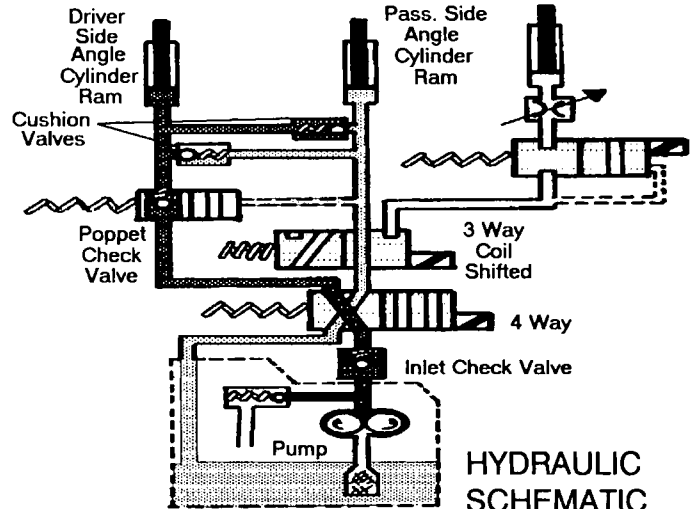
ANGLE RIGHT

Moving the Solenoid Control lever into the ANGLE RIGHT position closes a switch. This switch operates the motor Solenoid and also provides current to the 3 way cartridge valve coil. This current flow causes a magnetic field which shifts the 3 way spool. Oil from the pump flows thru the 4 way cartridge valve, pushes open the

poppet check valve, and flows into the driver's side angle cylinder ram to angle the blade to the right side. As the driver's side angle cylinder ram extends, the passenger's side angle cylinder ram must collapse, pushing its oil into the manifold, thru the shifted 3 way spool, thru the 4 way cartridge valve, back to the reservoir.



ELECTRICAL SCHEMATIC

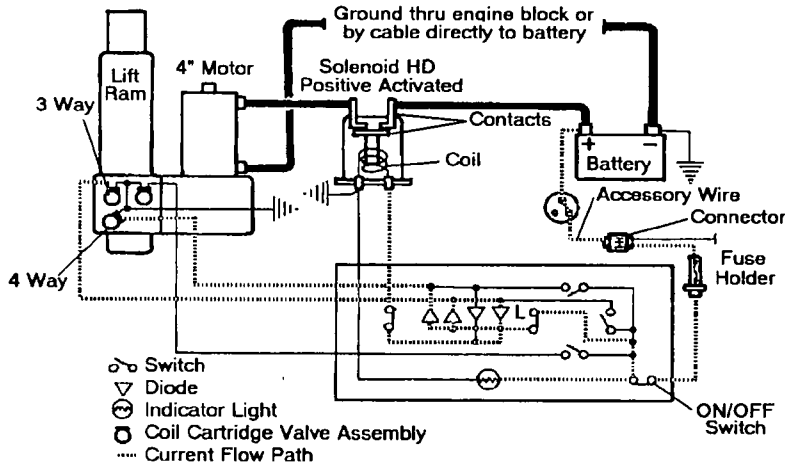


HYDRAULIC SCHEMATIC

THEORY OF OPERATION

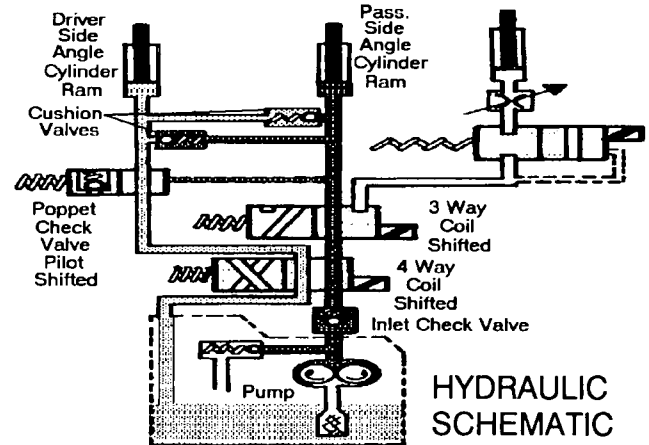
ANGLE LEFT

Moving the Solenoid Control lever into the ANGLE LEFT position closes a switch. This switch also operates the motor Solenoid and provides current to the 3 way and 4 way cartridge valve coils. This current flow causes magnetic fields in the coils to shift the 3 way and 4 way spools. Oil from the pump flows thru the shifted 4 way



ELECTRICAL SCHEMATIC

spool, thru the shifted 3 way spool to the passenger side angle cylinder ram to angle the blade to the left side. The oil flow to the passenger side angle cylinder ram also causes the Poppet Check Valve spool to shift holding open the poppet located in the manifold port for the driver side cylinder. As the passenger side angle cylinder ram extends, the driver side angle cylinder ram must collapse, pushing its oil into the manifold, thru the open Poppet Check Valve, thru the shifted 4 way spool, back to the reservoir.



HYDRAULIC SCHEMATIC

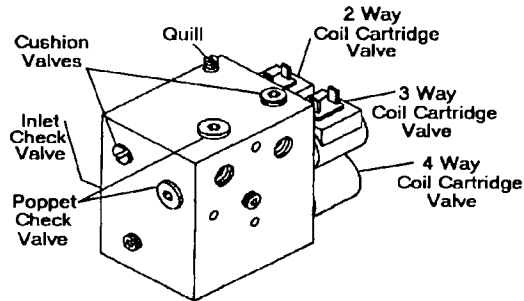
THEORY OF OPERATION

CUSHION VALVES

While plowing, oil is trapped in the extended angle cylinder rams. When the blade meets an object, pressure rises in one angle cylinder ram. As pressure in the ram exceeds the spring force holding the checkball against the seat, the checkball unseats allowing oil to flow to the opposite ram; thus, the blade angles to prevent damage to the hydraulic system, blade or vehicle. Oil is trapped in the passenger side ram by the 3 way cartridge valve and in the driver side ram by the Poppet Check Valve.

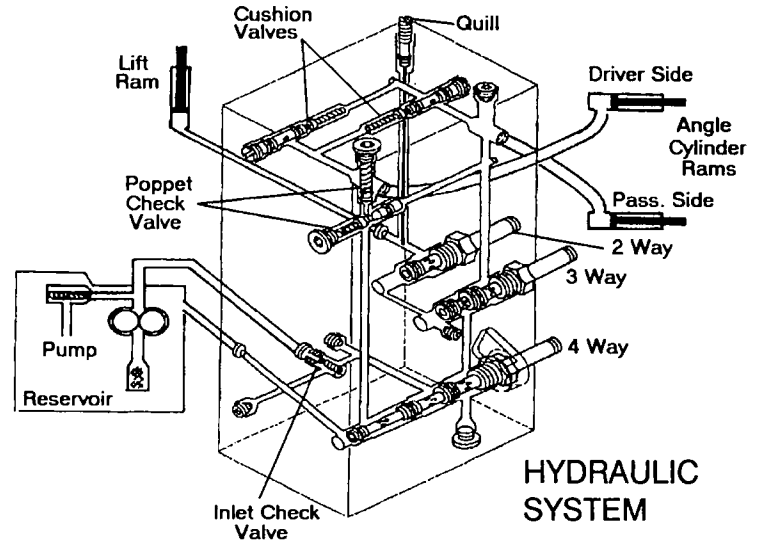
POPPET CHECK VALVE

This check valve prevents flow of oil out of the drivers side angle cylinder ram while the blade is being raised. Without this check valve, when raising the blade during "stacking" of snow, the shifted 4 way cartridge valve spool would allow oil from the driver side ram to flow directly back to the reservoir.



INLET CHECK VALVE

The pump supply passage in the Valve Manifold has an Inlet Check Valve (one way check valve) which allows oil to flow from the pump into the Valve Manifold. This check valve prevents oil from flowing back to reservoir anytime the pump is not in operation.



TROUBLESHOOTING GUIDE

SOLENOID CONTROL POSITION	PROBLEM DESCRIPTION	DEFINE PROBLEMS AND FOLLOW STEPS BELOW						
Angle	Blade will not angle or angles too slow. Time: 4 seconds 10" or 12" cyl. - 4 seconds	Check oil level, page 12.	See Solenoid Electric Hydraulic Pak Malfunction B, page 14.	All functions slow, check pump pressure, see A, page 14.	Check disconnect couplers & Angle cylinders ram nuts.	Remove pump. Clean filter screen.		
Raise	Blade will not raise. Time: 2 seconds for 6" SEHP 3 seconds for 10" SEHP				Check lift cyl packing nut.			
Lower	Blade will not lower.							
Neutral	Blade will not remain angled while plowing.	Inspect and adjust Cushion Valves, see F, page 18.	Verify Coil Cartridge Test, see E, page 17-18	See Poppet Check Valve inspection, G, page 19.				
Neutral	Motor continues to run in neutral.	Disconnect BROWN WIRE attached to small terminal of Solenoid HD, Positive Activated. If motor continues to run, Solenoid HD is shorted. Replace Solenoid. If motor stops, test Solenoid Control, see D, page 16, or replace/repair harness.						
Raise while "stacking" snow	Blade angles to left while raising blade during "stacking" operation.	See Poppet Check Valve inspection, G, page 19.						
Neutral	Blade lowers in neutral.	2 way valve stuck open or 2 way valve cartridge defective, see E, page 17-18.						
Lower	Blade lowers too fast.	Check lift cyl packing nut.			See Quill Adjustment H, page 19.			
	Blade lowers too slowly.					Check oil level, page 12..		Check pump pressure see A, page 14.
Raise	Blade raises too slowly.							

GENERAL INFORMATION

Most service can be performed with the hydraulic components left on the vehicle. This should be done whenever possible because it permits evaluation of the entire system (vehicle electrical system, harness, Solenoid Control, etc.) as well as saving considerable time.

Disconnect the NEGATIVE battery cable before replacing motor solenoid, or solenoid control.

It is suggested that the following items be kept in the vehicle for emergency use.

EMERGENCY PARTS

- 1 - 6817 Pivot Pin 1" x 6"
- 1 - 90013 Cotter Pin 1/4" x 2"
- 1 - 90619 Chain Bolt 3/8"-16 x 2-1/2" - Grade 5
- 1 - 90352 Locknut - 3/8"-16
- 1 - 10" Adjustable Wrench
- 1 - Medium Screw Driver
- 1 - Pair of Pliers
- 1 - Quart Automatic Transmission Fluid (ATF)

Always use FISHER designed and tested replacement parts.



WARNING: DO NOT stand between the vehicle and blade directly in front of blade when it is being raised, lowered or angled. Clearance between vehicle and blade decreases as blade is operated. Serious bodily injury can result from blade striking a body or dropping on feet or hands.

INSPECTION AND ROUTINE SERVICE

- Check hydraulic and electrical connections regularly. Make sure they are tight!
- Annually clean and retighten ALL positive and ALL negative connections to motor.
- Annually inspect, and clean if required, harness connections to coils on SEHP. (Remove plastic cover to access connections. An electrical sealant has been applied to the terminals. DO NOT remove this sealant.)
- At beginning of the plowing season, inspect and test your battery. Recharge or replace if necessary. Suggested MINIMUM vehicle electrical system: 70 amp hr./550 CCA battery, 55 amp alternator.
- Check all plugs and seals for oil leaks. Repair as necessary.

GENERAL INFORMATION

INSPECTION AND ROUTINE SERVICE

Oil Level

Push lift arm all the way down. Fill unit with ATF fluid thru fill plug at rear corner of reservoir behind motor (see diagram).

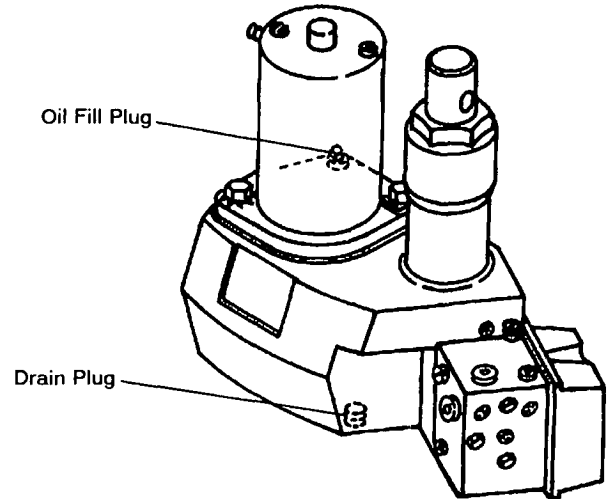
Oil Change

Changing fluid once each plowing season is required to assure long life for your hydraulic system.

Completely drain and flush the hydraulic reservoir and refill with new automatic transmission fluid (ATF) once each plow season to ensure long life for your hydraulic system. (Mobile One or Texaco 1537 Aircraft Hydraulic Oil may be used for low temperature operation). A drain plug is located in the bottom of the right front corner of the reservoir (see diagram). The system capacity is as follows:

Cylinder Stroke		Capacity	
LIFT	ANGLE	Reservoir	Total (w/hoses & cyl)
6"	10"	1-1/2qt	2-1/8qt
10"	12"	1-1/2qt	2-1/4qt

Fill through reservoir fill hole. Never fill through motor/pump opening if, for instance, the motor has been removed for servicing. Overfilling can damage the unit.



GENERAL INFORMATION

Packing Nut Adjustment

Periodically check lift cylinder and angle cylinder nuts to see if they have loosened. If loose or leakage appears while lifting or angling, tighten not more than 1/4 turn after you feel packing nut contact the packing. Over tightening affects operation and life of the packing. Packings not used for a period of time may show signs of oil weep which usually disappear after usage.

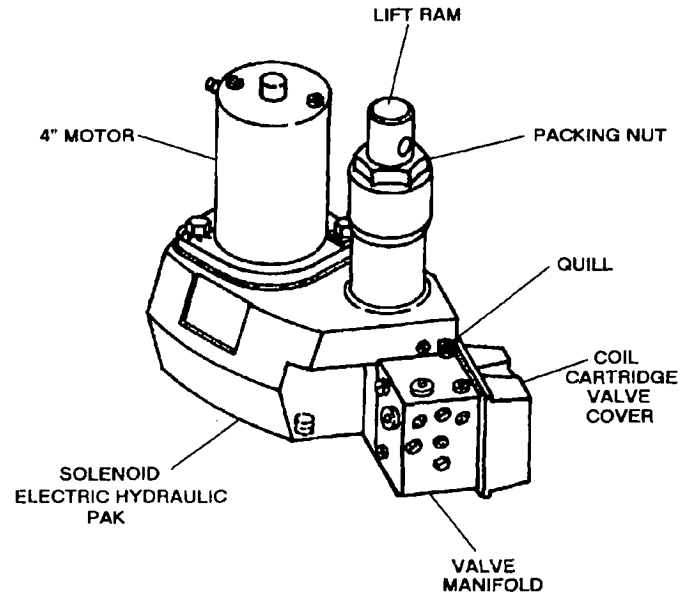
Chromed Surfaces

For long term storage, grease exposed chrome surfaces of the angle cylinder to prevent rust. Leave the Solenoid Electric Hydraulic Pak with the lift arm pushed all the way down.

Pump Inlet Filter Screen

The pump inlet filter screen should be cleaned whenever the pump is removed. If the screen is damaged, replace it. Torque Die Cast Pump mounting capscrews to 175-185 In. Lbs., Motor mounting capscrews to 15/20 Ft. Lbs.

PACKING NUT ADJUSTMENT - if leaking, tighten packing nut **NOT MORE THAN 1/4 TURN AFTER YOU FEEL PACKING NUT CONTACT PACKINGS.** Over-tightening affects ram operation and packing life.



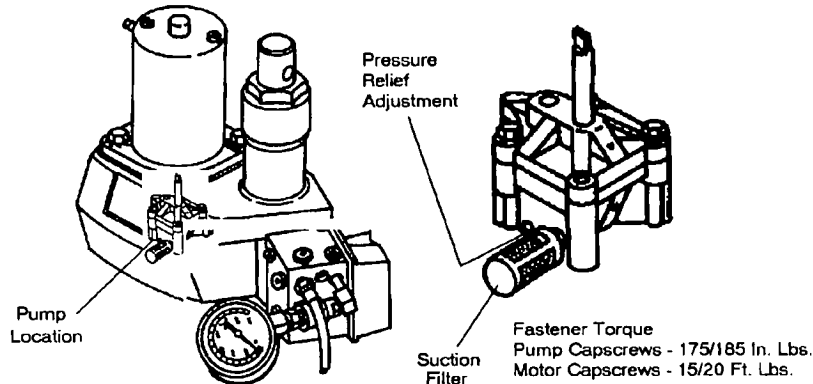
GENERAL INFORMATION

A PUMP PRESSURE TEST

Poor condition of battery or motor will cause invalid test results.

1. Disconnect lift chain and hoses to Angle Cylinder rams.
2. Install 2,000 PSI minimum gauge into female coupler on valve Manifold.
3. Move Solenoid Control to angle "LEFT" and read gauge.
4. If pressure is 1450-1850 PSI, pump pressure is "OK".

If pressure is low, remove pump, clean or replace filter and adjust pressure. (1/4 turn equals approximately 225 PSI.)



B SOLENOID ELECTRIC HYDRAULIC PAK MALFUNCTION

1. Turn ignition (key) switch of vehicle to "ON" or "ACCESSORY" position.
2. Turn ON/OFF Switch on Solenoid control to "ON" position.

IF indicator light on Solenoid Control does not light, check 10 amp fuse in fuse holder under dash or ground wire between control and motor Solenoid.

3. Operate control lever into "RAISE", angle "RIGHT" and angle "LEFT".

IF motor does not run in any position - go to Solenoid Control Test C, page 15.

IF motor runs in one or two positions - go to Solenoid Control Test D, page 16.

IF motor runs in all three positions - go to Solenoid Control Test E, page 17-18.

GENERAL INFORMATION

C SOLENOID TEST

Condition - Motor does not run with Solenoid Control in "RAISE", angle "RIGHT" or "LEFT". Battery has sufficient charge to start vehicle engine. Vehicle ignition (key) switch and solenoid control ON/OFF Switch are both in "ON" position. Red indicator light on control will glow indicating that the fuse located under dash is OK.

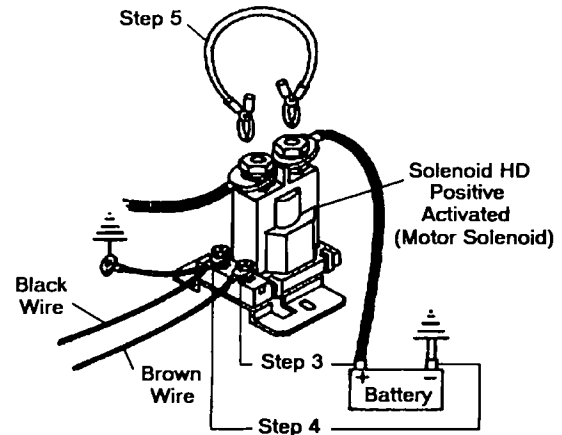
1. Disconnect Angle Cylinder hoses and lift chain from lift arm.
2. Check all electrical cables and connections including grounds. Clean and tighten if necessary.



WARNING: Protect top of battery, sparks from testing operations could cause battery gases to explode causing severe eye or body burns, or other personal injury.

3. Use a jumper wire to connect "POS +" terminal of battery to small terminal with BROWN wire attached on motor Solenoid. If motor runs, see Solenoid Control Test, D, page 16, and/or inspect harness from control to motor Solenoid for broken or damaged wires. If motor does not run...

4. Use Step 3 jumper wire to connect small terminal with BLACK wire on motor Solenoid to the "NEG-" terminal of the battery. Use a second jumper wire to repeat Step 3. If motor runs, repair black wire ground. If motor does not run...
5. Use heavy jumper cables to by-pass (jump) the two large terminals on top of the motor Solenoid. If motor runs, replace Solenoid. If motor does not run...
6. Remove motor and check pump shaft rotation. If tight, repair or replace pump. If loose, replace motor.



GENERAL INFORMATION

D SOLENOID CONTROL TEST

DO NOT use continuity testers for this test.

1. Disconnect the molded connector next to the control in the cab. Turn control ON/OFF Switch to "ON" position.
2. Attach 12 volt power supply to terminal shown in diagram.
3. In each position of the lever indicated in the chart below, use a grounded circuit tester light to test each numbered terminal. The chart indicates the condition of the circuit tester light.

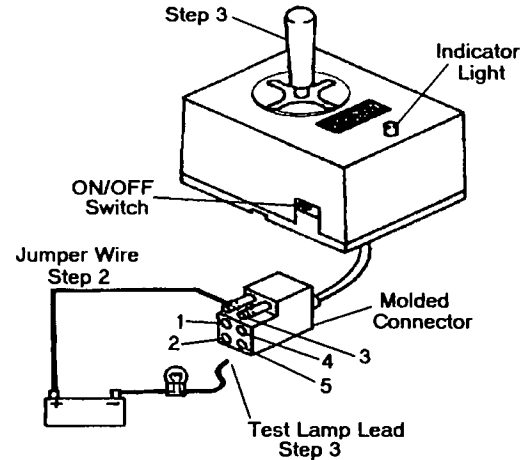
Position	1	2	3	4	5
Neutral	Off	*	Off	Off	Off
Raise	Off	*	On	On	Off
Lower	Off	*	Off	Off	On
Right	On	*	On	Off	Off
Left	On	*	On	On	Off

* Indicator light will be on and the circuit tester light will not be as bright.

4. If Solenoid Control tests OK, check harness for broken wires and/or corroded connections.

If test light is OFF when chart indicates it should be ON replace printed circuit board in control box.

If test light is ON when chart indicates it should be OFF replace printed circuit board in control box.



GENERAL INFORMATION

E COIL CARTRIDGE TEST

1. Disconnect Angle Cylinder hoses and lift chain from lift arm.
2. Move control to position in chart and test coil cartridge assembly stem for good magnetic pull (energized) using a steel screwdriver.

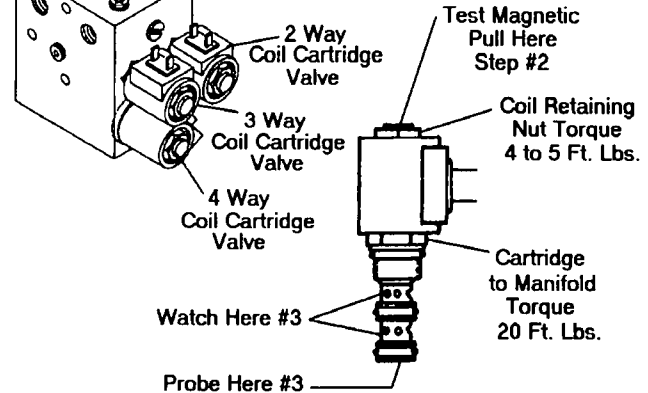
Position	2 Way	3 Way	4 Way
Raise	No	No	Yes
Lower	Yes	No	No
Right	No	Yes	No
Left	No	Yes	Yes

Wire connections at coils
 2 Way White Wire
 3 Way Green Wire
 4 Way Blue Wire
 Ground Black Wire

- * If coil activation MATCHES the above chart - proceed to Step 3.
- * If coil activation DOES NOT match chart - test for current at coil spade to harness connections on Valve Manifold.
- * If current is available - use a jumper wire to create a good ground at coil spade terminals with BLACK wires attached.
- * If coil energizes - repair ground at coil spade or body bolt in engine compartment.
- * If coil not energized - replace coil.
- * If current not available - test Solenoid Control per D, page 16.

3. Remove coils from cartridges and remove cartridges from manifold. Inspect cartridges for visible contamination or damaged seals. Check for stuck spools using a non-marring or scratching (plastic, aluminum or soft brass) probe to push spring loaded spool.
- * If movement seen - clean and oil cartridge. Reinstall cartridge and coil. Note torques shown.

EXCESSIVE TORQUE WILL DAMAGE OR AFFECT PERFORMANCE OF CARTRIDGE.



GENERAL INFORMATION

E COIL CARTRIDGE TEST

NOTE: Using probe to move spool may shear contamination which was affecting spool movement.

- * If stuck - replace cartridge.
- * If free - install coil on stem. Bench test using jumper wires to energize coil while watching for spool movement.
- * If no movement seen - replace cartridge.
- * If movement seen - clean and oil cartridge. Reinstall cartridge and coil. NOTE torques shown.

F CUSHION VALVE INSPECTION AND ADJUSTMENT

Whenever stems are removed, apply anti-seize compound or grease to threads of stems before assembly.

Disassembly and Inspection:

1. Remove cushion valve stem. Use a magnet to remove ball, spring spacer and spring. Inspect parts.
2. Replace O-Rings or complete assembly if damaged.
3. If OK, place ball on hard wood block, hold stem seat on ball and lightly strike stem with a hammer.

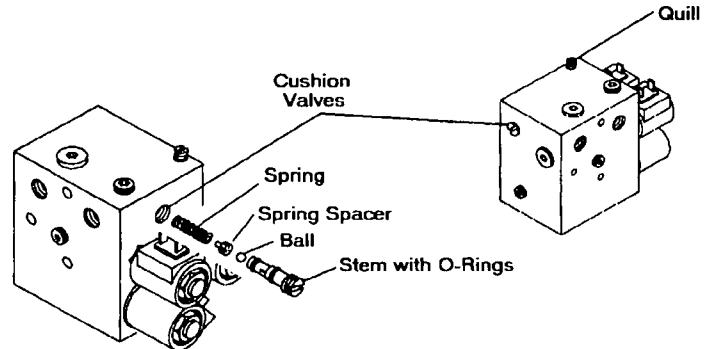
NOTE: Stem can be bent by not striking squarely.

4. Reassemble components into manifold.

Adjustment:

Adjust by tightening cushion valve stem until spring is fully compressed then unscrew the stem as follows:

CYLINDER LIFT	STROKE ANGLE	CROSSOVER RELIEF PRESSURE	NUMBER OF TURNS
6"	10°	2,500	1 3/4
10"	12°	4,000	1



GENERAL INFORMATION

G POPPET CHECK VALVE

1. Remove o-ring boss plug, spring and poppet from top of Valve Manifold.
2. Remove o-ring boss plug, spring and spool with o-ring from front side of Valve Manifold (use needle nose pliers to remove spool).
3. Inspect parts, poppet seat and spool bore for damage or contamination.
4. Install spool in bore. Spool must insert smoothly.
5. Install poppet, springs and o-ring boss plugs.

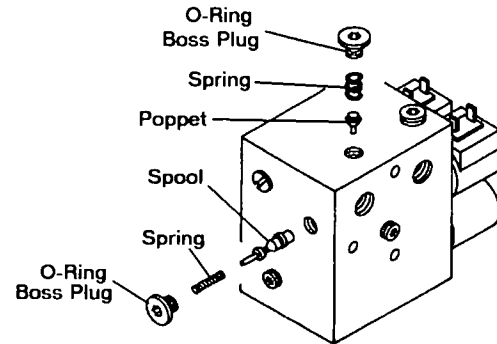
H QUILL ADJUSTMENT

To adjust blade drop speed:

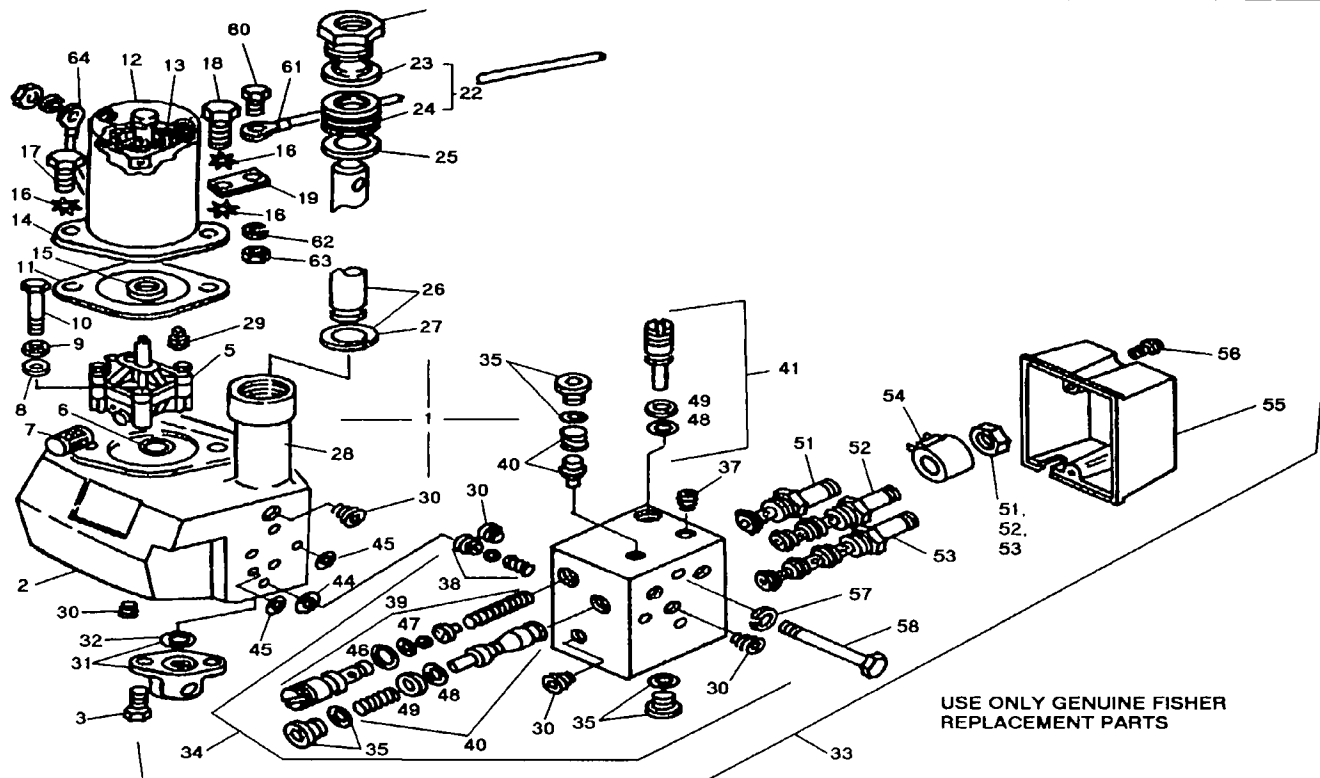
Turn Quill "IN" (clockwise) to slow drop speed.

Turn Quill "OUT" (counterclockwise) to increase drop speed.

NOTE: Turning Quill too far "IN" can slow raise time.



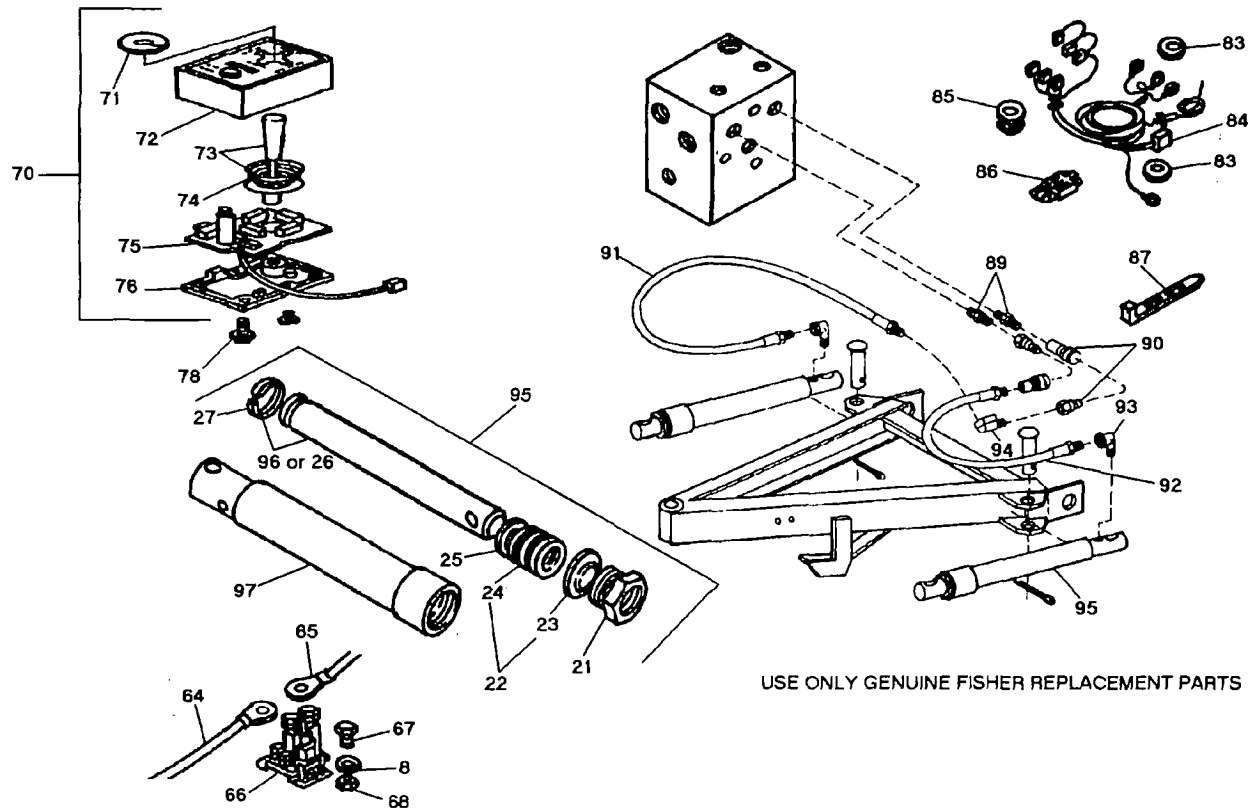
SOLENOID ELECTRIC HYDRAULIC PAK DIAGRAM



SOLENOID ELECTRIC HYDRAULIC PAK PARTS LIST

ITEM	PART#	QTY.	DESCRIPTION	ITEM	PART#	QTY.	DESCRIPTION
1	7616	1	SOLENOID EHP 6"-2500 PSI	32	5823	1	O-RING - 216
2	7617	1	SERVICE HOUSING KIT 1-1/2" SOL	33	7623	1	VALVE MANIFOLD ASSY SOL- 2500
3	90649	2	5/16-18 X 1-1/4 HXW TRTS TY TR-3	34	7624	1	MANIFOLD ASSY SOL - 2500 (W/O CARTRIDGES)
5	7618	1	PUMP KIT DIE CAST	35	7625	3	3/8-24 HX SO O-RING BOSS PLUG
6	5821	1	O-RING - 115	37	7627	1	PLUG 1/8 NPTF HX SO
7	7053	1	SUCTION FILTER	38	7628	1	PLUG 1/4 NPTF HX SO
8	90311	2	1/4 PLAIN WASHER ZP	39	7629	1	CHSHION VALVE REPAIR KIT - SET
9	90625	2	5/16 WASHER - BELLEVILLE	40	7630	1	POPPET CHECK VALVE KIT
10	90073	2	5/16-18 X 2-1/4 HX CS G5 ZP	41	7631	1	QUILL ASSY.
11	5822	1	GASKET	42	7632	1	BACK-UP/O- RING KIT - SOL
12	A5819	1	MOTOR ASSY. 4-1/2"	44	3719	1	O-RING - 013
13	7619	1	BRUSH KIT - PR 56133	45	5827	2	O-RING - 012
14	6577	1	FLANGE W/BEARING & SEAL	46	7085	2	O-RING - 010
15	6578	1	OIL SEAL	47	5833	2	O-RING - 008
16	90651	3	7/16 EX TOOTH LK WASHER ZP	48	2605	2	O-RING - 006
17	90174	1	7/16-14 X 1-1/4 HX CS G5 ZP	49	7633	2	BACK-UP RING-006 PARBAK SPLIT
18	90177	1	7/16-14 X 1-1/2 HX CS G5 ZP	51	7634	1	CARTRIDGE 20 W/JAM NUT
19	7620	1	GROUND CLIP	52	7635	1	SEAL KIT - CARTRIDGE 20
21	5763	1	PACKING NUT 1-1/2"	53	7636	1	CARTRIDGE 30 W/JAM NUT
22		1	PACKING SET W/WIPER 1-1/2"	54	7637	1	CARTRIDGE 40 W/JAM NUT
23	341	1	WIPER RING - 1-1/2"	55	7638	2	SEAL KIT - CARTRIDGE 30, 33 & 40
24	339	1	PACKING SET	56	7639	3	COIL W/SPADE TERMINALS
25	338	1	WASHER	57	7649	1	COVER ASSY.
26	5509	1	ROD ASSY - 1-1/2" X 6"	58	90650	2	#8-18 X 1/2 SL HXW TFTS TY B ZP
27	5764	1	1-1/2" CYL. RETAINER RING	59	90359	3	1/4 SP LK WASHER ZP
28	7087	1	BARREL 1.5 X 10 SEHP	58	90652	3	1/4 -20 X 3-1/4 HX CS G5 ZP
	7088	1	O-RING	60	90097	1	3/8-16 X 3/4 HX CS G5 ZP
29	7621	1	PLUG 3/8 NPTF				
30	7622	5	PLUG 1/8 NPTF HX SO				

SOLENOID ELECTRIC HYDRAULIC PAK DIAGRAM



USE ONLY GENUINE FISHER REPLACEMENT PARTS

SOLENOID HYDRAULIC PAK PARTS LIST

ITEM	PART #	QTY.	DESCRIPTION	ITEM	PART #	QTY.	DESCRIPTION	
61	5768	1	GROUND CABLE (6 GA 69") BLK	83	90656	2	# 10 PLAIN WASHER TY B NAR ZP	
62	90361	1	3/8 SP LK WASHER ZP	84	7648	1	HARNESS-CONTROL (10 amp fuse)	
63	90334	1	3/8-16 HX NUT ZP	85	3042	2	RUBBER GROMMET	
64	5797	1	BATTERY CABLE (4 GA 60") RED	87	3666	1	NYLON TIE	
65	5799	1	BATTERY CABLE (4 GA 22") RED	89	5804	2	1/4" HEX NIPPLE	
66	5794	1	SOLENOID	92	3074	1	22" H.P. HOSE, 1/4 P TO 1/4 P	
67	90461	2	1/4-20 X 3/4 HX CS G5 ZP	93	2780	1	1/4" BRASS BAR ST. ELL (FORGED)	
8	90311	2	1/4 PLAIN WASHER ZP	94	765	1	1/4" BRASS BAR STREET ELL	
68	90350	2	1/4-20 PT HX LK NUT TI ZP	95	A318	2	1-1/2" x 10" CYL. ASSY.	
70	7640	1	SOLENOID CONTROL	96	336	2	ROD ASSY. - 1-1/2" X 10"	
71	7641	1	SHEILD	97	5758	2	BARREL - 1-1/2" X 10"	
72	7642	1	BODY W/LABEL, LENS & SPRING	21	5763	2	PACKING NUT	
73	7643	1	LEVER, SPRING & ACTUATOR KIT	23	341	2	WIPER - 1-1/2"	
74	7644	1	SPRING - CONICAL	24	339	2	PACKING SET - 1-1/2"	
75	7645	1	BASE	25	338	2	WASHER	
77	90653	2	#6-19 X 3/8 SL HXW TFTS HI-LO	26				
78	5800	2	#8-18 X 5/8 SL HXW THFS BPO	27	5764	2	1-1/2" CYL. RETAINER RING	
79	7718	1	CONTROL BRACKET (not shown)					
ASSY	ASSEMBLY		NAR	NARROW			SPL	SPECIAL
BP	BLACK PHOSPHATE		NPTF	NATIONAL PIPE THREAD (FLUID)			SQ	SQUARE
BPO	BLACK PHOSPHATE & OIL		NYIS	NYLON INSERT			STD	STANDARD
BRG	BEARING		PC	PRINTED CIRCUIT			TCTS	THREAD CUTTING TAPPING SCREW
BZP	BLACK ZINC PLATE		PN	PAN			TFTS	THREAD FORMING TAPPING SCREW
CS	CAPSCREW		PR	PRESTOLITE			TRTS	THREAD ROLLING TAPPING SCREW
EX	EXTERNAL		PSI	POUND PER SQUARE INCH			TY	TYPE
G	GRADE		PT	PREVAILING TORQUE			ZP	ZINC
HD	HEAVY DUTY		SL	SLOTTED				
HX	HEX		SO	SOCKET HEAD				
HXW	HEX WASHER		SOL	SOLENOID				
LK	LOCK		SP	SPRING				

NOTES

