Wood-Mizer® Sawmill

Hydraulic Troubleshooting Guide

Safety is our #1 concern! Read and understand all safety information and instructions before operating, setting up or maintaining this machine.

June 2000

Form #MHG

INFORMATION
AND
TROUBLESHOOTING
GUIDE

FOR

MONARCH

DC HYDRAULIC POWER UNITS

Published By
Monarch Hydraulics
For

Wood-Mizer® Products, Inc.
8180 W. 10th Street
Indianapolis, IN 46214-2400
Phone: (317) 271-1542
Fax: (317) 273-1011

"From Forest To Final Form"

General Information

THIS GUIDE IS MADE AVAILABLE TO YOU BY

WOOD-MIZER® PRODUCTS, INC.
8180 West 10th Street
Indianapolis, IN 46214
Phone (317) 271-1542
FAX (317) 273-1011

CUSTOMER SERVICE:
Technical Assistance/Parts: (800) 525-8100

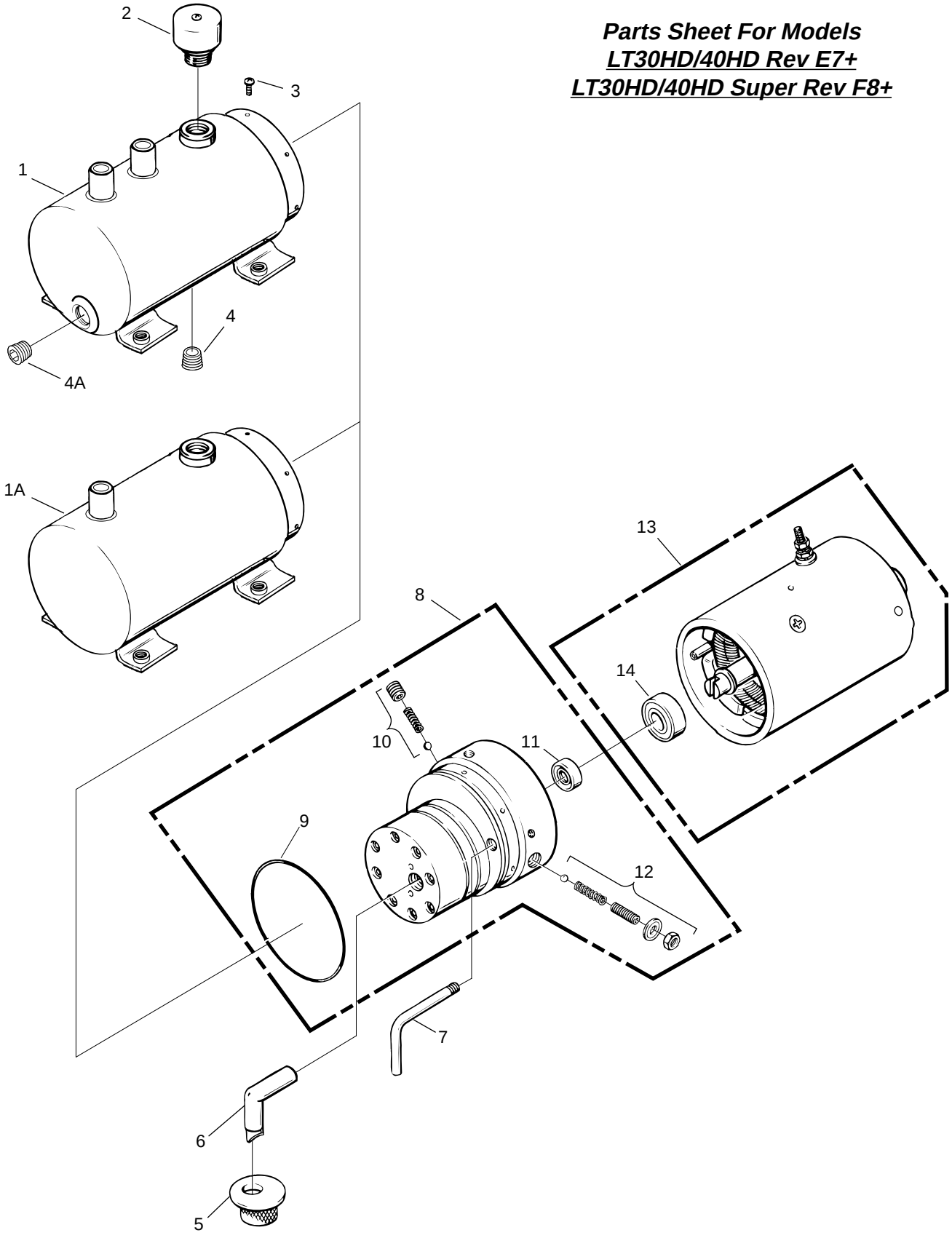
PLEASE: Before Calling Wood-Mizer be certain that:

1. You have read the guide carefully and are certain that all of the possible causes pertaining to your problem have been reviewed.
2. You have the following information available:
   a. Model of Sawmill
   b. Serial Number

TABLE OF CONTENTS

Troubleshooting Guide

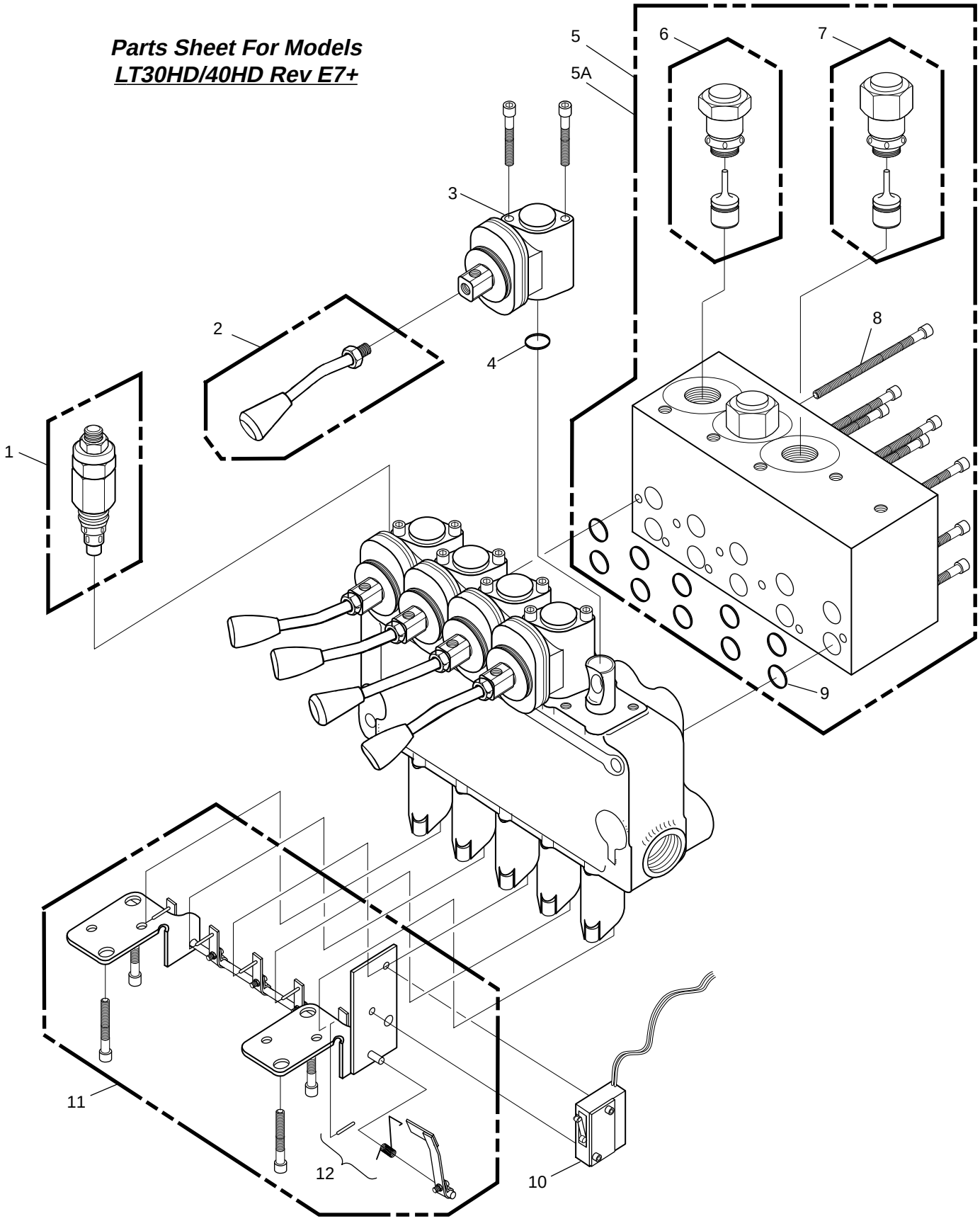
Parts Sheet For Models
<u>LT30HD/40HD Rev E7+</u>
<u>LT30HD/40HD Super Rev F8+</u>



Ref. No.	Part No.	Description	No. Req.
1	06065	RESERVOIR (For Use on Single Acting Spring Return Toe Boards, LT30HD/40HD Rev E7-F7)	1
1A	04676	RESERVOIR (For Use on Roller Toe Boards, LT30HD/40HD Rev F8+, LT30HD/40HD Super Rev F8+)	1
2	03171	PLUG	1
3	07703	SCREW, Thread Forming 10-24 x 3/8"	6
4	02349	PLUG, 3/8" (LT30HD/40HD Rev E7-G5, LT30HD/40HD Super Rev F8-G6)	1
4A	02348	PLUG, 1/2" (LT30HD/40HD Rev G6+, LT30HD/40HD Super Rev G7+)	1
5	01134	SCREEN, Filter (suction)	1
6	01209	TUBE, Filter Suction, 3/8" NPT 90 Deg.	1
7	01274	TUBE, Return (1/8" NPT)	1
8	02474	PUMP ASSEMBLY	1
9	02352	• O-RING, Industrial (3-5/8" x 3-7/8" x 1/8")	1
10	00075	• PARTS KIT, Check Valve (main)	1
11	02159	• SEAL	1
12	03766	• PARTS KIT, Relief Valve	1
13	08058	MOTOR	1
14	02318	• BEARING, Base, motor	1

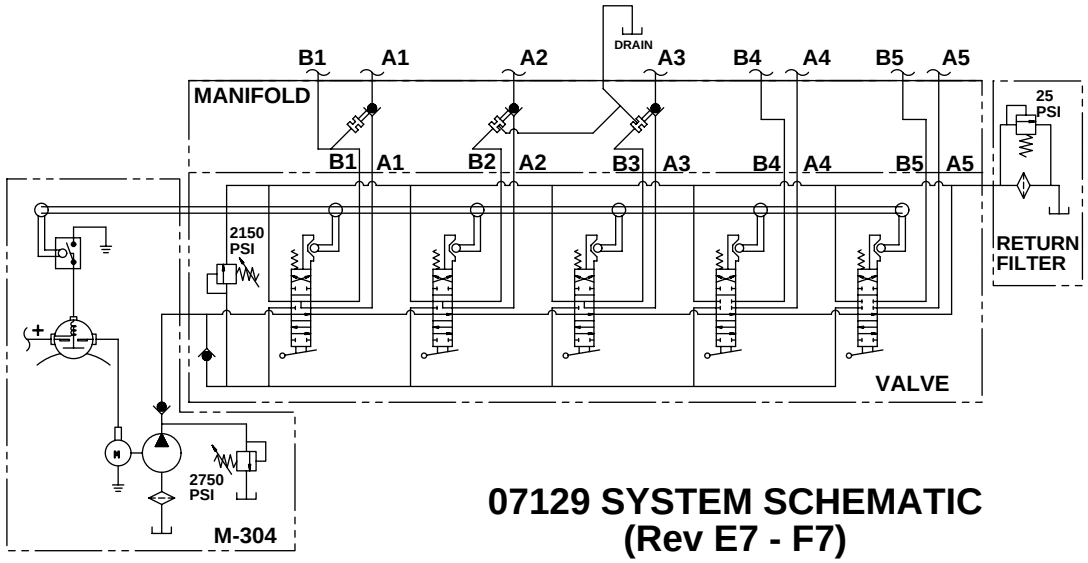
Troubleshooting Guide

Parts Sheet For Models
LT30HD/40HD Rev E7+

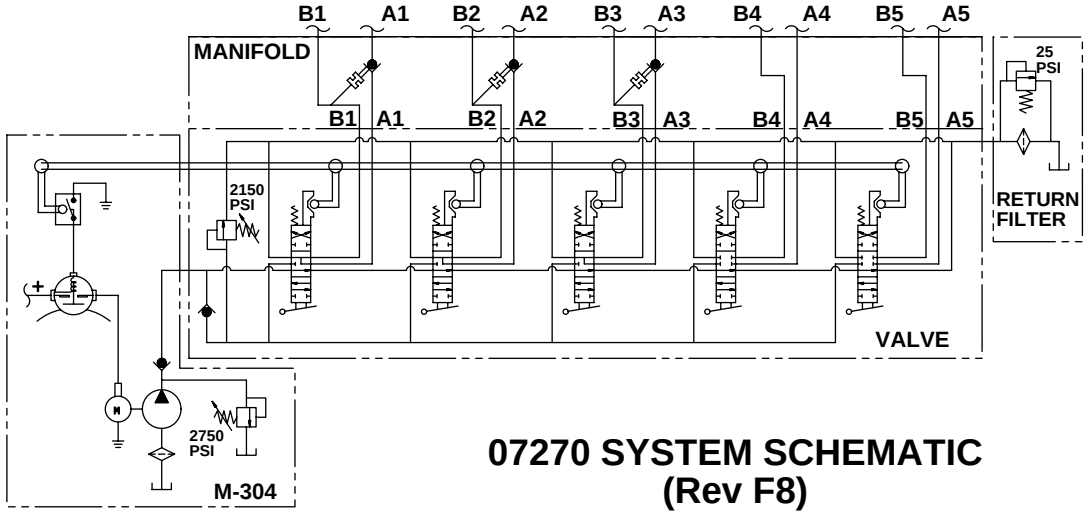


Ref. No.	Part No.	Description	No. Req.
	07129	VALVE ASSEMBLY WITH SINGLE ACTING SPRING RETURN TOE BOARDS (REV E7-F7)	
	07270	SIDE PORT VALVE ASSEMBLY WITH DOUBLE ACTING TOE BOARDS (REV F8 - F9.01,G4+)	
	07332	REAR PORT VALVE ASSEMBLY WITH DOUBLE ACTING TOE BOARDS (REV G1 - G3)	
1	07184	• MAIN RELIEF VALVE	1
2	07151	• HANDLE KIT (5 Valve Levers)	1
3	07183	• ENCLOSED LEVER ASSEMBLY, Without Valve Lever	5
4	07156	• SPOOL O-RING KIT (10 pcs.)	1
5	07141	• MANIFOLD ASSEMBLY FOR SINGLE ACTING SPRING RETURN TOE BOARDS (Used on 07129) (REV E7-F7)	1

Ref. No.	Part No.	Description	No. Req.
5A	07271	• MAINFOLD ASSEMBLY FOR ROLLER TOE BOARDS (Used on 07270) (REV F8+)	
6	07186	• • CHECK ASSEMBLY, #1 SPOOL, Low Pressure	1
7	04282	• • CHECK ASSEMBLY, #2 & #3 SPOOL, High Pressure	2
8	07753	• • SCREW, #10-24 x 2.0 Length	9
9	00113	• • O-RING, Dash No. 011	10
10	07147	• MICRO-SWITCH, Waterproof Type	1
11	07146	• SWITCH ASSEMBLY, Complete with Micro-Switch (Ref. No. 9)	1
12	07155	• PARTS KIT, SWITCH ACTUATOR (Spring and Pins)	1

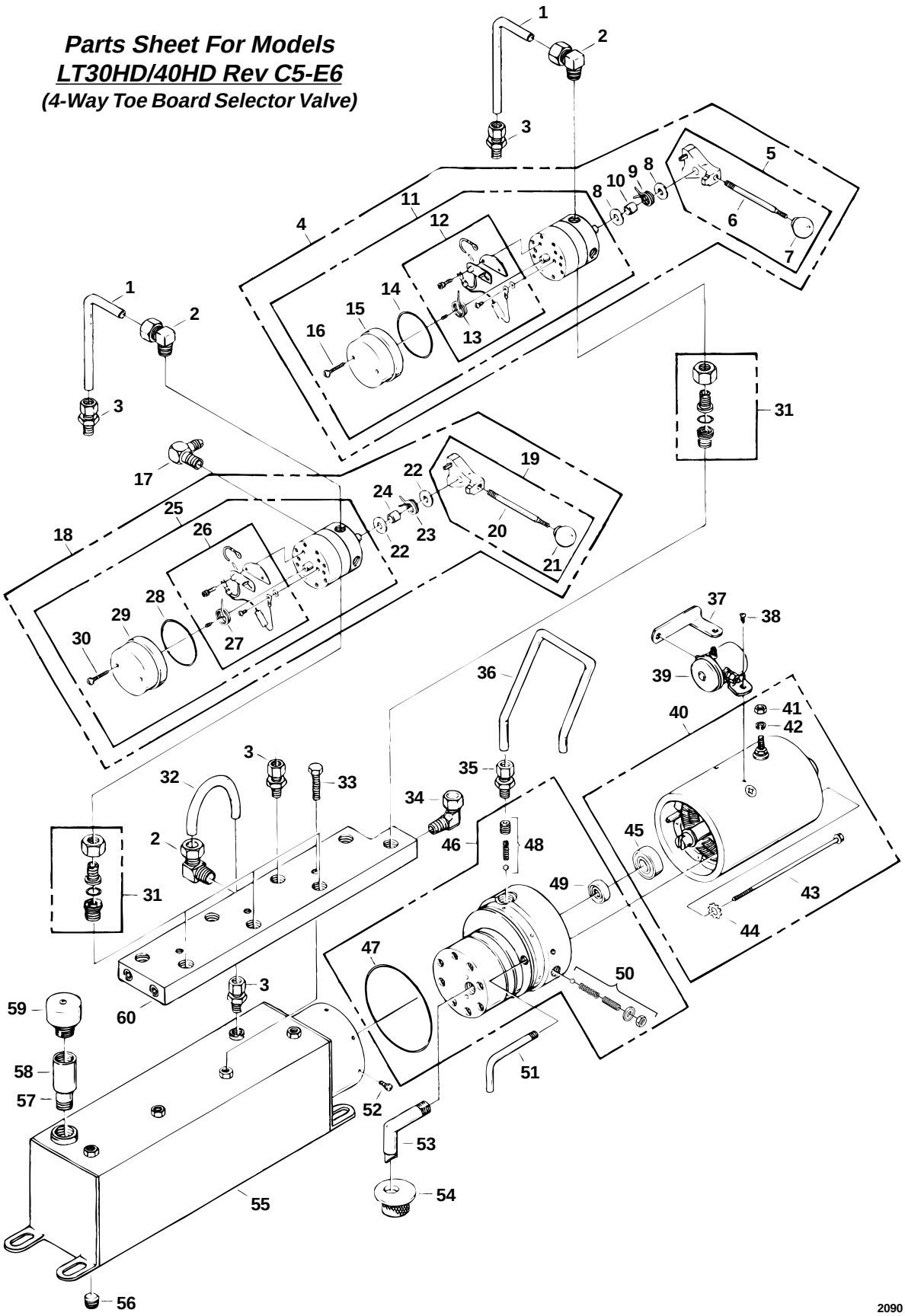


07129 SYSTEM SCHEMATIC (Rev E7 - F7)



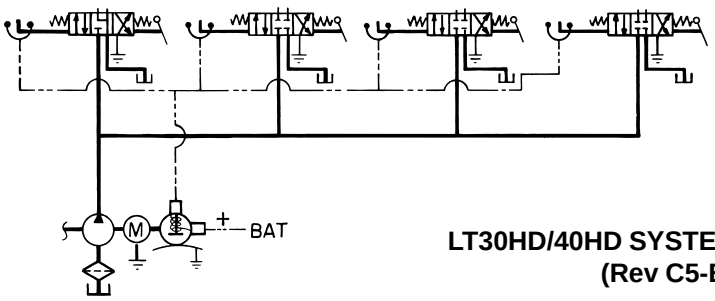
07270 SYSTEM SCHEMATIC (Rev F8)

Parts Sheet For Models
LT30HD/40HD Rev C5-E6
(4-Way Toe Board Selector Valve)



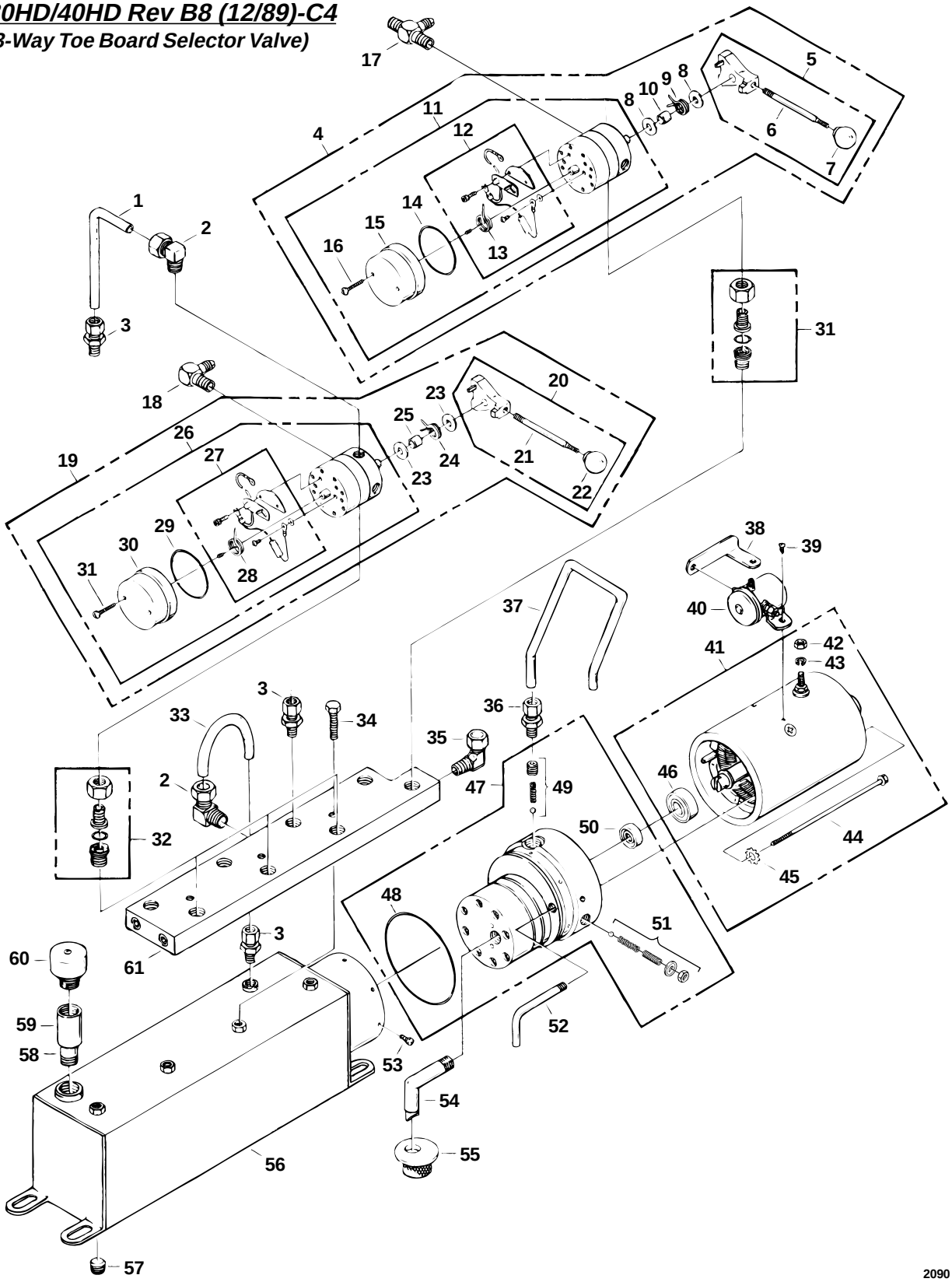
Ref. No.	Part No.	Description	No. Req.
1	*******	3/8" ALUMINUM TUBE	4
2	01225	ELBOW ASSEMBLY, 90 Deg. Brass 3/8" Tube x 1/4 NPT	5
3	01124	CONNECTOR ASSEMBLY, Brass 3/8" Tube x 3/8 NPT	5
4	00647	VALVE ASSEMBLY COMPLETE	1
5	00172	• HANDLE ASSEMBLY	1
6	01326	•• ROD, Handle, 4"	1
7	01157	•• BALL, Plastic	1
8	07780	WASHER, Flat (bore 5/16")	2
9	00071	• SPRING, Torsion	1
10	00016	• BUSHING, Torsion Spring	1
11	00648	• VALVE ASSEMBLY, 4 Way	1
12	03721	•• PARTS KIT, Electrical	1
13	00188	••• SPRING, Contact	1
14	02354	•• O-RING, Industrail (2 5/16" x 2 1/2" x 3/32")	1
15	00068	•• COVER, Condensor, contact	1
16	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	2
		FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION	
17	01979	ELBOW, 90 Deg, 37 deg flare, steel 1/4 tube x 1/4 - 18 NPTF male	3
18	00524	VALVE ASSEMBLY COMPLETE	3
19	00172	• HANDLE ASSEMBLY	3
20	01326	•• ROD, Handle, 4"	3
21	01157	•• BALL, Plastic	3
22	07780	• WASHER, Flat (bore 5/16")	6
23	00018	• SPRING, Torsion	3
24	00016	• BUSHING, Torsion Spring	3
25	00525	• VALVE ASSEMBLY, 4 Way	3
26	03721	•• PARTS KIT, Electrical	3
27	00188	••• SPRING, Contact	3
28	02354	•• O-RING, Industrial (2 5/16" x 2 1/2" x 3/32")	3
29	00068	•• COVER, Condensor, contact	3
30	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	6
		FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION	
31	03887	ADAPTER ASSEMBLY	4
32	*******	3/8" ALUMINUM TUBE	1
33	07858	SCREW, Hex Head Cap, 5/16-18 x 1.0"	3
34	01487	ELBOW ASSEMBLY, 90 Deg. Steel 3/8" Tube x 1/4 NPT	1

Ref. No.	Part No.	Description	No. Req.
35	01708	FITTING, Compression, 3/8 tube x 3/8-18 NPTF male	1
36	*******	3/8" ALUMINUM TUBE	1
37	01349	STRAP, Motor-Solenoid Connecting	1
38	07683	SCREW, Round Head Machine 10-32 x 1/4"	2
39	03336	SWITCH, Solenoid, 12 VDC 3-post insulated ground	1
	03340	SWITCH, Solenoid, 12 VDC 3-post (coated) insulated ground	1
	03335	SWITCH, Solenoid, 12 VDC 4-post isolated ground	1
	03342	SWITCH, Solenoid, 12 VDC 4-post (coated) isolated ground	1
	03343	SWITCH, Solenoid, 24 VDC 3-post insulated ground	1
	03344	SWITCH, Solenoid, 24 VDC 3-post (coated) insulated ground	1
40	08112	MOTOR, Electric, 12 VDC	1
41	07625	• NUT, Hex 5/16-24	1
42	07781	• WASHER, Lock, 5/16"	1
43	07738	• SCREW, Hex Head Cap 1/4-20 x 6 1/2"	2
44	07737	• WASHER, Star, 1/4"	2
45	02318	• BEARING, Base, motor	1
		FOR FURTHER BREAKDOWN OF MOTOR, SEE MOTOR SECTION	
46	02414	PUMP ASSEMBLY, Gear Code 51	1
47	02352	• O-RING, Industrial (3 5/8 x 3 7/8 x 1/8)	1
48	00075	• PARTS KIT, Check Valve (main)	1
49	02159	• SEAL	1
50	03766	• PARTS KIT, Relief Valve	1
		FOR FURTHER BREAKDOWN OF PUMP ASSEMBLY, SEE PUMP SECTION	
51	01274	TUBE, Return (1/8 NPT)	1
52	07703	SCREW, Thread Forming 10-24 x 3/8"	6
53	01209	TUBE, Filter Suction 3/8 NPT 90 Deg. (plastic)	1
54	01134	SCREEN, Filter (suction)	1
55	06211	RESERVOIR, 5" x 5" x 12", 249 in^3 usable	1
56	02349	PLUG	1
57	01804	NIPPLE, Pipe, 3/4 NPT x 2.0"	1
58	01869	PIPE COUPLING, 3/4-14	1
59	01143	PLUG, Vent (plastic)	1
60	03037	MANIFOLD	1



LT30HD/40HD SYSTEM SCHEMATIC (Rev C5-E6)

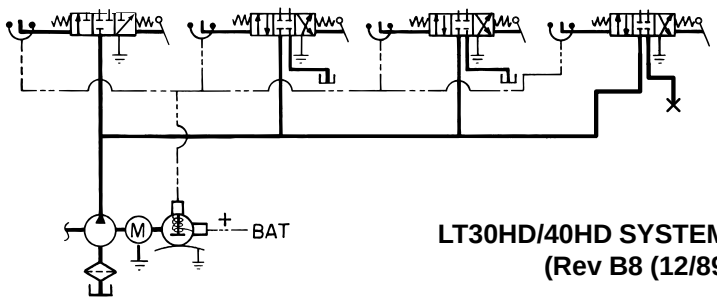
Parts Sheet For Models
LT30HD/40HD Rev B8 (12/89)-C4
(3-Way Toe Board Selector Valve)



2090

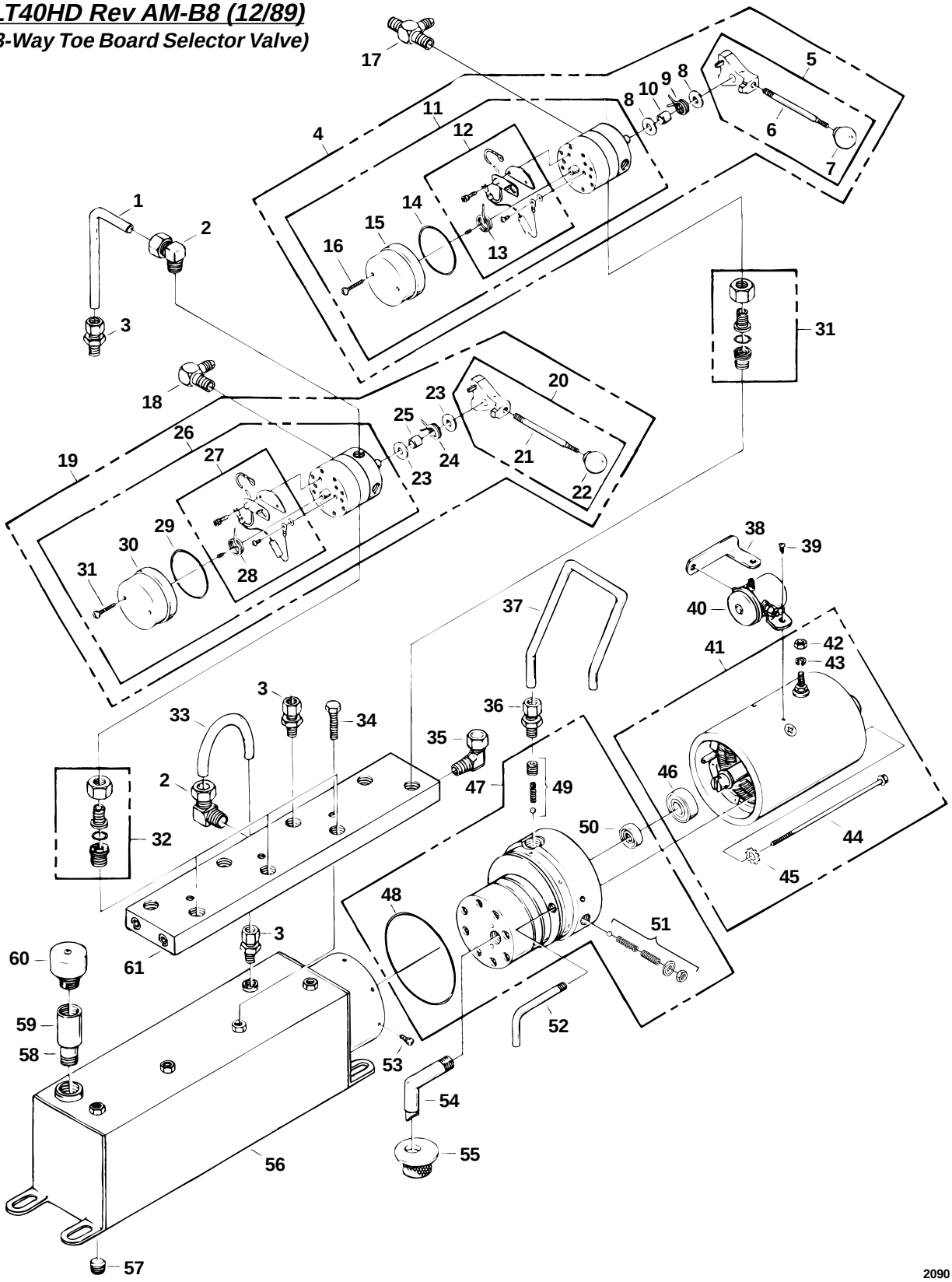
Ref. No.	Part No.	Description	No. Req.
1	*******	3/8" ALUMINUM TUBE	3
2	01225	ELBOW ASSEMBLY, 90 Deg. Brass 3/8" Tube x 1/4 NPT	4
3	01124	CONNECTOR ASSEMBLY, Brass 3/8" Tube x 3/8 NPT	4
4	00522	VALVE ASSEMBLY COMPLETE	1
5	00172	• HANDLE ASSEMBLY	1
6	01326	•• ROD, Handle, 4"	1
7	01157	•• BALL, Plastic	1
8	07780	WASHER, Flat (bore 5/16")	2
9	00071	• SPRING, Torsion	1
10	00016	• BUSHING, Torsion Spring	1
11	00648	• VALVE ASSEMBLY, 4 Way	1
12	03721	•• PARTS KIT, Electrical	1
13	00188	••• SPRING, Contact	1
14	02354	•• O-RING, Industrail (2 5/16" x 2 1/2" x 3/32")	1
15	00068	•• COVER, Condensor, contact	1
16	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	2
17	03032	TEE, Male Run	1
		FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION	
18	01979	ELBOW, 90 Deg, 37 deg flare, steel 1/4 tube x 1/4 - 18 NPTF male	3
19	00524	VALVE ASSEMBLY COMPLETE	3
20	00172	• HANDLE ASSEMBLY	3
21	01326	•• ROD, Handle, 4"	3
22	01157	•• BALL, Plastic	3
23	07780	• WASHER, Flat (bore 5/16")	6
24	00018	• SPRING, Torsion	3
25	00016	• BUSHING, Torsion Spring	3
26	00525	• VALVE ASSEMBLY, 4 Way	3
27	03721	•• PARTS KIT, Electrical	3
28	00188	••• SPRING, Contact	3
29	02354	•• O-RING, Industrial (2 5/16" x 2 1/2" x 3/32")	3
30	00068	•• COVER, Condensor, contact	3
31	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	6
		FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION	
32	03887	ADAPTER ASSEMBLY	4
33	*******	3/8" ALUMINUM TUBE	1
34	07858	SCREW, Hex Head Cap, 5/16-18 x 1.0"	3
35	01487	ELBOW ASSEMBLY, 90 Deg. Steel 3/8" Tube x 1/4 NPT	1

Ref. No.	Part No.	Description	No. Req.
36	01708	FITTING, Compression, 3/8 tube x 3/8-18 NPTF male	1
37	*******	3/8" ALUMINUM TUBE	1
38	01349	STRAP, Motor-Solenoid Connecting	1
39	07683	SCREW, Round Head Machine 10-32 x 1/4"	2
40	03336	SWITCH, Solenoid, 12 VDC 3-post insulated ground	1
	03340	SWITCH, Solenoid, 12 VDC 3-post (coated) insulated ground	1
	03335	SWITCH, Solenoid, 12 VDC 4-post isolated ground	1
	03342	SWITCH, Solenoid, 12 VDC 4-post (coated) isolated ground	1
	03343	SWITCH, Solenoid, 24 VDC 3-post insulated ground	1
	03344	SWITCH, Solenoid, 24 VDC 3-post (coated) insulated ground	1
41	08112	MOTOR, Electric, 12 VDC	1
42	07625	• NUT, Hex 5/16-24	1
43	07781	• WASHER, Lock, 5/16"	1
44	07738	• SCREW, Hex Head Cap 1/4-20 x 6 1/2"	2
45	07737	• WASHER, Star, 1/4"	2
46	02318	• BEARING, Base, motor	1
		FOR FURTHER BREAKDOWN OF MOTOR, SEE MOTOR SECTION	
47	02414	PUMP ASSEMBLY, Gear Code 51	1
48	02352	• O-RING, Industrial (3 5/8 x 3 7/8 x 1/8)	1
49	00075	• PARTS KIT, Check Valve (main)	1
50	02159	• SEAL	1
51	03766	• PARTS KIT, Relief Valve	1
		FOR FURTHER BREAKDOWN OF PUMP ASSEMBLY, SEE PUMP SECTION	
52	01274	TUBE, Return (1/8 NPT)	1
53	07703	SCREW, Thread Forming 10-24 x 3/8"	6
54	01209	TUBE, Filter Suction 3/8 NPT 90 Deg. (plastic)	1
55	01134	SCREEN, Filter (suction)	1
56	06211	RESERVOIR, 5" x 5" x 12", 249 in^3 usable	1
57	02349	PLUG	1
58	01804	NIPPLE, Pipe, 3/4 NPT x 2.0"	1
59	01869	PIPE COUPLING, 3/4-14	1
60	01143	PLUG, Vent (plastic)	1
61	03037	MANIFOLD	1



LT30HD/40HD SYSTEM SCHEMATIC
(Rev B8 (12/89)-C4)

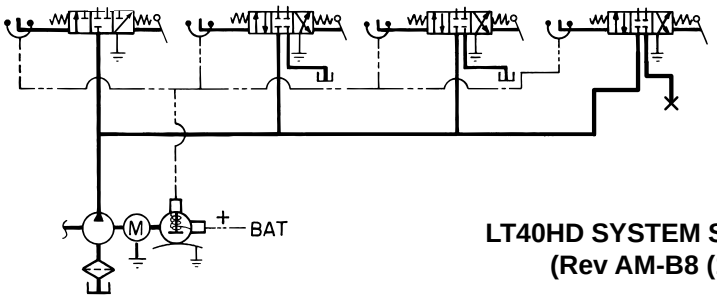
Parts Sheet For Models
LT40HD Rev AM-B8 (12/89)
(3-Way Toe Board Selector Valve)



2090

Ref. No.	Part No.	Description	No. Req.
1	*******	3/8" ALUMINUM TUBE	3
2	01225	ELBOW ASSEMBLY, 90 Deg. Brass 3/8" Tube x 1/4 NPT	4
3	01124	CONNECTOR ASSEMBLY, Brass 3/8" Tube x 3/8 NPT	4
4	00522	VALVE ASSEMBLY COMPLETE	1
5	00172	• HANDLE ASSEMBLY	1
6	01326	•• ROD, Handle, 4"	1
7	01157	•• BALL, Plastic	1
8	07780	WASHER, Flat (bore 5/16")	2
9	00071	• SPRING, Torsion	1
10	00016	• BUSHING, Torsion Spring	1
11	00648	• VALVE ASSEMBLY, 4 Way	1
12	03721	•• PARTS KIT, Electrical	1
13	00188	••• SPRING, Contact	1
14	02354	•• O-RING, Industrail (2 5/16" x 2 1/2" x 3/32")	1
15	00068	•• COVER, Condensor, contact	1
16	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	2
17	03032	TEE, Male Run	1
FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION			
18	01979	ELBOW, 90 Deg, 37 deg flare, steel 1/4 tube x 1/4 - 18 NPTF male	3
19	00524	VALVE ASSEMBLY COMPLETE	3
20	00172	• HANDLE ASSEMBLY	3
21	01326	•• ROD, Handle, 4"	3
22	01157	•• BALL, Plastic	3
23	07780	• WASHER, Flat (bore 5/16")	6
24	00018	• SPRING, Torsion	3
25	00016	• BUSHING, Torsion Spring	3
26	00525	• VALVE ASSEMBLY, 4 Way	3
27	03721	•• PARTS KIT, Electrical	3
28	00188	••• SPRING, Contact	3
29	02354	•• O-RING, Industrial (2 5/16" x 2 1/2" x 3/32")	3
30	00068	•• COVER, Condensor, contact	3
31	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	6
FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION			
32	03887	ADAPTER ASSEMBLY	4
33	*******	3/8" ALUMINUM TUBE	1
34	07858	SCREW, Hex Head Cap, 5/16-18 x 1.0"	3
35	01487	ELBOW ASSEMBLY, 90 Deg. Steel 3/8" Tube x 1/4 NPT	1

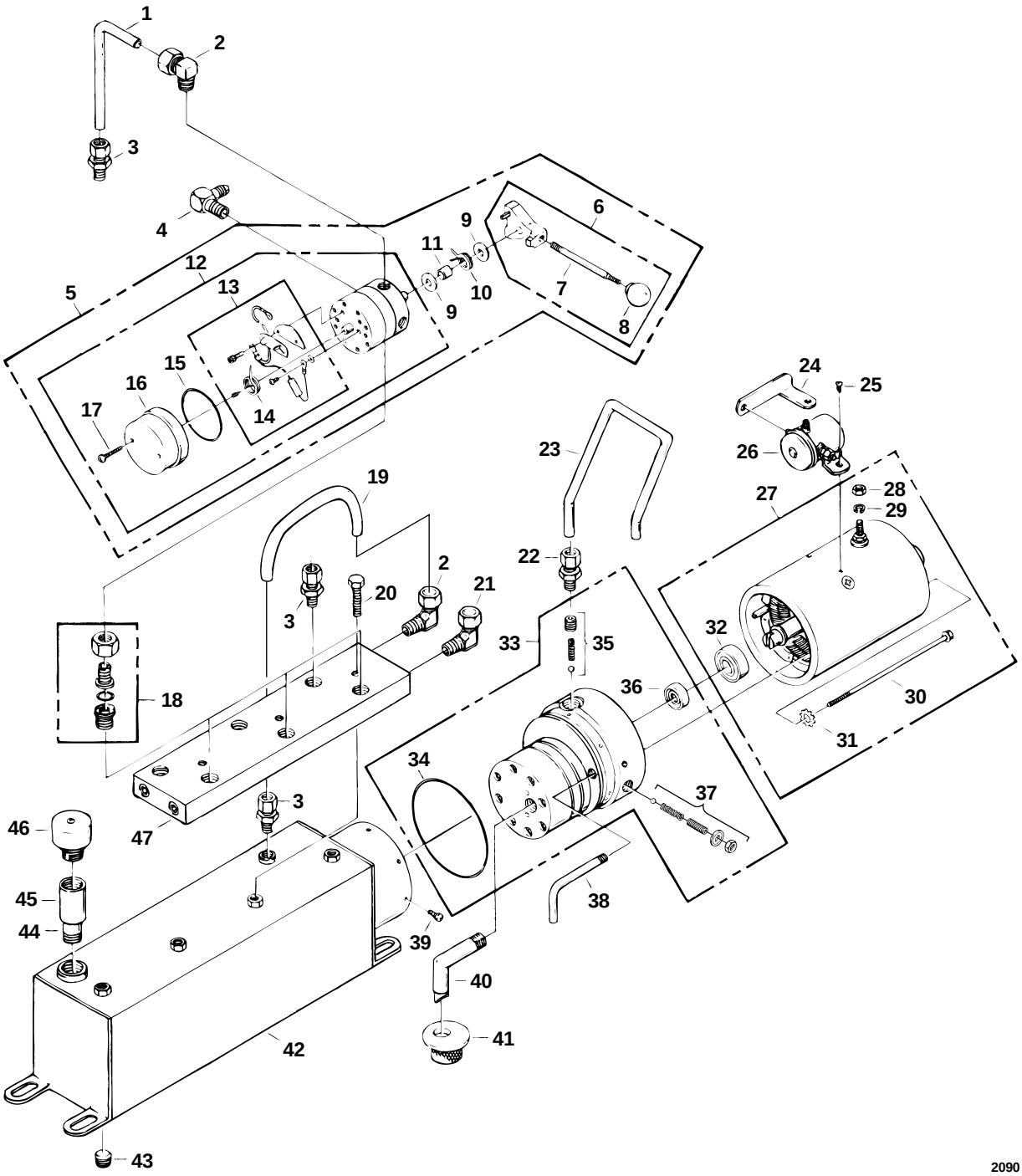
Ref. No.	Part No.	Description	No. Req.
36	01708	FITTING, Compression, 3/8 tube x 3/8-18 NPTF male	1
37	*******	3/8" ALUMINUM TUBE	1
38	01349	STRAP, Motor-Solenoid Connecting	1
39	07683	SCREW, Round Head Machine 10-32 x 1/4"	2
40	03336	SWITCH, Solenoid, 12 VDC 3-post insulated ground	1
	03340	SWITCH, Solenoid, 12 VDC 3-post (coated) insulated ground	1
	03335	SWITCH, Solenoid, 12 VDC 4-post isolated ground	1
	03342	SWITCH, Solenoid, 12 VDC 4-post (coated) isolated ground	1
	03343	SWITCH, Solenoid, 24 VDC 3-post insulated ground	1
	03344	SWITCH, Solenoid, 24 VDC 3-post (coated) insulated ground	1
41	08112	MOTOR, Electric, 12 VDC	1
42	07625	• NUT, Hex 5/16-24	1
43	07781	• WASHER, Lock, 5/16"	1
44	07738	• SCREW, Hex Head Cap 1/4-20 x 6 1/2"	2
45	07737	• WASHER, Star, 1/4"	2
46	02318	• BEARING, Base, motor	1
FOR FURTHER BREAKDOWN OF MOTOR, SEE MOTOR SECTION			
47	02414	PUMP ASSEMBLY, Gear Code 51	1
48	02352	• O-RING, Industrial (3 5/8 x 3 7/8 x 1/8)	1
49	00075	• PARTS KIT, Check Valve (main)	1
50	02159	• SEAL	1
51	03766	• PARTS KIT, Relief Valve	1
FOR FURTHER BREAKDOWN OF PUMP ASSEMBLY, SEE PUMP SECTION			
52	01274	TUBE, Return (1/8 NPT)	1
53	07703	SCREW, Thread Forming 10-24 x 3/8"	6
54	01209	TUBE, Filter Suction 3/8 NPT 90 Deg. (plastic)	1
55	01134	SCREEN, Filter (suction)	1
56	06211	RESERVOIR, 5" x 5" x 12", 249 in^3 usable	1
57	02349	PLUG	1
58	01804	NIPPLE, Pipe, 3/4 NPT x 2.0"	1
59	01869	PIPE COUPLING, 3/4-14	1
60	01143	PLUG, Vent (plastic)	1
61	03037	MANIFOLD (Replaces Original Design Shown)	1



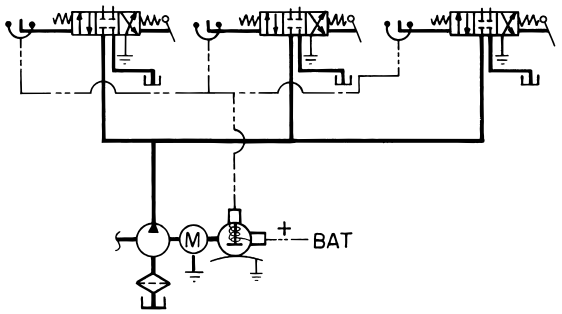
LT40HD SYSTEM SCHEMATIC
(Rev AM-B8 (12/89))

Troubleshooting Guide

Parts Sheet For Models
LT40HD Rev A-AL



Ref. No.	Part No.	Description	No. Req.
1	*******	3/8" ALUMINUM TUBE	3
2	01225	ELBOW ASSEMBLY, 90 Deg. Brass 3/8" Tube x 1/4 NPT	4
3	01124	CONNECTOR ASSEMBLY, Brass 3/8" Tube x 3/8 NPT	4
4	01979	ELBOW, 90 Deg, 37 deg flare, steel 1/4 tube x 1/4 - 18 NPTF male	3
5	00524	VALVE ASSEMBLY COMPLETE	3
6	00172	• HANDLE ASSEMBLY	3
7	01326	•• ROD, Handle, 4"	3
8	01157	•• BALL, Plastic	3
9	07780	• WASHER, Flat (bore 5/16")	6
10	00018	• SPRING, Torsion	3
11	00016	• BUSHING, Torsion Spring	3
12	00525	• VALVE ASSEMBLY, 4 Way	3
13	03721	•• PARTS KIT, Electrical	3
14	00188	••• SPRING, Contact	3
15	02354	•• O-RING, Industrial (2 5/16" x 2 1/2" x 3/32")	3
16	00068	•• COVER, Condensor, contact	3
17	07711	•• SCREW, Truss Head Machine, 10-24 x 1 1/8"	6
		FOR FURTHER BREAKDOWN OF VALVE, SEE VALVE SECTION	
18	03887	ADAPTER ASSEMBLY	3
19	*******	3/8" ALUMINUM TUBE	1
20	07858	SCREW, Hex Head Cap, 5/16-18 x 1.0"	3
21	01487	ELBOW ASSEMBLY, 90 Deg. Steel 3/8" Tube x 1/4 NPT	1
22	01708	FITTING, Compression, 3/8 tube x 3/8-18 NPTF male	1
23	*******	3/8" ALUMINUM TUBE	1
24	01349	STRAP, Motor-Solenoid Connecting	1
25	07683	SCREW, Round Head Machine 10-32 x 1/4"	2
26	03336	SWITCH, Solenoid, 12 VDC 3-post insulated ground	1
	03340	SWITCH, Solenoid, 12 VDC 3-post (coated) insulated ground	1
	03335	SWITCH, Solenoid, 12 VDC 4-post isolated ground	1
	03342	SWITCH, Solenoid, 12 VDC 4-post (coated) isolated ground	1
	03343	SWITCH, Solenoid, 24 VDC 3-post insulated ground	1
	03344	SWITCH, Solenoid, 24 VDC 3-post (coated) insulated ground	1
27	08112	MOTOR, Electric, 12 VDC	1
28	07625	• NUT, Hex 5/16-24	1
29	07781	• WASHER, Lock, 5/16"	1
30	07738	• SCREW, Hex Head Cap 1/4-20 x 6 1/2"	2
31	07737	• WASHER, Star, 1/4"	2
32	02318	• BEARING, Base, motor	1
		FOR FURTHER BREAKDOWN OF MOTOR, SEE MOTOR SECTION	
33	02414	PUMP ASSEMBLY, Gear Code 51	1
34	02352	• O-RING, Industrial (3 5/8 x 3 7/8 x 1/8)	1
35	00075	• PARTS KIT, Check Valve (main)	1
36	02159	• SEAL	1
37	03766	• PARTS KIT, Relief Valve	1
		FOR FURTHER BREAKDOWN OF PUMP ASSEMBLY, SEE PUMP SECTION	
38	01274	TUBE, Return (1/8 NPT)	1
39	07703	SCREW, Thread Forming 10-24 x 3/8"	6
40	01209	TUBE, Filter Suction 3/8 NPT 90 Deg. (plastic)	1
41	01134	SCREEN, Filter (suction)	1
42	06211	RESERVOIR, 5" x 5" x 12", 249 in^3 usable	1
43	02349	PLUG	1
44	01804	NIPPLE, Pipe, 3/4 NPT x 2.0"	1
45	01869	PIPE COUPLING, 3/4-14	1
46	01143	PLUG, Vent (plastic)	1
47	01704	MANIFOLD	1



LT40HD SYSTEM SCHEMATIC
(Rev A-AL)

Troubleshooting Guide

NOTE: Do not use Teflon tape on hydraulic fittings as it can easily jam valves and plug the filters in the system.

TEST EQUIPMENT

The following is a list of the test equipment required to troubleshoot D.C. powered hydraulic systems.

1. PRESSURE GAUGE

A small 0-5000 Pressure gauge, preferable glycerin filled, is a very valuable and relatively inexpensive tool for checking pressure in the various sections of the circuit.

2. D.C. TEST LIGHT

A test light is simply a light bulb which has one end connected by a wire to an alligator clip and the other end connected to a metal probe. It is used to check the electrical circuit when the battery is connected to the system. The alligator clip is grounded and the light glows when the probe comes in contact with a "HOT" electrical component. They are easily obtained from automotive jobbers or discount stores.

3. CONTINUITY LIGHT

A continuity light is like a test light but contains its own battery power source. It is used for testing electrical circuits when the components are not connected to a battery. They are easily obtained from discount stores or electrical jobbers at modest cost.

4. VOLT METER

A D.C. volt meter, as used in the automotive repair business, is a good investment for troubleshooting problems that are related to low voltage. They are used in two ways: first, one probe is grounded while the other is used to probe the "HOT" leads, the meter shows the voltage available at the point where the second probe is connected; second, they can be used to measure a voltage drop in a wire, one probe is connected to one end and the remaining probe to the other end, the reading is the voltage drop.

5. OHM METER

An ohm meter is used to measure resistance and is a very useful tool when working on wire circuits and solenoid coils. On some coils the wire resistance is up to a level where a D.C. test light might show an open circuit and it really is not so. An infinite meter reading on any test shows that the circuit is open. A coil test, however, will always show some value of resistance but it must not be infinite. All tests conducted with an ohm meter must be done with the battery disconnected from the system.

6. ASSORTED HOSES, HIGH PRESSURE FITTINGS

These can be used to connect and/or isolate certain parts of a hydraulic circuit to a pressure gauge or a shutoff valve for diagnosing hydraulic problems. 1/4" NPT and 3/8" NPT are the most commonly used sizes.

7. HIGH PRESSURE SHUTOFF VALVE

The shutoff valve can be used to choke off oil flow so that a "false" load can be put on the pump and other components. With the valve installed it can be slowly shut off while the equipment listed above records the data for making a proper diagnosis.

HYDRAULIC FLUID

1. THE PURPOSE OF OIL

The main purpose of hydraulic fluid is to transfer power from the pump to the actuators but it must also perform many other tasks which are critical to a well designed system. First, the oil must have good lubricity or be "slippery" so that the friction will be as low as possible to keep metal to metal wearing at a minimum. Second, the viscosity or "thickness" must be in the proper range at the operating temperature so that unwanted leakage will be at a minimum, but will still allow the oil to lubricate the close fitting parts in the system. (Oil that is too thin will leak past seals, valve spools, and the gears; oil that is too thick will not flow properly and cause the pump to cavitate or starve.) Third, the oil must be compatible with the seals used in the system. Fourth, there should also be additives in the oil to slow down the effects of rust oxidation (oxygen in the air combining with the oil to form sludge), foaming, and water settling to the bottom of the reservoir. Fifth, the oil must be able to pour or flow at the lowest expected temperature so that the oil can reach or get into the pump.

For all of the reasons just listed, automatic transmission fluid (ATF) was found in most cases, to be the best readily available fluid for the job in most climate conditions.

2. SELECTING FLUIDS FOR APPLICATIONS OUTSIDE OF ATF'S TEMPERATURE RANGE

When looking for fluid that can be used in the place of automatic transmission fluid, or for applications where the operating temperature is outside of the range of automatic transmission fluid, the following specifications should be discussed with your local oil distributor:

A. Fluid must be *compatible* with *Buna-N* sealing compounds.

B. The Pour Point must be below the lowest anticipated temperature that will be encountered.

C. It should contain *Rust* and *Oxidation* as well as other detergent type inhibitors.

D. The *Viscosity* (SUS) should lie between 80 as a minimum and 375 as a maximum in the operating range, with the ideal viscosity near 200 SUS.

E. The viscosity index should be as high as possible.

As an example, automatic transmission fluid (ATF) has the following specifications as listed by most oil manufacturers.

A.	Viscosity (SUS)	
	100°F.	185 to 205
	210°F.	45 to 55
B.	Pour Point	-45°F. to -35°F.
C.	Viscosity Index	145 to 165

NOTE: For cold weather applications consult Woodmizer for oil additives and cold weather fluid substitutes and instructions.

PUMPS

TYPE AND REPAIR

All Monarch pumps are of the external gear type. They are not complex in construction and if properly maintained give years of trouble free service. Before disassembling the pump because of failure make certain all other possibilities have been considered as the close tolerances can be disrupted by disassembly. The system should be checked by isolating the pump from the valve package and testing for proper pressure readings using a gage and shut off hose described in Test Equipment section 1, 6 and 7.

PUMP PRIMING

1. NEW INSTALLATIONS

New system installations, as well as those that are disassembled for repair, require proper priming to avoid possible pump failure. A pump is said to be “primed” when the internal cavity is full of oil and the air has been expelled. Prime a pump as follows:

A. “Crack” or remove a high pressure line at or near a cylinder.

B. Shift the appropriate valve and “jog” the unit until oil flow is clear (Air is absent).

C. Retighten or reattach the hose.

2. ON SYSTEMS THAT FAIL TO PRIME OR LOSE THEIR PRIME, CHECK FOR THE FOLLOWING:

A. Correct unit mounting position. Failure to mount the pump in the proper manner could mean that the pump cannot prime (pickup oil) because the suction tube is not submerged in the oil at all times.

B. Partially clogged suction filter. (See Filter Section.)

C. A loose or improperly installed suction pickup tube.

D. A solid fill plug in reservoir with no vent. (See Reservoir Section.)

E. Oil that is too thick.

F. Occasionally, a pump will not prime itself because a check valve spring in the high pressure port is too “stiff” or the spring retainer is turned down too far. If this condition is expected, loosen the spring retainer (it is found in the high pressure outlet port), energize the pump to prime it, and then turn the retainer back to the correct depth. (See section on check valves.)

RESERVOIRS

1. USE RECOMMENDED FLUID

Fill reservoir with approved fluid.

2. CORRECT FILLING AND OPERATING PROCEDURE

A. Operate unit several times starting with short cylinder strokes and increasing length with each successive stroke.

B. Recheck oil level often and add as necessary to keep pump from picking up air.

C. After system is completely “bled”, check oil level in reservoir as described in owner’s manual and install the filler/breather plug provided. The oil level should be about 3/4” down from top of reservoir with all cylinders collapsed.

Troubleshooting Guide

NOTE: Do not use a solid plug or a fill cap without a filler/breather element or damage will be caused to pump and/or reservoir.

3. PROBLEMS ASSOCIATED WITH THE RESERVOIR

A. Clear oil flowing out of the fill hole might indicate that all of the cylinders were not in proper position when the reservoir was filled.

B. Foamy oil flowing out of the fill hole points to the following:
   1. Air is present in the system; that is, cylinders and fluid lines. The response usually is “spongy” and the cylinder moves with “jerking” motion.
   2. There is no drop tube or “down spout” on the return line so that the oil is not returning to the bottom of the reservoir.
   3. Check for a loose suction tube.

C. Water in the oil.

   Water can enter the reservoir through the fill hole if the unit is left outdoors or washed with high pressure washers. Protect the unit, whenever possible, and change oil regularly to minimize problems. In cold weather the water will freeze and the pump will not work until the ice melts.

FILTERS

1. SUCTION FILTERS

All hydraulic units have suction filters which must be cleaned periodically or whenever flow is slow or sluggish. Filters can be washed in cleaning solvent and blown dry with compressed air. Those which cannot be cleaned properly should be replaced.

2. RETURN OIL FILTERS

Some sawmills use a spin-on filter to clean the oil before it is returned to the reservoir. These filters cannot be cleaned but should be replaced at regular intervals.

ELECTRICAL PROBLEMS

PLEASE REMOVE ALL RINGS, WATCHES AND JEWELRY PRIOR TO DOING ANY ELECTRICAL WORK. REFER TO WOOD-MIZER MANUAL FOR ADDITIONAL SAFETY INFORMATION

1. LOW VOLTAGE

Operating direct current (D.C.) power units efficiently requires proper voltage. Any attempt to operate below the minimum required voltage could cause system failure.

A. Signals which point to low voltages are:
   1. Motor start switches sticking or burning contacts.
   2. Motor running at reduced speed.

B. Minimum voltage readings are as follows:
   1. The minimum voltage between the motor stud and ground is 9.0 volts at maximum load conditions.

C. Causes for low voltage are:
   1. Battery capacity too small.
   2. Cable ends not electrically secure to battery cable.
   3. Battery cable size too small for load and length of run. Copper #2 automotive battery cable is the recommended minimum size. Larger copper battery cable, #1, #0, or #00, may be required for cable lengths over 25 feet to keep performance from deteriorating.
   4. Ground cable size not equivalent or larger than the battery “hotside” cable.
   5. Bad joints where cable ends are bolted to battery, motor solenoid, start switch, or ground.
   6. Bad cable end crimps.
   7. Burnt contacts on motor solenoid.

D. Check for low voltage as follows: (A volt meter will be required).
   1. On sawmills equipped with an alternator the voltage should be approximately 13.5 volts with no electrical accessories operating and the engine running - Check it.
   2. Operate pump unit under maximum conditions; this would be either under full load or when pump is running over relief (cylinder dead headed). Use the volt meter

to probe each connection, cable end, and cable from the battery all the way back to the motor stud and note the voltage losses. Make the necessary repairs. Increase the voltage above the minimum required.

NOTE: Check the ground side as well, paint, rust, and dirt are insulators - remove them.

2. D.C. MOTORS

Motors should be serviced periodically to insure proper performance.
Service as follows:

A. Remove head assembly from motor.

B. Check sleeve bearing in head assembly for wear on units using this design.

C. Place a few drops of oil on felt liner in head assembly.

D. Check brush set for wear and replace if necessary.

E. Blow dirt and dust out of motor housing and check for shorts, burnt wires, or open circuits in the field coil assembly.

F. Check armature and commutator for shorts or open circuits.

G. Check ball bearing on motor shaft, a growling motor can be caused by bad bearings.

H. Check for excessive “end play” of armature and add thrust washers as required on motors with sleeve bearing end heads. On style with ball bearing in end head make sure the wavy washer is in the bottom of the bearing hole to “thrust” the armature toward the pump.

NOTE: The newer style DC Motor with the ball bearing in the motor end head will replace all previous motors when furnished as a complete unit. Some internal parts are not interchangeable.

NOTE: A motor that does not turn in freezing weather could be caused by water that has frozen inside the housing.

J. All D.C. Motors turn counterclockwise when viewed from the drive end - check it when replacing a motor with a new one.

K. If motor fails to turn the pump, check the pump by turning the drive shaft by hand - it may be “setup” and the pump needs replacing. Turn the pump shaft clockwise.

3. ELECTRICAL SWITCHES

A. Limit Switches.

Defective switches are a common cause of electrical malfunction. What seems to be a serious system defect can often be caused simply by a faulty switch. Troubleshooting can be done by any one of three methods:

1. Use a “continuity light” to test switch. (See Test Equipment section).
2. Use a circuit “test light” to test switch. (See Test Equipment section).
3. Remove the wires from the switch and “touch” them together in the proper order to operate system.

B. “Contact Finger” Switches. (Manual Valves)
All models that use a contact finger(s) attached to the handle or shaft of a manual valve to start the D.C. motor, do so by *“grounding”* the small post of a solenoid start switch. When repairing systems with contact fingers check for the following:

1. Improperly aligned or broken contact finger.
2. Nub nut assembly that is not insulated from ground.
3. Wires that are bare or shorted to ground.

C. Motor Start Solenoid Switches.

1. 3-Post solenoid switch (See Figure 1).
   a. The three post solenoid switch is wired and constructed as follows:
      1. The large post marked “Bat” must be attached to the cable leading from the battery.
      2. The small post connects to the control circuit. (Contact finger or limit switch)
      3. The remaining large post attaches to the cable leading from the motor.

PLEASE REMOVE ALL RINGS, WATCHES AND JEWELRY PRIOR TO DOING ANY ELECTRICAL WORK. REFER TO WOOD-MIZER MANUAL FOR ADDITIONAL SAFETY INFORMATION

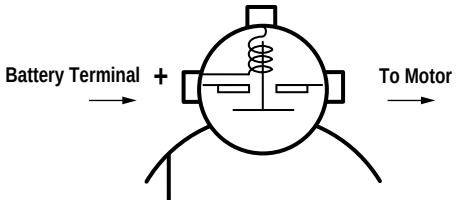


Figure 1. 3 Post Solenoid Switch

NOTE: Do not overtighten solenoid connections. Torque the large terminals to 35 inch pounds and the small terminals to 15 inch pounds.

NOTE: Do not attach motor cable to post marked "Bat" as solenoid will not operate properly.

4. Internally, the coil is constructed with one end connected to the post marked "Bat" and the other end to the small center-post. With the battery cable connected to the post marked "Bat", the solenoid switch is energized by grounding the small post; which in turn closes the main contacts and starts the motor.

b. Testing for a faulty solenoid switch: When testing, use an OHM meter, continuity light, or test light, and check all functions as described above. (See Test Equipment section).

4. SHORTS, "GROUNDING FAULTS" AND "OPEN" CIRCUITS

A. Shorts

In control wiring, shorts can only occur when "hot" lines (lines connected directly to the battery) come in contact with ground. A short will either cause a fuse to blow, if there is one, or burn the wire off at its weakest point. Likeable spots for shorts are switches, electrical strain reliefs, electrical junction boxes, and a control cord that has been pinched or cut.

B. Grounding Faults

Grounding faults are much like shorts except they occur on the opposite side of the electrical component. (Valve solenoid, or motor solenoid start switch.) A "ground fault" will cause the coil in the motor solenoid switch or valve to remain energized. This type of failure can happen because switching is done in the ground wire due to the construction of the motor solenoid switch (See Electrical Switches 3-C-1). Likeable spots for "faults" are the same as shorts.

C. Open Circuits.

An "open" circuit is simply a break which prohibits current flow. Likeable spots for "open" circuits are the same as shorts.

5. ELECTRICAL POLARITY

Motors and valves supplied by Monarch can be used on either positive or negative ground systems with the exception of the system using the round (cylindrical shaped) manual valve with a covered switch on the back plate. In these units there is a capacitor connected on the switch which must be "polarized." They are normally sent out for negative ground systems and, if used on a positive ground system, must have the capacitor turned end for end as the + sign must face the most positive side of the circuit. Failure to align properly *will* cause the lead wire to "blow" off the capacitor, which in turn could make a "Ground fault" and cause the motor to run with no control.

RELIEF VALVES

1. THE PURPOSE OF A RELIEF VALVE IS TO:

A. Keep the maximum system pressure at a safe level.

B. Keep the amp draw and battery drain at a minimum when the cylinder "dead heads" (reaches full stroke).

The Pump Relief Valve Assembly consists of a ball, spring, adjusting screw, seal, and lock nut.

REFER TO DECAL ON POWER UNIT FOR CORRECT RELIEF VALVE PSI SETTING.

2. DIAGNOSING AND REPAIRING THE RELIEF VALVE

NOTE: When testing or making adjustments on the relief valve the system must be "dead headed" (cylinder at full stroke or in a position where cylinder movement is zero).

A. Relief Valve Pressure Too High

1. Symptoms:
   a. Amp draw and battery drain excessive when system is "dead headed".
   b. Motor RPM is slow in comparison to full load system operation.

2. Repair Procedure:
   Turn relief valve adjusting screw counter-clockwise using a gauge, teed into the high pressure line, to record the proper pressure setting.

NOTE: It works best if you turn the relief valve lower than is required and then turn the screw back in slowly until the proper setting is reached.

B. Relief Valve Pressure Too Low
   1. Symptoms:
      a. Motor RPM is faster than normal.
      b. Cylinder will not extend.
      c. Excessive turbulence in the reservoir.
   2. Repair Procedure.
      a. There are 2 possible causes for lack of pressure.
         (1) The adjusting screw has backed up (loosened).
         (2) Foreign matter or "dirt" is trapped between the seat and the ball.
      b. Repair as follows:
         (1) Using a gauge, teed into the pressure line, turn the adjusting screw clockwise a turn or two and watch the gauge; if it goes up, continue to turn the screw until the required setting reached and then tighten the lock nut.
         (2) If the pressure does not increase when the adjusting screw is tightened; turn the adjusting screw counterclockwise all the way out; energize the pump to "flush" the dirt past the seat. (Caution: use hose to divert the oil into a container. Do not look into the port.) Inspect the ball for nicks and replace it if necessary; reseat the ball using a small drift punch and hammer with a light tap; reinstall the spring and adjusting screw and reset the pressure. Tighten the lock nut while holding the screw in the proper position.
   3. If the above procedure fails to increase the relief valve setting; check for a leaking cylinder, a plugged suction screen, a valve that is bypassing, or a worn pump.

CHECK VALVES

1. PURPOSE OF A CHECK VALVE

To allow free flow in one direction but block reverse flow. The purpose of the valve is to keep the motor and pump from running backwards if the motor were to fail to start.

A Check Valve is made up of the following components:

- Ball
- Light Spring
- Spring Retainer

2. MAIN PUMP CHECK VALVES

A cavity is drilled in the pump base into which the parts are assembled. The check valve is typically located inside the high pressure outlet port.

3. TROUBLESHOOTING AND REPAIRING CHECK VALVE FAILURES

A. Load Drift Failure
   1. Symptom
      In most cases a check valve will fail such that the load will drift down when the unit is in the "hold" position.
   2. Repair Procedures

NOTE: Measure the depth of the spring retainer so it can be reassembled to the same depth after repair.

      a. Remove the spring retainer.
      b. Remove spring.
      c. Remove the ball.
      d. Start pump to "flush" dirt from the seat area. (Caution: use hand or a piece of hose to diver oil into a container. Do not look into the port).
      e. Inspect the ball for damage and replace if necessary.
      f. Reinstall the ball.
      g. "Seat" the ball using a small drift punch and hammer with a light tap.
      h. Reinstall the spring.
      i. Replace the spring retainer to the correct depth.

B. Blocked Flow Failure
   1. Symptom
      Once in a while a ball type check valve will restrict flow to the point where the spring will collapse and the flow will be greatly reduced (even blocked) causing flow over relief.

2. Repair Procedure
   Remove the check valve components and replace the spring.

DIRECTIONAL CONTROL VALVES

1. MANUAL VALVES

A. The Round or Cylindrical Style Valve.
   1. These valves operate as follows:
      a. The handle is connected and aligned to a rotor by a shaft.
      b. The rotor is held and returned to the "Center" position by a torsion spring and two spring pins.
   2. Troubleshoot and repair as follows:
      a. If the valve does not direct the oil properly when "shifted" check for:
         1. A misaligned or loose handle on the shaft caused by a loose set screw. Retighten the set screw making sure that it enters the center of the locating hole in the shaft.
         2. A fractured or bent split-pin between the rotor and shaft. Disassemble the valve and replace the split-pin.

NOTE: Before you disassemble the valve mark all of the plates so they can be reassembled in the correct position.

      b. If the valve leaks oil, replace the O-rings. There are O-rings on the shaft and between the plates; to replace them requires that the valve be disassembled. (See note above.)

NOTE: For electrical problems associated with manual valves, see the electrical contact-finger switch section.

B. Mono-Cast 5 Sectional Spool Valve.
   1. This valve operates as follows:
      a. The handle through a lever assembly causes a spool to move "in" or "out" from a neutral center position.
      b. The rear of the spool moves a pin in and out to actuate a paddle attached to a rod assembly.
      c. The rod then rotates to activate a paddle that depresses a micro-switch which in turn energizes the motor start solenoid.
      d. With this system the hydraulic circuit is working in connection with the electrical system for proper control of the mill functions.
      e. At this point there are two different hydraulic circuits depending on the type of toe boards your mill has.
         1. Single Acting Spring Return Toe Board Circuits.
            In this manifold assembly the oil that is being controlled in the spool valve enters a pilot operated check valve manifold mounted to the top of the main valve. Here, two spool flows simply pass through the manifold while three spool flows pass through pilot operated checks, one being a 4-way circuit (clamp) and two (toe boards) circuits are changed into 3-way pilot operated pump unloading circuits.
         2. Double Acting Toe Board Circuits.
            In this manifold assembly the oil is controlled similar to the one above except on spool #2 and #3 (toe board spools). Here we do not change to a 3-way circuit but rather keep a "power up - power down" control with a single pilot operated check holding the toe board cylinder in a locked "up" position. The toe board cannot retract until the pump is starting to lower it. These functions work in the same manner as the clamp circuit.

NOTE: You must use the high pressure checks (tall type) for the toe board functions.

   2. Troubleshoot and repair as follows:
      a. If the "toe-boards" or the clamp circuit are not holding, inspect the check valves in the manifold for dirt or check to see if a piston is stuck.
      b. If there is not enough pressure, check for oil passing through (around) a pilot operated check piston or for a faulty relief valve (it is located next to the valve inlet port) that is dirty or out of adjustment. Also check cylinder piston seals that could be bypassing fluid internally. This is accomplished by removing the return hose and starting the pump, shifting the valve and watching for a continuous flow of oil coming out of the hose.

CAUTION: Have the mill function in a safe position and blocked or chained stationary or at cylinder stroke end when observing flow.

c. If the motor fails to start, check for a faulty microswitch, a faulty pump start switch, a paddle that is out of adjustment or a missing pin in the spool cover.

d. If the spool sticks, loosen the screws on the lever assembly or spool switch cover, shift the valve to let the cover center and retighten the screws (not too tight).

NOTE: The screws used in the valve itself are metric and those in the manifold are English. Use the appropriate wrenches.

e. In the unlikely event a spool O-ring leaks, remove the spool end lever assembly and switch cap on the spool in question and determine which O-ring is leaking. Push the spool into the valve just far enough to "pick" the O-ring out of the spool body, replace it, oil it and push the spool back into the proper location. Replace the end caps.

NOTE: Do not push the spool all the way out because you will shear off the O-ring on the opposite end with the sharp spool "lands". A back and forth spool motion is required to replace the O-rings.

f. To adjust the switch assembly, first study the mechanism before attempting to move anything. Then if the entire system is starting the motor too late, loosen the microswitch a little and move it closer to the switch paddle or loosen the switch paddle and move it. If the motor starts to early move the switch away from the paddle. If you have one or two functions not "timed" properly, first check to see if the pins are in position (Item #12 on valve parts sheet, Pages 8-9). If not, replace them. If they are okay, adjust the spool in question by moving the spool paddle closer to the pin or away, depending on whether or not you want the motor to start sooner or later.

NOTE: Do not over tighten the screws. They are small and you will strip the paddles if not careful. If you do strip a thread, drill the thread out of the paddle, then use a screw and nut (#10 English or 5mm metric) to make a field repair.

g. If the toe boards "jump" when operating other functions on the mill, make sure the high pressure (tall) checks are in spool positions #2 and #3.

NOTE: A high pressure check can be used in position #1, but they must be used in #2 and #3. Also check the return hose and filter for a kink in the hose or a dirty filter. Watch for thick oil in cold weather. You may want to "Thin" fluid. Consult Wood-Mizer for proper additive.

2. SPECIALTY VALVES

A. Cartridge Style Check Valves.

These valves screw into a cartridge cavity and allow for free flow from the end to the side and block reverse flow.

Troubleshoot and Repair as Follows:

If the valve does not hold, remove the cartridge from the housing. Blow compressed air through the cartridge from the side to the bottom while holding the ball or poppet off the seat (use a blunt object inserted through the bottom of the cartridge to hold the poppet off the seat.

Note: The valve itself cannot be disassembled in the field; replace it if cleaning does not solve the problem.

B. Pilot Operated Check Valves.

These valves use a cartridge check valve in conjunction with a pilot piston to shift the check valve with pump pressure. They are designed to hold a cylinder from drifting back when oil tries to return from the side port of the check valve toward the nose end. The valve can only be released when the pump is started and the spool valve is shifted to supply fluid to the end of the pilot piston below the cartridge check at the "blind" end of the piston. If the piston cannot move, grab the end of the piston with a pliers and with a twist and pull motion remove it. Clean the hole by flushing with hydraulic fluid; clean and/or replace the piston. If the pump cannot build up enough pressure to shift the piston, add an O-ring to the piston (Part Number 00113-011). If this fails to fix the problem, look for a plugged suction screen, (See Filter Section) another piston or spool that is bypassing fluid or a failed pump. (See Directional Control Valve Section.)

C. Directional Valve Integral Relief Valve.

This valve is made up of a cartridge containing a direct acting relief valve and a spring and poppet mounted loose on the end of the valve to create a pressure port check valve. Its function is to control the maximum pressure in the hydraulic system and prevent reverse flow. It is located near the valve inlet. See Item #1 on Pages 8-9. On power units that use this new valve, the main relief in the pump is a safety relief set at a much higher value than this valve.

NOTE: This valve controls the maximum system pressure.

Troubleshoot and Repair as Follows:

Tee a gauge into the port, start pump, “Dead Head” cylinder and note pressure. If it is too high the adjusting screw will need to be turned counterclockwise. If it is too low, turn the adjusting screw clockwise a turn and note the pressure gauge reading. If it does not move, turn the screw counter clockwise, start the pump, and flush dirt past the ball. Then turn the screw to the proper pressure setting. After the proper pressure is set, tighten the jam nut.

TIPS ON REPAIRS

1. Do not screw cartridge valves into cavity too fast - use a back and forth motion and have O rings well lubricated with clean oil.
2. Clean all parts thoroughly before assembly and lubricate with clean oil.
3. Do not use Teflon tape on hydraulic connections as it can easily jam the valves and plug the filters in the system.
4. Use care when working on electrical components to prevent shorts, “ground faults”, and “open” circuits.
5. Remove all rings, watches and jewelry that might come into contact with electrical connections prior to working on the electrical system. Refer to Wood-Mizer manual for additional safety information.

WOOD-MIZER, INC.
8180 West 10th Street
Indianapolis, IN 46214
Phone (317) 271-1542
FAX (317) 273-1011

CUSTOMER SERVICE:
Parts/Technical Assistance: (800) 525-8100

Monarch Form #2294-98