



Service and Maintenance Manual

MODEL 9MP

3121163
May 14, 2003

ANSI
CE



**CALIFORNIAN PROPOSITION 65
BATTERY WARNING**

**Battery posts,
terminals and related
accessories contain
lead and lead compounds,
chemical known to the
State of California
to cause cancer and
reproductive harm.**

**WASH HANDS
AFTER HANDLING!**

JLG Industries (Australia)
P.O. Box 5119
11 Bolwarra Road
Port Macquarie
N.S.W. 2444
Australia
Phone: (61) 2 65 811111
Fax: (61) 2 65 810122

JLG Industries (UK)
Unit 12, Southside
Bredbury Park Industrial Estate
Bredbury
Stockport
SK6 2sP
England
Phone: (44) 870 200 7700
Fax: (44) 870 200 7711

JLG Deutschland GmbH
Max Planck Strasse 21
D-27721 Ritterhude/Ihlpohl
Bei Bremen
Germany
Phone: (49) 421 693 500
Fax: (49) 421 693 5035

JLG Industries (Italia)
Via Po. 22
20010 Pregnana Milanese - MI
Italy
Phone: (39) 02 9359 5210
Fax: (39) 02 9359 5845

JLG Latino Americana Ltda.
Rua Eng. Carlos Stevenson,
80-Suite 71
13092-310 Campinas-SP
Brazil
Phone: (55) 19 3295 0407
Fax: (55) 19 3295 1025

JLG Europe B.V.
Jupiterstraat 234
2132 HJ Foofddorp
The Netherlands
Phone: (31) 23 565 5665
Fax: (31) 23 557 2493

JLG Industries (Norge AS)
Sofeimyrveien 12
N-1412 Sofienyr
Norway
Phone: (47) 6682 2000
Fax: (47) 6682 2001

JLG Polska
Ul. Krolewska
00-060 Warszawa
Poland
Phone: (48) 91 4320 245
Fax: (48) 91 4358 200

JLG Industries (Europe)
Kilmartin Place,
Tannochside Park
Uddingston G71 5PH
Scotland
Phone: (44) 1 698 811005
Fax: (44) 1 698 811055

JLG Industries (Pty) Ltd.
Unit 1, 24 Industrial Complex
Herman Street
Meadowdale
Germiston
South Africa
Phone: (27) 11 453 1334
Fax: (27) 11 453 1342

Plataformas Elevadoras
JLG Iberica, S.L.
Trapadella, 2
P.I. Castellbisbal Sur
08755Castellbisbal
Spain
Phone: (34) 93 77 24700
Fax: (34) 93 77 11762

JLG Industries (Sweden)
Enkopingsvagen 150
Box 704
SE - 175 27 Jarfalla
Sweden
Phone: (46) 8 506 59500
Fax: (46) 8 506 59534

MAINTENANCE SAFETY PRECAUTIONS

A. GENERAL

This section contains the general safety precautions which must be observed during maintenance of the aerial platform. It is of utmost importance that maintenance personnel pay strict attention to these warnings and precautions to avoid possible injury to themselves or others or damage to the equipment. A maintenance program must be established by a qualified person and must be followed to ensure that the machine is safe to operate.

⚠ WARNING

MODIFICATION OF THE MACHINE WITHOUT CERTIFICATION BY A RESPONSIBLE AUTHORITY THAT THE MACHINE IS AT LEAST AS SAFE AS ORIGINALLY MANUFACTURED IS A SAFETY VIOLATION.

The specific precautions to be observed during machine maintenance are inserted at the appropriate point in the manual. These precautions are, for the most part, those that apply when servicing hydraulic and larger machine component parts.

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of component weight and never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

⚠ WARNING

SINCE THE MACHINE MANUFACTURER HAS NO DIRECT CONTROL OVER THE FIELD INSPECTION AND MAINTENANCE, SAFETY IN THIS AREA IS THE RESPONSIBILITY OF THE OWNER/ OPERATOR.

B. HYDRAULIC SYSTEM SAFETY

1. It should be particularly noted that the machines hydraulic systems operate at extremely high and potentially dangerous pressures. Every effort should be made to relieve any system pressure prior to disconnecting or removing any portion of the system.
2. Relieve system pressure by activating the lift DOWN control with the platform completely lowered to direct any line pressure back into the return line to the reservoir. Pressure feed lines to system components can then be disconnected with minimal fluid loss.

C. MAINTENANCE

⚠ WARNING

FAILURE TO COMPLY WITH SAFETY PRECAUTIONS LISTED IN THIS SECTION COULD RESULT IN MACHINE DAMAGE, PERSONNEL INJURY OR DEATH AND IS A SAFETY VIOLATION.

- REMOVE ALL RINGS, WATCHES, AND JEWELRY WHEN PERFORMING ANY MAINTENANCE.
- DO NOT WEAR LONG HAIR UNRESTRAINED, OR LOOSE FITTING CLOTHING AND NECKTIES WHICH ARE APT TO BECOME CAUGHT ON OR ENTANGLED IN EQUIPMENT.
- OBSERVE AND OBEY ALL DANGER, WARNING, CAUTION AND OTHER INSTRUCTIONS ON MACHINE AND IN SERVICE MANUAL.
- KEEP STANDING SURFACES AND HAND HOLDS FREE OF OIL, GREASE, WATER, ETC.
- NEVER WORK UNDER AN ELEVATED PLATFORM UNTIL PLATFORM HAS BEEN SAFELY RESTRAINED FROM ANY MOVEMENT BY BLOCKING OR OVER-HEAD SLING.
- BEFORE MAKING ADJUSTMENTS, LUBRICATING OR PERFORMING ANY OTHER MAINTENANCE, SHUT OFF ALL POWER CONTROLS.
- BATTERY SHOULD ALWAYS BE DISCONNECTED DURING REPLACEMENT OF ELECTRICAL COMPONENTS.
- KEEP ALL SUPPORT EQUIPMENT AND ATTACHMENTS STOWED IN THEIR PROPER PLACE.
- USE ONLY APPROVED, NONFLAMMABLE CLEANING SOLVENTS.

REVISION LOG

October 10, 2002 – Original Issue of Manual

October 14, 2002 – Manual Revised

November 12, 2002 – Manual Revised

May 14, 2003 – Manual Revised

TABLE OF CONTENTS

SUBJECT - SECTION, PARAGRAPH	PAGE NO.
SECTION - MAINTENANCE SAFETY PRECAUTIONS	
A. GENERAL	A
B. HYDRAULIC SYSTEM SAFETY	A
C. MAINTENANCE	A
REVISION LOG	B
 SECTION 1 - MACHINE SPECIFICATIONS	
1.1 CAPACITIES	1-2
System Voltage	1-2
Hydraulic System	1-2
1.2 COMPONENT DATA	1-2
Hydraulic Pump/Pump Motor Assembly	1-2
Batteries/Battery Charger	1-2
1.3 PERFORMANCE DATA	1-2
Platform Capacity	1-2
Platform and Material Tray Size	1-2
Machine Height (platform stowed)	1-2
Base Footprint	1-2
1.4 TORQUE REQUIREMENTS	1-2
1.5 LUBRICATION	1-2
Hydraulic Oil	1-2
Lubrication Specifications	1-3
1.6 HYDRAULIC PRESSURE ADJUSTMENT	1-3
1.7 CYLINDER SPECIFICATIONS	1-4
1.8 SERIAL NUMBER LOCATIONS	1-4
 SECTION 2 - GENERAL	
2.1 MACHINE PREPARATION, INSPECTION, AND MAINTENANCE	2-1
General	2-1
Preparation, Inspection, and Maintenance	2-1
Pre-Start Inspection	2-1
Pre-Delivery Inspection and Frequent Inspection	2-1
Annual Machine Inspection	2-1
Preventative Maintenance	2-1
2.2 PREVENTIVE MAINTENANCE AND INSPECTION SCHEDULE	2-2
2.3 SERVICING AND MAINTENANCE GUIDELINES	2-5
General	2-5
Safety and Workmanship	2-5
Cleanliness	2-5
Components Removal and Installation	2-5
Component Disassembly and Reassembly	2-5
Pressure-Fit Parts	2-5
Bearings	2-5
Gaskets	2-5
Bolt Usage and Torque Application	2-5
Hydraulic Lines and Electrical Wiring	2-6
Hydraulic System	2-6
Lubrication and Servicing	2-6

TABLE OF CONTENTS

Batteries	2-6
Mast Chain Inspection Procedure	2-6
2.4 LUBRICATION INFORMATION	2-7
Hydraulic System	2-7
Hydraulic Oil	2-7
Changing Hydraulic Oil	2-7
Lubrication Specifications	2-7
2.5 POSITIONING LIFT FOR ACCESS TO COMPONENTS LOCATED UNDER THE BASE FRAME	2-8

SECTION 3 - BASE COMPONENTS

3.1 BASE ASSEMBLY COMPONENTS	3-1
3.2 PLATFORM DESCENT - BEACON AND ALARM	3-2
Descent Beacon - Remove/Install	3-2
Descent Alarm - Remove/Install	3-2
3.3 WHEEL ASSEMBLIES	3-2
Front Caster Wheel - Remove/Install	3-2
Rear Locking Caster Wheel - Remove/Install	3-2
Rear Wheel (Straight Axle)- Remove/Install	3-3
3.4 FLOOR STOP ASSEMBLY	3-3
Floor Stop - Remove/Install	3-3
Floor Stop Interlock Switch Assembly - Remove/Install	3-4
Floor Stop Interlock Switch - Remove/Install	3-4
3.5 BASE MAST SUPPORTS	3-5
Mast Support to Base - Straight Axle Base - Remove/Install	3-5
Mast Support to Base - Rear Caster Wheel Base - Remove/Install	3-5

SECTION 4 - CONTROL COMPONENTS

4.1 CONTROL COMPONENTS OVERVIEW	4-1
4.2 CONTROL COVER INSTALLATION	4-2
Battery/Battery Charger Cover - Remove/Install	4-2
Ground Control Station Cover - Remove/Install	4-2
4.3 BATTERY AND CHARGER - INSTALLATION	4-3
Battery - Remove/Install	4-3
Battery Charger - Remove/Install	4-3
4.4 GROUND STATION - SERVICING	4-4
4.5 PLATFORM STATION - SERVICING	4-5
4.6 PUMP-MOTOR ASSEMBLY - SERVICE PROCEDURE	4-6
General	4-6
Pump/Motor/Reservoir - Remove/Install	4-6
Tank Removal/Installation	4-7
Filter Screen Removal/Installation	4-7
Pump Removal/Installation	4-7
Pressure Adjust Valve Removal/Installation	4-7
Pressure Check Valve - Removal/Installation	4-8
Lift Down Valve - Removal/Installation	4-8
Motor - Remove/Install - Reference Marks	4-8
Motor Top Cover - Removal/Installation	4-9
Motor Components - Removal/Installation	4-9
Brush Carrier - Removal/Installation	4-10
Brush Housing Final Assembly Tips	4-10
4.7 BATTERY CHARGER - SERVICE PROCEDURES	4-11
General Information	4-11
General Component Installation Notes	4-11

Charger Cover - Remove/Install 4-11
 DC Circuit Breaker - Remove/Install 4-11
 AC Circuit Breaker/Voltage Select Switch - Remove/Install 4-12
 Battery Discharge Indicator - Remove/Install 4-12
 Printed Circuit Board - Remove/Install 4-12
 Shunt Assembly and Capacitors - Remove/Install 4-13
 SCR Rectifier - Remove/Install (Either Side) 4-13
 Transformer Installation 4-13

SECTION 5 - MAST COMPONENTS

5.1 MAST COMPONENTS OVERVIEW 5-1
 5.2 MAST CHAINS AND SEQUENCING CABLES ADJUSTMENT 5-2
 Mast Chain Adjustment (See Figure 5-2.) 5-2
 Sequencing Cable Adjustment (See Figure 5-2.) 5-2
 5.3 HYDRAULIC LIFT CYLINDER - REMOVAL, INSPECTION AND REBUILD 5-4
 Lift Cylinder Removal 5-4
 Cylinder Disassembly 5-6
 Lift Cylinder Component Inspection 5-6
 Cylinder Assembly 5-7
 Cylinder Installation 5-8
 5.4 MAST ASSEMBLY - REMOVE/INSTALL 5-9
 Mast Removal 5-9
 Mast Installation 5-9
 5.5 MAST ASSEMBLY AND DISASSEMBLY PROCEDURES 5-10
 Mast Disassembly Procedure 5-11
 Mast Assembly - 9MP 5-12
 5.6 9MP PLATFORM - REMOVE/INSTALL 5-18

SECTION 6 - TROUBLESHOOTING

6.1 GENERAL 6-1
 6.2 TROUBLESHOOTING INFORMATION 6-1
 6.3 ELECTRICAL AND HYDRAULIC CIRCUIT CHECKS 6-1

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1-1.	Hydraulic Pressure Adjustment - Cap and Screw	1-3
1-2.	Typical Hydraulic Pressure Gauge Installation.	1-3
1-3.	Torque Chart. (ANSI)	1-6
1-4.	Torque Chart. (ANSI to METRIC Conversion)	1-7
1-5.	Torque Chart (Metric Class Fasteners)	1-8
2-1.	Accessing Machine Underside Components by Lifting with a Fork Truck.	2-8
3-1.	9MP Base Components.	3-1
4-1.	Control Components Location - 9MP.	4-1
4-2.	9MP - SCR Dual Voltage - Battery Charger Wiring Diagram.	4-14
5-1.	Mast Components. (9MP)	5-1
5-2.	Mast Chain and Sequence Cable Adjustment Components. (9MP)	5-3
5-3.	Machine Positioned for Cylinder Removal.	5-4
5-4.	Lift Cylinder Component Cross-Section	5-7
5-5.	Mast Section - Assembly Reference.	5-10
5-6.	Mast Chain Routing Diagram. - 9MP.	5-12
5-7.	Mast Bottom End - Slide Pad Installation (Typical)	5-13
5-8.	Mast Top End - Slide Pad Installation (Typical)	5-13

TABLE OF CONTENTS

5-9.	Platform Remove/Install - 9MP.....	5-18
6-1.	Hydraulic Schematic. (9MP) (2792581-A)	6-3
6-2.	Electrical Diagram. (9MP) (4933269-A)	6-4

LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
1-1	9MP - Machine Operating Specifications	1-1
1-2.	Hydraulic Oil Operating Range	1-2
1-3.	Lubrication Specifications	1-3
1-4.	Cylinder Specifications	1-4
1-5	Lubrication Intervals for Various Components	1-5
2-1	Inspection and Maintenance	2-2
2-2	9MP - Preventive Maintenance & Inspection Schedule.....	2-3
2-3	Chain Stretch Tolerance	2-6
5-1	9MP Mast Component Features	5-10
6-1.	9MP - Troubleshooting	6-2

SECTION 1. MACHINE SPECIFICATIONS

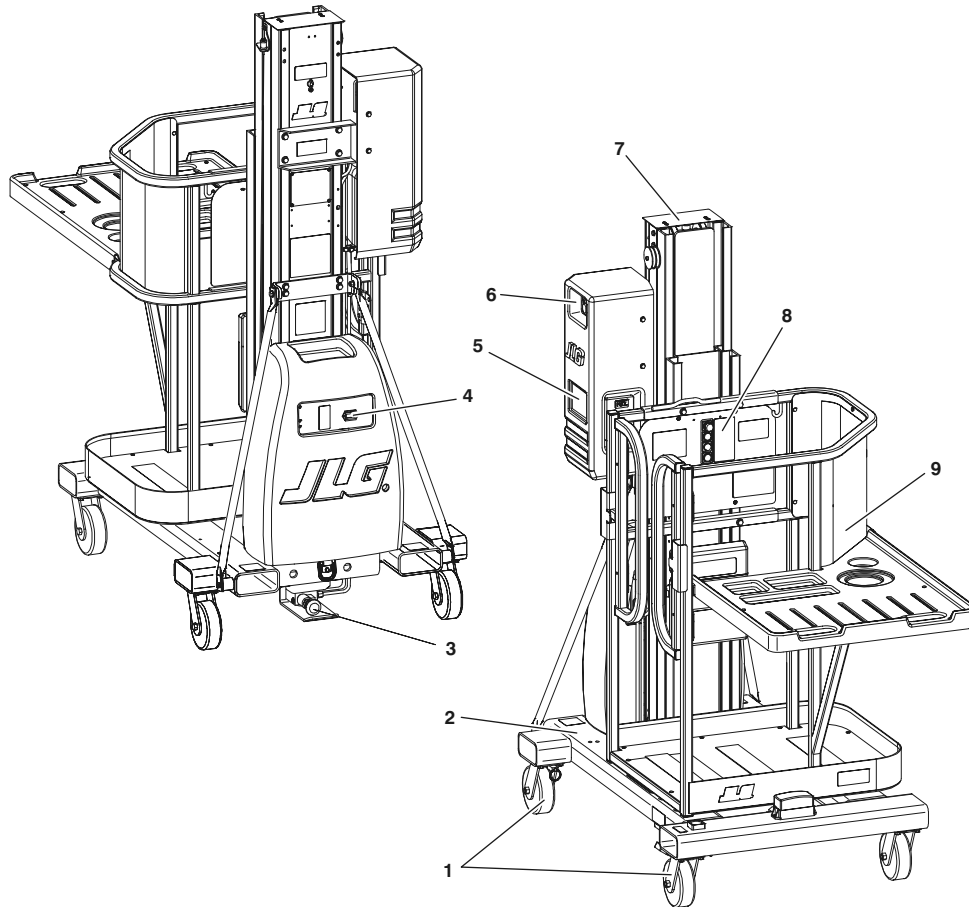


Table 1-1. 9MP - Machine Operating Specifications

	9MP	
Maximum Occupants:	1	
Maximum Work Load (Capacity): (Platform + Material Tray)	500 lb. (227 kg) (250 lb./250 lb.)	
Machine Height (Platform Stowed)	77 in. (196cm)	
Maximum Vertical Platform Height:	9 ft. (2.74 m)	
Max. Platform Speeds (w/Max. Load):	Platform Up:	16 sec.
	Platform Down:	8 - 13 sec.
Gross Machine Weight (Platform Empty):	740 lb. (336kg)	

SECTION 1 - MACHINE SPECIFICATIONS

1.1 CAPACITIES

System Voltage

12 Volt DC

Hydraulic System

5 qts. U.S. (4.7 L)

1.2 COMPONENT DATA

Hydraulic Pump/Pump Motor Assembly

Pump Motor - 12 Volt DC I-Term Motor

Pump Displacement – 2.1cc/rev.

Pump Output –1.85 GPM (min.) @ 1300 PSI / 185 Amps
(max.) current draw using 200 SSU
(43cST) fluid

Reservoir Capacity – 1 Gallon (3.78 L)

Batteries/Battery Charger

Battery – 12 Volt

100 O. A. H.

Leak Proof/Valve Regulated

Type M2 Marine Combination

Battery Charger –

120 - 240 Volt A.C. Selectable -50/60 Hz input
C.E. Approved

12 volt, 20 amp output - with 2 amp finish

Microprocessor Controlled

SCR Circuit Monitor

AC and DC Reset Circuit Breakers

Automatic Charge Circuit

NOTE: The batteries on 9MP machines require approximately five (5) hours to fully charge when drained to LOW BATTERY VOLTAGE on the Charger's - Battery Discharge Indicator.

1.3 PERFORMANCE DATA

Platform Capacity

500 lb. (227kg) - Maximum Capacity - (Combined Platform + Tray Load)

250 lb. (113kg) - Maximum Material Tray Capacity

NOTE: Operator + Material Tray load combined, must not exceed maximum platform capacity.

Platform and Material Tray Size

Platform - 28.5 in. W x 23 in. L (72cm) x (59cm)

Tray - 25.5 in. W x 23 in. L (65cm) x (59cm)

Machine Height (platform stowed)

77 in. (196cm) height

Base Footprint

34 in.-W x 50 in.-L (86cm) x (127cm)

1.4 TORQUE REQUIREMENTS

When maintenance becomes necessary or a fastener has loosened, refer to the applicable Torque Chart later in this section of the manual, to determine proper torque values.

1.5 LUBRICATION

Hydraulic Oil

Hydraulic oils must have anti-wear qualities at least to API Service Classification GL-3, and sufficient chemical stability for mobile hydraulic system service. JLG Industries, recommends Mobilfluid 424 hydraulic oil, which has an SAE viscosity of 10W-30 and a viscosity index of 152.

For cold weather applications, i.e. when temperatures remain consistently below +20°F (-7°C) JLG recommends using Mobil DTE 13 hydraulic oil.

Aside from JLG recommendations, it is not advisable to mix oils of different brands or types, as they may not contain the same required additives or be of comparable viscosities. If use of hydraulic oil other than Mobilfluid 424 is desired, contact JLG Industries for proper recommendations.

Table 1-2. Hydraulic Oil Operating Range

HYDRAULIC SYSTEM OPERATING TEMPERATURE RANGE	SAE VISCOSITY GRADE
0° F to +23° F (-18° C to -5° C)	10W

Table 1-2. Hydraulic Oil Operating Range

HYDRAULIC SYSTEM OPERATING TEMPERATURE RANGE	SAE VISCOSITY GRADE
0° F to +210° F (-18° C to +99° C)	10W-20, 10W-30
50° F to 210° F (+10° C to +210° C)	20W-20

Lubrication Specifications

Table 1-3. Lubrication Specifications

KEY	SPECIFICATIONS
MPG -	Multipurpose Grease having a minimum dripping point of 350° F. Excellent water resistance and adhesive qualities, and being of extreme pressure type. (Timken OK 40 pounds minimum.)
EPGL -	Extreme Pressure Gear Lube (oil) meeting API service classification GL-5 or MIL-Spec MIL-L-2105.
HO -	Hydraulic Oil. ISO-Vg grade 32, 46.

1.6 HYDRAULIC PRESSURE ADJUSTMENT

Adjust system pressure so that platform will raise with maximum rated capacity in platform.

The following pressure is a factory recommended (initial) pressure settings;

MODEL	PRESSURE SETTING
9MP	1300 PSI

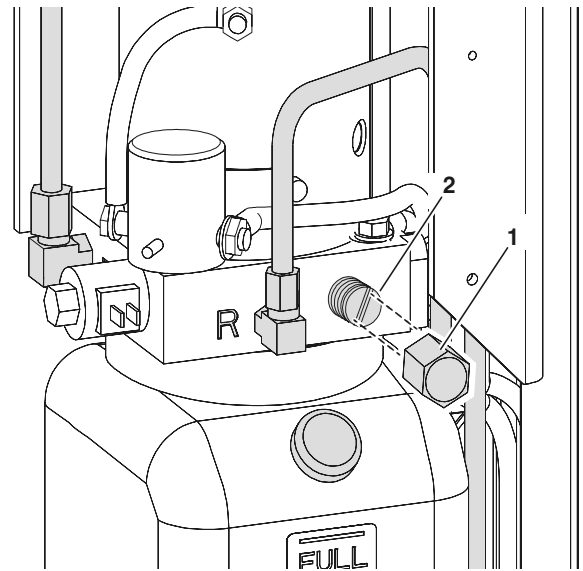
Turning adjustment screw **clockwise increases system pressure**, turning screw **counterclockwise decreases system pressure**.

Perform pressure adjustment with oil at normal operating temperature. If pressure is set when oil is cold, platform may not raise rated load after oil has warmed.

CAUTION

OPEN HYDRAULIC SYSTEM LINES ONLY WITH THE MAST FULLY LOWERED TO RELIEVE PRESSURE IN THE SYSTEM. CAREFULLY LOOSEN REQUIRED FITTINGS, WEAR SAFETY PROTECTION EQUIPMENT WHEN WORKING WITH HYDRAULIC SYSTEMS.

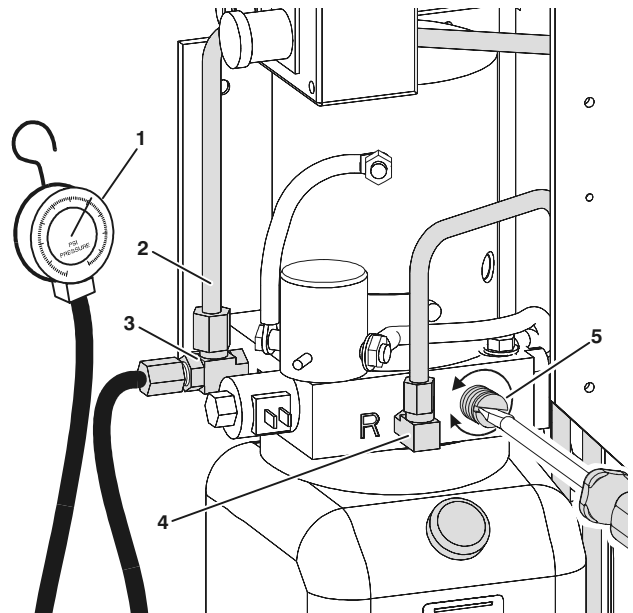
Connect pressure gauge as shown in Figure 1-2., Typical Hydraulic Pressure Gauge Installation. Select a T-Fitting to exactly match the thread size of the pump pressure line and gauge fitting as required.



- 1. Remove Adjust Screw Cap
- 2. Pressure Adjustment Screw

Note: Ground Control Station cover has been removed.

Figure 1-1. Hydraulic Pressure Adjustment - Cap and Screw



- 1. Pressure Gauge Assembly
- 2. Extend Line
- 3. Tee Fitting
- 4. Return Line
- 5. Pressure Adjust Screw

Figure 1-2. Typical Hydraulic Pressure Gauge Installation.

SECTION 1 - MACHINE SPECIFICATIONS

1.7 CYLINDER SPECIFICATIONS

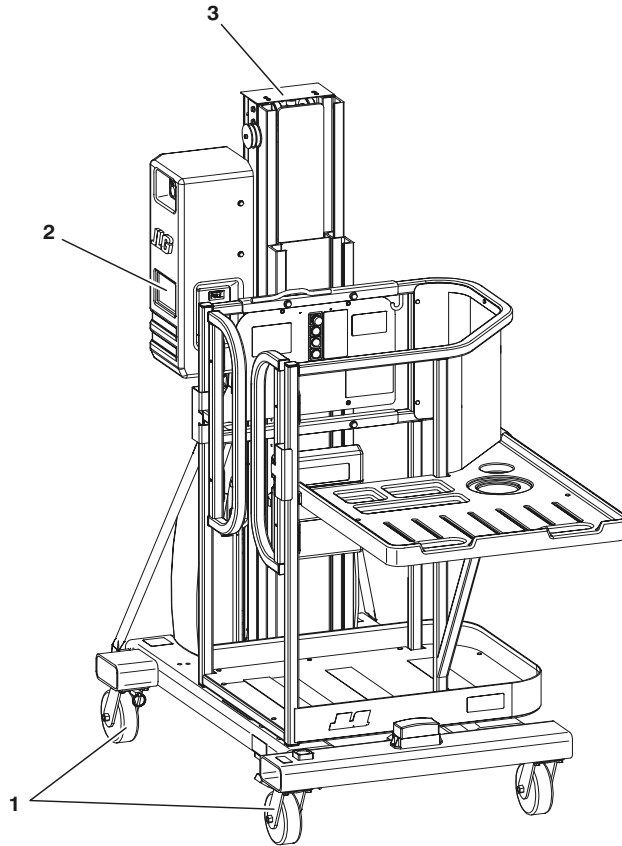
NOTE: All dimensions are given in inches (in), with the metric equivalent, centimeters (cm), given in parentheses.

Table 1-4. Cylinder Specifications

DESCRIPTION	BORE in./(cm)	STROKE in./(cm)	ROD DIA. in./(cm)
9MP Lift Cylinder	1.63 (4.10)	47.50 (120.65)	1.375 (3.49)

1.8 SERIAL NUMBER LOCATIONS

For machine identification, a serial number plate is affixed to the machine. The plate is located on the back of the mast, just above the mast support column.



Lubrication Points

Table 1-5. Lubrication Intervals for Various Components

ITEM	COMPONENT	NO/TYPE LUBE POINTS	LUBE/METHOD	INTERVAL HOURS				COMMENTS
				3 MONTHS	6 MONTHS	1 YEAR	2 YEARS	
1	Swivel Raceways	2 - Front Casters 2 - Rear Casters - (if equipped)	MPG - Pressure Gun	✓				
2	Hydraulic Oil ⁽³⁾	Fill To Line on Reservoir 4 Qt. Reservoir	HO - Check Hyd. Oil Level HO - Change Hyd. Oil				✓	Check Hydraulic Oil level daily. Change Hydraulic Oil every 2 years.
3	Mast Chains ⁽²⁾	2 - Per Section	Chain Lube - Brush or Spray		✓			Inspect, lubricate if dry or rusting.

Key to Lubricants: MPG - Multipurpose Grease
HO - Hydraulic Oil - See Section 1.5, "Lubrication" in Service Manual.

Notes: 1. Be certain to lubricate like items on each side of the machine.
2. Recommended lubricating intervals are based on normal use. If machine is subjected to severe operating conditions, such as a high number of cycles, location, corrosive/dirty environment, etc., user must adjust lubricating requirements accordingly.
3. Prior to checking hydraulic oil level, operate machine through one complete cycle of lift function (full up and down). Failure to do so will result in incorrect oil level reading on the hydraulic reservoir.

SECTION 1 - MACHINE SPECIFICATIONS

SIZE	THD	BOLT DIA. (IN.)	THREAD STRESS AREA (SQ. IN.)	VALUES FOR ZINC PLATED BOLTS ONLY												UNPLATED CAP SCREWS				
				SAE GRADE 5 BOLTS & GRADE 2 NUTS				SAE GRADE 8 BOLTS & GRADE 8 NUTS				UNBRAKO 1960 SERIES SOCKET HEAD CAP SCREW WITH LOC-WEL PATCH								
				CLAMP LOAD (LB.)		TORQUE (UUB.)		CLAMP LOAD (LB.)		TORQUE (UUB.)		CLAMP LOAD (LB.)		TORQUE (UUB.)			CLAMP LOAD (LB.)		TORQUE (UUB.)	
				(DRY OR LOC. 263) LB. IN.	(LOCTITE 262) LB. IN.	(UUB.) LB. IN.	(LOCTITE 242 OR 271) LB. IN.	(DRY OR LOC. 263) LB. IN.	(LOCTITE 262) LB. IN.	(UUB.) LB. IN.	(LOCTITE 242 OR 271) LB. IN.	(DRY OR LOC. 263) LB. IN.	(LOCTITE 262) LB. IN.	(UUB.) LB. IN.	(LOCTITE 242 OR 271) LB. IN.		(DRY OR LOC. 263) LB. IN.	(LOCTITE 262) LB. IN.	(UUB.) LB. IN.	(LOCTITE 242 OR 271) LB. IN.
4	40	0.1120	0.00604	380	8	6	—	—	540	12	9	—	—	—	—	—	—			
	48	0.120	0.00661	420	9	7	—	—	600	13	10	—	—	—	—	—	—			
6	32	0.1380	0.00909	580	16	12	—	—	820	23	17	—	—	—	—	—	—			
	40	0.1015	0.01015	610	18	13	—	—	920	25	19	—	—	—	—	—	—			
8	32	0.1640	0.01400	900	30	22	—	—	1260	41	31	—	—	—	—	—	—			
	36	0.1640	0.01474	940	31	23	—	—	1320	43	32	—	—	—	—	—	—			
10	24	0.1900	0.01750	1120	43	32	—	—	1580	60	45	—	—	—	—	—	—			
	32	0.1900	0.02000	1285	49	36	—	—	1800	68	51	—	—	—	—	—	—			
1/4	20	0.2500	0.0318	2020	96	75	—	105	2860	144	108	—	—	160	3180	13	—			
	28	0.2500	0.0364	2320	120	86	—	135	3280	168	120	—	—	185	3640	14	—			
					LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.	LB. FT.			
5/16	18	0.3125	0.0524	3340	17	13	16	19	4720	25	18	22	30	5240	25	—	—			
	24	0.3125	0.0580	3700	19	14	17	21	5220	25	20	25	30	5800	27	—	—			
3/8	16	0.3750	0.0775	4940	30	23	28	35	7000	45	35	40	50	7750	45	—	—			
	24	0.3750	0.0878	5600	35	25	32	40	7900	50	35	45	55	8780	50	—	—			
7/16	14	0.4375	0.1063	6800	50	35	45	55	9550	70	55	63	80	10630	70	—	—			
	20	0.4375	0.1187	7550	55	40	50	60	10700	80	60	70	90	11870	75	—	—			
1/2	13	0.5000	0.1419	9050	75	55	68	85	12750	110	80	96	120	14190	110	—	—			
	20	0.5000	0.1599	10700	90	65	80	100	14400	120	90	108	135	15990	115	—	—			
9/16	12	0.5625	0.1820	11600	110	80	98	120	16400	150	110	139	165	18200	155	—	—			
	18	0.5625	0.2030	12950	120	90	109	135	18250	170	130	154	190	20300	165	—	—			
5/8	11	0.6250	0.2260	14400	150	110	135	165	20350	220	170	180	240	22600	210	—	—			
	18	0.6250	0.2560	16300	170	130	153	190	23000	240	180	204	265	25600	220	—	—			
3/4	10	0.7500	0.3340	21300	260	200	240	285	30100	380	280	301	420	33400	365	—	—			
	16	0.7500	0.3730	23800	300	220	268	330	33600	420	320	336	465	37300	400	—	—			
7/8	9	0.8750	0.4620	29400	430	320	386	475	41600	600	460	485	660	46200	585	—	—			
	14	0.8750	0.5090	32400	470	350	425	520	45800	660	500	534	725	50900	635	—	—			
1	8	1.000	0.6060	38600	640	480	579	675	51500	900	680	687	990	60600	865	—	—			
	12	1.000	0.6630	42200	700	530	633	735	59700	1000	740	796	1100	66300	915	—	—			
1-1/8	7	1.1250	0.7630	42300	800	600	714	840	68700	1280	960	1030	1400	76300	1240	—	—			
	12	1.1250	0.8560	47500	880	660	802	925	77000	1440	1080	1155	1575	85600	1380	—	—			
1-1/4	7	1.2500	0.9690	53800	1120	840	1009	1175	87200	1820	1360	1453	2000	96900	1750	—	—			
	12	1.2500	1.0730	59600	1240	920	1118	1300	96600	2000	1500	1610	2200	107300	1880	—	—			
1-1/2	6	1.500	1.1550	64100	1460	1100	1322	1525	104000	2380	1780	1907	2625	115500	2320	—	—			
	12	1.500	1.3150	73000	1680	1260	1506	1750	118100	2720	2040	2165	3000	131500	2440	—	—			
1-1/2	6	1.500	1.4050	78000	1940	1460	1755	2025	126500	3160	2360	2530	3475	140500	3040	—	—			
	12	1.500	1.5800	87700	2200	1640	1974	2300	142200	3560	2660	2844	3925	158000	3270	—	—			

Note: These torque values do not apply to cadmium plated fasteners.



SAE GRADE 5



SAE GRADE 8

SIZE	THD	BOLT DIA. (CM)	THREAD STRESS AREA (SQ. CM)	VALUES FOR ZINC PLATED BOLTS ONLY												UNPLATED CAP SCREWS
				SAE GRADE 5 BOLTS & GRADE 2 NUTS				SAE GRADE 8 BOLTS & GRADE 8 NUTS				UNBRAKO 1960 SERIES SOCKET HEAD CAP SCREW WITH LOC-WEL PATCH				
				CLAMP LOAD (KG)	(DRY OR LOC. 263) NM	(LUB.) NM	(LOCTITE 262 OR 271) NM	CLAMP LOAD (KG)	(DRY OR LOC. 263) NM	(LUB.) NM	(LOCTITE 262 OR 271) NM	CLAMP LOAD (KG)	(DRY OR LOC. 263) NM	(LUB.) NM	(LOCTITE 262 OR 271) NM	
4	40	0.2845	0.0153	172	1	1	—	—	—	245	2	1	—	—	—	—
	48	0.0168	0.0168	191	1	1	—	—	—	272	2	1	—	—	—	—
6	32	0.3505	0.0232	263	2	2	—	—	—	372	3	2	—	—	—	—
	40	0.0258	0.0258	277	2	2	—	—	—	417	3	2	—	—	—	—
8	32	0.4166	0.0356	408	4	3	—	—	—	572	5	4	—	—	—	—
	36	0.0374	0.0374	426	4	4	—	—	—	599	5	4	—	—	—	—
10	24	0.4826	0.0445	508	5	4	—	—	—	717	7	5	—	—	—	—
	32	0.0508	0.0508	583	6	4	—	—	—	817	8	6	—	—	—	—
1/4	20	0.6350	0.0808	916	11	9	—	—	—	1297	16	12	—	—	18	1442
	28	0.0925	0.0925	1052	14	10	—	—	—	1488	19	14	—	—	21	1651
5/16	18	0.7938	0.1331	1515	23	18	22	26	26	2141	34	25	30	41	2377	34
	24	0.1473	0.1473	1678	26	19	23	29	29	2821	34	27	34	41	2631	37
3/8	16	0.9525	0.1969	2241	41	31	38	48	48	3175	61	48	54	68	3493	61
	24	0.2230	0.2230	2540	48	34	43	54	54	3583	68	48	61	75	3983	68
7/16	14	1.1112	0.2700	3085	68	48	61	75	75	4332	95	75	85	109	4822	95
	20	0.3015	0.3015	3425	75	68	68	81	81	4854	109	81	95	122	5384	102
1/2	13	1.2700	0.3604	4105	102	75	92	115	115	5783	149	109	130	163	6437	149
	20	0.4061	0.4061	4854	122	88	108	136	136	6532	163	122	146	183	7253	156
9/16	12	1.4288	0.4623	5262	149	109	133	163	163	7539	204	149	188	224	8256	210
	18	0.5156	0.5156	5874	163	122	148	183	183	8278	231	176	209	258	9208	224
5/8	11	1.5875	0.5740	6532	204	149	183	224	224	9231	298	231	244	326	10251	285
	18	0.6502	0.6502	7394	231	176	207	258	258	10433	326	244	277	359	11612	298
3/4	10	1.9050	0.8484	9662	353	271	325	387	387	13653	515	380	408	570	15150	495
	16	0.9474	0.9474	10796	407	298	363	448	448	15241	570	434	456	631	16919	542
7/8	9	2.2225	1.1735	13336	583	434	523	644	644	18870	814	624	658	895	20956	793
	14	1.5392	1.2929	14697	637	475	576	705	705	20775	895	678	724	983	23088	861
1	8	2.5400	1.5392	17509	868	651	785	915	915	23360	1220	922	931	1342	27488	1173
	12	1.6840	1.6840	19142	949	719	858	997	997	27080	1356	1003	1079	1492	30074	1241
1-1/8	7	2.8575	1.9380	19187	1085	814	968	1139	1139	31162	1736	1302	1396	1898	34610	1681
	12	2.1742	2.1742	21546	1193	895	1087	1254	1254	34927	1953	1464	1566	2136	38828	1871
1-1/4	7	2.4613	2.4613	24404	1519	1139	1368	1593	1593	38554	2468	1844	1970	2712	43954	2373
	12	3.1750	2.7254	27035	1681	1247	1516	1762	1762	43818	2712	2034	2183	2983	48671	2549
1-1/2	6	3.4925	2.9337	29076	1980	1492	1792	2068	2068	47174	3227	2413	2586	3559	52391	3145
	12	3.3401	3.3401	33113	2278	1708	2042	2373	2373	53570	3688	2766	2935	4068	59648	3308
1-1/2	6	3.8100	3.5687	35381	2630	1980	2379	2746	2746	57380	4284	3200	3430	4712	63731	4122
	12	4.0132	4.0132	39781	2983	2224	2676	3118	3118	142200	4827	3607	3856	5322	71669	4433

Note: These torque values do not apply to cadmium plated fasteners.



SAE GRADE 5




SAE GRADE 8


SECTION 1 - MACHINE SPECIFICATIONS

VALUES FOR ZINC PLATED / YELLOW CHROMATE FASTENERS ONLY												
SIZE	PITCH	TENSILE STRESS AREA	CLASS 8.8 METRIC BOLTS & CLASS 8 METRIC NUTS					CLASS 10.9 METRIC BOLTS & CLASS 10 METRIC NUTS				
			CLAMP LOAD	TORQUE				CLAMP LOAD	TORQUE			
				DRY OR LOCTITE 263	LUB	LOCTITE 262	LOCTITE 242 OR 271		DRY OR LOCTITE 263	LUB	LOCTITE 262	LOCTITE 242 OR 271
sq. mm	KN	N, m	N, m	N, m	N, m	KN	N, m	N, m	N, m	N, m		
3	.5	5.03	2.19	1.3	1.0	1.2	1.4	3.13	1.9	1.4	1.5	2.1
3.5	.6	6.78	2.95	2.1	1.6	1.9	2.3	4.22	3.0	2.2	2.4	3.3
4	.7	8.78	3.82	3.1	2.3	2.8	3.4	5.47	4.4	3.3	3.5	4.8
5	.8	14.2	6.18	6.2	4.6	5.6	6.8	8.85	8.9	6.6	7.1	9.7
6	1	20.1	8.74	11	7.9	9.4	12	12.5	15	11	12	17
7	1	28.9	12.6	18	13	16	19	18	25	19	20	28
8	1.25	36.6	15.9	25	19	23	28	22.8	37	27	29	40
10	1.5	58.0	25.2	50	38	45	55	36.1	72	54	58	79
12	1.75	84.3	36.7	88	66	79	97	52.5	126	95	101	139
14	2	115	50.0	140	105	126	154	71.6	200	150	160	220
16	2	157	68.3	219	164	197	241	97.8	313	235	250	344
18	2.5	192	83.5	301	226	271	331	119.5	430	323	344	473
20	2.5	245	106.5	426	320	383	469	152.5	610	458	488	671
22	2.5	303	132.0	581	436	523	639	189.0	832	624	665	915
24	3	353	153.5	737	553	663	811	220.0	1060	792	845	1170
27	3	459	199.5	1080	810	970	1130	286.0	1540	1160	1240	1690
30	3.5	561	244.0	1460	1100	1320	1530	349.5	2100	1570	1680	2310
33	3.5	694	302.0	1990	1490	1790	2090	432.5	2600	2140	2280	2860
36	4	817	355.0	2560	1920	2300	2690	509.0	3660	2750	2930	4020
42	4.5	1120	487.0	4090	3070	3680	4290	698.0	5860	4400	4690	6440

Note: These torque values do not apply to cadmium plated fasteners.



METRIC CLASS 8.8



METRIC CLASS 10.9

Figure 1-5. Torque Chart (Metric Class Fasteners)

SECTION 2. GENERAL

2.1 MACHINE PREPARATION, INSPECTION, AND MAINTENANCE

General

This section provides the necessary information needed by those personnel that are responsible to place the machine in operation readiness and maintain its safe operating condition. For maximum service life and safe operation, ensure that all the necessary inspections and maintenance have been completed before placing the machine into service.

Preparation, Inspection, and Maintenance

It is important to establish and conform to a comprehensive inspection and preventive maintenance program. The following table outlines the periodic machine inspections and maintenance recommended by JLG Industries, Inc. Consult your national, regional, or local regulations for further requirements for aerial work platforms. The frequency of inspections and maintenance must be increased as environment, severity and frequency of usage requires.

Pre-Start Inspection

It is the User's or Operator's primary responsibility to perform a Pre-Start Inspection of the machine prior to use daily or at each change of operator. Reference the Operator's and Safety Manual for completion procedures for the Pre-Start Inspection. The Operator and Safety Manual must be read in its entirety and understood prior to performing the Pre-Start Inspection.

Pre-Delivery Inspection and Frequent Inspection

The Pre-Delivery Inspection and Frequent Inspection shall be performed by a qualified JLG equipment mechanic. JLG Industries, Inc. recognizes a qualified JLG equipment mechanic as a person who, by possession of a recognized degree, certificate, extensive knowledge, training, or experience, has successfully demonstrated the ability and proficiency to service, repair, and maintain the subject JLG product model.

The Pre-Delivery Inspection and Frequent Inspection procedures are performed in the same manner, but at different times. The Pre-Delivery Inspection shall be performed prior to each sale, lease, or rental delivery. The Frequent Inspection shall be accomplished for each machine in service for 3 months; out of service for a period of more than 3 months; or when purchased used. The frequency of this

inspection must be increased as environment, severity and frequency of usage requires.

Reference the JLG Pre-Delivery and Frequent Inspection Form and the Inspection and Preventative Maintenance Schedule for items requiring inspection during the performance of these inspections. Reference the appropriate areas of this manual for servicing and maintenance procedures.

Annual Machine Inspection

JLG recommends that an Annual Machine Inspection be performed by a Factory-Certified Service Technician on an annual basis, no later than thirteen (13) months from the date of the prior Annual Machine Inspection. JLG Industries, Inc. recognizes a Factory-Certified Service Technician as a person who has successfully completed the JLG Service Training School for the subject JLG product model. Reference the machine Service and Maintenance Manual and appropriate JLG inspection form for performance of this inspection.

Reference the JLG Annual Machine Inspection Form and the Inspection and Preventative Maintenance Schedule for items requiring inspection during the performance of this inspection. Reference the appropriate areas of this manual for servicing and maintenance procedures.

For the purpose of receiving safety-related bulletins, it is important that JLG Industries, Inc. has updated ownership information for each machine. When performing each Annual Machine Inspection, notify JLG Industries, Inc. of the current machine ownership.

Preventative Maintenance

In conjunction with the specified inspections, maintenance shall be performed by a qualified JLG equipment mechanic. JLG Industries, Inc. recognizes a qualified JLG equipment mechanic as a person who, by possession of a recognized degree, certificate, extensive knowledge, training, or experience, has successfully demonstrated the ability and proficiency to service, repair, and maintain the subject JLG product model.

Reference Table 2-2, 9MP - Preventive Maintenance & Inspection Schedule., and the appropriate areas of this manual for servicing and maintenance procedures. The frequency of service and maintenance must be increased as environment, severity and frequency of usage requires.

Table 2-1. Inspection and Maintenance

Type	Frequency	Primary Responsibility	Service Qualification	Reference
Pre-Start Inspection	Prior to use each day; or At each Operator change.	User or Operator	User or Operator	Operator and Safety Manual
Pre-Delivery Inspection	Prior to each sale, lease, or rental delivery.	Owner, Dealer, or User	Qualified JLG Mechanic	Service and Maintenance Manual and applicable JLG inspection form.
Frequent Inspection	In service for 3 months; or Out of service for a period of more than 3 months; or Purchased used.	Owner, Dealer, or User	Qualified JLG Mechanic	Service and Maintenance Manual and applicable JLG inspection form.
Annual Machine Inspection	Annually, no later than 13 months from the date of the prior inspection.	Owner, Dealer, or User	Qualified JLG Mechanic	Service and Maintenance Manual and applicable JLG inspection form.
Preventative Maintenance	At intervals as specified in the Service and Maintenance Manual.	Owner, Dealer, or User	Qualified JLG Mechanic	Service and Maintenance Manual

2.2 PREVENTIVE MAINTENANCE AND INSPECTION SCHEDULE

(See Table 2-2.)

The preventive maintenance and inspection checks are listed and defined in the following table. This table is divided into two basic parts, the "AREA" to be inspected and the "INTERVAL" at which the inspection is to take place. Under the "AREA" portion of the table, the various systems along with the components that make up that system are listed. The "INTERVAL" portion of the table is divided into five columns representing the various inspection time periods. The numbers listed within the interval column represent the applicable inspection code for which that component is to be checked.

The checks and services listed in this schedule are not intended to replace any local or regional regulations that may pertain to this type of equipment nor should the lists be considered as all inclusive. Variances in interval times may occur due to climate and/or conditions and depending on the location and use of the machine.

Table 2-2. 9MP - Preventive Maintenance & Inspection Schedule.

AREA ON MACHINE	INTERVAL				
	PRE-START (1) INSPECTION	3 MONTH PREVENTATIVE MAINTENANCE	6 MONTH PREVENTATIVE MAINTENANCE	PRE-DELIVERY (2) OR FREQUENT (3) INSPECTION	ANNUAL (4) (YEARLY) INSPECTION
MAST ASSEMBLY	7				
Mast Sections				2,5	2,5
Chain Systems			14	3, 14	14,25
Sequence Cable Systems				3	1,2,3
Covers or Shields					1
Sheave Systems				1,2	1,2
Bearings					1,2
Slide Pads					1,2
PLATFORM ASSEMBLY	7				
Platform and Material Tray				1	1
Guard Rails				1,2,4	1,2,4
Gate				1,5	1,5
Floor				1,2	1,2
Lanyard Anchorage Point				1,4	1,4
CHASSIS ASSEMBLY	7				
Front (and Rear, if equipped) Caster Wheels	1,2	14		1,2	1,2
Rear Wheel Assembly				2	2
Bubble Level				1,7	1,7
Floor Stop Assembly		1,3,7			
FUNCTIONS/CONTROLS	7				
Platform Controls				5,6,7	5,6,7
Ground Controls				5,6	5,6,14
Function Control Locks, Guards, or Detents				5	5
Function Enable System					
Emergency Stop Switches (Ground & Platform)					5
Function Limit or Cutout Switch Systems				5	
Manual Descent or Auxiliary Power				5	5
POWER SYSTEM					
Battery	19			9	18
Battery Charger					5
HYDRAULIC/ELECTRIC SYSTEM	9				
Hydraulic Pump				1,2,9	1,2,5,9
Hydraulic Cylinder				2,7,9	2,9
Cylinder Attachment Pins and Pin Retainers				1,2	1,2
Hydraulic Hoses, Lines, and Fittings				1,9	1,9
Hydraulic Reservoir, Cap, and Breather				5,7	5,7
Hydraulic Filter					
Hydraulic Fluid *	11			11	11
Electrical Connections				20	20
Instruments, Gauges, Switches, Lights, Horn	5				

SECTION 2 - GENERAL

Table 2-2. 9MP - Preventive Maintenance & Inspection Schedule.

AREA ON MACHINE	INTERVAL				
	PRE-START (1) INSPECTION	3 MONTH PREVENTATIVE MAINTENANCE	6 MONTH PREVENTATIVE MAINTENANCE	PRE-DELIVERY (2) OR FREQUENT (3) INSPECTION	ANNUAL (4) (YEARLY) INSPECTION
GENERAL					
Operator and Safety Manuals in Storage Box	21			21	21
ANSI and EMI Manuals/Handbooks Installed	21			21	21
Capacity Decals Installed, Secure, Legible	21			21	21
All Decals/Placards Installed, Secure, Legible	21			21	21
"Walk-Around" Inspection Performed	22				
Annual Machine Inspection Due				21	
No Unauthorized Modifications or Additions				21	21
All Relevant Safety Publications Incorporated				21	21, 22
General Structural Condition and Welds				2, 4	2, 4
All Fasteners, Pins, Shields, and Covers					1, 2
Grease and Lubricate to Specifications				22	22
Function Test of All Systems	22			22	
Paint and Appearance				7	7
Stamp Inspection Date on Frame					22
Notify JLG of Machine Ownership					22

* Drain and Refill with fresh hydraulic fluid every two years.

Footnotes:

- (1) Prior to use each day; or at each Operator change
- (2) Prior to each sale, lease, or delivery
- (3) In service for 3 months; or Out of service for 3 months or more; or Purchased used
- (4) Annually, no later than 13 months from the date of the prior inspection

Inspection and Maintenance Codes:

1. Check for proper and secure installation.
2. Visual inspection for damage, cracks, distortion, or excessive wear.
3. Check for proper adjustment.
4. Check for cracked or broken welds.
5. Operates properly.
6. Returns to neutral or "off" position when released.
7. Clean and free of debris.
8. Interlocks function properly.
9. Check for signs of leakage.
10. Decals installed and legible.
11. Check for proper fluid level.
12. Check for chafing and proper routing.
13. Check for proper tolerances.
14. Properly lubricated.
15. Torqued to proper specification.
16. No gouges, excessive wear, or cords showing.
17. Properly inflated and seated around rim.
18. Proper and authorized components.
19. Fully charged.
20. No loose connections, corrosion, or abrasions.
21. Verify.
22. Perform.
23. Sealed properly.
24. Overrides Platform controls.
25. Inspected per Service and Maintenance Manual.

2.3 SERVICING AND MAINTENANCE GUIDELINES

General

The following information is provided to assist you in the use and application of servicing and maintenance procedures contained in this chapter.

Safety and Workmanship

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of component weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

⚠ WARNING

NEVER WORK UNDER AN ELEVATED PLATFORM UNTIL PLATFORM HAS BEEN SAFELY RESTRAINED FROM ANY MOVEMENT BY BLOCKING OR OVERHEAD SLING.

Cleanliness

The most important single item in preserving the long service life of a machine is to keep dirt and foreign materials out of the vital components. Precautions have been taken to safeguard against this. Shields, covers, seals, and filters are provided to keep the wheel bearings, mast sections and oil supply clean; however, these items must be maintained on a scheduled basis in order to function properly.

At any time when oil lines are disconnected, clear adjacent areas as well as the openings and fittings themselves. As soon as a line or component is disconnected, cap or cover all openings to prevent entry of foreign matter.

Clean and inspect all parts during servicing or maintenance, and assure that all passages and openings are unobstructed. Cover all parts to keep them clean. Be sure all parts are clean before they are installed. New parts should remain in their containers until they are ready to be used.

Components Removal and Installation

Use adjustable lifting devices, whenever possible, if mechanical assistance is required. All slings (*chains, cables, etc.*) should be parallel to each other and as near perpendicular as possible to top of part being lifted.

Should it be necessary to remove a component on an angle, keep in mind that the capacity of an eyebolt or similar bracket lessens, as the angle between the supporting structure and the component becomes less than 90 degrees.

If a part resists removal, check to see whether all nuts, bolts, cables, brackets, wiring, etc., have been removed and that no adjacent parts are interfering.

Component Disassembly and Reassembly

When disassembling or reassembling a component, complete the procedural steps in sequence. Do not partially disassemble or assemble one part, then start on another. Always recheck your work to assure that nothing has been overlooked. Do not make any adjustments, other than those recommended, without obtaining proper approval.

Pressure-Fit Parts

When assembling pressure-fit parts, use an "anti-seize" or molybdenum disulfide base compound to lubricate the mating surface.

Bearings

When a bearing is removed, cover it to keep out dirt and abrasives. Clean bearings in nonflammable cleaning solvent and allow to drip dry. Compressed air can be used but do not spin the bearing.

Discard bearings if the races and balls (or rollers) are pitted, scored, or burned.

If bearing is found to be serviceable, apply a light coat of oil and wrap it in clean (waxed) paper. Do not unwrap reusable or new bearings until they are ready to install.

Lubricate new or used serviceable bearings before installation. When pressing a bearing into a retainer or bore, apply pressure to the outer race. If the bearing is to be installed on a shaft, apply pressure to the inner race.

Gaskets

Check that holes in gaskets align with openings in the mating parts. If it becomes necessary to hand-fabricate a gasket, use gasket material or stock of equivalent material and thickness. Be sure to cut holes in the right location, as blank gaskets can cause serious system damage.

Bolt Usage and Torque Application

Use bolts of proper length. A bolt which is too long will bottom before the head is tight against its related part. If a bolt is too short, there will not be enough thread area to engage and hold the part properly. When replacing bolts, use only those having the same specifications of the original, or one which is equivalent.

Unless specific torque requirements are given within the text, standard torque values should be used on heat-treated bolts, studs, and steel nuts, in accordance with recommended shop practices. (*See Torque Charts in Section-1.*)

Hydraulic Lines and Electrical Wiring

Clearly mark or tag hydraulic lines and electrical wiring, as well as their receptacles, when disconnecting or removing them from the unit. This will assure that they are correctly reinstalled.

Hydraulic System

Keep the system clean. If evidence of metal or rubber particles is found in the hydraulic system, drain and flush the entire system.

Disassemble and reassemble parts on clean work surface. Clean all metal parts with non-flammable cleaning solvent. Lubricate components, as required, to aid assembly.

Lubrication and Servicing

Components and assemblies requiring lubrication and servicing are shown in the Lubrication Chart, (See Figure 1-2.). Service applicable components with the amount, type, and grade of lubricant recommended in this manual, at the specified intervals. When recommended lubricants are not available, consult your local supplier for an equivalent that meets or exceeds the specifications listed.

Batteries

Clean batteries, using a non-metallic brush and a solution of baking soda and water. Rinse with clean water. After cleaning, thoroughly dry batteries and coat terminals with an anti-corrosion compound.

Mast Chain Inspection Procedure

WARNING

MAST CHAINS TO BE INSPECTED AND LUBRICATED EVERY THREE MONTHS.

Inspect mast chains for the following conditions:

Wear: Always inspect that segment of chain that operates over a sheave. As the chain flexes over the sheaves, joints and plate edges very gradually wear. Chain “stretch” can be measured using a manufacturers wear scale or steel tape. When chains have elongated 3% they must be removed and replaced. Refer to Table 2-3 for proper chain specifications and allowable stretch tolerances. Peening and wear of chain plate edges are caused by sliding over a chain worn contact face of a sheave, or unusually heavy loads. All of the above require replacement of the chain and correction of the cause. Chain side wear, noticeable when pin heads and outside plates show a definite wear pattern, is caused by misalignment of the sheave/chain anchors and must be corrected promptly. Do not repair chains; if a section of chain is damaged, replace the entire chain set.

Rust and Corrosion: Rust and corrosion will cause a major reduction in the load carrying capacity of the chain, because these are primary reasons for side plate cracking. The initial lubrication at the factory is applied in a hot dip tank to assure full penetration into the joint. Do not steam clean or degrease chains. At time of chain installation, factory lube must be supplemented by a maintenance program to provide a film of oil on the chains at all times. If chains are corroded, they must be inspected, especially the outside plates, for cracks in-line with the pins. If cracks are found, replace the chain; if no cracks are discovered, lubricate the chains by dipping in heated oil, and reinstall on the machine. Keep chains lubricated.

Table 2-3. Chain Stretch Tolerance

Chain Size	Pin to Pin Measurement	Allowable Stretch
.50" pitch	12" or 24 pitches	.24 in./12 in. span
.625 pitch	15" or 24 pitches	.30 in./15 in. span

Fatigue Cracks: Fatigue is a phenomenon that affects most metals, and is the most common cause of chain plate failures. Fatigue cracks are found through the link holes, perpendicular (90 degrees) from the pin in-line position. Inspect chains carefully after long time use and heavy loading for this type of crack. If any cracks are discovered, replace all chains, as seemingly sound plates are on the verge of cracking. Fatigue and ultimate strength failures on JLG Lifts are incurred as a result of severe abuse as design specs are well within the rated lifting capacity of these chains.

Tight Joints: All joints in the leaf chain should flex freely. On leaf chain, tight joints are usually caused by rust/corrosion, or the inside plates “walking” off the bushing. Limber up rusty/corroded chains (*after inspecting carefully*) with a heavy application of oil (*preferably a hot oil dip*). Tap inside “walking” plates inward; if “walking” persists, replace the chain. This type of problem is accelerated by poor lubrication maintenance practice, and most tight joint chains have been operated with little or no lubrication. Tight joints on leaf chain are generally caused by:

- a. Bent pins or plates.
- b. Rusty joints.
- c. Peened plate edges.

Oil rusty chains, and replace chains with bent or peened chain components. Keep chains lubricated.

Protruding or Turned Pins: Chains operating with inadequate lube generate tremendous friction between the pin and plates (pin and bushing on leaf chain). In extreme cases, this frictional torque can actually turn the pins in the outside press-fit plates. Inspect for turned pins, which can be easily spotted as the “V” flats on the pin heads are no longer in line. Replace all chains showing evidence of turned or protruding pins. Keep chains lubricated.

Chain Anchors and Sheaves: An inspection of the chain must include a close examination of chain anchors and sheaves. Check chain anchors for wear breakage and misalignment. Anchors with worn or broken fingers should be replaced. They should also be adjusted to eliminate twisting the chain for an even load distribution.

Inspect the sheaves, sheave bearings, sheave grooves and pins for extreme wear, replace as necessary. A worn sheave can mean several problems, as follows:

- a. Chains too tight.
- b. Sheave bearings/pin bad.
- c. Bent/misaligned chains.

2.4 LUBRICATION INFORMATION

Hydraulic System

The primary enemy of a hydraulic system is contamination. Contaminants enter the system by various means, e.g., using inadequate hydraulic oil, allowing moisture, grease, filings, sealing components, sand, etc., to enter when performing maintenance, or by permitting the pump to cavitate due to insufficient system warm-up or leaks in the pump supply.

The design and manufacturing tolerances of the component working parts are very close, therefore, even the smallest amount of dirt or foreign matter entering a system can cause wear or damage to the components and generally results in faulty operation. Every precaution must be taken to keep hydraulic oil clean, including reserve oil in storage.

Cloudy oils indicate a high moisture content which permits organic growth, resulting in oxidation or corrosion. If this condition occurs, the system must be drained, flushed, and refilled with clean oil.

It is not advisable to mix oils of different brands or types, as they may not contain the same required additives or be of comparable viscosities. Good grade mineral oils, with viscosities suited to the ambient temperatures in which the machine is operating, are recommended for use.

NOTE: *Metal particles may appear in the oil of new machines due to the wear-in of meshing components.*

Hydraulic Oil

For best performance, JLG recommends the use of ISO-Vg grade 32, 46 oil with a viscosity range between 15-250 SUS at 100 degrees F (32-54 cST at 40 degrees C). Refer to Section 1-5 of this Service Manual for recommended hydraulic oils.

Changing Hydraulic Oil

Use of any of the recommended hydraulic oils eliminates the need for changing the oil on a regular basis. If it is necessary to change the oil, use only those oils meeting or exceeding the specifications appearing in this manual. If unable to obtain the same type of oil supplied with the machine, consult local supplier for assistance in selecting the proper equivalent. Avoid mixing petroleum and synthetic base oils. JLG Industries recommends changing the hydraulic oil annually.

Use every precaution to keep the hydraulic oil clean. If the oil must be poured from the original container into another, be sure to clean all possible contaminants from the service container.

While the unit is shut down, a good preventive maintenance measure is to make a thorough inspection of all hydraulic components, lines, fittings, etc., as well as a functional check of each system, before placing the machine back in service.

Lubrication Specifications

Specified lubricants, as recommended by the component manufacturers, are always the best choice, however, multi-purpose greases usually have the qualities which meet a variety of single purpose grease requirements. Should any question arise regarding the use of greases in maintenance stock, consult your local supplier for evaluation. Refer to the Lubricant Table in Section-1 of this Service Manual for an explanation of the lubricant key designations.

2.5 POSITIONING LIFT FOR ACCESS TO COMPONENTS LOCATED UNDER THE BASE FRAME

Access to the underside of the 9MP lift can be obtained by lifting the machine with a fork lift truck, using the fork lift pockets in the base frame.

Lifting with a Fork Truck (See Figure 2-1.)

1. Choose a fork lift truck capable of safely handling the full weight of the machine.
2. Locate work area on a firm, level surface.

⚠ WARNING

KEEP MACHINE LEVEL OR SLIGHTLY TILTED TOWARD FORKLIFT TRUCK WHEN LIFTING TO PREVENT MACHINE FROM SLIDING OFF LIFTING TINES.

3. When lifting with a fork truck, lift only using the fork lift-truck pockets running the length of the machine's base frame from rear to front.
4. After lifting machine to desired work height, place support stands under the machine. The support stands must reach from the floor to the bottom of the machine and be capable of safely handling the weight of the machine.

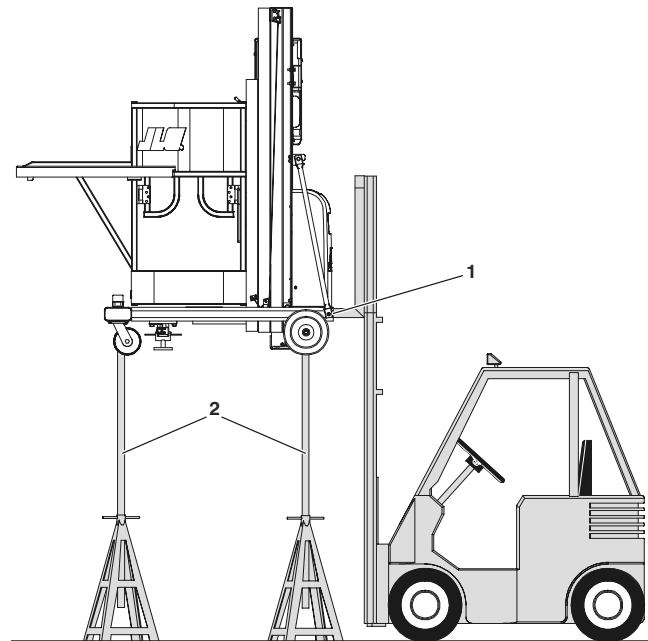
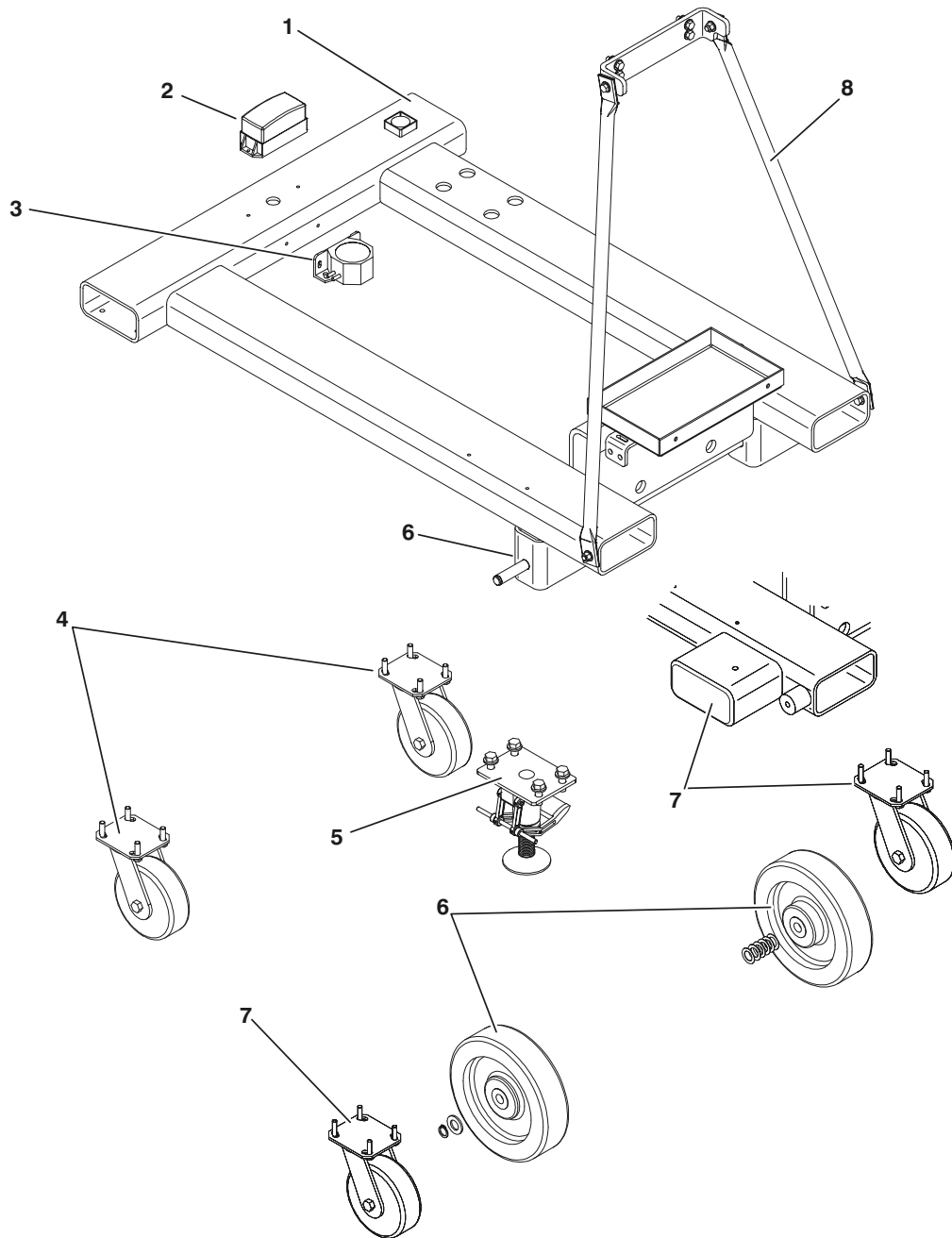


Figure 2-1. Accessing Machine Underside Components by Lifting with a Fork Truck.

SECTION 3. BASE COMPONENTS

3.1 BASE ASSEMBLY COMPONENTS



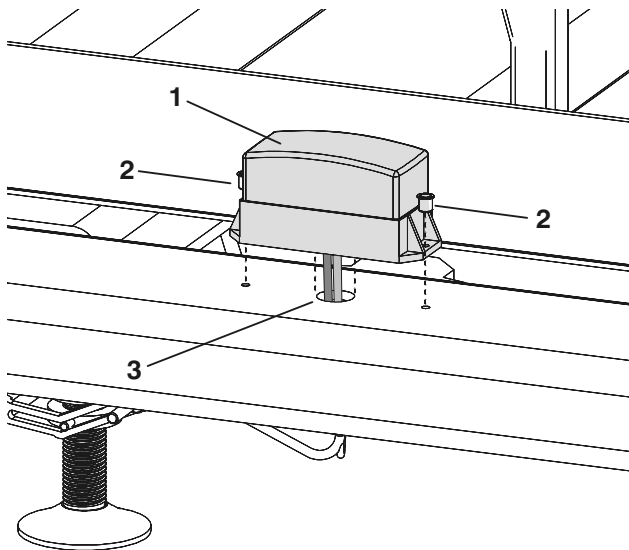
- | | | |
|------------------------------------|---|--|
| 1. Base Frame | 4. Front Swivel Casters | 7. Rear Locking Swivel Casters and Rear
Caster/Base Frame |
| 2. Platform Descent Warning Beacon | 5. Floor Stop | 8. Mast Support Assembly |
| 3. Platform Descent Warning Alarm | 6. Rear Straight Axle Wheels/Axle Frame | |

Figure 3-1. 9MP Base Components.

SECTION 3 - BASE COMPONENTS

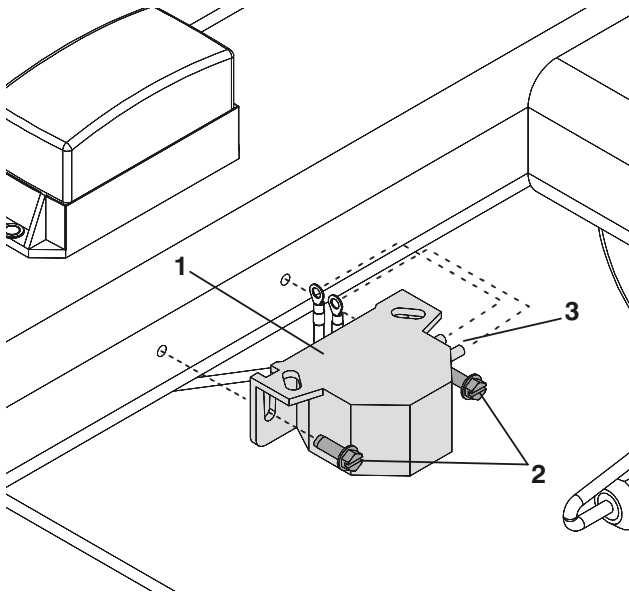
3.2 PLATFORM DESCENT - BEACON AND ALARM

Descent Beacon - Remove/Install



- 1. Beacon Assembly
- 2. Mounting Screws
- 3. Rout wires through hole in base frame

Descent Alarm - Remove/Install

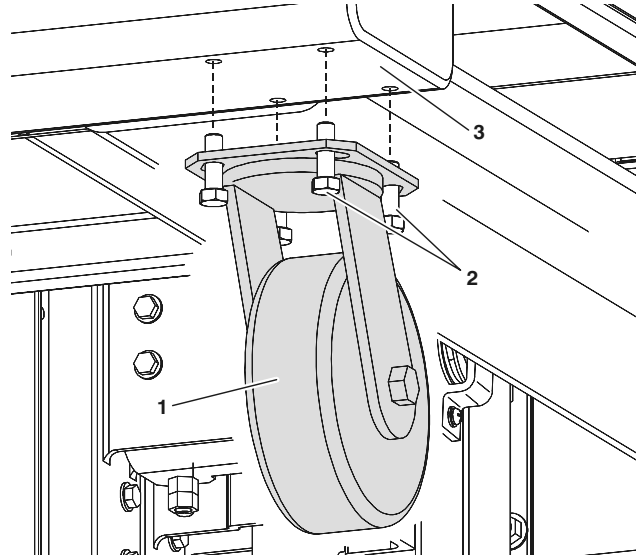


- 1. Descent Alarm Assembly
- 2. Mounting Screws
- 3. Wire Terminals

Note: Located inside base frame, under the platform.

3.3 WHEEL ASSEMBLIES

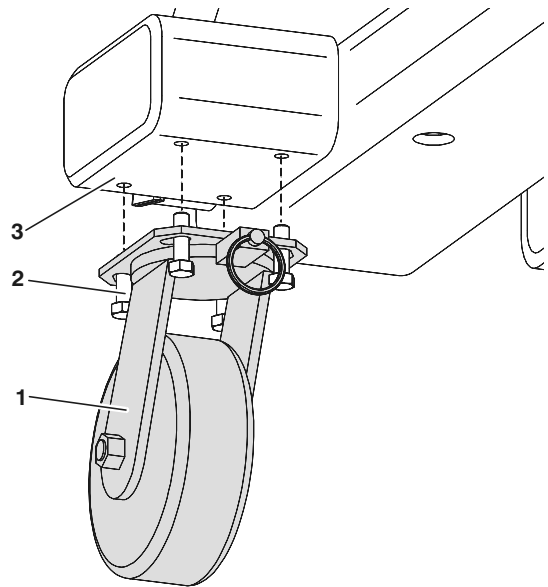
Front Caster Wheel - Remove/Install



- 1. Caster Wheel Assembly
- 2. Hex Head Cap Screws
- 3. Base Frame (Front Member)

Note: Left front caster wheel shown.

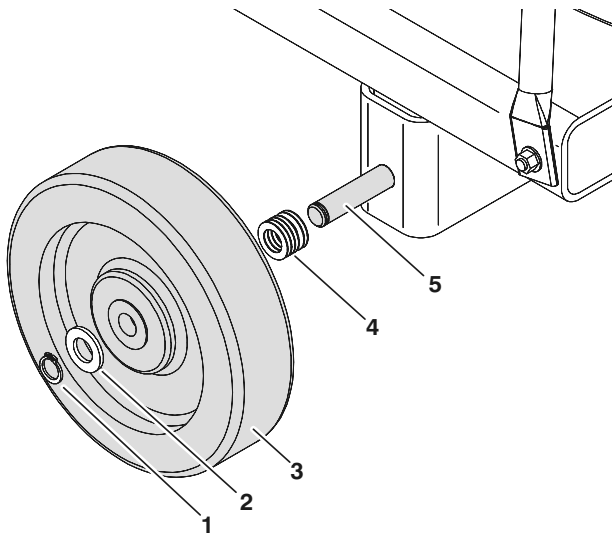
Rear Locking Caster Wheel - Remove/Install



- 1. Rear Locking Caster Wheel
- 2. Hex Head Cap Screws
- 3. Base Frame Caster Mounting Pad

Note: Right rear locking caster shown.

Rear Wheel (Straight Axle)- Remove/Install

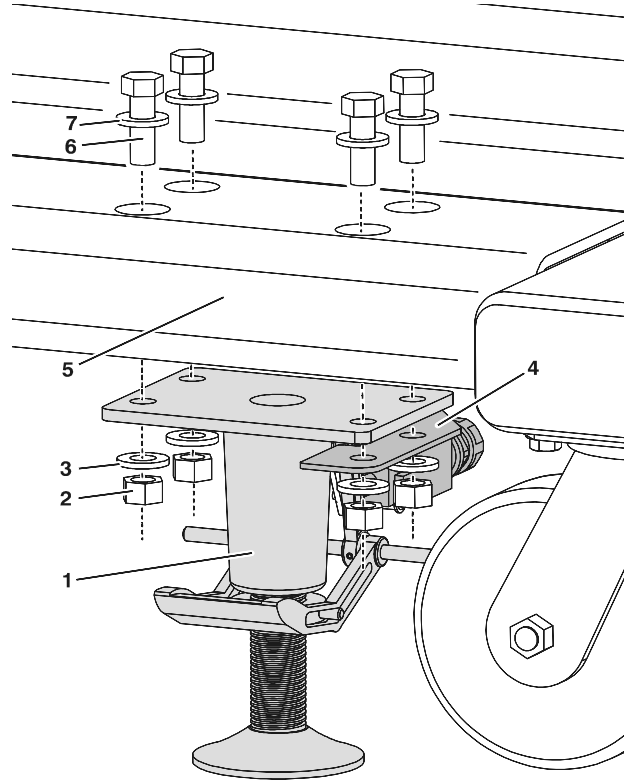


- | | |
|------------------------|----------------------------|
| 1. Snap Ring | 4. Washers (as required) |
| 2. Washer | 5. Base Frame Mounted Axle |
| 3. Rear Wheel Assembly | |

Note: Left rear wheel shown.

3.4 FLOOR STOP ASSEMBLY

Floor Stop - Remove/Install



- | | |
|---------------------------------|---|
| 1. Floor Stop Assembly | 5. Right Side Base Frame/
Fork Lift Tube |
| 2. Hex Nuts | |
| 3. Flat Washers | 6. Hex Head Screws (b) |
| 4. Interlock Switch Bracket (a) | 7. Flat Washers |

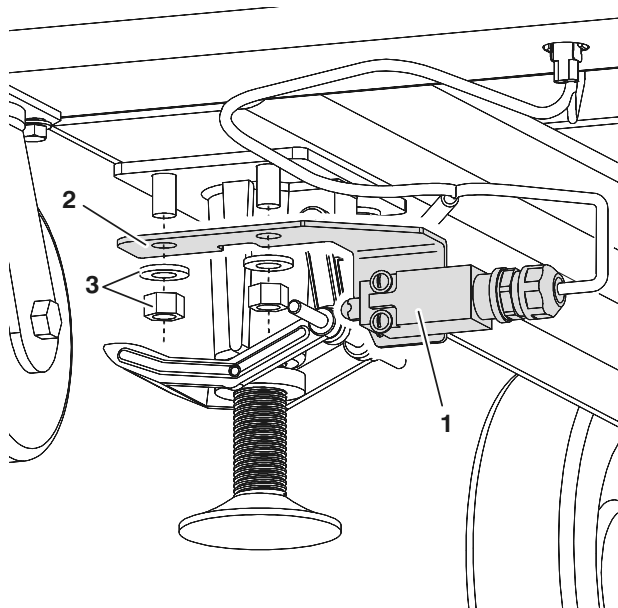
Note: (a) Mount bracket on outside of floor stop base.
(b) Apply Loctite #242 to screw threads before installing nuts.

To gain access to the floor stop mounting screws located inside the right base frame/fork lift tube:

- a. On a firm, level surface, power machine ON.
- b. Set floor stop.
- c. Raise platform approximately 2 feet from outside the platform.
- d. Power machine OFF.
- e. Place a floor stand under the raised platform before working under it.
- f. Release the floor stop.
- g. Remove floor stop fasteners.

SECTION 3 - BASE COMPONENTS

Floor Stop Interlock Switch Assembly - Remove/Install



1. Floor Stop Interlock Switch 3. Hex Nuts and Flat Washers (a)
2. Switch Bracket

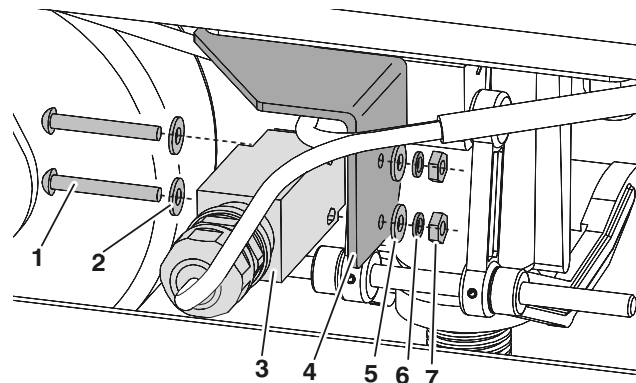
Note: (a) Apply Loctite #242 to screw threads before installing nuts.

To gain access to the floor stop/interlock switch bracket mounting screws located inside the right base frame/fork lift tube:

- a. On a firm, level surface, power machine ON.
- b. Set floor stop.
- c. Raise platform approximately 2 feet from outside the platform.
- d. Power machine OFF.
- e. Place a floor stand under the raised platform before working under it.
- f. Release the floor stop.
- g. Remove floor stop/interlock switch bracket fasteners.

Once installed, the floor stop pedal arm must engage the interlock switch actuator button when the pedal is UP, this will open the lift circuit. When the pedal is DOWN (SET), the pedal arm will pull away from the switch and allow the button to release, closing the circuit.

Floor Stop Interlock Switch - Remove/Install

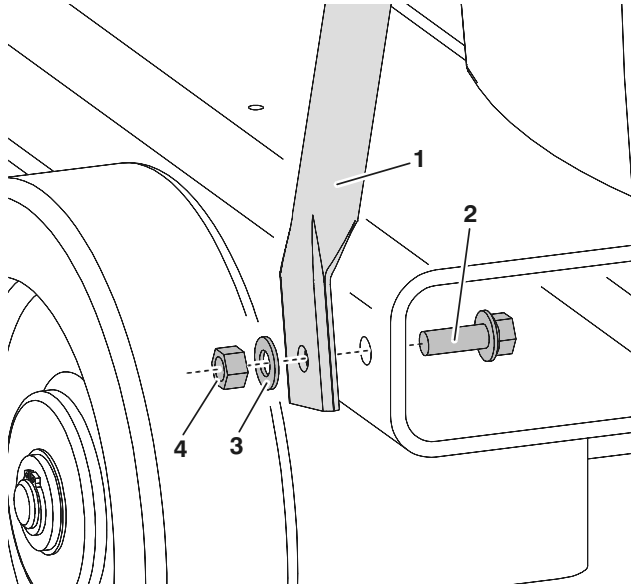


1. Mounting Screws (a) 5. Flat Washers
2. Flat Washers 6. Lock Washers
3. Interlock Switch 7. Mounting Nuts
4. Switch Mounting Bracket

Note: (a) Apply Loctite #242 to screw threads before installing nuts.

3.5 BASE MAST SUPPORTS

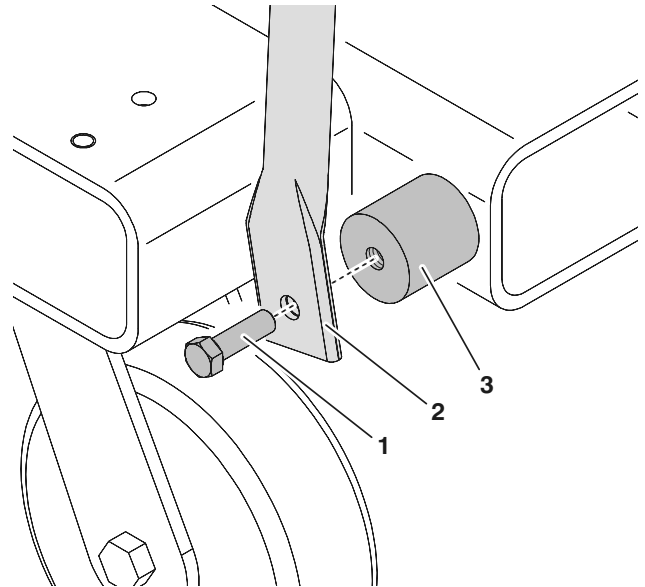
Mast Support to Base - Straight Axle Base - Remove/Install



- 1. Mast Support (*left side shown*)
- 2. Hex Head Cap Screw
- 3. Flat Washer
- 4. Nut (a)

Note: (a) Apply Loctite #242 to screw threads before installing nut.

Mast Support to Base - Rear Caster Wheel Base - Remove/Install



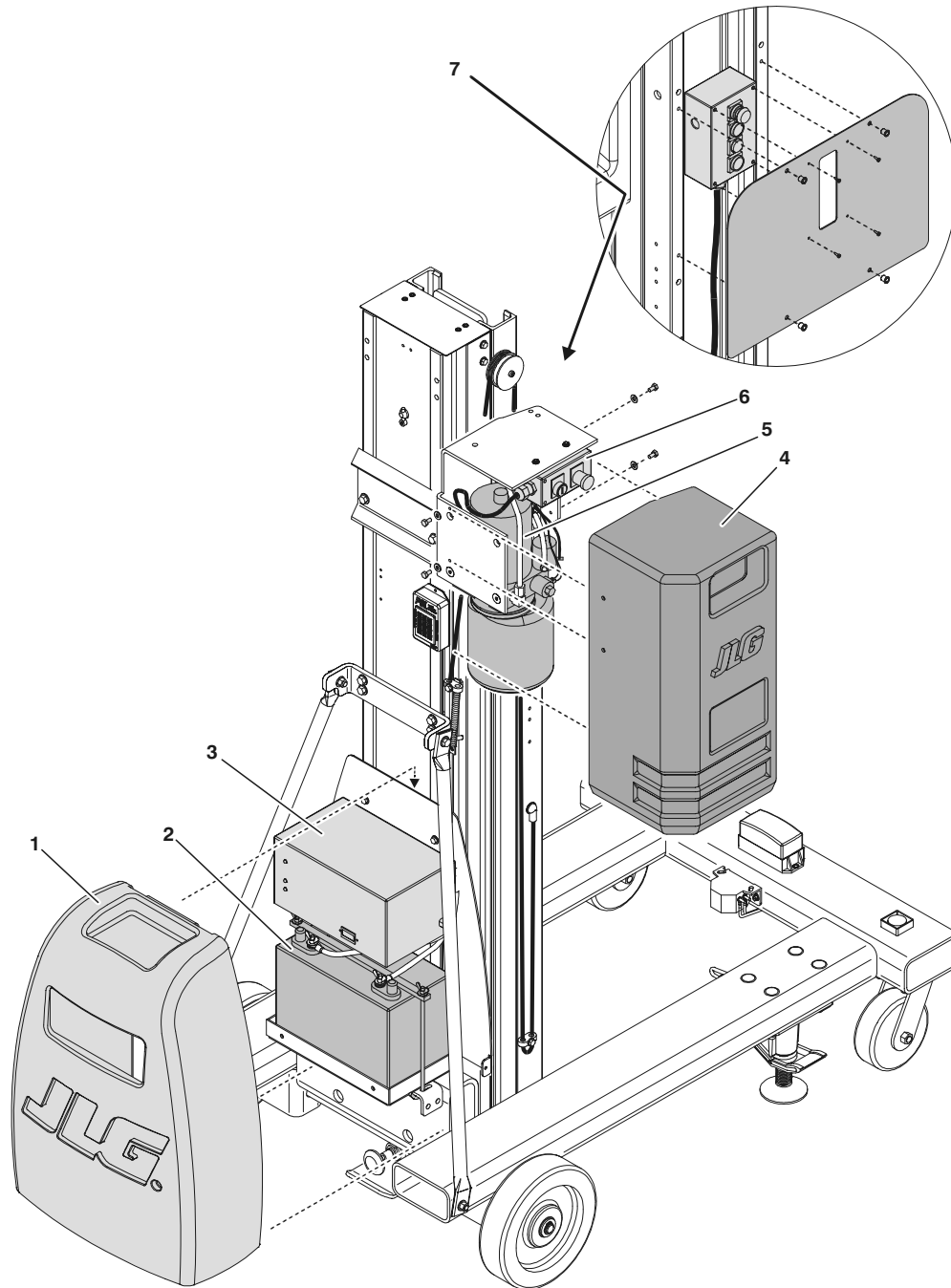
- 1. Hex Head Cap Screw
- 2. Mast Support (*left side shown*)
- 3. Support Attach Lug

Note: (a) Apply Loctite #242 to screw threads before installing.

This page intentionally left blank.

SECTION 4. CONTROL COMPONENTS

4.1 CONTROL COMPONENTS OVERVIEW



- 1. Rear Cover
- 2. 12 Volt Sealed (AGM) Battery
- 3. Battery Charger

- 4. Ground Control Station Cover
- 5. Pump/Motor/Tank Assembly
- 6. Ground Control Box

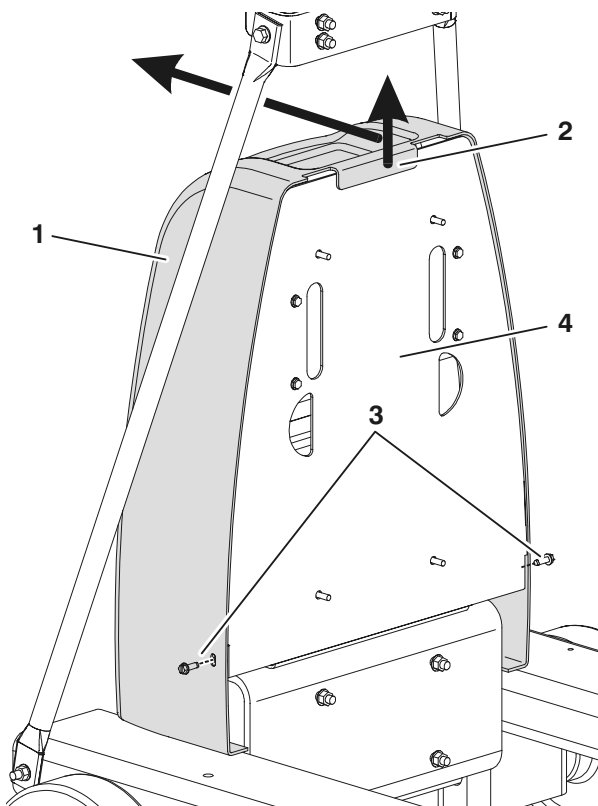
- 7. Platform Control Station

Note: Machine shown without platform.

Figure 4-1. Control Components Location - 9MP.

4.2 CONTROL COVER INSTALLATION

Battery/Battery Charger Cover - Remove/
Install

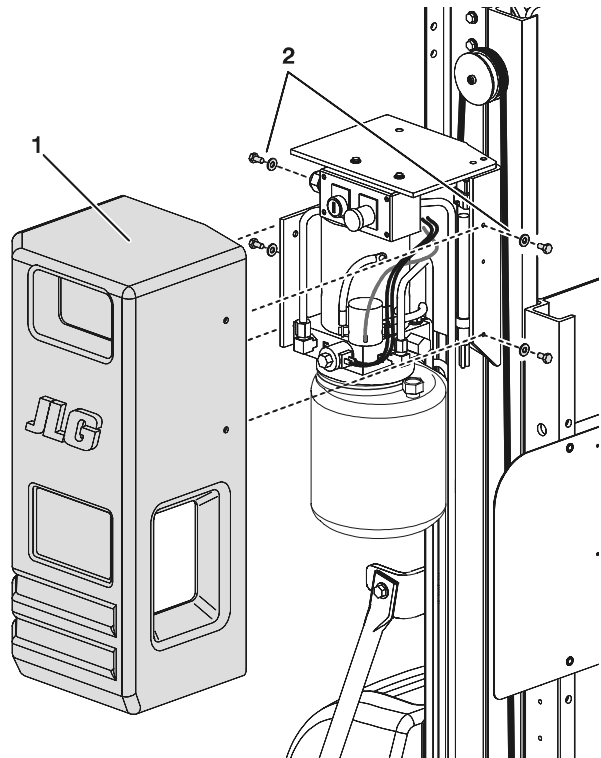


- 1. Cover
- 2. Slide Tab Over Mounting Plate. (a)
- 3. Attach Screws and Washers
- 4. Charger/Rear Cover Mounting Plate

Machine shown with mast and platform removed for illustrative purposes only.

Note: (a) After removing attach screws, lift cover and pull out to remove.

Ground Control Station Cover - Remove/
Install



- 1. Ground Station Cover
- 2. Attach Screws and Washers

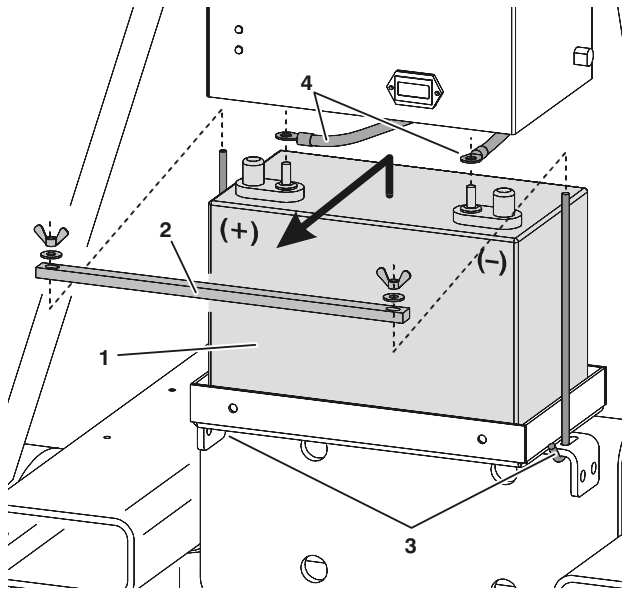
Machine shown with platform removed for illustrative purposes only.

4.3 BATTERY AND CHARGER - INSTALLATION

IMPORTANT

BEFORE REMOVING ANY COMPONENT FROM THE ELECTRICAL SYSTEM, DISCONNECT THE POSITIVE TERMINAL FROM THE BATTERY.

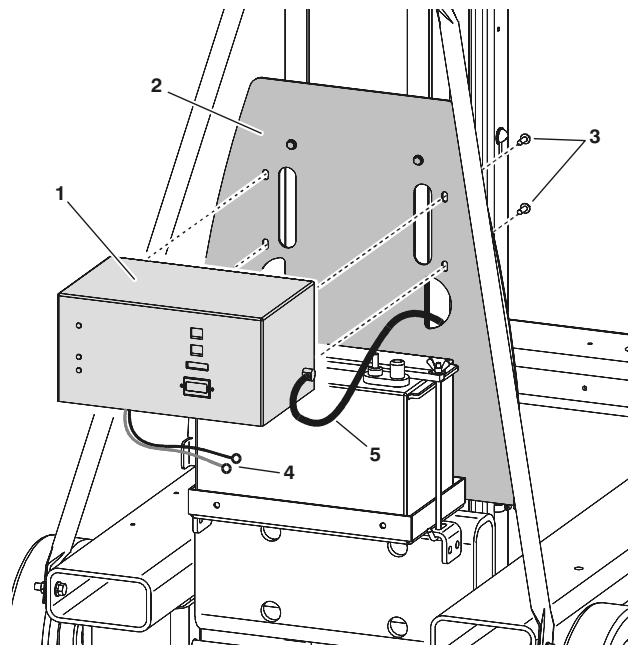
Battery - Remove/Install



- Remove the battery/battery charger cover, see Section 4.2.
 - After hold down bar, battery cables and battery charging leads are removed, lift battery up and out of battery tray.
1. 12 Volt (AGM) Battery (a) 3. Hold Down Bar Attach Rods
 2. Hold Down Bar and Nuts 4. (-) and (+) Battery Cables (b)

Notes: (a) Install the battery with the (+) terminal on the left side of machine, as shown in illustration above.
 (b) RED cable is (+) / BLACK cable is (-), install terminal boots over each post. (not shown)

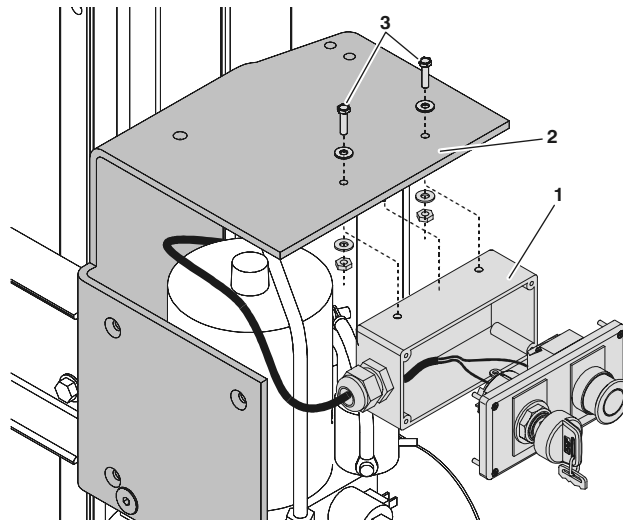
Battery Charger - Remove/Install



- Remove the battery/battery charger cover, see Section 4.2.
1. Battery Charger
 2. Charger/Rear Cover
 3. Attach Screws and Washers (2 ea. side)
 4. (+) RED and (-) BLACK - Battery Charging Leads (a)
 5. AC Voltage Input Cable (b)

Notes: (a) Attach to battery terminal posts, RED to (+), BLACK to (-).
 (b) If equipped with optional cord reel, attach AC plug to the input cable on the reel.

4.4 GROUND STATION - SERVICING

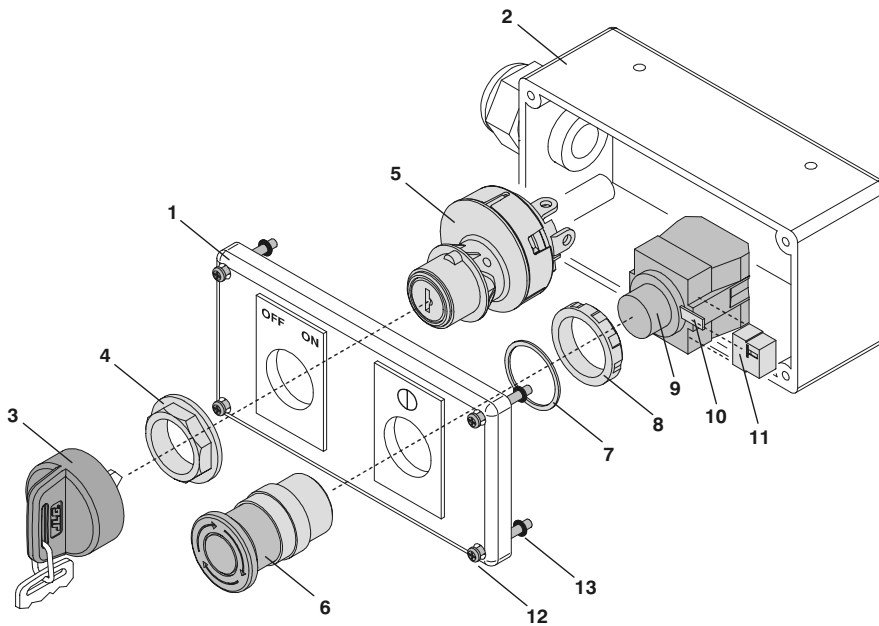


Ground Control Box - Removal/Installation

- Remove the ground control station cover, see Section 4.2.

1. Ground Control Box (a) 2. Pump/Motor Mount 3. Mounting Screws, Washers and Nuts (b)

Notes: (a) *Unscrew front cover to access nuts and washers.*
 (b) *Apply Loctite #242 to mounting screw threads before tightening.*

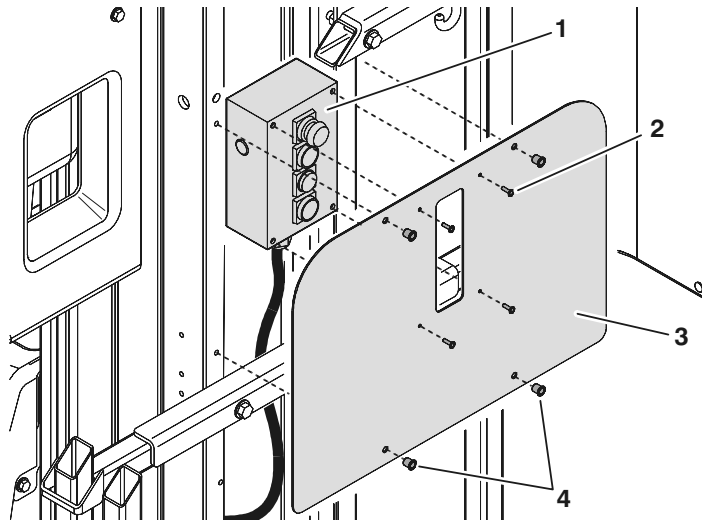


Ground Control Box - Disassembly/Assembly

- | | | | | |
|------------|--------------------------|-----------------------|-------------------------|----------------------|
| 1. Cover | 4. Key Switch Nut | 7. Stop Switch Gasket | 10. Stop Switch Release | 13. Cover Screw Seal |
| 2. Base | 5. Key Switch | 8. Stop Switch Nut | 11. Release Lever Cover | |
| 3. Key Set | 6. Emergency Stop Button | 9. Stop Switch | 12. Cover Screw | |

Note: *See wiring schematic in Section 6 of this manual for correct wiring connections.*

4.5 PLATFORM STATION - SERVICING

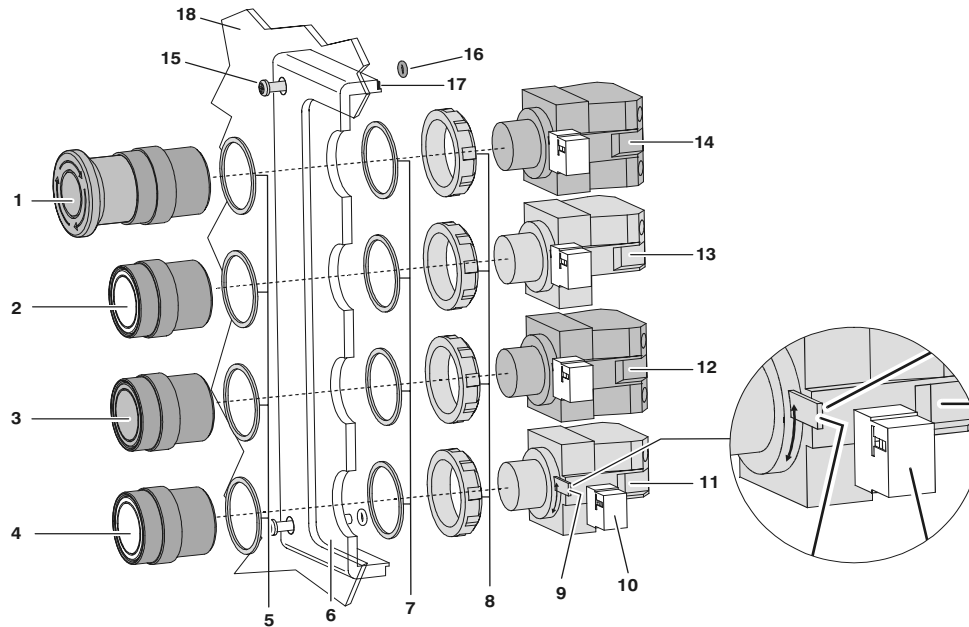


Platform Control Station - Removal/Installation

1. Platform Control Box 2. Box Mounting Screws (4) 3. Decal Mounting Board 4. Mounting Board Rivets (4) (a)

Notes: (a) To remove decal mounting board, remove the pop rivets attaching it to the mast header.

Platform is shown cut-away for illustrative purposes.



Platform Control Station - Disassembly/Assembly

- | | | | | |
|--------------------------|------------------------|-------------------------|--------------------|-----------------------------------|
| 1. Emergency Stop Button | 5. Button Outer Seal | 9. Switch Release Lever | 13. Lift Up Switch | 17. Silicone Bead |
| 2. Lift Up Button | 6. Box Cover (cutaway) | 10. Release Lever Cover | 14. E-Stop Switch | 18. Platform Decal Mounting Board |
| 3. Enable Button | 7. Button Inner Seal | 11. Lift Down Switch | 15. Cover Screw | |
| 4. Lift Down Button | 8. Button Attach Nut | 12. Enable Switch | 16. Screw Seal | |

Note: See wiring schematic in Section 6 of this manual for correct wiring connections.

4.6 PUMP-MOTOR ASSEMBLY - SERVICE PROCEDURE

General

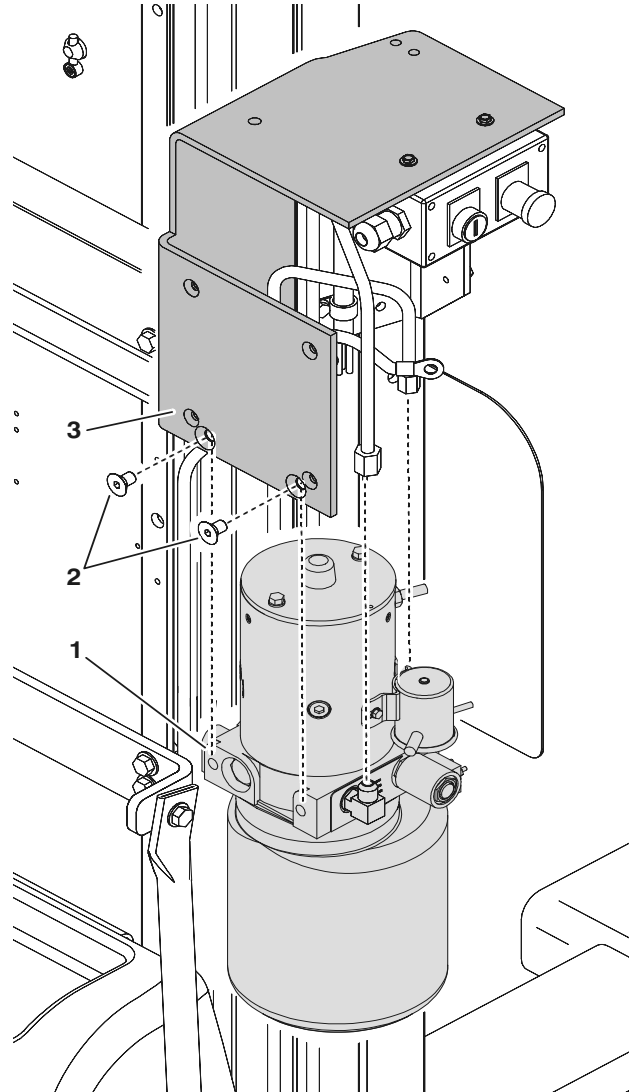
The following is a complete tear-down/re-assembly of the machines' pump/motor assembly. No internal parts to the hydraulic pump are serviced by JLG except for a pump installation seal kit. Also the only parts serviceable internal to the pump electric motor is the motor brush kit.

NOTE: During reassembly of the pump/motor assembly, apply a liberal coat of JLG recommended hydraulic fluid to all seals and o-rings. Also keep all internal metal parts clean and coated with hydraulic fluid to prevent surface corrosion. JLG recommends replacing all seals and o-rings when disassembling and reassembling the pump/motor unit.

Pump/Motor/Reservoir - Remove/Install

⚠ CAUTION

BE CERTAIN THE MAST IS FULLY LOWERED BEFORE REMOVING ANY HYDRAULIC LINES FROM THE PUMP UNIT. WEAR PROTECTIVE GEAR WHEN WORKING AROUND PRESSURIZED HYDRAULIC LINES. REMOVE CONNECTIONS CAREFULLY AND CAP ALL LINES AND PORTS WHEN DISCONNECTED.

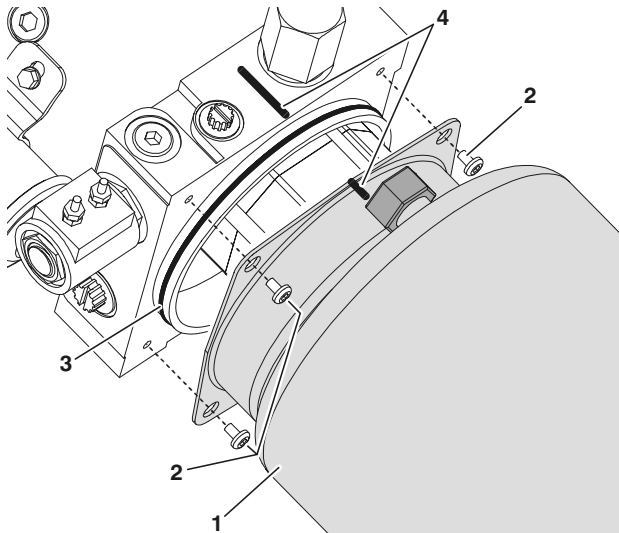


- Remove the ground control station cover, see Section 4.2.
- Remove the extend/return hydraulic lines.
- Remove all electrical connections from pump assembly.

- 1. Pump Assembly
- 2. Mounting Screws (a)
- 3. Pump Mount

Notes: (a) Apply Loctite #242 to mounting screw threads before tightening.

Tank Removal/Installation



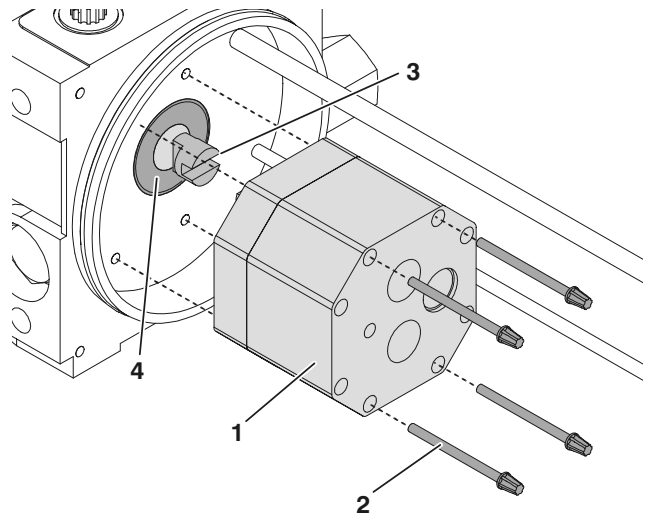
Tank - Removal/Installation

- For reassembly reference, place a mark on tank and valve body.

- | | |
|-------------------------|--------------------|
| 1. Tank Assembly | 3. O-Ring Seal (a) |
| 2. Tank Screws (Qty. 4) | 4. Reference Mark |

Note: (a) Lubricate o-ring with clean hydraulic fluid before sliding tank over during installation.

Pump Removal/Installation

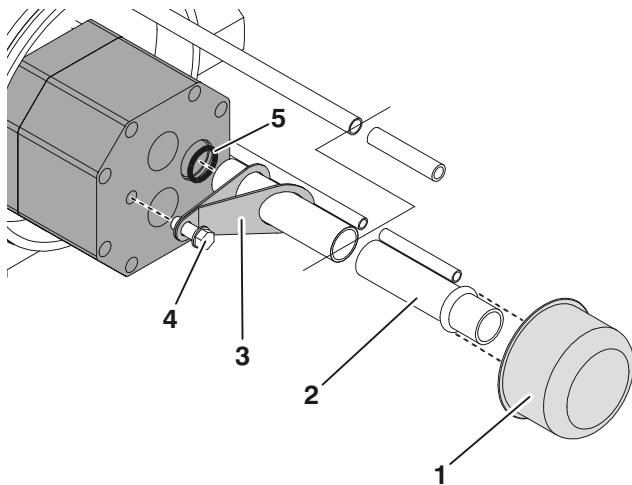


Pump - Removal/Installation

- Requires removal of tank assembly and pump pick-up tube.

- | | |
|-------------------------|--------------------------|
| 1. Pump Assembly | 3. Motor to Pump Coupler |
| 2. Pump Assembly Screws | 4. Pump Shaft Bearing |

Filter Screen Removal/Installation



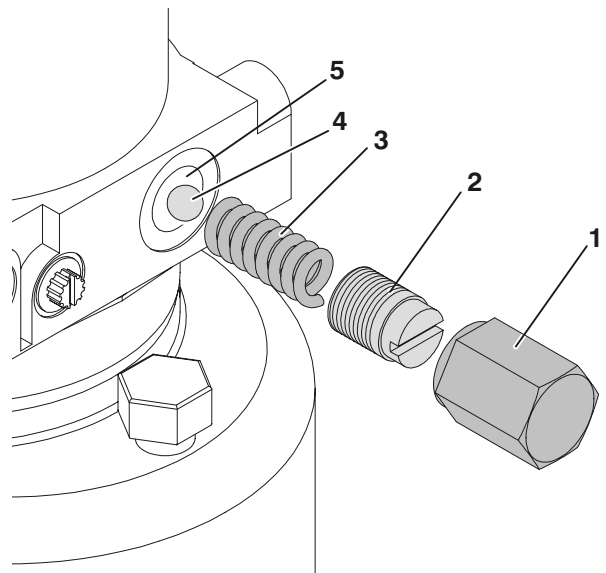
Filter Screen - Removal/Installation

- Requires removal of tank assembly.

- | | |
|-----------------------|----------------------|
| 1. Filter Screen | 4. Tube Attach Screw |
| 2. Pump Pick-Up Tube | 5. O-Ring |
| 3. Tube Retainer Clip | |

Note: Tubes shown shortened for illustrative purposes only.

Pressure Adjust Valve Removal/Installation



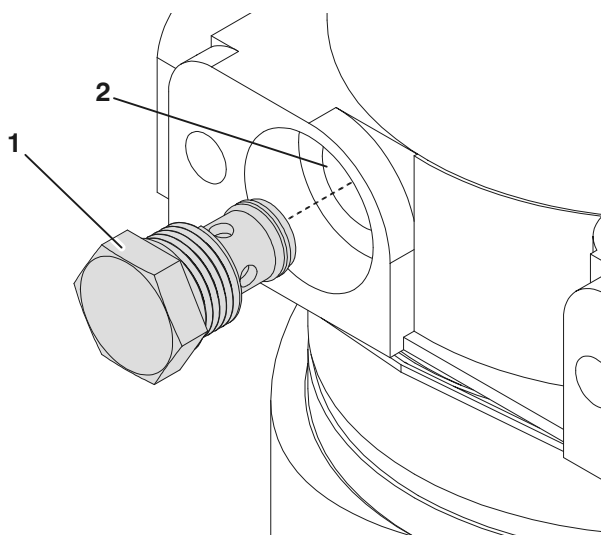
Pressure Adjust Valve - Removal/Installation

- | | |
|---------------------|----------------------|
| 1. Adjust Valve Cap | 4. Valve Ball |
| 2. Adjustment Screw | 5. Adjust Valve Port |
| 3. Valve Spring | |

Note: Adjust pressure per specification shown in Section-1 of this Service Manual.

SECTION 4 - CONTROL COMPONENTS

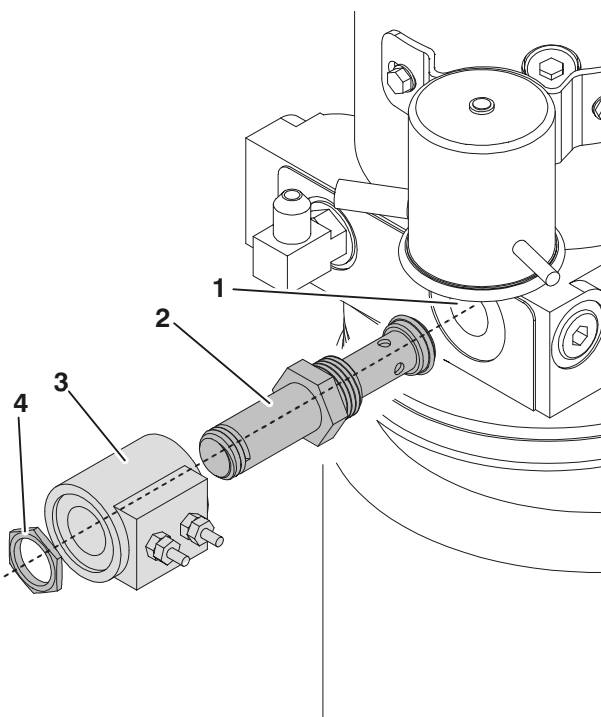
Pressure Check Valve - Removal/Installation



Pressure Check Valve Removal/Installation

1. Check Valve Assembly
2. Check Valve Port

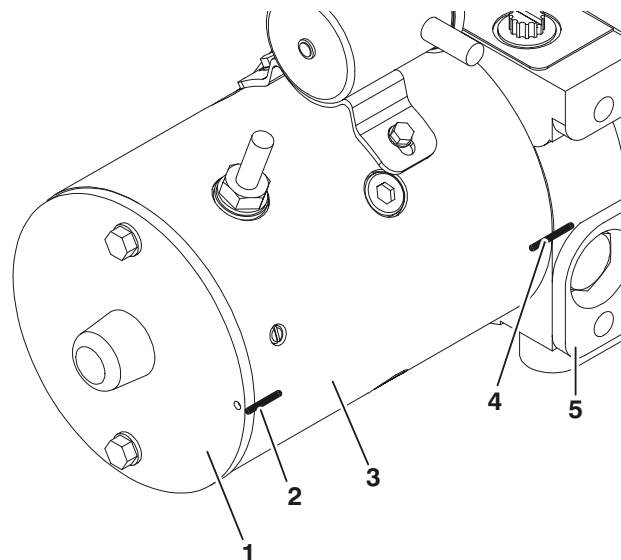
Lift Down Valve - Removal/Installation



Lift Down Valve - Removal/Installation

1. Valve Port
2. Valve
3. Valve Solenoid
4. Solenoid Nut

Motor - Remove/Install - Reference Marks

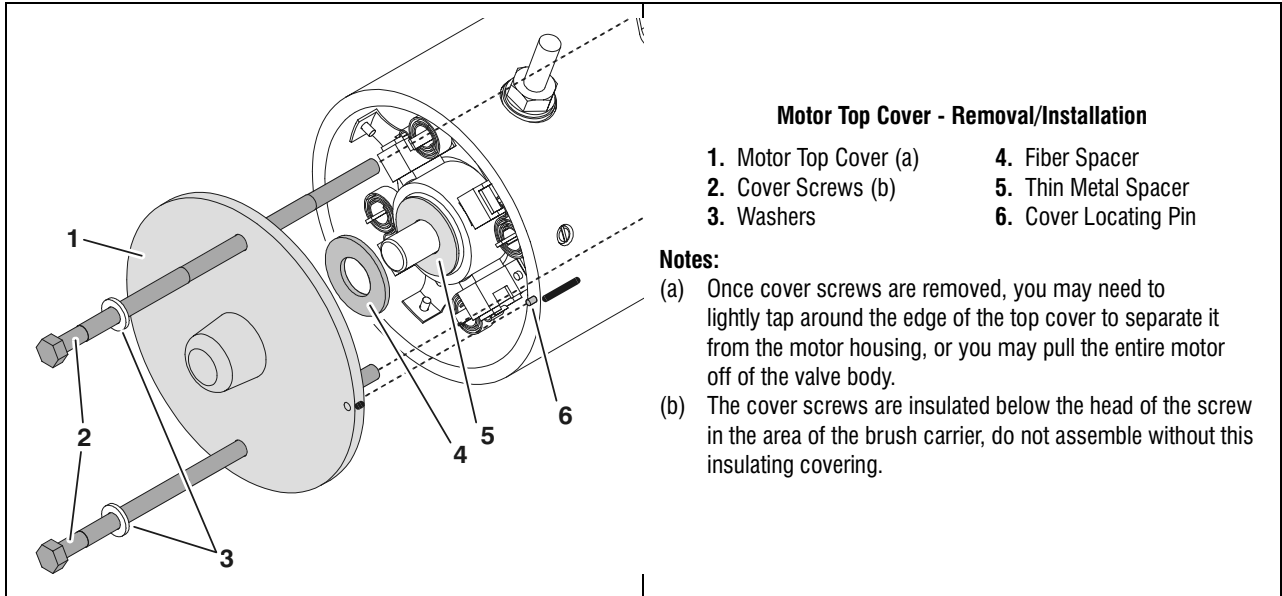


Motor - Removal/Installation - Reference Marks

- For reference when reassembling, mark motor cover, housing and valve body position before disassembling.

1. Motor Top Cover
2. Cover/Housing Reference Mark
3. Motor Housing
4. Housing/Motor Valve Body Reference Mark
5. Motor Valve Body

Motor Top Cover - Removal/Installation



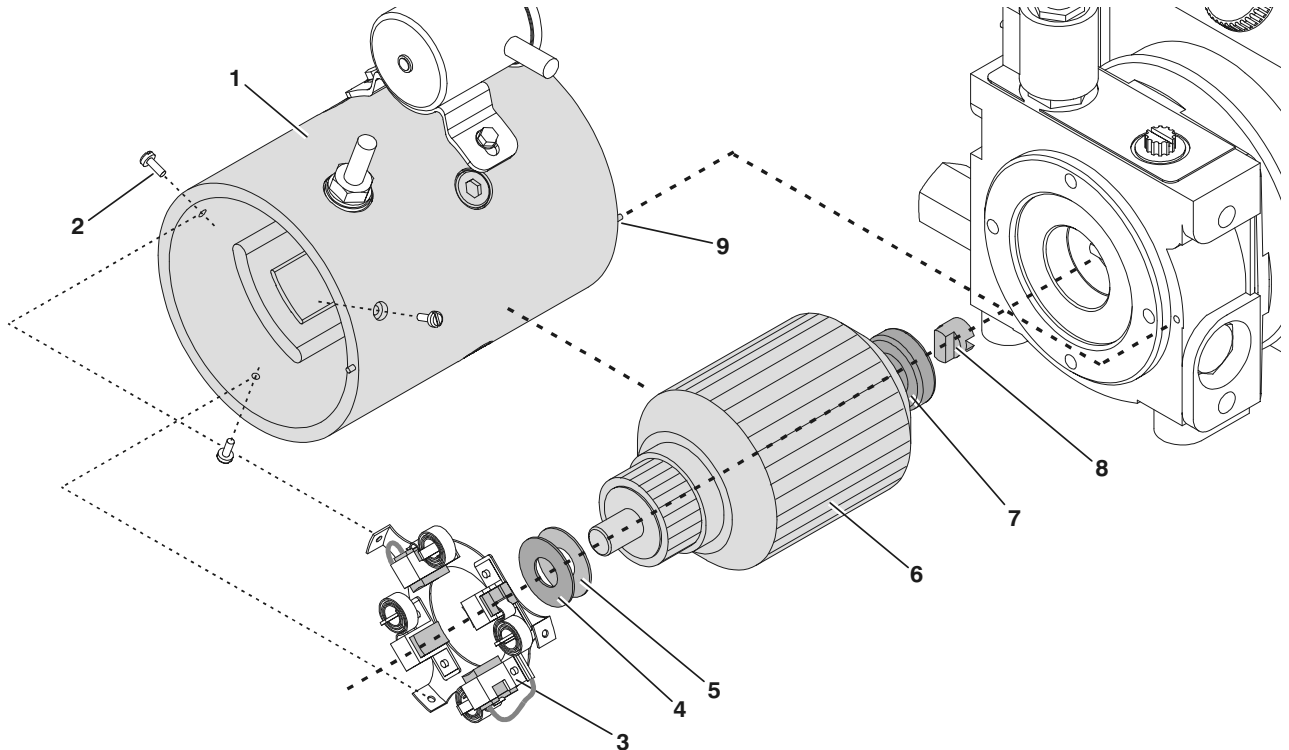
Motor Top Cover - Removal/Installation

- | | |
|------------------------|-----------------------|
| 1. Motor Top Cover (a) | 4. Fiber Spacer |
| 2. Cover Screws (b) | 5. Thin Metal Spacer |
| 3. Washers | 6. Cover Locating Pin |

Notes:

- (a) Once cover screws are removed, you may need to lightly tap around the edge of the top cover to separate it from the motor housing, or you may pull the entire motor off of the valve body.
- (b) The cover screws are insulated below the head of the screw in the area of the brush carrier, do not assemble without this insulating covering.

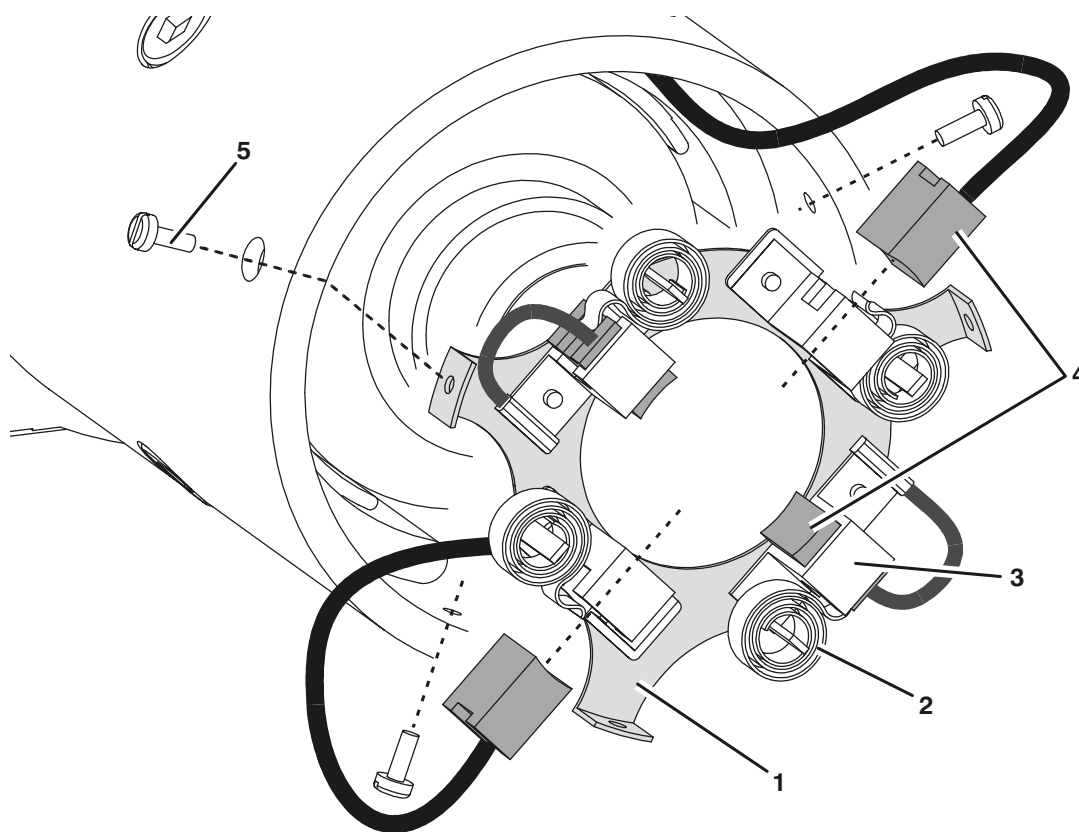
Motor Components - Removal/Installation



Pump Motor Components - Removal/Installation

- | | | |
|-----------------------------|----------------------|--------------------------|
| 1. Motor Housing | 4. Fiber Spacer | 7. Lower Rotor Bearing |
| 2. Brush Carrier Screws (3) | 5. Thin Metal Spacer | 8. Motor to Pump Coupler |
| 3. Brush Carrier Assembly | 6. Rotor Assembly | 9. Housing Locating Pin |

Brush Carrier - Removal/Installation



Brush Carrier - Removal/Installation

1. Brush Carrier Assembly 2. Brush Spring 3. Brush Holder 4. Brushes 5. Carrier Screws

Note: Length of wires to brush assemblies shown exaggerated for illustrative purposes.

Once brush carrier assembly has been removed, inspect the rotor commutator for excessive wear before installing a new brush set.

The rotor commutator surface when new, is approximately 1/8 in. (3mm) in thickness.

Brush Housing Final Assembly Tips

It is easier to install the brush carrier assembly by sliding the rotor assembly completely out of the other end of the motor housing, then attach the brush carrier first. After the brush carrier is installed look into the motor housing from the opposite end to check that the positive (+) post wires and static winding wires are positioned not to block the holes for the motor mounting bolts, and are properly positioned around the motor housing.

After final assembly of the brush housing check that all brush terminal screws are tight and the brush springs are positioned properly before mounting the motor to the pump/motor end head.

4.7 BATTERY CHARGER - SERVICE PROCEDURES

General Information

IMPORTANT

DO NOT ATTEMPT TO DISASSEMBLE THE BATTERY CHARGER IF MACHINE IS STILL UNDER WARRANTY. OPENING THE BATTERY CHARGER WHILE THE MACHINE IS UNDER WARRANTY WILL VOID THE CHARGER WARRANTY. IF UNDER WARRANTY REQUEST A REPLACEMENT CHARGER FROM THE FACTORY.

ALSO BEFORE REPLACING ANY COMPONENT, USE THE CHARGER MANUFACTURERS TROUBLESHOOTING GUIDE SHIPPED WITH THE MACHINE TO CHECK THE INTERNAL AC AND DC CIRCUITS AND DETERMINE WHICH COMPONENT HAS FAILED. A WIRING DIAGRAM FOR THIS MODEL DUAL VOLTAGE-SCR CHARGER IS INCLUDED AT THE END OF THIS SECTION OF THE MANUAL, SEE FIGURE 4-2.

See Section 4.3 of the manual for location and removal instructions of charger from machine.

The battery charger allows for replacement of the following internal components. Consult your Illustrated Parts Manual for part numbers of these components which are available from the JLG Parts Department:

- Transformer
- Printed Circuit Board
- Shunt Assembly
- Capacitors
- SCR Rectifier
- AC Circuit Breaker
- DC Circuit Breaker
- AC Voltage Selector Switch
- Battery Discharge Indicator

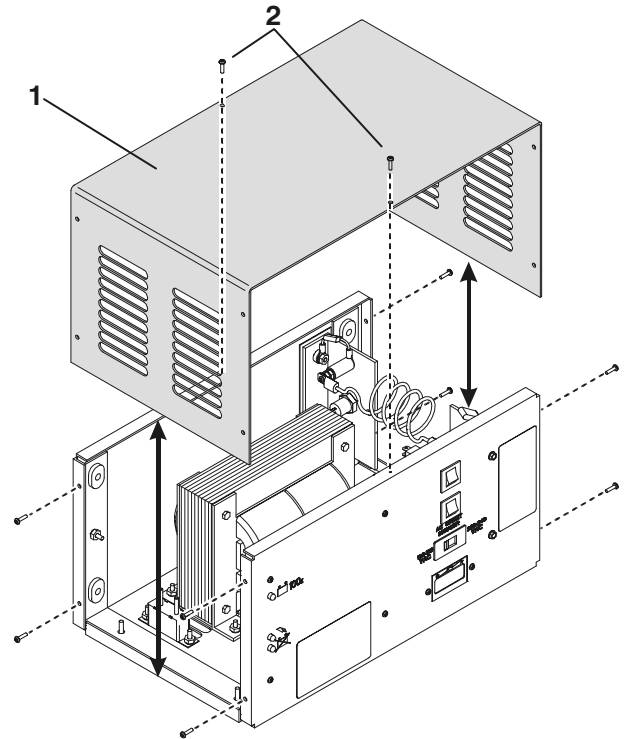
Replacement and troubleshooting of these components requires removal of the battery charger from it's mounting position on the machine.

General Component Installation Notes

When removing components make note of the wiring connections before disconnecting the wiring between the components within the charger assembly. Only disconnect enough wiring to remove a component.

The battery charger manual supplied with the machine contains a wiring diagram for the charger as well as Figure 4-2. at the end of this section of the manual.

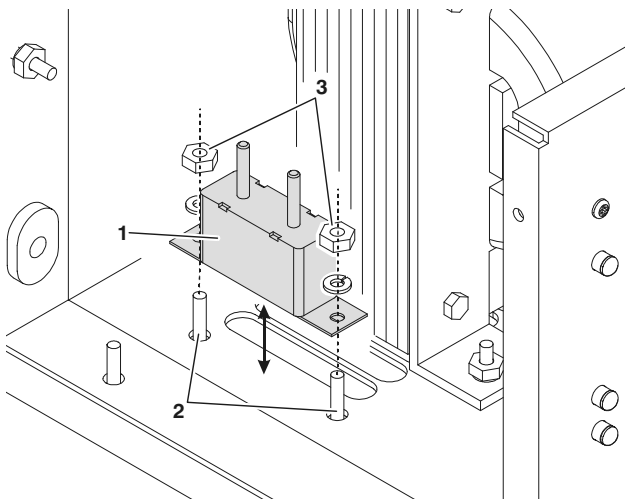
Charger Cover - Remove/Install



Battery Charger Cover - Remove/Install

1. Charger Cover 2. Cover Screws - Same on Both Sides

DC Circuit Breaker - Remove/Install

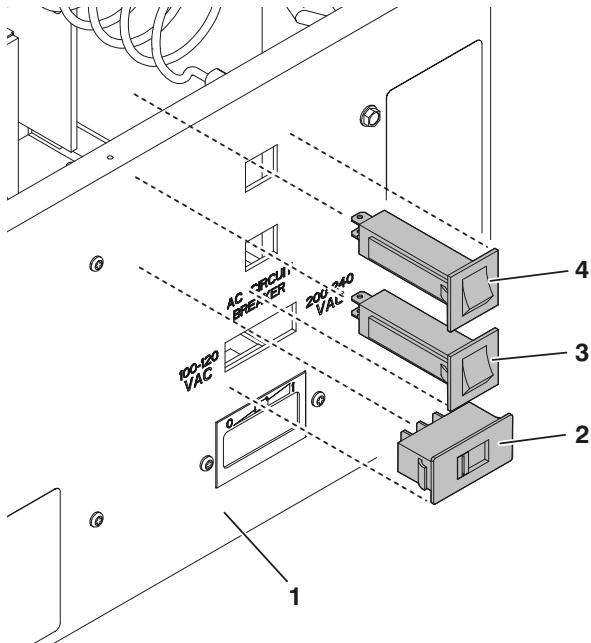


50 Amp - DC Circuit Breaker - Remove/Install

1. DC Circuit Breaker 3. Lock Washers/Nuts
2. Cap Screws

SECTION 4 - CONTROL COMPONENTS

AC Circuit Breaker/Voltage Select Switch - Remove/Install

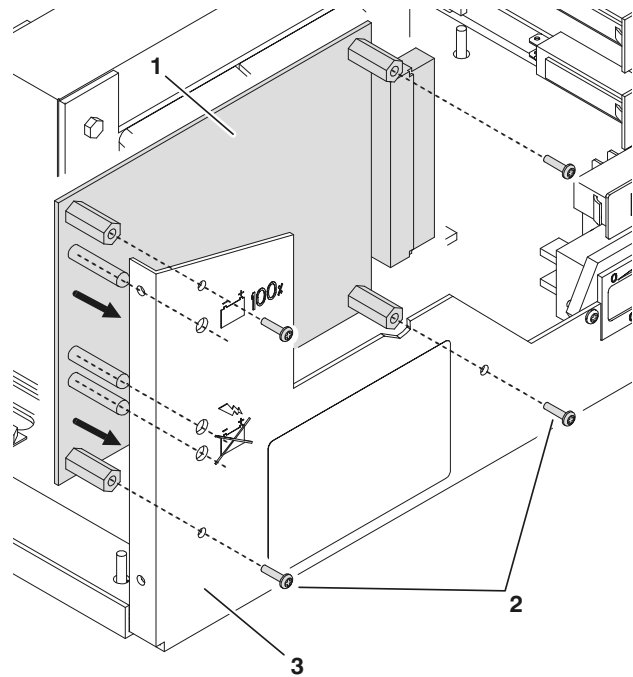


AC Circuit Breaker/Voltage Select Switch - Remove/Install

1. Front Face of Charger
2. 120/240 - AC Input Voltage Selector
3. & 4. 120 and 240 AC - 8 Amp-DC Circuit Breakers

Note: These switches are secured and released by tabs on each side of the switch behind the switch face. The cover must be removed to release the switch.

Printed Circuit Board - Remove/Install

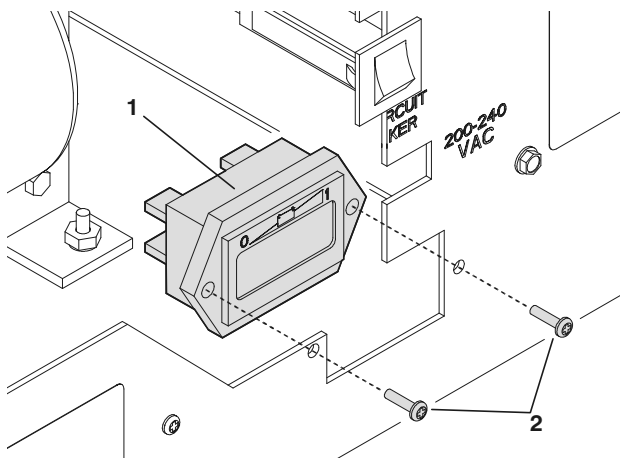


Circuit Board - Remove/Install

1. Circuit Board
2. Board Screws (4)
3. Charger Face Plate

Note: Charger front panel shown cut-away in illustration.

Battery Discharge Indicator - Remove/Install

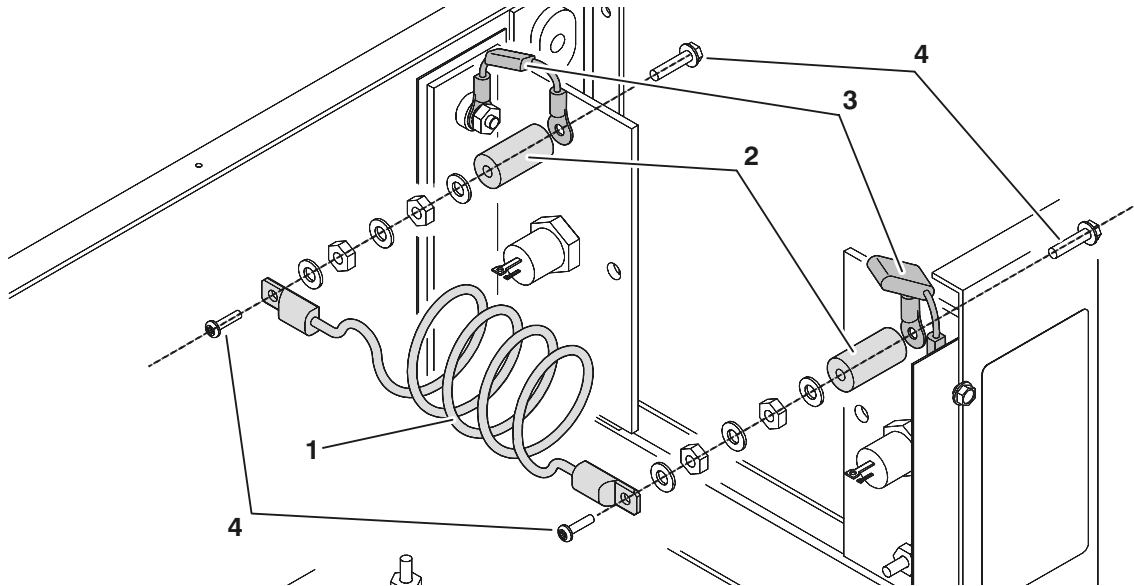


Battery Discharge Indicator - Remove/Install

1. LED Display Indicator
2. Mounting Screws

Note: Charger front panel shown cut-away in illustration.

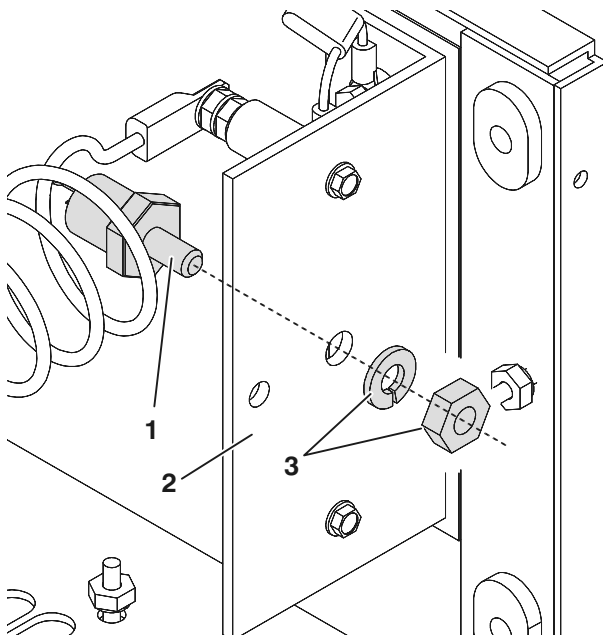
**Shunt Assembly and Capacitors -
Remove/Install**



Shunt Assembly and Capacitors - Remove/Install

1. Shunt Assembly 2. Spacers (2) 3. Capacitors 4. Attach Screws (4)

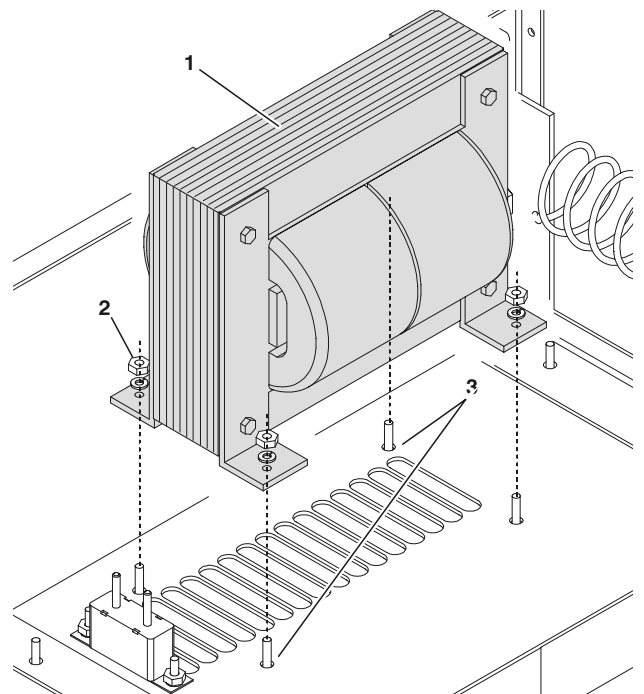
SCR Rectifier - Remove/Install (Either Side)



**SCR Rectifier - Remove/Install
(Same Mounting on Both Sides)**

1. SCR Rectifier 3. Nut/Lock Washer
2. Aluminum Mount Plate

Transformer Installation



Transformer Remove/Install

1. Transformer 2. Nuts/Washers (4) 3. Attach Screws

SECTION 4 - CONTROL COMPONENTS

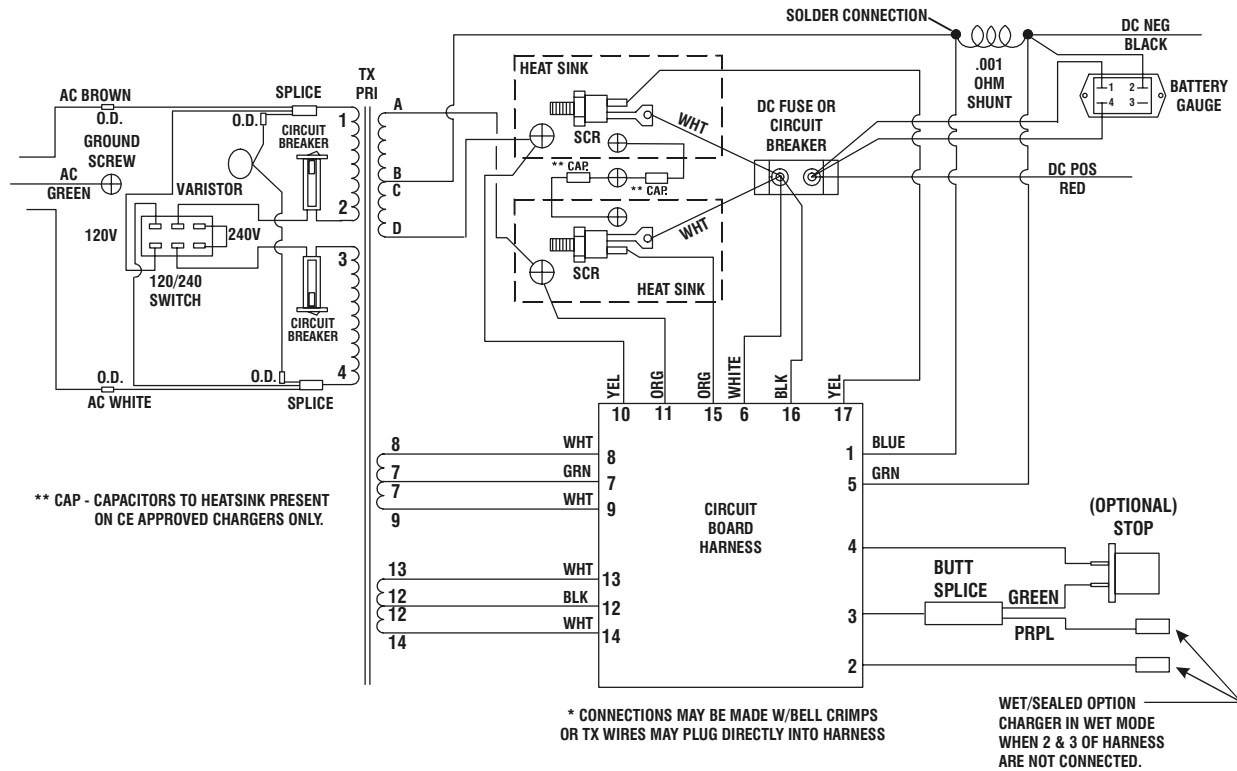
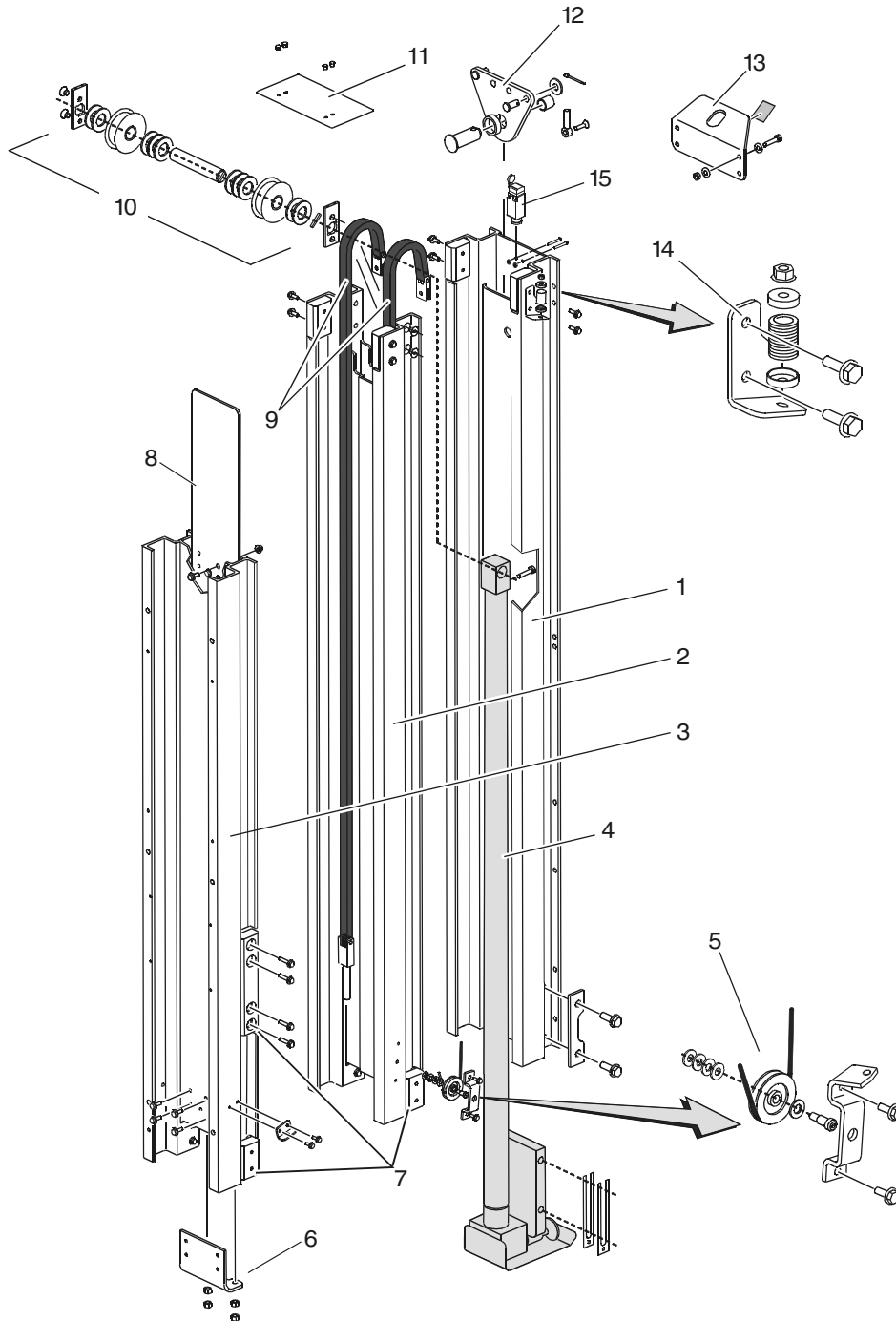


Figure 4-2. 9MP - SCR Dual Voltage - Battery Charger Wiring Diagram.

SECTION 5. MAST COMPONENTS

5.1 MAST COMPONENTS OVERVIEW



- | | | | | |
|---------------------|---------------------------|-------------------|---------------------------|---------------------------------------|
| 1. Mast Section - 1 | 4. Lift Cylinder Assy. | 7. Slide Pads | 10. Chain Sheave Assy. | 13. Crane Hook Anchor |
| 2. Mast Section - 2 | 5. Sequence Cable (Lower) | 8. Chain Guard | 11. Mast Cover | 14. Sequence Cable (Upper) |
| 3. Mast Section - 3 | 6. Chain Anchor (Lower) | 9. Mast Chain Set | 12. Chain/Equalizer Plate | 15. Brake Alarm Limit Switch (Option) |

Figure 5-1. Mast Components. (9MP)

5.2 MAST CHAINS AND SEQUENCING CABLES ADJUSTMENT

Mast Chain Adjustment (See Figure 5-2.)

The intention of this procedure is to assure equal load distribution between the individual chains of a mast section chain sets. Also to set the platform height above the base frame when the platform is completely lowered.

Adjust using the following procedure;

1. With mast retracted, step into the platform and bounce your weight up and down a few times to be certain platform is at the bottom of travel. Be certain the chain set is seated in the sheaves properly at the top of the mast.
2. Then with no load in the platform check the clearance from the frame under the platform, to the top of the machine base frame, it should be approximately 1 inch (2.54cm). (See Figure 5-2.)

NOTE: Mast section-1 is fixed to the base and mast section-2 is attached to the lift cylinder, these sections require no adjustment.

3. To adjust, elevate the platform until the chain anchor adjust nuts are accessible at the front and bottom of the mast section 3 (platform mounting section).

WARNING

NEVER WORK UNDER AN ELEVATED PLATFORM UNTIL PLATFORM HAS BEEN SAFELY RESTRAINED FROM ANY MOVEMENT BY BLOCKING OR OVERHEAD SLING.

4. Unthread the (*jam*) nuts from the adjusting nuts below the chain anchor plate.
5. **Tighten** (to raise mast section), or **loosen** (to lower mast section) the **adjusting nut** against the anchor plate on each chain. Adjust the nuts the amount required to raise or lower the mast section to obtain the proper platform height when the mast is retracted.

NOTE: It is more important that the (threaded ends) studs protruding on the adjustments are equal side to side than it is that the tension in the chains is equal. The chain equalizer plate will always assure equal tension, but if the adjustment isn't equal as described, the chains may tend to pull to one side or the other. The threaded end of the chain may need to be restrained while tightening the adjust nut to keep the chain from twisting.

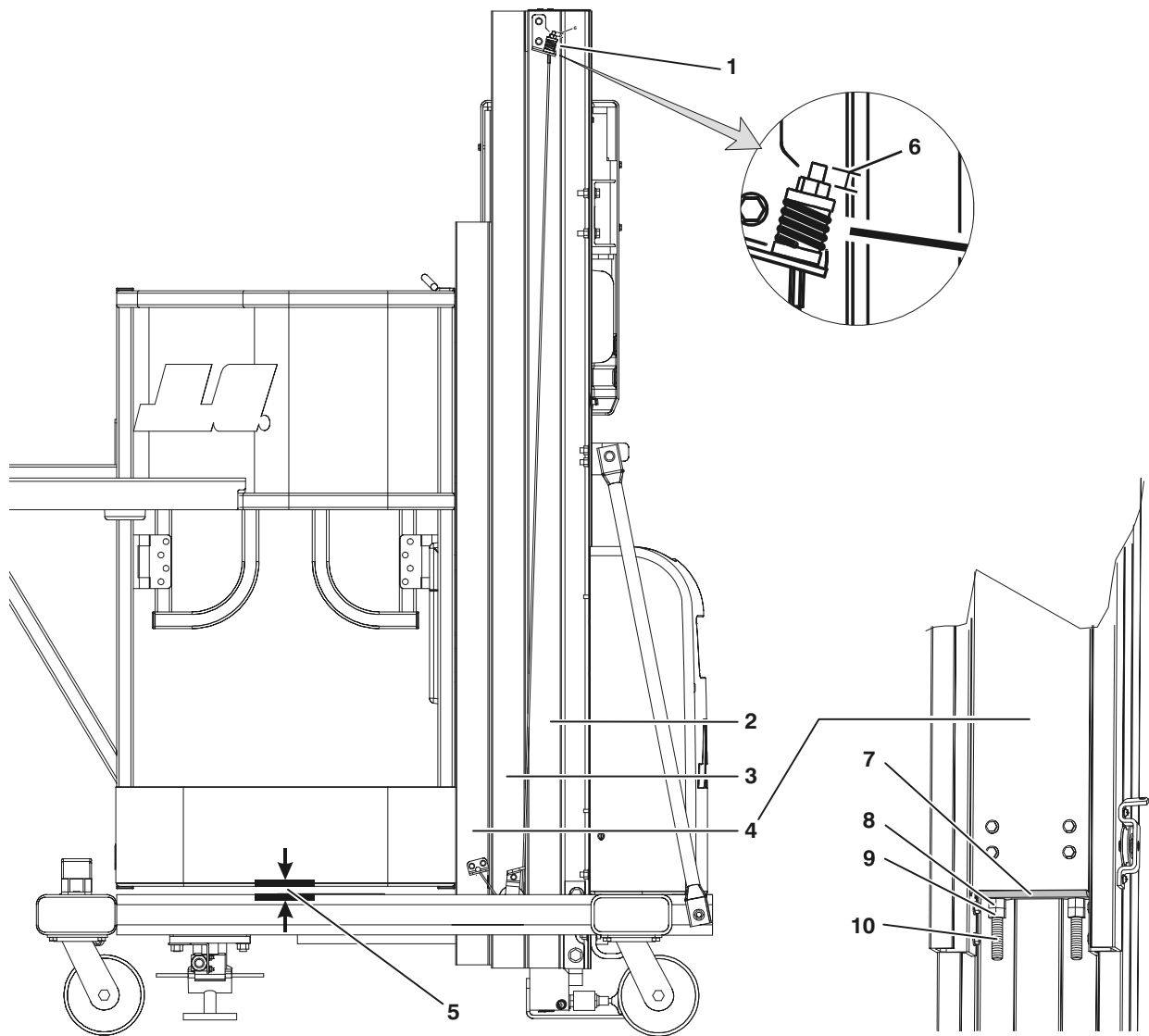
6. After making an adjustment retract the mast all the way and check if the platform height is adjusted properly as shown in Figure 5-2.
7. Repeat steps (5) and (6) until the proper platform height is obtained.
8. Once mast section adjustment is completed, apply loctite #242 to the threads under the (*jam*) nuts that were loosened. Then re-tighten the loosened (*jam*) nuts until tight against the top (*adjust*) nut.
9. Run mast through several cycles to verify chain adjustments and ensure no interference exists between chain anchor brackets and mast.

Sequencing Cable Adjustment (See Figure 5-2.)

1. Retract mast completely, and check the sequencing cable on outside of masts for excessive slack. Adjust only to remove slack from cable.
2. Tighten nylock-nut just enough to remove excessive slack from sequencing cable. The springs should not be compressed more than 25% after adjusting.

NOTE: Adjustment and spring compression will vary due to cable stretch as mast lift and lower cycles accumulate. If cable cannot be adjusted to remove slack, either the mast chain is adjusted improperly (platform to low) or the cable has stretched and needs replaced.

3. Run mast through several cycles to verify cable adjustments and ensure cable is seated in the sheave properly.



- | | | | |
|------------------------------|---------------------------------------|-----------------------------|------------------------|
| 1. Sequence Cable Adjust Nut | 4. Mast Section - 3 (c) | 7. Chain Anchor Plate | 10. Threaded Chain End |
| 2. Mast Section - 1 (a) | 5. 1 in. (2.54cm) Platform Height (d) | 8. Chain Adjust Nut | |
| 3. Mast Section - 2 (b) | 6. 1/4 in. (6mm) Cable Adjustment (e) | 9. Chain Lock (Jam) Nut (f) | |

Notes:

- (a) Mast section fixed.
- (b) Mast section raised by lift cylinder.
- (c) Mast section lifted by chain, can be adjusted.
- (d) Bottom of platform to top of base frame, approximate dimension adjustment.
- (e) Mainly adjust to remove slack in cable with 25% spring compression when mast is fully lowered. This adjustment also depends on mast section 3, platform to base frame adjustment, this adjustment can affect sequence cable adjustment. Also as cable stretches, more spring compression will be required. If mast section 3 is adjusted properly and sequence cable cannot be adjusted to remove slack, the sequence cable will need to be replaced due to stretching.
- (f) Apply Loctite #242 at final tightening.

Figure 5-2. Mast Chain and Sequence Cable Adjustment Components. (9MP)

5.3 HYDRAULIC LIFT CYLINDER - REMOVAL, INSPECTION AND REBUILD

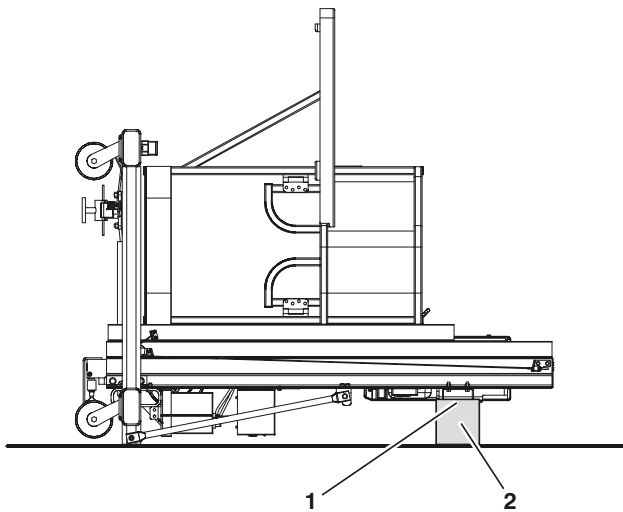
⚠ WARNING

HYDRAULIC CYLINDERS ARE DESIGNED TO HOLD HYDRAULIC FLUID UNDER HIGH PRESSURE. ENSURE ALL APPROPRIATE MEASURES ARE TAKEN TO RELIEVE RESIDUAL PRESSURE IN THE CYLINDER BEFORE DISCONNECTING LINES.

Lift Cylinder Removal

Removal of the hydraulic lift cylinder without removing the mast from the machine requires laying the machine on it's back (hood side) with the platform end on top.

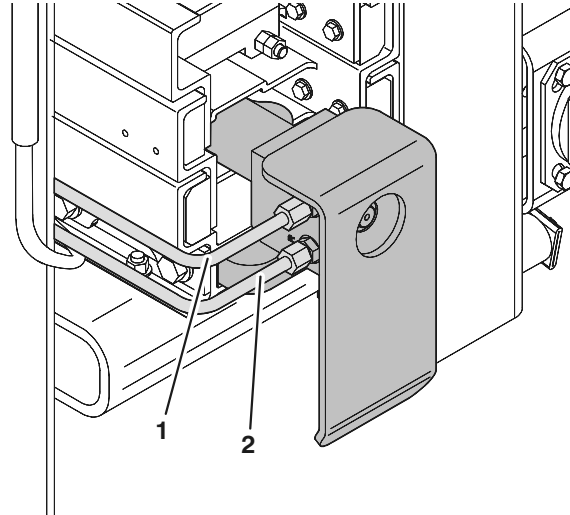
1. Remove the following components from the machine before laying machine on it's back:
 - Rear Cover (See Section 4)
2. Seal the vented cap on the hydraulic fluid reservoir by removing the cap, covering the hole with a few layers of plastic wrap or equivalent. Then install and tighten the cap over the plastic wrap to prevent leakage of hydraulic oil from the reservoir while machine is in a layed back position.
3. Use a forklift truck or overhead crane and carefully lay the machine on it's back, place a support under the mast end, keeping mast close to level. (See Figure 5-3.)



1. Support Mast Here Under Ground Station Support Beam.
2. Use An Object Capable Of Supporting Machines Weight.

Figure 5-3. Machine Positioned for Cylinder Removal.

4. At the base end, on the lift cylinder valve block, remove and tightly cap the extend and return hydraulic lines.

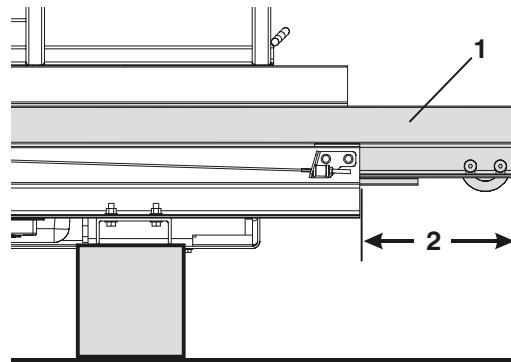


Remove Hydraulic Extend and Return Lines

1. Cylinder Extend Line 2. Cylinder Return Line

Notes: Cap lines tightly to keep lines clean and also to keep hydraulic fluid from the pump/motor reservoir from leaking out.

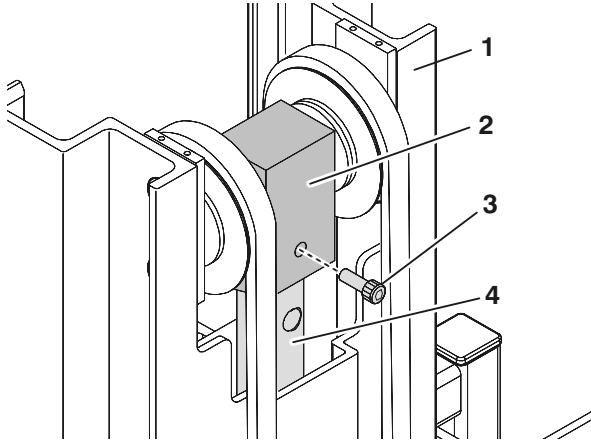
5. At the top of the mast, remove the mini cover from the top of the mast section 2 and the chain guard from mast section 3.
6. Manually extend the mast assembly until the top of mast section-2 is extended approximately one (1) foot (31cm), to allow access to the sheave wheel-cylinder attach block at the top of mast section-2 and the lift cylinder.



Extending Mast Sections

1. Mast Section-2 2. Extend 1 ft. (31cm) (Approx.)

7. Remove the cylinder rod anchor block attach screw from the back of the anchor block at the top of mast section-2.

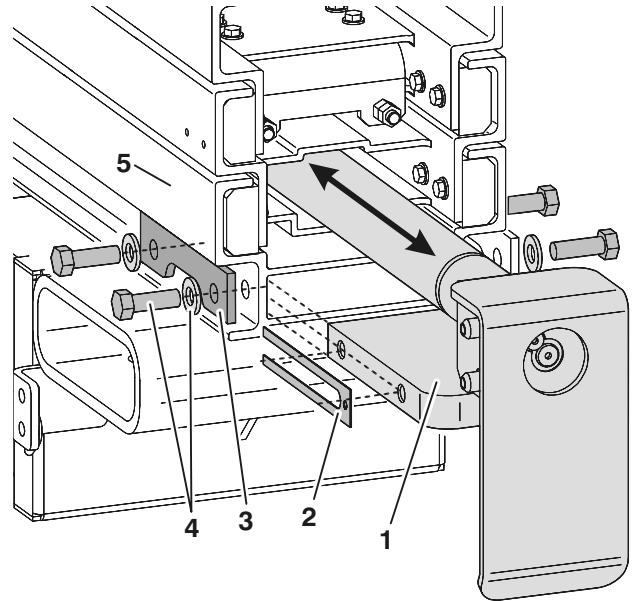


Cylinder Anchor Block Attach Screw Remove/Install

- | | |
|--------------------------|----------------------------------|
| 1. Top of Mast Section-2 | 3. Cylinder Rod Attach Screw (a) |
| 2. Cylinder Anchor Block | 4. Cylinder Rod |

Notes: (a) Apply Loctite #242 to screw threads before final assembly during installation.

8. At the base of the cylinder, remove the cylinder mount shoulder bolts, then slide cylinder assembly out of mast.



Lift Cylinder - Remove/Install

- | | |
|-----------------------------|-------------------------------|
| 1. Cylinder and Mount Assy. | 4. Mounting Bolts/Washers (b) |
| 2. Cylinder Mount Shims (a) | 5. Mast Section 2 |
| 3. Support Plate | |

Illustration above is shown with the side base frame channels (fork lift pockets) removed for illustrative purposes only.

- Notes: (a) If reassembling a cylinder assembly previously removed from the mast, note which shim set was disassembled from each side. If assembling a new cylinder assembly into the mast, shim the mount evenly on each side until the new cylinder assembly has no side to side movement in the mast channel.
- (b) Apply Loctite #242 to mounting bolt threads on final assembly.

Cylinder Disassembly

(See Figure 5-4.)

1. Before disassembling the cylinder, clean away all dirt and foreign substances from openings, particularly the head area.

NOTE: Always protect the chrome surface of the cylinder rod during assembly and disassembly. Any damage to this surface will require replacement of the rod.

2. Extend the rod until the piston bottoms out against the cylinder head.
3. Compress the head restraining ring enough to allow the cylinder head to be removed.
4. Carefully slide the head/rod/piston assembly out of the cylinder tube. A gentle tap on the head assembly may be required to remove the head from the cylinder tube.
5. Place the head/rod/piston assembly on a surface that will not damage the chrome.
6. Remove the piston locknut and separate the piston from the rod.
7. Slide the head off the rod from the piston end.

NOTE: When removing the old seals use only blunt tools, be sure there are no sharp edges that may damage the seal grooves during removal. Scratching the groove may cause by-pass.

8. Remove and discard all old seals.

Lift Cylinder Component Inspection

Cylinder Rod

There should be no scratches or pits deep enough to catch the fingernail. Pits that go to the base metal are unacceptable. Scratches that catch the fingernail but are not to the base metal, less than 0.5 inch long and primarily in the circumferential direction are acceptable provided they cannot cut the rod seal. Chrome should be present over the entire surface of the rod and the lack thereof is unacceptable. In the event that an unacceptable condition occurs, the rod should be repaired or replaced.

Cylinder Head

Visually inspect the inside bore for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading and when this occurs, the bore should be checked for out-of-roundness. If out-of-roundness exceed 0.007", this is unacceptable. Check the condition of the dynamic seals (wiper, rod seals) looking particularly for metallic particles embedded in the seal surface. It is normal to cut the static seal on the retaining ring groove upon disassembly. Remove the rod seal, static o-ring and backup and rod wiper. Damage to the seal grooves, particularly on the sealing surfaces, is unacceptable. In the event that an unacceptable condition occurs, the head should be replaced.

Piston

Visually inspect the outside surface for scratches or polishing. Deep scratches are unacceptable. Polishing indicates uneven loading and when this occurs, the diameter should be checked for out-of-roundness. If out-of-roundness exceeds 0.007", this is unacceptable. Check the condition of the dynamic seals and bearings looking particularly for metallic particles embedded in the bearing and in the piston seal surface. Remove the seals and bearings. Damage to the seal grooves, particularly on the sealing surfaces, is unacceptable. In the event that an unacceptable condition occurs, the piston should be replaced.

Tube Assembly

Visually inspect the inside bore for scratches and pits. There should be no scratches or pits deep enough to catch the fingernail. Scratches that catch the fingernail but are less than 0.5 inch long and primarily in the circumferential direction are acceptable provided they cannot cut the piston seal. The roughness of the bore should be between 10 and 20 μ inches RMS. Significant variation (greater than 8 μ inches difference) are unacceptable. In the event that an unacceptable condition occurs, the tube assembly should be repaired or replaced.

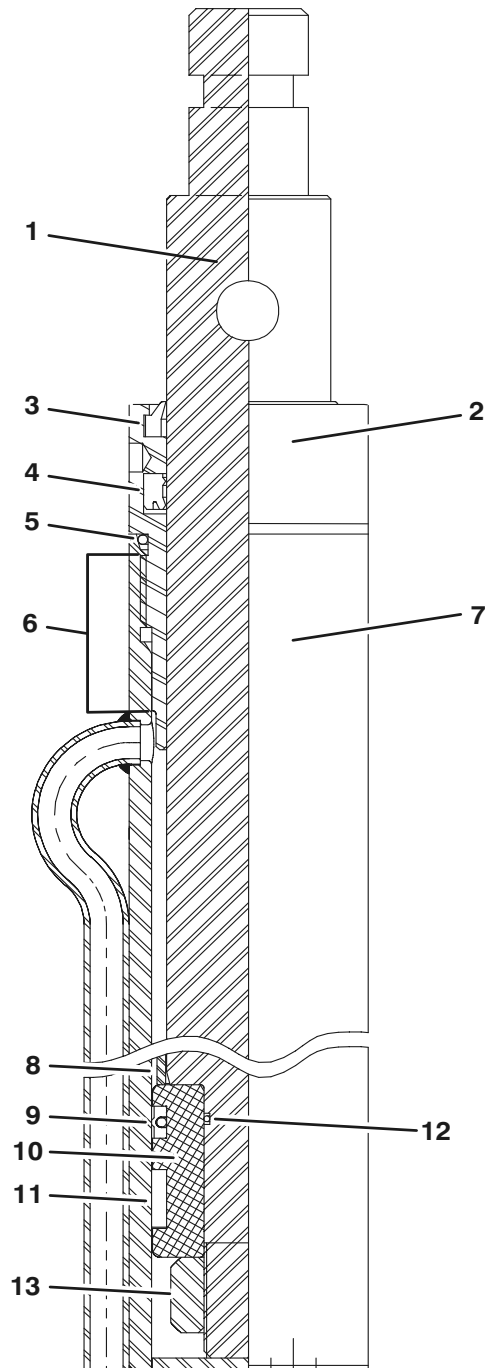
Cylinder Assembly

(See Figure 5-4.)

1. Rinse the inside of the tube with hydraulic fluid and allow to drain. A high-pressure rinse followed by a wipe with a lint-free rag is preferable. Clean all internal components of any foreign material.
2. Lubricate the head and all seals with hydraulic fluid prior to installation. Install the seal, wiper, o-ring, back-up ring, and retraining ring to the cylinder head.
3. Lubricate the piston and all components with hydraulic fluid. Install the seal and wear ring to the piston.

NOTE: Re-check that seals are not twisted or pinched and are properly seated.

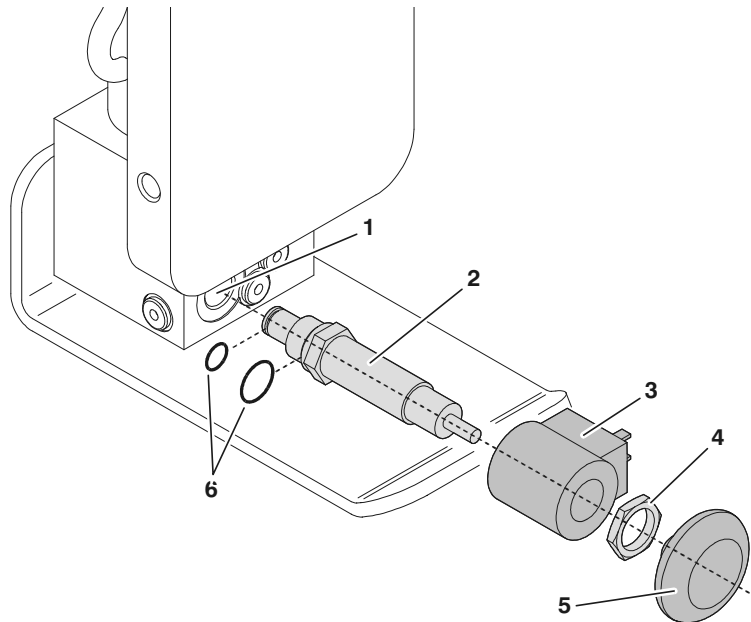
4. Place the rod on a clean table. Install the static piston o-ring seal into the groove on the piston end of the rod.
5. Install the head followed by the piston onto the rod noting the proper orientation of each component. Torque the piston nut to 100-120 ft. lbs.
6. When the rod assembly is ready to be installed into the tube, liberally apply an anti-seize lubricant to the cylinder head surface which slides into the cylinder tube.
7. Next dip the entire rod assembly into hydraulic fluid and stuff this assembly into the tube. Watch the seals as they pass over the rod port (if visible) to be sure they are not nicked or cut.
8. Install the head until the retaining ring seats in its groove.



- | | | |
|------------------|---------------------|-------------------------|
| 1. Cylinder Rod | 6. Apply Anti-Seize | 10. Piston |
| 2. Cylinder Head | 7. Cylinder Tube | 11. Wear Ring |
| 3. Rod Wiper | 8. Spacer | 12. Piston O-Ring |
| 4. Rod Seal | 9. Piston Seal | 13. Piston Lock Nut (a) |
| 5. O-Ring | | |

Note: (a) - Torque 100 - 120 ft. lbs.

Figure 5-4. Lift Cylinder Component Cross-Section



Lift Down Valve and Manual Release Installation (9MP)

- | | | |
|------------------------|---------------------------|-----------------------------|
| 1. Valve Port | 3. Valve Solenoid (b) | 5. Valve Release Knob (Red) |
| 2. Lift Down Valve (a) | 4. Solenoid Retaining Nut | 6. Valve O-Rings (a) |

Notes: (a) Coat all o-rings with clean hydraulic fluid before assembling.
(b) Mount with electrical terminals pointing to the right side (port side) of machine.

Cylinder Installation

To install the lift cylinder reverse the Lift Cylinder Removal instructions at the start of this section, however perform the following additional steps during re-assembly.

1. Apply Loctite #242 (*red*) to the cylinder mounting bolt threads securing the lift cylinder mount to the mast on final assembly.
2. Check that the platform electrical control cables and the sequence cables are seated in their sheave wheel assemblies when extending mast sections for reassembly.
3. Remove the plastic wrap from under the hydraulic reservoir tank cap.

5.4 MAST ASSEMBLY - REMOVE/INSTALL

NOTE: The mast may be completely disassembled while on the machine except for section-1 mast extrusion which is bolted to the machine. Follow steps 1 to 3 on cylinder removal for laying machine on it's back as shown in Section 5.3, Hydraulic Lift Cylinder - Removal, Inspection and Rebuild. Then perform the mast disassembly/assembly instructions in Section 5.5.

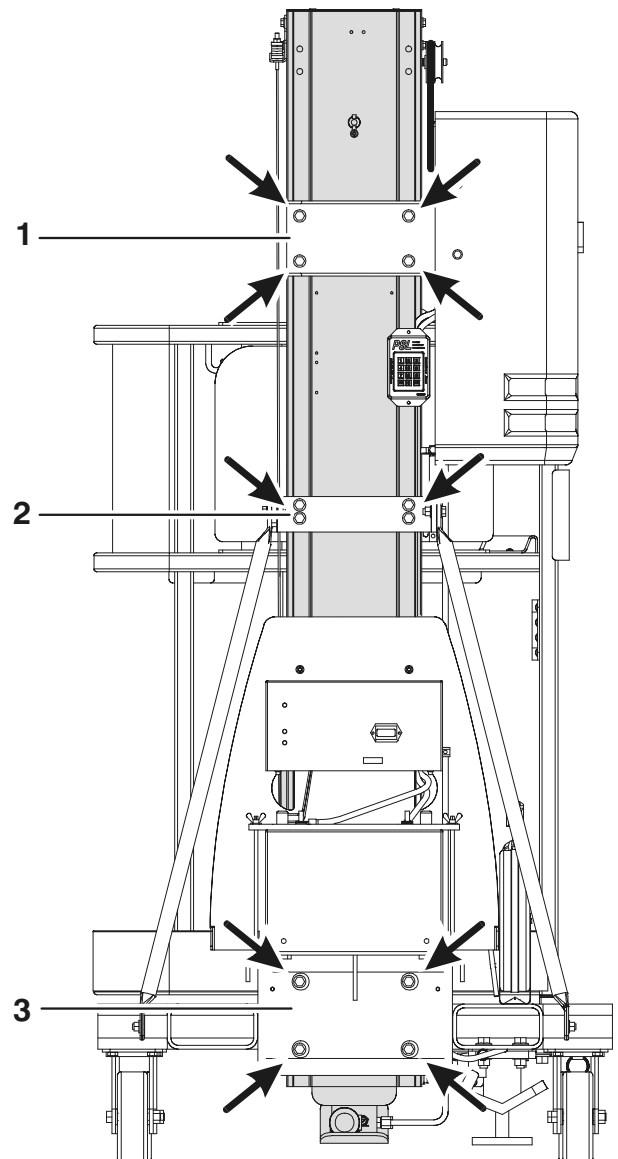
Mast Removal

- The following components must be removed from the machine before removing the mast assembly:
 - Rear Battery/Charger Cover
 - Battery Charger
 - Complete Ground Control Station with Mount and Hydraulic lines
 - Platform Assembly
- Disconnect the positive battery cable from the battery.
- Unplug the platform control cable connector at the ground control module.
- Remove the clamp attaching the platform control cable from inside the mast mounting column.
- Disconnect the spring and clamp attaching the platform controls cable on the right side of the mast.
- Under the machine, disconnect and cap the hydraulic extend and return lines from the hydraulic cylinder.
- Using an overhead crane or suitable lifting device capable of supporting the weight of the mast assembly, attach a sling strap to the mast. (If installed, use the optional crane lifting lug on the top back of the mast.)
- Remove the four (4) mast support bolts/nuts/washers from the mast support midway on the mast.
- Remove the four (4) mast attach bolts with washers and nuts securing the mast to the base frame mount.
- Carefully lift the mast off the base frame and place on a suitable work surface.

Mast Installation

To install the mast assembly reverse the Mast Assembly Removal instructions, however perform the following additional steps during re-assembly.

- Once assembly is complete cycle the mast up and down several times, then check the oil level in the hydraulic reservoir.



Mast Assembly - Remove/Install

- Pump Mounting Weldment Bolts/Nuts/Washers
- Mast Brace Support Bracket Bolts/Nuts/Washers (a)
- Base Frame - Mast Mounting Bolts/Nuts/Washers (a)

Notes: (a) Apply Loctite #242 to bolt threads on final assembly.

5.5 MAST ASSEMBLY AND DISASSEMBLY PROCEDURES

The model 9MP lift mast sections are constructed of extruded aluminum, protected with an anodized surface finish. The mast sections are interlocked into each other when assembled, by internally mounted slide pads at the top and bottom of each mast section. These slide pads run up and down in slide pad channels on each side of the mast.

The mast assembly contains a different number of mast sections as shown following;

Table 5-1. 9MP Mast Component Features

Model	No. of Mast Sections	Extend/Retract Device
9MP	3	Chain

Assembly procedures for all mast sections is basically the same, carefully slide the mast sections together until mast ends are even. *(When sliding the mast sections together, be careful not to scratch the anodized surface)*. Assemble the hardware to the bottom of mast section first, slide this section out the top of previous section and assemble hardware to the top of mast. Always install slide pad shims with slide pads inserted into the slide pad channels, *(ends of mast sections even)*. Applying Krytox Lubricant (JLG-P/N- 3020041) onto the slide pad channels before assembly will help mast sections slide easier after slide pads have been properly shimmed.

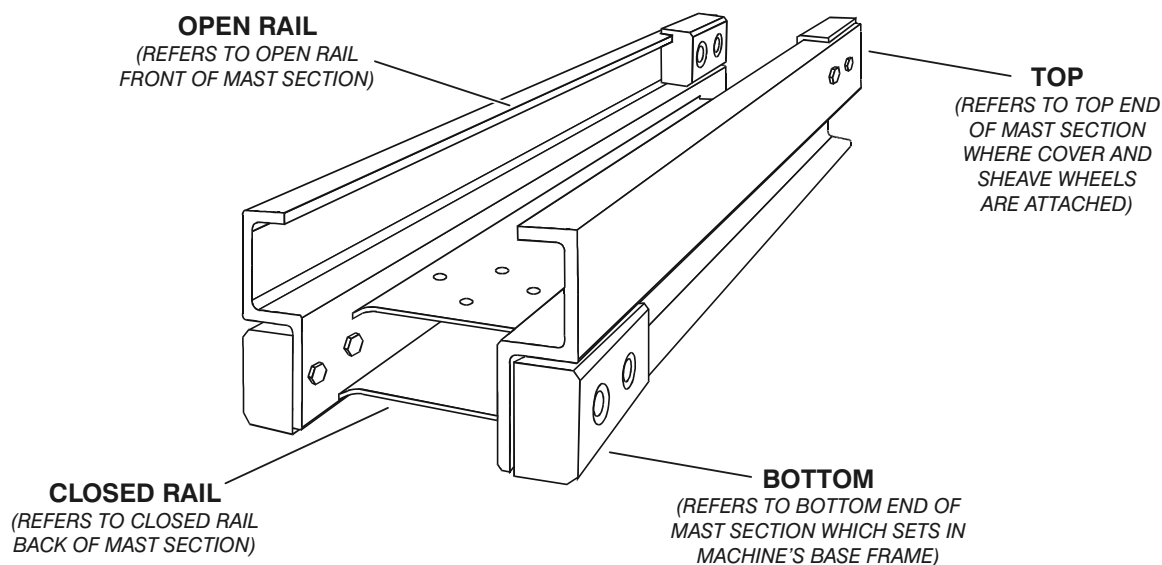


Figure 5-5. Mast Section - Assembly Reference.

Mast Disassembly Procedure

1. After the mast assembly has been removed from the machine, lay the mast assembly down on a suitable work table with the platform mounting section on top, facing up.
2. Remove the sequencing cable and hardware, if necessary, from the side of the mast assembly. Also remove the cover from the top of the mast assembly. And the chain guard from the top of mast section 3.

MAST SECTION-3 - REMOVAL

3. Remove chain adjust nuts from threaded ends of chain attached to the chain anchor plate (*lower*) on BOTTOM end of mast section-3 (*platform mounting section*). Push threaded ends of chain through anchor plate.
4. At the TOP of mast section-3, pull chains out and allow to hang for later removal. (*Be certain floor surface is clean and free of any metal chips or debris which may stick to lubricated chains*)

NOTE: *When sliding mast sections apart, be careful not to scratch or score the anodized surface in the slide pad channels.*

5. Carefully slide mast section-3 out the BOTTOM of mast section-2 rails. Disassemble slide pads, shims and chain anchor plate from mast section-3, if necessary.

MAST SECTION-2 - REMOVAL

6. Slide mast section-2 out TOP of mast section-1 far enough to allow access to the cylinder anchor block/sheave wheel assembly.

7. Remove the setscrew holding the hydraulic cylinder rod onto the cylinder anchor block.
8. Remove countersunk-flathead screws securing cylinder anchor block/sheave wheel assembly attach bars on both side rail channels at TOP of mast section-2.
9. Slide the cylinder anchor block/sheave wheel assembly out the TOP of mast section-2 and lay aside for further disassembly.
10. At the BOTTOM of mast section-1, remove the mounting bolts/washers and support plates securing the lift cylinder, then carefully slide the cylinder assembly out of mast section-2 being careful not to nick or score cylinder rod surface while removing.

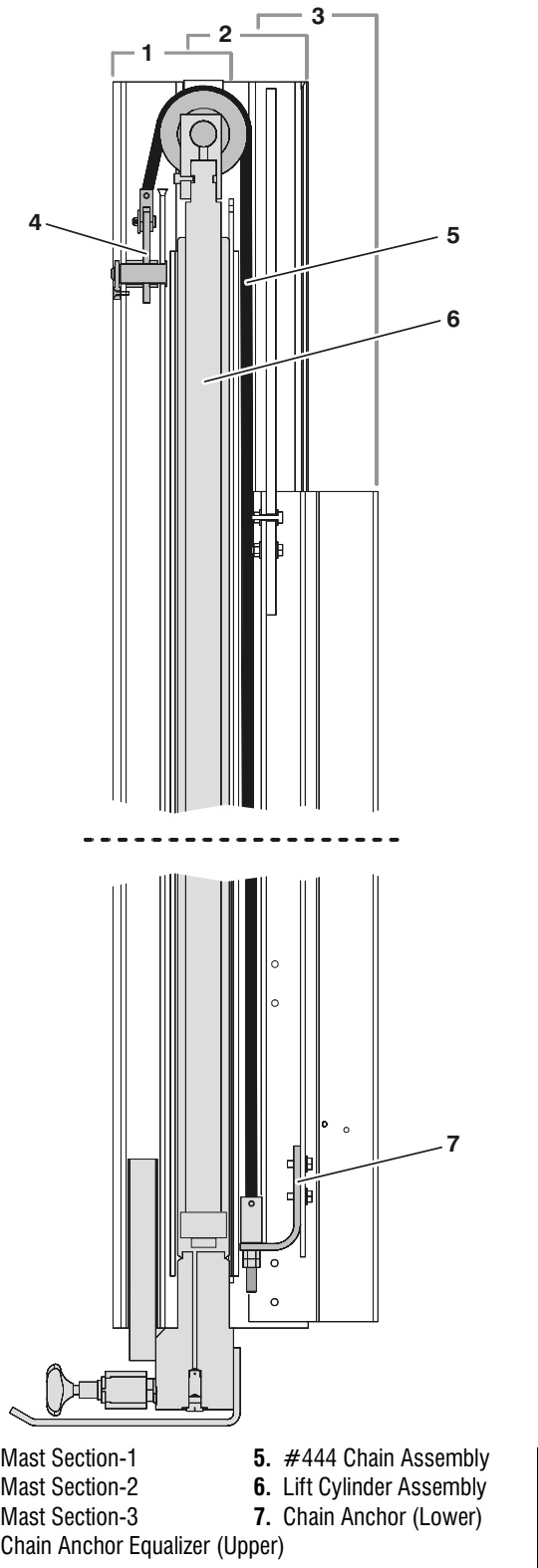
NOTE: *When sliding mast sections apart, be careful not to scratch or score the anodized finish in the slide pad channels.*

11. Carefully slide mast section-2 out BOTTOM of section-1. Remove slide pads and shims, if necessary.

MAST SECTION-1 - DISASSEMBLY

12. If equipped, remove the floor brake alarm switch assembly from the top of mast section-1.
13. Slide the TOP of mast section-1 out over edge of work surface and remove the pin attaching the chain equalizer-anchor block to mast section-1. Remove chain set and anchor block assemblies from mast and lay aside.
14. Remove slide pads and shims from mast section-1.

Mast disassembly should now be complete.



- | | |
|-----------------------------------|---------------------------|
| 1. Mast Section-1 | 5. #444 Chain Assembly |
| 2. Mast Section-2 | 6. Lift Cylinder Assembly |
| 3. Mast Section-3 | 7. Chain Anchor (Lower) |
| 4. Chain Anchor Equalizer (Upper) | |

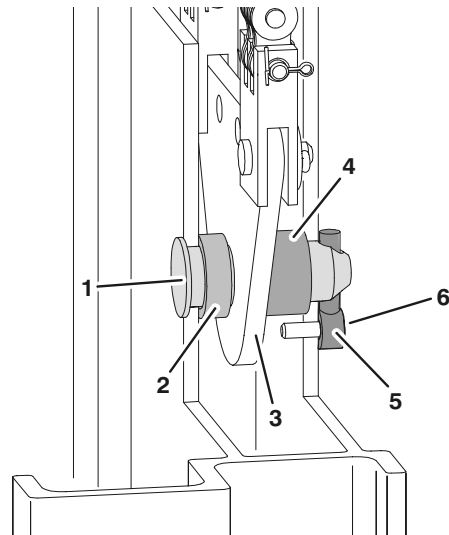
Figure 5-6. Mast Chain Routing Diagram. - 9MP

Mast Assembly - 9MP

(See Figure 2-2.)

MAST SECTION 1 - ASSEMBLY

1. Place mast section-1, rail (open) side up (See Figure 2-1.) on a clean, flat surface (preferably a table or work bench capable of supporting the weight of the entire mast assembly). Slide mast out over end of work surface far enough to allow access to the chain anchor attach hole near the top of the mast.
2. Locate the two (2) single (wide) chain assemblies and attach to the large equalizer anchor plate (if not already attached). Lay out the chain/anchor plate assembly with the anchor plate end towards top of the mast. (Be certain floor surface is clean and free of any metal chips or debris which may stick to lubricated chains).
3. Insert the chain/anchor plate assembly end into the top of mast section-1 and secure using the large anchor plate attach pin, spacers, and pin keeper.



**Chain/Anchor Plate Installation
(Mast Section-1 - Shown Cut-Away)**

- | | |
|-----------------------------|---------------------|
| 1. Anchor Plate Pin | 4. Long Spacer |
| 2. Short Spacer | 5. Pin Keeper |
| 3. Chain/Anchor Plate Assy. | 6. Keeper Screw (a) |

Notes: (a) Apply Loctite #242 to threads.

NOTE: If equipped, assemble the floor brake alarm limit switch into the top of mast section-1 now. Route the wiring out the hole on the right side of the extrusion.

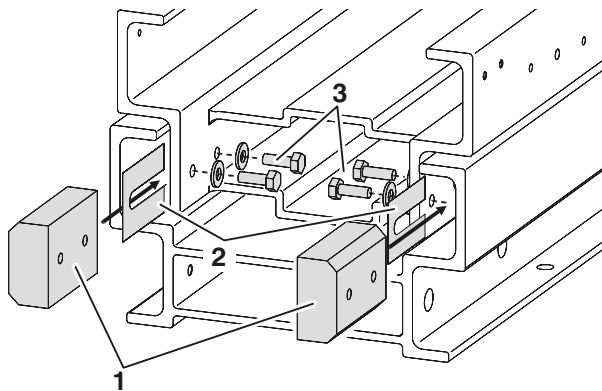
MAST SECTION 2 - ASSEMBLY

IMPORTANT

SPRAY THE SLIDE PAD CHANNELS WITH KRYTOX LUBRICANT AT ROOM TEMPERATURE BEFORE ASSEMBLING MAST SECTIONS TOGETHER AND SHIMMING SLIDE PADS.

NOTE: When sliding mast sections together, be careful not to scratch or score the anodized finish in the slide pad channels.

4. Locate mast section-2, carefully slide mast section-2 closed rail into section-1 open rail. Slide sections together until ends are even.
5. Insert slide pads into the slide pad channels at bottom end of mast between section-1 and -2, (one on each side of the mast), with beveled surface facing out towards section-1.



1. Slide Pads 2. Shim Stock 3. Slide Pad Bolts/Washers (a)

Notes: (a) Apply Loctite #242 to threads.

Figure 5-7. Mast Bottom End - Slide Pad Installation (Typical)

6. Thread slide pad attaching bolts, (two (2) 1/4"-20UNC x 3/8" long hex head bolts, place a flat washer under head of each bolt), through holes in mast section-2 inside rail, into the slide pad inserts. Thread in enough to hold pad in place.

7. Shim slide pads using the following steps:

NOTE: Always use the an even amount of shim material behind slide pads on both sides of the mast rails. This will keep mast sections centered in rail channels and prevent any distortion of the mast section.

- a. Start with a .036" thick shim and a .075" thick shim per side at each slide pad.
- b. Slide shims into place between slide pad and mast rail. Tighten the slide pad mounting bolts,

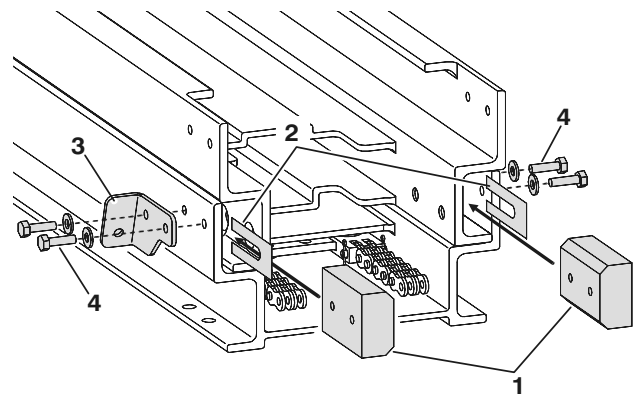
be sure there are no air gaps between shims, shim and mast or shim and slide pad when tightened.

- c. Check mast section for side play. If play exists add .015" shims dividing the thickness equally between both sides of mast. Insert shims until the shims cannot be inserted halfway by hand with the mast pulled to the opposite side.

- d. When mast slide pads are shimmed properly, there should be no side to side movement of slide pad in rail channel. Mast sections should be snug in channels but still be able to slide in channel by hand.

8. Insert slide pads into the slide pad channels (top of mast) between section-1 and -2, (one on each side of the mast), with beveled surface facing in towards section-2.

NOTE: Before fastening and shimming the slide pad on the top left side of the mast, install a sequence cable bracket against the mast under the flatwasher.



1. Slide Pads 3. Sequence Cable Bracket
2. Shim Stock 4. Slide Pad Bolts/Washers (a)

Notes: (a) Apply Loctite #242 to threads.

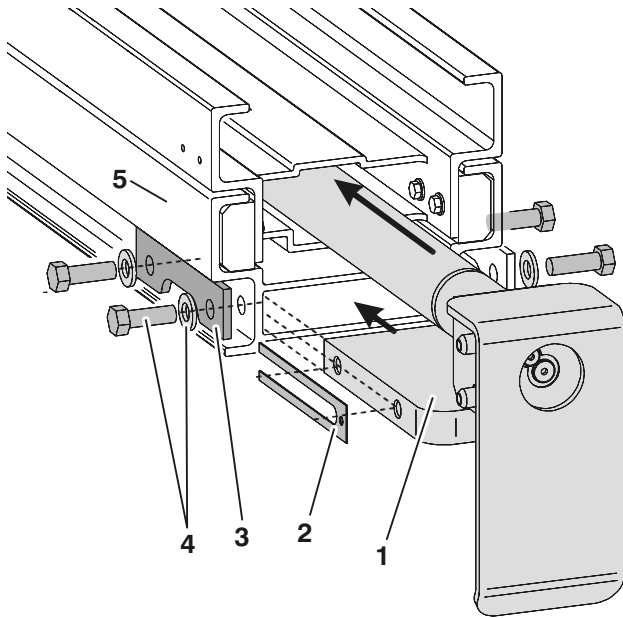
Figure 5-8. Mast Top End - Slide Pad Installation (Typical)

9. Thread slide pad attaching bolts, two (2) 1/4"-20UNC x 3/8" long hex head bolts, place a flat washer under head of each bolt, through holes in mast section-1 outside rail (top of mast) and into the slide pad inserts. Thread in enough to hold pad in place.

10. Shim per instructions in step 7, Mast Section 2 - Assembly.

SECTION 5 - MAST COMPONENTS

11. At the bottom of mast section-2, slide the lift cylinder assembly into mast section-2, with the cylinder mount inserted into mast section-1.

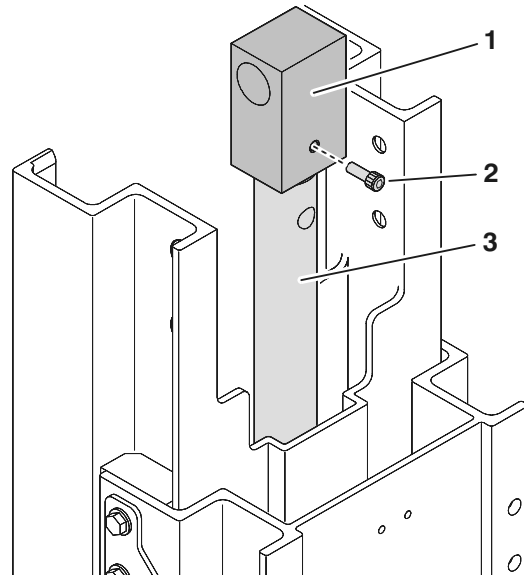


Lift Cylinder - Install

1. Cylinder and Mount Assy. 4. Mounting Bolts/Washers (b)
 2. Cylinder Mount Shims (a) 5. Mast Section 2
 3. Support Plate

Notes: (a) If reassembling a cylinder assembly previously removed from the mast, note which shim set was disassembled from each side. If assembling a new cylinder assembly into the mast, shim the mount evenly on each side until the new cylinder assembly has no side to side movement in the mast channel.

(b) Apply Loctite #242 to mounting bolt threads on final assembly.



Install Cylinder Anchor Block to Top of Lift Cylinder

1. Cylinder Anchor Block 3. Cylinder Rod (Extended)
 2. Attach Set Screw (a)

Notes: (a) Apply Loctite #242 to threads before final assembly.

12. Slide the mount into mast section-1 and check for side to side clearance. Use mounting shims of equal thickness on each side to center the mount in the closed rail portion if necessary.

NOTE: If hydraulic cylinder needs to be extended, the protective caps on the extend and return ports will need to be temporarily removed. Be careful not to nick or scour rod surface when extending, also catch any oil draining out of cylinder to avoid spillage onto work area.

13. Slide mast section-2 out of mast section-1 approximately one foot.
14. Assemble the cylinder anchor block to the cylinder rod end using the anchor plate/block attach pin and snap ring.

MAST SECTION 3 - ASSEMBLY

IMPORTANT

SPRAY THE SLIDE PAD CHANNELS WITH KRYTOX LUBRICANT AT ROOM TEMPERATURE (APPROX. 70°) BEFORE ASSEMBLING MAST SECTIONS TOGETHER AND SHIMMING SLIDE PADS.

NOTE: When sliding mast sections together, be careful not to scratch or score the anodized finish in the slide pad channels.

17. Locate the remaining mast section-3 (platform mounting - mast section). Lay mast section on flat stable surface.

18. Attach the chain bottom anchor plate (one with threaded holes aligned at the outside of bracket). Attach through set of holes in bottom of mast section-3 with four (4) 1/4"-20UNC x 3/4" long bolts, place a flatwasher under head of each bolt.

NOTE: The platform mounting section slide pads, are assembled differently than the slide pads for the other mast sections. Mast section-3 slide pads may need to be assembled/disassembled several times in order to determine the correct shim stock required for proper fit.

19. Complete the following steps to determine shim stock thickness required for section-3;

NOTE: Always use an even amount of shim material behind slide pads on both sides of the mast rails. This will keep mast sections centered in rail channels and prevent any distortion of the section.

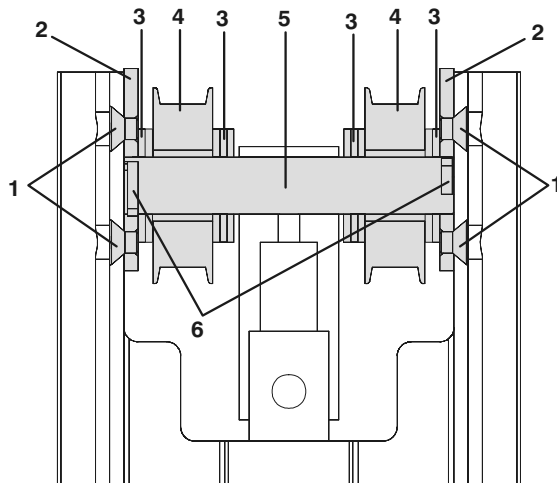
a. Use two shim pieces per slide pad, a thick one and a thin one.

b. Start with a total thickness of approximately .035" and .075" thick shim stock.

c. Attach shim stock and slide pads to both sides of mast section-5 using five (5) 1/4"-20UNC x 1-1/4" long, hex head cap screws per side, with flatwasher under each bolt head. (Assemble shim stock and slide pad to mast section rail with shim stock against rail and slide pad with beveled side out).

d. Carefully thread the slide pad mounting bolts with flat washers through slide pads and shim stock into threads in mast section-5. Be certain there are no air gaps between shims, shim and mast or shim and slide pad when tightened.

NOTE: Mast section-3 into section-2 fit should be very snug but still be able to be pushed together by hand. If too tight, remove section-3, disassemble slide pad and reduce thickness of shim stock.



Mast Section 2 - Cylinder/Anchor Block (Sheave Wheel Assembly)

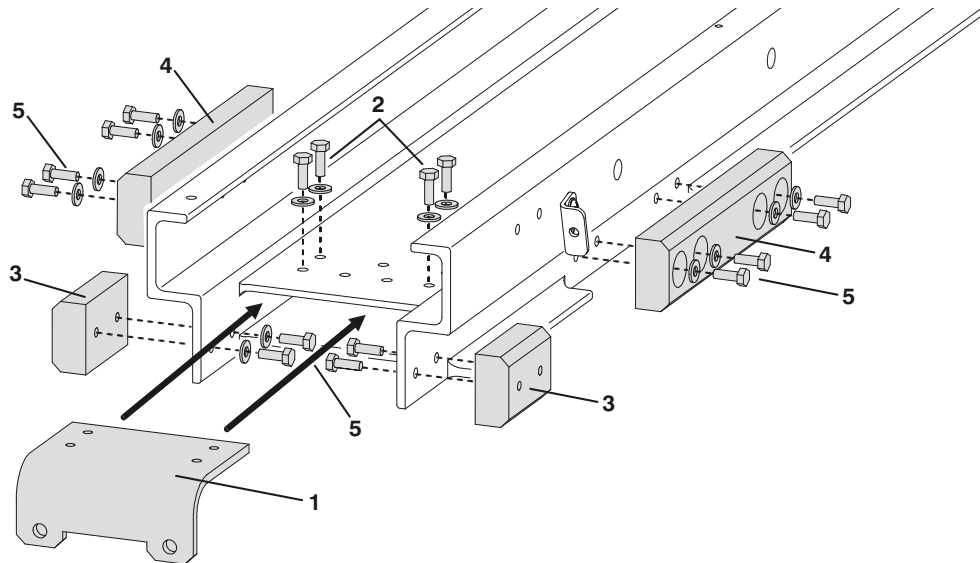
- | | |
|--------------------------|-----------------------|
| 1. Support Bar Screws(a) | 4. Sheave Wheel Assy. |
| 2. Pin Support Bars | 5. Sheave Pin |
| 3. Narrow Washer | 6. Square Keys |

Notes: (a) Apply Loctite #242 to threads.

15. Assemble chain sheaves on cylinder anchor block (attached to cylinder rod end) and attach to mast section-2 using following steps;

- a. Insert sheave pin through anchor block and cylinder rod on cylinder rod end.
- b. Load three 1" flat washers onto the sheave pin on each side of the anchor block.
- c. Place sheave wheels (for #444 chain) on sheave pin, one each side of anchor block.
- d. On the outside of each sheave wheel, place 2 flat washers, a roll pin (into the slot in each end of the pin), and then place a sheave pin support bar (rectangular plate with threaded holes on each side of pin bore hole).
- e. Slide the whole anchor block/cylinder assembly with sheave pin, wheels and pin support bars into top of mast section-2.
- f. Align the threaded holes in the attach bars on each side of the mast and attach to top of mast section-2 using two (2) 3/8"-16UNC x 1/2" long socket head-countersunk-flathead cap screws each side. Coat threads with Loctite #171 and tighten.

16. Slide mast section-2 back into section-1 until top and bottom ends are even.



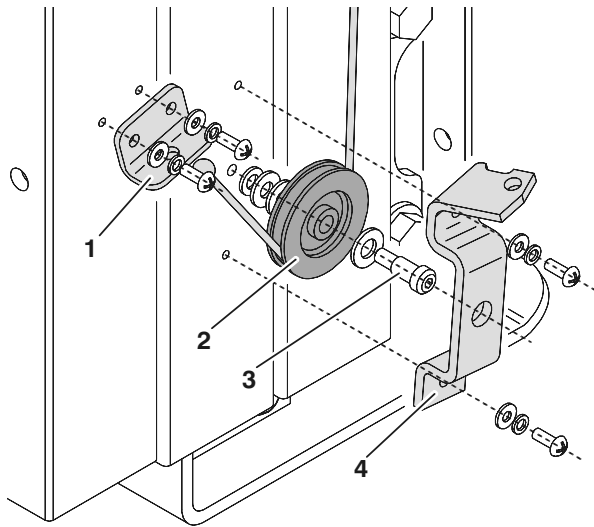
**Mast Section 5 - Bottom End Components
(Chain Anchor Bracket and Slide Pad Installation)**

- | | | |
|------------------------------------|-------------------|--------------------------------|
| 1. Chain Anchor Bracket | 3. Slide Pad | 5. Slide Pad Bolts/Washers (a) |
| 2. Anchor Bracket Bolts/Washers(a) | 4. Long Slide Pad | |

Notes: (a) Apply Loctite #242 to threads.

- e. Begin sliding top of mast section-3 with closed rail down engaging the slide pads into slide pad channels at bottom of mast section-2's open rail. Continue to push section-3 into section-2 until BOTTOM ends of mast sections are even.
 - f. Check mast section for side play. If play exists use thicker shims dividing thickness equally between both sides of mast.
 - g. When mast slide pads are shimmed properly, there should be no side to side movement of slide pad in rail channel. Mast sections should be very snug in channels but still be able to slide in channel by hand.
20. Slide mast section-3 out even with top of section-2.
 21. Insert threaded ends of chain assembly (*attached to top of mast section-1*) into the opening between mast section-2 and mast section-3. Slide the threaded ends through the holes in bottom chain anchor plate located on bottom of mast section-3. Loosely thread two (2) 3/8"-16UNC nuts onto stud threads on each chain. Chains will be adjusted later in assembly.
 22. Slide mast section-3 back into mast section-2 until bottom ends of masts are even. Check to make sure chain set attached to top of section-1 is seating properly in chain sheave wheels attached to top of mast section-2. (*Mast section-2 may need to be restrained to keep it's slide pads from pushing out the bottom of mast sections-1*).
 23. At bottom of mast assembly, thread all chain adjusting nuts on threaded ends until they are snug against the bottom anchor plates and all slack is removed from chains. Check that chains are seated in their sheave wheels at top of mast assembly.
 24. Assemble the mini cover to the top of mast section-2.
 25. Attach the sequencing cables and hardware to the sides of the mast assembly.
 26. Install the mast chain guard to the top mast section-3 (*platform mounting section*).

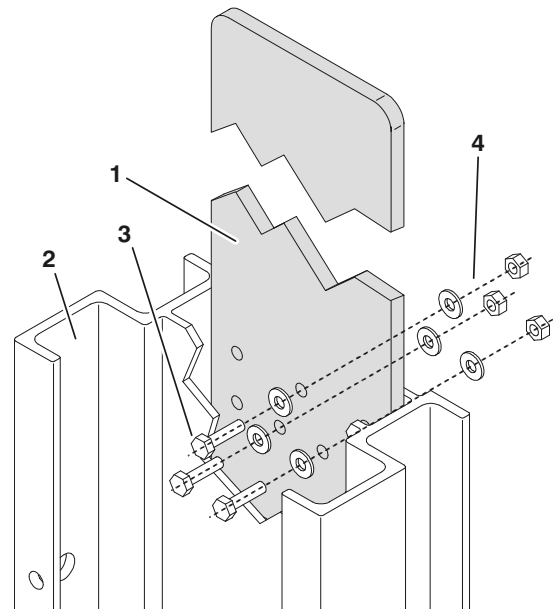
The mast assembly is now ready to install on the machine base frame.



**Sequence Cable Bracket Installation
(Bottom End)**

- 1. Cable End Bracket
- 2. Cable Sheave Wheel
- 3. Sheave Wheel Screw (a)
- 4. Sheave Wheel Bracket

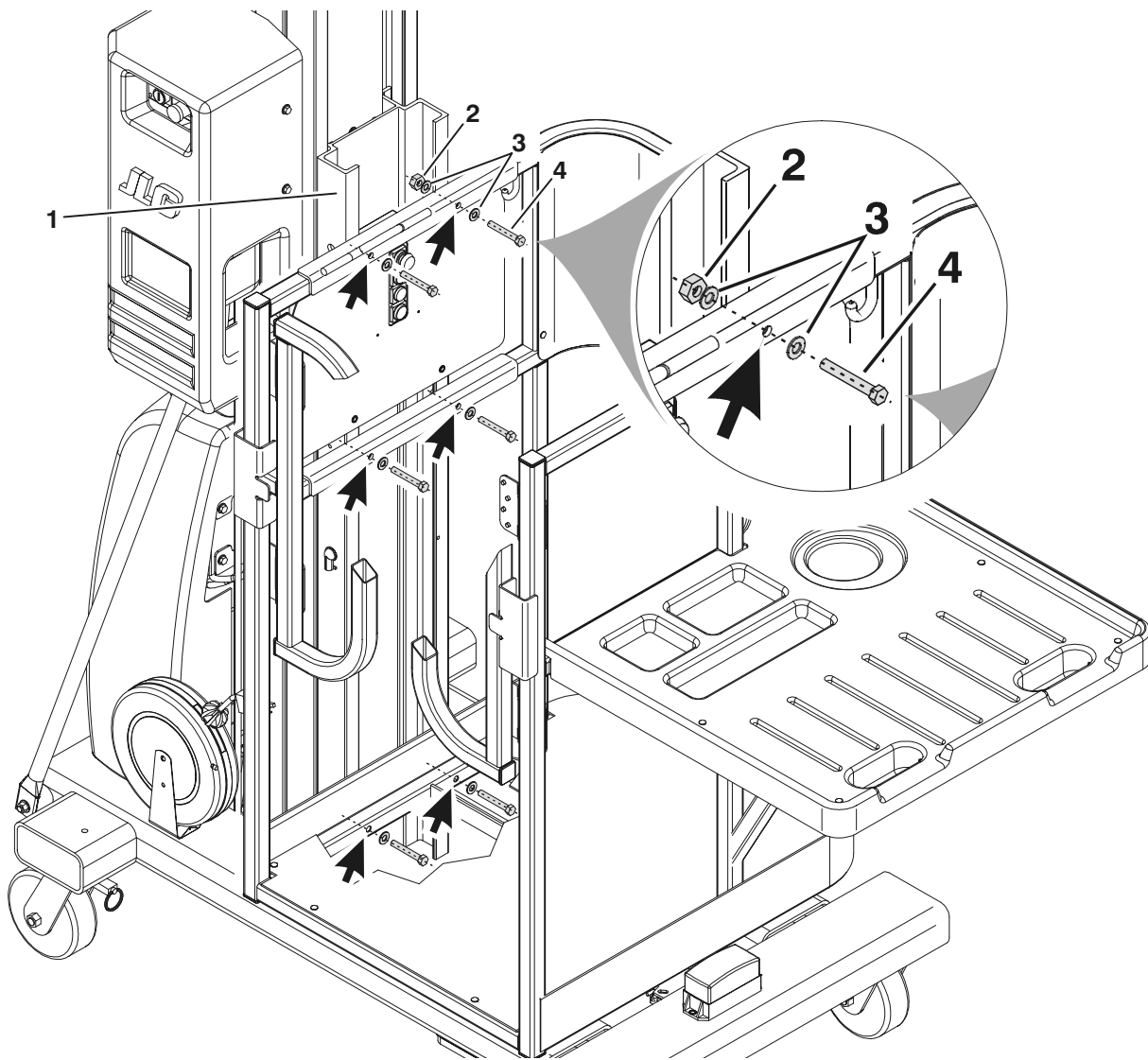
Notes: (a) Apply Loctite #242 to threads.



Chain Guard Installation

- 1. Chain Guard
- 2. Mast Section-3 (Platform)
- 3. Guard Bolts/Washers
- 4. Guard Nuts/Washers

5.6 9MP PLATFORM - REMOVE/INSTALL



1. Mast Platform Header Section 2. Nut (Qty.-6) 3. Washers (Qty.-12) 4. Hex Head Screws (Qty.-6)

Platform gate and floor shown cutaway for illustrative purposes only.

Note: Assemble the six mounting screws the same as shown in the illustration for items 2, 3, and 4 with a washer on the mast side and one on the platform side.

Figure 5-9. Platform Remove/Install - 9MP.

SECTION 6. TROUBLESHOOTING

6.1 GENERAL

This section contains troubleshooting information to be used for locating and correcting most of the operating problems which may develop in the aerial platform. If a problem should develop which is not presented in this section or which is not corrected by listed corrective actions, technically qualified guidance should be obtained before proceeding with any maintenance.

6.2 TROUBLESHOOTING INFORMATION

The troubleshooting procedures applicable to the aerial platform are listed and defined in Table 6-1., 9MP - Troubleshooting.

Each malfunction within an individual group or system is followed by a listing of probable causes which will enable determination of the applicable remedial action. The probable causes and the remedial action should, where possible, be checked in the order listed in the tables.

It should be noted that there is no substitute for a thorough knowledge of the equipment and related systems.

It should be recognized that the majority of the problems arising in the machine will be centered in the hydraulic and electrical systems. For this reason, every effort has been made to ensure that all likely problems in these areas are given the fullest possible treatment. In the remaining machine groups, only those problems which are symptomatic of greater problems which have more than one probable cause and remedy are included. This means that problems for which the probable cause and remedy may be immediately obvious are not listed in this section.

The first rule for troubleshooting any circuit that is hydraulically operated and electrically controlled is to determine if the circuit is lacking hydraulic oil and electrical control power. This can be ascertained by overriding the bypass valve (*mechanically or electrically*) so that oil is available to the function valve, then overriding the function valve mechanically. If the function performs satisfactorily, the problem exists with the control circuit.

6.3 ELECTRICAL AND HYDRAULIC CIRCUIT CHECKS

(See Figure 6-1. and Figure 6-2.)

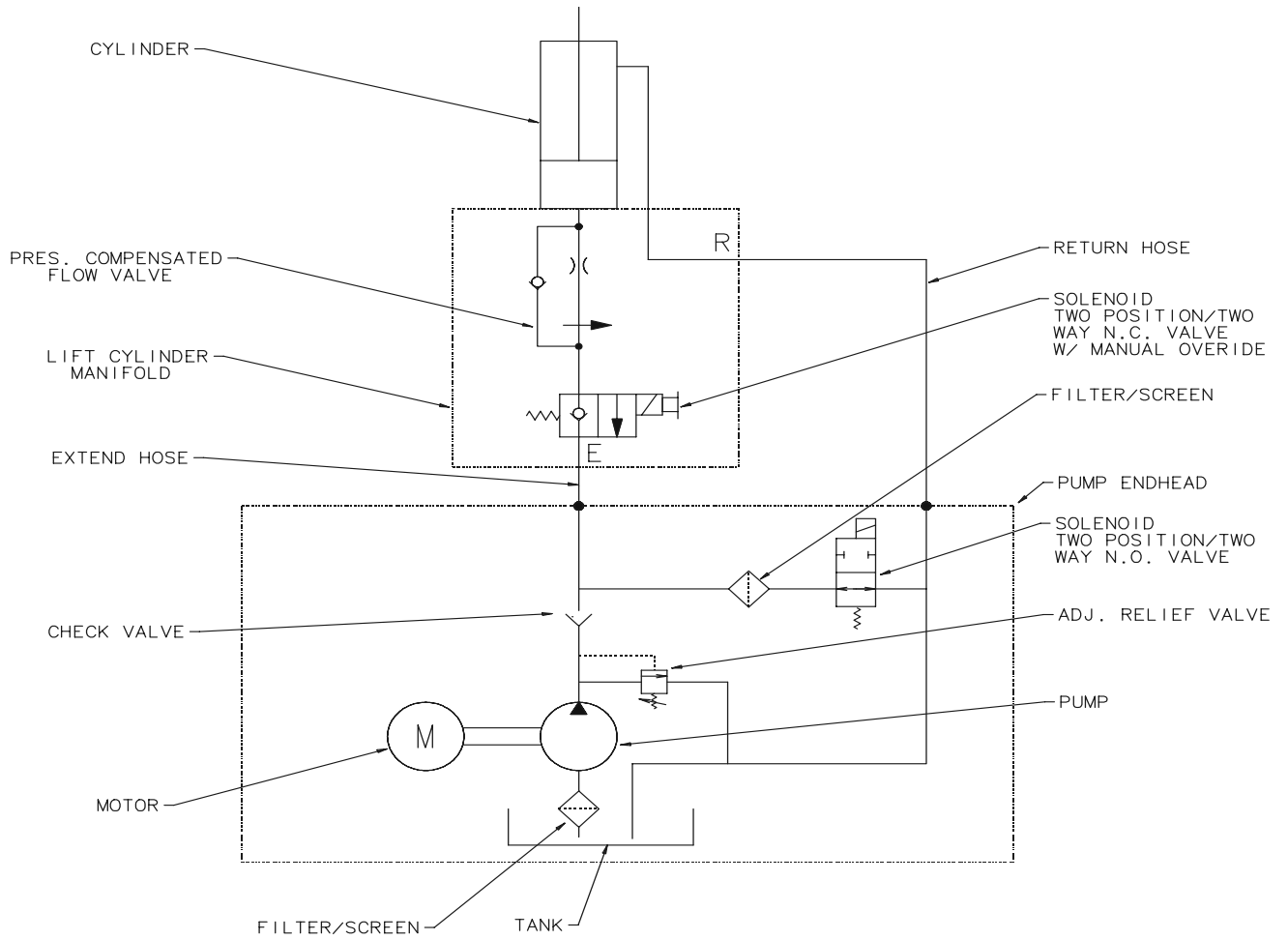
The first reference for improper function of a electrical/hydraulic system, where the cause is not immediately apparent, should be the Troubleshooting Chart. The best place to begin the problem analysis is at the power source (*pump*). Once it is determined that the pump is serviceable, then a systematic check of the circuit components, beginning with the control, would follow.

NOTE: For aid in Hydraulic troubleshooting, refer to Figure 6-1., Hydraulic Schematic. (9MP) (2792581-A) in this section. For ELECTRICAL Diagrams refer to Figure 6-2., Electrical Diagram. (9MP - 12 Volt) (4933269-A), also within this chapter.

SECTION 6 - TROUBLESHOOTING

Table 6-1. 9MP - TROUBLESHOOTING

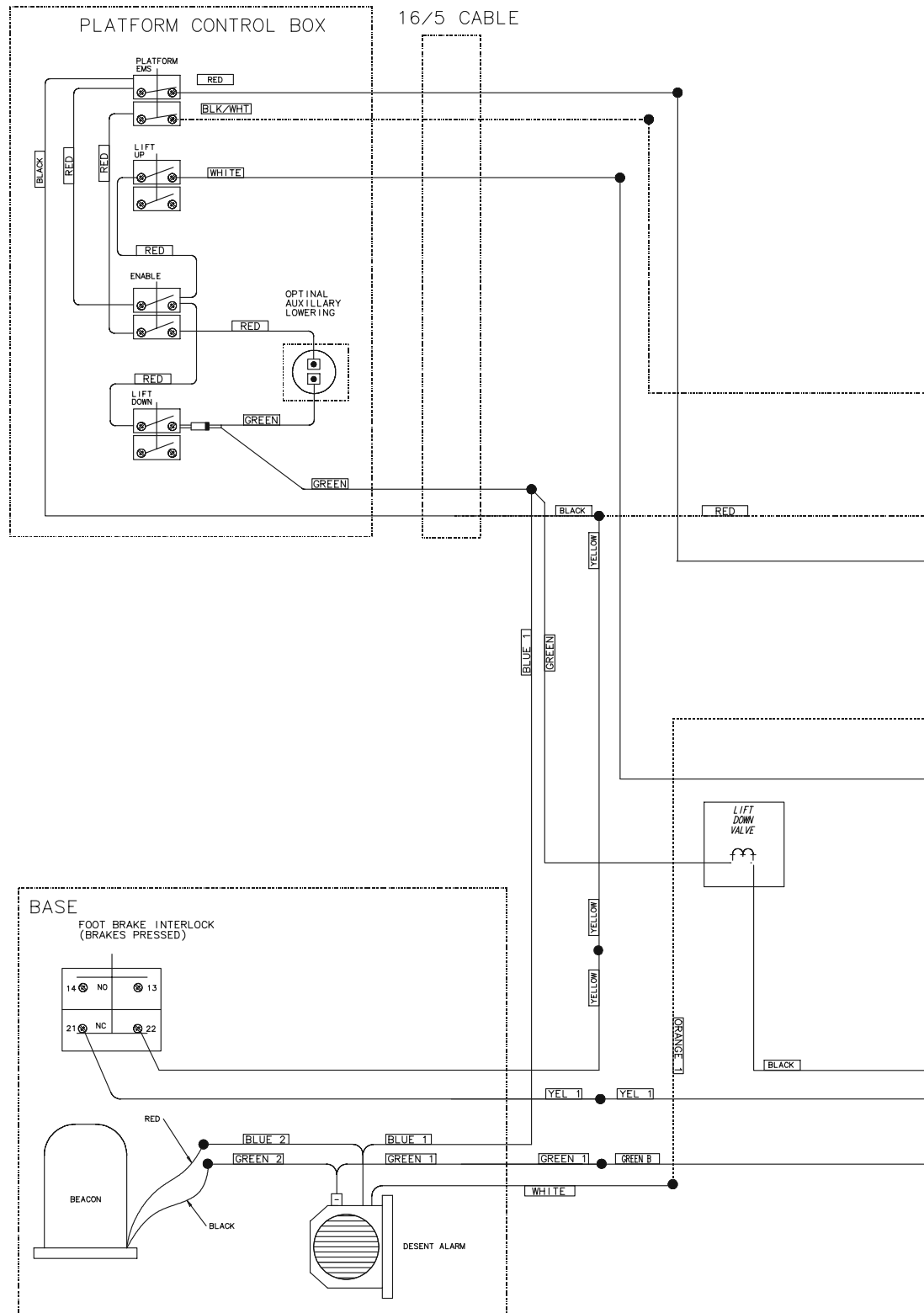
TROUBLE	PROBABLE CAUSE	REMEDY
Platform does not rise.		
	Power source is OFF or disconnected.	Check that Ground Station Key is switched ON or that the battery is connected.
	Red emergency stop button is engaged (PUSHED IN) on either ground control station or on platform.	Disengage (TURN CLOCKWISE) red emergency button until it pops out.
	Foot Stop is not engaged.	Engage Foot Stop (on gate side of machine).
	Control relay not functioning.	Replace control relay.
	Motor start relay not functioning.	Replace motor start relay.
	Main Power (5 Amp) Fuse(s) blown.	Replace blown fuse. If fuse blows again check electrical circuit for short circuit.
	Unit wiring not properly grounded.	Check all grounds in the wiring.
	Check for loose wire(s) on Floor Brake Limit Switch (causing an open circuit).	Properly reinstall wire to limit switch.
Platform lowers by itself.		
	Manual descent valve stuck open.	Close manual descent valve.
	Hydraulic hose and/or fittings loose causing a hydraulic pressure leak.	Tighten hydraulic hose and/or fittings.
	Lift DOWN solenoid valve not functioning.	Replace Lift DOWN solenoid valve.
Unit leaking hydraulic oil.		
	Hydraulic hose and/or fittings loose.	Tighten hydraulic hose and/or fittings.
	Valve and/or plug loose.	Tighten valve and/or plug.
	Breather cap on tank is saturated or clogged with oil.	Replace breather cap on tank.
	Hydraulic oil tank over-filled.	Lower oil level to full mark on dipstick.
Unit lowers very slowly.		
	Flow control valve not functioning.	Replace flow control valve.



2792581_A

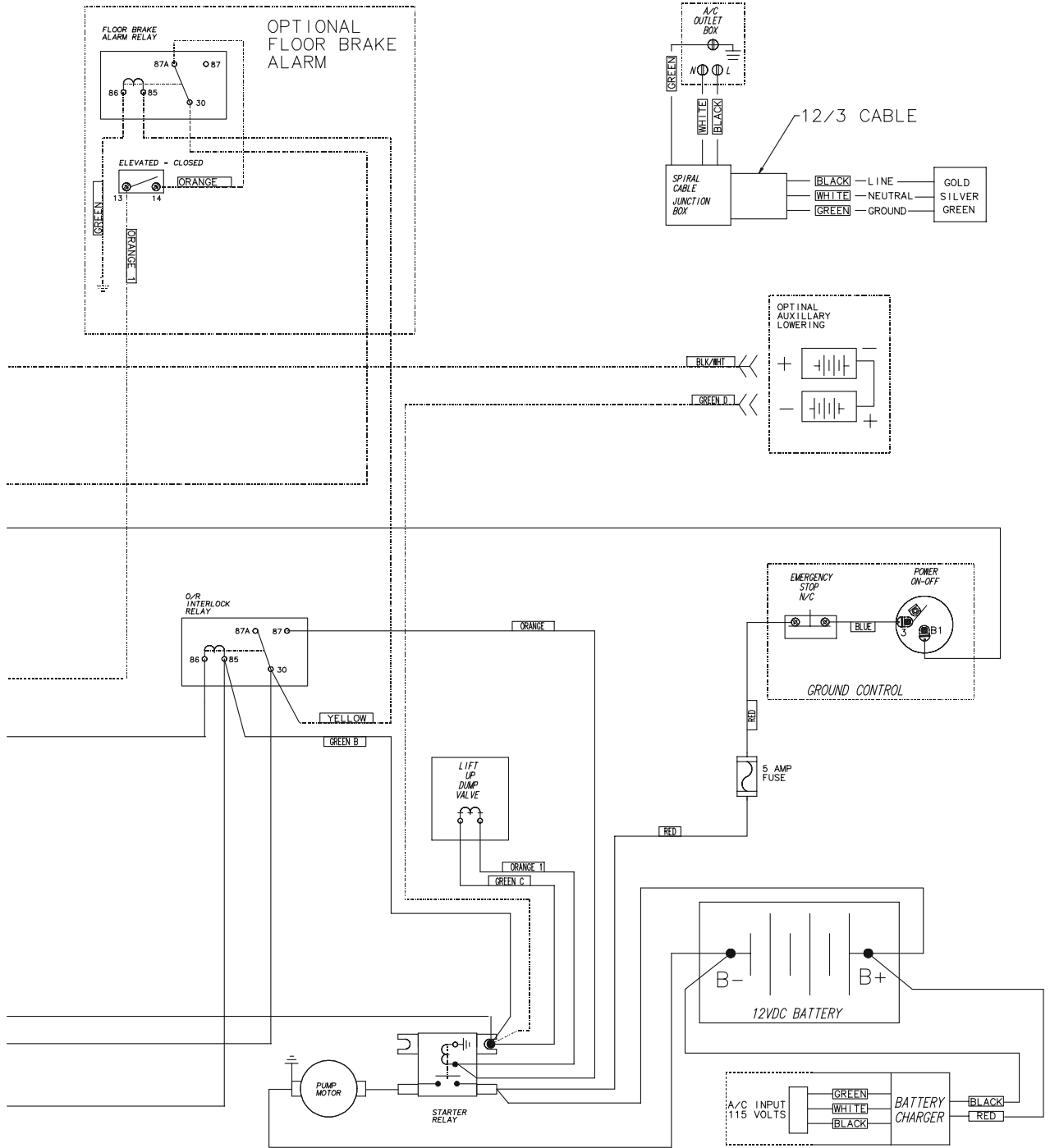
Figure 6-1. Hydraulic Schematic. (9MP) (2792581-A)

SECTION 6 - TROUBLESHOOTING



4933269_A

Figure 6-2. Electrical Diagram. (9MP - 12 Volt) (4933269-A)



4933269_A

Figure 3-2. Electrical Diagram. (9MP - 12 Volt) (4933269-A)

This page left intentionally blank.



Corporate Office
JLG Industries, Inc.
1 JLG Drive
McConnellsburg PA. 17233-9533
USA
Phone: (717) 485-5161
Customer Support Toll Free: (877) 554-5438
Fax: (717) 485-6417

JLG Worldwide Locations

JLG Industries (Australia)
P.O. Box 5119
11 Bolwarra Road
Port Macquarie
N.S.W. 2444
Australia
Phone: (61) 2 65 811111
Fax: (61) 2 65 810122

JLG Industries (UK)
Unit 12, Southside
Bredbury Park Industrial Estate
Bredbury
Stockport
SK6 2sP
England
Phone: (44) 870 200 7700
Fax: (44) 870 200 7711

JLG Deutschland GmbH
Max Planck Strasse 21
D-27721 Ritterhude/Idpohl
Bei Bremen
Germany
Phone: (49) 421 693 500
Fax: (49) 421 693 5035

JLG Industries (Italia)
Via Po. 22
20010 Pregnana Milanese - MI
Italy
Phone: (39) 02 9359 5210
Fax: (39) 02 9359 5845

JLG Latino Americana Ltda.
Rua Eng. Carlos Stevenson,
80-Suite 71
13092-310 Campinas-SP
Brazil
Phone: (55) 19 3295 0407
Fax: (55) 19 3295 1025

JLG Europe B.V.
Jupiterstraat 234
2132 HJ Foofddorp
The Netherlands
Phone: (31) 23 565 5665
Fax: (31) 23 557 2493

JLG Industries (Norge AS)
Sofeimyrveien 12
N-1412 Sofienyr
Norway
Phone: (47) 6682 2000
Fax: (47) 6682 2001

JLG Polska
Ul. Krolewska
00-060 Warszawa
Poland
Phone: (48) 91 4320 245
Fax: (48) 91 4358 200

JLG Industries (Europe)
Kilmartin Place,
Tannochside Park
Uddingston G71 5PH
Scotland
Phone: (44) 1 698 811005
Fax: (44) 1 698 811055

JLG Industries (Pty) Ltd.
Unit 1, 24 Industrial Complex
Herman Street
Meadowdale
Germiston
South Africa
Phone: (27) 11 453 1334
Fax: (27) 11 453 1342

Plataformas Elevadoras
JLG Iberica, S.L.
Trapadella, 2
P.I. Castellbisbal Sur
08755Castellbisbal
Spain
Phone: (34) 93 77 24700
Fax: (34) 93 77 11762

JLG Industries (Sweden)
Enkopingsvagen 150
Box 704
SE - 175 27 Jarfalla
Sweden
Phone: (46) 8 506 59500
Fax: (46) 8 506 59534
