SERVICE & MAINTENANCE

Models
30e
35e
n35e
40e
n40e
45e

3120743

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SECTION A. INTRODUCTION - 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 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 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 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

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

B HYDRAULIC SYSTEM SAFETY

It should be noted that the machines hydraulic systems operate at extremely high potentially dangerous pressures. Every effort should be made to relieve any system pressure prior to disconnecting or removing any portion of the system.

Relieve system pressure by cycling the applicable control several times with the engine stopped and ignition on, to direct any line pressure back into 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 MAY RESULT IN MACHINE DAMAGE, PERSONNEL INJURY OR DEATH AND IS A SAFETY VIOLATION.

- NO SMOKING IS MANDATORY. NEVER REFUEL DURING ELECTRICAL STORMS. ENSURE THAT FUEL CAP IS CLOSED AND SECURE AT ALL OTHER TIMES.
- 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 WARNINGS AND CAUTIONS ON MACHINE AND IN SERVICEMANUAL.
- KEEP OIL, GREASE, WATER, ETC. WIPED FROM STANDING SURFACES AND HAND HOLDS.
- USE CAUTION WHEN CHECKING A HOT, PRESSURIZED COOLANT SYSTEM.
- NEVER WORK UNDER AN ELEVATED BOOM UNTIL BOOM HAS BEEN SAFELY RESTRAINED FROM ANY MOVEMENT BY BLOCKING OR OVERHEAD SLING, OR BOOM SAFETY PROP HAS BEEN ENGAGED.
- 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.

REVISON LOG

March, 1989	- Original Issue
October, 1994	- Revised
August, 1997	- Revised
January, 1999	- Revised
Cvr, Intro., - and Pgs.	
May 1, 2000	-Revised
May 1, 2001	-Revised
October 1, 2001	-Revised

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SECTION 1. SPECIFICATIONS

1.1 CAPACITIES.

Hydraulic Oil Tank.

4.0 gallons (15.14 liters).

Hydraulic System.

Approximately 4.8 gallons (18.2 liters).

Torque Hubs (2).

17 ounces (0.5 liters).

1.2 COMPONENT DATA.

Battery Charger.

Input, 110 VAC,60 HZ.

Output, 48 VDC (23 Amps.).

Batteries (8).

6 Volt, 370 AmpHour (20 hour rate).

Drive System.

Drive Motor - 36 VDC, 4.1 H.P. @ 1880 rpm. continuous, rotation - reversible.

Drive Brake- 24 VDC, spring-applied, electrically released.

Tires - 30 electric.

Tires - ST205 75R15, Load Range C, 6 Ply Rating, 70 psi (4.9 kg/cm^2).

Foam Filled - 205 75R15, 6 Ply Rating, 70 psi (4.9 kg/cm^2).

Solid Tires - 26 x 7 x 20 Lug Tread Non marking Compound. (Optional)

Tires - n35/n40 electric.

Solid Tires - 22 x 6 x 16 Lug Tread Dual Service Compound.

Solid Tires - 22 x 6 x 16 Lug Tread Non marking Compound. (Optional)

Tires - 35/40 electric. **(Prior to March of 1996)**

Tires - ST225 75R15, Load Range D, 8 Ply Rating, 80 psi (5.5 kg/cm^2).

Tires - ST225 75R15, Load Range D, 8 Ply Rating, Foam Filled. (Optional)

Tires - 35/40 electric. **(March of 1996 to Present)**

Tires - G 78 - 15, Load Range E, 10 Ply Rating, 80 psi (5.5 kg/cm^2).

Tires - G 78 - 15, Load Range E, 10 Ply Rating, Foam Filled. (Optional)

Solid Tires - 22 x 6.5 x 16 Lug Tread Non marking Compound. (Optional)

Tires 10 - 16.5 NHS, 8 Ply, 70 psi (4.9 kg/cm^2).

Tires 10 - 16.5 NHS, 8 Ply, 70 psi (4.9 kg/cm^2), Foam Filled

Tires - 45 electric.

Tires - LT215 85R16, Load Range E, 10 Ply Rating, 90 psi (6.2 kg/cm^2).

Tires - LT215 85R16, Load Range E, 10 Ply Rating, Foam Filled. (Optional)

Tires 10 - 16.5 NHS, 8 Ply, 70 psi (4.9 kg/cm^2).

Tires 10 - 16.5 NHS, 8 Ply, 70 psi (4.9 kg/cm^2), Foam Filled.

Hydraulic Filter.

Return, 10 Micron.

Hydraulic Pump/Electric Motor Assembly.

Motor - 48 VDC, 2.14 H.P. @ 2700 rpm.

Pump - 0.098 in.^{3}/rev. (1.6 cm^3/rev.).

Pump Output - 1.09 gpm (4.13 lpm) @ 2000 psi (137.9 Bar).

1.3 PERFORMANCE DATA.

EE Rated, Certified By U/L.

Travel Speed.

30 electric - 4 mph (6.4 kph).

35 electric - 3 mph (4.8 kph).

n35 electric - 2.5 mph (4.1 kph).

40 electric - 3 mph (4.8 kph).

n40 electric - 2.5 mph (4.1 kph).

45 electric - 2.6 mph (4.2 kph).

Gradeability.

25%

Maximum Slope

5%.

Turning Radius (Inside).

30 electric - 4 ft. 4.50 in. (1.33 m.).

35 electric - 4 ft. 3 in. (1.31 m.).

n35 electric - 5 ft. 3 in. (1.60 m.).

40 electric - 4 ft. 3 in. (1.31 m.).

n40 electric - 5 ft. 3 in. (1.60 m.).

45 electric - 4 ft. 3 in. (1.31 m.).

Turning Radius (Outside).

30 electric - 11 ft. 10 in. (3.63 m.).

35 electric - 11 ft. 10 in. (3.63 m.).

n35 electric - 11 ft. 10 in. (3.63 m.).

40 electric - 11 ft. 10 in. (3.63 m.).

n40 electric - 11 ft. 10 in. (3.63 m.).

45 electric - 11 ft. 10 in. (3.63 m.).

Upper Boom Speed.

30 electric - Lift Up - 15 - 25 seconds.

30 electric - Lift Down - 17 - 27 seconds.

35/n35 electric - Lift Up - 40 - 50 seconds.

35/n35 electric - Lift Down - 32 - 42 seconds.

40/n40 electric - Lift Up - 40 - 50 seconds.

40/n40 electric - Lift Down - 59 - 69 seconds.

45 electric - Lift Up - 40 - 50 seconds.

45 electric - Lift Down - 39 - 49 seconds.

Lower Boom Speed.

30 electric - Lift Up - 16 - 26 seconds.

30 electric - Lift Down - 19 - 29 seconds.

35/n35 electric - Lift Up - 49 - 59 seconds.

35/n35 electric - Lift Down - 30 - 40 seconds.

40/n40 electric - Lift Up - 50 - 60 seconds.

40/n40 electric - Lift Down - 23 - 29 seconds.

45 electric - Lift Up - 58 - 68 seconds.

45 electric - Lift Down - 28 - 38 seconds.

Swing Speed - 360 Degrees.

30 electric - 55 - 65 seconds.

35/n35 electric - 65 - 75 seconds.

40/n40 electric - 85 - 95 seconds.

45 electric - 85 - 95 seconds.

Machine Weight.

30 electric - 4,770 lb. (2,164 kg).

35 electric - 9,500 lb. (4,309 kg).

n35 electric - 10,200 lb. (4,627 kg).

40 electric - 10,700 lb. (4,853 kg).

n40 electric - 11,830 lb. (5,366 kg).

45 electric - 11,800 lb. (5,352 kg).

Max. Tire Load.

30 electric - 2560 lbs. (1,161 kg).

35 electric - 3580 lbs. (1,624 kg).

n35 electric - 4250 lbs. (1,928 kg).

40 electric - 4700 lbs. (2,132 kg).

n40 electric - 5600 lbs. (2,540 kg).

45 electric - 5850 lbs. (2,656 kg).

Machine Height (stowed).

30 electric - 6 ft.,7.0 in. (2.0 m.).

35/n35 electric -6 ft., 7.0 in. (2.0 m.).

40/n40 electric - 6 ft., 7.0 in. (2.0 m.).

45 electric - 6 ft., 7.0 in. (2.0 m.).

Machine Length (stowed).

30 electric - 15 ft.,7.0 in. (4.75 m.).

35/n35 electric - 17 ft.,0 in. (5.18 m.).

40 electric - 17 ft.,7.0 in. (5.36 m.).

n40 electric - 17 ft.,4 in. (5.28 m.).

45 electric - 18 ft.,8.0 in. (5.69 m.).

Up and Over Platform Height.

30 electric - 16 ft.,7.0 in. (5.05 m.).

35/n35 electric - 17 ft.,11.0 in. (5.46 m.).

40/n40 electric - 20 ft.,0 in. (6.10 m.).

45 electric - 24 ft.,7 in. (7.49 m.).

Horizontal Reach Up and Over.

30 electric - 13 ft.,5.0 in. (4.09 m.).

35/n35 electric - 20 ft.,6.0 in. (6.25 m.).

40/n40 electric - 20 ft.,6.0 in. (6.25 m.).

45 electric - 22 ft. 8 in.,(6.91 m.).

Machine Width.

30 electric - 5 ft.,9 in. (1.75 m.).

35 electric - 5 ft.,9 in. (1.75 m.).

n35 electric - 4 ft.,11 in. (1.50 m.).

40 electric - 5 ft.,9 in. (1.75 m.).

n40 electric - 4 ft.,11 in. (1.50 m.).

45 electric - 5 ft.,9 in. (1.75 m.).

Wheel Base.

30 electric - 6 ft., 4 in. (1.93 m.).

35/n35 electric - 6 ft., 7.25 in. (2.01 m.).

40/n40 electric - 6 ft., 7.25 in. (2.01 m.).

45 electric - 6 ft., 7.25 in. (2.01 m.).

Working Height.

30 electric - 30 ft., 0 in. (9.14 m.).

35/n35 electric - 35 ft., 0 in. (10.67 m.).

40/n40 electric - 40 ft., 0 in. (12.19 m.).

45 electric - 45 ft., 0 in. (13.72 m.).

1.4 TORQUE SPECIFICATIONS.

Table 1-1.Torque specifications

Description	Torque Value (Dry)	Interval Hours
A. Bearing To Chassis	See Note	50/600*
B. Bearing To Turntable	See Note	50/600*
C. Wheel Bolts	90 ft. lb. (122 Nm)	150***

NOTE: **Check swing bearing bolts for security after first 50 hours of operation and every 600 hours thereafter. (See paragraph 2-16, - Swing Bearing.)*

NOTE: ****Torque in cross pattern. Foam filled or solid tires may require more frequent torque intervals.*

NOTE: *When maintenance becomes necessary or a fastener has loosened, refer to the Torque Chart, Figure 1-1, to determine proper torque value.*

1.5 LUBRICATION.

Hydraulic Oil.

Table 1-2.Hydraulic Oil

HYDRAULIC SYSTEM OPERATING TEMPERATURE RANGE	SAE VISCOSITY GRADE
0 F to 23 F (-18 C to -5 C)	10W
0 F to 210 F (-18 C to +99 C)	10W-20,10W-30
50 F to 210 F (+10 C to +99 C)	20W-20

NOTE: *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 index of 152.*

NOTE: *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.*

Lubrication Specifications

Table 1-3.Lubrication Specifications

KEY	SPECIFICATIONS
MPG	Multipurpose Grease having a minimum dripping point of 350 F (178 C). 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. API service classification GL-3, e.g. Mobilfluid 424.
OG*	Open Gear Lube - Mobiltac 375NC, Aerosol spray. (JLG Part No. 3020036)
BG*	Bearing Grease (JLG Part No. 3020029) Mobilith SHA 460.
LL	Synthetic Lithium Lubricant, Gredag 741 Grease. (JLG Part No. 3020022)

*MPG may be substituted for these lubricants, if necessary, but service intervals will be reduced.

NOTE: *Refer to Lubrication Chart, Figure1-2, for specific lubrication procedures.*

1.6 PRESSURE SETTINGS.

- **Model 30 electric.**

Hydro-Air Valve 4640725.

Lift Down Relief - 900 psi (62 bar).

Articulate and Lift Down Relief - 725 psi (49.99 bar).

Swing Relief - 1000 psi (68.95 bar).

Hydro-Air Valve 4640726.

Steer Relief - 1100 psi (75.84 bar).

Main Relief at Pump - 2600 psi (179.27 bar).

- **Model 35/n35 electric.**

Hydro-Air Valve 4640843.

Upper Lift Down Relief - 600 psi (41.37 bar).

Lower Lift Down Relief - 600 psi (41.37 bar).

Swing Relief - 1000 psi (68.95 bar).

Telescope In Relief - 2150 psi (148.25 bar).

Platform Level Up Relief - 2500 psi (172.37 bar).

Platform Level Down Relief - 1200 psi (82.74 bar).

Hydro-Air Valve 4640726.

Steer Relief - 1500 psi (103.42 bar).

Main Relief at Pump - 2600 psi (179.27 bar).

- **Model 40/n40/45 electric.**

Hydro-Air Valve 4640797.

Upper Lift Down Relief - 650 psi (44.82 bar).

Mid/Lower Lift Down Relief - 1700 psi (117.21 bar).

Swing Relief - 1000 psi (68.95 bar).

Telescope In Relief - 2150 psi (148.25 bar).

Platform Level Up Relief - 2500 psi (172.37 bar).

Platform Level Down Relief - 1200 psi (82.74 bar).

Hydro-Air Valve 4640726.

Steer Relief - 1500 psi (103.42 bar).

Main Relief at Pump - 3200 psi (220.64 bar).

1.7 CYLINDER SPECIFICATIONS.

NOTE: *All dimensions are given in inches (in.), with the metric equivalent, millimeters (mm) given in parentheses.*

Table 1-4. Cylinder Specifications.

e30			
DESCRIPTION	**BORE**	**STROKE**	**ROD DIA.**
Upper Lift Cylinder	3.00 (76.2)	14.62 (371.5)	1.50 (38.1)
Lower Lift Cylinder	3.00 (76.2)	14.62 (371.5)	1.50 (38.1)
Steer Cylinder (Double Rod)	2.00 (50.8)	3.00 (76.2) each direction	1.25 (31.8) each rod
e35/n35e			
DESCRIPTION	**BORE**	**STROKE**	**ROD DIA.**
Upper Lift Cylinder	3.00 (76.2)	24.4375 (620.7)	1.50 (38.1)
Lower Lift Cylinder	3.50 (88.9)	25.375 (644.5)	2.00 (50.8)
Telescope Cylinder	2.00 (50.8)	79 (2006.6)	1.25 (31.8)
Master Cylinder	2.00 (50.8)	9.375 (238.1)	1.00 (25.4)
Slave Cylinder	2.00 (50.8)	9.375 (238.1)	1.00 (25.4)
Rotator Cylinder	1.875 (47.6)	15.250 (387.3)	1.00 (25.4)
Steer Cylinder (Double Rod)	2.00 (50.8)	3.00 (76.2) each direction	1.25 (31.8) each rod
e40/n40e			
DESCRIPTION	**BORE**	**STROKE**	**ROD DIA.**
Upper Lift Cylinder	3.00 (76.2)	28.3125 (719.1)	1.50 (38.1)
Mid Lift Cylinder	3.00 (76.2)	21.25 (539.7)	1.50 (38.1)
Lower Lift Cylinder	3.50 (88.9)	23.1875 (589.0)	2.00 (50.8)
Telescope Cylinder	2.00 (50.8)	79 (2006.6)	1.25 (31.8)
Master Cylinder	2.00 (50.8)	9.375 (238.1)	1.00 (25.4)
Slave Cylinder	2.00 (50.8)	9.375 (238.1)	1.00 (25.4)
Rotator Cylinder	1.875 (47.6)	15.250 (387.3)	1.00 (25.4)
Steer Cylinder (Double Rod)	2.00 (50.8)	3.00 (76.2) each direction	1.25 (31.8) each rod
e45			
DESCRIPTION	**BORE**	**STROKE**	**ROD DIA.**
Upper Lift Cylinder	3.00 (76.2)	28.3125 (719.1)	1.50 (38.1)
Mid Lift Cylinder	3.00 (76.2)	21.25 (539.7)	1.50 (38.1)
Lower Lift Cylinder	3.50 (88.9)	23.1875 (589.0)	2.00 (50.8)
Telescope Cylinder	2.00 (50.8)	79 (2006.6)	1.25 (31.8)
Master Cylinder	2.00 (50.8)	9.375 (238.1)	1.00 (25.4)
Slave Cylinder	2.00 (50.8)	9.375 (238.1)	1.00 (25.4)
Rotator Cylinder	1.875 (47.6)	15.250 (387.3)	1.00 (25.4)
Steer Cylinder (Double Rod)	2.00 (50.8)	3.00 (76.2) each direction	1.25 (31.8) each rod

1.8 MAJOR COMPONENT WEIGHTS.

⚠ WARNING

SELECT LIFTING EQUIPMENT WITH CAPACITY CAPABLE OF SAFELY SUPPORTING WEIGHT.

1.9 CRITICAL STABILITY WEIGHTS.

⚠ WARNING

DO NOT REPLACE ITEMS CRITICAL TO STABILITY WITH ITEMS OF DIFFERENT WEIGHT OR SPECIFICATION (FOR EXAMPLE: BATTERIES, FILLED TIRES, PLATFORM) DO NOT MODIFY UNIT IN ANY WAY TO AFFECT STABILITY.

1.10 SERIAL NUMBER LOCATIONS. (SEE FIGURE 1-3)

Model 30/35/n35 electric.

For machine identification, a serial number plate is affixed to the turntable, facing the platform basket. If the serial number plate is damaged or missing, the machine serial number is stamped on the top left side of the frame and the top left side of the turntable. In addition, the serial number is stamped on top of the end of the upper boom at the platform, and lower boom at the upright.

Model 30/35/n35 electric.

For machine identification, a serial number plate is affixed to the left rear of frame, in front of left rear wheel. If the serial number plate is damaged or missing, the machine serial number is stamped on the top left side of the frame and the top left side of the turntable. In addition, the serial number is stamped on top of the end of the upper boom, mid boom, and lower boom at the left rear of the booms.

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					
				CLAMP LOAD (LB.)	TORQUE (DRY OR LOC. 263)	TORQUE (LUB.)	TORQUE (LOCTITE 262)	TORQUE (LOCTITE 242 OR 271)	CLAMP LOAD (LB.)	TORQUE (DRY OR LOC. 263)	TORQUE (LUB.)	TORQUE (LOCTITE 262)	TORQUE (LOCTITE 242 OR 271)	UNBRAKO 1960 SERIES SOCKET HEAD CAP SCREW WITH LOC-WEL PATCH: CLAMP LOAD (LB.)	UNBRAKO 1960 SERIES SOCKET HEAD CAP SCREW WITH LOC-WEL PATCH: TORQUE (as received)
					LB. IN.	LB. IN.	LB. IN.	LB. IN.		LB. IN.	LB. IN.	LB. IN.	LB. IN.		LB. FT.
4	40	0.1120	0.00604	380	8	6	—	—	540	12	9	—	—	—	—
	48		0.00661	420	9	7	—	—	600	13	10	—	—	—	—
6	32	0.1380	0.00909	580	16	12	—	—	820	23	17	—	—	—	—
	40		0.01015	610	18	13	—	—	920	25	19	—	—	—	—
8	32	0.1640	0.01400	900	30	22	—	—	1260	41	31	—	—	—	—
	36		0.01474	940	31	23	—	—	1320	43	32	—	—	—	—
10	24	0.1900	0.01750	1120	43	32	—	—	1580	60	45	—	—	—	—
	32		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		0.0364	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.		
5/16	18	0.3125	0.0524	3340	17	13	16	19	4720	25	18	22	30	5240	25
	24		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		0.0878	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		0.1187	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		0.1599	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		0.2030	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		0.2560	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		0.3730	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		0.5090	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		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		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		1.0730	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		1.3150	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		1.5800	87700	2200	1640	1974	2300	142200	3560	2660	2844	3925	158000	3270

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

SAE GRADE 5

SAE GRADE 8

Figure 1-1. Torque Chart

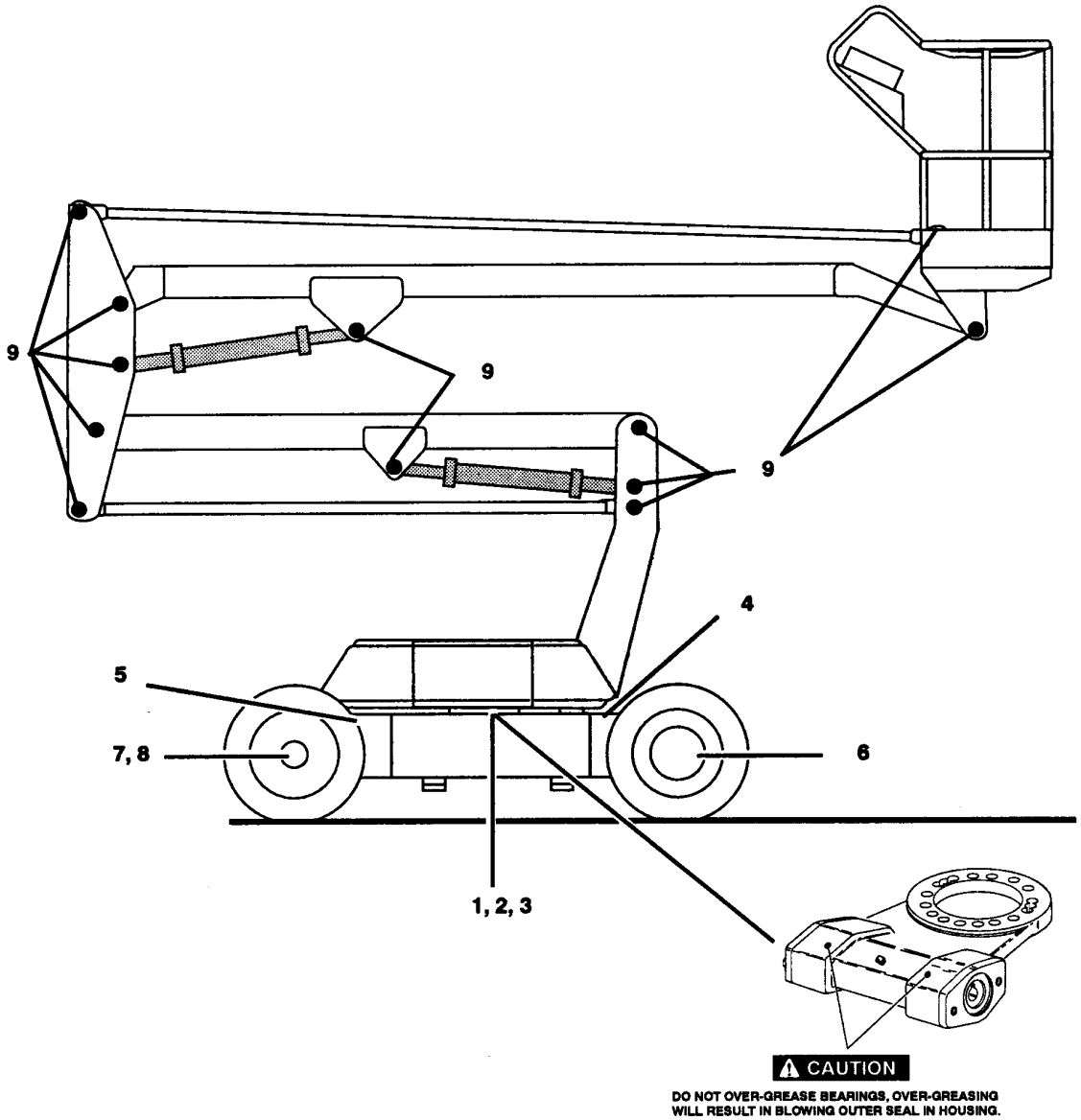

Figure 1-2. Lubrication Chart - 30 electric. (Sheet 1 of 6)

	COMPONENTS	NUMBER TYPE LUBE POINTS	CAPACITY	LUBE	INTERVAL HOURS 3 MONTHS 150 HRS	6 MONTHS 300 HRS	1 YEAR 600 HRS	2 YEAR 1200 HRS	COMMENTS
LUBRICATION:									
1	Swing Bearing	1 Grease Fitting	A/R	BG/MPG	✓				BG will have a longer service interval than MPG.
2	Swing Bearing - Gear - Teeth	1 Grease Fitting	A/R	OG/MPG	✓				OG will have a longer service interval than MPG.
3	Swing Worm Gear - Bearing *	Plug	A/R	BG/MPG				✓	BG will have a longer service interval than MPG.
4	Hydraulic Fluid (Oil)	Fill Cap	4.0 Gallons Tank 4.8 Gallons System	HO				✓	Check oil every 10 hours of operation. Change oil every 1200 hours of operation.
5	Hydraulic Filter	N/A	N/A	N/A		✓			Replace filter element after first 50 hours and every 300 hours thereafter.
6	Wheel Drive Hub	Fill plug/located at 4 or 8 Oclock	12 oz. (approx)	EPGL	✓				Check oil level at side plug on hub.
7	Wheel Bearing	Repack	A/R	MPG				✓	
8	Spindles/Bushing	N/A	A/R	LL	At spindle/bushing replacement.				Coat I.D. of bushings prior to installing king pins.
9	Boom Pivot Pins/Bushing	N/A	A/R	LL	At boom pivot pins/bushing replacement.				Coat I.D. of bushings prior to installing pins.

NOTE:

Lubrication intervals are based on machine operation under normal conditions. For machines used in multi shift operations and/or exposed to hostile environments or conditions, lubrication frequencies must be increased accordingly.

* If necessary install grease fittings into worm gear housing and grease bearings. Read CAUTION on diagram before greasing.

KEY TO LUBRICANTS:

BG - Mobilith SHC 460 Bearing Grease.
EPGL - Extreme Pressure Gear Lube.
HO - Hydraulic Oil - Modilfluid 424 or Kendall Hyken 052.
LL - Synthetic Lithium Lubricant (Gredag 741 Grease).
MPG - Multi-Purpose Grease.
OG - Open Gear Lube (Tribol Molub-Alloy 93)

Figure 1-3. Lubrication Chart - 30 electric.

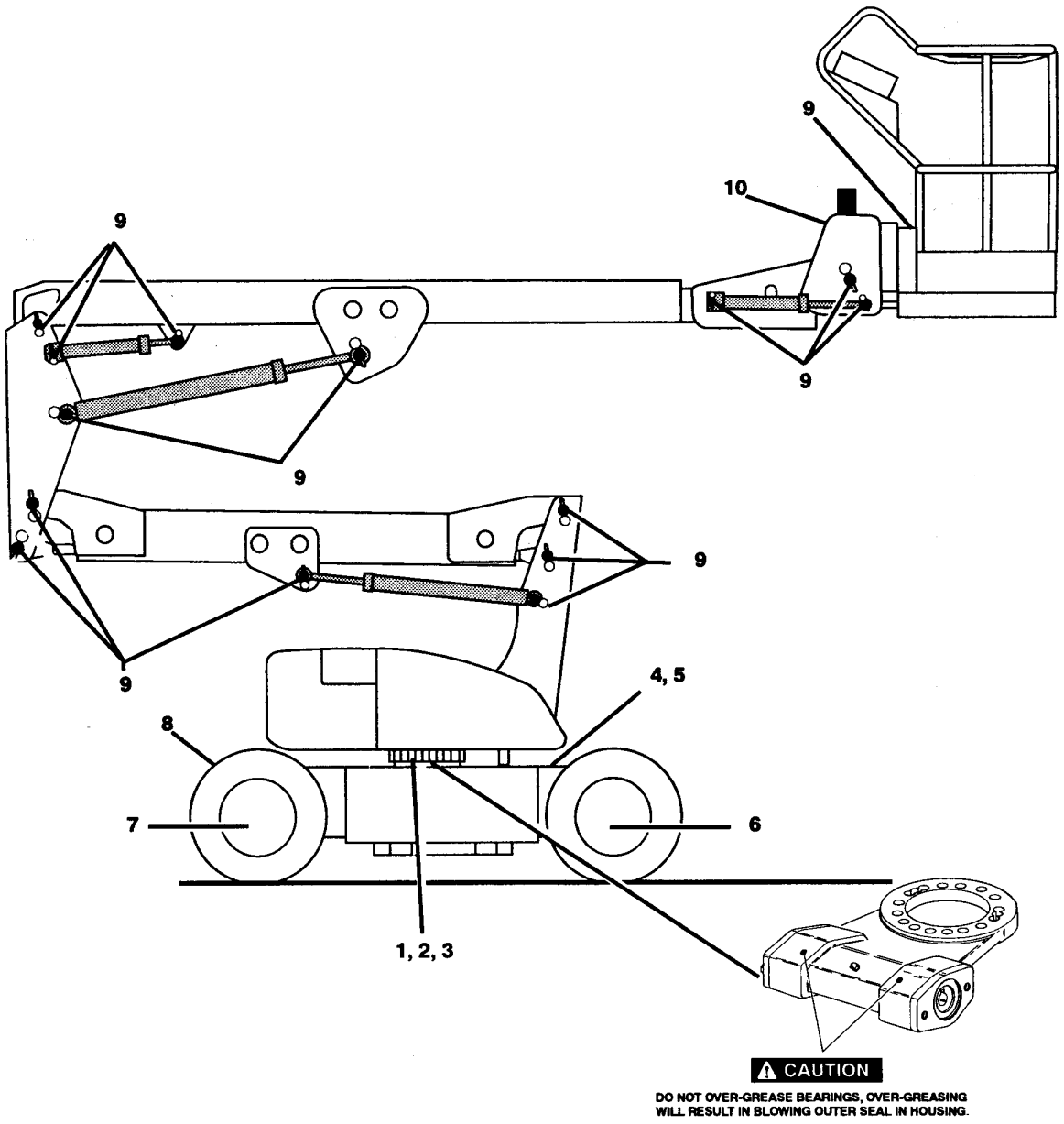

Figure 1-4. Lubrication Chart - 35/n35 electric. (Sheet 3 of 6).

	COMPONENTS	NUMBER TYPE LUBE POINTS	CAPACITY	LUBE	INTERVAL HOURS 3 MONTHS 150 HRS	6 MONTHS 300 HRS	1 YEAR 600 HRS	2 YEAR 1200 HRS	COMMENTS
LUBRICATION:									
1	Swing Bearing	1 Grease Fitting	A/R	BG/MPG	✓				BG will have a longer service interval than MPG.
2	Swing Bearing - Gear - Teeth *	1 Grease Fitting	A/R	OG/MPG	✓				OG will have a longer service interval than MPG.
3	Swing Worm Gear - Bearing	Plug	A/R	BG/MPG				✓	BG will have a longer service interval than MPG.
4	Hydraulic Fluid (Oil)	Fill Cap	4.0 Gals Tank 4.8 Gals System	HO				✓	Check oil every 10 hours of operation. Change oil every 1200 hours of operation.
5	Hydraulic Filter	N/A	N/A	N/A		✓			Replace filter element after first 50 hours and every 300 hours thereafter.
6	Wheel Drive Hub	Fill plug/located at 4 or 8 Oclock	12 OZ.(approx)	EPGL	✓				Check oil level at side plug on hub.
7	Wheel Bearing	Repack	A/R	MPG				✓	
8	Spindles/Bushing	N/A	A/R	LL	At spindle/bushing replacement.				Coat I.D. of bushings prior to installing king pins.
9	Boom Pivot Pins/Bushing	N/A	A/R	LL	At boom pivot pins/bushing replacement.				Coat I.D. of bushings prior to installing pins.
10	Rotator Hydraulic Tank	Fill Cap	1 Quart.	HO				✓	Check oil every 10 hours of operation. Change oil every 1200 hours of operation.

NOTE:

Lubrication intervals are based on machine operation under normal conditions. For machines used in multi shift operations and/or exposed to hostile environments or conditions, lubrication frequencies must be increased accordingly.

* If necessary install grease fittings into worm gear housing and grease bearings. Read CAUTION on diagram before greasing.

KEY TO LUBRICANTS:

BG - Mobilith SHC 460 Bearing Grease.
EPGL - Extreme Pressure Gear Lube.
HO - Hydraulic Oil - Modilfluid 424 or Kendall Hyken 052.
LL - Synthetic Lithium Lubricant (Gredag 741 Grease).
MPG - Multi-Purpose Grease.
OG - Open Gear Lube (Tribol Molub-Alloy Graese)

Figure 1-5. Lubrication Chart - 35/n35 electric. (Sheet 4 of 6).

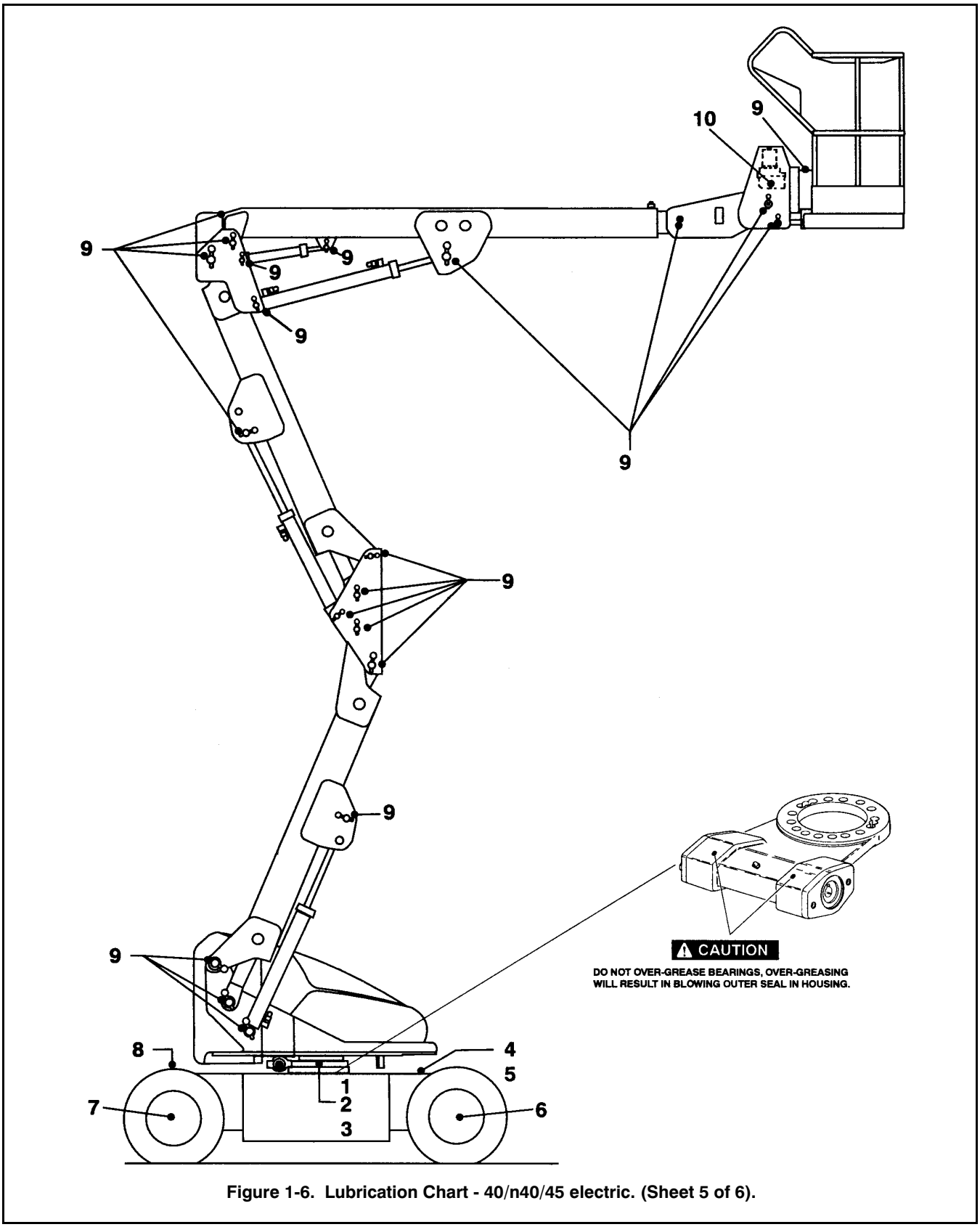

Figure 1-6. Lubrication Chart - 40/n40/45 electric. (Sheet 5 of 6).

	COMPONENTS	NUMBER/TYPE LUBE POINTS	CAPACITY	LUBE	INTERVAL 3 MONTHS 150 HRS	6 MONTHS 300 HRS	HOURS 1 YEAR 600 HRS	2 YEAR 1200 HRS	COMMENTS
LUBRICATION:									
1	Swing Bearing	1 Grease Fitting	A/R	BG/MPG	✓				BG will have a longer service interval than MPG.
2	Swing Bearing - Gear - Teeth *	1 Grease Fitting	A/R	OG/MPG	✓				OG will have a longer service interval than MPG.
3	Swing Worm Gear - Bearing	Plug	A/R	BG/MPG				✓	BG will have a longer service interval than MPG.
4	Hydraulic Fluid (Oil)	Fill Cap	4.0 Gals Tank 4.8 Gals System	HO				✓	Check oil every 10 hours of operation. Change oil every 1200 hours of operation.
5	Hydraulic Filter	N/A	N/A	N/A		✓			Replace filter element after first 50 hours and every 300 hours thereafter.
6	Wheel Drive Hub	Fill Plug/located at 4 or 8 Oclock	12 OZ.(approx)	EPGL	✓				Check oil level at side plug on hub.
7	Wheel Bearing	Repack	A/R	MPG				✓	
8	Spindles/Bushing	N/A	A/R	LL	At spindle/bushing replacement.				Coat I.D. of bushings prior to installing king pins.
9	Boom Pivot Pins/Bushing	N/A	A/R	LL	At boom pivot pins/bushing replacement.				Coat I.D. of bushings prior to installing pins.
10	Rotator Hydraulic Tank	Fill Cap	1 Quart.	HO				✓	Check oil every 10 hours of operation. Change oil every 1200 hours of operation.

NOTE:

Lubrication intervals are based on machine operation under normal conditions. For machines used in multi shift operations and/or exposed to hostile environments or conditions, lubrication frequencies must be increased accordingly.

* If necessary install grease fittings into worm gear housing and grease bearings. Read CAUTION on diagram before greasing.

KEY TO LUBRICANTS:

BG - Mobilith SHC 460 Bearing Grease.
EPGL - Extreme Pressure Gear Lube.
HO - Hydraulic Oil - Modilfluid 424 or Kendall Hyken 052.
LL - Synthetic Lithium Lubricant (Gredag 741 Grease).
MPG - Multi-Purpose Grease.
OG - Open Gear Lube (Tribol Molub-Alloy Graese)

Figure 1-7. Lubrication Chart - 40/n40/45 electric. (Sheet 6 of 6).

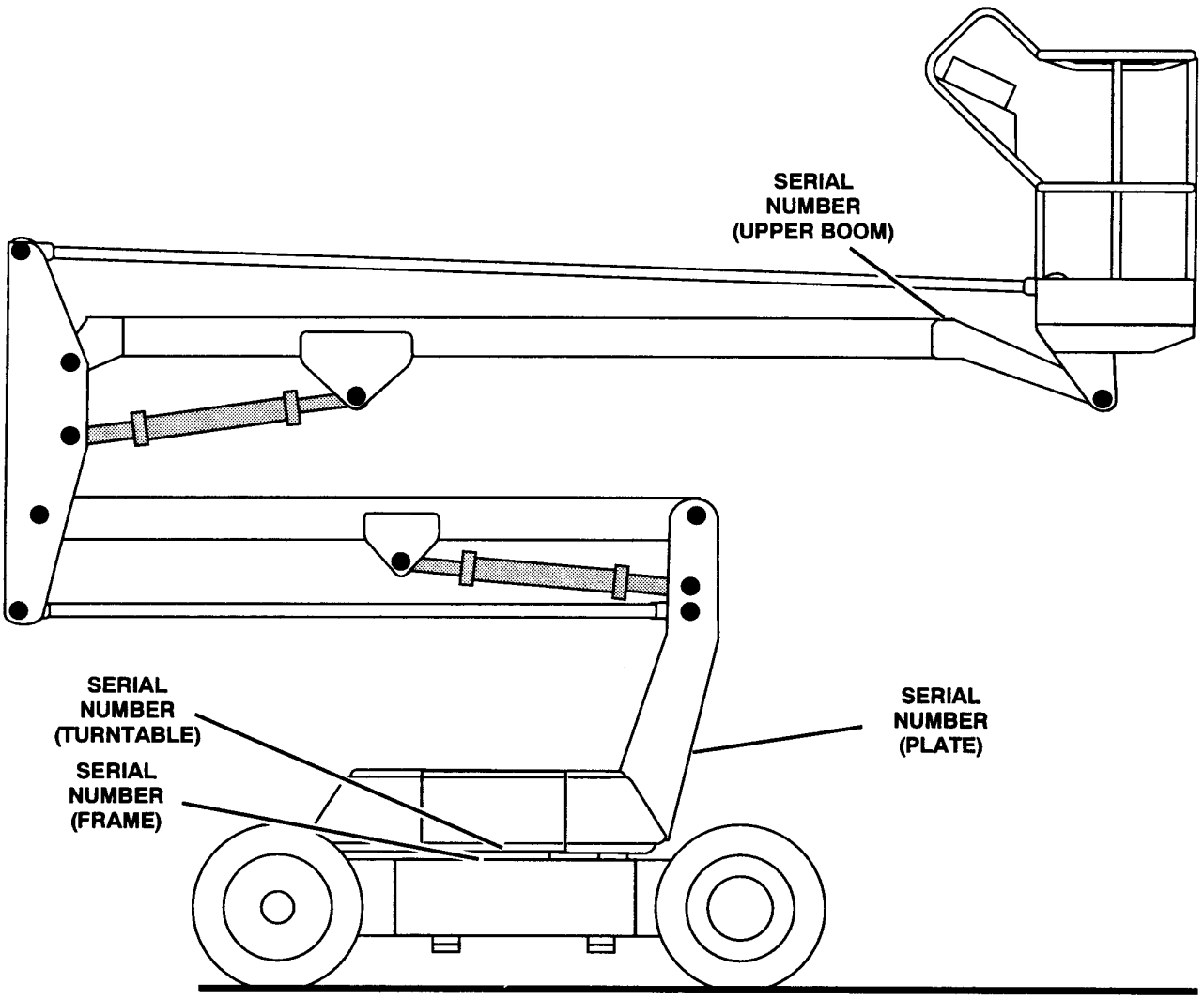

Figure 1-8. Serial Number Locations - 30 electric. (Sheet 1 of 3)

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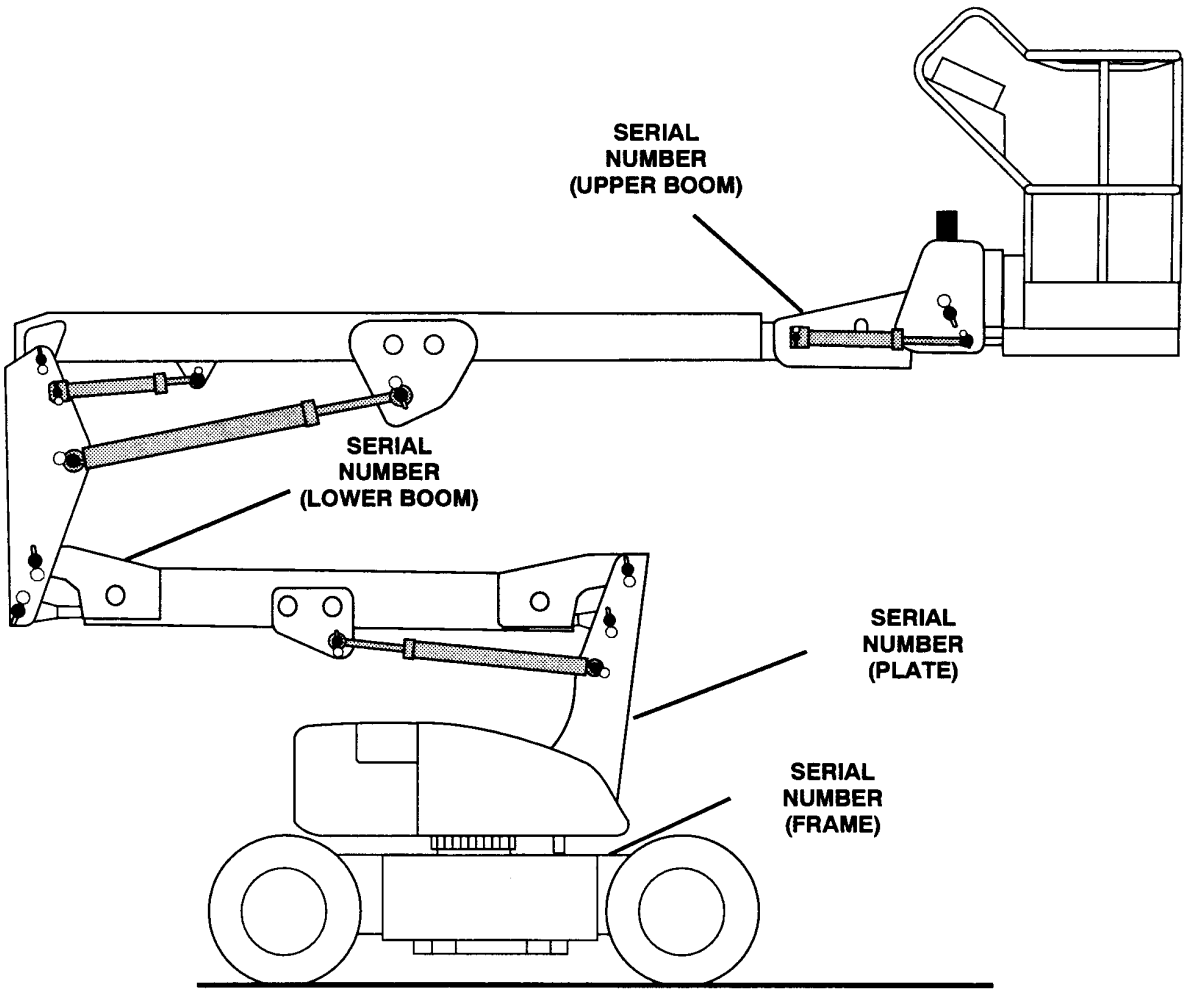


Figure 1-9. Serial Number Locations - 35/n35 electric. (Sheet 2 of 3).

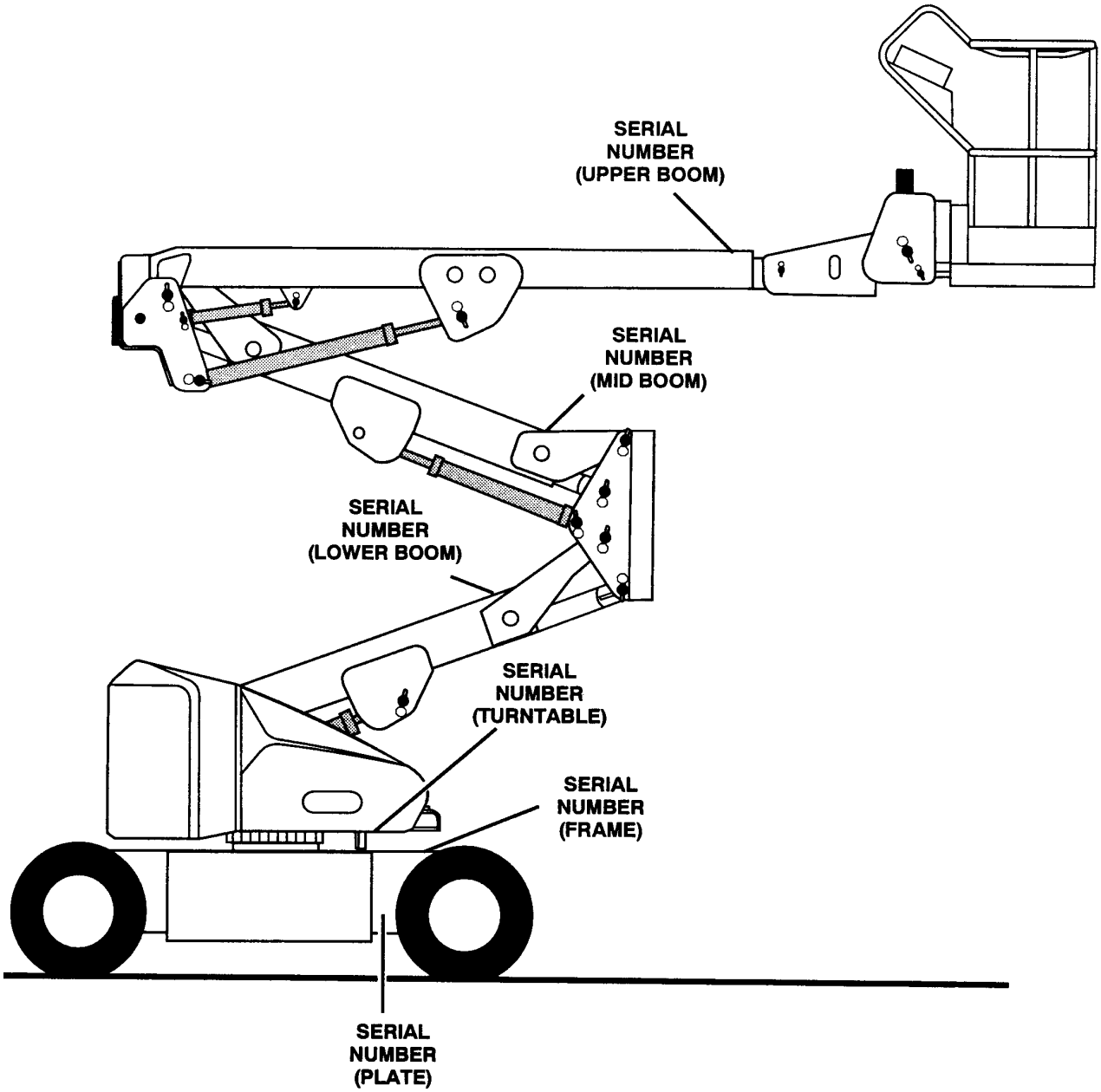


Figure 1-10. Serial Number Locations - 40/n40/45 electric. (Sheet 3 of 3).

SECTION 2. PROCEDURES

2.1 GENERAL.

This section provides information necessary to perform maintenance on the aerial platform. Descriptions, techniques and specific procedures are designed to provide the safest and most efficient maintenance for use by personnel responsible for ensuring the correct installation and operation of machine components and systems.

⚠ CAUTION

WHEN AN ABNORMAL CONDITION IS NOTED AND PROCEDURES CONTAINED HEREIN DO NOT SPECIFICALLY RELATE TO THE NOTED IRREGULARITY, WORK SHOULD BE STOPPED AND TECHNICALLY QUALIFIED GUIDANCE OBTAINED BEFORE WORK IS RESUMED.

The maintenance procedures included consist of servicing and component removal and installation, disassembly, and assembly, inspection, lubrication and cleaning. Information on any special tools or test equipment is also provided where applicable.

2.2 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 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.

Cleanliness.

1. 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 oil supplies clean; however, these items must be maintained on a scheduled basis in order to function properly.
2. At any time when hydraulic 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.
3. 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.

Component Removal and Installation.

1. 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.
2. 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.
3. 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.

1. 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.
2. Discard bearings if the races and balls (or rollers) are pitted, scored or burned.
3. 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 be installed.
4. 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.

1. 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.
2. 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 Figure 1-1).

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.

1. Keep the system clean. If evidence of metal or rubber particles are found in the hydraulic system, drain and flush the entire system.
2. 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.

Service applicable components with the amount, type, and grade of lubricant recommended in this manual, at the specified interval. 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.

Lubrication and Servicing.

Components and assemblies requiring lubrication and servicing are shown in Lubrication Chart.

2.3 LUBRICATION INFORMATION.

Hydraulic System.

1. The primary enemy of a hydraulic system is contamination. Contaminants enter the system by various means, e.g.; 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.
2. 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. Hydraulic system filters should be checked, cleaned, and/or replaced at the specified intervals required in Figure 1-2. Always examine filters for evidence of metal particles.
3. 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.
4. 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 or filters of new machines due to the wear-in of meshing components.*

Hydraulic Oil.

1. Refer to Table 1-1 for recommendations for viscosity ranges.
2. JLG recommends Mobilfluid 424 Hydraulic Oil, which has an SAE viscosity of 10W-30 and a viscosity index of 152.

NOTE: *Start-up of hydraulic system with oil temperatures below -15 degrees F. is not recommended. If it is necessary to start the system in a sub-zero environment, it will be necessary to heat the oil with a low density 100VAC heater to a minimum temperature of -15 degrees F.*

3. The only exception to the above is to drain and fill the system with Mobil DTE11 oil or its equivalent. This will allow start up at temperatures down to -20 degrees F. However, use of this oil will give poor performance at temperatures above 120 degrees F. Systems using DTE11 oil should not be operated at temperatures above 200 degrees F. under any condition.

Changing Hydraulic Oil.

1. Use of any of the recommended hydraulic oils eliminates the need for changing the oil on a regular basis. However, filter elements must be changed after the first 50 hours of operation and every 300 hours thereafter. 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 every two years.
2. 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. Always clean the mesh element of the filter and replace the cartridge any time the system oil is changed.
3. 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 requirements. Should any question arise regarding the use of greases in maintenance stock, consult your local supplier for evaluation. Refer to Table 1-2 for an explanation of the lubricant key designations appearing in the Lubrication Chart.

2.4 CYLINDERS - THEORY OF OPERATION.

Systems Incorporating Double Acting Cylinders.

30 electric - Upper Boom Lift, Lower Boom Lift, and Steer.

35/n35 electric - Upper Boom Lift, Lower Boom Lift, Telescope, Slave, Master, Rotator, and Steer.

40/n40/45 electric - Upper Boom Lift, Mid Boom Lift, Lower Boom Lift, Telescope, Slave, Master, Rotator, and Steer.

A double acting cylinder is one that requires oil flow to operate the cylinder rod in both directions. Directing oil (by actuating the corresponding control valve to the piston side of the cylinder) forces the piston to travel toward the rod end of the barrel, extending the cylinder rod (piston attached to rod). When the oil flow is stopped, movement of the rod will stop. By directing oil to the rod side of the cylinder, the piston will be forced in the opposite direction and the cylinder rod will retract.

Holding valves are used in the Lift circuits to prevent retraction of the cylinder rod should a hydraulic line rupture or leak develop between the cylinder and its related control valve.

2.5 VALVES - THEORY OF OPERATION.

Control Valves.

30 electric - Control Valve 4640725 this valve controls Swing, Lower Lift, and Upper Lift.

35/n35 electric - Control Valve 4640843 this valve controls Platform, Telescope, Swing, Lower Lift, and Upper Lift.

40/n40/45 electric - Control Valve 4640797 this valve controls Platform, Telescope, Swing, Lower Lift, and Upper Lift.

It consists of cartridge type valves in an anodized aluminum manifold. The cartridge valves provide for control of flow, volume of flow and pressure in the hydraulic system.

The directional control valves are solenoid operated, three position, 4-way sliding spool type valves. One valve is provided for each of the three functions. Energizing one of the electrical coils on a valve will divert the supply of hydraulic oil to provide motion of that function in one direction. Energizing the other coil will divert the oil for motion in the other direction. When neither coil is energized, the supply of hydraulic oil is blocked.

Flow control valves in the lift circuits provide for control of the rate of flow when the oil is flowing out of the cap ends of the cylinders (the load is being lowered). An adjusting screw on each cartridge flow control valve allows the rate of flow (speed) to be adjusted. When oil is flowing into the cap end of the lift cylinders, an internal check valve feature allows unrestricted flow.

Pressure relief valves limit the pressure in the swing circuit and the rod end of each lift cylinder. When the pressure in one of those circuits reaches the set point of the valve, the valve opens, allowing enough flow to return to the reservoir so that the set pressure is not exceeded. An adjusting screw on each cartridge relief valve allows the set pressure to be adjusted.

The aluminum manifold provides the passages through which the hydraulic oil is diverted to provide the desired movement of the actuators. No moving parts of the valves slide against the manifold and so it is not subject to wear.

Steer Valve 4640726. (30/35/n35/40/n40/45 electric)

This valve controls the STEER function. It consists of screw-in cartridge type valves in an anodized aluminum manifold. The cartridge valves provide for control of direction of flow and pressure in the STEER hydraulic circuit.

The directional control valve is a solenoid operated, three position, 4-way sliding spool type valve. Energizing one of the electrical coils on the valve will divert the supply of hydraulic oil to provide steering in one direction. Energizing the other coil will divert the oil for steering in the other direction. When neither coil is energized, the supply of hydraulic oil is blocked.

A pressure relief valve limits the pressure in the steer circuit. When the pressure reaches the set point of the valve, the valve opens, allowing enough flow to return to the reservoir so that pressure is not exceeded. An adjusting screw on the cartridge relief valve allows the set pressure to be adjusted.

The aluminum manifold provides the passages through which hydraulic oil is diverted to provide the desired movement of the steer cylinder. No moving parts of the valves slide against the manifold and so it is not subject to any wear.

2.6 MOTOR CONTROLLER.

Modes of Operation.

1. Traction Motor Drive.

    a. Drive in either forward or reverse will start only if the following conditions are satisfied:

1. Function switches off.

2. No procedure or diagnostic faults present.

3. FWD or REV selected as appropriate.

    b. Once in “drive” mode, activating a function switch shall not cause drive mode to be exited, the pump/traction contactor drive shall not be energized (shall be left at the traction position). If a function switch is selected during traction, a procedure fault will occur when neutral is selected, remaining until a function switch and both directions are no longer selected.

    c. When neutral is selected, the controller will control smooth stopping of the machine, using plug braking, before the electric brake is allowed to operate.

    d. If a function switch is activated in neutral, when the vehicle has stopped and the brake is applied, then pump mode will become operational.

1. Pump Motor Drive.

    a. Pump motor drive will start only if the following conditions are satisfied:

1. FWD and REV switch off.

2. Traction mode off (brake applied).

    a. Pump drive shall only be enabled when the direction selector inputs are in neutral and the machine is stationary. Once pump drive mode has been entered, then the status of the direction selector inputs shall no longer interlock pump operation. If a direction switch is selected during pump drive, a procedure fault will occur when the function switch is no longer selected, remaining until both directions and the function switch are no longer selected.

Features.

1. Features in Traction Mode.

    a. Maximum Speed Control.

The controller incorporates a function to limit the maximum speed of the machine to a percentage of maximum possible speed. The function operates in such a manner as to control vehicle speed by limiting the percentage on of the switching device to keep the machine speed below the maximum permitted value or, if required, to apply variable plug braking to restrict machine speed when traveling down a grade. The speed is controlled based on the percentage of accelerator input.

1. Features in Pump Mode.

    a. Proportional Control of Pump Motor Speed.

    The pump motor speed shall be controlled by varying the percentage on of the switching element in relation to a separate pump accelerator input.

    b. Soft Start.

    The pump motor speed control incorporates a “soft start” facility by applying acceleration delay to changes in the applied percentage on of the switching element.

2. General Features.

   a. Diagnostics.

      To obtain flash code, depress footswitch and repeat operation which caused fault. After fault occurs, maintain footswitch and function position and read flash code. NOTE: Flash code repeats after pause.

      Flash codes are as follows:

      LED On - Controller Operational.

      LED Off - Internal Fault or Power Not Turned On.

      1 Flash - Internal Fault

      2 Flashes - Procedure Fault.

      (Recycle Footswitch)

      This includes direction or function selected at power on, or direction and function selected together.

      3 Flashes - Motor Permanently Low.

      This includes MOSFET short circuit.

      4 Flashes - Motor Permanently High.

      This includes direction or pump/traction contactor welded.

      5 Flashes - Motor Neither Low Nor High. (Open Circuit)

      This includes direction or pump/traction contactor open circuit, MOSFET open circuit and hardware fail-safe trip.

      6 Flashes - Faulty Drive Hand Controller.

      This includes drive hand controller greater than 30% at power on, and wire off. Note that the pump accelerator is not fault detected.

      7 Flashes - Low Battery Voltage.

      This includes battery voltage below 13 volts.

      8 Flashes - Thermal Cutback, Controller.

      This includes MOSFET temperature above 80 degrees C (176 degrees F).

      10 Flashes - Tachometer Fault.

      When in traction drive with the controller pulsing at greater than 33% ON for more than 1 second, the tachometer input shall be monitored. Failure of the tachometer will result in a 10 flash diagnostic fault being raised and the brake applied, i.e., machine is disabled if tachometer fails. The fault is only recyclable using the footswitch.

      11 Flashes - Tachometer out of calibration.

      Tachometer output is sensed when vehicle is in neutral failure occurs when at the input to MOS90:

      1 tachometer PCB output was above 9.0 volts or below 6 volts.

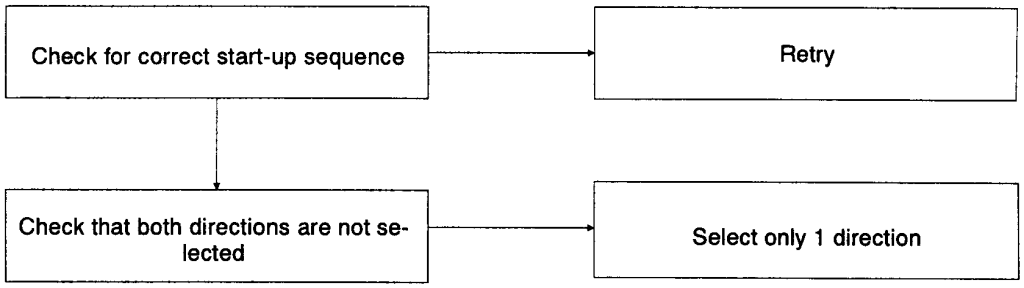
      Prevents TRACTION and PUMP modes.

NOTE: *Refer to Figure 2-1, Troubleshooting Flow Charts, for specific troubleshooting information.*

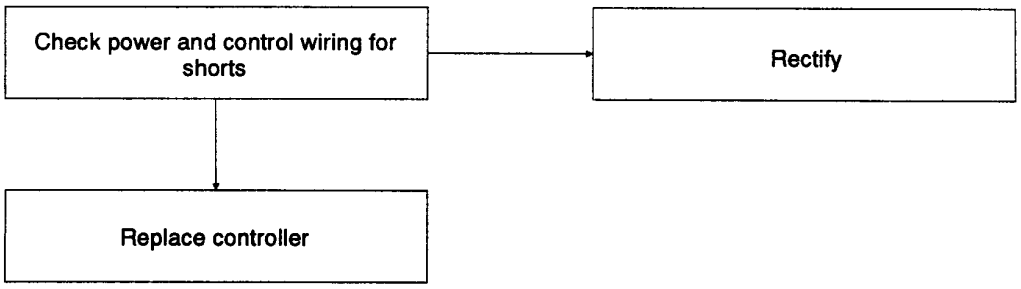
1. **At battery connection, the LED should not illuminate. At key ON, the LED should illuminate steadily. If the LED illuminates and remains steady, but no drive can be selected, contact JLG Service Department.**

2. **1 FLASH - Internal Fault. (Replace MOS90)**

3. **2 FLASHES - Procedure Fault. (Recycle Footswitch)**
- Illegal start up sequence, 2 directions selected, pump selected.
- Drive inhibited.
- Flashes until fault is cleared.



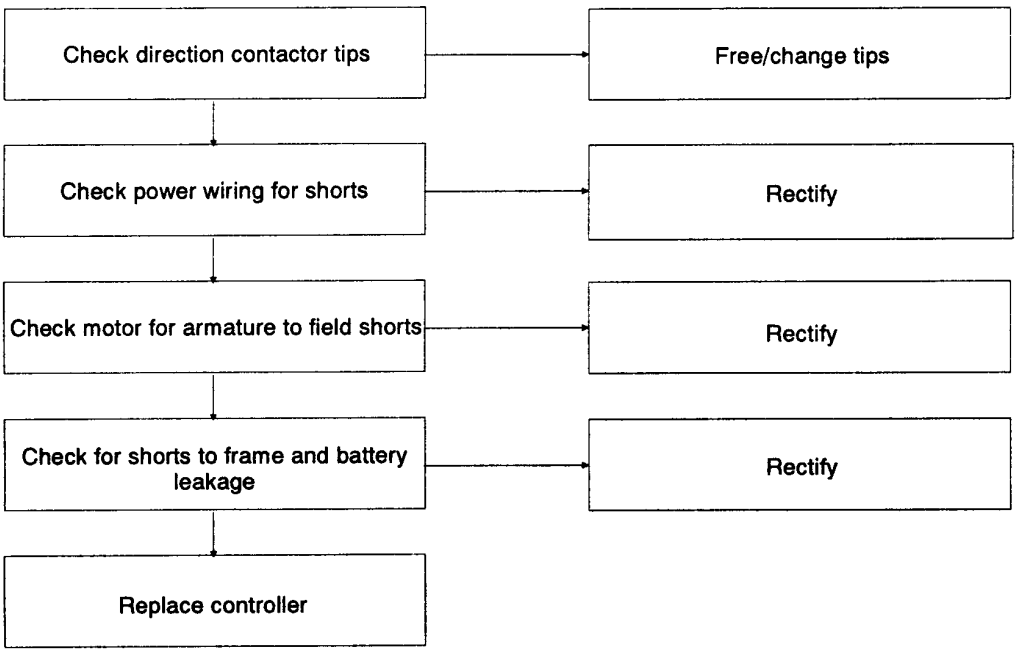
4. **3 FLASHES - Motor Permanently Low.**
- Point 'A' < 7V in neutral, or < 7V for 15mS in drive, or contactor coil short circuit or brake coil.
- Drive & pump inhibited.
- Recycle to neutral to clear.



5. **4 FLASHES - Motor Permanently High.**
- Direction contactor welded. (Point 'A' within 6V of B + ve in neutral).

Figure 2-1. Sevcon Controller Troubleshooting Flow Charts. (Sheet 1 of 4).

- Drive inhibited.
- Flashes in neutral until fault is cleared.



6. **5 FLASHES - Motor Neither Low Nor High. (Open Circuit)**
- Direction contactors (or line contactor) did not close.
- Point 'A' not within 6V of B + ve after 500mS.
- Drive inhibited.
- Flashes until fault is cleared, when contactor closes.

NOTE: *If recycling to neutral does not clear the fault, then the fail-safe is due to an S/C contactor coil and the key switch must be recycled (and coil replaced).*

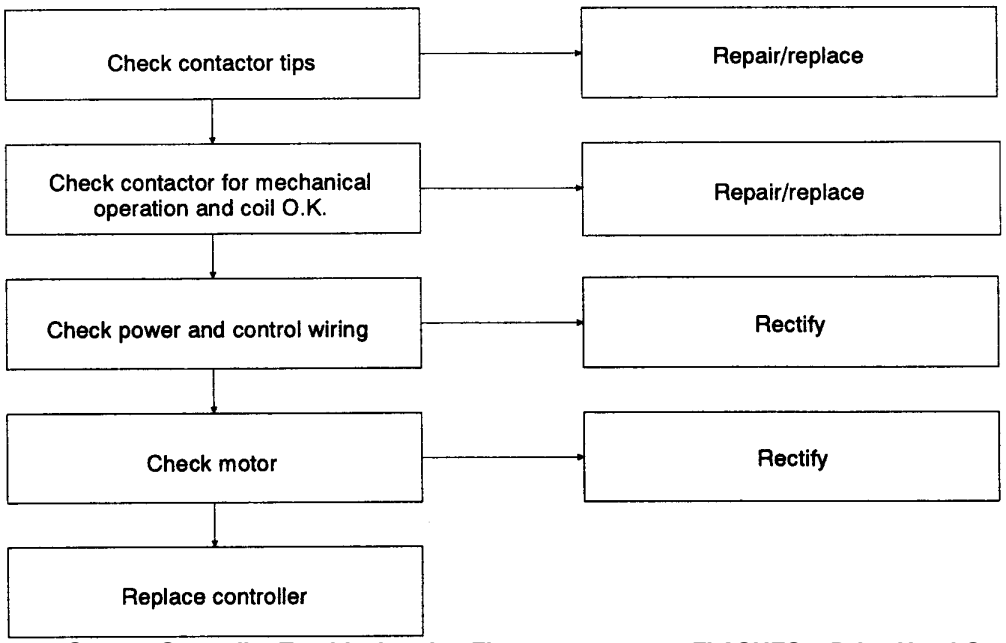
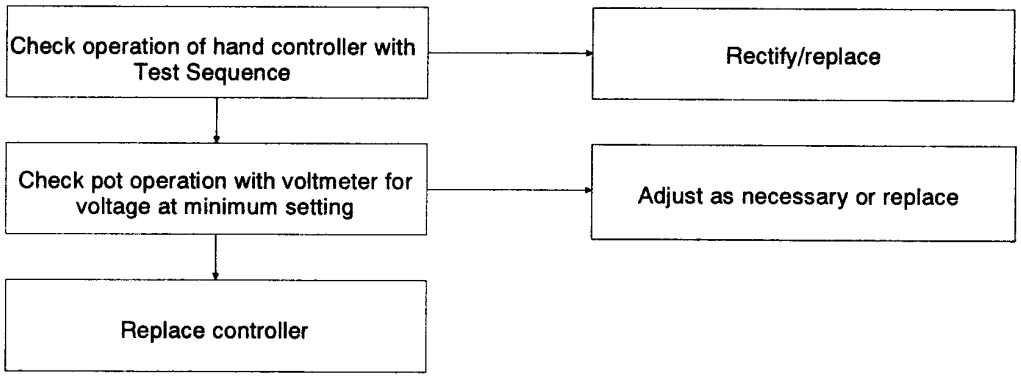


Figure 2-1. Sevcon Controller Troubleshooting Flow Charts. (Sheet 2 of 4).

7. **6 FLASHES - Drive Hand Controller Fault.**
- 3.5-0V Input: Voltage <2.5V on power up.
- Voltage >4.5V in drive.

- Controller drives at minimum speed.
- Flashes in drive until fault cleared.



8. **7 FLASHES - Low Battery Voltage - Battery Voltage < 13V.**

- Drive inhibited.
- Recycle to neutral to clear flashes.

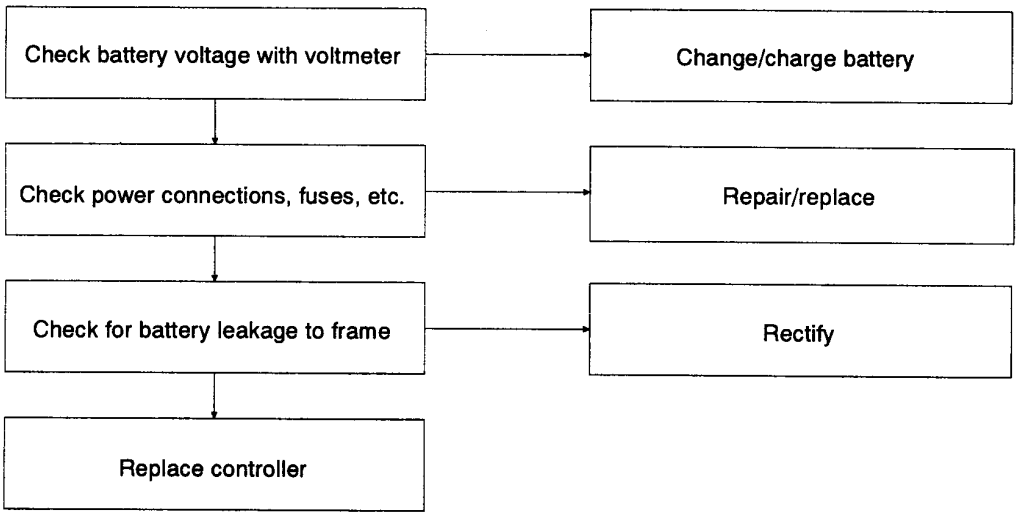
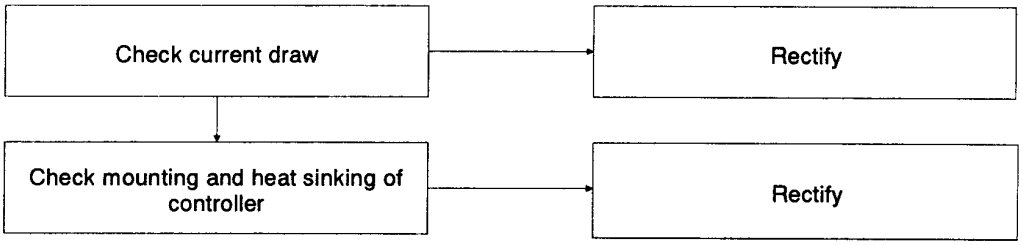


Figure 2-1. Sevcon Controller Troubleshooting Flow Charts. (Sheet 3 of 4).

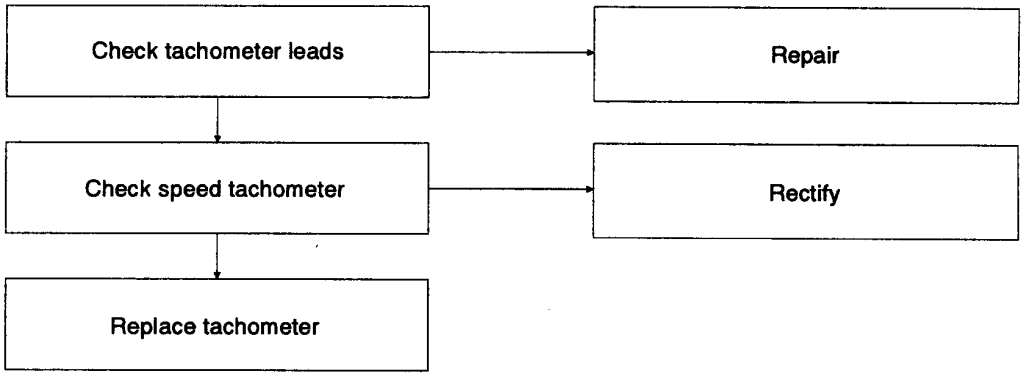
9. **8 FLASHES - Thermal Cutback, Controller.**
- Heat sink temperature > 80 degrees C (176 degrees F).

- (Current limit will be zero at 90 degrees C [194 degrees F]).
- Allow unit to cool down, to clear flashing.



10. **10 FLASHES - Tachometer Fault.**
- Controller > 33%, no tachometer output for 1 second.

NOTE: *If the machine is operated at a very slow speed or stalled when climbing a grade of 20% or greater, a 10 flash fault will occur. Recycle footswitch to recover.*



11. **11 FLASHES - Tachometer out of calibrate.**
- Pin voltage @ MOS90 above 9 volts or below 6 volts when in neutral.

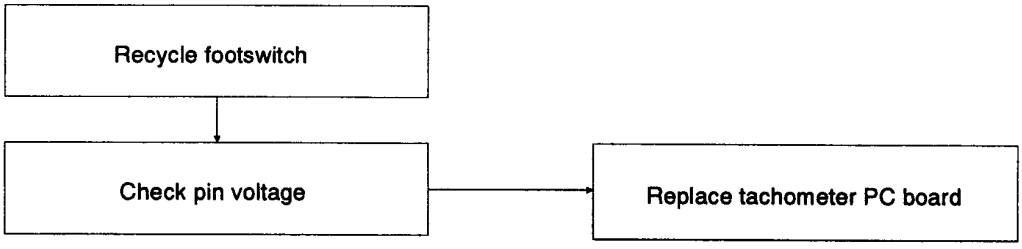
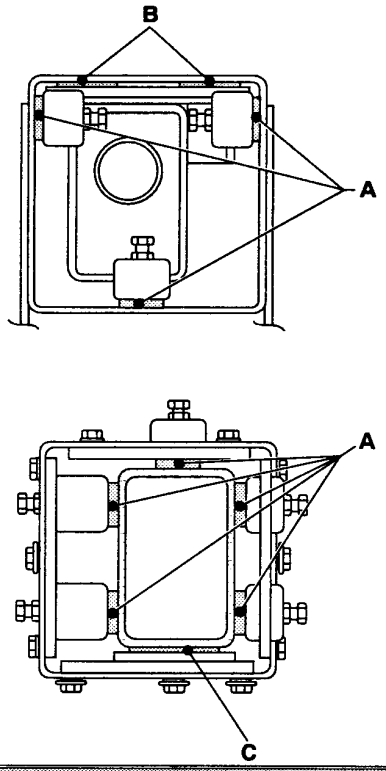


Figure 2-1. Sevcon Controller Troubleshooting Flow Charts. (Sheet 4 of 4).

2.7 WEAR PADS.

Main Boom. (Models 35/n35/40/n40/45)

1. Shim up wear pads until snug to adjacent surface.
2. Replace wear pads when worn to thickness shown in Figure 2-2.
3. Adjust wear pads as follows:
   a. a. Loosen jam nut on adjustment bolt, turn bolt CW until wear pad is snug to adjacent surface.
   b. b.After adjustments have been made, tighten the jam nuts on wear pad bolts.



WEAR PADS NEW		
PAD NUMBER	THICKNESS OF NEW PAD	REPLACE WHEN WORN TO:
A	0.75"	0.375"
B	0.50"	0.3125"
C	0.50"	0.3175"

Figure 2-2. Location and Thickness of Wear Pads.

2.8 BOOM MAINTENANCE.

Removal. (Model 30)

1. Remove the platform/support as follows:
   a. Disconnect electrical cable from control console.
   b. Using an overhead crane or suitable lifting device, strap support the platform/support.
   c. Remove hardware from pin #1. Using a suitable brass drift and hammer, remove pin #1 from the platform support.
   d. Supporting the platform/support, remove the hardware from pin #2. Using a suitable brass drift and hammer, remove pin #2 from the fly boom and remove the platform.

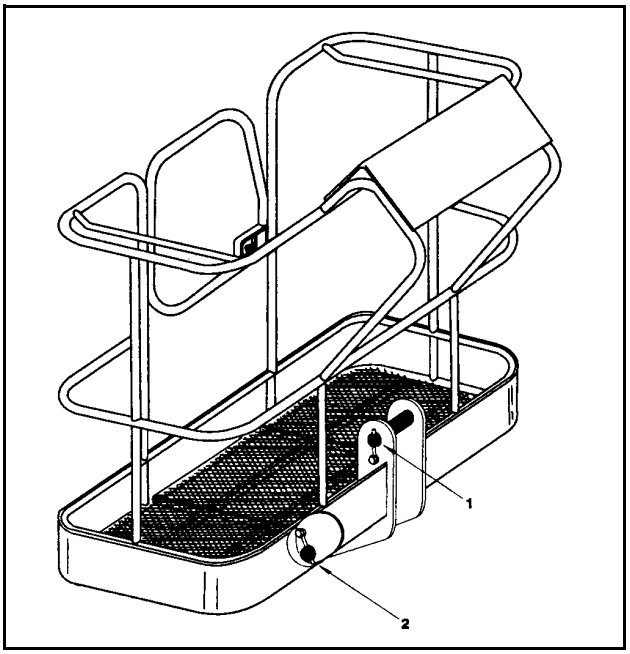


Figure 2-3. Location of Components - Platform Support (Model 30).

2. Remove the boom from upright as follows:
   a. Remove hardware securing the hose clamp to the base boom section and remove hose clamps. Pull wiring harness through the aft end of the base boom section.

⚠ CAUTION

HYDRAULIC LINES AND PORTS SHOULD BE CAPPED IMMEDIATELY AFTER DISCONNECTING LINES TO AVOID ENTRY OF CONTAMINANTS INTO SYSTEM.

   b. Using a suitable lifting equipment, adequately support boom link weight along entire length.
   c. Remove hardware securing the upper link pin #1. Using a suitable brass drift and hammer, remove pin #1 from the upright and remove upper link.
   d. Using a suitable lifting equipment, adequately support boom weight along entire length.
   e. Remove hardware securing the lift cylinder pin #2. Using a suitable brass drift and hammer, remove pin #2 from the base boom.
   f. Remove hardware securing the base boom pin #3. Using a suitable brass drift and hammer, remove pin #3 from the upright.

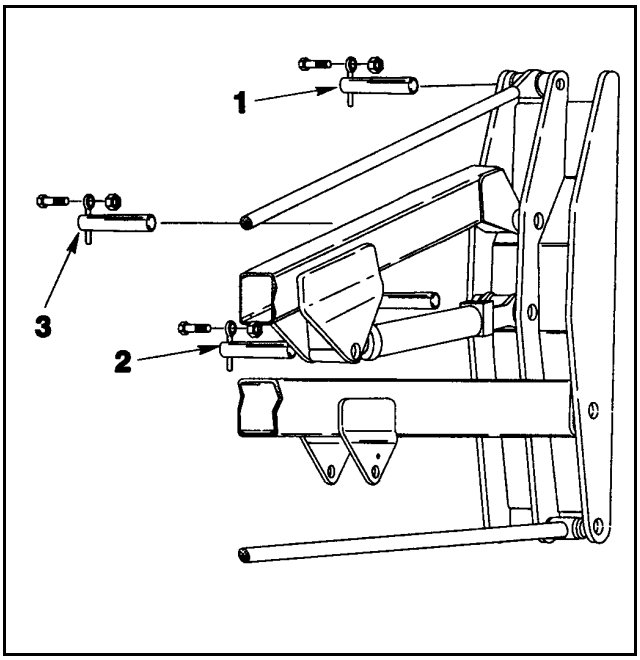


Figure 2-4. Location of Components - Removal of Base Boom. (Model 30)

Inspection.

1. Inspect boom pivot pin for wear, scoring or other damage, and for tapering or ovality. Replace pin as necessary.
2. Inspect upper link pins for wear, scoring or other damage, and for tapering or ovality. Ensure pin surfaces are protected prior to installation. Replace pins as necessary.
3. Inspect inner diameter of boom pivot bushings for scoring, distortion, wear or other damage. Replace bushings as necessary.
4. Inspect inner diameter of link pivot bushings for scoring, distortion, wear or other damage. Replace bushings as necessary.
5. Inspect all threaded components for damage such as stretching, thread deformation, or twisting. Replace as necessary.
6. Inspect structural units of boom assembly for bending, cracking, separation of welds, or other damage. Replace boom sections as necessary.

Installation.

1. Using suitable lifting equipment, position boom assembly on upright so that boom pivot holes in both boom and upright are aligned.
2. Install boom pivot pin, ensuring that location of the hole in pivot pin aligns with attach point on upright.
3. Using all applicable safety precautions, operate lifting equipment in order to position boom lift cylinder so that holes in cylinder rod end and boom structure are aligned. Insert cylinder pins.
4. If necessary, gently tap pin into position with a soft headed mallet, ensuring that attach hole in pin are aligned with attach hole in boom structure. Secure with hardware.
5. Using suitable lifting equipment, position upper link assembly on upright so that link pivot holes in both link and upright are aligned.
6. Install link pivot pin, ensuring that location of the hole in pivot pin aligns with attach point on upright.
7. Route the wiring harness through the boom and install clamp.
8. Install the platform to the boom and link assembly.
9. Connect all wiring to control console.
10. Using all safety precautions, operate machine systems and extend and retract boom for four or five cycles.
11. Shut down machine systems and check for leakage.

Removal. (Models 35/n35/40/n40/45)

1. Remove the platform/support as follows:
   a. Disconnect electrical cable from control console.
   b. Using an overhead crane or suitable lifting device, strap support the platform/support.
   c. Remove hardware from pin #1. Using a suitable brass drift and hammer, remove pin #1 from the platform support.
   d. Supporting the platform/support, remove the hardware from pin #2. Using a suitable brass drift and hammer, remove pin #2 from the fly boom and remove the rotator.

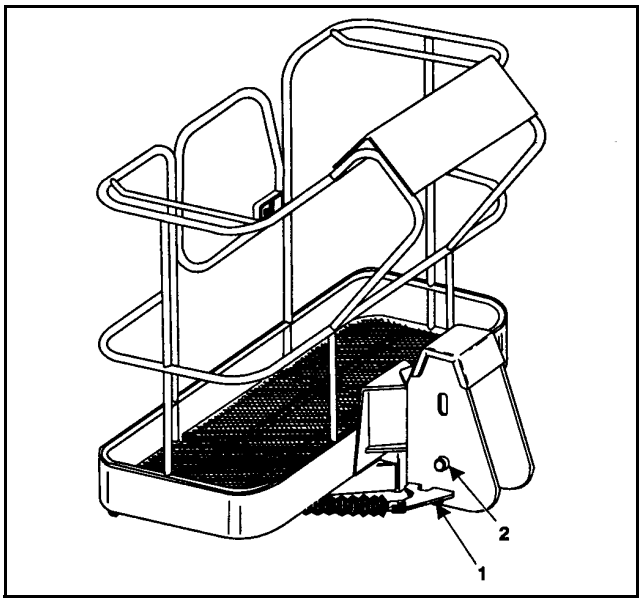


Figure 2-5. Location of Components - Platform Support. (Models 35/n35/40/n40/45)

   e. Supporting the slave cylinder, remove the hardware from pin #3. Using a suitable brass drift and hammer, remove pin #3 from the fly boom.
   f. Tag and disconnect hydraulic lines to the slave leveling cylinder. Use a suitable container to retain any residual hydraulic fluid. Cap hydraulic lines and ports. Remove the slave cylinder.

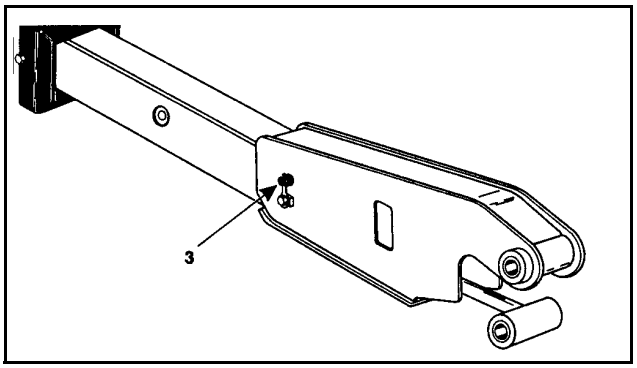


Figure 2-6. Location of Components - Slave Leveling Cylinder.

2. Remove the boom from upright as follows:

   a. Remove hardware securing the cover plate on the side of the base boom section and remove hose clamps. Disconnect wiring harness from ground control harness connector.

⚠ CAUTION

HYDRAULIC LINES AND PORTS SHOULD BE CAPPED IMMEDIATELY AFTER DISCONNECTING LINES TO AVOID ENTRY OF CONTAMINANTS INTO SYSTEM.

   b. Tag and disconnect hydraulic lines from boom to control valve. Use a suitable container to retain any residual hydraulic fluid. Cap hydraulic lines and ports.

   c. Using a suitable lifting equipment, adequately support boom weight along entire length.

   d. Remove hardware securing the lift cylinder pin #1. Using a suitable brass drift and hammer, remove pin #1 from the base boom.

   e. Remove hardware securing the master cylinder pin #2. Using a suitable brass drift and hammer, remove pin #2 from the base boom.

   f. Remove hardware securing the base boom pin #3. Using a suitable brass drift and hammer, remove pin #3 from the upright.

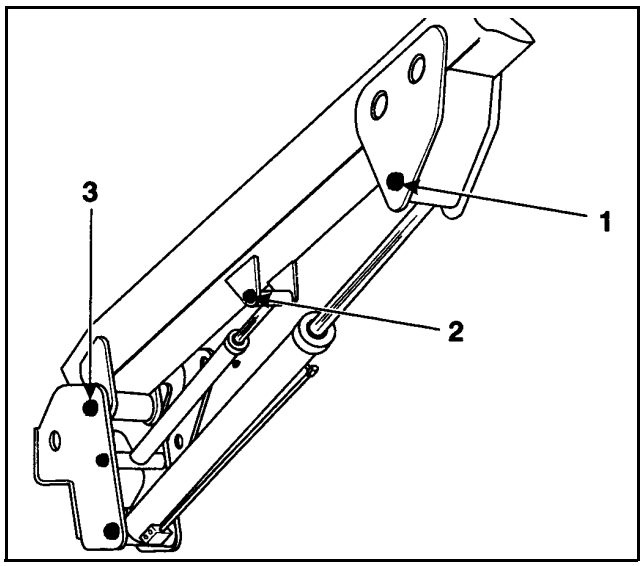


Figure 2-7. Location of Components - Removal of Base Boom. (Models 35/n35/40/n40/45)

   g. Using all applicable safety precautions, carefully lift boom assembly clear of upright and lower to ground or suitable supported work surface.

Disassembly Boom Sections.

1. Loosen jam nuts on aft end of fly boom wear pad adjustment and loosen adjustments.
2. Using a portable power source, attach hose to telescope cylinder port block. Using all applicable safety precautions, activate hydraulic system and extend cylinder rod pin #1. Shut down hydraulic system.

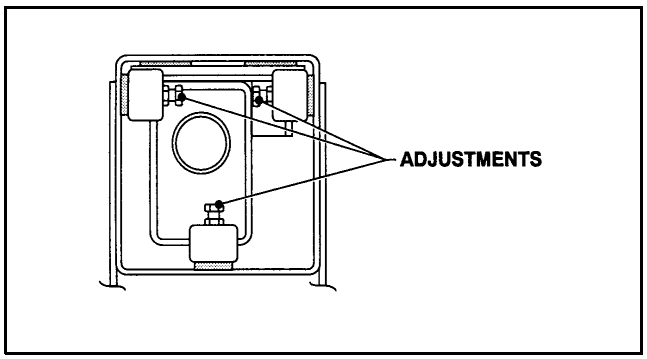


Figure 2-8. Location of Components - Aft End of Fly Boom Wear Pad Adjustments.

3. Carefully disconnect hydraulic hose from retract port of cylinder. There will be initial weeping of hydraulic fluid which can be caught in a suitable container. After initial discharge, there should be no further leakage from the retract port.
4. Remove hardware securing telescope cylinder #1 to the fly boom section, then remove pin from fly.
5. Remove hardware securing telescope cylinder to the base boom section.

⚠ CAUTION

WHEN REMOVING TELESCOPE CYLINDER FROM BOOM SECTIONS. CARE SHOULD BE TAKEN NOT TO LEAVE CYLINDER REST ON POWERTRACK WHICH COULD CAUSE DAMAGE TO POWERTRACK.

6. Using a suitable lifting device, remove telescope cylinder from boom sections.
7. Using a piece of tape, mark the length of hoses and wires from front of fly boom and bottom of base boom for reassembly.
8. Remove hardware securing the front cover on base boom section.

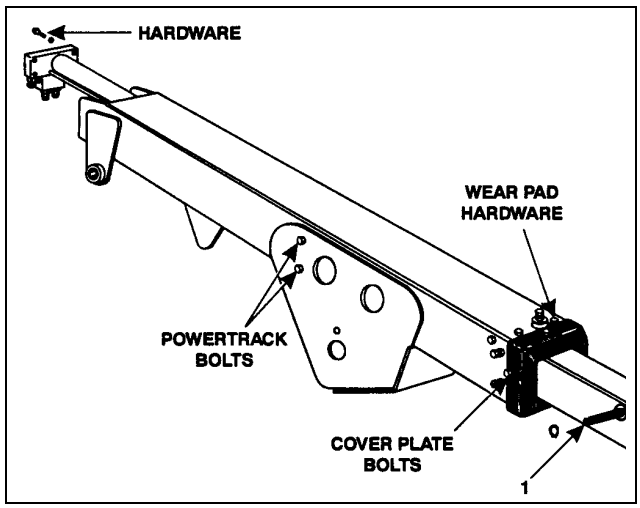


Figure 2-9. Location of Components - Removal of Telescope Cylinder.

9. Loosen jam nuts on front wear pad adjustments and loosen adjustments.
10. Remove hardware securing the front wear pads on base boom section, remove wear pads.

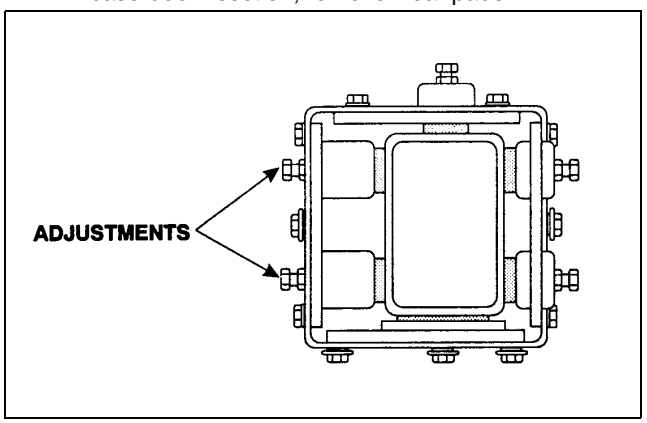


Figure 2-10. Location of Components - Front Base Boom Wear Pad Adjustments.

1. Remove wire clamp on the inside of the fly nose.
2. Manually push the fly boom section into base boom section to gain access to the powertrack attachment bolts on the right side of the base boom section.
3. Remove hardware securing the powertrack to the aft end of the fly boom section.
4. Using a suitable lifting device, remove fly boom from boom section.
5. Remove hydraulic lines and electrical cables from powertrack.
6. Remove hardware securing powertrack to the base boom section. Remove powertrack.

Inspection.

1. Inspect boom pivot pin for wear, scoring or other damage, and for tapering or ovality. Replace pin as necessary.
2. Inspect lift and master cylinder pins for wear, scoring or other damage, and for tapering or ovality. Ensure pin surfaces are protected prior to installation. Replace pins as necessary.
3. Inspect telescope cylinder rod attach pin for wear, scoring or other damage. Replace pin as necessary.
4. Inspect inner diameter of boom pivot bushings for scoring, distortion, wear or other damage. Replace bushings as necessary.
5. Inspect wear pads for wear as shown in paragraph 2-6, Wear Pads.
6. Inspect all threaded components for damage such as stretching, thread deformation, or twisting. Replace as necessary.
7. Inspect structural units of boom assembly for bending, cracking, separation of welds, or other damage. Replace boom sections as necessary.

Assembly.

1. Install power track to the attach point on the inside of the base boom section. Secure power track with hardware.
2. Install hydraulic lines and electrical cables into the power track.
3. Install wear pads to the aft end of the fly section.
4. Using suitable lifting equipment, slide fly section into the base section until power track attach point aligns with holes in side of base section.
5. Attach the power track to the aft end of fly boom section. Secure power track with hardware.
6. Using suitable lifting equipment, slide fly boom section out to gain access to telescope cylinder attach pin hole.
7. Measure the distance between the telescope cylinder port block attach point on base boom section and the attach point on fly boom section.
8. Connect a suitable auxiliary hydraulic power source to the telescope cylinder port block.
9. Extend the telescope cylinder the distance of the two attach points.
10. Secure the sling and lifting device at the telescope cylinder's approximate center of gravity, and lift the cylinder to the aft end of the boom assembly.

⚠ CAUTION

WHEN INSERTING THE TELESCOPE CYLINDER INTO THE BOOM, CARE MUST BE TAKEN NOT TO DAMAGE THE POWER TRACK ASSEMBLY.

11. Slowly slide the telescope cylinder into boom assembly, align rod end with attach point in fly section. Insert pin and secure with retaining ring.
12. Align bolt holes at aft end of base boom section with telescope cylinder port block. Secure telescope cylinder with hardware.
13. Install wear pads at end of base boom section. Adjust the adjustable wear pads to zero clearance. Adjust pads alternately side to side, so that fly boom section is centered in base boom section.
14. Retract boom section fully. Adjust wear pads at aft end of boom section to zero clearance. Adjust pads alternately side to side, so that fly boom section is centered in base boom section.
15. Disconnect auxiliary power source from telescope cylinder.

Installation.

1. Using suitable lifting equipment, position boom assembly on upright so that boom pivot holes in both boom and upright are aligned.
2. Install boom pivot pin, ensuring that location of the hole in pivot pin aligns with attach point on upright.
3. Using all applicable safety precautions, operate lifting equipment in order to position boom lift and master cylinders so that holes in cylinder rod ends and boom structure are aligned. Insert cylinder pins.
4. If necessary, gently tap pins into position with a soft headed mallet, ensuring that attach holes in pins are aligned with attach holes in boom structure. Secure with hardware.
5. Connect all hosing and wiring.
6. Install the slave leveling cylinder to the boom assembly.
7. Install the platform to the boom assembly.
8. Connect all hosing and wiring at platform control station.
9. Using all safety precautions, operate machine systems and extend and retract boom for four or five cycles.
10. Shut down machine systems and check for leakage.

2.9 CYLINDER CHECKING PROCEDURES.

NOTE: *Cylinder checks must be performed any time a cylinder component is replaced or when improper system operation is suspected.*

Cylinder Without Counterbalance Valves.

30 electric - Steer.
35/n35/40/n40/45 electric - Steer, Master, and Rotate.

1. Using all applicable safety precautions, activate hydraulic system and fully extend cylinder to be checked. Shut down hydraulic system.
2. Carefully disconnect hydraulic hose from retract port of cylinder. There will be initial weeping of hydraulic fluid which can be caught in a suitable container. After initial discharge, there should be no further leakage from the retract port.
3. Activate hydraulic system, and activate cylinder extend function.
4. If cylinder retract port leakage is less than 6-8 drops per minute, carefully reconnect hose to retract port and retract cylinder. If leakage continues at a rate of 6-8 drops per minute or more, cylinder repairs must be made.
5. With cylinder fully retracted, shut down motor and carefully disconnect hydraulic hose from cylinder extend port.
6. Activate hydraulic system and activate cylinder retract function. Check extend port for leakage.
7. If extend port leakage is less than 6-8 drops per minute, carefully reconnect hose to extend port, then activate cylinder through one complete cycle and check for leaks. If leakage continues at a rate of 6-8 drops per minute or more, cylinder repairs must be made.

Cylinders With Single Counterbalance Valve.

30/35/n35 electric - Upper and Lower Lift Cylinders.
40/n40/45 electric - Upper Lift Cylinder.

⚠ IMPORTANT

OPERATE ALL FUNCTIONS FROM GROUND CONTROL STATION ONLY.

1. Using all applicable safety precautions, activate hydraulic system.

⚠ WARNING

WHEN WORKING ON THE UPPER BOOM LIFT CYLINDER RAISE THE UPPER BOOM TO HORIZONTAL AND PLACE A BOOM PROP APPROXIMATELY 1 INCH 2.54 CM BELOW THE MAIN BOOM. REFER TO FIG. 2-11. IF WORKING ON LOWER BOOM LIFT CYLINDER, RAISE LOWER BOOM HALFWAY, FULLY ELEVATE UPPER BOOM AND ATTACH OVERHEAD CRANE TO THE UPRIGHT FOR SUPPORT, LEAVING APPROXIMATELY 1 INCH 2.54 CM OF SLACK IN CHAIN OR SLING FOR TEST PURPOSES.

2. After completing the above, shut down hydraulic system and allow machine to sit for 10-15 minutes. This is done to relieve pressure in the hydraulic lines. Carefully remove hydraulic hoses from appropriate cylinder port block.
3. There will be initial weeping of hydraulic fluid, which can be caught in a suitable container. After the initial discharge, there should not be any further leakage from the ports. If leakage continues at a rate of 6-8 drops per minute or more, the following cylinder repairs must be made. If the retract port is leaking, the piston is leaking, the piston seals are defective and must be replaced. If the extend port is leaking, the counterbalance is defective and must be replaced.
4. If no repairs are necessary or when repairs have been made, carefully reconnect hydraulic hoses to the appropriate ports.
5. Remove boom prop/overhead crane, activate hydraulic system and run cylinder through complete cycle to check for leaks and operation.

Cylinders With Dual Counterbalance Valve.

35/n35 electric - Telescope, an Slave Cylinders.
40/n40/45 electric- Lower Lift, Mid Lift, Telescope, and Slave Cylinders.

⚠ IMPORTANT

OPERATE ALL FUNCTIONS FROM GROUND CONTROL STATION ONLY.

1. Using all applicable safety precautions, activate hydraulic system.

⚠ WARNING

WHEN WORKING ON THE UPPER BOOM LIFT CYLINDER RAISE THE UPPER BOOM TO HORIZONTAL AND PLACE A BOOM PROP APPROXIMATELY 1 INCH 2.54 CM BELOW THE MAIN BOOM. REFER TO FIG. 2-11. IF WORKING ON LOWER BOOM LIFT CYLINDER, RAISE LOWER BOOM HALFWAY, FULLY ELEVATE UPPER BOOM AND ATTACH OVERHEAD CRANE TO THE UPRIGHT FOR SUPPORT, LEAVING APPROXIMATELY 1 INCH 2.54 CM OF SLACK IN CHAIN OR SLING FOR TEST PURPOSES.

2. When working on the platform slave cylinder, stroke platform slave level cylinder forward until platform sits at a 45 degree angle.
3. After completing the above, shut down hydraulic system and allow machine to sit for 10-15 minutes. This is done to relieve pressure in the hydraulic lines. Carefully remove hydraulic hoses from appropriate cylinder port block.
4. There will be initial weeping of hydraulic fluid, which can be caught in a suitable container. After the initial discharge, there should not be any further leakage from the ports. If leakage continues at a rate of 6-8 drops per minute or more, the following cylinder repairs must be made. If the retract port is leaking, the piston is leaking, the piston seals are defective and must be replaced. If the extend port is leaking, the counterbalance is defective and must be replaced.
5. To check piston seals, carefully remove the counterbalance valve from the retract port. After initial discharge there should not be any further leakage from the ports. If leakage occurs at a rate of 6-8 drops per minute or more, the piston seals are defective and must be replaced.
6. If no repairs are necessary or when repairs have been made, carefully reconnect hydraulic hoses to the appropriate ports.
7. Remove boom prop/overhead crane, activate hydraulic system and run cylinder through complete cycle to check for leaks and operation.

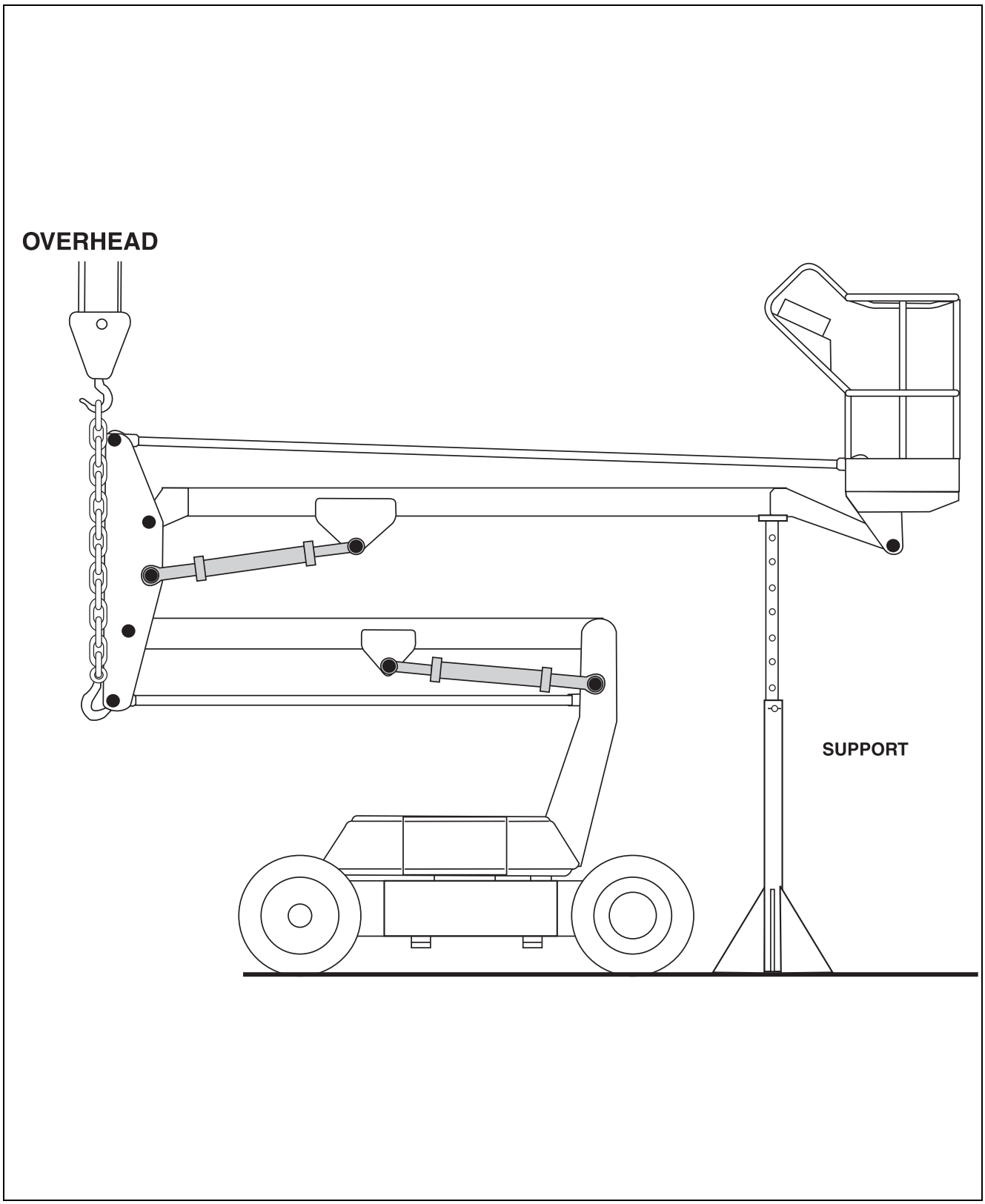


Figure 2-11. Boom Prop Configurations - 30 electric. (Sheet 1 of 3)

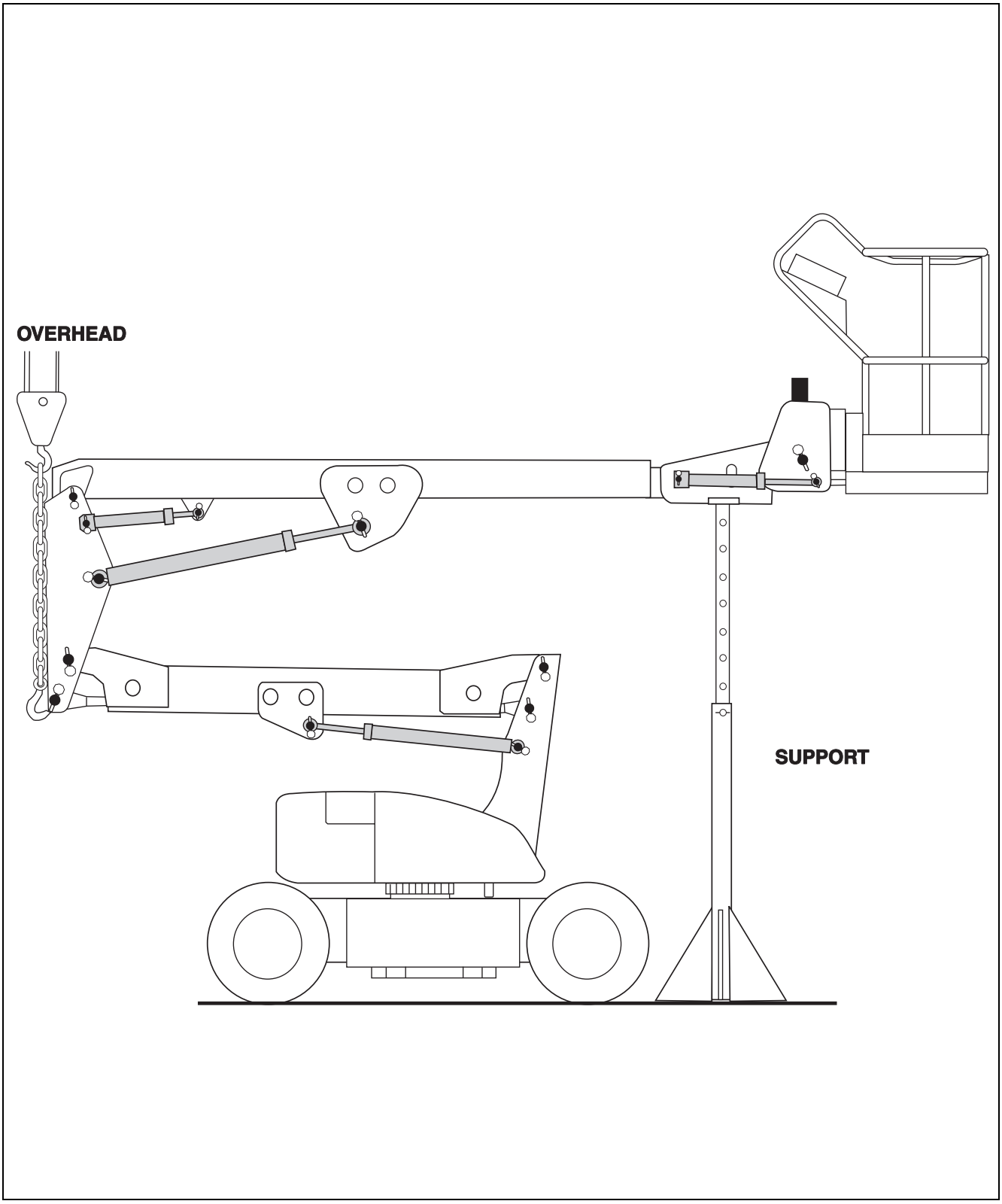


Figure 2-11. Boom Prop Configurations - 35/n35 electric. (Sheet 2 of 3)

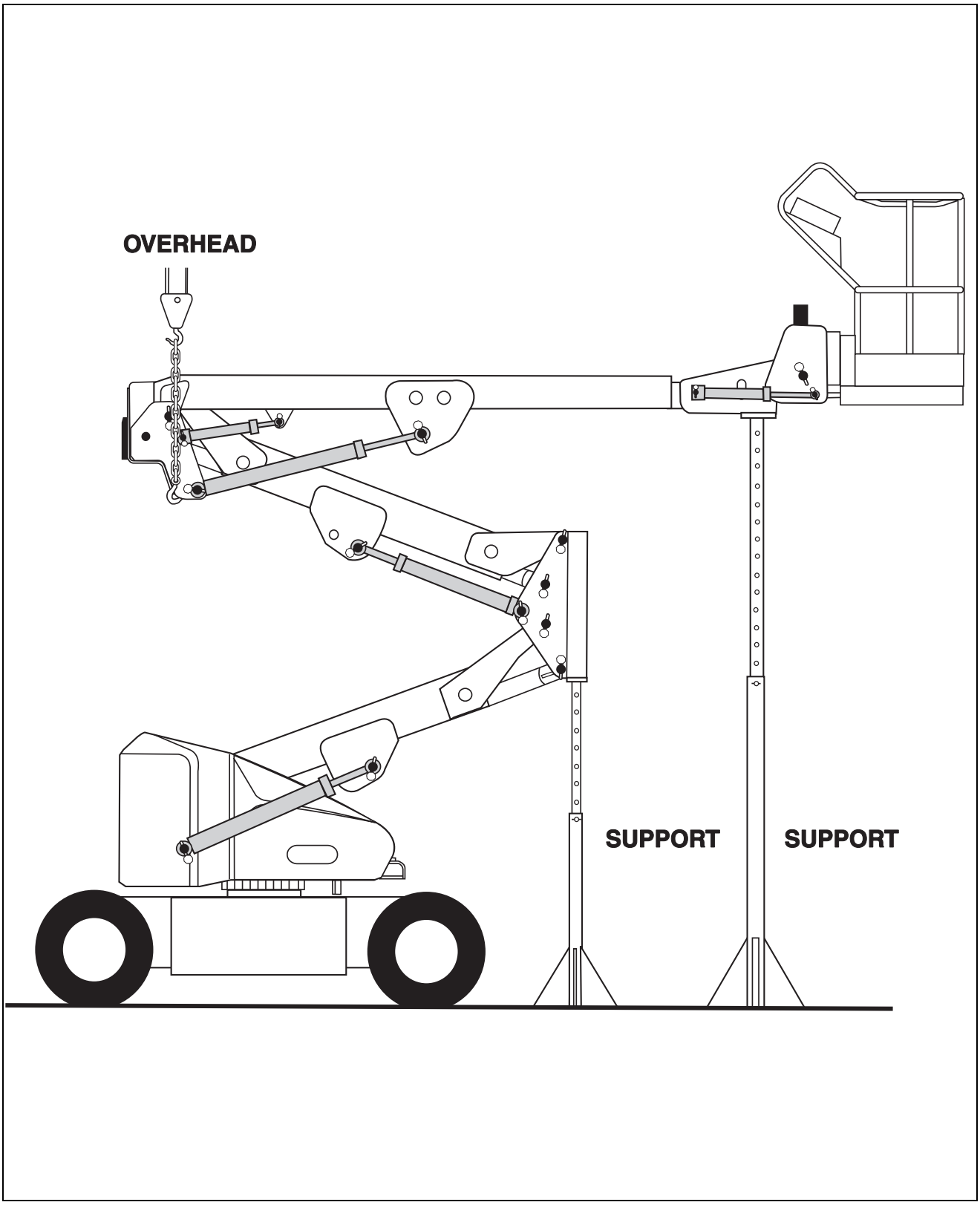


Figure 2-11. Boom Prop Configurations - 40/n40/45 electric. (Sheet 3 of 3)

2.10 CYLINDER REPAIR.

NOTE: *The following are general procedures that apply to all of the cylinders on this machine. Procedures that apply to a specific cylinder will be so noted.*

Disassembly.

⚠ IMPORTANT

DISASSEMBLY OF THE CYLINDER SHOULD BE PERFORMED ON A CLEAN WORK SURFACE IN A DIRT FREE WORK AREA.

1. Connect a suitable auxiliary hydraulic power source to the cylinder port block fitting.

⚠ WARNING

DO NOT FULLY EXTEND CYLINDER TO THE END OF STROKE. RETRACT CYLINDER SLIGHTLY TO AVOID TRAPPING PRESSURE.

2. Operate the hydraulic power source and extend the cylinder. Shut down and disconnect the power source. Adequately support the cylinder rod, if applicable.
3. If applicable, remove the cartridge type holding valve, manual descent valve, and fittings from the port block. Discard o-rings.
4. Place the cylinder barrel into a suitable holding fixture. Tap around outside of cylinder head retainer with a suitable hammer to shatter loctite.

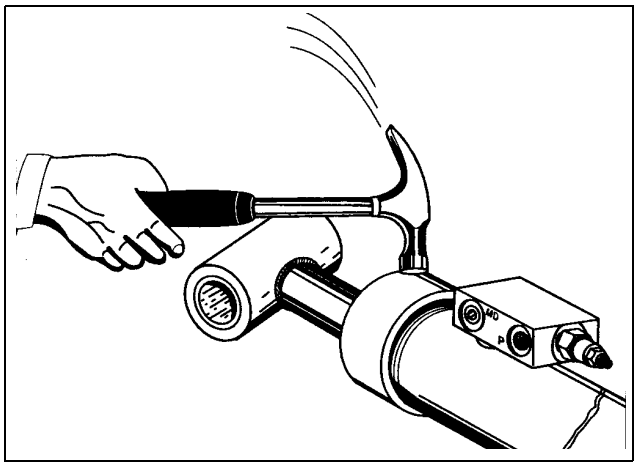


Figure 2-12. Removal of Cylinder Retainer.

5. Using a suitable chain wrench, loosen the cylinder head retainer, if applicable, and/or cylinder head gland, and remove from cylinder barrel.

NOTE: *Steer cylinder has cylinder head retainer at both ends. Remove both retainers.*

6. Attach a suitable pulling device to the cylinder rod port block end or cylinder rod end, as applicable.

⚠ IMPORTANT

EXTREME CARE SHOULD BE TAKEN WHEN REMOVING THE CYLINDER ROD, HEAD AND PISTON. AVOID PULLING THE ROD OFF CENTER, WHICH COULD CAUSE DAMAGE TO THE PISTON AND CYLINDER BARREL SURFACES.

7. With the barrel clamped securely, apply pressure to the rod pulling device and carefully withdraw the complete rod assembly from the cylinder barrel.

⚠ CAUTION

ONCE THE HEAD GLAND HAS CLEARED THE CYLINDER CASE MOUTH, THE ROD MUST BE SUPPORTED CLOSE TO THE CYLINDER CASE PRIOR TO THE PISTON BEING PULLED PAST THE CYLINDER CASE THREADS, AND/OR THE PISTON AND PISTON SEALS.

NOTE: *Step (8) applies to the steer cylinder.*

8. Remove the remaining head gland from the barrel if you have not already done so.
9. Using suitable protection, clamp the cylinder rod in a vise or similar holding fixture as close to the piston as possible.
10. Remove the set screw(s) if applicable, and nut which attach the piston and spacer(s), if applicable, to the rod, and remove piston and spacers. Discard self locking set screws.

NOTE: *Step (11) applies to the slave leveling and master cylinders. (Cylinders built from 12/94 to present)*

11. Remove the set screw, and nut which attach the piston and spacer to the rod. Using a suitable nylon strap wrench loosen piston and remove piston and spacers. Discard self locking set screws

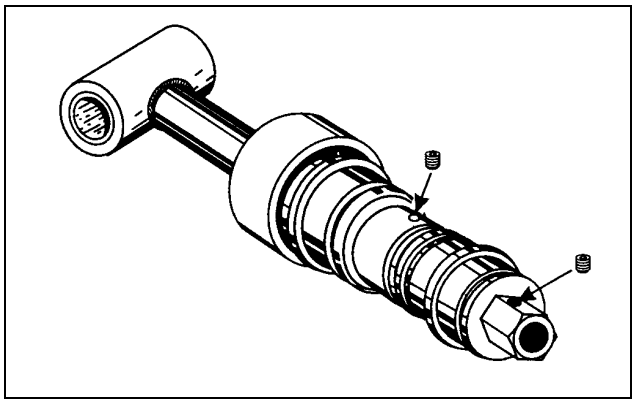


Figure 2-13. Removal of Set Screws.

12. Remove and discard the o-rings, seal rings and backup rings.

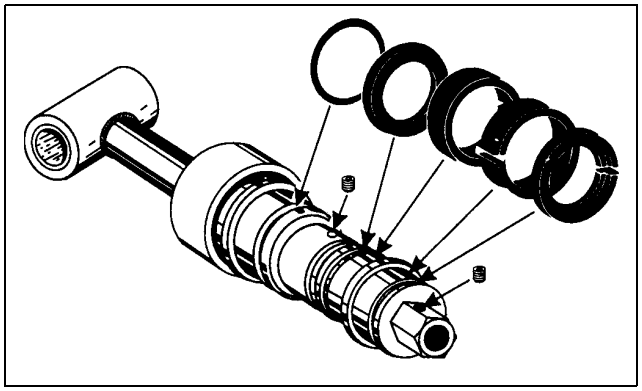


Figure 2-14. Removal of Seals and O-Rings.

13. Remove the rod from the holding fixture. Remove the cylinder head gland if applicable. Discard the o-rings, back-up rings, rod seals, and wiper seals.

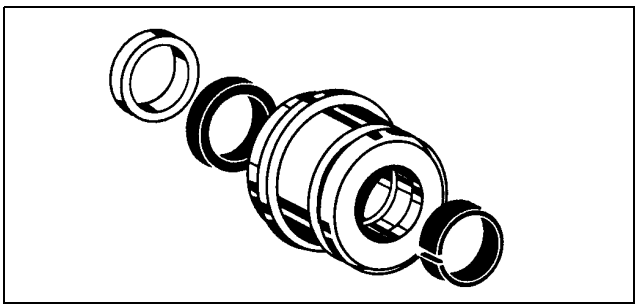


Figure 2-15. Removal of Piston Seals.

Cleaning and Inspection.

14. Clean all parts thoroughly in approved solvent.
15. Inspect the cylinder rod for scoring, tapering, ovality, or other damage. If necessary, dress rod with Scotch-Brite or equivalent. Replace rod if necessary.
16. Inspect threaded portion of rod if applicable for excessive damage. Dress threads as necessary.
17. Inspect inner surface of cylinder barrel tube for scoring or other damage. Check inside diameter for tapering or ovality. Replace if necessary.
18. Inspect threaded portion of barrel for damage. Dress threads as necessary.
19. Inspect piston surface for damage and scoring and for distortion. Dress or replace piston as necessary.
20. Inspect seal and o-ring grooves in piston for burrs and sharp edges. Dress applicable surfaces as necessary.
21. Inspect cylinder head(s) inside diameter for scoring or other damage and ovality and tapering. Replace as necessary.
22. Inspect seal and o-ring grooves in head(s) for burrs and sharp edges. Dress applicable surfaces as necessary.
23. If applicable, inspect cylinder head retainer(s) or end cap(s) for surface or thread damage. Repair or replace as necessary.
24. Inspect cylinder head(s) outside diameter for scoring or other damage and ovality and tapering. Replace as necessary.
25. If applicable, inspect rod and barrel bushing for signs of correct lubrication and excessive wear. Replace as necessary.
26. Inspect travel limiting collar or spacer(s) for burrs and sharp edges. If necessary, dress inside diameter surface with Scotch Brite or equivalent.
27. If applicable, inspect port block fittings and holding valve. Replace as necessary.
28. Inspect the oil ports for blockage or other presence of dirt or other foreign material. Repair as necessary.

Assembly.

NOTE: *Prior to cylinder assembly, ensure that the proper cylinder seal kit is used. See your JLG Parts Manual.*

Apply a light film of hydraulic oil to all components prior to assembly.

1. Place a new wiper seal and rod seal into the applicable cylinder head gland(s) grooves.

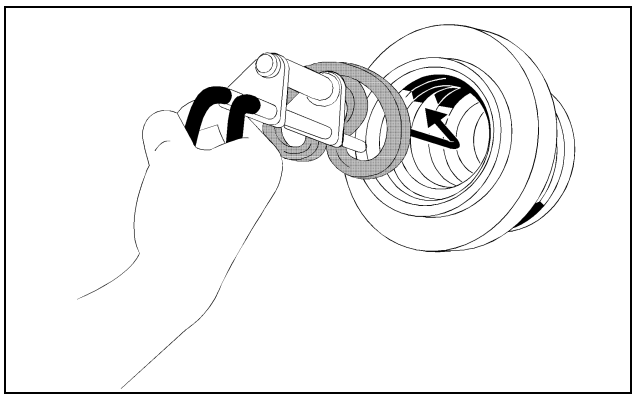


Figure 2-16. Rod Seal Installation.

2. Using a soft mallet, tap a new wiper seal into the applicable cylinder head gland grooves. Install a new wear ring into applicable cylinder head gland groove.

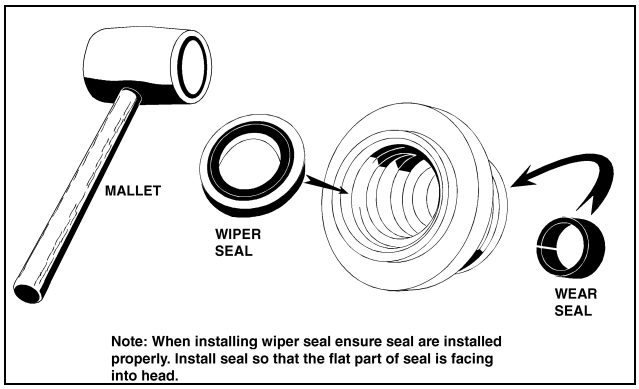


Figure 2-17. Wiper Seal Installation.

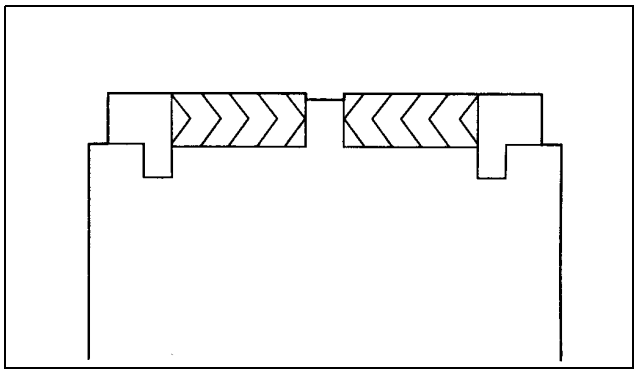


Figure 2-18. Poly-Pak Piston Seal Installation.

3. Place a new “o”-ring in the applicable outside diameter groove of the cylinder head.

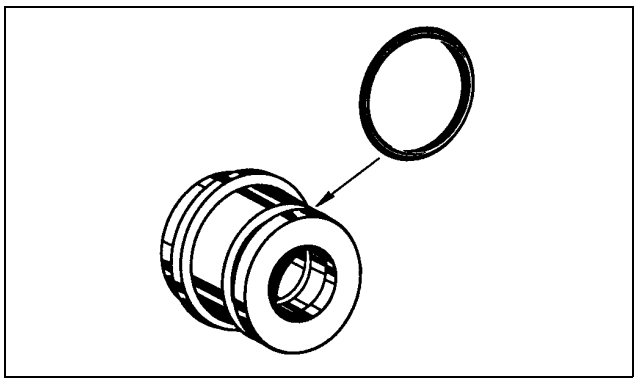


Figure 2-19. "O"-Ring Installation.

4. Install retainer or retaining ring onto the cylinder rod.
5. Carefully install the cylinder head on the cylinder rod, ensuring that the o-ring and back-up rings are not damaged or dislodged. Push the head along the rod to the rod end as applicable.
6. Using suitable protection, clamp the cylinder rod in a vise or similar holding fixture as close to the piston as possible.
7. If applicable, correctly place new o-ring in the inner piston diameter groove.
8. If applicable, correctly place new seals and guide lock rings in the outer piston diameter groove.

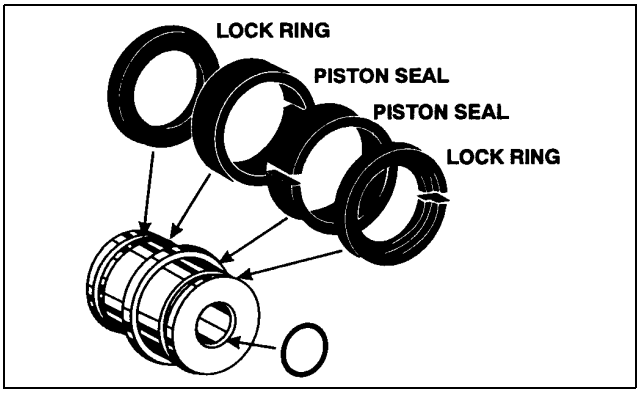


Figure 2-20. Piston Seal Kit Installation.

NOTE: *Step (9) applies to Upper, Mid, Lower Lift, Master, and Slave Cylinders.*

9. Push the piston onto the rod until it abuts the spacer end and install the attaching nut, and spot drill cylinder rod for set screw then install setscrew. (See Table 2-1.)

NOTE: *Step (10) applies to Steer Cylinder.*

10. Push the piston onto the rod until it straddles the o-ring in the center groove and abuts the retaining ring. Install the other retaining ring and spacer.

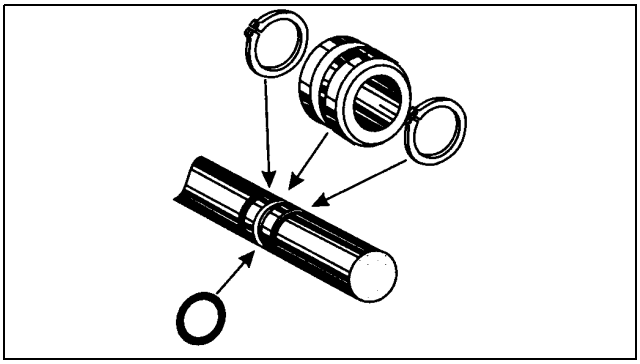


Figure 2-21. Steer Cylinder Piston Installation.

NOTE: *Step (11) applies to the Slave Leveling and Master Cylinders. (Cylinders built from 12/94 to present)*

11. Install piston onto rod by hand tighten the piston hand tight and install the attaching nut, and spot drill cylinder rod for set screw then install setscrew. (See Table 2-1.).

NOTE: *Step (12) applies to 35/n35/40/n40/45 electric Telescope Cylinder.*

12. Push the piston onto the rod until it abuts the spacer end and install the attaching locknut. (See Table 2-1.)

⚠ WARNING

WHEN REBUILDING THE LIFT CYLINDERS, APPLY LOCTITE 242 TO PISTON NUT AND SETSCREWS.

13. Remove cylinder rod from the holding valve.
14. Place new o-rings and seals in the applicable outside diameter grooves of both the piston and the cylinder head.
15. Position the cylinder barrel in a suitable holding fixture.

⚠ IMPORTANT

EXTREME CARE SHOULD BE TAKEN WHEN INSTALLING THE CYLINDER ROD, HEAD AND PISTON. AVOID PULLING THE ROD OFF-CENTER, WHICH COULD CAUSE DAMAGE TO THE PISTON AND CYLINDER BARREL SURFACES.

16. With barrel clamped securely, and while adequately supporting the rod, insert the piston end into the cylinder barrel. Ensure that the piston loading o-ring and seal ring are not damaged or dislodged.

NOTE: *These cylinders use setscrews which should be discarded and replaced whenever they are removed.*

17. Continue pushing the rod into the barrel until the cylinder head gland can be inserted into the barrel cylinder or if applicable until the cylinder head threads engage the barrel threads.
18. If applicable, apply loctite #222 and secure the cylinder head retainer using a suitable chain wrench.

NOTE: *Step (19) applies to the Steer Cylinder.*

19. Secure the cylinder head with retainer ring.

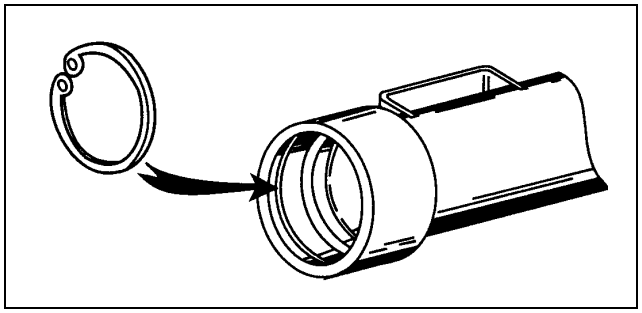


Figure 2-22. Installing Retainer Ring on Telescope Cylinder Barrel.

NOTE: *Step (20) applies to the Steer Cylinder.*

20. Insert the other cylinder head gland into the barrel cylinder. Secure the cylinder head retainer using a suitable chain wrench.
21. After the cylinder has been reassembled, the rod should be pushed all the way in (fully retracted) prior to the reinstallation of any holding valves.
22. If applicable, install the cartridge type holding valve and fittings in the rod port block using new o-rings as applicable. (See table 2-2 holding valve torque specifications)

⚠ CAUTION

IF THE CYLINDER IS TO BE TESTED PRIOR TO INSTALLATION ON THE MACHINE, EXTREME CARE SHOULD BE USED TO INSURE THAT THE OUTER END OF THE ROD IS SUPPORTED. USE EITHER A TRAVELING OVERHEAD HOIST, FORKLIFT, OR OTHER MEANS TO SUPPORT THE OVERHANGING WEIGHT OF THE EXTENDING ROD.

1. Cylinder Barrel
2. Holding Valve Cartridge
3. Holding Valve Cartridge
4. Nut, Hex
5. Set Screw 3/8" - 16 NC x 3/8"
6. Ring, Lock
7. Seal, Piston
8. Piston
9. O-Ring
10. Washer
11. Spacer
12. Set Screw 1/4" - 20 NC x 1/4"
13. O-Ring
14. Ring, Wear
15. Head
16. Seal, Rod
17. Wiper, Rod
18. Retainer
19. Cylinder Rod

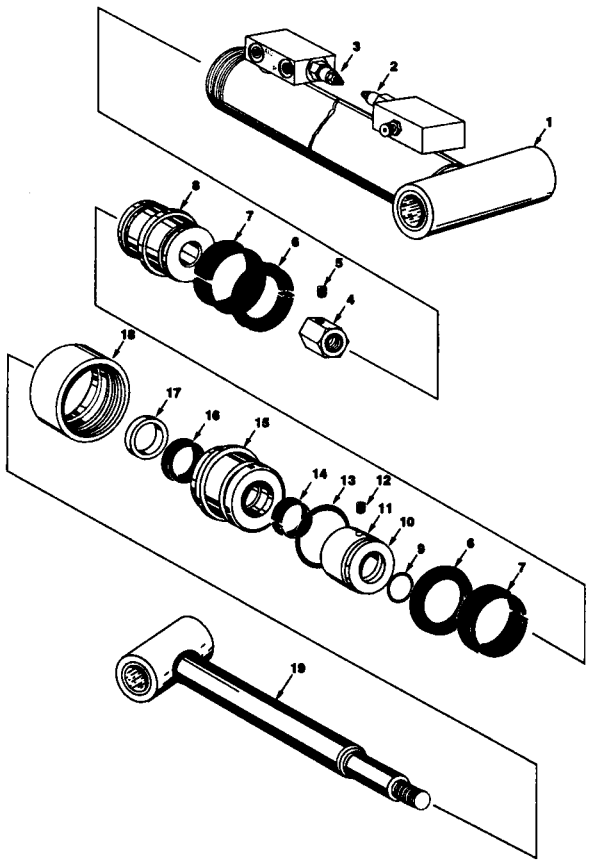


Figure 2-23. Lift Cylinder Assembly.

Table 2-1. Cylinder Piston Nut Torque Specifications

Description	Nut Torque Valve (Wet)	Setscrew Torque Value (Dry)
Model 30 electric		
Upper Lift Cylinder	200 ft. lbs. (271 Nm)	100 in. lbs. (12 Nm)
Lower Lift Cylinder	200 ft. lbs. (271 Nm)	100 in. lbs. (12 Nm)
Steer Cylinder	N/A	N/A
Model 35/n35 electric		
Upper Lift Cylinder	200 ft. lbs. (271 Nm)	100 in. lbs. (12 Nm)
Lower Lift Cylinder	400 ft. lbs. (542 Nm)	100 in. lbs. (12 Nm)
Slave Cylinder (To 12/94)	50 ft. lbs. (68 Nm)	100 in. lbs. (12 Nm)
Slave Cylinder (From 12/94 to present)	80 ft. lbs. (109 Nm)	100 in. lbs. (12 Nm)
Master Cylinder (To 1/95)	50 ft. lbs. (68 Nm)	100 in. lbs. (12 Nm)
Master Cylinder (From 1/95 to present)	80 ft. lbs. (109 Nm)	100 in. lbs. (12 Nm)
Rotator Cylinder	N/A	N/A
Steer Cylinder	N/A	N/A
Telescope Cylinder Piston Nut Torque Specifications.		
Description	Locknut Torque Value (Dry)	
Tele Cylinder	150 ft. lbs. (203 Nm)	
Model 40/n40 electric		
Upper Lift Cylinder	200 ft. lbs. (271 Nm)	100 in. lbs. (12 Nm)
Mid Lift Cylinder	200 ft. lbs. (271 Nm)	100 in. lbs. (12 Nm)
Lower Lift Cylinder	400 ft. lbs. (542 Nm)	100 in. lbs. (12 Nm)
Slave Cylinder (To 12/94)	50 ft. lbs. (68 Nm)	100 in. lbs. (12 Nm)
Slave Cylinder (From 12/23/94 to present)	80 ft. lbs. (109 Nm)	100 in. lbs. (12 Nm)
Master Cylinder (To 1/95)	50 ft. lbs. (68 Nm)	100 in. lbs. (12 Nm)

Table 2-1. Cylinder Piston Nut Torque Specifications

Master Cylinder (From 1/95 to present)	80 ft. lbs. (109 Nm)	100 in. lbs. (12 Nm)
Rotator Cylinder	N/A	N/A
Steer Cylinder	N/A	N/A
Telescope Cylinder Piston Nut Torque Specifications.		
Description	Locknut Torque Value (Dry)	
Tele Cylinder	150 ft. lbs. (203 Nm)	
Description	Nut Torque Value (Wet)	Setscrew Torque Value (Dry)
Model 45 electric		
Upper Lift Cylinder	200 ft. lbs. (271 Nm)	100 in. lbs. (12 Nm)
Mid Lift Cylinder	400 ft. lbs. (542 Nm)	100 in. lbs. (12 Nm)
Lower Lift Cylinder	400 ft. lbs. (542 Nm)	100 in. lbs. (12 Nm)
Slave Cylinder (To 12/94)	50 ft. lbs. (68 Nm)	100 in. lbs. (12 Nm)
Slave Cylinder (From 12/94 to present)	80 ft. lbs. (109 Nm)	100 in. lbs. (12 Nm)
Master Cylinder (To 1/95)	50 ft. lbs. (68 Nm)	100 in. lbs. (12 Nm)
Master Cylinder (From 1/95 to present)	80 ft. lbs. (109 Nm)	100 in. lbs. (12 Nm)
Rotator Cylinder	N/A	N/A
Steer Cylinder	N/A	N/A
Telescope Cylinder Piston Nut Torque Specifications.		
Description	Locknut Torque Value (Dry)	
Tele Cylinder	150 ft. lbs. (203 Nm)	

Table 2-2.Holding Valve Torque Specifications.

Description	Torque Value
SUN - 7/8 HEX M20 X 1.5 THDS.	30-35 ft. lbs. (41-48 Nm)
SUN - 1 1/8 HEX 1 -14 UNS THDS.	45-50 ft. lbs. (61-68 Nm)
SUN - 1 1/4 HEX M36 X 2 THDS.	150-160 ft. lbs. (204-217 Nm)
RACINE - 1 1/8 HEX 1 1/16 - 12 THDS.	50-55 ft. lbs. (68-75 Nm)
RACINE - 1 3/8 HEX 1 3/16 - 12 THDS.	75-80 ft. lbs. (102-109 Nm)
RACINE - 1 7/8 HEX 1 5/8 - 12 THDS.	100-110 ft. lbs. (136-149 Nm)

2.11 CYLINDER REMOVAL AND INSTALLATION.

Upper (Main) Boom Lift Cylinder Removal. (See Figure 2-24)

1. 30/35/n35 electric - Place the machine on a flat and level surface. Place the Upper Boom in a horizontal position. Shut down machine and prop boom.

   40/n40/45 electric - Place the machine on a flat and level surface. Place the Upper Boom in a horizontal position. Place Lower and Mid Booms 5 degree above horizontal. Shut down machine and prop boom.

2. Tag, disconnect and cap the upper boom lift cylinder hydraulic lines and ports.
3. Remove the hardware securing the cylinder rod attach pin #1 to the boom. Using a suitable brass drift, drive out the cylinder rod attach pin #1.
4. Secure the cylinder with suitable slings or supports as required. Remove the hardware securing the barrel end attach pin #2. Using a suitable brass drift, drive out the barrel end attach pin #2.
5. Remove the cylinder from the boom and place in a suitable work area.

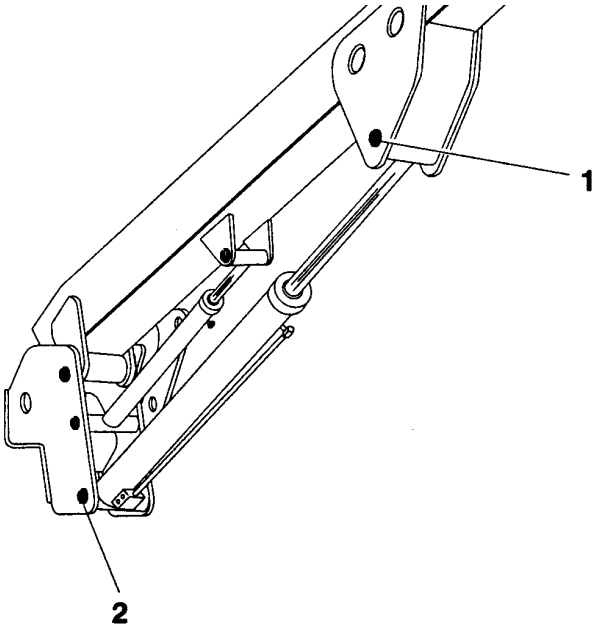


Figure 2-24. Upper Boom Lift Cylinder Removal.

Upper (Main) Boom Lift Cylinder Installation.

NOTE: *Coat I.D. of bushings with specified lubricant prior to installing pins.*

1. 30/35/n35/40/n40/45 electric - Install Lift Cylinder in place using suitable slings or supports, aligning attach pin mounting holes on upright.
2. Using a suitable drift, drive the barrel end attach pin #2 through the mounting holes in the lift cylinder and upright. Secure in place with pin retaining hardware.
3. Remove cylinder port plugs and hydraulic line caps and correctly attach lines to cylinder ports.
4. With function speed switch at its slowest setting, extend the cylinder rod until attach pin hole aligns with those in boom. Using a suitable drift, drive the cylinder rod attach pin #1 through the aligned holes. Secure the pin in place with pin retaining hardware.
5. Cycle cylinder completely to check for proper functioning. Place boom in stowed position. Check hydraulic fluid level and adjust accordingly.

Mid Boom Lift Cylinder Removal. (See Figure 2-25.)

1. 40/n40/45 electric - Place machine on flat and level surface. Place the Upper Boom in a horizontal position. Place the Mid Boom in a 10 degree elevated position. See Figure 2-11. Support Upper Boom with a prop. Support upright with an overhead crane.
2. Using slings, restrain the lower lift cylinder.
3. Remove the hardware securing the cylinder rod attach pin #3 to the boom. Using an appropriate brass drift, drive out the cylinder rod attach pin #3.
4. Tag, disconnect and cap the lift cylinder hydraulic lines and ports.
5. Remove the hardware securing the barrel end attach pin #4 to the boom. Using an appropriate brass drift, drive out the cylinder barrel pin #4.
6. Carefully remove cylinder from boom. Place in a suitable work area.

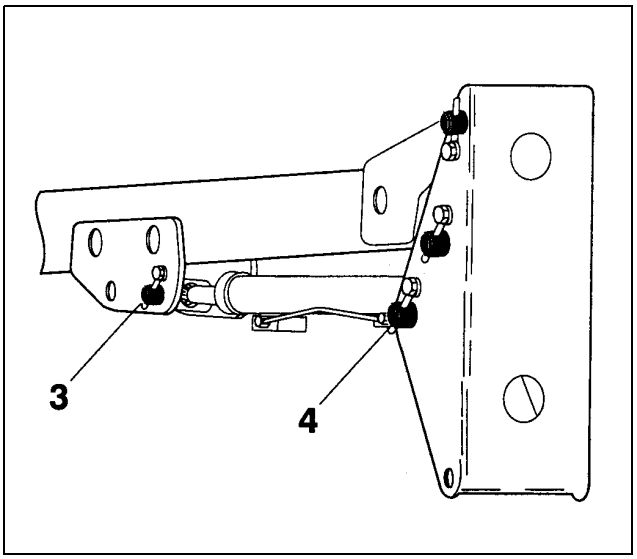


Figure 2-25. Mid Boom Lift Cylinder Removal.

Mid Boom Lift Cylinder Installation.

NOTE: *Coat I.D. of bushings with specified lubricant prior to installing pins.*

1. 40/n40/45 electric - With the booms positioned and supported as in Figure 2-11, place cylinder in position and secure in place using slings.
2. Install the cylinder barrel pin #4, being sure to align the hole in the cylinder barrel pin with the retaining pin screw hole. When holes align, install hardware.
3. Correctly install hydraulic lines to cylinder as previously tagged. Extend cylinder rod slowly until attach pin hole aligns with those in boom.
4. Using a suitable brass drift, drive the cylinder rod attach pin #3 through the aligned holes. Secure the pin in place using retaining hardware.
5. Remove boom prop and overhead crane. Take the lift cylinder through one complete cycle to assure correct functioning. Place boom in stowed position. Check hydraulic fluid and adjust accordingly.

Lower Boom Lift Cylinder Removal.

1. 30/35/n35 electric - Place machine on flat and level surface. Place the Upper Boom in a horizontal position. Place the Lower Boom in a horizontal position. See Figure 2-11. Support Upper Boom with a prop. Support upright with an overhead crane.
2. 40/n40/45 electric - Place machine on flat and level surface. Place the Upper Boom in a horizontal position. Place the Mid and Lower Booms in a 10 degree elevated position. See Figure 2-11. Support Upper Boom with a prop. Support upright with an overhead crane.
2. Using slings, restrain the lower lift cylinder.
3. Remove the hardware securing the cylinder rod attach pin #5 to the boom. Using an appropriate brass drift, drive out the cylinder rod attach pin #5.
4. Tag, disconnect and cap the lift cylinder hydraulic lines and ports.
5. Remove the hardware securing the barrel end attach pin #6 to the boom. Using an appropriate brass drift, drive out the cylinder barrel pin #6.
6. Carefully remove cylinder from boom. Place in a suitable work area.

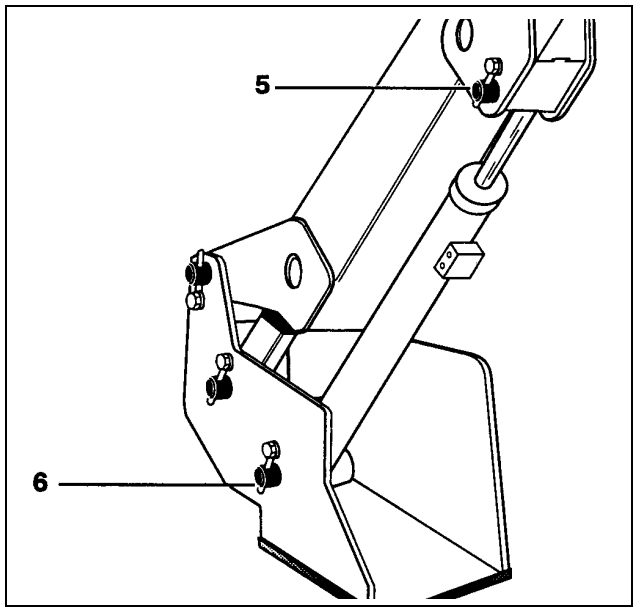


Figure 2-26. Lower Boom Lift Cylinder Removal.

Lower Boom Lift Cylinder Installation.

NOTE: *Coat I.D. of bushings with specified lubricant prior to installing pins.*

1. 30/35/n35/40/n40/45 electric - With the booms positioned and supported as in Figure 2-11, place cylinder in position and secure in place using slings.
2. Install the cylinder barrel pin #6, being sure to align the hole in the cylinder barrel pin with the retaining pin screw hole. When holes align, install hardware.
3. Correctly install hydraulic lines to cylinder as previously tagged. Extend cylinder rod slowly until attach pin hole aligns with those in boom.
4. Using a suitable brass drift, drive the cylinder rod attach pin #5 through the aligned holes. Secure the pin in place using retaining hardware.
5. Remove boom prop and overhead crane. Take the lift cylinder through one complete cycle to assure correct functioning. Place boom in stowed position. Check hydraulic fluid and adjust accordingly.

Upper Boom Telescope Cylinder Removal. (See Figure 2-27.)

1. 35/n35/40/n40/45 electric - Place machine on flat and level surface, with Upper Boom in the horizontal position. Extend Upper Boom until fly attach pin #1 is accessible on fly.
2. Support Upper Boom basket end with a prop. Support Upper Upright end with an overhead crane (See Figure 2-11.)
3. Tag, disconnect hydraulic lines to telescope cylinder. Use suitable container to retain any residual hydraulic fluid. Cap hydraulic lines and ports.
4. Remove the retaining rings that retain the telescope cylinder rod to the fly boom.
5. Using a suitable brass drift, carefully drive the telescope cylinder rod pin #1 from the fly boom.
6. Remove the four (4) bolts securing the telescope cylinder barrel end to the base boom.

NOTE: *Care should be taken when removing the telescope cylinder, do not leave cylinder rest on powertrack which could cause damage to powertrack.*

7. Using a suitable brass drift, carefully drive the telescope cylinder pin from the base boom.
8. Attach a suitable sling to the telescope cylinder. Using a suitable lifting device attached to the sling carefully pull the telescope cylinder from the boom assembly.
9. Using another lifting device, support the rod end of the cylinder and remove the cylinder from the boom assembly.
10. Carefully lift the cylinder clear of the boom assembly and lower to the ground or suitably supported work area.

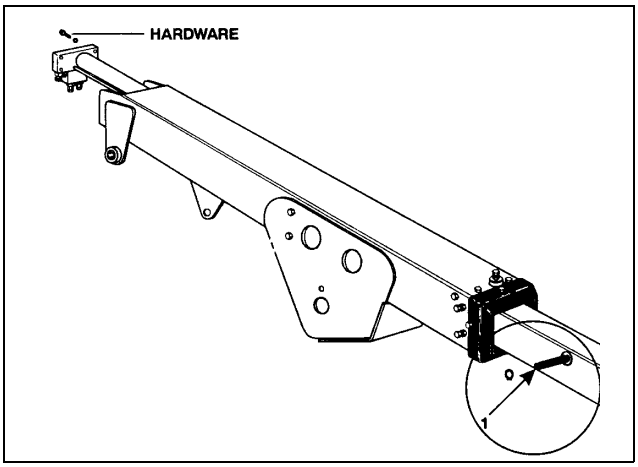


Figure 2-27. Upper Telescope Cylinder Removal.

Upper Boom Telescope Cylinder Installation.

1. 35/n35/40/n40/45 electric - Attach a hydraulic power supply to the telescope cylinder ports. Using suitable supports or lifting devices at each end of the cylinder, extend the rod so that the cylinder pin attach holes are the same distance apart as the boom pin attach holes.
2. Using suitable lifting equipment, carefully lower the cylinder to the boom assembly.
3. Using another lifting device, support the rod end of the cylinder and install the cylinder into the boom assembly.
4. Remove lifting devices from the telescope cylinder.
5. Carefully install the telescope cylinder rod pin #1 through the fly boom and secure it with the retaining rings.
6. Carefully install the telescope cylinder barrel end to base, securing cylinder to the base boom with four (4) bolts and hardware.
7. Remove applicable hydraulic line and port caps and correctly connect the hydraulic lines to the telescope cylinder. Ensure all hoses are correctly routed.
8. Remove boom prop and overhead crane. Actitive hydraulic system.
9. Using all applicable safety precautions, operate the boom functions. Check for correct operation and hydraulic leaks. Secure as necessary.
10. Check fluid level of hydraulic tank and add as necessary.

2.12 TILT INDICATOR SWITCH LEVELING PROCEDURE. (IF EQUIPPED.)

⚠ CAUTION

PERFORM TILT ALARM SWITCH LEVELING PROCEDURE A MINIMUM OF EVERY SIX MONTHS TO ENSURE PROPER OPERATION AND ADJUSTMENT OF SWITCH.

Manual Adjustment.

11. Park the machine on a flat level surface. Be sure it is as level as possible, with tires filled to rated pressure.

NOTE: *Ensure switch mounting is level and securely attached.*

12. Tighten the three flange nuts with a socket wrench. Each nut should be tightened approximately one-quarter of its spring's travel.
13. Using bubble level on top of indicator, Tighten or loosen the three flange nuts until indicator is level.
14. Individually push down on one corner at a time. There should be enough travel to cause the indicator to trip. If the indicator does not trip in all three tests, the flange nuts have been tightened too far.

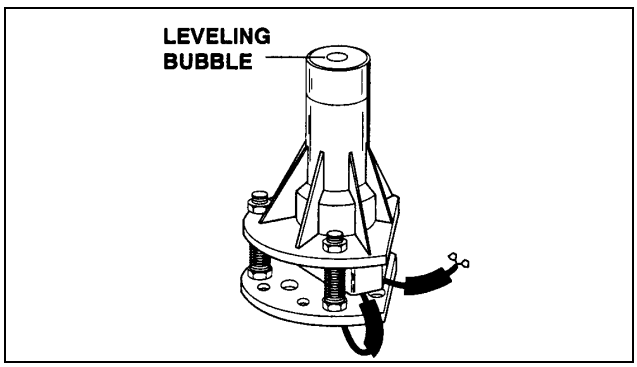


Figure 2-28. Tilt Switch.

2.13 BOOM LIMIT SWITCHES.

There are no adjustments to be made to the two Boom Limit Switches which bolt in place on the upright.

2.14 POWER TRACK REMOVAL PROCEDURE (35/N35/40/N40/45 ELECTRIC).

1. Position the Upper Boom to horizontal.
2. Align the (2) holes at left side rear of the Upper Boom.
3. Remove the cover on left side of Upper Boom. (exposing hydraulic and electric lines)
4. Disconnect and remove 3 pronged plug and 35 pin plug from electric lines.
5. Disconnect hydraulic lines. (2)
6. Remove Power Track bolts (2) at right side center of Upper Boom. (shown in Figure 2-9)
7. Remove holding block at rear of telescoping cylinder (4) bolts.
8. Pull the Power Track towards the rear from the right side of the track.
9. Disconnect the Power Track from left rear of Upper Boom.(2) bolts.
10. Remove the hydraulic and electrical lines from the Power Track.
11. Install in reverse order of removal.

2.15 PRESSURE SETTING PROCEDURES. (IN SEQUENCE) (SEE FIGURE 2-29)

NOTE: *Model 30 electric.*

Main Relief at Pump.

1. Install pressure gauge at port "G" on 4640725 valve.
2. Activate and bottom out either Upper or Lower Lift Up. Adjust Main Relief to 2600 psi (179.27 bar).

Lift Down Relief.

1. With pressure gauge at "G" port on 4640725 valve, activate and bottom out Upper Lift Down.
2. Adjust Upper Lift Relief to 900 psi (62 bar).
3. Activate and bottom out Lower Lift Down.
4. Adjust Lower Lift Relief to 725 psi (49.99 bar).

Swing Relief.

1. With pressure gauge at "G" port on 4640725 valve, activate and bottom out Swing function in either direction.
2. Adjust Swing Relief to 1000 psi (68.95 bar).

Steer Relief.

1. With pressure gauge at “G” port on 4640726 valve, activate and bottom out Steer Left or Right.
2. Adjust Steer Relief to 1100 (75.84 bar).
3. Shut down hydraulic system and remove pressure gauge.

Model 35/n35 electric.

Main Relief at Pump.

1. Install pressure gauge at port “G” on 4640843 valve.
2. Activate and bottom out either Upper or Lower Lift Up. Adjust Main Relief to 2600 psi (179.27 bar).

Lift Down Relief.

1. With pressure gauge at “G” port on 4640843 valve, activate and bottom out Upper Lift Down.
2. Adjust Upper Lift Relief to 600 psi (41.37 bar).

Lower Lift Down Relief.

1. With pressure gauge at “G” port on 4640843 valve, activate and bottom out Mid/Lower Lift Down.
2. Adjust Lower Lift Relief to 600 psi (41.37 bar).

Swing Relief.

1. With pressure gauge at “G” port on 4640843 valve, activate and bottom out Swing function in either direction.
2. Adjust Swing Relief to 1000 psi (68.95 bar).

Telescope In Relief.

1. With pressure gauge at “G” port on 4640843 valve, activate and bottom out Telescope In.
2. Adjust Telescope In Relief to 2150 psi (148.25 bar).

Platform Level Up Relief.

1. With pressure gauge at “G” port on 4640843 valve, activate and bottom out Platform Level Up.
2. Adjust Platform Level Up Relief to 2500 (172.37 bar).

Platform Level Down Relief.

1. With pressure gauge at “G” port on 4640843 valve, activate and bottom out Platform Level Down.
2. Adjust Platform Level Down Relief to 1200 psi (82.74 bar).

Steer Relief.

1. With pressure gauge at “G” port on 4640726 valve, activate and bottom out Steer Left or Right.
2. Adjust Steer Relief to 1500 psi (103.42 bar).
3. Shut down hydraulic system and remove pressure gauge.

Model 40/n40/45 electric.

Main Relief at Pump.

1. Install pressure gauge at port “G” on 4640797 valve.
2. Activate and bottom out either Upper or Lower Lift Up. Adjust Main Relief to 3200 psi (220.64 bar).

Upper Lift Down Relief.

1. With pressure gauge at “G” port on 4640797 valve, activate and bottom out Upper Lift Down.
2. Adjust Upper Lift Relief to 650 psi (44.82 bar).

Mid/Lower Lift Down Relief.

1. With pressure gauge at “G” port on 4640797 valve, activate and bottom out Mid/Lower Lift Down.
2. Adjust Mid/Lower Lift Relief to 1700 psi (117.21 bar).

Swing Relief.

1. With pressure gauge at “G” port on 4640797 valve, activate and bottom out Swing function in either direction.
2. Adjust Swing Relief to 1000 psi (68.95 bar).

Telescope In Relief.

1. With pressure gauge at “G” port on 4640797 valve, activate and bottom out Telescope In.
2. Adjust Telescope In Relief to 2150 psi (148.25 bar).

Platform Level Up Relief.

1. With pressure gauge at “G” port on 4640797 valve, activate and bottom out Platform Level Up.
2. Adjust Platform Level Up Relief to 2500 psi (172.37 bar).

Platform Level Down Relief.

1. With pressure gauge at “G” port on 4640797 valve, activate and bottom out Platform Level Down.
2. Adjust Platform Level Down Relief to 1200 psi (82.74 bar).

Steer Relief.

1. With pressure gauge at “G” port on 4640726 valve, activate and bottom out Steer Left or Right.
2. Adjust Steer Relief to 1500 psi (103.42 bar), for Models 35/n35/40/n40/45. Adjust pressure to 1100 psi (75.84 bar), for Models 30/n30.
3. Shut down hydraulic system and remove pressure gauge.

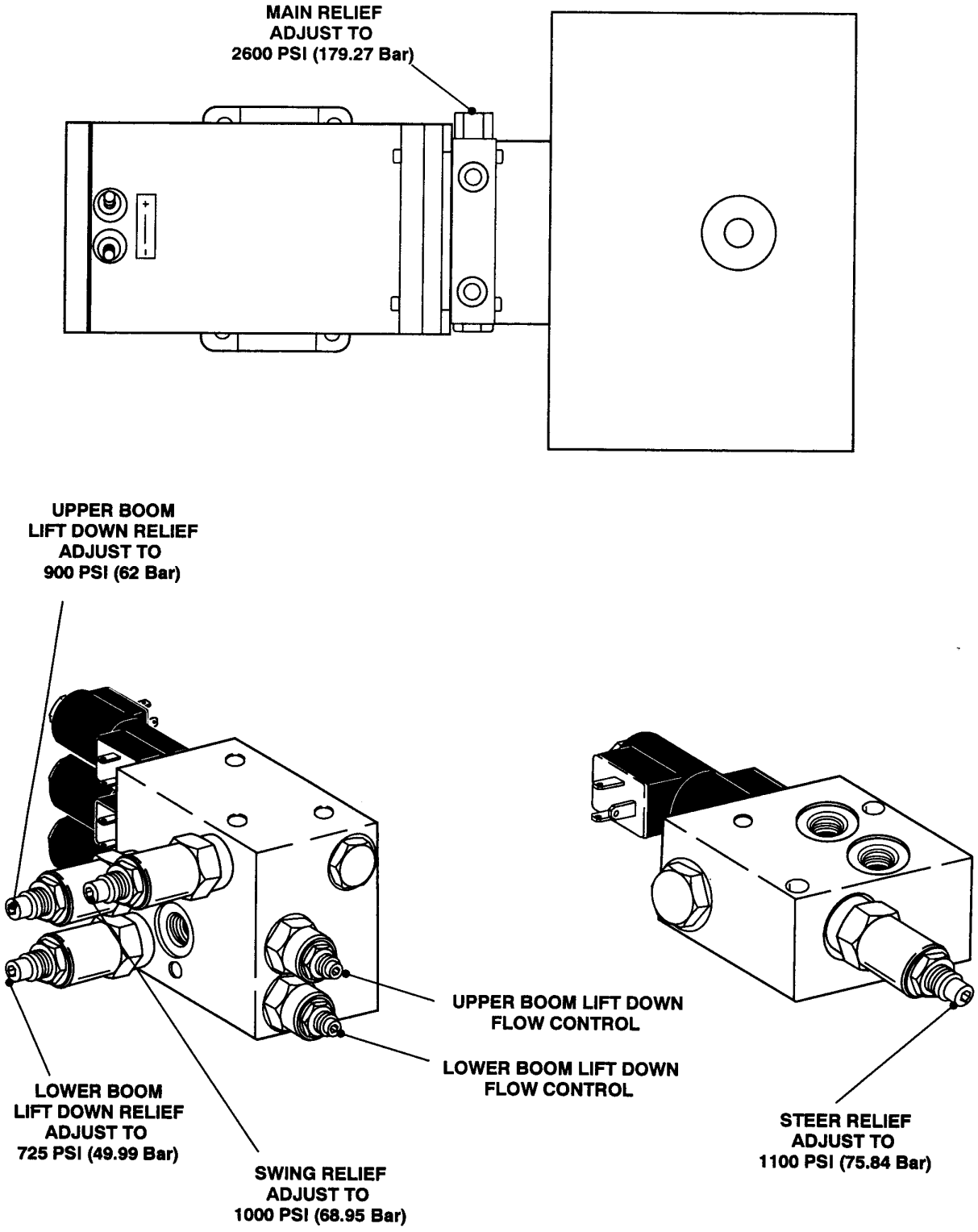


Figure 2-29. Pressure Setting Procedure - 30 electric. (Sheet 1 of 3)

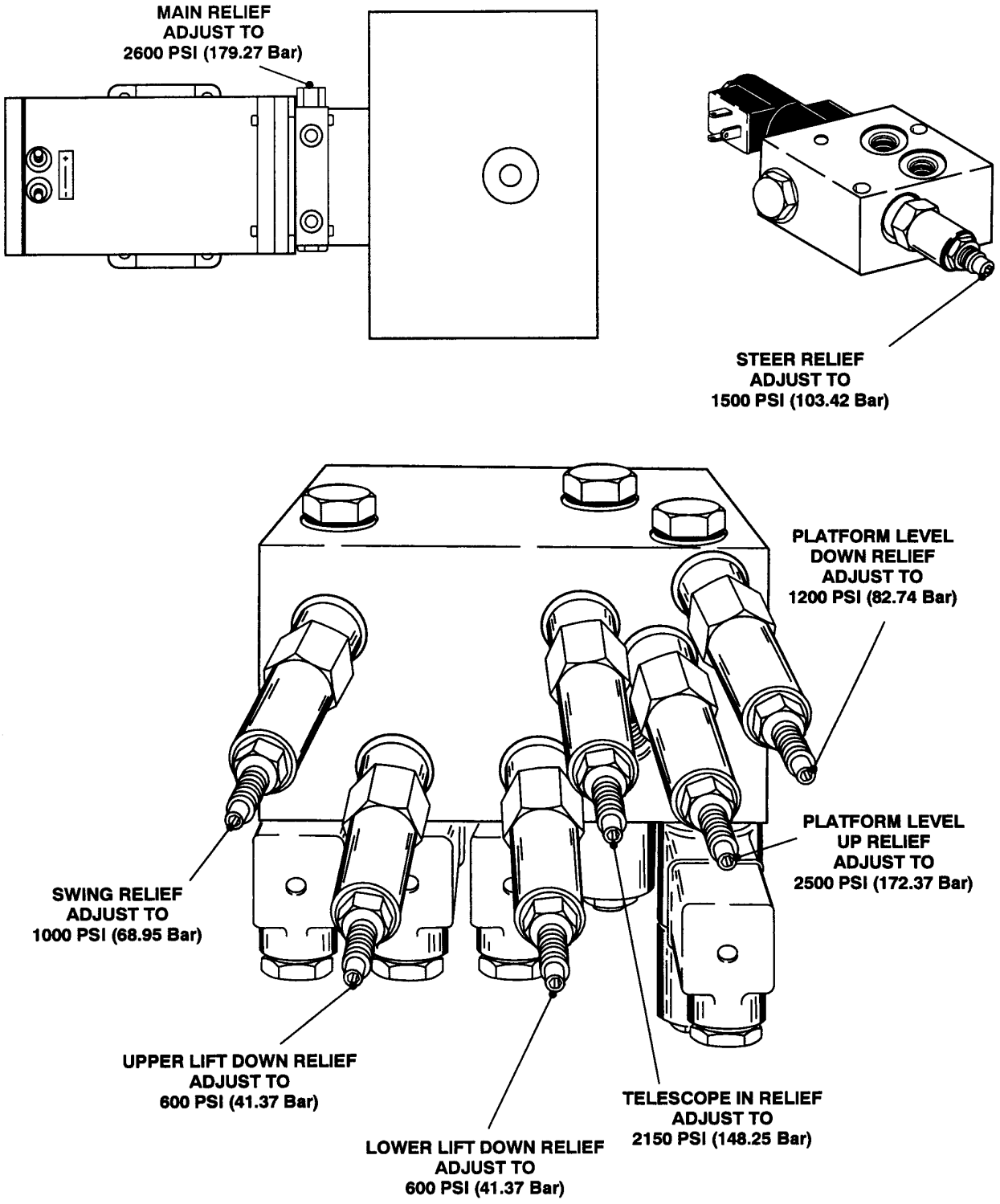


Figure 2-29. Pressure Setting Procedure - 35/n35 electric. (Sheet 2 of 3)

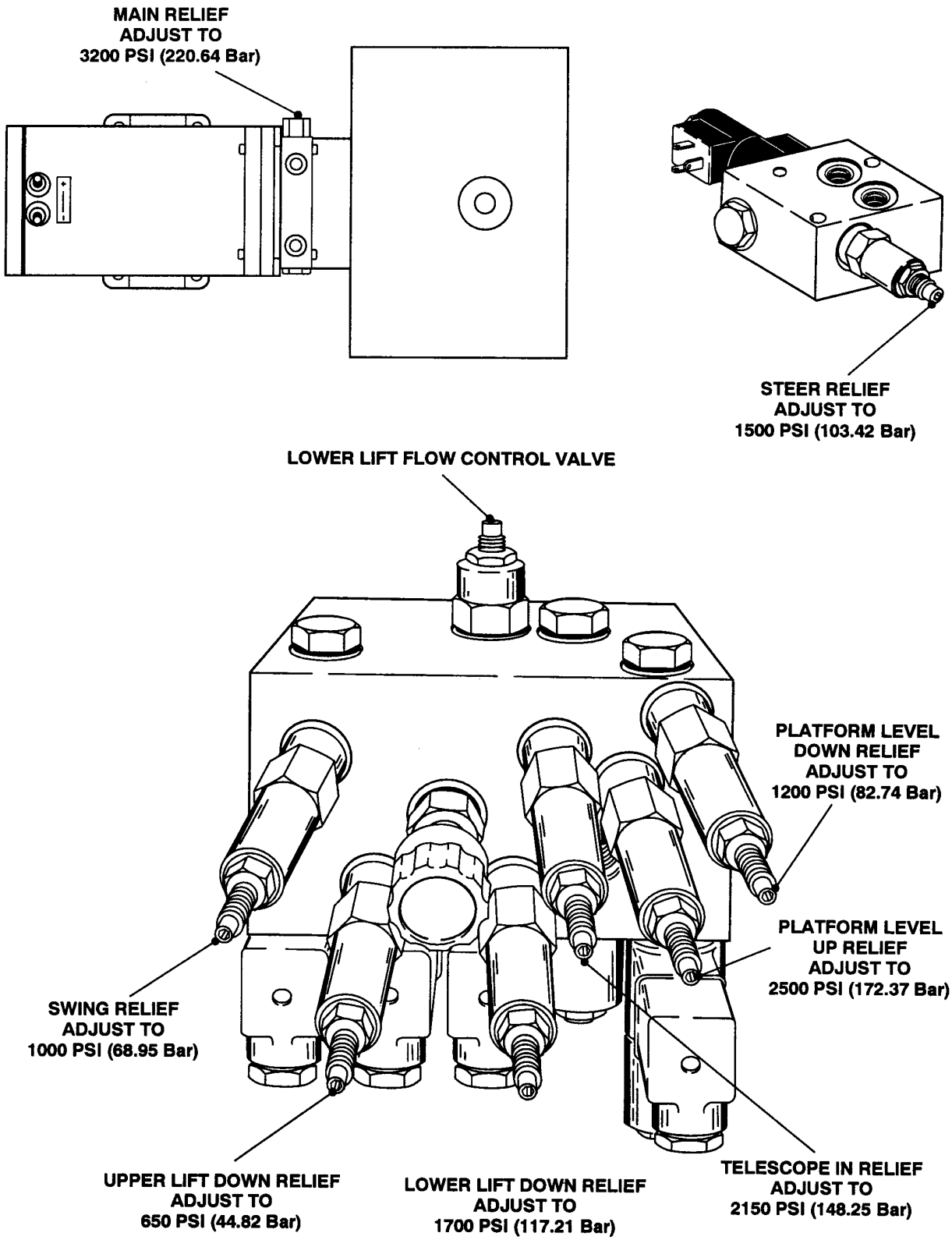


Figure 2-29. Pressure Setting Procedure - 40/n40/45 electric. (Sheet 3 of 3)

2.16 SWING BEARING.

Turntable Bearing Mounting Bolt Condition Check.

NOTE: *This check is designed to replace the existing bearing bolt torque checks on JLG Lifts in service. This check must be performed after the first 50 hours of machine operation and every 600 hours of machine operation thereafter. If during this check any bolts are found to be missing or loose, replace missing or loose bolts with new bolts and torque to the value specified in the torque chart, after lubricating the bolt threads with loctite #271. After replacing and torquing bolt or bolts recheck all existing bolts for looseness.*

1. Check the frame to bearing. Attach bolts as follows:
   a. Elevate the fully retracted boom to 70 degrees (full elevation).
   b. At the positions indicated on Figure 2-30. try and insert the.0015" feeler gauge between the bolt head and hardened washer at the arrow indicated position.
   c. Assure that the.0015" feeler gauge will not penetrate under the bolt head to the bolt shank.
   d. Swing the turntable 90 degrees, and check some selected bolts at the new position.
   e. Continue rotating the turntable at 90 degrees intervals until a sampling of bolts have been checked in all quadrants.
2. Check the turntable to bearing. Attach bolts as follows:
   a. Elevate the fully retracted boom to 70 degrees (full elevation).
   b. At the positions indicated on Figure 2-30. try and insert the.0015" feeler gauge between the bolt head and hardened washer at the arrow indicated position.
   c. Lower the boom to horizontal and fully extend the boom.
   d. At the position indicated on Figure 2-30. try and insert the.0015" feeler gauge between the bolt head and hardened washer at the arrow indicated position.

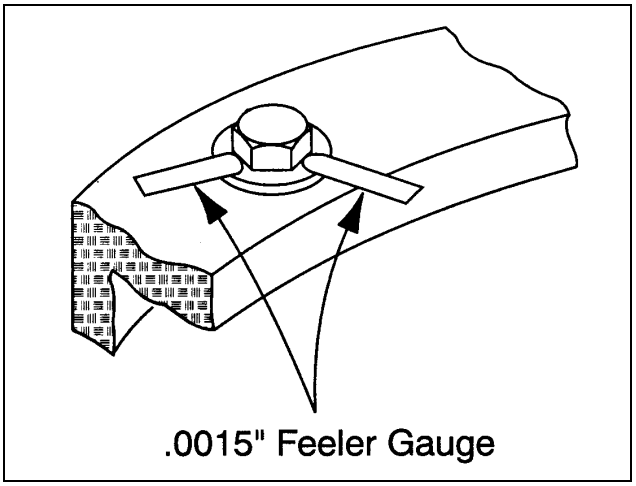


Figure 2-30. Swing Bearing Feeler Gauge Check.

Wear Tolerance.

1. 30 electric - With the boom positioned over the side of the machine, the Upper Boom fully elevated and Lower Boom stowed, (See Figure 2-31 a.), using a magnetic base dial indicator, measure and record the distance between the swing bearing and turntable. (See Figure 2-32.)

   35/n35 electric - With the boom positioned over the side of the machine, the Upper Boom horizontal with telescope fully extended and Lower Boom fully elevated, (See Figure 2-31 a.), using a magnetic base dial indicator, measure and record the distance between the swing bearing and turntable. (See Figure 2-32.)

   40/n40/45 electric - With the boom positioned over the side of the machine, the Upper Boom horizontal with telescope fully extended and Mid/Lower Boom stowed, (See Figure 2-31 a.), using a magnetic base dial indicator, measure and record the distance between the swing bearing and turntable. (See Figure 2-32.)
2. 30 electric - At the same point, with the boom positioned over the side of the machine, the Upper Boom horizontal and the Lower Boom fully elevated, (See Figure 2-31 b.) using a magnetic base dial indicator, measure and record the distance between the swing bearing and turntable (See Figure 2-32).

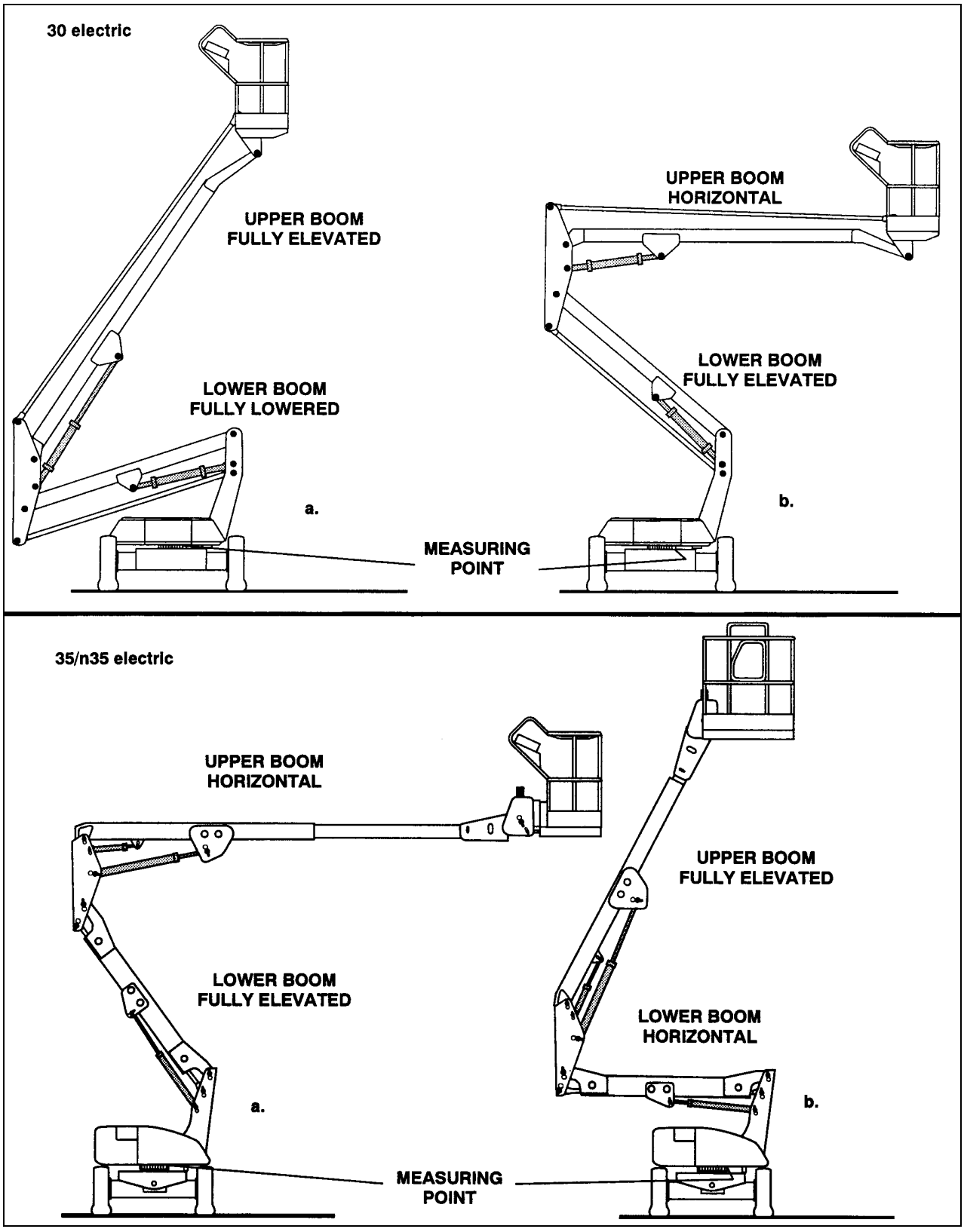


Figure 2-31. Swing Bearing Tolerance Boom Placement - 30/n30/n35 electric. (Sheet 1 of 2)

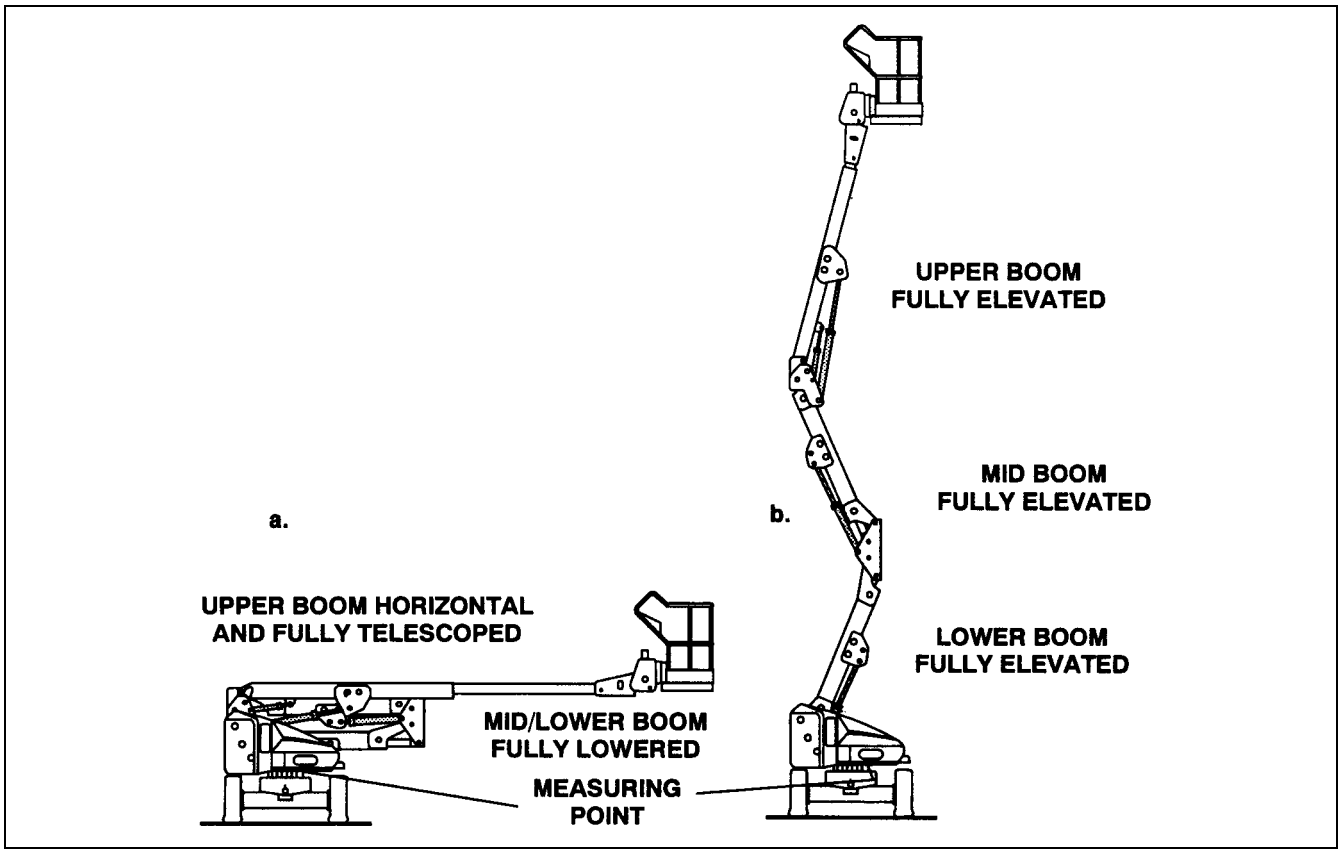


Figure 2 31. Swing Bearing Tolerance Boom Placement - 40/n40/45 electric. (Sheet 2 of 2)

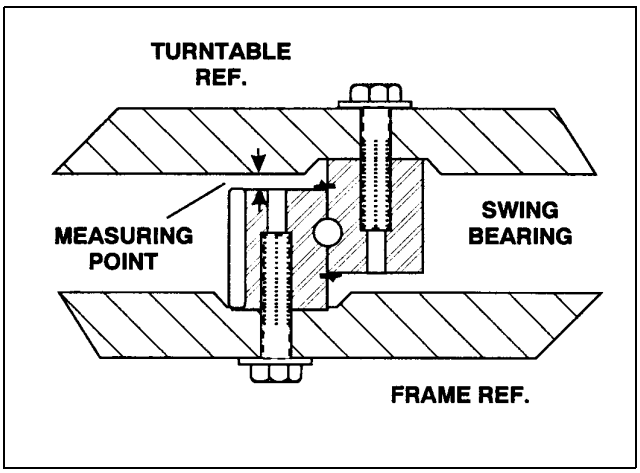


Figure 2-32. Swing Bearing Tolerance Measuring Point.

35/n35 electric - At the same point, with the boom positioned over the side of the machine, the Upper Boom fully elevated and the Lower Boom horizontal, (See Figure 2-31 b.) using a magnetic base dial indicator, measure and record the distance between the swing bearing and turntable (See Figure 2-32).

40/n40/45 electric - At the same point, with the boom positioned over the side of the machine, the Upper Boom fully elevated and the Mid/Lower Boom fully elevated, (See Figure 2-31 b.) using a magnetic base dial indicator, measure and record the distance between the swing bearing and turntable (See Figure 2-32).

3. If a difference greater than 0.057 in. (1.40 mm) is determined, the swing bearing should be replaced.
4. If a difference less than 0.057 in. (1.40 mm) is determined, and any of the following conditions exist, the bearing should be removed.
   a. Metal particles in the grease.
   b. Increased drive power.
   c. Noise.
   d. Rough rotation.
5. If bearing inspection shows no defects, reassemble bearing and return to service.

Replacement of Swing Bearing.

1. Removal.
   a. Attach an adequate support sling to the boom and draw all slack from sling. Prop or block the boom if feasible.
   b. Tag and disconnect hydraulic lines running through center of turntable and frame. Use a suitable container to retain any residual hydraulic fluid. Cap lines and ports.
   c. Attach suitable overhead lifting equipment to the base of turntable weldment.
   d. Use a suitable tool to scribe a line on the inner race of the swing bearing and on the underside of the turntable. This will aid in aligning the bearing upon installation. Remove bolts, nuts and washers which attach the turntable to the bearing inner race. Discard nuts and bolts.
   e. Use the lifting equipment to carefully lift the complete turntable assembly from the bearing. Ensure that no damage occurs to the turntable, bearing or frame mounted components.
   f. Carefully place the turntable on a suitably supported trestle.
   g. Use a suitable tool to scribe a line on the outer race of the swing bearing and the frame. This line will aid in aligning the bearing upon installation. Remove the bolts and washers which attach the outer race of the bearing to the frame. Discard the bolts. Use suitable lifting equipment to remove the bearing and rotation box assembly from the frame; move to a clean, suitably supported work area.
   h. Remove the two cap screws securing the bearing to the rotation box to separate the two for inspection.
2. Installation.
   a. Install bearing to rotation box with two cap screws, so that fill plug of bearing is as close to gear as bolt pattern will allow. Do not tighten cap screws.
   b. Line up high spot (blue) of bearing with center tooth of worm gear. Set backlash to 0.008 - 0.010 inch (0.20 - 0.25 mm). Tighten capscrews as shown in Figure 2-33.
   c. Apply Tribol Molub-Alloy 936 Open Gear Compound to bearing and worm gear teeth.
   d. Grease bearing with Mobilith SHC Bearing Grease. Grease fitting is on inside wall of inner race of bearing.

NOTE: *If Tribol Molub-Alloy 936 Open Gear Compound or Mobilith SHC Bearing Grease are not available, Multi-Purpose Grease (MPG) can be substituted, however the service interval will be shorter.*

   a. Using suitable lifting equipment, install bearing/ rotation box assembly to frame with soft spot (red) 90 degree relative to load axis. If reusing old bearing, ensure that scribed line of outer race of the bearing aligns with the scribed mark on the frame.

⚠ CAUTION

JLG INDUSTRIES RECOMMENDS THAT ALL REMOVED GRADE 8 BEARING NUTS AND BOLTS BE DISCARDED AND REPLACED WITH NEW NUTS AND BOLTS. SINCE THE SWING BEARING IS THE ONLY STRUCTURAL LINK BETWEEN THE FRAME AND TURNTABLE, IT IS IMPERATIVE THAT SUCH REPLACEMENT HARDWARE MEETS JLG SPECIFICATIONS. USE OF GENUINE JLG HARDWARE IS HIGHLY RECOMMENDED.

   b. Apply a light coating of Loctite 271 to the new bearing bolts and loosely install the bolts and washers through the frame and outer race of bearing.

⚠ CAUTION

IF COMPRESSED AIR OR ELECTRICALLY OPERATED IMPACT WRENCH IS USED FOR TIGHTENING THE BEARING ATTACHMENT BOLTS, THE TORQUE SETTING ACCURACY OF THE TOOL SHOULD BE CHECKED PRIOR TO USE.

   c. Following the torque sequence diagram shown in Figure 2-33, tighten the bolts to an initial torque of 175 ft. lbs. (237 Nm). Then following the same sequence, tighten to a final torque of 240 ft. lbs. (326 Nm).
   d. Remove lifting equipment from bearing.
   e. Use suitable lifting equipment to carefully position the turntable assembly above the machine frame.
   f. Carefully lower the turntable onto the swing bearing. Ensure that the scribed line of the inner race of the bearing aligns with the scribed mark on the turntable. If a new swing bearing is used, ensure that the filler plug fitting is at 90 degrees from the fore and aft centerline of the turntable.
   g. Apply a light coating of Loctite 271 to the new bearing bolts and install through the turntable and inner race of bearing.
   h. Following the torque sequence shown in Figure 2-33, tighten the bolts to an initial torque of 175 ft. lbs. (237 Nm). Then following the same

sequence, tighten the bolts to 240 ft. lbs (326 Nm).

i. Remove the lifting equipment.

j. Route hydraulic lines through center of turntable and frame and connect as tagged prior to removal.

k. Using all applicable safety precautions, activate the hydraulic system and functionally check swing system for proper and safe operation.

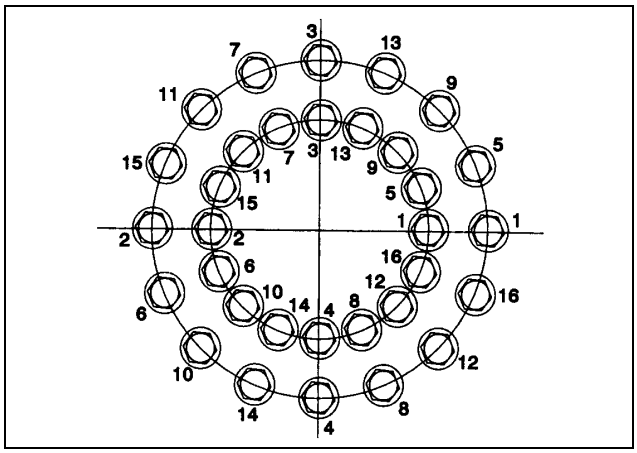


Figure 2-33. Swing Bearing Torquing Sequence

Swing Bearing Torque Values.

1. Dry - 220 ft. lbs. (298 Nm).
2. Loctite - 240 ft. lbs. (326 Nm).

Checking Worm Gear End Play.

NOTE: *JLG Industries requires that a annual inspection be performed on the worm gear end play.*

1. Using a dial indicator, measure end play of worm gear, by applying side to side movement by hand to platform.
2. If tolerance exceeds.010", reduce end play to less than.005". Refer to Adjusting End Play.

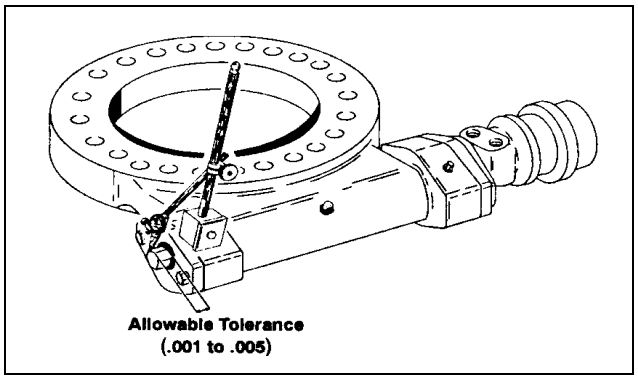


Figure 2-34. Worm Gear Tolerance

Adjusting End Play.

1. Remove end plate.
2. Measure and record total thickness of existing shim pack.
3. Determine thickness of shim pack required to obtain +.001",-.005" end play.
4. Adjust shim pack thickness as required to obtain proper end play. Reduce end play by removing thicker shims and replacing with thinner shims, included in kit.
5. Replace end plate and torque bolts to 90 ft. lbs. (122 Nm).
6. Recheck end play.

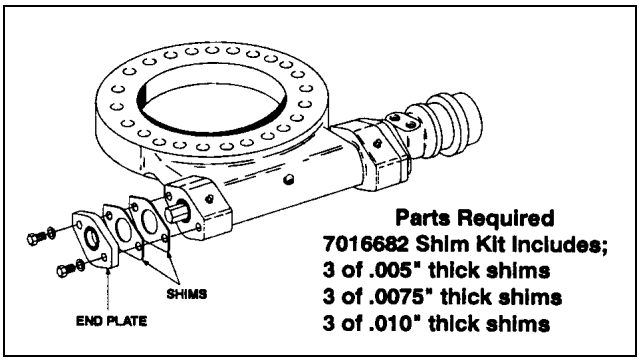


Figure 2-35. Worm Gear Shim Kit

2.17 DRIVE TORQUE HUB. (SEE FIGURE 2-34)

Disassembly.

1. Loosen all cover bolts (28 and 29) and drain oil from unit.
2. Remove the cover bolts (28 and 29) and lift off cover (23). Remove and discard o-ring (22) from counterbore of cover (23).
3. Remove input gear (24) and thrust washer (26)
4. Lift out the carrier assembly (14) and top thrust washer (27).
5. Remove input thrust spacer (25).
6. Lift out internal gear (13) and thrust washer (27).

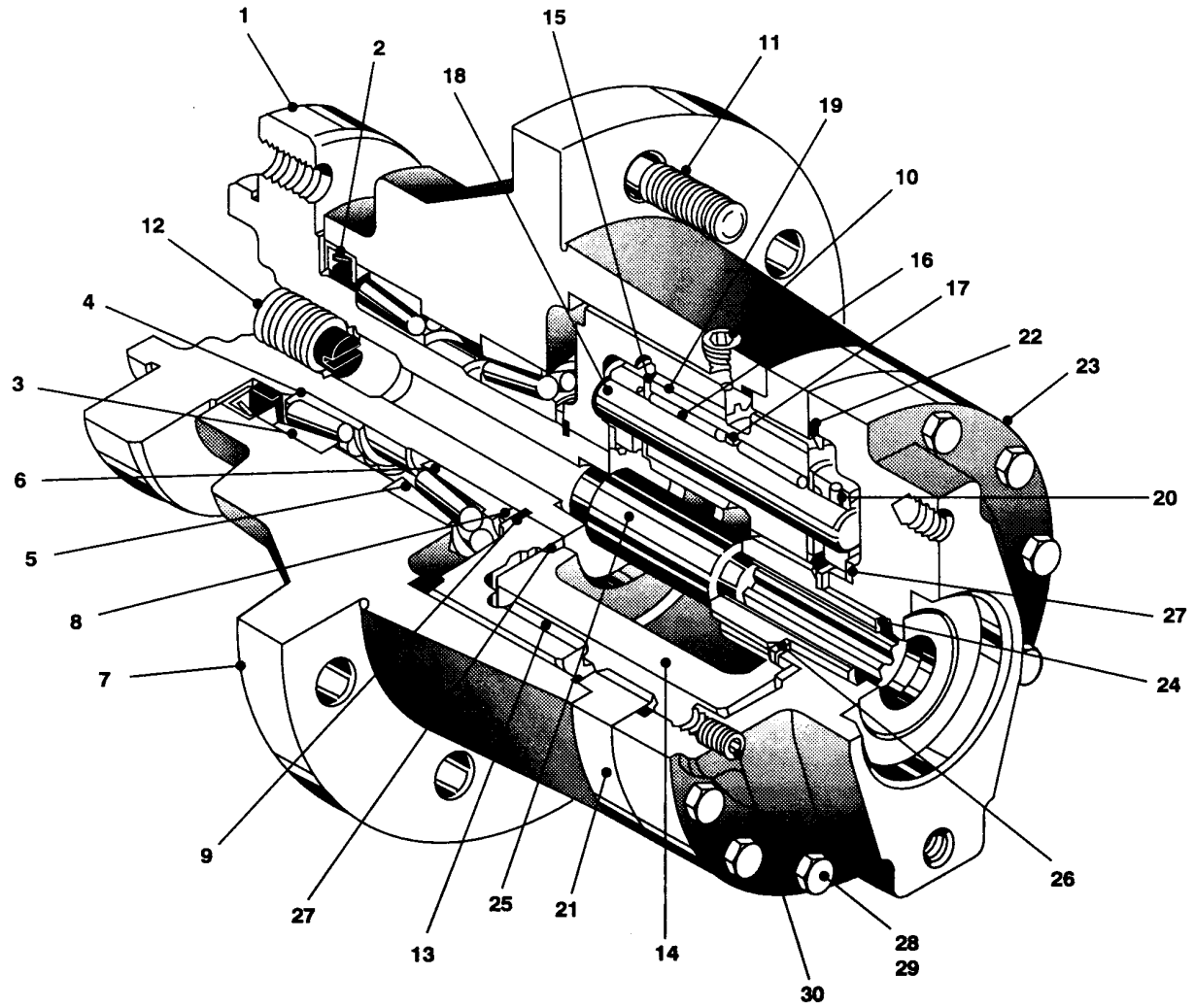
NOTE: *Eye protection should be worn during retaining ring (9) removal.*

7. Remove the retaining ring (9) from the spindle (1) and discard.
8. Remove thrust washer (8) from the spindle (1).
9. The spindle (1) may now be pressed out of the housing (7).
10. The bearing cups (3 and 5) will remain in housing (7) as will bearing cone (6). Bearing cone (4) will remain on the spindle (1). The seal (2) will be automatically removed during this procedure.

NOTE: *If bearing replacement is necessary, the bearing cups can be removed with a slide hammer puller or driven out with a punch.*

11. To remove the cluster gears (19) from the carrier (14), drive the roll pin (20) into the planet shaft (18). The planet shaft may now be tapped out of the carrier. After planet shaft has been removed, the roll pin (20) can be driven out.
12. The cluster gear (19) can now be removed from the carrier (14). The tanged thrust washer (15) will be removed from the cluster gear.
13. The needle bearings (16) and thrust spacer (17) are now removed from cluster gear (19).

NOTE: *When rebuilding or repairing the unit, the retaining ring (9), o-rings (22), and lip seal (2) should always be replaced.*



1.	Spindle	16.	Needle Bearing
2.	Lip Seal	17.	Thrust Spacer
3.	Outer Bearing Cup	18.	Planet Shaft
4.	Outer Bearing Cone	19.	Cluster Gear
5.	Inner Bearing Cup	20.	Rollpin
6.	Inner Bearing Cone	21.	Ring Gear
7.	Housing	22.	O-Ring
8.	Thrust Washer	23.	Input Cover
9.	Retaining Ring	24.	Input Gear
10.	Pipe Plug	25.	Input Spacer
11.	Wheel Stud	26.	Thrust Washer
12.	Pipe Plug	27.	Thrust Washer
13.	Internal Gear	28.	Hex Bolt
14.	Carrier Assembly	29.	Shoulder Bolt
15.	Tanged Thrust Washer	30.	Pipe Plug

Figure 2-36. Drive Hub Assembly - 30/35/n35/40/n40/45.

Assembly.

1. With the hub shaft sub-assembly resting on the spindle (1) install internal gear (13). The spline of the internal gear (13). The spline of the internal gear (13) bore will mesh with the spline of the output shaft (1).
2. Thrust washer (27) is installed on the face of the spindle (1). Sufficient grease or petroleum jelly should be used to hold thrust washer (27) in place.
3. Place o-ring (22) into hub counterbore. Use petroleum jelly to hold in place. Locate and mark the four counter beamed holes in the face of the housing (7). This is for identification later in the assembly.
4. Thrust spacer (25) is installed into the bore of the spindle (1). This should be a slip fit and the thrust spacer should rotate in this location.
5. Place carrier assembly (14) on a flat surface with the cluster gears (19) up. Find the punch marked tooth on each large gear and locate at 12 o'clock (straight up) from each planet pin.
6. With shoulder side of ring gear (21) facing down, place ring gear over (into mesh with) large gears. Be sure that punch marks remain in correct location during installation. The side of the ring gear with an "X" stamped on it should be up.
7. While holding ring gear (21) and cluster gears (19) in mesh, place small side of cluster gears into mesh with the internal gear (13) and input gear (24). On the ring gear, locate the hole marked "X" over one of the marked counterbored holes in assembly (7).

NOTE: *If gears do not mesh easily or carrier assembly does not rotate freely, then remove the carrier and ring gear and check the cluster gear timing.*

8. Input gear (24) is installed, meshing with the teeth of the large diameter cluster gear (19). The counterbore on the input gear (24) locates on the shoulder of the input spacer (25). This is to be a slip fit and should operate freely.
9. Thrust washer (26) is installed onto the input gear (24) and should locate on the gear teeth shoulder.
10. Thrust washer (27) is installed into the counterbore of the carrier.
11. Place o-ring (22) into input cover (23) counterbore. Use petroleum jelly to hold o-ring in place.
12. The input cover (23) is now installed on this assembly. Taking care to correctly align pipe plug hole (30) with those in the housing (7), usually 90 degrees to one another, locate the four counterbore holes in housing (7), marked in step (3) and install four shoulder bolts (29). A tap with a hammer may be necessary to align shoulder bolt with hub counterbore.
13. Install bolts (28) into remaining holes.
14. Pipe plugs (30) are to be installed into input cover (23) using a lubricant seal.
15. Torque bolts (28 and 29) to 23 - 27 ft. lbs. (31- 36 Nm).
16. Fill unit one-half full with EP90 lubricant.

2.18 DRIVE BRAKE ASSEMBLY. (SEE FIGURE 2-35.)

Disassembly.

1. After removing brake from its installation, place brake on a clean dry work bench with mounting plate uppermost.
2. Unscrew capscrews (9) in equal increments to ensure the spring pressure within the brake is reduced gradually and evenly.
3. Remove and lay aside the shaft (3) mounting plate (4) sub-assembly. Should it be necessary to replace ball bearings (11), remove circlips (12 and 13) and press bearing off.
4. Remove friction plates (5, 6, 7) and spacers (8) and set aside. Spacers are factory set for each brake to obtain required air-gap and are not interchangeable between brakes.
5. Armature (2) and coil springs (10) can be removed and set aside.

Inspection.

1. Inspection the friction plates (5, 6) and the mating surfaces on the armature (2) and mounting plate (4) for wear and/or damage.
2. Examine the coil springs (10).
3. Examine the friction plates and the shaft (3) for wear and/or damage to the spline.
4. Examine the pole faces of the magnet (1) and the armature (2) for bruises, swellings or damage. Any bruises, swellings or damage should be stoned flat.
5. Examine input and output splines of shaft for wear and/or damage.
6. Check ball bearing (11) for axial float and/or wear.

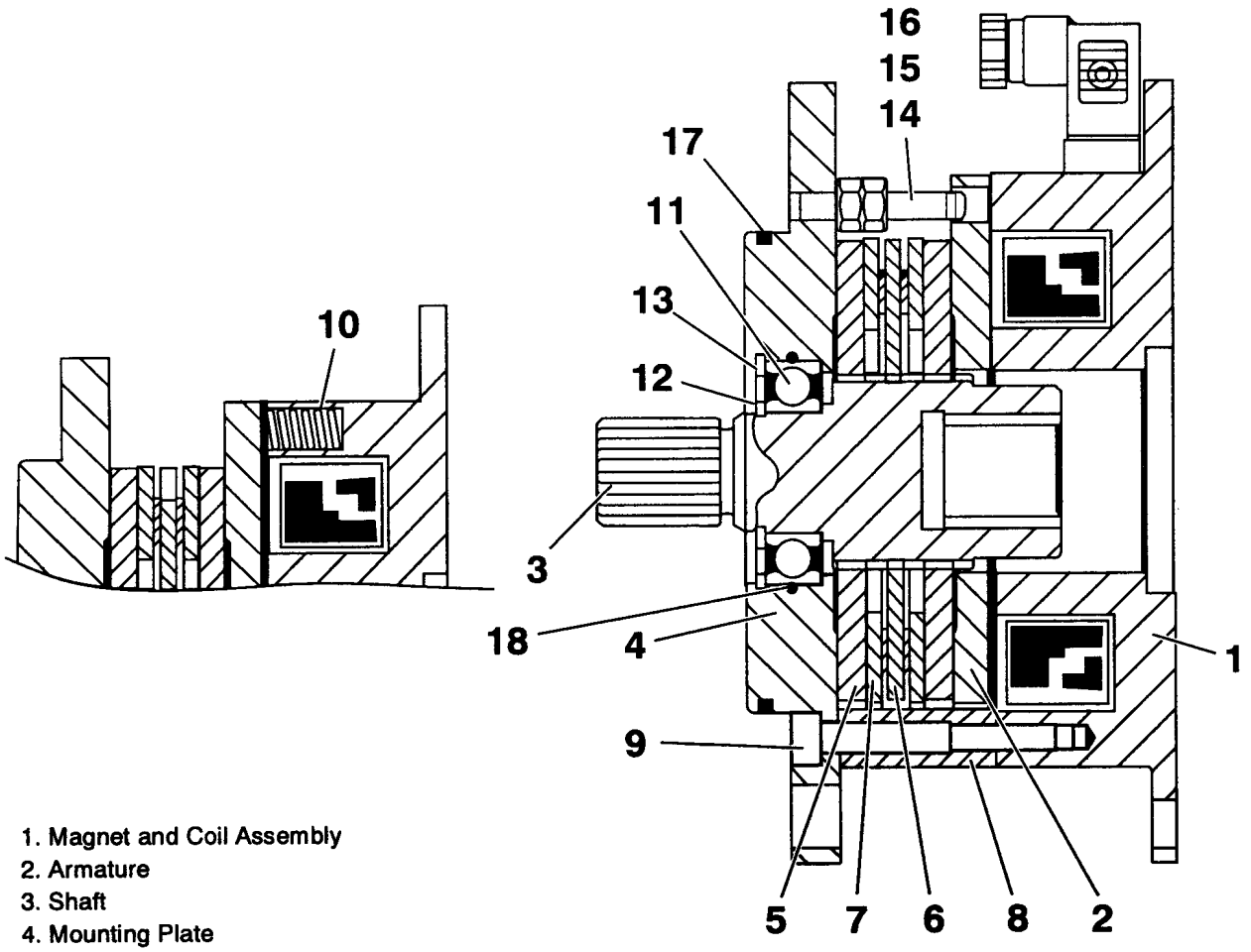
NOTE: *It is essential when replacing plates (5, 6, 7) that spacers (8) are also replaced.*

Assembly.

7. Clean all parts thoroughly.
8. Reverse disassembly procedure above, taking particular care with the assembly sequence of plates (5, 6, 7).

NOTE: *Assemble plate (6) with two center-punches facing towards mounting plate (4).*

9. If new plates have been fitted, then new spacers will have to be adjusted for air gap of 0.014 - 0.024 inches (0.35 - 0.60 mm) as shown in Figure 2-35.
10. After checking air gap, connect power supply.
11. Switch on power supply and ensure brake fully releases.
12. The brake can be adjusted for friction plate wear by removing spacers (8) and machining them to maintain the correct air gap. Length of all three spacers should be within 0.001 in. (0.025 mm).



1. Magnet and Coil Assembly
2. Armature
3. Shaft
4. Mounting Plate
5. Solid Friction
6. Composite
7. Outer Plate
8. Spacer
9. Metric Socket Head Bolt
10. Compression Spring
11. Ball Bearing
12. External Retainer Ring
13. Internal Retainer Ring
14. Metric Manual Release Screw
15. Metric Nut
16. Metric Lockwasher
17. O-Ring
18. O-Ring

Figure 2-37. Drive Brake Assembly - 30/35/n35/40/n40/45.

2.19 MID AND LOWER LIFT CYLINDER BLEEDING PROCEDURE. (40/N40/45 ELECTRIC)

NOTE: *Bleeding procedure should only be necessary if rebuilding or replacing lift cylinder.*

1. Check oil level in the hydraulic oil tank (all booms must be retracted). See Figure 2-36 for location of bleeder fitting in pilot port “P” at rod end of mid cylinder.
2. Lay an oil drip pan under the rod end port block (Mid Cylinder) and crack bleeder open from the fitting in the port block.
3. From the platform, turn the speed control knob to the slow position.
4. Lift up very slowly. This will force any air out of the circuit. If the lower boom is not extending, turn the speed control up very slowly until the lower boom starts to move.
5. Raise the lower boom approx. 1 foot (30.48mm), then close bleeder while the boom is still moving.
6. Lift down all the way.
7. Repeat this procedure until all air has been purged from the circuit. Re-check the hydraulic oil level.
8. To test, cycle the lower lift function 3-4 times to see if both cylinders stop at the same time when fully extended.

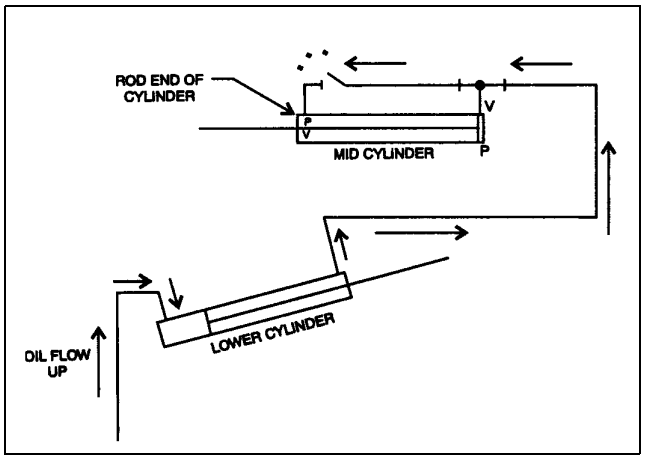


Figure 2-38. Port "P" Location.

2.20 BOOM SYNCHRONIZING PROCEDURE. (40/N40/45 ELECTRIC)

NOTE: *If the Lower Boom assembly does not fully lower:*

1. Remove all personnel from the platform.
2. Pull the red knob located under the main control valve.
3. From Ground Control, activate the lift control switch, raise Lower Boom 6 feet (1.83m).
4. After raising Lower Boom, release the red knob.
5. Activate Lower Boom Down, fully lower boom.
6. Repeat step 1 thru 5 if necessary

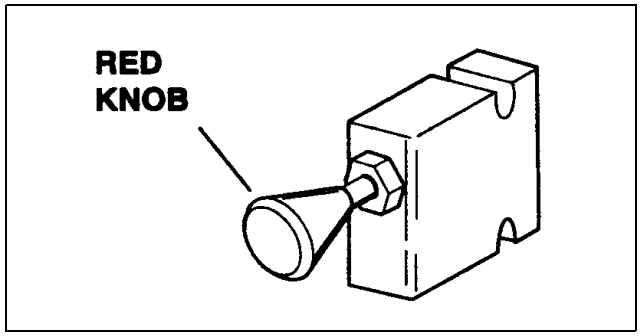


Figure 2-39. Synchronizing Valve.

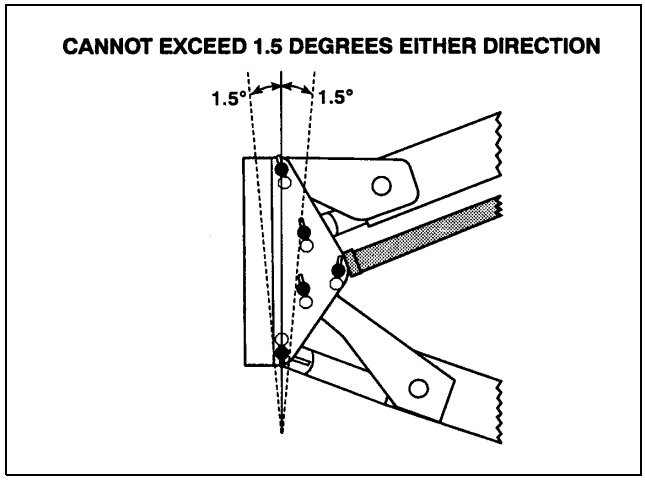


Figure 2-40. Upright Leveling.

2.21 FREE WHEELING PROCEDURE.

Use the following procedures ONLY for emergency movement to a suitable maintenance area. (See Figure 2-38.)

1. Chock all wheels securely.
2. Engage the mechanical release on both brakes by loosening, completely reversing (towards drive motor) and tightening the three nuts on each brake.
3. Connect suitable equipment, remove chocks, and move machine.
4. After moving machine, position on a firm, level surface.
5. Chock wheels securely.
6. Disengage the mechanical release on both drive brakes by loosening, completely reversing (towards torque hub) and tightening the three nuts on each brake.
7. Remove chocks from wheels as desired.

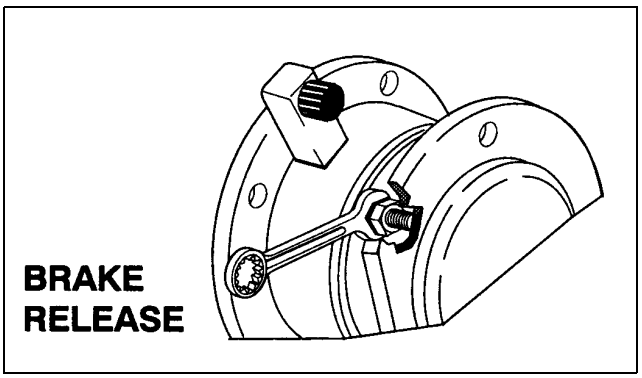


Figure 2-41. Drive Brake Release.

2.22 FOOTSWITCH ADJUSTMENT.

Adjust switch so that functions will operate when pedal is at center of travel. If switch operates within last 1/4 inch (6.35 mm) of travel, top or bottom, it should be adjusted.

2.23 P/Q CONTROLLER.

The PQ Controller converts manual input into proportional electrical output signals for commanding proportional flow control valves. The PQ Controller is a sealed unit and can withstand hostile and rugged outdoor weather conditions. The control handle enters the housing through a sealed bearing, reducing the possibility of water entering the housing.

The PQ Controller incorporates a mechanical safety lock whereby the operator must make an additional motion to unlock the control handle prior to operation. This feature eliminates the possibility of the control being accidently energized while in the neutral position. The controller also incorporates a neutral-position-off switch. When the control handle is in its neutral position, a switch contact opens, thus removing power from the electrical circuitry of the controller. The control handle is spring loaded, and will automatically return to the neutral-off position should the operator accidently lose grip of the handle. this feature gives the operator positive control of the machine at all times, requiring the operator to hold the control handle during the duration of the desired function.

Switch adjustment

Refer to manual 3120351.

Pulse Width Modulation (PWM) Fine tune adjustment

Refer to manual 3120351.

2.24 AXLE DRAIN PLATES

The electric boom lifts are equipped with two maze-type water drains, located on the underside of the axle box. This 'S' type drain arrangement is required to meet EE rating, although dust and debris can accumulate and clog these drains, trapping water inside the axle box. Periodically check and open drains with compressed air, or remove and clean them if necessary.

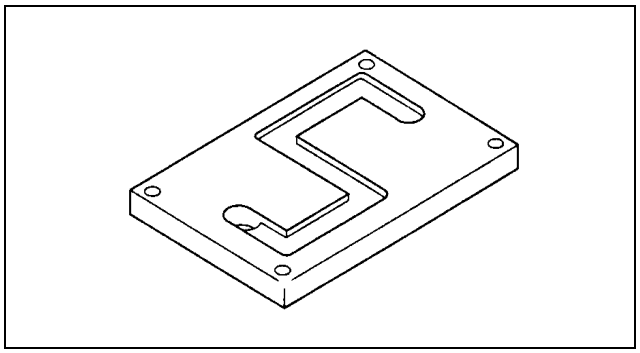


Figure 2-42. Drive Axle Drain Plate.

2.25 PREVENTIVE MAINTENANCE AND INSPECTION SCHEDULE.

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" of the table, the various systems along with 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.

JLG Industries requires that a complete annual inspection be performed in accordance with the "Annual Machine Inspection Report" form. Forms are supplied with each new machine and are also available from JLG Customer Service. Forms must be completed and returned to JLG Industries.

⚠ IMPORTANT

JLG INDUSTRIES REQUIRES THAT A COMPLETE ANNUAL INSPECTION BE PERFORMED IN ACCORDANCE WITH THE "ANNUAL MACHINE INSPECTION REPORT" FORM.

NOTE: *This machine requires periodic safety and maintenance inspections by a JLG Dealer. A decal located on the turntable affords a place to record (stamp) inspection dates. Notify dealer if inspection is overdue.*

The inspection and maintenance code numbers are as follows:

1. Check for proper and secure installation.
2. Check for visible damage and legibility.
3. Check for proper fluid level.
4. Check for any structural damage; cracked or broken welds; bent or warped surfaces.
5. Check for leakage.
6. Check for presence of excessive dirt or foreign material.
7. Check for proper operation and freedom of movement.
8. Check for excessive wear or damage.
9. Check for proper tightness and adjustment.
10. Drain, clean and refill.
11. Check for proper operation while engine is running.
12. Check for proper lubrication.
13. Check for evidence of scratches, nicks or rust and for straightness of rod.
14. Check for condition of element; replace as necessary.
15. Check for proper inflation.
16. Clean or replace suction screen.

NOTE: **Inspection and Maintenance Code 10, 12 and 16 to be performed every two years.*

Table 2-3.PREVENTIVE MAINTENANCE AND INSPECTION SCHEDULE

AREA	INTERVAL					
PLATFORM AND BOOMS	**DAILY**	**WEEKLY**	**MONTHLY**	**3 MONTH**	**6 MONTH**	**YEARLY**
1. Platform Gate	1, 4		12			
2. Platform	1, 4					
3. Platform Rotator	12	5, 11	8			
4. Footswitch	1, 11					
5. Controller	1, 11					
6. Switches	1, 11					
7. Placards and Decals	1, 2					
8. Control Tags	1, 2					
9. Hoses and Cables	1	4, 5, 8				
10. Pins			8			
11. Bushings			8			
12. Wear Pads			8			
13. Cylinders		1, 5, 6, 13				
TURNTABLE						
1. Gauges/Ground Controls	1, 2, 11					
2. Valves	1, 11	5				
3. Hydraulic Hoses	1	5				
4. Shields	1					
5. Limits Switches	1, 7					
6. Placards and Decals	1, 2					
7. Swing Bearing		1		9, 12		
8. Swing Motor		1, 5, 6	8			
CHASSIS						
1. Batteries	3	5				
2. Wheel and Tire Assemblies	1	8, 9, 15				
3. Drive Motors		1, 5, 6				
4. Drive Torque Hubs *		1, 5, 6		3		
5. Drive Brakes		1, 5, 6				
6. Hydraulic Pump/Motor	1	5				
7. Steer Components	1	4, 6	8			
8. Front Axle Pin	1		8			

Table 2-3.PREVENTIVE MAINTENANCE AND INSPECTION SCHEDULE

9.	Hydraulic Oil Tank *	3	5	4			
10.	Breather - Hydraulic Tank		6, 14				
11.	Hydraulic Hoses and Tubing	1	5				
12.	Placards and Decals	1, 2					
13.	Tilt Alarm Switch		1				
14.	Shields	1					
15.	Wheel Bearings *			8			
16.	Swing Bearing/Worn Gear		1		9, 12		

SECTION 3. TROUBLESHOOTING

3.1 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.

3.2 TROUBLESHOOTING INFORMATION.

The troubleshooting procedures applicable to the aerial platform are listed and defined in Tables 3-1 through 3-6. As an aid to table use, the aerial platform is divided into six major groups, each covered separately within this section. These groups are as follows: platform assembly, boom assembly, turntable assembly, chassis assembly, hydraulic system and electrical system.

Each malfunction within and 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 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 of 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 or 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.

3.3 HYDRAULIC CIRCUIT CHECKS.

The first reference for improper function of a 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. For aid in troubleshooting, refer to the Illustrated Parts Manual for hydraulic diagrams of the various circuits.

Table 3-1.Platform Assembly - Troubleshooting

TROUBLESHOOTING CHART		
TROUBLE	**PROBABLE CAUSE**	**REMEDY**
PLATFORM LEVELING SYSTEM.		
Automatic leveling inoperative. (35/n35/n40/45 electric)		
	Hydraulic system oil low.	Replenish oil as necessary.
	Dual check valves dirty/inoperative.	Clean or replace as necessary.
	Restricted or broken hydraulic line or fitting on slave cylinder or main lift cylinder.	Clean, repair, or replace line or fitting.
	Worn seal(s) in slave level or main lift cylinder.	Replace seal(s).
	Counterbalance valve in slave cylinder defective.	Replace counterbalance valve.
	Slave level or main lift cylinder not functioning properly.	Repair or replace cylinder.
Platform will not maintain level attitude.		
	Counterbalance valve on slave leveling cylinder improperly adjusted or not functioning properly.	Replace valve.
	Worn seal(s) in slave level or main lift cylinder.	Replace seal(s).
	Damaged slave level or main lift cylinder.	Repair or replace cylinder.
No response to platform leveling controls.		
	Level control switch inoperative.	Repair or replace control switch lever. Run systems test
	Hydraulic system oil low.	Replenish oil as necessary.
	System orifice plugged/dirty.	Clean orifice.
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Control valve not functioning properly.	Repair or replace valve.
	No electric to control valve.	See proper wiring diagram. Run systems test
	Slave cylinder not functioning properly.	Repair or replace pump.
	Main proportional valve in-operative	Run systems test
	Incorrect personality settings	check settings

Table 3-1.Platform Assembly - Troubleshooting

Platform will not adjust "up" to level.		
	Hydraulic pump not functioning properly.	Repair or replace pump.
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Slave cylinder not functioning properly.	Repair or replace cylinder.
	Electrical failure.	See proper wiring diagram. Run systems test
	Orifice plugged.	Clean orifice.
Platform will not adjust "down" to level.		
	See: Platform will not adjust "up" to level.	

Table 3-2.Boom Assembly - Troubleshooting

TROUBLESHOOTING CHART		
TROUBLE	**PROBABLE CAUSE**	**REMEDY**
CONTROL VALVES.		
Valve spool sticking.		
	Dirt in oil causing excessive temperature build-up.	Flush system and change oil using recommended viscosity
	Moisture in oil.	Flush system and change oil using recommended viscosity
	Incorrect valve mounting causing warping of the unit.	Loosen valve and check mounting. Repair as necessary.
	Valve spool scored.	Remove valve and repair or replace as necessary.
	Tie-bolts in valve over torqued.	Correctly torque bolts.
	Return spring weak or broken.	Remove valve and repair or replace as necessary.
	Relief valve malfunctioning causing excessive pressure within valve.	Check pressure delivery to and from valve and repair or replace as necessary.
Valve leaking.		
	Dirt or other foreign material under seal.	Remove and repair valve as necessary.
	Valve spool scored.	Remove valve and repair or replace as necessary.
	Excessive back pressure caused by restricted return line to reservoir.	Remove line and clear obstruction or replace line as necessary.
	Damaged valve seals.	Remove valve and repair or replace as necessary.

Table 3-2.Boom Assembly - Troubleshooting

BOOM ELEVATION SYSTEM.		
No response to lift control switch.		
	Lift control switch inoperative.	Repair or replace control switch.Run systems test
	Lift cylinder holding valve inoperative.	Repair or replace holding valve.
	Electrical malfunction.	See wiring diagram. Run systems test.
	Hydraulic system oil low.	Replenish oil as necessary.
	Restricted or broken supply line on valve bank or hydraulic pump.	Clean or replace line.
	Control valve not functioning properly.	Repair or replace valve.
	Lift cylinder not functioning properly.	Repair or replace cylinder.
	Hydraulic pump not functioning properly.	Repair or replace pump.
	Dump valve (bypass) not operating.	Determine cause and repair or replace valve.
Boom will not raise.		
	Load capacity exceeded (personnel or equipment on platform).	Reduce load.(Refer to capacity placard.)
	Hydraulic system oil low.	Replenish oil as necessary.
	Electrical failure to valves.	See proper wiring diagram. Run systems test.
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Control valve not functioning properly.	Repair or replace valve.
	Pressure relief valve not functioning properly.	Re-adjust or replace valve.
	Lift cylinder not functioning properly.	Repair or replace cylinder.
	Motor/Pump does not respond when LIFT control switch is moved to UP position.	Refer to Electrical Diagram and/or Electrical System Troubleshooting Chart. Run systems test.
	Binding lift cylinder or boom pivot pin.	Repair or replace cylinder or pin.
	Bypass valve (dump) not functioning.	Repair or replace valve.
Boom will not lower.		
	See: Boom will not raise.	
	Pressure relief valve not functioning properly.	Re-adjust or replace valve.
	Holding valve not functioning properly.	Re-adjust or replace valve.

Table 3-2.Boom Assembly - Troubleshooting

Boom raises and lowers erratically.		
	Hydraulic system oil low.	Replenish oil as required.
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Lack of lubricant on cylinder shafts and/or boom pivot.	Lubricate as required. (Refer to Lubrication Chart.)
	Counterbalance valve on lift cylinder improperly adjusted or not functioning properly.	Replace valve.
	Control valve not functioning properly.	Repair or replace valve.
	Worn seals in lift cylinder.	Replace seals.
	Cylinder not functioning properly.	Repair or replace cylinder.
Boom drifts down.		
	Worn seals in lift cylinder.	Replace seals.
Lower Lift Function.		
If the lower boom assembly does not fully lower.		
	The mid and lower booms are out of synchronization.	Refer to snchronization precedure.
Main Telescope system.		
No response to telescope control.		
	Telescope control switch in operative.	Repair or replace control switch.
	Hydraulic system oil low.	Replenish oil as necessary.
	Damaged wiring on control switch or solenoid valve.	Repair or replace valve.
	Control valve not functioning properly.	Repair or replace valve.
	Restricted or broken supply line on valve bank or hydraulic pump.	Clean or replace line.
	Telescope cylinder not functioning properly.	Repair or replace cylinder.
	Hydraulic pump not functioning properly.	Repair or replace pump.
Boom will not extend.		
	Control valve not funtioning properly.	Repair or replace control valve.
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Pressure setting incorrect.	Check pressure/ re-adjust as nessary.
	Telescope cylinder not functioning properly.	Repair or replace cylinder.

Table 3-2.Boom Assembly - Troubleshooting

Boom extends and retracts erratically.		
	Hydraulic system oil low.	Replenish oil as necessary.
	Wear pads worn.	Replace pads as required.
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Control valve not funtioning properly.	Repair or replace control valve.
	Worn seals in telescope cylinder.	Replace seals.
	Cylinder not functioning properly.	Repair or replace cylinder.
	Distorted boom section(s).	Replace distorted section (s).
	Counterbalance valve not functioning properly.	Replace counterbalance valve.
BOOM SWING SYSTEM.		
No response to swing control.		
	Hydraulic system oil low.	Replenish oil as necessary.
	Swing control switch not functioning.	Repair or replace swing control switch.
	Restricted or broken supply line on valve bank or hydraulic pump.	Clean or replace line.
	Control valve not functioning properly.	Repair or replace valve.
	Swing motor not functioning properly.	Repair or replace motor.
	Foreign objects (s) wedged between swing motor pinion and swing gear.	Remove objects, check for damage, and repair or replace component(s) as required.
	No electric power to valve.	See proper wiring diagram. Run systems test.
	Pressure relief valve in swing control circuit mal-functioning.	Repair or replace reducing valve.
	Restrictor valve 9s) plugged.	Clean or replace restrictor valve.
Boom will swing in only one direction.		
	Restricted or broken hydraulic line or fitting.	Clean, repair, or replace line or fitting.
	Control valve not functioning properly.	Repair or replace valve.
	Foreign object(s) wedged between swing motor pinion and swing gear.	Remove object(s), check for damage and repair or replace component(s) as required.
	Swing joystick not functioning properly.	Repair or replace swing control switch.

Table 3-2.Boom Assembly - Troubleshooting

Boom swings erratically in either direction.		
	Hydraulic system oil low.	Replenish oil as necessary.
	Lack of lubricant on swing gear or speed reducer pinion.	Lubricate as required. (See Lubrication Chart.)
	Swing motor not functioning properly.	Repair or replace swing control switch.
	Worn or broken teeth on swing gear or swing motor pinion.	Replace gear(s) as required.
	Restrictor valve plugged.	Clean or replace restrictor valve.

Table 3-3.Turntable Assembly - Troubleshooting

TROUBLESHOOTING CHART		
TROUBLE	**PROBABLE CAUSE**	**REMEDY**
CONTROL VALVE.		
Valve spool sticking.		
	Dirt in oil causing excessive temperature built-up.	Change oil using recommended viscosity and flush system.
	Incorrect valve mounting causing warping of the unit.	Loosen valve and check mounting Repair as necessary.
	Valve spool scored.	Remove valve and repair or replace as necessary.
	Return spring weak or broken.	Remove valve and repair or replace as necessary.
	Relief valve malfunctioning causing excessive pressure within valve.	Check pressure delivery to and from valve and repair or replace as necessary.
Valve leaking.		
	Dirt or other foreign material under seal.	Remove and replace valve as necessary.
	Valve spool scored.	Repair or replace valve.
	Excessive back pressure caused by restricted return line to reservoir.	Remove line and clear obstruction or replace line as necessary.
	Damaged valve seals.	Repair or replace valve as necessary.
	Is the main relief valve, of the brake / steer valve set too low?	Check settings.
	Is the pressure filter, of the brake / steer valve clogged?	Check filter.

Table 3-4.Chassis Assembly - Troubleshooting

TROUBLESHOOTING CHART		
TROUBLE	**PROBABLE CAUSE**	**REMEDY**
DRIVE SYSTEM.		
No response to drive control.		
	Sevcon overheated.	Check flash code on sevcon.
	Hydraulic system oil low.	Replenish oil as necessary.
	Hydraulic pump not functioning properly.	Repair or replace pump.
	Restricted or broken pump supply line.	Clean, repair or replace line.
	Restricted or broken line on valve bank.	Clean, repair or replace line.
	Drive motor(s) not functioning properly.	Repair or replace motor(s).
	Damaged wiring on control switch.	Repair or replace wiring.
	Control switch not functioning properly.	Replace switch. Run systems check.
	Brake(s) not releasing.	Determine cause and repair or replace.
	Low batteries.	Check flash code on sevcon.
Machine will not travel in forward.		
	Hydraulic system oil low.	Replenish oil as necessary.
	Restricted or broken hydraulic line or fitting.	Clean, repair or replace line or fitting.
	Control valve not functioning properly.	Repair or replace valve.
	Drive motor(s) not functioning properly.	Repair or replace motor(s).
	Circuit breaker open.	Determine and correct cause; reset circuit breaker.
	Brake(s) not releasing.	Determine cause and repair or replace.
	Motor/Pump will not respond when DRIVE control moved FORWARD.	Refer to Electric System Troubleshooting
	Motor controller FORWARD contactor defective.	Repair or replace contactor. Run systems check.
Machine will not travel in reverse.		
	Motor controller REVERSE contactor defective. See: Machine will not travel forward.	Repair or replace contactor. Run system test.
Drive system very jerky.		
	Sevcon controller defective.	Check flash code

Table 3-4.Chassis Assembly - Troubleshooting

Machine will speed up in forward or reverse.		
	Wires loose or broken from Tach Drive System to Sevcon controller.	Check flash code on sevcon. Repair or replace wire as necessary.
	Tach drive shaft broken off.	replace tach drive shaft.
	Tach drive defective.	Check flash code.
No response to steercontrol.		
	Hydraulic s ystem oil low.	Replenish oil as necessary.
	Hydraulic system pressure to low.	Adjust pressure.
	Damaged wiring on control switch or solenoid.	See proper wiring diagram.
	Control switch not operating properly.	Replace switch.
	Restricted or broken hydraulicline on valve bank or hydraulic pump.	Clean, repair or replace line.
	Steer control valve not functioning properly.	Repair or replace valve.
	Steer cylinder not functioning properly.	Repair or replace cylinder.
Machine hard to steer or steering is erratic.		
	Hydraulic s ystem oil low.	Replenish oil as necessary.
	Restricted hydraulic line or fitting.	Clean, repair or replace line or fitting.
	Restricted crossover relief valve.	Clean or replace valve.
	Steer system pressure low.	Adjust pressure.
	Bent linkage (tie rods).	Repair or replace linkage as required.
	Hydraulic pump not functioning properly.	Repair or replace pump.
	Steer cylinder not functioning properly.	Repair or replace cylinder.
Steering inoperative.		
	Damaged wiring on control switch or solenoid valve	See proper wiring diagram.
	Solenoid valve not function properly.	Repair or replace valve.
	Control switch not functioning properly.	Replace switch.
	Relief valve improperly set or not functioning properly.	Reset, repair or repolace valves as required.
	Steer cylinder not functioning properly.	Repair or replace cylinder.

Table 3-4.Chassis Assembly - Troubleshooting

Machine will not steer left or right.		
	Wiring on control switch is damaged.	See proper wiring diagram.
	Wiring on solenoid valve damaged.	Repair or replace wiring.
	Coil in solenoid valve damaged.	Replace coil.
	No oil flow or pressure to steer circuit.	Take pressure reading at steer valve and adjust as necessary.
	Bent cylinder rod.	Repair or replace cylinder.
	C rossover relief valve sticking.	Repair crossover relief valve.
	Damaged tie rod.	Replace tie rod.
	Cylinder packing defective.	Repair or replace cylinder.

Table 3-5.Hydraulic System - Troubleshooting

TROUBLESHOOTING CHART		
TROUBLE	**PROBABLE CAUSE**	**REMEDY**
HYDRAULIC SYSTEMS - GENERAL.		
Hydraulic pump noisy.		
	Air entering system through broken line or fitting. (Suction Side.)	Repair or replace line or fitting.
	Air bubbles in oil. (Reservoir oil too low.)	Replenish oil as required.
	Oil filter dirty.	Replace hydraulic filter.
	Wrong type of hydraulic oil.	Replace hydraulic oil.
Pump cavitating. (Vacuum in pump due to oil starvation.)		
	Restricted suction line.	Clean, repair, or replace line.
	Restricted reservoir air vent.	Clean or replace vent.
	Oil viscosity too high.	Drain system and replace with recommended oil. (Refer to Hydraulic Oils.)
	Air leak in suction side of tank.	Repair leak.
System overheating.		
	Oil viscosity too high.	Drain system and replace with recommended oil. (Refer to Hydraulic Oils.)
	Bypass valve not operating properly.	Repair or replace valve.
	Main relief valve set too low.	Reset valve as required.
	Hydraulic system oil low.	Replenish oil as necessary.
	Port relief set too high.	Reset valve as required.
	Restricted or blocked return line.	Repair or replace line.
Pump not delivering oil.		
	Restricted suction line.	Clean, repair, or replace line.
	Air entering system through broken line or fitting.	Repair or replace line or fitting.
	Defective motor/pump.	Repair or replace motor.

Table 3-5.Hydraulic System - Troubleshooting

System pressure to low.		
	Leak in component, line or fitting.	Repair or replace component, line or fitting.
	Main relief valve set too low.	Reset valve as required.
	Oil viscosity too low.	Drain system and replace with recommended oil. (Refer to Hydraulic Oils.)
System(s) operate erratically.		
	Sticking or binding valve spools, pistons.	Clean, repair, or replace components as required.
	Hydraulic oil not at operating temperature.	Allow oil sufficient time to warm up.

Table 3-6.Electrical System - Troubleshooting

TROUBLESHOOTING CHART		
TROUBLE	**PROBABLE CAUSE**	**REMEDY**
ELECTRICAL SYSTEM.		
Controller.		
	No electric power to controller.	Check electrical input to controller.
Steer valve will not function when thumb switch is moved in either direction.		
	No electric power to valve.	Check electrical output and electrical signal at the valve.
	Improper grounding.	Check for proper ground.
No response to a function control switch.		
	EMERGENCY STOP switch not position properly.	Place EMERGENCY STOP switch to the ON position.
	PLATFOR/GROUND SELECT switch not positioned properly.	Place PLATFOR/GROUND SELECT switch to correct position.
	Batteries defective or require charging.	Test batteries for serviceability. Replace or charge batteries as necessary.
	No voltage supplied to drive motors.	Check motor controller and contactors for proper operation. Repair or replace as necessary.
	Defective function switch.	Replace switch.
	Defective circuit breaker.	Replace circuit breaker.
	No voltage present at applicable control valve.	Check applicable wire for proper connection. Using suitable test meter, perform continuity test on wire. Repair or replace wire as necessary.
	Defective motor/pump assembly.	Replace motor/pump assembly.
Drive motors will not operate when controller is activated.		
	Motor controller 200 Amp fuse blown.	Check flashcode on sevcon and determine cause and repair. Replace fuse.
Hydraulic motor/pump will not run.		
	Batteries require charging or will not charge.	Charge or replace batteries as necessary.
	Motor controller contactors not functioning properly.	Repair or replace contactor.
	Motor/pump not functioning properly.	Repair or replace motor/pump.
Motor controller malfunctioning.		
	See REMEDY column.	Refer to Section 8 for malfunction codes.

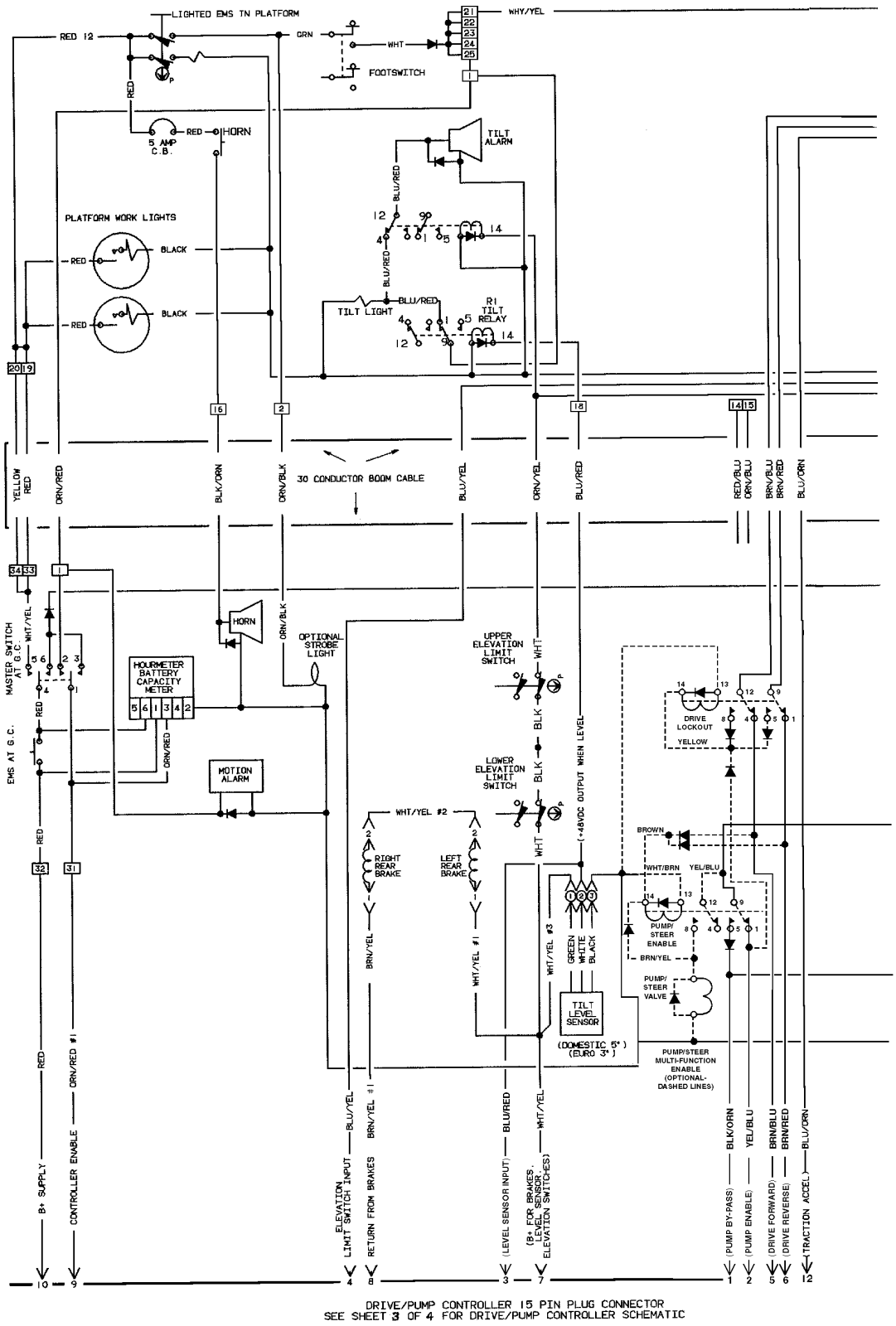


Figure 3-1. Electrical Schematic 30 electric. (Sheet 1 of 4)

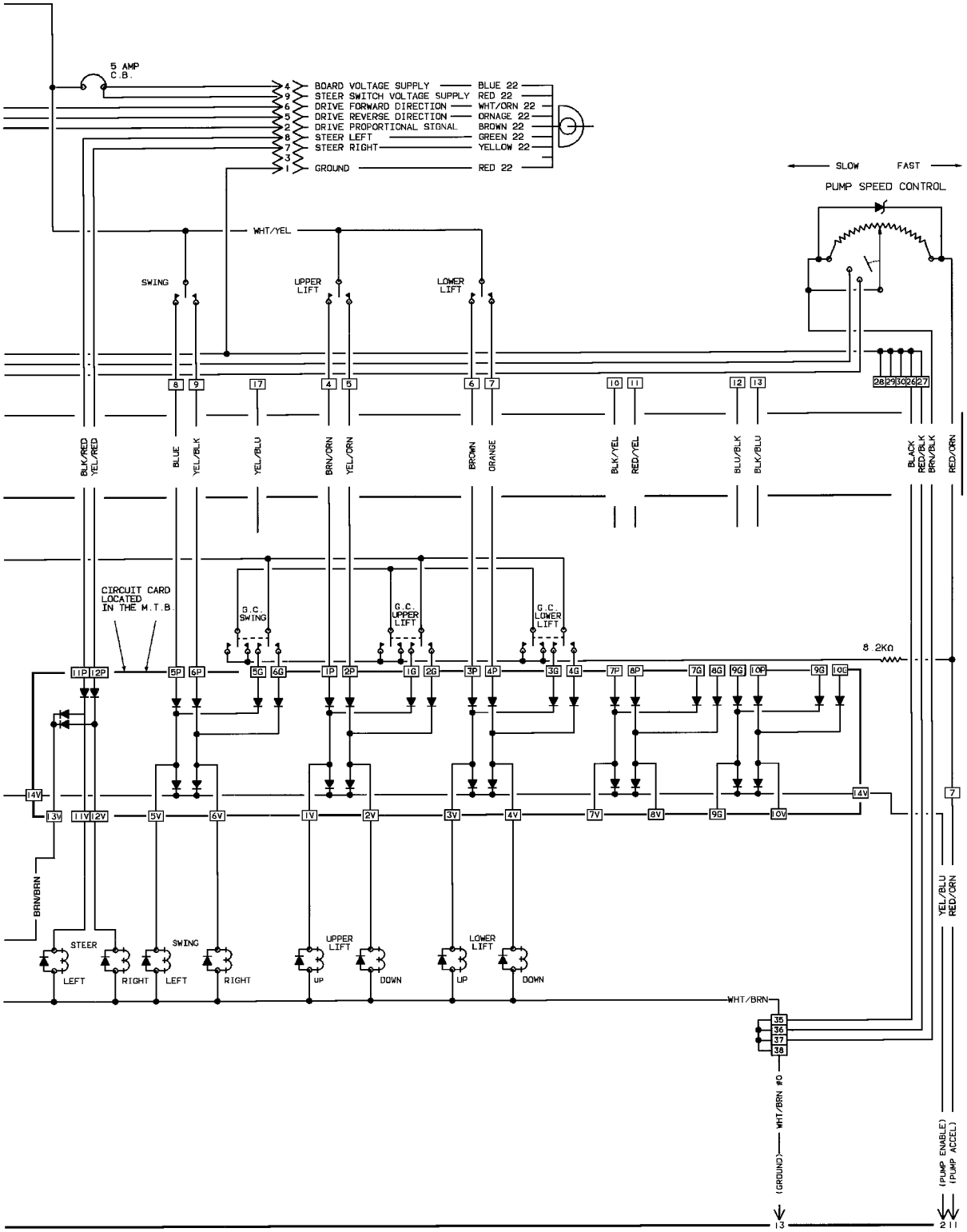


Figure 3-1. Electrical Schematic 30 electric. (Sheet 2 of 4)

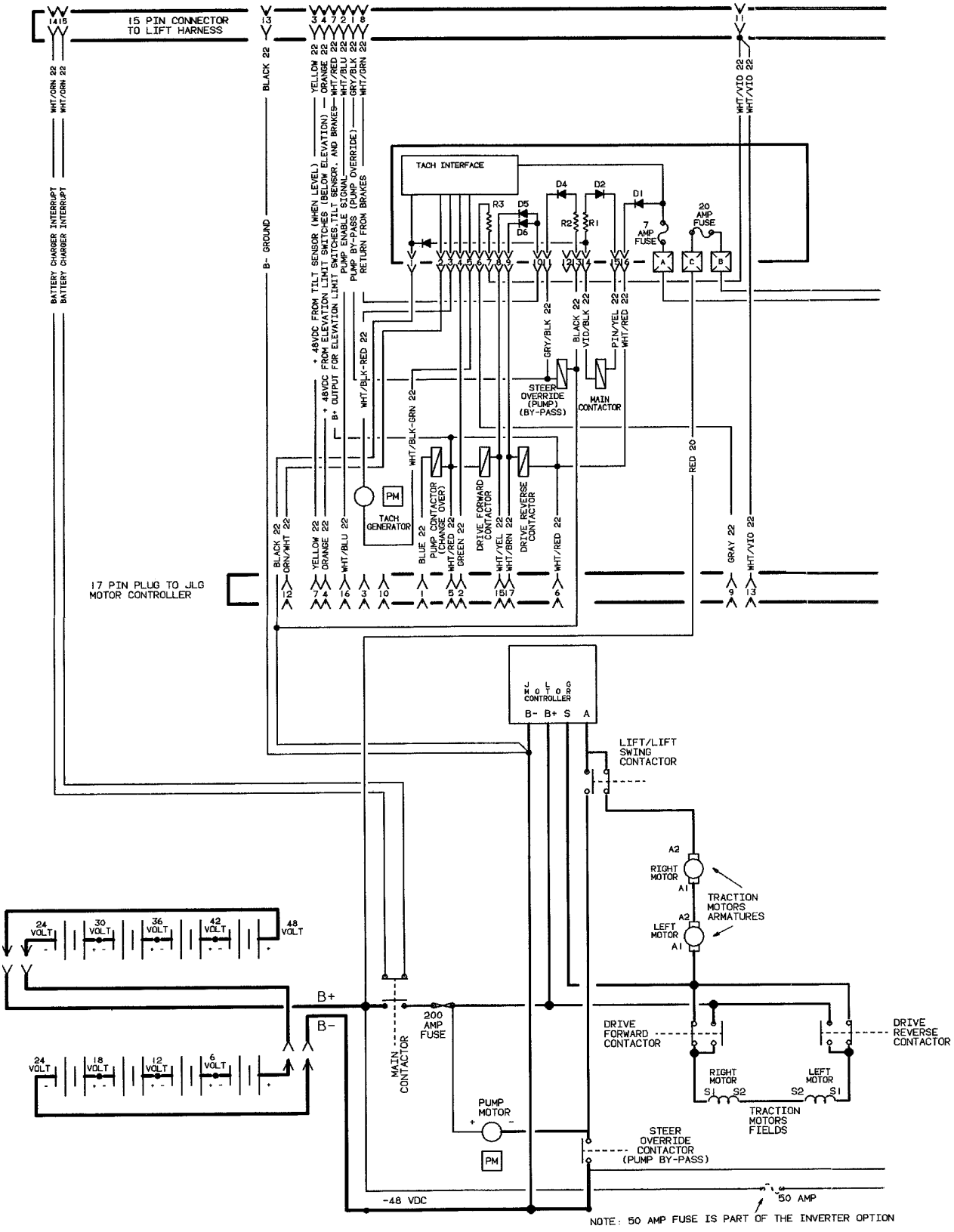


Figure 3-1. Electrical Schematic 30 electric. (Sheet 3 of 4)

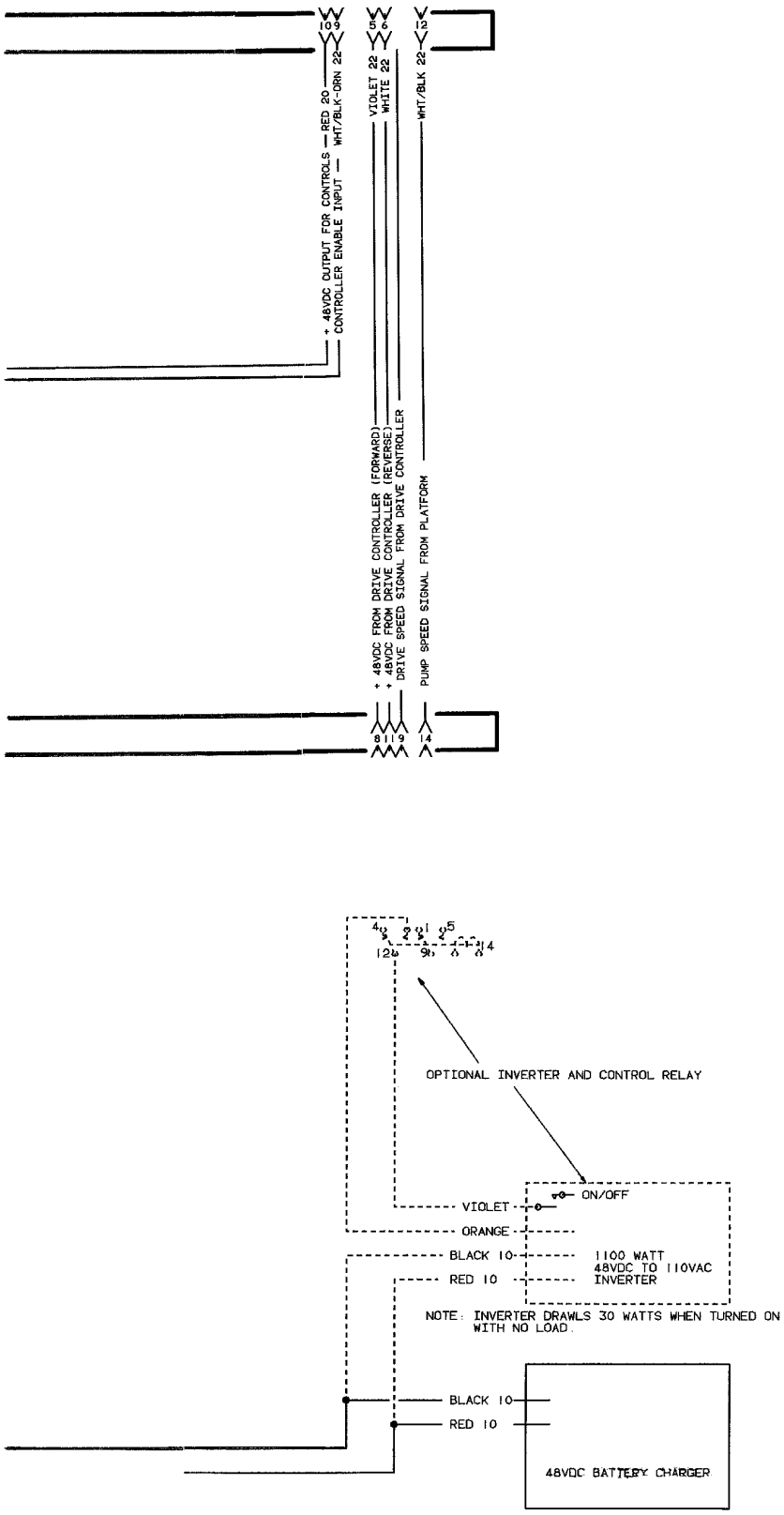


Figure 3-1. Electrical Schematic 30 electric. (Sheet 4 of 4)

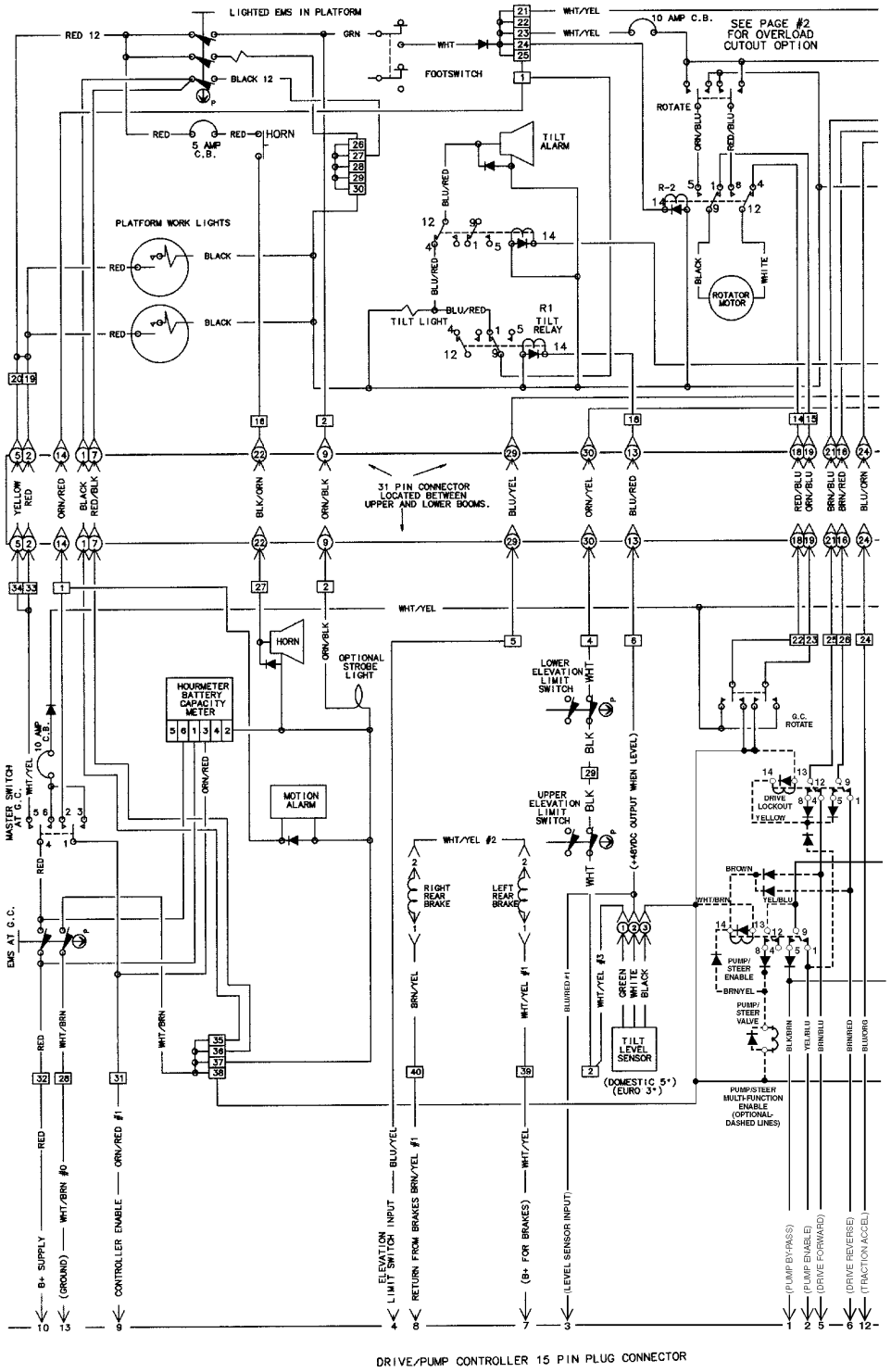


Figure 3-2. Electrical Schematic 35/40/45 electric. (Sheet 1 of 4)

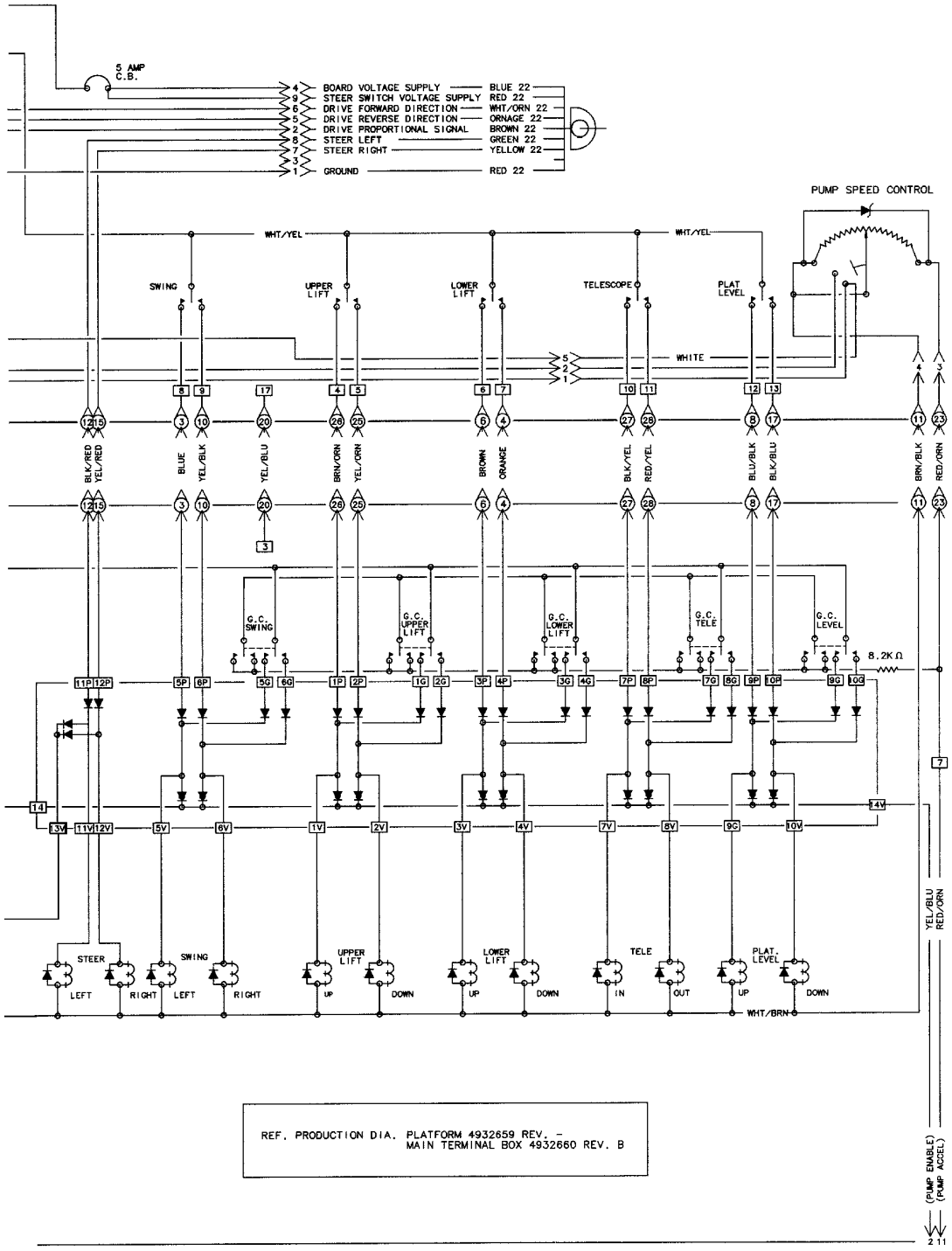


Figure 3-2. Electrical Schematic. 35/40/45 electric. (Sheet 2 of 4)

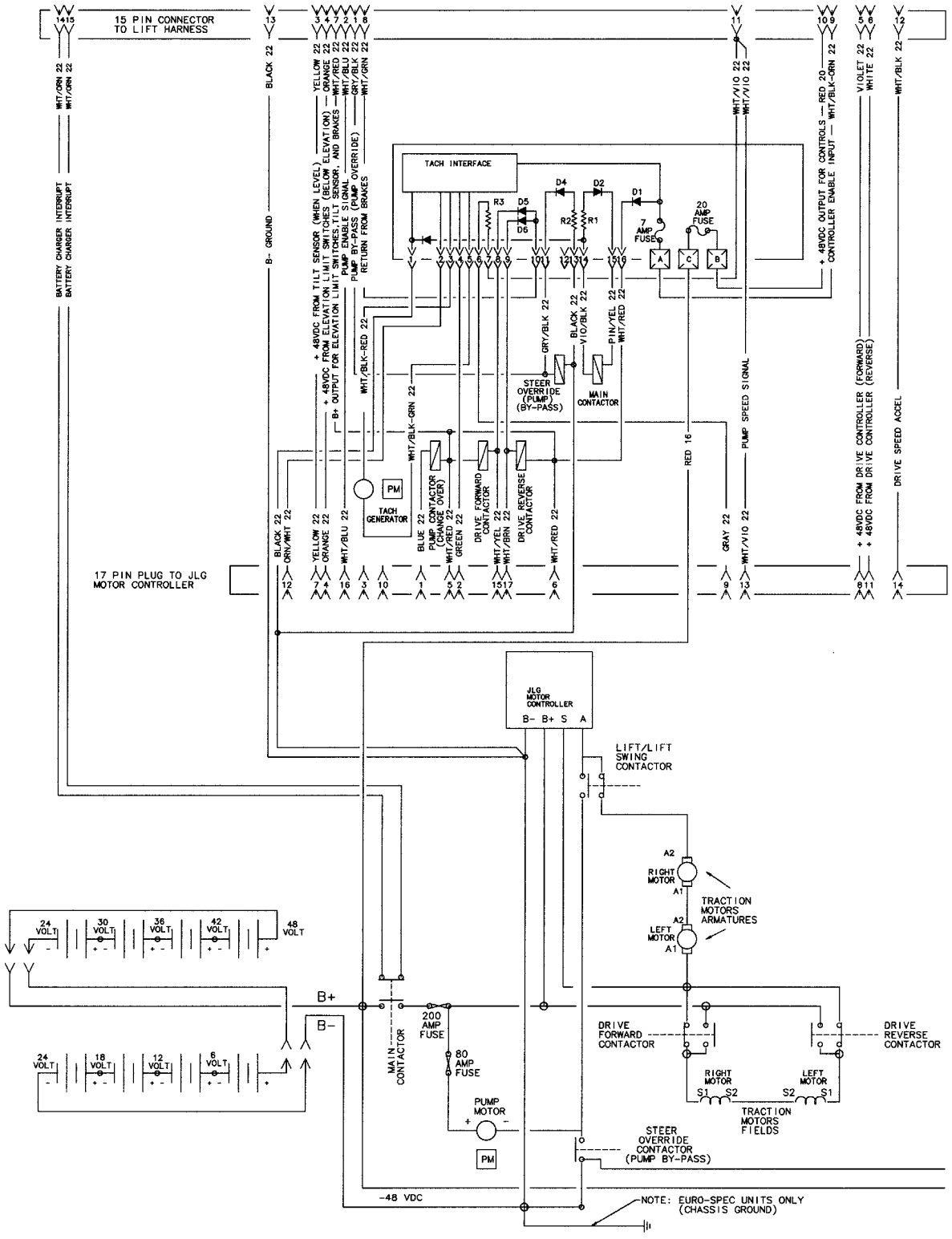


Figure 3-2. Electrical Schematic. 35/40/45 electric. (Sheet 3 of 4)

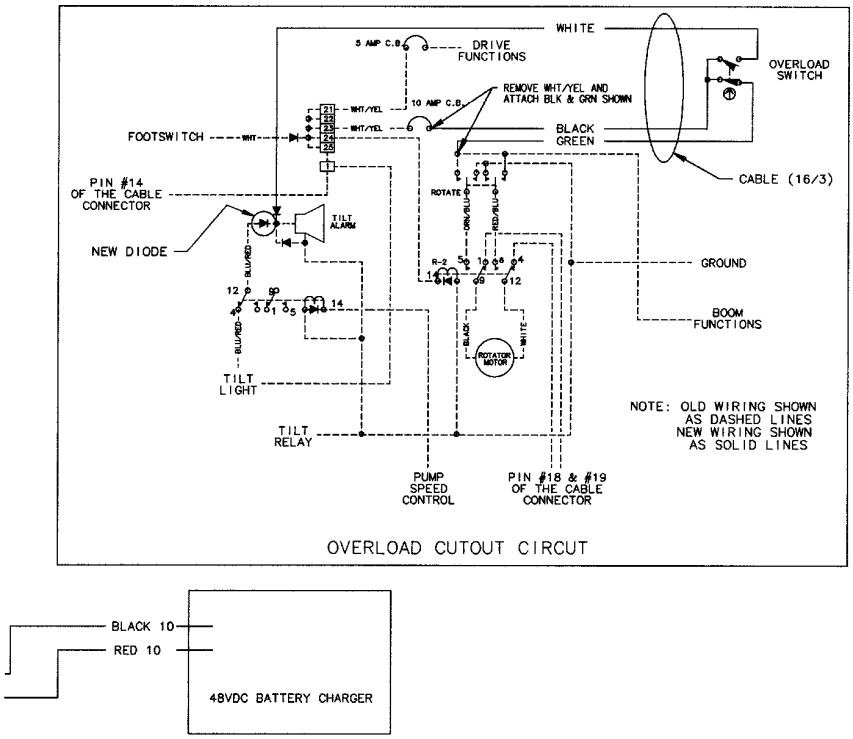


Figure 3-3. Electrical Schematic. 35/40/45 electric. (Sheet 4 of 4)

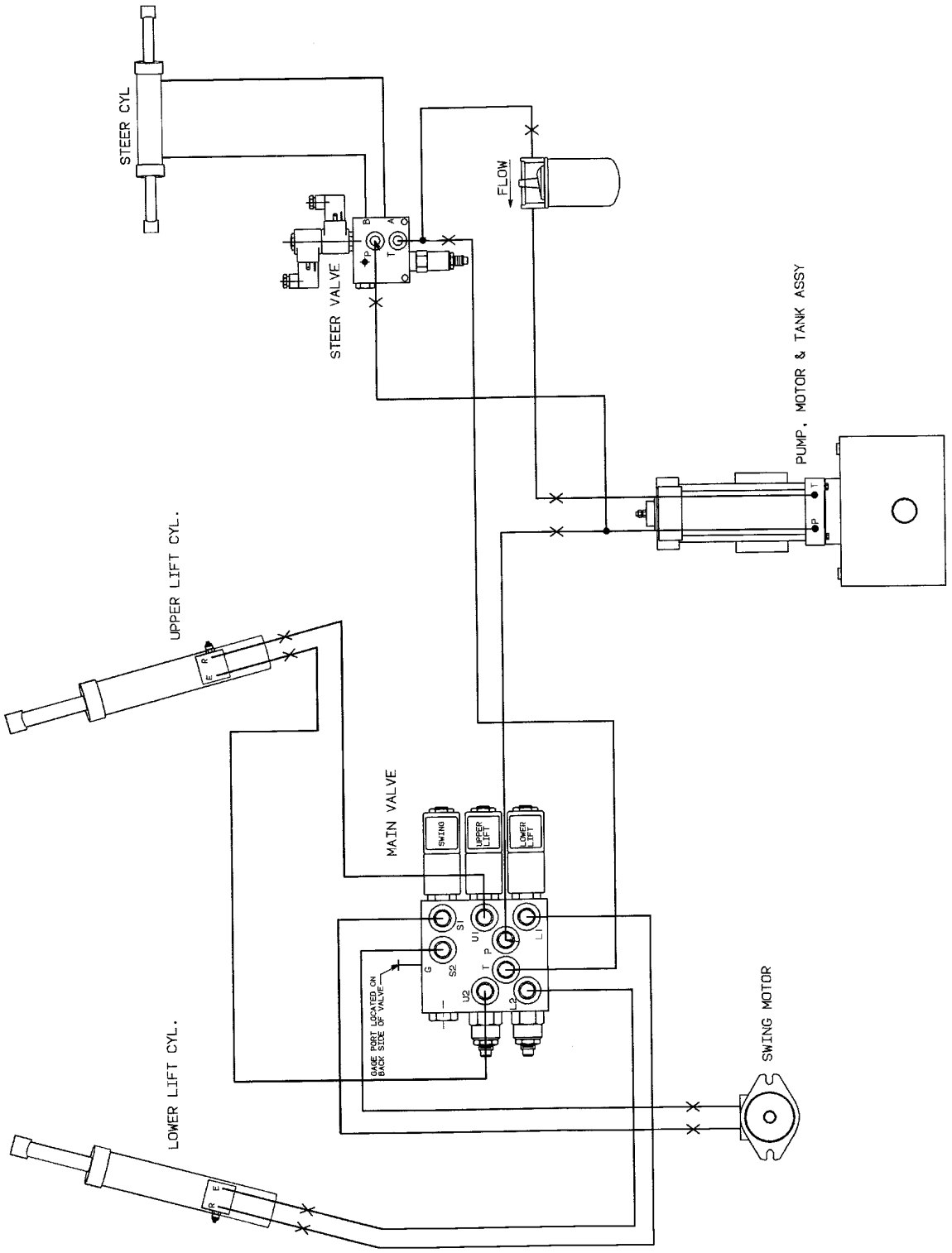


Figure 3-4. Hydraulic Diagram - 30 electric.

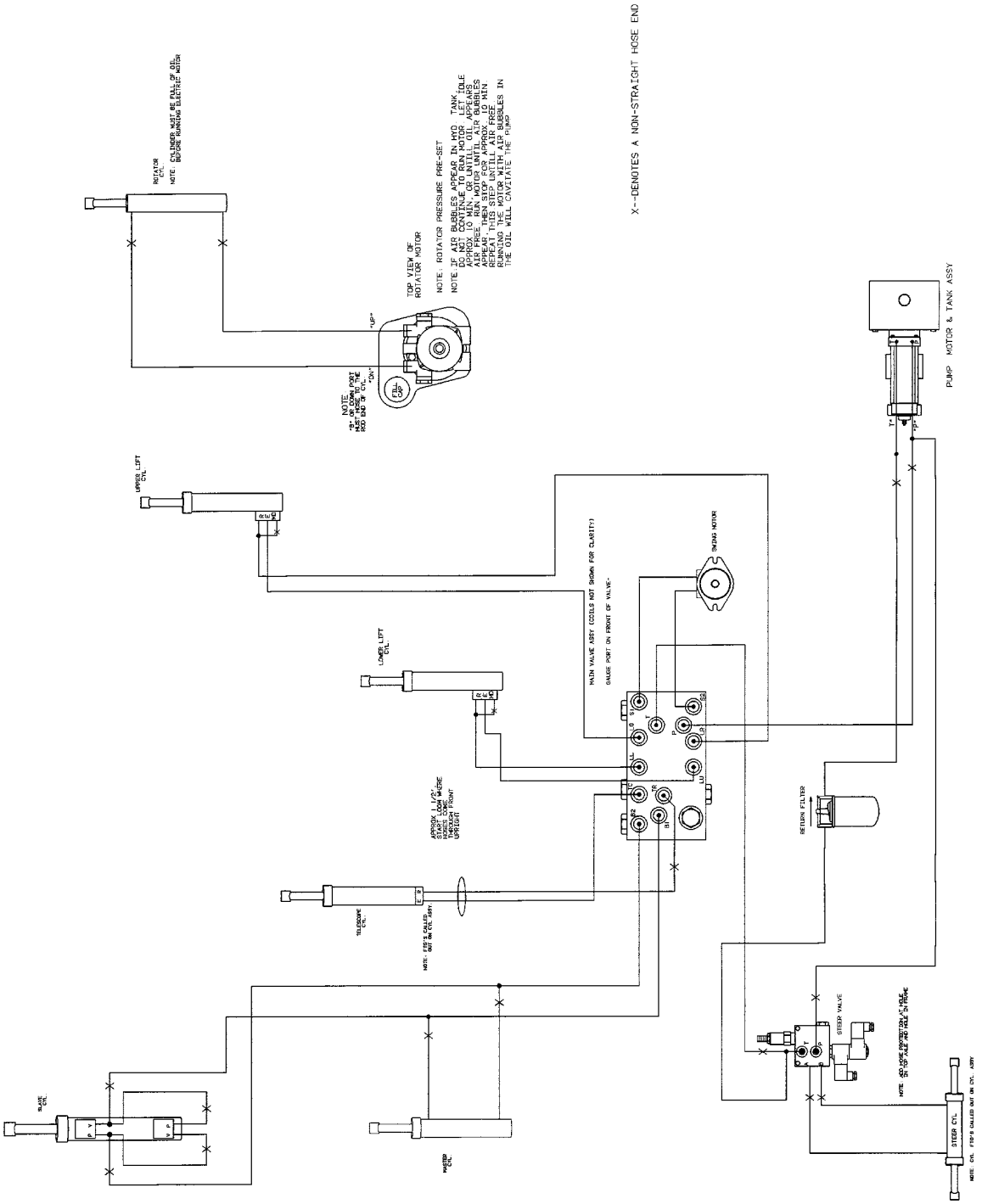


Figure 3-5. Hydraulic Diagram - 35 electric

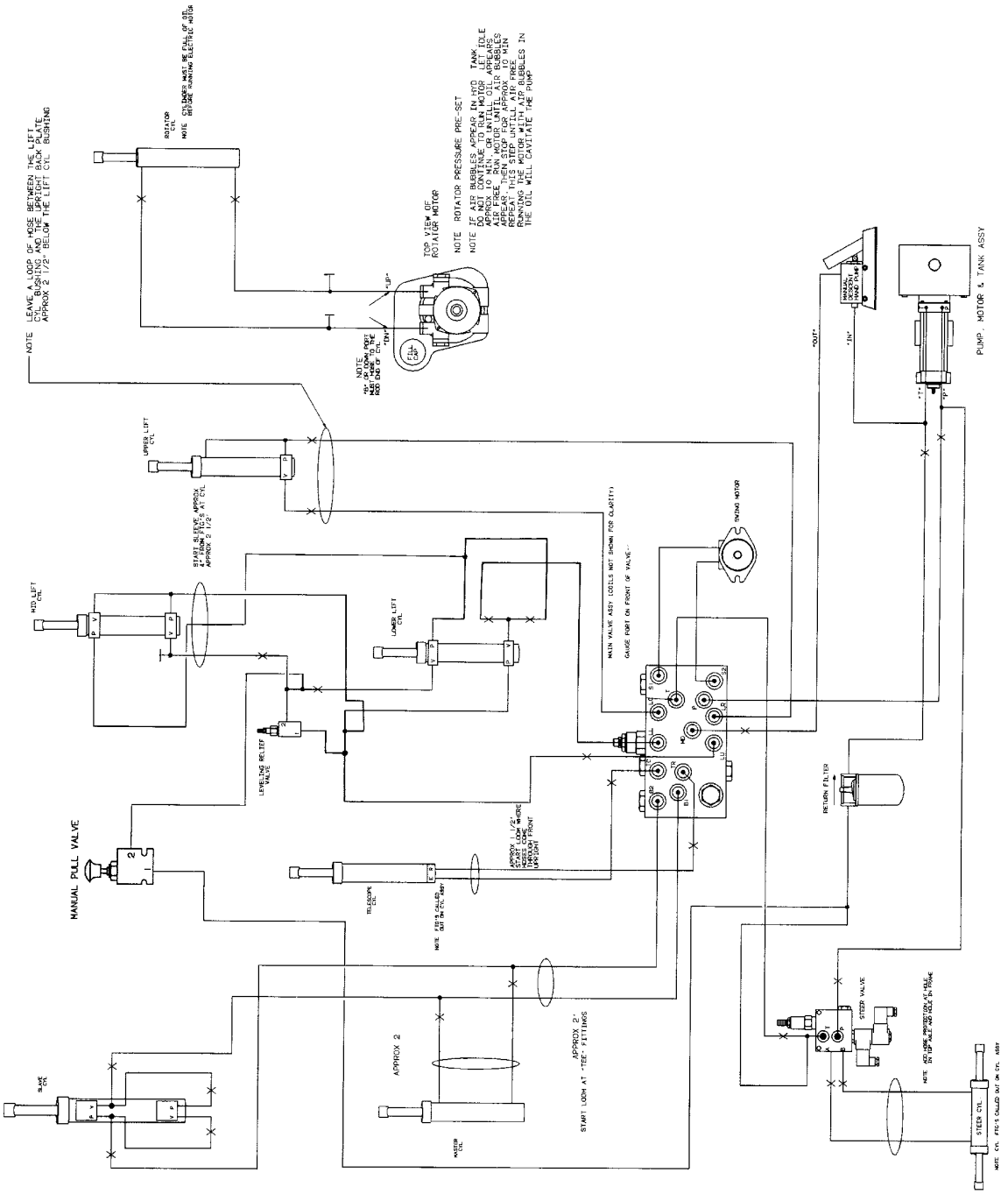


Figure 3-6. Hydraulic Diagram - 40/45 electric.

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