An Oshkosh Corporation Company

Service and Maintenance Manual

Model H800AJ

PVC 2007

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ANSI

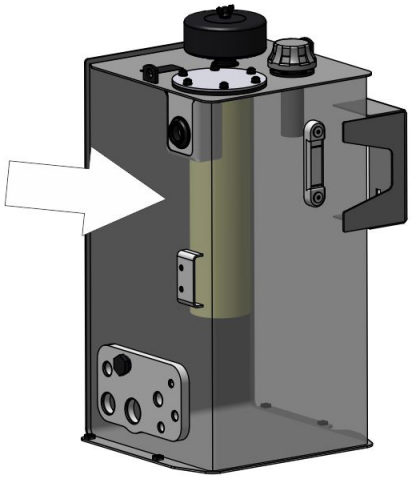
CE

AS/NZS

SECTION NO.	TITLE	PAGE NO.
4.17	Rotator Assembly	4-57
	Theory of Operation	4-57
	Required Tools	4-57
	Disassembly	4-60
	Inspection	4-64
	Assembly	4-64
	Installing Counterbalance Valve	4-70
	Greasing Thrust Washers	4-71
	Testing the Actuator	4-71
	Installation and Bleeding	4-72
4.18	Foot Switch Adjustment	4-72
	Troubleshooting	4-73
4.19	Skyguard	4-74
	Operation	4-74
	Function Test	4-74
	Diagnostics & Troubleshooting	4-75
SECTION 5 - BASIC HYDRAULIC INFORMATION & HYDRAULIC SCHEMATICS		
5.1	Lubricating O-Rings in the Hydraulic System	5-1
	Cup and Brush	5-1
	Dip Method	5-2
	Spray Method	5-2
	Brush-on Method	5-2
5.2	Hydraulic Connection Assembly and Torque Specification	5-3
	Tapered Thread Types	5-3
	Straight Thread Types, Tube and Hose Connections	5-3
	Straight Thread Types, Port Connections	5-4
	Flange Connection Types	5-4
	Tightening Methods	5-4
	Assembly And Torque Specifications	5-5
	Assembly Instructions for American Standard Pipe Thread Tapered (NPTF) Connections	5-6
	Assembly Instructions for British Standard Pipe Thread Tapered (BSPT) Connections	5-7
	Assembly Instructions for 37° (JIC) Flare Fittings	5-8
	Assembly Instructions for 45° SAE Flare Fittings	5-12
	Assembly Instructions for O-Ring Face Seal (ORFS) Fittings	5-14
	Assembly Instructions for DIN 24° Flare Bite Type Fittings (MBTL and MBTS)	5-16
	Assembly Instructions for Bulkhead (BH) Fittings	5-18
	Assembly Instructions for Metric ISO 6149 (MPP) Port Assembly Stud Ends	5-38
	Assembly instructions for Adjustable Port End (BSPP) Fittings	5-40
	Assembly Instructions for Flange Connections: (FL61 and FL62)	5-48
	Double Wrench Method	5-51
	FFWR and TFFT Methods	5-52
	Adjustable Stud End Assembly	5-52
	O-ring Installation (Replacement)	5-53
5.3	Hydraulic cylinders	5-54
	Axle Lockout Cylinder	5-54
	Slave Cylinder	5-56
	Upright Level Cylinder	5-62
	Jib Lift Cylinder	5-63
	Main Boom Lift Cylinder	5-69
	Tower Boom Lift Cylinder	5-70
	Master Cylinder	5-71
	Steer Cylinder	5-77
	Cleaning and Inspection	5-79
	Main Boom Telescope Cylinder	5-82
	Tower Boom Telescope Cylinder	5-88

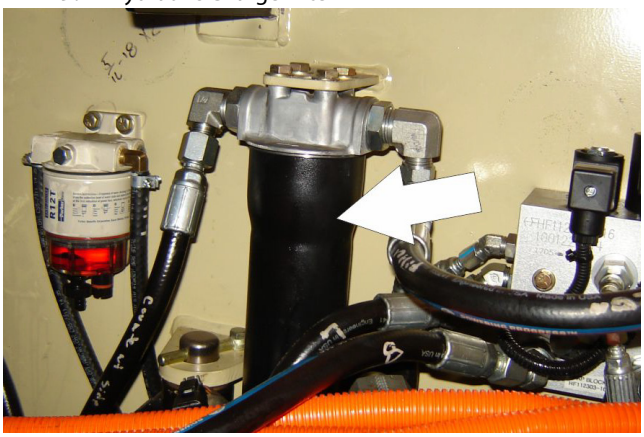
FIGURE NO.	TITLE	PAGE NO.
7-92.	Hybrid Harness - Sheet 1 of 3	7-125
7-93.	Hybrid Harness - Sheet 2 of 3	7-126
7-94.	Hybrid Harness - Sheet 3 of 3	7-130
7-95.	Battery Converter Harness	7-132
7-96.	Battery Charger Harness - Sheet 1 of 2	7-135
7-97.	Battery Charger Harness - Sheet 2 of 2	7-136
7-98.	Battery Converter cable	7-140
7-99.	Battery Stack Harness (RH) - Sheet 1 of 2	7-143
7-100.	Battery Stack Harness (RH) - Sheet 2 of 2	7-144
7-101.	Battery Stack Harness (LH) - Sheet 1 of 3	7-149
7-102.	Battery Stack Harness (LH) - Sheet 2 of 3	7-150
7-103.	Battery Stack Harness (LH) - Sheet 3 of 3	7-154
7-104.	Equalizer Cable (LT)	7-156
7-105.	Equalizer Cable (RT)	7-157
7-106.	HRT Light Harness - Sheet 1 of 2	7-159
7-107.	HRT Light Harness - Sheet 2 of 2	7-160
7-108.	PLT Work Light Harness	7-162
7-109.	Generator Light Harness.	7-164
7-110.	Skyguard Harness	7-166
7-111.	Strobe Harness.	7-168
7-112.	Soft Touch Harness.	7-170
7-113.	PLT Flood Light Harness	7-172
7-114.	Electrical Schematics - Sheet 2 of 19	7-176
7-115.	Electrical Schematics - Sheet 3 of 19	7-177
7-116.	Electrical Schematics - Sheet 4 of 19	7-178
7-117.	Electrical Schematics - Sheet 5 of 19	7-179
7-118.	Electrical Schematics - Sheet 6 of 19	7-180
7-119.	Electrical Schematics - Sheet 7 of 19	7-181
7-120.	Electrical Schematics - Sheet 8 of 19	7-182
7-121.	Electrical Schematics - Sheet 9 of 19	7-183
7-122.	Electrical Schematics - Sheet 10 of 19	7-184
7-123.	Electrical Schematics - Sheet 11 of 19	7-185
7-124.	Electrical Schematics - Sheet 12 of 19	7-186
7-125.	Electrical Schematics - Sheet 13 of 19	7-187
7-126.	Electrical Schematics - Sheet 14 of 19	7-188
7-127.	Electrical Schematics - Sheet 15 of 19	7-189
7-128.	Electrical Schematics - Sheet 16 of 19	7-190
7-129.	Electrical Schematics - Sheet 17 of 19	7-191
7-130.	Electrical Schematics - Sheet 18 of 19	7-192
7-131.	Electrical Schematics - Sheet 19 of 19	7-193

8. Hydraulic Return Filter



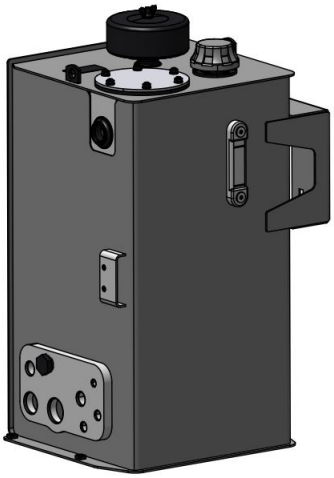
Interval - Change after first 50 hrs. and every 6 months or 300 hrs. thereafter or as indicated by Condition Indicator.

9. Hydraulic Charge Filter



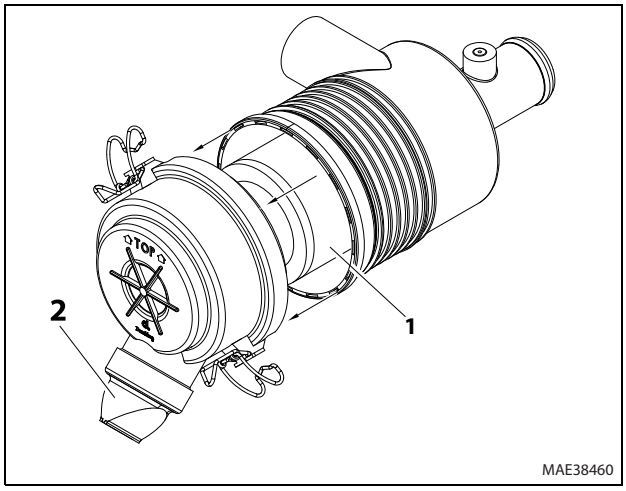
Interval - Change after first 50 hrs. and every 6 months or 300 hrs. thereafter or as indicated by Condition Indicator.

10. Hydraulic Tank



Lube Point(s) - Fill Cap
Capacity - 25 gallons (94.5 L) total capacity, 21 gallons (79.5 L) to Full Mark on Sight Gauge; 59 gallons (223 L) System
Lube - HO
Interval - Check Level daily; Change every 2 years or 1200 hours of operation.

11. Air Filter



Lube Point(s) - Replaceable Primary Filter Element (1) (Dry Type)
Interval - Every 6 months or 300 hours of operation. Under severe operating conditions (such as a very dusty work area) check condition of filter more often.

Once a week, squeeze the evacuator valve (2) on bottom of air cleaner assembly to allow collected debris to fall out of the air cleaner.

Metric Fastener Torque Chart (Continued)

Values for Magni Coated Fasteners (Ref 4150701)*						
CLASS 8.8 METRIC (HEX/SOCKET HEAD) BOLTS CLASS 8 METRIC NUTS						
Size	Pitch	Tensile Stress Area	Clamp Load See Note 4	Torque (Dry or Loctite® 263™) K=0.17	Torque (Lube or Loctite® 242™ or 271™ or Vibra-TITE™ 111 or 140) K=0.16	Torque (Loctite® 262™ or Vibra-TITE™ 131) K=0.15
		Sq mm	KN	[N.m]	[N.m]	[N.m]
3	0.5	5.03	2.19	1.1	1.1	1.0
3.5	0.6	6.78	2.95	1.8	1.7	1.5
4	0.7	8.78	3.82	2.6	2.4	2.3
5	0.8	14.20	6.18	5.3	4.9	4.6
6	1	20.10	8.74	9	8.4	7.9
7	1	28.90	12.6	15	14	13
8	1.25	36.60	15.9	22	20	19
10	1.5	58.00	25.2	43	40	38
12	1.75	84.30	36.7	75	70	66
14	2	115	50.0	119	110	105
16	2	157	68.3	186	175	165
18	2.5	192	83.5	256	240	225
20	2.5	245	106.5	362	340	320
22	2.5	303	132.0	494	465	435
24	3	353	153.5	627	590	555
27	3	459	199.5	916	860	810
30	3.5	561	244.0	1245	1170	1100
33	3.5	694	302.0	1694	1595	1495
36	4	817	355.5	2176	2050	1920
42	4.5	1120	487.0	3477	3275	3070

NOTES:

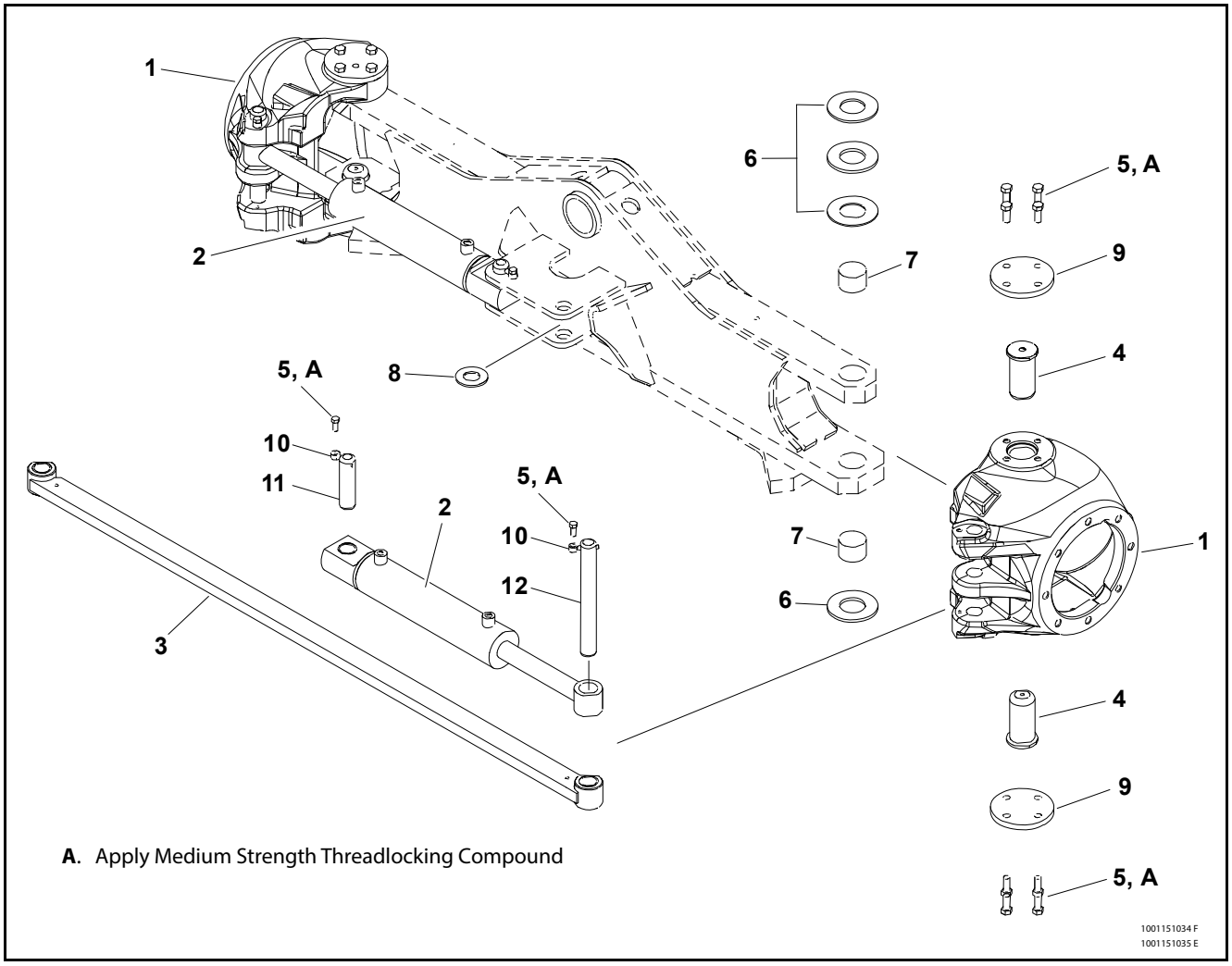
1. THESE TORQUE VALUES DO NOT APPLY TO CADMIUM PLATED FASTENERS

5000059K

2. ALL TORQUE VALUES ARE STATIC TORQUE MEASURED PER STANDARD AUDIT METHODS TOLERANCE = ±10%
3. * ASSEMBLY USES HARDENED WASHER
4. CLAMP LOAD LISTED FOR SHCS IS SAME AS GRADE 8 OR CLASS 10.9 AND DOES NOT REPRESENT FULL STRENGTH CAPABILITY OF SHCS. IF HIGHER LOAD IS REQUIRED, ADDITIONAL TESTING IS REQUIRED.

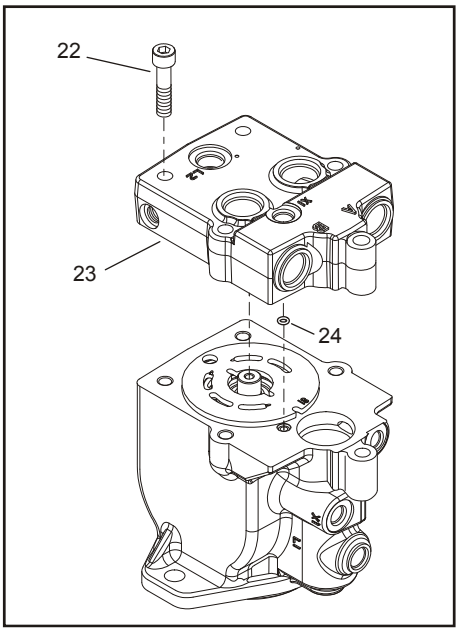
Table 2-3. Inspection and Preventive Maintenance Schedule

AREA	INSPECTION	
	Pre-Delivery[1] or Frequent[2] Inspection (Quarterly)	Annual[3] Inspection (Yearly)
General		
Operators and Safety Manuals in Storage Box	21	21
ANSI Manual of Responsibilities and AEM Safety Manual in Storage Box (ANSI and ANSI Export ONLY)	21	21
Capacity Decals Installed, Secure, Legible	21	21
All Decals/Placards Installed, Secure, Legible	21	21
Annual Machine Inspection Due	21	21
No Unauthorized Modifications or Additions	21	21
All Relevant Safety Publications Incorporated	21	21
General Structural Condition and Welds	2,4	2,4
All Fasteners, Pins, Shields, and Covers	1,2	1,2
Grease and Lubricate to Specifications	22	22
Function Test of All Systems	21	21, 22
Paint and Appearance	7	7
Stamp Inspection Date on Frame		22
Notify JLG of Machine Ownership		22



1. Drive Spindle
2. Steer Cylinder
3. Tie Rod
4. Kingpin
5. Bolt
6. Thrust Washer
7. Composite Bearing
8. Thrust Washer
9. Retaining Plate
10. Keeper PIN
11. Cylinder Pivot Pin
12. Cylinder Pivot Pin

Figure 3-2. Steering Installation



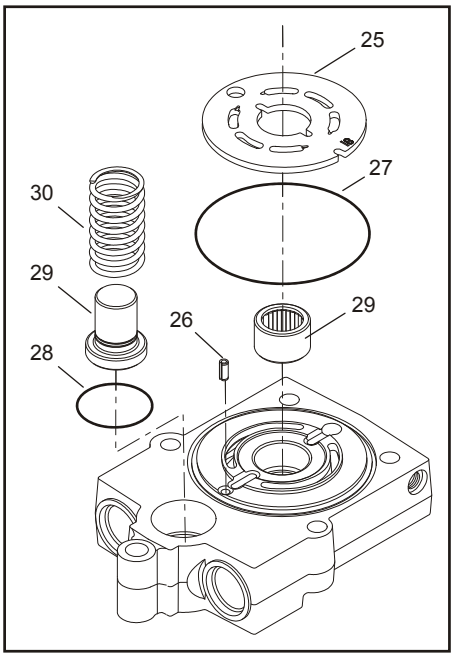
22. Screw
23. Endcap
24. O-ring

Figure 3-11. Endcap

13. Using an 8 mm internal hex wrench, remove the end-Capscrews (22).

14. Remove the endcap (23). Remove O-ring (24) from the housing or endcap.

When the end Capscrews are removed, pressure from the servo spring will cause the endcap to bind on the shaft. Press down on the portion of the endcap covering the servo piston and hold the endcap level while removing.



25. Valve Plate
26. Endcap
27. O-ring
28. O-ring
29. Angle Stop
30. Servo Spring

Figure 3-12. Valve Plate & Rear Shaft Bearing

NOTICE

TAKE CARE NOT TO SCRATCH THE SURFACE OF THE VALVE PLATE.

15. Remove the valve plate (25) and timing pin (26) from the endcap.

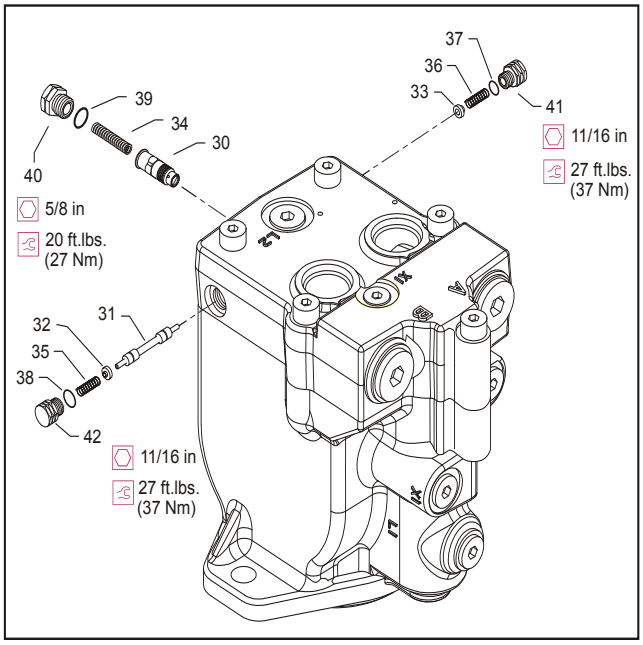
Each displacement has a unique valve plate. For identification, the last two digits of the valve plate part number are stamped on its surface.

16. Remove and discard the O-rings (27 and 28).

17. Remove the rear shaft bearing (29) from the endcap with a bearing puller.

The bearing may be difficult to remove with a puller. Try this as an alternative: Pack the bearing cavity with heavy grease. After the shaft is removed, insert it into the bearing cavity and tap lightly with a soft mallet on the splined end. The grease will force the bearing out. Use caution not to drive the bearing past the rear shaft journal as the bearing may become trapped on the shaft and damaged.

20. Install orifice poppet (30).



30. Orifice Poppet	34. Spring	37. O-ring	40. Plug
31. Shift Spool	35. Spring	38. O-ring	41. Plug
32. Spring	36. Spring	39. O-ring	42. Plug
33. Spring			

Figure 3-28. Loop Flushing Spool

21. Install shift spool (31).

22. Install spring retaining washers onto springs (32 and 33).

23. Carefully install centering springs (34, 35, and 36).

24. Install new O-rings (37, 38, and 39).

25. Using a 5/8 in wrench torque plug (40) to 20 ft.lbs. (27 Nm).

26. Using a 11/16 in wrench, torque plugs (41 and 42) to 27 ft.lbs. (37 Nm).

Initial Start-up Procedures

Follow this procedure when starting-up a new motor or when installing a motor that has been removed.

Prior to installing the motor, inspect for damage incurred during shipping. Make certain all system components (reservoir, hoses, valves, fittings, heat exchanger, etc.) are clean prior to filling with fluid.

1. Fill the reservoir with recommended hydraulic fluid. Always filter fluid through a 10 micron filter when pouring into the reservoir. Never reuse hydraulic fluid.

2. Fill the inlet line leading from the pump to the reservoir. Check the inlet line for properly tightened fittings and be certain it is free of restrictions and air leaks.

3. Fill the pump and motor housing with clean hydraulic fluid. Pour filtered oil directly into the upper most case drain port.

4. To ensure the pump and motor stay filled with oil, install case drain lines into the upper most case drain ports.

5. Install a 0 to 500 psi (0 to 35 bar) gauge in the charge pressure gauge port of the pump to monitor system pressure during start up.

6. While watching the pressure gauge, run the engine at the lowest possible speed until system pressure builds to normal levels (minimum 160 psi [11 bar]). Once system pressure is established, increase to full operating speed. If system pressure is not maintained, shut down the prime mover, determine cause, and take corrective action.

7. Operate the hydraulic system for at least fifteen minutes under light load conditions.

8. Check and adjust control settings as necessary after installation.

9. Shut down the prime mover and remove the pressure gauge. Replace plug at the charge pressure gauge port.

10. Check the fluid level in the reservoir; add clean filtered fluid if necessary. The motor is now ready for operation.

Hub-Shaft Assembly

NOTE: *Refer to Figure 3-34., Hub-Shaft*

1. Press Bearing Cup (1C) into Housing (1G) taking care to insure cup starts square with the bore of Hub (1G).
2. Place Bearing Cone (1D) in Bearing Cup (1C) in Housing (1G).
3. Press or tap Seal (1B) Into the counterbore of Housing (1G) to the point where it becomes flush with the Housing (1G) face. Care should be taken to insure Seal (1B) is being correctly installed (smooth face up). Apply grease to the rubber portion of the seal bore.
4. Invert Hub (1G) and press Bearing Cup (1E) into counterbore of Housing (1G).
5. Carefully lower Housing (1G) onto the Output Shaft (1A) until Bearing Cone (1D) contacts the Output Shaft (1A).
6. Press on the small end of the Bearing Cone (1D), being careful not to contact the bearing cage, until the Bearing Cone (1D) seats on the shoulder of the Output Shaft (1A).
7. Start the Bearing Cone (1F) onto the Output Shaft (1A).
8. Press or tap the Bearing Cone (1F) onto the Output Shaft (1A) until it is just seated in the Bearing Cup (1E). while rotating the Housing (G).
9. Install Bearing Spacer (1H) onto Output Shaft (1A) and against Bearing Cone (1F).
10. Install Retaining Ring (1I) into the groove in the Output Shaft (1A). This Retaining Ring (1I) should never be reused in a repair or rebuild.

⚠ WARNING

EYE PROTECTION SHOULD BE WORN DURING THIS PROCEDURE.

11. Tap the Retaining Ring (1I) with a soft metal punch to ensure that the Retaining Ring (1I) is completely seated in the groove of the Output Shaft (IA).

⚠ WARNING

EYE PROTECTION SHOULD BE WORN DURING THIS PROCEDURE.

12. Install O-ring Plug (1P) and torque to 23 to 24 ft.lbs. (31 to 32 Nm).

Carrier Assembly

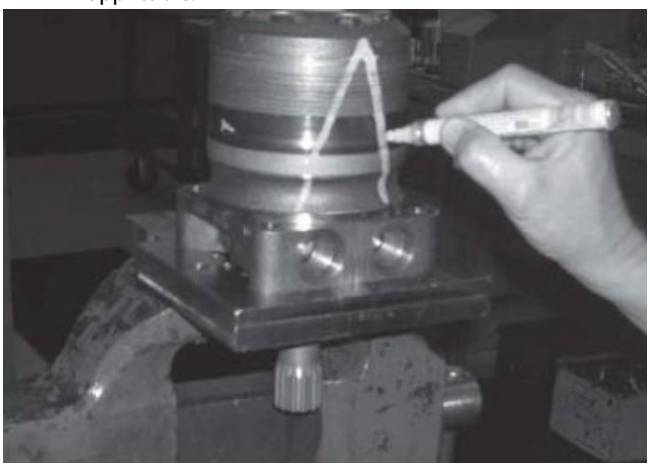
NOTE: *Refer to Figure 3-35., Carrier*

1. Apply a liberal Coat of grease to the bore of Cluster Gear (3F). This will enable the Needle Rollers (3C) to be held in place during assembly.
2. Install the first row of Needle Rollers (3C) into the bore of Cluster Gear (3F).
3. Insert Spacer (3D) into bore of Cluster Gear (3F) on top of the Needle Rollers (3C).
4. Place second row of Needle Rollers (3C) into bore of Cluster Gear (3F) against Spacer (3D).
5. Place Carrier (3A) so that one of the roll pin holes is straight up.
6. Start Planet Shaft (3E) through the hole in Carrier (3A). Using ample grease to hold it in position, slide one Thrust Washer (3B) over the Planet Shaft (3E) with the tang resting in the cast slot of the Carrier (3A).
7. With large end of Cluster Gear (3F) facing the roll pin hole in the Carrier, place the Cluster Gear into position in carrier (3A) and push Planet Shaft (3E) through the Cluster Gear (3F) without going all the way through.
8. Slide the second Thrust Washer (3B) between the Cluster Gear (3F) and the Carrier (3A) with the tang of the washer located in the cast slot of the Carrier (3A). Finish sliding the Planet Shaft (3E) through the Thrust Washer (3B) and into the Carrier (3A).
9. Position the non-chamfered side on the Planet Shaft (3E) roll pin hole so that it is in line with the hole in the Carrier (3A) using a 1/8" (3 mm) diameter punch.
10. After using a 3/16" (5 mm) punch to align the two roll pin holes. Drive the Roll Pin (3G) through Carrier (3A) and into the Planet Shaft (3E) until the Roll Pin (3G) is flush with the bottom of the cast slot in the Carrier (3A) outside diameter at the thrust washer (3B) tang. Use a 1/4" (6 mm) pin punch to make sure the Roll Pin (3G) is flush in the slot.
11. Repeat Steps 1 thru 10 for the remaining two Cluster Gears(3F).

3.13 SWING MOTOR

Disassembly and inspection

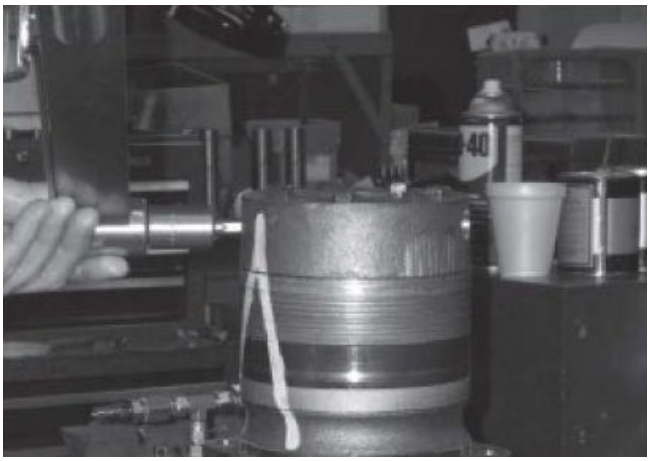
1. Place the Torqmotor™ in a soft jawed vice, with coupling shaft (12) pointed down and the vise jaws clamping firmly on the sides of the housing (18) mounting flange or port bosses. Remove manifold port O-Rings (18A) if applicable.

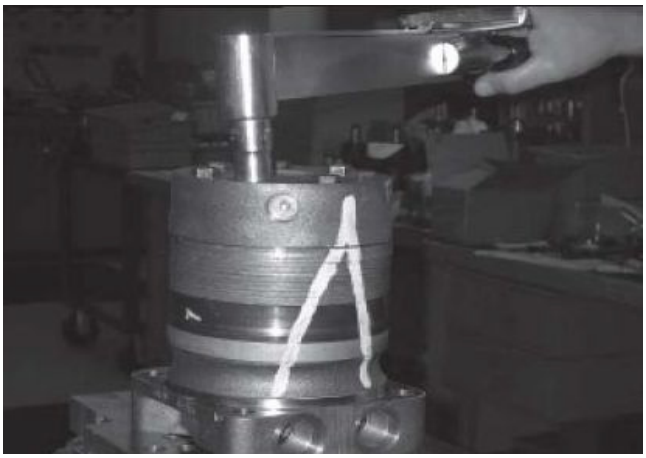


⚠ WARNING

IF THE TORQMOTOR™ IS NOT FIRMLY HELD IN THE VISE, IT COULD BE DISLODGED DURINGTHE SERVICE PROCEDURES, CAUSING INJURY.

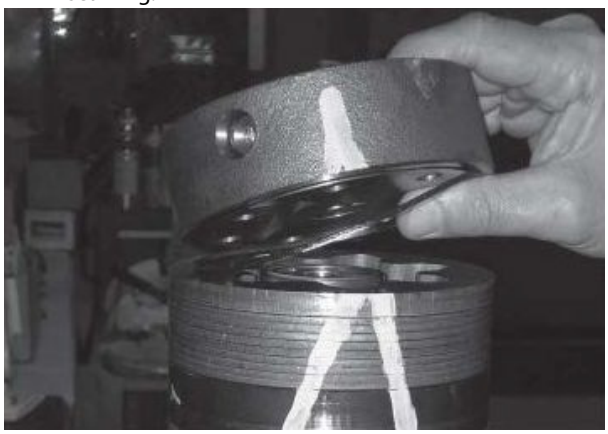
2. Scribe an alignment mark down and across the Torqmotor™ components from end cover (2) to housing (18) to facilitate reassembly orientation where required. Loosen two shuttle or relief valve plugs (21) for disassembly later if included in end cover. 3/16 or 3/8 inch Allen wrench or 1 inch hex socket required.





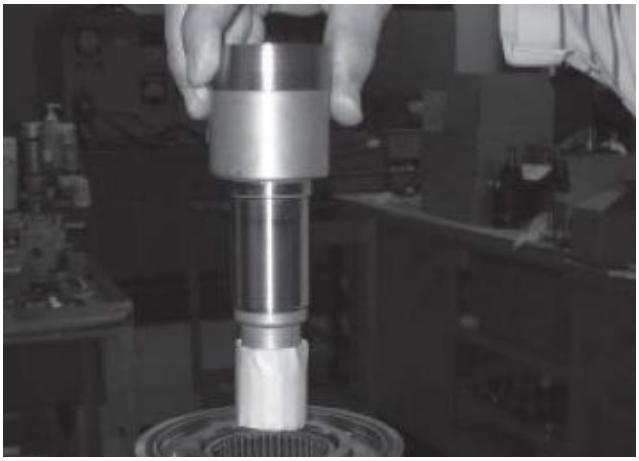
3. Remove the five, six, or seven special ring head bolts (1) using an appropriate 1/2 or 9/16 inch size socket. Inspect bolts for damaged threads, or sealing rings, under the bolt head. Replace damaged bolts.

4. Remove end cover assembly (2) and seal ring (4). Discard seal ring.



NOTE: *Refer to the appropriate "alternate cover construction" on the exploded view to determine the end cover construction being serviced.*

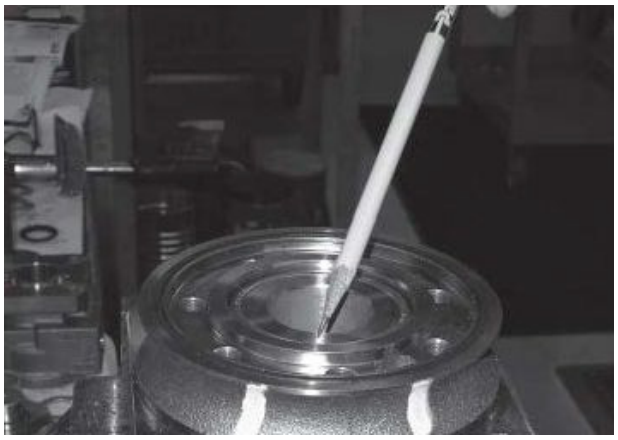
8. Be sure that a generous amount of clean corrosion resistant grease has been applied to the lower (outer) housing bearing/bushing (19). Install the coupling shaft (12) into housing (18), seating it against the thrust bearing (15) in the housings.



NOTICE

THE OUTER BEARING (19) IS NOT LUBRICATED BY THE SYSTEM'S HYDRAULIC FLUID. BE SURE IT IS THOROUGHLY PACKED WITH THE RECOMMENDED GREASE, PARKER GEAR GREASE SPECIFICATION #045236, E/M LUBRICANT #K-70M OR MOBIL MOBILITH SHC ® 460.

NOTE: *The coupling shaft (12) will be flush or just below the housing wear plate surface on Torqmotors™ when properly seated. The coupling shaft must rotate smoothly on the thrust bearing package.*



9. Apply a small amount of clean grease to a new seal ring (4) and insert it into the housing (18) seal ring groove.

NOTE: *One or two alignment studs screwed finger tight into housing (18) bolt holes, approximately 180 degrees apart, will facilitate the assembly and alignment of components as required in the following procedures.The studs can be made by cutting off the heads of either 3/8-24 UNF 2A or 5/16-24 UNF 2A bolts as required that are over 0.5 inch (12.7 mm) longer than the bolts (1) used in the Torqmotor™.*

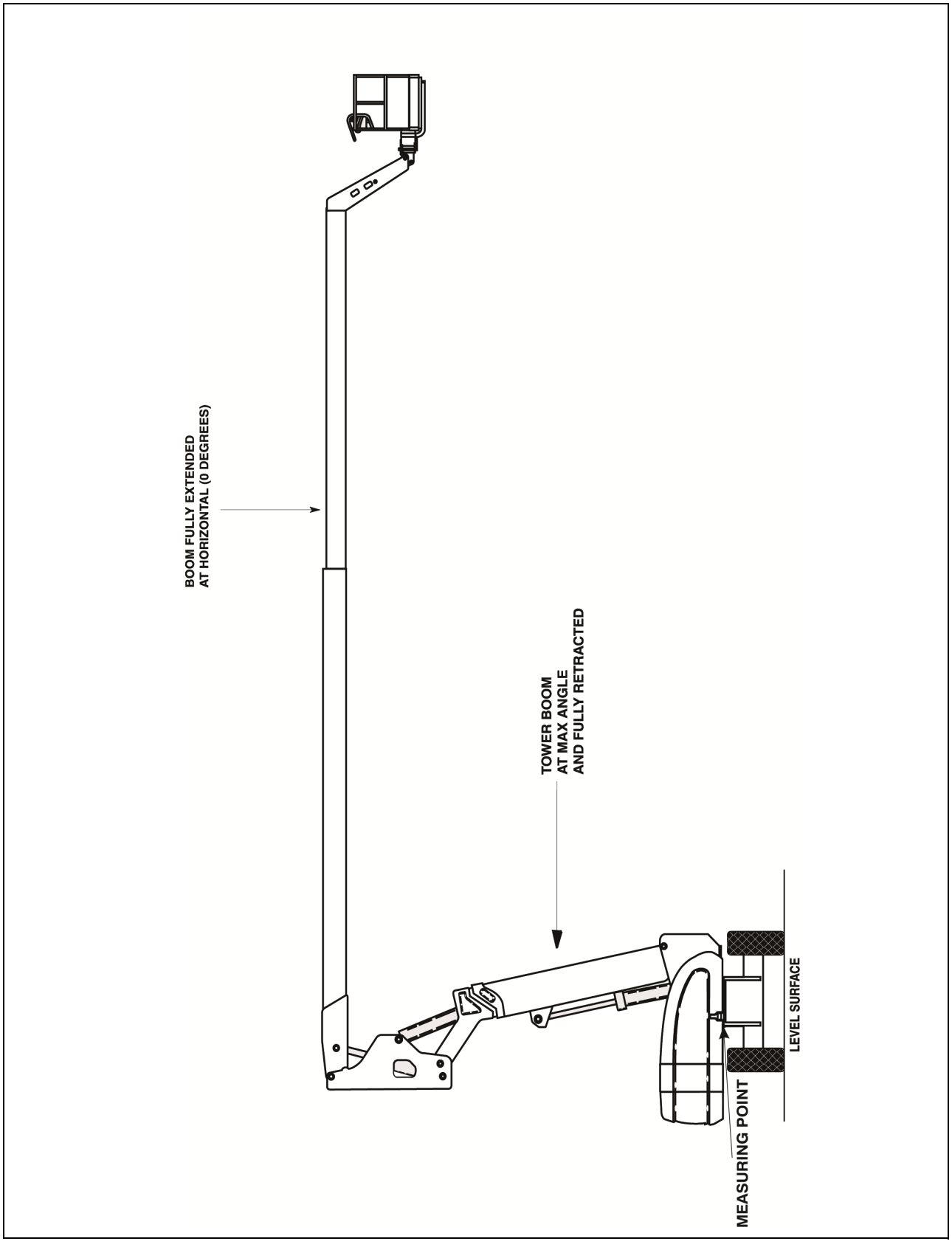


Figure 3-48. Swing Bearing Tolerance Boom Placement (Sheet 2 of 2)

Table 3-9. Coupling Port Information Table (7 port)

Port No.	Outlets	Port Size	Description	Operating Pressure PSI (Bar)	Proof Pressure PSI (Bar)
1	1	-8	Brake	450 (31)	675 (46.5)
2	2	-6	2 Speed	4500 (310)	6750 (465)
3	1	-6	Steer	2500 (172)	3750 (258.5)
4	1	-6	Steer	2500 (172)	3750 (258.5)
5	2	1-6, 1-16	Drive Reverse	4500 (310)	6750 (465)
6	1	-16	Drive Forward	4500 (310)	6750 (465)
7	3	2-8, 1-6	Drain	250 (17)	375 (26)

Table 3-10. Coupling Port Information Table (9 port)

Port No.	Outlets	Port Size	Description	Operating Pressure PSI (Bar)	Proof Pressure PSI (Bar)
1	1	-8	Brake	450 (31)	675 (46.5)
2	2	-6	2 Speed	4500 (310)	6750 (465)
3	1	-6	Steer	2500 (172)	3750 (258.5)
4	1	-6	Steer	2500 (172)	3750 (258.5)
5	2	1-6, 1-16	Drive Reverse	4500(310)	6750(465)
6	1	-16	Drive Forward	4500 (310)	6750 (465)
7	3	2-8, 1-6	Drain	250 (17)	375 (26)
8	1	-6	Steer	2500 (172)	3750 (258.5)
9	1	-6	Steer	2500(172)	3750 (258.5)

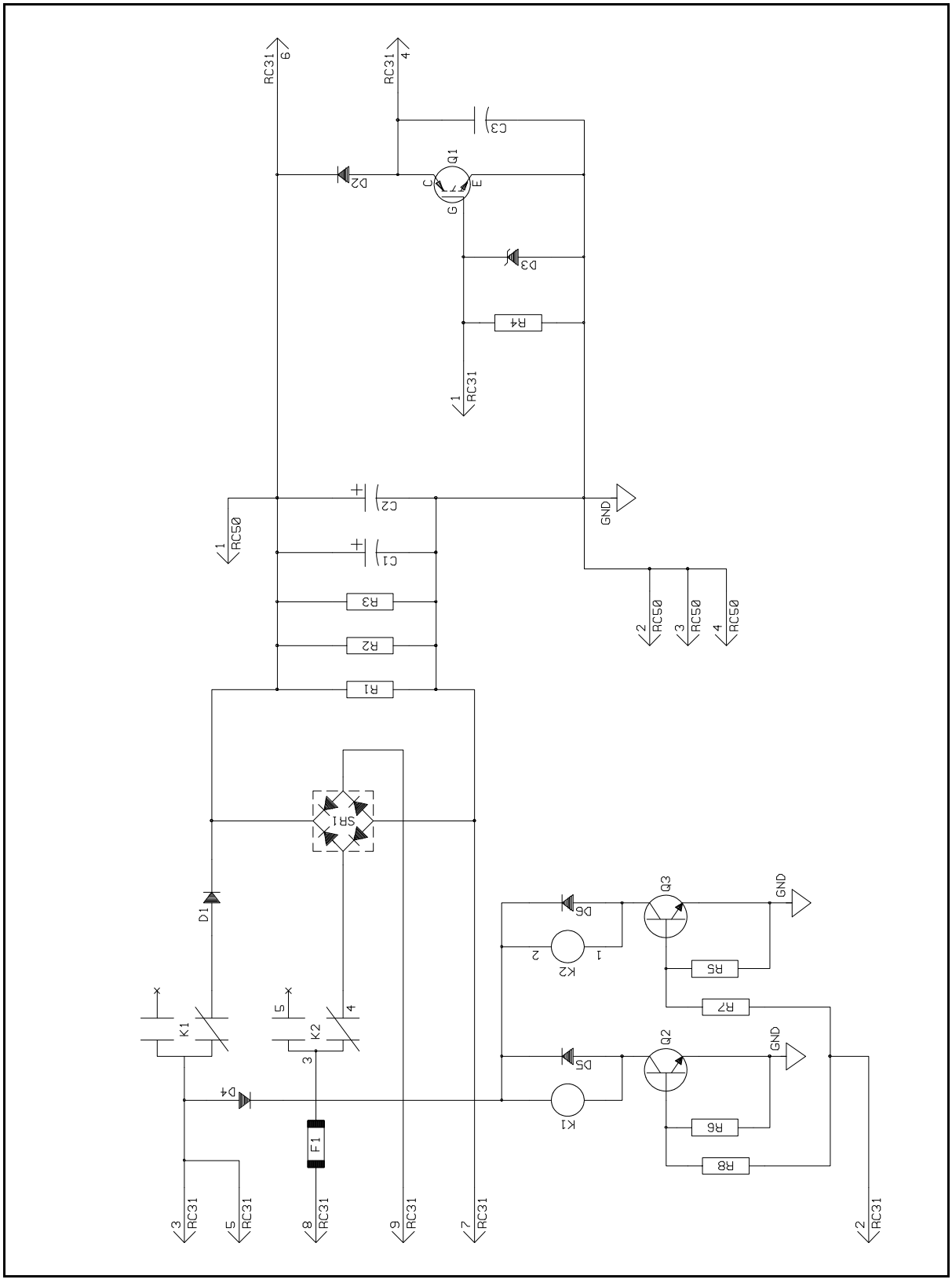


Figure 3-63. Power Board PC1 Electrical Circuit Diagram

3.22 CLUTCH KIT & RELEASE SHAFT INSTALLATION

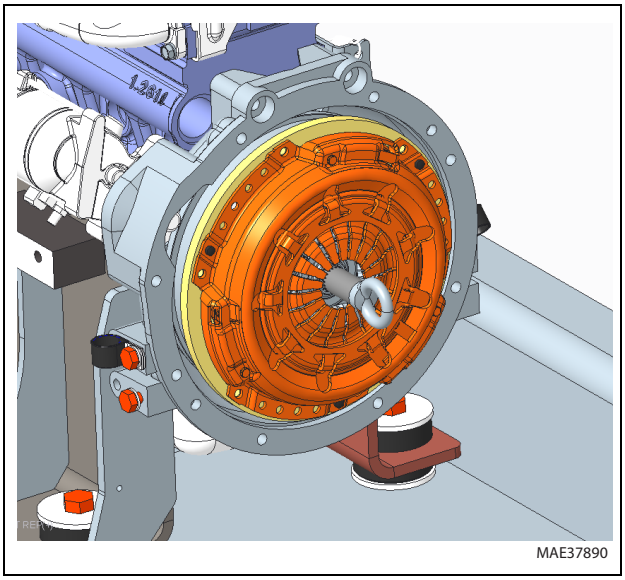
Clutch Kit

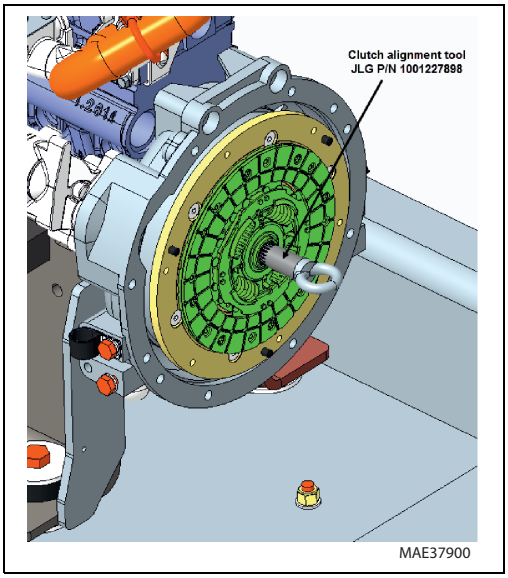
NOTE: *To properly install the clutch, JLG service tool PN 1001227898 must be used.*

NOTE: *Don't use power or air tools during this install.*

1. Apply blue Medium Strength Threadlocking Compound to all bolts and start all bolts ½ to 1 turn.
2. Center the clutch disc in the pressure plate using JLG PN 1001227898.

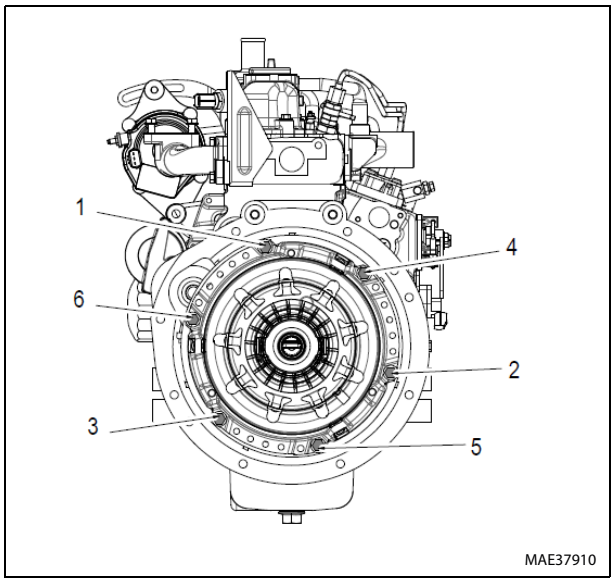
NOTE: *Disc orientation is critical. The hub must face outwards, Away from engine.*


MAE37890



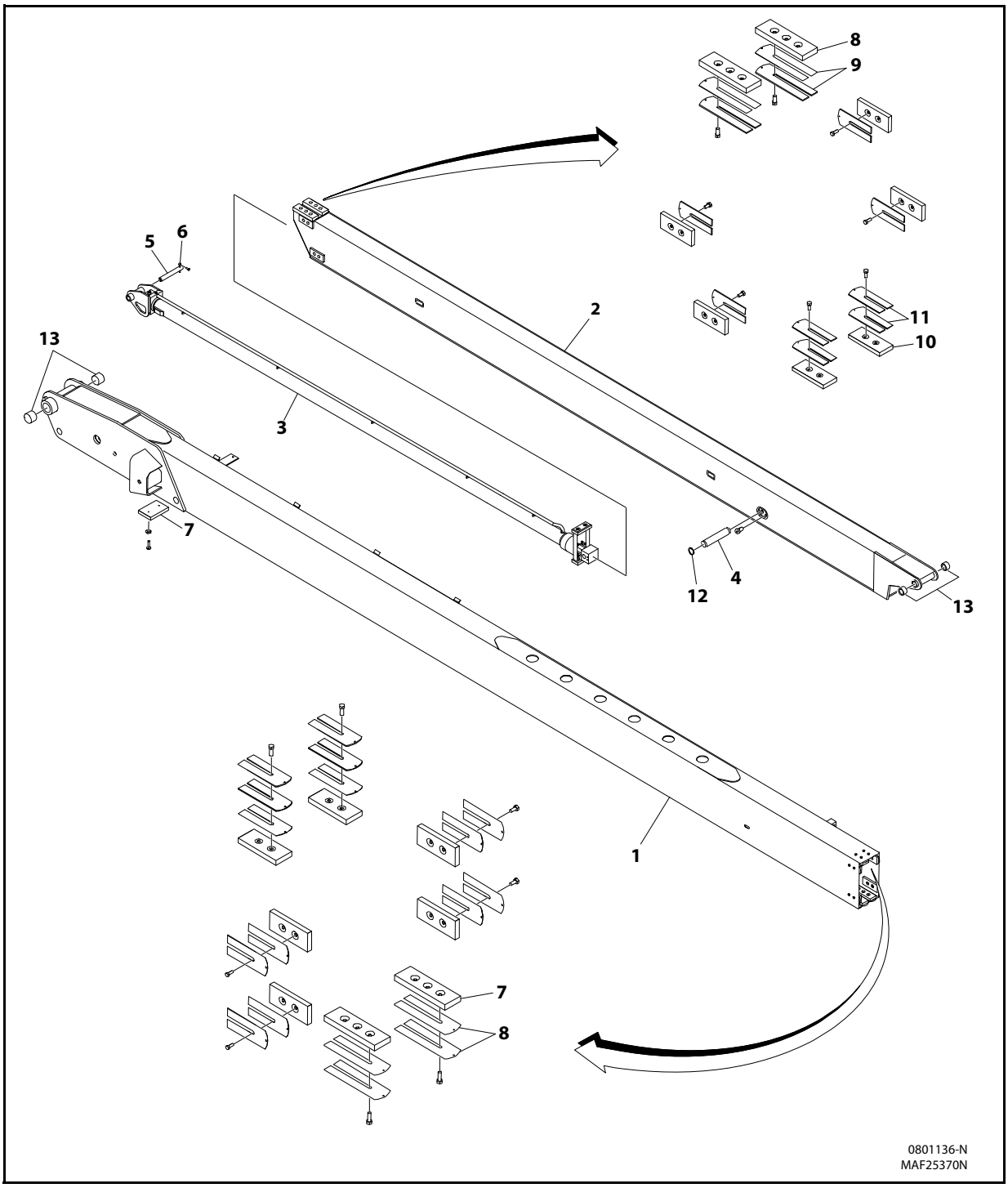
MAE37900

3. Using an alternating star pattern (1-6) work around the pressure plate, turning each bolt no more than 3 turns before turning the other bolts to a similar level.



MAE37910

4. Continue step 3 until the pressure plate contacts the adapter plate at all 6 bolt locations.
5. Using the same pattern, torque each bolt to 35 - 25 Nm.



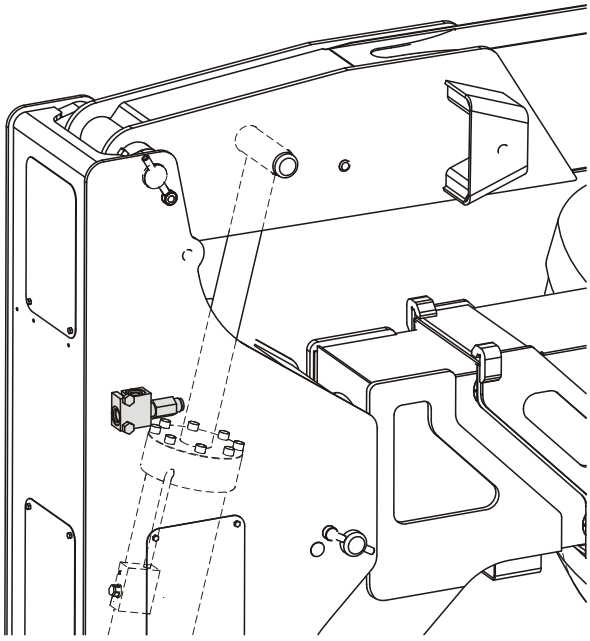
1. Base Boom
2. Fly Boom
3. Telescope Cylinder Assembly
4. Pin
5. Pin
6. Pin Keeper
7. Boom Rest Block
8. Wear Pad
9. Shim
10. Wear Pad
11. Shim
12. Retaining Ring
13. Bushing

Figure 4-3. Disassembly/Assembly of Main Boom Components

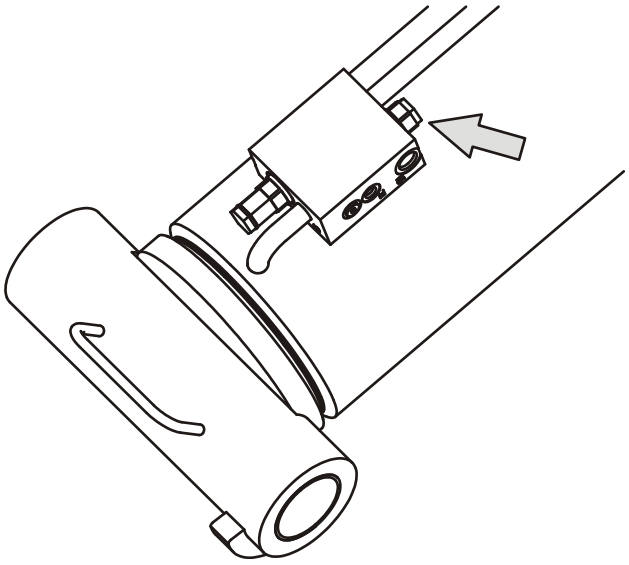
Tower is out of sync forwards, upright leaning away from the platform.

When towering down, the lower lift cylinder bottoms out before the upright level cylinder. This is caused by too much oil between the two cylinders. Problems that could cause this are:

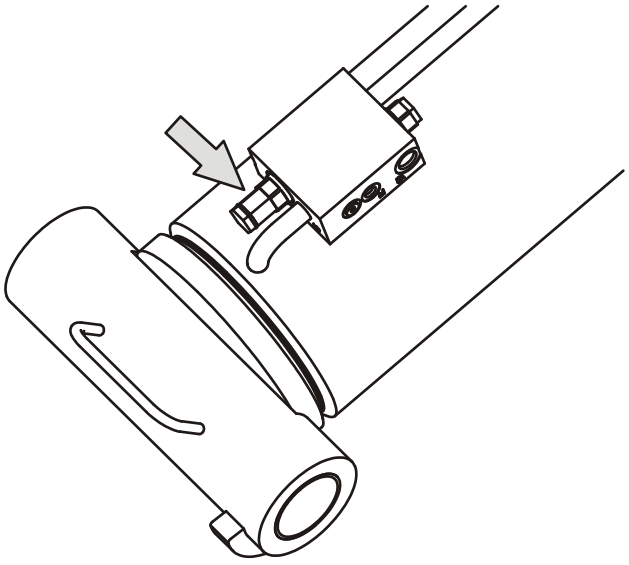
1. The relief valve located in the upright (PN: 4640929). If this valve is set too low or has contaminate in it causing it to leak prematurely, when lifting down oil can pass through it causing the volume to grow between the cylinders. Flush the valve out and reinstall it, or replace the cartridge. The cartridge pressure is pre-set so no adjustment can be made.



2. The counterbalance valve in the piston end of the upright level cylinder. There could be a leak path from the pilot port to the valve port. Replace the counterbalance valve.



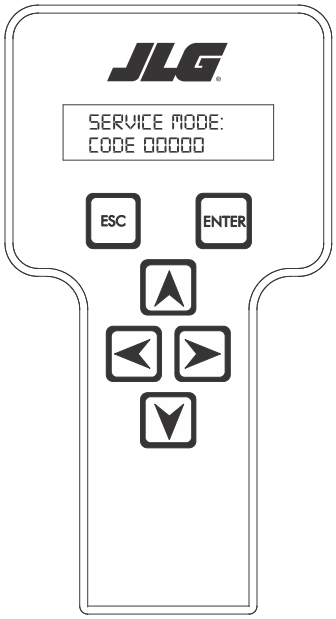
3. The counterbalance valve in the rod end of the lower lift cylinder. There could be a leak path from the pilot port to the valve port. Replace the counterbalance valve.



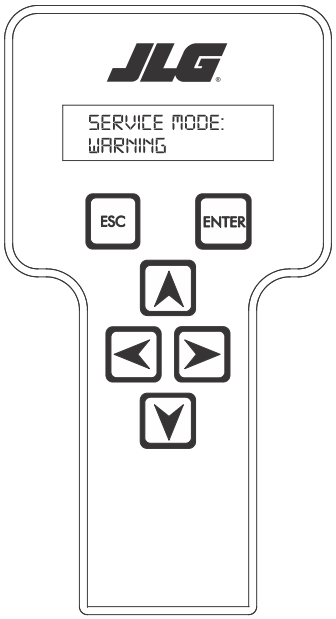
4. The packing on the lower lift cylinder can cause this. Do a cylinder test to check this out. Refer to Table 2-2, Cylinder Drift.

5. Scroll left to right through the above menu items until "TOWER LIFT DOWN?" sub menu appears on the bottom line of the analyzer display. Press the "ENTER" key.

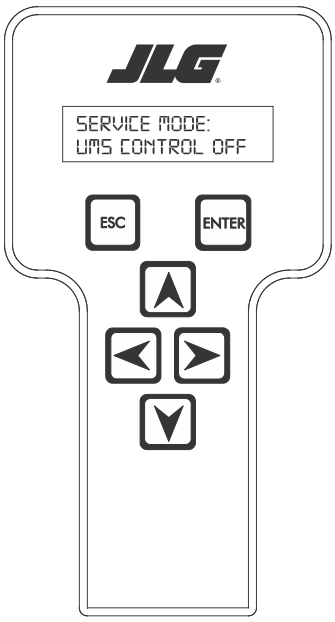
6. The controller will now display the following:



7. Enter the service code "**81075**" and press the "ENTER" key. The controller display will now display the following,

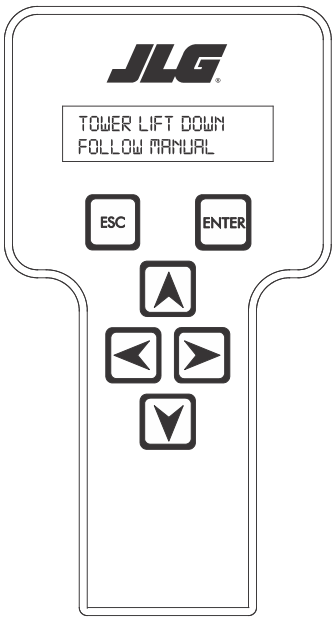


followed by:



The flashing and scrolling messages will repeat until the "ENTER" key is pressed.

8. When the "ENTER" key is pressed, the UMS will be disabled and the display will read:



4.9 ARTICULATING JIB

NOTE: *Pin numbers listed in the following procedures are referenced in Figure 4-13., Location of Components-Articulating Jib.*

NOTE: *Using a suitable lifting device, support the jib.*

NOTE: *The Jib assembly weighs approximately 269 lb (122 kg).*

Removal

1. For platform/support removal see platform/support removal diagram. (See Section 4.7, Platform).
2. Position the articulating jib boom level with the ground.
3. Tag and disconnect hydraulic lines from level cylinder and lift cylinder. Use suitable container to retain any residual hydraulic fluid. Cap hydraulic lines and ports.
4. Remove mounting hardware from slave cylinder pin (1). Using a suitable brass drift and hammer, remove the cylinder pin from articulating jib boom.
5. Remove mounting hardware from articulating jib boom pivot pin (2). Using a suitable brass drift and hammer, remove the pivot pin from boom assembly.

Disassembly

1. Remove mounting hardware from articulating jib boom pivot pins (3) and (4). Using a suitable brass drift and hammer, remove the pins from articulating jib boom pivot weldment.
2. Remove mounting hardware from rotator support pins (5) and (6). Using a suitable brass drift and hammer, remove the pins from rotator support.
3. Remove mounting hardware from lift cylinder pin (7). Using a suitable brass drift and hammer, remove the cylinder pin from articulating jib boom.

Inspection

NOTE: *When inspecting pins and bearings Refer to Pins and Composite Bearing Repair Guidelines in Section 2.*

1. Inspect articulating fly boom pivot pin for wear, scoring, tapering and ovality, or other damage. Replace pins as necessary.
2. Inspect articulating fly boom pivot attach points for scoring, tapering and ovality, or other damage. Replace pins as necessary.
3. Inspect inner diameter of articulating fly boom pivot bearings for scoring, distortion, wear, or other damage. Replace bearings as necessary.

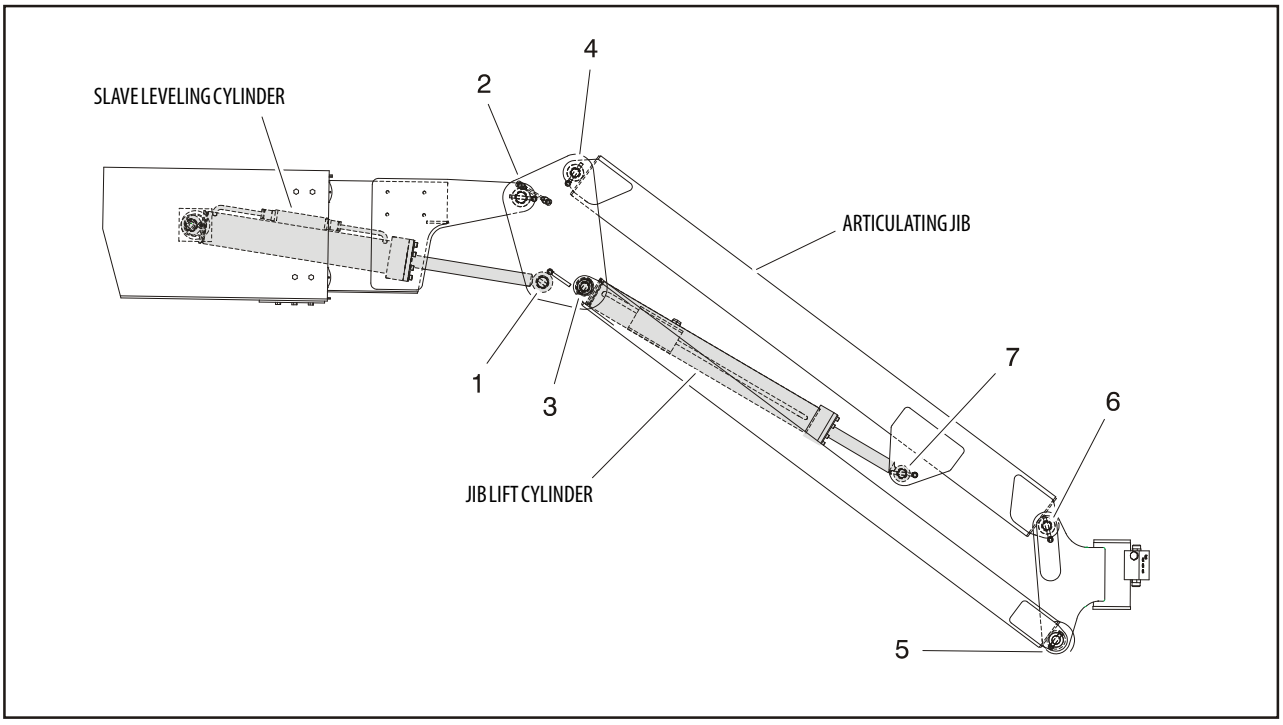


Figure 4-13. Location of Components-Articulating Jib

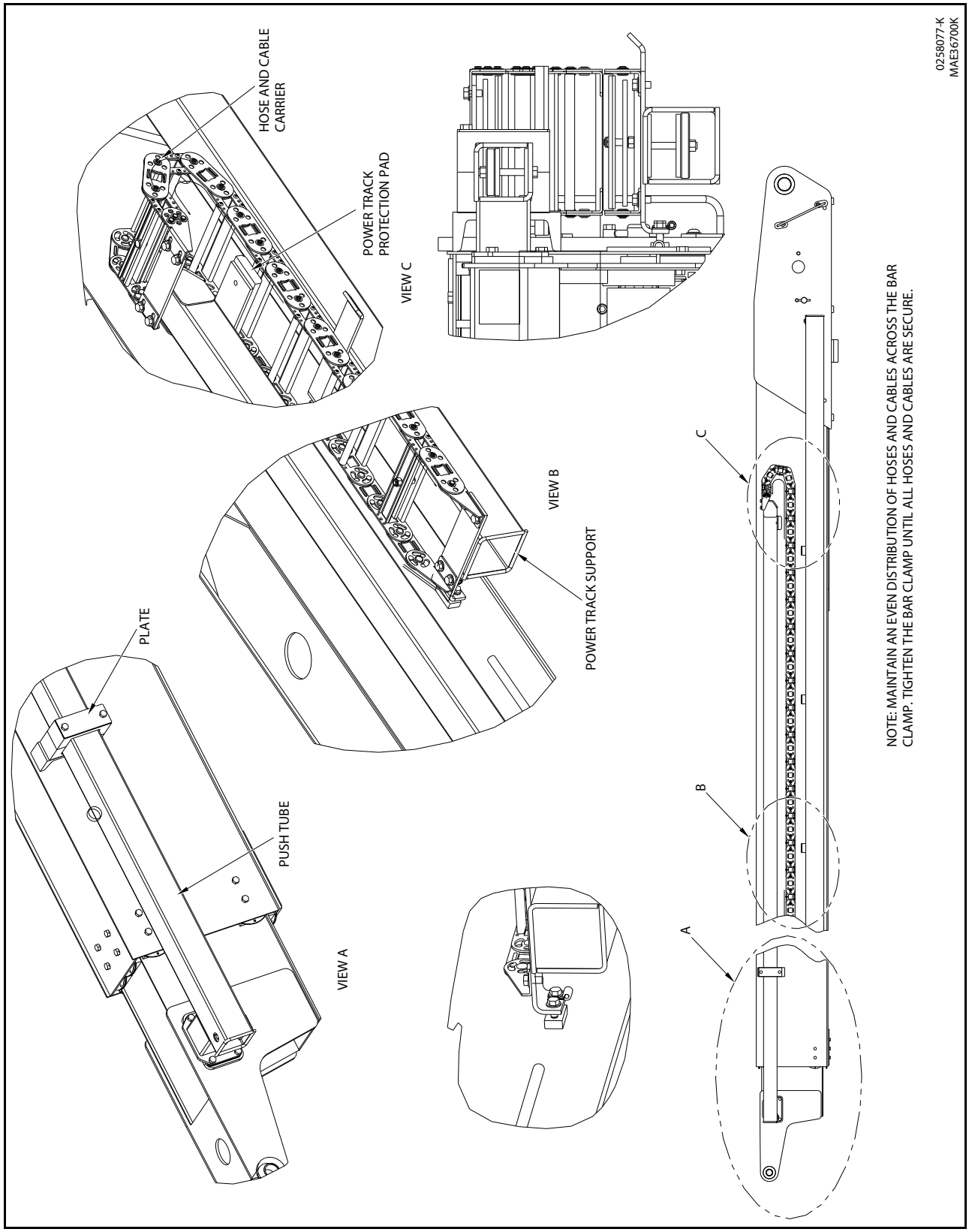
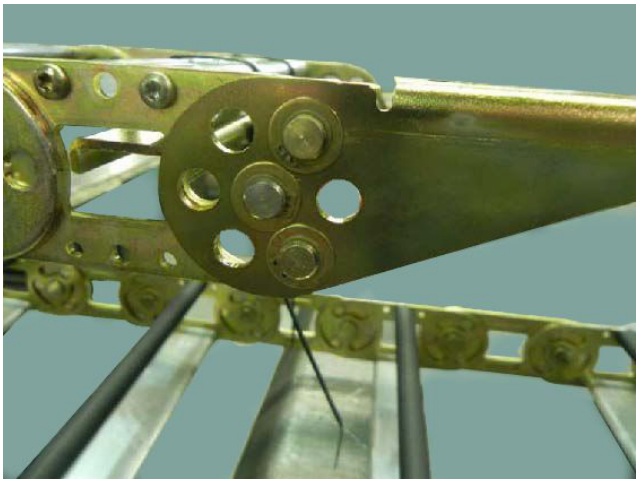


Figure 4-19. Powertrack Installation Main Boom

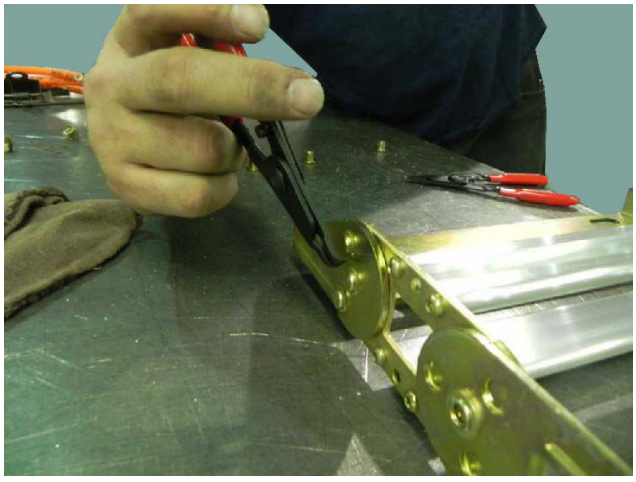
Replacing a Moving End Bracket

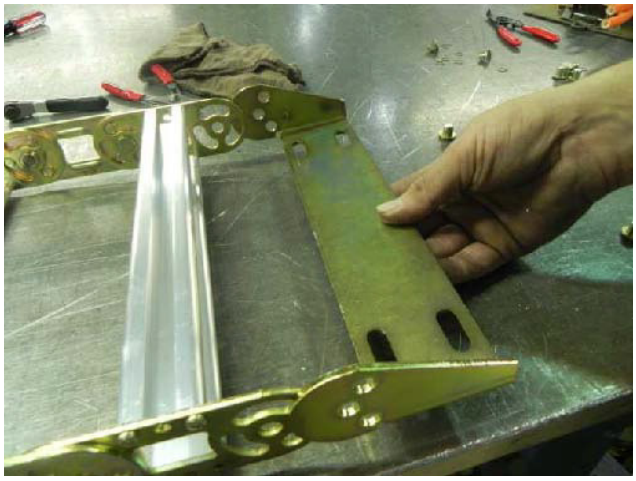
1. Remove bracket by removing all pins, washers, and snap rings. Replace with a new bracket and reinstall the pins, washers, and new snap rings. After installing a new bracket make sure that it rotates correctly.



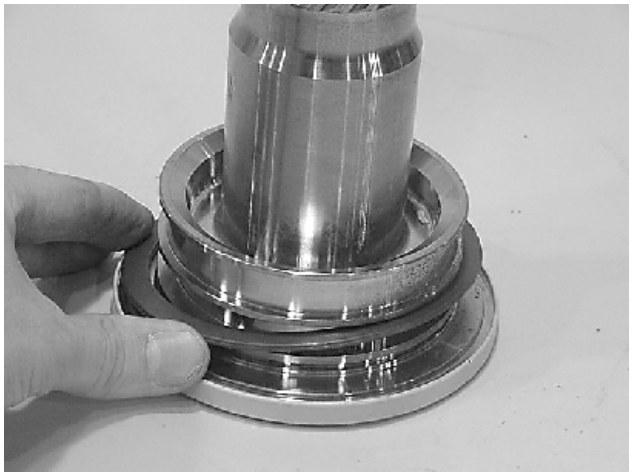
Replacing a One Piece Bracket

1. Remove all pins, washers, and snap rings and slide the bracket off of the links.

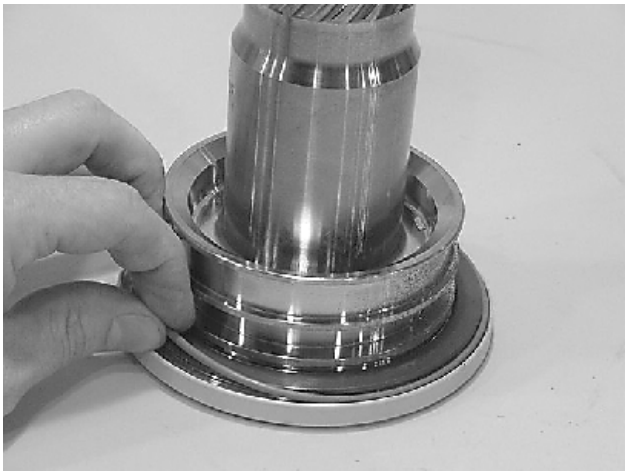




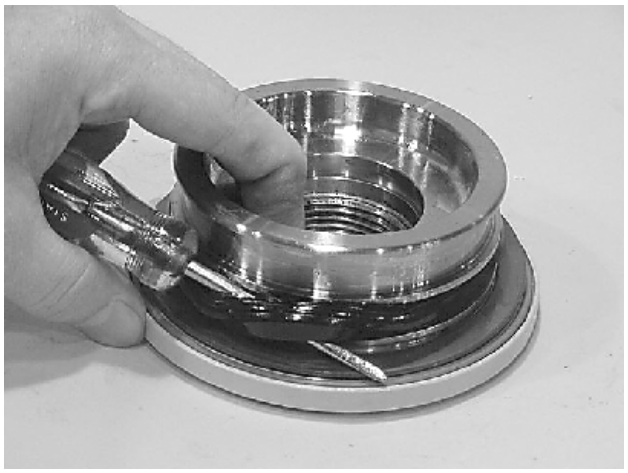
2. Install the thrust washer (304) onto shaft (2) and endcap (4).



3. Install the wiper seal (304.1/green 0-ring) into the groove on the shaft (2) and endcap (4) around the outside edge of the thrust washer (304).



4. Using a seal tool install the main pressure seal (205) onto shaft (2) and endcap (4). Use the seal tool in a circular motion.



5. Install the wear guide (302) on the endcap (4) and shaft (2).

Diagnostics & Troubleshooting

If SkyGuard does not function when the sensor is engaged, first verify the configuration under the
MACHINE SETUP: SKYGUARD OPTION menu using the handheld Analyzer. Ensure the selected configuration matches the actual system installed on the machine. If not, select the correct configuration, then verify operation.

Additionally, use the handheld analyzer to navigate to the DIAGNOSTICS: FEATURES → SKYGUARD INPUTS menu to determine additional SkyGuard fault information.

Engage the SkyGuard sensor and observe the Analyzer to determine if the switch/relay closes.

If the status of the switch/relay remains OPEN while the SkyGuard sensor is actively engaged, it is possible the sensor has failed and should be replaced immediately.

If the status of the switch/relay remains CLOSED while the SkyGuard sensor is actively engaged, a power or ground wire may not be making good contact or may be loose or broken. Additionally, there is a low probability that both relays may have failed.

If the switch/relay status is in disagreement, then one may have failed or is not installed correctly. In this case, the machine will be inoperable.

FAULT CODES

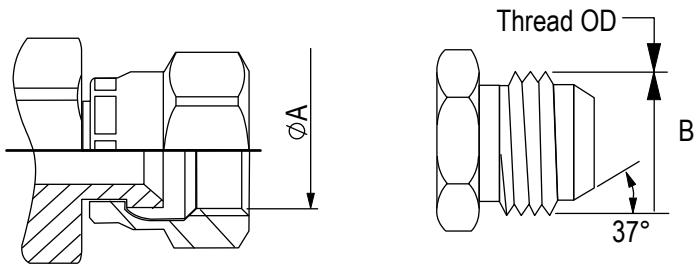
Refer to Table 6-11 for more fault code information

- **0039 -** SkyGuard switch activation fault
- **2563 -** switch disagreement fault

Table 4-2. SkyGuard Function Table

Drive Fwd	Drive Rev	Steer	Swing	Tower Lift up	Tower Tele Out	Tower Lift Down	Tower Tele In	Boom Lift up	Boom Lift Down	Boom Tele Out	Boom Tele In	Jib Lift	Basket Level	Basket Rorate
R*/C**	R	C	R	R	C	C	C	R	R	R	C	C	C	C
R = Indicates Reversal is Activated														
C = Indicates Cutout is Activated														
* If SkyGuard has been activated before Soft Touch the function will reverse, If Soft Touch has been activated before SkyGuard the function will cutout.														

Table 5-3. 37° Flare (JIC) Thread - Steel

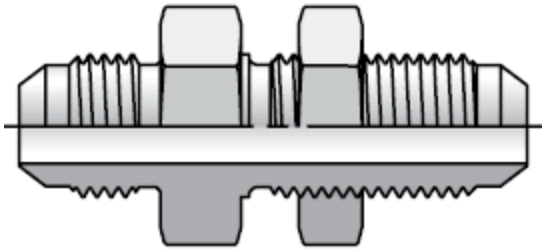


Type/Fitting Identification							Torque						Flats from Wrench Resistance (F.F.W.R)**
MATERIAL	Dash Size	Thread Size	ØA*		ØB*		[Ft-Lb]			[N-m]			
		(UNF)	(in)	(mm)	(in)	(mm)	Min	Nom	Max	Min	Nom	Max	
STEEL FITTINGS WITH STEEL MATING COMPONENTS; UN-LUBRICATED THREADS	2	5/16-24	0.28	7.00	0.31	7.75	6	7	7	8	9	10	--
	3	3/8-24	0.34	8.60	0.37	9.50	8	9	10	11	12	14	--
	4	7/16-20	0.39	10.00	0.44	11.10	13	14	14	18	19	19	1-1/2 to 1-3/4
	5	1/2-20	0.46	11.60	0.50	12.70	14	15	15	19	20	21	1 to 1-1/2
	6	9/16-18	0.51	13.00	0.56	14.30	22	23	24	30	31	33	1 to 1-1/2
	8	3/4-16	0.69	17.60	0.75	19.10	42	44	46	57	60	63	1-1/2 to 1-3/4
	10	7/8-14	0.81	20.50	0.87	22.20	60	63	66	81	85	89	1 to 1-1/2
	12	1 1/16-12	0.97	24.60	1.06	27.00	84	88	92	114	120	125	1 to 1-1/2
	14	1 3/16-12	1.11	28.30	1.19	30.10	100	105	110	136	142	149	1 to 1-1/2
	16	1 5/16-12	1.23	31.30	1.31	33.30	118	124	130	160	168	176	3/4 to 1
	20	1 5/8-12	1.54	39.20	1.63	41.30	168	176	185	228	239	251	3/4 to 1
	24	1 7/8-12	1.80	45.60	1.87	47.60	195	205	215	264	278	291	3/4 to 1
	32	2 1/2-12	2.42	61.50	2.50	63.50	265	278	292	359	377	395	3/4 to 1

* ØA and ØB thread dimensions for reference only.

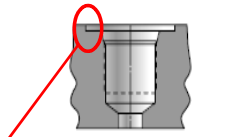
** See Appendix B for FFWR procedure requirements.

Table 5-10. Bulkhead Fittings (BH) - INCH

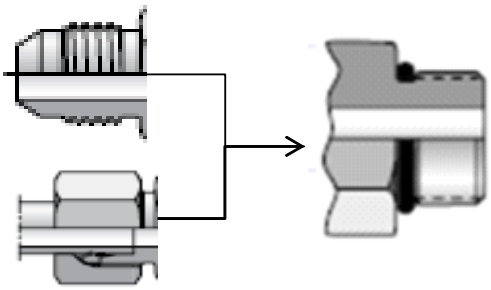


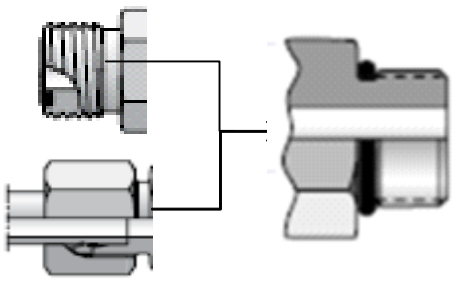
TYPE/FITTING IDENTIFICATION				FASTENING JAM NUT for Bulkhead Connectors					
MATERIAL	TYPE	Dash Size	Thread Size	Torque					
				[Ft-Lb]			[N-m]		
			(UNF)	Min	Nom	Max	Min	Nom	Max
STEEL FITTINGS	O-RING FACE SEAL (ORFS) BULKHEAD FITTING	4	9/16-18	15	16	17	20	22	23
		6	11/16-16	25	27	28	34	37	38
		8	13/16-16	55	58	61	75	79	83
		10	1-14	85	90	94	115	122	127
		12	13/16-12	135	142	149	183	193	202
		14	15/16-12	170	179	187	230	243	254
		16	17/16-12	200	210	220	271	285	298
		20	111/16-12	245	258	270	332	350	366
		24	2-12	270	284	297	366	385	403
	TYPE	Dash Size	Thread Size	Torque					
				[Ft-Lb]			[N-m]		
			(UNF)	Min	Nom	Max	Min	Nom	Max
	37° FLARE (JIC) BULKHEAD FITTING	3	3/8-24	8	9	9	11	12	12
		4	7/16-20	13	14	14	18	19	19
		5	1/2-20	20	21	22	27	28	30
		6	9/16-18	25	27	28	34	37	38
		8	3/4-16	50	53	55	68	72	75
		10	7/8-14	85	90	94	115	122	127
		12	11/16-12	135	142	149	183	193	202
		14	13/16-12	170	179	187	230	243	254
		16	15/16-12	200	210	220	271	285	298
		20	15/8-12	245	258	270	332	350	366
		24	17/8-12	270	284	297	366	385	403
		32	21/2-12	310	326	341	420	442	462

Table 5-24. Metric Pipe Parallel O-Ring Boss (MPP)



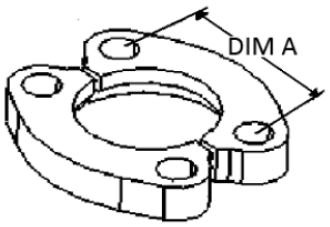
Note: Metric O-ring only style (ISO 6149) requires o-ring chamfer in the port, similar to ISO 11926 (SAE ORB),**but is not interchangeable.**

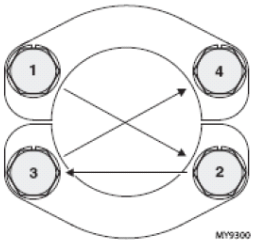




TYPE/FITTING IDENTIFICATION			STUD ENDS with 37° (JIC) or L series DIN (MBTL) opposite end						STUD ENDS with (ORFS) or S series DIN (MBTS) opposite end					
MATERIAL	Thread M Size	Connecting Tube O.D.	Torque						Torque					
			[Ft-Lb]			[N-m]			[Ft-Lb]			[N-m]		
	(metric)	(mm)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
STEEL FITTINGS WITH STEEL MATING COMPONENTS; UN-LUBRICATED THREADS	M8x1	4	6	7	7	8	9	9	8	9	9	10	12	12
	M10x1	6	11	12	12	15	16	16	15	16	17	20	22	23
	M12x1.5	8	18	19	20	25	26	27	26	28	29	35	38	39
	M14x1.5	10	26	28	29	35	38	39	33	35	36	45	47	49
	M16x1.5	12	30	32	33	40	43	45	41	43	45	55	58	61
	M18x1.5	15	33	35	36	45	47	49	52	55	57	70	75	77
	M20x1.5	--	--	--	--	--	--	--	59	62	65	80	84	88
	M22x1.5	18	44	46	48	60	62	65	74	78	81	100	106	110
	M27x2	22	74	78	81	100	106	110	125	132	138	170	179	187
	M30x2	--	95	100	105	130	136	142	175	184	193	237	249	262
	M33x2	25	120	126	132	160	171	179	230	242	253	310	328	343
	M38x2	--	135	142	149	183	193	202	235	247	259	319	335	351
	M42x2	30	155	163	171	210	221	232	245	258	270	330	350	366
	M48x2	38	190	200	209	260	271	283	310	326	341	420	442	462
	M60x2	50	230	242	253	315	328	343	370	389	407	500	527	552
ALUMINUM/BRASS FITTINGS OR ALUMINUM/BRASS MATING COMPONENTS; UN-LUBRICATED THREADS	M8x1	4	4	5	5	5	7	7	5	6	6	7	8	8
	M10x1	6	7	8	8	9	11	11	10	11	11	14	15	15
	M12x1.5	8	12	13	13	16	18	18	17	18	19	23	24	26
	M14x1.5	10	17	18	19	23	24	26	21	22	23	28	30	31
	M16x1.5	12	20	21	21	27	28	28	27	28	29	37	38	39
	M18x1.5	15	21	22	23	28	30	31	34	36	37	46	49	50
	M20x1.5	--	--	--	--	--	--	--	30	40	42	41	54	57
	M22x1.5	18	29	30	31	39	41	42	48	51	53	65	69	72
	M27x2	22	48	51	53	65	69	72	81	86	90	110	117	122
	M30x2	--	62	65	68	84	88	92	114	120	125	155	163	169
	M33x2	25	78	82	86	106	111	117	150	157	164	203	213	222
	M38x2	--	88	93	97	119	126	132	153	161	168	207	218	228
	M42x2	30	101	106	111	137	144	150	159	168	176	216	228	239
	M48x2	38	124	130	136	168	176	184	202	212	222	274	287	301
	M60x2	50	150	157	164	203	213	222	241	253	265	327	343	359

Table 5-31. Flange Code (FL61 & FL62) - Inch Fasteners





TYPE/FITTING IDENTIFICATION						STEEL 4-BOLT FLANGE SAE J518 (INCH FASTENERS)													
TYPE	Inch Flange SAE Dash Size	Flange Size		A*		Bolt Thread Size	Fastener Torque for Flanges Equipped with GRADE 5 Screws						Fastener Torque for Flanges Equipped with GRADE 8 Screws					
							[Ft-Lb]			[N-m]			[Ft-Lb]			[N-m]		
		(in)	(mm)	(in)	(mm)	(UNF)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
CODE 61 SPLIT FLANGE (FL61)	8	0.50	13	1.50	38.10	5/16-18	18	19	19	24	25	26	24	25	26	32	34	35
	12	0.75	19	1.88	47.75	3/8-16	32	33	35	43	45	47	44	46	49	60	63	66
	16	1.00	25	2.06	52.32	3/8-16	32	33	35	43	45	47	44	46	49	60	63	66
	20	1.25	32	2.31	58.67	7/16-14	52	54	57	70	74	77	68	71	75	92	97	101
	24	1.50	38	2.75	69.85	1/2-13	77	81	85	105	110	116	111	116	122	150	158	165
	32	2.00	51	3.06	77.72	1/2-13	77	81	85	105	110	116	111	116	122	150	158	165
	40	2.50	64	3.50	88.90	1/2-13	77	81	85	105	110	116	111	116	122	150	158	165
	48	3.00	76	4.19	106.43	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
	56	3.50	89	4.75	120.65	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
	64	4.00	102	5.13	130.30	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
	80	5.00	127	6.00	152.40	5/8-11	155	163	170	210	221	231	218	228	239	295	310	325
TYPE	Inch Flange SAE Dash Size	Flange Size		A*		Bolt Thread Size	Fastener Torque for Flanges Equipped with GRADE 5 Screws						Fastener Torque for Flanges Equipped with GRADE 8 Screws					
							[Ft-Lb]			[N-m]			[Ft-Lb]			[N-m]		
		(in)	(mm)	(in)	(mm)	(UNF)	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
CODE 62 SPLIT FLANGE (FL62)	8	0.50	13	1.59	40.39	5/16-18	--	--	--	--	--	--	24	25	26	32	34	35
	12	0.75	19	2.00	50.80	3/8-16	--	--	--	--	--	--	44	46	49	60	63	66
	16	1.00	25	2.25	57.15	7/16-14	--	--	--	--	--	--	68	71	75	92	97	101
	20	1.25	32	2.62	66.55	1/2-13	--	--	--	--	--	--	111	116	122	150	158	165
	20	1.25	32	2.62	66.55	--	--	--	--	--	--	--	--	--	--	--	--	--
	24	1.50	38	3.12	79.25	5/8-11	--	--	--	--	--	--	218	228	239	295	310	325
	32	2.00	51	3.81	96.77	3/4-10	--	--	--	--	--	--	332	348	365	450	473	495

* A dimension for reference only.

NOTE: *Install pin into the composite bearing dry. Lubrication is not required with nickel plated pins and bearings.*

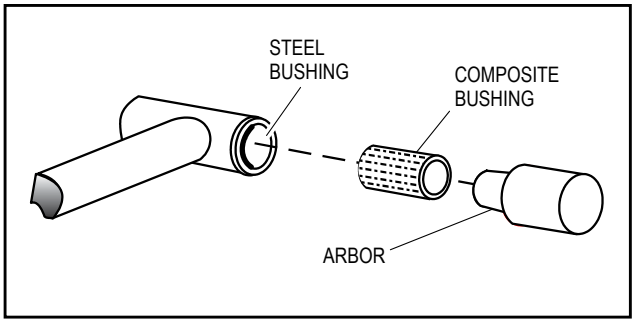


Figure 5-21. Composite Bearing Installation

12. Inspect spacer for burrs and sharp edges. If necessary, dress inside diameter surface with Scotch Brite or equivalent.

13. If applicable, inspect port block fittings and holding valve. Replace as necessary.

14. Inspect the oil ports for blockage or the presence of dirt or other foreign material. Repair as necessary.

15. If applicable, inspect piston rings for cracks or other damage. Replace as necessary.

ASSEMBLY

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

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

1. A special tool is used to install a new rod seal into the applicable cylinder head gland groove.

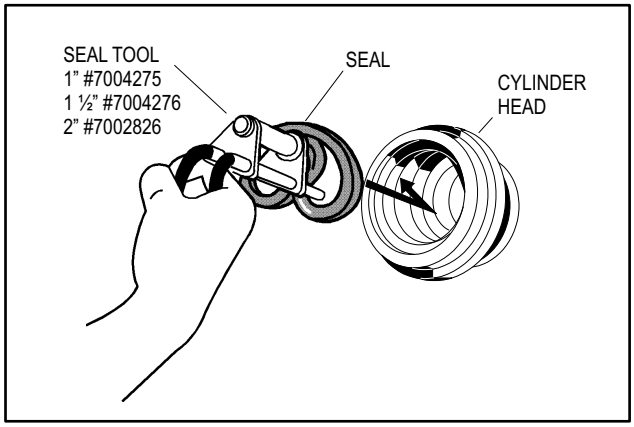


Figure 5-22. Rod Seal Installation

NOTICE

WHEN INSTALLING NEW SEALS, ENSURE SEALS ARE INSTALLED PROPERLY. IMPROPER SEAL INSTALLATION COULD RESULT IN CYLINDER LEAKAGE AND IMPROPER CYLINDER OPERATION.

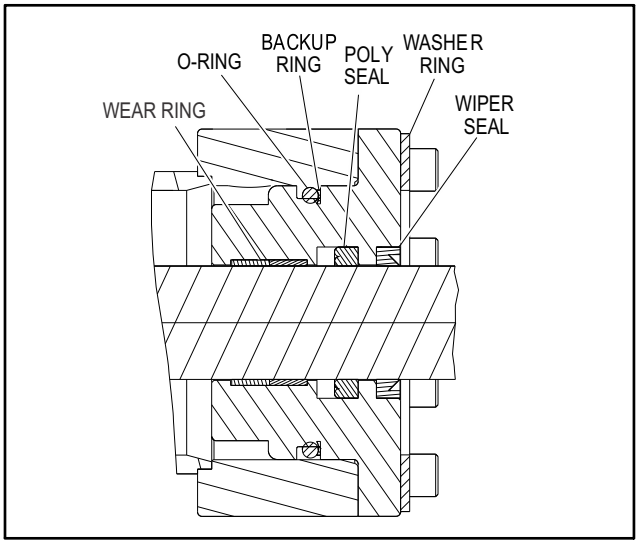


Figure 5-23. Cylinder Head Seal Installation

Main Boom Lift Cylinder

NOTE: *SERVICE INFORMATION NOT AVAILABLE AT TIME OF PUBLICATION.*

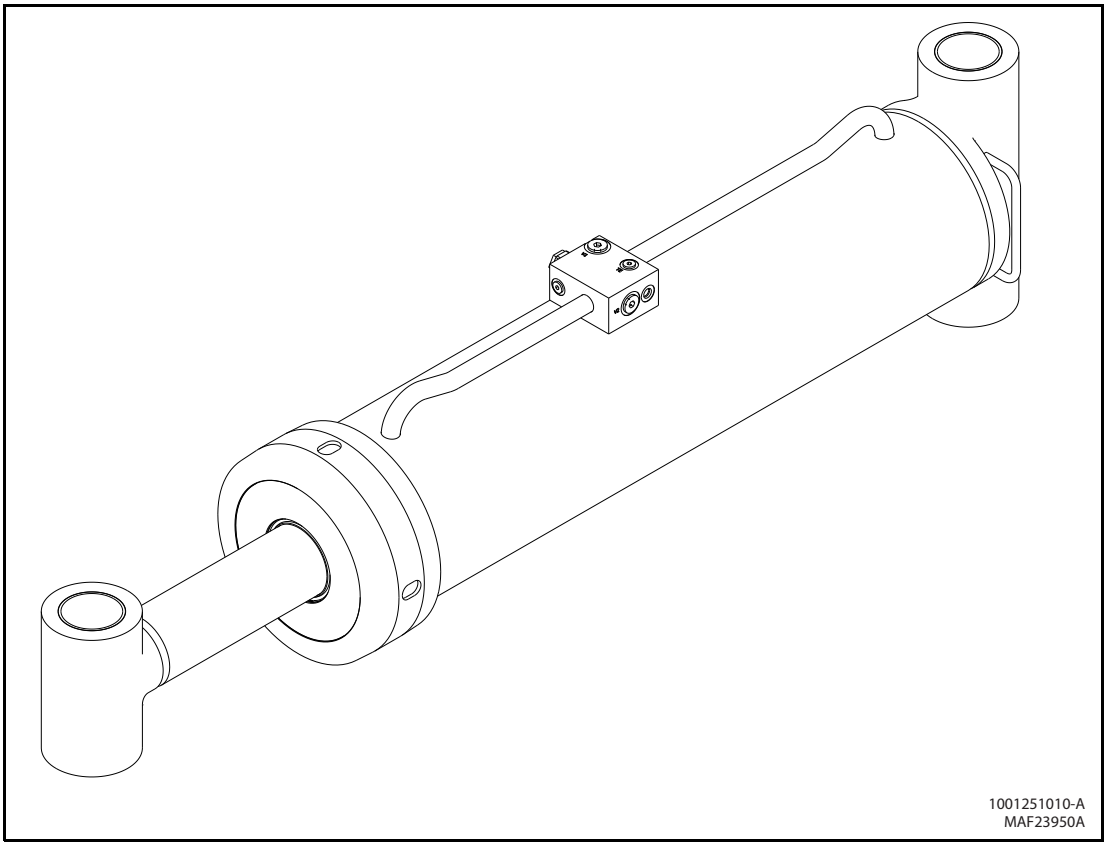


Figure 5-47. Main Boom Lift Cylinder

7. Using suitable protection, clamp the cylinder rod in a vise or similar holding fixture as close to the piston as possible.
8. Remove the setscrews from the piston.
9. Screw the piston counterclockwise, by hand, and remove the piston from cylinder rod.
10. Remove and discard the piston seal and wear rings.
11. Remove the rod from the holding fixture. Remove the cylinder head gland. Discard the o-ring, backup ring, c-ring, rod seal, and wiper seal.

Cleaning and Inspection

1. Clean all parts thoroughly in an approved cleaning solvent.
2. Inspect the cylinder rod for scoring, tapering, ovality, or other damage. If necessary, dress rod with Scotch Brite or equivalent. Replace rod if necessary.
3. Inspect threaded portion of rod for excessive damage. Dress threads as necessary.
4. Inspect inner surface of cylinder barrel tube for scoring or other damage. Check inside diameter for tapering or ovality. Replace if necessary.
5. Inspect piston surface for damage and scoring and for distortion. Dress piston surface or replace piston as necessary.
6. Inspect threaded portion of barrel for damage. Dress threads as necessary.
7. Inspect seal and o-ring grooves in piston for burrs and sharp edges. Dress applicable surfaces as necessary.
8. Inspect cylinder head inside diameter for scoring or other damage and for ovality and tapering. Replace as necessary.
9. Inspect seal and o-ring grooves in head for burrs and sharp edges. Dress applicable surfaces as necessary.
10. Inspect cylinder head outside diameter for scoring or other damage and ovality and tapering. Replace as necessary.
11. If applicable, inspect rod and barrel bearings for signs of correct excessive wear or damage. Replace as necessary.
    a. Thoroughly clean hole, (steel bushing) of burrs, dirt etc. to facilitate bearing installation.
    b. Inspect steel bushing for wear or other damage. If steel bushing is worn or damaged, rod/barrel must be replaced.
    c. Lubricate inside of steel bushing prior to bearing installation.
    d. Using an arbor of the correct size, carefully press the bearing into steel bushing.

NOTE: *Install pin into the composite bearing dry. Lubrication is not required with nickel plated pins and bearings.*

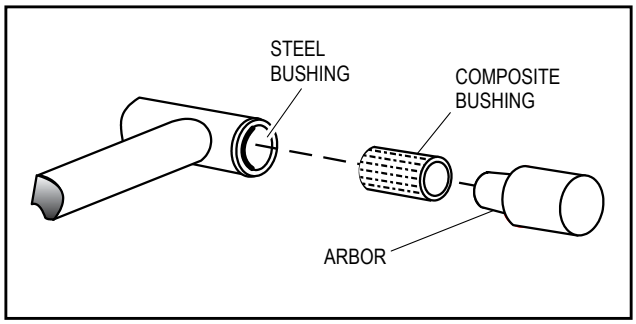
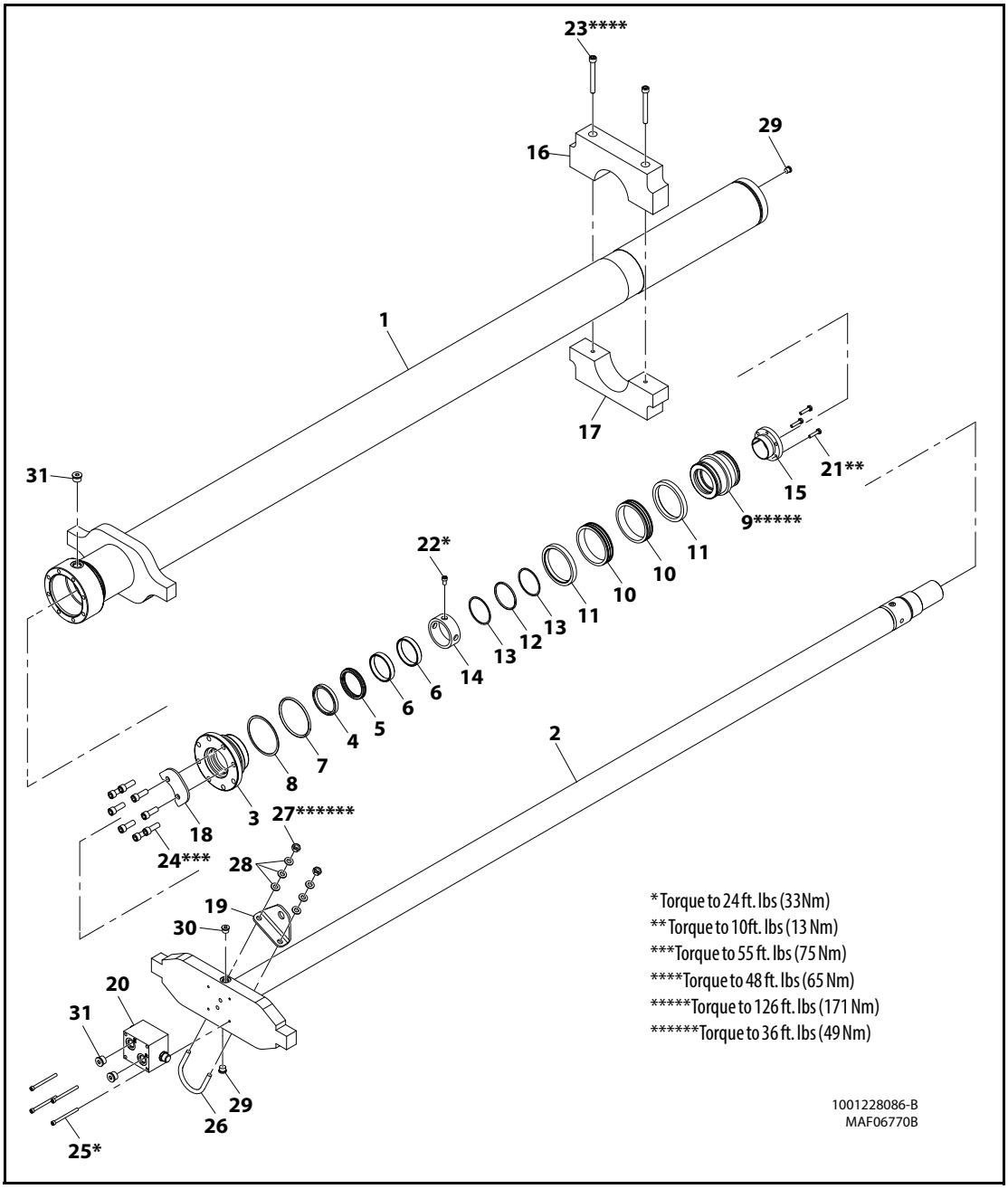


Figure 5-68. Composite Bearing Installation

12. Inspect spacer for burrs and sharp edges. If necessary, dress inside diameter surface with Scotch Brite or equivalent.
13. If applicable, inspect port block fittings and holding valve. Replace as necessary.
14. Inspect the oil ports for blockage or the presence of dirt or other foreign material. Repair as necessary.
15. If applicable, inspect piston rings for cracks or other damage. Replace as necessary.



1. Barrel
2. Rod
3. Head
4. Wiper
5. Rod Seal
6. Wear Ring
7. O-ring
8. Backup Ring
9. Piston
10. Seal
11. Lock Ring
12. O-ring
13. Backup Ring
14. Tube Spacer
15. Tapered Bushing
16. Support Pad
17. Support Pad
18. Target Plate
19. Mount Plate
20. Valve Assembly
21. Bolt
22. Setscrew
23. Bolt
24. Capscrew
25. Capscrew
26. U Bolt
27. Nut
28. Flatwasher
29. Plug
30. Plug
31. Plug

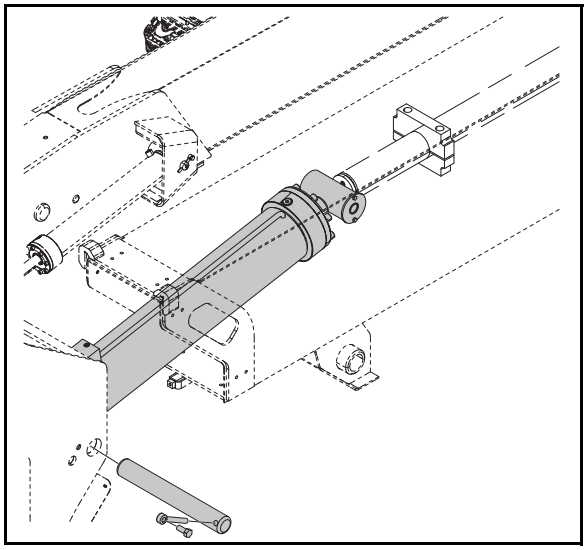
Figure 5-91. Tower Boom Telescopic Cylinder

Upright Level Cylinder Removal

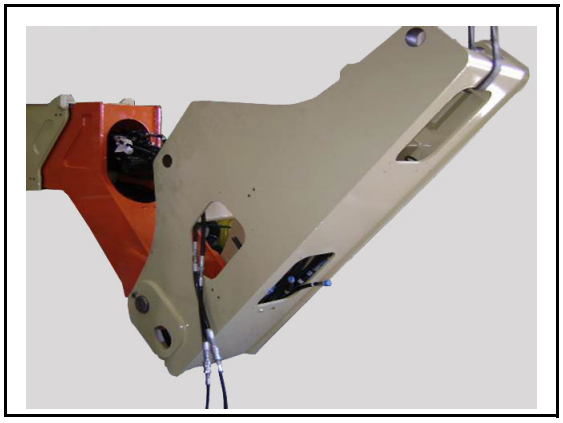
NOTICE

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

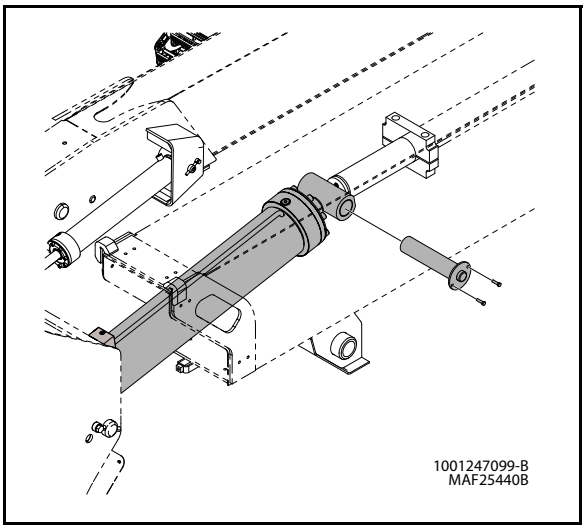
1. Remove the Main Boom. Refer to Section 4.2, Main Boom Assembly.
2. Tag and disconnect hydraulic lines to the main lift cylinder. Use suitable container to collect any residual hydraulic fluid. Cap hydraulic lines and ports.
3. Remove mounting hardware from the main boom lift cylinder barrel end. Use a suitable brass drift and hammer to remove main lift cylinder barrel end pin from Upright and remove main lift cylinder.
4. Disconnect the Upright Level Cylinder as follows:
   a. Use a suitable lifting device to support the Upright.
   b. Remove mounting hardware securing the Upright Level Cylinder to the upright. Use a suitable brass drift and hammer to remove upright level cylinder barrel end pin from upright and disconnect the upright level cylinder from the Upright.



NOTE: *The Upright weighs approximately 1167 lb (529.3 kg).*



5. Before extending the tower boom, support the tower boom from the bottom.
6. Extend the Tower Boom to get access to the Upright level cylinder rod end pin by using an external auxiliary pump.
7. Tag, disconnect and cap the hydraulic lines of the Upright level Cylinder barrel.
8. Attach a suitable lifting device to support the Upright Level Cylinder.
9. Remove mounting hardware from the upright level cylinder rod end and remove the pin.



10. Remove the Upright Level Cylinder from the Tower Fly Boom. Place the Upright level Cylinder in a suitable work area.

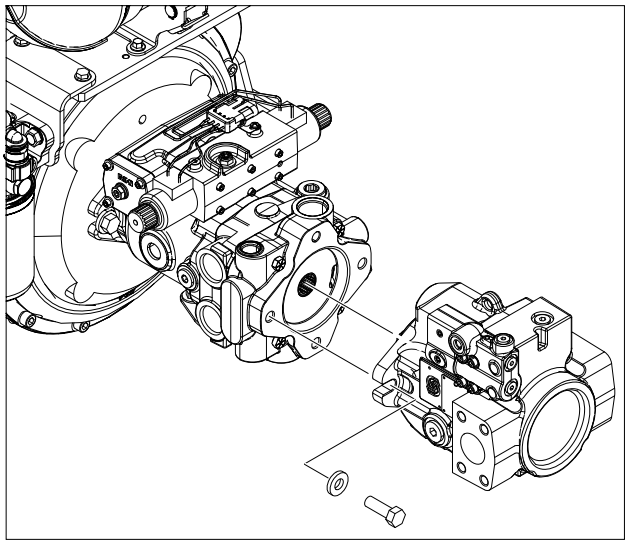
5.8 FUNCTION PUMP

Removal

1. Place machine on level surface and allow the engine and system fluids to cool.
2. Properly relieve any pressure in hydraulic system.
3. Tag and disconnect the hydraulic lines and fittings from the function pump. Use a suitable container to retain any residual hydraulic fluid. Immediately cap lines and ports.

NOTE: *The function pump weighs approximately 35 lbs. (16 kg).*

4. Use a suitable device to support the function pump.
5. Remove two bolts and washers attaching the function pump to the drive pump. Remove function pump from the machine as shown.



6. Remove and discard o-ring, if applicable.
7. Place function pump in the clean work area.

Installation

NOTE: *The function pump weighs approximately 35 lbs. (16 kg).*

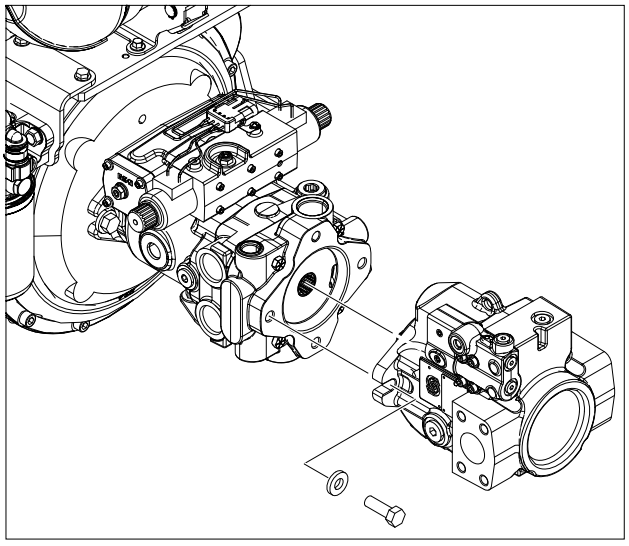
1. Use a suitable device to support the function pump.
2. If applicable, install the o-ring on to the function pump.
3. Align and install the function pump to the drive pump.

NOTE: *Make sure that the pump shaft is properly aligned.*

⚠ CAUTION

INCORRECT SHAFT ALIGNMENT MAY RESULT IN DAMAGE TO DRIVE SHAFT, BEARINGS, OR SEAL WHICH CAN CAUSE EXTERNAL OIL LEAKAGE.

4. Secure function pump with two bolts and washers as shown. Apply Medium Strength Threadlocking Compound to the bolts before installation. Torque bolts to 85 ft. lbs. (116Nm).



5. Remove tag and reconnect the hydraulic lines to the function pump.
6. Reconnect the battery power and make sure for proper working of the function pump.

5.9 DRIVE PUMP

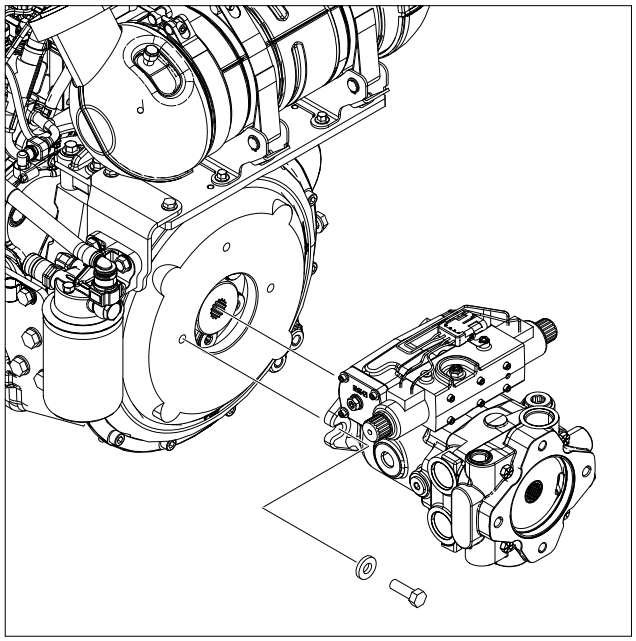
Removal

NOTE: *Remove the function pump from the machine first, refer Section 5.8, Function Pump.*

1. Tag and disconnect the hydraulic lines and fittings from the drive pump. Use a suitable container to retain any residual hydraulic fluid. Immediately cap lines and ports.

NOTE: *The drive pump weighs approximately 62 lb (28 kg).*

2. Use a suitable device to support the drive pump.
3. Remove two bolts and washers attaching the drive pump to the engine assembly. Remove drive pump from the machine as shown.



4. Remove and discard o-ring from the drive pump groove.
5. Place drive pump in the clean work area.

Installation

NOTE: *The drive pump weighs approximately 62 lbs. (28 kg).*

1. Use a suitable device to support the drive pump.
2. Install the new o-ring in to the drive pump groove.
3. Align and install the drive pump to the engine assembly.

NOTE: *Make sure that the pump shaft is properly aligned.*

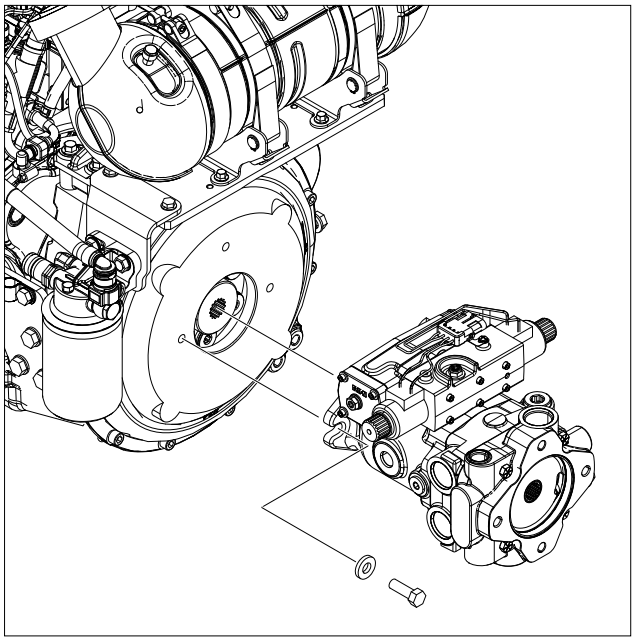
⚠ CAUTION

INCORRECT SHAFT ALIGNMENT MAY RESULT IN DAMAGE TO DRIVE SHAFT, BEARINGS, OR SEAL WHICH CAN CAUSE EXTERNAL OIL LEAKAGE.

4. Secure drive pump with two bolts and washers as shown.

NOTE: *Apply Medium Strength Threadlocking Compound to the bolts before installation.*

5. Torque bolt to 46-56 ft.lbs. (62-76 Nm)



6. Remove tag and reconnect the hydraulic lines and fittings to the drive pump.

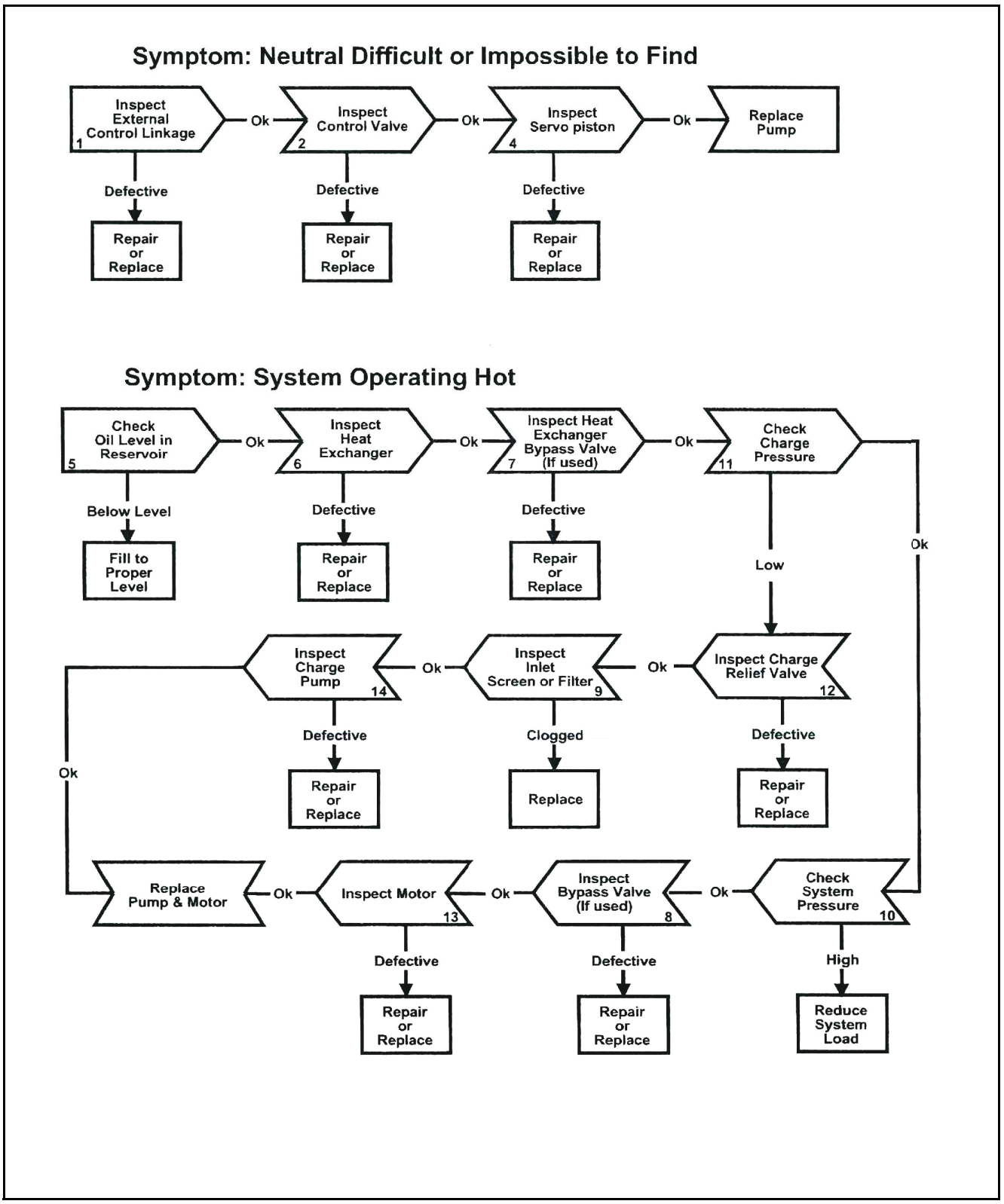


Figure 5-122. Fault- logic Troubleshooting

SECTION 6. JLG CONTROL SYSTEM

6.1 INTRODUCTION

NOTICE

THIS MACHINE IS POWERED BY AN 84VDC (NOMINAL) ELECTRICAL SYSTEM THAT CAN RANGE UP TO 105VDC DURING NORMAL OPERATION, AND BY A 48VAC (NOMINAL) ELECTRICAL MOTOR SYSTEM THAT CAN RANGE UP TO 60VAC. BASED ON EMPLOYER, LOCAL, AND GOVERNMENTAL REGULATIONS AS THEY PERTAIN TO THIS MACHINE, SPECIFIC ELECTRICAL TRAINING AND CERTIFICATIONS MAY BE REQUIRED BEFORE SERVICING OR TROUBLESHOOTING.

The machine has two separate battery systems, 12 Volt and 84 Volt.

The 12 Volt system powers the control modules (e.g., UGM), hydraulic valves, clutch actuation, fans, and the engine start/alternator system.

The 84 Volt system powers the Integrated Motor Generator (IMG) and the mobile battery charging system, which includes the battery boxes, IMG control enclosure, 84V/12V DC/DC converter. The two battery chargers are powered by AC mains power in the range 85-245 VAC, 45-65 Hz.

The JLG designed Control System is the 12 volt based control system installed on the boom lift and includes UGM, PLT and HEC modules.

The JLG Control System provides simplicity in viewing and adjusting the various personality settings for smooth control of: acceleration, deceleration, creep, min speed, and max.-speed for all boom, drive, and steering functions.

The main lift, swing, and drive are controlled by individual joysticks, with steering being controlled by a rocker switch built into the top the drive joystick. To activate Drive, Lift, and Swing simply pull up on the slide lock location on the joystick and move the handle into the direction desired.

The control system will control the voltage output to the valves and pump, as programmed for smooth operation and maximum cycle time. Ground control speeds for all boom functions can also be programmed into the control system.

The JLG Control System ground control module has a built in LED to indicate any faults. The system stores recent faults which may be accessed for troubleshooting. Optional equipment may be added later but must be programmed into the control system when installed.

The HEC module is responsible for commanding Hybrid control functions and processing Hybrid related feedback signals.

Table 6-1. Analyzer Abbreviations

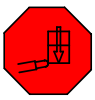
ABBREVIATION	MEANING
S/C	SHORT CIRCUIT
SEL	SELECTOR
SN	SERIAL NUMBER
SPD	SPEED
STOW	STOWED
STOWD	STOWED
SW	SWITCH or SOFTWARE
TELE	TELESCOPE
TEMP	TEMPERATURE
TORQ.	TORQUE
TRN	TRANSPORT
T/T	TURNTABLE
T	TOWER
TURNTBL	TURNTABLE
TWR	TOWER
U	UPPER or UP
V	VOLT
VER	VERSION
VLV	VALVE
WIT	WITNESS
YEL	YELLOW

6.3 PLATFORM LOAD SENSING SYSTEM

The Platform Load Sensing (LSS) System consists of a single load cell mounted within the platform support. This system compares the designed capacity (500 lb (230 kg)) to the measured weight in the platform.

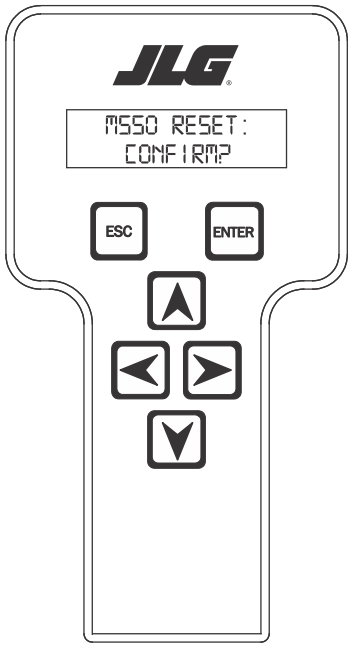
If the actual platform load exceeds the selected Rated Load, the following will occur:

1. The Overload Visual Warning Indicator will flash at the selected control position (platform or ground).



2. The Platform and Ground Alarms will sound 5 seconds On, and 2 seconds Off.
3. All normal movement will be prevented from the platform control position (optional - ground control functions may be prevented).
4. Further movement is permitted by:
   - **a.** Removing the excess platform load until actual platform load is less than Rated Load.
   - **b.** Operation of the overriding emergency system (Auxiliary Power Unit).
   - **c.** By an authorized person at the ground control position (optional - ground control functions may be prevented).

12. Press Enter (ENTER). The screen will read:



13. Press Enter (ENTER). The JLG Control System will reset an active 873 DTC and the MSSO System will be reset. Press Escape (ESC) to return to the CALIBRATIONS menu.

Test Notes

1. Stop watch should be started with the function, not with the controller or switch.
2. Drive test results reflect 15x19.5 or 18x19.5 tires, pneumatic or foam filled.
3. All speed tests are run from the platform. These speeds do not reflect the ground control operation.
4. The platform speed knob control must be at full speed (turned clockwise completely).
5. Function speeds may vary due to cold, thick hydraulic oil. Test should be run with the oil temperature above 100° F (38° C).
6. Some flow control functions may not work with the speed knob clicked into the creep position.

Table 6-10. Function Speeds

Function	Speed Tolerance Hybrid Mode (In Seconds)	Speed Tolerance Electric Mode (In Seconds)
Main Lift Up	45 - 50	45 - 50
Main Lift Down	45 - 50	45 - 50
Swing Right & Left	79 - 101	79 - 101
NOTE: *No more than 10% difference between swing left and swing right.*		
Main Telescope Out	30-40	30-40
Main Telescope In	24-34	24-34
Platform Rotate Right & Left	19 - 30	19 - 30
NOTE: *No more that 15% difference between rotator left and rotator right.*		
Jib Up	20-30	20-30
Jib Down	30-40	30-40
Tower Lift Up	60 - 75	60 - 75
Tower Lift Down	44 - 53	44 - 53
Tower Telescope Out	24 - 32	24 - 32
Tower Telescope In	15-25	15-25
Drive (4WD) Forward & Reverse	33-45 (FWD) 115-125 (Rev)	46-63 (FWD) 179-189 (Rev)
Drive Horizontal Above Elevation (4WD) Forward & Reverse (CE)	122 Min	122 Min
Drive Horizontal Above Elevation 4WD Forward & Reverse (ANSI)	122 Min	122 Min

4150241-I

Connector	Pin	Assignment	Function
J1 NATURAL	1	TOWER LIFT UP	DIGITAL INPUT
	2	TOWER LIFT DOWN	DIGITAL INPUT
	3	TOWER TELESCOPE IN	DIGITAL INPUT
	4	TOWER TELESCOPE OUT	DIGITAL INPUT
	5	MAIN TELESCOPE IN	DIGITAL INPUT
	6	MAIN TELESCOPE OUT	DIGITAL INPUT
	7	PLATFORM ROTATE RIGHT	DIGITAL INPUT
	8	PLATFORM ROTATE LEFT	DIGITAL INPUT
	9	PLATFORM LEVEL UP	DIGITAL INPUT
	10	PLATFORM LEVEL DOWN	DIGITAL INPUT
	11	JIB UP	DIGITAL INPUT
	12	JIB DOWN	DIGITAL INPUT
	13	SPEED PUMP POTENTIOMETER GROUND	GROUND
	14	ENGINE START	DIGITAL INPUT
	15	ELEC MODE	DIGITAL INPUT
	16	CRAB STEER SELECT	DIGITAL INPUT
	17	COORDINATED STEER SELECT	DIGITAL INPUT
	18	SWITCH POWER	BATTERY VOLTAGE
	19	UNALLOCATED	DIGITAL INPUT
	20	UNALLOCATED	DIGITAL INPUT
	21	UNALLOCATED	DIGITAL INPUT
	22	DRIVE ORIENTATION SYSTEM FEATURE ENABLE	DIGITAL INPUT
	23	SKYGUARD INPUT #2	DIGITAL INPUT
	24	UNALLOCATED	DIGITAL INPUT
	25	UNALLOCATED	DIGITAL INPUT
	26	UNALLOCATED	DIGITAL INPUT
	27	TWO SPEED VALVE (HIGHENGINE)	DIGITAL INPUT
	28	TORQUE MODE	DIGITAL INPUT
	29	SOFT TOUCH OVER RIDE	DIGITAL INPUT
	30	HEAD/TAIL LIGHT	DIGITAL INPUT
	31	HORN	DIGITAL INPUT
	32	CREEP MODE	DIGITAL INPUT
	33	UNALLOCATED	DIGITAL INPUT
	34	SPEED PUMP POTENTIOMETER REFERENCE VOLTAGE	+7 REFERENCE VOLTAGE
	35	SPEED PUMP POTENTIOMETER	DIGITAL INPUT

Connector	Pin	Assignment	Function
J5 NATURAL	1	LIFT/SWING JOYSTICK SUPPLY VOLTAGE	SUPPLY VOLTAGE
	2	LIFT CENTER TAP	INPUT
	3	LIFT SIGNAL	INPUT
	4	SWING SIGNAL	INPUT
	5	SWING CENTER TAP	INPUT
	6	NOT CONNECTED	INPUT
	7	LIFT/SWING JOYSTICK RETURN	GROUND
	8	GROUND RETURN	GROUND

Connector	Pin	Assignment	Function
J6 BLACK	1	DRIVE/STEER JOYSTICK SUPPLY VOLTAGE	SUPPLY VOLTAGE
	2	DRIVE CENTER TAP	INPUT
	3	DRIVE SIGNAL	INPUT
	4	STEER SIGNAL	INPUT
	5	STEER LEFT	INPUT
	6	STEER RIGHT	INPUT
	7	DRIVE/STEER JOYSTICK RETURN	GROUND
	8	GROUND RETURN	GROUND

Connector	Pin	Assignment	Function
J8	1	MODULE GROUND	GROUND
	2	MODULE POWER	BATTERY VOLTAGE

CONNECTOR	PIN	FUNCTION	TYPE	
A	1	IMG_CONTROLLER_IGN	LOGIC POWER IN	POWER
	2	SPARE	POWER OUT	POWER
	3	SPARE	ANALOG IN	INPUT
	4	SPARE	HS DIGITAL IN	INPUT
	5	SPARE	HS DIGITAL IN	INPUT
	6	CHARGER1_INTERLOCK_A	LS DIGITAL IN	INPUT
	7	SPARE	ENCODERCHA	INPUT
	8	SPARE	ENCODER PWR	POWER
	9	SPARE	ANALOG GND	POWER
	10	SPARE	ANALOG IN	INPUT
	11	SPARE	HS DIGITAL IN	INPUT
	12	SPARE	CAN1 TERMINATOR	COMMUNICATION
	13	CHARGER2_INTERLOCK_B	LS DIGITAL IN	INPUT
	14	SPARE	ENCODERCHB	INPUT
	15	LS_DIG/IMG_TEMP_GND	ENCODER GND	POWER
	16	MAIN_CONTACTOR_LS_DRV	PWM DIGITAL OUT	OUTPUT
	17	SPARE	POWER IN	POWER
	18	SPEED_CONVERTER_PULSE	LS DIGITAL OUT	OUTPUT
	19	SPEED_CONVERTER_CHARGE	LS DIGITAL OUTP WM	OUTPUT
	20	CAN2-L	CAN1 SIGNAL	COMMUNICATION
	21	CAN2-H	CAN1 SIGNAL	COMMUNICATION
	22	N/C	CAN1 GROUND	POWER
	23	IMG_TEMP+	ANALOG/DIGITAL TEMP	INPUT
B	1	SPARE	POWER IN	POWER
	2	BATT_VOLT_1	ANALOG IN	INPUT
	3	SPEED_CONVERTER_VOLT_FB	ANALOG IN	INPUT
	4	SPARE	LS DIGITAL IN	INPUT
	5	SPARE	LS DIGITAL IN	INPUT
	6	SPARE	HS DIGITAL IN	INPUT
	7	IMG_SPEED_SIN	SPEED SENSOR	INPUT
	8	IMG_SPEED_PWR	SPEED SENSOR PWR	POWER
	9	SPARE	LS DIGITAL OUT PVM	OUPUT
	10	SPARE	ANALOG IN	INPUT
	11	SPARE	LS DIGITAL IN	INPUT
	12	SPARE	CAN2 TERMINATOR	COMMUNICATION
	13	SPARE	HS DIGITAL IN	INPUT
	14	IMG_SPEED_COS	SPEED SENSOR	INPUT
	15	IMG_SPEED/BATT_TEMP_GND	SPEED SENSOR GND	POWER
	16	BATT_TEMP_1	LS DIGITAL OUT PWM	OUTPUT

Table 6-11. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
2518	25	18	DRIVE PREVENTED - BOOM SELECTED	MACHINE SETUP > FUNCTION CUTOUT = BOOM CUTOUT The boom is Above Elevation Any boom function is already active The operator attempts to activate Drive or Steer.	The UGM shall prohibit Drive and Steer.
2519	25	19	DRIVE PREVENTED - TILTED & EXTENDED OR HIGH ANGLE	Drive Selected while tilted and extended and tilt is configured to cutout drive.	
2520	25	20	FUNCTIONS LOCKED OUT - CONSTANT DATA VERSION IMPROPER		
2530	25	30	UMS SENSOR FORWARD LIMIT REACHED	The Upright angle relative to the turntable is less than -4.0 degree.	Refer Section 4.6.
2531	25	31	UMS SENSOR OUT OF USABLE RANGE	Both the turntable tilt sensor and the UMS sensor read greater then +/-10 degree in the same direction.	Refer Section 4.6.
2532	25	32	UMS SENSOR BACKWARD LIMIT REACHED	The Upright angle relative to the turntable is greater than +2.5 degree.	Refer Section 4.6.
2563	25	63	SKYGUARD SWITCH - DISAGREEMENT	MACHINE SETUP > SKYGUARD = YES; Machine is in Platform Mode; [(SkyGuard input #1 Platform Module J7-18) ≠ (SkyGuard input #2 Platform Module J1-23)] > 160ms	Response detailed in Sky-Guard section.
2568	25	68	TEMPERATURE CUTOUT ACTIVE - AMBIENT TEMPERATURE TOO LOW	Low Temperature Cutout = Active	If the Boom is Above Elevation; The UGM shall suspend motion; The UGM shall limit the machine to Creep speed after controls initialized If the Machine is in Platform Mode and if the Boom is not Above Elevation.
2576	25	76	PLATFORM LEVEL PREVENTED - ABOVE ELEVATION	Platform Level Override Cutout = Enabled; The Platform Level Up or Down switch input = High; Footswitch is active.	The UGM shall suspend Platform Level Up and Down commands; The UGM shall prohibit Platform Level Up and Down
2577	25	77	DRIVE PREVENTED - START BATTERY CONNECTED	Start battery is connected	Check the battery.
330	**33**	**0**	**<<< GROUND OUTPUT DRIVER >>>**		
331	33	1	BRAKE - SHORT TO BATTERY	There is a Short to Battery to the Brake Valve.	Check Harness for damage.
332	33	2	BRAKE - OPEN CIRCUIT	There is an Open Circuit to the Brake Valve.	Check Harness for damage.
3311	33	11	GROUND ALARM - SHORT TO BATTERY	There is a Short to Battery to the Ground Alarm.	Ground Alarm equipped vehicles only.
3336	33	36	ALTERNATOR POWER - SHORT TO GROUND	There is a Short to Ground to the Alternator/ECM.	Check Harness for damage.
3340	33	40	AUX POWER - SHORT TO GROUND	There is a Short to Ground to the Auxiliary Power Pump Relay.	Check Harness for damage.
3341	33	41	AUX POWER - OPEN CIRCUIT	There is an Open Circuit to the Auxiliary Power Pump Relay.	Check Harness for damage.
3342	33	42	AUX POWER - SHORT TO BATTERY	There is a Short to Battery to the Auxiliary Power Pump Relay.	Check Harness for damage.

Table 6-11. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
826	82	6	RUNNING AT CREEP - PLATFORM OVERLOADED	All functions at creep, the Load Sensing System indicates the Platform is overloaded AND is configured to warn only while the Platform is overloaded.	
827	82	7	DRIVE & BOOM PREVENTED - PLATFORM OVERLOADED	Driving and boom functions are not possible while the Load Sensing System indicates the Platform is overloaded AND is configured to prevent drive and boom functions while the Platform is overloaded.	
828	82	8	LIFT UP & TELE OUT PREVENTED - PLATFORM OVERLOADED	Lift up and telescope out are not possible while the Load Sensing System indicates the Platform is overloaded AND is configured to prevent Lift up and telescope out while the Platform is overloaded.	
8639	86	39	FRONT LEFT STEER VALVE - OPEN CIRCUIT	There is an open circuit to the Front Left Steer Valve	Check Harness for damage.
8640	86	40	FRONT LEFT STEER VALVE - SHORT TO BATTERY	There is a short to Battery to the Front Left Steer Valve	Check Harness for damage.
8641	86	41	FRONT LEFT STEER VALVE - SHORT TO GROUND	There is a short to Ground to the Front Left Steer Valve	Check Harness for damage.
8642	86	42	FRONT RIGHT STEER VALVE - OPEN CIRCUIT	There is an open circuit to the Front Right Steer Valve	Check Harness for damage.
8643	86	43	FRONT RIGHT STEER VALVE - SHORT TO BATTERY	There is a short to Battery to the Front Right Steer Valve	Check Harness for damage.
8644	86	44	FRONT RIGHT STEER VALVE - SHORT TO GROUND	There is a short to Ground to the Front Right Steer Valve	Check Harness for damage.
8645	86	45	REAR LEFT STEER VALVE - OPEN CIRCUIT	There is an open circuit to the Rear Left Steer Valve	Check Harness for damage.
8646	86	46	REAR LEFT STEER VALVE - SHORT TO BATTERY	There is a short to Battery to the Rear Left Steer Valve	Check Harness for damage.
8647	86	47	REAR LEFT STEER VALVE - SHORT TO GROUND	There is a short to Ground to the Rear Left Steer Valve	Check Harness for damage.
8648	86	48	REAR RIGHT STEER VALVE - OPEN CIRCUIT	There is an open circuit to the Rear Right Steer Valve	Check Harness for damage.
8649	86	49	REAR RIGHT STEER VALVE - SHORT TO BATTERY	There is a short to Battery to the Rear Right Steer Valve	Check Harness for damage.
8650	86	50	REAR RIGHT STEER VALVE - SHORT TO GROUND	There is a short to Ground to the Rear Right Steer Valve	Check Harness for damage.
871	87	1	RETURN FILTER BYPASSED	Hydraulic Return Filter Clogged	Check Hydraulic Return Filter.
872	87	2	CHARGE PUMP FILTER BYPASSED	Charge Pump Filter Clogged	Check Charge Pump Filter.
873	87	3	MACHINE SAFETY SYSTEM OVERRIDE OCCURRED	MSSO = Active	Response described in MSSO Influence on Machine Operation section.

Table 6-12. Diagnostic Trouble Code Chart - Additional HEC Faults

DTC	JLG Help Message	Required Control Response or State Assignment[2,3]	Conditions Required for Movement and/or to Clear Fault	Corrective Action

4495	IMG MOTOR - ROTATION OPPOSITE CONTROL	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Check IMG and IMG Controller Phase wiring for proper U, V, W phasing.
				This is typically caused by two phases that are swapped.

4496	IMG MOTOR - OPEN CIRCUIT	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Check IMG Phase connections U, V, W to the IMG Control Module for opens or loose connection.

44100	WRONG BATTERY STACK VOLTAGE	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Check 84V battery state of charge, BATTERY SOC diagnostic.
				Check 84V Battery Voltage, SOC BAT VOLTAGE diagnostic.
				Check all 84V battery stack wiring.

44101	IMG MOTOR - FEEDBACK FAILURE	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Internal controller failure. Replace controller.

Table 6-12. Diagnostic Trouble Code Chart - Additional HEC Faults

DTC	JLG Help Message	Required Control Response or State Assignment[2,3]	Conditions Required for Movement and/or to Clear Fault	Corrective Action

99319	IMG MODULE - POSITIVE LC OPEN	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Internal Module Error, replace module.

99320	IMG MODULE - LC COIL OPEN	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Internal Module Error, replace module.

99321	IMG MODULE - EEPROM PARAMATER RESTORE	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	Result of clearing EEPROM so that values are set to default values.

99322	IMG MODULE - SIN COS FAILURE	If (Hybrid Mode = Electric or Hybrid), HEC shall suspend all functions;
		
		If (Hybrid Mode = Electric or Hybrid), the HEC shall prohibit all functions;
		
		HEC / IMG Module shall command the Main Contactor open;
		If (Hybrid Mode = Engine), the HEC shall limit the machine to Creep speed after Controls initialized and trigger DTC 4378
			Power Cycled	TBD
				Internal Module Error, replace module.

Table 6-13. Diagnostic Trouble Code Chart - Hybrid UGM

DTC	JLG Help Message	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33170	MAIN LIFT DOWN VALVE - OPEN CIRCUIT			
33171	MAIN LIFT DOWN VALVE - SHORT TO BATTERY			
33172	MAIN LIFT DOWN VALVE - SHORT TO GROUND			
33182	MAIN LIFT VALVES - SHORT TO BATTERY			
33186	MAIN TELESCOPE OUT VALVE - OPEN CIRCUIT			
33188	MAIN TELESCOPE OUT VALVE - SHORT TO GROUND			
33189	MAIN TELESCOPE IN VALVE - OPEN CIRCUIT			
33190	MAIN TELESCOPE IN VALVE - SHORT TO GROUND			
33207	HORN - OPEN CIRCUIT			
33208	HORN - SHORT TO BATTERY			
33209	HORN - SHORT TO GROUND			
33267	ENGINE FUEL RELAY – OPEN CIRCUIT	UGM shall disable this output, command engine shutdown and prevent engine start. UGM shall flash the Engine Distress Lamp at 3Hz	Power Cycle	
33268	ENGINE FUEL RELAY - SHORT TO BATTERY	Only detected at Startup. UGM shall disable this output, command engine shutdown and prevent engine start; UGM shall flash the Engine Distress Lamp at 3Hz.	Power Cycle	
33269	ENGINE FUEL RELAY - SHORT TO GROUND	UGM shall disable this output, command engine shutdown and prevent engine start; UGM shall flash the Engine Distress Lamp at 3Hz	Power Cycle	
33279	GLOWPLUG - OPEN CIRCUIT	No response required. Engine start will proceed without glow.	Power Cycle	
33280	GLOWPLUG - SHORT TO BATTERY	UGM shall disable Glow Plug relay output	Power Cycle	
33281	GLOWPLUG - SHORT TO GROUND	Before Start: UGM shall disable Glow Plug relay output and prohibit glow plug cycle. After	Power Cycle	

Table 6-13. Diagnostic Trouble Code Chart - Hybrid UGM

DTC	JLG Help Message	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
8234	LSS STRAIN GAUGE 1 - NOT INSTALLED	SET PltfmGrs1SnsrOK = FALSE If {PltfmOvrLd_Wght == FALSE and MachineConfigLdSys-Active == TRUE } Then SET LSSCreep_DTC = TRUE End If If [(DTC 8218 – LSS SENSOR DISAGREEMENT or DTC 8223 – LSS STRAIN GUAGE 2 - STAGNANT is active) or (PltfmGrs2SnsrOK == FALSE)] Then SET PltfmOvrLd_DTC = TRUE End If	Power Cycle	
8235	LSS STRAIN GAUGE 2 - NOT INSTALLED	SET PltfmGrs2SnsrOK = FALSE If {PltfmOvrLd_Wght == FALSE and MachineConfigLdSys-Active == TRUE } Then SET LSSCreep_DTC = TRUE End If If [(DTC 8218 – LSS SENSOR DISAGREEMENT or DTC 8222 – LSS STRAIN GUAGE 1 - STAGNANT is active) or (PltfmGrs1SnsrOK == FALSE)] Then SET PltfmOvrLd_DTC = TRUE End If	Power Cycle	
8236	LSS NOT DETECTING CHANGE	SET PltfmOvrLd_DTC == TRUE	Power Cycle	
8237	LSS STRAIN GAUGE 1 - A/D DEFECT	SET PltfmGrs1SnsrOK = FALSE If {PltfmOvrLd_Wght == FALSE and MachineConfigLdSys-Active == TRUE } Then SET LSSCreep_DTC = TRUE End If If [(DTC 8218 – LSS SENSOR DISAGREEMENT or DTC 8223 – LSS STRAIN GUAGE 2 - STAGNANT is active) or (PltfmGrs2SnsrOK == FALSE)] Then SET PltfmOvrLd_DTC = TRUE End If	Power Cycle	
8238	LSS STRAIN GAUGE 2 - A/D DEFECT	SET PltfmGrs2SnsrOK = FALSE If {PltfmOvrLd_Wght == FALSE and MachineConfigLdSys-Active == TRUE } Then SET LSSCreep_DTC = TRUE End If If [(DTC 8218 – LSS SENSOR DISAGREEMENT or DTC 8222 – LSS STRAIN GUAGE 1 - STAGNANT is active) or (PltfmGrs1SnsrOK == FALSE)] Then SET PltfmOvrLd_DTC = TRUE End If	Power Cycle	
8639	FRONT LEFT STEER VALVE - OPEN CIRCUIT	UGM shall limit Drive and Steer speed to Creep	UGM no longer detects open circuit; Creep restriction removed after fault clears and controls initialized	
8640	FRONT LEFT STEER VALVE - SHORT TO BATTERY	UGM shall disable Drive and Steer	Power Cycle	
8641	FRONT LEFT STEER VALVE - SHORT TO GROUND	UGM shall disable Steer Left and Right outputs and limit Drive to Creep	Power Cycle	
8642	FRONT RIGHT STEER VALVE - OPEN CIRCUIT	UGM shall limit Drive and Steer speed to Creep	UGM no longer detects open circuit; Creep restriction removed after fault clears and controls initialized	

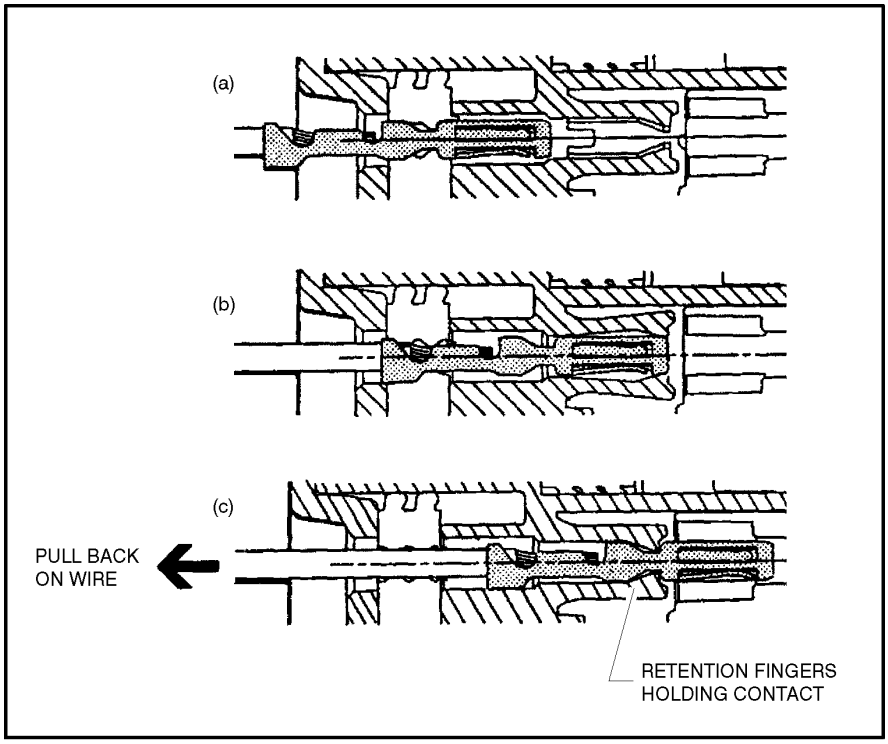


Figure 7-7. Connector Assembly Figure 2

3. After all required contacts have been inserted, the wedge lock must be closed to its locked position. Release the locking latches by squeezing them inward (See Figure 7-8.).

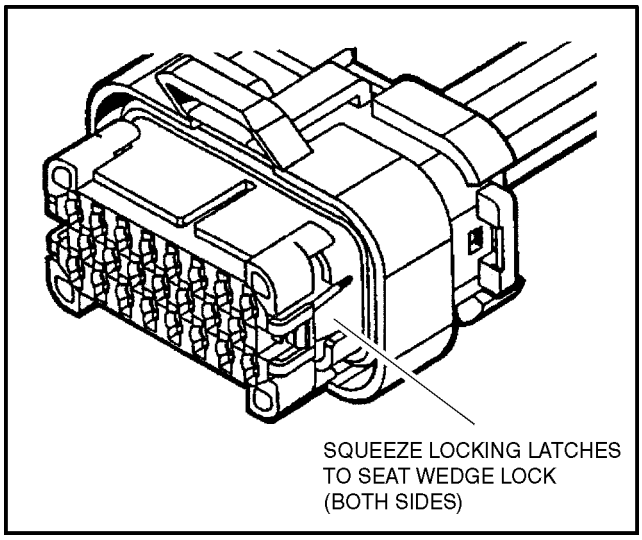


Figure 7-8. Connector Assembly Figure 3

4. Slide the wedge lock into the housing until it is flush with the housing (See Figure 7-9.).

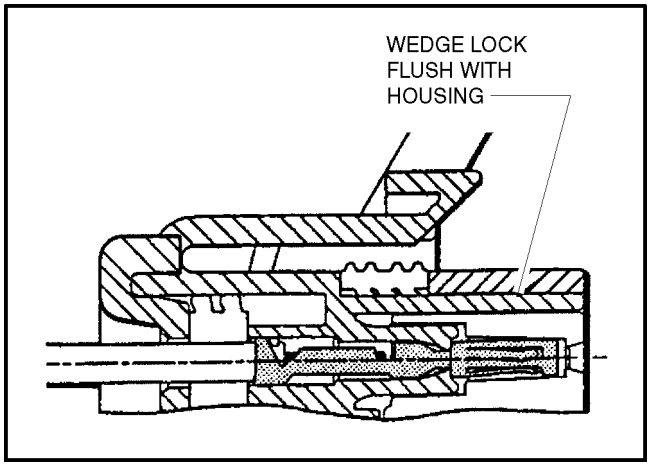


Figure 7-9. Connector Assembly Figure 4

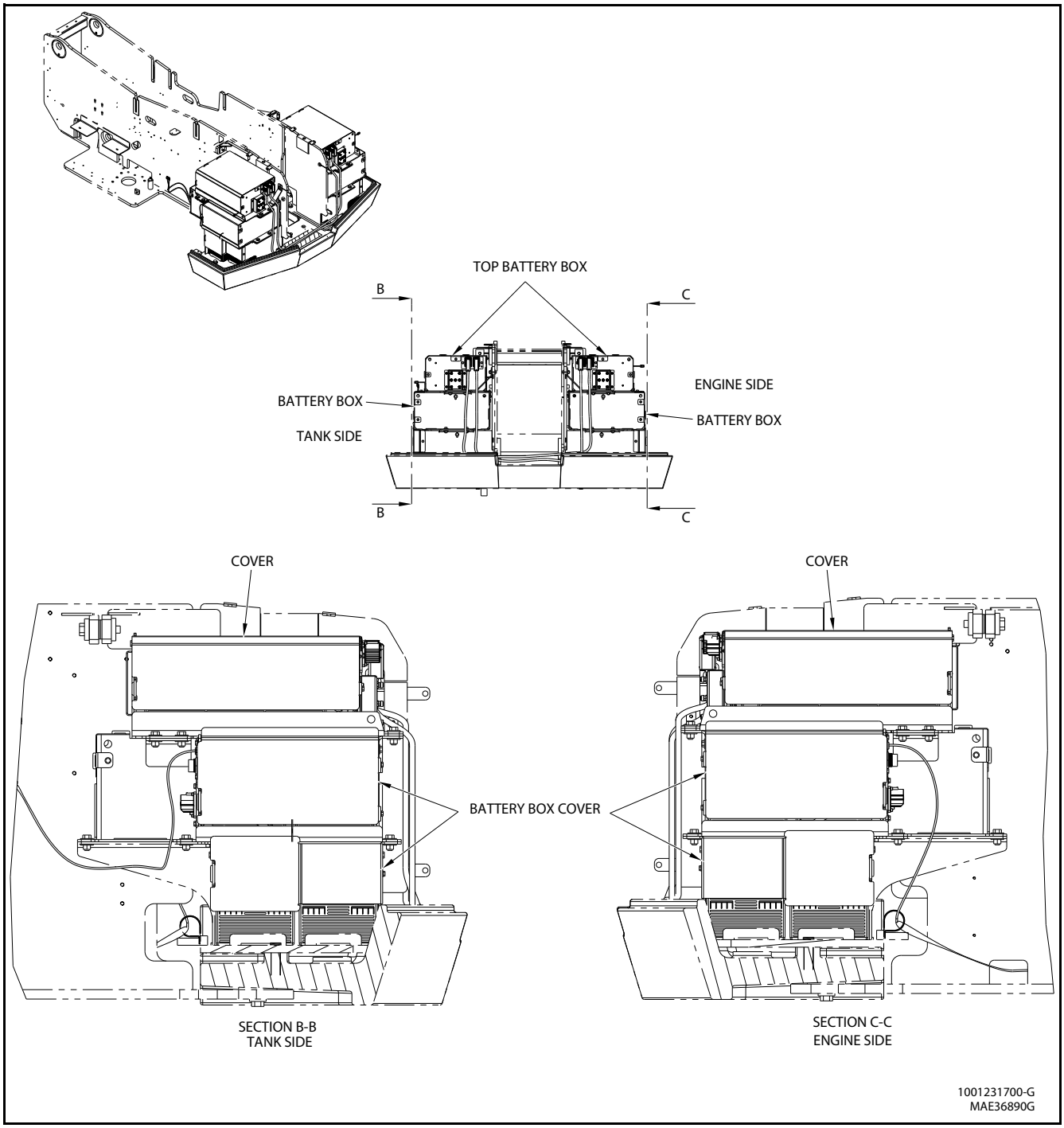


Figure 7-20. Battery Box - Sheet 1 of 15

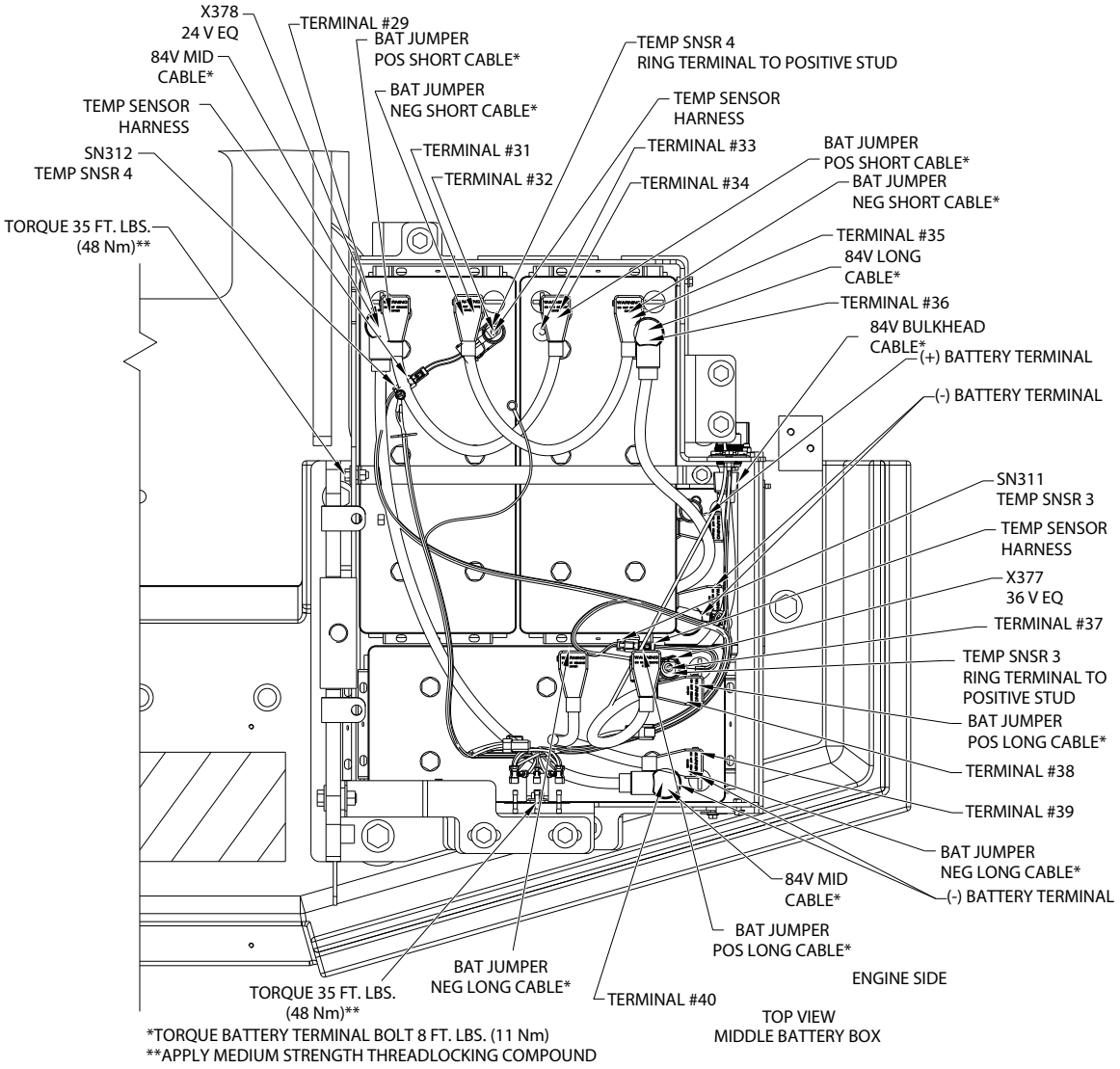


TABLE 4
CABLE/HARNESS/SENSOR INSTALL SEQUENCE
MIDDLE BATTERY BOX ENGINE SIDE
REF VIEW N FOR POSITION LOCATIONS

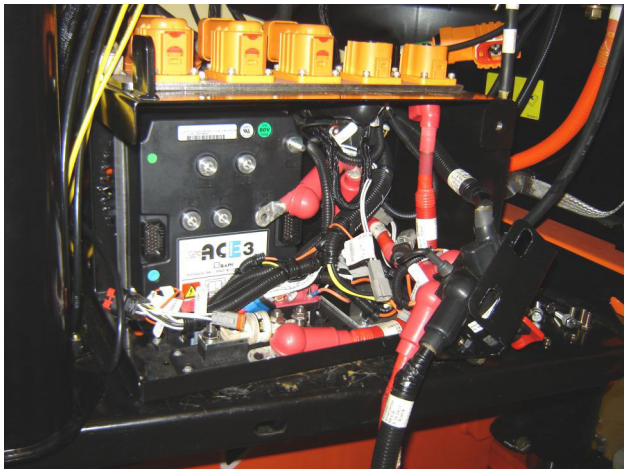
TERMINAL NUMBER	POSITION A	POSITION B	POSITION C
29	SEQ. #508	X378 24 V EQ	-
30	SEQ. #501	-	-
31	SEQ. #502	-	-
32	SEQ. #72 TEMP SNSR 4	-	-
33	-	-	-
34	SEQ. #501	-	-
35	SEQ. #502	-	-
36	SEQ. #509	-	-
37	X377 36 V EQ	SEQ. #72 TEMP SNSR 3	-
38	SEQ. #505	-	-
39	SEQ. #506	-	-
40	SEQ. #508	-	-

1001231700-G
MAE36990G

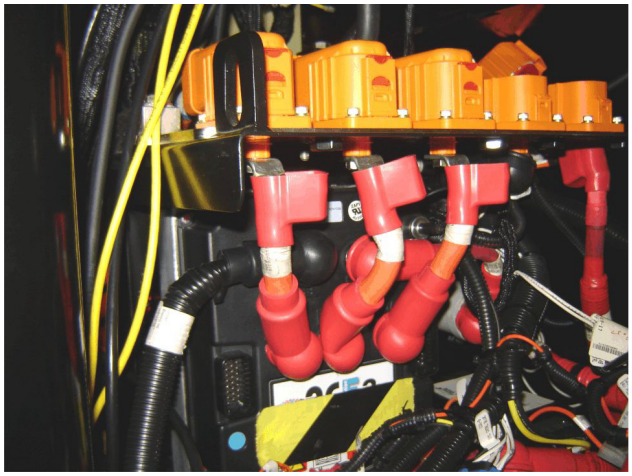
Figure 7-30. Battery Box - Sheet 11 of 15

Installation

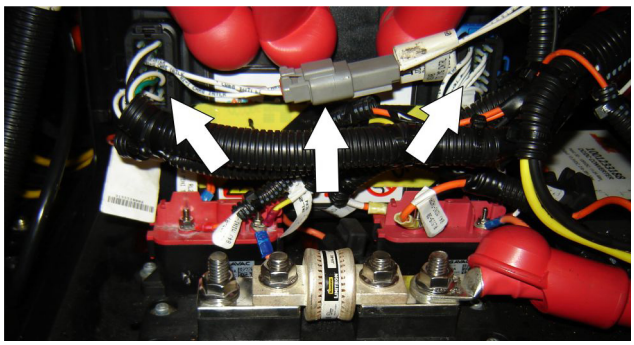
1. Install the IMG Controller to the box using the allen screws and retaining nuts. If installing a new controller, make sure to remove the standoffs from the old controller for proper installation. Push the box back in place.



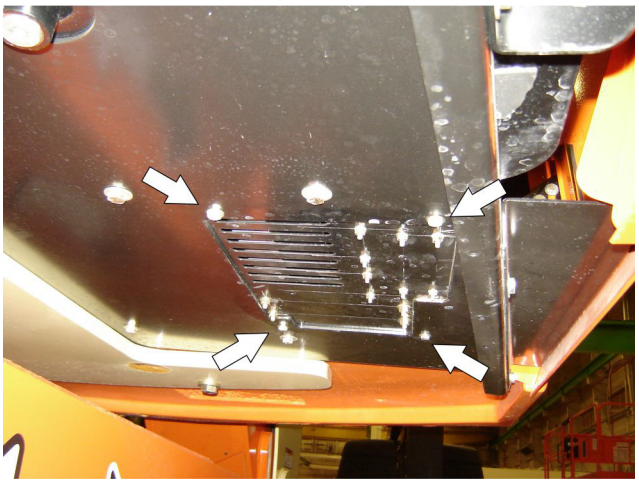
2. Install the power cables to the controller as tagged during removal. Torque all fasteners 9.5 to 11 ft. lbs. (13 to 15 Nm).



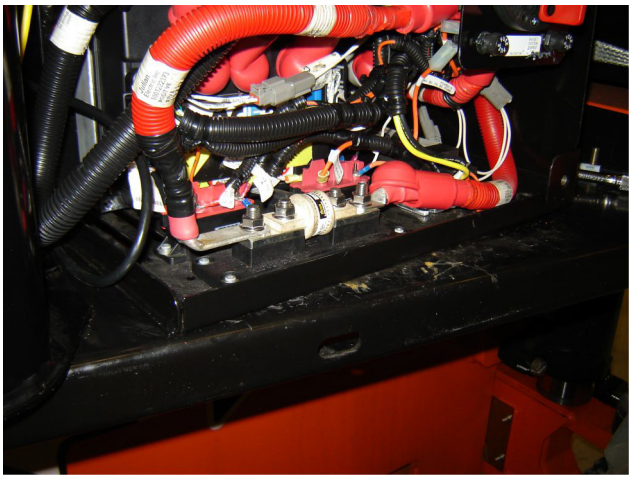
3. Plug the connectors back into the controller as tagged during removal. Reconnect the harness for the battery charger.



4. Position the maintenance disconnect and bracket assembly in place and secure with the attaching bolts.
5. Install the bolts that secure the IMG box to the turntable side tray.



6. Install the power cable onto the fuse as tagged during removal.



7.17 BATTERY CHARGERS

The machine incorporates two battery chargers (primary and a secondary) which operate on 220V or 110V. Both chargers operate initially and the primary does the finish charging. 220V charging is the preferred voltage for charging the batteries.

NOTICE

JLG MACHINES EQUIPPED WITH DELTA Q BATTERY CHARGERS ARE DESIGNED FOR THE BEST PERFORMANCE WITH OEM FACTORY APPROVED BATTERIES.

APPROVED JLG REPLACEMENT BATTERIES ARE AVAILABLE THROUGH JLG'S AFTERMARKET PARTS DISTRIBUTION CENTERS OR JLG'S AFTERMARKET PROGRAMS. FOR ASSISTANCE WITH PROPER BATTERY REPLACEMENT, PLEASE CONTACT YOUR LOCAL JLG SUPPORT OFFICE.

BATTERIES APPROVED BY JLG HAVE BEEN TESTED FOR COMPATIBILITY WITH THE ALGORITHM PROGRAMMING OF THE DELTA Q BATTERY CHARGER TO OPTIMIZE BATTERY LIFE AND MACHINE CYCLE TIMES. THE USE OF NON APPROVED BATTERIES IN YOUR JLG EQUIPMENT MAY RESULT IN PERFORMANCE ISSUES OR BATTERY CHARGER FAULT CODES. JLG ASSUMES NO RESPONSIBILITY FOR SERVICE OR PERFORMANCE ISSUES ARISING FROM THE USE OF NON APPROVED BATTERIES.

Battery Charging

IF CHARGING THE MACHINE USING STANDARD 110V 15 OR 20A OUTLETS, EACH CHARGER MUST BE PLUGGED INTO A SEPARATE CIRCUIT. FOR EXAMPLE, EACH OUTLET USED TO PLUG EACH CHARGER INTO MUST BE CONTROLLED BY AN INDIVIDUAL CIRCUIT BREAKER IN THE ELECTRICAL SERVICE PANEL. THE CHARGERS CANNOT BOTH BE PLUGGED INTO MULTIPLE OUTLETS CONTROLLED BY ONLY ONE CIRCUIT BREAKER. IF USING 220V TO CHARGE, A STANDARD 220V 15A CIRCUIT MAY BE USED.

NOTE: *Be sure that machine is parked in a well ventilated area before charging begins.*

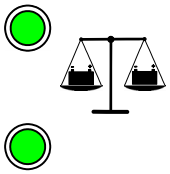
⚠ CAUTION

ONLY PLUG THE CHARGER INTO A PROPERLY INSTALLED AND GROUNDED OUTLET. DO NOT USE GROUND ADAPTORS OR MODIFY PLUG. DO NOT TOUCH NON-INSULATED PORTION OF OUTPUT CONNECTOR OR NON-INSULATED BATTERY TERMINAL.
DO NOT OPERATE CHARGER IF THE AC SUPPLY CORD IS DAMAGED OR IF THE CHARGER HAS BEEN DAMAGED IN ANY WAY.

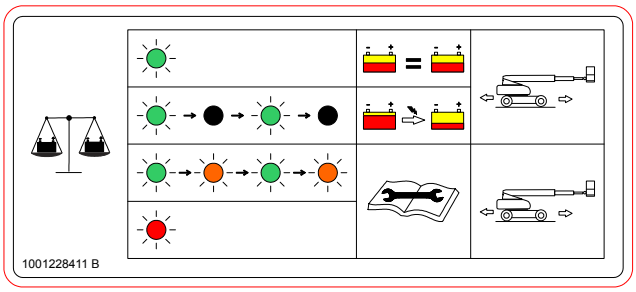
1. The battery charger AC input plug is located near the ground control console.
2. Connect the charger AC input plug to a grounded outlet using a 3 wire heavy duty extension cord.
3. After connecting the charger to an AC outlet at the start of the charging cycle, check the Charger Status and Battery Balance indicators on the Ground Control console.

Ground Panel Indicators

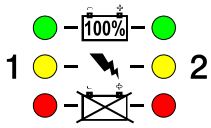
BATTERY BALANCE INDICATOR



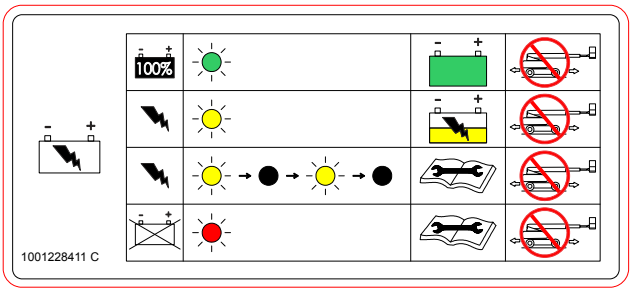
The Battery Balance Indicator displays the state of charge balance of the battery packs. The lights will glow a steady green when the battery pack is balanced or a steady red when the batteries are too far out of balance, resulting in a system shutdown condition. For conditions in between, the light will be green and blink orange at different rates depending upon how far from the normal range the battery packs are (for example, the further out of balance the battery pack is, the faster it will blink. When the battery pack is close to being balanced and is equalizing, the light will blink green.



CHARGER STATUS



The Charger Status LEDs give a visual indicator of the status of the battery charger. The red LED indicates Charging Abnormal. The yellow LED indicates charging in progress. The green LED indicates charging is complete. There is one set of LEDs for each battery pack.



Programming Delta-Q QuiQ and QuiQ-dci Chargers

Click on the Charger Status tab to activate the Charger Status tab. Then click Browse, to select the folder on your PC containing the QuiQ charger software and algorithms.

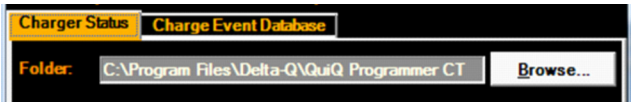
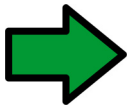
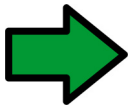


Table 7-8. Programming Delta-Q QuiQ and QuiQ-dci Chargers

What do you want to do?	Icon	Action
Add a charge algorithm to the charger		In the Battery Charge Algorithms list, on the QuiQ Programmer CT user interface, select the algorithms that you want to add to the charger; click the Add to Charger icon.
Upgrade the charger software		In the Charger Software Versions list, on the QuiQ Programmer CT user interface, select the software version that you want to add to the charger; click the Add to Charger icon. Software may take up to 90 seconds to load.
Select a different default algorithm		In the Algorithms Present list on the QuiQ Programmer CT user interface, select the algorithm that you want to set as the default charge algorithm; click Set as Default icon.
Delete an algorithm from the charger		In the Algorithms Present list on the QuiQ Programmer CT user interface, select the algorithms that you want to delete from the charger; click the Delete from Charger icon. Note: You cannot undo an algorithm deletion.
Tip: To select two or more items one after the other in a list, select the first item, press and hold down the SHIFT key on your keyboard, then select the last item. To select two or more items in a list that may not be one after the other, press and hold down the CRTL key, and select the items.		

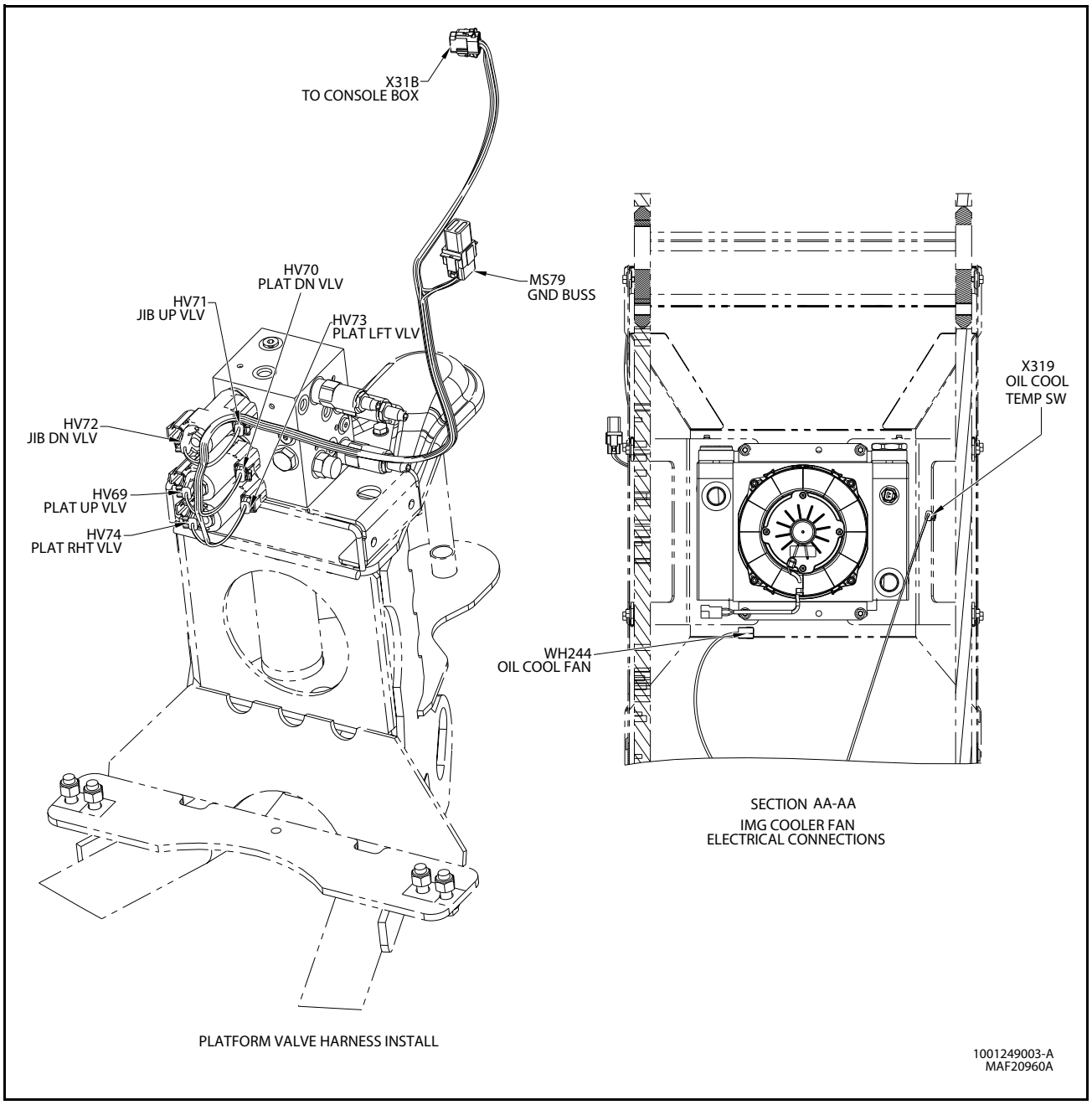


Figure 7-55. Electrical Installation - Sheet 8 of 8

MS79 GND BUSS					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2	BLK	0-12-2	18AWG	GXL	HV72(2)
3	BLK	0-12-3	18AWG	GXL	HV74(2)
4	BLK	0-12-4	18AWG	GXL	HV73(2)
5	BLK	0-12-5	18AWG	GXL	HV70(2)
6	BLK	0-12-6	18AWG	GXL	HV69(2)
7	BLK	0-12	16AWG	GXL	X31B(5)
8	BLK	0-12-7	18AWG	GXL	HV71(2)

X31B TO PLAT HARN					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	16-2 JIB DN VLV	18AWG	GXL	HV72(1)
2	WHT	12-2 PLAT LFT VLV	18AWG	GXL	HV73(1)
3	WHT	11-2 PLAT RHT VLV	18AWG	GXL	HV74(1)
4					
5	BLK	0-12	16AWG	GXL	MS79(7)
6	WHT	14-2-1 PLAT DN VLV	18AWG	GXL	HV70(1)
7	WHT	13-2-1 PLAT UP VLV	18AWG	GXL	HV69(1)
8	WHT	15-2 JIB UP VLV	18AWG	GXL	HV71(1)

HV71 JIB UP VLV					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	15-2 JIB UP VLV	18AWG	GXL	X31B(8)
2	BLK	0-12-7	18AWG	GXL	MS79(8)

HV70 PLAT DN VLV					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	14-2-1 PLAT DN VLV	18AWG	GXL	X31B(6)
2	BLK	0-12-5	18AWG	GXL	MS79(5)

HV73 PLAT LF TVLV					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	12-2 PLAT LFT VLV	18AWG	GXL	X31B(2)
2	BLK	0-12-4	18AWG	GXL	MS79(4)

HV74 PLAT RHT VLV					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	11-2PLATRHTVLV	18AWG	GXL	X31B(3)
2	BLK	0-12-3	18AWG	GXL	MS79(3)

HV69 PLAT UP VLV					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	13-2-1 PLAT UP VLV	18AWG	GXL	X31B(7)
2	BLK	0-12-6	18AWG	GXL	MS79(6)

HV72 JIB DN VLV					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	16-2JIBDNVLV	18AWG	GXL	X31B(1)
2	BLK	0-12-2	18AWG	GXL	MS79(2)

X432 HARNESS BREAK					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	RED	1-1	16 AWG	GXL	X144B (4)
B	YEL	2-14-21	12 AWG	GXL	S109 (2)
C	YEL	2-14-14	18 AWG	GXL	X144B (6)
D	YEL	2-14-22	12 AWG	GXL	CO2-J8 (2)
E	BLK	0-14-4	12 AWG	GXL	CO2-J8 (1)
F	BLK	0-14-2	18 AWG	GXL	X144B (5)
G	BLK	0-14-3	10 AWG	GXL	S129 (2)
H	YEL	2-14-11	18 AWG	GXL	S458 (2)
J	BLK	0-14-7	18 AWG	GXL	X336 (15)
K	RED	1-3	18 AWG	GXL	S160 (1)
L	YEL	2-14-20	18 AWG	GXL	S163 (2)
M	BLK	0-14-6	18 AWG	GXL	S162 (2)
N	GRN	CH #1 TO MS385	18 AWG	GXL	MS132 (9)
P	YEL	CH #1 TO MS385	18 AWG	GXL	MS132 (12)
R	YEL	2-14-17	18 AWG	GXL	SN337 (2)
S	YEL	CH #1 TO TILT SNSR	18 AWG	GXL	MS132 (2)
T	GRN	CH #1 TO TILT SNSR	18 AWG	GXL	MS132 (5)
U	YEL	2-12	18 AWG	GXL	S112 (2)
V					
W					
X					

MS331-1 TO CAN TEE					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CH #2 TO IMG CNTRL	18 AWG	GXL	X338 (2)
B	GRN	CH #2 TO IMG CNTRL	18 AWG	GXL	X338 (1)
C	BLK	0-50	18 AWG	GXL	CO2-J12 (5)

SN337 DOS					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	49-17 DRV ORNT	18 AWG	GXL	CO2-J7 (35)
2	YEL	2-14-17	18 AWG	GXL	X432 (R)

S109					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-14-21-1	12 AWG	GXL	X83B (12)
1	YEL	2-14-21-2	12 AWG	GXL	X83B (10)
2	YEL	2-14-21	12 AWG	GXL	X432 (B)

S160					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	1-3	18 AWG	GXL	X432 (K)
2	RED	1-3-1	18 AWG	GXL	X159 (1)
2	RED	1-3-2	18 AWG	GXL	X158 (B)

S129					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-3-1	12 AWG	GXL	X83B (16)
1	BLK	0-14-3-2	12 AWG	GXL	X83B (18)
2	BLK	0-14-3	10 AWG	GXL	X432 (G)

S162					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-6-1	18 AWG	GXL	X159 (2)
1	BLK	0-14-6-2	18 AWG	GXL	X158 (A)
2	BLK	0-14-6	18 AWG	GXL	X432 (M)

S163					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-14-5-1	18 AWG	GXL	X159 (3)
1	YEL	2-14-5-2	18 AWG	GXL	X158 (H)
2	YEL	2-14-20	18 AWG	GXL	X432 (L)

S458					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-14-11-1	18 AWG	GXL	X336 (14)
1	YEL	2-14-11-2	18 AWG	GXL	X336 (12)
2	YEL	2-14-11	18 AWG	GXL	X432 (H)

S112					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-12-1	18 AWG	GXL	MS227 (1)
1	YEL	2-12-2	18 AWG	GXL	MS228 (1)
2	YEL	2-12	18 AWG	GXL	X432 (U)

MS228 GND DIODE					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-12-2	18 AWG	GXL	S112 (1)
2	YEL	2-12-2	18 AWG	GXL	X144B (2)

1001245028-A
MAF23270A

Figure 7-75. Turntable Harness - Sheet 3 of 5

RL111 IGNITION RELAY					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-12	18AWG	GXL	X432B(U)
2	BLK	0-14-1	18AWG	GXL	X123(1)

X334 TILT SNSR					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	2-14-16	18AWG	GXL	FC242(16)
2	BLK	0-40	18AWG	GXL	X340(1)
3	YEL	CH#1 TO TILT SNSR	18AWG	GXL	X432B(S)
4	GRN	CH#1 TO TILT SNSR	18AWG	GXL	X432B(T)

X124 TO GND					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-4	12AWG	GXL	X432B(E)

X126 TO GND					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-2	18AWG	GXL	X432B(F)

X125 TO GND					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-3	10AWG	GXL	X432B(G)

X161 TO GND					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-6	18AWG	GXL	X432B(M)

X165 TO GND					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-7	18AWG	GXL	X432B(J)

X123 TO GND					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-14-1	18AWG	GXL	RL111(2)

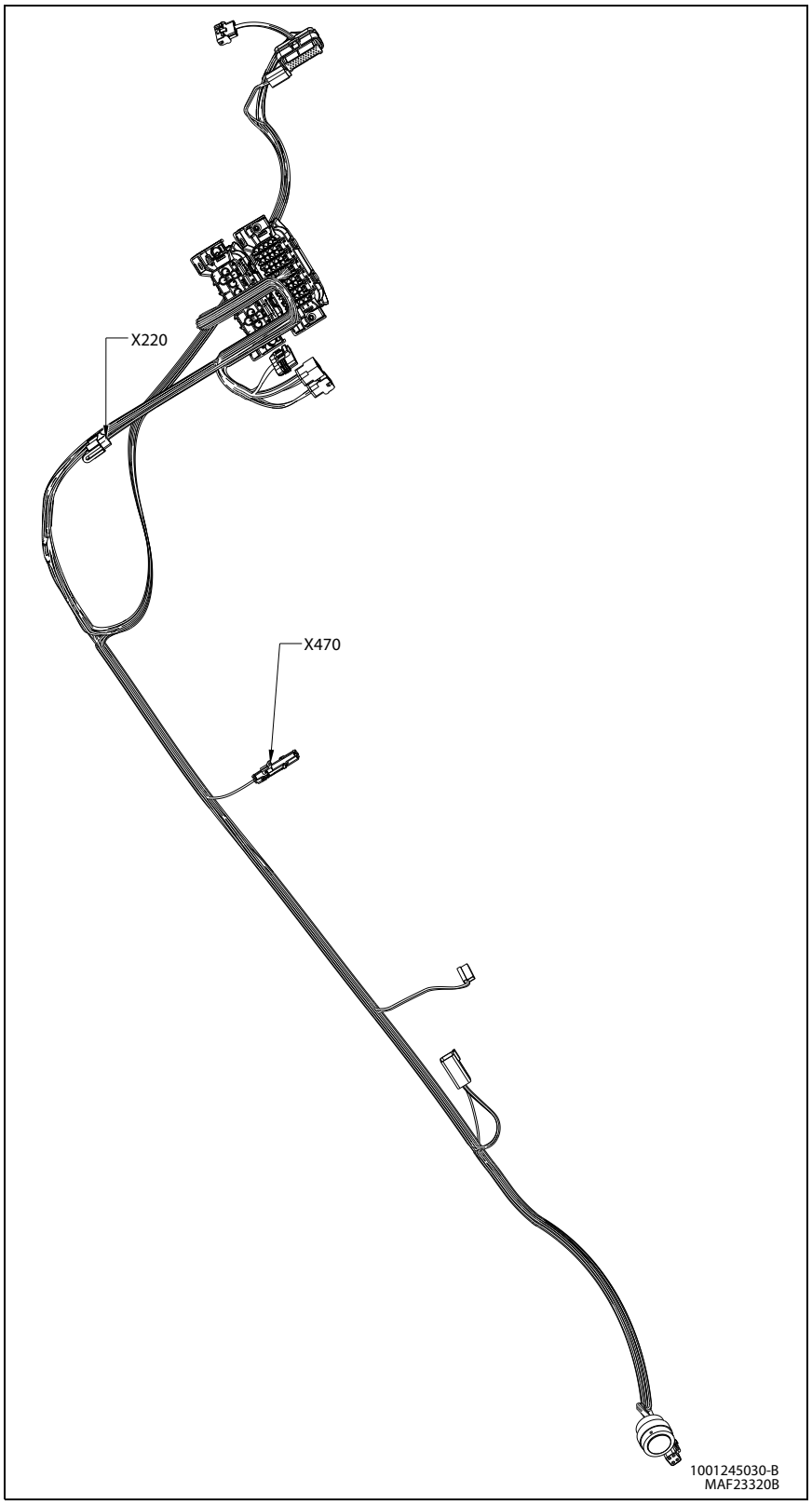


Figure 7-86. Engine Harness - Sheet 1 of 4

X329 84V NEG					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-36 84V GND	12AWG	GXL	CO7-1(3)
1	BLK	0-46	16AWG	GXL	X344(A)

X346 TO RSLVER/CNVTER					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-46	18AWG	GXL	CO6-A(15)
2					
3	WHT	84-22 SPD PULSE	18AWG	GXL	CO6-A(18)
4	WHT	84-18 IMG SPD SIN	18AWG	GXL	CO6-B(7)
5	WHT	84-16 IMG SPD COS	18AWG	GXL	CO6-B(14)
6	WHT	84-19 SPD VFB	18AWG	GXL	CO6-B(3)
7	WHT	84-17 IMG SPD PWR	18AWG	GXL	CO6-B(8)
8					
9	WHT	84-20 SPD CHRG	18AWG	GXL	CO6-A(19)
10	BLK	0-39-3	18AWG	GXL	S345(2)
11					
12	WHT	84-21 IMG TEMP	18AWG	GXL	CO6-A(23)

X544 RL269 RIGHT STUD					
CONN POS	WIREC OLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-1-2	18AWG	GXL	RL272-30(1)

X543 RL269 LEFT STUD					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	84-3-2 MAIN CONT	18AWG	GXL	X542(3)

SW269-3 84V POS					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	84-1	16AWG	GXL	FC457-2(1)
1	ORG	84-5	12AWG	GXL	FC456-1(1)

RL515-85 (-)EN CONTACTOR					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-35-1 12V GND	18AWG	GXL	X305(1)

FC457-2 84V ENABLE FUSE					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	84-1	16AWG	GXL	SW269-3(1)

FC457-1 84V ENABLE FUSE					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	84-1	16AWG	GXL	RL272-87(1)

FC456-1 84V DC TO DC FUSE					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	84-5	12AWG	GXL	SW269-3(1)

CO7-1 DC/DC CNVTER					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-35 12V GND	10AWG	GXL	X305(1)
2	YEL	2-15	10AWG	GXL	X516(1)
3	BLK	0-36 84V GND	12AWG	GXL	X329(1)
4	ORG	84-5 DC TO DC PWR	12AWG	GXL	RL515-87(1)
5					

X290-84V-					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	BLK	0-37	12AWG	GXL	CO5-4(1)
1	BLK	0-33-1	18AWG	GXL	CO5-8(8)

X279-84V-					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	BLK	0-33	18AWG	GXL	CO4-8(8)
1	BLK	0-38	12AWG	GXL	CO4-4(1)

X344(D)-					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	81-1TEMPSEN	16AWG	GXL	CO4-4(3)

X344(E)-					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	81-2TEMPRTN	16AWG	GXL	CO4-4(4)

FC342-CHARGERFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-7	12AWG	GXL	SW269-4(1)
2	ORG	84-7	12AWG	GXL	CO4-4(2)

X314B - TOIMGCNTRL					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	82-1CHRGINTLK	18AWG	GXL	CO5-8(2)
2	WHT	82-2CHRGINTLK	18AWG	GXL	CO4-8(2)

SW269-4-84V+					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-6	12AWG	GXL	FC341(1)
1	ORG	84-7	12AWG	GXL	FC342(1)

FC341-CHARGERFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-6	12AWG	GXL	SW269-4(1)
2	ORG	84-6	12AWG	GXL	CO5-4(2)

CO4-4-CHARGEROUTPUT					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	BLK	0-38	12AWG	GXL	X279(1)
2	ORG	84-7	12AWG	GXL	FC342(2)
3	WHT	81-1TEMPSEN	16AWG	GXL	X344(D)(1)
4	WHT	81-2TEMPRTN	16AWG	GXL	X344(E)(1)

CO5-8-DELTAQ					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1					
2	WHT	82-1CHRGINTLK	18AWG	GXL	X314B(1)
3	WHT	80-6REDLED	18AWG	GXL	LB278(4)
4	WHT	80-4YELLED	18AWG	GXL	LB278(2)
5	BLK	0-32	18AWG	GXL	LB278(1)
6	WHT	80-2GRNLED	18AWG	GXL	LB278(3)
7					
8	BLK	0-33-1	18AWG	GXL	X290(1)

FC360-1-84VSIGFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2884VOLT	12AWG	GXL	X460B(2)

X367-EQUILIZERGROUND					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	BLK	0-45	16AWG	GXL	X344B(J)

FC419-2-BTEMP1FUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	84-15BTEMP1	18AWG	GXL	X344B(B)

FC359-2-72VSIGFUSE					
CONNPOS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2772VOLT	12AWG	GXL	X365(3)

FC356-2-SOCFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-29SOCPWR	16AWG	GXL	X403B(11)

X368-48VEQ					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2548VOLT	12AWG	GXL	FC357-1(1)

FC360-2-84VSIGFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2884VOLT	12AWG	GXL	X365(4)

FC420-1-BTEMP2FUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	84-14BTEMP2	18AWG	GXL	SN310(1)

FC357-1-48VSIGFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2548VOLT	12AWG	GXL	X368(1)

FC357-2-48VSIGFUSE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2548VOLT	12AWG	GXL	X365(1)

X365-EQUILIZEROUTPUT					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2548VOLT	12AWG	GXL	FC357-2(1)
2	ORG	84-2660VOLT	12AWG	GXL	FC358-2(1)
3	ORG	84-2772VOLT	12AWG	GXL	FC359-2(1)
4	ORG	84-2884VOLT	12AWG	GXL	FC360-2(1)

SN310-TEMPSNSR2					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	WHT	84-14BTEMP2	18AWG	GXL	FC420-1(1)
2	BLK	0-39-1-2	18AWG	GXL	S313(1)

X369-60VEQ					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	TO
1	ORG	84-2660VOLT	12AWG	GXL	FC358-1(1)

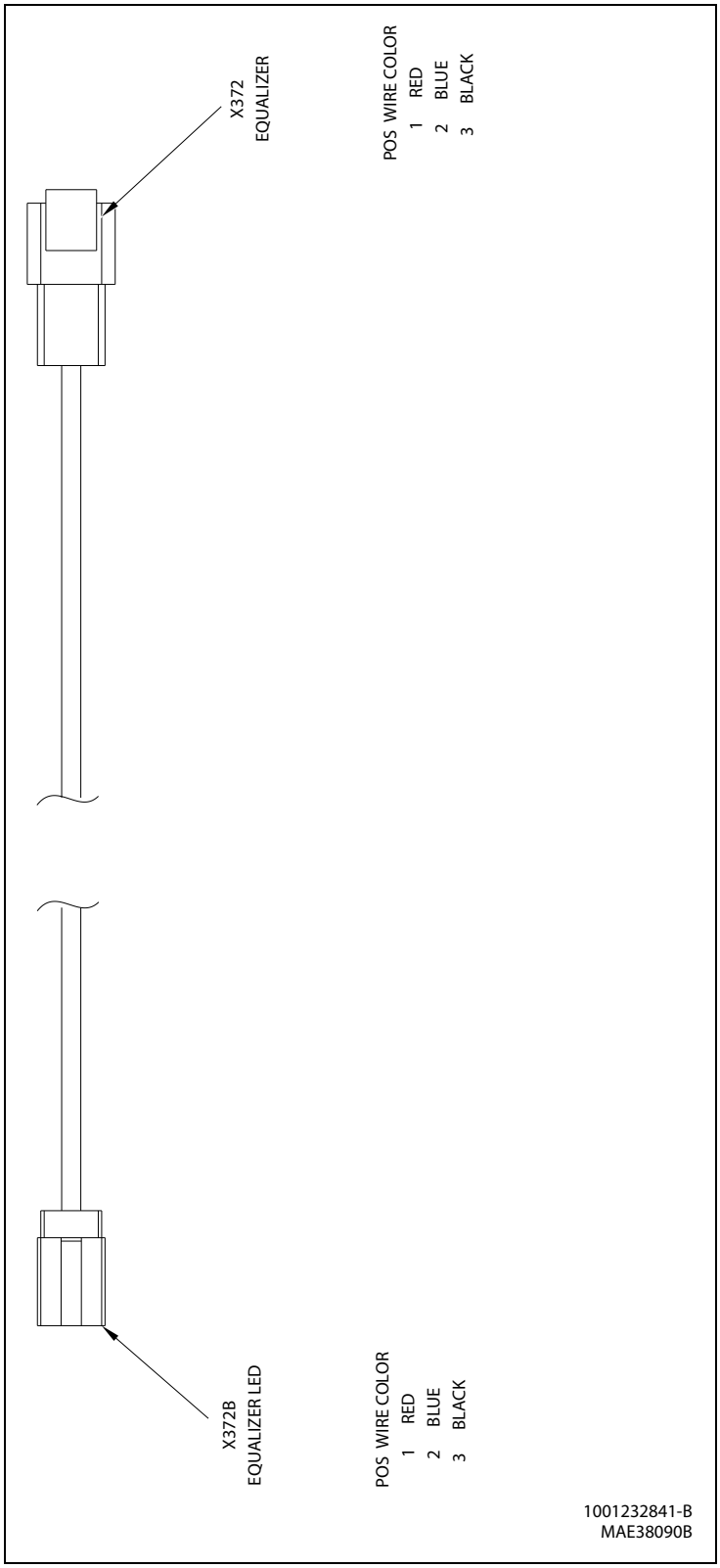


Figure 7-105. Equalizer Cable (RT)

X5B- INTERFACE					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
1	WHT	P2	18AWG	GXL	IP114(1)
2	WHT	P6	18AWG	GXL	X500(2)
3					
4	WHT	P1	18AWG	GXL	RL503(87)
5	WHT	P3	18AWG	GXL	RL502(87)
6					

RL503-SKYGUARDRELAY#1					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
30	WHT	P9-1	18AWG	GXL	IP114(1)
85	WHT	P5-1	18AWG	GXL	S191(1)
86	WHT	P4-1	18AWG	GXL	S192(1)
87	WHT	P1	18AWG	GXL	X5B(4)
87A					

RL502-SKYGUARDRELAY#2					
CONNPOS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
30	WHT	P9-2	18AWG	GXL	IP114(1)
85	WHT	P5-2	18AWG	GXL	S191(1)
86	WHT	P4-2	18AWG	GXL	S192(1)
87	WHT	P3	18AWG	GXL	X5B(5)
87a					

S192					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
1	WHT	P4-1	18AWG	GXL	RL503(86)
1	WHT	P4-2	18AWG	GXL	RL502(86)
2	WHT	P4	18AWG	GXL	X500(3)

S191					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
1	WHT	P5-1	18AWG	GXL	RL503(85)
1	WHT	P5-2	18AWG	GXL	RL502(85)
2	WHT	P5	18AWG	GXL	X500(4)

X500 - PLATSENSOR					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
1	WHT	P10	18AWG	GXL	IP114(2)
2	WHT	P6	18AWG	GXL	X5B(2)
3	WHT	P4	18AWG	GXL	S192(2)
4	WHT	P5	18AWG	GXL	S191(2)

IP114					
CONN POS	WIRE COLOR	WIRELABEL	GAUGE	JACKET	T0
1	WHT	P2	18AWG	GXL	X5B(1)
1	WHT	P9-1	18AWG	GXL	RL503(30)
1	WHT	P9-2	18AWG	GXL	RL502(30)
2	WHT	P10	18AWG	GXL	X500(1)

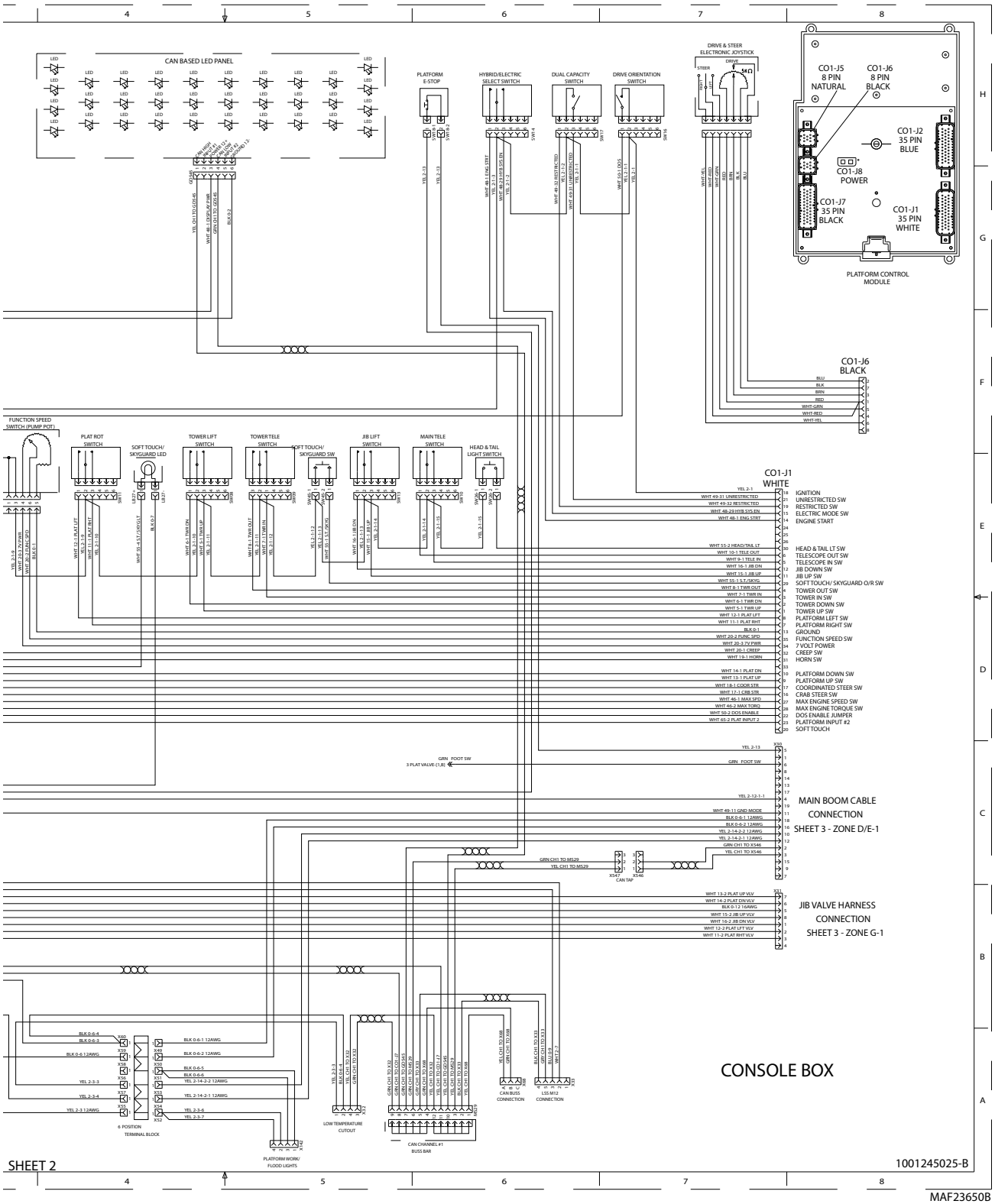


Figure 7-115. Electrical Schematics - Sheet 3 of 19

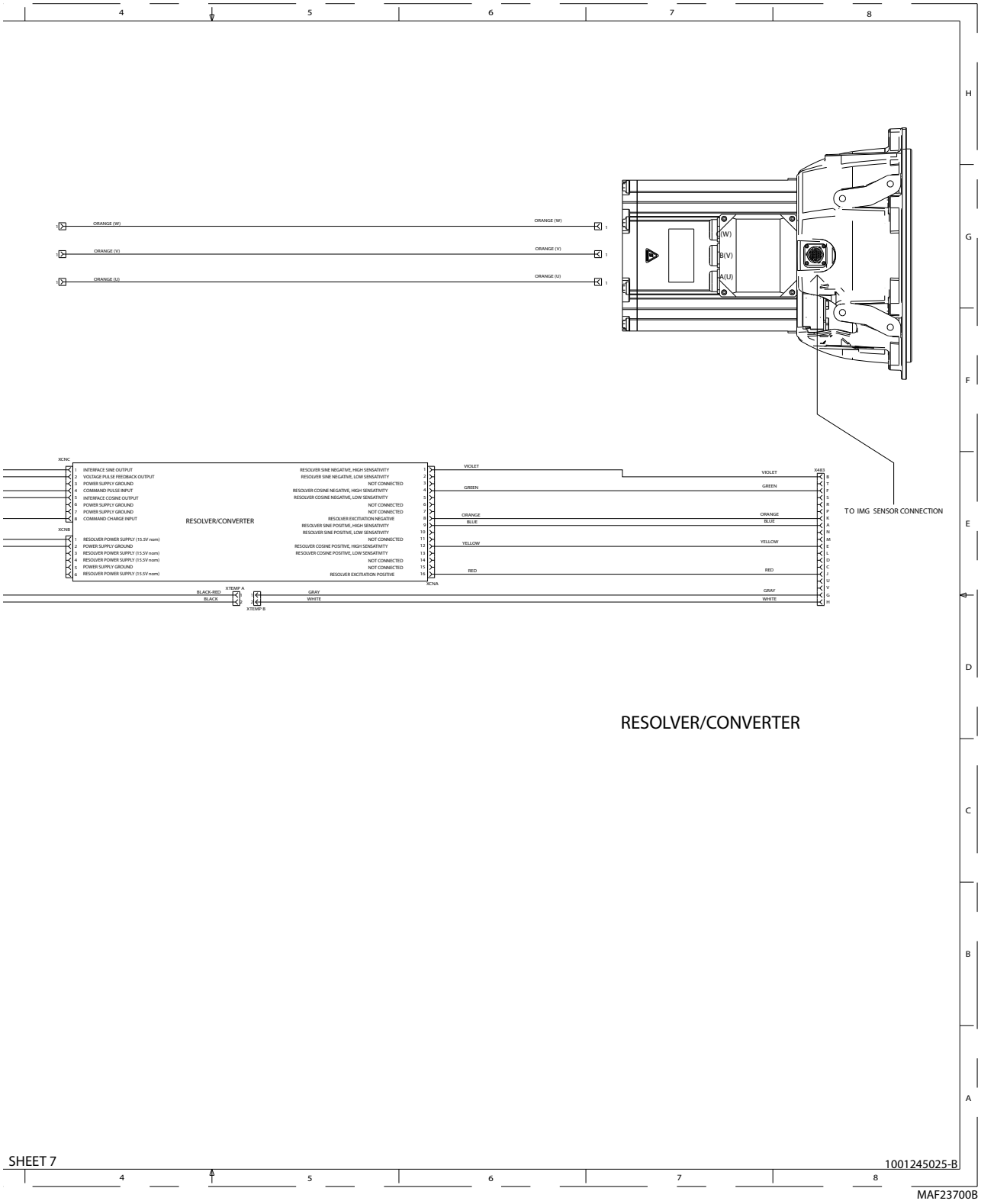


Figure 7-125. Electrical Schematics - Sheet 13 of 19