



Service and Repair Manual

Serial Number Range

Z-40/23N

from Z40N13-1902 to
Z40N16N-4499

Z-40/23N RJ

from Z40NN-4500

This manual includes:
Repair procedures
Fault Codes
Electrical and
Hydraulic Schematics

For detailed maintenance
procedures, refer to the
appropriate Maintenance
Manual for your machine.

Part No. 1268528
Rev A2
September 2016

Introduction

Important

Read, understand and obey the safety rules and operating instructions in the appropriate Operator's Manual on your machine before attempting any procedure.

This manual provides troubleshooting and repair procedures for qualified service professionals.

Basic mechanical, hydraulic and electrical skills are required to perform most procedures. However, several procedures require specialized skills, tools, lifting equipment and a suitable workshop. In these instances, we strongly recommend that maintenance and repair be performed at an authorized Genie dealer service center.

Compliance

Machine Classification

Group B/Type 3 as defined by ISO 16368

Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

Genie has endeavored to deliver the highest degree of accuracy possible. However, continuous improvement of our products is a Genie policy. Therefore, product specifications are subject to change without notice.

Readers are encouraged to notify Genie of errors and send in suggestions for improvement. All communications will be carefully considered for future printings of this and all other manuals.

Contact Us:

Internet: www.genielift.com

E-mail: awp.techpub@terex.com

Find a Manual for this Model

Go to <http://www.genielift.com>

Use the links to locate Service Manuals, Maintenance Manuals, Service and Repair Manuals, Parts Manuals and Operator's Manuals.

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First Edition, First Printing

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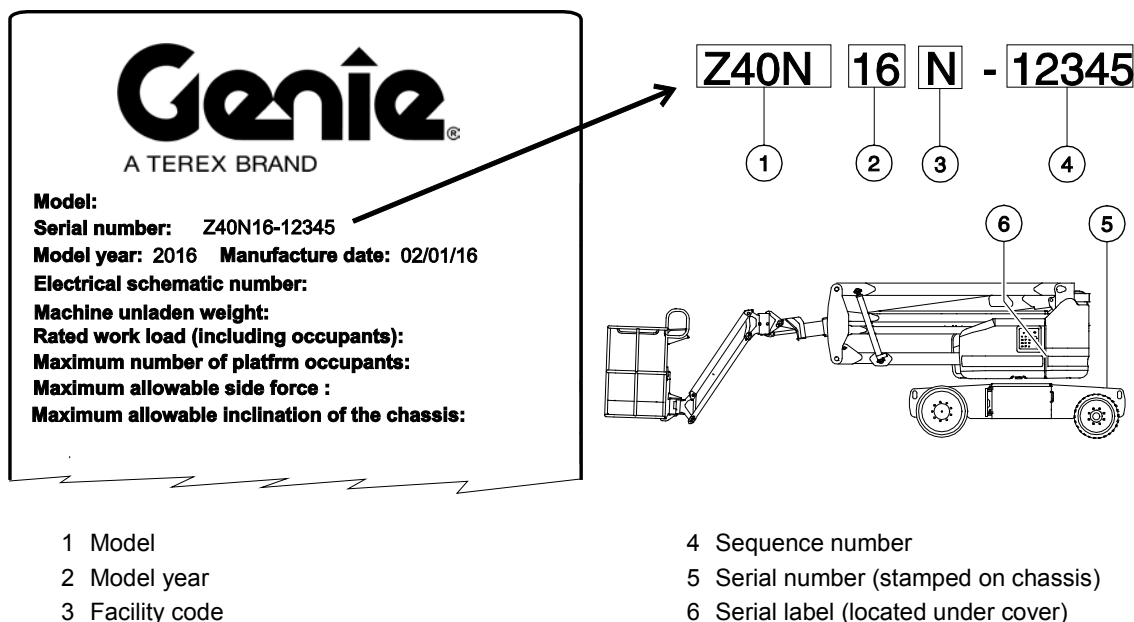
Revision History

Part No. 1268528 Z-40/23N, Z-40/23N RJ iii

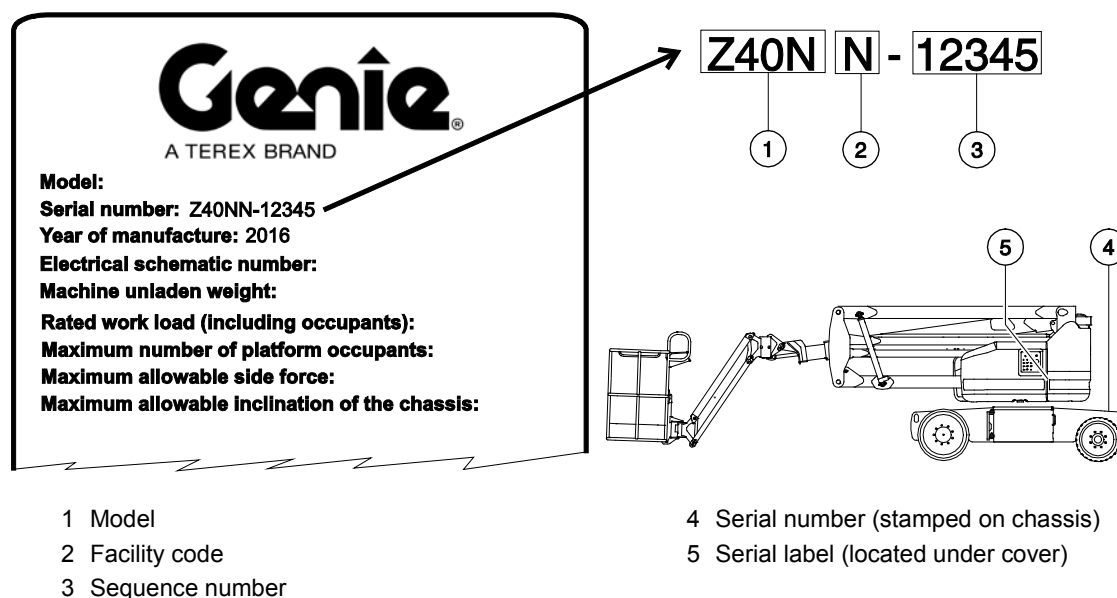
Introduction

Serial Number Legend

To August 31, 2016



From September 1, 2016



Safety Rules



Danger

Failure to obey the instructions and safety rules in this manual and the appropriate Operator's Manual on your machine will result in death or serious injury.

Many of the hazards identified in the operator's manual are also safety hazards when maintenance and repair procedures are performed.

Do Not Perform Maintenance Unless:

- ☒ You are trained and qualified to perform maintenance on this machine.
- ☒ You read, understand and obey:
 - manufacturer's instructions and safety rules
 - employer's safety rules and worksite regulations
 - applicable governmental regulations
- ☒ You have the appropriate tools, lifting equipment and a suitable workshop.

Safety Rules

Personal Safety

Any person working on or around a machine must be aware of all known safety hazards. Personal safety and the continued safe operation of the machine should be your top priority.



Read each procedure thoroughly. This manual and the decals on the machine, use signal words to identify the following:



Safety alert symbol—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

Indicates a imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may cause minor or moderate injury.

NOTICE

Indicates a potentially hazardous situation which, if not avoided, may result in property damage.



Be sure to wear protective eye wear and other protective clothing if the situation warrants it.



Be aware of potential crushing hazards such as moving parts, free swinging or unsecured components when lifting or placing loads. Always wear approved steel-toed shoes.

Workplace Safety

Any person working on or around a machine must be aware of all known safety hazards. Personal safety and the continued safe operation of the machine should be your top priority.



Be sure to keep sparks, flames and lighted tobacco away from flammable and combustible materials like battery gases and engine fuels. Always have an approved fire extinguisher within easy reach.



Be sure that all tools and working areas are properly maintained and ready for use. Keep work surfaces clean and free of debris that could get into machine components and cause damage.



Be sure any forklift, overhead crane or other lifting or supporting device is fully capable of supporting and stabilizing the weight to be lifted. Use only chains or straps that are in good condition and of ample capacity.



Be sure that fasteners intended for one time use (i.e., cotter pins and self-locking nuts) are not reused. These components may fail if they are used a second time.



Be sure to properly dispose of old oil or other fluids. Use an approved container. Please be environmentally safe.



Be sure that your workshop or work area is properly ventilated and well lit.

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Specifications

Machine Specifications

Tires and wheels	Front	Rear
Tire size	22 x 7 x 17.75 in	25.6 x 7 x 22 in
(solid rubber)	56 x 17.8 x 45 cm	56 x 17.8 x 45 cm
Overall tire diameter	22in	25.6in
	55.9 cm	65 cm
Wheel diameter	18.4 in	22 in
	46.7 cm	56 cm
Wheel width	7 in	7 in
Wheel lugs	8 @ 5/8 - 18	9 @ 5/8 - 18
Lug nut torque		
(lubricated)	94 ft-lbs	94 ft-lbs
	127.5 Nm	127.5 Nm
(dry)	125 ft-lbs	125 ft-lbs
	169.5 Nm	169.5 Nm

For operational specifications, refer to the Operator's Manual.

Fluid capacities

Hydraulic tank	8 gallons
	30.3 liters
Hydraulic system (including tank)	10 gallons
	37.9 liters
Drive hubs	23 fl oz
	680 cc
Drive hub oil type:	EP 80-90W gear oil
	API service classification GL5

Batteries

Type	6V DC
Group size	L16GH
Quantity	8
Capacity	390 AH
Reserve capacity @ 25A rate	789 minutes
Weight, each	101 lb
	46 kgs

Specifications

Performance Specifications Z-40/23N and Z-40/23N RJ

Drive speed, maximum

Drive speed, stowed	4.5 mph 7.24 km/h 40 ft / 6.0 sec 12.2 m / 6.0 sec
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Drive speed, stowed (CE models)	3.75 mph 6 km/h 40 ft / 7.3 sec 12.2 m / 7.3 sec
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Drive speed, boom raised or extended, all models	0.68 mph 1.09 km/h 40 ft/40 sec 12.2 m/40 sec
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Braking distance

On paved surface	5 to 7 ft 1.5 to 2m
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Gradeability	See Operator's Manual
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Boom function speeds, maximum from platform controls (with rated load secured to platform)

Jib boom up	16 to 20 seconds
Jib boom down	16 to 20 seconds
Jib boom rotate, 180°, Z40/23N RJ	16 to 20 seconds
Primary boom up	26 to 30 seconds
Primary boom down	26 to 30 seconds
Primary boom extend	18 to 22 seconds
Primary boom retract	18 to 22 seconds
Secondary boom up	32 to 36 seconds
Secondary boom down°	32 to 36 seconds
Turntable rotate, 355°	62 to 68 seconds
Platform rotate, 180°	10 to 14 seconds

Specifications

Hydraulic Oil Specifications

Hydraulic Fluid Specifications

Genie specifications require hydraulic oils which are designed to give maximum protection to hydraulic systems, have the ability to perform over a wide temperature range, and the viscosity index should exceed 140. They should provide excellent antiwear, oxidation prevention, corrosion inhibition, seal conditioning, and foam and aeration suppression properties.

Cleanliness level, minimum	ISO 15/13
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Water content, maximum	250 ppm
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Recommended Hydraulic Fluid

Hydraulic oil type	Chevron Rando HD Premium
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Viscosity grade	32
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Viscosity index	200
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Optional Hydraulic Fluids

Mineral based	Shell Tellus S2 V 32 Shell Tellus S2 V 46 Shell Tellus S4 VX 32 Shell Shell Donax TG (Dexron III) Chevron 5606A
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Biodegradable	Petro Canada Environ MV 46
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Fire resistant	UCON Hydrolube HP-5046
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Note: Genie specifications require additional equipment and special installation instructions for the approved optional fluids. Consult Genie Product Support before use.

NOTICE

Optional fluids may not have the same hydraulic lifespan and may result in component damage.

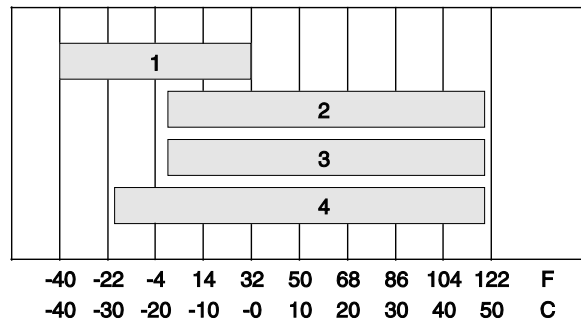
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond its maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

NOTICE

Do not top off with incompatible hydraulic fluids. Hydraulic fluids may be incompatible due to the differences in base additive chemistry. When incompatible fluids are mixed, insoluble materials may form and deposit in the hydraulic system, plugging hydraulic lines, filters, control valves and may result in component damage.

Note: Do not operate the machine when the ambient air temperature is consistently above 120°F / 49°C.

Hydraulic Fluid Temperature Range



Ambient air temperature

- 1 Chevron hydraulic oil 5606A
- 2 Petro-Canada Environ MV 46
- 3 UCON Hydrolube HP-5046D
- 4 Chevron Rando HD premium oil MV

Specifications

Chevron Rando HD Premium Oil MV Fluid Properties

ISO Grade	32
Viscosity index	200
Kinematic Viscosity	
cSt @ 200°F / 100°C	7.5
cSt @ 104°F / 40°C	33.5
Brookfield Viscosity	
cP @ -4°F / -20°C	1040
cP @ -22°F / -30°C	3310
Flash point	375°F / 190°C
Pour point	-58°F / -50°C
Maximum continuous operating temperature	171°F / 77°C

Note: A hydraulic oil heating system is recommended when the ambient temperature is consistently below 0°F / -18°C.

Note: Do not operate the machine when the ambient temperature is below -20°F / -29°C with Rando HD Premium MV.

Chevron 5606A Hydraulic Oil Fluid Properties

ISO Grade	15
Viscosity index	300
Kinematic Viscosity	
cSt @ 200°F / 100°C	5.5
cSt @ 104°F / 40°C	15.0
cSt @ -40°F / -40°C	510
Flash point	180°F / 82°C
Pour point	-81°F / -63°C
Maximum continuous operating temperature	124°F / 51°C

Note: Use of Chevron 5606A hydraulic fluid, or equivalent, is required when ambient temperatures are consistently below 0°F / -17°C unless an oil heating system is used.

NOTICE Continued use of Chevron 5606A hydraulic fluid, or equivalent, when ambient temperatures are consistently above 32°F / 0°C may result in component damage

Petro-Canada Environ MV 46 Fluid Properties

ISO Grade	46
Viscosity index	154
Kinematic Viscosity	
cSt @ 200°F / 100°C	8.0
cSt @ 104°F / 40°C	44.4
Flash point	482°F / 250°C
Pour point	-49°F / -45°C
Maximum continuous operating temperature	180°F / 82°C

Shell Tellus S4 VX Fluid Properties

ISO Grade	32
Viscosity index	300
Kinematic Viscosity	
cSt @ 200°F / 100°C	9
cSt @ 104°F / 40°C	33.8
Brookfield Viscosity	
cSt @ -4°F / -20°C	481
cSt @ -13°F / -25°C	702.4
cSt @ -40°F / -40°C	2624
Flash point	>100
Pour point	-76°F / -60°C
Maximum continuous operating temperature	103°F / 75°C

UCON Hydrolube HP-5046 Fluid Properties

ISO Grade	46
Viscosity index	192
Kinematic Viscosity	
cSt @ 149°F / 65°C	22
cSt @ 104°F / 40°C	46
cSt @ 0°F / -18°C	1300
Flash point	None
Pour point	-81°F / -63°C
Maximum continuous operating temperature	189°F / 87°C

Specifications

Hydraulic Component Specifications

Function pump

Type: Fixed displacement gear pump

Displacement 0.244 cu in
4 cc

High pressure filter Beta 3 $\geq$ 200 with 101 psi
/ 7 bar bypass

Function manifold

Proportional relief pressure, variable 50 to 3000 psi
3.4 to 207 bar

Primary boom down relief valve pressure 2100 psi
145 bar

Platform level relief valve pressure 2500 psi
172 bar

Platform level flow regulator 1800 psi
124 bar

Turntable rotate relief pressure 0.6 gpm
2.27 L/min

Auxiliary pump

Type: Fixed
displacement
gear pump

Displacement 0.5 gpm
1.9 L/min

Manifold Component Specifications

Plug torque

SAE No. 2 36 in-lbs / 4 Nm

SAE No. 4 10 ft-lbs / 13 Nm

SAE No. 6 14 ft-lbs / 19 Nm

SAE No. 8 38 ft-lbs / 51 Nm

SAE No. 10 41 ft-lbs / 55 Nm

SAE No. 12 56 ft-lbs / 76 Nm

Valve Coil Resistance

Note: The following coil resistance specifications are at an ambient temperature of 68°F / 20°C. As valve coil resistance is sensitive to changes in air temperature, the coil resistance will typically increase or decrease by 4% for each 18°F / 10°C that your air temperature increases or decreases from 68°F / 20°C.

Valve Coil Resistance Specification

Description	Specification
Solenoid valve, 3 position 4 way, 20V DC (schematic item BG)	24 Ω
Proportional solenoid valve, 3 position 4 way, 20V DC (schematic items AA, AB, AC, BC, BG, BK, BN, BS, and BU)	24 Ω
Proportional solenoid relief valve, 20V DC (schematic item BW)	22 Ω

Specifications

Machine Torque Specifications

Platform rotator

3/4 - 10 center bolt, GR 8 (dry)	380 ft-lbs 515 Nm
3/4 - 10 center bolt, GR 8 (lubricated)	280 ft-lbs 379 Nm
3/8 - 16 bolts, GR 8, (dry)	44 ft-lbs 60 Nm
3/8 - 16 bolts, GR 8, (lubricated)	33 ft-lbs 45 Nm

Jib boom rotator, Z-40/23N RJ

1 - 8 center bolt, GR 5, (dry)	640 ft-lbs 868 Nm
1 - 8 center bolt, GR 5, (dry)	480 ft-lbs 650 Nm
1/2 - 13 bolts, GR 5, (dry)	75 ft-lbs 102 Nm
1/2 - 13 bolts, GR 5, (lubricated)	57 ft-lbs 77Nm

Axles

5/8 - 11 mounting bolt, GR 5 (dry)	150 ft-lbs 203 Nm
5/8 11 mounting bolt, GR 5 (lubricated)	101 ft-lbs 149 Nm

Turntable rotate assembly

Rotate bearing mounting bolts, lubricated	180 ft-lbs 244 Nm
Rotate bearing motor/brake mounting bolts, lubricated	93 ft-lbs 126 Nm

Drive motor and hubs

Drive hub mounting bolts, lubricated	180 ft-lbs 244 Nm
Drive motor mounting bolts, lubricated	5 ft-lbs 6.8 Nm

Specifications

Hydraulic Hose and Fitting Torque Specifications

Your machine is equipped with Parker Seal-Lok™ ORFS or 37° JIC fittings and hose ends. Genie specifications require that fittings and hose ends be torqued to specification when they are removed and installed or when new hoses or fittings are installed.

Seal-Lok™ Fittings

(hose end - ORFS)

SAE Dash Size	Torque
-4	10 ft-lbs / 13.6 Nm
-6	30 ft-lbs / 40.7 Nm
-8	40 ft-lbs / 54.2 Nm
-10	60 ft-lbs / 81.3 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	140 ft-lbs / 190 Nm
-24	180 ft-lbs / 245 Nm

JIC 37° Fittings

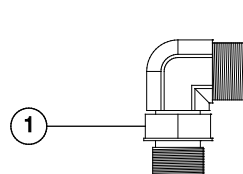
(swivel nut or hose connection)

SAE Dash Size	Thread Size	Flats
-4	7/16-20	2
-6	9/16-18	1 ¼
-8	3/4-16	1
-10	7/8-14	1
-12	1 1/16-12	1
-16	1 5/16-12	1
-20	1 5/8-12	1
-24	1 7/8-12	1

SAE O-ring Boss Port

(tube fitting - installed into Aluminum)
(all types)

SAE Dash Size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31.2 Nm
-8	36 ft-lbs / 54.2 Nm
-10	62 ft-lbs / 84 Nm
-12	84 ft-lbs / 114 Nm
-16	125 ft-lbs / 169.5 Nm
-20	151 ft-lbs / 204.7 Nm
-24	184 ft-lbs / 249.5 Nm



Adjustable Fitting

1 jam nut



Non-adjustable fitting

SAE O-ring Boss Port

(tube fitting - installed into Steel)

SAE Dash Size	Torque
-4 ORFS / 37° (Adj)	15 ft-lbs / 20.3 Nm
ORFS (Non-adj)	26 ft-lbs / 35.3 Nm
37° (Non-adj)	22 ft-lbs / 30 Nm
-6 ORFS (Adj / Non-adj)	35 ft-lbs / 47.5 Nm
37° (Adj / Non-adj)	29 ft-lbs / 39.3 Nm
-8 ORFS (Adj / Non-adj)	60 ft-lbs / 81.3 Nm
37° (Adj / Non-adj)	52 ft-lbs / 70.5 Nm
-10 ORFS (Adj / Non-adj)	100 ft-lbs / 135.6 Nm
37° (Adj / Non-adj)	85 ft-lbs / 115.3 Nm
-12 (All types)	135 ft-lbs / 183 Nm
-16 (All types)	200 ft-lbs / 271.2 Nm
-20 (All types)	250 ft-lbs / 339 Nm
-24 (All types)	305 ft-lbs / 413.5 Nm

Specifications

Torque Procedure

Seal-Lok™ fittings

- 1 Replace the O-ring. The O-ring must be replaced anytime the seal has been broken. The O-ring cannot be re-used if the fitting or hose end has been tightened beyond finger tight.

Note: The O-ring in Parker Seal Lok™ fittings and hose end are custom-size O-rings. They are not standard size O-rings. They are available in the O-ring field service kit (Genie part number 49612).

- 2 Lubricate the O-ring before installation.
- 3 Be sure the O-ring face seal is seated and retained properly.
- 4 Position the tube and nut squarely on the face seal end of the fitting, and tighten the nut finger tight.
- 5 Tighten the nut or fitting to the appropriate torque. Refer to the appropriate torque chart in this section.
- 6 Operate all machine functions and inspect the hose, fittings and related components to confirm there are no leaks.

JIC 37° fittings

- 1 Align the tube flare (hex nut) against the nose of the fitting body (body hex fitting) and tighten the hex nut to the body hex fitting to hand tight, approximately 30 in-lbs / 3.4 Nm.
- 2 Using a permanent ink marker, make a reference mark on one the flats of the hex nut and continue the mark onto the body of the hex fitting. Refer to Illustration 1.

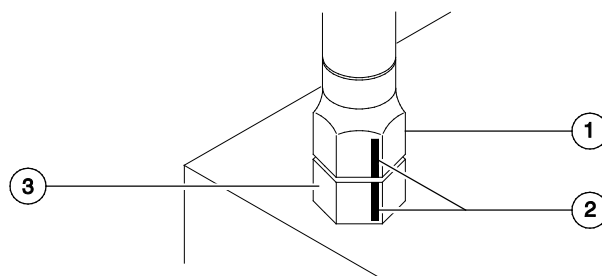


Illustration 1

- 1 hex nut
- 2 reference mark
- 3 body hex fitting

Specifications

- 3 Working clockwise on the body hex fitting, make a second mark with a permanent ink marker to indicate the proper tightening position. Refer to Illustration 2.

Note: Use the JIC 37° Fitting table in this section to determine the correct number of flats, for the proper tightening position.

Note: The marks indicate the correct tightening positions have been determined. Use the second mark on the body hex fitting to properly tighten the joint after it has been loosened.

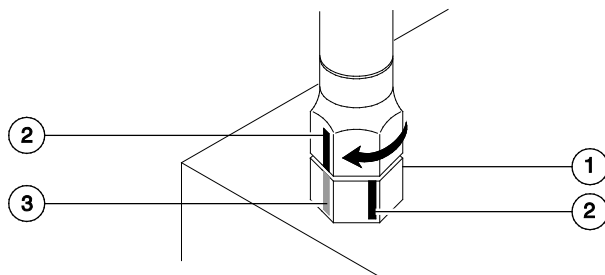


Illustration 2

- 1 body hex fitting
 - 2 reference mark
 - 3 second mark
- 4 Tighten the hex nut until the mark on the hex nut is aligned with the second mark on the body hex fitting.
 - 5 Operate all machine functions and inspect the hose, fittings and related components to confirm there are no leaks.

Specifications

SAE FASTENER TORQUE CHART											
• This chart is to be used as a guide only unless noted elsewhere in this manual •											
SIZE	THREAD	Grade 5 				Grade 8 				A574 High Strength Black Oxide Bolts	
		LUBED		DRY		LUBED		DRY		LUBED	
		in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
1/4	20	80	9	100	11.3	110	12.4	140	15.8	130	14.7
	28	90	10.1	120	13.5	120	13.5	160	18	140	15.8
		LUBED		DRY		LUBED		DRY		LUBED	
		ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
5/16	18	13	17.6	17	23	18	24	25	33.9	21	28.4
	24	14	19	19	25.7	20	27.1	27	36.6	24	32.5
3/8	16	23	31.2	31	42	33	44.7	44	59.6	38	51.5
	24	26	35.2	35	47.4	37	50.1	49	66.4	43	58.3
7/16	14	37	50.1	49	66.4	50	67.8	70	94.7	61	82.7
	20	41	55.5	55	74.5	60	81.3	80	108.4	68	92.1
1/2	13	57	77.3	75	101.6	80	108.4	110	149	93	126
	20	64	86.7	85	115	90	122	120	162	105	142
9/16	12	80	108.4	110	149	120	162	150	203	130	176
	18	90	122	120	162	130	176	170	230	140	189
5/8	11	110	149	150	203	160	217	210	284	180	244
	18	130	176	170	230	180	244	240	325	200	271
3/4	10	200	271	270	366	280	379	380	515	320	433
	16	220	298	300	406	310	420	420	569	350	474
7/8	9	320	433	430	583	450	610	610	827	510	691
	14	350	474	470	637	500	678	670	908	560	759
1	8	480	650	640	867	680	922	910	1233	770	1044
	12	530	718	710	962	750	1016	990	1342	840	1139
1 1/8	7	590	800	790	1071	970	1315	1290	1749	1090	1477
	12	670	908	890	1206	1080	1464	1440	1952	1220	1654
1 1/4	7	840	1138	1120	1518	1360	1844	1820	2467	1530	2074
	12	930	1260	1240	1681	1510	2047	2010	2725	1700	2304
1 1/2	6	1460	1979	1950	2643	2370	3213	3160	4284	2670	3620
	12	1640	2223	2190	2969	2670	3620	3560	4826	3000	4067

METRIC FASTENER TORQUE CHART																
• This chart is to be used as a guide only unless noted elsewhere in this manual •																
Size (mm)	Class 4.6 				Class 8.8 				Class 10.9 				Class 12.9 			
	LUBED		DRY		LUBED		DRY		LUBED		DRY		LUBED		DRY	
	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm
5	16	1.8	21	2.4	41	4.63	54	6.18	58	6.63	78	8.84	68	7.75	91	10.3
6	19	3.05	36	4.07	69	7.87	93	10.5	100	11.3	132	15	116	13.2	155	17.6
7	45	5.12	60	6.83	116	13.2	155	17.6	167	18.9	223	25.2	1.95	22.1	260	29.4
	LUBED		DRY		LUBED		DRY		LUBED		DRY		LUBED		DRY	
	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
8	5.4	7.41	7.2	9.88	14	19.1	18.8	25.5	20.1	27.3	26.9	36.5	23.6	32	31.4	42.6
10	10.8	14.7	14.4	19.6	27.9	37.8	37.2	50.5	39.9	54.1	53.2	72.2	46.7	63.3	62.3	84.4
12	18.9	25.6	25.1	34.1	48.6	66	64.9	88	69.7	94.5	92.2	125	81	110	108	147
14	30.1	40.8	40	54.3	77.4	105	103	140	110	150	147	200	129	175	172	234
16	46.9	63.6	62.5	84.8	125	170	166	226	173	235	230	313	202	274	269	365
18	64.5	87.5	86.2	117	171	233	229	311	238	323	317	430	278	377	371	503
20	91	124	121	165	243	330	325	441	337	458	450	610	394	535	525	713
22	124	169	166	225	331	450	442	600	458	622	612	830	536	727	715	970
24	157	214	210	285	420	570	562	762	583	791	778	1055	682	925	909	1233

Repair Procedures



Observe and Obey:

- ☒ Repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☒ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☒ Repair any machine damage or malfunction before operating the machine.

Before Repairs Start:

- ☒ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☒ Be sure that all necessary tools and parts are available and ready for use.
- ☒ Use only Genie approved replacement parts.
- ☒ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous conditions.

Machine Configuration:

- ☒ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
 - Machine parked on a firm, level surface
 - Key switch in the off position with the key removed
 - The red Emergency Stop button in the off position at both the ground and platform controls
 - Wheels chocked
 - All external AC power supply disconnected from the machine
 - Boom in the stowed position
 - Turntable secured with the turntable rotation lock

Repair Procedures

About This Section

Most of the procedures in this section should only be performed by trained service professional in a suitably equipped workshop. Select the appropriate repair procedure after troubleshooting the problem.

Perform disassembly procedures to the point where repairs can be completed. Then to re-assemble, perform the disassembly steps in reverse order.

Symbols Legend



Safety alert symbol—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Indicates a imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may cause minor or moderate injury.



Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

- ⦿ Indicates that a specific result is expected after performing a series of steps.
- ⊗ Indicates that an incorrect result has occurred after performing a series of steps.

Platform Controls

1-1 Joysticks

How to Calibrate a Joystick

The joysticks on this machine utilize digital Hall Effect technology for proportional control. If a joystick is disconnected or replaced, it must be calibrated before that particular machine function will operate.

Note: The joystick must be calibrated before the threshold, max-out or ramp rate can be set.

Note: For units with revision D software or higher, the control system continuously monitors and updates joystick calibration, therefore it is not necessary perform this procedure.

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the 'ON' position at both the ground and platform controls.
- 3 Open the platform control box.
- 4 Select a joystick to calibrate. Do not press down on the foot switch.
- 5 Disconnect the wire harness connector from the joystick for approximately 10 seconds or until the alarm sounds.
 - ⦿ Result: The alarm should sound a long beep indicating the joystick has lost calibration. After 3 seconds the alarm should sound a short beep to enter calibration mode.
- 6 Connect the wire harness connector to the joystick.
 - ⦿ Result: The alarm should sound a long beep setting the neutral calibration point.

- 7 Move the joystick full stroke and hold for 5 seconds in each direction.
 - ⦿ Result: The alarm should sound a short beep indicating successful joystick calibration in each direction.
- 8 **Joysticks with a thumb rocker switch:** Press down and hold the thumb rocker switch in each direction.
 - ⦿ Result: The alarm should sound a short beep indicating successful joystick calibration in each direction.
- 9 Repeat this procedure for each joystick controlled machine function.

Note: No machine function should operate while performing the joystick calibration procedure.

Platform Controls

How to Adjust the Joystick Threshold Setting

The threshold setting of a joystick is the minimum output at which a function proportional valve can open and allow the function to operate.

Note: Perform this procedure with the boom in the stowed position.

- 1 Turn the key switch to platform control. Do not start the engine.
- 2 Pull out the red Emergency Stop button to the 'ON' position at both the ground and platform controls.
- 3 Do not press down the foot switch.
- 4 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.
- 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
 - ⦿ Result: The display will show FAULTS.
- 6 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 7 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND PUMP SETTINGS is shown on the display.
- 8 Momentarily activate the drive enable toggle switch in the right direction until THRESHOLD CURRENT is shown on the display.
- 9 Momentarily activate the drive enable toggle switch in the right direction to enter the threshold calibration mode.

Toggle switch controlled functions:

Note: Begin this procedure with the rotary speed control at the platform controls turned fully in the counterclockwise direction.

- 10 Press down on the foot switch and activate the function in the direction to be corrected. Slowly turn the rotary speed control in the clockwise direction just until the function begins to move. Momentarily activate the drive enable toggle switch in the right direction.
 - ⦿ Result: The alarm should sound indicating the setting has been saved.

Joystick controlled functions:

Note: Begin this procedure with the rotary speed control at the platform controls turned fully in the clockwise direction.

- 11 Press down on the foot switch and slowly move the joystick in the direction to be corrected until the function begins to move. Momentarily activate the drive enable toggle switch in the right direction.
 - ⦿ Result: The alarm should sound indicating the setting has been saved. To exit programming mode:
- 12 Move and hold the drive enable toggle switch in the left direction until the display screen returns to SYSTEM READY.

Platform Controls

How to Adjust the Maximum Speed Setting

The maximum speed setting of a joystick and toggle switch controls the maximum speed of a machine function. Whenever a hydraulic cylinder, drive motor or hydraulic pump is replaced, the maximum speed setting should be adjusted to maintain optimum performance. The maximum speed settings can be changed to compensate for hydraulic pump wear and to maintain peak performance from the machine.

Note: There are two types of max speed settings.

High flow functions: Primary up / down, secondary up / down and extend / retract.

Low flow functions: Platform rotate, jib rotate, jib up / down and turntable rotate.

Note: Begin this procedure with the rotary speed control at the platform turned fully in the clockwise direction.

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the 'ON' position at both the ground and platform controls.
- 3 Do not press down the foot switch.
- 4 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.

- 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
 - ⦿ Result: The display will show FAULTS.
- 6 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 7 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND PUMP SETTINGS is shown on the display.
- 8 Momentarily activate the drive enable toggle switch in the right direction until THRESHOLD is shown on the display.
- 9 Momentarily activate the steer rocker switch in the right direction until VALVE MAXIMUM CURRENT is shown on the display.
- 10 Momentarily activate the drive enable toggle switch in the right direction to enter VALVE MAXIMUM CURRENT calibration mode.

High flow functions:

- 11 Momentarily activate one of the high flow functions full stroke.
 - ⦿ Result: The display will show the function, direction and milliamps.
- 12 Press down on the foot switch and activate the same function in the same direction again.
 - ⦿ Result: Alarm sounds, continue to step 15.
 - ✗ Result: Alarm does not sound, continue to step 13.

Platform Controls

- 13 Release the footswitch. Momentarily activate the steer rocker in the left direction to decrease the value shown on the display in small increments. Continue to step 14.
- 14 Press down on the foot switch and activate the same function in the same direction. Repeat step 13 until the alarm sounds while function is in motion. Then release the foot switch and momentarily activate the steer rocker switch in the right direction 3 times. Continue to step 17.
- 15 Release the footswitch. Momentarily activate the steer rocker in the right direction to increase the value shown on the display in small increments. Continue to step 16.
- 16 Press down on the foot switch and activate the same function in the same direction. Repeat step 15 until the alarm no longer sounds while function is in motion. Then momentarily activate the steer rocker switch in the right direction 2 times. Continue to step 17.
- 17 Momentarily activate the drive enable toggle switch in the right direction to save the new setting.
 - ⦿ Result: The alarm should sound indicating the setting has been saved.
- 18 Repeat steps 11 through 17 as needed for high flow functions.

Low flow functions:

- 19 Momentarily activate one of the low flow functions full stroke.
 - ⦿ Result: The display will show the function, direction and milliamps.
 - 20 Start a timer, press down on the foot switch and activate the same function in the same direction again.. Record the time it takes for that function to complete a full cycle; i.e., jib up.
 - 21 Compare the machine function time with the function times listed. Refer to Specifications, *Performance Specifications*. Determine whether the function time needs to increase or decrease.
 - 22 To adjust a function speed, release the foot switch. Momentarily move the steer rocker switch in the right direction to increase or momentarily in the left direction to decrease.
- Note: Each time the steer rocker switch is momentarily pressed, the time will change in 5mA to 10mA increments.
- 23 When function times have been achieved, activate the drive enable toggle switch to the right to save your changes.
 - ⦿ Result: The alarm should sound indicating the setting has been saved.
 - 24 Repeat steps 19 through 23 as needed for low flow functions.

To exit programming mode:

- 25 Move and hold the drive enable toggle switch in the left direction until the display screen returns to SYSTEM READY.

Platform Controls

How to Adjust the Function Ramp Up Time Setting

The ramp up time setting of a function controls the time at which it takes for the function to reach maximum output, when moved out of the neutral position. The ramp up time of a function can be changed to compensate for hydraulic pump wear to maintain peak performance from the machine.

Note: Begin this procedure with the rotary speed control at the platform turned fully in the clockwise direction.

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the 'ON' position at both the ground and platform controls.
- 3 Do not press down on the foot switch.
- 4 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.
- 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
- ⦿ Result: The display will show FAULTS.
- 6 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 7 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND PUMP SETTINGS is shown on the display.
- 8 Momentarily activate the drive enable toggle switch in the right direction until THRESHOLD is shown on the display.
- 9 Momentarily activate the steer rocker switch in the right direction until RAMP UP TIME is shown on the display.
- 10 Momentarily activate the drive enable toggle switch in the right direction to enter RAMP UP TIME calibration mode.
- 11 Press down on the foot switch and momentarily activate the function to be corrected.
- ⦿ Result: The display will show the function, direction and milliamps.
- 12 Press down on the foot switch, start a timer and activate the same function in the same direction.

Note how long it takes the function to reach maximum speed. This is the ramp up time.

- 13 Compare the function ramp up time with the table on the next page and determine whether the ramp up time needs to increase or decrease.

Platform Controls

- 14 To adjust the ramp up time setting, release the foot switch. Momentarily move the steer rocker switch in the right direction to increase or momentarily in the left direction to decrease.

Note: Each time the steer rocker switch is momentarily pressed, the time will change in 0.1 second increments.

Note: Changing the ramp up time setting in one direction will also change the opposite direction.

- 15 When ramp time has been achieved, activate the drive enable toggle switch to the right to save your changes.
- ⦿ Result: The alarm should sound indicating the setting has been saved.
- 16 Repeat steps 11 through 13 for each machine function.

To exit programming mode:

- 17 Move and hold the drive enable toggle switch in the left direction until the display screen returns to SYSTEM READY.

Ramp rate (factory settings)

Primary boom up/down	1 second
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Secondary boom up/down

accelerate	1 second
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Turntable rotate

accelerate	1 second
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Extend/Retract

accelerate	0.5 second
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Jib up/down

accelerate	2.5 seconds
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Platform Rotate

accelerate	2 seconds
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Jib rotate (if equipped)

accelerate	2 seconds
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Platform Controls

How to Adjust the Function Ramp Down Time Setting

The ramp down time setting of a function controls the time at which it takes for the function to come to a complete stop, when returned to the neutral position. The ramp down time of a function can be changed to compensate for hydraulic pump wear to maintain peak performance from the machine.

Note: Begin this procedure with the rotary speed control at the platform turned fully in the clockwise direction.

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the 'ON' position at both the ground and platform controls.
- 3 Do not press down the foot switch.
- 4 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.
- 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
- ⦿ Result: The display will show FAULTS.
- 6 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 7 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND PUMP SETTINGS is shown on the display.
- 8 Momentarily activate the drive enable toggle switch in the right direction until THRESHOLD is shown on the display.
- 9 Momentarily activate the steer rocker switch in the right direction until RAMP DOWN TIME is shown on the display.
- 10 Momentarily activate the drive enable toggle switch in the right direction to enter RAMP DOWN TIME calibration mode.
- 11 Press down on the foot switch and momentarily activate the function to be corrected.
- ⦿ Result: The display will show the function, direction and milliamps.
- 12 Press down on the foot switch, start a timer and activate the same function in the same direction. Note how long it takes the function to reach maximum speed. This is the ramp down time.
- 13 Compare the function ramp down time with the table on the next page and determine whether the ramp down time needs to increase or decrease.
- 14 To adjust the ramp down time setting, release the foot switch. Momentarily move the steer rocker switch in the right direction to increase or momentarily in the left direction to decrease.

Note: Each time the steer rocker switch is momentarily pressed, the time will change in 0.1 second increments.

Note: Changing the ramp down time setting in one direction will also change the opposite direction.

Platform Controls

- 15 When ramp time has been achieved, activate the drive enable toggle switch to the right to save your changes.
- ⦿ Result: The alarm should sound indicating the setting has been saved.
- 16 Repeat steps 11 through 13 for each machine function.

To exit programming mode:

- 17 Move and hold the drive enable toggle switch in the left direction until the display screen returns to SYSTEM READY.

Ramp down time (factory settings)	
Primary boom up/down	
decelerate	1.5 second
Secondary boom up/down	
decelerate	0.65 second
Turntable rotate	
decelerate	0.25 second
Extend/Retract	
decelerate	0.5 seconds
Jib up/down	
decelerate	0.25 second
Platform rotate	
decelerate	0.15 second
Jib rotate (if equipped)	
decelerate	0.25 seconds

How to Adjust the Max Speed Drive Settings

Adjusting the max speed setting will only affect the stowed drive speed. Elevated drive speed is not adjustable.

Note: Begin this procedure with the machine in the stowed position.

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the 'ON' position at both the ground and platform controls.
- 3 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.
- 4 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
- ⦿ Result: The display will show FAULTS.
- 5 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 6 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND PUMP SETTINGS is shown on the display.
- 7 Momentarily activate the steer rocker switch in the right direction until you see the AUTHORIZATION screen.
- 8 Momentarily activate the drive enable toggle switch in the right direction to enter the authorization screen.

Platform Controls

- 9 Using the rocker switch on the drive joystick, momentarily activate steer left, left, right, and left.
 - ⦿ Result: The alarm will sound.
 - 10 Momentarily activate the steer rocker switch in the right direction until you see the DRIVE SETTINGS screen.
 - 11 Momentarily activate the drive enable toggle switch in the right direction to enter the DRIVE SETTINGS menu.
 - ⦿ Result: The display will show ACCEL RAMP.
 - 12 Momentarily activate the steer rocker switch in the right direction until you see the MAX SPEED screen.
 - 13 Momentarily activate the drive enable toggle switch in the right direction to enter the MAX SPEED menu.
 - 14 Create start and finish lines by marking two lines on the ground 40 feet / 12.2 m apart.
 - 15 Choose a point on the machine; i.e., contact patch of a tire, as a visual reference for use when crossing the start and finish lines.
 - 16 Bring the machine to maximum drive speed before reaching the start line. Begin timing when your reference point on the machine crosses the start line.
 - 17 Continue at full speed and note the time when the machine reference point passes over the finish line. Release the foot switch. Refer to Specifications, *Performance Specifications*.
 - ⦿ Result: The drive speed meets specification. Continue to step 19.
 - ✗ Result: The drive speed does not meet specification. Continue to step 18 to adjust the drive speed.
 - 18 Momentarily move the steer rocker switch in the right direction to increase or momentarily in the left direction to decrease. Repeat steps 16 and 17.
- Note: Adjusting this setting will affect the stowed drive speed in forward and reverse.
- 19 Momentarily activate the drive enable toggle switch to the right direction to save your changes.
 - ⦿ Result: The alarm should sound indicating the setting has been saved.

To exit programming mode:

- 20 Move and hold the drive enable toggle switch in the left direction until the display screen returns to SYSTEM READY.

Platform Components

2-1

Platform Leveling Slave Cylinder

The slave cylinder and the rotator pivot are the two primary supports for the platform. The slave cylinder keeps the platform level through the entire range of boom motion. It operates in a closed-circuit hydraulic loop with the master cylinder. The slave cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the Platform Leveling Slave Cylinder

Note: Before cylinder removal is considered, bleed the slave cylinder to be sure there is no air in the closed loop.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Extend the boom until the slave cylinder barrel-end pivot pin is accessible.
- 2 Raise the boom slightly and place blocks under the platform for support.
- 3 Lower the primary boom until the platform is resting on the blocks just enough to support the platform. Do not rest the entire weight of the boom on the blocks.

- 4 Tag, disconnect and plug the hydraulic hoses from the slave cylinder at the unions and connect them together using a connector.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 5 Remove the pin retaining fastener from the slave cylinder rod-end pivot pin. Do not remove the pin. Do not remove the pin.
- 6 Remove the external snap rings from the slave cylinder barrel-end pivot pin. Do not remove the pin.
- 7 Place a block of wood under the barrel of the slave cylinder for support. Protect the cylinder rod from damage.
- 8 Use a soft metal drift to remove the rod-end pivot pin.

⚠ WARNING

Crushing hazard. The platform could fall if not properly supported.

NOTICE

Component damage hazard. The slave cylinder rod may become damaged if it is allowed to fall if not properly supported by the lifting device.

- 9 Use a soft metal drift to remove the barrel-end pivot pin.
- 10 Carefully pull the cylinder, with hydraulic hoses, out of the boom.

Platform Components

How to Bleed the Slave Cylinder

- 1 Raise the primary boom to a horizontal position.
- 2 Move the platform level toggle switch up and down through two platform leveling cycles to remove any air that might be in the system.

2-2

Platform Rotator

How to Bleed the Platform Rotator

Note: This procedure will require two people.

- 1 Move the function enable toggle switch to either side and activate the platform rotate toggle switch to the right and then to the left through two platform rotation cycles. Then hold the switch to the right position until the platform is fully rotated to the right.
- 2 Place a suitable container underneath the platform rotator.
- 3 Open the top bleed screw on the rotator, but do not remove it.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 4 Move the function enable toggle switch to either side and hold the platform rotate toggle switch to the left position until the platform is fully rotated to the left. Continue holding the toggle switch until air stops coming out of the bleed screw. Close the bleed screw.

⚠ WARNING

Crushing hazard. Keep clear of the platform during rotation.

Platform Components

- 5 Open the bottom bleed screw on the rotator, but do not remove it.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 6 Move the function enable toggle switch to either side and hold the platform rotate toggle switch to the right position until the platform is fully rotated to the right. Continue holding the toggle switch until air stops coming out of the bleed screw. Close the bleed screw.

⚠ WARNING

Crushing hazard. Keep clear of the platform during rotation.

- 7 Clean up any hydraulic oil that may have spilled.
- 8 Rotate the platform fully in both directions and inspect the bleed screws for leaks.

2-3

Platform Overload System

How to Calibrate the Platform Overload System

Calibration of the platform overload system is essential to safe machine operation. Continued use of an improperly calibrated platform overload system could result in the system failing to sense an overloaded platform. The stability of the machine is compromised and it could tip over.

Note: Perform this procedure with the machine on a firm, level surface.

- 1 Turn the key switch to platform control.
- 2 Determine the maximum platform capacity. Refer to the machine serial plate.
- 3 Remove all weight, tools and accessories from the platform.

Note: Failure to remove all weight, tools and accessories from the platform will result in an incorrect calibration.

- 4 Using a suitable lifting device, place a test weight equal to the maximum platform capacity at the center of the platform floor.

Platform Components

Determine the limit switch trigger point:

- 5 Gently move the platform up and down by hand, so it bounces approximately 1 to 2 inches / 2.5 to 5 cm. Allow the platform to settle.
- ⦿ Result: **The overload indicator light and the alarm is on.** Slowly tighten the load spring adjustment nut by turning it clockwise just until the overload indicator light and alarm turns off.

Note: The platform will need to be moved up and down and allowed to settle between adjustments.

Note: There may be an approximate 2 second delay before the overload indicator light turns on and the alarm sounds.

- ⦿ Result: **The overload indicator light and alarm is off.** Slowly loosen the load spring adjustment nut by turning it counterclockwise just until the overload indicator light and alarm turn on.

Note: There may be an approximate 2 second delay before the overload indicator light turns on and the alarm sounds.

Note: The platform will need to be moved up and down and allowed to settle between adjustments.

Confirm the setting:

- 6 Turn the key switch to platform control.
- 7 Lift the test weight off the platform floor using a suitable lifting device.
- 8 Place the test weight back onto the center of the platform floor using a suitable lifting device.

- ⦿ Result: The alarm should be off. The platform overload indicator light should be off at both the ground and platform controls.

Note: There may be an approximate 2 second delay before the overload indicator light and alarm turn off.

- 9 Add an additional 10 lb / 4.5 kg test weight to the original test weight to overload the platform.

Result: The alarm should sound. The platform overload indicator light should be flashing at both the ground and platform controls.

Note: There may be an approximate 2 second delay before the overload indicator light turns on and the alarm sounds.

- 10 Test all machine functions from the platform controls.

Result: All platform control functions should not operate.

- 11 Turn the key switch to ground control.
- 12 Test all machine functions from the ground controls.
- ⦿ Result: All ground control functions should not operate.

Note: If the platform overload system is not operating properly, repeat steps 1 through 4.

Platform Components

2-4

Platform Overload Recovery Message (software 1256908A and later)

If the platform controls LCD screen displays OVERLOAD RECOVERY, the emergency lowering system has been used while the platform was overloaded.

How to Clear the Platform Overload Recovery Message

Note: This message shall be cleared by a person trained and qualified on the troubleshooting and repair of this machine.

Note: Use the following chart to identify the description of each LCD screen control button used in this procedure.

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
- 3 Do not press down on the foot switch.
- 4 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.
- 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
 - ⦿ Result: The display will show FAULTS.
- 6 Momentarily activate the drive enable toggle switch in the right direction.
 - ⦿ Result: The display will show ACTIVE FAULTS.
- 7 Momentarily activate the steer rocker switch in the right direction until RESET OVERLOAD MSG is shown on the display.
- 8 Momentarily activate the drive enable toggle switch in the right direction.
 - ⦿ Result: The display will show ENTER PASSWORD.
- 9 Momentarily active the steer rocker switch in the following order.
Steer right, steer right, steer right, steer left.
 - ⦿ Result: A one second audible alarm pulse verifies the message has been reset.
 - ✗ Result: The alarm does not sound. Repeat this procedure starting with step 8.
- 10 Push in the red Emergency Stop button to the off position.
- 11 Pull out the red Emergency Stop button to the on position.
 - ⦿ OVERLOAD RECOVERY is not shown on the display.

Jib Boom Components

3-1 Jib Boom

How to Remove the Jib Boom

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the platform and the platform mounting weldment.
- 2 Support the platform rotator with a suitable lifting device.
- 3 Tag, disconnect and plug the platform rotator hydraulic hoses. Cap the fittings on the rotator. Remove the platform. Remove the platform mounting weldment and the platform rotator. Refer to Repair Procedure, *How to Remove the Platform Rotator*
- 4 Attach a lifting strap from an overhead crane to the jib boom for support.

NOTICE Component damage hazard. Hoses and cables can be damaged if they are kinked or pinched.

- 5 Remove the pin retaining fasteners from the jib boom leveling arm pivot pin at the platform rotator.
- 6 Use a soft metal drift to remove the leveling arm pivot pin. Let the leveling arms and jib boom lift cylinder hang down.
- 7 Remove the pin retaining fastener from the jib boom lift cylinder barrel-end pivot pin.
- 8 Use a soft metal drift to remove the platform rotator pivot pin and remove the platform rotator from the machine.

⚠ WARNING Crushing hazard. The jib boom could fall when the pin is removed if not properly supported by the overhead crane.

- 9 Remove the pin retaining fasteners from the jib boom lift cylinder rod-end pivot pin. Do not remove the pin.
- 10 Slide both of the jib boom leveling arms off of the jib boom cylinder rod-end pivot pin.
- 11 Remove all hose and cable clamps from the jib boom.
- 12 Tag, disconnect and plug the jib boom lift cylinder hydraulic hoses. Cap the fittings on the jib boom lift cylinder.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

Jib Boom Components

- 13 Remove the mounting fasteners from the jib boom/platform rotate manifold and lay the manifold to the side. Do not remove the hoses or disconnect the wiring.

NOTICE

Component damage hazard. Hoses and cables can be damaged if they are kinked or pinched.

- 14 Attach a lifting strap from an overhead crane to the rod end of the jib boom lift cylinder.
- 15 Use a soft metal drift to remove the jib boom rod-end pivot pin. Remove the jib boom lift cylinder from the machine.

⚠ WARNING

Crushing hazard. The jib boom could fall when the pin is removed if not properly supported by the overhead crane.

- 16 Remove the pin retaining fastener from the jib boom pivot pin. Do not remove the pin.
- 17 Attach a lifting strap from an overhead crane to the jib boom.
- 18 Use a soft metal drift to remove the jib boom pivot pin. Carefully remove the jib boom from the machine.

⚠ WARNING

Crushing hazard. The jib boom could fall when the pin is removed if not properly supported by the overhead crane.

3-2

Jib Boom Bell Crank (models without rotating jib boom)

How to Remove the Jib Boom Bell Crank

Note: Perform this procedure with the boom in the stowed position.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the jib boom. Refer to Repair Procedure, *How to Remove the Jib Boom*.
- 2 Support and secure the jib boom bell crank to an appropriate lifting device.
- 3 Remove the pin retaining fasteners from the slave cylinder rod-end pivot pin. Do not remove the pin.
- 4 Place a block of wood under the platform leveling slave cylinder for support. Protect the cylinder rod from damage.
- 5 Remove the pin retaining fasteners from the jib boom bell crank at the extension boom. Use a soft metal drift to remove the pin.
- 6 Use a soft metal drift to remove the slave cylinder rod-end pivot pin.
- 7 Remove the jib boom bell crank from the extension boom.

⚠ WARNING

Crushing hazard. The jib boom bellcrank may become unbalanced and fall if it is not properly supported when it is removed from the machine.

Jib Boom Components

3-3

Jib Boom Rotator (models with rotating jib boom)

The platform rotator is a hydraulically activated helical gear assembly used to rotate the jib boom 180 degrees.

How to Remove the Jib Boom Rotator

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the jib boom. Refer to Repair Procedure, *How to Remove the Jib Boom*.
- 2 Support and secure the jib boom rotator to an appropriate lifting device.
- 3 Remove the eight mounting bolts from the jib boom rotator mount.
- 4 Remove the center bolt. Carefully remove the jib boom rotator from the machine.

⚠ WARNING Crushing hazard. The jib boom rotator could become unbalanced and fall when removed from the machine if not properly supported and secured to the lifting device.

Note: When installing the jib boom rotator, be sure to torque the fasteners to specification. Refer to Specifications, *Machine Torque Specifications*.

- 5 Support and secure the jib boom bell crank to an appropriate lifting device.
- 6 Remove the pin retaining fasteners from the slave cylinder rod-end pivot pin. Do not remove the pin.
- 7 Place a block of wood under the platform leveling slave cylinder for support. Protect the cylinder rod from damage.
- 8 Remove the pin retaining fasteners from the jib boom bell crank at the extension boom. Use a soft metal drift to remove the pin.
- 9 Use a soft metal drift to remove the slave cylinder rod-end pivot pin.
- 10 Remove the jib boom bell crank from the extension boom.

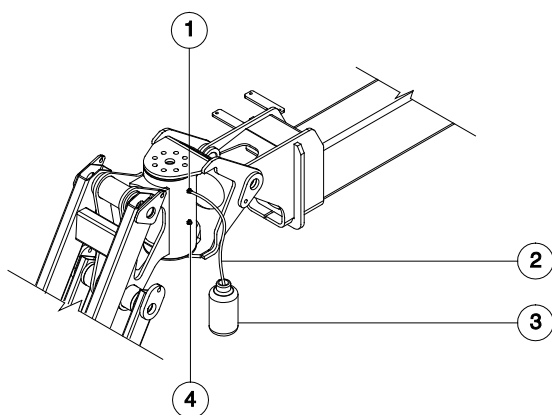
⚠ WARNING Crushing hazard. The jib boom bellcrank may become unbalanced and fall if it is not properly supported when it is removed from the machine.

Jib Boom Components

How to Bleed the Jib Boom Rotator

Note: This procedure will require two people.

- 1 Turn the key switch to ground controls and pull out the red Emergency Stop buttons to the on position at both the ground and platform controls.
- 2 Connect a clear hose to the top bleed valve. Place the other end of the hose in a container to collect any drainage. Open the top bleed valve, but do not remove it.



- 1 top bleed valve
- 2 clear hose
- 3 container
- 4 bottom bleed valve

- 3 Move and hold the function enable toggle switch to either side and move and hold the jib boom rotate toggle switch to the right for approximately 5 seconds, then release it. Repeat three times.

WARNING

Crushing hazard. Keep hands and head clear of the jib boom during rotation.

- 4 Move and hold the function enable switch to either side and move and hold the jib boom rotate toggle switch to the left for approximately 5 seconds, then release it. Repeat three times.
- 5 Fully rotate the jib boom to the left and continue holding the jib boom rotate toggle switch until air stops coming out of the bleed screw.

WARNING

Crushing hazard. Keep hands and head clear of the jib boom during rotation.

- 6 Rotate the jib boom to the right until the jib boom is centered.
- 7 Open the bottom bleed screw.
- 8 Rotate the jib boom to the right and continue holding the platform rotate toggle switch until air stops coming out of the bleed screw.

WARNING

Crushing hazard. Keep hands and head clear of the jib boom during rotation.

- 9 Close the bleed screw.
- 10 Rotate the jib boom full left and right and inspect the bleed screws for leaks.

WARNING

Crushing hazard. Keep hands and head clear of the jib boom during rotation.

- 11 Turn the key switch to the off position and clean up any hydraulic oil that may have spilled.

Jib Boom Components

3-4

Jib Boom Lift Cylinder

How to Remove the Jib Boom Lift Cylinder

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the jib boom slightly and place blocks under the platform mounting weldment. Then lower the jib boom until the platform is resting on the blocks just enough to support the platform.

Note: Do not rest the entire weight of the boom on the blocks.

- 2 Tag, disconnect and plug the jib boom lift cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 3 Remove the pin retaining fasteners from the jib boom lift cylinder rod-end pivot pin. Do not remove the pin.

- 4 Use a soft metal drift to tap the rod-end pivot pin half way out and lower one of the leveling links to the ground. Tap the pin the other direction and lower the opposite leveling link. Do not remove the pin.
- 5 Support the jib boom with a suitable lifting device.
- 6 Remove the pin retaining fasteners from the jib boom lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the barrel-end pivot pin. Let the cylinder hang down.

⚠ WARNING

Crushing hazard. The jib boom lift cylinder may become unbalanced and fall when it is removed from the machine if it is not properly supported by the overhead crane.

- 7 Attach a lifting strap from an overhead crane to the lug on the rod end of the jib boom lift cylinder.
- 8 Use a soft metal drift to remove the jib boom lift cylinder rod-end pin. Remove the jib boom lift cylinder from the machine.

⚠ WARNING

Crushing hazard. The jib boom lift cylinder may become unbalanced and fall when it is removed from the machine if it is not properly supported by the overhead crane.

Primary Boom Components

4-1 Cable Track

The primary boom cable track guides the cables and hoses running up the boom. It can be repaired link by link without removing the cables and hoses that run through it. Removing the entire primary boom cable track is only necessary when performing major repairs that involve removing the primary boom.

How to Remove the Cable Track

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Tag and disconnect each electrical connector from the platform control box.
- 2 Remove the hose and cable clamp from the jib boom bellcrank pivot pin.
- 3 Remove all of the hose and cable clamps from the jib boom and platform support.
- 4 Remove the power to platform electrical box mounting fasteners. Remove the electrical box from the platform. Do not disconnect the wiring.
- 5 Remove the jib boom/platform rotate manifold cover.
- 6 Tag, disconnect and plug the hydraulic hoses from ports P and T at the jib boom/platform rotate manifold. Cap the fittings on the manifold.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 7 Tag and disconnect the hydraulic hoses from the platform leveling slave cylinder at the union and connect them together using a connector. Connect the hoses from the cylinder together using a connector.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 8 Remove the hose and cable clamp from the platform end of the cable track tube.
- 9 Pull all of the electrical cables out of the plastic cable track. Do not pull out the hydraulic hoses.
- 10 Remove all hose and cable clamps from the underside of the primary boom.

Primary Boom Components

- 11 Tag, disconnect and plug the jib boom/platform rotator hydraulic hoses at the union located above the primary boom lift cylinder. Cap the fittings on the unions.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 12 Pull the jib boom/platform rotator hydraulic hoses, disconnected at the union, through the mounting ears of the rod end of the primary boom lift cylinder, towards the platform.

NOTICE

Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

- 13 Remove the cover from the bottom of the cable track.
- 14 Pull all of the cables through the mounting ears of the rod end of the primary boom lift cylinder, towards the counterweight end of the machine.

- 15 Place blocks between the cable track tube and the lower cable track. Secure the cable track tube and lower cable track together.

⚠ WARNING

Crushing hazard. If the upper and lower cable tracks are not properly secured together, the cable track could become unbalanced and fall when removed from the machine.

- 16 Support and secure the cable track to an overhead crane or other similar lifting device.
- 17 Remove the cable track tube retaining fasteners from the platform end of the extension tube.
- 18 Remove the cable track mounting fasteners that attach the lower cable track tray to the primary boom.
- 19 Remove the cable track from the machine and place it on a structure capable of supporting it.

⚠ WARNING

Crushing hazard. If the upper and lower cable tracks are not properly secured together, the cable track could become unbalanced and fall when removed from the machine.

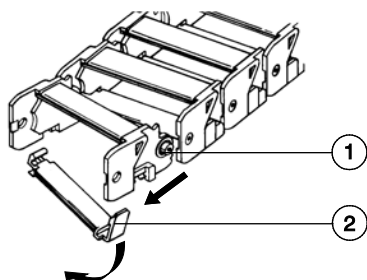
Primary Boom Components

How to Repair the Primary Boom Cable Track

NOTICE

Component damage hazard.
The boom cable track can be damaged if it is twisted.

Note: A 7 link repair section of cable track is available through the Genie Service Parts Department.



- 1 link separation point
- 2 lower clip

- 1 Use a slotted screwdriver to pry down on the lower clip.
- 2 To remove a single link, open the lower clip and then use a screw driver to pry the link to the side.
- 3 Repeat steps 1 and 2 for each link.

How to Shim the Primary Boom

- 1 Extend the boom until the wear pads are accessible.
- 2 Loosen the wear pad mounting fasteners.
- 3 Install the new shims under the wear pad to obtain zero clearance and zero drag.
- 4 Tighten the mounting fasteners.
- 5 Extend and retract the boom through an entire cycle. Check for tight spots that could cause scraping or binding.

Note: Always maintain squareness between the outer and inner boom tubes.

Primary Boom Components

How to Remove the Primary Boom

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: Perform this procedure with the boom in the stowed position.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the jib boom. Refer to Repair Procedure, *How to Remove the Jib Boom*.
- 2 **Models without rotating jib boom:** Remove the jib boom bellcrank. Refer to Repair Procedure, *How to Remove the Jib Boom Bellcrank*.

Models with rotating jib boom: Remove the jib boom rotator. Refer to Repair Procedure, *How to Remove the Jib Boom Rotator*.

- 3 Remove the cable track. Refer to Repair Procedure, *How to Remove the Cable Track*.
- 4 Remove the hose and cable guard from the upper pivot.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 5 Raise the primary boom until the master cylinder barrel-end pivot pin is accessible.
- 6 Remove the pin retaining fastener from the master cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin. Lower the cylinder and let it hang down.

NOTICE Component damage hazard. When lowering the master cylinder down, be sure not to damage the master cylinder hoses or fittings.

- 7 Locate the primary boom drive speed limit switch inside the upper pivot.

Primary Boom Components

- 8 Remove the primary boom drive speed limit switch mounting fasteners and move the limit switch out of the way. Do not disconnect the wiring.
- 9 Locate the primary extension boom drive speed limit switch inside the extension boom.
- 10 Remove the primary extension boom drive speed limit switch mounting fasteners. Do not disconnect the wiring.
- 11 Pull the limit switch and the wiring out of the extension tube and move it out of the way.
- 12 Tag, disconnect and plug the primary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 13 Lower the primary boom to a horizontal
- 14 Attach a 5 ton / 5,000 kg overhead crane to the center point of the primary boom.
- 15 Attach a similar lifting device to the primary boom lift cylinder.

- 16 Place support blocks under the primary boom lift cylinder.
- 17 Remove the pin retaining fasteners from the primary boom lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

⚠ WARNING

Crushing hazard. The boom lift cylinder and primary boom will fall if not properly supported.

- 18 Lower the rod end of the primary boom lift cylinder onto support blocks. Protect the cylinder rod from damage.
- 19 Remove the pin retaining fasteners from the primary boom pivot pin.
- 20 Remove the primary boom pivot pin with a soft metal drift. Carefully remove the primary boom from the machine and place it on a structure capable of supporting it.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 21 Attach a lifting strap from an overhead crane to the primary boom lift cylinder.

Primary Boom Components

- 22 Place 2 x 4 x 18 inch / 5 x 10 x 46 cm support blocks under the cylinder, across the secondary boom.
- 23 Remove the pin retaining fastener from the primary boom lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

⚠ WARNING Crushing hazard. The primary boom lift cylinder could become unbalanced and fall if not properly supported by the lifting device.

- 24 Lower the rod end of the primary boom lift cylinder onto support blocks. Protect the cylinder rod from damage.
- 25 Remove the pin retaining fastener from the primary boom pivot pin.
- 26 Remove the primary boom pivot pin with a soft metal drift. Carefully remove the primary boom assembly from the machine.

⚠ WARNING Crushing hazard. The primary boom could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

How to Disassemble the Primary Boom

Note: Complete disassembly of the boom is only necessary if the outer or inner boom tubes must be replaced. The extension cylinder can be removed without completely disassembling the boom. Refer to Repair Procedure, *How to Remove the Extension Cylinder*.

- 1 Remove the primary boom. Refer to Repair Procedure, *How to Remove the Primary Boom*.
- 2 Place blocks under the extension cylinder for support.
- 3 Remove the retaining fasteners from the extension cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.
- 4 Remove and label the location of the wear pads from the top side of the boom tube at the platform end of the boom.

Note: Pay careful attention to the location and amount of shims used with each wear pad.

Primary Boom Components

- 5 Support and slide the extension tube and extension cylinder assembly out of the boom tube.

⚠ WARNING

Crushing hazard. The boom extension tube could fall when removed from the boom if not properly supported.

Note: During removal, the overhead crane strap will need to be adjusted for proper balancing.

- 6 Remove the external snap rings from the extension cylinder rod-end pivot pin at the platform end of the extension tube. Use a soft metal drift to remove the pin.
- 7 Support and slide the extension cylinder out of the base end of the extension tube. Place the extension cylinder on blocks for support.

⚠ WARNING

Crushing hazard. The extension cylinder could become unbalanced and fall when removed from primary boom extension tube if not properly supported.

Note: During removal, the overhead crane strap will need to be adjusted for proper balancing.

4-3

Primary Boom Lift Cylinder

The primary boom lift cylinder raises and lowers the primary boom. The primary boom lift cylinder is equipped with a counterbalance valve to prevent movement in the event of a hydraulic line failure.

How to Remove the Primary Boom Lift Cylinder

⚠ WARNING

Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the primary boom to a horizontal position.
- 2 Raise the secondary boom until the primary boom lift cylinder barrel-end pivot pin is above the turntable covers.
- 3 Attach a 5 ton / 5000 kg overhead crane to the primary boom for support.
- 4 Using the overhead crane, raise the primary boom slightly to take the pressure off the primary boom lift cylinder pivot pins.

Primary Boom Components

- 5 Support both ends of the primary boom lift cylinder with a second overhead crane or similar lifting device.
- 6 Tag, disconnect and plug the primary boom lift cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 7 Place a support block across both turntable covers under the primary boom lift cylinder.
- 8 Remove the pin retaining fasteners from the primary boom lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

⚠ WARNING Crushing hazard. The primary boom could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

- 9 Lower the rod end of the lift cylinder onto the block. Protect the cylinder rod from damage.

⚠ WARNING Crushing hazard. The primary boom could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

- 10 Remove the primary boom lift cylinder barrel-end pivot pin retaining fasteners. Use a slide hammer to remove the barrel-end pivot pin. Carefully remove the primary boom lift cylinder from the machine.

⚠ WARNING Crushing hazard. The lift cylinder could become unbalanced and fall if not properly supported and secured to the lifting device.

⚠ WARNING Crushing hazard. The primary boom could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

Primary Boom Components

4-4

Primary Boom Extension Cylinder

The primary boom extension cylinder extends and retracts the primary boom extension tube. The primary boom extension cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the Primary Boom Extension Cylinder

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the primary boom to a horizontal position.
 - 2 Extend the primary boom until the primary boom extension cylinder rod-end pivot pin is accessible in the primary boom extension tube.
 - 3 Remove the hose and cable guard from the upper pivot.
 - 4 Tag, disconnect and plug the primary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder.
- ⚠ WARNING** Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.
- 5 Locate the primary extension boom drive speed limit switch inside the extension boom at the pivot end.
 - 6 Remove the primary extension boom drive speed limit switch mounting fasteners. Do not disconnect the wiring.
 - 7 Pull the limit switch and the wiring out of the extension tube and move it out of the way.
 - 8 At the platform end of the boom, remove the external snap rings from the extension cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.
 - 9 Remove the barrel-end pivot pin retaining fasteners.
 - 10 Place a support block under the barrel end of the primary boom extension cylinder.
 - 11 Use a slide hammer to remove the pin.

Primary Boom Components

- 12 Support and slide the extension cylinder out of the upper pivot.

⚠ WARNING

Crushing hazard. The extension cylinder could fall when removed from the extension boom if not properly supported.

NOTICE

Component damage hazard. Be careful not to damage the counterbalance valves on the primary boom extension cylinder when removing the cylinder from the primary boom.

NOTICE

Component damage hazard. Hoses and cables can be damaged if the primary boom extension cylinder is dragged across them.

Note: Note the length of the cylinder after removal. The cylinder must be at the same length for installation.

4-5

Platform Leveling Master Cylinder

The platform leveling master cylinder acts as a pump for the slave cylinder. It is part of the closed-loop hydraulic circuit that keeps the platform level through the entire range of primary boom motion. The platform leveling master cylinder is located inside the upper mid-pivot at the pivot end of the primary boom.

How to Remove the Platform Leveling Master Cylinder

⚠ WARNING

Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the secondary boom until both the rod end and barrel-end pivot pins of the master cylinder are accessible.

Primary Boom Components

- 2 Tag, disconnect and plug the master cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

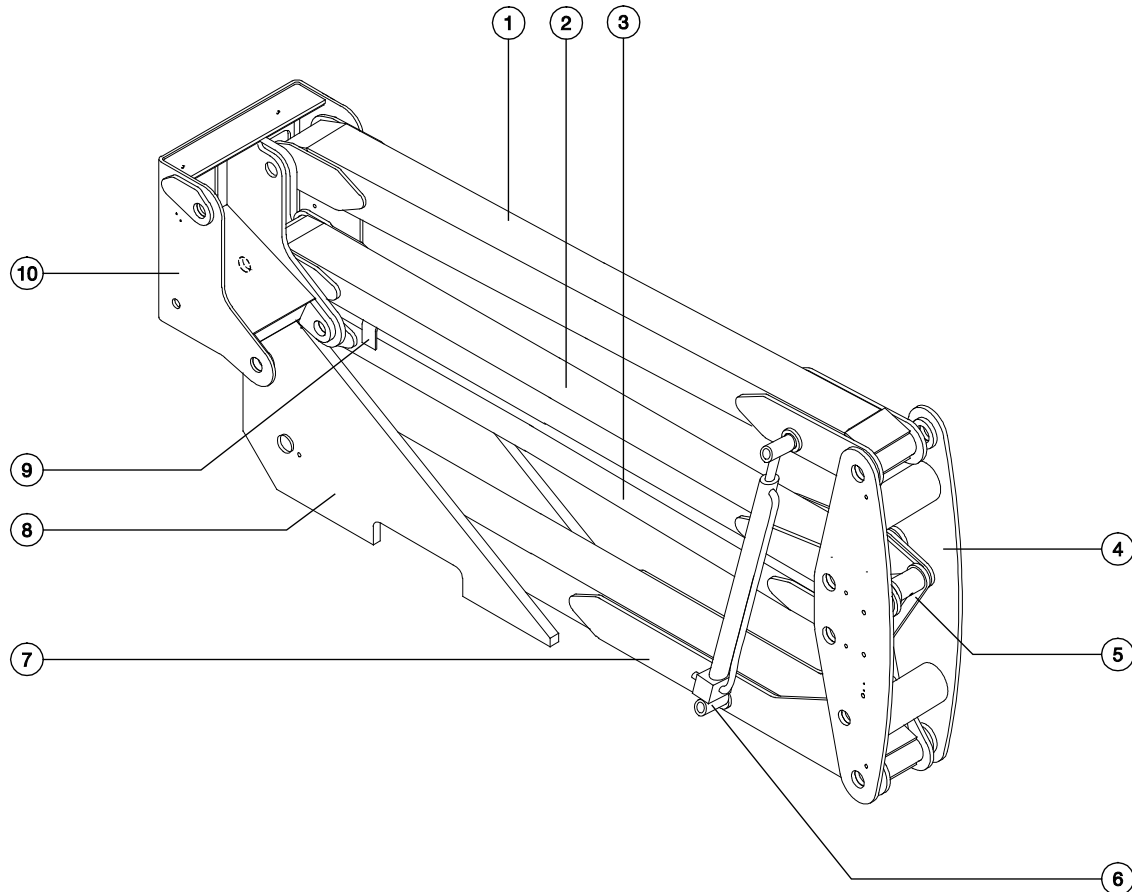
- 3 Attach an overhead crane or similar lifting device to the master cylinder.
- 4 Remove the pin retaining fasteners from the master cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.

⚠ WARNING Crushing hazard. The master cylinder could become unbalanced and fall if not properly attached to the overhead crane.

- 5 Remove the pin retaining fastener from the rod-end pivot pin.
- 6 Place a rod through the rod-end pivot pin and twist to remove the pin.
- 7 Remove the master cylinder from the machine.

⚠ WARNING Crushing hazard. The master cylinder could become unbalanced and fall if not properly attached to the overhead crane.

Secondary Boom Components



Secondary Boom components

- | | |
|-------------------------|------------------------------------|
| 1 upper pivot | 6 lower compression arm |
| 2 upper compression arm | 7 turntable pivot |
| 3 mid-pivot | 8 counterweight (Z-30N / Z-30N RJ) |
| 4 compression link | 9 upper secondary boom |
| 5 lower secondary boom | |

Secondary Boom Components

5-1

Secondary Boom

How to Disassemble the Secondary Boom

⚠ WARNING

Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Follow the disassembly steps to the point required to complete the repair. Then re-assemble the secondary boom by following the disassembly steps in reverse order.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Remove the primary boom. Refer to Repair Procedure, *How to Remove the Primary Boom*.
- 2 Remove the master cylinder. Refer to Repair Procedure, *How to Remove the Platform Leveling Master Cylinder*.
- 3 Attach a lifting strap from an overhead crane to the lug on the rod end of the primary boom lift cylinder. Using the overhead crane, raise the primary boom lift cylinder to a vertical position.

- 4 Tag, disconnect and plug the hydraulic hoses at the primary boom lift cylinder. Cap the fittings on the cylinder.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 5 Remove the pin retaining fastener from the primary boom lift cylinder barrel-end pivot pin.
- 6 Use a slide hammer to remove the pin. Remove the primary boom lift cylinder from the machine.

⚠ WARNING

Crushing hazard. The primary boom lift cylinder could become unbalanced and fall if not properly supported by the lifting device.

- 7 Lower the secondary boom to the stowed position.
- 8 Tag, disconnect and plug the hydraulic hoses on both of the secondary boom lift cylinders. Cap the fittings on the cylinders.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 9 Remove the pin retaining fasteners from both sides of the secondary boom lift cylinder rod end pivot pin and barrel-end pivot pin. Do not remove the pins.

Secondary Boom Components

- 10 Attach a strap from an overhead crane to the lug on the rod end of one of the secondary boom lift cylinders for support. Do not apply any lifting pressure.
- 11 Use a soft metal drift to drive the barrel-end pivot pin half way out. Lower the barrel end of the secondary boom lift cylinder and let it hang down.
- 12 Use a soft metal drift to drive the rod-end pivot pin half way out.
- 13 Remove the secondary boom lift cylinder from the machine.

⚠ WARNING Crushing hazard. The secondary boom lift cylinder could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

NOTICE Component damage hazard. When removing a secondary boom lift cylinder from the machine, be careful not to damage the counterbalance valve at the barrel end of the cylinder.

- 14 Repeat steps 12 through 15 for the other secondary boom lift cylinder.
- 15 Attach a lifting strap from an overhead crane to the upper pivot for support. Do not lift it.
- 16 Attach a lifting strap from a second overhead crane to the number 1 arm at the mid-point between the upper pivot and mid-pivot.
- 17 Remove the pin retaining fasteners from the number 1 arm pivot pins at the mid-pivot and the upper pivot. Do not remove the pins.

- 18 Use a soft metal drift to drive both pins out.
- 19 Remove the number 1 arm from the machine.

⚠ WARNING Crushing hazard. The number 1 arm could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

⚠ WARNING Crushing hazard. The upper pivot could fall when the number 1 arm is removed from the machine if not properly supported by the overhead crane.

- 20 Attach a lifting strap from an overhead crane to the upper pivot.
- 21 Using the overhead crane attached to the upper pivot, raise the secondary boom assembly approximately 30 inches / 76 cm.
- 22 Insert a 4 x 4 x 11 inch / 10 x 10 x 28 cm block between the number 2 arm and the boom rest. Lower the secondary boom assembly onto the block.

⚠ WARNING Crushing hazard. The secondary boom assembly could fall if not properly supported by the 4 x 4 x 11 inch / 10 x 10 x 28 cm block.

- 23 Pull all of the cables and hoses out through the upper pivot.

NOTICE Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

- 24 Remove the hose and cable cover and clamps from the top of the number 2 arm.

Secondary Boom Components

- 25 Pull all of the hoses and cables out of the upper pivot and out through the mid-pivot. Lay the hoses and cables on the ground.

NOTICE

Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

- 26 Remove the pin retaining fastener from the number 2 arm pivot pin at the upper pivot. Use a soft metal drift to remove the pin.
- 27 Remove the upper pivot from the machine.

WARNING

Crushing hazard. The upper pivot could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

- 28 Attach the lifting strap from an overhead crane to the number 2 arm at the upper pivot end.
- 29 Raise the number 2 arm slightly and remove the 4 x 4 x 11 inch / 10 x 10 x 28 cm block.
- 30 Lower the number 2 arm onto the boom rest pad.
- 31 Insert a 4 x 4 x 8 1/2 inch / 10 x 10 x 22 cm block between the number 3 arm and the number 4 arm at the mid-pivot end.
- 32 Attach a lifting strap from the overhead crane to the mid-pivot for support. Do not apply any lifting pressure.
- 33 Remove the pin retaining fasteners from the number 2, 3 and 4 arm pivot pins at the mid-pivot. Do not remove the pins.

- 34 Use a soft metal drift to drive each pin out. Remove the mid-pivot from the secondary boom assembly.

WARNING

Crushing hazard. The mid-pivot could become unbalanced and fall when removed from the secondary boom assembly if not properly supported by the overhead crane.

- 35 Attach the lifting strap from an overhead crane to the center point of the number 2 arm for support. Do not apply any lifting pressure.
- 36 Remove the pin retaining fasteners from both compression link pivot pins. Do not remove the pins.
- 37 Use a soft metal drift to remove the lower compression link pivot pin at the number 3 arm.
- 38 Support the compression link with an appropriate lifting device.
- 39 Use a soft metal drift to remove the upper compression link pivot pin from the number 2 arm. Remove the compression link from the machine.

WARNING

Crushing hazard. The number 2 arm could fall when the compression link is disconnected from the number 2 arm if not properly supported by the overhead crane.

WARNING

Crushing hazard. The compression link may fall if not properly supported when removed from the secondary boom assembly.

Secondary Boom Components

- 40 Remove the number 2 arm from the machine.

⚠ WARNING

Crushing hazard. The number 2 arm could become unbalanced and fall when removed from the secondary boom assembly if not properly supported by the overhead crane.

- 41 Remove the hose and cable cover and clamps from the number 3 arm.
- 42 Remove the secondary boom drive speed limit switch mounting fasteners from the number 4 arm at the mid-pivot end. Do not disconnect the wiring.
- 43 Pull all of the cables and hoses from the number 3 arm and lay them over the turntable counterweight.

NOTICE

Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

- 44 Remove the mounting fasteners from the cover located in the boom storage area to access the number 3 and number 4 arm pivot pin retaining fasteners at the turntable pivot.

- 45 Attach the lifting strap from the overhead crane to the centerpoint of the number 3 arm for support. Do not apply any lifting pressure.

- 46 Remove the pin retaining fasteners from the number 3 arm at the turntable pivot. Do not remove the pin.
- 47 Use a slide hammer to remove the number 3 arm pivot pin from the turntable pivot through the access hole in the counterweight.
- 48 Remove the number 3 arm from the machine.

⚠ WARNING

Crushing hazard. The number 3 arm could become unbalanced and fall when removed from the machine if not properly supported by the overhead crane.

- 49 Remove the pin retaining fasteners from the number 4 arm at the turntable pivot. Do not remove the pin.
- 50 Attach a lifting strap from the overhead crane to the center point of the number 4 arm. Do not apply any lifting pressure.
- 51 Use a slide hammer to remove the number 4 arm from the turntable pivot through the access hole in the counterweight.
- 52 Remove the number 4 arm from the machine.

⚠ WARNING

Crushing hazard. The number 4 arm could become unbalanced and fall when removed from the machine if not properly supported by the overhead crane.

Secondary Boom Components

5-2

Secondary Boom Lift Cylinder

The secondary boom lift cylinder raises and lowers the secondary boom. The secondary boom lift cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the Secondary Boom Lift Cylinder

⚠ WARNING Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 With the secondary boom in the stowed position, raise the primary boom until it is above the secondary boom lift cylinder rod-end pivot pin.

- 2 Tag, disconnect and plug the hydraulic hoses on the secondary boom lift cylinder. Cap the fittings on the cylinder.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 3 Remove the pin retaining fasteners from the secondary boom lift cylinder rod-end pivot pin and barrel-end pivot pin. Do not remove the pins.
- 4 Attach a strap from an overhead crane to the lug on the rod end of the secondary boom lift cylinder for support. Do not apply any lifting pressure.
- 5 Use a soft metal drift to drive the barrel-end pivot pin half way out. Lower the barrel end of the secondary boom lift cylinder and let it hang down.
- 6 Use a soft metal drift to drive the rod-end *pivot pin half way out*.
- 7 Remove the secondary boom lift cylinder from the machine.

⚠ WARNING Crushing hazard. The secondary boom lift cylinder could become unbalanced and fall when removed from the machine if not properly attached to the overhead crane.

NOTICE Component damage hazard. When removing a secondary boom lift cylinder from the machine, be careful not to damage the counterbalance valve at the barrel end of the cylinder.

Hydraulic Pump

6-1 How to Remove the Auxiliary Pump

How to Remove the Auxiliary Pump

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the secondary boom approximately 6 ft / 2 m. Turn the machine off.
- 2 Place a suitable container under the hydraulic tank. Refer to Specifications, *Machine Specifications*.
- 3 Remove the drain plug from the hydraulic tank. Completely drain the hydraulic tank into a container of suitable capacity.

⚠ CAUTION Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

- 4 Remove the center turntable cover fasteners. Remove the cover from the machine.

- 5 Tag, disconnect and plug the hydraulic hoses from the auxiliary pump. Cap the fittings on the pump.

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 6 Remove the auxiliary pump mounting bolts. Carefully remove the pump.

Hydraulic Pump

6-2 How to Remove the Function Pump

The function pump motor operates at various speeds, depending on the flow and pressure required for the machine function selected. A speed sensor, built into the pump motor, enables the control system to monitor and control the speed of the pump motor, which controls the flow output of the pump.

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Place a suitable container under the hydraulic tank. Refer to Section 2, Specifications.
- 2 Remove the drain plug from the hydraulic tank. Completely drain the hydraulic tank into a container of suitable capacity..

⚠ CAUTION Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

- 3 Tag, disconnect and plug the hydraulic hoses from the pump. Cap the fittings on the pump.

⚠ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 4 Remove the pump mounting bolts. Carefully remove the pump.

Note: When replacing the function pump, it will need to be calibrated. Refer to Repair Procedure, *How to Calibrate the Function Pump*.

How to Calibrate the Function Pump

Calibration of the function pump is essential to good machine performance and service life. Continued use of an uncalibrated or improperly calibrated function pump could result in reduced machine performance. The function pump must be calibrated before machine functions are calibrated or before adjusting boom function speeds.

Note: This procedure must be performed with the rotary speed controller turned to the full clockwise position.

- 1 Calibrate the proportional relief valve. Refer to Repair Procedure, *How to Calibrate the Proportional Relief Valve*.
- 2 Turn the key switch to platform control.
- 3 Pull out the red Emergency Stop buttons to the on position at both the ground and platform controls.
- 4 Do not press down the foot switch.
- 5 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.

Hydraulic Pump

- 6 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
 - ⦿ Result: The display will show FAULTS.
- 7 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 8 Momentarily activate the drive enable toggle switch in the right direction to enter the SETTINGS menu.
 - ⦿ Result: The display will show VALVE AND PUMP SETTINGS.
- 9 Momentarily activate the drive enable toggle switch in the right direction to enter the VALVE AND PUMP SETTINGS menu.
 - ⦿ Result: The display will show THRESHOLD CURRENT.
- 10 Momentarily activate the steer rocker switch in the right direction until START PUMP GPM is shown on the display.
- 11 Momentarily activate the drive enable toggle switch in the right direction to begin pump calibration.
- 12 Press down on the foot switch. Move and hold the primary boom rocker switch in the extend direction until the boom is fully extended and an audible alarm has sounded.
 - ⦿ Result: The alarm sounds. Continue to step 13.
 - ✗ Result: The alarm does not sound. Fully retract the primary boom and repeat steps 11 and 12.

To exit programming mode:

- 13 Move and hold the drive enable toggle in the left position until the display returns to SYSTEM READY mode.

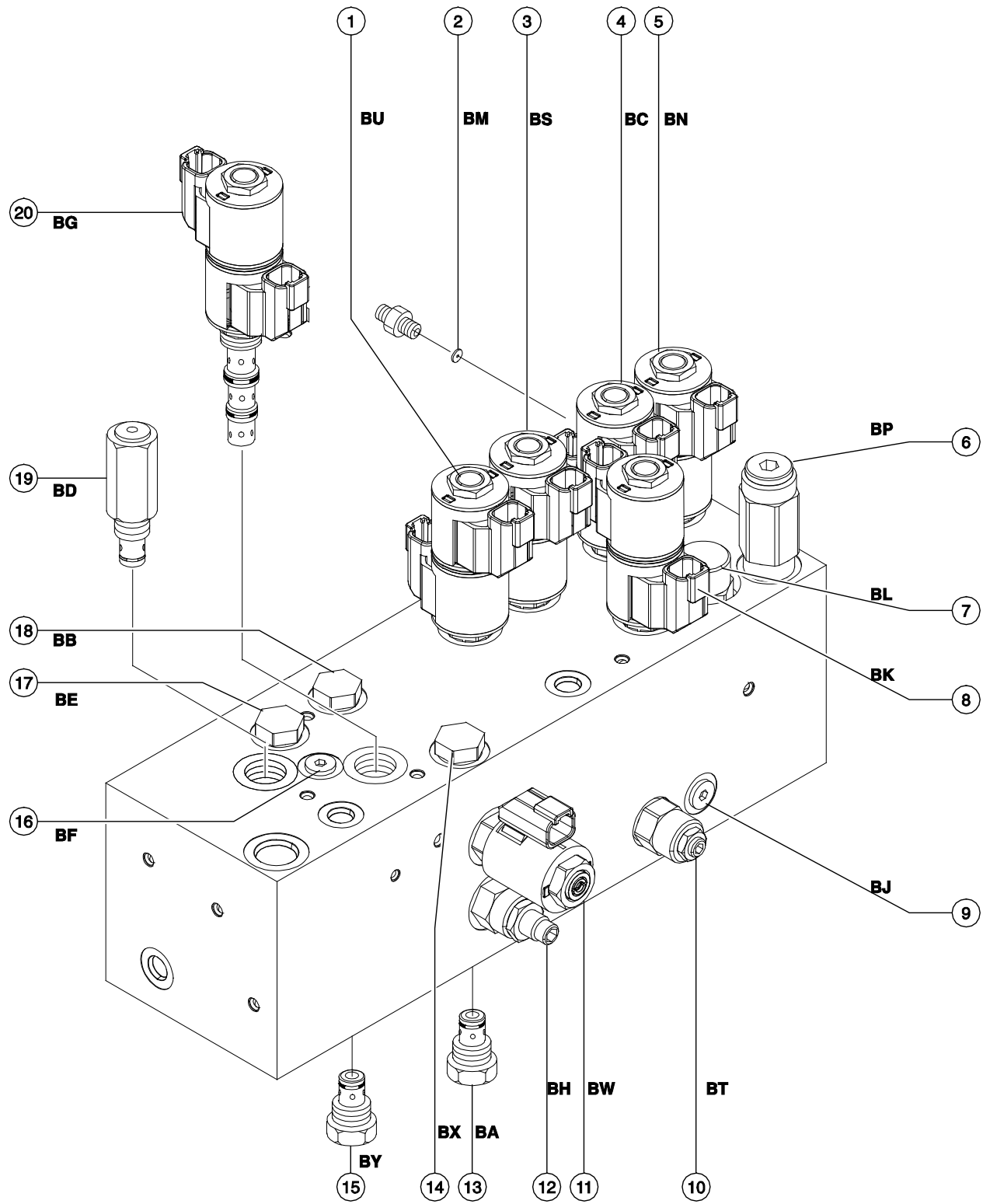
Manifolds

7-1 Function Manifold Components

The function manifold is located behind the ground controls turntable cover.

Index No.	Description	Schematic Item	Function	Torque
—	Coil nut			4-5 ft-lbs / 5-7 Nm
1	Proportional solenoid valve, 3 position 4 way	BU	Primary boom extend/retract	16-20 ft-lbs / 24-27 Nm
2	Orifice, 0.046 inch / 1.17 mm	BM	Secondary boom down	
3	Proportional solenoid valve, 3 position 4 way	BS	Primary boom up/down	16-20 ft-lbs / 24-27 Nm
4	Proportional solenoid valve, 3 position 4 way	BC	Steer left/right	16-20 ft-lbs / 24-27 Nm
5	Proportional solenoid valve, 3 position 4 way	BN	Secondary boom up/down	18-20 ft-lbs / 25-27 Nm
6	Relief valve, 2100 psi / 145 bar	BP	Secondary boom down	18-20 ft-lbs / 25-27 Nm
7	Pressure compensator valve, 80 psi / 5.5 bar	BL	Turntable rotate circuit	25-25 ft-lbs / 34-36.7 Nm
8	Proportional solenoid valve, 3 position 4 way	BK	Turntable rotate left/right	18-20 ft-lbs / 25-27 Nm
9	Shuttle valve	BJ	Turntable rotate circuit	4-5 ft-lbs / 5-7 Nm
10	Counterbalance valve, 1000 psi / 70 bar	BT	Primary boom down	44-52 ft-lbs / 60-70 Nm
11	Proportional relief valve, 50 to 3000 psi / 3 to 207 bar	BW	System relief	18-20 ft-lbs / 25-27 Nm
12	Needle valve	BH	Primary level up/down	18-20 ft-lbs / 25-27 Nm
13	Check valve, 4 psi / 0.3 bar	BA	Prevents oil from draining from turntable rotate circuit back to tank	20 ft-lbs / 27 Nm
14	Check valve, 25 psi / 1.7 bar	BX	System relief valve circuit	18-20 ft-lbs / 25-27 Nm
15	Check valve, 4 psi / 0.3 bar	BY	Prevents oil from draining out of jib/rotate manifold back to tank	18-20 ft-lbs / 25-27 Nm
16	Shuttle valve	BF	Platform level	18-20 ft-lbs / 25-27 Nm
17	Check valve, dual pilot	BE	Platform level	20 ft-lbs / 27 Nm
18	Check valve, 25 psi / 1.7 bar	BB	Prevents oil from draining out of manifold	18-20 ft-lbs / 25-27 Nm
19	Relief valve, 2500 psi / 172 bar	BD	Platform level relief	18-20 ft-lbs / 25-27 Nm
20	Solenoid valve, 3 position 4 way	BG	Platform level up/down	16-20 ft-lbs / 24-27 Nm

Manifolds



Manifolds

7-2 Valve Adjustments - Function Manifold

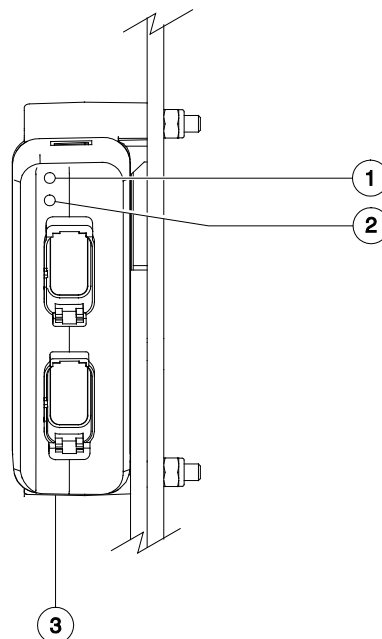
How to Calibrate the Proportional Relief Valve

Note: This procedure must be performed at the ground controls with the jib boom in the fully elevated position.

- 1 Turn the key switch to the off position, and push in the red Emergency Stop button to the off position.
- 2 Connect a 0 to 3000 psi / 0 to 207 bar pressure gauge to test port TP1 on the function manifold.
- 3 Turn the key switch to the ground control position. Pull out the red Emergency Stop button to the on position and immediately activate the function enable toggle switch in either direction 3 times after the alarm sounds.

Note: The function enable toggle switch must be activated within 2 seconds of the audible tone.

- ⦿ Result: The green LED on the TCON should change from a slow blinking light to a rapid blinking light.
- ⊗ Result: The green LED on the TCON does not blink rapidly. Push in the red Emergency Stop button to the off position and repeat this procedure beginning with step 3.



- 1 green LED
- 2 red LED
- 3 turntable control module (TCON)

Manifolds

- 4 Move and hold the secondary boom toggle switch in the down direction.
- ⦿ Result: The pressure gauge shows 1100 psi /76 bar. Continue to step 6.
 - ✗ Result: The pressure gauge does not show 1100 psi / 76 bar. Continue to step 5.

Note: Do not activate the function enable toggle switch while making this adjustment.

- 5 Move and hold the secondary boom toggle switch in the down direction. Momentarily activate the platform level toggle switch in the up direction to increase the relief pressure or in the down direction to decrease the relief pressure. Repeat this procedure beginning with step 4.

Note: Momentarily activating the platform level toggle switch will increase or decrease the relief pressure in increments of approximately 50 psi / 3 bar.

- 6 Move and hold the jib boom toggle switch in the up direction.
- ⦿ Result: The pressure gauge shows 2100 psi /124 bar. Continue to step 8.
 - ✗ Result: The pressure does not show 2100 psi /124 bar. Continue to step 7.

Note: Do not activate the function enable toggle switch while making this adjustment.

- 7 Move and hold the jib boom toggle switch in the up direction. Momentarily activate the platform level toggle switch in the up direction to increase the relief pressure or in the down direction to decrease the relief pressure. Repeat this procedure beginning with step 6.

Note: Momentarily activating the platform level toggle switch will increase or decrease the relief pressure in increments of approximately 50 psi / 3 bar.

- 8 Move and hold the primary boom toggle switch in the retract direction.
- ⦿ Result: The pressure gauge shows 2500 psi /172 bar. Continue to step 10.
 - ✗ Result: The pressure gauge does not show 2500 psi / 172 bar continue to step 9.

Note: Do not activate the function enable toggle switch while making this adjustment.

- 9 Move and hold the primary boom toggle switch in the retract direction. Momentarily activate the platform level toggle switch in the up direction to increase the relief pressure or in the down direction to decrease the relief pressure. Repeat this procedure beginning with step 6.

Note: Momentarily activating the platform level toggle switch will increase or decrease the relief pressure in increments of approximately 50 psi / 3 bar. To exit programming mode:

- 10 Move and hold the drive enable toggle switch in the left direction until the display returns to SYSTEM READY mode.

Manifolds

How to Adjust the Secondary Boom Down Relief Valve

- 1 Turn the machine off. Locate the proportional relief valve (item BW) on the function manifold. Remove the coil nut and remove the coil from the valve cartridge and set aside. Do not disconnect the coil electrical connector.
- 2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port TP1 on the function manifold.
- 3 Turn the key switch to ground controls.
- 4 With the secondary boom fully lowered, move and hold the function enable toggle switch to *either side and hold the secondary boom up/down toggle switch in the down direction*. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.
- 5 Turn the machine off. Hold the secondary boom down relief valve with a wrench and remove the cap (item BP).
- 6 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the relief valve cap.
 - ⦿ Result: The relief pressure meets specification. Continue to step 7.
 - ✗ Result: The relief pressure does not meet specification. Repeat this procedure beginning with step 3.
- 7 Turn the machine off. Remove the pressure gauge and install the proportional relief valve coil.

⚠ WARNING

Tip-over hazard. Do not adjust the relief valve higher than specified.

Manifolds

How to Adjust the Platform Level Relief Valve

- 1 Turn the machine off. Locate the proportional relief valve (item BW) on the function manifold. Remove the coil nut and remove the coil from the valve cartridge and set aside. Do not disconnect the coil electrical connector.
- 2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port TP2 on the function manifold.
- 3 Turn the key switch to ground controls.
- 4 Move and hold the function enable toggle switch to either side and hold the platform level up/down toggle switch in the up direction. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.
- 5 Turn the machine off. Hold the platform level relief valve with a wrench and remove the cap (item BD).
- 6 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the relief valve cap.
 - ⦿ Result: The relief pressure meets specification. Continue to step 7.
 - ✗ Result: The relief pressure does not meet specification. Repeat this procedure beginning with step 3.
- 7 Turn the machine off. Remove the pressure gauge and install the proportional relief valve coil.

⚠ WARNING

Tip-over hazard. Do not adjust the relief valve higher than specified.

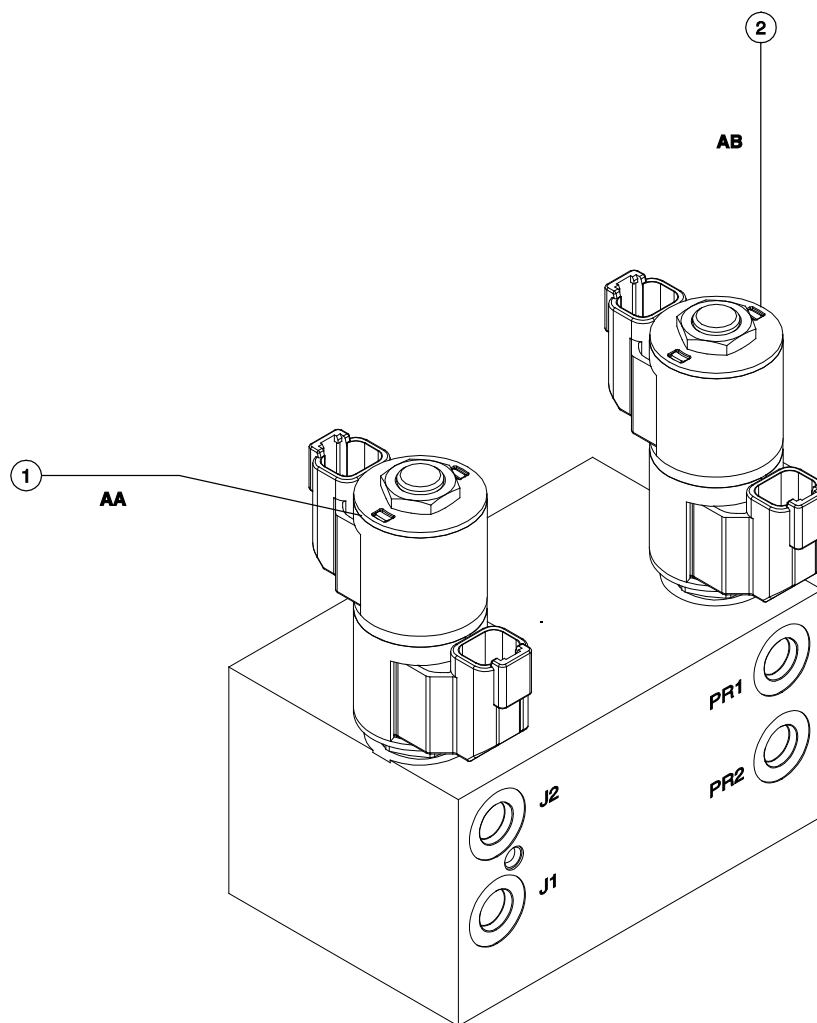
Manifolds

7-3

Jib Boom / Platform Rotate Manifold Components, Z-40/23N

The jib boom/platform rotate manifold is mounted to the jib boom.

Index No.	Description	Schematic Item	Function	Torque
—	Coil nut			4-5 ft-lbs / 5-7 Nm
1	Proportional solenoid valve, 3 position 4 way	AA	Jib boom up / down	18-20 ft-lbs / 25-27 Nm
2	Proportional solenoid valve, 3 position 4 way	AB	Platform rotate	18-20 ft-lbs / 25-27 Nm



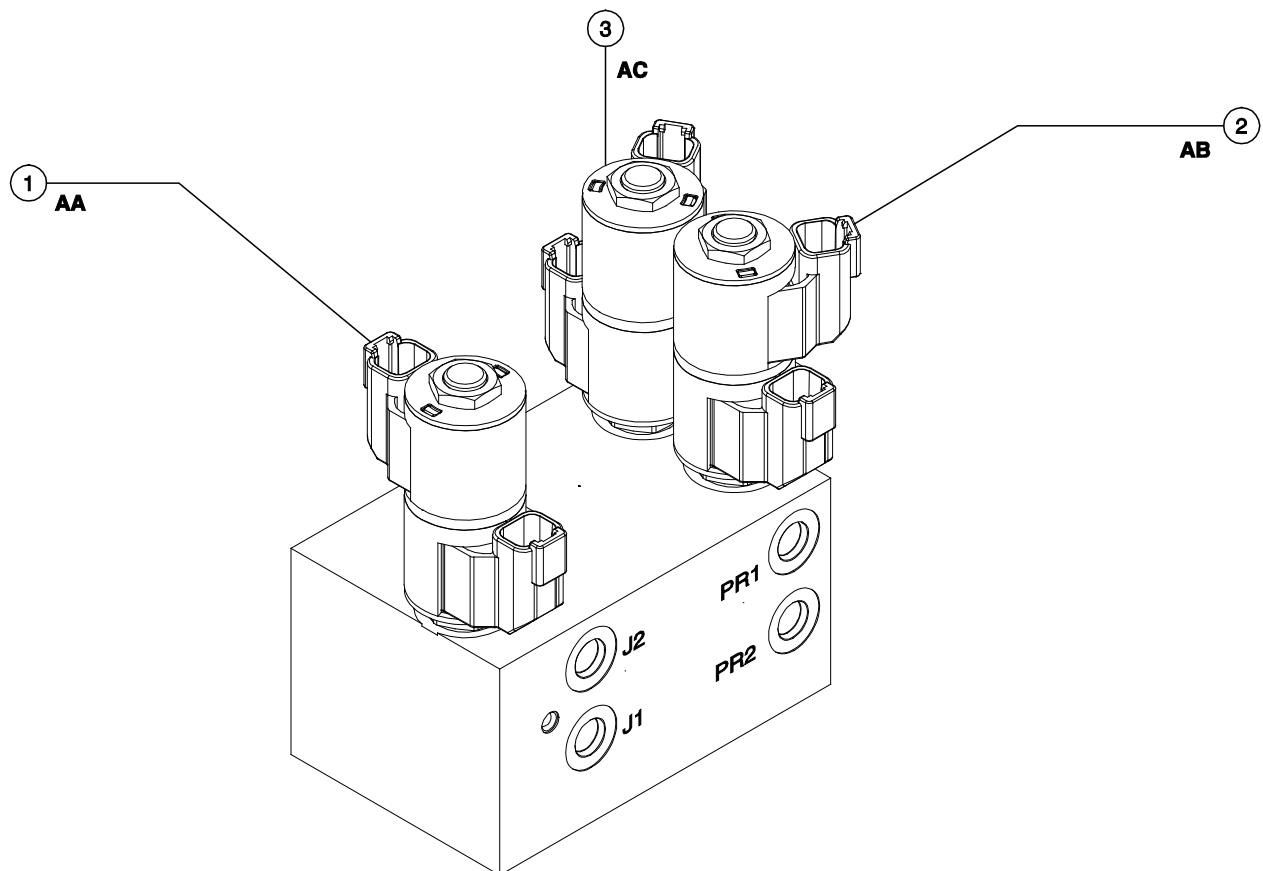
Manifolds

7-4

Jib Boom and Platform / Jib Rotate Manifold Components, Z-40/23N RJ

The jib boom/platform rotate manifold is mounted to the jib boom.

Index No.	Description	Schematic Item	Function	Torque
—	Coil nut			4-5 ft-lbs / 5-7 Nm
1	Proportional solenoid valve, 3 position 4 way	AA	Jib boom up/down	18-20 ft-lbs / 25-27 Nm
2	Proportional solenoid valve, 3 position 4 way	AB	Platform rotate left/right	18-20 ft-lbs / 25-27 Nm
3	Proportional solenoid valve, 3 position 4 way	AC	Jib boom rotate left/right	18-20 ft-lbs / 25-27 Nm



Manifolds

7-5 Valve Coils

How to Test a Coil

A properly functioning coil provides an electromagnetic force which operates the solenoid valve. Critical to normal operation is continuity within the coil. Zero resistance or infinite resistance indicates the coil has failed.

Since coil resistance is sensitive to temperature, resistance values outside specification can produce erratic operation. When coil resistance decreases below specification, amperage increases. As **resistance rises above specification**, voltage increases.

While valves may operate when coil **resistance is outside** specification, maintaining coils within specification will help ensure proper valve function over a wide range of operating temperatures.

Note: If the machine has been in operation, allow the coil to cool at least 3 hours before performing this test.

- 1 Tag and disconnect the wiring from the coil to be tested.

- 2 Test the coil resistance using a multimeter set to resistance (Ω). Refer to the Valve Coil Resistance Specification table.
- ⦿ Result: If the resistance is not within the adjusted specification, plus or minus 10%, replace the coil.

Valve Coil Resistance Specification

Note: The following coil resistance specifications are at an ambient temperature of 68°F / 20°C. As valve coil resistance is sensitive to changes in air temperature, the coil resistance will typically increase or decrease by 4% for each 18°F / 10°C that your air temperature increases or decreases from 68°F / 20°C.

Valve Coil Resistance Specification

Description	Specification
Proportional solenoid valve, 3 position 4 way, 20V DC (schematic items AA, AB, AC, BC, BG, BK, BN, BS, BU)	24 Ω
Solenoid valve, 20V DC (schematic item BG)	24 Ω
Proportional solenoid relief valve, 20V DC (schematic item BW)	22 Ω

Turntable Rotation Components

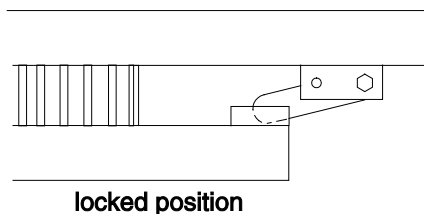
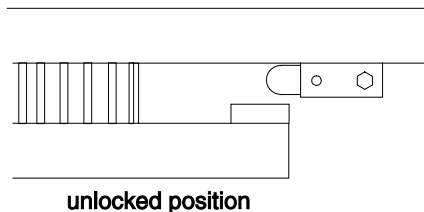
8-1 Turntable Rotation Assembly

How to Remove the Turntable Rotation Assembly

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the secondary boom until the upper pivot is above the turntable covers. Turn the machine off.
- 2 Secure the turntable from rotating with the turntable rotation lock pin.

▲ WARNING Crushing hazard. The turntable rotation assembly could become unbalanced and fall when removed from the machine if not properly supported by the overhead crane.



- 3 Remove the retaining fasteners from the center turntable cover. Remove the cover from the machine.

- 4 Disconnect the battery packs from the machine.

▲ WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 5 Tag, disconnect and plug the hydraulic hoses from the turntable rotation motor manifold. Cap the fittings on the manifold.

▲ WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 6 Attach a lifting strap from an overhead crane or other suitable lifting device to the turntable rotation assembly.
- 7 Remove the turntable rotation assembly mounting fasteners.
- 8 Carefully remove the turntable rotation assembly from the machine.

▲ WARNING Crushing Hazard. The machine could tip over when the turntable rotation assembly is removed if the turntable rotation lock is not in the locked position.

▲ WARNING Crushing hazard. The turntable rotation assembly could become unbalanced and fall when removed from the machine if not properly supported by the overhead crane.

Steer Axle Components

9-1 Steer Angle Sensor

How to Replace the Steer Angle Sensor

The steer angle sensor, installed on the steer yoke pivot pin, is monitored by the control system to determine steer angle. The control system uses the steer angle input, along with pre-programmed parameters, to vary the speed of each drive motor while steering to minimize tire scrub and to help minimize turning radius. Drive speed is also reduced proportionately depending on the steer angle to minimize lateral platform acceleration.

- 1 Adjust the steer tires so they are in a straight driving position.
- 2 Turn the key switch to the off position.
- 3 Push in the red Emergency Stop buttons to the off position at both the ground and platform controls.
- 4 Remove the drive chassis cover at the steer end of the machine.
- 5 Remove the cable clamp securing the steer sensor cable to the chassis.
- 6 Tag and disconnect the steer sensor harness from the main harness.
- 7 Remove the steer sensor cover retaining fasteners. Remove the steer sensor assembly from the machine.

Note: Inspect the sensor activator pin to make sure it is not broken or twisted.

Note: If the sensor activator pin needs to be replaced, note the mounting orientation to be sure the new one is installed correctly.

- 8 Install the new steer sensor assembly to the yoke pivot pin. Loosely install the cover retaining fasteners.

Note: Be sure the sensor activator pin is engaged into the sensor.

Note: The arrow on the steer sensor cover should point towards the front of the machine.

- 9 Connect the steer sensor harness to the main harness.
- 10 Set a voltmeter to read DC voltage. Probe the back of the electrical connector at the orange wire using the positive lead of the voltmeter. Probe the back of the electrical connector at the black wire using the negative lead of the voltmeter.
- 11 Turn the key switch to platform control.
- 12 Pull out the red Emergency Stop buttons to the on position at both the ground and platform controls.
- 13 Adjust the steer sensor cover so that the volt meter reads 2.5V DC.
- 14 Tighten steer sensor cover fasteners.
- 15 Install the cable clamp to secure the steer sensor cable to the drive chassis.
- 16 Install the drive chassis cover.
- 17 Calibrate the steer sensor. See *How to Calibrate the Steer Angle Sensor*.

Steer Axle Components

How to Calibrate the Steer Angle Sensor

- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
- 3 Using the thumb rocker switch on the drive joystick, adjust the steer wheels so they are pointing straight ahead, in line with the nonsteer wheels. Release the foot switch.
- 4 Move and hold the drive enable toggle switch in the right direction while holding the steer rocker switch in the right direction.
- 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch on the drive steer joystick.
- ⦿ Result: The display will show FAULTS.
- 6 Momentarily activate the steer rocker switch in the right direction until SETTINGS is shown on the display.
- 7 Momentarily activate the steer rocker switch in the right direction until you see the DRIVE SETTINGS screen.
- 8 Momentarily activate the drive enable toggle switch in the right direction until you see the CALIBRATE CENTER screen.

Note: Authorization is not required for steer calibrations.

Calibrate Steer Center

- 9 Momentarily activate the drive enable toggle switch in the right direction.
- ⦿ Result: The display will show NO and ENABLE will appear at the bottom of the screen.
- 10 Momentarily activate the steer rocker switch in the right direction to activate calibrate steer center.
- ⦿ Result: ENABLE will appear at the bottom of the screen.

- 11 Momentarily activate the drive enable toggle switch in the right direction.
- ⦿ Result: The display will show YES. Proceed to step 12.
- ✗ Result: System does not allow YES to appear. Press in the red Emergency stop button and return to step one. Check steer angle sensor wiring is correct and steer tires are pointing straight ahead.
- 12 Momentarily activate the drive enable toggle switch in the right direction to save the setting.
- ⦿ Result: The alarm will sound indicating the setting has been saved.

Calibrate Steer Right

- 13 Momentarily activate the steer rocker switch in the right direction until you see the CALIBRATE RIGHT screen and press the drive enable toggle switch once to the right.
- ⦿ Result: The display will show NO and ENABLE will appear at the bottom of the screen.
- 14 Adjust the steer wheels fully in the right direction.
- 15 Momentarily activate the drive enable toggle switch in the right direction to activate calibrate steer right.
- ⦿ Result: ENABLE will appear at the bottom of the screen.
- 16 Momentarily activate the steer rocker switch in the right direction.
- ⦿ Result: The display will show YES.
- 17 Momentarily activate the drive enable toggle switch in the right direction to save the setting.
- ⦿ Result: The alarm should sound indicating the setting has been saved.

Calibrate Steer Left

- 18 Momentarily activate the steer rocker switch in the right direction until you see the CALIBRATE LEFT screen and press the drive enable toggle switch once to the right.

Steer Axle Components

- ⦿ Result: The display will show NO and ENABLE will appear at the bottom of the screen.
- 19 Adjust the steer wheels fully in the left direction
- 20 Momentarily activate the drive enable toggle switch in the right direction.
- ⦿ Result: ENABLE will appear at the bottom of the screen.
- 21 Momentarily activate the steer rocker switch in the right direction.
- ⦿ Result: The display will show YES.
- 22 Momentarily activate the drive enable toggle switch in the right direction to save the setting.
- ⦿ Result: The alarm will sound indicating the setting has been saved.

Note: After all three calibrations have been accepted, an alarm sounds to indicate the calibration procedure is successful and CALIBRATION OK will appear on the display.

To exit programming mode:

- 1 Move and hold the drive enable toggle in the left position until the display returns to SYSTEM READY mode.

Non-steer Axle Components

10-1 Drive Motors

How to Remove a Drive Motor

The drive motors are AC powered and are a brushless design requiring very little maintenance. They have built-in speed and temperature sensors which are monitored by the turntable controller (TCN) and the platform controller (PCN). The speed sensor is a Hall-effect type and is part of the rear motor shaft bearing. The temperature switch will shut down the drive motor if it becomes excessively hot.

- 1 Disconnect the battery packs from the machine.

⚠ WARNING

Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Remove the chassis cover fasteners from the non-steer end of the chassis. Remove the cover.
- 3 Remove the axle covers fasteners from the non-steer axle. Remove the covers.

- 4 Tag and disconnect the power cables from the drive motor.
- 5 Tag and disconnect the electrical connectors for the brake, speed and temperature sensors at the drive motor.
- 6 Remove the drive motor fasteners.
- 7 Support and slide the drive motor shaft out of the drive hub. Remove the drive motor from the machine.

Non-steer Axle Components

10-2 Drive Brake

How to Remove a Drive Brake

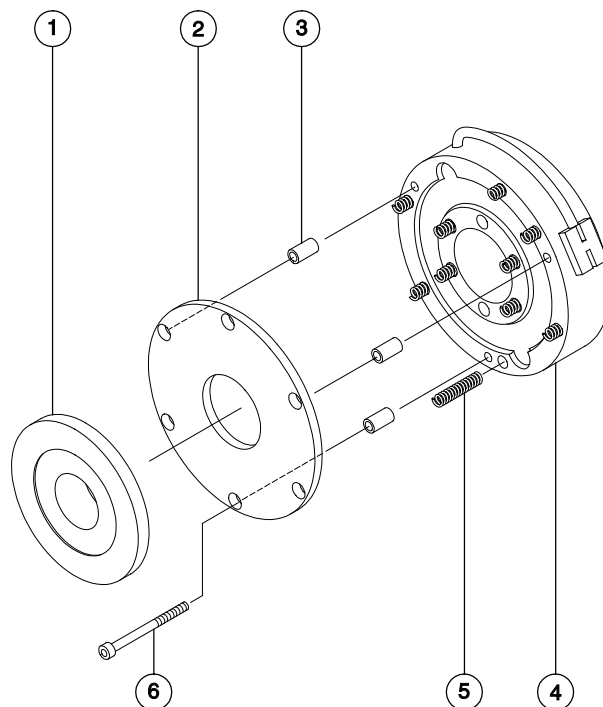
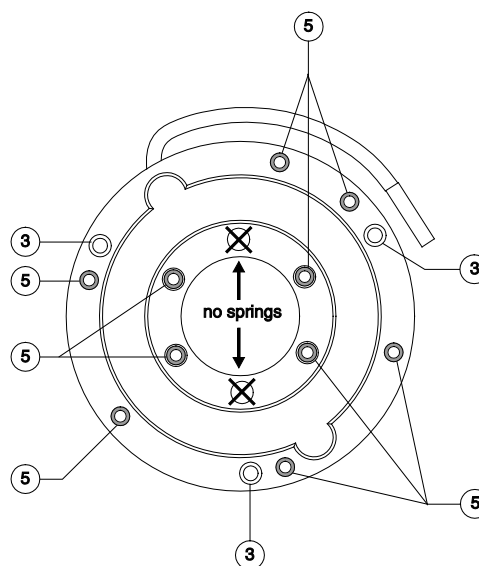
Proper brake action is essential to safe machine operation. The machine uses drive motor regenerative braking to slow and stop the machine. Spring applied electrically released individual wheel brakes hold the machine once it has stopped. The drive motor regenerative braking should operate smoothly, free of hesitation and jerking.

- 1 Block the steer wheels to prevent the machine from rolling.
- 2 Disconnect the battery packs from the machine.
- 3 Remove the chassis cover fasteners from the non-steer end of the chassis. Remove the cover.
- 4 Tag and disconnect the electrical connector from the brake.
- 5 Loosen the brake mounting fasteners in an even pattern until all spring tension has been relieved. Remove the fasteners.
- 6 Remove the brake from the drive motor.

Note: Some parts may fall loose from the brake assembly during removal. Refer to the following illustrations to be sure the spring pattern is correct and that the rest of the brake components are assembled properly prior to installing the brake onto the drive motor.

Note: When installing the brake, torque the brake mounting fasteners to 7.4 ft-lbs / 10 Nm.

- 1 brake disk
- 2 brake plate
- 3 spacer
- 4 brake body
- 5 spring
- 6 screw

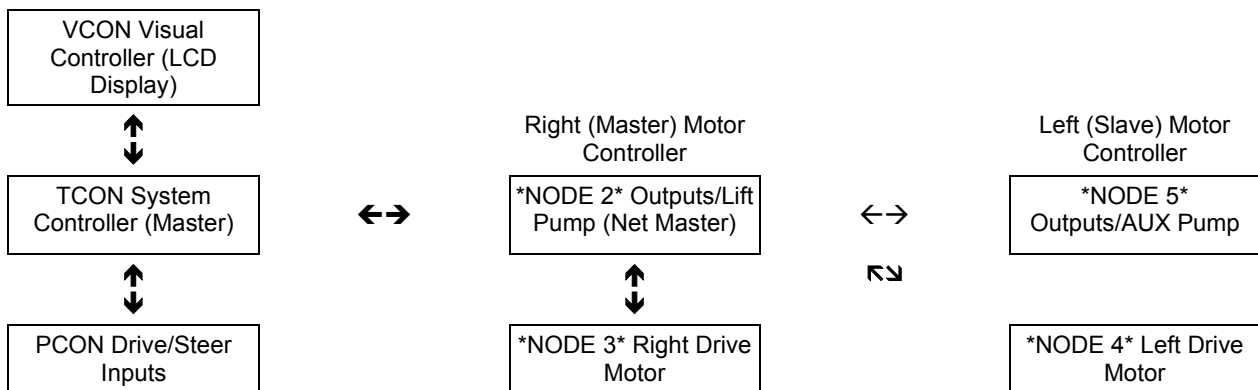


Motor Controllers

11-1 Motor Controllers

There are two drive motor controllers located inside the non-steer axle, one for each drive motor. When viewed from the non-steer end of the machine, the right side motor controller is the "master" and the left side motor controller is the "slave." The master motor controller controls the right drive motor and the function pump. The slave motor controller controls the left side drive motor and auxiliary power unit. The motor controllers are also AC voltage inverters which take the DC voltage from the system batteries and convert the voltage to AC power for the drive motors. The motor controllers are in communication with the turntable controller (TCON) and the platform controller (PCON) which are able to communicate operating or fault information to the LCD display at the platform controls.

The motor controllers also control the valve outputs and machine options such as flashing beacon, travel alarm, etc. Refer to *Fault Codes* section, for a list of fault codes and additional information. For further information or assistance, consult the Genie Product Support.



Fault Codes



Observe and Obey:

- ☑ Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.
- ☑ Unless otherwise specified, perform each procedure with the machine in the following configuration:
 - Machine parked on a firm, level surface
 - Key switch in the off position with the key removed
 - The red Emergency Stop button in the off position at both the ground and platform controls
 - Wheels chocked
 - All external AC power supply disconnected from the machine
 - Boom in the stowed position
 - Turntable secured with the turntable rotation lock
 - Welder disconnected from the machine (if equipped with the weld cable to platform option)

Before Troubleshooting:

- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.
- ☑ Read each appropriate fault code thoroughly. Attempting short cuts may produce hazardous conditions.
- ☑ Be aware of the following hazards and follow generally accepted safe workshop practices.

⚠ WARNING

Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

Note: Two persons will be required to safely perform some troubleshooting procedures.

Control System Fault Codes

Control System Fault Codes

How to Retrieve Control System Fault Codes from the Platform Controls

At least one fault code is present when the alarm at the platform controls produces two short beeps every 30 seconds for 10 minutes.

- 1 Turn the key switch to platform control.
 - 2 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
 - 3 Do not press down the foot switch.
 - 4 Move and hold the drive enable toggle switch in the right direction and hold the steer rocker switch in the right direction.
 - 5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and the steer rocker switch.
- ⊙ Result: The display will show FAULTS.

To access active faults:

- 6 Momentarily activate the drive enable toggle switch in the right direction until ACTIVE FAULTS is shown on the display.
- 7 Momentarily activate the drive enable toggle switch in the right direction to access the active fault codes.
- 8 Activate the steer rocker switch in the right direction to scroll through the fault codes.

To access motor controller faults:

- 9 Momentarily activate the drive enable toggle switch in the right direction until ACTIVE FAULTS is shown on the display.
- 10 Activate the steer rocker switch in the right direction until MOTOR CONTROLLER FAULTS is shown on the display.
- 11 Momentarily activate the drive enable toggle switch in the right direction to access the motor controller fault codes.
- 12 Activate the steer rocker switch in the right direction to scroll through the fault codes.
- 13 Refer to the fault code table on the following pages to aid in troubleshooting the machine by pinpointing the area or component affected.
- 14 To exit the fault code screen, momentarily activate the drive enable toggle switch to the left direction until FAULTS is shown on the display.

To exit programming mode:

- 15 Push in the red Emergency Stop button at the platform controls. Wait approximately 5 seconds and then pull out the red Emergency Stop button out to the on position.

Control System Fault Codes

How to Retrieve Control System Fault Codes from the Ground Controls

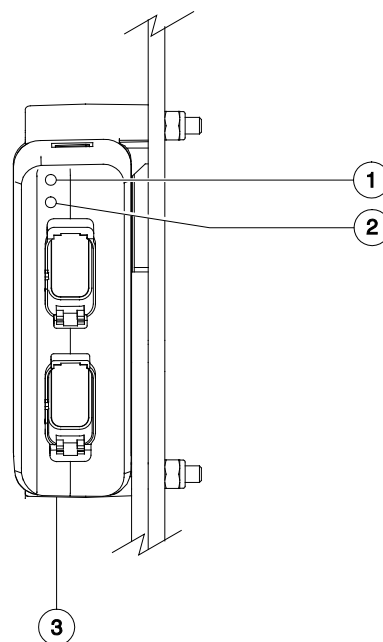
- 1 Turn the key switch to platform control.
- 2 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
- 3 Open the ground controls side turntable cover.
- 4 Locate the turntable control module (TCON) underneath the ground control box.
- 5 Visually inspect the flashing green and red LEDs on the controller.

Note: The red LED indicates the source of the error and the green LED indicates the error type.

- 6 Determine the error source: The flashing red LED, when combined with short or long pauses between the flash, tells the service technician the specific source of the error. Error source code 32, for example, would appear as three quick red flashes followed by a short pause of almost two seconds, then two more quick red flashes. Error source code 33 would appear as three quick red flashes followed by a short pause, then three more quick red flashes followed by a long pause.
- 7 Determine the error type: The flashing green LED, when combined with short or long pauses between the flash, tells the service technician the specific error type. Error type code 12, for example, would appear as one quick green flash followed by a short pause of almost two seconds, then two more quick green flashes followed by a long pause. Error type code 15 would appear as one quick green flash followed by a short pause, then five more quick green flashes followed by a long pause.

- 8 Use the fault code table on the following pages to aid in troubleshooting the machine by pinpointing the area or component affected.

Note: Only control system fault codes can be retrieved from TCON. Motor controller fault codes can only be retrieved by following the procedure using the platform controls. See *How to Retrieve Control System Fault Codes from the Platform Controls*.



- 1 green LED
- 2 red LED
- 3 turntable control module (TCON)

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
11	BATTERY_PWR	12	Out of range	Main contactor open or will not close. All functions disabled.	Do not operate machine with batteries charging. Batteries overcharged, exceeds 65V DC with excessive braking. Batteries undercharged, may occur under load. Replace right (master) AC motor controller.
		15	Value too low	Slow functions. Battery charge less than 10%.	Charge or replace batteries.
12	PR5_COIL Main contactor coil.	15	Value too low Coil shorted	All functions disabled.	Check for short to main contactor. Check diode on main contactor. Replace main contactor. Replace right (master) motor controller.
13	PR5_CONTACT Main contactor.	12	Value too high Contacts stuck closed	All functions disabled.	Check for voltage at main contactor coil with machine in the on position. (24V DC on red wire. 48V DC on orange wire). Replace main contactor.
		15	Value too low Contacts stuck open	All functions disabled.	Check for voltage at main contactor coil with machine in the on position. (24V DC on red wire. 48V DC on orange wire). Replace main contactor.
14	RELIEF_VALVE	12	Value too high Open circuit (unplugged or failed valve coil)	No primary or secondary up	Check for open at proportional relief valve.(wh/rd wire). Replace coil.
		16	Value at 0V output shorted to B-	No primary or secondary up.	Check for short to proportional relief valve. Check coil resistance (22 Ohms). Replace coil.

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
15	FOOTSWITCH	22	Fault Foot switch on within 200 milliseconds of power-up	All functions disabled.	Release foot switch and recycle power. Check for power to PCON at C28-6 with foot switch not pressed. Replace foot switch
		24	Time out	All functions disabled.	Release foot switch and press again.
16	SPEED_DIAL Rotary Speed controller	12	Value too high > 5.2 volts	Function speeds reduced.	Check for 5V DC (orange wire). Check output. 0-4.7V DC (wh/rd). Check input at VCON at C35-3. Replace rotary controller.
17	LIFT_PUMP	12	Value too high Pump motor output too high with respect to PWM applied	Lift pump disabled Auxiliary functions only.	Check for 48V DC to main function pump. Check for current leakage from motor or cables to B-. Replace right (master) AC motor controller.
		15	Value too low		Do not operate machine with batteries charging. Check for 48V DC to main function pump. Replace right (master) AC motor controller.
		22	Fault		Allow main pump to cool down. Check for air restriction to electric motor. Check relief valve settings at main manifold.
18	TACH_LIFTPUMP Lift pump motor encoder.	22	Fault	No primary up or secondary up.	Check 3 wire plug on encoder at pump motor. Check 5V DC (red wire). Replace lift pump encoder and wiring.
19	AUX_PUMP Auxiliary pump.	12	Value too high	Auxiliary functions disabled.	Check fuse F1 (200A). Check for 24V DC to Aux pump. Replace Aux. pump. Replace left (slave) AC motor controller.
		15	Value too low	Main lift pump and drive disabled.	Check for 24V DC to Aux pump. Replace Aux. pump. Replace left (slave) AC motor controller.

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
21	PRI_UD_JYSTK Primary up/down joystick.	11	Shorted to supply	Primary up/down function disabled.	Inspect and repair joystick wiring. Replace joystick.
		16	Value at 0V		Check neutral output range is within 2000 to 3000 mV. Calibrate joystick. Replace joystick.
		17	Not calibrated Neutral out if range		
22	PRI_UP_VALVE Primary boom up valve.	12	Value too high	Primary up function disabled.	Check for open or short from TCON(C14-5) to the up coil. Replace coil.
		15	Value too low		
23	PRI_DN_VALVE Primary boom down valve.	12	Value too high	Primary down function disabled.	Check for open or short from TCON(C14-6) to the down coil. Replace coil.
		15	Value too low		
25	PRI_ER_JYSTK Primary boom extend/retract joystick.	11	Shorted to supply	Primary extend/retract function disabled.	Inspect and repair joystick wiring. Replace joystick.
		16	Value at 0V		Check neutral output range is within 2000 to 3000 mV. Calibrate joystick. Replace joystick.
		17	Not calibrated Neutral out if range		
26	PRI_EX_VALVE Primary boom extend valve.	12	Value too high	Primary extend function disabled.	Check for open or short from TCON(C14-3) to the extend coil. Replace coil.
		15	Value too low		
27	PRI_RT_VALVE Primary boom retract valve.	12	Value too high	Primary retract function disabled.	Check for open or short from TCON (C14-4) to the retract coil. Replace coil.
		15	Value too low		
32	SEC_UP_VALVE Secondary boom up valve.	12	Value too high	Secondary up function disabled.	Check for open or short from TCON (C14-7) to the secondary up coil. Replace coil.
		15	Value too low		

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
33	SEC_DN_VALVE Secondary boom down valve.	12 15	Value too high Value too low	Secondary down function disabled.	Check for open or short from TCON (C14-8) to the secondary down coil. Replace coil.
36	JIB_UP_VALVE Jib boom up valve.	12 15	Value too high Value too low	Jib up function disabled.	Check for open or short from PCON (C29-5) to the jib up coil. Replace coil.
37	JIB_DN_VALVE Jib boom down valve.	12 15	Value too high Value too low	Jib down function disabled.	Check for open or short from PCON (C29-6) to the jib down coil. Replace coil.
41	TT_ROT_JYSTK Turntable rotate joystick.	11	Shorted to supply	Turntable rotate functions disabled.	Inspect and repair joystick wiring. Replace joystick.
		16	Value at 0V		
		17	Not calibrated Neutral out of range	Turntable rotate functions disabled.	Check neutral output range is within 2000 to 3000 mV. Calibrate joystick. Replace joystick.
42	TT_CW_VALVE Turntable rotate clockwise valve.	12 15	Value too high Value too low	Turntable rotate clockwise function disabled.	Check for open or short from TCON (C29-8) to the turntable CW coil. Replace coil.
43	TT_CCW_VALVE Turntable rotate counter clockwise	12 15	Value too high Value too low	Turntable rotate counterclockwise function disabled.	Check for open or short from TCON (C29-7) to the turntable CCW coil. Replace coil.
46	PROT_CW_VALV Platform rotate clockwise valve.	12 15	Value too high Value too low	Platform rotate clockwise function disabled.	Check for open or short from PCON (C29-3) to the platform rotate CW coil. Replace coil.
47	PROT_CCW_VLV Platform rotate counter clockwise	12 15	Value too high Value too low	Platform rotate counterclockwise function disabled.	Check for open or short from PCON (C29-4) to the platform rotate CCW coil. Replace coil.
51	DRIVE_JYSTK Drive joystick.	11	Shorted to supply	Drive functions disabled.	Inspect and repair joystick wiring. Replace joystick.
		16	Value at 0V		
		17	Not calibrated Neutral out of range		Check neutral output range is within 2000 to 3000 mV. Calibrate joystick. Replace joystick.

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
52	AC_R_MOTOR Right side drive motor.	12	Value too high	Drive function disabled.	Do not operate machine with batteries charging. Check cable connections. Check for 33V AC across any two legs on drive motor at full stick. Replace right drive motor. Replace right (master) AC motor controller.
		15	Value too low		Check cable connections. Check for 33V AC across any two legs on drive motor at full stick. Replace right drive motor. Replace right (master) AC motor controller.
		22	Fault		Check wires to thermal sensor at 6 wire deutsch plug on motor. Check resistance on thermal sensor.
53	AC_L_MOTOR Left side drive motor.	12	Value too high	Drive function disabled.	Do not operate machine with batteries charging. Check cable connections. Check for 33V AC across any two legs on drive motor at full stick. Replace right drive motor. Replace right (master) drive controller.
		15	Value too low		Check cable connections. Check for 33V AC across any two legs on drive motor at full stick. Replace right drive motor. Replace right (master) AC motor controller.
		22	Fault		Check wires to thermal sensor at 6 wire connector on motor. Check resistance on thermal sensor.
54	BRAKE_RIGHT Brake AC motor right side.	15	Value too low Coil shorted	Drive function disabled.	Check for 48V DC to brake (WH/RD). Check for 48V DC at C16-4. (48V is brake set, 0V is released). Replace brake

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
55	BRAKE_LEFT Brake AC motor left side.	15	Value too low Coil shorted	Drive function disabled.	Check for 48V DC to brake (WH/RD). Check for 48V DC at C23-4. (48V is brake set, 0V is released). Replace brake
56	TACH_R_MOTOR Right side AC drive motor encoder.	22	Fault	Drive function disabled.	Check wiring at the 6 wire connector at the drive motor. Check for 12V DC on pins 1 and 2. Replace motor. Replace right (master) AC motor controller.
57	TACH_L_MOTOR Left side AC drive motor encoder.	22	Fault	Drive function disabled.	Check wiring at the 6 wire connector at the drive motor. Check for 12V DC on pins 1 and 2. Replace motor. Replace left (slave) AC motor controller.
58	AC_R_CTRLR Right side AC motor controller.	13	No response	All functions disabled.	Check can bus circuit for open. Check can bus resistor. Isolate all other modules simultaneously. Replace right AC motor controller.
		22	Fault	All functions disabled or limited.	Refer to MOTOR CONTROLLER FAULT CODES screen at platform. See <i>Motor Controller Fault Codes</i> chart.
59	AC_L_CTRLR Left side AC motor controller.	22	Fault	All functions disabled or limited.	Refer to MOTOR CONTROLLER FAULT CODES screen at platform. See <i>Motor Controller Fault Codes</i> chart.
61	STEER_JYSTK Joystick steer.	11	Shorted to supply	Steering function disabled.	Repair joystick wire connections or replace joystick.
		16	Value at 0V		
		17	Not calibrated		Calibrate joystick. Replace joystick.
62	AC_R_OUTPUT Right side AC motor controller output.	15	Value too low Coil shorted	Steering and platform level functions disabled. Flashing beacon disabled	Check wiring and coil for function causing fault. Fault at power up, replace right AC motor controller.
		16	Value at 0V Output shorted to B-	Steering and platform level functions disabled. Flashing beacon disabled	Check wiring and coil for function causing fault. Fault at power up, replace right (Master) AC motor controller.

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
63	STEER_SENSOR Steer angle sensor.	11	Shorted high (5V)	Wheel speed correction is disabled. Drive speed reduced.	Check for 5V DC (GR/WH) at steer sensor. Check for 0-5V DC (orange) output at steer sensor. Check for 0-5V DC (orange) at C16-30 on right AC motor controller. Replace steer sensor. Replace steer sensor. Re-calibrate steer sensor. Verify wiring. Replace steer sensor
		12	Value too high		
		15	Value too low		
		16	Value at 0V		
		17	Not calibrated		
		22	Fault		
66	AC_L_OUTPUT Left side AC motor controller output.	15	Value too low	Hour meter, brake relay and tilt sensor alarm disabled. Platform overload alarm disabled (option).	Check wiring and coil for function causing fault. Fault at power up, replace left AC motor controller.
		16	Value at 0V Output shorted to B- (only detected with key switch turned to platform)	Hour meter, brake relay and tilt sensor alarm disabled. Platform overload alarm disabled (option).	Check wiring and coil for function causing fault. Look for short to B- in wire from faulted function to left AC motor controller
67	DENA_SW_PBOX Platform control box drive enable switch.	12	Value too high	Drive function disabled in drive disable zone.	Check for voltage output at drive enable toggle switch. (Blue) C35-4. Check for voltage output when not activated.
		19	Out of Range		
		22	Fault		
68	FUNC_SW_GBOX Ground box function enable switch.	22	Fault	Auxiliary functions only.	Check for 24V DC at function enable toggle switch. Check for 24V DC input at TCON at C14-2. Check for voltage output when not activated.
71	ESTOP_RELAY Emergency Stop relay.	11	Shorted to supply	All functions disabled.	With Red Emergency Stop pulled out at ground control, CR62 should close. Check for 24V DC on 30 and 87 of CR62. Replace relay. Replace red Emergency Stop button contacts.

Control System Fault Codes

Error Source		Error Type			
ID	Name	ID	Name	Condition	Solution
72	JROT_CW_VALV Jib rotate clockwise valve.	12 15	Value too high Value too low	Jib rotate clockwise function disabled.	Check for open or short from PCON (C29-8) to the platform rotate CW coil. Replace coil.
74	JROT_CCW_VLV Jib boom rotate counterclockwise valve.	12 15	Value too high Value too low	Jib rotate counterclockwise function disabled.	Check for open or short from PCON (C29-7) to the platform rotate CCW coil. Replace coil.
76	OVERLOAD_SW Platform overload switch (option).	12 22	Value too high Fault	Platform functions limited to recovery only. Primary lift pump functions at ground controls disabled. Auxiliary functions at ground control only. Extend disabled.	Do not exceed maximum platform weight. Check for 24V DC input to load sensor (black.) Check for 24V DC output from load sensor when not overloaded to PCON pin C28-7 (black at switch, WH/BK at module). Check for 0V DC output from load sensor when not overloaded to right AC motor controller pin C16-19 (white at switch, BL/WH at module).
77	VCON_PBOX Platform display screen.	13	No response	Platform functions disabled. Ground controls operative.	Check can bus circuit for open. Check can bus resistor (120 Ω). Isolate all other modules simultaneously.
78	PCON_PBOX Platform controller screen.	13	No response	Platform functions disabled. Ground controls operative.	Check can bus circuit for open. Check can bus resistor. Isolate all other modules simultaneously.
82	LOAD SENSE RECOVERY	22	Fault	System was overloaded and moved under AUX power.	For reporting purposes only.
83	DISABLED BY OWNER	22	Fault	Functions disabled.	Contact machine owner

Motor Controller Fault Codes

AC Motor controller code	Error Type	Condition	Solution
24592	Watchdog	No functions or drive.	Replace the AC motor controller.
65297	Logic failure #3	No functions or drive.	Replace the AC motor controller.
65298	Logic failure #2	No functions or drive.	Replace the AC motor controller.
8977	S TB Y I HIGH	No functions or drive.	Replace the AC motor controller.
12592	Capacitor charge	No functions or drive.	Check for 48V DC on B + , using B - for ground. Replace the AC motor controller.
12833	Contactor driver	No functions or drive.	Replace the AC motor controller.
65503	Safety feedback	No functions or drive.	Replace the AC motor controller.
12835	P OS AUX Shorted	No functions or drive.	Check for 48V DC on the WH/RD wire going to the right brake coil. Replace the AC motor controller.
8785	Hardware coil short time out	No functions or drive.	Replace the AC motor controller.
65512	Wrong set point	No functions or drive.	Replace the AC motor controller.
6513	Power MOS shorted	No functions or drive.	Replace the AC motor controller.
65515	Tiller error	No functions or drive.	Check for 48V DC R-1, OR/RD on master motor controller. Check for 24V DC on R-29, Blue on master motor controller. Replace AC motor controller.

Motor Controller Fault Codes

AC Motor controller code	Error Type	Condition	Solution
65517	Analog input	No functions or drive.	If problem is constant, replace the AC controller.
65520	Hardware fault	No functions or drive.	Replace the AC motor controller.
65531	Wrong set battery	Cut out valves, function pump, propel stopped, MC opened, EB applied.	Replace the AC motor controller.
21808	EEPROM time out	Functions and drive will revert to factory default settings.	Cycle power off and back on. If the fault disappears, all valve settings will have to be readjusted. If fault is maintained, replace the AC motor controller.
13912	High temperature	Functions and drive start to degrade and quit. One or both motor controllers have exceeded 85°C/185°F.	Let the AC motor controllers cool off. If fault persists with AC motor controllers cooled, replace faulty AC motor controller.
65516	Current gain	Functions and drive will revert to factory default settings.	Readjust the max current Setting.
16913	Thermic sensor time out	Function and drive speeds will slow down.	Replace the AC motor controller.
65512	Slip profile	No drive.	Replace the AC motor controller.
65360	Forward/Reverse	Propel is stopped (node 2 only).	Replace the right (master) AC motor controller.
65508	Plat-Gnd switch open	Node 2 only.	Replace the right (master) AC motor controller.
65521	Check up needed	Continuous normal operation (node 2 only).	Perform scheduled maintenance

Motor Controller Fault Codes

AC Motor controller code	Error Type	Condition	Solution
24592	Watchdog	No functions or drive.	Replace the AC motor controller.
65509	Wrong zero	No functions or drive.	Replace the AC motor controller.
65510	Output mismatch	No functions or drive.	Replace the AC motor controller.
65530	Input mismatch	No functions or drive.	Replace the AC motor controller.
65511	Safety feedback	No functions or drive.	Replace the AC motor controller.
65512	Wrong setpoint	No functions or drive.	Replace the AC motor controller.
65513	Wrong config.	No functions or drive.	Replace the AC motor controller.
65532	Hardware fault	No functions or drive.	Replace the AC motor controller.
65528	Analog input	No functions or drive.	Replace the AC motor controller.
21808	EEPROM time out	No functions or drive.	Replace the AC motor controller.
9233	I=0 ever	No functions or drive.	Replace the AC motor controller.
8977	STBY I HIGH	No functions or drive.	Replace the AC motor controller.
16912	High temperature	Function pump chopper maximum current reduced proportionally to temperature increase.	Let the AC motor controllers cool off. If fault persist with AC motor controllers cooled, replace faulty AC motor controller.
65515	Hardware fault valve	No functions or drive.	Replace the AC motor controller.
65280	Tiller mismatch	No functions or drive.	Replace the AC motor controller.
16913	Current sensor time out	No functions or drive.	Replace the AC motor controller.
21776	EEPROM warning	No functions or drive.	Replace the AC motor controller.

Motor Controller Fault Codes

Drive Motor Thermal Sensor

The thermal sensor is monitored by the motor controllers to maintain optimum performance and as a thermal shutdown protection device.

Normal safe operating range is between -40°F / -40°C and 131°F / 55°C at an 85% duty cycle.

Thermal faults will occur when the temperature exceeds its threshold of 302°F / 150°C. Then drive speeds will be reduced by 50%.

Thermal shut down occurs at 392°F / 200°C.

How to Test the Thermal Sensor

- 1 Disconnect the battery packs from the machine.

⚠ WARNING

Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 2 Remove the chassis cover fasteners from the non-steer end of the chassis. Remove the cover.
- 3 Remove the fasteners from the axle covers from the non-steer axle. Remove the covers.
- 4 Tag and disconnect the six pin Deutsch electrical connector for the speed and temperature sensor at the drive motor. Measure the drive motor case temperature using a thermometer.
- 5 Measure the drive motor case temperature using a thermometer.
- 6 Measure the resistance between pins 5 and 6 on the Deutsch connector going into the motor housing. Compare value to chart on right.

Temperature	Resistance
°F / °C	Ohm
-40 / -40	355
-22 / -30	386
-4 / -20	419
14 / -10	455
32 / 0	493
50 / 10	533
68 / 20	576
77 / 25	598
86 / 30	621
104 / 40	668
122 / 50	718
140 / 60	769
158 / 70	824
176 / 80	880
194 / 90	939
212 / 100	1000
230 / 110	1063
248 / 120	1129
266 / 130	1197
284 / 140	1268
302 / 150	1340
320 / 160	1415
338 / 170	1493
347 / 180	1572
374 / 190	1654
392 / 200	1739
410 / 210	1825
428 / 220	1914
446 / 230	2006
464 / 240	2099
482 / 250	2195
500 / 260	2293
518 / 270	2392
536 / 280	2490
554 / 290	2584
572 / 300	2668

Schematics



Observe and Obey:

- ☑ Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.

Before Troubleshooting:

- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.

About This Section

There are two groups of schematics in this section.

Electrical Schematics

⚠ WARNING

Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

Hydraulic Schematics

⚠ WARNING

Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

Schematics

Circuit numbering

- 1 Circuit numbers consist of three parts: the circuit prefix, circuit number and circuit suffix. The circuit prefix indicates the type of circuit. The circuit number describes the function of the circuit. The circuit suffix provides an abbreviation for the number or may be used to further define the function of this portion of the circuit. It also may be used to indicate the final end of the circuit, i.e., LS or limit sw.
- 2 The circuit number may be used more than once in a circuit.

For Example:

C 74 PL – This is the circuit for the lockout valve #1. C stands for control, 74 is the number of the circuit for the primary #1 lock out valve. PL stands for Primary Lockout.

S 62 BST – This is the circuit that communicates to the onboard computers of the machine that the boom is fully stowed. S stands for safety, 62 is the number of the circuit for boom stowed and BST stands for Boom Stowed.

P 48 LP – P stands for power. 48 is the circuit number for work lamps and LP stands for Lamp.

R 48 LP – R stands for relay. In this case it is the wire that feeds the relay coil for the work lamp. All other numbers remain the same.

V61AXR – V stands for valve power. Number 61 stands for axle retracted circuit; AXR stands for Axle retracted.

R46HRN – R stands for Relay output, supplying power to the horn (HRN). Number 46 is the circuit number for the horn.

Circuit prefix

C	Control
D	Data
E	Engine
G	Gauges
N	Neutral
P	Power
R	Relay Output
S	Safety
V	Valve

Schematics

Suffix	Definition	Suffix	Definition
GEN	AC Generator	EDC	Electrical Displacement Control
AF	Alternator Field	ENV	Envelope Light
ANG	Angle	ESP	Engine Speed Select
ABV	Auxiliary Boom Valve	ESL	Engine Status Lamp
AFV	Auxiliary Forward Valve	ENL	Envelope Lockout
AH	Auxiliary Hydraulic Pump	FLR	Filter Restricted
APV	Auxiliary Platform Valve	FLT	Filter Switch
ARV	Auxiliary Reverse Valve	FB	Flashing Beacon
ASV	Auxiliary Steer/Drive Valve	FS	Float Switch
AXE	Axle Extend Valve	FTS	Foot switch Signal
AXO	Axle Oscillate	FWD	Forward
AXR	Axle Retract Valve	FP	Fuel Pump
AFP	Axle Front Position	FL	Fuel Select (gas/LP)
RAP	Axle Rear Position	FSL	Fuel Solenoid
BAT	Battery	FE	Function Enable
BEX	Boom Extended	TCN	Ground Control
BST	Boom Stowed	GND	Ground
BRK	Brake	HRN	Horn
BV	Bypass Valves	HS	High RPM
CAL	Calibrate	HG	Hydraulic Generator
CAN	CAN Signal	IGN	Ignition
SHD	CAN Shield	JBD	Jib Bellcrank Down
CAT	CATS Module	JBU	Jib Bellcrank Up
CNK	Chain Break	JBS	Jib Sensor
DTH	Data High	JUD	Jib Up/Down Control
DTL	Data Low	JD	Jib Down
DCN	Drive Chassis Controller	JFC	Jib Up/Down Flow Control
DE	Drive Enable	JSV	Jib Select Valve
DEL	Drive Enable Left	JU	Jib Up
DER	Drive Enable Right	JER	Jib Extend/Retract Control

Schematics

Suffix	Definition	Suffix	Definition
JBE	Jib Extend	PS	Pressure Switches
JBR	Jib Retract	PBS	Primary Boom Angle Sensor
JRL	Jib Rotate Left (CCW)	PBD	Primary Boom Down
JRR	Jib Rotate Right (CW)	PBL	Primary Boom Extend/Retract Lockout Valve
JPW	Joystick 5V DC Power	PBE	Primary Boom Extend
LPS	Lamps	PER	Primary Boom Extend/Retract Flow Control
LF	Left Front	PBR	Primary Boom Retract
LFS	Left Front Steer Sensor	PBU	Primary Boom Up
LR	Left Rear	PBF	Primary Boom Up/Down Flow Control
LRS	Left Rear Steer Sensor	PLS	Primary Boom Extend/Retract Signal
LS	Limit Switch	PES	Primary Boom Up/Down Signal
LSR	Lift Speed Reduction	PEL	Primary Extend/Retract Lockout
LDS	Load Sensor	PSL	Primary Length Sensor
LO	Lockout	PL	Primary Lockout
LS	Low RPM	PWR	Power
LOF	Low fuel	PSL	Power to Length Sensor
MS	Motor Shift (Speed)	PSE	Program Set up Enable
MFV	Multi Function Valve	JPL	Propel Signal
PCN	Platform Control	PLL	Propel Lockout
PLD	Platform Level Down	PRV	Proportional Valve
PLF	Platform Level Flow Control	PXS	Proximity Sensor
PLU	Platform Level Up	REC	Receptacle
PRF	Platform Rotate Flow Control	RCV	Recovery
PRC	Platform Rotate Control	RL	Retract Lockout
PRL	Platform Rotate Left (CCW)	RET	Return
PRR	Platform Rotate Right (CW)	REV	Reverse
PTA	Platform Tilt Alarm	RF	Right Front
PTS	Platform Tilt Sensor	RFS	Right Front Steer Sensor
PCE	Pressure Comp Enable	RR	Right Rear
PSR	Pressure Sender	RRS	Right Rear Steer Sensor

Schematics

Suffix	Definition
RPM	RPM
SBS	Sec Boom Angle Sensor
SBL	Sec Boom Elevated
SBD	Sec Boom Down
SBE	Sec Boom Extend
SER	Sec Boom Extend/Retract Flow Control
SBR	Sec Boom Retract
SBU	Sec Boom Up
SUD	Sec Boom Up/Down Flow Control
SB	Secondary Boom
SLE	Secondary Boom Lockout Valve (extend)
SLD	Secondary Boom Lockout Valve (riser down)
SP	Spare
SS	Speed Sensor
SA	Start Aid (Glow Plug or choke)
STR	Starter
STC	Steer Control Signal
SCW	Steering Valve (CW)
SCC	Steering Valve (CCW)
TSR	Temp Sender
TS	Temp Switches
TET	Tether
TAX	Tilt Alarm X axis
TAY	Tilt Alarm Y axis
TCN	Ground Control Panel
TRF	Turntable Rotate Flow Control
TRR	Turntable Rotate Right (CW)
TTA	Turntable Tilt Alarm
TTS	Turntable Tilt Sensor
TSW	Test Switch

Schematics

Wire Coloring

- 1 All cylinder extension colors are solid and all retract functions are striped black. When using black wire, the stripe shall be white.
- 2 All rotations that are LEFT or CW are solid, RIGHT or CCW are striped and black. When the wire is black, the stripe is white.
- 3 All proportional valve wiring is striped.

Power Circuits

P10	Primary boom extend valve
P11	Primary boom up valve
P30	Secondary boom down and extend valves
P38	Propel (drive) valves
P39	Turntable rotate flow control valve

Wire Color Legend

BL	Blue
BL/BK	Blue/Black
BL/RD	Blue/Red
BL/WH	Blue/White
BK	Black
BK/RD	Black/Red
BK/WH	Black/White
BR	Brown
GR	Green
GR/BK	Green/Black
GR/WH	Green/White
RD	Red
RD/BK	Red/Black
RD/WH	Red/White
OR	Orange
OR/BL	Orange/Blue
OR/BK	Orange/Black
OR/RD	Orange/Red
WH	White
WH/BK	White/Black
WH/RD	White/Red
YL	Yellow

Schematics

Color	Circuit #	Primary Function	Color	Circuit #	Primary Function
RD	1	Primary boom up driver	RD	24	Power to warning senders
RD/BK	2	Primary boom down driver	WH/BK	25	Power to oil pressure sender
RD/WH	3	Primary boom up/down flow control proportional valve driver	WH/RD	26	Power to temp sender
WH	4	Turntable rotate left valve driver	RD	27	Auxiliary Power
WH/BK	5	Turntable rotate right valve driver	RD/BK	28	Platform level alarm
WH/RD	6	Turntable rotate flow control proportional valve driver	RD/WH	29	Drive Motor shift (speed)
BK	7	Primary boom extend	WH	30	Forward/EDC-A
BK/WH	8	Primary boom retract	WH/BK	31	Reverse/EDC-B
BK/RD	9	Primary boom Extend/Retract proportional valve driver	WH/RD	32	Brake
BL	10	Secondary boom up valve driver	BK	33	Start
BL/BK	11	Secondary boom down valve driver	BK/WH	34	Start Aid (glow plug or choke)
BL/WH	12	Secondary boom up/down flow control proportional valve driver	BK/RD	35	High Engine speed select
BL/RD	13	Drive enable	BL	36	Steer clockwise
OR	14	Platform level up valve	BL/BK	37	Steer counterclockwise
OR/BK	15	Platform level down valve	BL/WH	38	Gasoline
OR/RD	16	Platform up/down flow control proportional valve driver	BL/RD	39	LPG
GR	17	Platform rotate left valve driver	OR	40	Limit switch signal stowed
GR/BK	18	Platform rotate right valve driver	OR/BK	41	RPM signal
GR/WH	19	Jib select valve driver circuit	OR/RD	42	Boom retracted signal
RD	20	12V DC battery supply	GR	43	Jib Up
WH	21	12V DC ignition supply	GR/BK	44	Jib Down
BK	22	Key switch power to platform	GR/WH	45	AC Generator
WH	23	Power to platform	WH	46	Horn
			WH/BK	47	Output Power Enable
			WH/RD	48	Work Lamp
			WH/BK	49	Motion Lamp
			BL	50	Auxiliary Boom
			BL/WH	51	Auxiliary Steer
			BL/RD	52	Auxiliary Platform

Schematics

Color	Circuit #	Primary Function	Color	Circuit #	Primary Function
WH/BK	53	Boom envelope safety valve cutoff	N/A	80	Can 2.0/J1939 Shield
BK/WH	54	Power to safety interlock switches (engine)	GR	81	Can 2.0/J1939 Low
GR/BK	55	Axle oscillation	Y L	82	Can 2.0/J1939 High
RD	56	Foot switch/TCON estop power	GR/WH	83	Tilt signal X axis
RD/WH	57	Boom down safety interlock	GR/BK	84	Tilt signal Y axis
RD/BK	58	Safety interlock to engine	GR	85	Tilt sensor power
GR/WH	59	Chain break circuit	OR	86	Hydraulic Filter restricted
GR/WH	60	Axle extend	RD	87	Platform Level Safety Power
GR	61	Axle retract	RD/BK	88	Platform Level Safety Output
OR	62	Boom stowed (safety)	BR	89	Platform Level Safety Ground
OR/RD	63	Power to boom envelope safety switch	RD/BK	90	Proximity Kill
OR/BK	64	Power for operational switches	RD/WH	91	Gate Interlock
BL/WH	65	Low fuel indication	WH/BK	92	Motor Speed (LO/HI)
BL	66	Drive Enable	WH/RD	93	Motor Bypass
BL	67	Secondary boom not stowed	WH	94	Load Sensor
RD	68	Primary Boom lowered (operational)	OR	95	Tether ESTOP return
BK	69	Primary boom #1 extended	RD	96	Tether Power
BL/WH	70	Primary boom #2 retracted	BK	97	Tether ESTOP Power
BL/BK	71	Primary boom #2 extended	WH	98	J1708 + (high)
GR	72	Secondary boom extend	BK	99	J1708- (low)
GR/BK	73	Secondary boom retract	WH/RD	100	Outrigger lowered
RD	74	Primary #1 Lockout	WH/BK	101	Outrigger raised
RD/WH	75	Primary #2 Lockout	OR	102	Pothole protector up
BL	76	Primary boom #3 extended	OR/RD	103	Pothole protector down
WH	77	Lower Angle #1 operational	BK/WH	104	Proprietary Data buss -(I.e. ITT or AP)
WH/BK	78	Upper Angle #2 operational	BK/RD	105	Proprietary Data buss + (I.e. ITT or AP)
BK	79	Power from TCON ESTOP			

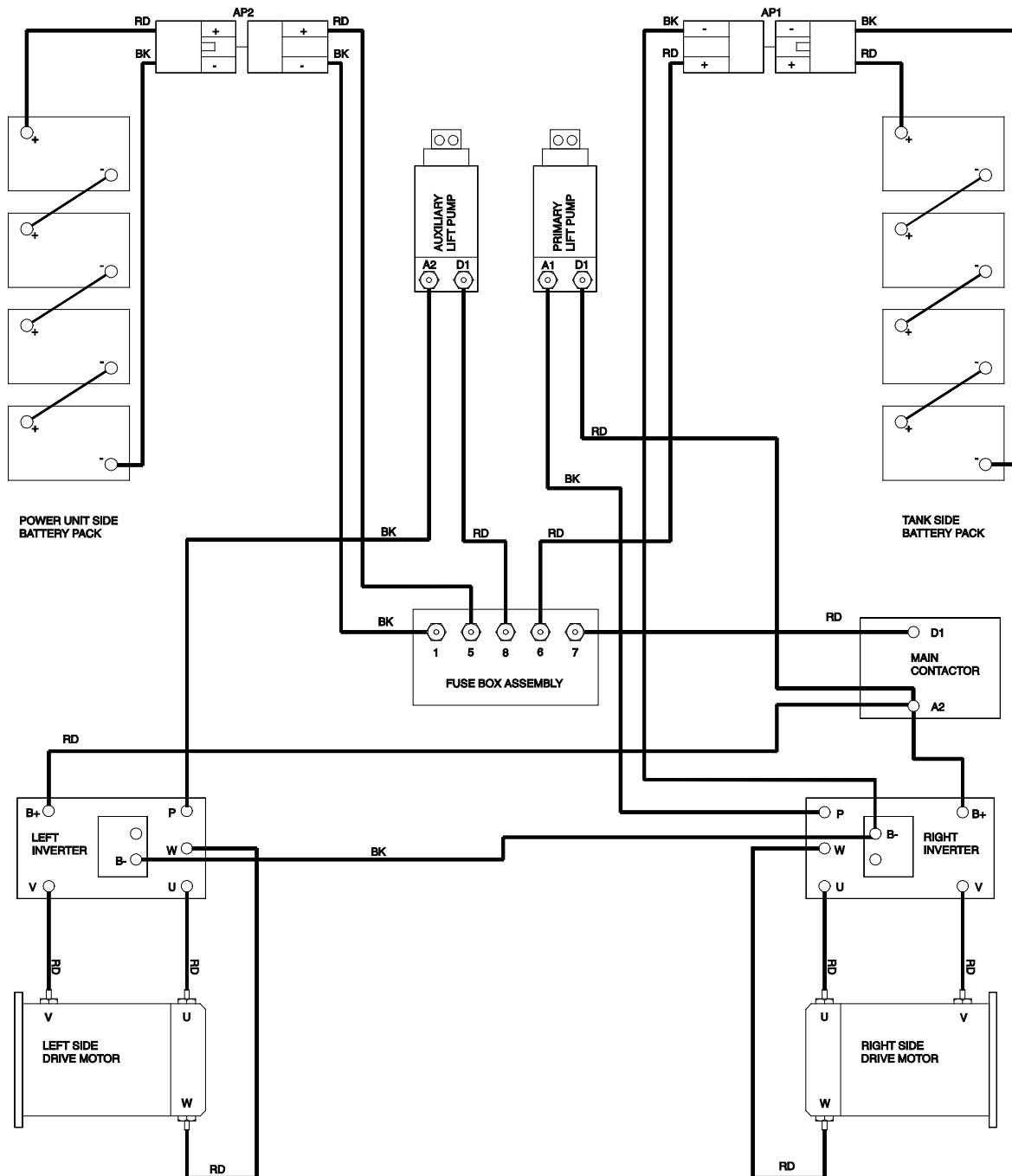
Schematics

Color	Circuit #	Primary Function	Color	Circuit #	Primary Function
GR	106	Spare	BL	131	Motion Alarm
RD	107	Alternator Field	GR	132	Platform Load Input
BL/WH	108	Engine Status	GR/WH	133	Platform Load Alarm
GR/WH	109	Sensor Power	GR/BK	134	Key Switch power
BK	110	Sensor Return	BL/WH	135	Fuel Pump
OR	111	Steer Signal	RD	136	Power to Safety Module
RD	112	Steer Signal to Solenoid Valve	RD/WH	137	Propel Power (P_38)
OR/RD	113	Multi-function Valve	RD/BK	138	Primary Boom Up/Secondary Boom Down-Extend (P_11/30)
BK/RD	114	Load Moment Overweight	WH/RD	139	Turntable Rotate Flow Control Safety (P_39)
RD/BK	115	Load Moment Underweight	OR/RD	140	Boom Envelope Safety
OR	116	Hydraulic Oil Cooler	RD	141	Primary Boom Angle Signal Safety
RD	117	Flashing Beacon	OR	142	Secondary Boom Angle Signal Safety
OR	118	Lift Speed Reduction	BL/RD	143	Drive Enable Left
BL	119	Hydraulic Pressure Sensor Output	BL/WH	144	Drive Enable Right
OR	120	Oil Cooler Fan	RD/WH	145	Calibrate
GR	121	Axle Oscillate Left	BL	146	Jib Bellcrank Up Flow Control
GR/BK	122	Axle Oscillate Right	BL/BK	147	Jib Bellcrank Down Flow Control
RD/BK	123	Primary Boom Angle Signal Operational	BL/WH	148	Jib Bellcrank Sensor
RD/WH	124	Secondary Boom Angle Signal Operational	GR/WH	149	Jib Up/Down Flow Control
WH/RD	125	Secondary Boom Lockout (Extend Enable)	GR/BK	150	Hydraulic Generator Bypass
WH/BK	126	Secondary Boom Lockout (Riser Down Enable)	GR	151	Hydraulic EDC Output
GR	127	ECU Test Switch	BK	152	Injector Retard
OR/RD	128	Low Engine Speed	BK	153	Jib Extend
RD/BK	129	Descent Alarm	BK/WH	154	Jib Retract
WH/RD	130	Travel Alarm			

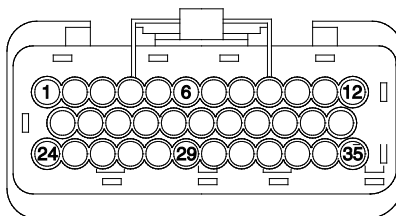
Schematics

Color	Circuit #	Primary Function	Color	Circuit #	Primary Function
OR/RD	155	Pressure Comp. Enable	GR/WH	176	Secondary Extend/Retract Flow Control
GN/WH	156	Jib Up/Down	BL/RD	177	Extend/Retract Lockout
BK/RD	157	Jib Extend/Retract	BK	178	Control Module Status Light
BL/RD	158	Steer Signal Rocker	GR	179	Drive Power Relay
BL/WH	159	Steer Joystick Signal	BK	180	Lift Power Relay
WH/RD	160	Propel Joystick Signal	OR	181	48 volt Alternator Field (or battery)
WH/BK	161	Secondary Boom Joystick Signal	RD	182	24 volt battery
OR	162	Joystick 5V DC power	BL	183	Envelope or Load Sense Recovery
BL/WH	163	Primary Extend/Retract Signal	WH	184	Program Set up Enable
RD/WH	164	Primary Up/Down Signal	WH	185	Encode A
WH/RD	165	TT Rotate Signal	BL	186	Encode B
OR	166	Boom Length Signal Safety	BL	187	Bootstrap or Program Enable
OR/BK	167	Boom Length Signal Operational	GR	188	Safety Cross Check
BL/RD	168	Primary Boom Hydraulic Lockout	BK	189	Data Receive
GN	169	Envelope Active LED	BK/WH	190	Data Transmit
WH/RD	170	Load Sense Relay Source	WH/RD	191	Multi-function Pressure Relief
WH/BK	171	Load Sense Relay Sink	WH/BK	192	Jib Rotate Left
BL	172	Up/Down Flow Control Ground	WH/RD	193	Jib Rotate Right
BK	173	Extend/Retract Flow Control Ground	WH/RD	194	Speed Select Input
WH	174	Key switch Power, Ground Position	OR/RD	195	Electric Brake Source
WH/BK	175	Load Sensor Signal, Operational	Y L	196	2.5 volt Sensor Power
			BR	N/A	Ground or Return

Power Cable Diagram



Motor Controller Pin Legend



Pin Numbering for 35 Pin Motor Controller Connector

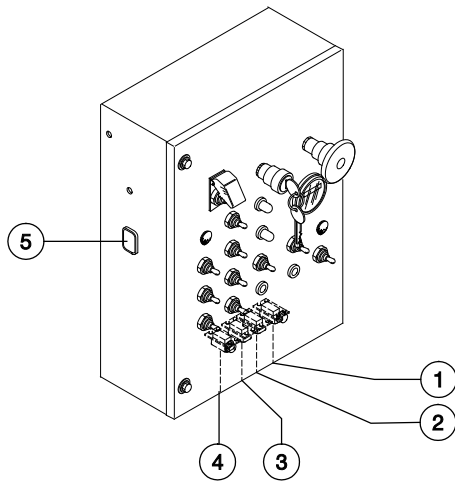
Left Motor Controller (Slave)

1	R195PWR - OR/RD
2	C32BRK - WH/RD
3	R181PWR - OR
4	R32RET - BK
5	P110RET - BK
6	PERSONALIZE R
7	SPARE DIG IN
8	SPARE OUT
9	C130TA - WH/RD
10	R181PWR - OR
11	C197RET - WH
12	SPARE DIG OUT
13	D185SEN - WH
14	D186SEN - BL
15	C16PLF - OR/RD
16	TXD- SERIAL
17	C27AUX - RD
18	D187PSE - BL
19	SPARE DIG IN
20	SPARE DIG IN
21	RXD- SERIAL
22	C26TSR - WH/RD
23	C133PLA - GR/WH
24	SPARE PROP OUT
25	P198SEN - RD
26	TXD+ SERIAL
27	D81CAN "-" - GR
28	D82CAN "+" - YL
29	R174PWR - WH
30	C156JUD - GR/WH
31	C17PRL - GR
32	C18PRR - GR/BK
33	SPARE OUT
34	C32RET - WH/RD
35	SPARE DIG IN

Right Motor Controller (Master)

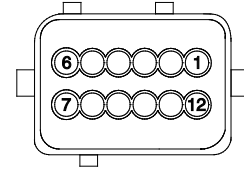
1	R195PWR - OR/RD
2	C32BRK - WH/RD
3	R181PWR - OR
4	R32RET - BK
5	P110RET - BK
6	C184PSE - OR
7	C28TTS RD/BK
8	V14PLUA - OR
9	C117FB - RD
10	R181PWR - OR
11	SPARE DIG OUT
12	C181RET - OR
13	D185SEN - WH
14	D186SEN - BL
15	C192JR - WH/BK
16	TXD - SERIAL
17	C199TS - WH/RD
18	D187PSE - BL
19	SL32LDS - BL/WH
20	C22PWR - BK
21	RXD - SERIAL
22	C26TSR - WH/RD
23	V15PLDA - OR/BK
24	V191PCEA - WH/RD
25	P198SEN - RD
26	TXD+ SERIAL
27	D81CAN "-" - GR
28	D82CAN "+" - YL
29	C66LS - BL
30	C111LFS - OR
31	SPARE DIG IN
32	C47FE - WH/BK
33	V36SCWA - BL
34	V37SCCA - BL/BK
35	C86FLR - OR

Ground Control Box Pin Legend



Harness Legend

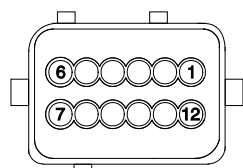
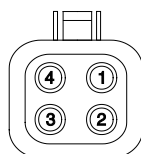
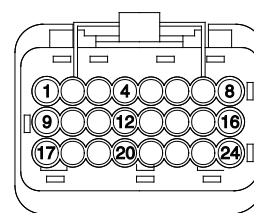
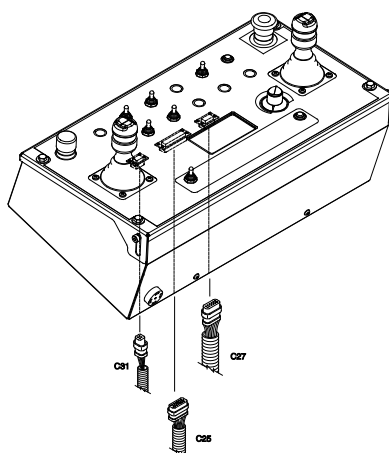
- 1 C4
- 2 C3
- 3 C2
- 4 C1
- 5 C5



Pin Numbering for 12 pin connectors

C1 Ground Control Box Harness	C2 Ground Control Box Harness	C3 Ground Control Box Harness	C4 Ground Control Box Harness	C5 Ground Control Box Harness
1 R195PWR - OR/RD	1 C18PRR - GR/BK	1 C41RPM - OR	1 P23BAT - RD	1 C28TTS - RD/BK
2 R181PWR - OR	2 C17PRL - GR	2 C134PWR - RD	2 P22BAT - RD/BK	2 V191PCEA - WH/RD
3 S132LDS - BL/WH	3 C27AUX - RD	3 C47FE - WH/BK	3 GND - RD/WH	3 V36SCWA - BL
4 C22PWR - BK	4 C133PLA - GR/BK	4 C165TRS - WH/RD	4 C134PWR - WH/BK	4 V37SCCA - BL/BK
5 D82CAN(+) - YL	5 C32RET - WH/RD	5 C163PLS - BL/WH	5 D82CAN(+) - YL	5 V14PLUA - OR
6 D81CAN(-) - GR	6 C156JUD - GR/WH	6 R46HRN - WH	6 D81CAN(-) - GR	6 V15PLDA - OR/BK
7 C192JR - WH/BK	7 C16PLF - OR/RD	7 SPARE	7 C27AUX - WH/RD	7 V15PLDB - OR/BK
8 P109PWR - GR/WH	8 C197RET - WH	8 P109PWR - GR/WH	8 C46HRN - BK	8 V14PLUB - OR
9 C184PSE - OR	9 D82CAN(+) - YL	9 D82CAN(+) - YL	9 S132LDS - BK/WH	9 V37SCCB - BL/BK
10 P181BAT - OR	10 D81CAN(-) - GR	10 D81CAN(-) - GR	10 R181PWR - BL	10 V36SCWB - BL
11 P182BAT - RD	11 R174PWR - WH	11 C164PES - RD/WH	11 GND - BL/BK	11 V191PCEB - WH/RD
12 C47FE - WH/BK	12 C130TA - WH/RD	12 C161SB - WH/BK	12 SPARE	12 C134PWR - RD

Platform Control Box Pin Legend

**C27****C31****C25**

Pin Numbering for 4 Pin Connector (C31)

- | | |
|---|-------------|
| 1 | P23BAT - WH |
| 2 | C56FTS - RD |

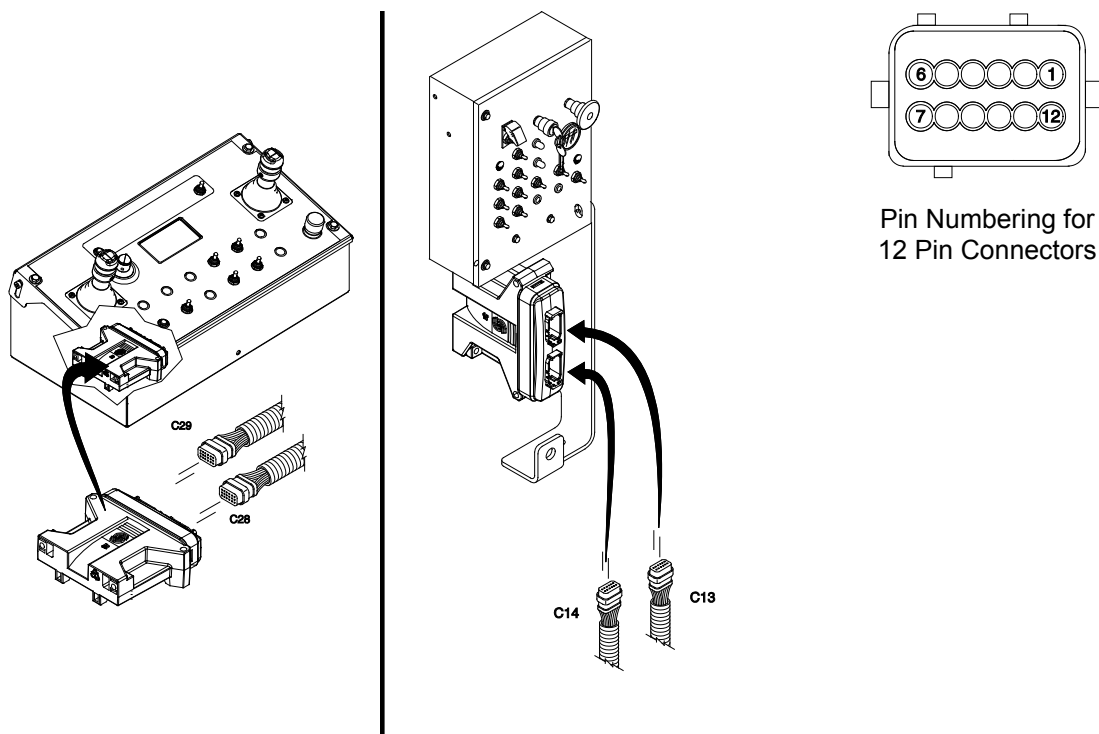
Pin Numbering for 12 Pin Connector (C27)

- | | |
|----|-----------------|
| 1 | SPARE |
| 2 | SPARE |
| 3 | V17PRL - GR |
| 4 | V18PRR - GR/BK |
| 5 | V43JU - GR |
| 6 | V44JD - GR/BK |
| 7 | V193JRR - WH/RD |
| 8 | V192JRL - WH/BK |
| 9 | GND - BR |
| 10 | C134PWR - RD |
| 11 | S132LDS - BL/WH |
| 12 | C175LDS - WH/BK |

Pin Numbering for 24 Pin Connector (C25)

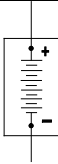
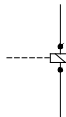
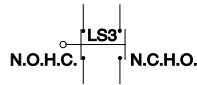
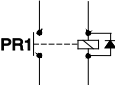
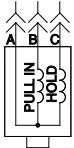
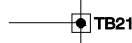
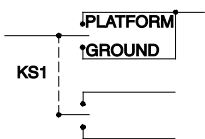
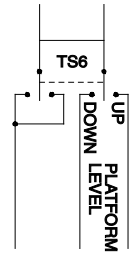
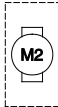
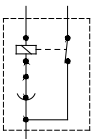
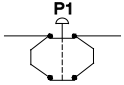
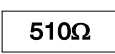
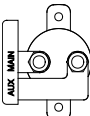
- | | |
|----|-----------------|
| 1 | P23BAT - WH |
| 2 | P22BAT - BKD |
| 3 | GND - BR |
| 4 | C134PWR - RD |
| 5 | D82CAN(+) - YL |
| 6 | D81CAN(-) - GR |
| 7 | C27AUX - RD |
| 8 | C46HRN - WH |
| 9 | S132LDS - BL/WH |
| 10 | R181PWR - OR |
| 11 | SPARE |
| 12 | SPARE |
| 13 | P49LPS - WH/BK |
| 14 | C49GEN - GR/WH |
| 15 | GND - BR |
| 16 | SPARE |
| 17 | SPARE |
| 18 | SPARE |
| 19 | C48LPS - WH/RD |
| 20 | GND - BR |
| 21 | C48LPS - WH/RD |
| 22 | GND - BR |
| 23 | SPARE |
| 24 | SPARE |

Turntable and Platform Controller Pin Legend

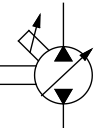
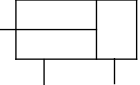
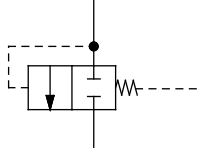
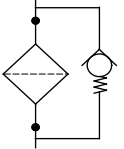
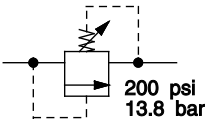
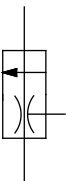
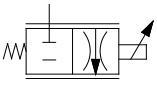
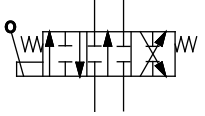
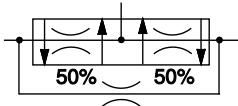
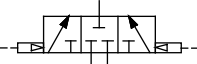
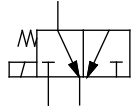
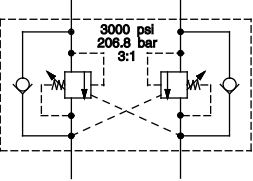
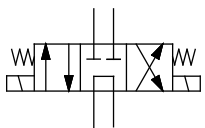
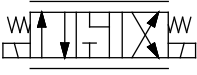
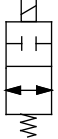


PCON Platform Controller (C28)		PCON Platform Controller (C29)		TCON Turntable Controller (C13)		TCON Turntable Controller (C14)	
1	GND - BR	1	C156JUD - GR/WH	1	GROUND - BR	1	C41RPM - OR
2	C134PWR - RD	2	C160JPL - WH/RD	2	C134PWR - RD	2	C47FE - WH/BK
3	D82CAN(+) - YL	3	V17PRL - GR	3	D82CAN(+) - YL	3	V07PBE - BK
4	D81CAN(-) - GR	4	V18PRR - GR/BK	4	D81CAN(-) - GR	4	V08PBR - BK/WH
5	C163PLS - BL/WH	5	V43JU - GR	5	C163PLS - BL/WH	5	V01PBU - RD
6	C56FTS - RD	6	V44JD - GR/BK	6	C68PBD - RD	6	V02PBD - RD/BK
7	C175LDS - WH/BK	7	V193JRR - WH/RD	7	C40SBD - OR	7	V10SBU - BL
8	P162JPW - OR	8	V192JRL - WH/BK	8	P109PWR - GR/WH	8	V11SBD - BL/BK
9	GND - BR	9	C130TA - WH/RD	9	R110RET - BR	9	V04TRL - WH
10	C164PES - RD/WH	10	SPARE	10	C165TRS - WH/RD	10	V05TRR - WH/BK
11	C159STC - BL/WH	11	C134PWR - RD	11	C165PES - RD/WH	11	C134PWR - RD
12	C165TRS - WH/RD	12	C134PWR - RD	12	C161SB - WH/BK	12	C134PWR - RD

Electrical Symbol Legend

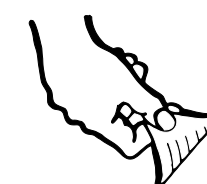
				
Battery	Coil, solenoid or relay	Horn or alarm	Flashing beacon	Gauge
				
Diode	Hour meter	LED	Fuse with amperage	Foot switch
				
T-circuits connect	Limit Switch	Power relay	Coil with suppression	Fuel or RPM solenoid
				
Connection - no terminal	T-circuits connect at terminal	Circuits crossing - no connection	Quick disconnect terminal	Circuit breaker with amperage
				
Key switch	Toggle switch DPDT	Toggle switch SPDT	Pump or Motor	Tilt sensor
				
Horn button - normally open	Emergency stop button - normally closed	Resistor with ohm value	Battery separator	Gauge sending unit
				
Oil temperature switch normally open	Coolant temperature switch - normally open	Oil pressure switch normally closed	Control relay contact normally open	Diode starting aid, glow plug or flame ignitor

Hydraulic Symbols Legend

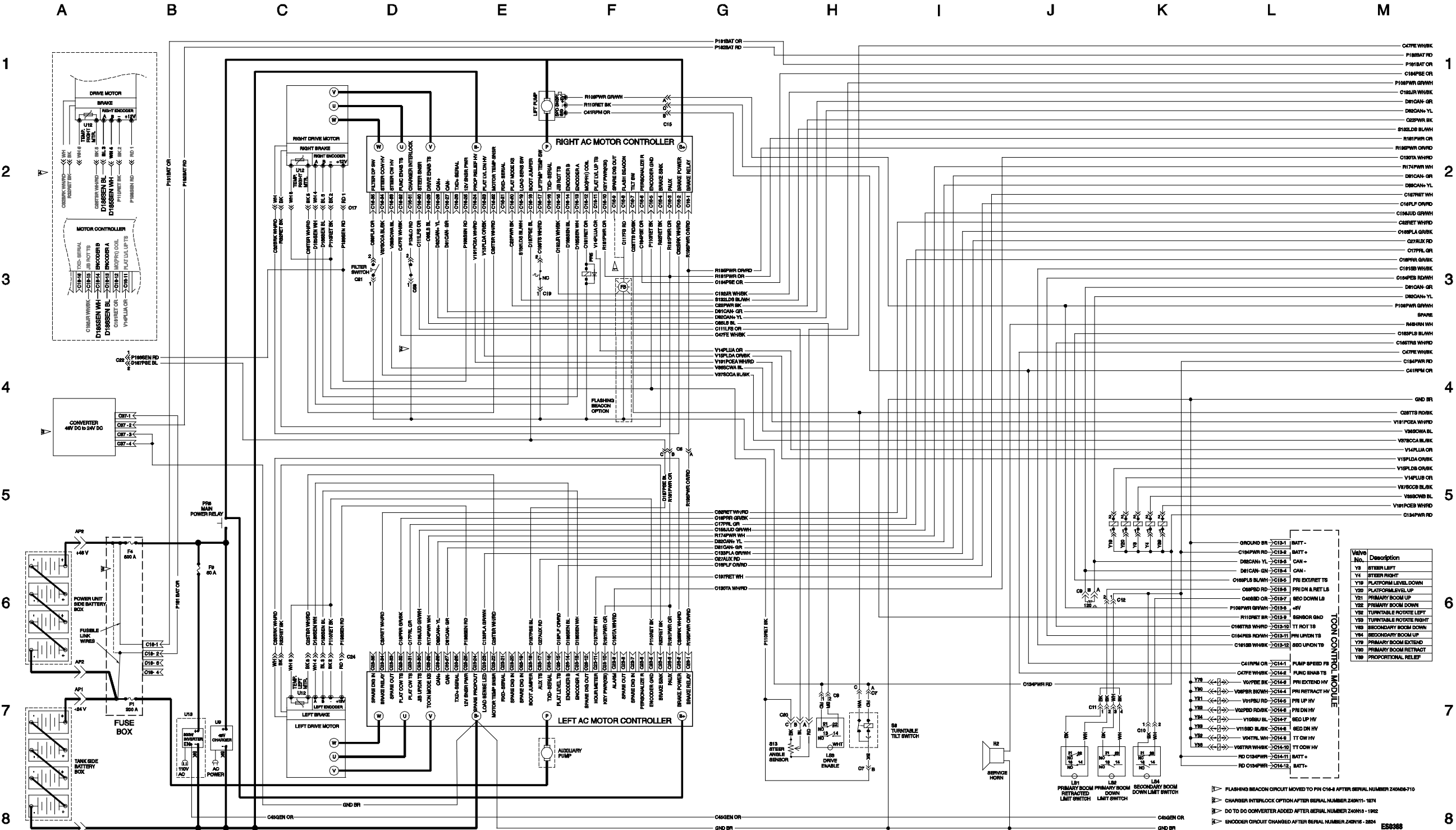
			
Orifice with size	Check valve	Shut off valve	Brake
			
Pump, fixed displacement	Pump, bi-directional variable displacement	Motor, bi-directional	Motor, 2 speed bi-directional
			
Double acting cylinder	Pump, prime mover (engine or motor)	Shuttle valve, 2 position, 3 way	Differential sensing valve
			
Filter with bypass relief valve	Relief valve with pressure setting 200 psi 13.8 bar	Priority flow regulator valve	Solenoid operated proportional valve
			
Directional valve (mechanically activated)	Flow divider/combiner valve	Pilot operated 3 position, 3 way shuttle valve	Solenoid operated 2 position, 3 way directional valve
			
Counterbalance valve with pressure and pilot ratio 3000 psi 206.8 bar 3:1	Solenoid operated 3 position, 4 way directional valve	Solenoid operated 3 position, 4 way proportional directional valve	2 position, 2 way solenoid valve

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Electrical Schematic - Chassis

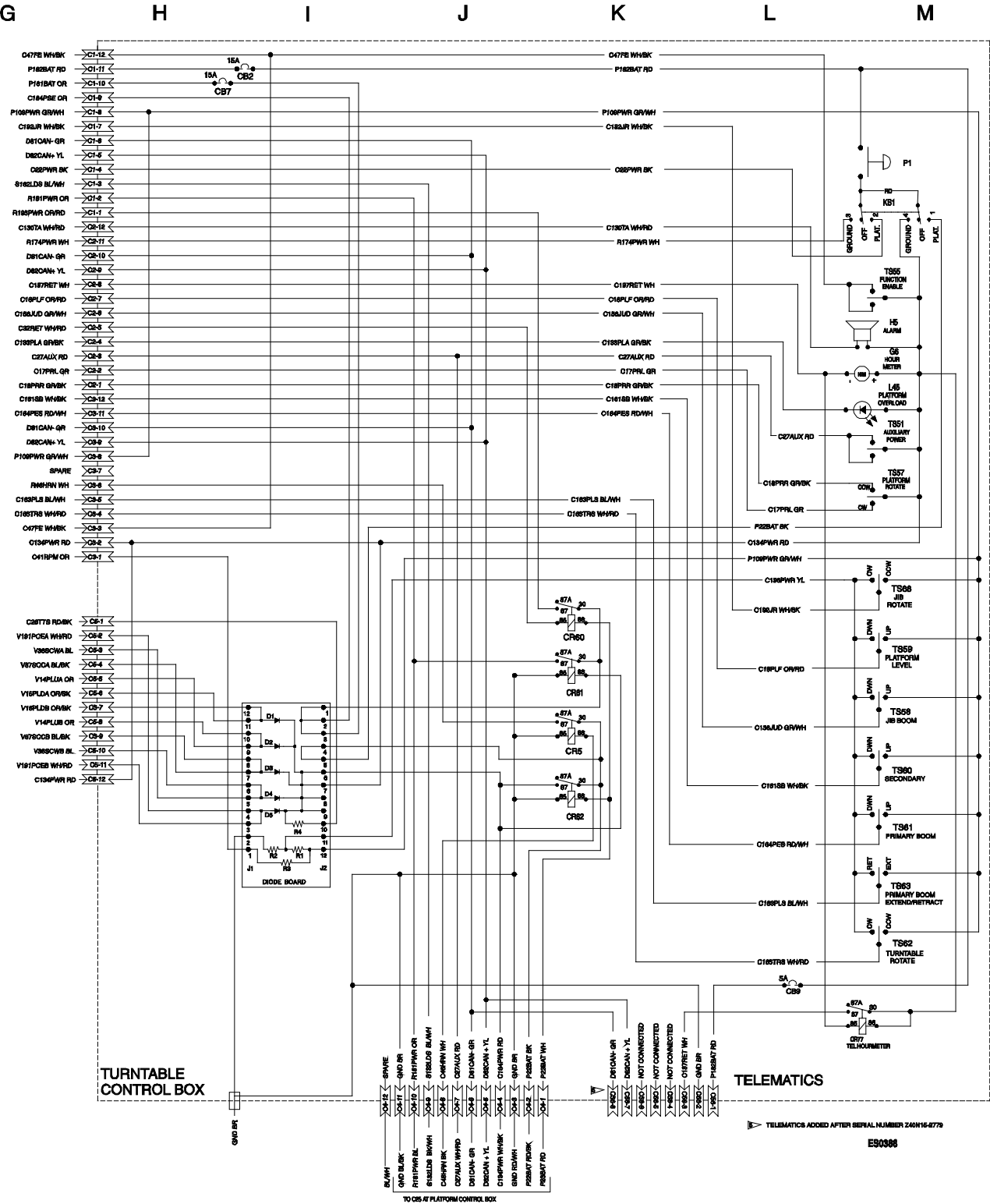


Electrical Schematic - Chassis

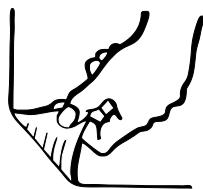


Electrical Schematic - Ground Controls

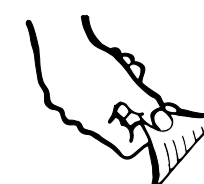
LABEL	DESCRIPTION
CB2	CIRCUIT BREAKER, 24V DC (CONTROLS)
CB7	CIRCUIT BREAKER, 48V DC (MASTER)
CB9	CIRCUIT BREAKER, 5A (TELEMATICS)
CR6	HORN RELAY
CR60	BRAKE RELAY
CR61	KEYSWITCH RELAY
CR62	PLATFORM EMERGENCY STOP RELAY
CR77	TELEMATICS HOUR METER
P1	GROUND CONTROLS EMERGENCY STOP BUTTON
KS1	KEYSWITCH



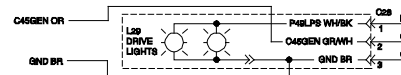
Electrical Schematic - Ground Controls

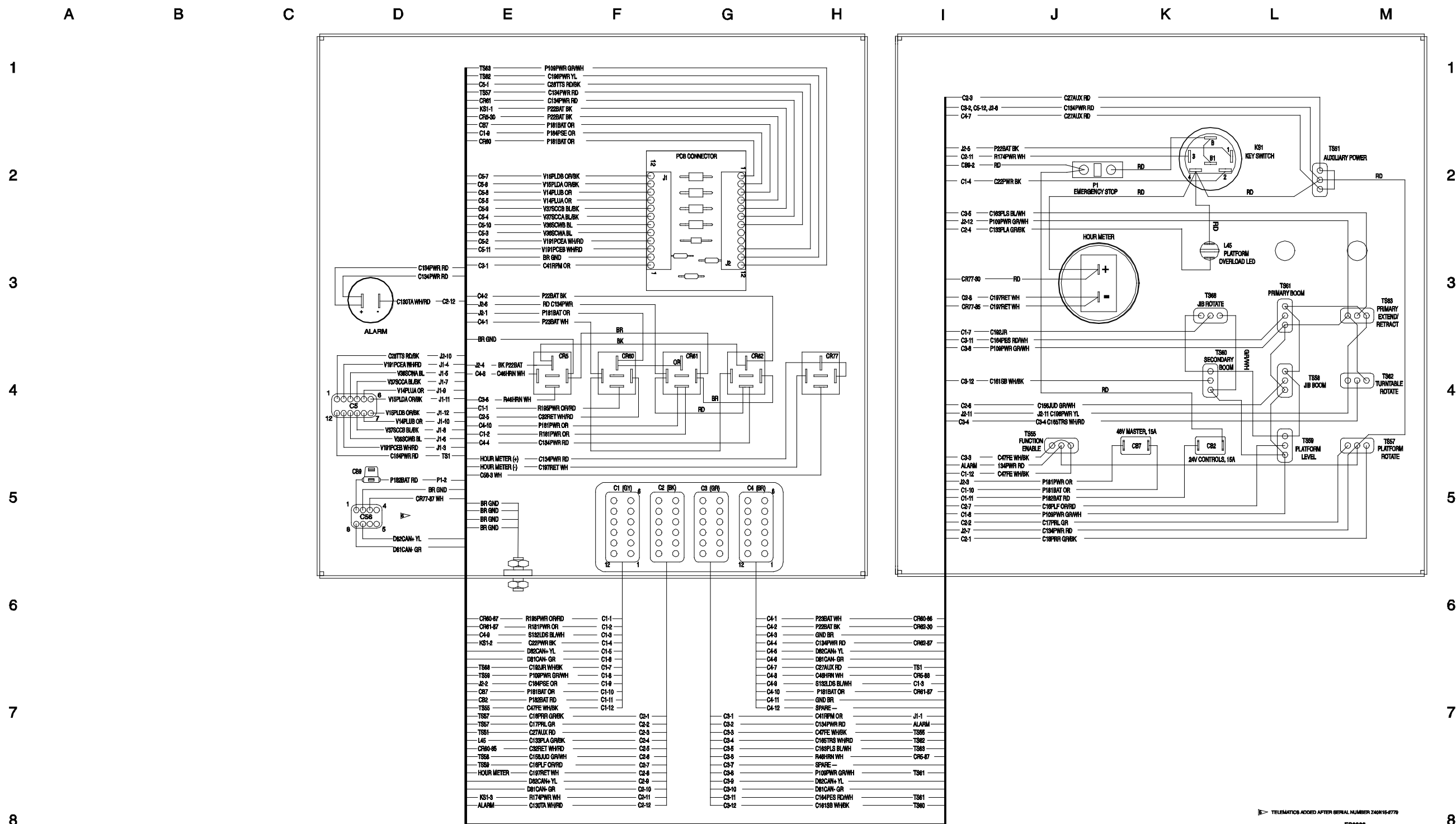


Electrical Schematic - Platform Controls

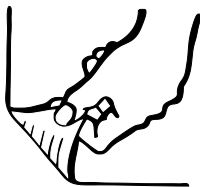


A	B	C	D	E	F	G	H	I	J	K	L	M
---	---	---	---	---	---	---	---	---	---	---	---	---

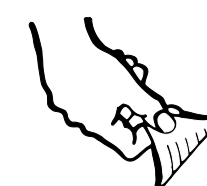




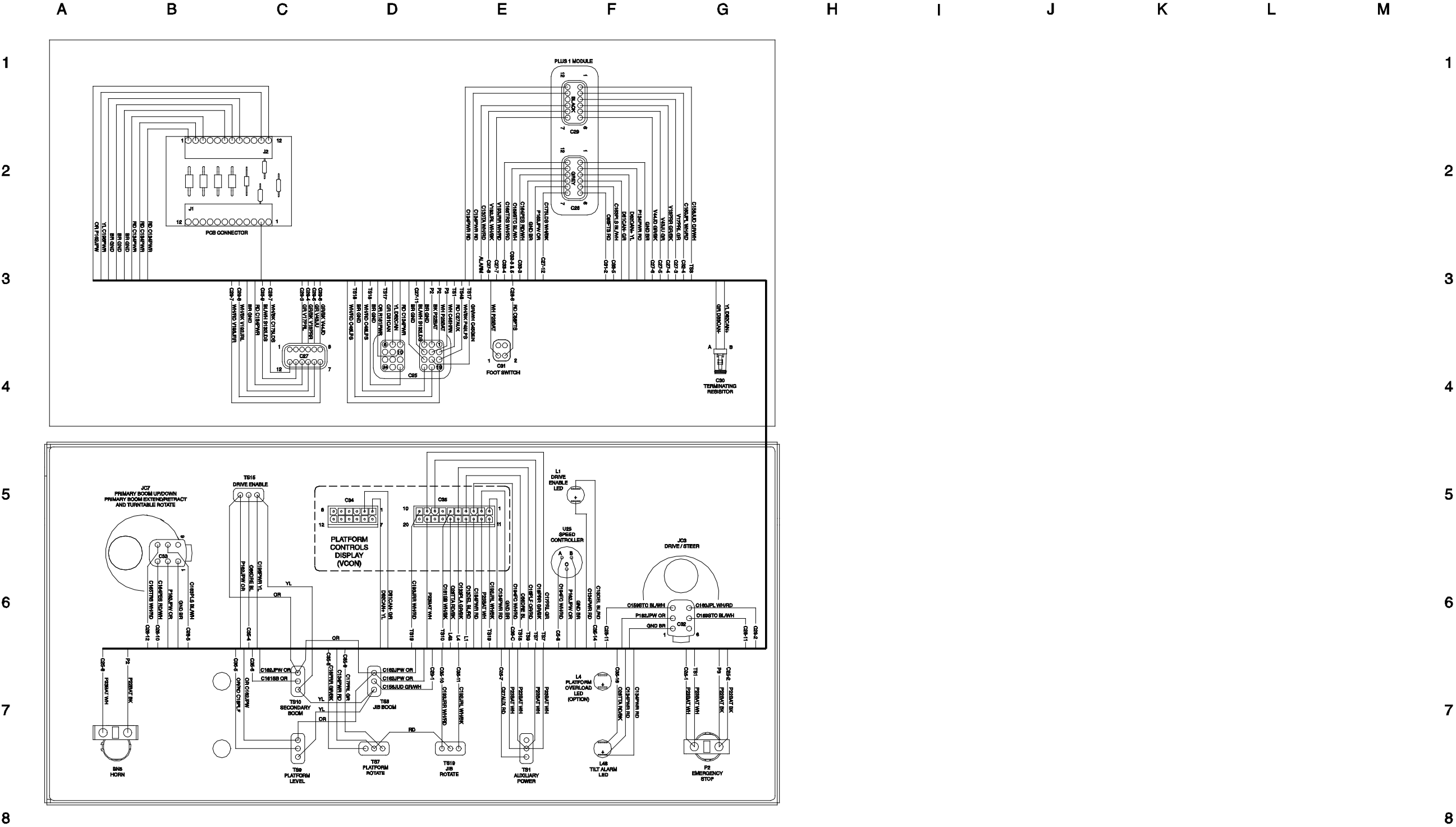
Ground Control Box Wiring Diagram



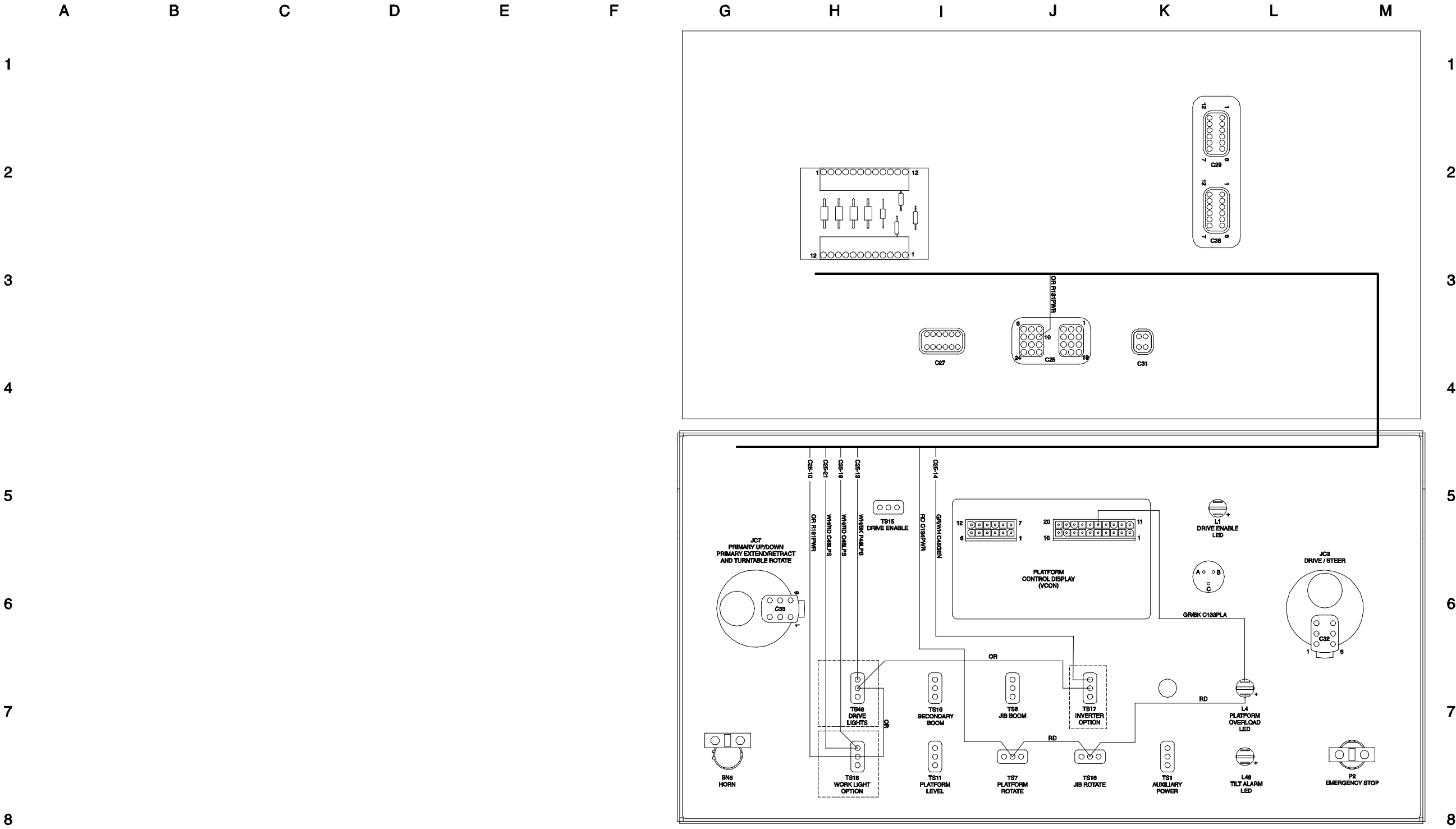
Platform Control Box Wiring Diagram



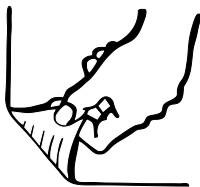
Platform Control Box Wiring Diagram



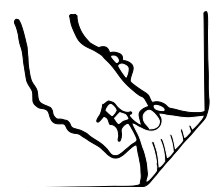
Platform Control Box Wiring Diagram - Options



Platform Control Box Wiring Diagram - Options



Hydraulic Schematic



The diagram is a detailed hydraulic schematic for a crane system. It includes the following components and sections:

- Counterbalance Valves Table:**

VALVE	RATIO	PRESSURE
CR	3:1	750 PSI
CT	4.5:1	1000 PSI
BT	3:1	1000 PSI
CA CB	1.5:1	3000 PSI
CC CD CE CF	3:1	3300 PSI
CG CH	4.5:1	3000 PSI
CL CM	4.5:1	3500 PSI
CJ CK	4.5:1	3600 PSI
CN	3:1	3800 PSI
- Hydraulic Tank:** The main reservoir for the system.
- LIFT PUMP:** 4CC/REV, driven by an electric motor (M).
- AUXILIARY PUMP:** 0.5 GPM, driven by an electric motor (M).
- Pressure Switch:** Connected to the auxiliary pump line.
- High Pressure Filter:** Located on the main line from the lift pump.
- Manifolds:**
 - JIB/PLATFORM ROTATE MANIFOLD (Z-40/23N):** Controls rotation for the jib and platform.
 - JIB BOOM AND PLATFORM/JIB ROTATE MANIFOLD (Z-40/23N RJ):** Controls rotation for the jib boom and platform/jib.
 - FUNCTION MANIFOLD:** The central hub for all hydraulic functions, including boom up/down, rotate, and extend/retract.
- Cylinders:**
 - STEER CYLINDER:** 2.8 GPM, controls steering.
 - PLATFORM LEVEL (MASTER):** Controls platform leveling.
 - PLATFORM LEVEL (SLAVE):** Controls platform leveling.
 - TURNABLE ROTATE:** 0.6 GPM, controls turnable rotation.
 - SECONDARY BOOM UP/DOWN:** 2.1 / 1.0 GPM, controls secondary boom movement.
 - PRIMARY BOOM UP/DOWN:** 2.2 / 1.1 GPM, controls primary boom movement.
 - PRIMARY BOOM EXTEND/RETRACT:** 3.2 / 2.4 GPM, controls primary boom extension.
- Valves:** Numerous check valves (BV), solenoid valves (e.g., CA, CB, CC, CD, CE, CF, CG, CH, CL, CM, CJ, CK, CN, CR, CT, BT, BA, BB, BC, BD, BE, BF, BG, BH, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ), and pressure-reducing valves (e.g., 2500 PSI, 2100 PSI, 0.046 inch).
- Pressure Settings:** 2500 PSI, 2100 PSI, 0.046 inch, 50 - 3000 PSI (VARIABLE).

California Proposition 65



WARNING

Operating, servicing and maintaining this equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. These chemicals can be emitted from or contained in other various parts and systems, fluids and some component wear by-products. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your equipment and vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your equipment or vehicle and after operation. For more information go to www.P65Warnings.ca.gov/passenger-vehicle.