Genie
A TEREX BRAND

Service and Repair Manual

Serial Number Range

Z®-45 DC
Z®-45 FE

from Z45EM-101

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

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

Original Instructions
Part No. 1297714GT
Rev C
August 2024

Introduction

Important

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

This manual provides detailed scheduled maintenance information for the machine owner and user. It also 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 https://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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Revision History

Revision	Date	Section	Procedure / Page / Description
A	3/2020		Initial Release
A1	7/2020	Schematics	Hydraulic schematics
B	10/2022	Specifications	Kohler engine
		Repair	Calibration process steps
			Procedure 2-3, 6-1, 9-2
		Fault Codes	Update fault codes
		Navigation Menus	Update navigation menus
		Schematics	Kohler engine fuse / relay module
			Electrical schematics
			Hydraulic schematics
B1	6/2024	Repair	Calibration process steps
C	8/2024	Specifications	Hydraulic Component Specifications Kubota engine Machine Torque Specifications
		Repair	Procedure 1-1
		Fault Codes	Update fault codes
		Schematics	Electrical schematics

Reference Examples:	**Electronic Version** Click on any content or procedure in the Table of Contents to view the update.
Section – Repair Procedure, 4-2	
Section – Fault Codes, All charts	
Section – Schematics, Legends and schematics	

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 modify or alter a MEWP without prior written permission from the manufacturer.

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	
Tire size	315/55 D20
Wheel diameter	20 in 50.8 cm
Wheel width	11 in 27.9 cm
Overall tire diameter	32.5 in 82.6 cm
Tire ply rating	12
Wheel lugs	9 @ 5/8 - 18
Lug nut torque, dry	125 ft-lbs 169.5 Nm
Lug nut torque, lubricated	94 ft-lbs 127.5 Nm

Fluid capacities	
Fuel tank	17 gallons 64.4 liters
Hydraulic tank	11.6 gallons 43.9 liters
Hydraulic system (including tank)	17 gallons 64.4 liters
Drive hubs	24 fl oz 710 cc
Turntable rotation drive hub	25.5 fl oz 750 cc

Drive hub oil type: SAE 90 multipurpose hypoid gear oil API service classification GL5

Batteries	
Type	AGM
Group	903-L16
Quantity	8
Ampere hour	370 AH
Reserve capacity @ 25A rate	817 minutes
Type	L16G-AC
Group	903
Quantity	8
Ampere hour	390 AH
Reserve capacity @ 25A rate	789 minutes
Battery box torque	128 ft-lbs 173.5 Nm

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

Specifications

Performance Specifications

Drive speed - stowed	40 ft / 6.1 sec 12.2 m / 6.1 sec
Drive speed - raised or extended	40 ft / 90 sec 12.2 m / 90 sec
Gradeability	See Operator's Manual
Braking distance, high range on paved surface	3 - 6 ft 0.9 - 1.8 m
Function speeds, maximum from platform controls	
Jib boom up	13 - 17 seconds
Jib boom down	13 - 17 seconds
Primary boom up	26 - 30 seconds
Primary boom down	26 - 30 seconds
Primary boom extend	12 - 20 seconds
Primary boom retract	12 - 20 seconds
Secondary boom up	26 - 30 seconds
Secondary boom up/down	26 - 30 seconds
Turntable rotate stowed, 90°	67 - 80 seconds
Turntable rotate raised or extended, 90°	105 - 130 seconds
Platform level (10° range of motion)	6 - 7 seconds
Platform rotate	10 - 14 seconds

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

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
Water content, maximum	250 ppm
Recommended Hydraulic Fluid	
Hydraulic oil type	Chevron Rando HD Premium
ISO Grade	32
Viscosity index, maximum	200
Optional Hydraulic Fluids	
Mineral based	Shell Tellus S2 V 32 Shell Tellus S2 V 46 Shell Tellus S4 VX 32 Shell Donax TG (Dexron III) Chevron 5606A
Biodegradable	Petro Canada Environ MV 46
Fire resistant	UCON Hydrolube HP-5046

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.

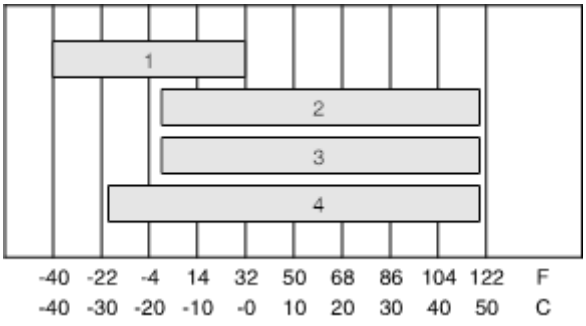
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond its maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

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

Chevron Rando HD Premium Oil MV Fluid Properties

ISO Grade	32
Viscosity index, maximum	200
Kinematic Viscosity, maximum cSt @ 200°F / 100°C cSt @ 104°F / 40°C	 7.5 33.5
Brookfield Viscosity, maximum cP @ -4°F / -20°C cP @ -22°F / -30°C	 1040 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.

Specifications

Chevron 5606A Hydraulic Oil Fluid Properties

ISO Grade	15
Viscosity index, maximum	300
Kinematic Viscosity, maximum	
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, maximum	154
Kinematic Viscosity, maximum	
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, maximum	300
Kinematic Viscosity, maximum	
cSt @ 200°F / 100°C	9
cSt @ 104°F / 40°C	33.8
Brookfield Viscosity, maximum	
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, maximum	192
Kinematic Viscosity, maximum	
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	gear pump
Displacement	.40 cu in / 6.6 cc
Maximum flow rate DC models FE models	 6.7 gpm / 25.4 L/min 5 gpm / 19 L/min
Auxiliary pump	
Type	Fixed displacement gear pump
Displacement per revolution (Bucher)	1.9 gpm 7.3 L/min
Displacement per revolution (MTE)	1.7 gpm 6.44 L/min
Function manifold	
Proportional relief valve pressure, variable	50 - 3000 psi 3.4 - 207 bar
Secondary boom down relief valve pressure	2100 psi 145 bar
Platform level relief valve pressure	3500 psi 241 bar
Oscillate reducing valve pressure	500 psi 34.5 bar
Platform level flow regulator, variable	1 - 1.5 gpm 3.8 - 5.7 L/min
Hydraulic Filters	
High pressure filter:	Beta 5 ˆ 200
Hydraulic tank return filter	Beta 10 ˆ 1000

Manifold Component Specifications

Plug torque	
SAE No. 4	14 ft-lbs / 19 Nm
SAE No. 6	23 ft-lbs / 31.2 Nm
SAE No. 8	36 ft-lbs / 49 Nm
SAE No.10	62 ft-lbs / 84 Nm
SAE No. 12	84 ft-lbs / 114 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.

Description	Specification
Proportional solenoid relief valve, 24V DC (schematic item AA)	22 Ω
Proportional solenoid valve, 3 position 4 way, 20V DC (schematic items B, G, and S)	19 Ω
Proportional solenoid valve, 3 position 4 way, 20V DC (schematic items AE, E, I, O, R, and Z)	24 Ω
Solenoid valve, 2 position 3way, 12V DC (schematic item JA)	9 Ω

Specifications

Kubota D1105-E4-GNI-1 Engine

Displacement	68.53 cu in 1.123 liters
Number of cylinders	3
Bore and Stroke	3.07 x 3.09 inches 78 x 78.4 mm
Horsepower, gross intermittent	24.8 @ 3000 rpm 18.5 kW @ 3000 rpm
Combustion system	Indirect injection
Firing order	1 - 2 - 3
Low idle	2150 rpm 208 Hz
High idle	3000 rpm 500 Hz
Compression ratio	24:1
Compression pressure	412 - 469 psi 28.4 - 32.3 bar
Governor	mechanical
Valve clearance, cold	0.0057 - 0.0072 in 0.145 - 0.185 mm
Lubrication system	
Oil pressure	28 - 64 psi 1.9 - 4.4 bar
Oil capacity (including filter)	5.4 quarts 5.1 liters
Oil viscosity requirements	
Below -10°C (14° F)	SAE 10W-30/ SAE 10W-40
-10 to 25° C (14° to 77° F)	SAE 10W-30/ SAE 10W-40/ SAE 15W-40
Above 25° C (77° F)	SAE 10W-30/ SAE 10W-40/ SAE 15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	
Engine coolant	
Capacity	3.3 quarts 3.1 liters
Fuel injection system	
Injection pump make	Bosch MD
Injection pump pressure, maximum	1991 psi 137 bar
Injection timing	18° BTDC
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Cranking speed	200 - 300 RPM
Current draw, normal load	155A
Battery	
Type	12V DC
Group	70
Quantity	1
Ampere hour	75AH
Cold cranking ampere	450A
Reserve capacity @ 25A rate	70 minutes
Alternator output	40A @ 12V DC
Fan belt deflection	1/4 - 3/8 inches 7 - 9 mm
Electric clutch	1.6A @ 48 V DC 29.22 Ω +/- 5%
Clutch fastener torque LOCTITE® 243™ threadlocker	45 ft-lbs / 65 Nm

Specifications

Kohler KDW 1404 Engine

Displacement	83.72 cu in 1.372 liters
Number of cylinders	4
Bore and Stroke	2.95 x 3.05 inches 75 x 77.6 mm
Horsepower, gross intermittent	25.2 @ 3000 rpm 18.8 kW @ 3000 rpm
Firing order	1 - 3 - 4 - 2
Low idle	2150 rpm
High idle	3000 rpm
Compression ratio	22.8:1
Governor	mechanical
Valve clearance, cold	0.0059 - 0.0078 in 0.15 - 0.20 mm
Engine coolant	
Capacity	4.23 quarts 4 liters
Lubrication system	
Oil pressure	22 - 80 psi 1.5 - 5.5 bar
Oil capacity (including filter)	3.4 quarts 3.2 liters
Oil viscosity requirements	
Below -10°C (14° F)	SAE 5W-40 SAE 10W-30 SAE 10W-40
-10 to 25° C (14° to 77° F)	SAE 5W-40 SAE 15W-40
Above 25° C (77° F)	SAE 5W-40 SAE 15W-40

Unit ships with 5W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.

Injection system	
Injection pump	Bosch PDM
Injection timing	11° BTDC
Injection pump pressure, maximum	2030 - 2248 psi 140 - 155 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Cranking speed	250 - 300 rpm
Current draw, normal load	200A
Battery	
Type	12V DC
Group	70
Quantity	1
Ampere hour	54AH
Cold cranking ampere	530A
Reserve capacity @ 25A rate	86 minutes
Alternator	
Alternator output	45A, 12V DC
Fan belt deflection	0.4 - 0.6 inches 10 - 15 mm

Specifications

Machine Torque Specifications

Platform Rotator	
1-8 center bolt, GR 5	
Lubricated	480 ft-lbs 650 Nm
Dry	547 ft-lbs 742 Nm
3/8 -16 bolts, GR 8	
Lubricated	39 ft-lbs 53 Nm
Dry	36 ft-lbs 49 Nm
Turntable rotate assembly	
Rotate bearing mounting bolts, lubricated	159 ft-lbs 216 Nm
Rotate drive hub mounting bolts, lubricated	93 ft-lbs 126 Nm
Drive motors and hubs	
Drive hub mounting bolts, lubricated	93 ft-lbs 126 Nm
Drive motor leads square nuts (requires 12 point socket)	10 ft lbs 13.6 Nm
Hydraulic tank return filter	
from serial number Z45EM-1985	
Mounting bolts, dry	13 ft-lbs 18 Nm
Platform control box display	
Retaining fasteners	13.2 in-lbs 1.5 Nm

Machine Component Weights

Tire and wheel assembly	343 lbs 156 kg
Drive motor and hub	120 lbs 54 kg
Engine assembly - Kubota	640 lbs 290 kg
Engine assembly - Kohler	807 lbs 333 kg
Primary boom	982 lbs 445 kg
Primary boom lift cylinder	133 lbs 60 kg
Primary boom extend cylinder	88 lbs 40 kg
Secondary boom linkage	1670 lbs 756 kg
Secondary boom lift cylinder	66 lbs 30 kg
Jib boom assembly	356 lbs 162 kg
Jib boom cylinder	66 lbs 30 kg
Oscillate cylinder	40 lbs 18 kg
Counterweight	770 lbs 350 kg
6 ft / 1.8 m platform	275 lbs 125 kg
Battery box assembly (without batteries)	240 lbs 109 kg
Battery 6V (Flooded lead acid)	101 lbs 46 kg
Battery 6V (AGM)	115 lbs 52 kg

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	18 ft-lbs / 25 Nm
-6	30 ft-lbs / 41 Nm
-8	40 ft-lbs / 55 Nm
-10	60 ft-lbs / 81 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	150 ft-lbs / 205 Nm
-24	230 ft-lbs / 315 Nm

JIC 37° Fittings

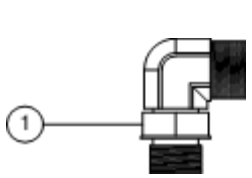
(swivel nut or hose connection)

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

SAE O-ring Boss Port

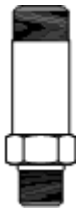
(tube fitting - installed into Aluminum)
(all types)

SAE Dash Size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31.2 Nm
-8	36 ft-lbs / 49 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) ORFS (Non-adj) 37° (Non-adj)	15 ft-lbs / 20.3 Nm 26 ft-lbs / 35.3 Nm 22 ft-lbs / 30 Nm
-6	ORFS (Adj / Non-adj) 37° (Adj / Non-adj)	35 ft-lbs / 47.5 Nm 29 ft-lbs / 39.3 Nm
-8	ORFS (Adj / Non-adj) 37° (Adj / Non-adj)	60 ft-lbs / 81.3 Nm 52 ft-lbs / 70.5 Nm
-10	ORFS (Adj / Non-adj) 37° (Adj / Non-adj)	100 ft-lbs / 135.6 Nm 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.

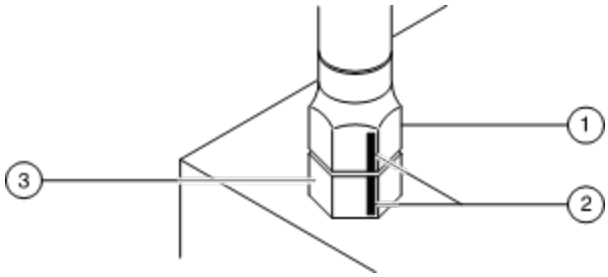


Illustration 1

1 hex nut
2 reference mark
3 body hex fitting

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.

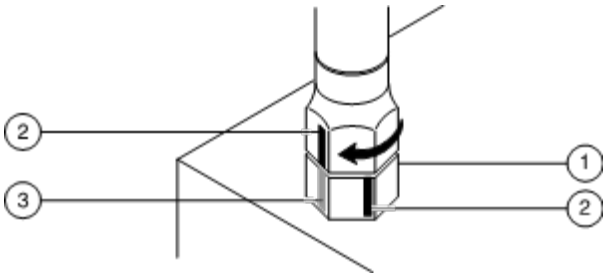


Illustration 2

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.

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.

⚠ 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.

⊙ 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.

Repair Procedures

Calibration Process Steps

It is required to perform the calibration process if system defaults have been reset or if new software has been installed. Any deviation in the order of these steps could result in improper machine function and fault codes to display.

1 **Calibrate the pressure relief valve:** Refer to Repair Procedures, *How to Adjust the Proportional Relief Valve and Hydraulic Pressure Sensor.*

Note: Perform this procedure prior to calibrating other hydraulic functions.

2 **Calibrate the universal tilt sensor:** Refer to Repair Procedures*, How to Calibrate Universal Tilt Sensor.*

3 **Calibrate the platform overload:** Refer to Repair Procedures, *How to Perform a Full Load Platform Calibration*.

4 **Calibrate the primary and secondary angle sensors:** Refer to Repair Procedures, *How to Calibrate Booms Angle Sensors.*

5 **Calibrate the steer angle sensor:** Refer to Repair Procedures, *How to Calibrate the Steer Angle Sensor*.

6 **Verify pump efficiency calibration:** Refer to Repair Procedures, *How to Check the Function Pump Calibration*.

7 **Set hydraulic valve thresholds** for turntable rotate, primary up/down, secondary up/down, primary extend/retract, jib up/down, and platform rotate: Refer to Repair Procedures, *How to Adjust the Joystick Threshold Setting*.

8 **Set low flow hydraulic valves** for jib up/down and platform rotate: Refer to Repair Procedures, *How to Adjust the Maximum Speed Setting (Hydraulic Functions)*.

9 **Set high flow hydraulic valves** for primary up/down, secondary up/down, primary extend/retract and turntable rotate: Refer to Repair Procedures, *How to Adjust the Maximum Speed Setting (Hydraulic Functions)*.

10 **Clear the fault history:** Refer to Repair Procedure, *How to Clear Fault History*.

How to Reset System Defaults from Ground Controls

It is required to perform the calibration process if defaults have been reset. Refer to *Calibration Process Steps*.

1 Turn the machine on at the ground controls and immediately move and hold both the function enable and auxiliary enable toggle switches for 5 seconds.

⊙ Result: The LCD screen will display "**PASSWORD**".

2 Momentarily activate the extend / retract toggle switch in the following sequence to enter the password.

<left><left><right><left>

⊙ Result: An audible alarm sounds for 1 second. Defaults have been reset.

⊠ Result: There is no audible alarm. Repeat this procedure.

Note: The password must be entered within 5 seconds.

How to Reset General Parameter Defaults from Platform Controls

General parameters do not include calibration parameters. Machine calibration is not required.

Note: Refer to Navigation Menus, *Settings Navigation Menu.*

1 Turn the key switch to platform controls.

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 Do not start the engine (if equipped).

5 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

6 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

7 Navigate to **RESET GENERAL PARAMETERS** and press <**enter**>.

8 Press <**+**> to select **YES**.

9 Press <**enter**> to save the change.

10 Navigate to **EXECUTE PARAMETER RESET** and press <**enter**>.

11 Press <**+**> to select **YES**.

12 Press <**enter**> to save the change.

⊙ Result: An audible alarm sounds for 1 second. Defaults have been reset.

Repair Procedures

How to Reset Calibration Defaults from Platform Controls

It is required to perform the calibration process if defaults have been reset. Refer to *Calibration Process Steps*.

Note: Refer to Navigation Menus, *Settings Navigation Menu.*

1 Turn the key switch to platform controls.

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 Do not start the engine (if equipped).

5 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

6 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

7 Navigate to **RESET CALIBRATION** and press <**enter**>.

8 Press <**+**> to select **YES**.

9 Press <**enter**> to save the change.

10 Navigate to **EXECUTE PARAMETER RESET** and press <**enter**>.

11 Press <**+**> to select **YES**.

12 Press <**enter**> to save the change.

⊙ Result: An audible alarm sounds for 1 second. Defaults have been reset.

How to Reset All Parameter Defaults from Platform Controls

It is required to perform the calibration process if defaults have been reset. Refer to *Calibration Process Steps*.

Note: Refer to Navigation Menus, *Settings Navigation Menu.*

1 Turn the key switch to platform controls.

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 Do not start the engine (if equipped).

5 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

6 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

7 Navigate to **RESET ALL PARAMETERS** and press <**enter**>.

8 Press <**+**> to select **YES**.

9 Press <**enter**> to save the change.

10 Navigate to **EXECUTE PARAMETER RESET** and press <**enter**>.

11 Press <**+**> to select **YES**.

12 Press <**enter**> to save the change.

⊙ Result: An audible alarm sounds for 1 second. Defaults have been reset.

1-1
Platform Controls

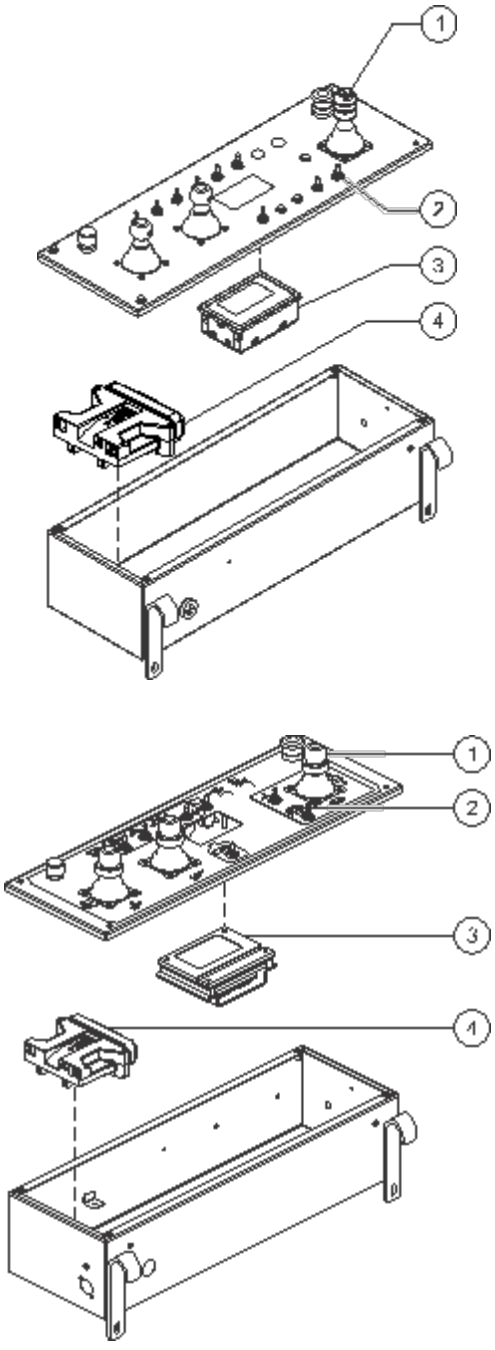
The platform control box contains two control modules; The VCON is a LCD screen mounted between the secondary boom and drive joysticks. The PCON (platform controller) inside the platform control box communicates with the VCON and controllers located on the turntable of the machine.

The joystick controllers at the platform controls utilize Hall Effect technology and require no calibration. Automatic calibration of center voltage occurs on power up if the signal value is in the valid range. Each joystick controller should operate smoothly and provide proportional speed control over its entire range of motion. The remaining boom functions operate by on/off toggle switches. Except for platform level, the speed of these functions are controlled by a function speed control switch.

The platform controls VCON can be utilized to perform a number of tasks:

- Read active and stored faults
- Battery SOC (State of Charge)
- Select options
- View function speed setting
- Fuel level (FE models)
- Operating mode (DC / FE)
- Software part number and version
- Aid in the calibration process

Note: Platform control box may vary per machine.



1 drive joystick with steer left/right rocker switch
2 drive enable toggle switch
3 VCON (diagnostic display)
4 PCON (platform control module)

Platform Controls

How to Adjust the Joystick Threshold Setting

The threshold setting is the minimum output current at which a function proportional valve can open and allow the function to operate. There are two types threshold currents to adjust:

Joystick controlled functions - Primary Up/Down, Secondary Up/Down and Turntable Rotate.
Switch controlled functions - Primary Extend/Retract, Platform Rotate, Jib Up/Down and Jib Rotate.

The boom functions threshold current should be operating at near zero speed smoothly with no vibrations.

Note: Perform this procedure with the boom in the stowed position. Refer to Navigation Menus, *Settings Menu*.

1 Turn the key switch to platform controls. Do not start the engine (if equipped).

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 steer in the right direction.

5 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

6 Momentarily activate steer 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 SENSOR SETTINGS is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction until CALIBRATE TILT SENSOR is shown on the display.

9 Momentarily activate steer in the right direction until VALVE THRESHOLD CURRENT is shown on the display.

Joystick Controlled Functions:

10 Press down on the foot switch and slowly deflect the joystick to be adjusted until the valve is operating at the desired threshold current.

⊙ Result: The display will indicate the threshold current parameter in milliamps while operating the function.

11 While operating the function and the function is barely moving, momentarily activate the drive enable toggle switch in the right direction to save the desired value.

⊙ Result: The alarm will sound indicating the setting has been saved. Release the foot switch. Continue to the next threshold current adjustment.

Switch Controlled Functions:

12 Perform steps 1 through 9 to enter the sub menu THRESHOLD CURRENT on the display.

13 Momentarily activate the speed select toggle switch in either direction until the bar graph is at about 50% on the display.

14 Press down on the foot switch and select the toggle switch controlled boom function to be adjusted.

⊙ Result: The display will indicate the parameter in milliamps while operating the function.

15 Momentarily activate the speed select switch in either direction while operating the function (foot switch depressed) to achieve the desired threshold value. Do not release the foot switch.

16 Momentarily activate the drive enable toggle switch in the right direction to save the value.

⊙ Result: The alarm will sound indicating the setting has been saved. Release the foot switch. Continue to the next threshold current adjustment.

To exit programming mode:

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

How to Adjust the Maximum Speed Setting (Hydraulic Functions)

There are three types of speed settings to adjust:
High Flow Functions: Primary Up/Down Primary Extend/Retract, Secondary Up/Down and Turntable rotate.
Low flow Functions: Jib Up/Down, Jib rotate, and Platform rotate.
Other Functions: Steering is set by a fixed flow regulating valve (non adjustable), Platform level (adjusted by a needle valve located on the function manifold) and Hydraulic Valve Ramps. Refer to *How to Adjust Ramp Rate Setting.*

Note: Refer to Specifications, *Performance Specifications,* for each boom function speed. Check function pump calibration before adjusting the maximum speed setting. Refer to Repair Procedures, *How to Check Function Pump Calibration*.

1 Turn the key switch to platform controls.

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 steer in the right direction.

5 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊠ Result: The display will show FAULTS.

6 Momentarily activate steer 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 SENSOR SETTINGS is shown on the display.

Platform Controls

8 Momentarily activate the drive enable toggle switch in the right direction until CALIBRATE TILT SENSOR is shown on the display.

9 Momentarily activate steer in the right direction until VALVE MAXIMUM CURRENT is shown on the display.

10 Momentarily activate the drive enable switch to enter the sub menu VALVE MAXIMUM CURRENT.

High Flow Functions:

The function speeds are fixed by the flow rate supplied by the hydraulic pump. Excess flow is rarely produced resulting in little or no oil going over relief.

11 Momentarily activate and release the high flow boom function in one direction.

⊙ Result: The display shows the name, direction and current value in milliamps for the function being moved. Example: “PRI_UP_MAX 590.”

12 Momentarily activate steer right five times to increase the mA value.

13 Activate the boom function again by pressing the foot switch and moving the function switch (or joystick to full speed) in the same direction. Momentarily active steer left once every three seconds to decrease the maximum mA value where pressure rises to about 300 psi / 21 bar.

14 Release the foot switch and momentarily activate steer in the right direction one time to increase the value by 10 milliamps. Repeat releasing the foot switch and momentarily activating steer right until the function moves with no valve throttling and no audible alarm for the primary up/down, secondary up/down and primary boom extend/retract.

15 Momentarily activate steer in the right direction three times to increase the value by 30 milliamps for the turntable function setting.

16 Momentarily activate the drive enable toggle switch in the right direction to save the value.

⊙ Result: The alarm will sound indicating the setting has been saved. Continue to the next desired high flow function adjustment.

To exit programming mode:

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

Low Flow Functions:

Hydraulic flow from the pump is fixed, and the function speed is controlled by the hydraulic directional control valve. Hydraulic flow will always exceed the flow allowed by the controlling valve and the excess flow will always be sent over the relief valve and back to tank. Function speed is set by changing control current (mA) and is confirmed by timing the function travel time with a stop watch. Refer to Specifications, *Performance Specifications* for each boom function speed.

18 Perform steps 1 through 10 to enter the sub menu VALVE MAXIMUM CURRENT on the display.

19 Momentarily active a low flow boom function in one direction.

⊙ Result: The display shows the name of the function, direction and current value in milliamps for the function being moved. Example: “JIB_UP_MAX 590.”

20 Activate the boom function again by pressing the foot switch and moving the function switch in the same direction. Using a stop watch, record the full motion function and compare this time to the performance specification.

21 While performing the function, activate steer in either direction to reach the desired speed.

Note: Activating steer right decreases the time it takes to perform the low flow boom function. Activating steer left increases the time it takes to perform the low flow boom function.

22 Momentarily activate the drive enable toggle switch in the right direction to save the value.

⊙ Result: The alarm will sound indicating the setting has been saved. Continue to the next low flow function adjustment.

To exit programming mode:

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

How to Adjust the Function Ramp Rate Setting

The ramp rate setting is an adjustment that controls the way boom functions start and stop. There are two types of ramp rates to adjust on separate menus:

Ramp Up Time -- the amount of time it takes to accelerate to speed.

Ramp Down Time -- the amount of time it takes to decelerate to a stop

The ramp rate settings of a joystick can be changed to compensate for hydraulic pump wear to maintain peak performance from the machine.

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

Refer to Navigation Menus, *Settings Navigation Menu*.

1 Turn the key switch to platform controls. Do not start the engine (if equipped).

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 steer in the right direction.

5 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

6 Momentarily activate steer in the right direction until SETTINGS is shown on the display.

Platform Controls

7 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND SENSOR SETTINGS is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction until CALIBRATE TILT SENSOR is shown on the display.

9 Momentarily activate steer in the right direction to choose either RAMP UP TIME or RAMP DOWN TIME sub menus.

10 Momentarily activate the drive enable toggle switch in the right direction to enter the desired ramp time calibration sub menu.

11 Momentarily activate the boom function to be adjusted.

⊙ Result: The display shows the name of the function, direction, and time value in milliseconds. Example "PRI_UP_VALVE 2500" (2500 milliseconds / 2.5 seconds of ramp time).

Note: At this step, the function can be tested and ramp times can be measured. Release the foot switch prior to making a parameter adjustment.

12 Momentarily active steer to change the ramp up or ramp down value. Each activation will change the value by 50 milliseconds. Refer to the Ramp Rate chart for factory settings.

13 Momentarily activate the drive enable toggle switch in the right direction to save the value.

⊙ Result: The alarm will sound indicating the setting has been saved. Continue to the next desired Ramp time adjustment.

Ramp Rate (factory settings)	
Primary boom up/down	
ramp up	2 seconds
ramp down	0.6 seconds
Secondary boom up/down	
ramp up	2.5 seconds
ramp down	0.5 seconds
Turntable rotate	
ramp up	1.5 seconds
ramp down	1.25 seconds
Primary boom extend/retract	
ramp up	2 seconds
ramp down	0.4 seconds
Jib boom up/down	
ramp up	2 seconds
ramp down	0.4 seconds
Platform rotate	
ramp up	0.75 seconds
ramp down	0.3 seconds
Drive forward/reverse	
ramp up	5 seconds
ramp down	3 seconds

1-2
How to Calibrate Booms Angle Sensors

Boom angle sensors are installed on the primary and secondary boom sections. They are used to detect whether the boom sections are stowed or not stowed. A two point calibration procedure captures the signal with the cylinder fully extended and fully retracted to an angle measurement that is scaled to degrees within the program. If either angle sensor is in the uncalibrated state, drive speed is limited to out-of-stowed speed.

Note: Start this procedure with the boom in a stowed position. Position the machine in a suitable location with sufficient vertical space. Refer to Navigation Menus, *Settings Menu*.

Note: The one point calibration is optional. It allows 2 MPH / 3.2 Km/h of travel in the stowed position if the machine needs to be immediately moved.

1 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.

2 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

3 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

4 Momentarily activate steer in the right direction until SETTINGS is shown on the display.

5 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND SENSOR SETTINGS is shown on the display.

6 Momentarily activate the drive enable toggle switch in the right direction until CALIBRATE TILT SENSOR is shown on the display.

7 Momentarily activate steer in the right direction until BOOM ANGLE CALIBRATE is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction to enter the BOOM ANGLE CALIBRATE screen.

9 Momentarily activate the drive enable toggle switch in the right direction to enter the sub-menu.

⊙ Result: The screen will display PRI SNSR MVXXXX, SEC SNSR MVXXXX. A flashing value indicates the mV (millivolt) value is within expected range.

10 Momentarily activate the drive enable toggle switch in the right direction to store the millivolt value.

⊙ Result: An alarm will sound for one second and the screen will display CALIBRATED.

11 Calibrate the boom elevated positions, fully raise the primary and secondary booms. Repeat steps 9 and 10 to store the millivolt value.

⊙ Result: An alarm will sound for two seconds and the screen will display CALIBRATED indicating both the primary and secondary angle sensors have been calibrated successfully.

To exit programming mode:

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

Platform Controls

1-3
How to Clear Fault History

There are 1 - 16 fault codes shown in the fault history menu 1 being the most recent displayed. It may be necessary to clear the fault history in order to acquire the most recent fault codes. It is also good practice to clear fault history after performing any calibration procedure.

Note: Perform this procedure with the boom in the stowed position. Refer to Navigation Menus, *Faults Menu*.

1 Turn the key switch to platform controls. Do not start the engine (if equipped).

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 steer in the right direction.

5 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

6 Momentarily activate the drive enable toggle switch in the right direction until ACTIVE FAULTS is shown on the display.

7 Momentarily activate steer in the right direction until FAULT HISTORY is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction to activate the clear fault history function

⊙ Result: The display will read ENABLE at the bottom.

9 Momentarily activate steer in the right direction to change NO to YES on the display.

10 Momentarily activate the drive enable toggle switch to except the change.

⊙ Result: The alarm will sound indicating the fault history has been cleared.

2-1
Platform Leveling 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 Cylinder

Note: Before cylinder removal is considered, bleed the leveling 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 primary boom until the slave cylinder barrel-end pivot pin is accessible.

2 Raise the jib boom slightly and place blocks under the platform.

3 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 jib boom on the blocks.

4 Tag, disconnect and cap the hydraulic hoses from the slave cylinder. Plug the union hoses from the master 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.

5 Remove the pin retaining fastener from the slave cylinder rod-end pivot 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 under the slave cylinder for support. Protect the cylinder rod from damage.

8 Use a soft metal drift to drive the rod-end pivot pin out.

⚠WARNING Crushing hazard. The platform could fall when the leveling cylinder rod-end pivot pin is removed if not properly supported.

NOTICE Component damage hazard. The leveling 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 and drive the barrel-end pin out.

10 Carefully pull the cylinder out of the primary boom.

How to Bleed the Platform Leveling Cylinder

1 Simultaneously activate the primary boom up function and the platform level up function until the boom is fully raised.

2 Simultaneously activate the primary boom down function and the platform level down function until the boom is fully lowered.

Platform Components

2-2 Platform Rotator

How to Remove the Platform Rotator

NOTICE Component damage hazard. Mark the platform mounting weldment and the rotator flange before removing the platform mounting weldment. The platform mounting weldment must be replaced in the exact same position on the rotator flange as it was before removal. If a new rotator is installed or the rotator is disassembled, proper alignment can be achieved by rotating the rotator all the way to the left and then installing the platform mounting weldment all the way in the left 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 platform and platform support.

2 Tag, disconnect and plug the hydraulic hoses from the platform rotator manifold. Cap the fittings on the rotator.

⚠ 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 Support the platform rotator with a suitable lifting device. Do not apply any lifting pressure.

⚠ WARNING Crushing hazard. The platform rotator may become unbalanced and fall if not properly supported.

How to Bleed the Platform Rotator

Note: This procedure will require two people. Do not start the engine. Use auxiliary power for this procedure.

1 Move the function enable toggle switch to either side and activate the platform rotate toggle switch to the right then 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.

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

Calibrating the platform overload system regularly is essential to safe machine operation. Continued use of an improperly operating platform overload system, could result in the system not sensing an overloaded platform condition. Machine stability could be compromised resulting in the machine tipping over.

How to Perform a Zero Load Platform Calibration

Perform this procedure when platform overload is not operating within the calibration parameters. This procedure will re-calibrate the zero load point without affecting a previous full load calibration. In most cases the machine will maintain full load capacity, however, in some situations the platform load capacity may be reduced until a full load calibration has been performed.

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

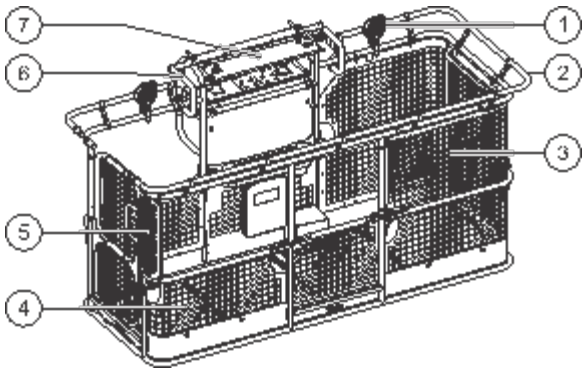
1 Fully retract and lower the boom. Level the platform.

2 Remove all weight, tools, accessories and equipment from the platform.

Note: Options and accessories that are considered integrated components of the platform do not require removal to perform calibration. Refer to *Integrated Options and Accessories*.

⚠DANGER Tip-over hazard. Failure to remove all non-integrated factory and non-factory options and accessories could result in the machine tipping over, causing death or serious injury.

Platform Components



Integrated Options and Accessories

1 platform work lights
2 auxiliary top rail
3 platform full height mesh
4 platform half height mesh
5 swing gate latch guard
6 Contact alarm
7 control box cover

3 Turn the key switch to ground controls and pull out the red Emergency Stop button. Within 5 seconds, activate the secondary boom up toggle switch 3 times.

Note: Do not activate function enable.

⊙ Result: The hour meter displays **CALIBRAT MODE**.

4 Activate and hold secondary down for 3 - 4 seconds.

⊙ Result: Hour meter displays **ZEROLOAD CAL OK**. Calibration is saved.

☒ Result: Hour meter displays **ZEROLOAD OUT OF RANGE**. Calibration has not been saved. Adjust the load cell and repeat this procedure.

How to Perform a Full Load Platform Calibration

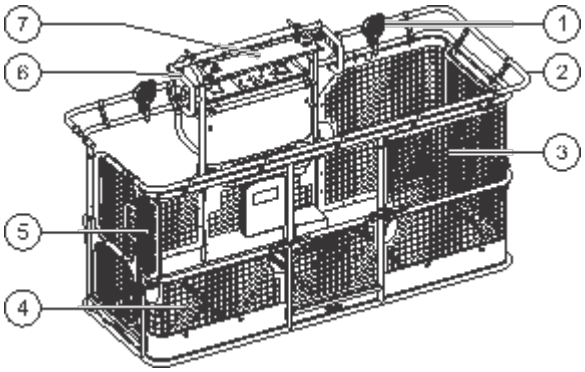
Note: Perform this procedure on a firm, level surface with the machine in the stowed position.

1 Fully retract and lower the boom. Level the platform.

2 Remove all weight, tools, accessories and equipment from the platform.

Note: Options and accessories that are considered integrated components of the platform do not require removal to perform calibration. Refer to *Integrated Options and Accessories*.

⚠ DANGER Tip-over hazard. Failure to remove all non-integrated factory and non-factory options and accessories could result in the machine tipping over, causing death or serious injury.



Integrated Options and Accessories

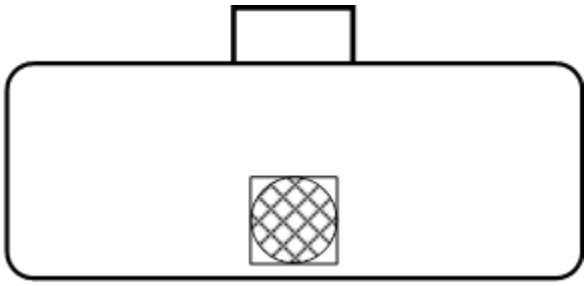
1 platform work lights
2 auxiliary top rail
3 platform full height mesh
4 platform half height mesh
5 swing gate latch guard
6 Contact alarm
7 control box cover

3 Perform a zero load calibration. Refer to *How to Perform a Zero Load Calibration*.

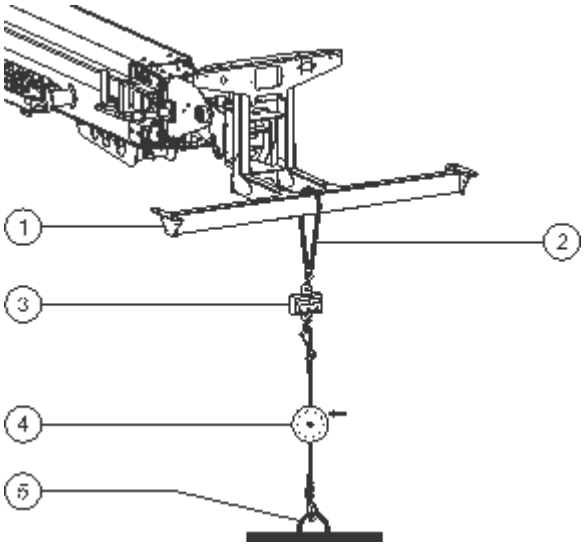
4 Place a test weight on the platform floor using a suitable lifting device. Place the weight near the center entry point of the platform, as far away from the operator controls as possible.

Weight = 660 lbs / 300 kg

Note: If test weights are not available, you may use an industrial scale to weigh available objects until it equals the platform's maximum capacity.



Note: Alternate method for achieving rated load in the platform is to attach a hanging scale to the bottom of the platform and apply load using a winch or chain hoist until the readout displays the appropriate weight.



Platform hidden from illustration for clarity

1 platform support
2 sling
3 hanging scale
4 winch or chain hoist
5 anchoring device

5 Activate and hold secondary boom up for 3 - 4 seconds.

⊙ Result: Hour meter displays **MAXRATED LOAD CAL OK**. Calibration is saved.

⊠ Result: Hour meter displays **MAXRATED LOAD OUT OF RANGE**. Calibration has not been saved. Adjust the load cell and repeat this procedure.

6 Push in the red Emergency Stop button to the off position.

Confirm calibration:

7 Start the engine from the ground controls.

8 Add an additional 50 lbs / 23 kg of weight or load to the platform.

⊙ Result: The alarm sounds. The engine turns off. The platform overload indicator light or LCD symbol flashes at the platform controls and *Platform Overload* is displayed on the LCD screen at the ground controls.

Note: There may be a 2 second delay before the overload indicator lights flash and the alarm sounds.

9 Test all machine functions from the ground controls.

⊙ Result: Engine does not start. Limited APU functionality. Elevate and extend functions do not operate.

10 Remove the weight or rated load from the platform.

Platform Components

How to Replace the Load Cell Sensor

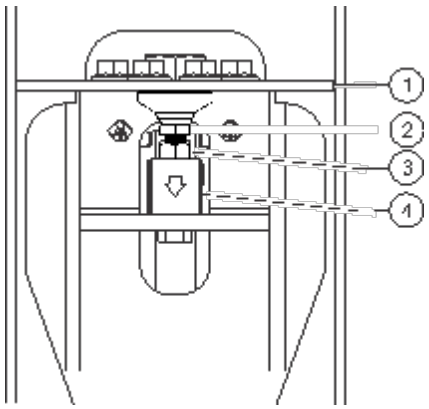
Note: The preload adjustment should only be performed after the load cell sensor has been replaced.

1 Remove all equipment or tools from the platform. Remove the welder if equipped.

2 At the platform, remove the plastic instruction holder from the document mount plate.

3 Tag and disconnect the load cell sensor harness.

4 Loosen the jam nut securing the load cell sensor foot and rotate the foot screw clockwise to remove the preload.



1 flex plate
2 load cell sensor foot
3 jam nut
4 load cell sensor

5 Remove the fasteners securing the load cell sensor and remove the sensor.

Install the new Load Cell Sensor

6 Screw the foot with jam nut into the top of the load cell sensor until the foot bolt extends out of the bottom of the sensor.The foot should not contact the flex plate when assembling onto the platform support.

Note: Verify the arrow on the load cell is in the downward position.

7 Assemble the load cell and foot assembly to the platform and securely tighten the two mounting screws. Torque the bolts to 101 ft-lbs / 137 Nm.

Set the Load Cell Sensor Preload

8 Rotate the foot screw counter clockwise until the foot just contacts the flex plate (finger tight).

9 Using an open end wrench, continue to rotate the foot counter clockwise an additional 1/2 turn (180°). Then, while holding the foot bolt, securely tighten the jam nut. Torque the jam nut to 55 ft-lbs / 75 Nm.

10 Attach the load cell sensor harness.

11 Install the plastic instruction holder.

12 Calibrate the platform overload system. Refer to, *How to Perform a Full Load Platform Calibration.*

How to Reset Overload Recovery Faults (if equipped)

The message OVERLOAD RECOVERY will be displayed when a platform overload recovery occurs under auxiliary power. The message will persist until the reset overload recovery procedure is performed. Refer to Navigation Menus, *Faults Menu.*

1 Turn the key switch to platform controls.

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 steer in the right direction.

5 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

6 Momentarily activate the drive enable toggle switch in the right direction until ACTIVE FAULTS is shown on the display.

7 Activate steer in the right direction until RESET OVERLOAD RECOVERY is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction to lock the menu OVERLOAD RECOVERY RESET.

9 Enter the reset code by momentarily activating steer right three times then steer left one time.

⊙ Result: A one second pulse alarm will sound indicating the reset procedure has been saved.

Jib Boom Components

3-1
Jib Boom

How to Remove the Jib Boom

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 platform.

2 Disconnect the electrical connector from the jib boom/platform rotate select valve manifold mounted to the platform support.

3 Tag, disconnect and plug all of the hydraulic hoses from the jib boom/platform rotate select valve 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.

4 Remove the platform support.

5 Remove the platform rotator. Refer to Repair Procedure, *How to Remove the Platform rotator*.

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

7 Slide both of the jib boom leveling arms off of the jib boom cylinder rod-end pivot pin.

8 Remove the hose and cable cover from the side of the jib boom. Remove the hose and cable separators.

9 Attach a lifting strap from an overhead supporting device to the jib boom.

10 Support the barrel end of the jib boom lift cylinder with a suitable lifting device.

11 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.

12 Remove the pin retaining fastener from the jib boom lift cylinder barrel-end pivot pin.

13 Use a soft metal drift to remove the pin and let the cylinder hang down.

⚠ WARNING Crushing hazard. The jib boom could fall when the barrel-end pivot pin is removed if not properly supported by the lifting device.

14 Remove the pin retaining fastener from the jib boom pivot pin. Use a soft metal drift to remove the pin, then remove the jib boom.

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

3-2
Jib Boom Lift Cylinder

How to Remove the Jib Boom Lift Cylinder

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 Raise the jib boom slightly and place blocks under the platform support. 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 jib boom lift cylinder rod-end pivot pin out enough to lower one of the leveling arms to the ground. Tap the pin the other direction and lower the opposite leveling arm. Do not remove the pin.

5 Support the jib boom lift cylinder with a suitable lifting device.

6 Remove the pin retaining fastener from the jib boom lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the barrel-end pin and let the cylinder hang down.

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

7 Attach a lifting strap from an overhead lifting device 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 lifting device.

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 the harnesses from the platform control box.

2 Remove hose and cable cover from the side of the jib boom. Remove the hose and cable separators.

3 Remove the hose clamp on the primary boom bellcrank.

4 Pull all of the electrical cables out of the plastic cable track. Do not pull out the hydraulic hoses.

5 Tag, disconnect and plug the hydraulic hoses from ports V1 and V2 on the counterbalance valve manifold located on the platform rotator. Cap the fittings.

⚠ 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 Tag, disconnect and plug the hydraulic hoses from the cable track to the bulkhead union at platform end of the boom. Cap the union fittings.

⚠ 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, disconnect and plug the hydraulic hoses from the jib boom/platform rotate manifold. Cap the fittings.

⚠ 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 Tag, disconnect and plug the 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.

9 Tag, disconnect and plug the hydraulic hoses from the platform leveling master 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.

Primary Boom Components

10 Raise the boom to a horizontal position.

11 Place blocks between the upper and lower cable tracks and secure the upper and lower tracks 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.

12 Attach a lifting strap from an overhead 5 ton / 5,000 kg capacity lifting device to the platform end of the primary boom for support. Do not lift it.

13 Remove all hoses and cable clamps from the underside of the primary boom.

14 Support the rod-end of the primary boom lift cylinder with a suitable lifting device.

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

16 Raise the primary boom slightly with the suitable lifting device to relieve the pressure on the primary boom lift cylinder rod-end pivot pin.

17 Use a soft metal drift to remove the primary boom lift cylinder rod-end pivot pin.

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

18 Lower the rod-end of the primary boom lift cylinder approximately 12 inches / 30 cm.

19 Pull all of the hoses and cables out and away from the mounting ears for the rod-end of the primary boom lift cylinder.

20 Raise the rod end of the primary boom lift cylinder back into position and install the rod-end pivot pin. Install the pin retaining fasteners.

21 Attach a strap from an suitable lifting device to the cable track.

22 Remove the mounting fasteners from the upper cable track at the platform end of the extension boom.

23 Remove the cable track mounting fasteners that attach the lower cable track to the primary boom.

24 Remove the cable track from the machine and place it on a structure capable of supporting it.

⚠WARNING Crushing hazard. The cable track could become unbalanced and fall if not properly attached to the lifting device.

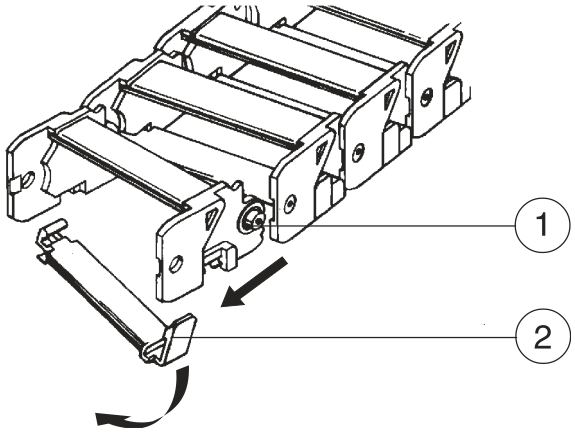
NOTICE Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

Primary Boom Components

How to Repair the Cable Track

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

Note: A cable track repair kit 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.

4-2 Primary Boom

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 platform.

2 Remove the jib boom. Refer to Repair Procedure, *How to Remove the Jib Boom.*

3 Remove the cable track. Refer to Repair Procedure, *How to Remove the Cable Track*.

4 Raise the primary boom to a horizontal position.

5 Remove the hose and cable cover from the upper pivot.

6 Remove the pin retaining fastener from the master cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin. Then 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.

Primary Boom Components

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

8 Remove the primary boom drive speed limit switch mounting fasteners. Do not disconnect the wiring.

9 Locate the primary extension boom drive speed limit switch inside of 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 Remove the hose clamp at the pivot end of the boom.

14 Attach a 5 ton / 5,000 kg capacity suitable lifting device 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, then carefully remove the primary boom from the machine and place it on a structure capable of supporting it.

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

Primary Boom Components

How to Disassemble the Primary Boom

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

1 Remove the primary boom. Refer to Repair Procedure, *How to Remove the Primary Boom*.

2 Place blocks under the barrel end of the primary boom extension cylinder for support.

3 Remove the pin retaining fastener from the extension cylinder barrel-end pivot pin at the pivot end of the primary boom. Use a soft metal drift to remove the pin.

4 Remove and label the location of the wear pads from the platform end of the primary boom.

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

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

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

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

6 Remove the external snap rings from the extension cylinder rod-end pivot pins at the platform end of the extension tube. Use a soft metal drift to remove the pins.

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 lifting 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 supporting device to the primary boom for support.

4 Raise the primary boom with the overhead supporting device slightly to take pressure off the primary boom lift cylinder pivot pins.

5 Support the rod end and the barrel end of the primary boom lift cylinder with a second overhead supporting 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 Remove the 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 will fall if not properly supported when the primary boom rod-end pivot pin is removed.

8 Place a support block across both turntable covers under the primary boom lift cylinder.

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

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

10 Remove the primary boom lift cylinder barrel-end pivot pin retaining fasteners.

11 Use a slide hammer to remove the 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.

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 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.

6 Remove the barrel-end pivot pin retaining fasteners.

7 Place a rod through the barrel-end pivot pin and twist to remove the pin.

8 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 master cylinder acts as a pump for the slave cylinder. It's part of the closed circuit hydraulic loop that keeps the platform level through the entire range of boom motion. The master cylinder is located at the base of the primary boom.

How to Remove the Platform Leveling Master 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 secondary boom until both the rod-end and barrel-end pivot pins on the master cylinder are accessible.

2 Use an overhead supporting device to support the platform. Do not apply lifting pressure.

3 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.

4 Attach overhead supporting device to the master cylinder.

5 Remove the retaining fasteners from the master cylinder barrel-end pivot pin.

6 Use a soft metal drift to remove the pin.

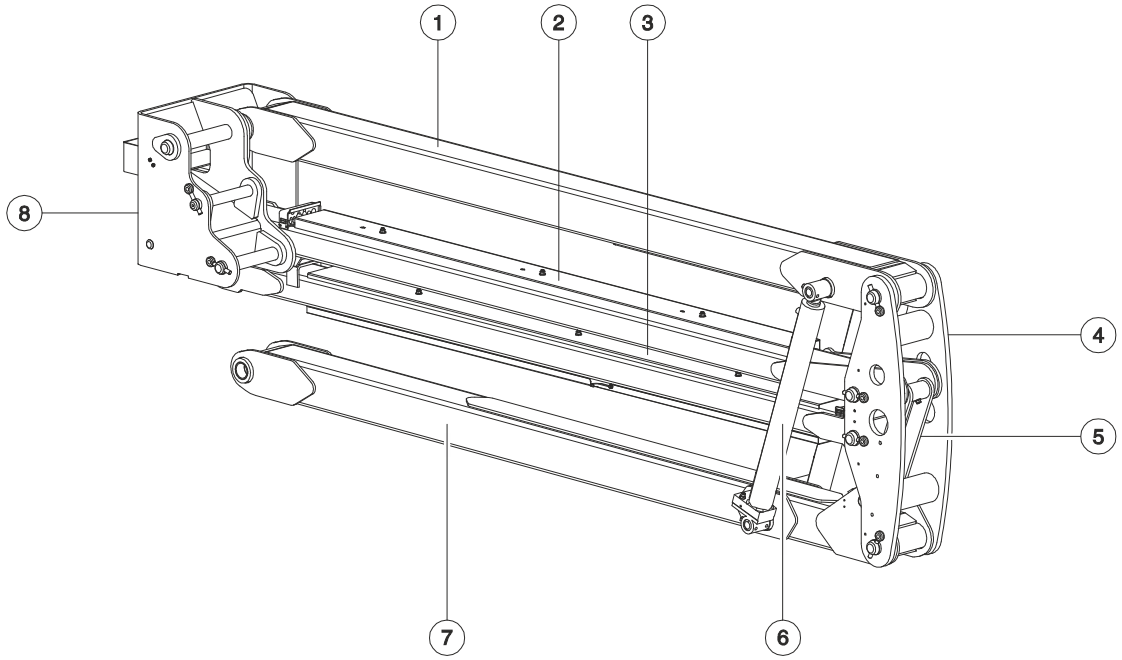
7 Remove the retaining fastener from the rod-end pivot pin.

8 Use a soft metal drift to remove the pin.

9 Remove the master cylinder from the machine.

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

Secondary Boom Components



1 upper secondary boom (number 1 arm)
2 upper tension link (number 2 arm)
3 lower tension link (number 3 arm)
4 mid-pivot
5 compression link
6 secondary boom lift cylinder (2)
7 lower secondary boom (number 4 arm)
8 upper pivot

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 platform.

2 Remove the jib boom. Refer to Repair Procedure, *How to Remove the Jib Boom.*

3 Remove the primary boom. Refer to Repair Procedure, *How to Remove the Primary Boom*.

4 Remove the master cylinder. Refer to Repair Procedure, *How to Remove the Master Cylinder*.

5 Attach a lifting strap from an overhead lifting device to the lug on the rod end of the primary boom lift cylinder. Then raise the primary boom lift cylinder with the lifting device, to a vertical position.

6 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.

7 Remove the pin retaining fastener from the primary boom lift cylinder barrel-end pivot pin.

8 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.

9 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.

10 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.

11 Attach a strap from an overhead lifting device to the lug on the rod end of one of the secondary boom lift cylinders for support. Do not apply any lifting pressure.

Secondary Boom Components

12 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.

13 Use a soft metal drift to drive the rod-end pivot pin half way out.

14 Remove the secondary boom lift cylinder from the machine.

15 Repeat steps 11 through 14 for the other secondary boom lift cylinder.

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

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.

16 Attach a lifting strap from an overhead lifting device to the upper pivot for support. Do not lift it.

17 Attach a lifting strap from a second overhead lifting device to the number 1 arm at the mid-point between the upper pivot and mid-pivot.

18 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.

19 Use a soft metal drift to drive both pins out.

20 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 suitable lifting device.

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

21 Using an overhead lifting device 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. Then 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 covers 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 suitable lifting device.

28 Attach the lifting strap from an overhead lifting device 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 an overhead lifting device to the mid-pivot for support. Do not lift it.

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. Then 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 suitable lifting device.

35 Attach the lifting strap from an overhead lifting device to the center point of the number 2 arm for support. Do not lift it.

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 overhead 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 suitable lifting device.

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

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 lifting device.

41 Remove the upper and lower hose and cable covers from the number 3 arm.

42 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.

Secondary Boom Components

43 Open the ground controls side turntable cover.

44 Remove the fuel tank filler cap.

45 Using an approved hand-operated pump, drain the fuel tank into a container of suitable capacity. Refer to Specifications, *Machine Specifications*.

⚠ DANGER Explosion and fire hazard. Engine fuels are combustible. Perform this procedure in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

⚠ DANGER Explosion and fire hazard. When transferring fuel, connect a grounding wire between the machine and pump or container.

Note: Be sure to only use a hand-operated pump suitable for use with gasoline and diesel fuel.

46 Tag, disconnect and plug the fuel hoses from the fuel tank. Clean up any fuel that may have spilled.

47 Remove the fuel tank mounting fasteners. Carefully remove the fuel tank from the machine.

NOTICE Component damage hazard. The fuel tank is plastic and may become damaged if allowed to fall.

Note: Clean the fuel tank and inspect for cracks and other damage before installing it onto the machine.

48 Remove the retaining fastener from the ground control box and function manifold pivot plate.

49 Lower the ground control box and function manifold pivot plate to access the number 3 arm pivot pin.

50 Attach a lifting strap from an overhead lifting device to the center point of the number 3 arm for support. Do not lift it.

51 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 riser.

52 Remove the pin retaining fasteners from the number 3 arm at the turntable riser. Do not remove the pin.

53 Use a slide hammer to remove the number 3 arm pivot pin from the turntable pivot through the access hole behind the ground control box.

54 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 lifting device.

55 Remove the upper and lower hose and cable covers from the number 3 arm.

56 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.

57 Remove the pin retaining fasteners from the number 4 arm at the turntable riser. Do not remove the pin.

58 Attach a lifting strap from an overhead lifting device to the center point of the number 4 arm. Do not lift it.

59 Use a slide hammer to remove the number 4 arm from the turntable riser through the ground controls side bulkhead.

60 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 lifting device.

5-2
Secondary Boom Lift Cylinder

There are two secondary boom lift cylinders incorporated in the structure of the secondary boom assembly. These cylinders operate in parallel and require hydraulic pressure to extend and retract. Each secondary boom lift cylinder is equipped with a counterbalance valve 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 Lower the secondary boom to the stowed position.

2 Raise the primary boom so that it is above the secondary boom lift cylinder rod-end pivot pin.

3 Tag, disconnect and plug the hydraulic hoses on the secondary 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.

4 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.

5 Attach a strap from an overhead lifting device to the lug on the rod end of the secondary boom lift cylinder for support. Do not apply any lifting pressure.

6 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.

7 Use a soft metal drift to drive the rod-end pivot pin half way out.

8 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 suitable lifting device.

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.

Engines

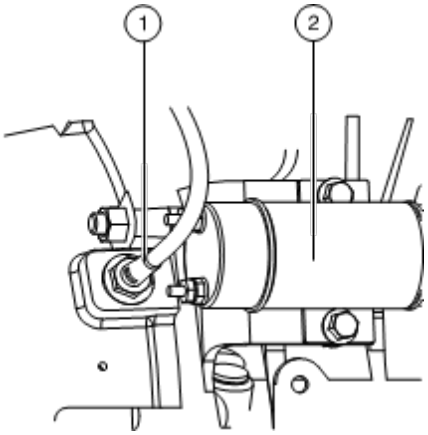
6-1 RPM Adjustment

Refer to Maintenance Procedure in the appropriate Service or Maintenance Manual for your machine, *Check and Adjust the Engine RPM*.

How to Replace the Motor Tach Sensor

1 Remove the fastener under the engine tray and pull the engine out.

2 **Kohler engine models:** Remove the high idle solenoid from the bracket.



1 tach sensor
2 high idle solenoid

3 Locate, tag and disconnect the tach sensor harness.

4 Loosen the jam nut and remove the tach sensor.

5 Thread the new tach sensor until it stops.

Note: Do not over tighten.

6 Back the tach sensor off 1/2 turn and tighten the jam nut.

7 **Kohler engine models:** Install the high idle solenoid.

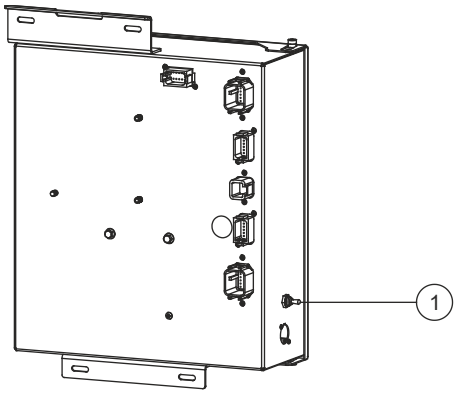
8 Start the engine and check the high idle parameter. Refer to Specifications, *Engine Specifications*.

9 Secure the engine tray and tighten the engine tray fastener.

7-1 Control System Fault Recovery Switch

The turntable control box (TCON) is the communication and operations center for the machine. The switch at the bottom of the control box is the control system fault Recovery switch. Bypass and Recovery mode is only intended for certain circumstances and is not part of normal machine operation. If the Recovery function is required, this indicates there may be faults with the machine. Contact trained personnel immediately.

Recovery is only to be used as a last attempt to retract and lower the platform when control system failures or CAN communication failures occur.



1 Recovery switch

How to use Control System Fault Recovery Switch

Recovery is only to be used as a last attempt to retract and lower the platform when control system failures or CAN communication failures occur.

⚠WARNING Bodily injury hazard. When using recovery mode, the platform may not fully lower to the ground when the recovery mode is completed. Failure to use only suitable equipment and/or practices to allow the operator to safely exit the platform could result in death or serious injury.

The Recovery switch allows the platform to be lowered in case of control system fault or CAN communication loss. The recovery switch retracts the primary boom and lowers the primary and secondary booms at the same time using the main pump at reduced speed to allow the operator to exit the platform.

1 In case of CAN communication loss or control system failure only, turn off the machine, wait at least two seconds and turn the key switch to the ground controls position.

2 Press and hold the function enable button and move the Recovery switch backward to lower the primary and secondary booms or move the Recovery switch forward to retract the primary boom.

Note: The recovery switch must be held in the recovery position until the recovery sequence is complete or until the operator in the platform can safely exit the platform.

Note: If the Recovery function has been used, this will indicate there are faults with the machine. Tag and remove the machine from service until the fault has been corrected by trained personnel.

Hydraulic Pumps

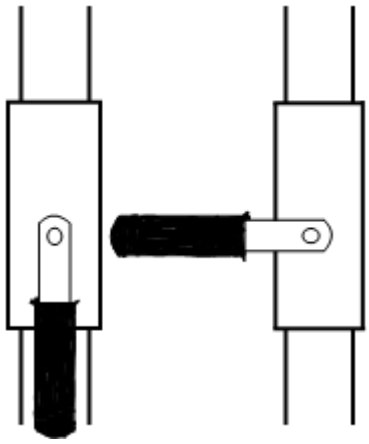
8-1 Function Pump

How to Remove the Function 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 Locate the hydraulic tank valve at the hydraulic tank. Close the valve.

NOTICE Component Damage hazard.Do not perform any functions with hydraulic tank shut off valve closed. Remove the key switch and tag the machine to inform personnel of the condition.



Open Closed

2 Tag, disconnect and plug function pump hydraulic hoses. 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.

3 Support the pump with a suitable lifting device.

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

NOTICE Component damage hazard. Be sure to open the hydraulic tank valve and prime the pump after installation.

How to Check the Function Pump Calibration

Pump efficiency is calibrated automatically but must be verified after a new pump installation and before performing any boom speed calibrations. Refer to Repair Procedures, *Calibration Process Steps.* This procedure determines the number of revolutions that are required to create a determined amount of flow. This can also aid in diagnosing if a pump is failing.

Note: Start this procedure with the secondary boom in the stowed position and primary boom at or above horizontal. Position the machine in a suitable location with sufficient vertical space. Refer to Navigation Menus, *Settings Menu.*

Note: Primary and secondary angle sensors must be functional and calibrated. Refer to Repair Procedures, *How to Calibrate Booms Angle Sensors.*

1 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.

Note: If the unit is equipped with the engine option, set the machine to DC mode.

2 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

3 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

4 Momentarily activate steer in the right direction until SETTINGS is shown on the display.

5 Momentarily activate the drive enable toggle switch in the right direction until you see the VALVE AND SENSOR SETTINGS screen.

6 Momentarily activate the drive enable toggle switch in the right direction until CALIBRATE TILT SENSOR is shown on the display.

7 Continue to momentarily active the steer in the right direction until PUMP EFFICIENCY CALIBRATION is shown on the display.

8 Momentarily activate the drive enable toggle switch to enter PUMP EFFICIENCY CALIBRATION menu.

9 Fully elevate the secondary boom.

10 Fully lower the secondary boom.

⊙ Result: A one second pulse alarm will sound indicating a successful pump efficiency calibration. The display will indicate pump efficiency in %.

To exit programming mode:

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

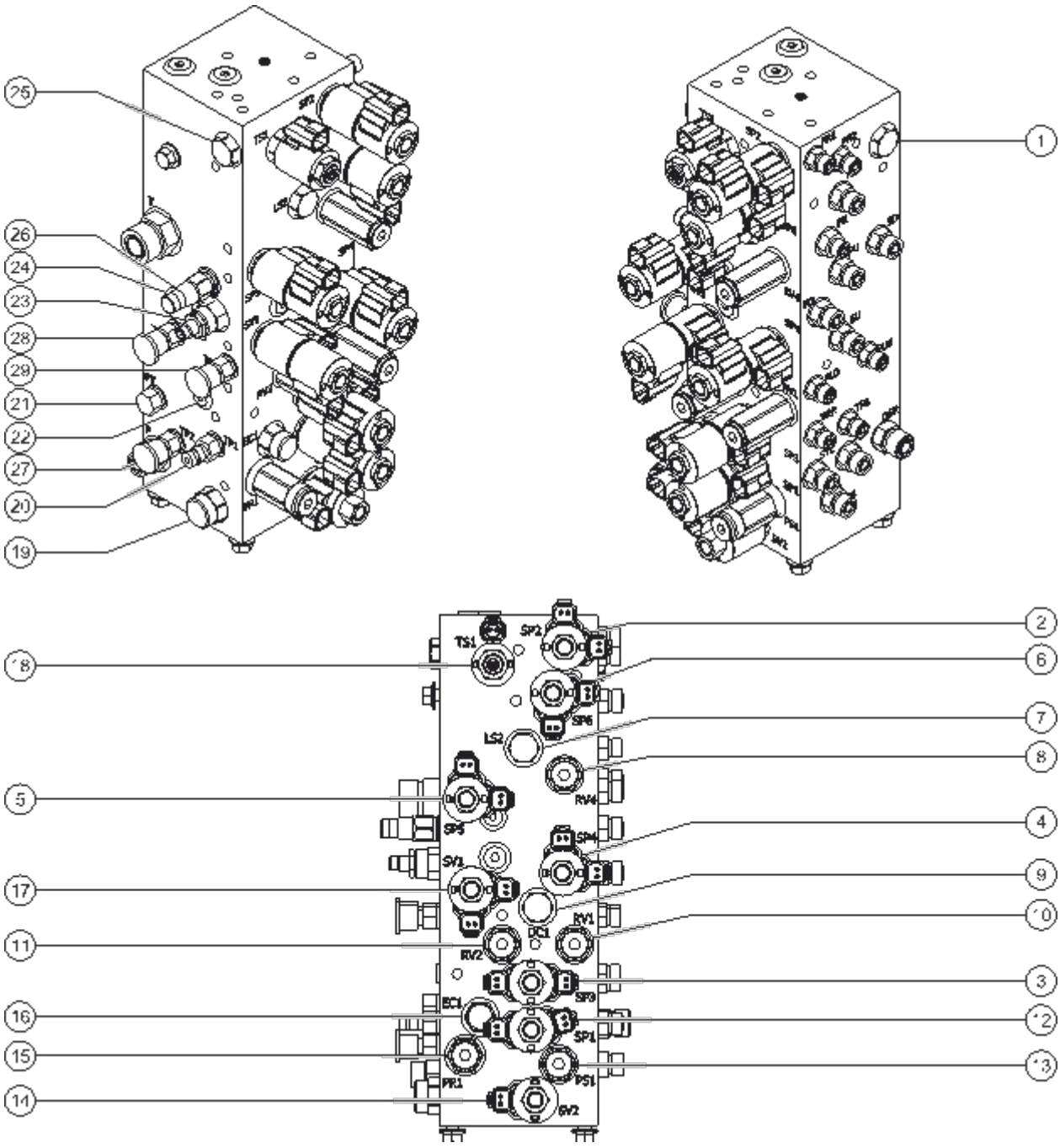
Manifolds

9-1
Function Manifold Components

The function manifold is mounted to the turntable next to the ground controls.

Index No.	Description	Schematic Item	Function	Torque
1	Check valve	A	Platform rotate left/right	19-21 ft-lbs / 26-29 Nm
2	Proportional solenoid valve, 3 position 4 way	B	Platform rotate left/right	19-21 ft-lbs / 26-29 Nm
3	Proportional solenoid valve, 3 position 4 way	C	Turntable rotate left/right	19-21 ft-lbs / 26-29 Nm
4	Proportional solenoid valve, 3 position 4 way	D	Secondary boom up/down	19-21 ft-lbs / 26-29 Nm
5	Proportional solenoid valve, 3 position 4 way	E	Primary boom up/down	19-21 ft-lbs / 26-29 Nm
6	Proportional solenoid valve, 3 position 4 way	F	Primary boom extend/retract	19-21 ft-lbs / 26-29 Nm
7	Shuttle valve	G	Primary boom extend/retract circuit	19-21 ft-lbs / 26-29 Nm
8	Relief valve, 2100 psi / 145 bar	H	Secondary boom down	19-21 ft-lbs / 26-29 Nm
9	Check Valve, pilot operated	I	Platform level up/down	19-21 ft-lbs / 26-29 Nm
10	Relief valve, 3500 psi / 241 bar	J	Platform level up circuit	19-21 ft-lbs / 26-29 Nm
11	Relief valve, 3500 psi / 241 bar	K	Platform level down circuit	19-21 ft-lbs / 26-29 Nm
12	Proportional solenoid valve, 3 position 4 way	L	Steer left/right	19-21 ft-lbs / 26-29 Nm
13	Pressure sensing valve, 850 psi / 59 bar	M	Oscillate circuit	24-26 ft-lbs / 33-35 Nm
14	Solenoid valve, 2 position 2 way (normally open)	N	Pressure circuit	19-21 ft-lbs / 26-29 Nm
15	Pressure reducing valve, 500 psi / 34.4 bar	O	Oscillate circuit	24-26 ft-lbs / 33-35 Nm
16	Pressure compensator valve	P	Turntable rotate left/right circuit	19-21 ft-lbs / 26-29 Nm
17	Solenoid valve, 3 position 4 way	Q	Platform level up/down	19-21 ft-lbs / 26-29 Nm
18	Proportional relief valve	R	Boom functions	19-21 ft-lbs / 26-29 Nm
19	Flow regulator valve, 2 gpm / 7.6 L/min	S	Oscillate circuit	25-27 ft-lbs / 34-37 Nm

Manifolds

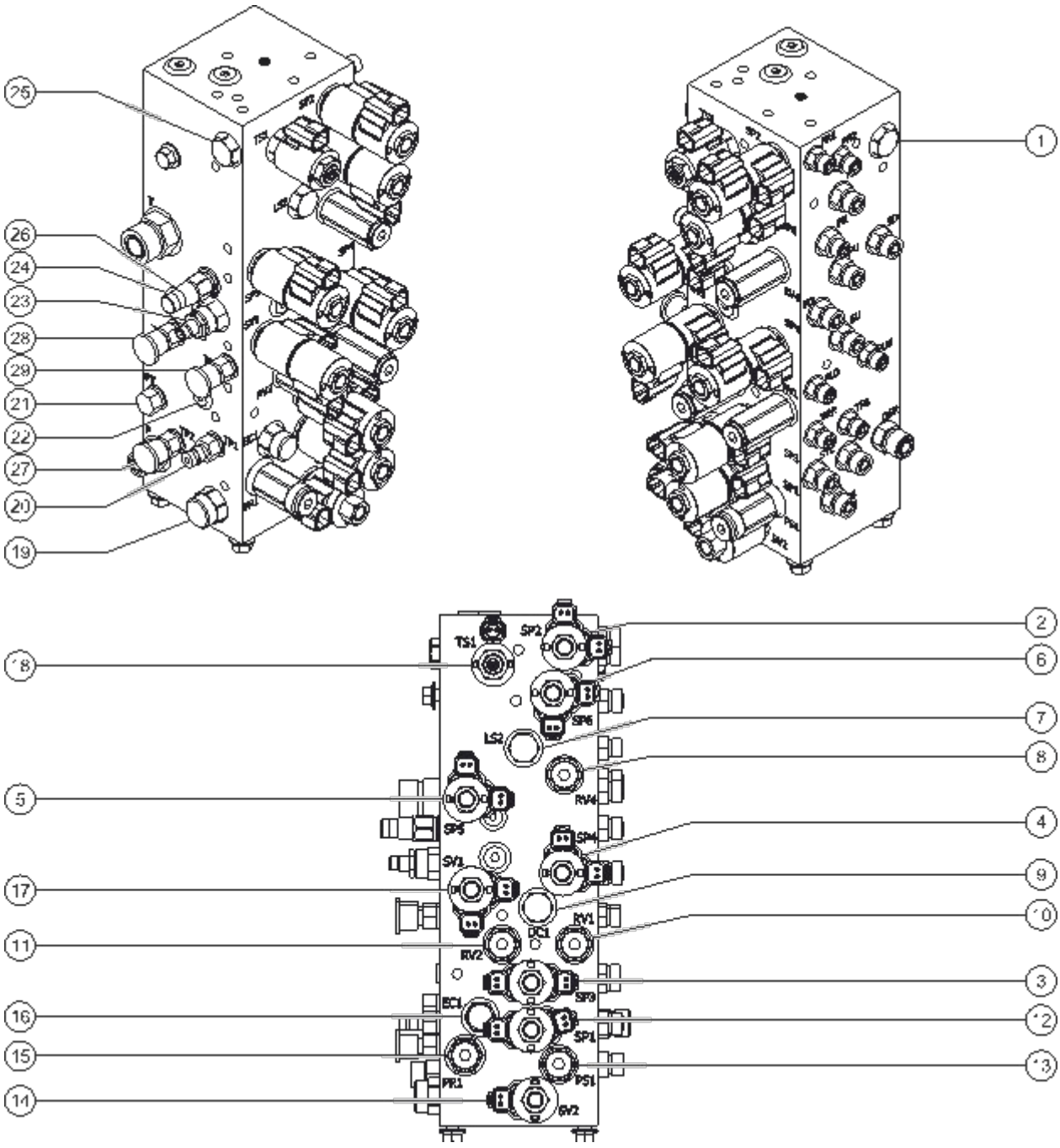

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SP1
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PS1
SV2

Manifolds

Function Manifold Components, continued

Index No.	Description	Schematic Item	Function	Torque
20	Diagnostic port	TP1	System relief	__
21	Pressure transducer	U	Monitors pressure	18-20 ft-lbs / 25-27 Nm
22	Shuttle valve	V	Turntable rotate left/right circuit	4-5 ft-lbs / 5-6 Nm
23	Needle valve	W	Platform level circuit	20 ft-lbs / 27 Nm
24	Check valve, 25 psi / 1.7 bar	X	Tank return circuit	19-21 ft-lbs / 26-29 Nm
25	Check valve, 25 psi / 1.7 bar	Y	Secondary boom down	19-21 ft-lbs / 26-29 Nm
26	Counterbalance valve	Z	Primary boom down	30-33 ft=lbs /40-45 Nm
27	Diagnostic port	TP2	Oscillate circuit	
28	Diagnostic port	TP3	Platform level up circuit	
29	Diagnostic port	TP4	Platform level down circuit	

Manifolds


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RV2
SP3
EC1
SP1
PR1
PS1
SV2

Manifolds

9-2
Valve Adjustments - Function Manifold

How to Adjust the Proportional Relief Valve and Hydraulic Pressure Sensor

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to test port #1 (TP1) on the function manifold.

2 Turn the key switch to Ground control. Pull out the platform red Emergency Stop button to the on position and pull out the ground control red Emergency stop button to the on position.

3 To enter the pressure sensor calibration mode, momentarily activate the ground control function enable switch three times within 5 seconds of pulling the red Emergency Stop button at the ground controls.

⊙ The pump motor activates and a green light will begin flashing on the TCON controller.

Note: The procedure will time out if any step is not completed within 90 seconds or terminate if the function enable switch is activated.

4 Activate the platform level toggle switch up or down until the pressure gauge reads 1000 psi / 69 bar. The platform level toggle up increases pressure, platform level down decreases pressure.

5 Activate the platform rotate toggle switch to store the value.

⊙ Result: The control system will continue to the next calibration procedure value - (3000 psi / 207 bar).

6 Activate the platform level toggle switch up or down until the pressure gauge reads 3000 psi / 207 bar. The platform level toggle up increases pressure, platform level down decreases pressure.

7 Activate the platform rotate toggle switch to save the value.

⊙ Result: The control system will automatically continue through the procedure and it automatically sweeps the following calibration points: 2500 psi / 172 bar, 2000 psi / 138 bar, 600 psi / 41,4 bar. A one second pulse alarm will indicate the calibration procedure is complete.

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

8 Remove the pressure gauge.

How to Adjust the Secondary Boom Down Relief Valve

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

Note: Refer to Function Manifold Component list to locate the secondary boom down relief valve.

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to test port #1 (TP1) on the function manifold.

2 Press and hold the function enable button. Activate and hold the secondary boom down switch with the secondary boom fully lowered.

3 Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

4 Use a wrench to hold the relief valve and remove the cap.

5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the relief valve cap.

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

6 Repeat this procedure beginning with step 2 to confirm the relief valve pressure.

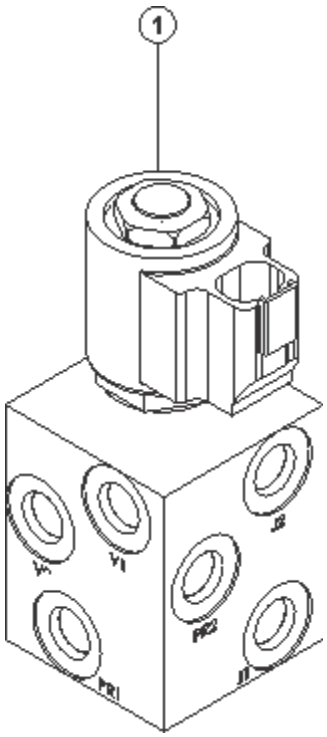
7 Remove the pressure gauge.

Manifolds

9-3
Jib Boom / Platform Rotate Manifold Components

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

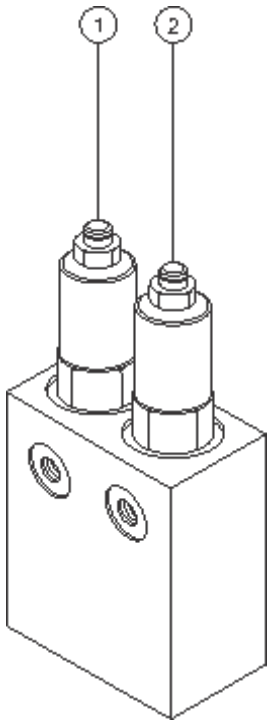
Index No.	Description	Schematic Item	Function	Torque
1	Solenoid Valve, 2 position 3 way	AA	Platform rotate/jib boom select	8-10 ft-lbs / 11-14 Nm



9-4
Turntable Rotation Manifold Components

The turntable rotation manifold is mounted to the turntable rotation motor located in the boom storage compartment.

Index No.	Description	Schematic Item	Function
1	Counterbalance valve	BA	Turntable rotate right
2	Counterbalance valve	BB	Turntable rotate left

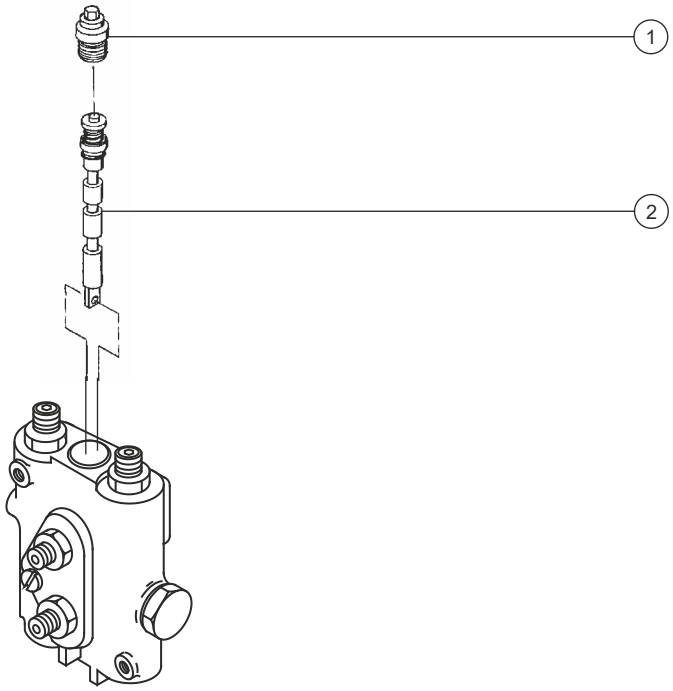


Manifolds

9-5
Directional Valve Manifold Components

The directional valve manifold is mounted inside the drive chassis at the non-steer end.

Index No.	Description	Schematic Item	Function	Torque
1	Cap		Breather	20-25 ft-lbs / 27-33 Nm
2	Spool valve	CA	Directional control	



How to Set Up the Oscillate Directional Valve Linkage

Note: Adjustment of the oscillate directional valve linkage is only necessary when the linkage or valve has been replaced.

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

Note: Two people will be required to perform this procedure.

1 Use a "bubble type" level to verify the floor is completely level.

⚠WARNING Tip-over hazard. Failure to perform this procedure on a level floor could compromise the stability of the machine resulting in the machine tipping over.

2 Remove the non-steer end drive chassis and axle covers.

3 Place a "bubble type" level across the drive chassis non-steer end. Verify the drive chassis is level to the working surface.

4 Locate and remove the ball joint retaining fastener from the bracket.

5 To level the drive chassis, perform any boom function and push up or pull down on the threaded rod until the machine is completely level. Do not raise the primary or secondary booms.

6 Verify that the ground and drive chassis are completely level.

7 Adjust the ball joint until the hole lines up with the retaining fastener hole in the bracket.

8 Install the ball joint to the axle and tighten the jam nut.

9 Verify that the ground and drive chassis are completely level.

10 Measure the distance between the drive chassis and the non-steer axle on both sides (from the inside of the drive chassis).

Note: If the distance is not equal and the adjustment to the linkage was completed with the ground and drive chassis level, repeat steps 4 through 9 or consult Genie Product Support.

Manifolds

9-6 Valve Coils

How to Test a Coil

A properly functioning coil provides an electromotive force which operates the solenoid valve. Critical to normal operation is continuity within the coil that provides this force field.

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.

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

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

2 Test the coil resistance.

⊙ Result: The resistance should be within specification, plus or minus 30%.

⊠ Result: If the resistance is not within specification, plus or minus 30%, 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. Refer to Specifications, *Manifold Component Specifications* for valve coil specifications.

How to Test a Coil Diode

Properly functioning coil diodes protect the electrical circuit by suppressing voltage spikes. Voltage spikes naturally occur within a function circuit following the interruption of electrical current to a coil. Faulty diodes can fail to protect the electrical system, resulting in a tripped circuit breaker or component damage.

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

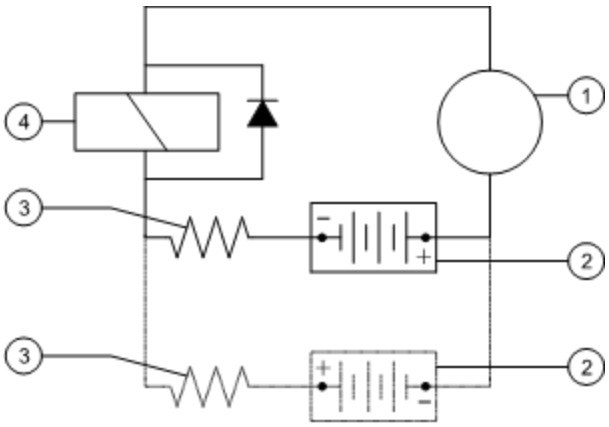
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.

2 Connect a 10W resistor to the negative terminal of a known good 9V DC battery. Connect the other end of the resistor to a terminal on the coil.

Resistor 10Ω

Genie part number 27287

Note: The battery should read 9V DC or more when measured across the terminals.



1 multimeter
2 9v DC battery
3 10Ω resistor
4 coil

Note: Dotted lines in illustration indicate a reversed connection as specified in step 6.

3 Set a multimeter to read DC current.

Note: The multimeter, when set to read DC current, should be capable of reading up to 800 mA.

4 Connect the negative lead to the other terminal on the coil.

5 Momentarily connect the positive lead from the multimeter to the positive terminal on the 9V DC battery. Note and record the current reading.

6 At the battery or coil terminals, reverse the connections. Note and record the current reading.

⊙ Result: Both current readings are greater than 0 mA and are different by a minimum of 20%. The coil is good.

7 Result: If one or both of the current readings are 0 mA, or if the two current readings do not differ by a minimum of 20%, the coil and/or its internal diode are faulty and the coil should be replaced.

Turntable Rotation Components

10-1 Turntable Rotation Assembly

How to Remove a 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.*

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

1 Secure the turntable from rotating with the turntable rotation lock pin.

Note: The turntable rotation lock pin is located next to the boom rest pad.

⚠ DANGER Tip-over hazard. The machine could tip over when the turntable rotation assembly is removed if the turntable rotation lock is not in the locked position.

2 Remove the center turntable cover retaining fasteners.

3 Remove the center turntable cover from the machine.

4 Tag, disconnect and plug the hydraulic hoses from the turntable rotation drive motor. Cap the fittings on the drive motor.

⚠ 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 Attach a lifting strap from an overhead lifting device to the turntable rotator assembly.

6 Remove the turntable rotation assembly mounting fasteners.

7 Carefully remove the turntable rotation assembly from the machine.

⚠ WARNING Crushing hazard. The turntable could rotate unexpectedly when the rotation drive hub assembly is removed if the turntable is not secured 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 lifting device.

When installing the drive hub assembly:

8 Install the drive hub. Torque the back lash pivot plate to specification. Refer to Specifications, *Machine Torque Specifications*.

9 Adjust turntable rotation gear backlash. Refer to Repair Procedure, *How to Adjust the Turntable Rotation Gear Backlash*.

10-2
How to Replace the Universal Tilt Sensor (UTS)

This machine has a dual axis angle-sensing device called the Universal Tilt Sensor (UTS). It is mounted on the turntable to monitor and communicate ground angle relative to gravity via CAN bus. Should the turntable be tilted at the *Allowable Tilt Angle* or greater an alarm will sound at both the turntable and the platform. If not calibrated, the machine will only drive in the stowed configuration in turtle mode.

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

1 Push in the red Emergency Stop button to the off position.

2 Tag and disconnect the harness from the tilt sensor.

Note: Record the X and Y axis orientation of the tilt sensor.

3 Remove the fasteners securing the tilt sensor to the turntable.

4 Secure the new tilt sensor using the existing fasteners removed in step 3. Tighten the fasteners.

5 Calibrate the tilt sensor. Refer to Repair Procedure, *How to Calibrate the Universal Tilt Sensor*.

How to Calibrate the Universal Tilt Sensor (UTS)

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

Note: Refer to Navigation Menus, *Settings Menu*.

1 Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.

2 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

3 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

4 Momentarily activate steer in the right direction until SETTINGS is shown on the display.

5 Momentarily activate the drive enable toggle switch in the right direction until VALVE AND SENSOR SETTINGS is shown on the display.

6 Momentarily activate the drive enable toggle switch in the right direction until TILT SENSOR CALIBRATE is shown on the display.

7 Momentarily activate the drive enable toggle switch in the right direction to enter the TILT SENSOR CALIBRATE screen.

8 Momentarily activate the drive enable toggle switch to save the X and Y axis values.

⊙ Result: An audible alarm will sound for one second indicating a successful calibration.

Note: Calibration is possible only if the measured X/Y tilt value is lower than 1 degree.

To exit programming mode:

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

Axle Components

11-1 Oscillating Axle Cylinders

The oscillating axle cylinders extend and retract between the drive chassis and the oscillating axle. The cylinders are equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure. The valves are not adjustable.

How to Remove an Oscillating Axle Cylinder

Note: Perform this procedure on a firm, level surface with the machine 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 Rotate the turntable until the boom is between the steer tires.

2 Tag, disconnect and plug the oscillating axle cylinder hydraulic hoses. Cap the fittings on the oscillate 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 rod-end pivot pin. Use a soft metal drift to remove the pin.

4 Attach a lifting strap from an overhead lifting device to the barrel end of the oscillating cylinder.

5 Remove the pin retaining fasteners from the barrel-end pivot pin. Use a soft metal drift to remove the pin.

6 Remove the oscillate cylinder from the machine.

⚠ CAUTION Crushing hazard. The oscillate cylinder may become unbalanced and fall when removed from the machine if not properly attached to the lifting device.

11-2 How to Remove the Steer Cylinder

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 button 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 Tag, disconnect and plug the hydraulic hoses from the steer 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.

8 Remove the rue ring and clevis pin from each end of the cylinder.

9 Remove the cylinder from the machine.

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

How to Calibrate the Steer Angle Sensor

Note: Perform this procedure on a firm, level surface with the machine in the stowed position. Refer to Navigation Menus, *Settings Menu*.

1 Turn the key switch to platform controls.

2 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.

3 Adjust the steer wheels so they are pointing straight ahead, in line with the non-steer wheels. Release the foot switch.

4 Move and hold the drive enable toggle switch in the right direction while holding steer in the right direction.

5 When the display leaves **SYSTEM READY** mode, release the drive enable toggle switch and the steer joystick.

⊙ Result: The display will show FAULTS.

6 Momentarily activate steer in the right direction until SETTINGS is shown on the display.

7 Momentarily activate the steer 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 STEER SENSOR CAL screen.

9 Momentarily activate the drive enable toggle switch in the right direction.

⊙ Result: The display will show steer sensor value in mV and ENABLE will appear at the bottom of the screen.

Axle Components

10 Momentarily activate the drive enable toggle switch in the right direction to save calibrate steer center.

⊙ Result: The alarm will sound and the mV value flashes to indicate the setting has been saved.

To exit programming mode:

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

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

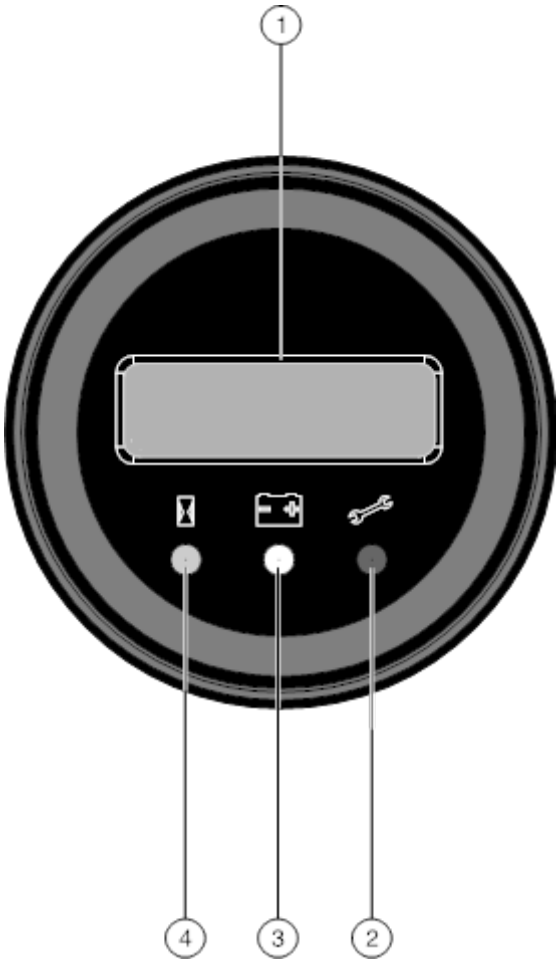
Fault Codes Ground Controls

Standard Genie fault codes shall be displayed and the red LED will illuminate when any faults are present. If more than one fault code is present, the codes shall be displayed in succession with each code displayed for 4 seconds. Once all active fault codes have been displayed the screen will pause for 4 seconds and then repeat the list of active fault codes. Use the *Control Systems Fault Codes* chart to aid in troubleshooting the machine by pinpointing the area or component affected.

Ground Display Smart Hour Meter

The smart hour meter will display unit hours and battery state of charge (SOC) whenever no faults are present on the system. The value will cycle between unit hours and battery SOC every 5 seconds. When the engine is running (if equipped), the display will cycle hours, SOC, and RPM.

Both Engine Hours and DC Function Enable Hours will be tracked. DC Function enable hours will be displayed on the smart hour meter by default. Engine Hours will be displayed if the hybrid mode select switch is held for three (3) seconds. Engine Hours will continue to display as long as the hybrid mode select switch is held.



1 LCD screen (8 character display)
2 Red LED below the wrench icon illuminates when system faults are displayed
3 Yellow LED below the battery icon illuminates when battery state of charge is displayed.
4 Green LED below the hourglass icon illuminates when unit hours are displayed.

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 one short beep every 30 seconds. Refer to Navigation Menus, *Faults Menu*.

To access active faults list:

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 steer in the right direction.

5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and steer.

⊙ Result: The display will show 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 steer in the right direction to scroll through the fault codes. Fault codes will be listed in order 1 through 16.

To access component faults list:

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 steer in the right direction.

5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and steer.

⊙ Result: The display will show FAULTS.

6 Momentarily activate the drive enable toggle switch in the right direction until COMPONENT 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 steer in the right direction to scroll through the fault codes. Fault codes will be listed in order 1 through 16.

Control System Fault Codes

To access fault history list:

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 steer in the right direction.

5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and steer.

⊙ Result: The display will show FAULTS.

6 Momentarily activate the drive enable toggle switch in the right direction until ACTIVE FAULTS is shown on the display.

7 Activate the steer rocker switch in the right direction until FAULT HISTORY is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction to access the fault history list codes.

9 Activate the steer rocker switch in the right direction to scroll through the fault codes. Fault codes will be listed in order 1 through 16.

10 Refer to the *Control System Fault Codes* chart to aid in troubleshooting the machine by pinpointing the area or component affected

To clear fault history:

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 steer in the right direction.

5 When the display leaves SYSTEM READY mode, release the drive enable toggle switch and steer.

⊙ Result: The display will show FAULTS.

6 Momentarily activate the drive enable toggle switch in the right direction until ACTIVE FAULTS is shown on the display.

7 Activate steer in the right direction until CLEAR FAULTS HISTORY is shown on the display.

8 Momentarily activate the drive enable toggle switch in the right direction to enter CLEAR FAULTS HISTORY.

⊙ Result: CLEAR FAULT HISTORY? NO will appear on the display.

9 Momentarily activate drive enable right to enter menu.

⊙ Result: Enable will appear at the bottom of the display.

10 Activate steer in the right direction to change the display from NO to YES.

11 Activate the drive enable toggle switch in the right direction to accept the change.

⊙ Result: The alarm will sound for one second. All fault history listings and counters will be cleared.

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
15	**FOOT SWITCH**	21	Fault	Stuck ON (on @ power up)	Platform controlled functions disabled	Release foot switch and recycle power Verify: (when activated) • 24V supply on C11-1 (P22PWR WH) • 24V on C11-2, PCON C46-6 GY (C56FTS RD) when pressed, 0V when not pressed
		28	Timeout	ON for > Timeout Time (default is 2 min)		
16	**SPEED ADJUSTMENT TOGGLE SWITCH**	27	Active at startup	Stuck ON (on @ power up)	Toggle Switch functions operate at 50% speed	Verify: · 24V supply on toggle switch center (RD C134PWR) · 24V on pos 3, C48-11 VCON (C194DEC WH/BK) when pressing down on the switch · 24V on C48-10 (C194INC WH/RD) when pressing up on the switch (B- otherwise)
18	**PROPORTIONAL RELIEF VALVE**	21	Fault	Open or short circuit	Warning: Will cause poor operating efficiency	Verify no open/short circuit across C28-2 RRDCON, C1-6, C3-3 (V191PCE WH/RD)
19	**AUX PUMP TOGGLE SWITCH**	27	Active at startup	Stuck ON (on @ power up)	AUX functions disabled	Verify: (when activated) · 24V created by AUX toggle switch TS1 at platform or ground controls(they are wired in parallel) · 24V at C35-11 to RRDCON C28-33 (C27AUX RD) to 24V when switch is activated · 24V across AUX Relay CR3-86 & CR3-85 (DC units only)
21	**PRIMARY UP/DOWN JOYSTICK**	11	Shorted to Supply	5V	Primary Boom disabled	Verify: · 5V at JC7-2 (P162PJW OR) · B- at JC7-1 (JSGND BR) · 500 to 4500 mV at JC7-3 & PCON C46-11 (C195STC BL/WH) through joystick motion
		16	Value at 0 V	0V		
		17	Not Calibrated	Not between 2000 & 3000 mV at startup		
22	**PRIMARY UP VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C20-5 BK & B- (V01PBU RD)
		26	Value too low	Short or Ohms <5		

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
23	**PRIMARY DOWN VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C20-6 BK & B- (V02PBD RD/BK)
		26	Value too low	Short or Ohms < 5		
24	**PRIMARY BOOM ANGLE SENSOR**	11	Shorted to Supply	>4850 mV	Act as if in Out of Stowed position · elevated drive speed · no elevated drive due to tilt drive cutout on CE units Note: Driving at 2 MPH is allowed if primary and secondary angle sensors are calibrated and the mV value is close to the calibrated, stowed value	Verify: · 5V from C27-5 to C12-C (P109PWR GR/WH) · B- at Pin C12-A · Signal Output approximately 1000 - 4000 mV across range of motion at LRDCON C27-16 C123 PBS RD/BK) · Cycle Power with problem corrected to clear fault To Calibrate: · Stowed mV must be between 3450 & 4450 mV · Elevated mV must be between 950 & 1950 mV
		16	Value at 0 V	0V		
		17	Not Calibrated	Calibration Not Completed		
		19	Out of Range	Reported angle sensor value out outside normal range more than 3 degrees		
26	**PRIMARY EXTEND VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across TCON C20-3 BK & B- (V07PBE BK)
		26	Value too low	Short or Ohms < 5		
27	**PRIMARY RETRACT VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across TCON C20-4 BK & B- (V08PBR BK/WH)
		26	Value too low	Short or Ohms < 5		
31	**SECONDARY UP/DOWN JOYSTICK**	11	Shorted to Supply	5V	Secondary Boom disabled	Verify: · 5V at JC1-2 (P162JW OR) · B- at JC1-1 (JSGND BR) · 500 to 4500 mV at JC1-3 & VCON C48-6 (C161 SB WH/BK) through joystick motion
		16	Value at 0 V	0V		
		17	Not Calibrated	Not between 2000 & 3000 mV at startup		
32	**SECONDARY UP VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across TCON C20-7 BK & B- (V10SBU BL)
		26	Value too low	Short or Ohms < 5		

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
33	**SECONDARY DOWN VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across TCON C20-8 BK & B- (V11SBD BL/BK)
		26	Value too low	Short or Ohms < 5		
36	**JIB UP/PLATFORM ROTATE LEFT VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C47-4 BK or C9-17 or C6-3 & B- (V17PRL GR) · Can occur during platform rotate L uses the same valve with selector
		26	Value too low	Short or Ohms < 5		
37	**JIB DOWN/PLATFORM ROTATE RIGHT VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C47-5 BK or C9-18 or C6-4 & B- (V17PRR GR/BK) · Can occur during platform rotate R uses the same valve with selector
		26	Value too low	Short or Ohms < 5		
40	**JIB SELECT VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C47-3 BK or C10-1 & B- (C19JSV GR/WH)
		26	Value too low	Short or Ohms < 5		
41	**TURNTABLE JOYSTICK**	11	Shorted to Supply	5V	Turntable rotate functions disabled	Verify: · 5V at JC7-2 (P162PJW OR) · B- at JC7-1 (JSGND BR) · 500 to 4500 mV at JC7-4 & PCON C46-12 (C165TRS WH/RD) through joystick motion
		16	Value at 0 V	0V		
		17	Not Calibrated	Not between 2000 & 3000 mV at startup		
42	**TURNTABLE CW VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across TCON C20-9 TCON BK & B- (V04TRL WH)
		26	Value too low	Short or Ohms < 5		
43	**TURNTABLE CCW VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across TCON C20-10 BK & B- (V05TRR WH/BK)
		26	Value too low	Short or Ohms < 5		
44	**DRIVE ENABLE TOGGLE SWITCH**	27	Active at startup	Stuck ON (on @ power up)	Drive disabled	· Verify 5V VCON C48-4 (C66DRE BL) when switch is pressed right and 2.5V when pressed left
48	**SMALL PUMP ENABLE VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C47-7 BK or C9-14 or C6-2 & B- (V242HGP WH/BK)
		26	Value too low	Short or Ohms < 5		

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
49	**LARGE PUMP ENABLE VALVE**	25	Value too high	Open Circuit or Ohms > 60	Associated Function disabled	· Check Ohms · Verify no open/short circuit across PCON C47-6 BK or C9-13 or C6-1 & B- (V241HGP OR/RD)
		26	Value too low	Short or Ohms < 5		
51	**DRIVE JOYSTICK**	11	Shorted to Supply	5V	Drive disabled	Verify: · 5V at JC3-2 (P162JW OR) · B- at JC3-1 (JSGND BR) · 500 to 4500 mV at JC3-4 & PCON C47-2 (C160JPL WH/RD) through joystick motion
		16	Value at 0 V	0V		
		17	Not Calibrated	Not between 2000 & 3000 mV at startup		
56	**TELEMATICS DEVICE**	13	Not Detected	Genie Telematics Device not detected when option is enabled	Only basic telematics functionality	Verify: · CAN bus wiring · Telematics device is functioning
61	**STEER JOYSTICK**	11	Shorted to Supply	5V	Steer function disabled	Verify: · 5V at JC3-2 (P162JW OR) · B- at JC3-1 (JSGND BR) · 500 to 4500 mV at JC3-3 (JC3-5 for dual axis joystick) & PCON C46-11 (C159STC BL/WH) through joystick motion Note: 1500 to 3500 mV for rocker style joystick at JC3-5
		16	Value at 0 V	0V		
		17	Not Calibrated	Not between 2000 & 3000 mV at startup		
64	**HYDRAULIC PRESSURE SENSOR**	11	Shorted to Supply	12V	Warning: Calibration affected which can lead to poor operating efficiency	Verify: · 12V (P198SEN RD) on Pin A · Signal (C245PSR GR) at C34-17 ECON (Approx. 1000 mV at 0 psi, 1800 mV at 1000 psi & 3400 mV at 3000 psi) · B- (SENGND BK) at Pin C
		16	Value at 0 V	0V		
		17	Not Calibrated	Calibration not completed		

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
66	**SECONDARY BOOM ANGLE SENSOR**	11	Shorted to Supply	5V	Act as if in Out of Stowed position · elevated drive speed · no elevated drive due to tilt drive cutout on CE units Note: Driving at 2 MPH is allowed if primary and secondary angle sensors are calibrated and the mV value is close to the calibrated, stowed value	Verify: · 5V from TCON C19-8 thru C3-15 to sensor C15-C · B- from C19-9 thru C3-16 to C15-A · Signal Output approximately 1000 - 4000 mV across range of motion at TCON C19-10 GY thru C58-5 from C15-B (C124 SBS RD/WH) · Cycle Power with problem corrected to clear fault To Calibrate: Stowed mV must be between 3600 & 4600 mV Elevated mV must be between 1900 & 2900 mV
		16	Value at 0 V	0V		
		17	Not Calibrated	Calibration not completed		
		19	Out of Range	Reported angle sensor value out outside normal range more than 3 degrees		
68	**FUNCTION ENABLE TOGGLE SWITCH** (Ground controls)	27	Active at startup	Stuck ON (on @ power up)	Ground controlled functions disabled	Verify: no open/short circuit across C3-14 or C20-2 (C47FE WH/BK) to either 24V or B-
71	**ESTOP RELAY**	21	Fault	Relay Contact Stuck · Platform Estop detected when Key Switch is in Ground Position or · Platform Estop not detected when key switch is in platform position	Platform functions disabled	Verify: · Relay is in operable condition · LRDCON C27-22 detects Platform Estop when ON (passes thru C4-4 & C9-4) (P23PWR WH) · Key switch ground position detected at LRDCON C27-14 (C174PWR WH)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
72	**LIFT GUARD CONTACT ALARM SWITCH**	14	Cross check fault	NO/NC switch contacts not connected correctly or welded	Platform functions disabled	Verify: *When switch is not activated: · -0V on N.O. switch output and at C247LS OR/BK · -26V on N.C. switch output and at C247LS OR/BK *When switch is activated: · Reverse readings
		21	Generic fault	Switch tripped	Contact alarm switch is open	Connect the contact alarm to close switch
76	**PLATFORM LOAD**	12	Overload	Overload condition detected	All functions disabled	Remove excess weight from platform
		13	Not detected	No CAN signal from load cell		· Verify CAN connection at the load cell
		15	Negative load	Negative load detected while boom up activated		· Check load cell mounting · Repeat calibration · Replace load cell
		17	Not Calibrated	Load cell not calibrated		· Perform full calibration
		21	Internal Fault	Vishay VPG internal error status		· Replace load cell
		23	Too high (Overloaded)	Too much weight in the platform detected by LS18		Remove weight from platform
		31	Invalid calibration	Zero / Full load gain outside limits		· Check calibration weights · Check load cell mounting · Repeat calibration · Replace load cell
		36	Invalid calibration (Crosscheck error)	Crosscheck between controllers failed		· Check load cell mounting · Repeat calibration · Replace load cell

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
77	**VCON LCD DISPLAY** (Platform controls)	13	No Response	No CAN communication	All functions disabled from platform controls All functions allowed from ground controls	Verify: · 24V supply on C48-1 · B- at C48-2 · 60 Ohm resistance across CAN+/- C49-1 and C49-2
78	**PCON CONTROLLER** (Platform controls)	13	No Response	No CAN communication	All functions disabled	Verify: · 24V supply on C47-11, C47-12, and C46-2 · B- at C46-1 · 60 Ohm resistance across CAN +/- C46-3 and C46-4
		29	Software Version Mismatch	Wrong software version		
79	**ROUND LCD DISPLAY** (Ground controls)	13	No Response	No CAN communication	Warning	Verify: · 24V supply on C61-5 · B- at C61-8 · 60 Ohm resistance across CAN+/- C61-1 and C62-2

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
82	**LOAD SENSE RECOVERY**	21	Fault	Overload was tripped and AUX was used to lower the platform while overloaded	All functions disabled	Enter LCD menu at Platform, Navigate to RESET OVERLOAD RECOVERY (<Enter>,<+>, <+>, <+>) Enter reset pass code:<+>, <+>, <+>, <->
83	**TELEMATICS REMOTE SHUTDOWN**	21	Fault	Unit shut down via remote telematics command	All functions disabled or drive speed reduced or lift speed reduced	Contact machine owner to have functionality restored
84	**LEVEL SENSOR**	13	No Response	No CAN communication	· 2WD or 4WD limited to 2.5 MPH (ANSI)3 · 2WD or 4WD Elevated Drive disabled (CE) · Tilt Alarm ON (Sensor or calibration fault latches, loss of CAN does not)	Verify: · 24V supply on C21-1 · B- at C1-2 · 60 Ohm resistance across CAN +/- C21-3 and C21-4
		17	Not Calibrated	Calibration not completed		Calibrate Level Sensor
		21	Fault	Internal Fault		Replace Sensor
89	**FUEL LEVEL SENSOR**	11	Shorted to Supply	Signal > 4975 mV	Display fault code only	Verify: · 24V supply on pin A of sensor · B1 on pin C · 1700 - 4500 mV on pin B
		12	Value too high	Signal > 4900 mV		
		16	Value at 0 V	Signal < 150 mV		

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
95	**ENGINE RPM**	23	Value too high	Engine Speed higher than setting	Hybrid Mode disabled	Verify: · Proper operation engine hi RPM solenoid · Proper engine RPM setting: -Normal/Low 2150 RPM (208 Hz) -High 3000 RPM (290 Hz)
		24	Value too low	Engine Speed lower than setting		Verify: · Over temperature switch is not activating Relay CR64 by providing a ground path to the relay coil {unplug oil pressure switch for this test} (C108SEL WH/BK) · Oil Pressure Switch contacts open to B- after engine start (C108SEL WH/BK) · Relay CR64 is operable. Output of relay CR64-87 is connected to C27-4 LRDCON through C35-1 (R108SEL WH/BK)
96	**LOW OIL PRESSURE OR ENGINE OVERTEMP**	19	Value out of range	Either the over temperature or low oil pressure switch provided a ground to relay CR64 to shut down the engine. A time delay of 5 seconds gives the oil pressure time to build after the engine is started.		
97	**MOTOR BRAKING FAULT**	21	Fault	Drive motors do not slow during braking	Electric brakes set	Verify: · Proper operation and calibration of the UTS level sensor · Motor & motor controller phase leads and main power connections

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
100	**PLATFORM LEVEL UP VALVE**	21	Fault	Open or Shorted	Associated Function Disabled	Verify: · No open/short circuit across ECON C34-3 & B- (V14PLU OR)
101	**PLATFORM LEVEL DOWN VALVE**	21	Fault	Open or Shorted	Associated Function Disabled	Verify: · No open/short circuit across ECON C34-4 & B- (V14PLD OR/BK)
104	**STEER ANGLE SENSOR**	11	Shorted to Supply	12V	High Speed Drive disabled	Verify: · 12V supply Pin A & RRDCON C28-25 (P198SEN RD) in relation to C28-7 RRDCON (Sensor Ground) · 500-4500mV through steer motion at PIN B & C28-24 (C111LFS OR) and has no open/short circuit to either pin A or pin C · When wheels are straight, signal must be between 2200 & 3400 mV
		16	Value at 0 V	0V		
		17	Not Calibrated	Calibration not completed		

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
135	**WALL POWERED CHARGER FAULT CODES**	51	DC-DC failure: LLC excessive leakage fault	Internal charger fault		Remove AC and battery for minimum 30 seconds and retry charger
		52	PFC failure: PFC excessive leakage fault			
		53	PFC has taken too long to boost			
		54	The charger has been unable to calibrate the current offset			
		55	The output relay voltage too high when relay is closed			
135	**WALL POWERED CHARGER ERROR CODES**	0	No Response	No CAN communication	Display fault, but battery BDI% value will be less accurate	Verify: · 24V supply on (+) Terminal · B- on (-) Terminal · 60 Ohm resistance across CAN +/- C22-6 and C22-10 · Make sure charger is plugged in to the machine
		1	High battery voltage error	Battery voltage is too high to charge		· Check the battery voltage and cable connections · Check battery size and condition. (This error will automatically clear once the condition has been corrected)
		2	Low battery voltage error detected prior to starting a charge cycle	Battery Voltage is too low to charge		
		3	Charge timeout	Charge Timeout caused by battery pack not reaching required voltage within safe time limit. Possible causes: Charger output reduced due to high temperatures. Poor battery health. Very deeply discharged battery. Poorly connected battery. Extra loads.		· Operate at lower ambient temperature · Replace battery pack · Check DC connections (This error will automatically clear once the charger is reset by cycling DC)
		4	Battery defective	Battery could not be trickle charged up to the minimum voltage.		· Check for shorted or damaged cells · Replace battery pack · Check DC connections (This error will automatically clear once the charger is reset)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
135	**WALL POWERED CHARGER ERROR CODES**	7	Ah Limit Exceeded	Safety limit exceeded, possible causes: · Poor battery health. · Discharged battery. · Poorly connected battery. · High parasitic loads on battery while charging.		· Replace battery pack · Check DC connections · Disconnect parasitic loads (This error will automatically clear once the charger is reset by cycling DC)
		8	Battery temperature out of range error	Battery temperature sensor error		· Check temperature sensor and connections · Reset charger (This error will automatically clear once the condition has been corrected)
		11	Charger is disabled by external command			
		12	Reverse polarity error	Battery is connected the wrong way around		· Check the battery connections. (This error will automatically clear once the condition has been corrected.)
		13	Battery does not take current	Battery voltage is detected but the charger is unable to charge the battery. This can be due to an electrical device connected between the charger and the battery, which passes through voltage but not current. Or if an algorithm is installed that does not require battery voltage then the charger can try to charge, but if it cannot supply current then this fault would be seen (Lithium application with a BMS perhaps)		Ensure the charger is properly connected to approved equipment (This error will automatically clear once the charger is reset by cycling DC)
		16	Software upgrade failure			Ensure the USB Flash Drive is properly formatted and retry the update by reinserting the USB Flash Drive into the charger

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
135	**WALL POWERED CHARGER ERROR CODES**	17	USB error	There has been a problem mounting or unmounting the USB Flash Drive		· Remove and re-insert the USB Drive · If the condition persists then remove AC and battery for minimum 30 seconds and retry charger
		18	Slot CRC error	The software update failed		Ensure the USB Flash Drive is properly formatted and retry the update by reinserting the USB Flash Drive into the charger
		19	Hardware build does not support software version	The charger hardware does not support the new software version trying to be programmed. Existing SW is left running.		Contact Product Support
		20	No active algorithm selected	There is no active charge profile selected		Select a charge profile
		21	High battery voltage error detected while charging	Battery voltage is too high as detected by the algorithm		Check the battery voltage and cable connections. (This error will automatically clear once the condition has been corrected)
		22	Low battery voltage error detected while charging	Battery voltage is too low as detected by the algorithm		Check the battery voltage and cable connections. (This error will automatically clear once the condition has been corrected)
		23	High AC voltage error (>270VAC)	AC voltage is too high		Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz. (This error will automatically clear once the condition has been corrected)
		24	Failure to initialize	The charger has failed to turn on properly		Disconnect AC input and battery for 30 seconds before retrying

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
135	**WALL POWERED CHARGER ERROR CODES**	25	Low AC voltage oscillation error	AC source is unstable. Could be caused by undersized generator and/or severely undersized input cables		Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 HZ. (This error will automatically clear once the condition has been corrected)
		26	Script Failure	The software update failed		Ensure the USB Flash Drive is properly formatted and retry the update by reinserting the USB Flash Drive into the charger
		27	USB overcurrent fault	USB hardware overcurrent protection has been tripped		Remove and reinsert USB flash drive. (If condition persists, try using a different USB flash drive)
		28	Charge profile incompatibility	The selected charging profile is incompatible with the charger software		Update charger software or select a different charging profile
		29	CAN Bus error	CANbus network error		Check the physical CAN connector, electrical bus conditions and other CAN modules for correct functioning. For example check termination resistance is approximately 60ohms.
		30	COMM battery module error	CANbus battery module error		Check the CANbus battery module for correct functioning
		31	The Vref for the ADC measurements has triggered an alarm	Internal charger error		Remove AC and battery for minimum 30 seconds and retry charger
		32	CAN Bus heartbeat error	CANbus heartbeat error		Check the networked CANbus device(s) for correct functioning

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
135	**WALL POWERED CHARGER ERROR CODES**	36	Battery Temperature Sensor Error	Battery temperature sensor is required by charge profile (battery temperature compensated algorithm) by it is not installed		Check if sensor is connected correctly if alarm is shown or ensure the charge profile installed does not require temperature compensation
		37	CANOpen reprogramming failed	N/A		Re-try CANOpen download or re-program using the USB
		38	Stalled Cooling Fan Motor	Fan will not turn when commanded, rotor must be locked		Fan is obstructed, inspect the fan and clear the blockage
136	**PUMP/GENERATOR MOTOR CONTROLLER**	0	No Response	No CAN communication	Hydraulic Functions disabled	Verify: · 48V supply on C34-1 (R45GEN GR/WH)
		12---99	Curtis Fault Code	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller
137	**LEFT FRONT DRIVE CONTROLLER**	0	No Response	No CAN communication	Drive disabled	Verify: · 48V supply on C28-1, C28-11 (R181PWR), 0V on C28-12
		12---99	Curtis Fault Code	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller
138	**RIGHT FRONT DRIVE CONTROLLER**	0	No Response	No CAN communication	Drive disabled	Verify: · 48V supply on C27-1 (R181PWR OR), 0V on C27-11, C27-12
		12---99	Curtis Fault Code	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller
139	**LEFT REAR DRIVE CONTROLLER**	0	No Response	No CAN communication	Drive disabled	Verify: · 48V supply on C26-1, C26-12 (R181PWR OR), 0V on C26-11
		12---99	Curtis Fault Code	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller	Refer to Code 140 Right Rear Motor Controller

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	0	No Response	No CAN communication	Drive disabled	Verify: 48V on C25-1, C25-11, C25-12 (R181PWR OR)
		12	**Controller Overcurrent** 1. External short of phase U,V, or W motor connections. 2. Motor parameters are miss-tuned. 3. Controller defective. 4. Speed encoder noise problems.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Phase current exceeded the current measurement limit. Clear: Cycle Key switch.
		13	**Current Sensor Fault** 1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective.			Set: Controller current sensors have invalid offset reading. Clear: Cycle Key switch.
		14	**Precharge Failed** 1. See Monitor menu » Battery: Capacitor Voltage. 2. Open circuit in external precharge relay, external precharge resistor, or associated wiring. 3. External load on capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging.			Set: Precharge failed to charge the capacitor bank from the external precharge resistor. Clear: Cycle Interlock input or use VCL function. Enable_Precharge().
		15	**Controller Severe Undertemp** 1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment.			Set: Heatsink temperature below -40°C. Clear: Bring heatsink temperature above -40°C, and cycle interlock or key switch.
		16	**Controller Severe Overtemp** 1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle. 4. Improper mounting of controller.			Set: Heatsink temperature above +95°C. Clear: Bring heatsink temperature below +95°C, and cycle interlock or key switch.

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	17	**Severe B+ Undervoltage**	1. Battery parameters are mis-adjusted. 2. Non-controller system drain on battery. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. See Monitor menu » Battery: Capacitor Voltage. 6. Blown B+ fuse or main contactor did not close.	Reduced drive torque.	Set: Capacitor bank voltage dropped below the Severe Undervoltage limit with FET bridge enabled. Clear: Bring capacitor voltage above Severe Undervoltage limit.
		18	**Severe B+ Overvoltage**	1. See Monitor menu » Battery: Capacitor Voltage. 2. Battery parameters are mis-adjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Capacitor bank voltage exceeded the Severe Overvoltage limit with FET bridge enabled. Clear: Bring capacitor voltage below Severe Overvoltage limit, and then cycle key switch.
		22	**Controller Overtemp Cutback**	1. See Monitor menu » Controller: Temperature. 2. Controller is performance-limited at this temperature. 3. Controller is operating in an extreme environment. 4. Excessive load on vehicle. 5. Improper mounting of controller.	Reduced drive and brake torque.	Set: Heatsink temperature exceeded 85°C. Clear: Bring heatsink temperature below 85°C.
		23	**B+ Undervoltage Cutback**	1. Normal operation. Fault indicates the batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are mis-adjusted. 3. Non-controller system drain on battery. 4. Battery resistance too high. 5. Battery disconnected while driving. 6. See Monitor menu » Battery: Capacitor Voltage. 7. Blown B+ fuse or main contactor did not close.	Reduced drive torque.	Set: Capacitor bank voltage dropped below the Undervoltage limit with the FET bridge enabled. Clear: Bring capacitor voltage above the Undervoltage limit.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	25	**'+5V Supply Failure** 1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are mis-adjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 5. See Monitor menu » Battery: Capacitor Voltage.		None	Set: +5V supply (pin 26) outside the 5 V±10% range. Clear: Bring voltage within range.
		26	**Digital Out 6 Open/Short** 1. External load impedance on Digital Output 6 driver (pin 19) is too low.		Digital Output 6 driver will not turn on.	Set: Digital Output 6 (pin 19) current exceeded 1 Amp. Clear: Remedy the overcurrent cause and cycle power.
		27	**Digital Out 7 Open/Short** 1. External load impedance on Digital Output 7 driver (pin 20) is too low.		Digital Output 7 driver will not turn on.	Set: Digital Output 7 (pin 20) current exceeded 1 Amp. Clear: Remedy the overcurrent cause and cycle power.
		28	**Motor Temp Hot Cutback** 1. Motor temperature is at or above the programmed Temperature Hot setting, and the current is being cut back. 2. Motor Temperature Control Menu parameters are miss-tuned. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2. 4. If the application doesn't use a motor thermistor, Temp Compensation and Temp Cutback should be programmed Off.		Reduced drive torque.	Set: Motor temperature is at or above the Temperature Hot parameter setting. Clear: Bring the motor temperature within range.
		29	**Motor** Temp Sensor Fault 1. Motor thermistor is not connected properly. 2. If the application doesn't use a motor thermistor, Motor Temp Sensor Enable should be programmed Off. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2.		MaxSpeed reduced (LOS, Limited Operating Strategy), and motor temperature cutback disabled.	Set: Motor thermistor input (pin 8) is at the voltage rail (0 V or 10 V). Clear: Bring the motor thermistor input voltage within range.

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	31	**Main Open/Short** (RRDCON & ECON only) 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Main contactor driver (pin 6) is either open or shorted. This fault can be set only when Main Enable = On. Clear: Correct open or short, and cycle driver.
		32	**EMBrake Open/Short** (DCON Only) 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.		ShutdownEMBrake; ShutdownThrottle; FullBrake. Will drag tire with the bad brake.	Set: Electromagnetic brake driver (pin 5) is either open or shorted. This fault can be set only when EM Brake Type >0. Clear: Correct open or short, and cycle driver.
		33	**Coil3 Driver Open/Short** 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.		ShutdownDriver3.	Set: Driver 3 (pin 4) is either open or shorted. Clear: Correct open or short, and cycle driver.
		34	**Coil4 Driver Open/Short** 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.		ShutdownDriver4.	Set: Driver 4 (pin 3) is either open or shorted. Clear: Correct open or short, and cycle driver.
		35	**PD Open/Short** 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.		ShutdownPD.	Set: Proportional driver (pin 2) is either open or shorted. Clear: Correct open or short, and cycle driver.
		36	**Encoder Fault** 1. Motor encoder failure. 2. Bad crimps or faulty wiring. 3. See Monitor menu » Motor: Motor RPM.		ShutdownEMBrake; Motor disabled.	Set: Motor encoder phase failure detected. Clear: Either cycle KSI, or if parameter LOS Upon Encoder Fault= On and Interlock has been cycled, then the Encoder Fault is cleared and Encoder LOS fault (code 93) is set, allowing limited motor control.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	37	**Motor Open** 1. Motor phase is open. 2. Bad crimps or faulty wiring.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Motor phase U, V, or W detected open. Clear: Cycle key switch.
		38	**Main Contactor Welded** (RRDCON & ECON only) 1. Main contactor tips are welded closed. 2. Motor phase U or V is disconnected or open. 3. An alternate voltage path (such as an external precharge resistor) is providing a current to the capacitor bank (B+ connection terminal).		ShutdownEMBrake; Motor disabled.	Set: Motor encoder phase failure detected. Clear: Cycle key switch.
		39	**Main Contactor Did Not Close** (RRDCON & ECON only) 1. Main contactor did not close. 2. Main contactor tips are oxidized, burned, or not making good contact. 3. External load on capacitor bank (B+ connection terminal) that prevents capacitor bank from charging. 4. Blown B+ fuse.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge. Clear: Cycle key switch.
		46	**EEPROM Failure** 1. Failure to write to EEPROM memory. This can be caused by EEPROM memory writes initiated by VCL, by the CAN bus, by adjusting parameters with the programmer, or by loading new software into the controller.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4; ShutdownPD; FullBrake.	Set: Controller operating system tried to write to EEPROM memory and failed. Clear: Download the correct software (OS) and matching parameter default settings into the controller and cycle key switch.
		49	**Parameter Change Fault** 1. This is a safety fault caused by a change in certain parameter settings so that the vehicle will not operate until KSI is cycled. For example, if a user changes the Throttle Type this fault will appear and require cycling key switch before the vehicle can operate.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Adjustment of a parameter setting that requires cycling of key switch. Clear: Cycle key switch.

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	68	**VCL Runtime Error** 1. VCL code encountered a runtime VCL error. 2. See Monitor menu » Controller: VCL Error Module and VCL Error. This error can then be compared to the runtime VCL module ID and error code definitions found in the specific OS system information file.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4; ShutdownPD; FullBrake.	Set: Runtime VCL code error condition. Clear: Edit VCL application software to fix this error condition; flash the new compiled software and matching parameter defaults; cycle key switch.
		71	**OS General** 1. Internal controller fault.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4; ShutdownPD; FullBrake.	Set: Internal controller fault detected. Clear: Cycle key switch.
		72	**PDO Timeout** 1. Time between CAN PDO messages received exceeded the PDO Timeout Period.		ShutdownThrottle; CAN NMT State set to Pre-operational.	Set: Time between CAN PDO messages received exceeded the PDO Timeout Period. Clear: Cycle key switcg or receive CAN NMT message.
		73	**Stall Detected** 1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder. 5. See Monitor menu » Motor: Motor RPM.		ShutdownEMBrake; Motor disabled; Control Mode changed to LOS (Limited Operating Strategy).	Set: No motor encoder movement detected. Clear: Cycle key switch.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	77	**Supervisor Fault** 1. The Supervisor has detected a mismatch in redundant readings. 2. Internal damage to Supervisor microprocessor. 3. Switch inputs allowed to be within upper and lower thresholds for over 100 milliseconds.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4; ShutdownPD; FullBrake.	Set: Mismatched redundant readings; damaged Supervisor; illegal switch inputs. Clear: Check for noise or voltage drift in all switch inputs; check connections; cycle key switch.
		78	**Supervisor Incompatible** 1. The main OS is not compatible with the Supervisor OS.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4;ShutdownPD; FullBrake.	Set: Incompatible software. Clear: Load properly matched OS code or update the Supervisor code; cycle key switchI.
		82	**Bad Calibrations** 1. Internal controller fault.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Internal controller fault detection. Clear: Cycle key switch.
		83	**Driver Supply Fault** 1. Internal controller fault in the voltage supply for the driver circuits.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Internal controller fault detection. Clear: Cycle key switch.
		84	**Following Error Fault** 1. The Following Error Limit has been exceeded for the Following Error Time. 2. Incorrect or overly restrictive Following Error Limit and Following Error Time parameter settings. 3. Motor or drive train rotation obstruction or degradation.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: The Following Error Limit has been exceeded for the Following Error Time. Clear: Cycle key switch.

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	**Pump & Drive Controllers:** **136=Pump [ECON]** **137=Left Front [LF]** **138=Right Front [RF]** **139=Left Rear [LR]** **140=Right Rear [RR]**	88	**Encoder Pulse Count Fault** 1. Encoder Steps parameter does not match the actual motor encoder.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4; ShutdownPD; FullBrake.	Set: Motor lost IFO control and accelerated without throttle command. Clear: Ensure the Encoder Steps parameter matches the actual encoder; Cycle key switch.
		89	**Motor Type Fault** 1. The Motor_Type parameter value is out of range.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Cycle power.
		91	**VCL/OS Mismatch** 1. The VCL software in the controller does not match the OS software in the controller.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1,2,3 &4; ShutdownPD; FullBrake.	Set: VCL & OS software do not match; when key switch cycles, a check is made to verify that they match & a fault occurs when they don't Clear: Download the correct VCL and OS software into the controller.
		92	**EM Brake Failed to Set** 1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating.		ShutdownEMBrake; ShutdownThrottle. Position Hold is engaged when Interlock = On.	Set: After the EM Brake was commanded to set & time has elapsed to allow the brake to fully engage, vehicle movement sensed. Clear: Activate the Interlock.
		98	**Illegal Model Number** 1. Model_Number variable contains illegal value. 2. Software and hardware do not match. 3. Controller defective.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Illegal Model_Number variable; when key switch cycles, a check is made to confirm a legal Model_ Number, and a fault is issued if one is not found. Clear: Download appropriate software for controller model.

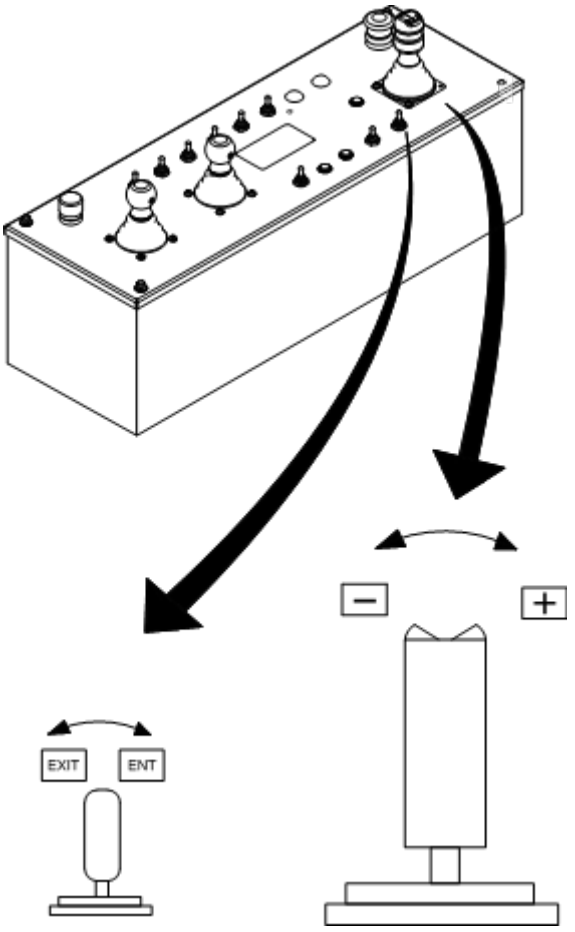
Control System Fault Codes

Control System Fault Codes

Error Source		Error Type				
ID	**Component**	**ID**	**Name**	**Cause**	**Effect**	**Solution**
140	Pump & Drive Controllers: 136=Pump [ECON] 137=Left Front [LF] 138=Right Front [RF] 139=Left Rear [LR] 140=Right Rear [RR]	99	Parameter Mismatch	1. Dual drive enabled on one controller. 2. Incorrect position feedback type chosen for motor technology in use. 3. Dual drive is enabled in torque mode.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Clear: Adjust parameters to appropriate values and cycle key switch.
160	Steer Left Valve	21	Fault		Open or short circuit	Associated Function disabled
161	Steer Right Valve	21	Fault		Open or short circuit	Associated Function disabled

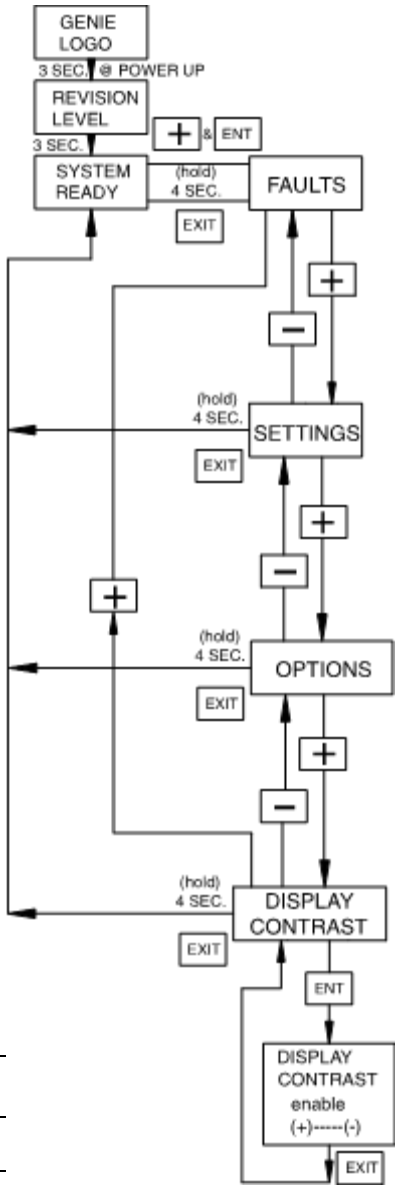
Navigation Menus

Navigation Menu - Top Menus



Drive enable switch

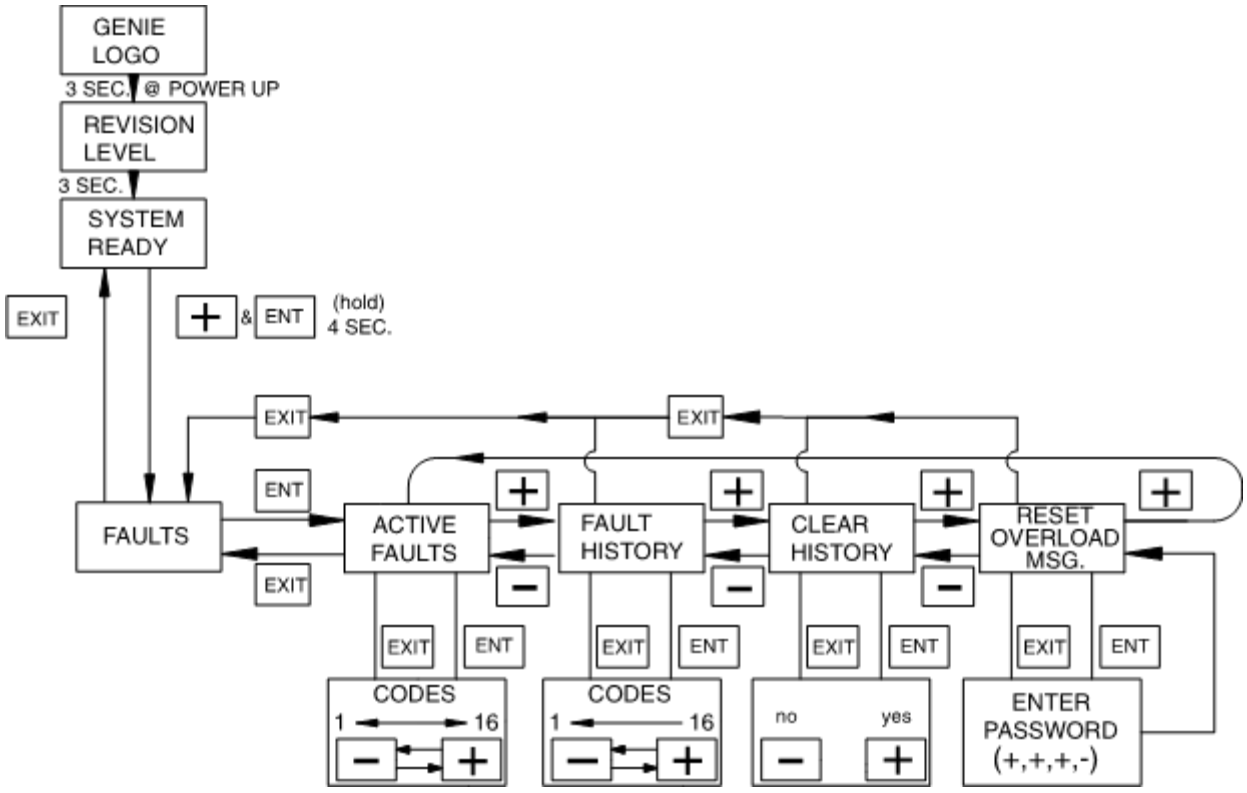
Drive Joystick



EXIT	Drive enable switch left
ENT	Drive enable switch right
−	Drive joystick left
+	Drive joystick right

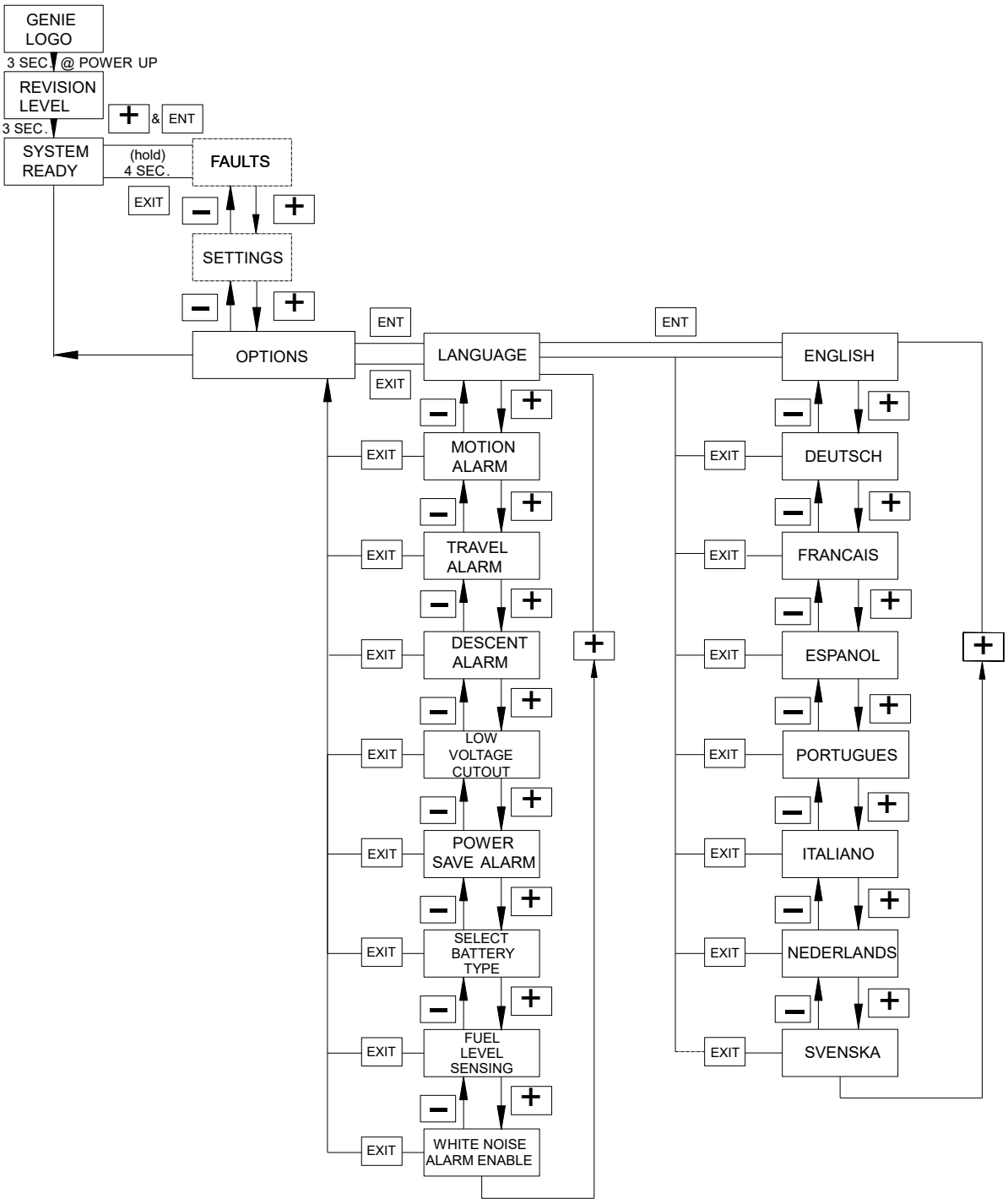
Faults Navigation Menu

Faults Navigation Menu



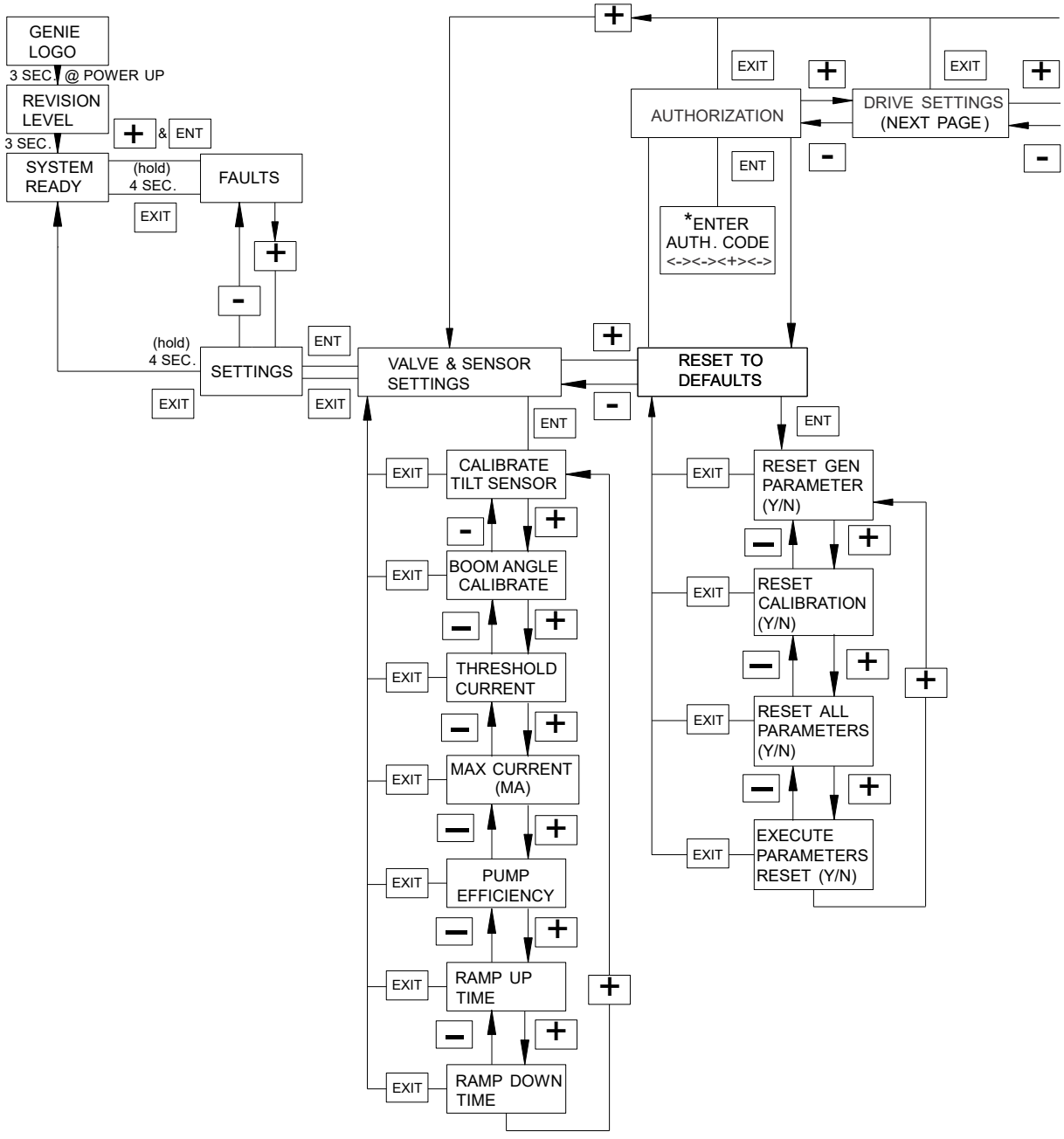
Options Navigation Menu

Options Navigation Menu



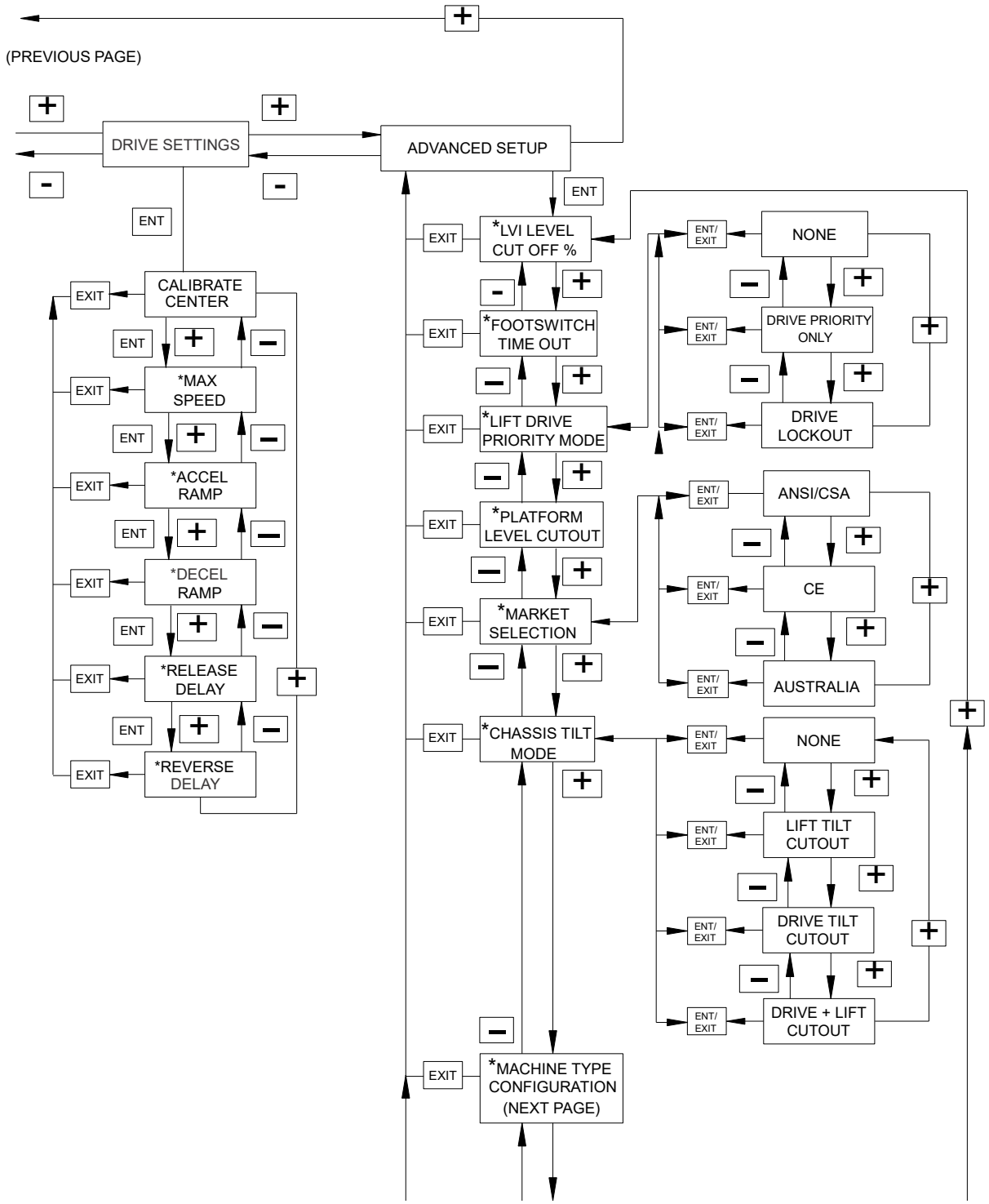
Settings Navigation Menu

Settings Navigation Menu



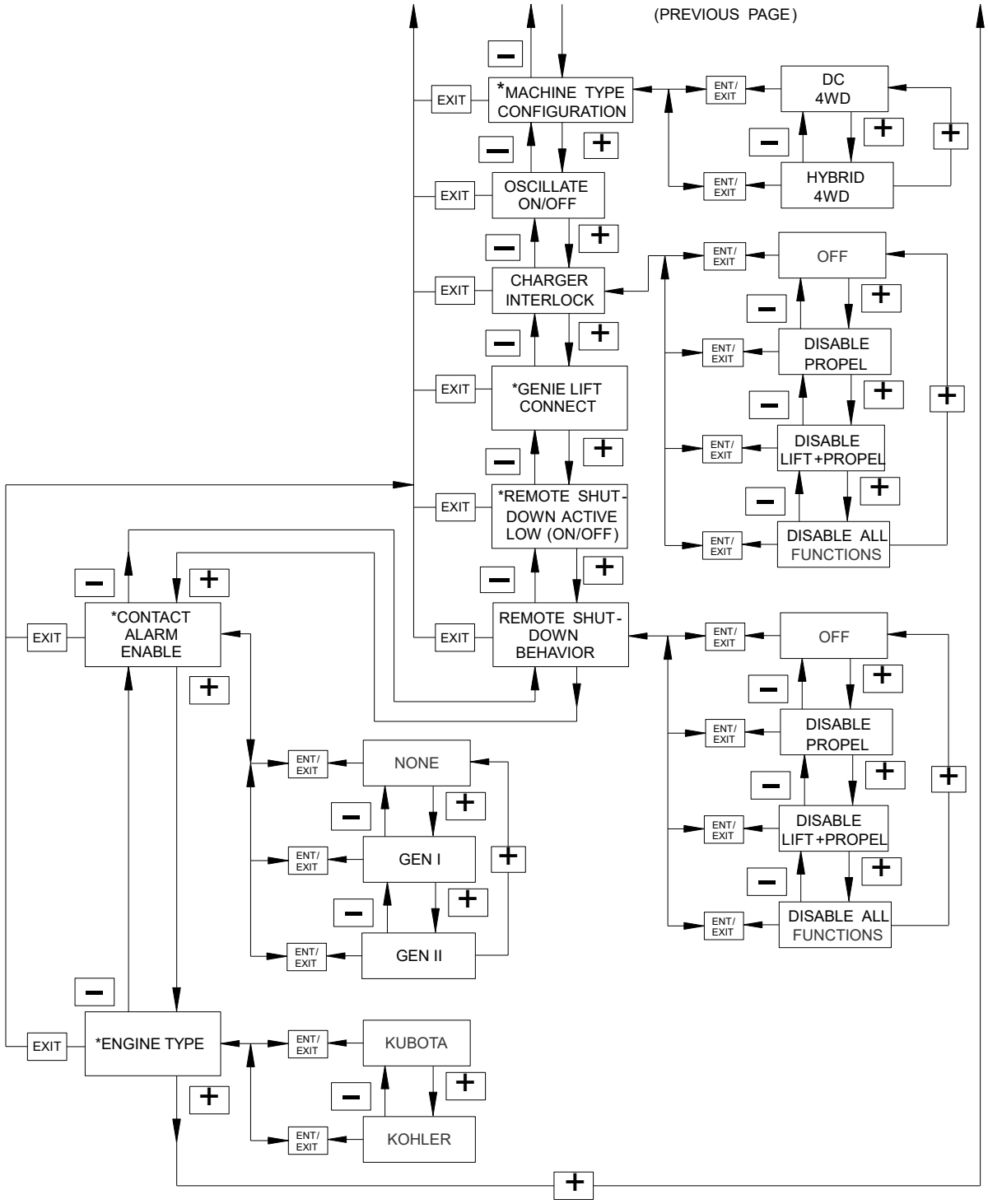
Advanced and Drive Navigation Menu

Advanced and Drive Navigation Menu



Advanced and Drive Navigation Menu

Advanced and Drive Navigation Menu (cont.)



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.

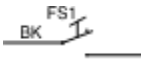
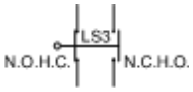
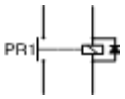
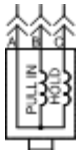
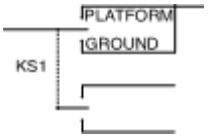
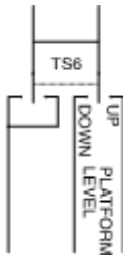
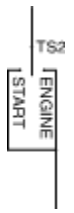
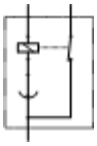
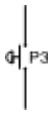
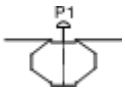
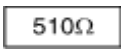
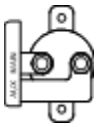
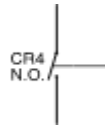
Electrical Schematics

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

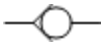
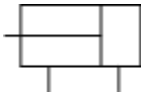
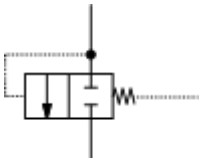
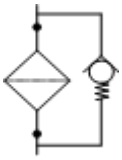
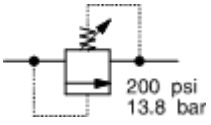
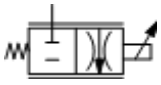
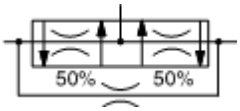
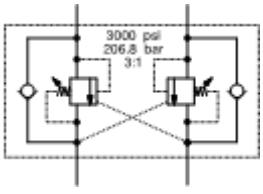
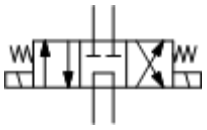
Hydraulic Schematics

⚠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.

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
 Cylinder, double acting	 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	 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	 Solenoid operated 3 position 4 way directional valve	 Solenoid operated 3 position, 4 way proportional directional valve	 Solenoid valve, 2 position 2 way

Electrical Component and Wire Color Legends

Item	Description
B	**Battery**
B1	Engine start, 12V DC
B7	Left / Right side battery packs, 48V DC
C	**Connector**
C1	GCON box to rear motor controller harness
C2	GCON box to ECON harness
C3	GCON box the turntable harness
C4	GCON box to 18/18 boom cable
C5	GCON box to 12/3 boom cable
C6	Harness jumper, 18/18 to TT harness
C7	Rear motor controller to function harness
C8	PCON box to 12/3 boom cable
C9	PCON box to 18/18 boom cable
C10	PCON box to LS1, load and prox switch
C11	PCON to foot switch
C12	Primary boom angle sensor
C13	LS1 Primary extend limit switch
C14	Battery charger (12V)
C15	Secondary boom angle sensor
C16	Fuse / contactor box
C17	PCON CAN1 connect
C18	DC/DC converter
C19 / C20	TCON (gry) / TCON (blk)
C21	Tilt sensor
C22	Battery charger (48V)
C23	CAN connect (PCON)
C24	Hydraulic pressure sensor
C25	DCON, Left front AC motor controller
C26	DCON, Right front AC motor controller
C27	DCON, Left rear AC motor controller
C28	DCON Right rear AC motor controller
C29	Telematics
C30	Jumper plug LR/RR motor controller to ECON
C31	Jib select hydraulic manifold
C32	Steer sensor extender
C33	Function pump motor / Generator
C34	ECON, AC motor / Generator controller
C35	DC or Engine (option)
C36	Battery status LED
C37	Drive enable limit switch
C38	Left front AC motor to front MC harness
C39	Right front AC motor to front MC harness
C40	Left rear AC motor to rear MC harness
C41	Right rear AC motor to rear MC harness
C42	Drive lights (option)
C43	Steer sensor
C44	Flashing beacon
C45	Engine speed pickup
C46/47	PCON (gray) / PCON (black)
C48/49	VCON (20 pin) / VCON (14 pin)
C50	Work light (option)
C51	Fuel shut off
C52	Left side battery box temp sensor
C53/C54	relay block 1 / relay block 2
C55	Angle sensor common harness
C56	Primary angle sensor extender
C57	DCON CAN connect (ECON end)
C58	Jumper plug ECON to function harness
C59	Electric clutch
C61	Hour meter
C63	Operational protection alarm (option)
C68	Inverter (option)
C69	Charger interlock 2
C70	12V charger
C73	Glow plug signal (Kohler models)

Electrical Component and Wire Color Legends

Item	Description
CB	**Circuit breaker**
CB1	Fuel pump, 15A
CB2	Controls power, 24V DC, 15A
CB4	Charger box 12V, 10A
CB7	Engine RPM, 10A
CB9	Telematics, 5A (option)
CR	**Control relay**
CR1	Engine start
CR2	Fuel pump
CR3	Auxiliary power relay
CR4	High idle
CR5	Horn
CR6	Ignition power (Kohler models)
CR15	Timer glow plug (Kohler models)
CR15a/b	Glow plugs relays
CR27	Brake circuit (lift/drive option)
CR30	Limit switch (lift/drive option)
CR47	Generator KS1 relay
CR62	E-stop relay
CR64	Oil / Temp. shut down relay
CR80	Telematics
CR88	Charger relay
FB	Flashing beacon
F	Fuse
F1	Battery, 325A
F2 / F3	Glow plugs, 30A
F5	Spare, 15A
F8	Charger, 40A
F11	Engine power, 25A (Kohler models)
F18	Work lights, 5A
F21	RPM solenoid, 25A (Kohler models)
F22	Glow plug, 80A (Kohler models)
F33	Telematics, 6A
FS1	Foot switch

Item	Description
G	**Gauge**
G1	Battery charge indicator
G2	Engine oil pressure
G3	Engine coolant temp.
G4	Engine oil temp.
G6	Hour meter
H	**Horn or alarm**
H1	Tilt / Platform overload
H2	Horn
H5	Alarm (multifunction)
JC	**Joystick**
JC1	Boom proportional joystick: secondary boom up/down
JC3	Drive/steer proportional joystick
JC7	Boom proportional joystick: primary up/down, turntable rotate
KS1	**Key switch**
L	**LED or Light**
L1	Drive enable
L4	Platform overload (ground)
L5	Battery mode
L29	Work lights
L44	Hybrid mode
L45	Platform overload (platform)
L48	Tilt alarm
L53	Charger
LS	**Limit switch**
LS1	Primary boom extend
LS3	Drive enable
LS18	Platform overload
M	**Motor**
M1	Function pump motor/generator
M2	Auxiliary pump
M3	Engine starter

Electrical Component and Wire Color Legends

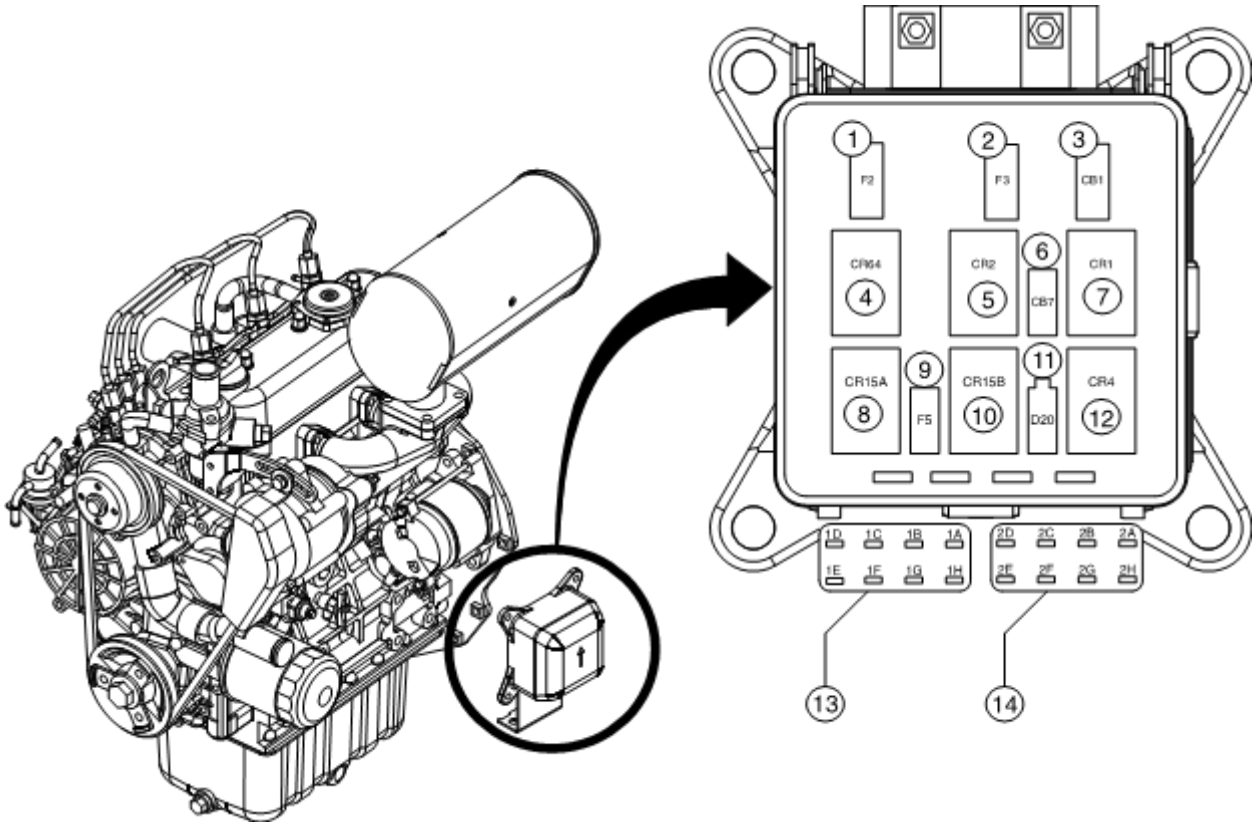
Item	Description
P	**Button**
P1	Red emergency stop (ground)
P2	Red emergency stop (platform)
P3	Horn
P4	Function enable
PR	**Power relay**
PR1	Main contactor
PR2	Pump / Generator contactor
R	**Resistor**
R1	+5V
R2	+2.5V
S	**Sensor**
S7	Tilt sensor
S13	Steer angle sensor
S17	Primary boom angle sensor
S19	Secondary boom angle sensor
SW	**Switch**
SW2	Engine temperature switch
SW3	Engine oil switch
SW30	Proximity switch
TS	**Toggle Switch**
TS1	Auxiliary pump
TS3	Hybrid mode
TS5	Function speed
TS7	Platform rotate
TS8	Jib boom up/down
TS9	Platform level up/down
TS13	Primary boom extend/retract
TS14	Two-speed drive motor shift
TS15	Drive enable
TS18	Work light (option)
TS46	Proximity kill (option)
TS47	Inverter (optional)
TS51	Auxiliary pump
TS52	Model select
TS57	Platform rotate
TS58	Jib boom up/down
TS59	Platform level up/down
TS60	Secondary boom up/down
TS61	Primary boom up/down
TS62	Turntable rotate
TS63	Primary boom extend/retract
U	**Module**
U3A	DCON, RR, AC motor controller
U3B	DCON, LR AC motor controller
U3C	DCON, RF AC motor controller (4WD option)
U3D	DCON LF AC motor controller (4WD) option)
U4	Battery charger, 48V

Electrical Component and Wire Color Legends

Wire Color Legend	
Item	Description
BL	Blue
BK	Black
BR	Brown
GR	Green
OR	Orange
PP	Purple
RD	Red
WH	White
YL	Yellow
BL/BK	Blue / Black
BL/RD	Blue / Red
BL/WH	Blue / White
BK/RD	Black / Red
BK/WH	Black / White
GR/BK	Green / Black
GR/WH	Green / White
OR/BK	Orange / Black
OR/RD	Orange / Red
OR/WH	Orange / White
RD/BK	Red / Black
RD/WH	Red / White
WH/BK	White / Black
WH/RD	White / Red
WH/YL	White / Yellow
YL/BK	Yellow / Black

Kubota Engine Fuse and Relay Module

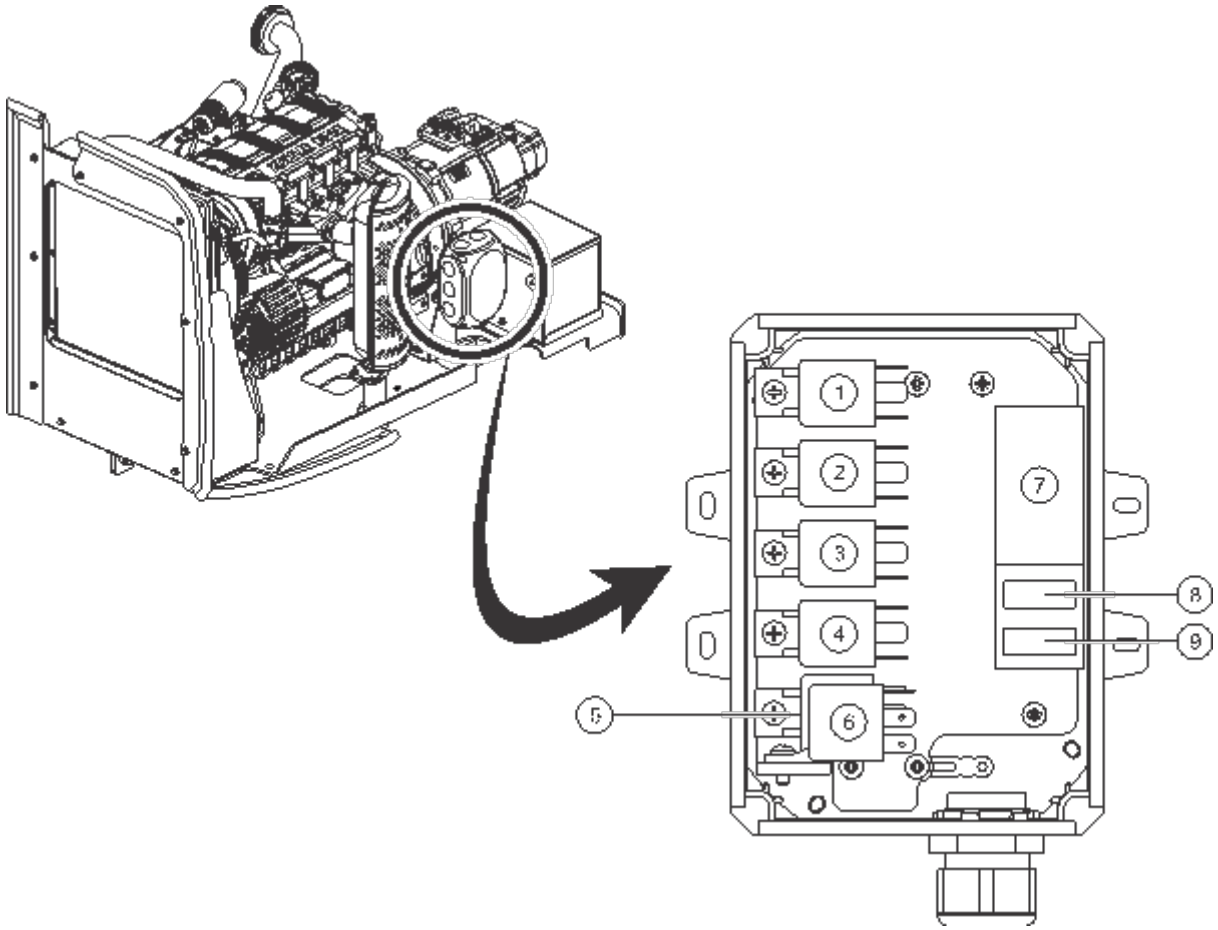
Kubota D1105-E4B



1 Fuse 1 - 15A (spare)
2 Fuse 3 - 30A glow plug
3 Circuit breaker 1 - 15A Engine start / Fuel pump
4 Control Relay 64 Engine fault
5 Control Relay 2 Fuel pump
6 Circuit breaker 7 - 10A Engine RPM
7 Control Relay 1 Engine start
8 Control Relay 15A glow plug 1
9 Fuse 5 - 15A (spare)
10 Control Relay 15B glow plug 2
11 Diode - 6A
12 Control Relay 4 Engine RPM
13 Connector 1 Blue
14 Connector 2 Orange

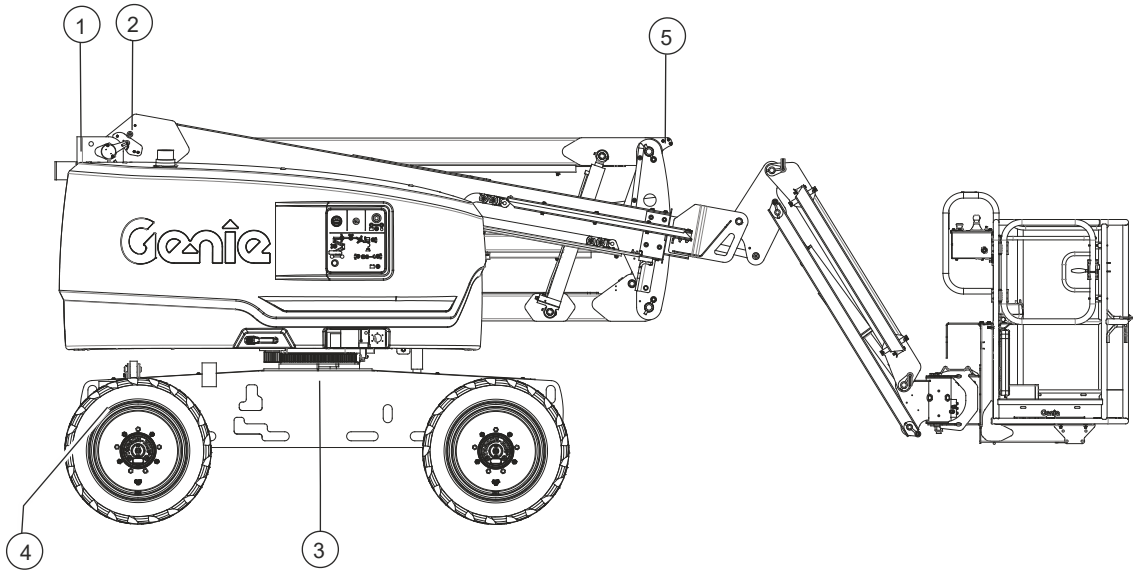
Kohler Engine Fuse and Relay Module

Kohler KDW 1404



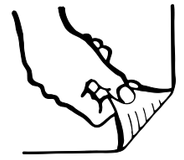
1 CR1 Engine start
2 CR4 High rpm
3 CR6 Fuel pump
4 CR15A Engine status
5 CR64 Fault alarm
6 CR15B Engine status
7 CR15 Glow plug
8 F11 25A DC supply
9 F21 25A RPM solenoid

Limit Switch/Angle Sensor Legend

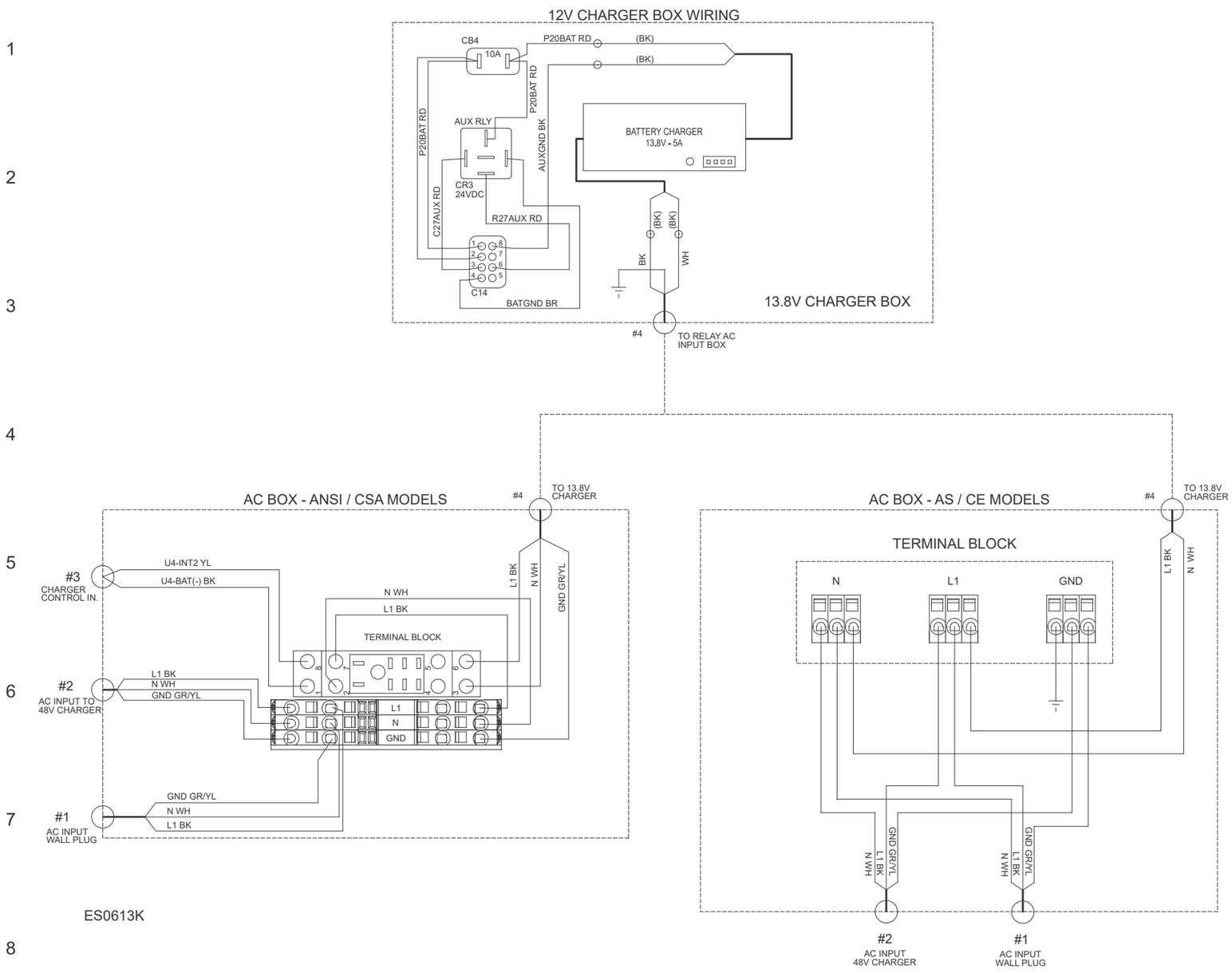


1 S17 Primary angle sensor
2 LS1 Boom extend limit switch
3 LS3 Drive enable
4 S13 Steer angle sensor (inside steer cylinder)
5 S19 Secondary angle sensor

AC / DC Junction Box Wiring Diagram

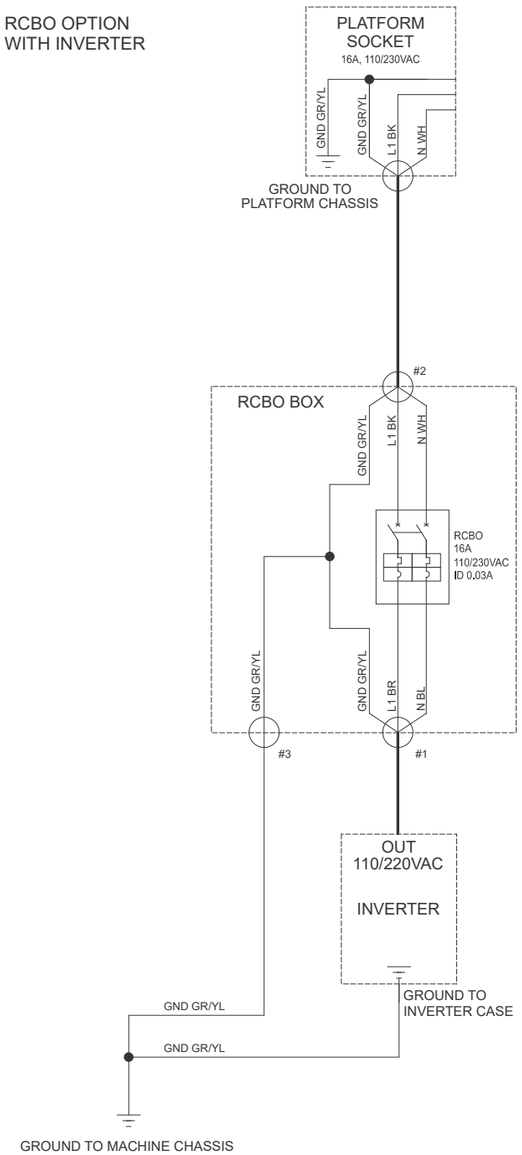


AC / DC Junction Box Wiring Diagram

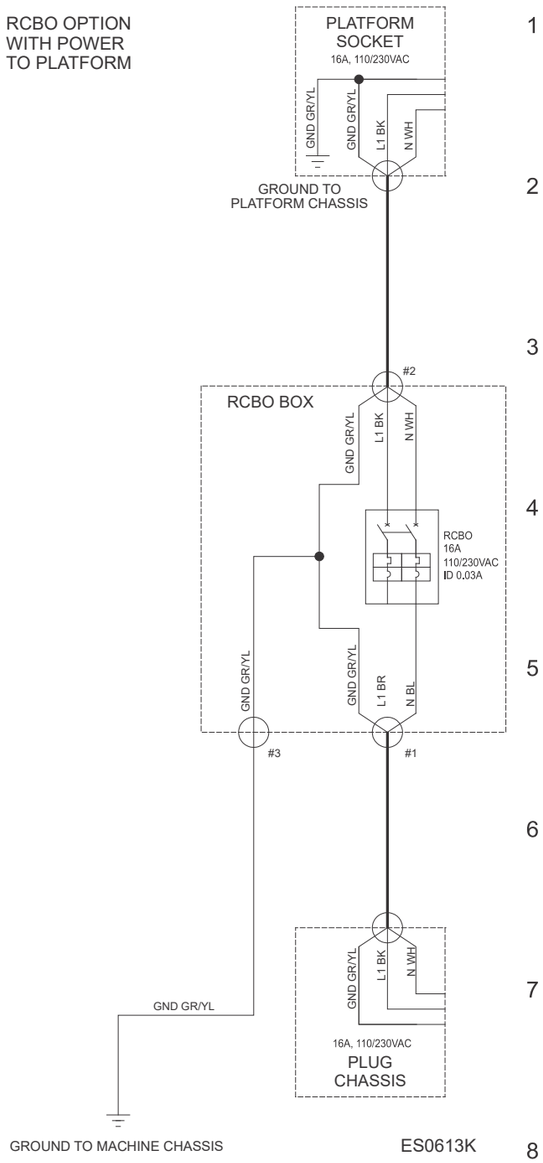


RCBO Option Wiring Diagram

RCBO OPTION
WITH INVERTER



RCBO OPTION
WITH POWER
TO PLATFORM

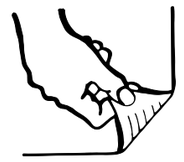


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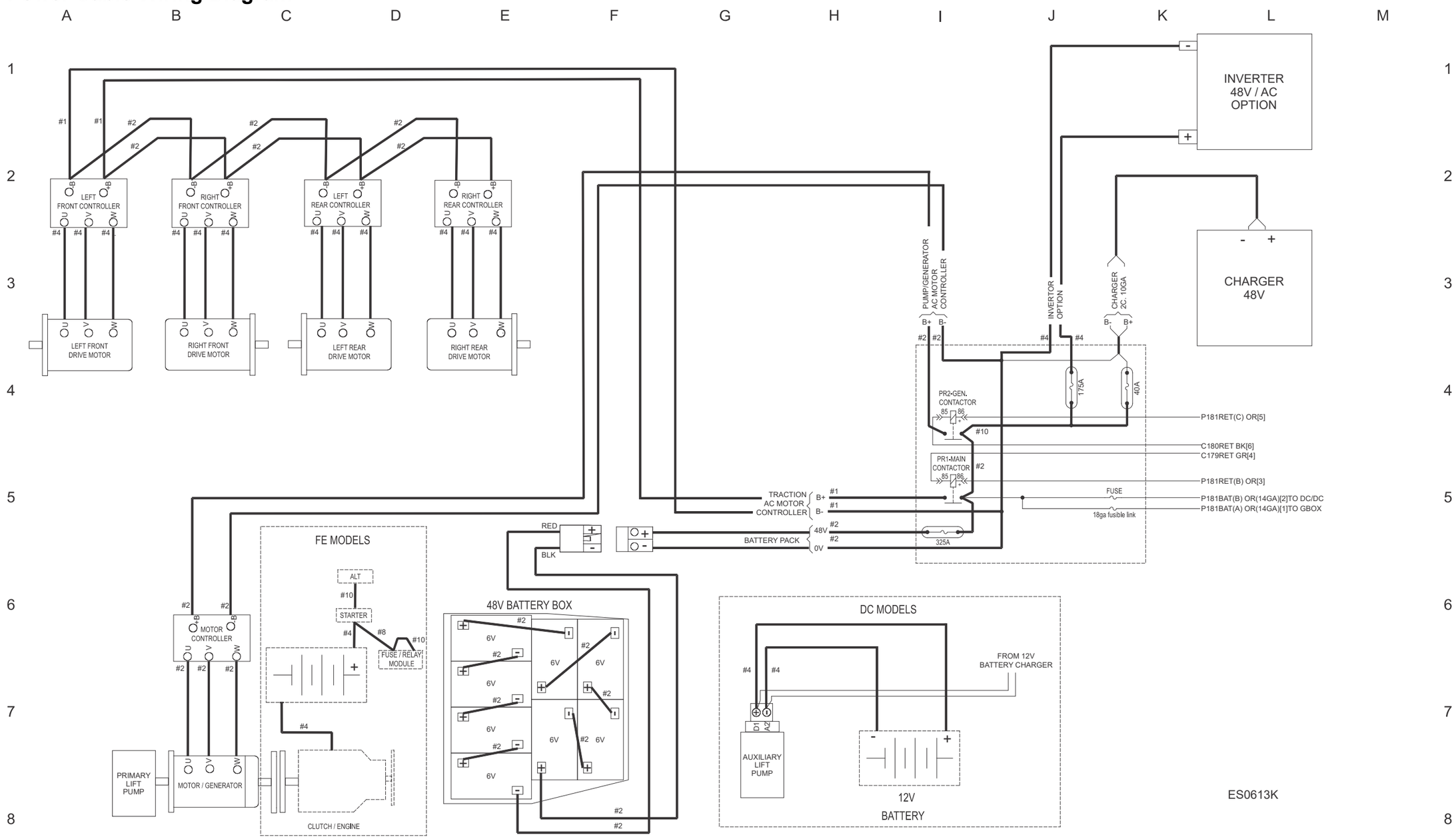
RCBO Option Wiring Diagram



Power Cable Wiring Diagram

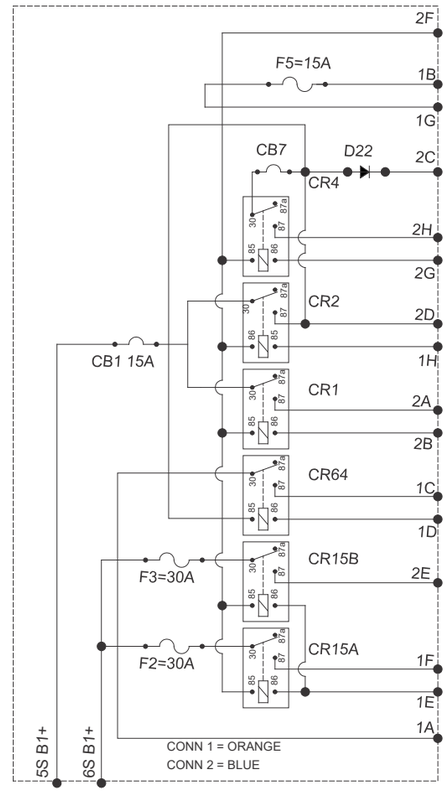


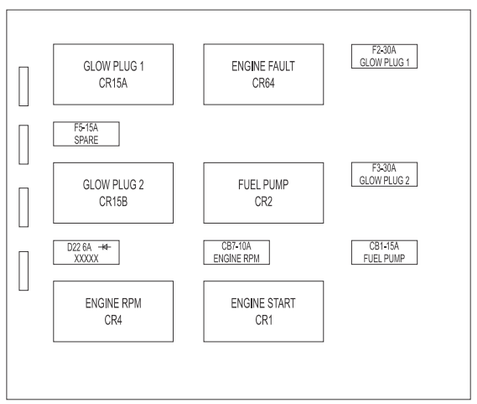
Power Cable Wiring Diagram

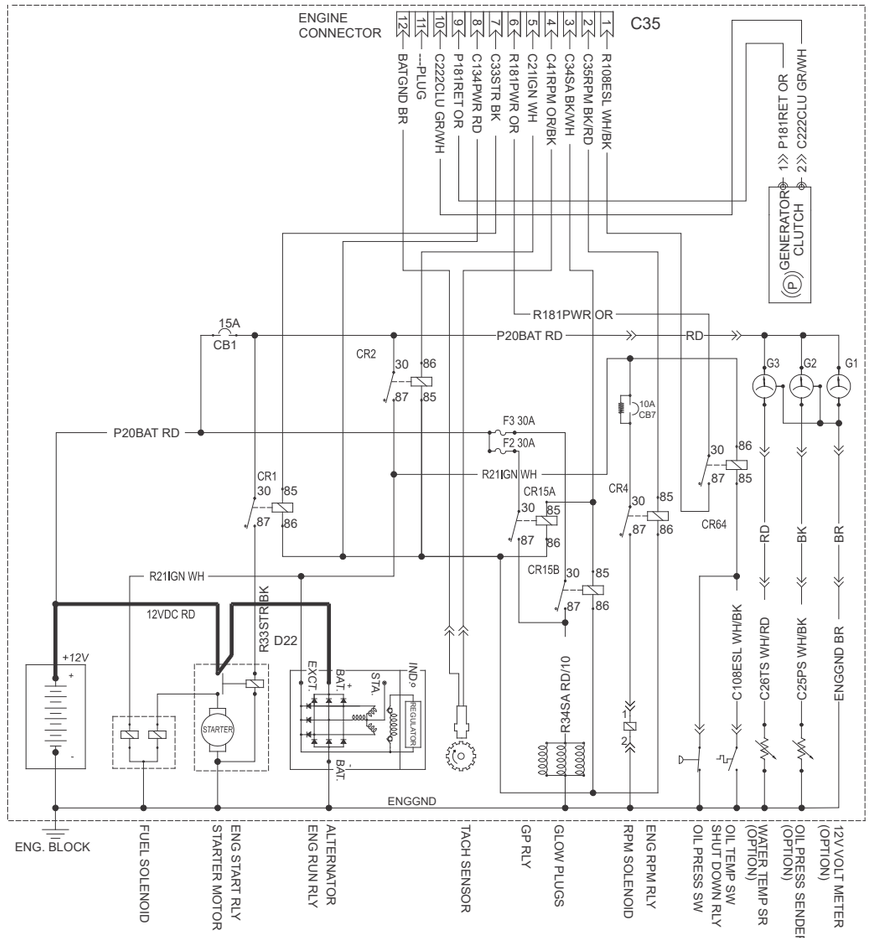


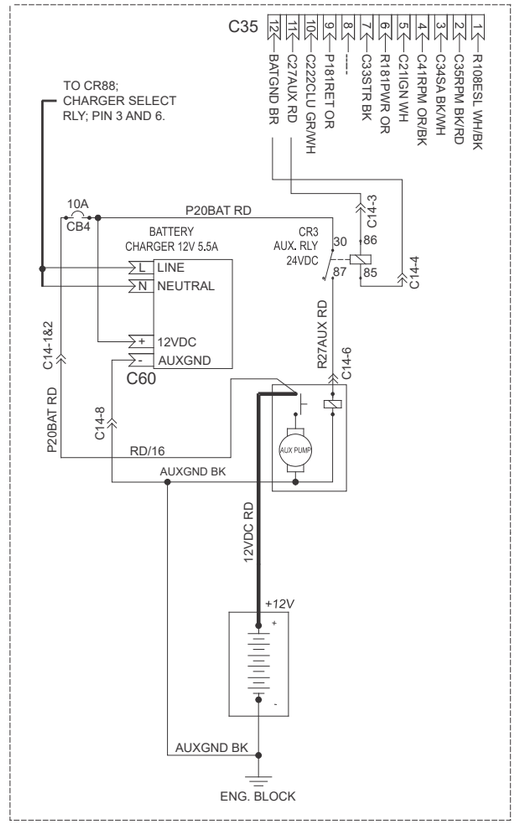
ES0613K

Electrical Schematic, Kubota Engine Models



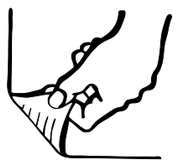




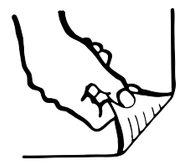


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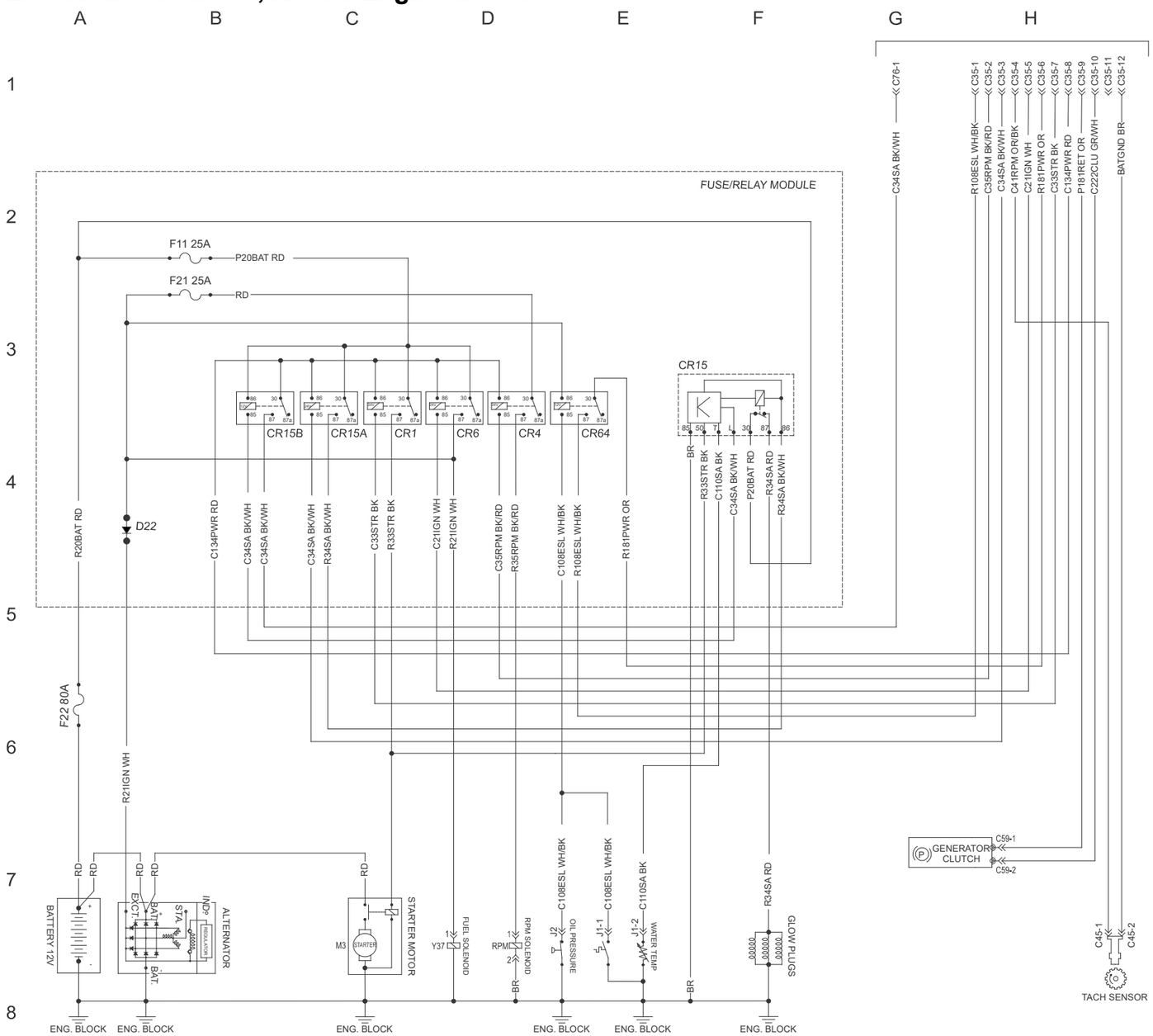
Electrical Schematic, Kubota Engine Models

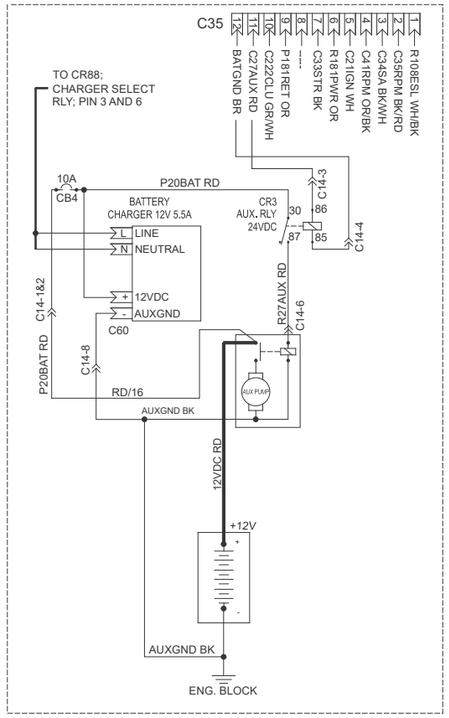


Electrical Schematic, Kohler Engine Models



Electrical Schematic, Kohler Engine Models

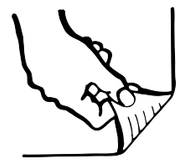




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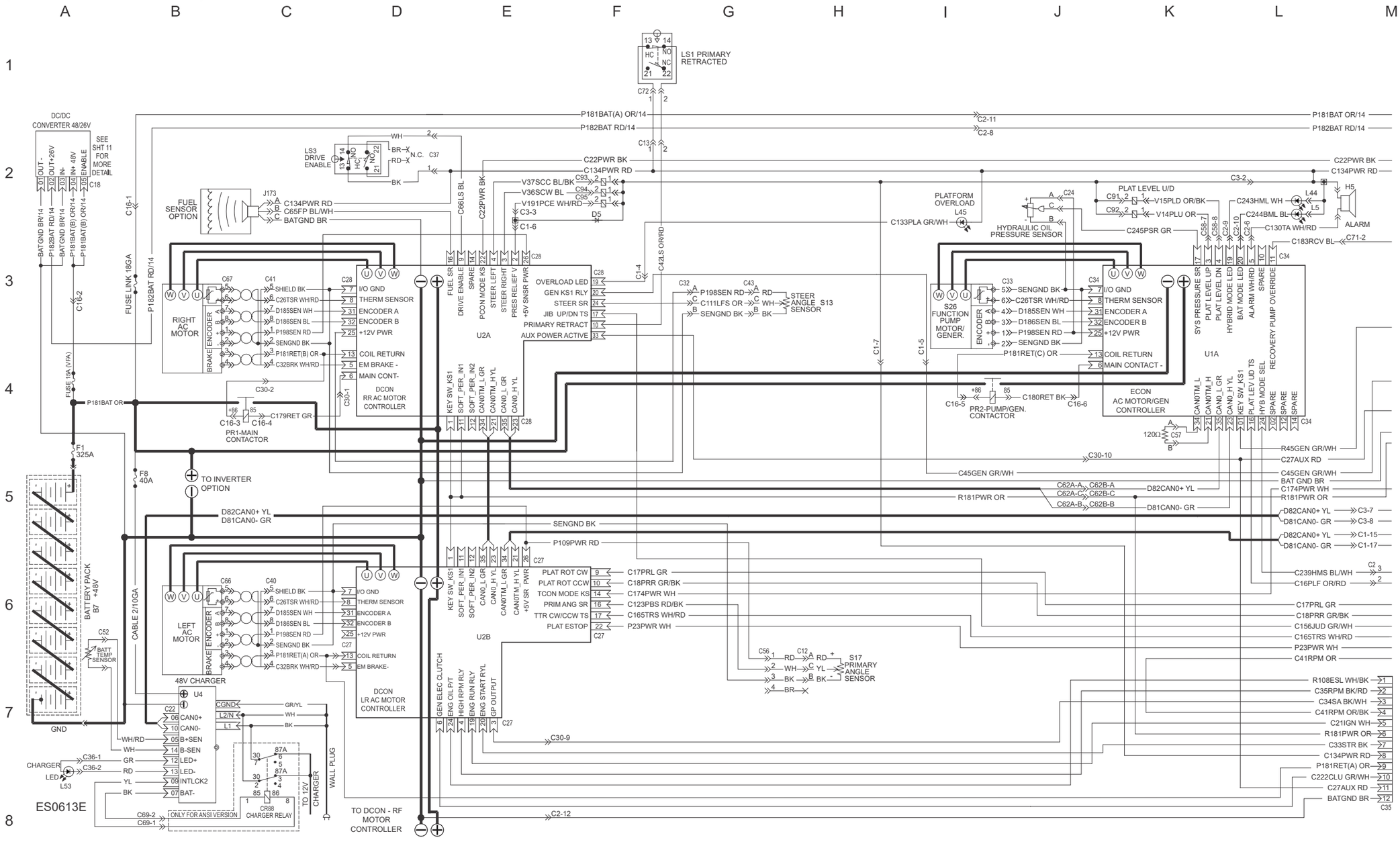
Electrical Schematic, DCON

(from Z45EM-101 to 1499)



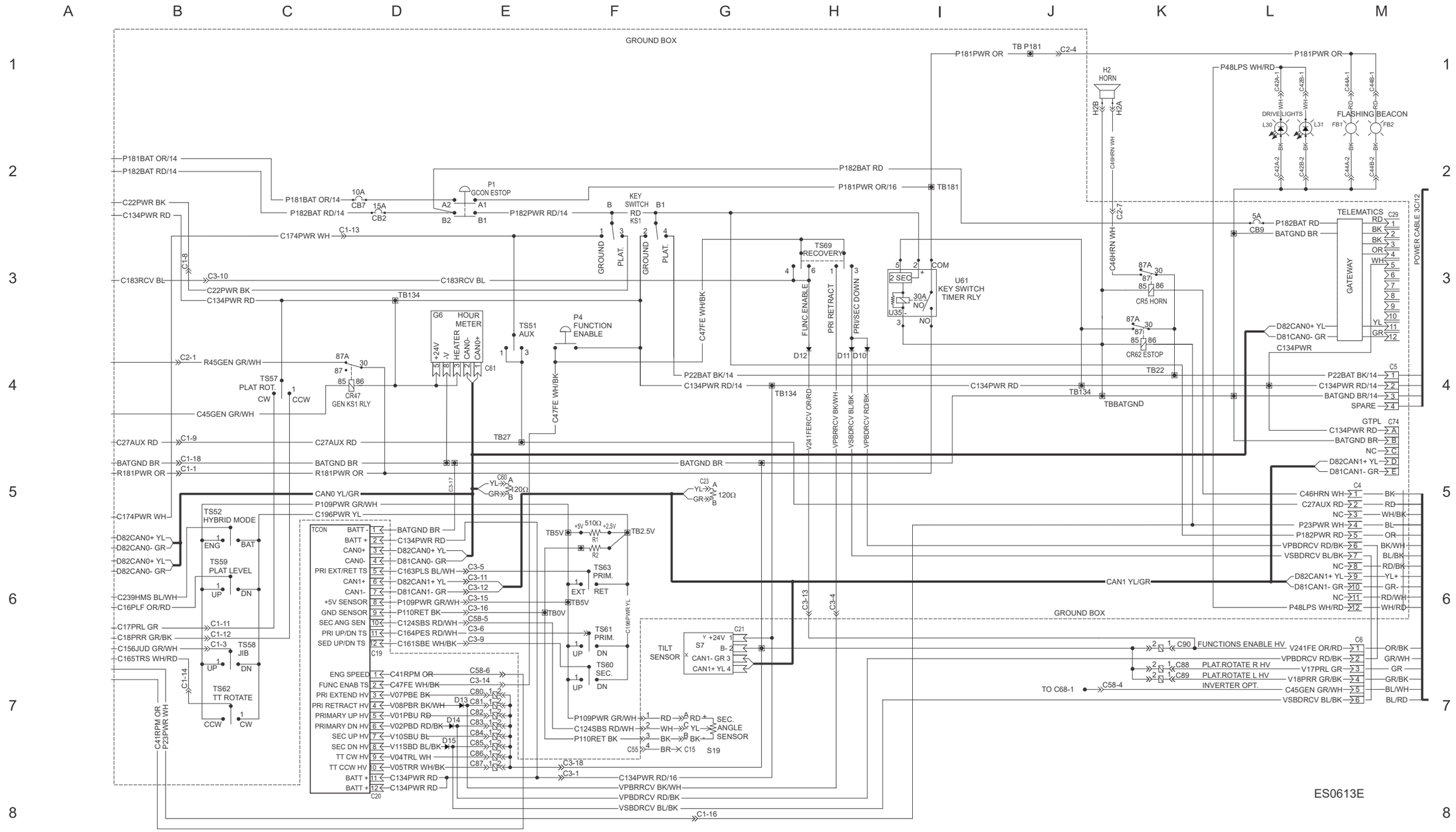
Electrical Schematic, DCON

(from Z45EM-101 to 1499)



Electrical Schematic, TCON

(from Z45EM-101 to 1499)



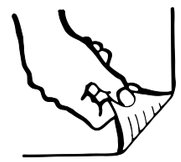
Electrical Schematic, TCON

(from Z45EM-101 to 1499)



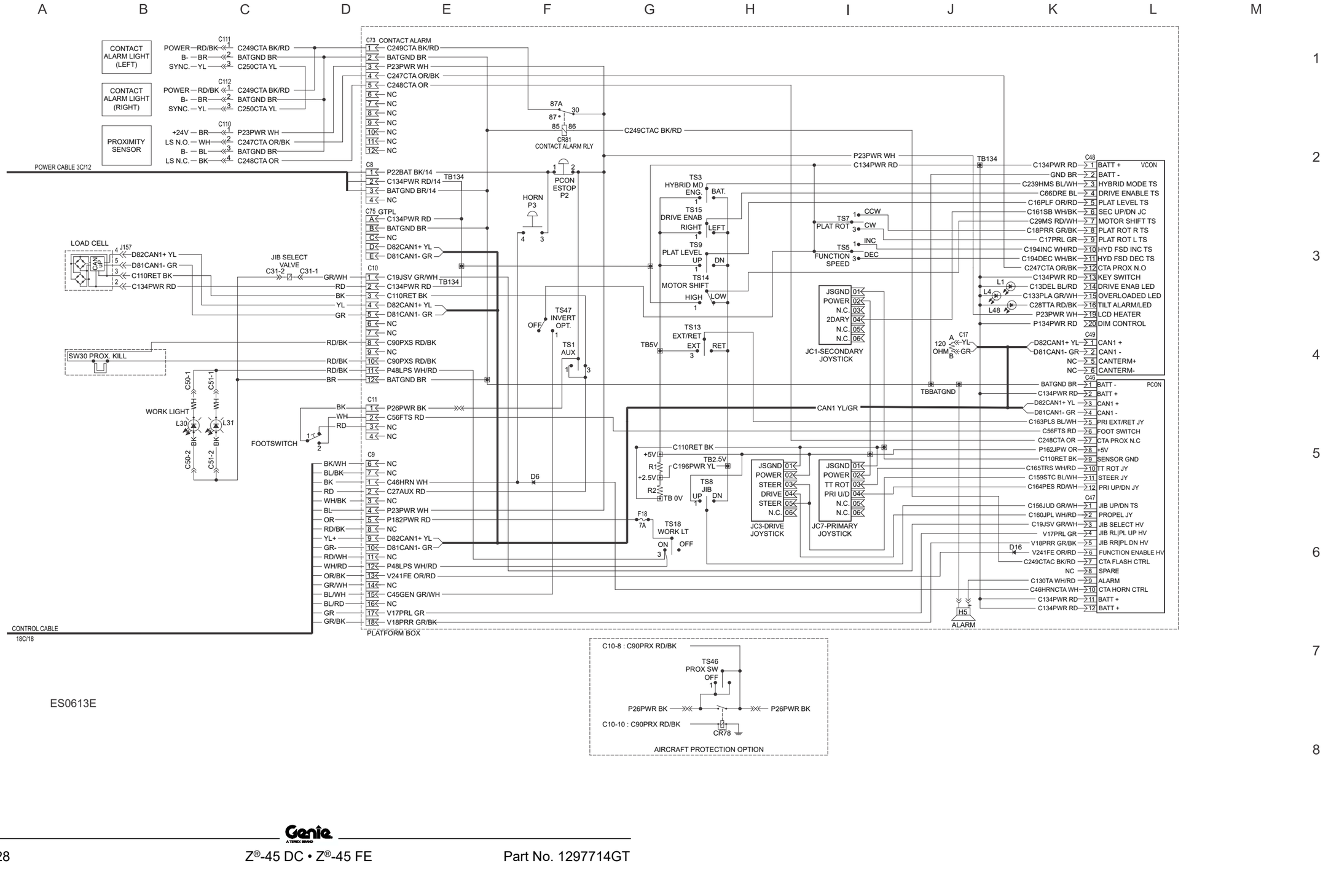
Electrical Schematic, PCON

(from Z45EM-101 to 1499)



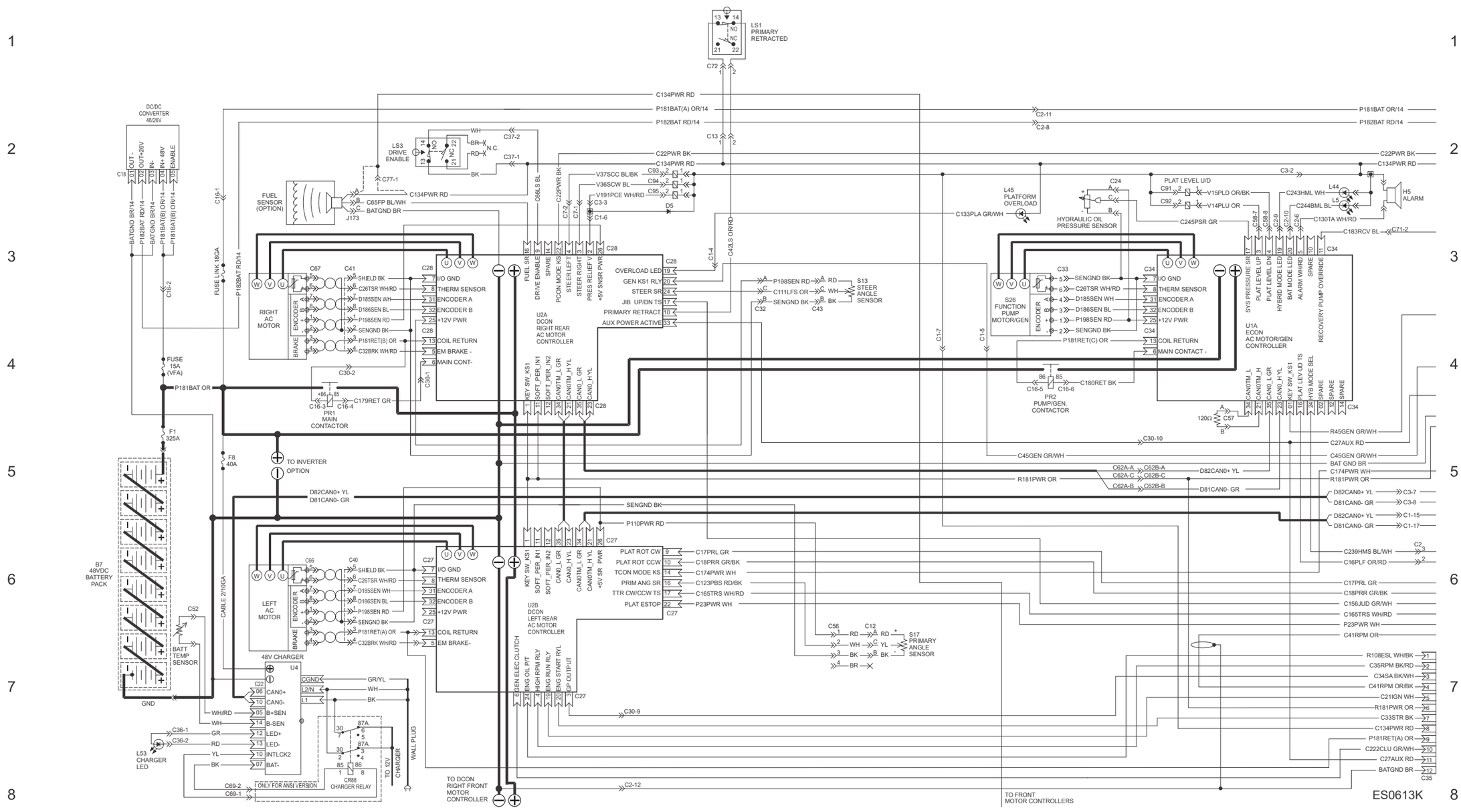
Electrical Schematic, PCON

(from Z45EM-101 to 1499)



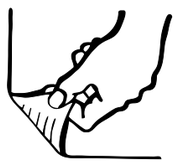
Electrical Schematic, DCON

(from Z45EM-1500)



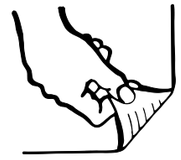
Electrical Schematic, DCON

(from Z45EM-1500)



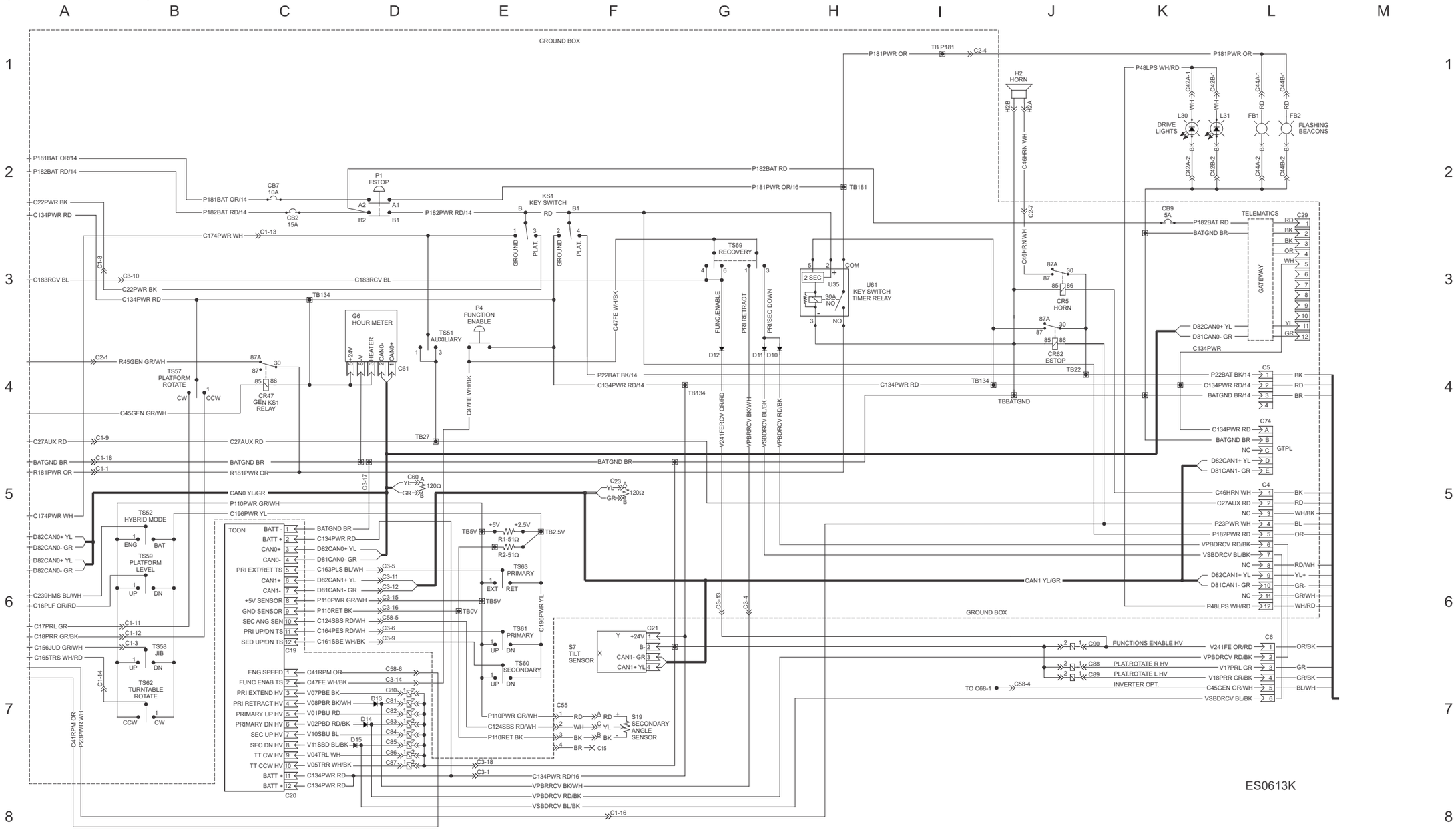
Electrical Schematic, TCON

(from Z45EM-1500)



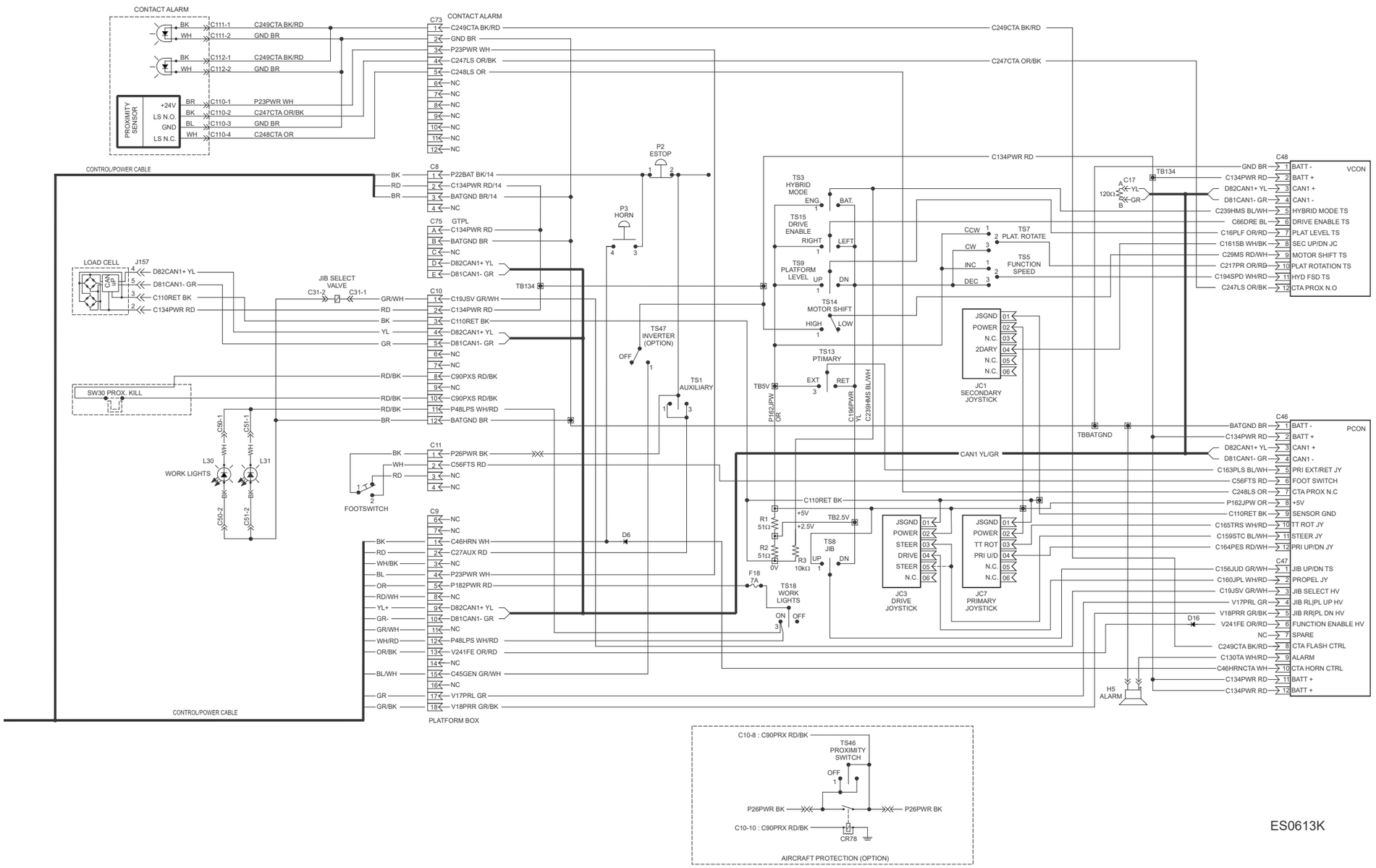
Electrical Schematic, TCON

(from Z45EM-1500)



Electrical Schematic, PCON

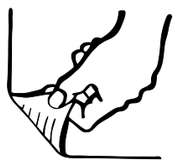
(from Z45EM-1500)



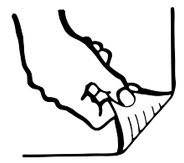
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Electrical Schematic, PCON

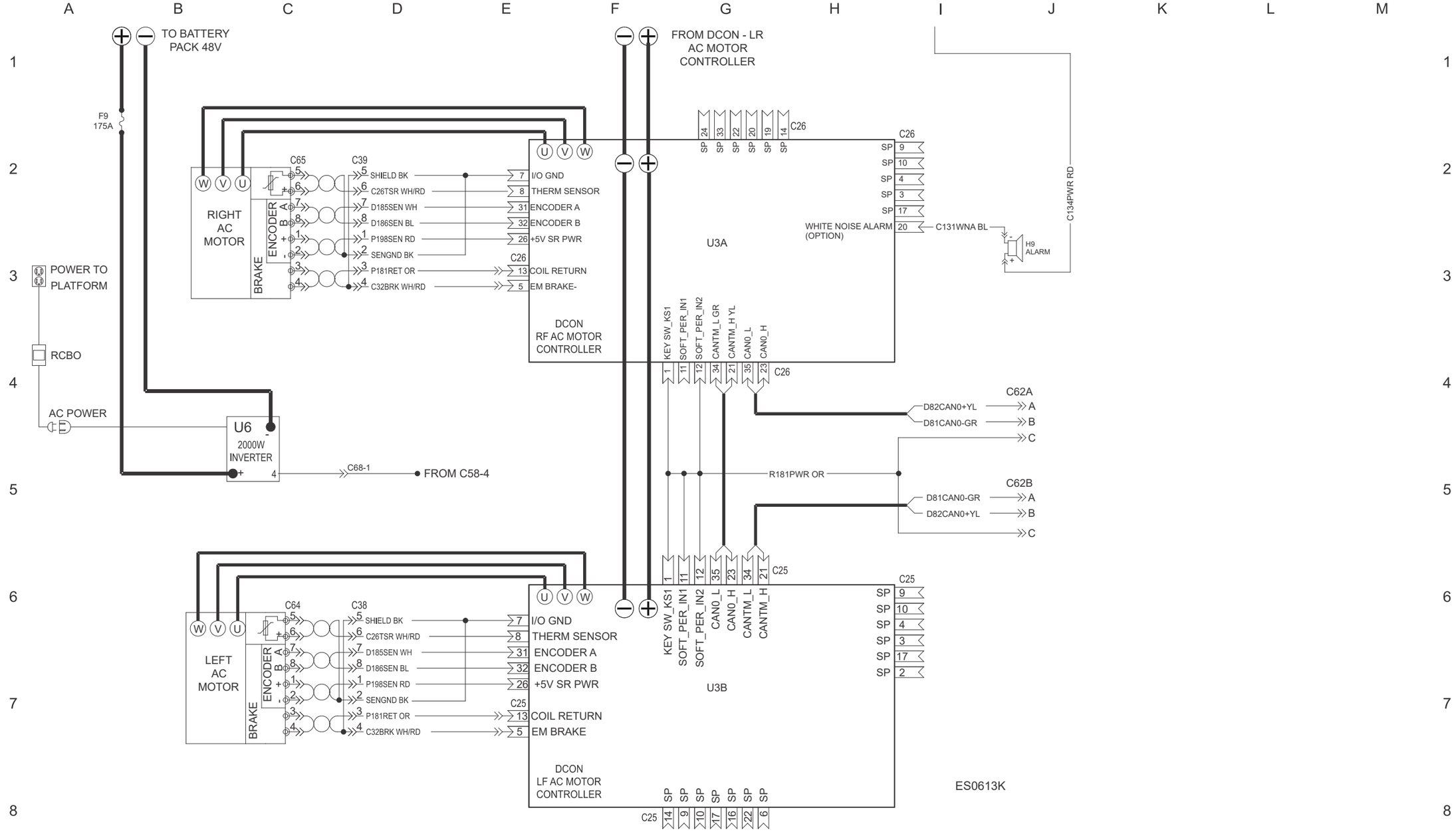
(from Z45EM-1500)



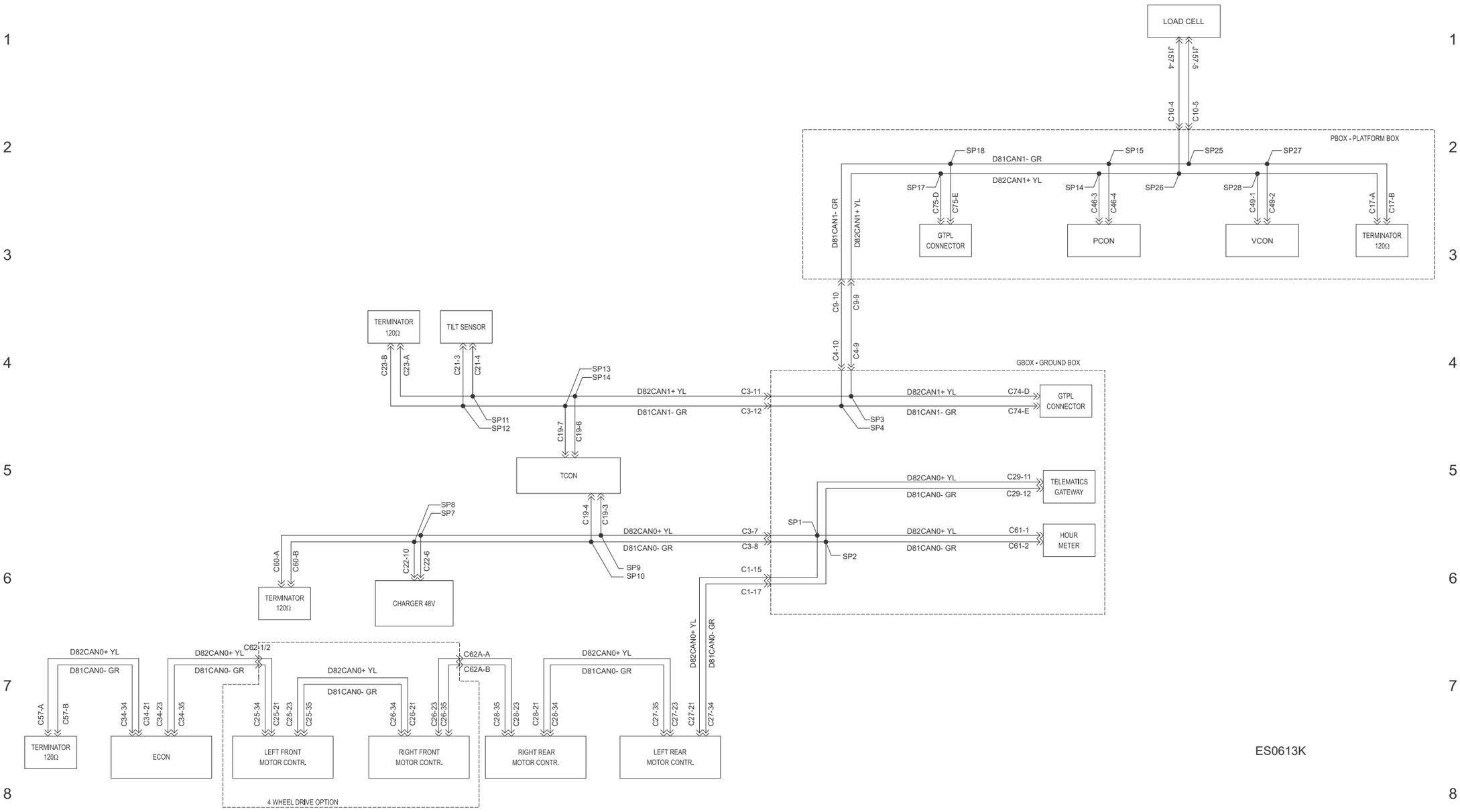
Electrical Schematic, Front Motor Controllers



Electrical Schematic, Front Motor Controllers



CAN Bus Wiring Diagram

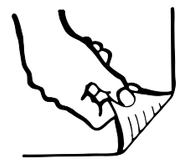


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CAN Bus Wiring Diagram



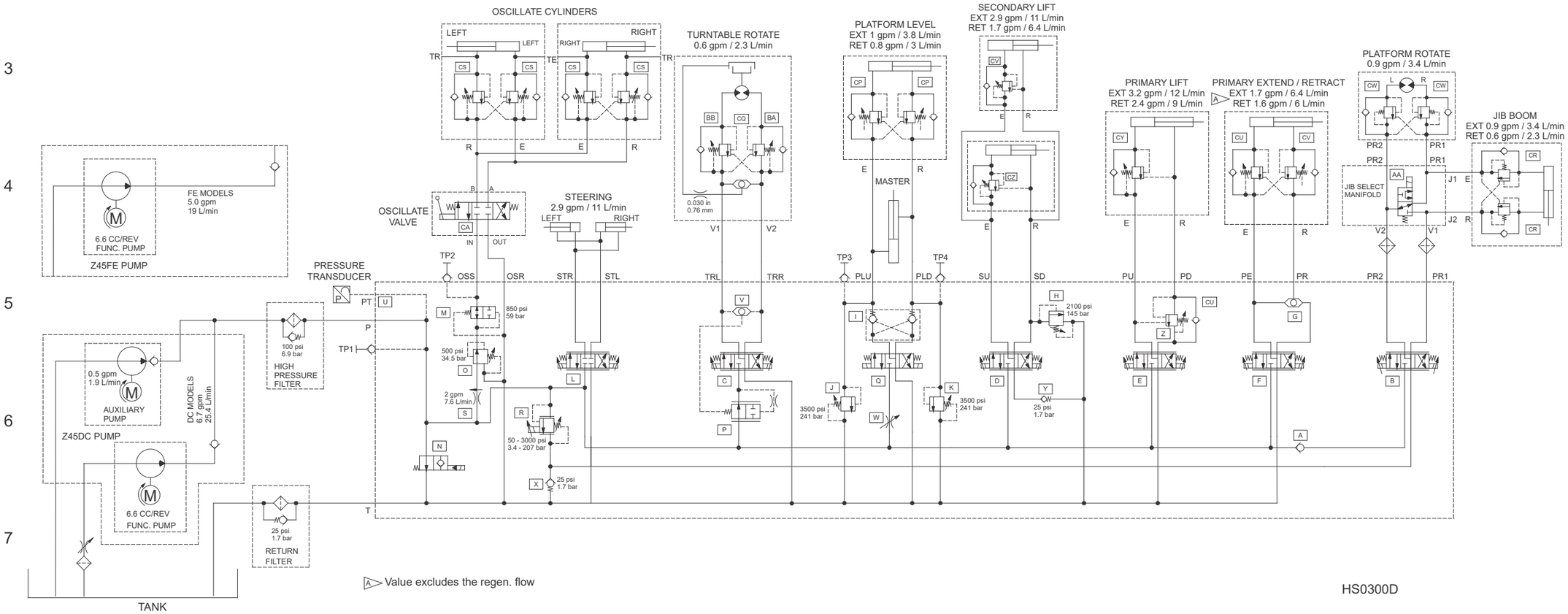
Hydraulic Schematic



Hydraulic Schematic

COUNTERBALANCE VALVES

	RATIO	psi / bar
CP	3:1	3500 / 241
CQ	4.25:1	3626 / 250
CR	3:1	3000 / 207
CS	10:1	3250 / 224
CU	3:1	1000 / 69
CV	3:1	1500 / 103
CW	3:1	3300 / 228
CY	3:1	3800 / 262
CZ	1.5:1	3500 / 241



HS0300D

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.

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

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