Genie®
A TEREX BRAND

Service and Repair Manual

Serial Number Range

Z®-45 FE
Z®-45 DC

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.

Part No. 1297714GT
Rev A1
July 2020

Introduction

Important

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

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

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

Compliance

Machine Classification
Group B/Type 3 as defined by ISO 16368

Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

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

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

Contact Us:

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Find a Manual for this Model

Go to http://www.genielift.com

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

1297714GT Rev A1 July 2020

First Edition, First Printing

Introduction

Revision History

Revision	Date	Section	Procedure / Page / Description
A	03/2020		Initial Release
A1	07/2020	Section 6	Schematic page 120

REFERENCE EXAMPLES:

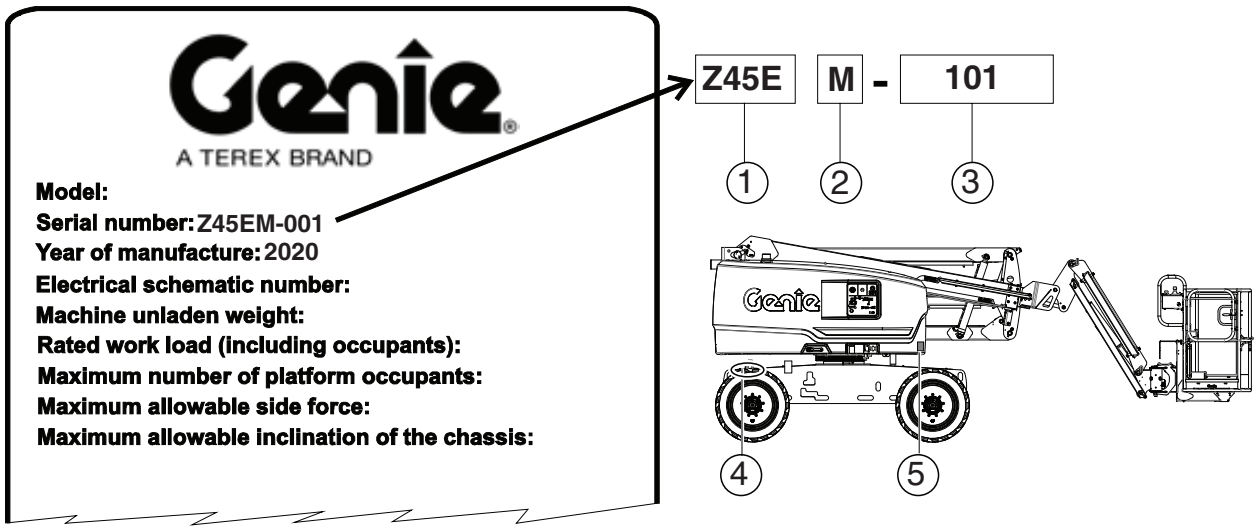
Section – Repair Procedure, 4-2
Section – Fault Codes, All charts
Section – Schematics, Legends and schematics

Electronic Version

Click on any content or procedure in the Table of Contents to view the update.

Introduction

Serial Number Legend



1 Model
2 Facility code
3 Sequence number
4 Serial number (stemped on chassis)
5 Serial label (located under cover)

Safety Rules

Danger

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

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

Do Not Perform Maintenance Unless:

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

SAFETY RULES

Personal Safety

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

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

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

⚠DANGER Indicates an 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

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	Rough terrain
Tire size	315/55 D20
Tire ply rating	12
Tire and wheel weigh foam filled (minimum)	290 lbs 131.5 kg
Overall tire diameter	32.5 in 82.5 cm
Wheel diameter	20 in 50.8 cm
Wheel width	11 in 27.9 cm
Wheel lugs	9 @ 5/8 -18
Lug nut torque, lubricated	94 ft-lbs 127.4 Nm
Lug nut torque, dry	125 ft-lbs 169.5 Nm

Fluid capacities	
Fuel tank	17 gallons 64.4 liters
Hydraulic tank	10.5 gallons 40 liters
Hydraulic system (including tank)	17 gallons 65 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	L16G-AC lead acid AGM dry cell
Group	903-L16
Quantity	8
Capacity (lead acid) (dry cell)	390 AH 370 AH
Reserve capacity @ 25A rate	789 minutes 817 minutes
Weight, each	Refer to Machine Component Weights
Battery Box Screws Torque	128 ft-lbs 174 Nm
L16-AGM battery with DT terminal-Torque	88 in lb 10 Nm

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

Specifications

Performance Specifications

Drive speed, maximum stowed position	
2WD/4WD models Stowed	4.5 mph 7.2 km/h 40 ft / 6.1 sec 12.2 m / 6.1 sec
Elevated	0.3 mph 0.5 km/h 40 ft / 90 sec 12.2 m / 90 sec
Gradeability	See Operator's Manual
Braking distance	
High range on paved surface	3 to 6 feet 0.9 to 1.8 m

Boom function speeds, maximum from platform controls	
Jib boom up	13 to 17 seconds
Jib boom down	13 to 17 seconds
Primary boom up	26 to 30 seconds
Primary boom down	26 to 30 seconds
Primary boom extend	12 to 20 seconds
Primary boom retract	12 to 20 seconds
Secondary boom up	26 to 30 seconds
Secondary boom down	26 to 30 seconds
Turntable rotate, per 90° Stowed	67 to 80 seconds
Turntable rotate, per 90° Not stowed	105 to 130 seconds
Platform Level (10° range of motion)	6 to 7 seconds
Platform Rotate, per 90°	10 to 14 seconds

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

Specifications

Hydraulic Specifications

Hydraulic Oil Specification	
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
Viscosity grade	32
Viscosity index	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 the Genie Product Support before use.

NOTICE

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

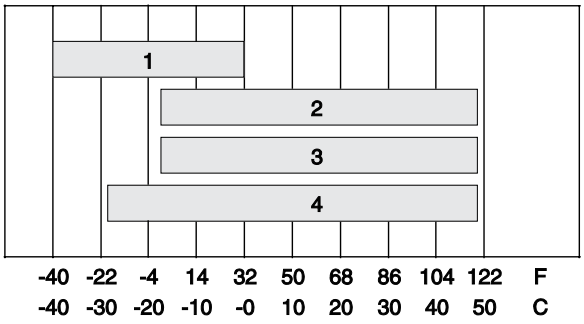
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond it's maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

NOTICE

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

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

Hydraulic Fluid Temperature Range



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

Specifications

Chevron Rando HD Premium Oil MV Fluid Properties

ISO Grade	32
Viscosity index	200
Kinematic Viscosity cSt @ 200°F / 100°C cSt @ 104°F / 40°C	 7.5 33.5
Brookfield Viscosity 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.

Chevron 5606A Hydraulic Oil Fluid Properties

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

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

NOTICE

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

Petro-Canada Environ MV 46 Fluid Properties

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

Shell Tellus S4 VX Fluid Properties

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

UNCON Hydrolube HP-5046 Fluid Properties

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

Specifications

Hydraulic Component Specifications

Functions Pump	
Type:	Single unit gear pump
Displacement per revolution	.40 cu in / 6.6 cc
Max flow rate	6.97 gpm / 26.4
Auxiliary pump	
Type	Fixed displacement gear pump
Displacement per revolution	1.7 gpm 6.44 L/min
Function Manifold	
Proportional relief valve pressure, variable	50 to 3200 psi 3.4 to 220.6 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 to 1.5 gpm 3.8 to 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	84ft-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.

Valve Coil Resistance Specification

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 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 to 469 psi 28.4 to 32.3 bar
Governor	mechanical
Valve Clearance, cold	0.0014 to 0.0025 in 0.145 to 0.185 mm
Lubrication system	
Oil pressure	28 to 64 psi 1.9 to 4.4 bar
Oil capacity (including filter)	5.4 quarts 5.1 liters
Oil viscosity requirements	
Below -10°C (14° F)	SAE 10W-30
-10 to 25° C (14° to 77° F)	SAE 10W-30/ SAE 15W-40
Above 25° C (77° F)	SAE30, SAE10W-30/ SAE15W-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 to 3/8 inch 7 to 9 mm
Electric clutch	1.6A @ 48 V DC 29.22 Ω +/- 5%

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 motor 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

Machine Component Weights

Tire and wheel assembly	300 lbs 136 kg
Drive motor and hub	114.6 lbs 52 kg
Engine assembly	640 lbs 290.3 kg
Primary boom	981.6 lbs 445.2 kg
Primary boom cylinder	128 lbs 58 kg
Primary boom extend cylinder	87.8 lbs 40 kg
Secondary boom linkage	1668.6 lbs 757 kg
Secondary boom cylinder	60 lbs 27 kg
Jib boom assembly	355.6 lbs 161.3 kg
Jib boom cylinder	61.3 lbs 27.8 kg
Oscillate cylinder	37 lbs 16.8 kg
6 ft / 1.8 m platform	275 lbs 125 kg
Battery box assembly (without batteries)	272.6 lbs 123.7 kg
Battery 6volt (wet)	107.5 lbs 48.8 kg
Battery 6 volt (maintenance free)	115 lbs 52.2 kg

Specifications

Hydraulic Hose and Fitting Torque Specifications

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

Seal-Lok™ Fittings
(hose end - ORFS)

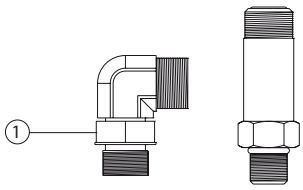
SAE Dash size	Torque
-4	18 ft-lbs / 24.4 Nm
-6	30 ft-lbs / 40.7 Nm
-8	40 ft-lbs / 54.2 Nm
-10	60 ft-lbs / 81.3 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	150 ft-lbs / 203.4 Nm
-24	230 ft-lbs / 312 Nm

JIC 37° Fittings
(swivel nut or hose connection)

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

SAE O-ring Boss Port
(tube fitting - installed into Aluminum)
(all types)

SAE Dash size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31.2 Nm
-8	36 ft-lbs / 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 Fitting1
Jam nut

Non-adjustable fitting

SAE O-ring Boss Port
(tube fitting - installed into Steel)

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

Specifications

Torque Procedure

Seal-Lok™ fittings

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

Note: The O-rings used in the Parker Seal Lok™ fittings and hose ends are custom-size O-rings. They are not standard SAE 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 that the face seal O-ring 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 hoses, fittings and related components to confirm that 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.

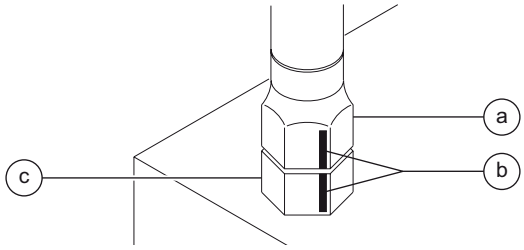


Figure 1

a hex nut
b reference mark
c 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° Fittings table in this section to determine the correct number of flats, for the proper tightening position.

Note: The marks indicate that 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.

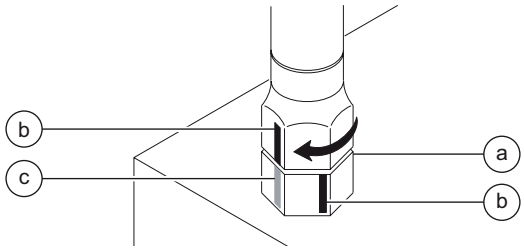


Figure 2

a body hex fitting
b reference mark
c 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 hoses and fittings and related components to confirm that 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.
- ☑ 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

About This Section

Most of the procedures in this section should only be performed by a 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 an 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 **Set system defaults:** Turn the machine on at the ground controls and immediately move and hold both the function enable and auxiliary enable switches for 5 seconds.

⊙ Result: an alarm will sound indicating the system has been restored to defaults.

2 **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.

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

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

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

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

6 **Complete calibrating the Primary and Secondary angle sensors stowed and elevated positions:** Refer to Repair Procedures, *How to Calibrate Booms Angle Sensors.*

7 **Verify pump efficiency calibration:** Refer to Repair Procedures, *How to Calibrate Function Pump.*

8 **Set hydraulic valve thresholds** *f*or 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.*

9 **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).*

10 **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).*

11 **Check oscillate function** *(if equipped).*

12 **Clear the fault history:** *R*efer to Repair Procedure, *How to Clear Fault History.*

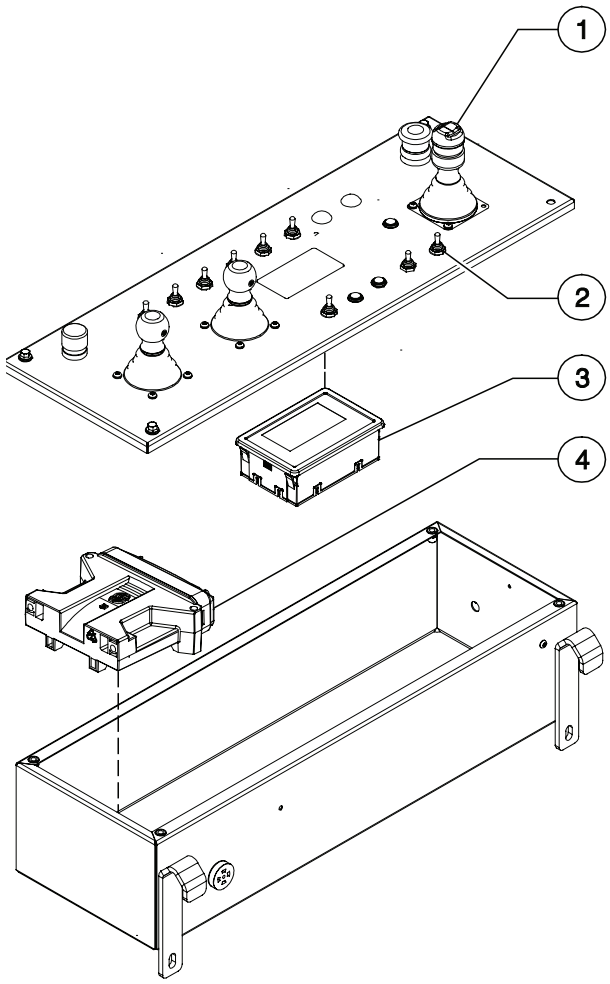
Platform Controls

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, and aid in the calibration process.



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 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:
Important

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 control. 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 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.

Platform Controls

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 achieved 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 control.

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

3 Do not press down the foot switch.

4 Move and hold the drive enable toggle switch in the right direction while holding 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 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 3000 PSI / 207 bar and an audible alarm sounds.

Note: The turntable function will only increase 300 PSI and no audible alarm. When the 300 PSI occurs, proceed to the next step.

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 and 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 switch to the right 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.

Platform Controls

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 switch to the right 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 Ramp Rate Setting

The ramp rate setting is an adjustment that controls the way boom function starts and stops. 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.

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

1 Turn the key switch to platform control. 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.

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 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 drive enable switch right to save the value.

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

Ramp up time (factory settings)	
Primary boom up/down	
ramp accelerate (up)	2 seconds
ramp decelerate (down)	0.6 second
Secondary boom up/down	
ramp accelerate (up)	2.5 second
ramp decelerate (down)	0.5 second
Turntable rotate	
ramp accelerate (up)	1.5 seconds
ramp decelerate (down)	1.25 seconds
Extend/Retract	
ramp accelerate (up)	2 seconds
ramp decelerate (down)	0.4 second
Jib up/down	
ramp accelerate (up)	2 second
ramp decelerate (down)	0.4 second
Platform rotate	
ramp accelerate (up)	0.75 second
ramp decelerate (down)	0.3 second
Propel	
ramp accelerate (up)	5 seconds
ramp decelerate (down)	3 seconds

Platform Controls

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.

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 you see the VALVE AND SENSOR SETTINGS screen.

6 Momentarily activate the drive enable toggle switch in the right direction until you see the CALIBRATE TILT SENSOR screen.

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 thru 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 control. 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 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.

Platform Components

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 slave cylinder to be sure there is no air in the closed loop.

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

1 Extend the primary boom until the slave cylinder barrel-end pivot pin is accessible.

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

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 slave cylinder rod-end pivot pin is removed if not properly supported.

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

9 Use a soft metal drift and drive the barrel-end pin out.

10 Carefully pull the cylinder out of the primary boom.

Platform Components

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.

2-2 Platform Rotator

How to Remove the Platform

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.

Platform Components

3 Support the platform rotator with an appropriate 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.

Platform Components

2-3 Platform Overload System

How to Calibrate the 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.

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

1 Turn the key switch to ground control. Level the platform.

2 Determine the maximum platform capacity. Refer to the machine serial plate.

3 Remove all weight, tools and accessories from the platform.

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

4 Turn Off the machine. Turn on and right after the boot commute the Secondary Up three time to enter in calibration mode. The smart hourmeter displays "CALIBRAT. MODE".

5 ZERO LOAD CALIBRATION: With the platform empty, keep the Secondary Down switch command pressed until the zero load calibration is done. The smart hourmeter displays "ZEROLOAD CAL OK".

6 FULL RATED LOAD CALIBRATION: Using a suitable lifting device, place a test weight equal to the maximum platform capacity at the center of the platform floor. Refer to the machine serial plate.

7 Activate and hold the secondary boom up toggle switch until the full rated load calibration is done. The smart hourmeter displays "MAXRATED LOAD CAL OK".

Note: There may be a 2 second delay before the platform overload indicator light and alarm responds.

8 Power off the machine and add to the full rated load an extra 5Kg/10lbs weight.

⊙ Result: the overload indicator lights is flashing at both the gorund and platform controls, the alarm is sounding.

9 Using auxiliary power, test all machine functions from the ground controls.

⊙ Result: All ground control functions should operate.

10 Using a suitable lifting device, remove the additional weight from the platform.

⊙ Result: The platform overload indicator light should be off at both the ground and platform controls and the alarm should not sound.

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

11 Test all machine functions using the function enable switch at the ground controls.

⊙ Result: All ground control functions should operate.

12 Reset the overload recovery fault. Refer to Repair Procedure, *How to Reset Overload Recovery Faults*.

Platform Components

2-4 How to Reset Overload Recovery Faults

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 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 and 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 and pull the hoses out through the platform 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.

4 Remove the platform mounting weldment.

5 Attach a lifting strap from an overhead lifting device to the platform rotator for support.

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

7 Remove the pin retaining fasteners from both platform rotator pivot pins. Do not remove the pins.

8 Use a soft metal drift to remove the leveling arm pivot pin and let the leveling arms hang down.

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

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

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

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

13 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.

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

15 Use a soft metal drift to remove the pin and let the cylinder hang down. Remove the platform rotator from the machine.

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

Jib Boom Components

16 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 from the bellcrank.

⚠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.

17 Attach a lifting strap from an overhead lifting device to the lug on the rod end of the jib boom lift cylinder.

18 Use a soft metal drift to remove the jib boom lift cylinder rod-end pivot pin, then remove the jib boom lift cylinder from the bellcrank.

⚠WARNING Crushing hazard. The jib boom lift cylinder may become unbalanced and fall when it is removed from the machine if it is not properly supported by the overhead 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 mounting weldment. Then lower the jib boom until the platform is resting on the blocks just enough to support the platform.

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

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

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

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

Jib Boom Components

4 Use a soft metal drift to tap the jib boom lift cylinder rod-end pivot pin half way out. Then 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.

7 Use a soft metal drift to remove the pin and let the cylinder hang down. Remove the platform rotator from the machine.

⚠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.

8 Attach a lifting strap from an overhead lifting device to the lug on the rod end of the jib boom lift cylinder.

9 Use a soft metal drift to remove the jib boom lift cylinder rod-end pin. Remove the jib boom lift cylinder from the machine.

⚠WARNING Crushing hazard. The jib boom lift cylinder may become unbalanced and fall when it is removed from the machine if it is not properly supported by the overhead 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 Locate the cables from the primary boom cable track to the platform control box. Number each cable and its entry location at the platform control box.

2 Disconnect the cables from the platform control box.

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

4 Remove the hose clamp on the primary boom bellcrank.

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

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

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

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

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

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

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

9 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.

Primary Boom Components

10 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.

11 Raise the boom to a horizontal position.

12 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.

13 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.

14 Remove all hose and cable clamps from the underside of the primary boom.

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

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

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

18 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.

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

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

21 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.

22 Attach a strap from an overhead lifting device to the cable track.

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

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

25 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 overhead lifting device.

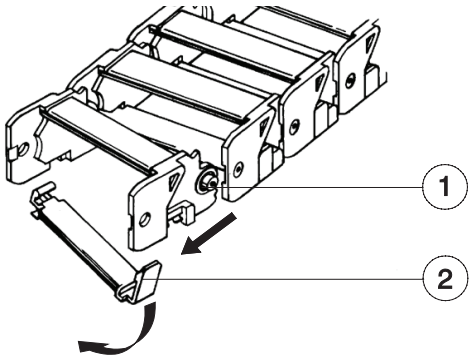
NOTICE Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

Primary Boom Components

How to Repair the Primary Boom Cable Track

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

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



1 link separation point
2 lower clip

1 Use a slotted screwdriver to pry down on the lower clip.

2 To remove a single link, open the lower clip and then use a screw driver to pry the link to the side.

3 Repeat steps 1 and 2 for each link.

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.

Primary Boom Components

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.

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 overhead 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 overhead 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 assembly out of the 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 overhead lifting device strap will need to be carefully 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 overhead lifting device strap will need to be carefully adjusted for proper balancing.

Primary Boom Components

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 lifting device to the primary boom for support.

4 Raise the primary boom with the overhead lifting device slightly to take the 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 lifting device or similar 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 pin retaining fasteners from the primary boom lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

⚠WARNING Crushing hazard. The primary boom 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. Do not remove the pin.

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

Primary Boom Components

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

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 pins. Use a soft metal drift to remove the pins.

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.

Primary Boom Components

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 primary and secondary booms until both the rod-end and barrel-end pivot pins on the master cylinder are accessible.

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

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

3 Attach overhead lifting device or similar supporting device to the master cylinder.

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

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

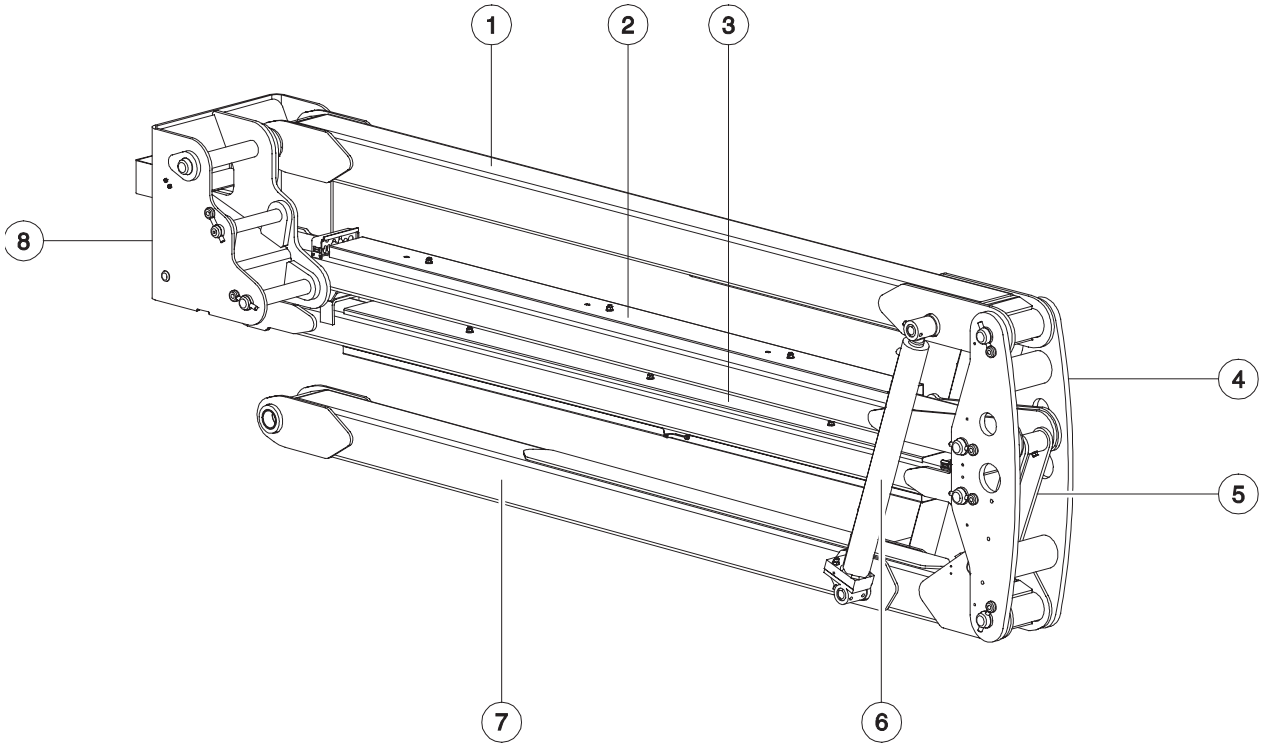
6 Remove the pin retaining fastener from the rod-end pivot pin.

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

8 Remove the master cylinder from the machine.

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

Secondary Boom Components



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

Secondary Boom Components

5-1
Secondary Boom

How to Disassemble the Secondary Boom

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

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

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

1 Remove the 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 overhead 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 overhead 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 overhead lifting device.

21 Using the 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 overhead 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 81/2 inch / 10 x 10 x 22 cm block between the number 3 arm and the number 4 arm at the mid-pivot end

32 Attach a lifting strap from the overhead 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 overhead 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 appropriate lifting device.

39 Use a soft metal drift to remove the upper compression link pivot pin from the number 2 arm. Remove the compression link from the machine.

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

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

Secondary Boom Components

40 Remove the number 2 arm from the machine.

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

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 the lifting strap from the 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.

Secondary Boom Components

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 overhead 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 the 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 overhead 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.

Secondary Boom Components

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 overhead 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

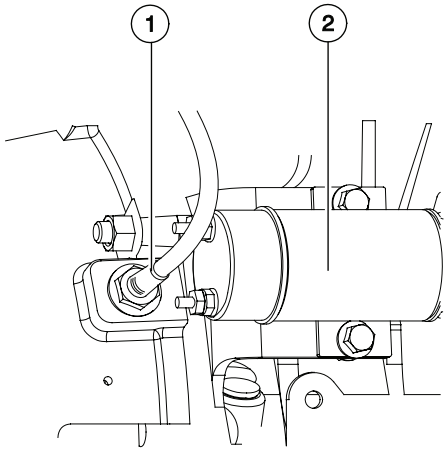
6-1 RPM Adjustment

Refer to Maintenance Procedure in the appropriate 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 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 Start the engine and check the high idle parameter. Refer to Specifications, Kubota D1105 Engine Specifications.

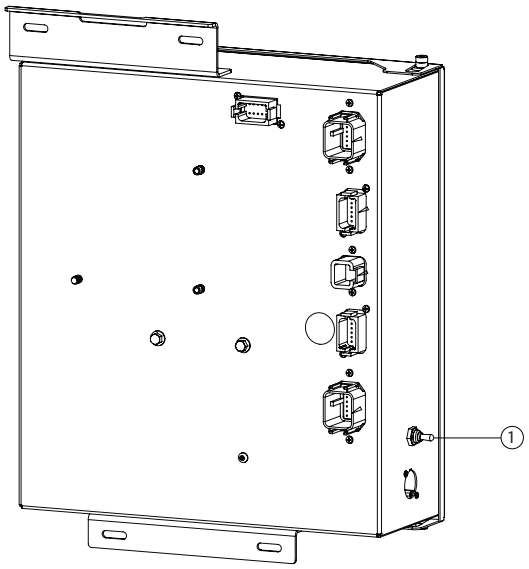
8 Secure the engine tray and tighten the engine tray fastener.

Ground Control

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

Ground Control

How to Use Control System Fault Recovery Switch

Recovery is only to be used as a last attempt to 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 severe fault or CAN communication loss. The recovery switch permits to retract the primary boom and lower 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 in GROUND 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 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.

3 If the recovery function has been used, this indicates major faults with the main control system and/or CAN bus. Tag and remove the machine from service until the faults have been fixed by trained personnel.

Hydraulic Pumps

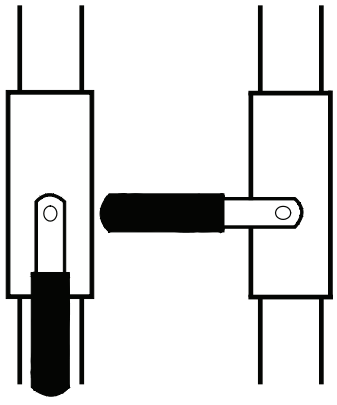
8-1 Function Pump

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.

Hydraulic Pumps

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.

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

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Manifolds

9-1
Function Manifold Components

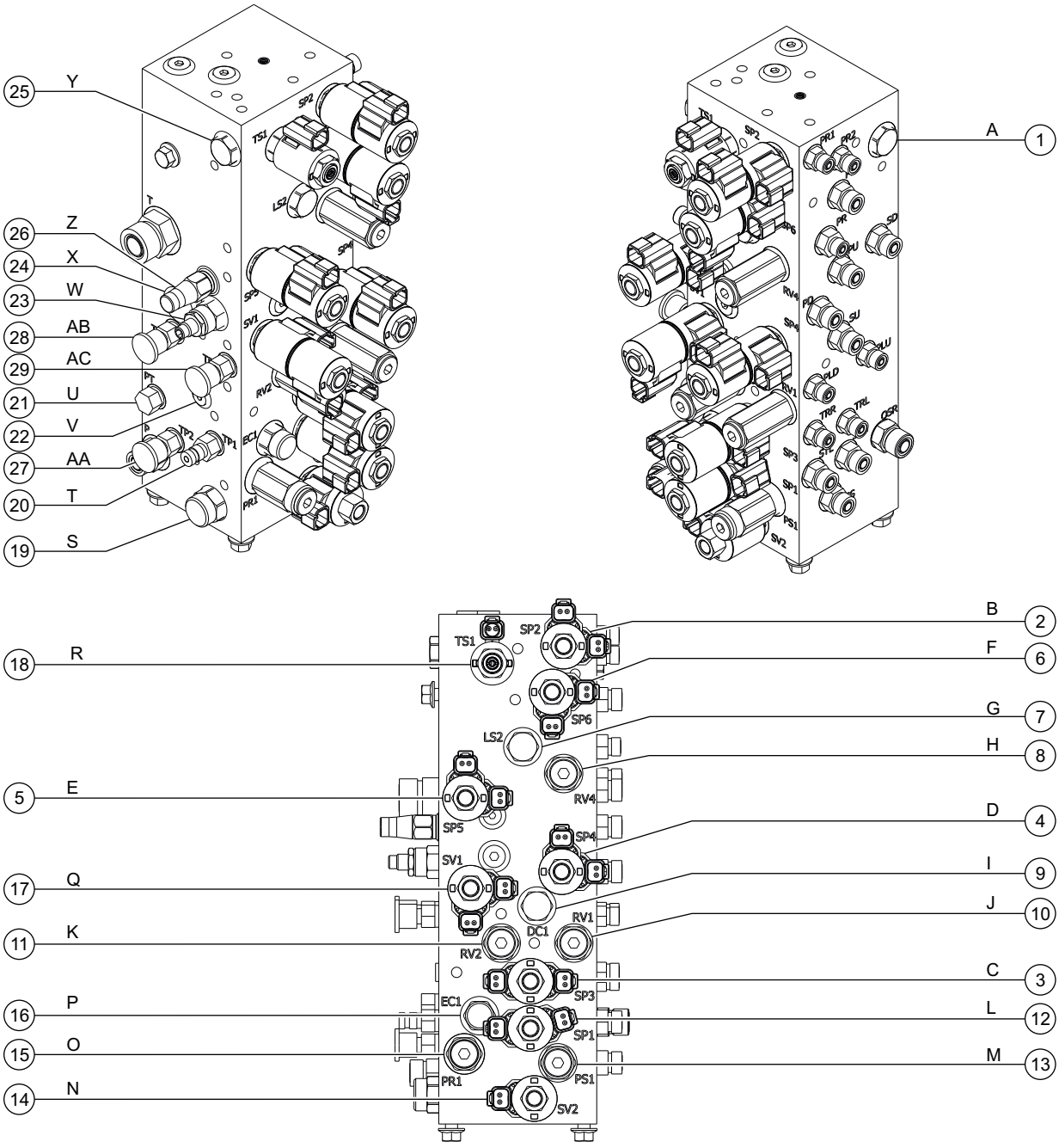
The function manifold is located on the turntable next to the ground controls

Index No.	Description	Schematic Item	Function	Torque
1	Valve, Check, Gs68 (Size8 8)	A	Platform rotate left/right	19 - 21 ft lbs / 26 - 29 Nm
2	Valve, Spool, 4 Way, 3 Position	B	Platform rotate left/right	19 - 21 ft lbs / 26 - 29 Nm
3	Valve, Proportional 3 Pos 4 Wy	C	Turntable rotate left/right	19 - 21 ft lbs / 26 - 29 Nm
4	Valve, Proportional 3 Pos 4 Wy	D	Secondary boom extend/ retract	19 - 21 ft lbs / 26 - 29 Nm
5	Valve, Proportional 3 Pos 4 Wy	E	Primary boom up/down	19 - 21 ft lbs / 26 - 29 Nm
6	Valve, Proportional 3 Pos 4 Wy	F	Primary boom extend/ retract	19 - 21 ft lbs / 26 - 29 Nm
7	Valve, Shuttle,Gs68	G	Primary boom extend/ retract circuit	19 - 21 ft lbs / 26 - 29 Nm
8	Valve, Relief, 2100 Psi	H	Secondary boom retract circuit	19 - 21 ft lbs / 26 - 29 Nm
9	Valve, Pilot Operated Check	I	Platform level up/down circuit	19 - 21 ft lbs / 26 - 29 Nm
10	Valve, Relief,Size 8,3500 Psi	J	Platform level up circuit	19 - 21 ft lbs / 26 - 29 Nm
11	Valve, Relief,Size 8,3500 Psi	K	Platform level down circuit	19 - 21 ft lbs / 26 - 29 Nm
12	Valve, Spool, 4 Wy, 3 Position, Closed Center	L	Steer left/right	19 - 21 ft lbs / 26 - 29 Nm
13	Valve, Pilot Operated, 850 Psi	M	Oscillate circuit	24 -26 ft lbs / 33 - 35 Nm
14	Valve, Solenoid,2pos 2way N.o.*	N	P circuit	19 - 21 ft lbs / 26 - 29 Nm
15	Valve, Pressure Reducing	O	Oscillate circuit	24 -26 ft lbs / 33 - 35 Nm
16	Compensator, 150 Psi	P	Turntable rotate left/right circuit	19 - 21 ft lbs / 26 - 29 Nm
17	Valve, Solenoid 3 Pos.4 Way***	Q	Platform level up/down	19 - 21 ft lbs / 26 - 29 Nm
18	Valve, Proportional Relief	R	Boom function	19 - 21 ft lbs / 26 - 29 Nm
19	Regulator, Flow, 2gpm	S	Oscillate circuit	25 - 27 ft lbs / 34 - 37 Nm

Function Manifold Components, continued

Index No.	Description	Schematic Item	Function	Torque
20	Nipple, Diagnostic,#4	T	Testing	-
21	Harness, Press,Transducer***	U	Monitors pressure	18 - 20 ft lbs / 25 - 27 Nm
22	Valve, Shuttle	V	Turntable rotate left/right circuit	4 - 5 ft-lbs / 5 - 6 Nm
23	Valve, Needle, Fine Adjustment**	W	Platform level up/down circuit	20 lbs / 27 Nm

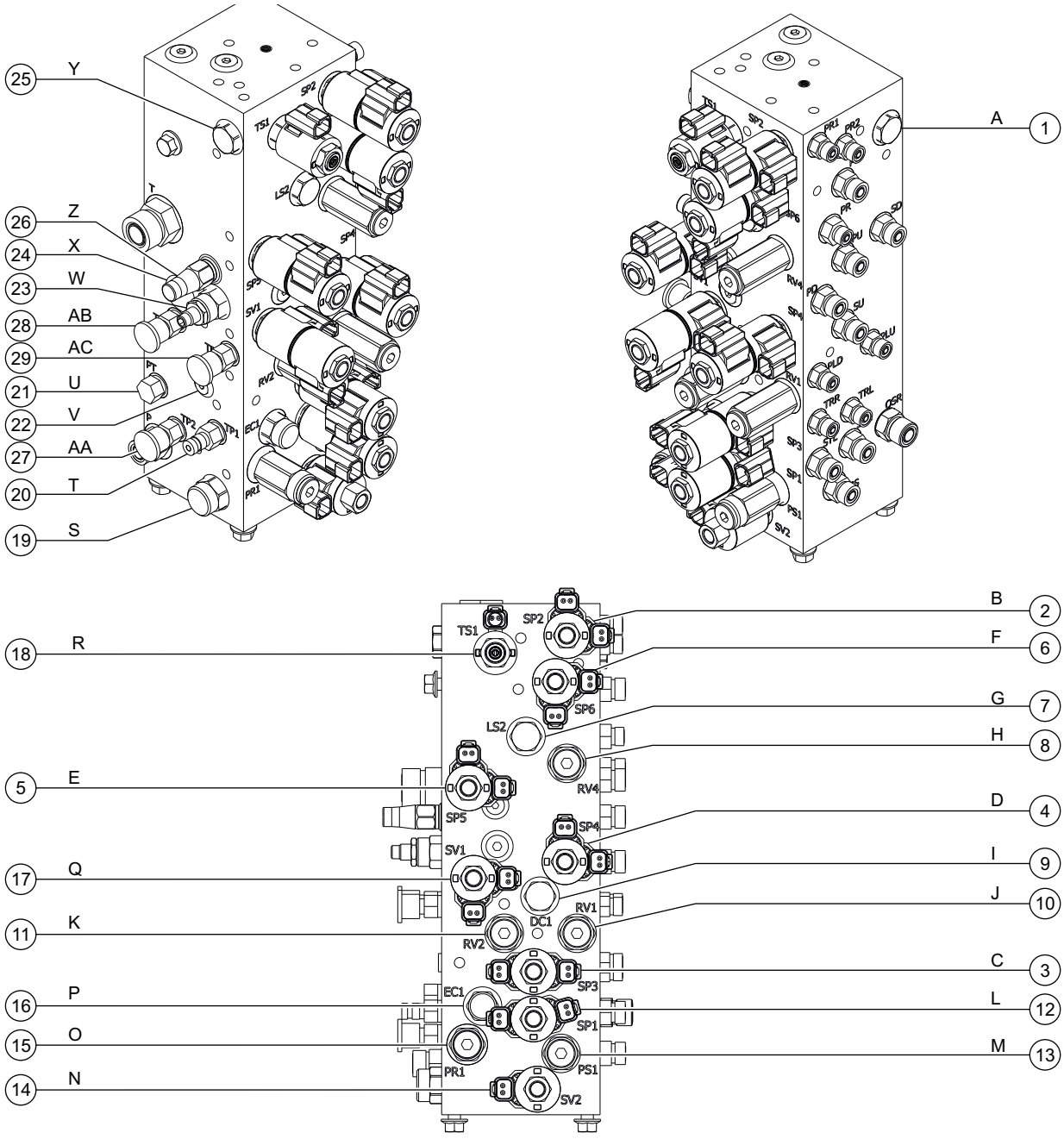
Manifolds


25 Y
26 Z
24 X
23 W
28 AB
29 AC
21 U
22 V
27 AA
20 T
19 S
A 1
18 R
5 E
17 Q
11 K
16 P
15 O
14 N
B 2
F 6
G 7
H 8
D 4
I 9
J 10
C 3
L 12
M 13
TS1
SP2
LS2
SP6
RV4
SP5
SP4
SV1
RV1
DC1
RV2
SP3
EC1
SP1
PR1
PS1
SV2

Manifolds

24	Valve, Check 25 Psi	X	Tank return circuit	19 - 21 ft lbs / 26 - 29 Nm
25	Valve, Check 25 Psi	Y	Secondary boom retract circuit	19 - 21 ft lbs / 26 - 29 Nm
26	Valve, Counterbalance	Z	Primary boom retract circuit	30 - 33 ft lbs / 40 - 45 Nm
27	Nipple, Diagnostic, #4	AA	Testing	-
28	Nipple, Diagnostic, #4	AB	Testing	-
29	NIPPLE, DIAGNOSTIC, #4	AC	Testing	-

Manifolds


25 Y
26 Z
24 X
23 W
28 AB
29 AC
21 U
22 V
27 AA
20 T
19 S
A 1
18 R
5 E
17 Q
11 K
16 P
15 O
14 N
B 2
F 6
G 7
H 8
D 4
I 9
J 10
C 3
L 12
M 13
TS1
SP2
LS2
SP6
RV4
SP5
SP4
SV1
RV1
DC1
RV2
SP3
EC1
SP1
PR1
PS1
SV2

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 on top of 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 Simultaneously activate the platform level toggle switch until the pressure gauge reads 1000 PSI / 69 bar. The platform level toggle up increases pressure, platform level down decreases pressure.

5 Simultaneously 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 Simultaneously activate the platform level toggle switch until the pressure gauge reads 3000 PSI / 207 bar. The platform level toggle up increases pressure, platform level down decreases pressure.

7 Simultaneously activate the platform rotate toggle switch to save the value.

⊙ Result: The control system will automatically continue to the next procedure, calibrate and save for the remaining values:
2500 PSI / 172 bar, 2000 PSI / 138 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.

Manifolds

How to Adjust the Secondary Boom Down Relief Valve

Note: Perform this procedure with the boom 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 the test1 port on the function manifold.

2 Press and hold the function enable switch 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 Specifications*

4 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.

5 Repeat steps 2 through 5 and recheck relief valve pressure.

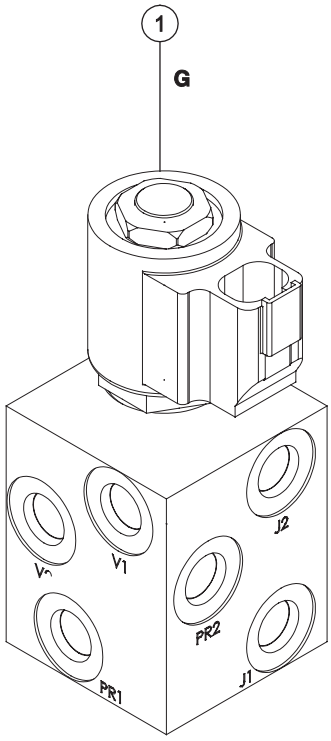
6 Remove the pressure gauge.

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	G	Platform rotate/jib boom select	8-10 ft-lbs / 11-14 Nm

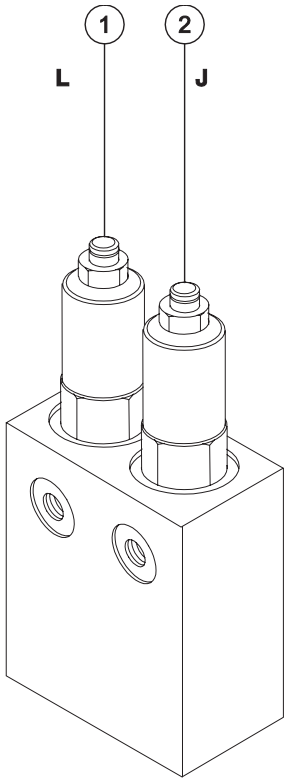


Manifolds

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	L	Turntable rotate right
2	Counterbalance valve	J	Turntable rotate left

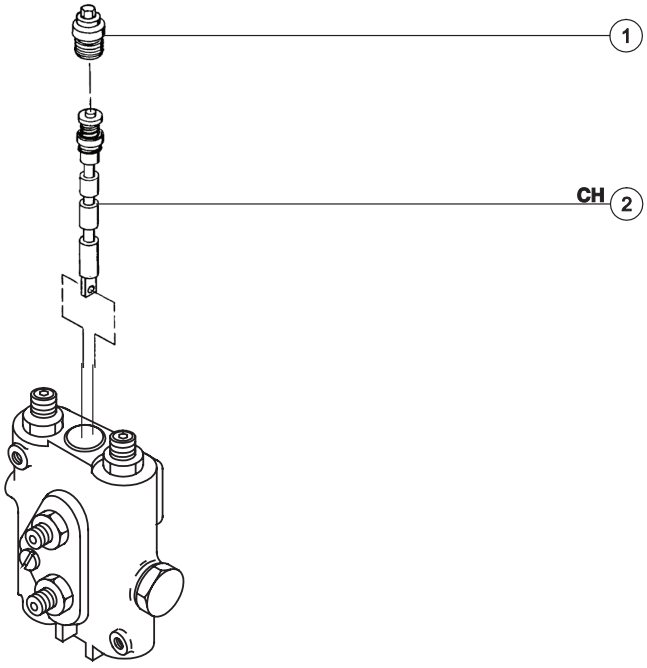


Manifolds

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	CH	Directional control	



Manifolds

9-6
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 with the machine on a firm, level surface with the boom in the stowed position. This procedure will require two technicians.

1 Use a "bubble type" level to verify the working surface 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 chassis, perform any boom function and push up or pull down the threaded rod until the machine is completely level.

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 non-steer axle on both sides (from inside of the drive chassis.

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

Manifolds

9-7 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.

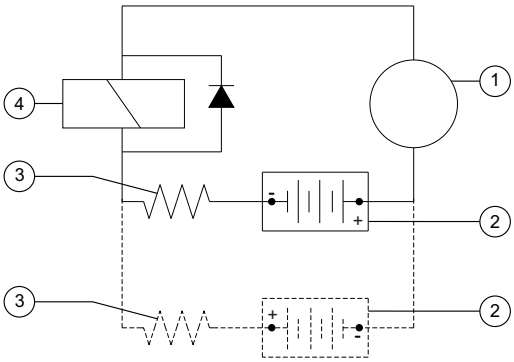
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil.*

2 Connect a 10Ω 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.

Manifolds



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.

⊠ 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 the Turntable Rotation Assembly

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

Note: Perform this procedure with the machine on a firm and 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.

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.*

Turntable Rotation Components

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. Refer to Navigation Menus, *Settings Menu*.

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

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 you see the VALVE AND SENSOR SETTINGS screen.

6 Momentarily activate the drive enable toggle switch in the right direction until you see the TILT SENSOR CALIBRATE screen.

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 deg.

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 with the machine on a firm, level surface 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 Rotate the turntable until the boom is between the steer tires or tracks.

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.

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

Axle Components

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 buttons to the off position at both the ground and platform controls.

4 Remove the drive chassis cover at the steer end of the machine.

5 Remove the cable clamp securing the steer sensor cable to the chassis.

6 Tag and disconnect the steer sensor harness from the main harness.

7 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 control.

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 right 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.

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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

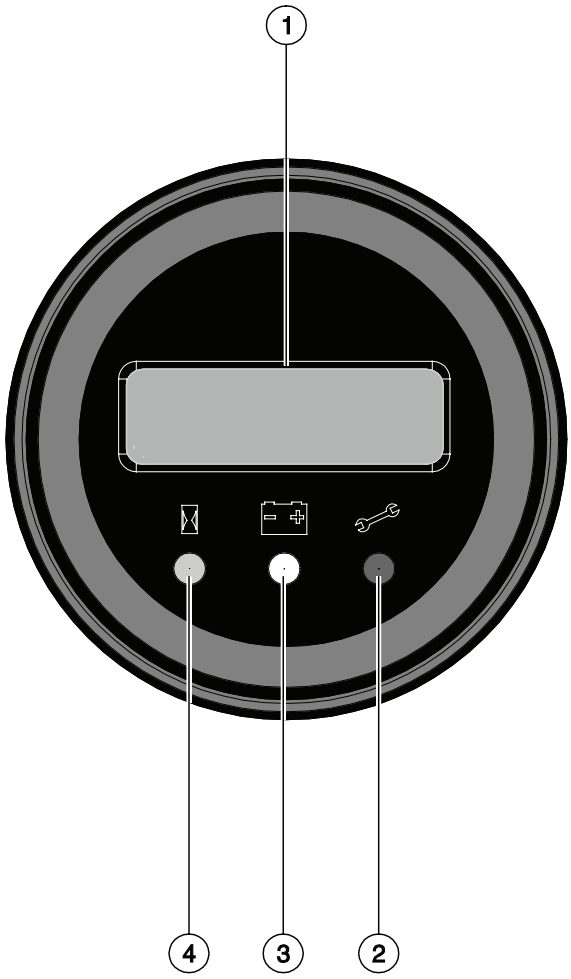
Fault Codes Ground Controls

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.*

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.

To access active faults list:

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 fault history list:

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

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

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

12 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.

13 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

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

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

16 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.

17 Momentarily activate drive enable right to enter menu.

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

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

19 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

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
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	Time Out	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 swtich *24V on C48-10 (C194INC WH/RD) when pressing up on the switch (B- otherwise)
18	Proportional Relief Valve	21	Fault	Open or Shorted	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)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
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	Sensor at Zero	0V		
		17	Not calibrated	Not between 2000 & 3000 mV at startup		
22	Primary Up Valve	25	Resistance 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	Resistance Too Low	Short or Ohms <5		
23	Primary Down Valve	25	Resistance 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	Resistance Too Lowt	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 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 2600 & 3400 mV *Elevated mV must be between 400
		16	Sensor at Zero	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	Resistance 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	Resistance Too Low	Short or Ohms <5		

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
27	Primary Retract Valve	25	Resistance 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	Resistance 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), *500-4500 mV at JC1-3 & VCON C48-6 (C161SB WH/BK) through joystick motion.
		16	Sensor at 0v	0V		
		17	Not calibrated	Not between 2000 & 3000 mV at startup		
32	Secondary Up Valve	25	Resistance 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	Resistance Too Low	Short or Ohms <5		
33	Secondary Down Valve	25	Resistance 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	Resistance Too Low	Short or Ohms <5		
36	Jib Up (or Platform Rotate Left) Valve	25	Resistance 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 plat. rotate L uses the same valve with selector.
		26	Resistance Too Low	Short or Ohms <5		
37	Jib Down (or Platform Rotate Right) Valve	25	Resistance 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 plat. rotate R uses the same valve with selector.
		26	Resistance Too Low	Short or Ohms <5		

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
40	Jib Select Valve	25	Resistance 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	Resistance Too Low	Short or Ohms <5		
41	Turntable Joystick	11	Shorted to supply	5V	Turntable Rotate Disabled	Verify: *5V at JC7-2 (P162PJW OR) *B- at JC7-1 (JSGND BR) *500-4500 mV at JC7-4 & PCON C46-12 (C165TRS WH/RD) through joystick motion.
		16	Sensor at 0v	0V		
		17	Not calibrated	Not between 2000 & 3000 mV at startup		
42	Turntable CW Valve	25	Resistance 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	Resistance Too Low	Short or Ohms <5		
43	Turntable CCW Valve	25	Resistance 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	Resistance 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.
49	Pump Enable Valve	25	Resistance Too High	Open Circuit or Ohms > 60	Fault Code Displayed	*Check Ohms *Verify no open/short circuit across PCON C47-6 BK or C9-13 or C6-1&B- (V241HGP OR/RD)
		26	Resistance Too Low	Short or Ohms <5		

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
51	Drive Joystick	11	Shorted to supply	5V	Drive Disabled	Verify: *5V at JC3-2 (P162JW OR) *B- at JC3-1 (JSGND BR), * 500-4500 mV at JC3-4 & PCON C47-2 (C160JPL WH/RD) through joystick motion
		16	Sensor at 0v	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 functioniong
61	Steer Joystick	11	Shorted to supply	5V	Steer Disabled	Verify: *5V at JC3-2 (P162JW OR) *B- at JC3-1 (JSGND BR) *500-4500 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	Sensor at 0v	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, 1800mV at 1000 psi & 3400 mV at 3000 psi) *B- (SENGND BK) at PinC
		16	Sensor at Zero	0V		
		17	Not calibrated	Calibration Not Completed		

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
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 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 *Verify 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 & 4400 mV Elevated mV must be between 600 &
		16	Sensor at Zero	0V		
		17	Not calibrated	Calibration Not Completed		
		19	Out of Range	Reported angle sensor value out outside normal range more than 3 degrees		
68	Func 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-
70	Pump Electric Motor Speed	19	Value out of range	Generator & Engine RPM don't match by more than 100 RPM for > 2.5 seconds	Hybrid Mode disabled	*Confirm engine speed signal => square wave (HZ/frequency) at C20-1 TCON, C58-6 & C35-4 (C41RPM OR/BK) *Confirm pump motor speed signal=> square wave (HZ/frequency) at C34-31 and also C34-32 (D185SEN WH & D186SEN BL) Note: Approx. 6V DC while turning, either B- or 12V when stopped.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
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	All plagorm functions disabled	Verify: *Relay 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)
72	Lift Guard Contact Alarm Switch	14	Cross-Check Failure	NO/NC contacts not connected correctly or welded		
		21	Generic Fault	Switch tripped	Relocate Contact Alarm Switch in the closed position	
76	Load Sense	12	Overload	Overload condition detected	All functions disabled	Unload the exceeding weight on the Platform
		13	Not Detected	No CAN communication	All functions disabled	Verify CAN connection to LC
		15	Anti Tampering	Negative load detected while boom up triggered	All functions disabled	Check LC mounting and repeat calibration
		17	Not Calibrated	Load Sense not calibrated	All functions disabled	Perform full calibration of the LC
		21	Internal Fault	Vishay VPG internal error status	All functions disabled	Change LC
		31	Invalid Calibration	Zero/Full load gain outside limits	All functions disabled	Check calibration weight and LC mounting, repeat calibration, change damaged LC
		36	Invalid Calibration (crosscheck error)	Crosscheck between controllers failed	All functions disabled	Repeat Calibration, Check LC mounting, Change damaged LC
		23	Too High (Overloaded)	Too much weight in the plataform	All functions disabled	Remove weight from platform

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
77	VCON LCD Display (platform controls)	13	Not Detected	No CAN communication	Lift functions disabled	Verify: *24V supply on C48-1 *B- at C48-2 *60 Ohm resitance across CAN+/- C49-1 and C49-2
78	PCON controller (platform controls)	13	Not Detected	No CAN communication	All functions disabled	Verify: *24V supply on C47-11,C47-12, C46- 2 *B- at C46-1 *60 Ohm restance across CAN +/- C46-3 and C46-4
		29	Sotware Version Mismatch	Wrong software version	All functions disabled	Install correct software version. Revision of TCON & PCON software must match.
79	Round LCD Display (ground controls)	13	Not Detected	No CAN communication	Warning	Verify: *24V supply on C61-5 *B- at C61-8 *60 Ohm restance across CAN +/- C61-1 and C62-2
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	Not Detected	No CAN communication	*2WD or 4WD limited to 2.5 MPH (ANSI) *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 restance across CAN +/- C21-3 and C21-4
		17	Not calibrated Calibration	Calibration Not Completed		Calibrate Level Sensor
		21	Fault	Internal Fault		Replace Sensor

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
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	Sensor too High	Signal > 4900 mV		
		16	Sensor at Zero	Signal < 150 mV		
95	Engine RPM	23	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	Too Low	Engine Speed lower than setting		
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.		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)
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.
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)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
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
		16	Sensor at Zero	0V		
		17	Not calibrated	Calibration Not Completed		
135	Wall Powered Charger Faults	51	DC-DC failure: LLC excessive leakage fault (Charger Fault #1 offset by +50)	Internal charger fault.		Remove AC and battery for minimum 30 seconds and retry charger
		52	PFC failure: PFC excessive			
		53	PFC has taken too long to boost (Charger Fault #3 offset by +50)			
		54	The charger has been unable to calibrate the current offset.			
		55	The output relay voltage too high when relay is closed.			

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
135	Wall Powered Charger Error Codes	0	No Response (Detected by TCON not reported by charger)	Loss of CAN from charger	Display fault, but battery BDI% value will be less accurate	Verify: *24V supply on (+) Terminal *B- on (-) Terminal *60 Ohm restance across CAN +/- C22-6 and C22-10 *Make sure charger is plugged in to the the machine.
		1	High battery voltage error	Battery Voltage is too high to charge.		*Check the battery voltage and cable connections *Check battery size & 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.		*Check the battery voltage and cable connections *Check battery size & condition (This error willautomatically clear once the condition has been corrected.)
		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.)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
135	Wall Powered Charger Error Codes (continued)	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)
		7	Ah Limit Exceeded	Safety limit exceeded. Possible causes: Poor battery health. Very deeply 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	Could be 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.)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
135	Wall Powered Charger Error Codes (continued)	13	Battery does not take current	Battery voltage is detected but the charger is unable to charge the battery. This can be due to a 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		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 failed 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.
		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.)

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
135	Wall Powered Charger Error Codes (continued)	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.
		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 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 charge profile.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
135	Wall Powered Charger Error Codes (continued)	29	CAN Bus error	CANbus network error.		Check the physical CAN connector, electrical bus conditions & other CAN modules for correct function. For example, check termination resistance is approximately 60 ohms.
		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 & retry charger.
		32	CAN Bus heartbeat error	CANbus heartbeat error.		Check the networked CANbus device(s) for correct functioning.
		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 thecharge profile installed does not require temperature compensation.
		37	CANOpen reprogramming failed	n/a		Re-try CANOpen download or reprogram using the USB
		38	Stalled Cooling Fan Motor	Fan will not turn when commanded, rotor must be locked		Fan is obstructed, please inspect the fan and clear the blockage
136	Pump/Generator Motor Controller	0	No Response	No CAN communication	Hydraulic Functions disabled	48V on C34-1 (R45GEN GR/WH)
		12..99	Curtis Fault Code	Same as RR motor controller	Same as RR motor controller	Same as RR motor controller

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
137	Left Front Drive Controller	0	No Response	No CAN communication	Drive disabled	48V on C28-1, C28-11 (R181PWR), 0V on C28-12
		12..99	Curtis Fault Code	Same as RR motor controller	Same as RR motor controller	Same as RR motor controller
138	Right Front Drive Controller	0	No Response	No CAN communication	Drive disabled	48V on C27-1 (R181PWR OR), 0V on C27-11, C27-12
		12..99	Curtis Fault Code	Same as RR motor controller	Same as RR motor controller	Same as RR motor controller
139	Left Rear Drive Controller	0	No Response	No CAN communication	Drive disabled	48V on C26-1, C26-12 (R181PWR OR), 0V on C26-11
		12..99	Curtis Fault Code	Same as RR motor controller	Same as RR motor controller	Same as RR motor controller
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	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.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Phase current exceeded the current measurement limit. Clear: Cycle KSI.
		13	**Current Sensor Fault** 1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective.		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Controller current sensors have invalid offset reading. Clear: Cycle KSI.
		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+		ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Precharge failed to charge the capacitor bank from the external precharge resistor. Clear: Cycle Interlock input or use VCL function Enable_Precharge().

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	15	**Controller Severe Undertemp**	1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Heatsink temperature below -40°C. Clear: Bring heatsink temperature above -40°C, and cycle interlock or KSI.
		16	**Controller Severe Overtemp**	1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Heatsink temperature above +95°C. Clear: Bring heatsink temperature below +95°C, and cycle interlock or KSI.
		17	Severe B+ Undervoltage	1. Battery parameters are misadjusted. 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	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 misadjusted. 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 KSI.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	22	**Controller Overtemp Cutback**	1. See Monitor menu » Controller: Temperature. 2. Controller is performance-limited at this temperature.	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 misadjusted. 3. Non-controller system drain on battery. 4. Battery resistance too high	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.
		25	+5V Supply Failure	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is	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.	Reduced drive torque.	Set: Motor temperature is at or above the Temperature Hot parameter setting. Clear: Bring the motor temperature within range.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	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.		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.
		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. Thisfault 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.		ShutdownPD.	Set: Proportional driver (pin 2) 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.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	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.
		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 KSI.
		38	**Main Contactor Welded** (RRDCON & ECON only) 1. Main contactor tips are welded closed.		ShutdownEMBrake; Motor disabled.	Set: Motor encoder phase failure detected. Clear: Cycle Power to KSI
		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.		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 KSI Power
		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 KSI.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	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	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Adjustment of a parameter setting that requires cycling of KSI. Clear: Cycle Power to KSI
		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 KSI.
		71	**OS General**	1. Internal controller fault.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake;	Set: Internal controller fault detected. Clear: Cycle Power to KSI.
		72	**PDO Timeout**	1. Time between CAN PDO messages received exceeded the PDO Timeout Period.	ShutdownThrottle; CAN NMT State set to Preoperational.	Set: Time between CAN PDO messages received exceeded the PDO Timeout Period. Clear: Cycle KSI 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	ShutdownEMBrake; Motor disabled; Control Mode changed to LOS (Limited Operating Strategy).	Set: No motor encoder movement detected. Clear: Cycle Power to KSI

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	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 KSI.
		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 KSI.
		82	**Bad Calibrations**	1. Internal controller fault.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: Internal controller fault detection. Clear: Cycle Power to KSI.
		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 Power to KSI.
		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 drivetrain rotation obstruction or degradation.	ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	Set: The Following Error Limit has been exceeded for the Following Error Time. Clear: Cycle Power to KSI.

Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	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 Power to KSI.
		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 KSI 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

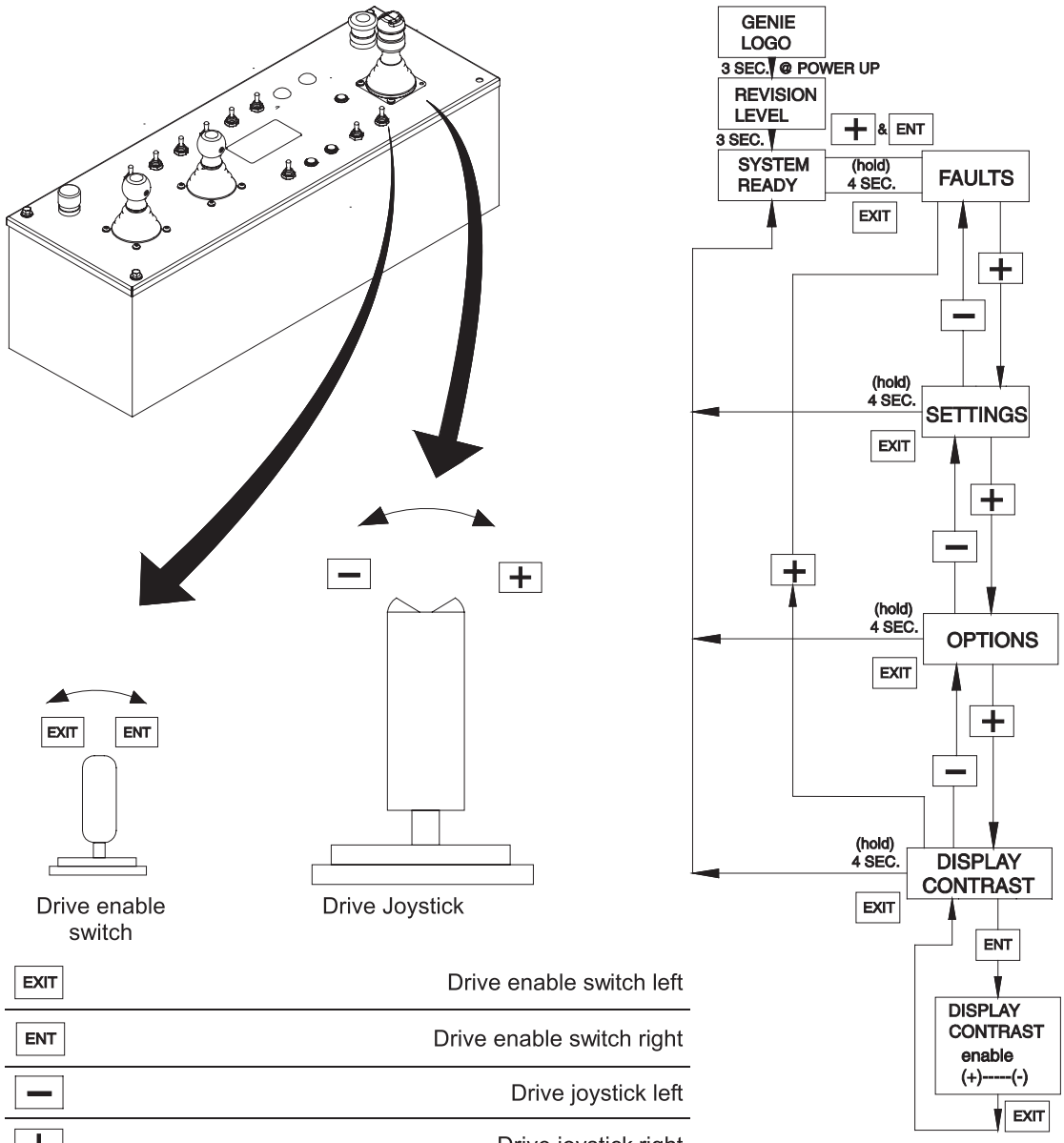
Control System Fault Codes

Control System Fault Codes

Error Source		Error Type		Cause	Effect	Solution
ID	Component	ID	Name			
140	Pump & Drive Controllers: 136=Pump[ECON] 137=Left Front[LF] 138=Right Front[RF] 139=Left Rear[LR] 140=Right Rear[RR] (continued)	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 KSI 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.
		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 KSI.
160	Steer Left Valve	21	Fault	Open or Shorted	Associated Function Disabled	*Verify no open/short circuit across RRDCON C28-4 & B- (V37SCC BL/BK)
161	Steer Right Valve	21	Fault	Open or Shorted	Associated Function Disabled	*Verify no open/short circuit across RRDCON C28-3 & B- (V36SCW BL)

Control System Fault Codes

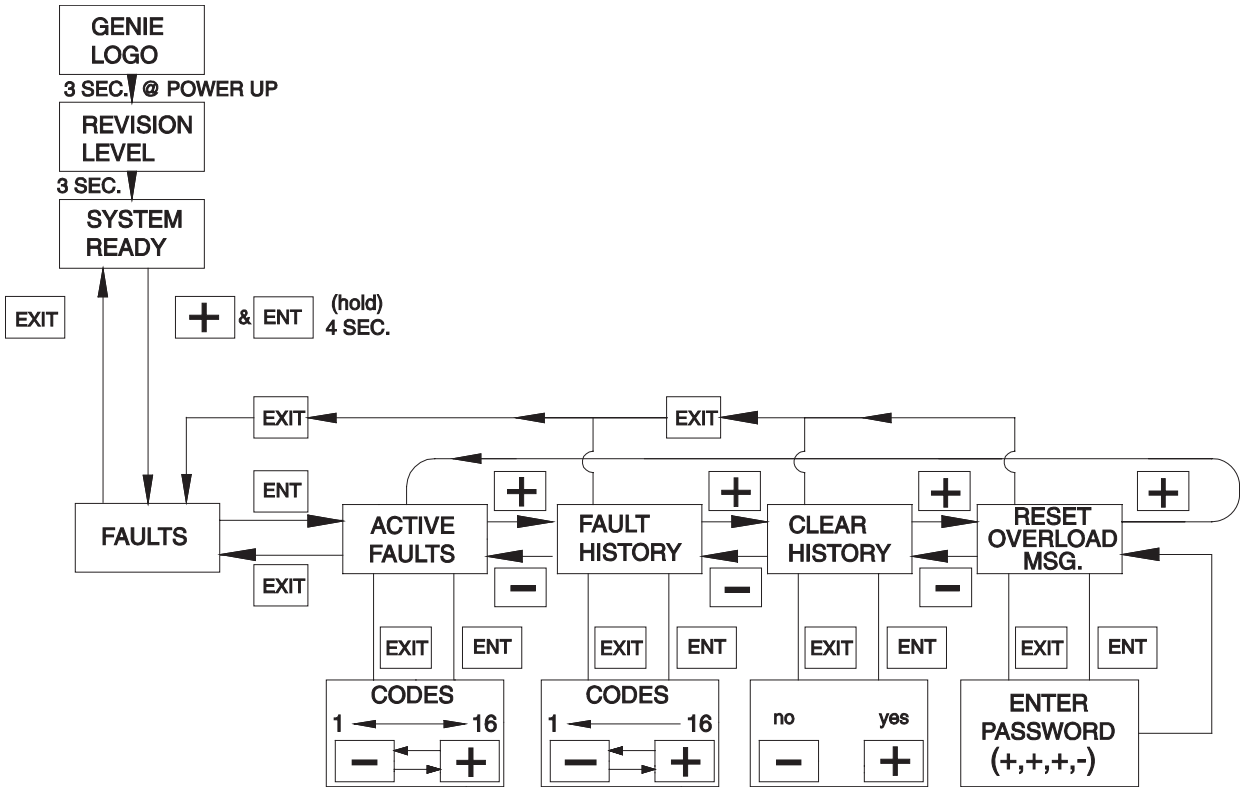
Navigation Menu - Top Menus



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

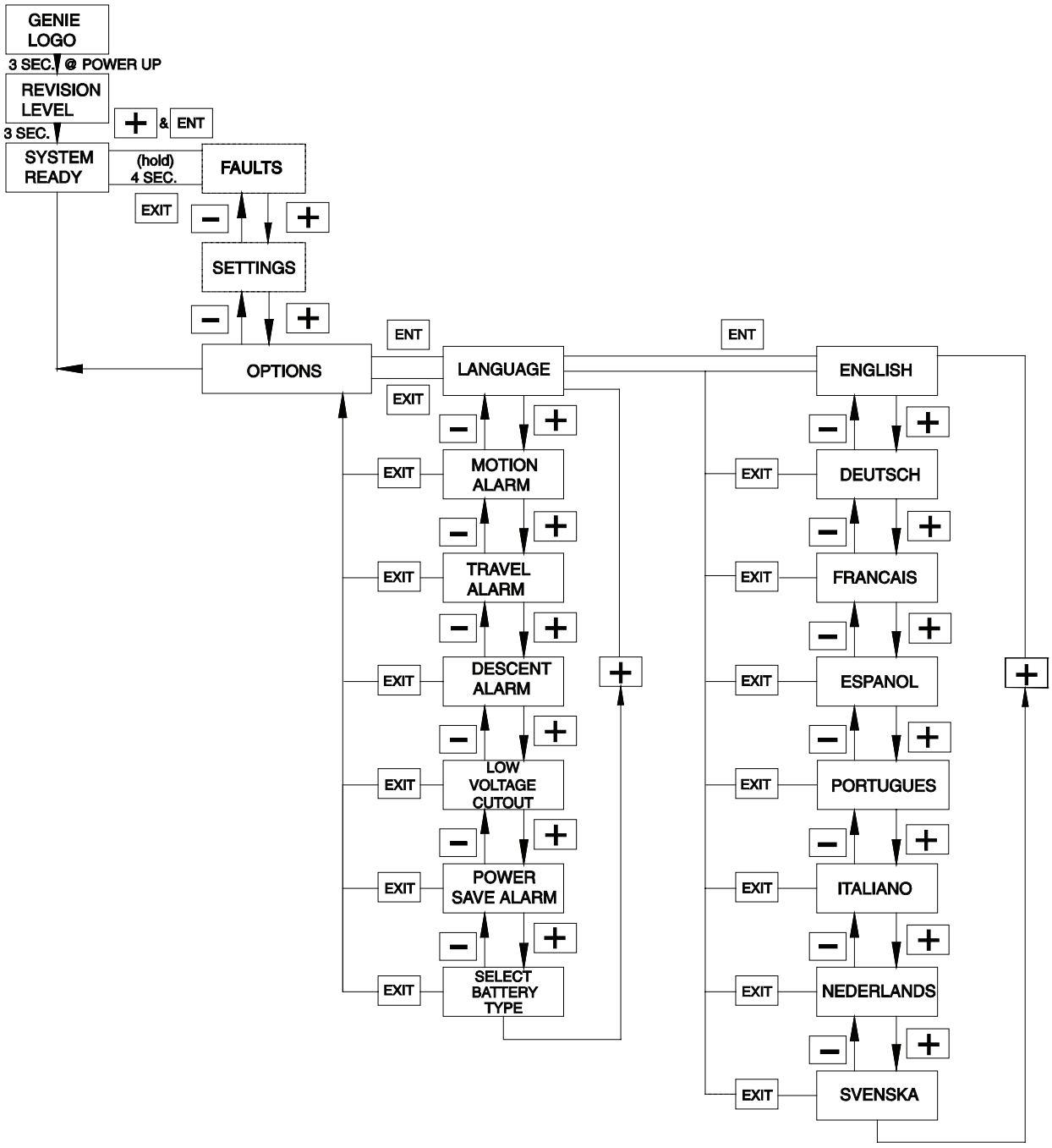
Faults Navigation Menu

Faults Navigation Menu



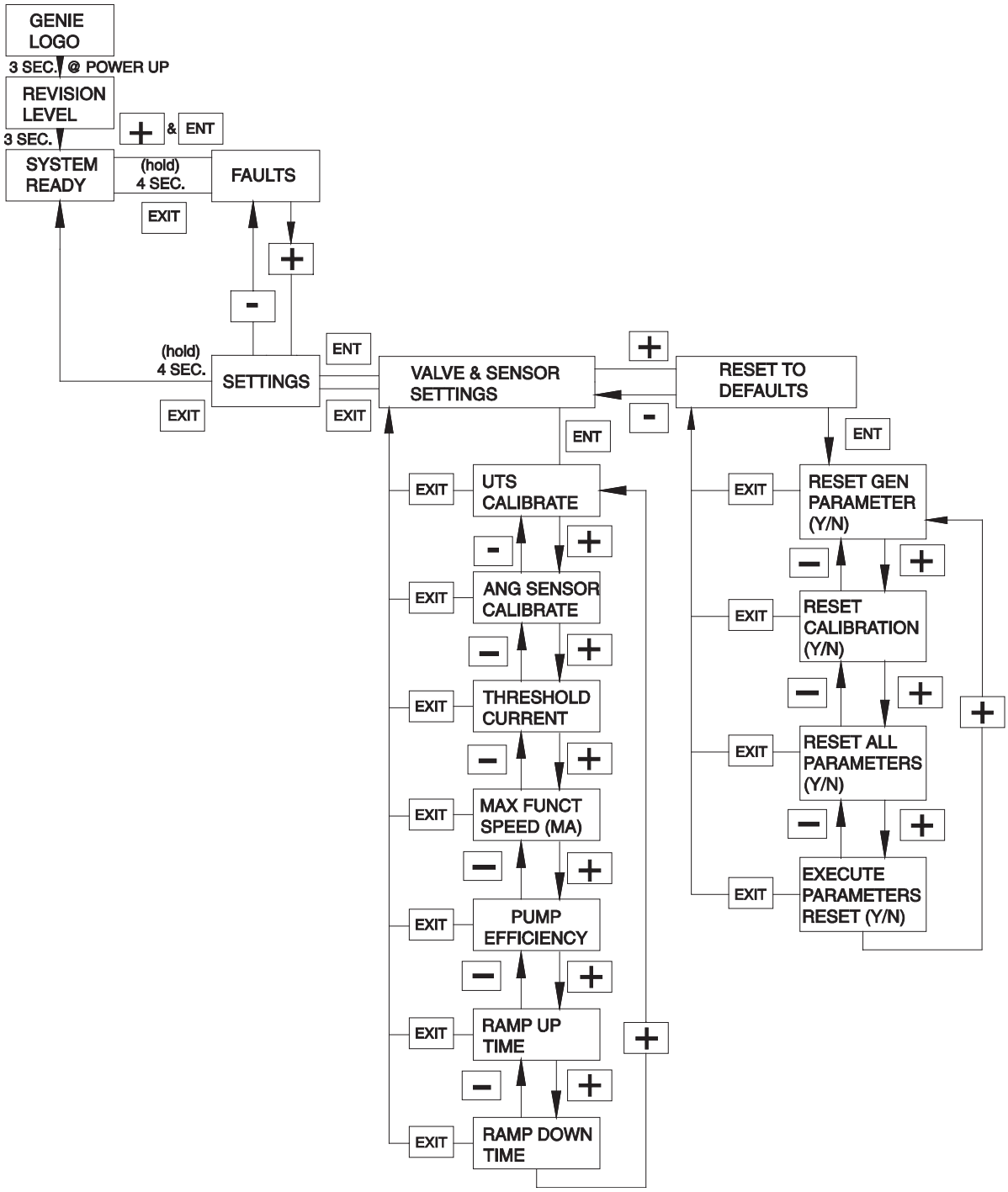
Options Navigation Menu

Options Navigation Menu



Settings Navigation Menu

Settings Navigation Menu



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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.

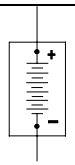
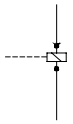
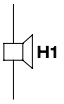
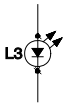
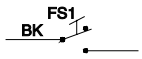
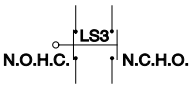
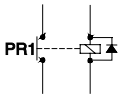
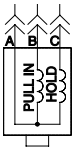
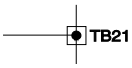
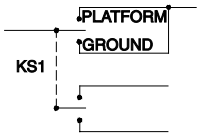
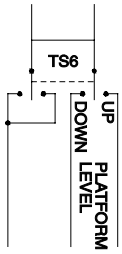
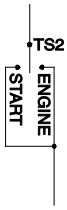
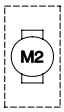
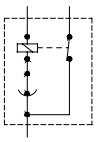
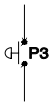
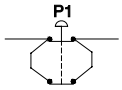
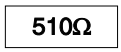
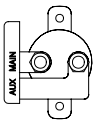
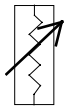
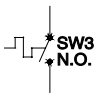
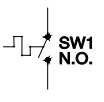
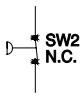
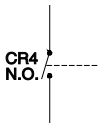
Electrical Schematics

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

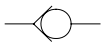
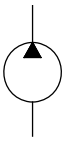
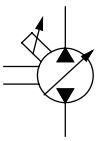
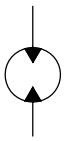
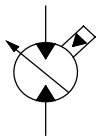
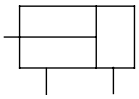
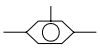
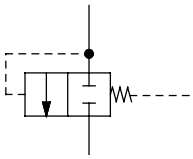
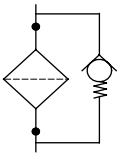
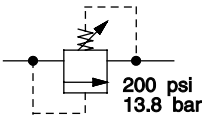
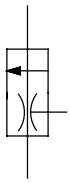
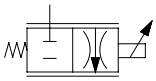
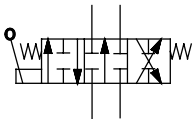
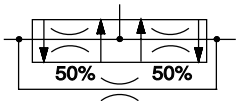
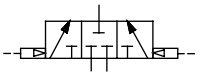
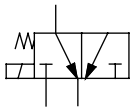
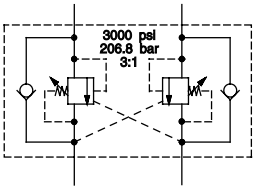
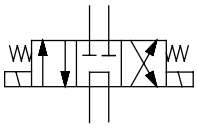
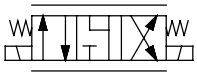
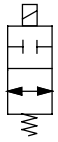
Hydraulic Schematics

⚠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 Symbols Legends

 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 seperator	 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 Legends

 Orifice with size	 Check valve	 Shut off valve	 Brake
 Pump, fixed displacement	 Pump, bi-directional variable displacement	 Motor, bi-directional	 Motor, 2 speed bi-directional
 Double acting cylinder	 Pump, prime mover (engine or motor)	 Shuttle valve. 2 position, 3 way	 Differential sensing valve
 Filter with bypass relief valve	 Relief valve with pressure setting	 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	 2 position, 2 way solenoid valve

Electrical Component and Wire Color Legends

Item	Description
B	**Battery**
B1	Engine Start - 12V DC
B7	Battery pack, 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 angle sensor
C13	LS1 Primary extend limit switch
C14	12V battery charger
C15	Secondary boom angle sensor
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

Electrical Component and Wire Color Legends

Item	Description
CB	**Circuit Breaker**
CB1	Engine power, 15A
CB2	Controls power, 24V DC, 15A
CB4	Charger box 12V, 10A
CB7	Master, 48V DC, 10A
CB9	Telematic, 5A (option)
CR	**Control Relay**
CR1	Engine start
CR2	Ignition power
CR3	Auxiliary relay
CR4	High idle
CR5	Horn
CR13	Jib (jib option)
CR14	Jib (jib option)
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
FB1	Flashing beacon
F	**Fuse**
F1	Battery, 325A
F2/F3	Glow plugs 30A
F5	Spare 15A
F8	Charger, 40A
F18	Work lights, 5A
F33	Telematics, 6A
FS1	Foot switch
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
KS	**Key switch**
KS1	Key switch
L	**LED or Light**
L1	Drive enable led
L4	Platform overload led (AS/CE models)
L5	Battery mode led
L29	Work lights
L44	Hybrid mode LED
L45	Platform overload led (AS/CE models)
L48	Tilt alarm led (ANSI/CSA models)
L53	Charger LED
LS	**Limit Switch**
LS1	Primary boom extend
LS3	Drive enable
LS18	Platform overload (AS/CE models)
M	**Motor**
M1	Function pump motor/generator
M2	Auxiliary pump
M3	Engine starter
P	**Button**
P1	Red emergency stop (ground)
P2	Red emergency stop (platform)
P3	Horn
P4	Function enable

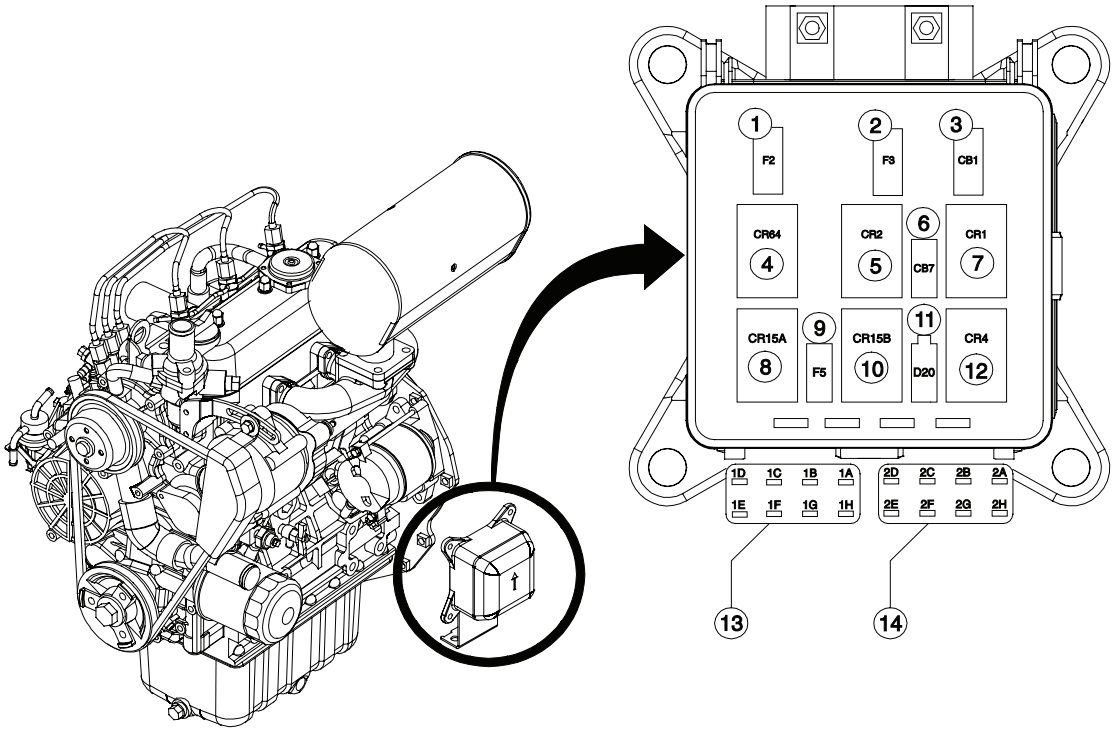
Electrical Component and Wire Color Legends

Item	Description
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
S19	Secondary 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
TS9	Platform level
TS13	Primary boom extend/retract
TS14	Motor shift (high / low)
TS15	Drive enable
TS18	Work light (option)
TS46	Proximity kill (option)
TS47	Inverter (option)
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	48V charger

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
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

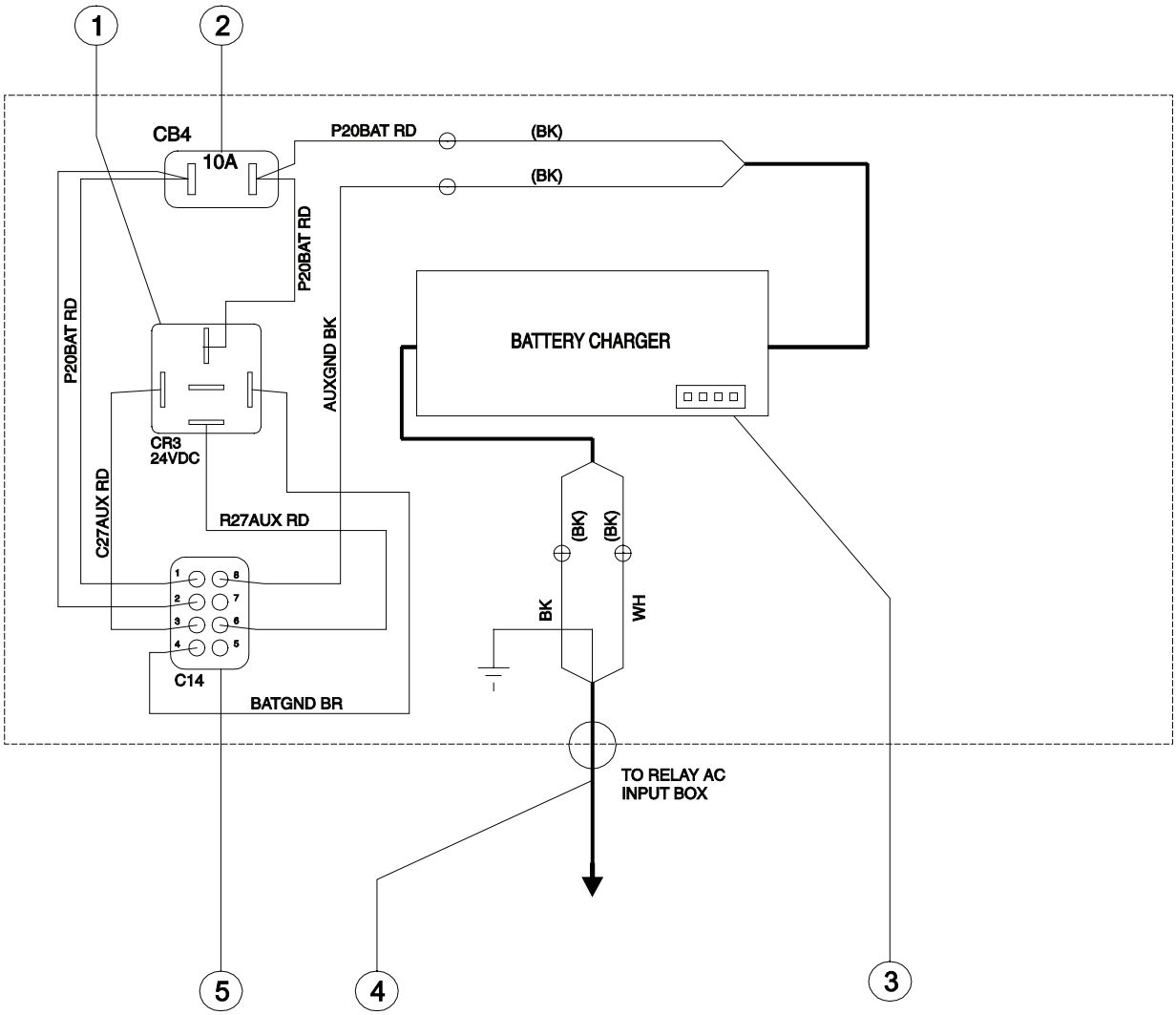
Kubota Engine Fuse and Relay Module

Kubota D1105-E4B



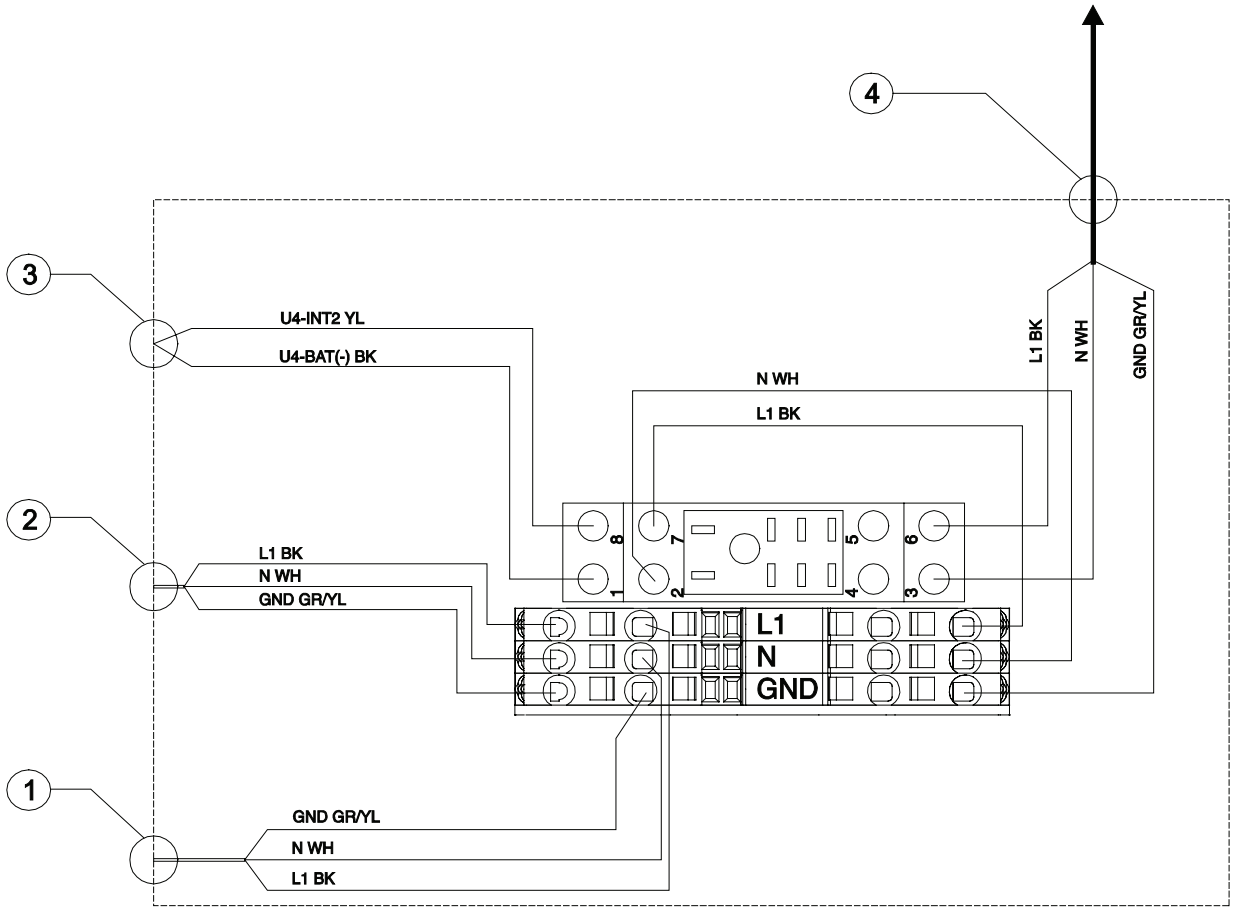
1 Fuse 1 - 15A (spare)
2 Fuse 3 - 30A glow plug
3 Circuit breaker 1 - 15A Engine start / Fuel pump
4 Control Relay 64 Engine fault
5 Control Relay 2 Fuel pump
6 Circuit breaker 7 - 10A Engine RPM
7 Control Relay 1 Engine start
8 Control Relay 15A glow plug 1
9 Fuse 5 - 15A (spare)
10 Control Relay 15B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

12V DC Charger Wiring (DC Option)



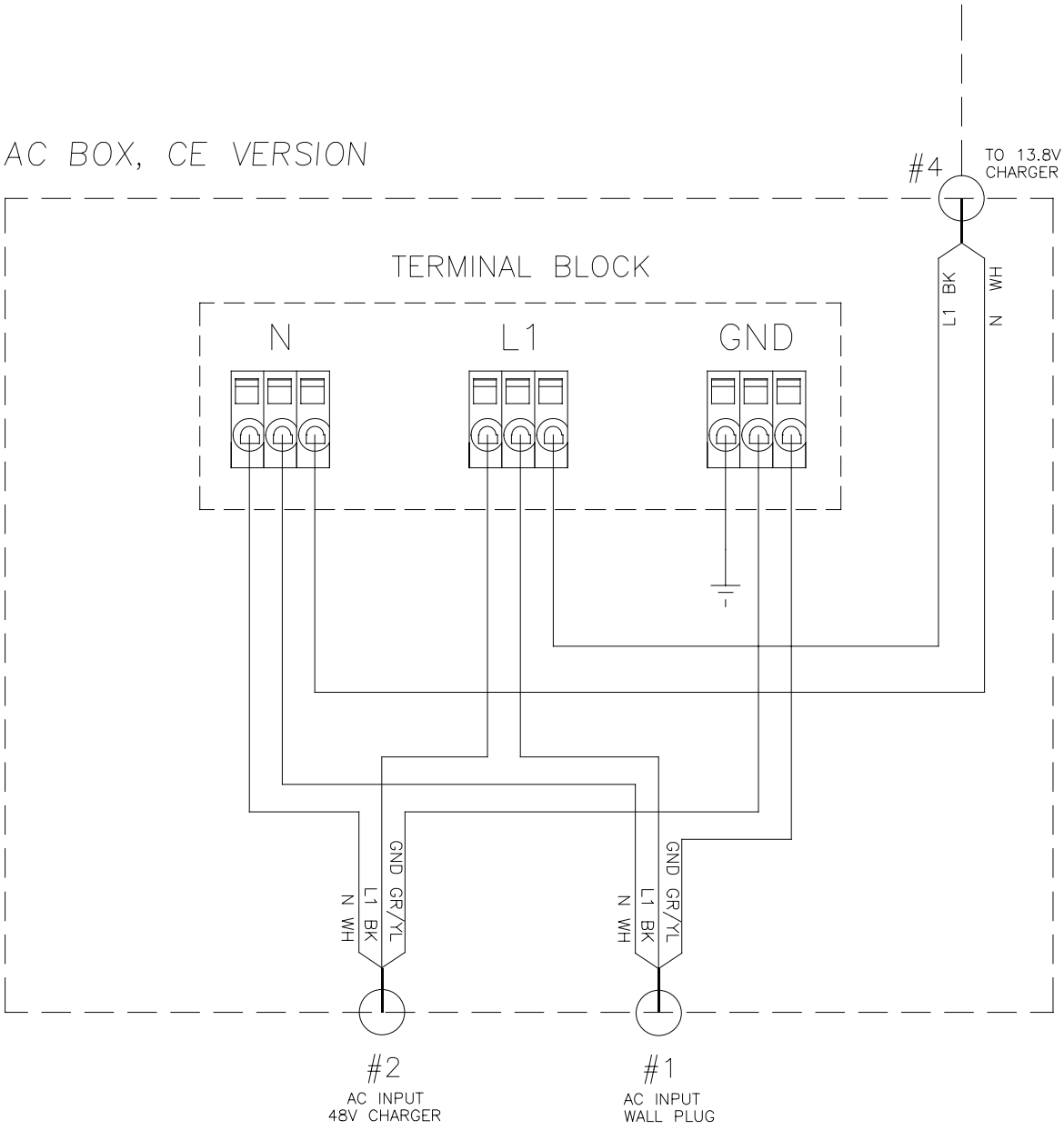
1 Control Relay 3 - 24V auxiliary
2 Circuit breaker 4 - 10A
3 Battery charger - 12V
4 To relay AC input box
5 Connector 14

AC Input Wiring, ANSI/CSA version (DC Option)



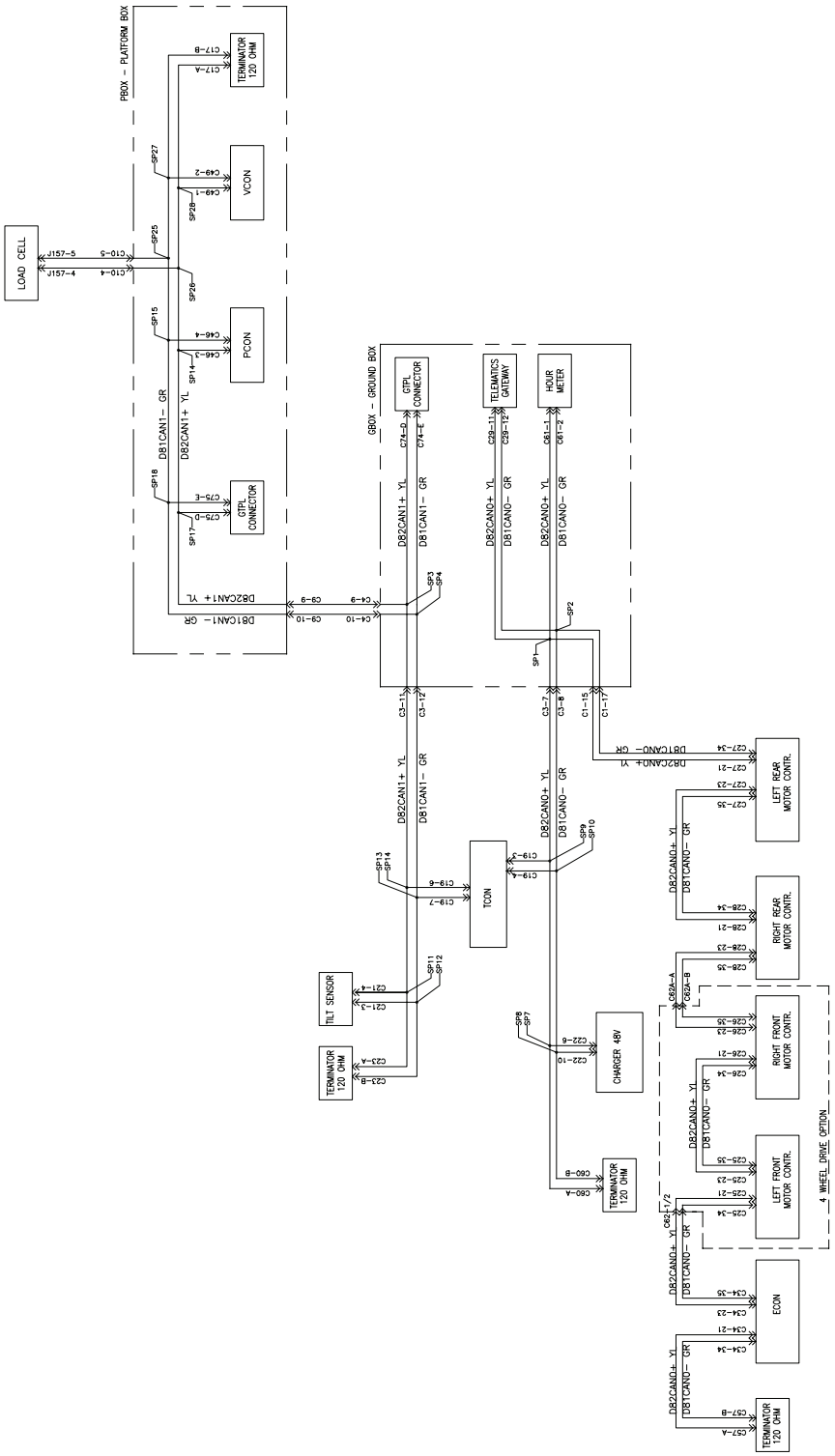
1 AC input wall plug
2 AC input to 48V charger
3 Charger Control IN
4 To 12V charger

AC Input Wiring, AS/CE version (DC Option)

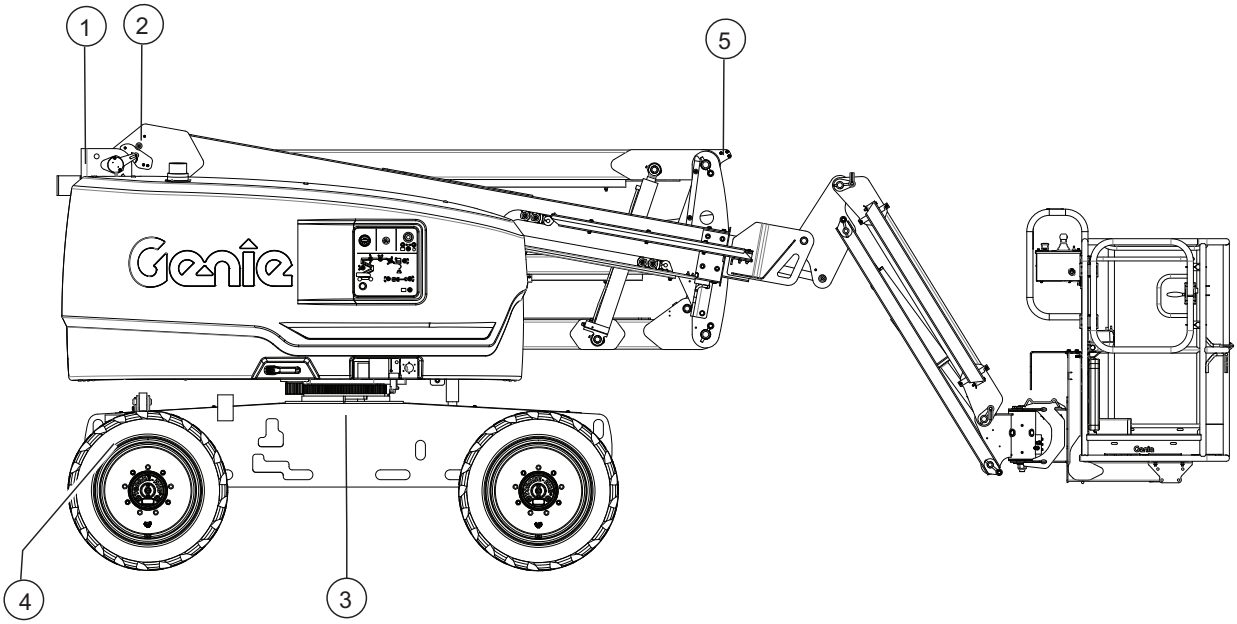


1 AC input wall plug
2 AC input to 48V charger
4 To 12V charger

CAN BUS Wiring Diagram

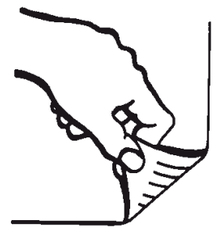


Limit Switch/Angle Sensor Legend

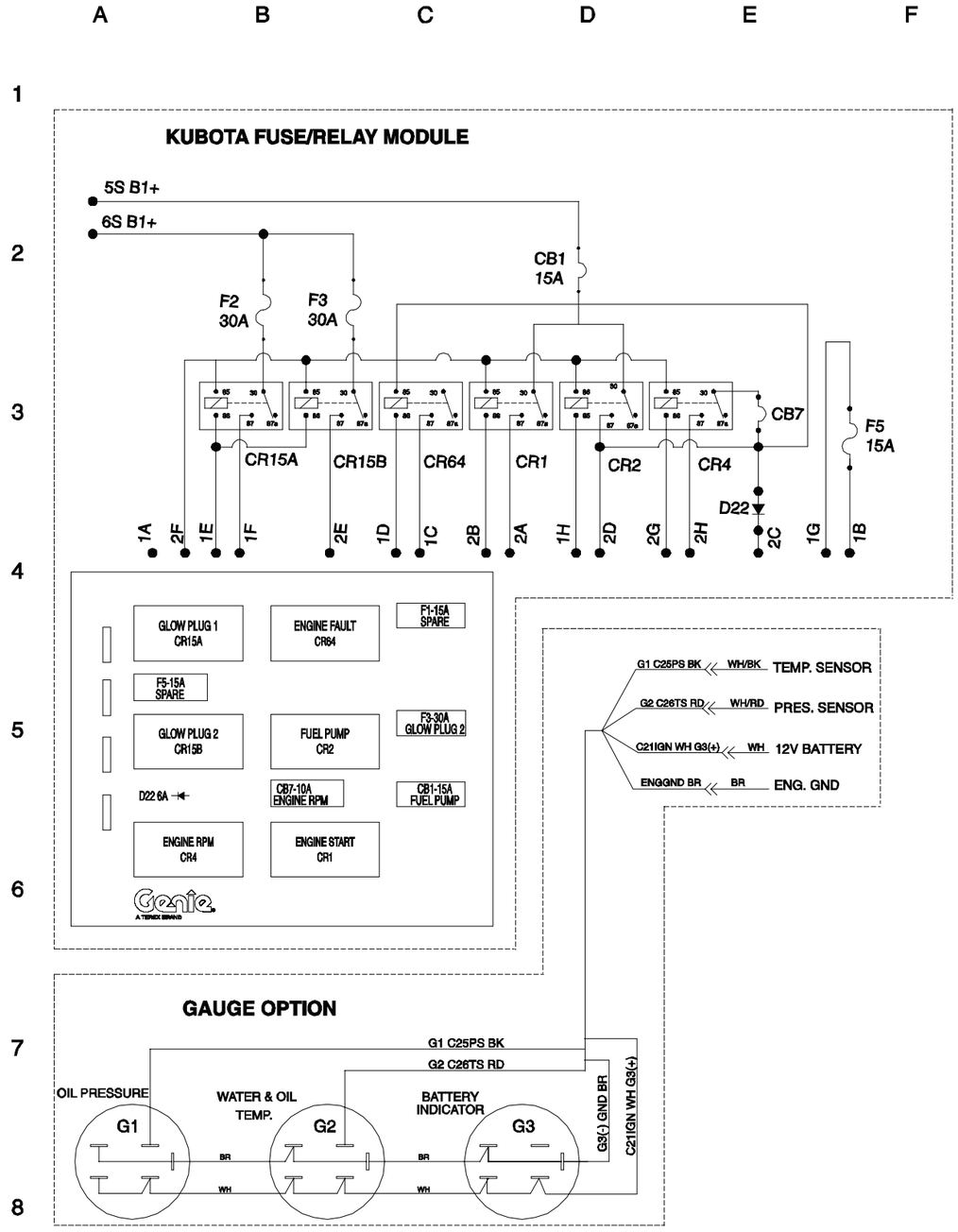


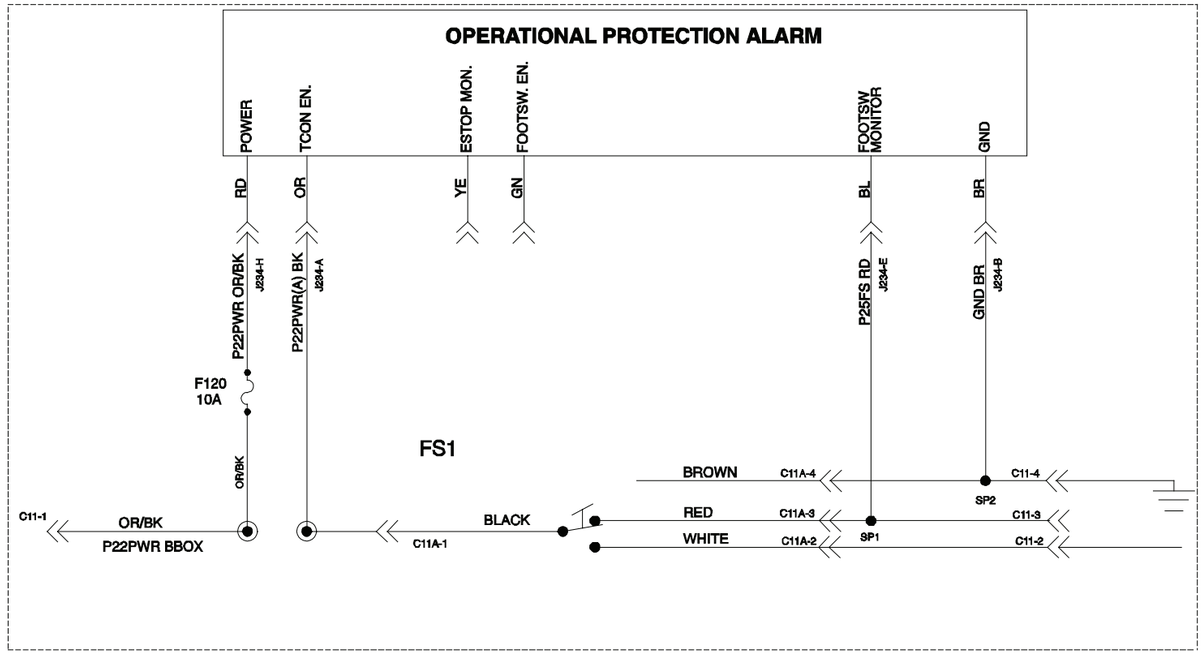
1 S17 Primary angle sensor
2 LS1 Boom extend limit switch
3 LS3 Drive enable
4 S13 Steer Angle sensor (inside steer cylinder)
5 S19 Secondary angle sensor

Wiring Diagram - Options



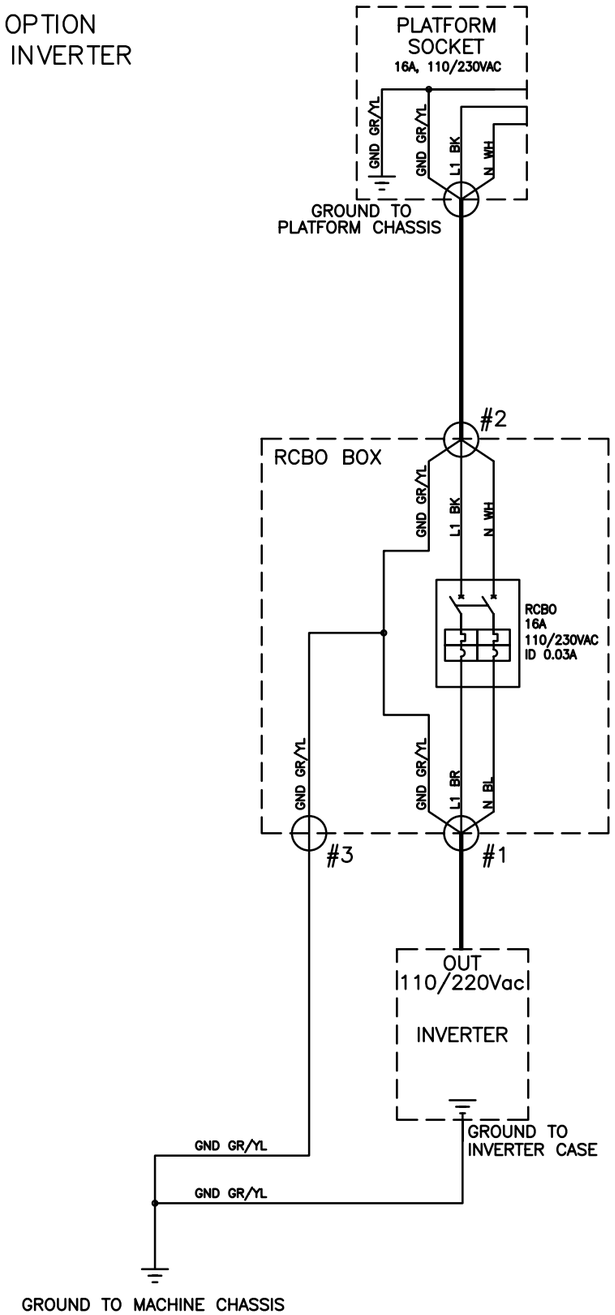
Wiring Diagram - Options



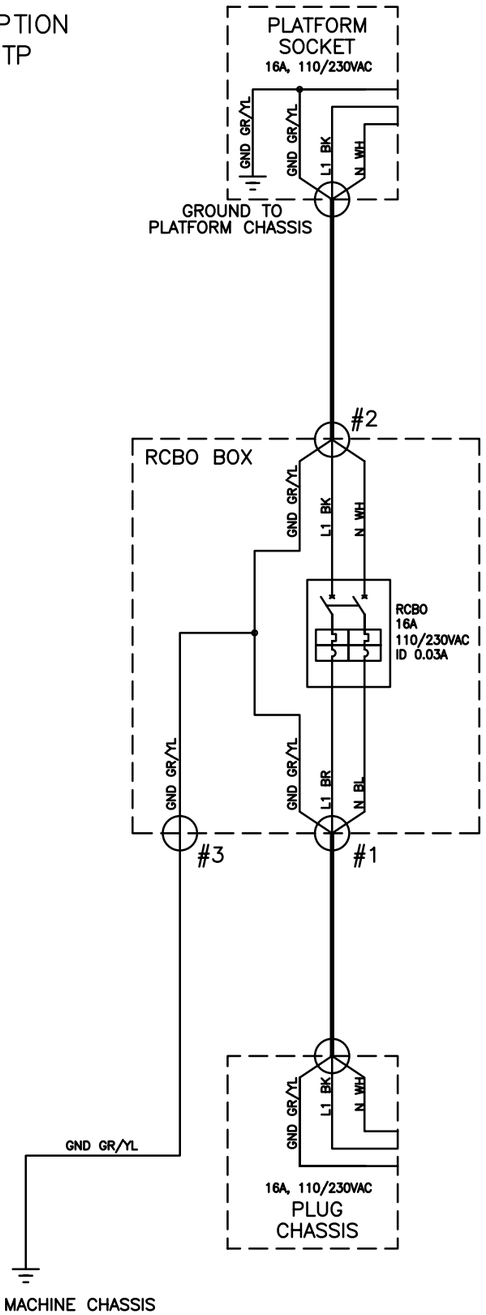


Wiring Diagram - Options

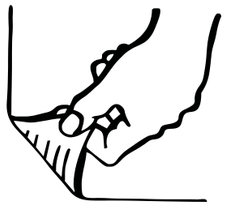
RCBO OPTION
USING INVERTER



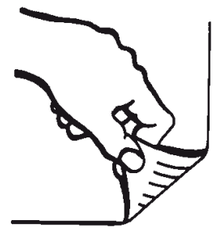
RCBO OPTION
USING PTP



Wiring Diagram - Options



Schematics - Options, DC and FE Models

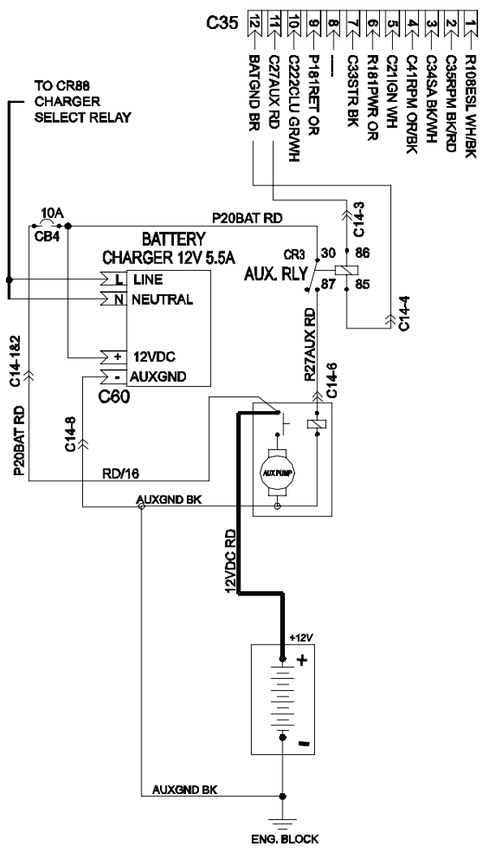


Schematics - Options, DC and FE Models

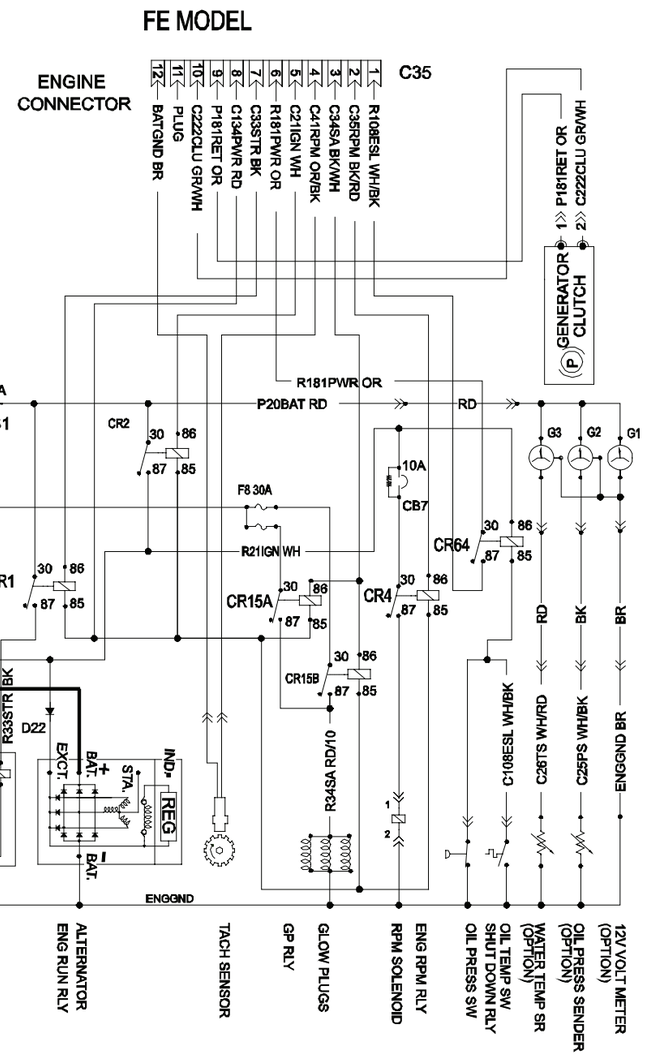
A B C D E F G H

1 2 3 4 5 6

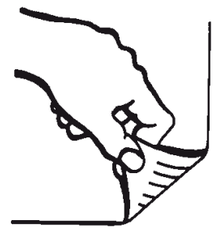
DC MODEL ONLY



FE MODEL

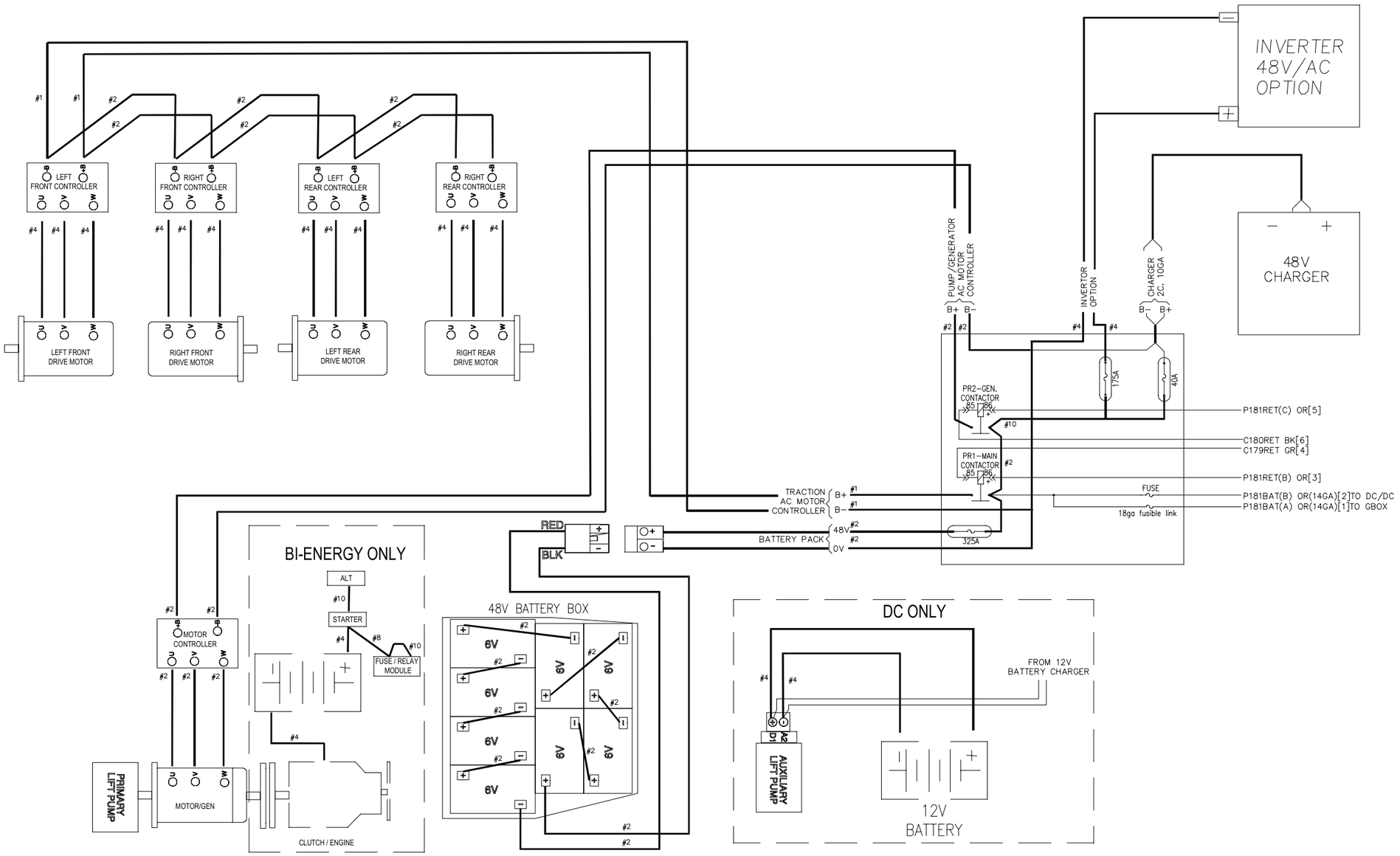


Power Cable Wiring Diagram

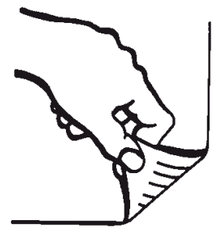


Wiring Diagram - Options

POWER CABLE DIAGRAM
Z45FE/DC

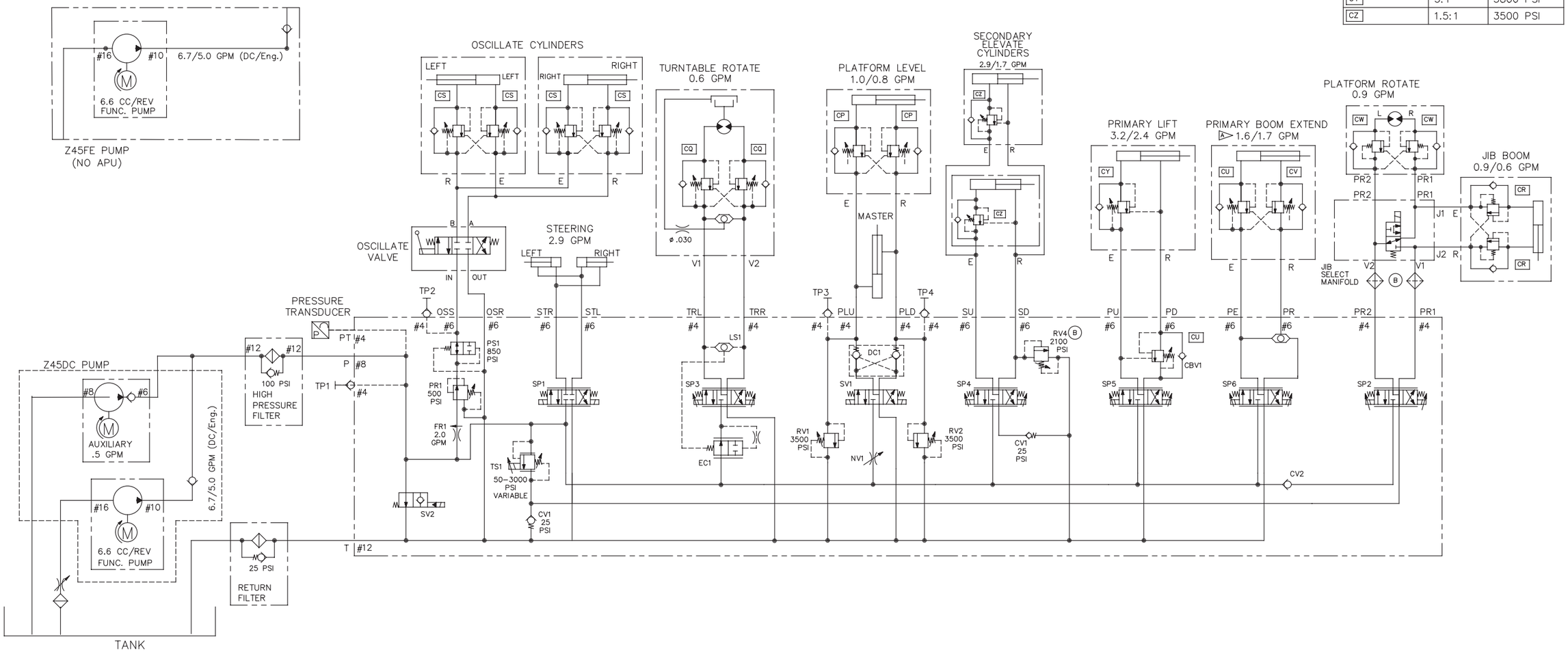


Hydraulic Schematic



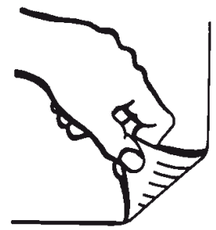
Hydraulic Schematic, DC/FE Models

CP	3:1	3500 PSI
CQ	4.25:1	3626 PSI
CR	3:1 (B)	3000 PSI
CS	10:1	3250 PSI
CU	3:1	1000 PSI
CV	3:1	1500 PSI
CW	3:1	3300 PSI
CY	3:1	3800 PSI
CZ	1.5:1	3500 PSI

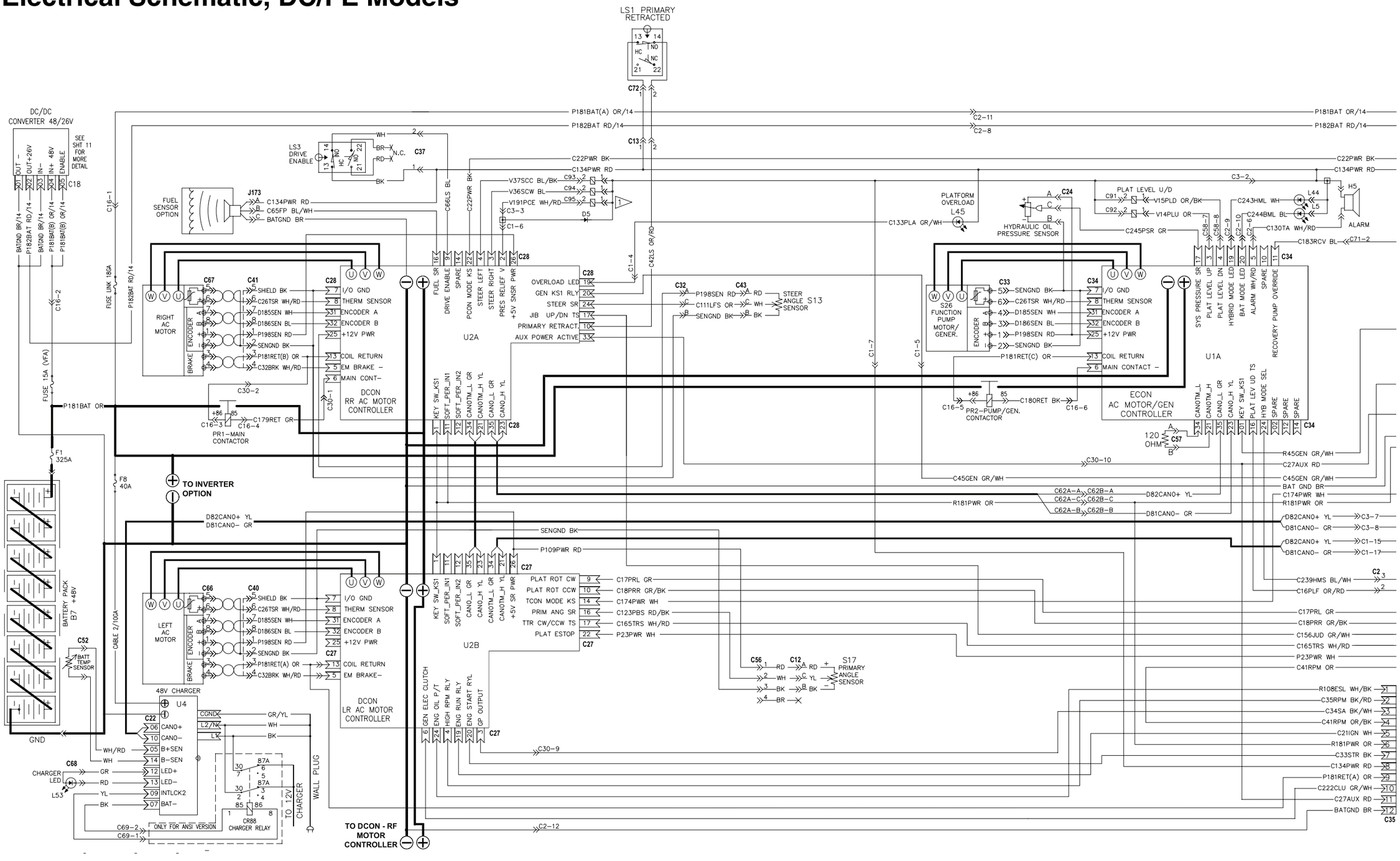


NOTE:
(A) Value excludes the regen. flow

Electrical Schematic, DC/FE Models



Electrical Schematic, DC/FE Models



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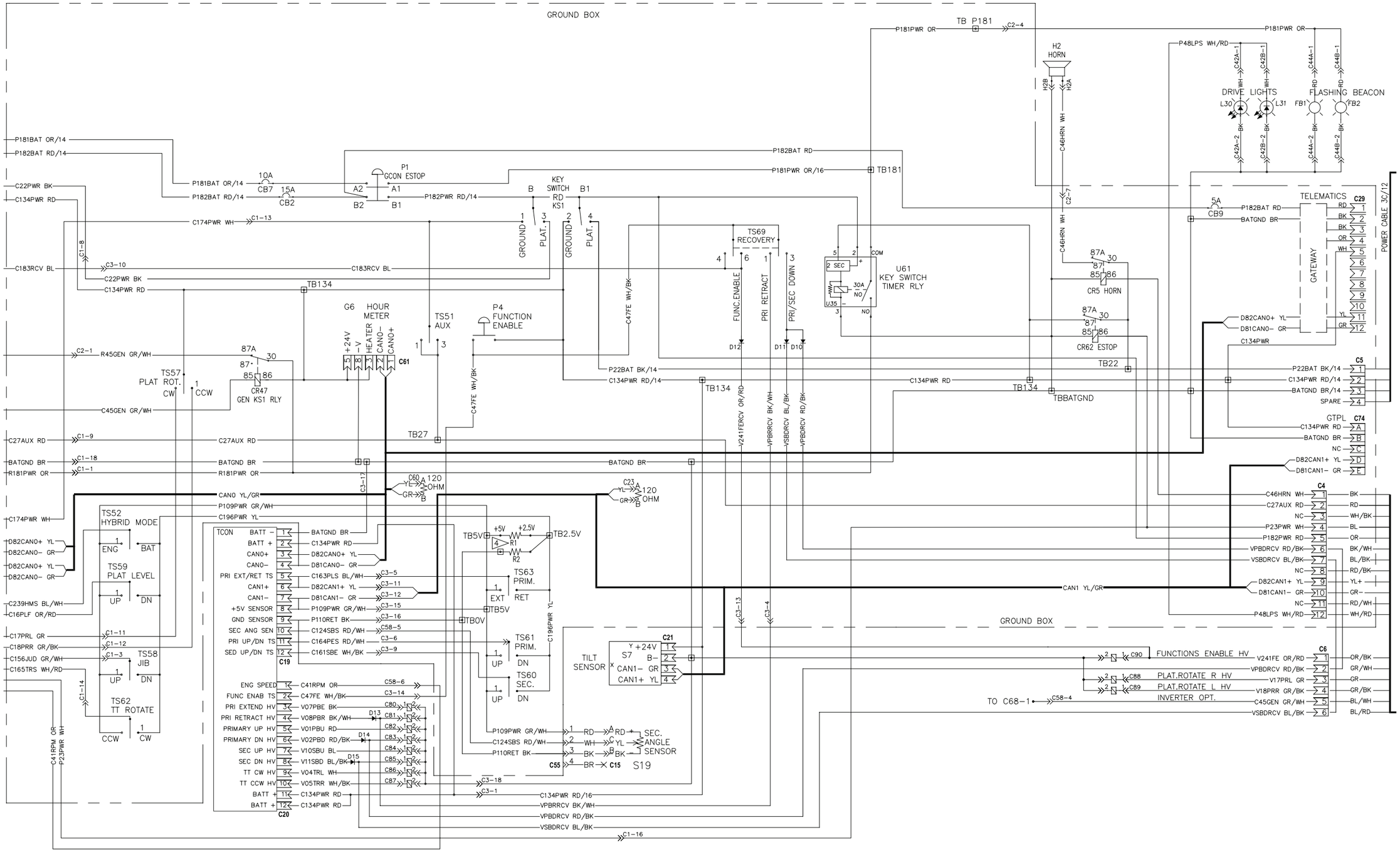

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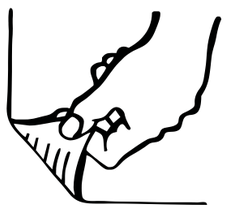

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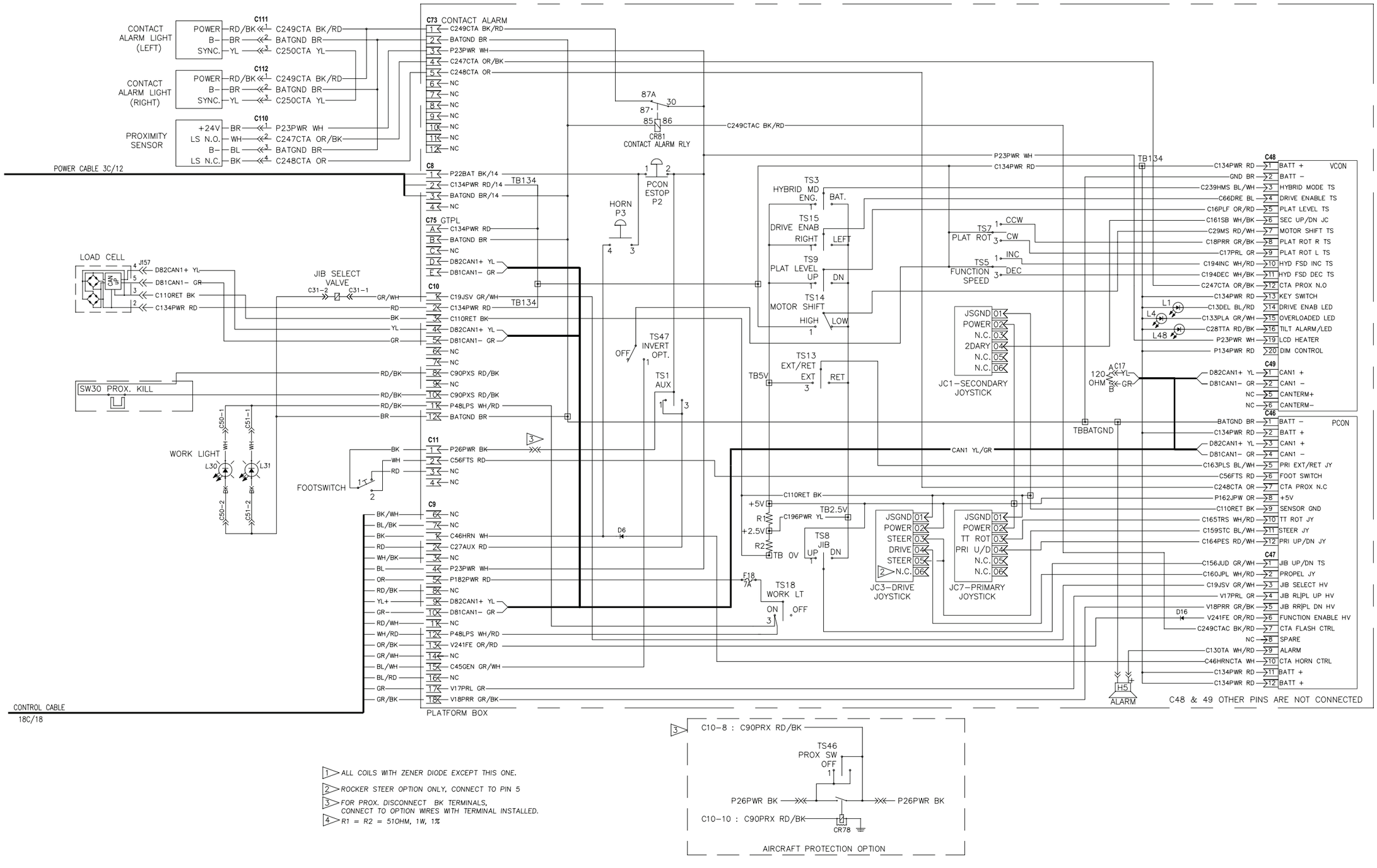

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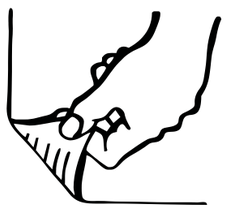
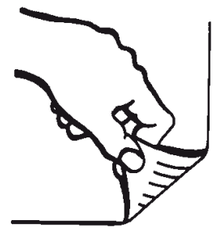


Ground Control Box Terminal Strip Wiring Diagram, DC/FE Models



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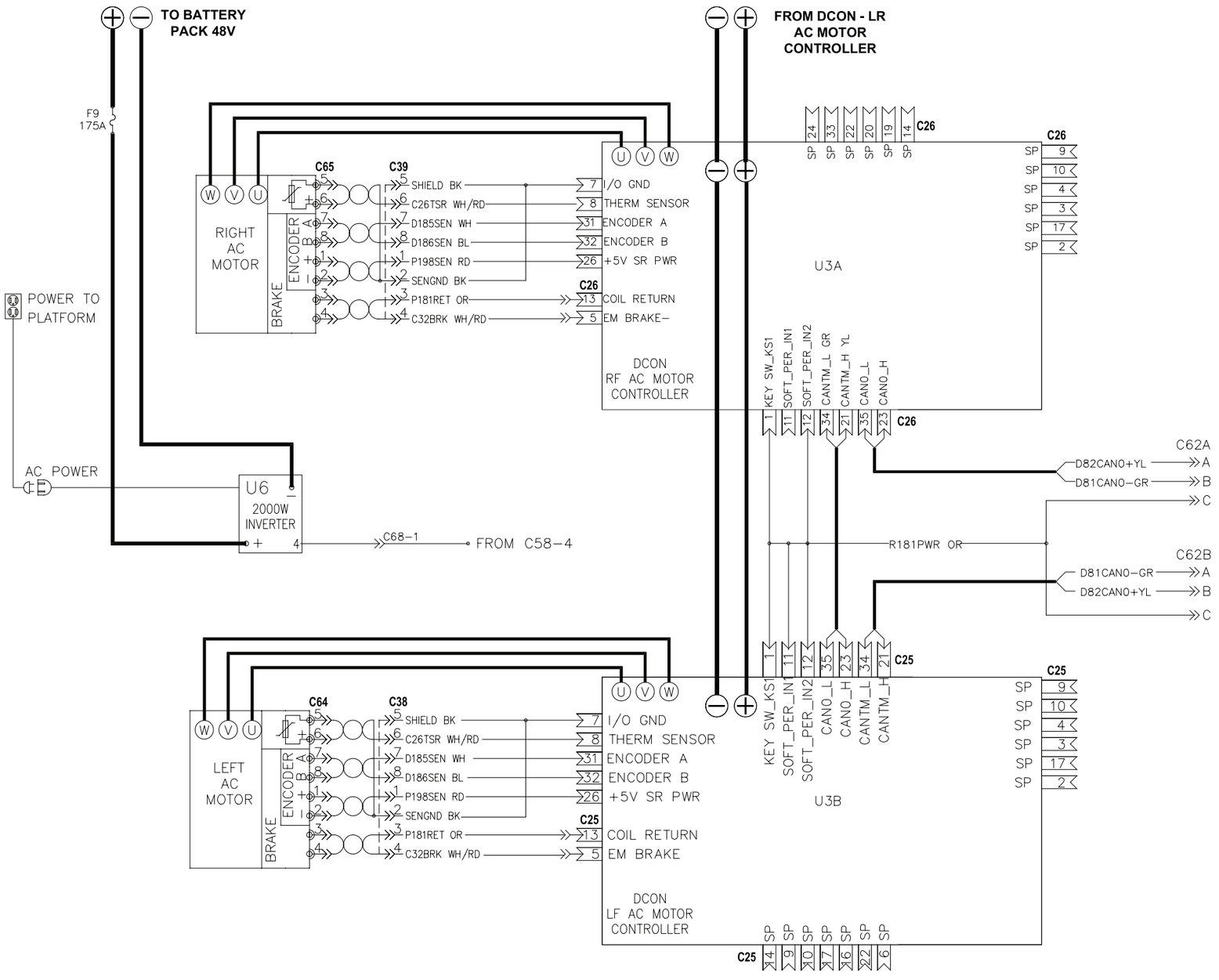
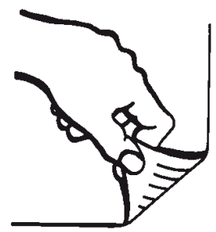


Ground Control Box Terminal Strip Wiring Diagram, DC/FE Models



California Proposition 65

WARNING

Operating, servicing and maintaining this equipment, passenger vehicle or off-highway motor vehicle 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.

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