Genie
A TEREX BRAND

Service and Repair Manual

Serial Number Range

SX™-135 XC™

from SX135H-101
from SX135D-112

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

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

Original Instructions
Part No. 1263383GT
Rev D
April 2023

Introduction

Important

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

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

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

Compliance

Machine Classification

Group B/Type 3 as defined by ISO 16368

Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

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

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

Contact Us:

Internet: www.genielift.com
E-mail: awp.techpub@terex.com

Find a Manual for this Model

Go to http://www.genielift.com

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

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First Edition, Fourth Printing

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Revision History

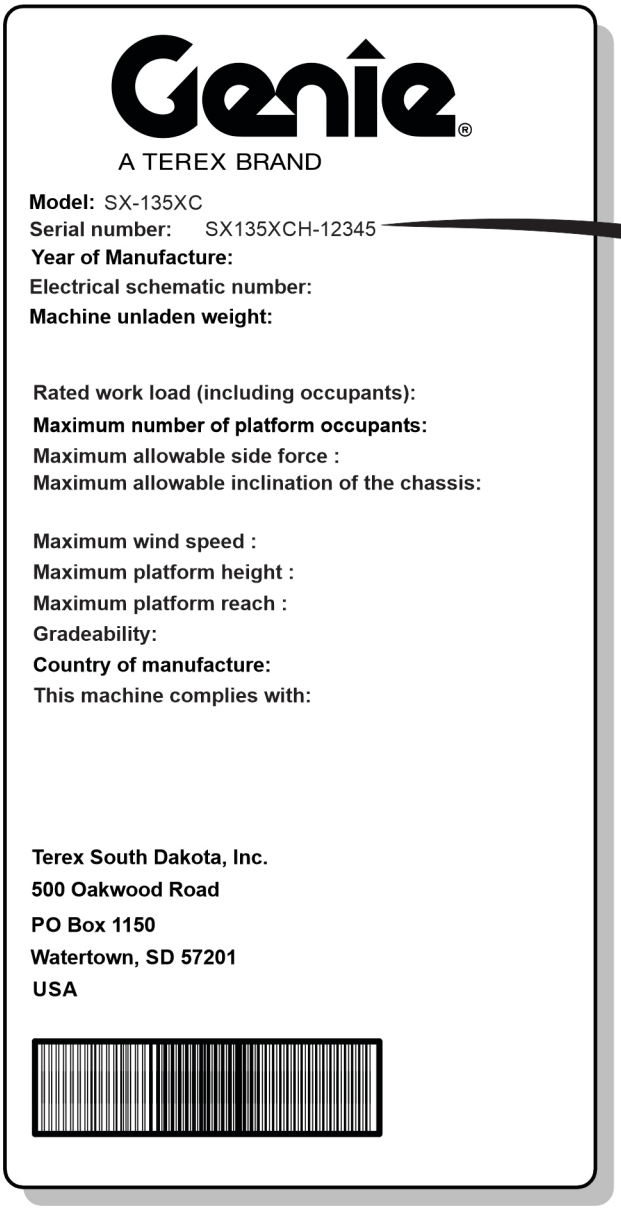
Revision	Date	Section	Procedure / Page / Description
A	10/2016		Initial Release
B	1/2017	Cover	Changed part number from 1263382GT to 1263383GT
		Repair	How to Adjust Load Cell Pre-load Update Function Manifold, Steer Manifold
B1	1/2017	Specifications	Platform rotator torque
C	5/2017	Repair	1-2 Joysticks 2-5 Platform Overload System 3-6 Jib Boom Bellcrank Angle Sensor 4-6 Primary Boom Angle Sensor 4-7 Boom Length Sensor 6-4 Full Machine Calibration 9-2 Turntable Level Sensor 10-2 Axle Angle Sensors Display Module - Boom Function Speeds Display Module - Sensor Calibration Display Module - Options
C1	7/2017	Repair Schematics	Control System Numerical Fault Codes Generator Manifold Hydraulic Schematic
C2	11/2017	Fault Codes Schematics	Updated references to LSB2RO Updated references to LSB2RO
Reference Examples:			**Electronic Version** Click on any content or procedure in the Table of Contents to view the update.
Section – Repair Procedure, 4-2			
Section – Fault Codes, All charts			
Section – Schematics, Legends and schematics			

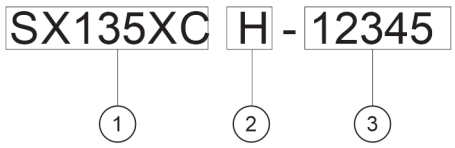
Introduction

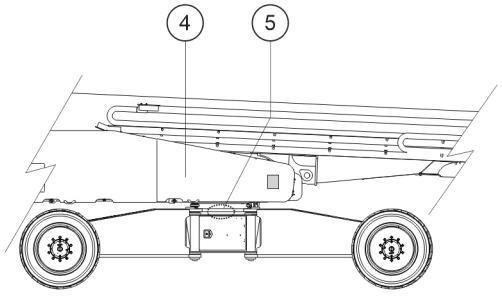
Revision History

Revision	Date	Section	Procedure / Page / Description
C3	8/2018	Fault Codes	Added LSB1RS/LSJ1RO Cross-check, Jib Bellcrank Loop Valve, Platform Level Loop Valve, Axle Retract Enable Valve, Fuel Level Sensor
C4	12/2018	Specifications	Rotate hub torque value
C5	12/2018	Repair	10-1 Cal. All Steer Sensors
D	4/2023	All Sections	Add Deutz TCD 2.2 L3, TD 2.9 L4 Stage IV
		Repair	2-5
Reference Examples:			
Section – Maintenance, B-3			**Electronic Version** Click on any content or procedure in the Table of Contents to view the update.
Section – Repair Procedure, 4-2			
Section – Fault Codes, All charts			
Section – Schematics, Legends and schematics			

Serial Number Legend







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

Safety Rules



Danger

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

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

Do not modify or alter a MEWP without prior written permission from the manufacturer.

Do Not Perform Maintenance Unless:

☑ You are trained and qualified to perform maintenance on this machine.

☑ You read, understand and obey:

- manufacturer's instructions and safety rules
- employer's safety rules and worksite regulations
- applicable governmental regulations

☑ You have the appropriate tools, lifting equipment and a suitable workshop.

Safety Rules

Personal Safety

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



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



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

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

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

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

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



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



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

Workplace Safety

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



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



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



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



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



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



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

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Specifications

Machine Specifications

Tires and wheels	
Tire size	445D50/710, FF
Tire ply rating	18
Tire weight, new foam-filled (minimum)	850 lbs 386 kg
Overall tire diameter	45.47 in 115.5 cm
Wheel diameter	28 in 71.1 cm
Wheel width	15 in 38.1 cm
Wheel lugs	10 @ 3/4 - 16
Lug nut torque, dry	320 ft-lbs 434 Nm
Fluid capacities	
Fuel tank	40 gal 151 liters
Hydraulic tank	60 gal 227 liters
Hydraulic system (including tank)	138 gal 522 liters
Drive hubs	67 fl oz 1981 cc
Turntable rotation drive hub	43 fl oz 1262 cc
Drive hub oil type: SAE 90 multipurpose hypoid gear oil API service classification GL5	

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

Specifications

Performance Specifications

Drive speed, maximum	
Stowed position, high speed	2.7 mph 3.7 km/h 40 ft / 9 - 12 sec 12.2 m / 9 - 12 sec
Raised or extended	0.4 mph 0.65 km/h 18 ft / 31 -34 sec 5.5 m / 31 - 34 sec

Braking distance, maximum	
High range on paved surface	6 ft / 2 m
Gradeability	Refer to Operator's Manual

Boom function speeds, maximum from platform controls	
Jib boom up/down (retracted)	60 - 65 sec
Jib boom up/down (extended)	120 - 130 sec
Jib boom extend/retract (full extend to full retract)	50 - 60 sec
Primary boom extend/retract	30 - 33 sec / 0 - 100 in / 254 cm
Primary boom up/down (stowed)	88 - 94 sec / 75°
Primary boom up/down string pot = 138 in / 351 cm	26 - 29 sec / 10°
Primary boom up/down string pot = 202 in / 513 cm	24 - 27 sec / 10°
Primary boom up/down string pot = 268 in / 681 cm	34 - 37 sec / 10°
Primary boom up/down string pot = 357 in / 907 cm	21 - 24 sec / 5°
Turntable rotate,drive enable to drive enable (30°) fully stowed	17 - 23 sec
Turntable rotate, drive enable to drive enable (30°) string pot = 12 in / 30.5 cm	28 - 34 sec
Turntable rotate, drive enable to drive enable (30°) string pot = 137 in / 348 cm	48 - 54 sec

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

Hydraulic Oil Specifications

Hydraulic Fluid Specifications	
Genie specifications require hydraulic oils which are designed to give maximum protection to hydraulic systems, have the ability to perform over a wide temperature range, and the viscosity index should exceed 140. They should provide excellent antiwear, oxidation prevention, corrosion inhibition, seal conditioning, and foam and aeration suppression properties.	
Cleanliness level, minimum	ISO 15/13
Water content, maximum	250 ppm
Recommended Hydraulic Fluid	
Hydraulic oil type	Chevron Rando HD Premium
ISO Grade	32
Viscosity index, maximum	200
Optional Hydraulic Fluids	
Mineral based	Shell Tellus S2 V 32 Shell Tellus S2 V 46 Shell Tellus S4 VX 32 Shell Donax TG (Dexron III) Chevron 5606A
Biodegradable	Petro Canada Environ MV 46
Fire resistant	UCON Hydrolube HP-5046

Note: Genie specifications require additional equipment and special installation instructions for the approved optional fluids. Consult Genie Product Support before use.

NOTICE

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

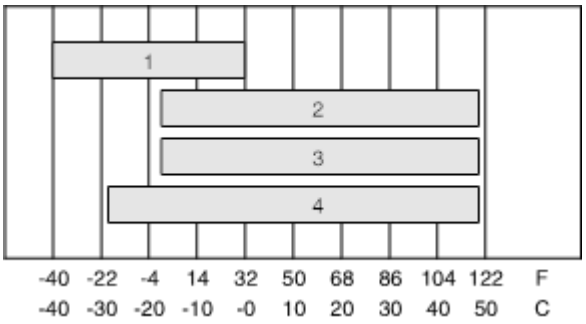
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond its maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

NOTICE

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

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

Hydraulic Fluid Temperature Range



Ambient air temperature

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

Specifications

Chevron Rando HD Premium Oil MV Fluid Properties

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

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

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

Chevron 5606A Hydraulic Oil Fluid Properties

ISO Grade	15
Viscosity index, maximum	300
Kinematic Viscosity, maximum 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, maximum	154
Kinematic Viscosity, maximum 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

Specifications

Shell Tellus S4 VX Fluid Properties

ISO Grade	32
Viscosity index, maximum	300
Kinematic Viscosity, maximum cSt @ 200°F / 100°C cSt @ 104°F / 40°C	 9 33.8
Brookfield Viscosity, maximum cSt @ -4°F / -20°C cSt @ -13°F / -25°C cSt @ -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

UCON Hydrolube HP-5046 Fluid Properties

ISO Grade	46
Viscosity index, maximum	192
Kinematic Viscosity, maximum 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

Hydraulic Component Specifications

Drive Pump	
Type: bi-directional variable displacement piston pump	
Displacement per revolution	2.8 cu in 46 cc
Flow rate @ 2450 rpm	30 gpm 114 L/min
Drive pressure, maximum	3625 psi 250 bar
Charge Pump	
Type	gerotor
Displacement per revolution	0.85 cu in 13.9 cc
Flow rate @ 2450 rpm	9 gpm 34 L/min
Charge pressure @ 2450 rpm Neutral position	315 psi 21.7 bar
Function Pump	
Type	variable displacement piston pump
Displacement per revolution	0 to 2.8 cu in 0 to 45 cc
Flow rate @ 2450 rpm	0 to 29 gpm 0 to 109.7 L/min
Pressure, maximum	2900 psi 200 bar
Pressure compensator	2900 psi 200 bar
Standby pressure	350 psi 24 bar

Specifications

Auxiliary pump	
Type	fixed displacement gear pump
Displacement per revolution	0.15 cu in 2.47 cc

Function manifold	
System relief valve pressure, maximum	3200 psi 221 bar
Primary boom extend relief pressure (measured at PTEST port)	2350 psi 162 bar

Platform Manifold	
Platform rotate and platform level flow regulator	0.2 gpm 0.76 L/min

Steer/Axle Manifold	
Axle extend relief pressure	2400 psi 165 bar

Traction Manifold	
Hot oil relief pressure	240 psi 16.5 bar

Brakes	
Brake relief pressure	160 psi 11 bar

Drive Motors	
Displacement per revolution high speed:	1.19 cu in 19.5 cc
Displacement per revolution low speed	2.7 cu in 45 cc

Hydraulic Filters	
High pressure filter:	Beta 5 ≥1000
High pressure filter bypass pressure	102 psi 7 bar
Medium pressure filter	Beta 3 ≥200
Medium pressure filter bypass pressure	51 psi 3.5 bar
Hydraulic tank return filter	10 micron with 25 psi / 1.7 bar bypass
Drive motor case drain return filter	Beta 10 ≥2

Manifold Component Specifications

Plug torque	
SAE No. 2	36 in-lbs / 4 Nm
SAE No. 4	10 ft-lbs / 13 Nm
SAE No. 6	14 ft-lbs / 19 Nm
SAE No. 8	38 ft-lbs / 51 Nm
SAE No. 10	41 ft-lbs / 55 Nm
SAE No. 12	56 ft-lbs / 76 Nm

Specifications

Deutz TD2011L04i Engine

Displacement	220.9 cu. in 3.62 liters
Number of cylinders	4
Bore and Stroke	3.78 x 4.92 inches 96 x 125 mm
Horsepower net intermittent @ 2400 rpm	74 hp 55 kW
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Low idle	1300 rpm
High idle	2450 rpm
Compression ratio	17.5:1
Compression pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	centrifugal mechanical
Valve clearance, cold	
Intake	0.012 in 0.3 mm
Exhaust	0.020 in 0.5 mm
Lubrication system	
Oil pressure, hot (@ 2000 rpm)	40 to 60 psi 2.8 to 4.1 bar
Oil capacity (including filter)	12.8 quarts 12.1 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-30 (synthetic)
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	
Oil temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	275°F 135°C
Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	22 psi 1.5 bar
Fuel injection system	Motorpal
Injection pump pressure, maximum	15,000 psi 1034 bar
Injector opening pressure	3046 psi 210 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	140 - 200A
Cranking speed	250 - 350 rpm
Battery – Auxiliary power units	
Type	6V DC
Quantity	2
Battery capacity, maximum	285 AH
Reserve capacity @ 25A rate	745 minutes
Battery – Engine starting and control system	
Type	12V DC, Group 31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Alternator output	80A @ 14V DC
Fan belt deflection	3/8 to 1/2 inch 9 to 12 mm

Specifications

Deutz TD 2.9 L4 Engine

Displacement	177 cu. in 2.9 liters
Number of cylinders	4
Bore and Stroke	3.6 x 4.3 inches 92 x 110 mm
Horsepower net intermittent @ 2600 rpm	74.2 hp 55 kW
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Low idle, standby	1000 rpm
Low idle, function enable	1500 rpm
High idle	2500 rpm
Compression ratio	17.4:1
Compression pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	electronic
Lubrication system	**Low ash oil required**
Oil pressure, hot (@ 2000 rpm)	40 to 60 psi 2.8 to 4.1 bar
Oil capacity (including filter)	9.4 quarts 8.9 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-30 (synthetic)
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	

Oil temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	275°F 135°C
Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	22 psi 1.5 bar
Fuel injection system	Motorpal
Injection pump pressure, maximum	15,000 psi 1034 bar
Injector opening pressure	3046 psi 210 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	140 - 200A
Cranking speed	250 - 350 rpm
Battery – Engine starting and control system	
Type	12V DC, Group 31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Alternator output	95A @ 14V DC
Fan belt deflection	3/8 - 1/2 inch 9 - 12 mm

Specifications

Deutz TCD 2.2 L3 Engine

Displacement	134 cu. in 2.2 liters
Number of cylinders	3
Bore and Stroke	3.6 x 4.3 inches 92 x 110 mm
Horsepower net intermittent @ 2600 rpm	74 hp 55 kW
Induction system	turbocharged
Firing order	1 - 2 - 3
Low idle, standby	1000 rpm
Low idle, function enable	1500 rpm
High idle	2400 rpm
Governor	electronic
Lubrication system	Low ash oil required
Oil pressure, hot (@ 2000 rpm)	40 - 60 psi 2.8 - 4.1 bar
Oil capacity (including filter)	8 quarts 7.6 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-30 (synthetic)
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	

Oil temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	257°F 125°C
Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	17.4 psi 1.2 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Engine coolant capacity	2.5 gallons 9.5 liters
Unit ships with Ethylene Glycol engine coolant. Consult your local supplier for compatibility before mixing alternative engine coolants.	
Starter motor	
Current draw, normal load	140 - 200A
Cranking speed	250 - 350 rpm
Battery – Engine starting and control system	
Type	12V DC, Group 31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 minutes
Alternator output	95A @ 14V DC

Specifications

Perkins 1104D-44T Engine

Displacement	268.5 cu. in 4.4 liters
Number of cylinders	4
Bore and Stroke	4.13 x 5 inches 105 x 127 mm
Horsepower net intermittent @ 2200 rpm	68 hp / 50.7 kW 74 hp / 55.2 kW
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Low idle	1300 rpm
High idle	2450 rpm
Compression ratio	18.2:1
Compression pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	centrifugal mechanical
Valve clearance, cold	
Intake	0.008 in 0.2 mm
Exhaust	0.018 in 0.45 mm
Lubrication system	
Oil pressure, hot (@ 2000 rpm)	40 to 60 psi 2.8 to 4.1 bar
Oil capacity (including filter)	10.4 quarts 9.8 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-20
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	

Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	8 psi 0.55 bar
Oil Sensor Settings	
0 psi	10 ohms
50 psi	120 ohms
Fuel injection system	
Transfer pump pressure	10-12 psi / 0.69-0.83 bar
Injection pressure	(4264+116 psi) / (294+8 bar)
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	115A
Cranking speed	200 - 250 rpm
Battery – Auxiliary power units	
Type	6V DC
Quantity	2
Battery capacity, maximum	285 AH
Reserve capacity @ 25A rate	745 minutes
Battery – Engine starting and control system	
Type	12V DC, Group 31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes

Specifications

Perkins 1104D-44T cont.

Engine coolant	
Capacity (engine only)	9.5 quarts 9 liters
Coolant temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	230°F 110°C
Temperature Sensor Settings	
215°F 102°C	37 ohms
170°F 82°C	78 ohms
Alternator output	85A @ 12V DC
Fan belt deflection	3/8 to 1/2 inch 9 to 12 mm

Specifications

Perkins 854F-34T Engine

Displacement	207 cu. in 3.4 liters
Number of cylinders	4
Bore and Stroke	3.89 x 4.33 inches 99 x 110 mm
Horsepower net intermittent @ 2500 rpm	74 hp / 55.2 kW
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Standby speed	1000 rpm
Low idle	1500 rpm
High idle	2450 rpm
Compression ratio	17.0:1
Compression pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	Electronic
Lubrication system	
Oil pressure, hot (@ 2000 rpm)	40 - 60 psi 2.8 - 4.1 bar
Minimum oil pressure	12 psi 0.82 bar
Oil capacity (including filter)	7.7 quarts 7.3 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-20
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40

Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.

Oil Pressure switch	
Installation torque	18.4 ft-lbs 25 Nm
Pressure switch point	12 psi 0.82 bar
Oil Sensor Settings	
0 psi	10 ohms
50 psi	120 ohms
Fuel injection system	
Transfer pump pressure	10 - 12 psi / 0.69- 0.83 bar
Injection pressure	23000 psi 1600 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Glow plugs	
Initial load (0-10 sec)	80A
Continuous load (>10 sec)	40A
Starter motor	
Current draw, normal load	68A
Cranking speed	130 - 200 rpm
Battery – Auxiliary power units	
Type	6V DC
Quantity	2
Battery capacity, maximum	285 AH
Reserve capacity @ 25A rate	745 minutes
Battery – Engine starting and control system	
Type	12V DC, Group 31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes

Specifications

Perkins 854F-34T cont.	
Engine coolant	
Capacity (50/50 extended life)	16.5 quarts 15.6 liters
Coolant temperature switch	
Installation torque	18.4 ft-lbs 25 Nm
Maximum continuous temperature	226°F 108°C
Temperature Sensor Settings	
215°F 102°C	37 ohms
170°F 82°C	78 ohms
Alternator output	120A @ 12V DC
Fan belt deflection	3/8 - 1/2 inch 9 - 12 mm

Machine Torque Specifications

Platform Rotator	
1-8 center bolt, GR 5, dry	500 ft-lbs 678 Nm
1/2-13 bolts, GR 8, threadlock	90 ft-lbs 122 Nm*
Turntable rotate assembly	
Rotate bearing mounting bolts, lubricated (5/8-11 SHC)	180 ft-lbs 244 Nm
Rotate bearing mounting bolts, lubricated (3/4-10 SHC)	320 ft-lbs 434 Nm
Rotate drive hub mounting bolts, dry	80 ft-lbs 108.5 Nm
Backlash plate mounting bolts, lubricated	320 ft-lbs 434 Nm
Drive motors and hubs	
Drive hub mounting bolts, lubricated	205 ft-lbs 288 Nm
Drive motor mounting bolts, dry	165 ft-lbs 224 Nm
Engine vibration isolators	
Compressed height	>0.375 in
Compressed height	<0.625 in

Machine Component Weights

Primary boom assembly (does not include jib assembly)	8725 lbs 3958 kg
Primary boom lift cylinder	825 lbs 374 kg
Primary boom extend cylinder	1550 lbs 703 kg
Platform level cylinder	50 lbs 23 kg
Jib boom assembly	1675 lbs 760 kg
Jib boom cylinder	145 lbs 66 kg
Jib boom extend cylinder	170 lbs 77 kg
Bellcrank cylinder	200 lbs 91 kg
Turntable assembly (does not include counterweight)	11483 lbs 5072 kg
Counterweight	9450 lbs 4287 kg
Drive chassis assembly	15275 lbs 6929 kg
Axle extend/retract cylinder	230 lbs 104 kg
Drive hub	253 lbs 115 kg
Drive motor	35 lbs 16 kg
Engine assembly	1375 lbs 624 kg
Battery – Engine starting and control system	63 lbs 29 kg
Battery – Auxiliary power units	88 lbs 40 kg
Platform, 6 ft / 1,8 m	275 lbs 125 kg
Platform, 8 ft / 2,4 m	315 lbs 143 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 / 25 Nm
-6	30 ft-lbs / 41 Nm
-8	40 ft-lbs / 55 Nm
-10	60 ft-lbs / 81 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	150 ft-lbs / 205 Nm
-24	230 ft-lbs / 315 Nm

JIC 37° Fittings

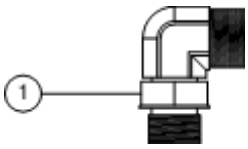
(swivel nut or hose connection)

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

SAE O-ring Boss Port

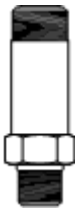
(tube fitting - installed into Aluminum)
(all types)

SAE Dash Size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31.2 Nm
-8	36 ft-lbs / 49 Nm
-10	62 ft-lbs / 84 Nm
-12	84 ft-lbs / 114 Nm
-16	125 ft-lbs / 169.5 Nm
-20	151 ft-lbs / 204.7 Nm
-24	184 ft-lbs / 249.5 Nm



Adjustable Fitting

1 jam nut



Non-adjustable fitting

SAE O-ring Boss Port

(tube fitting - installed into Steel)

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

Torque Procedure

Seal-Lok™ fittings

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

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

2 Lubricate the O-ring before installation.

3 Be sure the O-ring face seal is seated and retained properly.

4 Position the tube and nut squarely on the face seal end of the fitting, and tighten the nut finger tight.

5 Tighten the nut or fitting to the appropriate torque. Refer to the appropriate torque chart in this section.

6 Operate all machine functions and inspect the hose, fittings and related components to confirm there are no leaks.

JIC 37° fittings

1 Align the tube flare (hex nut) against the nose of the fitting body (body hex fitting) and tighten the hex nut to the body hex fitting to hand tight, approximately 30 in-lbs / 3.4 Nm.

2 Using a permanent ink marker, make a reference mark on one the flats of the hex nut and continue the mark onto the body of the hex fitting. Refer to Illustration 1.

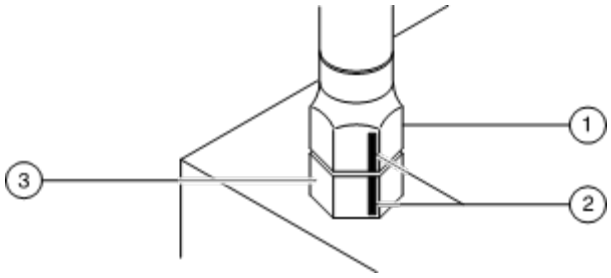


Illustration 1

1 hex nut
2 reference mark
3 body hex fitting

Specifications

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

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

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

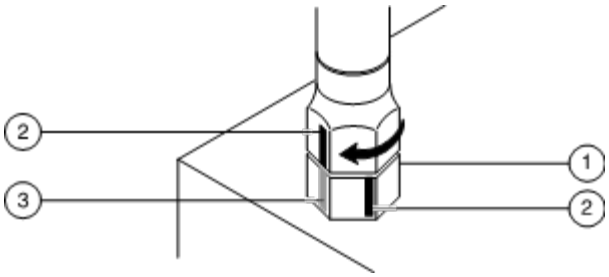


Illustration 2

1 body hex fitting
2 reference mark
3 second mark

4 Tighten the hex nut until the mark on the hex nut is aligned with the second mark on the body hex fitting.

5 Operate all machine functions and inspect the hose, fittings and related components to confirm there are no leaks.

Repair Procedures



Observe and Obey:

☑ Repair procedures shall be completed by a person trained and qualified on the repair of this machine.

☑ Immediately tag and remove from service a damaged or malfunctioning machine.

☑ Repair any machine damage or malfunction before operating the machine.

Before Repairs Start:

☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.

☑ Be sure that all necessary tools and parts are available and ready for use.

☑ Use only Genie approved replacement parts.

☑ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous conditions.

Machine Configuration:

☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:

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

Repair Procedures

About This Section

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

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

Symbols Legend



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

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

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

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

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

⊙ Indicates that a specific result is expected after performing a series of steps.

☒ Indicates that an incorrect result has occurred after performing a series of steps.

1-1
Platform Circuit Board

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

Note: When the platform circuit board is replaced, the joystick controllers will need to be calibrated. Refer to Repair Procedure, *How to Calibrate a Joystick.*

How to Remove the Circuit Board

1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.

2 Locate the cables that connect to the bottom of the control box. Number each cable and its location at the control box.

3 Disconnect the cables from the bottom of the platform control box.

4 Remove the control cable receptacle retaining fasteners from the bottom of the platform control box.

5 Remove the platform control box lid retaining fasteners. Open the control box lid.

6 Locate the circuit board mounted to the inside of the platform control box.

7 Attach an ESD grounded wrist strap to the ground screw inside the control box.

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

NOTICE Component damage hazard. Electrostatic discharge (ESD) can damage printed circuit board components. Maintain firm contact with a metal part of the machine that is grounded at all times when handling printed circuit boards OR use a grounded wrist strap.

8 Tag and carefully disconnect the wire connectors from the circuit board.

9 Tag and disconnect the ribbon cable from the LED circuit board.

10 Remove the circuit board mounting fasteners.

11 Carefully remove the circuit board from the control box.

Platform Controls

How to Remove the LED Circuit Board

1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.

2 Remove the platform control box lid retaining fasteners. Open the control box lid.

3 Locate the circuit board mounted to the inside of the platform control box.

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

NOTICE Component damage hazard. Electrostatic discharge (ESD) can damage printed circuit board components. Maintain firm contact with a metal part of the machine that is grounded at all times when handling printed circuit boards OR use a grounded wrist strap.

4 Tag and carefully disconnect the ribbon cables from the membrane circuit board.

5 Remove the circuit board mounting fasteners.

6 Carefully remove the LED circuit board from the platform control box lid. Do not lose the plastic spacers.

Note: When installing the LED circuit board, be sure the plastic spacers are installed between the circuit board and the control box lid.

1-2 Joysticks

How to Calibrate a Joystick

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

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

Note: After each joystick is calibrated, check the display at the ground control box. There should be no calibration faults shown on the display. If calibration faults exist, repeat procedure for that joystick controlled function.

Note: If *Joystick Not Calibrated* is displayed at the ground control box, proceed to step 7 for that joystick controlled function procedure.

Note: Perform this procedure with the engine off.

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



Plus Minus Previous Enter

Platform Controls

Drive functions:

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the scroll button to scroll through the menu until DELETE DRIVE JOYSTICK DEFAULTS is displayed.

5 Press the **plus** button to select YES, then press the **enter** button.

6 Do not start the engine.

7 Locate the drive/steer joystick.

8 Move the drive/steer joystick full stroke in the forward direction and hold for 5 seconds, then return to the center or neutral position.

9 Move the drive/steer joystick full stroke in the reverse direction and hold for 5 seconds, then return to the center or neutral position.

⊙ Result: The alarm at the ground controls should sound for a successful calibration.

Steer functions:

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the scroll button to scroll through the menu until DELETE STEER JOYSTICK DEFAULTS is displayed.

5 Press the **plus** button to select YES, then press the **enter** button.

6 Do not start the engine.

7 Locate the drive/steer joystick.

8 Move the drive/steer joystick or thumb rocker switch (if equipped) full stroke in the left direction and hold for 5 seconds, then return to the center or neutral position.

9 Move the drive/steer joystick or thumb rocker switch (if equipped) full stroke in the right direction and hold for 5 seconds, then return to the center or neutral position.

⊙ Result: The alarm at the ground controls should sound for a successful calibration.

Platform Controls

Primary boom extend/retract functions:

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the scroll button to scroll through the menu until DELETE PRIMARY BOOM EXTEND/RETRACT JOYSTICK DEFAULTS is displayed.

5 Press the **plus** button to select YES, then press the **enter** button.

6 Do not start the engine.

7 Locate the thumb rocker switch on top of the primary boom/turntable rotate joystick.

8 Move the primary boom extend/retract thumb rocker switch full stroke in the extend direction and hold for 5 seconds, then return to thecenter or neutral position.

9 Move the primary boom extend/retract thumb rocker switch full stroke in the retract direction and hold for 5 seconds, then return to the center or neutral position.

⊙ Result: The alarm at the ground controls should sound for a successful calibration.

Primary boom up/down functions:

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the scroll button to scroll through the menu until DELETE PRIMARY BOOM UP/DOWN JOYSTICK DEFAULTS is displayed.

5 Press the **plus** button to select YES, then press the **enter** button.

6 Do not start the engine.

7 Locate the primary boom/turntable rotate joystick.

8 Move the boom/turntable rotate joystick full stroke in the up direction and hold for 5 seconds, then return to the center or neutral position.

9 Move the boom/turntable rotate joystick full stroke in the down direction and hold for 5 seconds, then return to the center or neutral position.

⊙ Result: The alarm at the ground controls should sound for a successful calibration.

Platform Controls

Jib boom up/down functions:

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the scroll button to scroll through the menu until RESET JIB BOOM UP/DOWN JOYSTICK DEFAULTS is displayed.

5 Press the **plus** button to select YES, then press the **enter** button.

6 Do not start the engine.

7 Locate the jib boom joystick.

8 Move the jib boom joystick full stroke in the up direction and hold for 5 seconds, then return to the center or neutral position.

9 Move the jib boom joystick full stroke in the down direction and hold for 5 seconds, then return to the center or neutral position.

⊙ Result: The alarm at the ground controls should sound for a successful calibration.

Turntable rotate functions:

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the scroll button to scroll through the menu until DELETE TURNTABLE ROTATE JOYSTICK DEFAULTS is displayed.

5 Press the **plus** button to select YES, then press the **enter** button.

6 Do not start the engine.

7 Locate the primary boom/turntable rotate joystick.

8 Move the boom/turntable joystick full stroke in the left direction and hold for 5 seconds, then return to the center or neutral position.

9 Move the boom/turntable joystick full stroke in the right direction and hold for 5 seconds, then return to the center or neutral position.

⊙ Result: The alarm at the ground controls should sound for a successful calibration.

Platform Controls

How to Reset a Proportional Valve Coil Default

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



Plus Minus Previous Enter

Note: This procedure only needs to be performed if a proportional valve has been replaced.

Note: After the valve coil defaults have been set, each machine function threshold and default function speed must be set. Refer to Repair Procedure, *How to Set the Function Thresholds and Default Function Speeds*.

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **minus** button twice, then press the **enter** button twice.

4 Use the **previous** button to scroll through the menu until the function valve that needs to be reset is displayed. Press the **plus** button to select yes, then press the **enter** button to save the setting.

5 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

6 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

How to Set the Function Thresholds and Default Functions Speeds

Note: Before the threshold and default function speeds can be set, the boom function proportional valve coil defaults must be set first. Refer to Repair Procedure*, How to Reset a Proportional Valve Coil Default.*

Note: If a boom function proportional valve coil has not been replaced and just want to reset the function speed to original factory settings, proceed to Function speeds procedure.

1 Start the engine from the platform controls.

2 Press down the foot switch.

Note: Be sure the engine rpm is set to foot switch activated high idle.

Function threshold:

3 Select a joystick controlled function that needs to have the threshold set.

4 Slowly move the joystick off center in either direction just until the machine function starts to move, then move the joystick very slowly towards the neutral or center position just before the machine function stops. Do not let go of the joystick.

5 While holding the joystick in position, press the engine start button at the platform controls to set the joystick controller threshold.

6 Slowly move the joystick off center in the opposite direction just until the machine function starts to move, then move the joystick very slowly towards the neutral or center position just before the machine function stops. Do not let go of the joystick.

7 While holding the joystick in position, press the engine start button at the platform controls to set the joystick controller threshold.

8 Repeat steps for each joystick controlled machine function:

- turntable rotate left/right.
- primary boom extend/retract.
- drive forward/reverse.

9 Once the threshold has been set, press and hold the engine start button until the engine shuts off. Do not press the red Emergency Stop button.

Note: Approximately 3 seconds after the engine shuts off, the alarm at the ground controls will sound to indicate the settings are being saved in memory.

10 At the ground controls, turn the key switch to the off position, wait a moment and then turn the key switch to platform controls.

11 Check the display at the ground controls to be sure there are no calibration faults.

Note: There should be no calibration faults shown on the display. If calibration faults exist, repeat this procedure.

Function speeds:

Note: Be sure the machine is in the stowed position and the boom is rotated between the circle end tires.

Note: Perform this procedure with the machine on a firm, level surface that is free of obstructions.

12 Start the engine from the platform controls.

13 Select the function that needs the function speeds set.

14 Press down the foot switch.

15 **Primary boom up/down functions:** Move the joystick full stroke in the up direction. When the alarm sounds, move the joystick in the opposite direction full stroke until the alarm sounds again. Return the joystick to center.

Turntable rotate functions: Move the joystick full stroke in either the left or right direction. When the drive enable indicator light turns on, move the joystick in the opposite direction full stroke until the alarm sounds. Return the joystick to center.

Extend the boom approximately 4 ft / 1.2 m, then again move the joystick full stroke in the opposite direction until the alarm sounds. Return the joystick to center.

Raise and extend the primary boom approximately 85 ft / 26 m, then again move the joystick full stroke in the opposite direction until the alarm sounds. Return the joystick to center.

Platform Controls

16 Once the function speeds have been set, press and hold the engine start button until the engine shuts off. Do not press the red Emergency Stop button.

Note: Approximately 3 seconds after the engine shuts off, the alarm at the ground controls will sound to indicate the settings are being saved in memory.

17 At the ground controls, turn the key switch to the off position, wait a moment and then turn the key switch to platform controls.

18 Check the display at the ground controls to be sure there are no calibration faults.

Note: There should be no calibration faults shown on the display. If calibration faults exist, repeat this procedure.

How to Adjust the Function Speeds

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

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



Plus Minus Previous Enter

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

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **plus** button twice, then press the **minus** button twice.

4 Press the **previous** button until the function to be adjusted is displayed.

5 Press the **plus** button to increase the speed or press the **minus** button to decrease the speed.

6 Press the **enter** button to save the setting in memory.

7 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

8 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

9 Continue to perform this procedure until the machine function speed meets specification. Refer to Specifications, *Performance Specifications*.

How to Adjust the Function Ramp Rate Setting

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

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

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



Plus Minus Previous Enter

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

2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.

3 Press the **plus** button twice, then press the **previous** button twice.

4 Press the **previous** button until the function to be adjusted is displayed.

5 Press the **plus** button to increase the ramp rate or press the **minus** button to decrease the ramp rate.

6 Press the **enter** button to save the setting in memory.

7 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

8 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

Platform Components

2-1 Platform

How to Remove the Platform

1 Separate the foot switch quick disconnect plug.

2 Support the platform with an appropriate lifting device.

3 Locate the cables that connect to the bottom of the control box. Number each cable and its location at the platform control box.

4 Disconnect the cables from the bottom of the platform control box.

5 Remove the platform control box mounting fasteners. Remove the platform control box and set it aside.

6 Remove the air line to platform bracket retaining fasteners (if equipped).

7 Remove the power to platform cover plate from the electrical outlet box. Do not disconnect the wiring.

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

8 Remove the power to platform electrical outlet box from the platform and lay it to the side.

9 Remove the weld cable from the platform (if equipped).

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

10 Support the platform mounting weldment, but do not apply any lifting pressure.

11 Remove the eight mounting bolts from the platform mounting weldment.

12 Remove the center bolt and slide the platform mounting weldment off of the platform rotator.

⚠WARNING Crushing hazard. The platform mounting weldment may become unbalanced and fall if it is not properly supported.

2-2
Platform Leveling Cylinder

The platform leveling cylinder keeps the platform level through the entire range of boom motion. The platform is maintained level to the turntable. To accomplish this, the ECM at the ground controls compares the difference in readings between the platform angle sensor and the turntable level sensor, which then sends a signal to the platform controls to open or close the appropriate platform level proportional valve on the platform manifold to maintain a level platform. The platform leveling 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: 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 jib boom until the platform leveling cylinder barrel-end pivot pin is accessible.

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

3 Lower the jib boom until the platform is resting on the blocks just enough to support the platform.

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

4 Place a block under the platform leveling cylinder for support.

5 Remove the external snap rings from the barrel-end pivot pin. Use a soft metal drift to remove the barrel-end pivot pin.

6 Support the rod end of the platform level cylinder.

7 Remove the pin retaining fasteners from the platform leveling cylinder rod-end pivot pin. Use a soft metal drift to remove the barrel-end pivot pin.

8 Carefully pull the platform leveling cylinder out of the boom to access the hydraulic hoses.

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

10 Remove the platform leveling cylinder from the machine.

⚠CAUTION Crushing hazard. The platform leveling cylinder may fall if not properly supported when removed from the machine.

Platform Components

2-3 Platform Rotator

The platform rotator is a hydraulically activated helical gear assembly used to rotate the platform 160 degrees.

How to Remove the Platform Rotator

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

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

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

2 Tag and disconnect the electrical connector from the platform angle sensor.

3 Remove the platform angle sensor retaining fasteners. Remove the platform angle sensor from the platform rotator.

NOTICE Component damage hazard. The platform angle sensor is a very sensitive instrument. It can be damaged internally if is dropped or sustains any physical shock, even if the damage is not visible.

4 Tag, disconnect and plug the hydraulic hoses from the platform rotator 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.

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

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

6 Remove the pin retaining fasteners from the jib boom and jib boom leveling arms to platform rotator pivot pins. Do not remove the pins.

7 Support the jib boom leveling arms with an overhead supporting device. Do not apply any lifting pressure.

8 Use a soft metal drift to remove both pins and remove the platform rotator from the machine.

⚠WARNING Crushing hazard. The jib boom leveling arms may fall if they are not properly supported when the jib boom leveling arm pivot pin is removed.

NOTICE Component damage hazard. The platform angle sensor is a very sensitive instrument. It can be damaged internally if is dropped or sustains any physical shock, even if the damage is not visible.

How to Bleed the Platform Rotator

Note: Do not start the engine. Use auxiliary power for all machine functions in this procedure.

1 Rotate the platform full right, then full left until air is completely out of the rotator. Bleeding the valve is not necessary.

Platform Components

2-4 Platform Level Sensor

The platform level sensor is mounted to the side of the platform rotator. The platform level sensor is monitored by the control system to maintain a level platform through boom range of motion. If a platform level sensor is replaced, it must be calibrated prior to machine operation.

How to Calibrate the Platform Level Sensor

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

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

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



Plus Minus Previous Enter

1 Secure a digital level to one of the side railings of the platform.

2 Start the machine and level the platform to gravity. Turn the machine off.

3 Open the ground control box.

4 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

5 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

6 Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The platform level calibration value will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.

7 Press and hold the **enter** button on the ground control panel while turning the key switch to ground controls. Hold the **enter** button for approximately 5 seconds.

8 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

9 Press the **enter** or **previous** button on the LCD screen until SET PLATFORM LEVEL SENSOR TO GRAVITY is displayed.

10 Press the **plus** button to select YES, then press the **enter** button to accept.

Note: The platform level sensor is calibrated at the factory for the correct millivolt/degree and will not need to be adjusted.

11 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

12 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

13 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

2-5 Platform Overload System

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

How to Perform a Zero Load Platform Calibration

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

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

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

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

Note: Remove the welder (if equipped).

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

3 Push in the ground controls red Emergency Stop button to the off position.

4 Turn the key switch to ground controls.

5 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

6 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

7 Press the **enter** or **previous** button on the LCD screen until CALIBRATE LOAD CELL ZERO is displayed.

8 Press the **plus** button to select YES, then press the **enter** button to accept.

9 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

10 Press the **plus** button to select YES, then press the **enter** button to accept.

11 Wait approximately 20 seconds and turn the machine off by pressing the red Emergency Stop button in.

Platform Components

How to Perform a Full Load Platform Calibration

Perform this procedure if the platform support or load cell sensor has been replaced, or if a zero load platform calibration does not return the machine to full load capacity.

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

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

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

Note: Remove the welder (if equipped).

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

3 Push in the ground controls red Emergency Stop button to the off position.

4 Turn the key switch to ground controls.

5 Open the ground control box.

6 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

7 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

8 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The platform overload calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.

9 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

10 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

11 Press the **enter** or **previous** button on the LCD screen until DELETE LOAD CELL FACTORY CALIBRATION is displayed.

12 Press the **plus** button to select YES, then press the **enter** button to accept.

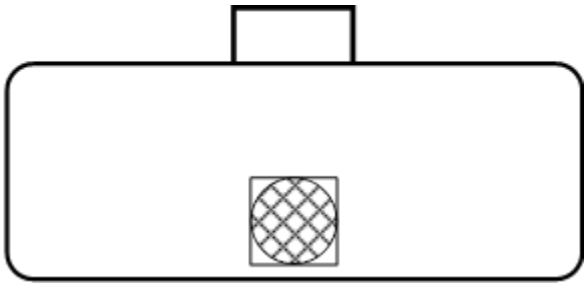
13 Press the **enter** or **previous** button on the LCD screen until CALIBRATE LOAD CELL ZERO is displayed.

14 Press the **plus** button to select YES, then press the **enter** button to accept.

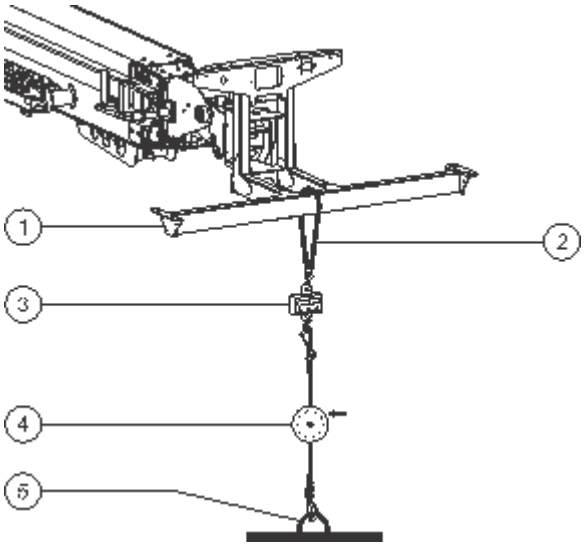
15 Place a test weight on the platform floor using a suitable lifting device. Place the weight near the center entry point of the platform, as far away from the operator controls as possible.

Note: Refer to the serial label located on the machine for the maximum platform capacity.

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



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



Platform hidden from illustration for clarity

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

16 Press the **enter** or **previous** button on the LCD screen until LOAD CELL FULL LOAD LBS or LOAD CELL FULL LOAD KGS is displayed. Press the **plus** or **minus** button to adjust the display to indicate the actual weight.

17 Press the **enter** button to accept.

18 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

19 Press the **plus** button to select YES, then press the **enter** button to accept.

20 Turn the bypass/recovery key switch to the run position.

21 Remove the key from the bypass/recovery key switch and insert the key into the main key switch.

22 Wait approximately 20 seconds and turn the machine off by pressing the red Emergency Stop button in.

23 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

Confirm calibration:

24 Start the engine from the ground controls.

Platform Components

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

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

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

26 Test all machine functions from the ground controls.

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

⊙ Remove the weight or rated load from the platform.

How to Replace the Load Cell Sensor

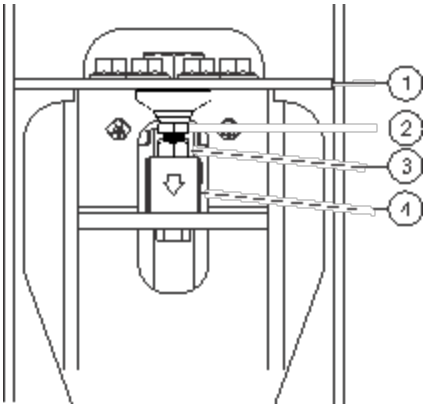
Note: The preload adjustment should only be performed after the load cell sensor has been replaced.

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

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

3 Tag and disconnect the load cell sensor harness.

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



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

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

Install the new Load Cell Sensor

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

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

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

Set the Load Cell Sensor Preload

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

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

10 Attach the load cell sensor harness.

11 Install the plastic instruction holder.

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

13 Calibrate the platform overload system. Refer to Repair Procedure *How to Calibrate the Platform Overload System*.

2-6 Platform Overload Recovery Message

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

How to Clear the Platform Overload Recovery Message

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

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



Plus Minus Previous Enter

1 Turn the key switch to the off position.

2 Press and hold the **enter** button on the ground control panel while turning the key switch to ground controls. Hold the **enter** button for approximately 5 seconds.

Platform Components

3 Press the buttons on the ground controls in the following sequence: **(plus)(minus)(minus)(plus)**.

4 Press the **enter** or **previous** button on the LCD screen until CLEAR OVERLOAD RECOVERY is displayed.

5 Press the **plus** button or the **minus** button to select YES. Then press the buttons in the following sequence: **(plus)(plus)(plus)(minus)**. and press the **enter** button to accept.

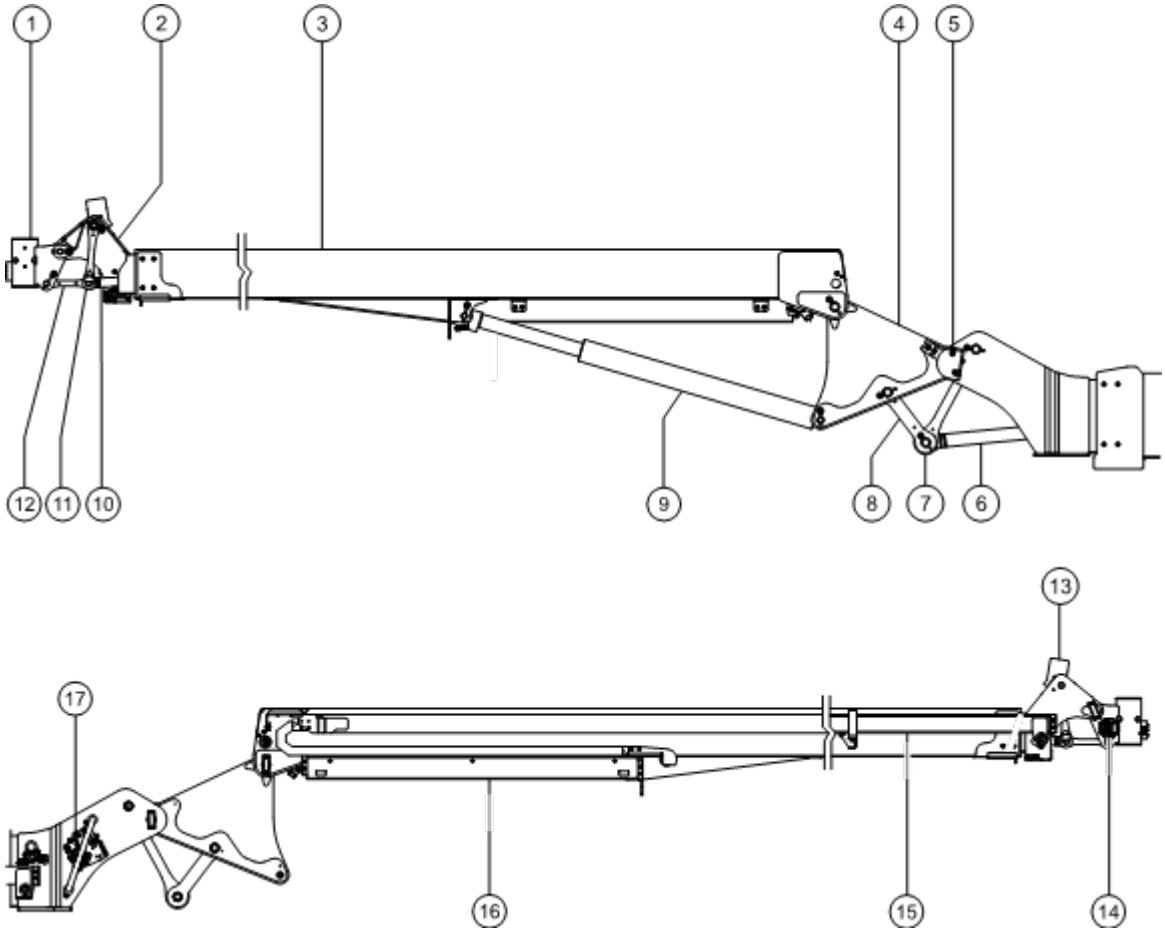
Note: The passcode buttons **(plus)(plus)(plus)(minus)** must be entered in the proper sequence before the **enter** button is pressed.

6 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

7 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

8 Turn the key switch to the off position.

Jib Boom Components



1 platform rotator
2 boom #5
3 boom #4
4 bellcrank
5 jib angle sensor
6 bellcrank leveling cylinder
7 bellcrank vertical link
8 bellcrank lower link
9 jib lift cylinder
10 platform leveling cylinder
11 platform vertical link
12 platform lower link
13 jib rest pad
14 platform level sensor
15 jib cable track
16 jib cable tray
17 jib manifold

Jib Boom Components

3-1
Jib Boom

How to Remove the Jib 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. Refer to Repair Procedure, *How to Remove the Platform.*

2 Remove the platform mounting weldment and the platform rotator. Refer to Repair Procedure, *How to Remove the Platform Rotator*.

3 Tag, disconnect and plug the two hydraulic hoses from the jib boom manifold that lead to the platform manifold. Cap the fittings on the manifold.

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

4 Tag, disconnect and plug the jib boom lift cylinder hydraulic hoses from the jib boom 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.

5 Remove the cotter pin from the upper cable track tube at the platform end of the jib boom.

Note: Always replace the cotter pin with a new one.

6 Remove the cable track guide fasteners from the cable track guide at the platform end of the jib boom and remove the cable track guide from the jib boom.

Jib Boom Components

7 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.

8 Attach a lifting strap from an overhead crane to the cable track.

9 Remove the mounting fasteners that attach the lower cable track to the jib boom.

10 Remove the cable track from the machine and lay to the side.

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

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

11 Disconnect the electrical connector from the jib boom angle sensor located at the jib boom pivot pin on the engine side of the machine.

12 Remove the cover retaining fasteners from the jib boom angle sensor. Remove the cover.

13 Remove the jib boom angle sensor mounting bracket fasteners from the side of the primary extension boom.

14 Carefully remove the bracket and sensor assembly. Note the location of the springs. Do not lose the springs.

Note: There is one spring inside the jib boom pivot pin and one inside the angle sensor.

Note: When the jib boom is installed, the jib boom angle sensor will need to be calibrated. Refer to repair procedure, *Jib Boom Bellcrank Angle Sensor* for the calibration procedure.

15 Attach a lifting strap from an overhead crane to the platform end of the jib boom.

16 Support the barrel end of the jib boom lift cylinder with another suitable lifting device.

17 Remove the pin retaining fasteners from the jib boom lift cylinder barrel-end pivot pin.

18 Use a soft metal drift to remove the jib boom lift cylinder barrel-end pivot pin.

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

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

Jib Boom Components

19 Secure the jib boom lift cylinder to the jib boom with a strap or other suitable device.

20 Raise the jib boom to a horizontal position using the overhead crane.

21 Attach a second lifting strap from the overhead crane to the pivot end of the jib boom.

22 Remove the pin retaining fastener from the jib boom pivot pin. Do not remove the pin.

23 Place a block under the jib boom level cylinder for support. Protect the cylinder rod from damage.

24 Use a soft metal drift to tap the pin halfway out in one direction and lower one side of the jib boom bellcrank. Tap the pin in the other direction and lower the other side of the jib boom bellcrank.

25 Use a soft metal drift to remove the jib boom pivot pin. Remove the jib boom from the machine and place it on a structure capable of supporting it.

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

3-2
Jib Boom Lift Cylinder

How to Remove the Jib Boom Lift Cylinder

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

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

1 Raise the jib boom slightly and place blocks under the platform mounting weldment. 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 Support the rod end of the jib boom lift cylinder with a suitable lifting device.

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

5 Attach a lifting strap from an overhead crane to the barrel end of jib boom lift cylinder.

6 Remove the pin retaining fasteners from the jib boom lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.

7 Remove the jib boom lift cylinder from the machine.

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

3-3
Jib Boom Level Cylinder

How to Remove the Jib Boom Level 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 Extend the primary boom until the jib boom level cylinder barrel-end pivot pin is accessible.

2 Raise the jib boom above horizontal.

3 Attach an overhead crane to the jib boom assembly for support.

4 Place a block under the jib boom level cylinder for support. Protect the cylinder rod from damage.

5 Remove the pin retaining fasteners from the jib boom level cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

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

Jib Boom Components

6 Remove the external snap rings from the jib boom level cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.

7 Tag, disconnect and plug the jib boom level cylinder hydraulic hoses from the jib boom 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.

8 Attach an overhead crane or other suitable device to the jib boom level cylinder for support.

9 Carefully remove the jib boom level cylinder from the machine.

⚠WARNING Crushing hazard. The jib boom level cylinder could become unbalanced and fall when removed from the machine if not properly supported.

3-4
Jib Boom Extension Cylinder

How to Remove the Jib 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: 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. Refer to Repair Procedure, *How to Remove the Platform.*

2 Remove the jib boom lift cylinder. Refer to Repair Procedure, *How to Remove the Jib Boom Lift Cylinder*.

3 Attach a lifting strap from an overhead crane to the platform end of the jib boom for support. Raise the jib boom to a horizontal position using the overhead crane.

4 Extend the jib boom until the jib boom extension cylinder rod-end pivot pin is accessible.

Jib Boom Components

5 Tag, disconnect and plug the two hydraulic hoses from the jib boom manifold that lead to the platform manifold. Cap the fittings on the manifold.

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

6 Tag, disconnect and plug the jib boom lift cylinder and jib boom extension cylinder hydraulic hoses from the jib boom manifold. Cap the fittings on the manifold.

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

7 Remove the cover from the lower jib boom cable track.

8 Tag and disconnect the electrical connectors inside the lower cable track.

9 Remove the hose and cable clamp retaining fasteners from lower cable track at the pivot end of the jib boom. Remove the clamps.

10 Pull the electrical cables out of the lower cable track that lead to the primary boom.

11 Attach a lifting strap from a second overhead crane to the pivot end of the jib boom for support. Do not apply any lifting pressure.

12 Place a block under the jib boom level cylinder for support. Protect the cylinder rod from damage.

13 Remove the pin retaining fastener from the jib boom pivot pin. Do not remove the pin.

14 Use a soft metal drift to tap the pin halfway out in one direction and lower one side of the jib boom bellcrank. Tap the pin in the other direction and lower the other side of the jib boom bellcrank.

15 Use a soft metal drift to remove the jib boom pivot pin. Remove the jib boom from the machine and place it on a structure capable of supporting it.

⚠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.

16 Remove the pin retaining fasteners from the jib boom extension cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

17 Attach a lifting strap from an overhead crane to the barrel end of the jib boom extension cylinder.

18 Remove the pin retaining fasteners from the jib boom extension cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.

19 Carefully slide the jib boom extension cylinder out of the jib boom and place it on a structure capable of supporting it.

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

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

Jib Boom Components

3-5
How to Remove the Jib Boom Bellcrank

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. Refer to Repair Procedure, *How to Remove the Platform.*

2 Remove the platform mounting weldment and the platform rotator. Refer to Repair Procedure, *How to Remove the Platform Rotator*.

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

4 Attach a lifting strap from an overhead crane to the jib boom bellcrank.

5 Remove the jib angle sensor.

6 Remove the pin retaining fastener from the bellcrank lower link pivot pin.

7 Use a soft metal drift to remove the bellcrank lower link pivot pin.

⚠ CAUTION Crushing hazard. The bellcrank leveling cylinder may be damaged if it is not properly supported when the rod-end pivot pin is removed.

8 Remove the pin retaining fastener from the jib boom bellcrank pivot pin.

9 Use a soft metal drift to remove the jib boom bellcrank pivot pin. Remove the jib boom bellcrank from the machine.

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

3-6
Jib Boom Bellcrank Angle Sensor

The jib boom bellcrank angle sensor is monitored by the control system to keep the jib boom bellcrank vertical and to help maintain a level platform through boom range of motion. If a jib boom bellcrank angle sensor is replaced, it must be calibrated prior to machine operation. The jib boom bellcrank angle sensor is mounted to the bellcrank pivot pin on the engine side of the machine.

How to Calibrate the Jib Boom Bellcrank Angle Sensor

Note: If the primary boom angle sensor has been removed or replaced, it must to be calibrated before the jib boom bellcrank angle sensor. Refer to Repair Procedure, *How to Calibrate the Primary Boom Angle Sensor*.

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

Note: A digital level will be required to perform this procedure.

Note: A kit is available through Genie Product Support (Genie part number 58351GT). This kit includes a digital level with a magnetic base and cable harnesses.

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



Plus Minus Previous Enter

1 Raise the jib boom to a slightly less than horizontal position.

2 Push in the ground controls red Emergency Stop button to the off position. Do not turn the key switch to the off position.

3 Open the ground control box.

4 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

5 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

6 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.

7 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

8 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

9 Press the **enter** or **previous** button on the LCD screen until DELETE JIB LEVEL ANGLE SENSOR CALIBRATION is displayed.

10 Press the **plus** button to select YES, then press the **enter** button to accept.

11 Start the engine and use the platform level up button to fully extend the jib level cylinder.

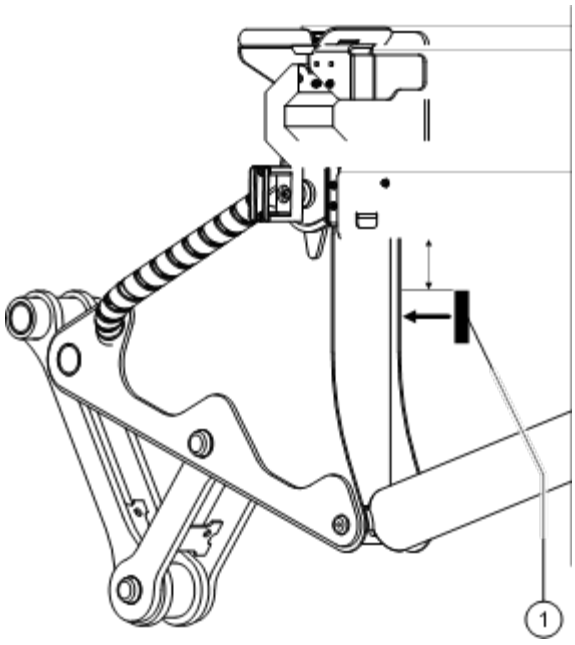
Note: If the system exits out of calibration mode when the engine is started, repeat this procedure starting with step 7.

Jib Boom Components

13 The LCD screen should read JIB BELLCRANK FULLY EXTENDED. Press the **plus** button to select YES, then press the **enter** button to accept.

14 Fully raise the jib boom using the jib up button until it stops.

15 Place a digital level with a magnetic base, on the vertical surface of the jib bellcrank 6 inches / 15cm from top of the bellcrank. Press the alt zero button on the digital level so that it reads 0.0°.



1 digital level

16 Using the platform level down button, retract the jib level cylinder until the digital level reads -75 ± 2 degrees.

17 The LCD screen should read JIB BC LEVEL ANGLE TO GRAVITY -75.0°. Press the **plus** button or **minus** button to adjust the display to the angle shown o the digital level, then press the **enter** button to accept.

18 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.

⊙ Result: An audible alarm sounds for 1 second. Calibration has been stored.

Note: Do not turn the engine off with the key switch or red Emergency Stop button or all calibration points or values will not be saved.

19 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

20 Press the **plus** button to select YES, then press the **enter** button to accept.

21 Turn the bypass/recovery key switch to the run position.

22 Remove the key from the bypass/recovery key switch and insert the key into the main key switch.

Note: Be sure that the bypass/recovery key switch is in the run position before attempting to operate the machine.

23 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

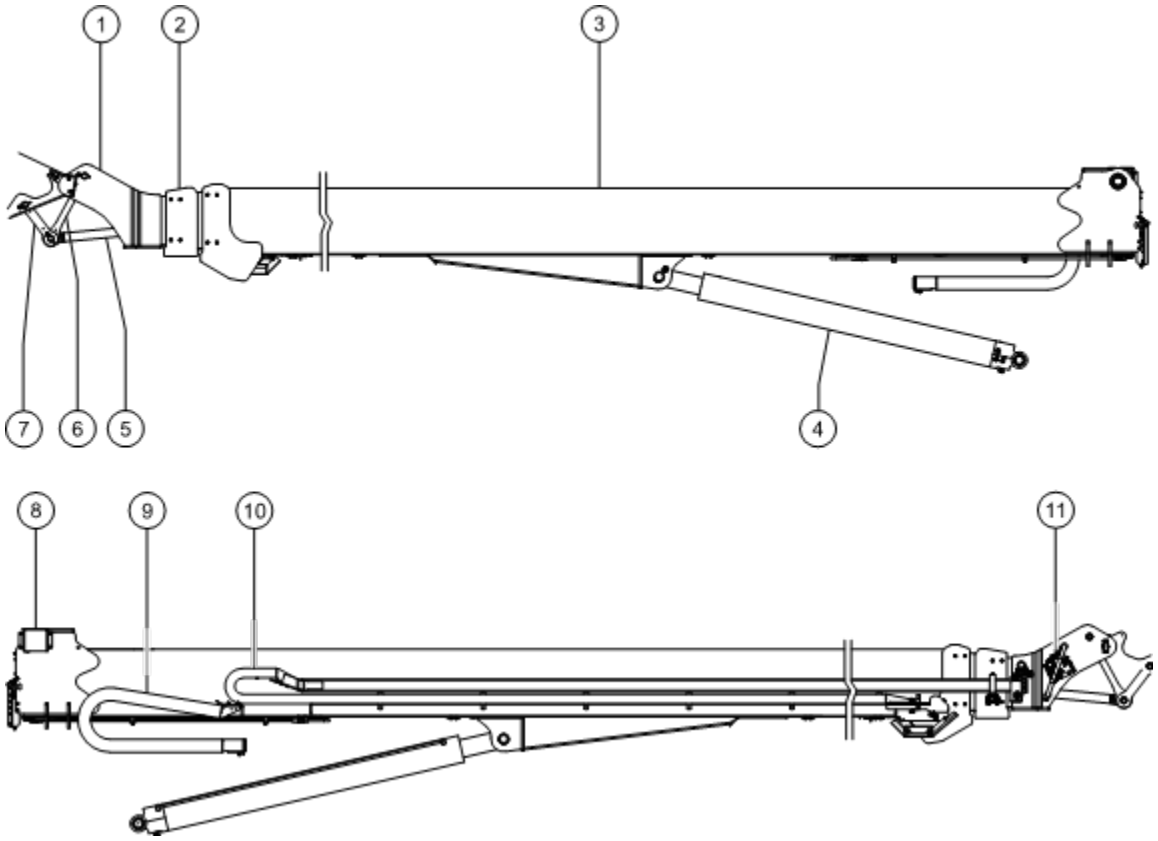
24 Using auxiliary power, activate and release jib down until the jib bellcrank returns to 0 degrees.

Note: The jib will only lower a few degrees at a time.

25 Remove the digital level from jib bellcrank.

26 Start the engine and lower the boom to the stowed position. Verify there are no jib level sensor calibration faults shown on the display.

Boom Components



1 boom tube #1
2 boom tube #2
3 boom tube #3
4 boom lift cylinder
5 bellcrank level cylinder
6 bellcrank vertical link
7 bellcrank lower link
8 boom angle sensor
9 lower cable track
10 cable track
11 jib manifold

Boom Components

4-1
Primary Boom 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 Primary Boom 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.*

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

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

1 Remove the cover from the lower jib boom cable track.

2 Tag and disconnect the electrical connectors inside the lower cable track.

3 Remove the hose and cable clamp retaining fasteners from lower cable track at the pivot end of the jib boom. Remove the clamps.

4 Pull the electrical cables out of the lower cable track that lead to the primary boom.

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

5 Tag and disconnect the electrical connectors from the jib boom manifold located at the platform end of the primary extension boom.

6 Tag, disconnect and plug the two hydraulic hoses from the jib boom manifold that lead to the platform manifold. Cap the fittings on the manifold.

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

7 Remove the retaining fasteners from the hose and cable guide at the platform end of the primary boom. Remove the hose and cable guide.

8 Tag and disconnect the electrical connector from the limit switch on the side of the primary boom. Do not remove the limit switch.

9 Remove the cotter pin from the upper cable track tube at the platform end of the primary extension boom.

Note: Always replace the cotter pin with a new one.

10 Remove the retaining fasteners from the cable track guide at the platform end of the boom. Remove the cable track guide from the machine.

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

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

12 Remove the hose and cable clamps from the primary boom lift cylinder.

Boom Components

13 At the counterweight end of the secondary boom, support and secure the secondary boom lower end cover to a suitable lifting device.

14 Remove the cover retaining fasteners and remove the cover from the end of the secondary boom.

⚠ WARNING Crushing hazard. The secondary boom lower end cover could become unbalanced and fall when removed from the secondary boom if not properly supported and secured to the lifting device.

15 Locate the two hydraulic hoses inside the end of the secondary boom that lead to the primary boom cable track.

16 Tag, disconnect and plug the hydraulic hoses from the unions. 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.

17 Disconnect the electrical connectors for the electrical cables that lead to the cable track at the end of the secondary boom.

18 Pull all hydraulic hoses and electrical cables that lead to the cable track out of the secondary boom riser.

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

19 Attach a lifting strap to each end of the cable track from an overhead crane for support. Do not apply any lifting pressure.

20 Remove the mounting fasteners that attach the lower cable track to the primary boom lift cylinder.

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

22 Carefully remove the cable track from the machine and lay it on a structure capable of supporting it.

⚠ WARNING Crushing hazard. The primary boom cable track could become unbalanced and fall when removed from the primary boom if not properly supported by the overhead crane.

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

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

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 cable track repair kit is available through the Genie Service Parts Department.

1 Visually inspect the cable track and determine which 4-link section needs to be replaced.

2 Support the cable track assembly above the section to be replaced.

3 Carefully remove the snap rings and pins from each end of the damaged section of cable track.

4 Remove the retaining fasteners from the upper black rollers from the 4-link section of cable track to be replaced. Remove the rollers.

5 Lift up the hoses and cables and carefully remove the damaged 4-link section of cable track.

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

6 Remove the upper rollers from the replacement section of cable track.

7 Lift up the hoses and cables and carefully insert the new 4-link section of cable track.

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

8 Connect the ends of the replacement cable track section to the existing cable track using the pins and snap rings.

9 Install the rollers onto the new section of cable track.

10 Operate the primary boom extend/retract function through a full cycle to ensure smooth operation of the new section of cable track.

4-2 Primary Boom

How to Shim the Boom

1 Measure each upper, side and lower wear pad.

Note: If a wear pad is not less than specification, perform the following procedure.

Platform end wear pads

2 Extend the boom until the wear pads are accessible at the platform end of the machine.

3 Loosen the wear pad mounting fasteners.

4 Add shims by hand until snug.

Note: Do not use force when adding the shims.

5 Tighten the mounting fasteners.

6 Remove the boom end cover retaining fasteners at the pivot end of the boom. Remove the boom end cover from the machine..

Pivot end side wear pads

7 Loosen the wear pad mounting fasteners.

8 Add shims by hand until snug.

Note: Do not use force when adding the shims.

9 Tighten the mounting fasteners.

Pivot end upper wear pads

10 Loosen the wear pad mounting fasteners.

11 Add shims by hand until snug.

Note: Do not use force when adding the shims.

12 Remove one shim from each upper wear pad only.

Note:The wear pad clearance should be 0.060 in / 1.52 mm.

13 Tighten the mounting fasteners.

14 Replace the covers.

15 Extend and retract the boom through an entire cycle. Check for tight spots that may cause binding of the boom.

Primary boom wear pad specifications	Minimum
Platform end	
Bottom and side wear pads	0.63 in 16 mm
Top wear pads (#1 to #2;)	0.35 in 9 mm
Top wear pads (#2 to #3)	0.63 in 16 mm
Pivot end	
Top wear pads	0.63 in 16 mm
Side wear pads	0.47 in 12 mm
Grease Specification	
Lube a Boom grease Genie part number	1284533GT

Boom Components

How to Remove the Primary Boom

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

Note: 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 boom retracted in the horizontal position.

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

2 Remove the platform mounting weldment and the platform rotator. Refer to Repair Procedure, *How to Remove the Platform Rotator*.

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

Note: When the jib boom is installed, the jib boom angle sensor will need to be calibrated. Refer to Repair Procedure, *How to Calibrate the Jib Boom Bellcrank Angle Sensor*.

Note: Most repair procedures to the boom assembly components can be performed with the boom attached.

Note: The boom assembly may be removed with the cable track attached.

4 Remove the end cover from the pivot end of the primary boom.

5 Remove the limit switch mounting fasteners from the limit switch on the ground controls side of the primary boom. Do not disconnect the wiring. Remove the limit switch.

6 Disconnect the electrical connector from the primary boom angle sensor.

Note: The primary boom angle sensor is located on the pivot pin on the tank side of the boom.

7 Remove the primary boom angle sensor bracket mounting fasteners and remove the primary boom angle sensor from the primary boom. Do not remove the angle sensor from the bracket.

Note: When the primary boom is installed, the primary boom angle sensor will need to be calibrated. Refer to Repair Procedure, *How to Calibrate the Primary Boom Angle Sensor*.

8 Remove the hose and cable guide fasteners at the primary boom pivot pin. Remove the hose and cable guide.

9 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.

10 Place support blocks under the primary boom lift cylinder.

11 Attach a lifting strap from an overhead crane to the rod end of the primary boom lift cylinder.

12 Remove the pin retaining fasteners from the primary boom lift cylinder rod-end pivot pin.

13 Use a soft metal drift to remove the rod-end pivot pin. Rest the rod end of the primary boom lift cylinder on the blocks.

14 Attach a 5 ton / 5000 kg overhead crane to both ends of the primary boom. Do not apply any lifting pressure.

15 Remove the pin retaining fasteners from the primary boom pivot pin.

16 Use a soft metal drift to remove the primary boom pivot pins.

17 Carefully remove the primary boom from the machine and place it on a structure capable of supporting it.

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

How to Disassemble 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: 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 Level the boom.

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

3 Remove the platform mounting weldment and the platform rotator. Refer to Repair Procedure, *How to Remove the Platform Rotator*.

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

5 Remove the jib boom lift cylinder. Refer to Repair Procedure, *How to Remove the Jib Boom Lift Cylinder*.

6 Remove the jib boom bellcrank. Refer to Repair Procedure, *How to Remove the Jib Boom Bellcrank*.

7 Remove the boom primary extension cylinder. Refer to Repair Procedure, *How to Remove the Boom Primary Extension Cylinder*.

8 The boom tubes can be disassembled without removing the cable track assembly. If you choose to remove the cable track assembly, Refer to Repair Procedure, *How to Remove the Cable Track*.

Boom Components

9 Remove the brackets supporting the cable track assembly from the #2 and #3 boom tubes

10 Place blocks between the cable tracks and cable tubes for support.

11 Strap together the boom cable tubes, blocks of wood, and the cable track.

NOTICE Component damage hazard. Cables, hoses, boom cable tube and cable track can be damaged if they are kinked or pinched.

12 Remove the #3 boom tube:

13 At the pivot end of the machine, remove the shims from the wear pads between the #2 and #3 boom tubes.

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

14 At the platform end, remove the shims from the lower channel and upper side wear pads between the #2 and #3 boom tubes.

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

15 Attach the #3 boom tube to a forklift, and lift the tube enough to relieve the pressure from the lower wear pads, begin sliding the tube from the boom assembly.

Note: Make sure the tube remains parallel to the #2 boom tube while removing.

When approximately 10 feet of the #3 boom tube remains in the #2 boom tube, attach a strap from a suitable overhead lifting device and slightly lift the tube.

⚠WARNING Crushing hazard. The # 3 boom tube may become unbalanced and fall when removed from the # 2 boom tube if it is not properly supported and attached to the overhead crane.

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

16 Remove the fasteners securing the lower wear pads between the #2 and #3 boom tubes.

Note: This will allow the retract cables to come out with the boom tubes.

17 Support and slide the #3 boom tube from the boom assembly.

Remove the #2 boom tube:

18 Tag and disconnect the harness to limit switch 3RS and 4EOS. Remove the bracket and limit switch from the #1 boom tube.

⚠DANGER Tip-over hazard. Failure to install the correct proximity and/or limit switches in the correct location will result in the machine tipping over, resulting in death or serious injury.

19 At the pivot end of the machine, remove the shims from the wear pads between the #1 and #2 boom tubes.

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

20 At the platform end, remove the top wear pads between the #1 and #2 boom tubes.

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

21 At the platform end, remove the shims from the upper side wear pad and lower side wear pads from the opposite side of the boom between the #1 and #2 boom tubes.

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

22 Attach the #2 boom tube to a forklift, and lift the tube enough to relieve the pressure from the lower wear pads.

23 Remove the fasteners securing the lower wear pads and remove the wear pads and aluminum block between the #1 and #2 boom tubes.

24 Back the wire cables from the opening below the #1 boom tube into the tube and then push them out the end of the #1 boom tube.

Note: This will allow the retract cables to come out with the boom tubes. Remove the retract wire cables with the #2 boom tube

25 Begin pulling the #2 boom tube from the #1 boom tube.

Note: Make sure the tube remains parallel to the #1 boom tube while removing.

26 When approximately 10 feet of the #2 boom tube remains in the #1 boom tube, attach a strap from a suitable overhead lifting device and slightly lift the tube.

⚠WARNING Crushing hazard. The number 2 boom tube may become unbalanced and fall when it is removed from the number 1 boom tube if it is not properly supported and attached to the overhead crane.

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

27 Remove the final two side wear pads from the platform end of the machine.

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

28 Support and slide the #2 boom tube from the boom assembly.

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 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 boom until there is approximately 4 feet / 1.2 m between the turntable and boom rest pad.

2 Attach a lifting strap from an overhead supporting device to the rod end of the the boom lift cylinder.

Boom Components

3 Attach an 10 ton / 9071 kg overhead supporting device to the platform end of the boom for support. Do not lift the boom.

Note: Place the lifting strap between the cable track assembly and the boom.

4 Remove the boom storage area cover retaining fasteners. Remove the cover from the machine.

5 Remove the pin retaining fastener from the boom lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin. Protect the cylinder rod from damage.

⚠WARNING Crushing hazard. The boom lift cylinder may fall when the rod-end pivot pin is removed if the boom lift cylinder is not properly supported by the overhead crane.

⚠WARNING Crushing hazard. The boom may fall when the rod-end pivot pin is removed if the boom is not properly supported by the overhead crane.

6 Place support blocks under the boom lift cylinder.

7 Using the Auxiliary Power Unit, retract the boom lift cylinder until the rod end will clear the boom weldment.

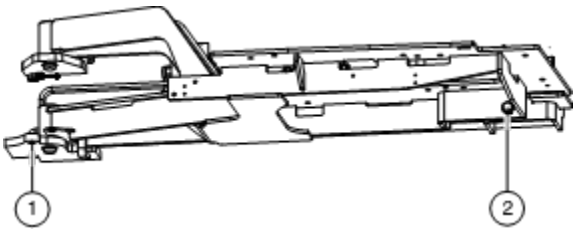
8 Carefully lower the rod end of the boom lift cylinder down onto the support blocks.

9 Tag, disconnect and plug the boom lift cylinder hydraulic hoses.

⚠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 Carefully raise the boom with the overhead crane until the barrel end of the boom lift cylinder is accessible.

11 Remove the engine pivot plate retaining fastener. Swing the engine pivot plate out away from the machine.



1 engine pivot plate anchor hole
2 engine pivot plate retaining fastener

12 Locate the engine pivot plate anchor hole at the pivot end of the engine pivot plate.

13 Install the bolt that was just removed into the anchor hole to secure the engine pivot plate from moving.

⚠WARNING Crushing hazard. Failure to install the bolt into the engine pivot plate to secure it from moving could result in death or serious injury.

14 Remove the pin retaining fastener from the barrel-end pivot pin. Do not remove the pin.

15 Support the boom lift cylinder with an overhead crane.

16 Remove the boom lift cylinder barrel-end pivot pin through the access hole in the engine side turntable riser.

17 With the boom lift cylinder being supported by the overhead supporting device, pull the boom lift cylinder toward the platform until it is out.

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

NOTICE Component damage hazard. Be careful not to damage the proximity and/or limit switches when removing the boom lift cylinder.

NOTICE Component damage hazard. The cables and hydraulic hoses can be damaged if the boom lift cylinder is pulled across them.

4-4 Extension Cylinder

The primary boom extension cylinder is located inside the boom assembly and incorporates cables and pulleys that are responsible for extending the boom tubes. The 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 boom to a horizontal position and fully retract the primary extension cylinder.

2 Remove the retaining fasteners from the boom end cover at the pivot end of the boom. Remove the cover from the machine.

3 Tag and disconnect the limit switch harnesses. Remove the fasteners to the limit switch harness mounting bracket and remove the bracket.

4 Disconnect and remove the string potentiometer from boom tube #1. Remove the clevis from the extend cylinder.

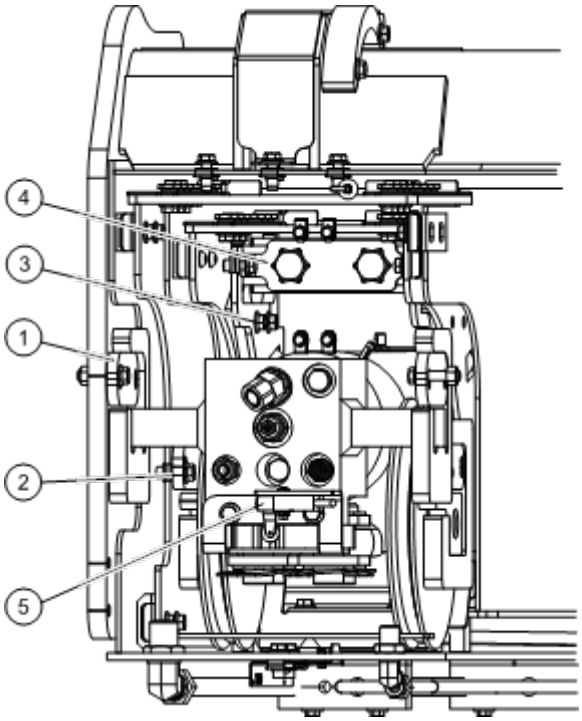
Boom Components

5 Tag and disconnect the harness from cable tension limit switch 5S (5). (Illustration 1)

Note: The mounting bracket and limit switch can remain attached to the extend cylinder.

6 Tag, disconnect and plug the hydraulic hoses from the primary boom extension 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.



Ilustration 1

1 #1 extend cylinder locking plate
2 #2 extend cylinder locking plate
3 red extend cable locking plate
4 #3 retract cable retaining plate
5 LSB5S limit switch

7 At the platform end of the machine, loosen the retract cable equalizer bolt at the #1 boom tube.

8 Remove the retaining fasteners from the red cable adjustment locking bracket.(1) (Illustration 1) Remove the red locking bracket.

⚠WARNING Bodily injury hazard. Failure to install the red cable adjustment locking bracket would allow the cable mounting bolts to loosen and fall out which could result in death or serious injury.

9 Loosen the #3 extend cable adjustment bolts 10 turns (about 1 in / 2.54 cm).

Note: Do not over loosen the extend cables.

10 Remove the locking plates securing the extend cylinder to boom #1 (1). (Illustration 1)

11 Remove the locking plates securing the extend cylinder to boom #2 (2). (Illustration 1

12 Remove the locking plates (3) securing the retract cables to boom #3. (Illustration 1)

13 Attach a suitable lifting device to the extend cylinder arms that will allow the cylinder to be lifted to clear the mounting plates on the #1 boom and pulled from the boom assembly.

14 Attach a lifting strap from an overhead crane to support the cylinder as it is removed from the boom assembly.

15 Support and slide the primary boom extension cylinder out of the boom assembly while guiding the cables out of the boom and place it on a structure capable of supporting it.

⚠WARNING Crushing hazard. The primary boom extension cylinder may become unbalanced and fall when it is removed from the boom if it is not properly supported and attached to the overhead crane.

NOTICE Component damage hazard. Cables can be damaged if they are kinked, pinched or snagged during removal.

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

4-5
Boom Extend and Retract Cables

How to Adjust the Boom Extend/Retract Cables

Properly adjusted extend/retract cables are essential to safe machine operation. Failure to maintain proper adjustment of the cables could result in unsafe operating conditions and may cause component damage. The boom extend and retract functions should operate smoothly and be free of hesitation, jerking and unusual noise.

1 Start the engine from the ground controls.

2 Raise and extend the boom approximately 15 feet / 3.8 m.

3 Fully retract the boom and lower to the horizontal position.

4 Stop the engine.

5 Measure the distance between boom tubes #1 and #2, measuring from the points identified as (8) and (9). (Illustration 1) This is dimension "A".

Note: The distance should be approximately 1 in / 2.6 cm. The actual measurement will be a function of the primary extend/retract cylinder.

Boom Components

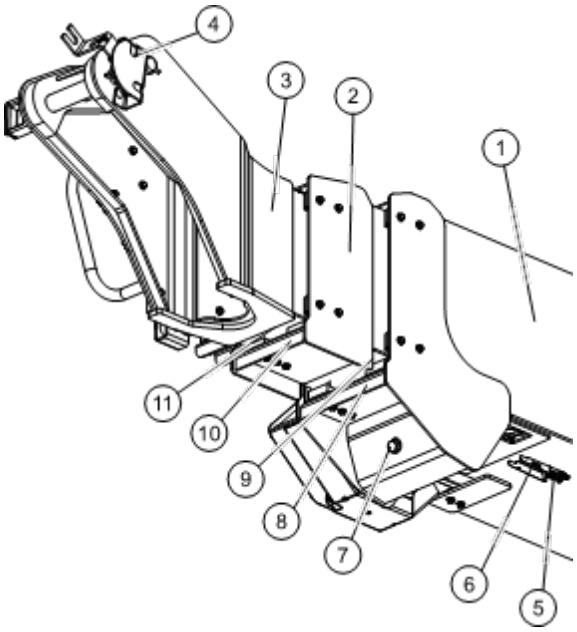


Illustration 1

1 Boom tube #1
2 Boom tube #2
3 Boom tube #3
4 bellcrank level sensor
5 LSB4EO limit switch
6 LSB3RS limit switch
7 boom retract cable adjusting bolt
8 Boom #1 measuring surface
9 Boom #2 measuring edge
10 Boom #2 measuring surface
11 Boom #3 measuring edge

6 Measure the distance between boom tubes #2 and #3 using points (10) and (11). (Illustration 1) The gap should be 1 in / 2.6 cm to 1.5 in / 3.8 cm greater than dimension "A".

⊙ Result: The measurement is between 1 in / 2.6 cm and 1.5 in / 3.8 cm more than dimension "A". The gap is in tolerance. Proceed to step 28.

⊙ Result: The measurement is more than 1.5 in / 3.8 cm greater than dimension "A". Proceed to step 7.

⊙ Result: The measurement is less than 1 in / 2.6 cm greater than dimension "A". Proceed to step 20.

7 Remove the boom end cover from the pivot end of the machine.

8 Locate the red locking bracket (1) covering the cable adjustment bolts at the pivot end of the boom (Illustration 2).

9 Loosen each of the extend cable adjustment bolts (2) five turns. (Illustration 2)

Boom Components

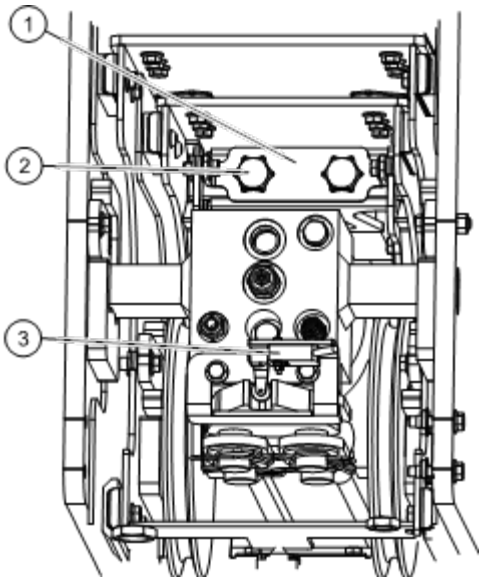


Illustration 2

1 extend cable red locking bracket
2 extend cable adjustment bolts
3 cable tension limit switch 5S

10 At the platform end of the boom, locate the retract cable bolt under the # 1 boom tube (7). (Illustration 1)

11 Loosen the jam nut on the cable tension retract bracket. Do not remove the nuts.

12 Tighten the retract bolt using a torque wrench until boom tube #3 begins to move.

Note: If the torque wrench reaches 70 ft-lbs / 94.9 Nm and boom tube #3 hasn't moved, loosen the extend cable adjustment bolts 5 turns and continue tightening the boom tube #1 retract bolt.

13 Tighten the retract bolt until the gap between boom tubes #2 and #3 is 1 to 1.5 in / 2.5 to 3.8 cm greater than dimension "A".

14 Torque the two extend cable adjustment bolts to 35 ft-lbs / 47.5 Nm. Make small adjustments to the two bolts to insure the cable break limit switch roller is centered in the limit switch actuator bracket (3). (Illustration 2)

15 Torque the #1 retract bolt to 70 ft-lbs / 94.9 Nm.

16 Start the engine and fully raise and extend the boom approximately 15 ft / 4.6 m.

17 Fully retract the boom and lower the boom to the horizontal position.

18 Stop the engine.

19 Re-measure the gap between boom tubes #1 and #2 from points (11) and (12) (dimension “A”) and boom tubes #2 and #3 from points (9) and (10). (Illustration 1)

⊙ Result: The measurement is between 1 in / 2.6 cm and 1.5 in / 3.8 cm more than dimension "A". The gap is in tolerance. Proceed to step 28.

⊙ Result: The measurement is more than 1.5 in / 3.8 cm greater than dimension "A". Repeat the procedure beginning with step 9.

⊙ Result: The measurement is less than 1 in / 2.6 cm greater than dimension "A". Proceed to step 20.

20 Loosen the retract cable retract bolt (7). (Illustration 1)

21 Tighten the two extend cable adjustment bolts (4) (Illustration 2) until the gap between boom tubes #2 and #3 is between 1 in / 2.6 cm and 1.5 in / 3.8 cm plus dimension “A”.

22 Torque the retract cable retract bolt to 70 ft-lbs / 94.9 Nm.

23 Torque the two extend cable adjustment bolts (4) to 35 ft-lbs / 47.5 Nm. Make small adjustments to the two bolts to insure the cable tension limit switch arm (3) is centered in the limit switch actuator bracket. (Illustration 2)

24 Start the engine and fully raise and extend the boom approximately 15 ft / 4.6 m.

Boom Components

25 Fully retract the boom and lower the boom to the horizontal position.

26 Stop the engine.

27 Re-measure the gap between boom tubes #1 and #2 from points (8) and (9) (dimension “A”) and boom tubes #2 and #3 from points (10) and (11). (Illustration 1)

- Result: The measurement is between 1 in / 2.6 cm and 1.5 in / 3.8 cm more than dimension "A". The gap is in tolerance. Proceed to step 28.
- Result: The measurement is more than 1.5 in / 3.8 cm greater than dimension "A". Repeat the procedure beginning with step 9.
- Result: The measurement is less than 1 in / 2.6 cm greater than dimension "A". Repeat the procedure beginning with step 20.
- Result: The measurement is between 1 in / 2.6 cm and 1.5 in / 3.8 cm more than dimension "A". The gap is in tolerance. Proceed to step 28.

28 Install the red locking bracket over the cable adjustment bolts. A flat edge of each bolt head must be on top for the locking bracket to secure the bolts (Illustration 2).

⚠WARNING Bodily injury hazard. Failure to install the red cable adjustment locking bracket would allow the cable mounting bolts to loosen and fall out which could result in death or serious injury.

29 Tighten the jam nut on the cable tension retract bracket.

30 Lower the boom to the stowed position.

How to Replace the Boom Extend/Retract Cables

Note: The cable sheaves must be inspected when replacing the cables.

Remove the primary boom extension cylinder. Refer to Repair Procedure, *How to Remove the Primary Boom Extension Cylinder*.

Boom extend cables:

1 The boom extend cables remain attached to the extension cylinder during removal.

Boom retract cables:

2 Remove the top wear pads between the #1 and #2 boom tubes.

3 Loosen the retract adjustment bolt from the boom retract cables at the platform end of the #1 boom.

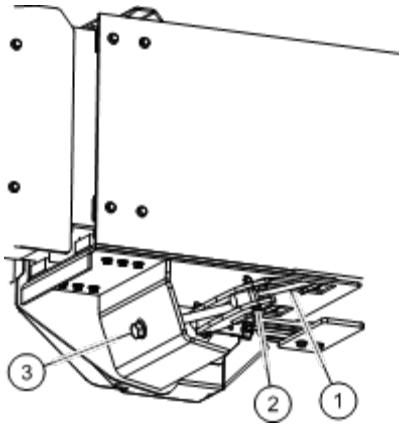


Illustration 1

1 retract cable
2 retract cable retaining bolts
3 retract cable adjustment bolt

4 Remove the retract cable retaining bolts and attach an electrician's tape or rope to the cable.

5 At the pivot end remove the string potentiometer.

6 Remove the fasteners securing the red extend cable locking bracket.

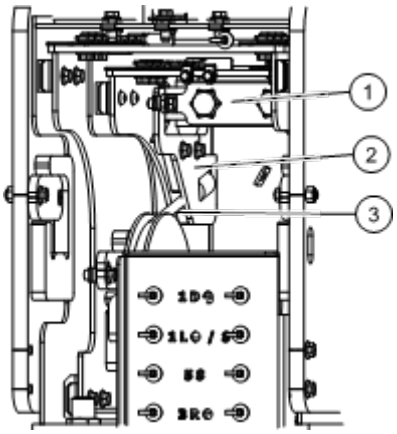


Illustration 2

1 red extend cable locking bracket
2 retract cable retaining plate
3 retract cable

7 Remove the fasteners securing the retract cable retaining plate, and lay the retract cable on the bottom of the boom.

8 Use a lifting device to raise the #2 boom tube enough to remove the retract cables.

9 At the pivot end, pull the retract cable out of the boom tubes.

10 Repeat the procedure for the other retract cable.

11 Reverse the procedure to install the new retract cable.

12 Adjust the boom extend/retract cables. Refer to Repair Procedure, *How to Adjust the Boom Extend and Retract Cables*.

4-6
Primary Boom Angle Sensor

The primary boom angle sensor is used to limit the angle of the primary boom relative to the angle of the turntable and gravity.

How to Calibrate the Primary Boom Angle Sensor

Note: If the angle sensor is replaced, it must be replaced as a complete assembly.

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

Note: The turntable level sensor and platform load sensor must be calibrated prior to calibrating the primary boom angle sensor.

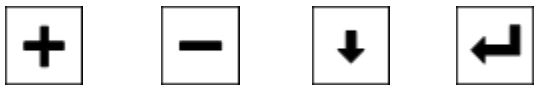
Note: RSB1AO and RSB1AS are calibrated at the same time.

Note: The turntable level sensor, platform load sensor and primary boom angle sensor must be calibrated before calibrating the boom length sensor.

Note: If the calibration flags between SCON and TCON do not agree after calibration, a crosscheck fault is generated and recorded and the affected boom function is inhibited.

Note: A digital level will be required to perform this procedure.

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



Plus Minus Previous Enter

1

Boom Components

2 Push in the ground controls red Emergency Stop button to the off position.

3 Turn the key switch to ground controls.

4 Open the ground control box.

5 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

6 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

7 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.

8 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

9 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

10 Press the **enter** or **previous** button on the LCD screen until DELETE PRIMARY BOOM ANGLE SENSOR is displayed.

11 Press the **plus** button to select YES, then press the **enter** button to accept.

12 Start the engine and fully lower the primary boom into the cradle wear pads. Place the digital level on top of the primary boom near the pivot and note the angle displayed on the digital level.

13 Press the **enter** button until PRIMARY BOOM ANGLE TO GRAVITY -5 DEG is displayed, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

Note: If the measured angle already matches the angle shown on the display at the ground controls, press the **plus** button or **minus** button to change the angle and then change back to the measured value. The system must detect a change in displayed value to record the calibrated value.

14 Press and hold a function enable/speed select button and the primary boom up button until the boom stops at the end of the lift cylinder stroke.

15 At the PRIMARY BOOM ANGLE TO GRAVITY 75.0 DEG screen, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

Note: If the measured angle already matches the angle shown on the display at the ground controls, press the **plus** button or **minus** button to change the angle and then change back to the measured value. The system must detect a change in displayed value to record the calibrated value.

16 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.

⊙ Result: An audible alarm sounds for 1 second. Calibration has been stored.

Note: Do not turn the engine off with the key switch or red Emergency Stop button or all calibration points or values will not be saved.

17 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

18 Press the **plus** button to select YES, then press the **enter** button to accept.

Note: If full machine calibration is being performed, proceed to step 21. Then continue to the next calibration procedure.

19 Turn the bypass/recovery key switch to the run position.

20 Remove the key from the bypass/recovery key switch and insert the key into the main key switch.

21 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

22 Start the engine and lower the boom to the stowed position. Verify there are no primary boom angle sensor faults shown on the display.

4-7
Boom Length Sensor

How to Calibrate the Primary Boom Length Sensor

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

Note: The turntable level sensor and platform load sensor must be calibrated prior to calibrating the primary boom angle sensor.

Note: LTB1LO and LTB1LS are calibrated at the same time.

Note: The turntable level sensor, platform load sensor and primary boom angle sensor must be calibrated before calibrating the boom length sensor.

Note: Platform leveling is set to default parameters to avoid platform out of level faults during calibration.

Note: If the calibration flags between SCON and TCON do not agree after calibration, a crosscheck fault is generated and recorded and the affected boom function is inhibited.

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



Plus Minus Previous Enter

1

Boom Components

2 With the boom in the stowed position, start the engine and fully raise the boom to its maximum angle.

3 Push in the ground controls red Emergency Stop button to the off position.

4 Turn the key switch to ground controls.

5 Open the ground control box.

6 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

7 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

8 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The length sensor calibration values will not be saved correctly unless the key switch is in the bypass / recovery position.

9 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

10 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

11 Press the **enter** or **previous** button on the LCD screen until DELETE PRIMARY BOOM LENGTH CALIBRATION is displayed.

12 Press the **plus** button to select YES, then press the **enter** button to accept.

13 Start the engine and attempt to retract the boom to insure it is fully retracted.

14 Press the **enter** or **previous** button on the LCD screen until BOOM FULLY RETRACTED? is displayed.

15 Press the **plus** button to select YES, then press the **enter** button to accept.

16 Fully extend the boom.

17 Press the **enter** or **previous** button on the LCD screen until BOOM FULLY EXTENDED? is displayed.

18 Press the **plus** button to select YES, then press the **enter** button to accept.

19 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.

⊙ Result: An audible alarm sounds for 1 second. Calibration has been stored.

Note: Do not turn the engine off with the key switch or red Emergency Stop button or all calibration points or values will not be saved.

20 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

21 Press the **plus** button to select YES, then press the **enter** button to accept.

22 Turn the bypass/recovery key switch to the run position.

23 Remove the key from the bypass/recovery key switch and insert the key into the main key switch.

24 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

25 Start the engine and retract the boom to the stowed position.Verify there are no primary boom length sensor calibration faults shown on the display.

5-1
RPM Adjustment

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

5-2
Flex Plate

The flex plate acts as a coupler between the engine and the pump. It is bolted to the engine flywheel and has a splined center to drive the pump.

How to Remove the Flex Plate

1 Locate and disconnect the black negative battery cable from the engine battery.

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

2 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

3 Support the drive pump with an appropriate lifting device. Then remove all of the pump mounting plate to engine bell housing bolts.

4 Carefully pull the pump away from the engine and secure it from moving.

5 Remove the flex plate mounting fasteners, then remove the flex plate from the engine flywheel.

Engines

How to Install the Flex Plate

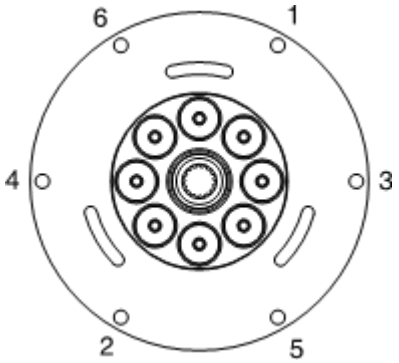
1 Install the flex plate onto the engine flywheel with the rubber vibration isolators towards the pump.

2 Use blue thread locking compound and torque the flex plate mounting bolts in sequence to 28 ft-lbs / 38 Nm. Then torque the flex plate mounting bolts in sequence to 40 ft-lbs / 54 Nm.

3 Apply a high viscosity coupling grease (Genie part number 128025) to the splines of the pump shaft and flex plate.

4 Install the pump plate and pump assembly onto the engine.

Grease Specification
Shell Alvania® Grease CG, NLGI 0/1 or equivalent.



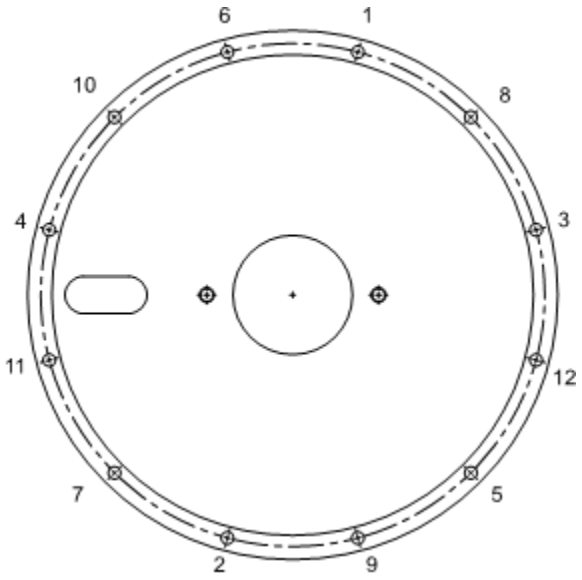
Deutz and Perkins models

How to Install the Pump Plate

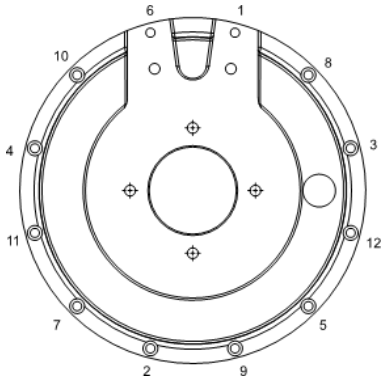
1 Using a suitable lifting device, install the pump plate and pump assembly onto the engine.

2 **Deutz engines**: Torque the pump plate mounting bolts in sequence to 23 ft-lbs / 31 Nm. Then torque the pump plate mounting bolts in sequence to 47 ft-lbs / 63 Nm.

3 **Perkins engines**: Torque the pump plate mounting bolts in sequence to 23 ft-lbs / 31 Nm. Then torque the pump plate mounting bolts in sequence to 47 ft-lbs / 63 Nm.



Perkins models



Deutz models

5-3 Diesel Particle Filter Regeneration - Deutz TCD 2.2 L3 Engine

The combustion of diesel fuel results in soot, which is separated in the diesel particle filter (DPF). This must be regenerated as the contamination with soot increases. There are 3 types of regeneration.

Passive regeneration:

Under normal operating conditions when the exhaust temperature is >482°F / 250°C the particle filter contamination with soot remains in a permissible range. This process is automatically activated by the engine control unit, the operator does not need to perform any actions.

Standstill regeneration:

If passive regeneration does not attain an adequate reduction of the soot contamination, the particle filter will continue to become contaminated with soot and a standstill regeneration will be required by the operator.

To perform standstill regeneration, refer to the Operator's Manual on your machine.

Service regeneration:

If a fault occurs, the system reacts by reducing the engine performance. This can include limited machine functions, torque reduction, reduced engine rpm and replacement of the DPF.

If standstill regeneration is prohibited by the operator. Service regeneration must be performed by a trained technician with the use of the DEUTZ SerDia software tool and DeCom interface cable. Available from Deutz.

If service regeneration is not performed, replacement of the DPF will be required.

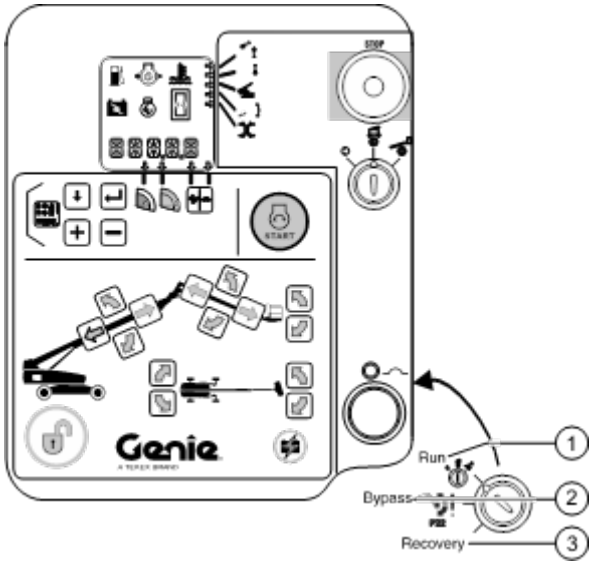
Ground Controls

6-1 Bypass/Recovery Key Switch

The turntable control box (TCON) is the communication and operations center for the machine. The turntable control box contains two key switches. The main key switch towards the top of the control box is for selection of ground or platform controls. The key switch at the bottom of the control box is the Bypass/Recovery key switch. Bypass and Recovery modes are only intended for certain circumstances and are not part of normal machine operation. If either the Bypass or the Recovery function is required, this indicates there may be faults with the machine. Contact trained personnel immediately.

Bypass is used for a platform out-of-level condition and calibrating certain machine parameters.

Recovery is only to be used as a last attempt to lower the platform when the operator in the platform is unable to do so, system failure or in emergency situations.



1 Run
2 Bypass
3 Recovery

How to Use the Bypass Mode

⚠ DANGER Tip-over hazard. Operating the machine outside of the operating envelope while in Bypass mode will result in death or serious injury if proper operating procedures and safety precautions are not followed. Do not use this mode if you are not trained and familiar with the operating envelope of the machine.

Note: Before using the Bypass mode, make sure you understand the fault code or issue affecting the operation of the machine to be sure the use of bypass is required.

The Bypass mode will allow the platform to be manually leveled when an out-of-level condition exists. In the event that the platform angle is greater than 10° from level, the boom angle and platform level functions are disabled. Use of the Bypass mode will allow the platform to be manually adjusted to within the normal operating envelope, ±4.5°. Only auxiliary power can be used to correct an out of level platform fault.

1 Turn the engine off.

2 Turn the main key switch to ground controls. Remove the key from the main key switch and insert the key into the bypass/recovery key switch.

Note: The main key switch must remain in the ground control position.

3 Turn the bypass/recovery key switch to the bypass position.

4 Using auxiliary power, operate the ground control buttons to level the platform.

Note: Only the auxiliary power unit can be used to correct an out of level platform fault.

5 Turn the bypass/recovery key switch to the run position.

6 Remove the key from the bypass/recovery key switch and insert the key into the main key switch.

Note: If the Bypass function has been used, there may be faults with the machine. Check the LCD screen on the ground control box for machine faults, then contact trained service personnel.

How to Use the Recovery Mode

Recovery is only to be used as a last attempt to lower the platform when the operator in the platform is unable to do so, system failure or in emergency situations.

⚠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.

⚠WARNING Bodily injury hazard. Platform leveling is not active when using recovery mode. The platform could reach high out-of-level conditions when using this mode. The operator will need to secure themself to the platform to prevent falling injury.

The recovery sequence will automatically fully retract the primary boom and then lower the primary boom using the auxiliary power unit to allow the operator at the platform controls to exit the platform.

1 Turn the main key switch to ground controls. Remove the key from the main key switch and insert the key into the bypass/recovery key switch.

Ground Controls

2 Turn and hold the bypass/recovery key switch to the recovery position. The switch must be held in the recovery position.

⊙ Result: The auxiliary power unit will turn on and the boom will begin the following recovery sequence.

- The primary boom will retract.
- The primary boom will lower.

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

Note: If any boom safety limit switches are faulty, the boom will only retract and not lower and the operator will need to be recovered from that point.

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

6-2 Circuit Boards

The ground control box contains a replaceable membrane decal with touch sensitive buttons for various machine functions. The ground control box also contains two printed circuit boards:

The LCD (Liquid Crystal Display) circuit board is mounted to the inside of the control box lid which controls the LCD display screen.

The ECM circuit board is the main circuit board for the machine. All operating parameters and configuration of options for the machine are stored in the ECM memory.

Note: When the ECM circuit board is replaced, the joysticks will need to be calibrated. Refer to Repair Procedure, *How to Calibrate a Joystick.*

Note: When the ECM circuit board is replaced, all the boom, platform and axle angle sensors will need to be calibrated and in a specific order. Contact Genie Product Support.

How to Remove the LCD Display Screen Circuit Board

1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.

2 Remove the ground control box lid fasteners.

3 Open the ground control box.

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

NOTICE Component damage hazard. Electrostatic discharge (ESD) can damage printed circuit board components. Maintain firm contact with a metal part of the machine that is grounded at all times when handling printed circuit boards OR use a grounded wrist strap.

4 Carefully disconnect the LCD circuit board ribbon cable from the ECM circuit board.

5 Remove the LCD display circuit board retaining fasteners.

6 Carefully remove the LCD display circuit board from the ground control box lid.

How to Remove the ALC-1000 Circuit Board

1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.

2 Remove the ground control box lid fasteners.

3 Open the ground control box.

4 Tag and disconnect the harnesses from the ground control box.

5 Remove the control cable receptacle retaining fasteners from the side of the control box.

6 Attach an ESD grounded wrist strap to the ground screw inside the control box.

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

NOTICE Component damage hazard. Electrostatic discharge (ESD) can damage printed circuit board components. Maintain firm contact with a metal part of the machine that is grounded at all times when handling printed circuit boards OR use a grounded wrist strap.

7 Tag and carefully disconnect the wire connectors from the circuit board.

8 Carefully disconnect the LCD circuit board ribbon cable from the ECM circuit board.

9 Carefully disconnect the two ribbon cables from the membrane decal at the ECM circuit board.

10 Remove the circuit board mounting fasteners.

11 Carefully remove the circuit board from the control box.

Ground Controls

6-3 Membrane Decal

The membrane decal is a special decal that consists of a decal with an electronic membrane on the backside. The membrane contains touch sensitive areas that, when pushed, activate the machine functions. The membrane contains touch sensitive areas that activate the machine functions.

How to Replace the Membrane Decal

1 Turn the key switch to the off position and push in the red Emergency Stop button to the off position at both the ground and platform controls.

2 Remove the ground control box lid fasteners.

3 Open the ground control box.

4 Carefully disconnect the two ribbon cables from the membrane decal at the ECM circuit board.

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

NOTICE Component damage hazard. Electrostatic discharge (ESD) can damage printed circuit board components. Maintain firm contact with a metal part of the machine that is grounded at all times when handling printed circuit boards OR use a grounded wrist strap.

5 Carefully remove the membrane decal from the control box lid while guiding the ribbon cables out of the control box lid.

6 Remove any decal adhesive from the control box lid with a mild solvent.

Note: Do not allow any solvent to come in contact with the LCD display screen.

7 Install the new membrane decal while guiding the ribbon cables through the control box lid.

8 Connect the ribbon cables to the ECM circuit board.

9 Close the control box lid and install the retaining fasteners.

6-4
Full Machine Calibration

Full machine calibration must be completed in the proper sequence when the ALC-1000 circuit board (TCON) in the ground control box has been replaced or the turntable level sensor (SCON) has been replaced.

How to Fully Calibrate the Machine

Calibration procedures shall only be completed by qualified technicians that have Genie factory service training.

⚠WARNING Tip-over hazard. Failure to calibrate the machine in the proper sequence could cause the machine to tip over resulting in death or serious injury.

Note: A digital level will be required to perform this procedure.

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



Plus Minus Previous Enter

Note: Start this procedure with the booms in the fully stowed position and the axle retracted.

Full machine calibration must be completed in the following sequence:

- Select engine configuration. Refer to Repair Section Display Module. *Unit of Measure and Language*.
- Joysticks. Refer to Repair Procedure, *How to Calibrate a Joystick*.
- Turntable level sensor. Refer to Repair Procedure, *How to Calibrate the Turntable Level Sensor*.
- Platform level sensor. Refer to Repair Procedure, *How to Calibrate the Platform Level Sensor*.
- Platform overload system. Refer to Repair Procedure, *How to Calibrate the Platform Overload System*.
- Axle angle sensors. Refer to Repair Procedure, *How to Calibrate the Axle Angle Sensors*.
- Steer sensors. Refer to Repair Procedure, *How to Calibrate All Steer Sensors*.
- Primary boom angle sensor. Refer to Repair Procedure, *How to Calibrate the Primary Boom Angle Sensor*.
- Primary boom length sensor. Refer to Repair Procedure, *How to Calibrate the Primary Boom Length Sensor*.
- Jib boom bellcrank angle sensor. Refer to Repair Procedure, *How to Calibrate the Jib Boom Bellcrank Sensor*.
- Select option configuration. Refer to Repair Section, Display Module, *Options.*

Display Module

This table lists the various screens and menu options of the operating software. Some display menus are for informational purpose only, while others can be used to change the machine operating parameters.

⚠WARNING Tip-over hazard. Calibration and parameter settings must be completed by a person trained and qualified on the repair of this machine. Failure to properly calibrate or set parameters could cause the machine to tip over resulting in death or serious injury.

Note: The key switch must be in the off position before entering the programming mode.

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



Plus



Minus



Previous



Enter

Activation of the **enter** or **previous** buttons scrolls through the screens. To change parameter values or select a setting, use the **plus** button (to increase or scroll forward) and the **minus** button (to decrease or scroll backwards). Then press the **enter** button to save the new value to memory. An audible beep will indicate a save to memory. Use the **enter** and **previous** buttons to scroll to the EXIT menu. Use the **plus** button to change to YES and use the **enter** button to exit.

Screen or Menu	Procedure	Description	Range or Selection
Operator	Default	Hourmeter (on power up)	
		Engine speed	
		Engine oil pressure PSI (English)	
		Engine oil pressure kPa (metric)	
		Engine temperature °F (Engiish)	engine temp will not display until temp is >100°F
		Engine temperature °C (metric)	engine temp will not display until temp is >38°C
		Primary boom angle to gravity	
		Turntable level sensor X° direction	
		Turntable level sensor Y° direction	
		Platform level sensor degree	
		Battery volts	

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Machine Status	With key switch on, press the **(plus)(minus)** buttons at the same time.	Hydraulic pressure PSI (English)	0-4500 PSI
		Hydraulic pressure kPa (metric)	0-31000 kPa
		Primary angle degrees	-2° to +83°
		Length sensor extension inches	0in to 682in
		Length sensor extension centimeters	0cm to 1732cm
		Axles fully extended	YES/NO
		Jib bellcrank angle	-10° to +10°
		DPF regeneration mode	Auto/Force/Inhibit
Unit of Measure and Language	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(minus)(minus)(plus)**	Metric/English (measurement units)	English, German, French, Spanish, Portuguese, Italian, Dutch, and Swedish.
		Set engine	Deutz 2.9L Turbo (D2.9T) Deutz TD2011L04i (DL04i) Perkins 1104D-44T (P1104) Perkins 854F (P854T)
		Start Glow Time	30s max, 0s min, 6s default
		Display Faults as	Text or Numeric
		Clear Overload Recovery	Yes/No
Default Reset	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(minus)(minus)(previous)(previous)**	Delete drive functions	Yes/No
		Delete boom function speeds	
		Delete lift function ramps	
		Delete all Sensor Calibrations	

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Drive Functions	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(plus)(enter)(enter)**.	Forward extended drive speed %	120% (max) 100% (default) 50% (min)
		Forward not stowed drive speed %	120% (max) 100% (default) 50% (min)
		Forward low drive speed %	120% (max) 100% (default) 50% (min)
		Forward high drive speed %	120% (max) 100% (default) 50% (min)
		Reverse extended drive speed %	120% (max) 100% (default) 50% (min)
		Reverse not stowed drive speed %	120% (max) 100% (default) 50% (min)
		Reverse low drive speed %	120% (max) 100% (default) 50% (min)
		Reverse high drive speed %	120% (max) 100% (default) 50% (min)
		Drive acceleration %	125% (max) 100% (default) 25% (min)
		Drive deceleration %	125% (max) 100% (default) 25% (min)
		Speed limit on steer angle	100% (max) 50% (default) 0%

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Boom Function Speeds	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(plus)(minus)(minus)**	Primary boom up speed stowed Primary boom up speed <80ft Primary boom up speed >80ft Primary boom up speed >80ft Primary boom up speed >120ft Primary boom down speed stowed Primary boom down speed <80ft Primary boom down speed >80ft Primary boom down speed >120ft Primary boom extend speed Primary boom retract speed Turntable rotate speed retracted Turntable rotate speed not retracted Turntable rotate speed > 75' Turntable rotate speed > 125' Jib up speed Jib down speed Jib extend speed Jib retract speed	120% max, 50% min, 100% (default)

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Lift Functions Ramps	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(plus)(previous)(previous)**.	Primary boom up/down ramp acceleration % Primary boom up/down ramp deceleration % Primary boom extend/retract ramp acceleration % Primary boom extend/retract ramp deceleration % Turntable rotate ramp acceleration % Turntable rotate ramp deceleration % Jib up/down ramp acceleration % Jib up/down ramp deceleration % Jib extend ramp acceleration Jib retract ramp deceleration %	150% max and 50% min 100% (default), 5% increment
Screen or Menu	**Procedure**	**Description**	**Range or Selection**
Valve Calibration	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(minus)(minus)(enter)(enter)**.	Delete drive valve calibration Delete boom extend/retract valve calibration Delete turntable rotate valve calibration Allow turntable rotate speed calibration Delete drive joystick calibration Delete boom up/down joystick calibration Delete boom extend/retract joystick calibration Delete turntable rotate joystick calibration Delete steer joystick calibration Delete jib up/down joystick calibration Delete jib extend/retract joystick calibration	YES/NO

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Sensor Calibration	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(enter)(enter)(plus)**.	Delete TT tilt sensor calibration	
		Set unit X-axis to gravity	
		Set unit Y-axis to gravity	
		Set platform level to gravity (YES/NO)	
		Platform level sensor millivolts/degree	
		Delete load cell calibration (YES/NO)	
		Calibrate load cell zero (YES/NO)	
		Platform rated load lbs	
		Platform rated kg	
		Delete axles angle sensors calibration? (YES/NO)	
		Axle angle fully retracted (YES/NO)	
		Axle angle fully extended (YES/NO)	
		Delete all steer sensors calibrations? (YES/NO)	Use +/- buttons to adjust
		Delete blue end blue side steer sensor (LF) calibration? (YES/NO)	
		Delete yellow end blue side steer sensor (LR) calibration? (YES/NO)	
		Delete blue end yellow side steer sensor (RF) calibration? (YES/NO)	
		Delete yellow end yellow side steer sensor (RR) calibration? (YES/NO)	
		Delete primary boom angle sensor calibration? (YES/NO)	
		Primary boom angle to gravity -5.0°	
		Primary boom angle to gravity 75°	
		Delete boom length sensor calibration? (YES/NO)	
		Boom fully retracted (YES/NO)	
		Boom fully extended (YES/NO)	
		Delete jib level angle sensor calibration? (YES/NO)	
		Jib bellcrank fully extended (YES/NO)	
		Jib bellcrank level angle to gravity -75.0°	

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Options	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(minus)(minus)(plus)(plus)**.	AC Generator	(NONE/7.5KW/12.5KW)
		Engine start aid time	0 - 30 sec, 10 sec default
		Alarm options	No (NO AL)/Motion (MO AL)/ Travel (TR AL)/ Descent (DE AL)/ Travel and Descent (TD AL)
		Auxiliary alarm	No (NO AL)/Motion (MO AL)/ Travel (TR AL)/ Descent (DE AL)/ Travel and Descent (TD AL)
		Lift/Drive options	No (NO CO)/ Drive cut out while not stowed (DCONS)/ Lifting or driving (LORDR)
		Proximity Switch?	(NONE/PROX)
		Flashing Beacon?	(NO/YES)
		Disable Steer Mode Change while Driving? (NO/YES)	
		Rocker Switch steering?	(NO/YES)
		Foot Switch Lockout (0-30 minutes)	30.0 max and 0.0 min, 10.0 (default) Holding +/- button will cause display to scroll through options or increment number settings automatically at 0.2 min increase/decrease
		Platform Always Level to Gravity?	(NO/YES)
		Axle Motion Only While Driving?	(NO/YES)
		Chassis Tilt Options	(CODRV/COALL)
		Boom Length Limit	(NONE/120FT/100FT/80FT)

7-1 Function Pump

The function pump is a pressure compensated, variable displacement piston pump. Any internal service to the pump should be performed at an authorized Sauer-Danfoss service center. Contact Genie Product Support to locate your local authorized service center.

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 two hydraulic tank valves at the hydraulic tank. Close the valves.

NOTICE Component damage hazard. The engine must not be started with the hydraulic tank shut-off valves in the closed position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

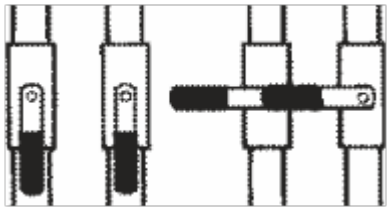
2 Tag, disconnect and plug the function pump hydraulic hoses. Cap the fittings on the pump.

⚠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 two pump mounting fasteners. Carefully remove the pump.

NOTICE Component damage hazard. Be sure to open the two hydraulic tank valves and prime the pump after installing the pump.



open closed

Hydraulic Pumps

How to Prime 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 Remove the case drain hydraulic hose from the top of the function pump.

Note: The case drain hose is the smaller of the two hoses on top of the function pump and closest to the drive pump.

2 Locate and open the hydraulic tank shut-off valve at the hydraulic tank that supplies hydraulic oil to the function pump. Do not open the valve for the drive pump.

3 When hydraulic fluid begins to come out of the case drain port of the function pump, install the function pump case drain hose.

4 Clean up any oil that may have spilled. Properly discard the used oil.

5 Start the engine from the ground controls.

6 Check for hydraulic leaks.

How to Adjust the Function Pump Standby Pressure

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

2 Start the engine from the ground controls and allow the engine to run at low idle.

3 Observe the pressure reading on the pressure gauge.

⊙ Result: The pressure gauge shows 350 psi / 25 bar. One or both of the functions pumps are correctly set. Proceed to step 4.

☒ Result: If the gauge shows a reading lower than 350 psi / 25 bar, both the function pumps need to be adjusted higher Proceed to step 6.

☒ Result: If the gauge shows a reading higher than 350 psi / 25 bar, one or both of the function pumps need to be adjusted lower. Proceed to step 8.

Note: The reading will show the higher pressure of the two function pumps.

Pressure reads 350 psi / 25 bar

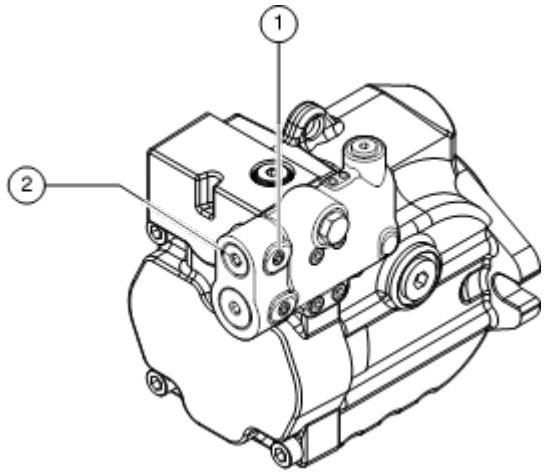
4 One or both of the function pumps may be at the correct pressure. Loosen the set screw for the standby pressure adjustment on the rear function pump and turn the adjustment screw clockwise (higher pressure). If the pressure increases above 350 psi / 25 bar, turn the screw counterclockwise (lower pressure) until the gauge shows 350 psi / 25 bar. Tighten the set screw.

5 Loosen the set screw for the standby pressure adjustment on the middle function pump and turn the adjustment screw clockwise until the pressure reads higher than 350 psi / 25 bar. Once the gauge reads higher than 350 psi / 25 bar, turn the adjustment screw counterclockwise until the gauge reads 350 psi / 25 bar. Tighten the set screw. Proceed to step 11.

Pressure reads less than 350 psi / 25 bar

6 Loosen the set screw for the standby pressure adjustment screw on the rear function pump. Turn the adjustment screw clockwise (higher pressure) until the pressure reads 350 psi / 25 bar. Tighten the set screw.

7 Loosen the set screw for the standby pressure adjustment screw on the mid function pump. Turn the adjustment screw clockwise (higher pressure) until the pressure reads greater than 350 psi / 25 bar, then turn the adjustment screw counterclockwise (lower pressure) until the pressure reads 350 psi / 25 bar. Tighten the set screw. Proceed to step 11.



1 standby pressure set screw
2 standby pressure adjustment screw

Hydraulic Pumps

Pressure reads more than 350 psi / 25 bar

8 Loosen the set screw for the standby pressure adjustment screw on the rear function pump. Turn the adjustment screw counterclockwise (lower pressure) and note if the pressure drops. If so turn the adjust screw counterclockwise (higher pressure) until the pressure reads 350 psi / 25 bar. If the pressure does not drop, turn the screw slightly counterclockwise to lower the pressure and proceed to step 7.

9 Loosen the set screw for the standby pressure adjustment screw on the mid function pump. Turn the adjustment screw counterclockwise until the pressure reads 350 psi / 25 bar. Tighten the set screw. Proceed to step 8.

10 Turn the adjustment screw on the rear function pump clockwise until the pressure reads greater than 350 psi / 25 bar, then turn the screw counterclockwise until the gauge reads 350 psi / 25 bar. Tighten the adjustment screw.

11 Turn the engine off and remove the pressure gauge.

How to Adjust the Function Pump Pressure Compensator

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

1 Confirm the system relief pressure is set to specification. Refer to Repair Procedure, *Valve Adjustments - Function Manifold*.

2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the function manifold.

3 Start the engine from the ground controls and change the rpm to high idle.

4 Push and hold the high speed function enable button (rabbit symbol). Do not activate any boom functions.

5 Locate the function enable solenoids below the function pumps on the engine tray. Disconnect the wire connector from the inside solenoid and observe the pressure reading on the pressure gauge.

⊙ Result: The gauge should show 2900 psi / 200 bar on the end pump.

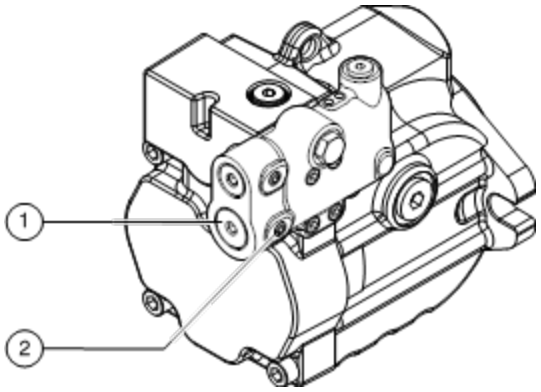
⊠ Result: If the gauge does not show 2900 psi / 200 bar, proceed to step 7 to adjust the function pump pressure compensator.

6 Reconnect the wire connector to the inside solenoid and disconnect the wire connector from the outer solenoid.

⊙ Result: The gauge should show 2700 psi / 186 bar on the middle pump.

⊠ Result: If the gauge does not show 2700 psi / 186 bar, proceed to step 7 to adjust the function pump pressure compensator.

7 Loosen the set screw for the pressure compensator adjustment screw.



1 pressure compensator set screw
2 pressure compensator adjustment screw

8 Adjust the pressure compensator pressure. Turn the adjustment screw clockwise to increase the pressure or counterclockwise to decrease the pressure. Tighten the set screw.

NOTICE

Component damage hazard. Do not adjust the pressure compensator higher than specified.

9 Verify that the wire connectors to both solenoids are securely connected.

10 Turn the engine off and remove the pressure gauge.

7-2 Drive Pump

The drive pump is a bi-directional variable displacement piston pump. The pump output is controlled by the electronic displacement controller (EDC), located on the pump. The only adjustment that can be made to the pump is the neutral or null adjustment. Any internal service to the pump should be performed at an authorized Sauer-Danfoss service center. Contact Genie Product Support to locate your local authorized service center.

How to Remove the Drive Pump

NOTICE

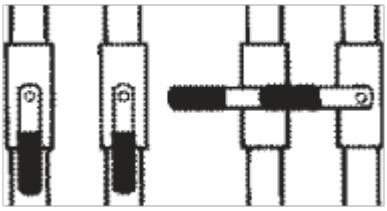
Component damage hazard. The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system and cause severe component damage. Dealer service is recommended.

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 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

Hydraulic Pumps

2 Locate the two hydraulic tank valves at the hydraulic tank. Close the valves.



open closed

NOTICE Component damage hazard. The engine must not be started with the hydraulic tank shut-off valves in the closed position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

3 Tag, disconnect and plug the hydraulic hoses from the drive and function pumps. Cap the fittings on the pumps.

⚠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 Support the pumps with a suitable lifting device and remove the two drive pump mounting fasteners.

5 Carefully pull the drive pump out until the pump coupler separates from the flex plate.

6 Remove the drive pump from the machine.

NOTICE Component damage hazard. The pump(s) may become unbalanced and fall if not properly supported.

NOTICE Component damage hazard. The engine must not be started with the hydraulic tank shut-off valves in the closed position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

How to Prime the Drive Pump

NOTICE

Component damage hazard. Be sure to open the hydraulic tank valves before performing this procedure.

1 With the top hoses disconnected from the drive pump, fill the pump with hydraulic fluid.

2 Connect the hydraulic hoses to the drive pump.

3 Start the engine from the ground controls and allow the engine to run at low idle.

4 Check for hydraulic leaks.

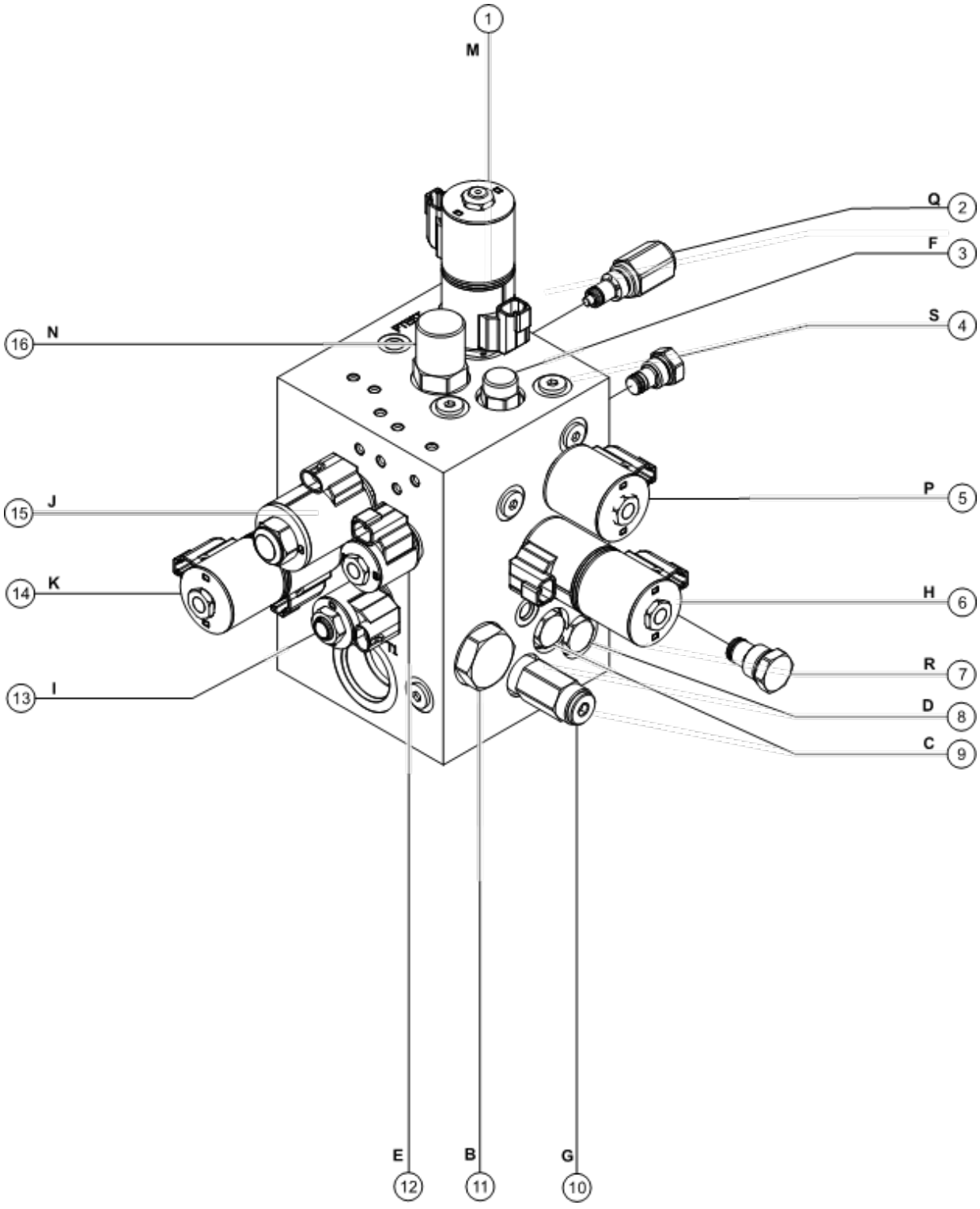
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8-1
Function Manifold Components

The function manifold is mounted next to the hydraulic tank on the ground control side of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 3 position 4 way CC	M	Primary boom extend/retract	115-125 ft-lbs / 156-170 Nm
2	Relief valve, 1750 psi / 120.7 bar	Q	Primary boom extend relief pressure	33-37 ft-lbs / 45-50 Nm
3	Pressure compensator valve, 150 psi / 10.3 bar	F	Turntable rotate	33-37 ft-lbs / 45-50 Nm
4	Check valve, 10 psi / 0.7 bar	S		20 ft-lbs / 27.1 Nm
5	Flow control valve, 2 way NC	P	Primary boom extend/retract	33-37 ft-lbs / 45-50 Nm
6	Solenoid operated 3 position 4 way directional valve	H	Turntable rotate	24-26 ft-lbs / 32.5-35.3 Nm
7	Check valve, 100 psi / 6.9 bar	R	Primary boom extend/retract	24-26 ft-lbs / 32.5-35.3 Nm
8	Check valve, 10 psi / 0.7 bar	D	Aux 2 reverse flow	20 ft-lbs / 27.1 Nm
9	Check valve, 10 psi / 0.7 bar	C	Aux 1 reverse flow	20 ft-lbs / 27.1 Nm
10	Relief valve, 3200 psi / 221 bar	G	System relief	25-27 ft-lbs / 34-36 Nm
11	Check valve	B	Function pump reverse flow	50 ft-lbs / 68 Nm
12	Flow control valve, 2 way, NC	E	Turntable rotate flow control	19-21 ft-lbs / 25.7-28.5 Nm

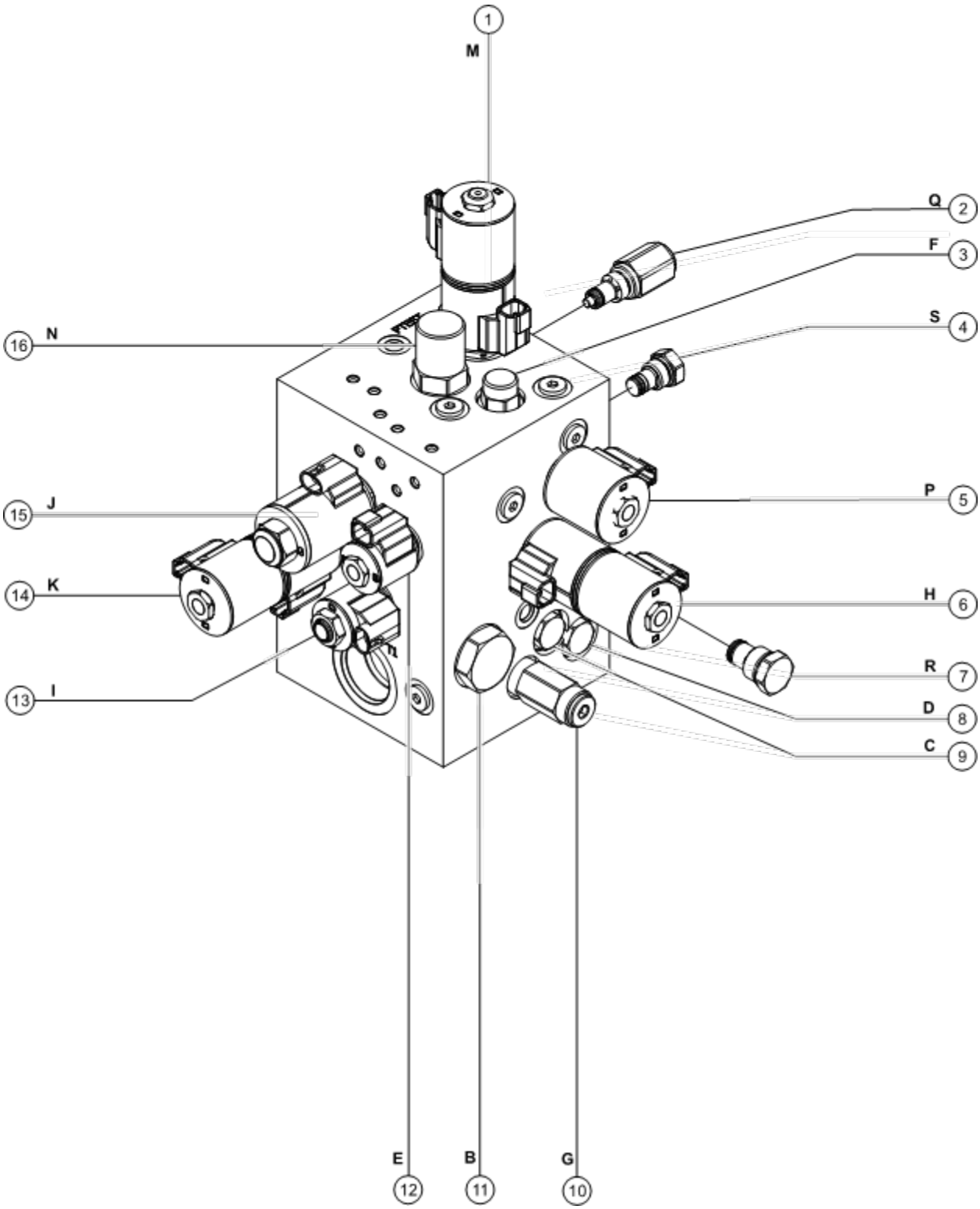
Manifolds



Function Manifold Components

Index No.	Description	Schematic Item	Function	Torque
13	Proportional solenoid valve, 3 way NC	I	Primary lift cylinder up/down low speed control	20 ft-lbs / 27.1 Nm
14	Solenoid valve, 3 position 4 way	K	Primary boom up/down	75-85 ft-lbs / 102-115 Nm
15	Flow regulator valve, 3 way NC	J	Primary lift cylinder up/down high speed control	27 ft-lbs / 36.7 Nm
16	Pressure compensator valve, 160 psi / 11 bar	N	Primary boom extend/retract	30 ft-lbs / 40.6 Nm

Manifolds



8-2 Valve Adjustments - Function Manifold

How to Adjust the Function Manifold Relief Valve

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

Note: Refer to Function Manifold Component list to locate the system relief valve.

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

2 Start the engine and raise the boom slightly and completely lower the jib boom. Turn off the engine.

3 Push and hold the auxiliary button and the jib down button and observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

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

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

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

6 Repeat step 3 to confirm relief valve pressure.

7 Remove the pressure gauge.

How to Adjust the Primary Boom Extend Relief Valve

Note: Perform this procedure with the axles extended.

1 Locate limit switch LSB4EO on the bottom of boom #1.

2 Disconnect the wire connector from the limit switch and connect a jumper wire to pin 1 and pin 2 of the deutsch connector on the upper limit switch cable.

Note: The correct wire connector will be a 4 pin connector with a red and blue marker on the cable.

3 Start the engine and fully extend the primary boom. Turn the engine off.

4 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ptest port on the function manifold.

5 Start the engine from the ground controls.

Manifolds

6 Simultaneously push and hold the function enable and the primary boom extend button with the primary boom fully extended. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

Note: The pressure at the ptest port on the function manifold is a combination of pressures produced by the differential valve and relief valve. Setting the valve to the combined pressure will insure the relief valve is set to the correct pressure.

7 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.

8 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.

9 Repeat step 6 to confirm relief valve pressure.

10 Connect the limit switch connector that was disconnected in step 2.

11 Remove the pressure gauge.

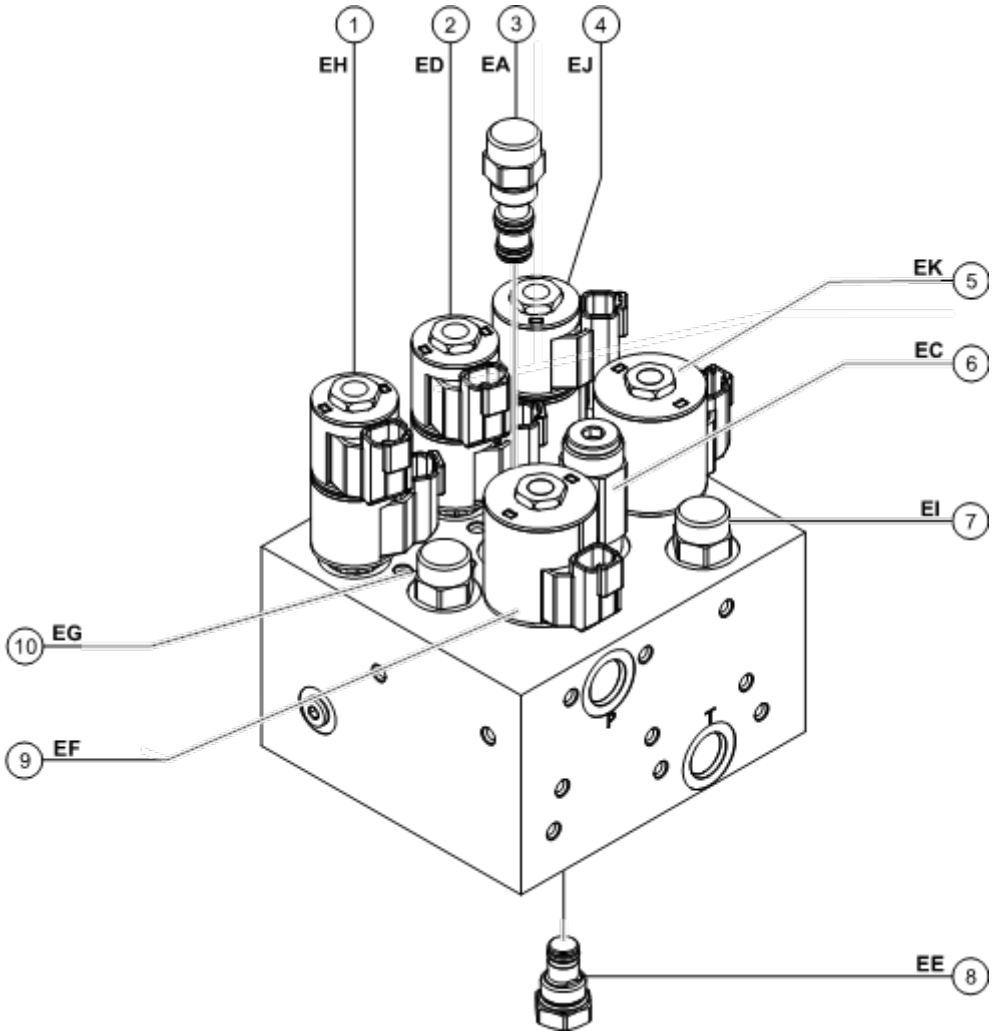
12 Start the engine and fully retract the primary boom. Turn the engine off.

8-3
Jib Manifold Components

The jib manifold is mounted on the side of the # 3 Boom.

Index No.	Description	Schematic Item	Function	Torque
1	Proportional solenoid valve, 3 position 4 way	EH	Jib boom up/down	19-21 ft-lbs / 25.8-28.6 Nm
2	Proportional solenoid valve, 3 position 4 way	ED	Jib extend/retract	19-21 ft-lbs / 25.8-28.6 Nm
3	Pressure compensator valve, 150 psi / 10.3 bar	EA	Jib extend/retract compensator	19-21 ft-lbs / 25.8-28.6 Nm
4	Solenoid valve, 3 position 4 way	EJ	Bellcrank level up/down	19-21 ft-lbs / 25.8-28.6 Nm
5	Solenoid valve, 2 position 2 way (normally open)	EK	Bellcrank up/down level loop valve	19-21 ft-lbs / 25.8-28.6 Nm
6	Relief valve, 1100 psi / 75.8 bar	EC	Jib extend relief	19-21 ft-lbs / 25.8-28.6 Nm
7	Pressure compensator valve, 150 psi / 10.3 bar	EI	Bellcrank up/down compensator	19-21 ft-lbs / 25.8-28.6 Nm
8	Check valve, 25 psi / 1.7 bar	EE	Tank line return check	19-21 ft-lbs / 25.8-28.6 Nm
9	Solenoid valve, 2 position 2 way, N.C.	EF	Jib extend/retract enable	19-21 ft-lbs / 25.8-28.6 Nm
10	Pressure compensator valve, 150 psi / 10.3 bar	EG	Jib up/down compensator	19-21 ft-lbs / 25.8-28.6 Nm

Manifolds

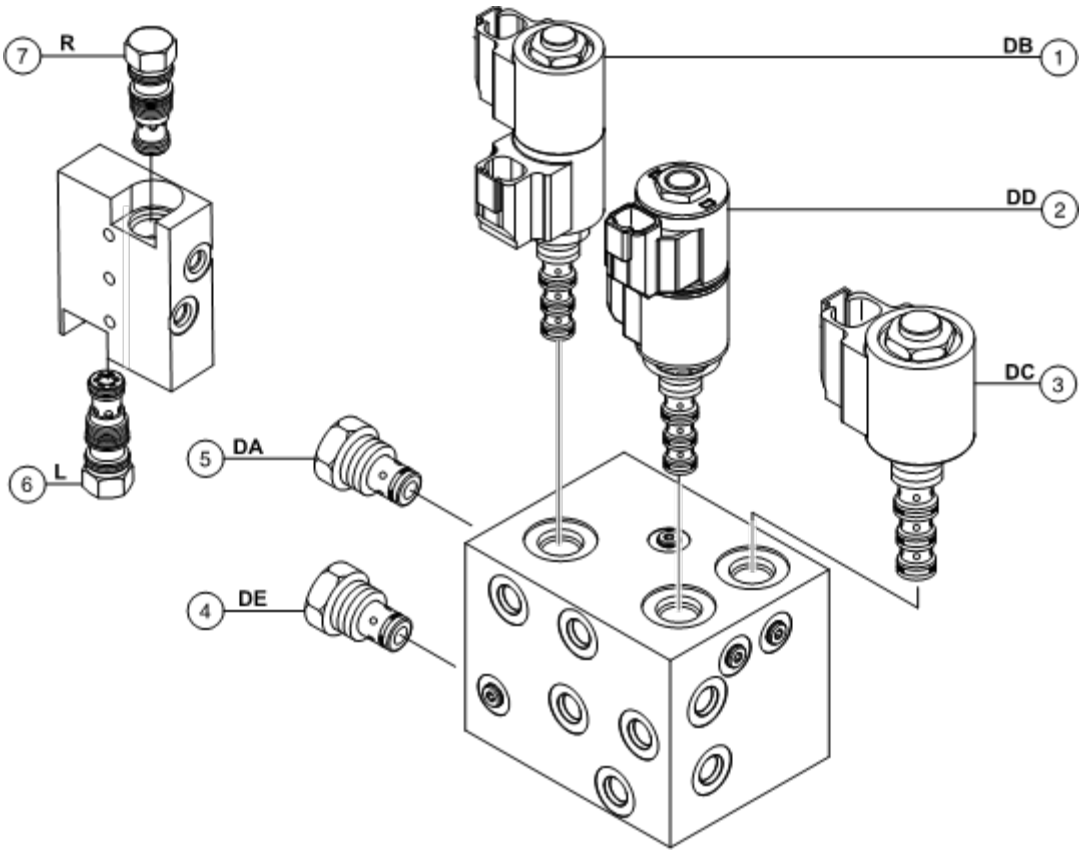


8-4
Platform and Rotator Manifold Components

The platform manifold is mounted on the platform and the rotator manifold is mounted on the rotator.

Index No.	Description	Schematic Item	Function	Torque
1	Proportional solenoid valve, 3 position 4 way	DB	Platform left/right circuit	19-21 ft-lbs / 25.8-28.6 Nm
2	Proportional solenoid valve, 3 position 4 way	DD	Platform up/down circuit	19-21 ft-lbs / 25.8-28.6 Nm
3	Solenoid valve, 2 position 2 way (normally open)	DC	Platform level loop lock valve	25-30 ft-lbs / 33.9-40.7 Nm
4	Flow control valve, 0.2 gpm / 0.76 L/min	DE	Regulates flow in up/down circuit	19-21 ft-lbs / 25.8-28.6 Nm
5	Flow control valve, 0.2 gpm / 0.76 L/min	DA	Regulates flow in left/right circuit	19-21 ft-lbs / 25.8-28.6 Nm
6	Counterbalance valve	L	Platform rotate left	25-30 ft-lbs / 33.9-40.7 Nm
7	Counterbalance valve	R	Platform rotate right	25-30 ft-lbs / 33.9-40.7 Nm

Manifolds

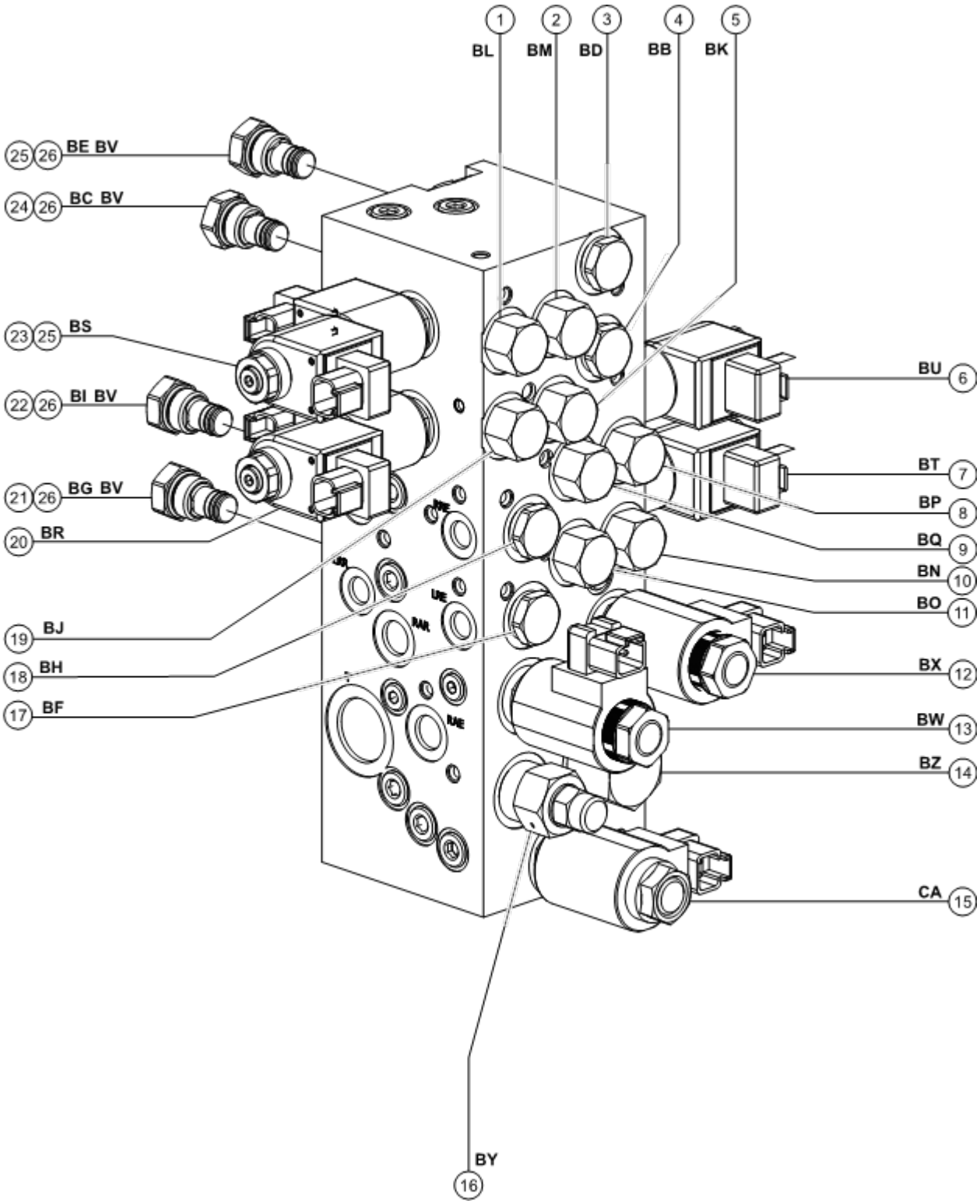


8-5
Steer and Axle Manifold Components

The steer and axle manifold is mounted inside the manifold box at the yellow triangle side of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Flow control valve, 2.1 gpm / 8 L/min	BL	Right front steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
2	Flow control valve, 1.5 gpm / 5.7 L/min	BM	Right front steer cylinder retract circuit	20-25 ft-lbs / 27-34 NM
3	Check valve, 65 psi	BD	Prevents right front steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
4	Check valve, 65 psi	BB	Prevents left rear steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
5	Flow control valve, 1.5 gpm / 5.7 L/min	BK	Left rear steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
6	Solenoid valve, 3 position 4 way	BU	Steer left/right, right rear steer cylinder	26-30 ft-lbs / 35.3-40.7 Nm
7	Solenoid valve, 3 position 4 way	BT	Steer left/right, left rear steer cylinder	26-30 ft-lbs / 35.3-40.7 Nm
8	Flow control valve, 2.1 gpm / 8 L/min	BP	Right rear steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
9	Flow control valve, 1.5 gpm / 5.7 L/min	BQ	Right rear steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
10	Flow control valve, 2.1 gpm / 8 L/min	BN	Left rear steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
11	Flow control valve, 1.5 gpm / 5.7 L/min	BO	Left rear steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
12	Solenoid Valve, 2 position 3 way	BX	Axle retract	33-37 ft-lbs / 45-50 Nm
13	Solenoid Valve, 2 position 3 way	BW	Axle extend	33-37 ft-lbs / 45-50 Nm
14	Flow control valve, 9.0 gpm / 41 L/min	BZ	Axle extend/retract circuit	50-55 ft-lbs / 68-75 Nm
15	Solenoid valve	CA	Axle retract enable	

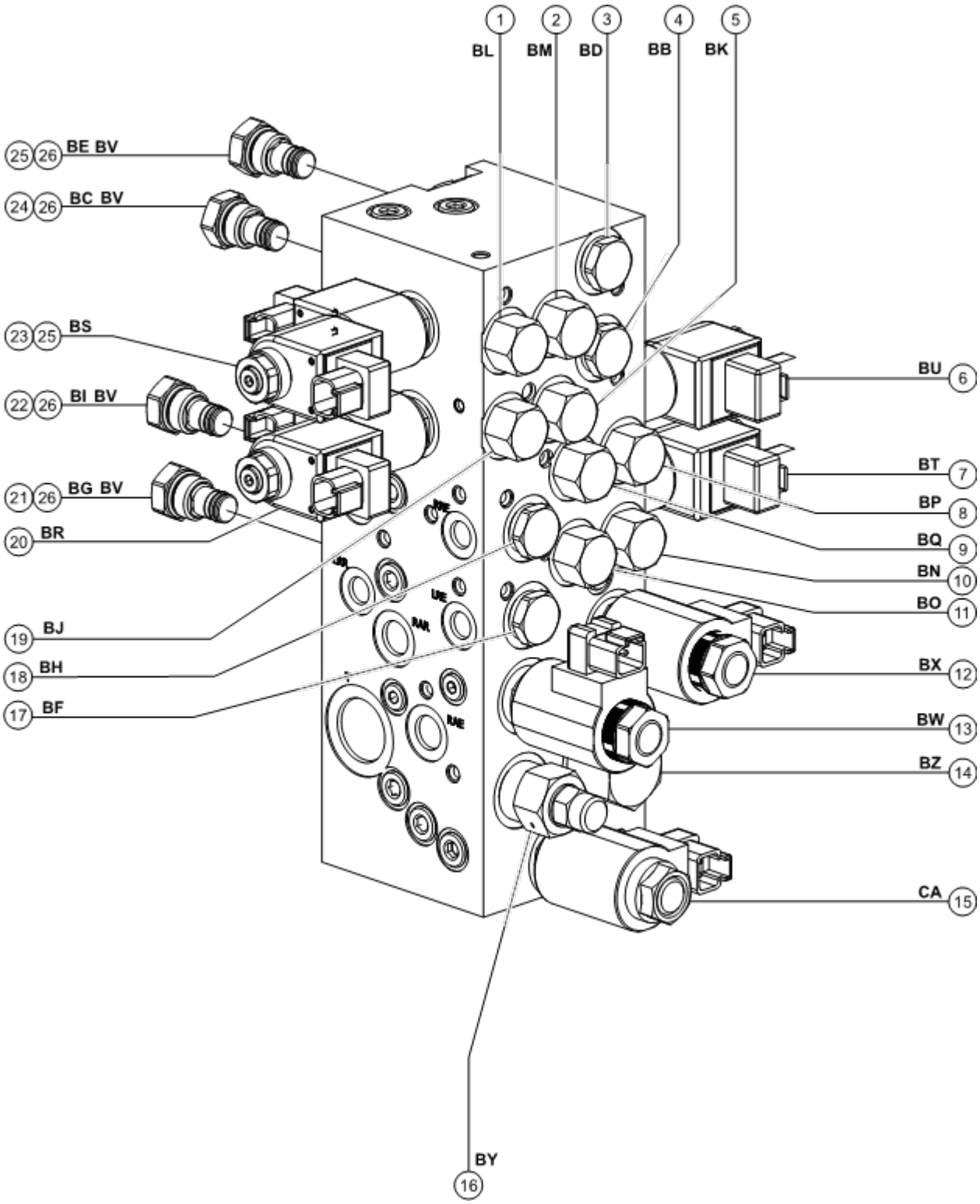
Manifolds


1 BL
2 BM
3 BD
4 BB
5 BK
25 26 BE BV
24 26 BC BV
23 25 BS
22 26 BI BV
21 26 BG BV
20 BR
19 BJ
18 BH
17 BF
16 BY
BU 6
BT 7
BP 8
BQ 9
BN 10
BO 11
BX 12
BW 13
BZ 14
CA 15

Manifolds

Index No.	Description	Schematic Item	Function	Torque
16	Pressure reducing valve, 2400 psi / 165.5 bar	BY	Axle extend/retract circuit	33-37 ft-lbs / 45-50 Nm
17	Check valve, 65 psi / 4.5 bar	BF	Prevents left rear steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
18	Check valve, 65 psi / 4.5 bar	BH	Prevents right rear steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
19	Flow control valve, 2.1 gpm / 8 L/min	BJ	Left front steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
20	Flow control valve, 1.5 gpm / 5.7 L/min	BR	Steer left/right, left front steer cylinder	26-30 ft-lbs / 35.3-40.7 Nm
21	Check valve, 65 psi / 4.5 bar	BG	Left front steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
22	Check valve, 65 psi / 4.5 bar	BI	Prevents right rear steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
23	Solenoid Valve	BS	Steer left/right, right front steer cylinder	26-30 ft-lbs / 35.3-40.7 Nm
24	Check valve, 65 psi / 4.5 bar	BC	Prevents left front steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
25	Check valve, 65 psi / 4.5 bar	BE	Prevents right front steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm

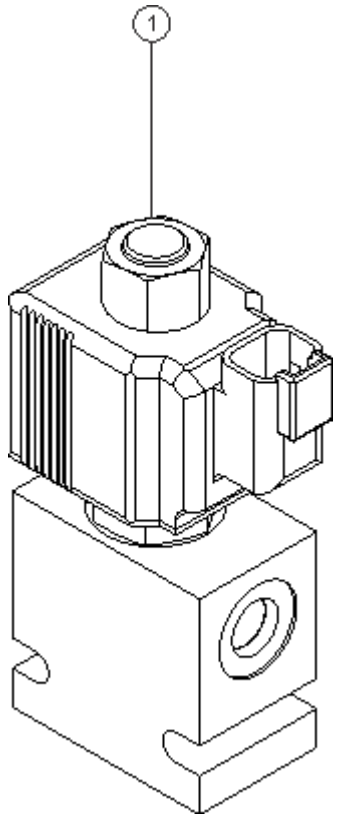
Manifolds


1 BL
2 BM
3 BD
4 BB
5 BK
25 26 BE BV
24 26 BC BV
23 25 BS
22 26 BI BV
21 26 BG BV
20 BR
19 BJ
18 BH
17 BF
16 BY
BU 6
BT 7
BP 8
BQ 9
BN 10
BO 11
BX 12
BW 13
BZ 14
CA 15

8-6
Function Enable Manifold

The jib boom manifold is mounted inside the primary extension boom at the platform end.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 2 position 2 way	A	Enables function pumps to provide hydraulic pressure for all boom and steer/axle functions	20-25 ft-lbs / 27-34 Nm



Manifolds

8-7
Valve Adjustments - Steer and Axle Manifold

How to Adjust the Axle Relief Valve

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

Note: Refer to Steer and Axle Manifold list to locate the axle relief valve.

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the steer and axle manifold.

2 Locate the axle relief valve on the steer and axle manifold. Hold the relief valve with a wrench and remove the cap.

3 Start the engine from the platform controls and press down the foot switch. Press and hold the axle extend button at the platform controls. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

4 Turn the engine off.

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

NOTICE Component damage hazard. Do not adjust the relief valve pressures higher than specifications.

6 Repeat steps 3 through 5 to confirm relief valve pressure.

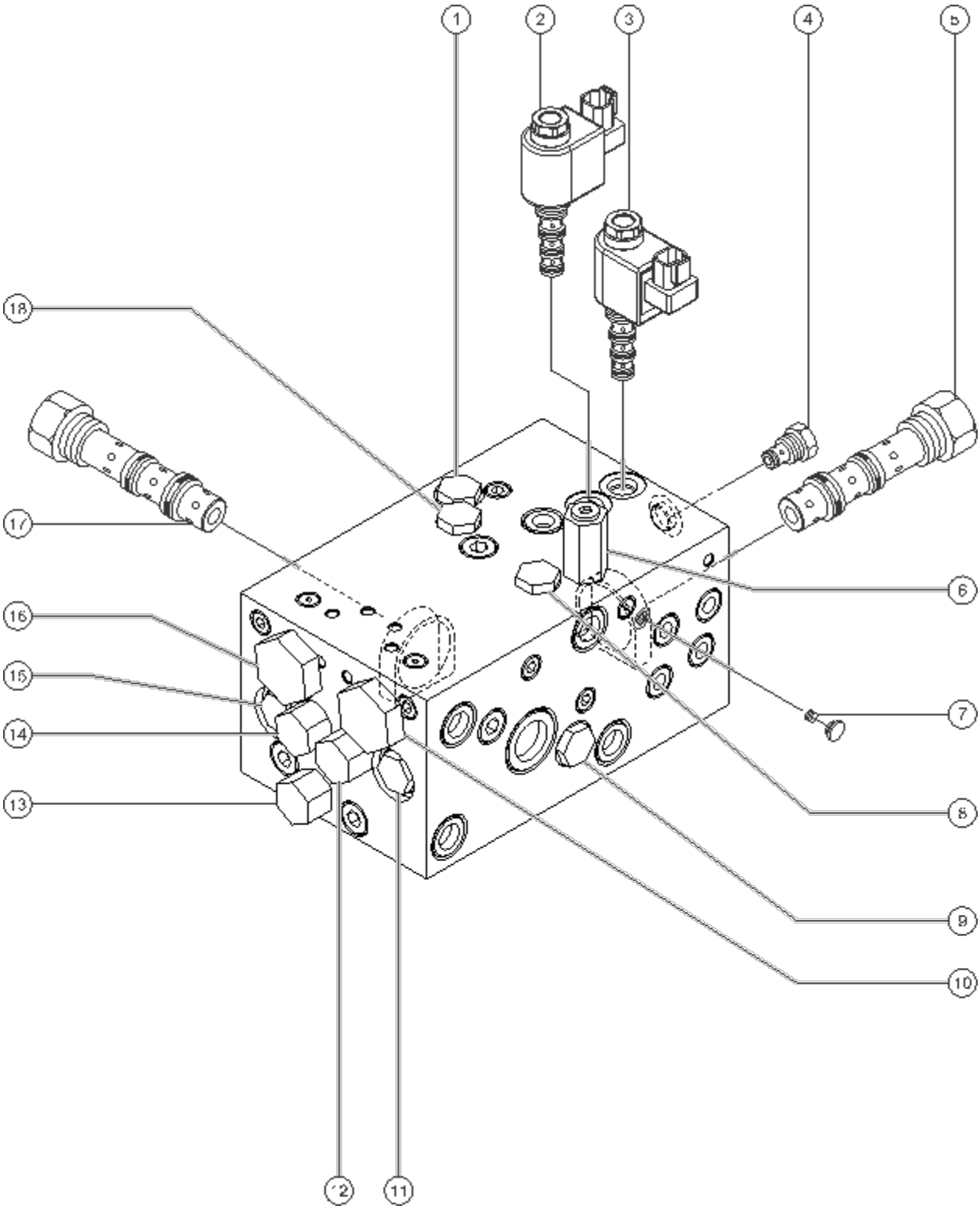
7 Remove the pressure gauge.

8-8
Traction Manifold Components

The traction manifold is mounted inside the drive chassis at the circle end of the machine

Index No.	Description	Schematic Item	Function	Torque
1	Check valve	AZ	Anti-cavitation	30-35 ft-lbs / 40.7-47.5 Nm
2	Solenoid Valve, 2 position 3 way	AX	Two-speed drive motor shift	26-30 ft-lbs / 35.3-40.7 Nm
3	Solenoid Valve, 2 position 3 way	AY	Brake release	26-30 ft-lbs / 35.3-40.7 Nm
4	Check valve	AW	Keeps brakes released if temporary loss of charge pressure	20-25 ft-lbs / 27.1-33.9 Nm
5	Shuttle Valve, 3 position 3 way	AO	Charge pressure circuit that directs hot oil out of low pressure side of drive pumpp	50-55 ft-lbs / 67.8-74.6 Nm
6	Relief valve, 250 psi / 17.23 bar	AN	Charge pressure circuit	20-25 ft-lbs / 27.1-33.9 Nm
7	Orifice Plug, 0.030 inch / 0.762 mm	AV	Brake and two-speed circuit	20-25 ft-lbs / 27.1-33.9 Nm
8	Check valve	AU	Anti-cavitation	20-25 ft-lbs / 27.1-33.9 Nm
9	Check valve	BA	Anti-cavitation	30-35 ft-lbs / 40.7-47.5 Nm
10	Flow divider/combiner valve	AR	Controls flow to square end drive motors in forward and reverse	90-100 ft-lbs / 122-135.6 Nm
11	Check valve	AK	Anti-cavitation	20-25 ft-lbs / 27.1-33.9 Nm
12	Orifice, 2 gpm / 7.6 L/min	AS	Equalizes pressure on both sides of divider/combiner valve	30-35 ft-lbs / 40.7-47.5 Nm

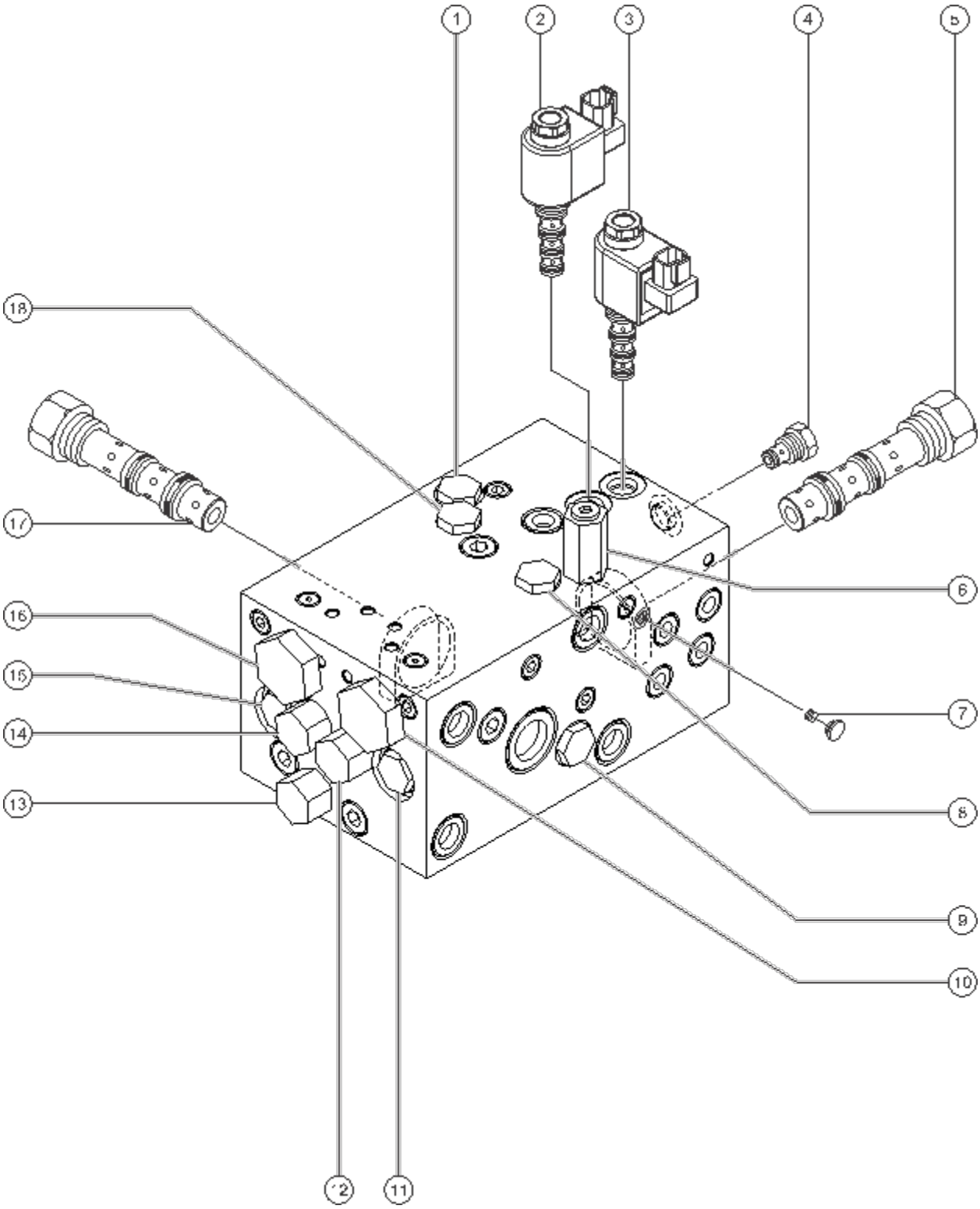
Manifolds



Traction Manifold Components, continued

Index No.	Description	Schematic Item	Function	Torque
13	Orifice, 2 gpm / 7.6 L/min	AQ	Equalizes pressure on both sides of divider/combiner valve AP	30-35 ft-lbs / 40.7-47.5 Nm
14	Orifice, 2 gpm / 7.6 L/min	AL	Equalizes pressure on both sides of divider/combiner valve AM	30-35 ft-lbs / 40.7-47.5 Nm
15	Check valve	AJ	Anti-cavitation	20-25 ft-lbs / 27.1-33.9 Nm
16	Flow divider/combiner valve	AM	Controls flow to circle end drive motors in forward and reverse	90-100 ft-lbs / 122-135.6 Nm
17	Flow divider/combiner valve	AP	Controls flow to divider/combiner valves AM and AR	90-100 ft-lbs / 122-135.6 Nm
18	Check valve	AT	Anti-cavitation	20-25 ft-lbs / 27.1-33.9 Nm

Manifolds



8-9
Valve Adjustments - Traction Manifold

How to Adjust the Hot Oil Relief Valve

Note: The hydraulic oil temperature must be 100°F to 150°F / 38°C to 65.5°C before performing this procedure.

1 Connect a 0 to 600 psi / 0 to 50 bar pressure gauge to either the "A" or "B" test port on the drive pump.

2 Locate the hot oil relief valve on the traction manifold. Hold the relief valve and remove the cap.

3 Turn the internal hex socket clockwise fully until it stops. Install the cap.

4 Start the engine from the ground controls.

5 Press and hold the function enable/high rpm select button (rabbit symbol) position. Note the reading on the pressure gauge.

6 Turn the engine off.

7 Remove the pressure gauge from the drive pump. Connect the gauge to the test port located on the traction manifold.

8 Hold the hot oil relief valve and remove the cap.

9 Start the engine from the ground controls.

10 Press and hold the function enable/high rpm select button (rabbit symbol) position.

11 Adjust the internal hex socket until the pressure reading on the gauge is 40 psi / 2.8 bar less than the pressure reading on the pump. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the relief valve cap.

12 Turn the engine off.

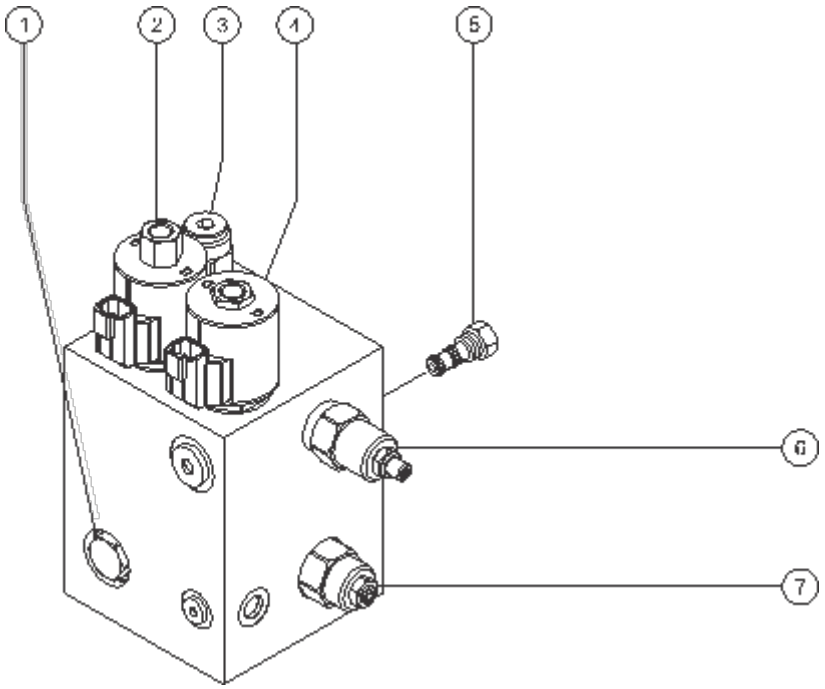
13 Remove the pressure gauge.

Manifolds

8-10
Generator Manifold Components

The oil diverter manifold is mounted near the hydraulic generator located in the engine compartment.

Index No.	Description	Schematic Item	Function	Torque
1	Check valve	FA	Controls flow to diverter valve	19-21 ft-lbs 26-28 Nm
2	Solenoid valve, 2 position 2 way valve (normally closed)	FB	Pilot valve to diverter valve	33-37 ft-lbs 45-50 Nm
3	Relief valve, 3200 psi / 221 bar	FC	Generator relief valve	24-26 ft-lbs 33-35 Nm
4	Solenoid valve, 2 position 2 way (normally open)	FD	Charge pressure circuit	33-37 ft-lbs 45-50 Nm
5	Check valve	FE	Prevents oil to generator	7-8 ft-lbs 9-11 Nm
6	Needle valve	FF	Charge pressure circuit	45-50 ft-lbs 61-68 Nm
7	Counterbalance valve, 4.5:1 2000 psi / 138 bar	FG	Adds backpressure to generator circuit	45-50 ft-lbs 61-68 Nm



8-11 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.

Valve Coil Resistance Specification	
Function Manifold	
schematic item L	4.5Ω@12v
schematic item K	5.4Ω@12v
schematic item J, N, T, U	7.1Ω@12v
schematic item W, X	6.2Ω@12v
schematic Item M	8.8Ω@12v
Steer Manifold	
schematic item BT, BU	5.6Ω@12v
schematic item BF, BH, BJ, BL	7.2@12v
Traction Manifold	
schematic item AX, AY	7.2Ω@12v
Jib Manifold	
schematic item EB, ED	6.2Ω@10v
Platform Manifold	
schematic item DB, DD, DG	6.2Ω@10v
Function Enable Manifold	
schematic item A	7.2Ω@12v
Generator Manifold	
schematic item FB, FD	7.1Ω@12v

Manifolds

How to Test a Coil Diode

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

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

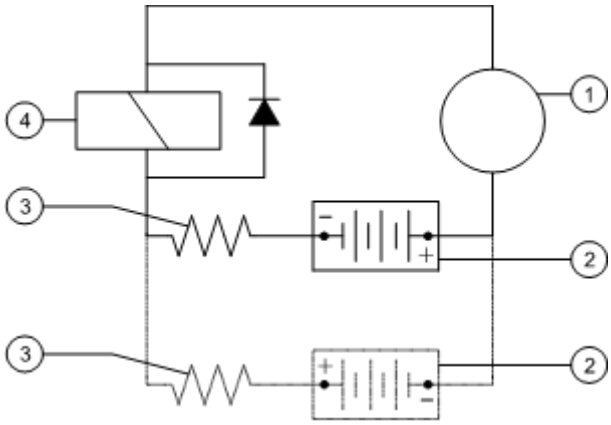
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.

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

Resistor 10Ω

Genie part number 27287

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



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

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

3 Set a multimeter to read DC current.

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

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

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

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

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

☒ 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.

9-1 Turntable Rotation Assembly

How to Remove a Turntable Rotation Assembly

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

Note: Perform this procedure with the primary boom between the circle-end tires and with the machine on a firm, level surface.

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

2 Remove the ground controls side fixed turntable cover.

3 Tag, disconnect the hydraulic hoses from the turntable rotation motor. Cap the fittings on the 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.

4 Attach a lifting strap from an overhead crane or other suitable lifting device to the lifting eye on the turntable rotation assembly.

5 Remove the drive hub mounting bolts and remove the turntable rotation assembly from the machine.

6 Repeat steps 3 through 5 for the other turntable rotation assembly.

⚠DANGER Tip-over hazard. If the turntable rotation lock pin is not properly installed, machine stability is compromised and the machine could tip over when the drive hub is removed from the machine, which could result in death or serious injury.

⚠WARNING Crushing hazard. The drive hub could become unbalanced and fall if not properly supported by an overhead crane or lifting device when removed from the machine.

Note: When installing a turntable rotation assembly, the rotation gear backlash must be adjusted. Refer to Repair Procedure, *Adjust the Turntable Rotation Gear Backlash*.

Turntable Rotation Components

How to Adjust the Turntable Rotation Gear Backlash

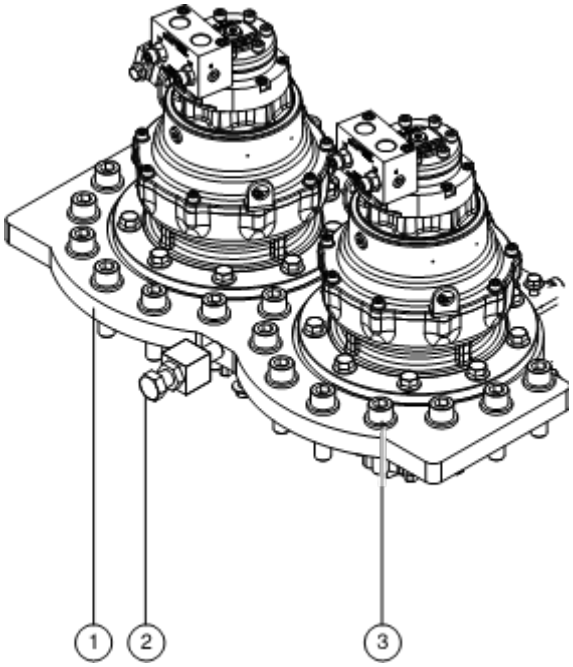
1 Secure the turntable from rotating with the turntable rotation lock pin.

2 Loosen the backlash pivot plate mounting bolts.

3 Push the backlash pivot plate towards the turntable as far as possible (this will push the rotation pinion gears into the turntable bearing ring gear).

4 Loosen the lock nut on the adjustment bolt.

5 Turn the adjustment bolt clockwise until it contacts the backlash pivot plate.



1 backlash pivot plate
2 adjustment bolt with lock nut
3 backlash pivot plate mounting bolts

6 Turn the adjustment bolt 1/2 to 3/4 turn counterclockwise. Tighten the lock nut on the adjustment bolt.

7 Pull the backlash pivot plate away from the turntable until it contacts the adjustment bolt. Then lubricate the mounting fasteners on the backlash pivot plate and torque to specification. Refer to Specifications, *Machine Torque Specifications*.

8 Rotate the turntable through an entire rotation. Check for tight spots that could cause binding. Readjust if necessary.

9-2
Turntable Level Sensor

How to Calibrate the Turntable Level Sensor

Note: If the Safety Controller (SCON) has been replaced, the entire machine needs to be calibrated in a specific order. Refer to Repair Procedure, *How to Fully Calibrate the Machine*.

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

Note: A digital level will be required to perform this procedure.

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



Plus Minus Previous Enter

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

2 Open the ground control box.

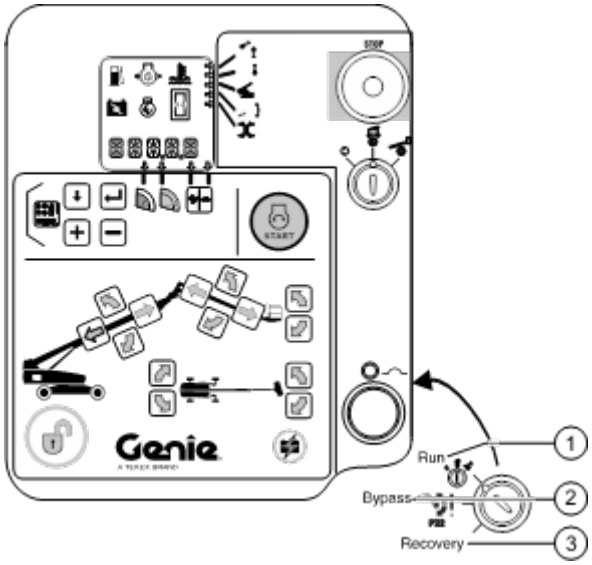
3 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

4 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

5 Turn the key switch to ground controls.

6 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.



1 Run
2 Bypass
3 Recovery

Turntable Rotation Components

7 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

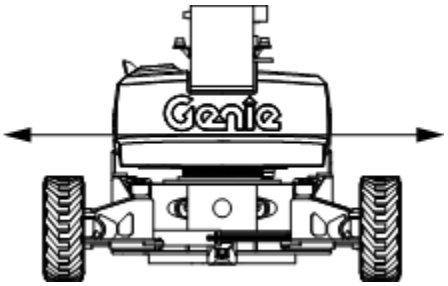
8 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

9 Press the **enter** or **previous** button on the LCD screen until **DELETE TT TILT SENSOR CALIBRATION** is displayed.

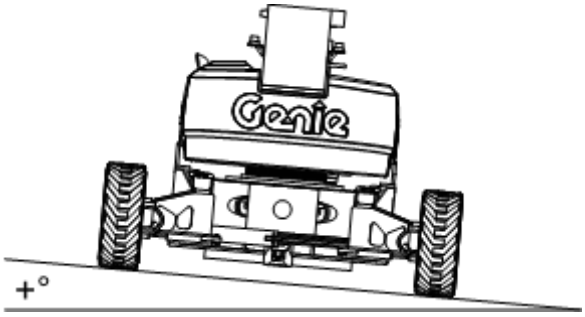
10 Press the **plus** button to select YES, then press the **enter** button to accept.

11 Press the **enter** or **previous** button on the LCD screen until SET UNIT X AXIS LEVEL TO GRAVITY is displayed.

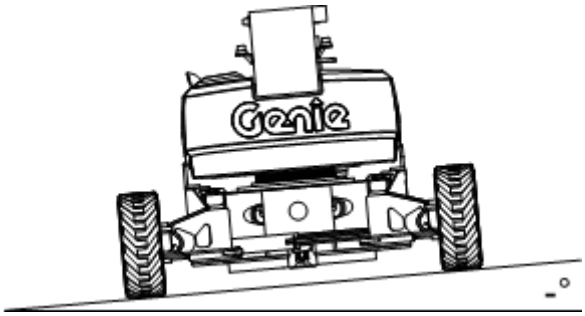
12 Place a digital level that has been calibrated to gravity on the X axis of the turntable.



X axis



positive degree side slope



negative degree side slope

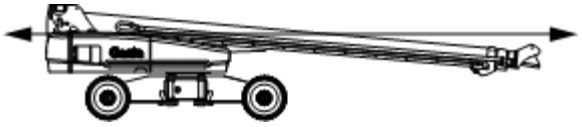
Turntable Rotation Components

13 Press the **plus** button or **minus** button to adjust the display to the exact value shown on the digital level and press the **enter** button.

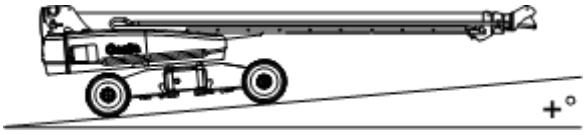
Note: If the measured angle already matches the angle shown on the display at the ground controls, press the **plus** button or **minus** button to change the angle and then change back to the measured value. The system must detect a change in displayed value to record the calibrated value.

14 Press the **enter** or **previous** button on the LCD screen,until SET UNIT Y AXIS LEVEL TO GRAVITY is displayed.

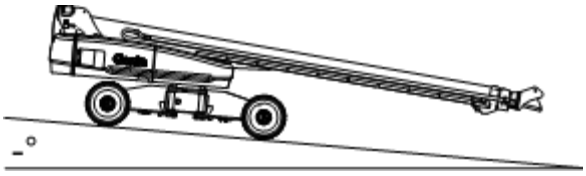
15 Place a digital level that has been calibrated to gravity on the Y axis of the turntable.



Y axis



positive degree downhill slope



negative degree uphill slope

16 Press the **plus** button or **minus** button to adjust the display to the exact value shown on the digital level and press the **enter** button.

Note: If the measured angle already matches the angle shown on the display at the ground controls, press the **plus** button or **minus** button to change the angle and then change back to the measured value. The system must detect a change in displayed value to record the calibrated value.

17 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

18 Press the **plus** button to select YES, then press the **enter** button to accept.

19 Wait approximately 20 seconds and turn the machine off by pressing the red Emergency Stop button in.

20 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

21 Use the key to turn the bypass / recovery key switch to the run position.

Note: Be sure that the bypass/recovery key switch is in the run position before attempting to operate the machine.

22 Start the engine. Be sure there are no calibration faults shown on the display.

Axle Components

10-1
Steer Sensors

The steer sensors measure steer angle and communicates that information to the ground controls ECM. The steer sensor on the ground controls side of the machine at the square-end acts as the lead sensor when in front wheel steer mode. In rear wheel steer mode, the steer sensor on the ground controls side of the machine at the circle-end acts as the lead sensor. The other three sensors follow the position, or steer angle, of the lead sensor. There is a steer sensor mounted to the top of each steer yoke upper pivot pin.

How to Replace a Steer Sensor

Note: Perform this procedure with the axles fully retracted and the boom in the stowed position.

1 Align the remaining wheels on the machine so they are visually parallel to the chassis as close as possible.

2 Disconnect the steer sensor assembly cable from the main harness to be replaced.

3 Remove the steer sensor cover retaining fasteners. Remove the steer sensor assembly.

Note: If the sensor activator pin needs to be replaced, install the new activator pin per Illustration 1.

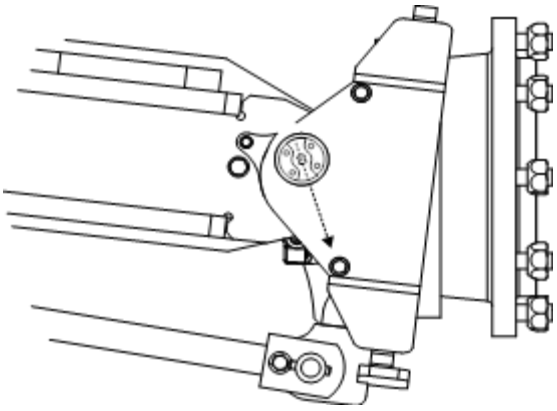


Illustration 1
(square end, yellow side and circle end, blue side shown)

Left front (square-end, blue side) and right rear (circle-end, yellow side) angle sensors:

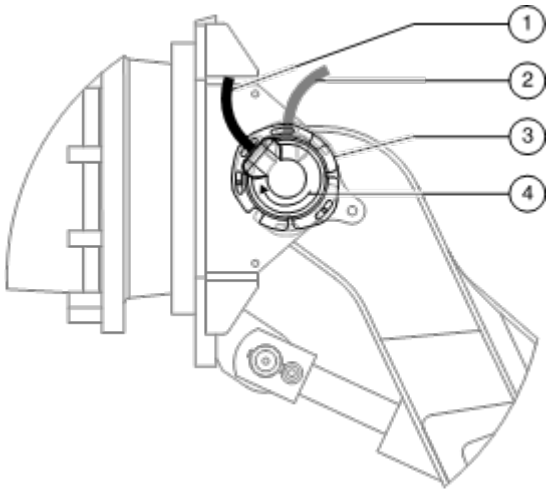


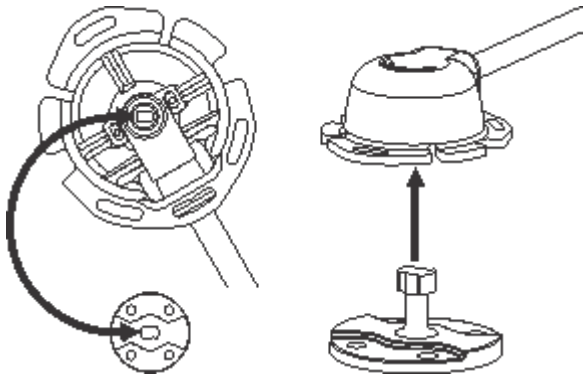
Illustration 2

1 installed position
2 starting position
3 sensor cover
4 rotation arrow

4 Position the new steer sensor assembly over the sensor activator pin with the sensor cable angled towards the tire. Refer to Illustration 2.

5 Align the sensor with the pin and install the sensor on to the pin.

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



6 Rotate the sensor housing in a clockwise direction until the sensor cable is pointing away from the machine. Refer to Illustration 2.

7 Install the steer sensor cover retaining fasteners. Do not tighten the cover retaining fasteners.

8 Connect the steer sensor assembly cable to the main harness.

9 Calibrate the steer sensor. Refer to Repair Procedure, *How to Calibrate a Replacement Steer Sensor*.

Note: Be sure the yoke pivot pin retaining plate is fully engaged into the pivot pin and that the fasteners are securely tightened.

Right front (square-end, yellow side) and left rear (circle-end, blue side) angle sensors:

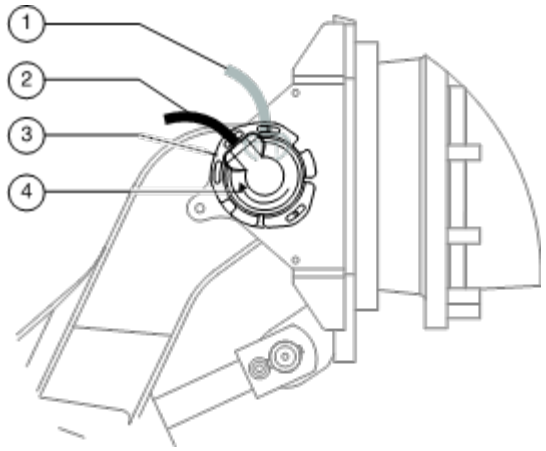


Illustration 3

1 starting position
2 installed position
3 sensor cover
4 rotation arrow

Axle Components

10 Position the new steer sensor assembly over the sensor activator pin with the sensor cable angled away from the tire. Refer to Illustration 3.

11 Align the sensor with the pin and install the sensor on to the pin.

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

12 Rotate the sensor housing in a clockwise direction until the sensor cable is pointing away from the machine. Refer to Illustration 2.

13 Install the steer sensor cover retaining fasteners. Do not tighten the cover retaining fasteners.

14 Connect the steer sensor assembly cable to the main harness.

15 Calibrate the steer sensor. Refer to Repair Procedure, *How to Calibrate a Replacement Steer Sensor*.

Note: Be sure the yoke pivot pin retaining plate is fully engaged into the pivot pin and that the fasteners are securely tightened.

How to Calibrate a Replacement Steer Sensor

Note: If a steer angle sensor has been removed or replaced, the steer angle sensors will need to be calibrated.

Note: Perform this procedure with the axles retracted and the tires straightened.

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

Note: Be sure the yoke pivot pin retaining plate is fully engaged into the pivot pin and that the fasteners are securely tightened.

1 Start the engine from the platform controls.

2 Select the proper steer mode. If a front (square-end) steer angle sensor has been replaced, select rear steer mode. If a rear (circle-end) steer angle sensor has been replaced, select front steer mode.

3 Have another person press down the foot switch.

⚠ CAUTION Bodily injury hazard. Keep clear of the tires when the foot switch is activated. The tires can self adjust automatically.

4 At the new steer angle sensor, loosen the steer angle sensor cover retaining fasteners. Do not remove the fasteners or the sensor cover.

5 Rotate the sensor cover clockwise or counterclockwise until the tire is straight in relation with the other tires. Tighten the sensor cover fasteners.

Note: If available, WebGPI can also be used for this procedure.

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

How to Calibrate All Steer Sensors

Note: This procedure will only need to be performed if the ground controls circuit board (TCON) has been replaced.

Note: Perform this procedure with the axles retracted and the tires straightened.

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



Plus Minus Previous Enter

1 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

2 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

3 Turn the key switch to ground controls and pull out the ground controls red Emergency Stop button to the on position.

4 Loosen the steer angle sensor cover retaining fasteners. Do not remove the fasteners or the sensor cover.

5 Using a voltmeter set to DC voltage, probe the back of the electrical connector at pins B and C.

6 **Left front (square-end, blue side) and right rear (circle-end, yellow side) angle sensors:** Rotate the sensor cover clockwise or counterclockwise until the voltage reading is between 0.8 to 1.2V DC. Tighten the sensor cover fasteners.

Right front (square-end, yellow side) and left rear (circle-end, blue side) angle sensors: Rotate the sensor cover clockwise or counterclockwise until the voltage reading is between 3.6 to 4.0V DC. Tighten the sensor cover fasteners.

Note: If available, WebGPI can also be used for this procedure.

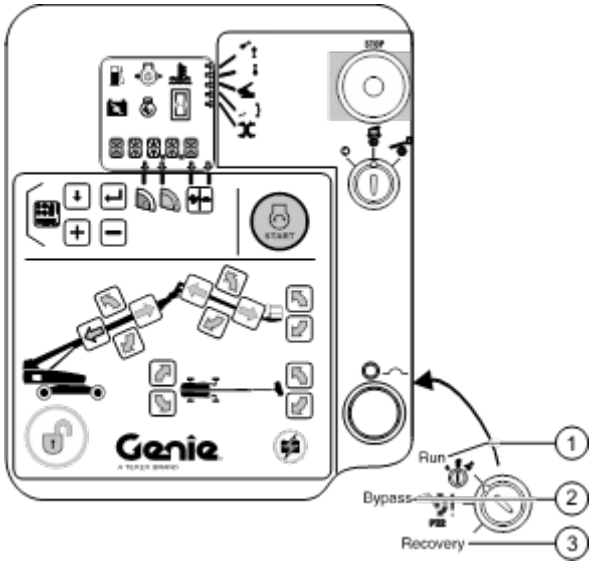
7 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.

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

Axle Components

9 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.



1 Run
2 Bypass
3 Recovery

10 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

Delete all Steer Sensor Calibrations

11 Press the **enter** or **previous** button on the LCD screen until DELETE ALL STEER SENSORS CALIBRATION is displayed. Press the **plus** button to select YES, then press the **enter** button to accept.

12 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

13 Press the **plus** button to select YES, then press the **enter** button to accept.

14 Proceed to step 21.

Delete a Single Steer Sensor Calibration

15 To calibrate a single steer sensor, delete the specific steer sensor calibration

16 Press the **enter** or **previous** button on the LCD screen until DELETE _____ STEER SENSORS CALIBRATION is displayed. Example: DELETE BLUE END BLUE SIDE STEER SENSORS CALIBRATION (FL).

17 Press the **plus** button to select YES, then press the **enter** button to accept.

18 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

19 Press the **plus** button to select YES, then press the **enter** button to accept.

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

21 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

22 Use the key to turn the bypass / recovery key switch to the run position.

Note: Be sure that the bypass/recovery key switch is in the run position before attempting to operate the machine.

10-2 Steer Cylinders

How to Remove a Steer 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.*

Note: Perform this procedure with the axles extended.

1 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.

2 Support the steer cylinder with a suitable lifting device. Protect the cylinder rod from damage.

3 Remove the pin retaining fasteners from both steer cylinder pivot pins.

4 Use a soft metal drift to remove the pin.

5 Remove the steer cylinder from the machine.

⚠ CAUTION Crushing hazard. The steer cylinder may become unbalanced and fall if not properly supported by the lifting device when removed from the machine.

10-3 Axle Extension Cylinders

How to Remove an Axle Extension 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.*

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

Note: This procedure will require the use of a portable hydraulic power unit.

1 Tag, disconnect and plug the hydraulic hoses from the axle extension 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.

2 Remove the axle extension limit switch cover fasteners. Remove the cover.

3 Remove the limit switch mounting fasteners and remove the limit switch. Do not disconnect the wiring.

Axle Components

4 Connect the hydraulic hoses from a portable hydraulic power unit to the axle extension cylinder.

Note: Connect the pressure hose from the power unit to the "R" port of the cylinder and the return hose from the power unit to the "E" port on the cylinder.

5 Support the axle extension cylinder with a suitable lifting device. Protect the cylinder rod from damage.

6 Remove the pin retaining fasteners from both axle extension cylinder pivot pins.

7 Use a soft metal drift to remove the pin.

8 Using the portable hydraulic power unit, retract the axle extension cylinder until the ends of the cylinder clear the axles.

9 Remove the axle extension cylinder from the machine.

⚠ CAUTION Crushing hazard. The axle extension cylinder may become unbalanced and fall if not properly supported by the lifting device.

10-4 Axle Angle Sensors

The axle angle sensors measure the axle angle and communicates that information to the ground controls ECM. There are two axle angle sensors. They are located on opposite axle pivot pins at each end of the chassis.

How to Calibrate the Axle Angle Sensors

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



Plus Minus Previous Enter

Note: If an axle angle sensor has been removed or replaced, the axle angle sensors will need to be calibrated.

Note: Perform this procedure with the axles fully retracted and the boom in the stowed position.

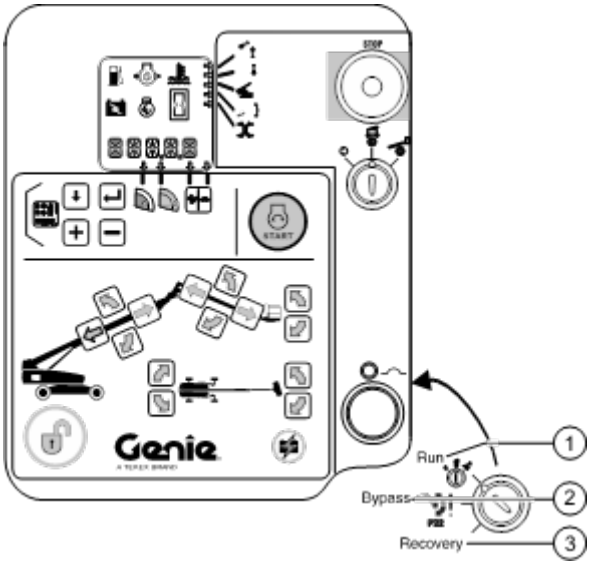
1 Push in the ground controls red Emergency Stop button to the off position.

2 Turn the key switch to platform controls.

3 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

4 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

5 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.



1 Run
2 Bypass
3 Recovery

Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.

6 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

7 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.

8 Press the **enter** or **previous** button on the LCD screen until DELETE AXLE ANGLE SENSORS CALIBRATION is displayed.

9 Press the **plus** button to select YES, then press the **enter** button to accept.

10 At the AXLE ANGLES FULLY RETRACTED screen, press the **plus** button to select YES, then press the **enter** button to accept.

11 When the AXLE ANGLES FULLY EXTENDED screen is displayed, start the engine from the platform controls and fully extend the axles.

Note: If the system exits out of calibration mode when the engine is started, perform the following from the ground controls after fully extending the axles.

- Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.
- Push in the ground controls red Emergency Stop button to the off position.
- Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.
- Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
- Press the **enter** or **previous** button on the LCD screen until AXLE ANGLES FULLY EXTENDED is displayed.
- Start the engine.
- Continue with step 12.

Axle Components

12 Press the **plus** button to select YES, then press the **enter** button to accept.

13 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.

14 Press the **plus** button to select YES, then press the **enter** button to accept.

15 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.

Note: Do not turn the engine off with the key switch or red Emergency Stop button or all calibration points or values will not be saved.

16 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

17 Use the key to turn the bypass / recovery key switch to the run position.

Note: Be sure that the bypass/recovery key switch is in the run position before attempting to operate the machine.

11-1
Welder Generator

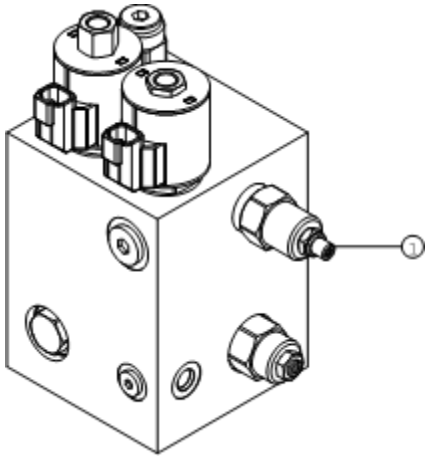
How to Set the Welder Generator Frequency

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

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

1 Plug a 1000 watt load into the generator outlet like a portable work light or heater.

2 Loosen the retaining nut on the needle valve and screw the adjustment screw clockwise until it stops.



1 Needle valve

3 Turn the adjusting screw counterclockwise two turns.

4 Start the engine from the platform controls.

5 Turn on the generator from the platform controls and let the generator run for at least three minutes.

6 Insert the leads from a multimeter set to register frequency (HZ) and turn the needle valve until the frequency is 2 Hz above the normal frequency.

Note: The normal frequency will be either 50 Hz or 60 Hz, depending on the country.

7 While holding the adjusting screw, tighten the retaining nut on the needle valve.

8 Turn off the generator and then turn off the engine.

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

Error Source	Error Type	Effects	Recovery Actions
Primary Ext/Ret Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Primary Up/Down Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Steer Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Primary Boom Up/Down buttons on TCON	Fault Check (both buttons pressed)	Primary Boom Up/Down disabled, display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Primary Boom Ext/Ret buttons on TCON	Fault Check (both buttons pressed)	Primary Boom Ext/Retract disabled, display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Primary Extend/Retract Speed	Not Calibrated	Display message on LCD and allow operation at default speed	Perform auto calibrate procedure.
Operational Primary Boom Length Sensor	Value at 5.0 V	Disable Boom Up, Extend Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allowed once boom is fully stowed. Display message on LCD. Alarm sounds	Power up controller with problem corrected.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Primary Up only active from TCON activate alarm	Calibrate Sensor
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Safety Primary Boom Length Sensor	Value at 5.0 V	Disable Boom Up, Extend Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allowed once boom is fully stowed. Display message on LCD. Alarm sounds	Power up controller with problem corrected.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Primary up only active from TCON, activate alarm	Calibrate Sensor
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
RSB1AO/RSB1AS Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RS. Alarm sounds. Propel allowed once boom is fully stowed. Display message on LCD: BOOM ANGLE SENSORS CROSS CHECK FAULT.	Power up controller with problem corrected.
LTB1LO/LTB1LS Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RS. Alarm sounds. Display message on LCD: BOOM LENGTH SENSORS CROSS CHECK FAULT.	Power up controller with problem corrected.
RSB1AO (boom angle) Active Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: RSB1AO ACTIVE CROSS CHECK FAULT.	Power up controller with problem corrected.
LTB1LO (boom length) Active Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LTB1AO ACTIVE CROSS CHECK FAULT.	Power up controller with problem corrected.

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
RSB1AO/LSB1DO (10°) Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LTB1AO ACTIVE CROSS CHECK FAULT.	Power up controller with problem corrected.
LTB1LO/LSB3RO (3 ft) Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RS. Alarm sounds. Display message on LCD: LTB1LO/LSB4RO CROSS CHECK FAULT.	Power up controller with problem corrected.
LSB3RO (retracted)/LSB4EO (extended) Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LSB3RO/LSB4EO CROSS CHECK FAULT.	Power up controller with problem corrected.

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
LSB2RS (151ft)/LSB4ES (150 ft) Cross-check	Fault Check	Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LSB2RS/LSB4ES CROSS CHECK FAULT.	Power up controller with problem corrected.
Primary Boom Extend Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Primary Boom Retract Valve			
Primary Boom Up Valve			
Primary Boom Down Valve			
Primary Lock-Out Valve #1			
Primary Lock-Out Valve #2			
Engine Speed	Range Check (underspeed)	Display message on LCD	Engine is running below 50 RPM. Check fuel system.
Oil Pressure	Range Check (low oil pressure)	Display message on LCD	Oil pressure is low. Check sender and oil level.
Water/Oil Temperature	Range Check (high temp)	Display message on LCD	Engine is overheating. Check sender, water or oil level or radiator/heat exchanger.
Oil Pressure Sender	Fault Check	Display message on LCD	Check wiring to senders for opens or shorts. Repair or replace senders.
Water/Oil Temp Sender			

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Axle Extend/Retract Switches	Fault Check	Axle extend/retract disabled. Display message on LCD	Check for defective or damaged wiring or switches. Power up controller with problem corrected.
Axle Valves	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
DCON CAN Bus	Fault Check	Display message on LCD Disable propel	Check CAN bus wiring from TCON to DCON through rotator. Repair or replace wiring or DCON.
CAN Bus	Fault Check	Display message on LCD	Check CAN bus wiring from TCON to SCON/PCON. Repair or replace wiring or SCON/PCON.
Tether Power P3	Fault Check	Display message on LCD TETHER POWER P3 FAULT	Power up controller with problem corrected.
Valve Power P6R1	Fault Check	Display message on LCD VALVE POWER P6R1 FAULT	Power up controller with problem corrected.
Engine Power P6R2	Fault Check	Display message on LCD ENGINE POWER P3 FAULT	Power up controller with problem corrected.
Enable Input P7	Fault Check	Display message on LCD ENABLE INPUT P7 FAULT	Power up controller with problem corrected.
Enable Output P7R	Fault Check	Display message on LCD ENABLE OUTPUT P7R FAULT	Power up controller with problem corrected.
DCON Valve Power P7R	Fault Check	Display message on LCD DCON VALVE POWER P7R FAULT	Power up controller with problem corrected.
Primary Down Power P9A	Fault Check	Display message on LCD PRI DOWN POWER P9A FAULT	Power up controller with problem corrected.
Ignition/Fuel Power P9B	Fault Check	Display message on LCD IGN/FUEL POWER P9B FAULT	Power up controller with problem corrected.

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Primary Extend Power P10	Fault Check	Display message on LCD PRI EXTEND POWER P10 FAULT	Power up controller with problem corrected.
Primary Up Power P11	Fault Check	Display message on LCD PRI UP POWER P11 FAULT	Power up controller with problem corrected.
Axle Retract Power P12	Fault Check	Display message on LCD AXLE RETRACT POWER P12 FAULT	Power up controller with problem corrected.
Test Point P14 (not currently used)	Fault Check	Display message on LCD TEST POINT P14 FAULT	Power up controller with problem corrected.
Test Point P18 (not currently used)	Fault Check	Display message on LCD TEST POINT P18 FAULT	Power up controller with problem corrected.
Platform Level Valve P22	Fault Check	Display message on LCD PLAT LEVEL VALVE P22 FAULT	Power up controller with problem corrected.
Primary Up/Down Valve Power P22R	Fault Check	Display message on LCD PRI UP/DN VLV PWR P22R FAULT	Power up controller with problem corrected.
Propel Power P38	Fault Check	Display message on LCD PROPEL PWR P38 FAULT	Power up controller with problem corrected.
Turntable Rotate Power P39	Fault Check	Display message on LCD TURNTABLE ROTATE P39 FAULT	Power up controller with problem corrected.
Secondary Up/Ext Power P30 (not currently used)	Fault Check	Display message on LCD SEC UP/EXT POWER P30 FAULT	Power up controller with problem corrected.
Platform Overload	Fault Check (if active)	Display message on LCD	Power up controller with problem corrected.
Platform Overload Switches Inconsistent			

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Turntable Rotate Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Turntable Rotate Buttons on TCON	Fault Check (both buttons pressed)	Turntable rotate disabled Display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Turntable Rotate Speed	Not Calibrated	Display message on LCD and allow operation at default speed	Perform auto calibrate procedure.
Turntable Rotate Flow Valve	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		Check for shorts to ground in the wiring. Replace coil if necessary

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Turntable Rotate Clockwise Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Turntable Rotate Counterclockwise Valve			
Operational Turntable Level Sensor X Direction	Value at 5.0 V	Flash unit out of level icon and LED and activate alarm	Check that SCON is grounded
	Value too high		Replace SCON
	Value too low		
	Value at 0 V		
	Out of Tolerance		
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Safety Turntable Level Sensor X Direction	Value at 5.0 V	Flash unit out of level icon and LED and activate alarm	Check that SCON is grounded
	Value too high		Replace SCON
	Value too low		
	Value at 0 V		
	Out of Tolerance		
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Operational Turntable Level Sensor Y Direction	Value at 5.0 V	Primary up and extend disabled, Alarm sounds	Check that SCON is grounded
	Value too high		Replace SCON
	Value too low		
	Value at 0 V		
	Out of Tolerance		
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Safety Turntable Level Sensor Y Direction	Value at 5.0 V	Primary up and extend disabled, Alarm sounds	Check that SCON is grounded
	Value too high		Replace SCON
	Value too low		
	Value at 0 V		
	Out of Tolerance		
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Primary Boom Up/Down Flow Valve(s) (#1 and #2)	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Calibrate Thresholds.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		
Primary Boom Extend/Retract Flow Valve	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Calibrate Thresholds.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Operational Primary Boom Angle Sensor	Value at 5.0 V	Disable Boom Up, Extend, Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allow once boom is fully stowed. Display message on LCD. Alarm sounds.	Power up controller with problem corrected.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Primary up only active from TCON, activate alarm	Calibrate Sensor
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Safety Primary Boom Angle Sensor	Value at 5.0 V	Disable Boom Up, Extend, Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allow once boom is fully stowed. Display message on LCD. Alarm sounds.	Power up controller with problem corrected.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Primary up only active from TCON, activate alarm	Calibrate Sensor
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Platform Level Sensor Y Direction	Value at 5.0 V	Primary up and extend disabled, Alarm sounds	Power up controller with problem corrected.
	Value too high		
	Value too low		
	Value at 0 V		
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Platform Rotate Clockwise Valve	Fault Check	Fault Check	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Platform Rotate Counterclockwise Valve			
Jib Up/Down Flow Valve(s)	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Jib Level (Bellcrank) Up/Down Flow Valve(s)	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		
Jib Rotate CW/CCW Flow Valve(s)	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		
Platform Level Up / Platform Level Down Flow Valve	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for shorts to ground in the wiring. Replace coil if necessary

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Platform Rotate Switches	Fault Check (both buttons pressed)	Primary Boom Up/Down disabled. Display message on LCD	Power up controller with problem corrected.
Platform Level Switches	Fault Check (both buttons pressed)	Primary Boom Ext/Ret disabled. Display message on LCD	Power up controller with problem corrected.
Jib Up/Down Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Jib Rotate Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Front Axle Angle Sensor	Value at 5.0 V	Primary up and Extend disabled, axle extend and retract LED flash	Check for an open ground circuit going to the sensor
	Value too high	Primary up and Extend disabled, axle extend and retract LED flash	Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.
	Value too low		
	Value at 0 V	Primary up and Extend disabled, axle extend and retract LED flash	Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary
	Not Calibrated	Primary up only active from TCON, activate alarm	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Rear Axle Angle Sensor	Value at 5.0 V	Primary up and Extend disabled, axle extend and retract LED flash	Check for an open ground circuit going to the sensor
	Value too high	Primary up and Extend disabled, axle extend and retract LED flash	Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.
	Value too low		
	Value at 0 V	Primary up and Extend disabled, axle extend and retract LED flash	Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary
	Not Calibrated	Primary up only active from TCON, activate alarm	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Propel Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value too high		
	Value too low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Thresholds.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Propel Valves Forward/Reverse	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Thresholds.
Propel EDC Forward/Reverse	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value too low		Check for shorts to ground in the wiring. Replace coil if necessary
Motor Valve Speed	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Brake Valve			

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Left Front Steer Angle Sensor	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for an open ground circuit going to the sensor
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.
	Value too low		
	Value at 0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary
Right Front Steer Angle Sensor	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for an open ground circuit going to the sensor
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.
	Value too low		
	Value at 0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary
Left Rear Steer Angle Sensor	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for an open ground circuit going to the sensor
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.
	Value too low		
	Value at 0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Right Rear Steer Angle Sensor	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for an open ground circuit going to the sensor
	Value too high	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.
	Value too low		
	Value at 0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary
Steer Valves - LF, RF, LR, RR	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Jib Bellcrank Sensor	Value at 5.0 V	Primary up and extend disabled, Alarm sounds	Power up controller with problem corrected.
	Value too high		
	Value too low		
	Value at 0 V		
SCON Tilt Sensor	Calibration check	Display X direction and Y direction not calibrated	Re-power after entering tilt x axis and y axis matrix information
Footswitch Timeout	Calibration check	Display message on LCD	Recycle power
LSJ1RS/LSJ1RO Cross-check	Fault Check	Disable Primary Boom Up, Extend,and Jib Up, Extend. Boom Retract and Jib Retract are allowed. Alarm sounds. Display message on LCD: JIB SWITCHES CROSS-CHECK FAULT	Power up controller with problem corrected.
Jib Bellcrank Loop Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Power up controller with problem corrected.
Platform Level Loop Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Power up controller with problem corrected.
Axle Retract Enable Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Power up controller with problem corrected.
Fuel Level Sensor	Value at 5.0 V	Display message on LCD	Power up controller with problem corrected.
	Value too high		
	Value too low		

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
PBMAS Safety Envelope	Position Check	Disable Boom Up, TT Rotate, Propel and Ignition/Fuel. Boom Down and Retract allowed. All functions allowed once boom is lowered back into envelope. Alarm Sounds. Display message on LCD PRIMARY BOOM PBMAS SAFETY ENVELOPE	Return Boom back inside Operational Envelope
PBMLS Safety Envelope	Position Check	Disable Boom Up, Down, Extend, TT Rotate, Propel and Ignition/Fuel. Boom Retract allowed. All functions allowed once boom is lowered back into envelope. Alarm Sounds. Display message on LCD PRIMARY BOOM PBMLS SAFETY ENVELOPE	Return Boom back inside Operational Envelope
Boom Envelope Safety	Position Check	Disable Boom Down, Extend, and Ignition/Fuel. Boom Retract and Up allowed. All functions allowed once boom is lowered back into envelope. Alarm Sounds. Display message on LCD PRIMARY BOOM SAFETY ENVELOPE	Return Boom back inside Operational Envelope

Control System Fault Codes

P_38 - Propel (P13-17 TCON)	P_39 - Turntable Rotate (P13-19 TCON)	P_10 - Primary Boom Extend (P12-08 TCON)	P_11 - Primary Up (P12-09 TCON)	P_9A - Primary Down (P12-06 TCON)	P_9B - Ignition/Fuel (P12-07 TCON)
P_22 - Jib Jib Lvl Pwr	P_22R - Primary Up/Down FC	P_12 - Axle Retract (P121-08 SCON)			

	P_38	P_39	P_10	P_11	P_9A	P_9B	P_22	P_22R	P_12
Turntable tilt Y axis (+5°, secondary boom not stowed)	OFF	OFF		OFF					
Primary Boom Angle (crosscheck)	OFF	OFF	OFF	OFF	OFF*				
Primary Boom Length (crosscheck)	OFF	OFF	OFF	OFF	OFF*				
Primary 2 Cylinder (crosscheck)			OFF	OFF	OFF*				
Boom Envelope Safety Interlock			OFF		OFF	OFF			
Axle Safety Not Stowed		OFF		OFF					
Axles crosscheck Angle sensor vs. safety switch(es)		OFF	OFF	OFF	OFF				
Axle (not fully extended) and TT Rotate (stowed and in drive disable zone)	OFF	OFF							
Turntable Tilt Angle (crosscheck SCON internal sensors 3 in a delta configuration)	OFF	OFF	OFF	OFF	OFF				
Loss of CAN	OFF	OFF	OFF	OFF	OFF*	OFF			
Platform Overload (SCON pin #1)						OFF			
Platform Out of Level (>10°)							OFF		
Jib Bellcrank Out of Level (>10°)							OFF		
Boom Safety (max angle)	OFF	OFF		OFF		OFF			
Boom Safety (max length)	OFF	OFF	OFF	OFF	OFF	OFF			
Axle Retract Safety									OFF
Cable Tension (#1 or #2)			OFF						

* P-9A and P-10 energized if boom is fully retracted as indicated by LSB3RS

Control System Fault Codes

Fault Source and Type will display as:

Source	Type
“ ID XXX_xx FAULT “	

Where XXX is the one to three digit Fault Source and xx is the two digit Fault Type.

TCON - Turntable Controller

PCON - Platform Controller

SCON - Safety Controller

DCON - Drive Controller

Fault Type	
ID	**Description**
11	Value at 5V
12	Value too High
13	No Response
15	Value too Low
16	Value at 0V
17	Not Calibrated
21	Fault
26	Timeout
31	Invalid Setup
32	Min Cal Too Low
33	Min Cal Too High

Fault Source	
ID	**Description**
3	SCON Controller Area Network
4	Primary Boom Angle Zone
5	Primary Boom Length Switches Cross-Check
8	PCON Controller Area Network
9	Engine
18	DCON Controller Area Network
20	Boom Extend/Retract Joystick
21	Boom Up/Down Joystick
26	Boom Extend/Retract Buttons
27	Boom Up/Down Buttons
28	Boom Angle Sensors Cross-Check (SCON)
29	LSB2RS/LSB4ES Cross-Check (SCON)
30	Propel Joystick
35	Propel Valve
40	Turntable Rotate Joystick
43	Footswitch Timeout
44	Jib Up/Down Joystick
48	PBMAS Safety Envelope (SCON)
49	Jib Up/Down Buttons
50	Jib Up/Down Flow Valve
52	Steer Joystick
53	Left Front Steer Sensor
54	Right Front Steer Sensor
55	Left Rear Steer Sensor
56	Right Rear Steer Sensor
59	Rocker Steer Joystick
61	PBMLS Safety Envelope (SCON)
63	Front Axle Sensor
64	Rear Axle Sensor

Control System Fault Codes

Fault Source	
ID	**Description**
65	Turntable Level Sensor X-Direction
66	Turntable Level Snesor Y-Direction
67	Boom Length Sensors Cross-Check (SCON)
68	Boom Safety Envelope (SCON)
70	Turntable Controller - Platform Controller Software Version
73	Engine Pressure Sensor
74	Engine Temperature Sensor
75	LSB3RO/LSB4EO Cross-Check
80	TCON/SCON Calibration Inconsistent
81	Boom Up/Down Flow Valve (Fine)
82	Boom Extend/Retract Flow Valve
83	Boom Extend/Retract Speed
85	Boom Up/Down Speed
86	Boom Angle Sensor
90	Jib Rotate Flow Valve
91	Turntable Rotate Buttons
92	Turntable Rotate Flow Valve
93	Turntable Rotate Speed
94	Boom Length Sensor
95	Jib Rotate Joystick
98	Platform Level Sensor
99	Platform Level Buttons
110	Platform Rotate Buttons
113	Jib Rotate Buttons
117	Propel Power P38
118	Turntable Rotate Power P39
121	Valve Power P6R1
122	Engine Power P6R2
123	Enable Input Power P7

Fault Source	
ID	**Description**
124	Enable Output Power P7R
125	Primary Down Power P9A
126	IGN/Fuel Power P9B
127	Primary Extend Power P10
128	Primary Up Power P11
129	Axle Retract Power P12
132	Platform Level Power P22
133	Primary Up/Down Valve Power P22R
134	DCON Valve Power P7R
142	Turntable Rotate CW Valve
143	Turntable Rotate CCW Valve
144	Axle Safety Not Stowed (SCON)
145	Boom Up Valve
146	Boom Down Valve
147	Platform Overload Switches Inconsistent (SCON)
148	Boom Extend Valve
149	Boom Retract Valve
150	Overload Recovery
152	Boom Up/Down Flow Valve (Gross)
153	Primary Lockout P1 Valve
154	Primary Lockout P2 Valve
157	Axles Fully Extended Cross-Check (SCON)
158	Drive Disable Zone and Axles Not Fully Extended (SCON)
160	Left Front Steer Valve
161	Right Front Steer Valve
162	Left Rear Steer Valve
163	Right Rear Steer Valve
164	Axle Valve
165	Boom Not Retracted and Chassis Tilted (SCON)

Control System Fault Codes

Fault Source	
ID	**Description**
166	Brake Valve
167	Motor Shift Valve
168	Chassis Tilt Sensors Cross-Check (SCON)
170	Jib Bellcrank Level Sensor
171	Jib Bellcrank Level Flow Valve
172	AUX Relay
173	Platform Level Toggle Switch
174	Platform Rotate Toggle Switch
175	Platform Level Flow Valve
176	Platform Rotate Valve
180	Boom Length Sensor
195	Safety Platform Overload (SCON)
220	RSB1AO Active Cross-Check
221	LTB1LO Active Cross-Check
222	Axle Extend/Retract Toggle Switch
235	RSB1AO/LSB1DO Cross-Check
236	LTB1LO/LSB3RO Cross-Check
237	LTB1LO/LSB4EO Cross-Check
238	Pressure Comp Enable #1 Valve
239	Pressure Comp Enable #2/Generator Valve
245	Check Machine Software Type at TCON
246	Check Machine Software Type at SCON
247	TCON/SCON Software Inconsistent

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
1000	98	2	Engine oil level sensor internal error. Sensor reports error. Open/short transducer.
1001	98	31	Engine oil level out of range. Level low, high, foaming.
1002	98	31	Oil sensor voltage out of range. <8,5V ±0,5V: >16.5V ±0.5V.
1003	98	2	Oil sensor invalid sensor status.
1004	98	31	Oil sensor temperature out of range.
1005	98	14	Oil sensor is broken or disconnected.
1021	100	3	Oil pressure voltage above normal or shorted to high.
1022	100	4	Oil pressure voltage below normal or shorted to low.
1025	100	1	Low oil pressure. Warning threshold exceeded.
1026	100	1	Low oil pressure. Shut off threshold exceeded.
1043	107	0	Air filter differential pressure. Air filter clogged.
1071	411	2	Engine exhaust gas recirculation. Pressure does not change between engine operating points.
1072	411	0	Engine exhaust gas recirculation. Pressure above normal operational range.
1073	411	1	Engine exhaust gas recirculation. Pressure below normal operational range.
1074	411	2	Engine exhaust gas recirculation. Negative measured differential pressure.
1075	411	2	Engine exhaust gas recirculation. Positive measured differential pressure.
1077	411	3	Engine exhaust gas recirculation. Signal value above maximum limit.
1078	411	4	Engine exhaust gas recirculation. Signal value below maximum limit.
1079	108	0	Ambient air pressure sensor above normal operational range.
1080	108	1	Ambient air pressure sensor below normal operational range.
1081	108	15	Fault check max signal range violated for ambient air pressure sensor.
1082	108	17	Fault check min signal range violated for ambient air pressure sensor.
1083	108	2	Ambient air pressure sensor error by component self diagnosis.
1084	3720	0	DPF ash load above normal operational range.
1086	3734	0	DPF soot load exceeded. Remove filter level.
1087	4781	14	DPF soot load exceeded shut off level.
1088	4781	0	DPF soot load exceeded warning level.
1089	4781	16	DPF. Too much standstill time in short time interval.
1090	10156	0	DPF. The standstill-regeneration mode time exceeds the short-limit.
1091	3735	16	DPF. Standstill required and no successful standstill longer than escalation threshold. Moderately severe.
1092	3735	0	DPF. Standstill required and no successful standstill longer than escalation threshold. Most severe.
1093	4766	1	DOC. Regeneration temperature in standstill main phase not reached.
1102	171	2	Ambient air temperature shows a deviation from expected value at cold start conditions.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
111	102	0	Engine intake manifold pressure above normal operational range.
1114	102	1	Engine intake manifold pressure below normal operational range.
1115	102	3	Intake manifold pressure sensor voltage above normal or shorted to high.
1116	102	4	Intake manifold pressure sensor voltage below normal or shorted to low.
1118	102	1	Intake manifold pressure below normal operational range.
1121	102	2	DFC for signal variation check for pressure sensor of the intake manifold.
1122	102	0	Intake air pressure valve sensor, warning condition exceeded.
1123	102	1	Intake air pressure valve sensor, shutoff condition exceeded.
1124	1209	2	Engine exhaust pressure turbine upstream differs from ambient pressure while engine not running.
1125	1209	15	Engine exhaust pressure turbine upstream above upper limit.
1126	1176	1	Engine turbocharger compressor intake pressure below normal operational range.
1127	1209	2	Engine exhaust pressure turbine upstream tuck check failed. Pressure does not change between engine operating points.
1130	1209	3	Engine exhaust pressure sensor voltage above normal or shorted to high.
1131	1209	4	Engine exhaust pressure sensor voltage below normal or shorted to low.
1134	3251	3	DPF voltage above normal or shorted to high.
1135	3251	4	DPF voltage below normal or shorted to low.
1136	3251	14	DPF reporting communication error.
1137	3251	14	DPF reporting data error.
1138	3251	14	DPF reporting fast channel 1 error.
1139	3251	14	DPF reporting fast channel 2 signal range error.
1149	3251	2	DPF difference pressure value not plausible.
1150	3251	0	DPF difference pressure above shut off threshold.
1151	3251	16	DPF difference pressure above warning threshold.
1152	3251	1	DPF difference pressure below shut off threshold.
1153	3251	18	DPF difference pressure below warning threshold.
1161	5571	16	Rail fuel pressure relief valve above normal operational range.
1162	5571	2	Rail fuel pressure relief valve is forced to open, perform pressure increase.
1163	5571	2	Rail fuel pressure relief valve is forced to open. Performed by pressure increase.
1164	5571	16	Rail fuel pressure relief valve is forced to open. Shutoff conditions.
1165	5571	15	Rail fuel pressure relief valve is forced to open. Warning conditions.
1166	5571	0	Open rail fuel pressure relief valve was detected.
1167	5571	2	Unexpected opening of the rail fuel pressure relief valve.
1168	5571	2	Successful rail fuel pressure relief valve opening cannot be ensured.
1169	5571	13	Averaged rail fuel pressure after valve opening is outside the expected tolerance range.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
1170	5571	16	Open time of rail fuel pressure relief valve for wear out monitoring had exceeded.
1171	94	1	Fuel pressure build up during engine start not successful.
1172	1347	5	Electrical fuel pump current below normal or open circuit.
1174	1347	3	Electrical fuel pump voltage above normal or shorted to high.
1175	1347	4	Electrical fuel pump voltage below normal or shorted to low.
119	1231	14	CAN Bus 2 off Error for Application CAN.
1190	7103	13	Rail fuel pressure below set point, speed-dependent threshold exceeded.
1191	7103	13	Rail fuel pressure metering unit. Fuel quantity balance is disrupted.
1194	7103	13	Negative rail fuel pressure governor deviation at zero delivery by metering unit.
1195	7103	1	Rail fuel pressure value is below minimum rail pressure threshold.
1197	7103	0	Maximum rail fuel pressure exceeded.
1198	7103	2	Set point of fuel metering unit in overrun mode not plausible.
120	639	14	CAN Bus 1 off Error for Power train CAN.
1200	5357	14	Shut-off due to undershoot of minimum rail pressure.
1202	157	0	Maximum rail pressure exceeded in limp home mode.
1208	157	3	Engine fuel injector metering rail pressure voltage above normal or shorted to high.
1209	157	4	Engine fuel injector metering rail pressure voltage below normal or shorted to low.
121	520252	2	Wrong checksum in the CAN message EAT Control.
1212	629	12	ECU. Keep alive error during runtime at an external device.
1213	629	12	ECU. Keep alive error during initialization phase at an external device.
1215	629	12	ECU. Read diagnosis error for non volatile memory.
1216	629	12	ECU. Write diagnosis error for non volatile memory.
1218	629	12	ECU. Stack memory threshold overrun.
1219	629	12	ECU. Observation counter irregular switch off counter triggered by engine running.
122	4207	2	TSC1 message checksum fault.
123	4207	2	TSC1 message checksum fault.
1233	5826	15	Emission control system operator inducement level 1 severity above normal operational range.
1235	5826	0	Emission control system operator inducement level 2 severity above normal operational range.
1236	5826	14	Emission control system operator pre-trigger inducement level 2 severity.
124	4207	2	TSC1 message checksum fault.
125	4207	2	TSC1 message checksum fault.
1274	91	3	Accelerator pedal sensor position 1 voltage above normal or shorted to high.
1275	2623	3	Accelerator pedal 1, channel 2 voltage above normal or shorted to high.
1276	29	3	Accelerator pedal 2 voltage above normal or shorted to high.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
1277	2625	3	Accelerator pedal 2, channel 2 voltage above normal or shorted to high.
1280	91	4	Accelerator pedal sensor position 1 voltage below normal or shorted to low.
1281	2623	4	Accelerator pedal 1, channel 2 voltage below normal or shorted to low.
1282	29	4	Accelerator pedal 2 voltage below normal or shorted to low.
1283	2625	4	Accelerator pedal 2, channel 2 voltage below normal or shorted to low.
1289	3509	14	Failure of sensor supply voltage 1 from ECU.
1290	3509	0	Sensor supply voltage 1 from ECU above normal operational range.
1291	3509	6	Sensor supply voltage 1 from ECU current above normal or grounded circuit.
1292	3509	1	Sensor supply voltage 1 from ECU below normal operational range.
1293	3510	14	Failure of sensor supply voltage 2 from ECU.
1294	3510	0	Sensor supply voltage 2 from ECU above normal operational range.
1295	3510	6	Sensor supply voltage 2 from ECU current above normal or grounded circuit.
1296	3510	1	Sensor supply voltage 2 from ECU below normal operational range.
1306	677	3	Engine starter motor relay voltage above normal or shorted to high.
1307	677	4	Engine starter motor relay voltage below normal or shorted to low.
1308	677	5	Engine starter motor relay current below normal or shorted to low.
1310	677	3	Engine starter motor relay voltage above normal or shorted to high.
1311	677	4	Engine starter motor relay voltage below normal or shorted to low.
1323	91	11	Accelerator pedal position 1. Possible error between APP1 and APP2 or APP1 and idle switch.
1326	29	11	Accelerator Pedal 2 Position. Possible error between APP1 and idle switch.
1346	1041	14	Start signal indicator. Terminal 50 was operated too long.
1354	105	0	Engine intake manifold 1 temperature data above normal operational range. Warning threshold exceeded.
1355	105	0	Engine intake manifold 1 temperature above normal operational range. Shutoff threshold exceeded.
1357	1136	0	Engine ECU temperature above normal operational range. Most severe.
1358	1136	1	Engine ECU temperature below normal operational range. Most severe.
1359	1136	15	Engine ECU temperature above normal operational range. Least severe.
1360	1136	17	Engine ECU temperature below normal operational range. Least severe.
1361	1136	2	Engine ECU temperature fault check.
1362	412	15	Engine exhaust gas recirculation temperature above normal operational range.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
1363	412	17	Engine exhaust gas recirculation temperature below normal operational range.
1364	412	3	Engine exhaust gas recirculation temperature voltage above normal or shorted to high.
1365	412	4	Engine exhaust gas recirculation temperature voltage below normal or shorted to low.
1372	51	5	Engine throttle valve 1, position 1 current below normal or open circuit.
1375	51	3	Engine throttle valve 1, position 1 voltage above normal or shorted to high. Short circuit to battery 1.
1376	51	3	Engine throttle valve 1, position 1 voltage above normal or shorted to high. Short circuit to battery 2.
1377	51	4	Engine throttle valve 1, position 1 voltage below normal or shorted to low. Short circuit to ground 1.
1378	51	4	Engine throttle valve 1, position 1 voltage below normal or shorted to low. Short circuit to ground 2.
1379	51	6	Engine throttle valve 1, position 1 current above normal or grounded circuit.
1382	51	7	Engine throttle valve 1 position 1 mechanical system not responding or out of adjustment. Valve stuck closed.
1383	51	7	Engine throttle valve 1 position 1 mechanical system not responding or out of adjustment. Valve stuck open.
1391	51	3	Engine throttle valve 1, position 1 voltage above normal or shorted to high.
1392	51	4	Engine throttle valve 1, position 1 voltage below normal or shorted to low.
1397	105	0	Engine intake manifold 1 temperature above normal operational range.
1398	105	1	Engine intake manifold 1 temperature below normal operational range.
1399	4766	2	DOC temperature too high.
1400	4766	2	DOC temperature too low.
1401	4766	15	DOC outlet temperature above normal operational range.
1402	4766	3	DOC outlet temperature voltage above normal or shorted to high.
1403	4766	4	DOC outlet temperature voltage below normal or shorted to low.
1404	4766	2	DOC intake temperature error.
1405	4766	15	DOC Intake temperature above normal operational range.
1406	4766	3	DOC intake temperature voltage above normal or shorted to high.
1407	4766	4	DOC intake temperature voltage below normal or shorted to low.
1408	4766	2	DOC intake temperature does not change.
142	520256	9	Timeout of EAT control receive message. CAN message is not received.
144	523211	9	Timeout error of CAN receive frame EBC1.
154	523212	9	Timeout error of CAN receive frame engine protection.
1540	520254	8	The stand still regeneration mode time exceeds the long limit threshold.
1541	520255	2	Hoses connected to the dp DPF SENT sensor inverted. Swap hoses.
155	523741	14	Engine shutdown request via CAN.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
1587	97	0	Water in fuel level prefilter; maximum value exceeded.
188	523240	9	Timeout CAN message function mode control.
219	520253	2	Rolling counter fault CAN message EAT Control.
220	4206	2	Fault check for Rolling Counter of TSC1AE.
221	4206	2	Fault check for Rolling Counter of TSC1AR.
222	4206	2	Fault check for Rolling Counter of TSC1TE.
223	4206	2	Fault check for Rolling Counter of TSC1TR.
349	3349	0	Timeout error of CAN receive frame active TSC1AE.
350	3349	0	Timeout error of CAN receive frame passive TSC1AE.
351	3349	0	Timeout error of CAN receive frame active TSC1AR.
352	3349	0	Timeout error of CAN receive frame passive TSC1AR.
353	3349	0	Timeout error of CAN receive frame TSC1TE active.
354	3349	0	TSC1 receive timeout error. Short circuit to ground error.
355	3349	0	Timeout error of CAN receive frame TSC1TR.
356	3349	0	Passive timeout error of CAN receive frame TSC1TR.
361	3349	0	Timeout error of CAN receive frame TSC1AE. Traction Control.
363	3349	0	Timeout error of CAN receive frame TSC1AR. Retarder.
365	3349	0	Timeout error of CAN receive frame TSC1TE. Setpoint.
367	3349	0	Timeout Error of CAN receive frame TSC1TR; control signal.
38	1485	3	ECM main relay voltage above normal or shorted to high.
39	1485	3	ECM main relay voltage above normal or shorted to high of actuator relay 2.
40	1485	3	ECM main relay voltage above normal or shorted to high of actuator relay 3.
41	1485	4	ECM main relay voltage below normal or shorted to low.
42	1485	4	ECM main relay voltage below normal or shorted to low of actuator relay 2.
43	1485	4	ECM main relay voltage below normal or shorted to low of actuator relay 3.
48	168	0	Battery voltage above normal operational range.
49	168	1	Battery voltage low normal operational range.
50	168	3	Battery voltage above normal or shorted to high.
51	168	4	Battery voltage above normal or shorted to low.
516	523982	0	Power stage diagnosis disabled. High battery voltage.
517	523982	1	Power stage diagnosis disabled. Low battery voltage.
52	168	0	High battery voltage. Warning threshold is exceeded.
567	27	5	Engine exhaust gas recirculation 1 valve position current below normal or open circuit.
570	27	3	Engine exhaust gas recirculation 1 valve position voltage above normal or shorted to battery 1.
571	27	3	Engine exhaust gas recirculation 1 valve position voltage above normal or shorted to battery 2.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
572	27	4	Engine exhaust gas recirculation 1 valve position voltage below normal or shorted to ground 1.
573	27	4	Engine exhaust gas recirculation 1 valve position voltage below normal or shorted to ground 2.
574	27	6	Engine exhaust gas recirculation 1 valve position current above normal or grounded circuit.
577	27	7	Engine exhaust gas recirculation 1 valve position. Mechanical system not responding or out of adjustment. Valve stuck closed.
578	27	7	Engine exhaust gas recirculation 1 valve position. Mechanical system not responding or out of adjustment. Valve stuck open.
582	5763	3	Engine exhaust gas recirculation 1, actuator 1 voltage above normal or shorted to high.
583	5763	4	Engine exhaust gas recirculation 1, actuator 1 voltage below normal or shorted to low.
586	3055	14	Internal software error ECU. Injection cut off.
587	190	0	Engine speed above warning threshold. Over speed detection in component engine protection.
588	190	0	Engine speed above warning threshold. FOC-Level 1.
589	190	0	Engine speed above warning threshold. FOC-Level 2.
590	190	0	Engine speed above warning threshold. Overrun Mode.
610	171	15	Environment temperature sensor, temperature above upper physical threshold.
613	171	3	Ambient air temperature sensor voltage above normal or shorted to high.
614	171	4	Ambient air temperature sensor voltage below normal or shorted to low.
615	723	8	Camshaft speed sensor abnormal frequency or pulse width or period.
616	723	14	Camshaft sensor detection. Out of range, signal disrupted, no signal.
617	723	13	Offset angle between crank and camshaft sensor is too large.
618	4201	8	Crankshaft sensor detection. Out of range, signal disrupted, no signal.
619	4201	14	Crankshaft speed sensor. Speed detection, out of range, signal disrupted or no signal.
68	1669	14	CAN Bus ID-5. CAN Hardware registers are not updated within the expected time.
70	110	2	Engine Coolant Temperature. Data erratic, intermittent or incorrect.
709	97	3	Water in fuel indicator 1. Voltage above normal or shorted to high.
710	97	4	Water in fuel indicator 1. Voltage below normal or shorted to low.
721	94	15	Low fuel pressure system, max. physical range exceeded.
723	94	3	Engine fuel pressure sensor voltage above normal or shorted to high.
724	94	4	Engine fuel pressure sensor voltage below normal or shorted to low.
725	94	1	Low fuel pressure system, warning threshold exceeded.
726	94	1	Low fuel pressure, shut off threshold exceeded.
75	110	3	Engine coolant temperature voltage above normal or shorted to high.
76	110	4	Engine coolant temperature voltage below normal or shorted to low.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
77	110	0	High coolant temperature. Warning threshold exceeded.
78	110	0	Coolant temperature. System reaction initiated.
797	676	12	Engine cold start aid relay error.
798	676	5	Engine cold start aid relay current below normal or open circuit.
799	676	5	Engine cold start aid relay current below normal or open circuit.
80	411	2	Intake air massflow not in expected range.
803	676	3	Engine cold start aid relay voltage above normal or shorted to high.
805	676	4	Engine cold start aid relay voltage below normal or shorted to low.
807	2797	14	Engine fuel 1 injector, Group 1. Number of possible injections limited by the injection valve.
815	2797	4	Engine fuel 1 injector, Group 1 voltage below normal or shorted to low.
816	5358	5	Engine cylinder 1 fuel injection quantity current below normal or open circuit.
817	5359	5	Engine cylinder 2 fuel injection quantity current below normal or open circuit.
818	5360	5	Engine cylinder 3 fuel injection quantity current below normal or open circuit.
819	5361	5	Engine cylinder 4 fuel injection quantity current below normal or open circuit.
820	5362	5	Engine cylinder 5 fuel injection quantity current below normal or open circuit.
821	5363	5	Engine cylinder 6 fuel injection quantity current below normal or open circuit.
822	2797	6	Engine fuel 1 injector, Group 1 current above normal or grounded circuit.
823	2798	6	Engine fuel 1 injector, Group 2 current above normal or grounded circuit.
824	5358	6	Engine cylinder 1 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.
825	5359	6	Engine cylinder 2 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.
826	5360	6	Engine cylinder 3 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.
827	5361	6	Engine cylinder 4 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.
828	5362	6	Engine cylinder 5 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.
829	5363	6	Engine cylinder 6 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.
83	111	1	Coolant level too low.
830	5358	6	Engine cylinder 1 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
831	5359	6	Engine cylinder 2 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage.
832	5360	6	Engine cylinder 3 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage.
833	5361	6	Engine cylinder 4 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage.
834	5362	6	Engine cylinder 5 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage.
835	5363	6	Engine cylinder 6 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage.
836	105	3	Engine intake manifold temperature voltage above normal or shorted to high.
837	105	4	Engine intake manifold temperature voltage below normal or shorted to low.
838	2797	14	Engine fuel 1 injector, group 1 missing injector adjustment value programming injector 1.
839	2798	14	Engine fuel 1 injector, group 2 missing injector adjustment value programming injector 2.
840	4257	14	Engine fuel 1 injector, group 3 missing injector adjustment value programming injector 3.
854	7103	5	Engine fuel metering rail pump current below normal or open circuit.
855	7103	3	Engine fuel metering rail pump voltage above normal or shorted to high. Short circuit to battery on the high side power stage.
856	7103	3	Engine fuel metering rail pump voltage above normal or shorted to high. Short circuit to battery on the low side power stage.
857	7103	4	Engine fuel metering rail pump voltage below normal or shorted to low. Short circuit to battery on the high side power stage.
858	7103	4	Engine fuel metering rail pump voltage below normal or shorted to low. Short circuit to battery on the low side power stage.
859	7103	6	Engine fuel metering rail pump current above normal or grounded circuit.
868	629	12	Function monitoring: fault of ECU ADC. Null load test pulse.
869	629	12	Function monitoring: fault of ECU ADC. Test voltage.
870	629	12	ECU. DFC to indicate ICO request from MoCSOP module.
871	91	14	Function monitoring: Monitoring of accelerator pedal position.
875	190	2	Function monitoring: Fault of engine speed check.
876	5357	2	Engine fuel injection error for multiple cylinders. Diagnostic fault check error between level 1 energizing time and level 2 information.

Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code
FMI = Failure Mode Identifier
SPN = Suspect Parameter Number

DTC	SPN	FMI	Description
877	5441	2	Engine fuel injection timing error for multiple cylinders.
878	5357	2	Engine fuel injection error for multiple cylinders. Diagnostic fault check to report the error due to non plausibility in ZFC.
879	523612	12	Internal recovery. Diagnosis fault check to report the error to demand for an ICO due to an error in the PoI2 shut-off.
88	598	10	Clutch switch. Abnormal rate of change.
880	523612	12	Internal recovery. Diagnosis fault check to report the error to demand for an ICO due to an error in the PoI3 efficiency factor.
881	523612	12	Internal recovery. Diagnosis fault check to report the error to demand for an ICO due to an error in change of EOM.
882	5357	2	Engine fuel injection error for multiple cylinders. Diagnosis fault check to report the error to demand for an ICO due to an error in total torque relevant quantity.
883	5357	2	Engine fuel injection error for multiple cylinders. Diagnostic fault check to report the error due to injection quantity correction.
884	5442	2	Engine fuel injection pressure error for multiple cylinders.
885	29	2	Accelerator pedal 2 position.
886	677	2	Engine starter motor relay. Function monitoring: Fault of ECU power train active.
887	513	2	Actual engine percent torque. DFC to report the fault in energizing time comparison.
888	513	2	Actual engine percent torque. DFC to report in torque comparison error.
889	520250	2	Function monitoring: Error in the post-build selectable monitoring.
890	629	12	ECU. Status of the EMM alarm FCCU0 which is read out of the FCCU hardware module.
91	1109	2	Engine protection system approaching shutdown. Engine shut off demand ignored.
92	1109	14	Engine protection system approaching shutdown. Shut off request from supervisory monitoring function.
996	629	12	ECU. Diagnostic fault check to report ABE active state.
997	629	12	Function monitoring: Fault of ECU, WDA active by inquiry/response communication.
998	629	12	Function monitoring: Fault of ECU, Error Pin active suspision of HW fault.
999	629	12	Function monitoring: Fault of ECU, WDA active by overvoltage detection.

The following DTC fault code range shares the same description. Replace the ECU.

DTC	891 - 945	Description
SPN	629	Internal ECU error.
FMI	12	

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier
KWP = Keyword Protocol

SPN	FMI	KWP	Description
51	3	1019	EGR-Valve, short circuit to battery
51	3	1024	Position sensor error of actuator EGR-Valve; signal range check high
51	3	1226	EGR-Valve; short circuit to battery (A02)
51	3	1227	EGR-Valve; short circuit to battery (A67)
51	4	1020	EGR-Valve; short circuit to ground
51	4	1025	Position sensor error actuator EGR-Valve; signal range check low
51	4	1228	EGR-Valve; short circuit to ground (A02)
51	4	1229	EGR-Valve; short circuit to ground (A67)
1	4	1232	Actuator error EGR-Valve; Voltage below threshold
51	5	1015	Actuator error EGR-Valve; signal range check low
51	5	1017	Actuator EGR-Valve; open load
51	5	1023	Actuator error EGR-Valve; signal range check low
51	5	1223	Actuator EGR-Valve; open load
51	6	1014	Actuator error EGR-Valve; signal range check high
51	6	1022	Actuator error EGR-Valve; signal range check high
51	6	1224	Actuator EGR-Valve; over current
51	6	1230	Actuator error EGR-Valve; Overload by short-circuit
51	7	1016	Actuator position for EGR-Valve not plausible
51	11	1231	Actuator error EGR-Valve; Power stage over temp due to high current
51	12	1018	Actuator EGR-Valve; powerstage over temperature
51	12	1021	Mechanical actuator defect EGR-Valve
51	12	1225	Actuator EGR-Valve; over temperature
94	1	474	Low fuel pressure; warning threshold exceeded
94	1	475	Low fuel pressure; shut off threshold exceeded
94	3	472	Sensor error low fuel pressure; signal range check high
94	4	473	Sensor error low fuel pressure; signal range check low
97	3	464	Sensor error water in fuel; signal range check high
97	4	465	Sensor error water in fuel; signal range check low
97	12	1157	Water in fuel level prefilter; maximum value exceeded

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier
KWP = Keyword Protocol

SPN	FMI	KWP	Description
100	0	734	High oil pressure; warning threshold exceeded
100	0	735	High oil pressure; shut off threshold exceeded
100	1	736	Low oil pressure; warning threshold exceeded
100	1	737	Low oil pressure; shut off threshold exceeded
100	3	732	Sensor error oil pressure; signal range check high
100	4	733	Sensor error oil pressure sensor; signal range check low
102	2	88	Charged air pressure above warning threshold
102	2	89	Charged air pressure above shut off threshold
102	4	777	Sensor error charged air press.; signal range check low
105	0	996	High charged air cooler temperature; warning threshold exceeded
105	0	997	High charged air cooler temperature; shut off threshold exceeded
105	3	994	Sensor error charged air temperature; signal range check high
105	4	995	Sensor error charged air temperature; signal range check low
108	3	412	Sensor error ambient air press.; signal range check high
108	4	413	Sensor error ambient air press.; signal range check low
110	0	98	High coolant temperature; warning threshold exceeded
110	0	99	High coolant temperature; shut off threshold exceeded
110	3	96	Sensor error coolant temp.; signal range check high
110	4	97	Sensor error coolant temp.; signal range check low
111	1	101	Coolant level too low
132	11	1	Air flow sensor load correction factor exceeding the maximum drift limit; plausibility error
132	11	2	Air flow sensor load correction factor exceeding drift limit; plausibility error
132	11	3	Air flow sensor low idle correction factor exceeding the maximum drift limit
132	11	4	Air flow sensor load correction factor exceeding the maximum drift limit
157	3	877	Sesnor error rail pressure; signal range check high
157	4	878	Sensor error rail pressure; signal range check low

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier
KWP = Keyword Protocol

SPN	FMI	KWP	Description
168	0	1180	Physical range check high for battery voltage
168	1	1181	Physical range check low for battery voltage
168	2	47	High battery voltage; warning threshold exceeded
168	2	48	Low battery voltage; warning threshold exceeded
168	3	45	Sensor error battery voltage; signal range check high
168	4	46	Sensor error battery voltage; signal range check low
171	3	417	Sensor error environment temperature; signal range check high
171	4	418	Sensor error environment temperature; signal range check low
172	0	1182	Physical range check high for intake air temperature
172	1	1183	Physical range check low for intake air temperature
172	2	9	Sensor ambient air temperature; plausibility error
172	2	983	Intake air sensor; plausibility error
172	3	981	Sensor error intake air; signal range check high
172	4	982	Sensor error intake air sensor; signal range check low
174	0	481	High low fuel temperature; warning threshold exceeded
174	0	482	High Low fuel temperature; shut off threshold exceeded
175	0	740	Physical range check high for oil temperature
175	0	745	High oil temperature; warning threshold exceeded
175	0	746	High oil temperature; shut off threshold exceeded
175	1	741	Physical range check low for oil temperature
175	2	738	Sensor oil temperature; plausibility error
175	2	739	Sensor oil temperature; plausibility error oil temperature too high
175	3	743	Sensor error oil temperature; signal range check high
175	4	744	Sensor error oil temperature; signal range check low
190	0	389	Engine speed above warning threshold (FOC-Level 1)
190	2	421	Offset angle between crank- and camshaft sensor is too large
190	8	419	Sensor camshaft speed; disturbed signal

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
190	8	422	Sensor crankshaft speed; disturbed signal
190	11	390	Engine speed above warning threshold (FOC-Level 2)
190	12	420	Sensor camshaft speed; no signal
190	12	423	Sensor crankshaft speed; no signal
190	14	391	Engine speed above warning threshold (Overrun Mode)
190	14	1222	Camshaft- and Crankshaft speed sensor signal not available on CAN
411	0	791	Physical range check high for differential pressure Venturiunit (EGR)
411	1	792	Physical range check low for differential pressure Venturiunit (EGR)
411	3	795	Sensor error differential pressure Venturiunit (EGR); signal range check high
411	4	381	Physical range check low for EGR differential pressure
411	4	796	Sensor error differential pressure Venturiunit (EGR); signal range check low
412	3	1007	Sensor error EGR cooler downstream temperature; signal range check high
412	4	1008	Sensor error EGR cooler downstream temperature; signal range check low
520	9	306	Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint
597	2	49	Break lever mainswitch and break lever redundancy switch status not plausible
624	3	971	SVS lamp; short circuit to batt.
624	4	972	SVS lamp; short circuit to grd.
624	5	969	SVS lamp; open load
624	12	970	SVS lamp; powerstage over temperature
630	12	376	Access error EEPROM memory (delete)
630	12	377	Access error EEPROM memory (read)
630	12	378	Access error EEPROM memory (write)
639	14	84	CAN-Bus 0 "BusOff-Status"
651	3	580	Injector 1 (in firing order); short circuit
651	4	586	High side to low side short circuit in the injector 1 (in firing order)

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
651	5	568	Injector 1 (in firing order); interruption of electric connection
652	3	581	Injector 2 (in firing order); short circuit
652	4	587	High side to low side short circuit in the injector 2 (in firing order)
652	5	569	Injector 2 (in firing order); interruption of electric connection
653	3	582	Injector 3 (in firing order); short circuit
653	4	588	High side to low side short circuit in the injector 3 (in firing order)
653	5	570	Injector 3 (in firing order); interruption of electric connection
654	3	583	Injector 4 (in firing order); short circuit
654	4	589	High side to low side short circuit in the injector 4 (in firing order)
654	5	571	Injector 4 (in firing order); interruption of electric connection
676	11	543	Cold start aid relay error.
676	11	544	Cold start aid relay open load
677	3	956	Starter relay high side; short circuit to battery
677	3	960	Starter relay low side; short circuit to battery
677	4	957	Starter relay high side; short circuit to ground
677	4	961	Starter relay low side; short circuit to ground
677	5	958	Starter relay; no load error
677	12	959	Starter relay; powerstage over temperature
703	3	426	Engine running lamp; short circuit to battery
703	4	427	Engine running lamp; short circuit to ground
703	5	424	Engine running lamp; open load
703	12	425	Engine running lamp; powerstage over temperature
729	5	545	Cold start aid relay open load
729	12	547	Cold start aid relay; over temperature error
898	9	305	Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
1079	13	946	Sensor supply voltage monitor 1 error (ECU)
1080	13	947	Sensor supply voltage monitor 2 error (ECU)

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
1109	2	121	Engine shut off demand ignored
1136	0	1398	Physikal range check high for ECU temperature
1136	1	1399	Physikal range check low for ECU temperature
1136	3	1400	Sensor error ECU temperature; signal range check high
1136	4	1401	Sensor error ECU temperature; signal range check low
1176	3	849	Sensor error pressure sensor upstream turbine; signal range check high
1176	4	850	Sensor error pressure sensor downstream turbine; signal range check high
1180	0	1193	Physical range check high for exhaust gas temperature upstream turbine
1180	0	1460	Turbocharger Wastegate CAN feedback; warning threshold exceeded
1180	0	1462	Exhaust gas temperature upstream turbine; warning threshold exceeded
1180	1	1194	Physical range check low for exhaust gas temperature upstream turbine
1180	1	1461	Turbocharger Wastegate CAN feedback; shut off threshold exceeded
1180	1	1463	Exhaust gas temperature upstream turbine; shut off threshold exceeded
1180	3	1067	Sensor error exhaust gas temperature upstream turbine; signal range check high
1180	11	1066	Sensor exhaust gas temperature upstream turbine; plausibility error
1188	2	1414	Wastegate; status message from ECU missing
1188	7	1415	Wastegate actuator; blocked
1188	11	1411	Wastegate actuator; internal error
1188	11	1412	Wastegate actuator; EOL calibration not performed correctly
1188	11	1416	Wastegate actuator; over temperature (> 145øC)
1188	11	1417	Wastegate actuator; over temperature (> 135øC)
1188	11	1418	Wastegate actuator; operating voltage error
1188	13	1413	Wastegate actuator calibration deviation too large, recalibration required
1231	14	85	CAN-Bus 1 "BusOff-Status"
1235	14	86	CAN-Bus 2 "BusOff-Status"

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
1237	2	747	Override switch; plausibility error
1322	12	610	Too many recognized misfires in more than one cylinder
1323	12	604	Too many recognized misfires in cylinder 1 (in firing order)
1324	12	605	Too many recognized misfires in cylinder 2 (in firing order)
1325	12	606	Too many recognized misfires in cylinder 3 (in firing order)
1326	12	607	Too many recognized misfires in cylinder 4 (in firing order)
2659	0	1524	Physical range check high for EGR exhaust gas mass flow
2659	1	1525	Physical range check low for EGR exhaust gas mass flow
2659	2	1523	Exhaust gas recirculation AGS sensor; plausibility error
2659	2	1527	AGS sensor temperature exhaust gas mass flow; plausibility error
2659	12	1526	Exhaust gas recirculation; AGS sensor has "burn off" not performed
2797	4	1337	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 0
2798	4	1338	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1
2798	4	1339	Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 0
2798	4	1340	Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 1
3224	2	127	DLC Error of CAN-Receive-Frame AT1IG1 NOX Sensor (SCR-system upstream cat; DPF-system downstream cat); length of frame incorrect
3224	9	128	Timeout Error of CAN-Receive-Frame AT1IG1; NOX sensor upstream
3248	4	1047	Sensor error particle filter downstream temperature; signal range check low
3699	2	1616	DPF differential pressure sensor and a further sensor or actuator CRT system defective
3699	2	1617	Temperature sensor us. and ds. DOC simultaneously defect
3699	14	1615	Maximum stand-still-duration reached; oil exchange required
4765	0	1039	Physical range check high for exhaust gas temperature upstream (DOC)
4765	1	1042	Physical range check low for exhaust gas temperature upstream (DOC)

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
4766	0	1029	Physical range check high for exhaust gas temperature downstream (DOC)
4766	1	1032	Physical range check low for exhaust gas temperature downstream (DOC)
4768	2	1036	Sensor exhaust gas temperature upstream (DOC); plausibility error
4768	3	1044	Sensor error exhaust gas temperature upstream (DOC); signal range check high
4768	4	1045	Sensor error exhaust gas temperature upstream (DOC) signal range check low
4769	2	1026	Sensor exhaust gas temperature downstream (DOC); plausibility error
4769	3	1034	Sensor error exhaust gas temperature downstream (DOC); signal range check high
4769	4	1035	Sensor error exhaust gas temperature downstream (DOC); signal range check low
523006	3	34	Controller mode switch; short circuit to battery
523006	4	35	Controller mode switch; short circuit to ground
523008	1	648	Manipulation control was triggered
523008	2	649	Timeout error in Manipulation control
523009	9	825	Pressure Relief Valve (PRV) reached maximun allowed opening count
523009	10	833	Pressure relief valve (PRV) reached maximun allowed open time
523212	9	171	Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection
523216	9	198	Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command
523240	9	179	Timeout CAN-message FunModCtl; Function Mode Control
523350	4	565	Injector cylinder-bank 1; short circuit
523352	4	566	Injector cylinder-bank 2; short circuit
523354	12	567	Injector powerstage output defect
523470	2	826	Pressure Relief Valve (PRV) forced to open; performed by pressure increase
523470	2	827	Pressure Relief Valve (PRV) forced to open; performed by pressure shock

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
523470	7	876	Maximum rail pressure in limp home mode exceeded (PRV)
523470	11	831	The PRV can not be opened at this operating point with a pressure shock
523470	11	832	Rail pressure out of tolerance range
523470	12	828	Open Pressure Relief Valve (PRV); shut off condition
523470	12	829	Open Pressure Relief Valve (PRV); warning condition
523470	14	830	Pressure Relief Valve (PRV) is open
523550	12	980	T50 start switch active for too long
523601	13	948	Sensor supply voltage monitor 3 error (ECU)
523603	9	126	Timeout Error of CAN-Receive-Frame AMB; Ambient Temperature Sensor
523605	9	300	Timeout Error of CAN-Receive-Frame TSC1AE; Traction Control
523606	9	301	Timeout Error of CAN-Receive-Frame TSC1AR; Retarder
523612	12	387	Internal software error ECU; injection cut off
523612	12	612	Internal ECU monitoring detection reported error
523612	12	613	Internal ECU monitoring detection reported error
523612	12	614	Internal ECU monitoring detection reported error
523612	12	615	Internal ECU monitoring detection reported error
523612	12	616	Internal ECU monitoring detection reported error
523612	12	617	Internal ECU monitoring detection reported error
523612	12	618	Internal ECU monitoring detection reported error
523612	12	619	Internal ECU monitoring detection reported error
523612	12	620	Internal ECU monitoring detection reported error
523612	12	621	Internal ECU monitoring detection reported error
523612	12	623	Internal ECU monitoring detection reported error
523612	12	624	Internal ECU monitoring detection reported error
523612	12	625	Internal ECU monitoring detection reported error
523612	12	627	Internal ECU monitoring detection reported error
523612	12	628	Internal ECU monitoring detection reported error

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
523612	12	637	Internal ECU monitoring detection reported error
523612	12	1170	Internal software error ECU
523612	14	973	Softwarereset CPU SWReset_0
523612	14	974	Softwarereset CPU SWReset_1
523612	14	975	Softwarereset CPU SWReset_2
523613	0	856	Maximum positive deviation of rail pressure exceeded (RailMeUn0)
523613	0	857	Maximum positive deviation of rail pressure in metering unit exceeded (RailMeUn1)
523613	0	858	Railsystem leakage detected (RailMeUn10)
523613	0	859	Maximum negative deviation of rail pressure in metering unit exceeded (RailMeUn2)
523613	0	860	Negative deviation of rail pressure second stage (RailMeUn22)
523613	0	862	Maximum rail pressure exceeded (RailMeUn4)
523613	1	861	Minimum rail pressure exceeded (RailMeUn3)
523613	2	864	Setpoint of metering unit in overrun mode not plausible
523615	3	594	Metering unit (Fuel-System); short circuit to battery highside
523615	3	596	Metering unit (Fuel-System); short circuit to battery low side
523615	4	595	Metering unit (Fuel-System); short circuit to ground high side
523615	4	597	Metering Unit (Fuel-System); short circuit to ground low side
523615	5	592	Metering unit (Fuel-System); open load
523615	12	593	Metering unit (Fuel-System); powerstage over temperature
523619	2	488	Physical range check high for exhaust gas temperature upstrem (SCR-CAT)
523698	11	122	Shut off request from supervisory monitoring function
523717	12	125	Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments
523718	3	1488	SCR mainrelay; short circuit to battery (only CV56B)
523718	4	1489	SCR mainrelay; short circuit to ground (only CV56B)
523718	5	1486	SCR mainrelay; open load (only CV56B)
523718	12	1487	SCR mainrelay; powerstage over temperature (only CV56B)
523766	9	281	Timeout Error of CAN-Receive-Frame Active TSC1AE
523767	9	282	Timeout Error of CAN-Receive-Frame Passive TSC1AE

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
523768	9	283	Timeout Error of CAN-Receive-Frame Active TSC1AR
523769	9	284	Timeout Error of CAN-Receive-Frame Passive TSC1AR
523770	9	285	Timeout Error of CAN-Receive-Frame Passive TSC1DE
523776	9	291	Timeout Error of CAN-Receive-Frame TSC1TE - active
523777	9	292	Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
523778	9	293	Active Timeout Errorof CAN-Receive-Frame TSC1TR
523779	9	294	Passive Timeout Error of CAN-Receive-Frame TSC1TR
523788	12	299	Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate
523793	9	202	Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message
523794	9	203	Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data
523895	13	559	Check of missing injector adjustment value programming (IMA) injector 1 (in firing order)
523896	13	560	check of missing injector adjustment value programming (IMA) injector 2 (in firing order)
523897	13	561	check of missing injector adjustment value programming (IMA) injector 3 (in firing order)
523898	13	562	check of missing injector adjustment value programming (IMA) injector 4 (in firing order)
523910	6	1261	Air Pump; over current
523913	3	74	Sensor error glow plug control diagnostic line voltage; signal range check high
523913	4	75	Sensor error glow plug control diagnostic line voltage; signal range check low
523914	3	78	Glow plug control; short circuit to battery
523914	4	79	Glow plug control; short circuit to ground
523914	5	76	Glow plug control; open load
523914	5	1216	Glow plug control release line; short circuit error
523914	11	1217	Glow plug control; internal error
523914	12	77	Glow plug control; powerstage over temperature
523919	2	1378	Sensor air pump airpressure; plausibility error
523920	2	1379	Sensor exhaust gas back pressure burner; plausibility error

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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KWP = Keyword Protocol

SPN	FMI	KWP	Description
523922	7	1262	Burner Shut Off Valve; blocked closed
523922	7	1264	Burner Shut Off Valve; blocked closed
523929	0	109	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
523929	1	115	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
523930	0	110	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
523930	1	116	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
523931	0	111	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
523931	1	117	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
523932	0	112	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
523932	1	118	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
523935	12	168	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
523936	12	169	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
523946	0	1158	Zerofuel calibration injector 1 (in firing order); maximum value exceeded
523946	1	1164	Zerofuel calibration injector 1 (in firing order); minimum value exceeded
523947	0	1159	Zerofuel calibration injector 2 (in firing order); maximum value exceeded
523947	1	1165	Zerofuel calibration injector 2 (in firing order); minimum value exceeded
523948	0	1160	Zerofuel calibration injector 3 (in firing order); maximum value exceeded
523948	1	1166	Zerofuel calibration injector 3 (in firing order); minimum value exceeded
523949	0	1161	Zerofuel calibration injector 4 (in firing order); maximum value exceeded
523949	1	1167	Zerofuel calibration injector 4 (in firing order); minimum value exceeded
523960	0	1011	Physical range check high for EGR cooler downstream temp.

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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KWP = Keyword Protocol

SPN	FMI	KWP	Description
523960	0	1458	High exhaust gas temperature EGR cooler downstream; warning threshold exceeded
523960	1	1012	Physical range check low for EGR cooler downstream temp.
523960	1	1459	High exhaust gas temperature EGR cooler downstream; shut off threshold exceeded
523980	14	1187	Bad quality of reduction agent detected
523981	11	918	Urea-tank without heating function (heating phase)
523982	0	360	Powerstage diagnosis disabled; high battery voltage
523982	1	361	Powerstage diagnosis disabled; low battery voltage
523988	3	1245	Charging lamp; short circuit to battery
523988	4	1246	Charging lamp; short circuit to ground
523988	5	1243	Charging lamp; open load
523988	12	1244	Charging lamp; over temp.
523998	4	1327	Injector cylinder bank 2 slave; short circuit
523999	12	1328	Injector powerstage output Slave defect
524014	1	1254	Air pressure glow plug flush line; below limit
524016	2	1259	Amount of air is not plausible to pump speed
524016	2	1260	Calculated amount of air is not plausible to HFM reading
524016	11	1258	HFM sensor; electrical fault
524021	11	1263	Burner fuel line pipe leak behind Shut Off Valve
524024	11	1302	Deviation of the exhaust gas temp. setpoint to actual value downstream (DOC) too high
524028	2	1431	CAN message PROEGRActr; plausibility error
524029	2	1432	Timeout Error of CAN-Receive-Frame ComEGRActr - exhaust gas recirculation positioner
524030	7	1440	EGR actuator; internal error
524031	13	1441	EGR actuator; calibration error
524032	2	1442	EGR actuator; status message EGRCust is missing
524033	7	1443	EGR actuator; due to overload in Save Mode
524034	3	1438	Disc separator; short circuit to battery
524034	4	1439	Disc separator; short circuit to ground
524034	5	1436	Disc Separator; open load
524034	12	1437	Disc Separator; powerstage over temperature

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
524035	12	1341	Injector diagnostics; time out error in the SPI communication
524057	2	1505	Electric fuel pump; fuel pressure build up error
524097	9	1663	Timeout error of CAN-Transmit-Frame DPFBrnAirPmpCtl
524098	9	1664	Timeout error of CAN-Transmit-Frame ComDPFBrnPT
524099	9	1665	Timeout error of CAN-Transmit-Frame ComDPFC1
524100	9	1666	Timeout error of CAN-Transmit-Frame ComDPFHisDat
524101	9	1667	Timeout error of CAN-Transmit-Frame ComDPFTstMon
524102	9	1674	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl
524103	9	1675	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
524104	9	1676	Timeout error of CAN-Receive-Frame ComRxDPFCtl
524105	9	1668	Timeout error of CAN-Transmit-Frame ComEGRMsFlw
524106	9	1677	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1
524107	9	1678	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2
524108	9	1669	Timeout error of CAN-Transmit-Frame ComEGRTVActr
524109	9	1679	Timeout error of CAN-Receive-Frame ComRxEGRTVActr
524110	9	1670	Timeout error of CAN-Transmit-Frame ComETVActr
524111	9	1680	Timeout error of CAN-Receive-Frame ComRxETVActr
524112	9	1671	Timeout ComITVActr
524113	9	1681	Timeout error of CAN-Receive-Frame ComRxITVActr
524114	9	1659	Timeout error of CAN-Transmit-Frame A1DOC
524115	9	1660	Timeout error of CAN-Transmit-Frame AT1S
524116	9	1661	Timeout error of CAN-Transmit-Frame SCR2
524117	9	1662	Timeout error of CAN-Transmit-Frame SCR3
524118	9	1672	Timeout error of CAN-Receive-Frame ComRxCM1
524119	9	1673	Timeout error of CAN-Receive-Frame ComRxCustSCR3

Deutz TD 2.9 L4 Engine Fault Codes

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SPN	FMI	KWP	Description
524120	9	1682	Timeout error of CAN-Receive-Frame ComRxSCRHtDiag
524121	9	1683	Timeout error of CAN-Receive-Frame ComRxTrbChActr
524122	9	1684	Timeout error of CAN-Receive-Frame ComRxUQSens
524123	9	1685	Timeout error of CAN-Receive-Frame ComSCRHtCtl
524124	9	1686	Timeout error of CAN-Receive-Frame ComTxAT1IMG
524125	9	1687	Timeout error of CAN-Receive-Frame ComTxTrbChActr

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
27	3	Engine Exhaust Gas Recirculation Valve Position :Voltage Above Normal	Valve Position Sensor- Test
27	4	Engine Exhaust Gas Recirculation Valve Position :Voltage Be- low Normal	Valve Position Sensor - Test
29	3	Accelerator Pedal Position 2 :Voltage Above Normal	Analog Throttle Position Sensor Circuit - Test
29	4	Accelerator Pedal Position 2 :Voltage Below Normal	Analog Throttle Position Sensor Circuit - Test
51	3	Engine Throttle Valve 1Position :Voltage Above Normal	Valve Position Sensor - Test
51	4	Engine Throttle Valve 1 Position :Voltage Below Normal	Valve Position Sensor - Test
91	3	Accelerator Pedal Position 1 :Voltage Above Normal	Analog Throttle Position Sensor Circuit - Test
91	4	Accelerator Pedal Position 1: Voltage Below Normal	Analog Throttle Position Sensor Circuit - Test
97	15	Water In Fuel Indicator :High - least severe	Fuel Contains Water
100	2	Engine Oil Pressure :Erratic,Intermittent,or Incorrect	Switch Circuits - Test
100	17	Engine Oil Pressure :Low - least severe (1)	Oil Pressure Is Low
102	3	Engine Intake Manifold #1 Pressure:Voltage Above Normal	Engine Pressure Sensor Open or Short Circuit - Test
102	4	Engine Intake Manifold #1 Pressure :Voltage Below Normal	Engine Pressure Sensor Open or Short Circuit - Test
102	20	Engine Intake Manifold #1Pressure :Data Drifted High	Engine Pressure Sensor Open or Short Circuit - Test
102	21	Engine Intake Manifold #1Pressure :Data Drifted Low	Engine Pressure Sensor Open or Short Circuit - Test
105	3	Engine Intake Manifold #1 Temperature :Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit - Test
105	4	Engine Intake Manifold #1 Temperature :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit- Test
107	2	Engine Air Filter 1Differential Pressure : Erratic,Intermittent,or Incorrect	Switch Circuits - Test
107	15	Engine Air Filter 1Differential Pressure :High - least severe (1)	Inlet Air Is Restricted
107	16	Engine Air Filter 1Differential Pressure :High - moderate severity(2)	Inlet Air Is Restricted

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
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SPN	FMI	Description	Refer to Engine Manual
108	3	Barometric Pressure :Voltage Above Normal	Engine Pressure Sensor Open or Short Circuit - Test
108	4	Barometric Pressure :Voltage Below Normal	Engine Pressure Sensor Open or Short Circuit - Test
110	3	Engine Coolant Temperature :Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit - Test
110	4	Engine Coolant Temperature :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit - Test
110	15	Engine Coolant Temperature :High - least severe (1)	Coolant Temperature Is High
110	16	Engine Coolant Temperature:High - moderate severity (2)	Coolant Temperature Is High
152	2	Number Of ECU Resets :Erratic,Intermittent,or Incorrect	ECM Memory - Test
157	0	Engine Injector Metering Rail#1Pressure : High - most severe (3)	Fuel Rail Pressure Problem
157	2	Engine Injector Metering Rail #1 Pressure : Erratic, Intermittent, or Incorrect	Fuel Rail Pressure Problem
157	3	Engine Injector Metering Rail#1 Pressure : Voltage Above Normal	Engine Pressure Sensor Open or Short Circuit - Test
157	4	Engine Injector Metering Rail #1 Pressure :Voltage Below Normal	Engine Pressure Sensor Open or Short Circuit - Test
157	10	Engine Injector Metering Rail#1 Pressure : Abnormal Rate of Change	Engine Pressure Sensor Open or Short Circuit - Test
157	16	Engine Injector Metering Rail#1 Pressure : High - moderate severity (2)	Fuel Rail Pressure Problem
157	17	Engine Injector Metering Rail#1Pressure :Low - least severe (1)	Fuel Rail Pressure Problem
157	18	Engine Injector Metering Rail#1Pressure :Low - moderate severity (2)	Fuel Rail Pressure Problem
168	3	Battery Potential/ Power Input 1 :Voltage Above Normal	Ignition Keyswitch Circuit and Battery Supply Circuit - Test
166	2	Engine Rated Power :Erratic, Intermittent or Incorrect	ECM Memory- Test
166	14	Engine Rated Power :Special Instruction	ECM Memory - Test
168	4	Battery Potential/ Power Input 1 :Voltage Below Normal	Ignition Keyswitch Circuit and Battery Supply Circuit - Test

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
172	3	Engine Air Inlet Temperature Sensor :Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit- Test
172	4	Engine Air Inlet Temperature Sensor :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit - Test
173	3	Engine Exhaust Gas Temperature : Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit - Test
173	4	Engine Exhaust Gas Temperature :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit- Test
174	3	Engine Fuel Temperature1 :Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit - Test
174	4	Engine Fuel Temperature 1 :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit - Test
190	8	Engine Speed :Abnormal Frequency,Pulse Width,or Period	Engine Speed/Timing Sensor Circuit - Test
190	15	Engine Speed :High - least severe (1)	Engine Over speeds
558	2	Accelerator Pedal1Low Idle Switch :Erratic, Intermittent, or Incorrect	Idle Validation Switch Circuit- Test
593	31	Engine Idle Shutdown has Shutdown Engine	This code indicates that an engine idle shutdown is about to occur. This code does not represent a fault. If equipped, the warning lamp will come on.
594	31	Engine Idle Shutdown Driver Alert Mode	This code indicates that an engine idle shut down has occurred.This code does not represent a fault. If equipped,the warning lamp will flash and the shutdown lamp will come on.
623	6	Red Stop Lamp :Current Above Normal	Indicator Lamp Circuit- Test
624	6	Amber Warning Lamp :Current Above Normal	Indicator Lamp Circuit - Test
630	2	Calibration Memory :Erratic, Intermittent, or Incorrect	Injector Data Incorrect- Test
637	11	Engine Timing Sensor :Other Failure Mode	Engine Speed/Timing Sensor Circuit- Test
639	9	J1939 Network #1 :Abnormal Update Rate	CAN Data Link Circuit - Test
639	14	J1939 Network #1:Special Instruction	CAN Data Link Circuit - Test
651	5	Engine Injector Cylinder #01 : Current Below Normal	Injector Solenoid Circuit - Test
651	6	Engine Injector Cylinder #01 : Current Above Normal	Injector Solenoid Circuit- Test
651	20	Engine Injector Cylinder#01 :Data Drifted High	Injector Data Incorrect- Test
651	21	Engine Injector Cylinder#01 :Data Drifted Low	Injector Data Incorrect - Test

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
652	5	Engine Injector Cylinder #02 :Current Below Normal	Injector Solenoid Circuit - Test
652	6	Engine Injector Cylinder #02 :Current Above Normal	Injector Solenoid Circuit - Test
652	20	Engine Injector Cylinder #02 :Data Drifted High	Injector Data Incorrect- Test
652	21	Engine Injector Cylinder #02 :Data Drifted Low	Injector Data Incorrect- Test
653	5	Engine Injector Cylinder #03 :Current Below Normal	Injector Solenoid Circuit - Test
653	6	Engine Injector Cylinder #03 :Current Above Normal	Injector Solenoid Circuit - Test
653	20	Engine Injector Cylinder #03 :Data Drifted High	Injector Data Incorrect- Test
653	21	Engine Injector Cylinder #03 :Data Drifted Low	Injector Data Incorrect - Test
654	5	Engine Injector Cylinder #04 :Current Below Normal	Injector Solenoid Circuit - Test
654	6	Engine Injector Cylinder #04 :Current Above Normal	Injector Solenoid Circuit - Test
654	20	Engine Injector Cylinder #04 :Data Drifted High	Injector Data Incorrect- Test
654	21	Engine Injector Cylinder #04 :Data Drifted Low	Injector Data Incorrect - Test
676	5	Engine GloW Plug Relay : Current Below Normal	Glow Plug Starting Aid - Test
676	6	Engine Glow Plug Relay :Current Above Normal	Glow Plug Starting Aid - Test
676	19	Engine Glow Plug Relay :Data Error	Glow Plug Starting Aid- Test
677	3	Engine Starter Motor Relay :Voltage Above Normal	Start Relay Circuit - Test
677	5	Engine Starter Motor Relay :Current Below Normal	Start Relay Circuit - Test
677	6	Engine Starter Motor Relay :Current Above Normal	Start Relay Cricuit - Test
723	8	Engine Speed Sensor #2 :Abnormal Frequency,Pulse Width, or Period	Engine Speed/liming Sensor Circuit - Test
976	2	PTO Governor State : Erratic,Intermittent, or Incorrect	PTO Switch Circuit - Test
1041	2	Start Signal Indicator :Erratic,Intermittent,or Incorrect	Start Relay Circuit- Test

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
1076	2	Engine Fuel Injection Pump Fuel Control Valve :Erratic, Intermittent, or Incorrect	Solenoid Valve - Test
1076	5	Engine Fuel Injection Pump Fuel Control Valve :Current Below Normal	Solenoid Valve - Test
1076	6	Engine Fuel Injection Pump Fuel Control Valve :Current Above Normal	Solenoid Valve- Test
1081	5	Engine Wait to Start Lamp :Current Below Normal	Indicator Lamp Circuit - Test
1081	6	Engine Wait to Start Lamp :Current Above Normal	Indicator Lamp Circuit- Test
1127	16	Engine Turbocharger 1 Boost Pressure : High - moderate severity (2)	Intake Manifold Air Pressure Is High
1127	18	Engine Turbocharger 1 Boost Pressure :Low - moderate severity (2)	Intake Manifold Air Pressure Is Low
1188	5	Engine Turbocharger Wastegate Actuator 1 Position :Current Below Normal	Solenoid Valve - Test
1188	6	Engine Turbocharger Wastegate Actuator 1 Position :Current Above Normal	Solenoid Valve - Test
1209	3	Engine Exhaust Gas Pressure :Voltage Above Normal	Engine Pressure Sensor Open or Short Circuit - Test
1209	4	Engine Exhaust Gas Pressure :Voltage Below Normal	Engine Pressure Sensor Open or Short Circuit- Test
1221	2	Continuously Monitored Systems Support/Status ;Erratic,Intermittent,or Incorrect	ECM Memory- Test
1221	14	Continuously Monitored Systems Support/Status : Special Instruction	Another diagnostic code has requested engine speed limitation. The warning lamp will flash.The engine speed is limited to 1200rpm. Troubleshoot all other diagnostic codes.No troubleshooting is required for this diagnostic code.
1239	0	Engine Fuel Leakage 1 :High- most severe (3)	Fuel Rail Pressure Problem
1485	7	ECM Main Relay :Not Responding Properly	Electrical Power Supply- Test
1485	14	ECM Main Relay :Special Instruction	Electrical Power Supply- Test

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
2791	5	Engine Exhaust Gas Recirculation (EGR) Valve Control:Current Below Normal	Motorized Valve- Test
2791	6	Engine Exhaust Gas Recirculation (EGR) Valve Control :Current Above Normal	Motorized Valve - Test
2791	7	Engine Exhaust Gas Recirculation (EGR) Valve Control :Not Responding Properly	Motorized Valve- Test
2797	6	Engine Injector Group 1 :Current Above Normal	Injector Solenoid Circuit- Test
2797	7	Engine Injector Group 1 :Not Responding Property	Injector Solenoid Circuit - Test
2798	6	Engine Injector Group 2 :Current Above Normal	Injector Solenoid Circuit- Test
2840	12	ECU Instance :Failure	ECM Memory- Test
2840	14	ECU Instance :Special Instruction	Electrical Power Supply- Test
2880	2	Engine Operator Primary Intermediate Speed Select :Erratic, Intermittent,or Incorrect	Throttle Switch Circuit - Test
2880	3	Engine Operator Primary Intermediate Speed Select :Voltage Above Normal	Throttle Switch Circuit - Test
2880	4	Engine Operator Primary Intermediate Speed Select : Voltage Below Normal	Throttle Switch Circuit - Test
2970	2	Accelerator Pedal 2 Low Idle Switch :Erratic, Intermittent, or Incorrect	Idle Validation Switch Circuit- Test
3217	3	After treatment #1 Intake 02 :Voltage Above Normal	Oxygen Level- Test
3217	4	After treatment #1 Intake 02 :Voltage Below Normal	Oxygen Level - Test
3217	5	After treatment #1 Intake 02 :Current Below Normal	Oxygen Level- Test
3217	6	After treatment #1 Intake 02 :Current Above Normal	Oxygen Level- Test
3217	12	After treatment #1 Intake 02 :Failure	Oxygen Level- Test
3217	13	After treatment #1 Intake 02 : Out of Calibration	Oxygen Level- Test
3217	15	After treatment #1 Intake 02 : High - least severe (1)	Oxygen Level- Test

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
3219	15	After treatment #1 Intake Gas Sensor at Temperature : High- least severe (1)	Oxygen Level- Test
3219	17	After treatment #1 Intake Gas Sensor at Temperature : Low - least severe (1)	Oxygen Level- Test
3222	3	After treatment #1 Intake Gas Sensor Heater : Voltage Above Normal	Oxygen Level- Test
3222	4	After treatment #1 Intake Gas Sensor Heater :Voltage Below Normal	Oxygen Level- Test
3222	5	After treatment #1 Intake Gas Sensor Heater :Current Below Normal	Oxygen Level- Test
3242	3	Particulate Trap Intake Gas Temperature :Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit- Test
3242	4	Particulate Trap Intake Gas Temperature :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit- Test
3251	0	Particulate Trap Differential Pressure : High-most severe (3)	Diesel Particulate Filter Collects Excessive Soot
3251	3	Particulate Trap Differential Pressure:Voltage Above Normal	Engine Pressure Sensor Open or Short Circuit - Test
3251	4	Particulate Trap Differential Pressure :Voltage Below Normal	Engine Pressure Sensor Open or Short Circuit- Test
3251	7	Particulate Trap Differential Pressure :Not Responding Properly	Diesel Particulate Filter Has Differential Pressure Problem
3251	10	Particulate Trap Differential Pressure :Abnormal Rate of Change	Diesel Particulate Filter Has Differential Pressure Problem
3251	16	Particulate Trap Differential Pressure :High-moderate severity (2)	Diesel Particulate Filter Collects Excessive Soot
3251	17	Particulate Trap Differential Pressure : Low - least severe (1)	Diesel Particulate Filter Has Differential Pressure Problem
3509	2	Sensor Supply Voltage 1: Erratic,Intermittent,or Incorrect	5 Volt Sensor Supply Circuit- Test
3510	2	Sensor Supply Voltage 2 : Erratic,Intermittent, or Incorrect	5 Volt Sensor Supply Circuit- Test
3511	2	Sensor Supply Voltage 3 : Erratic,Intermittent,or Incorrect	5 Volt Sensor Supply Circuit - Test
3697	6	Particulate Trap Lamp Command :Current Above Normal	Indicator Lamp Circuit- Test
3698	6	Exhaust System High Temperature Lamp Command :Current Below Normal	Indicator Lamp Circuit- Test

Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description	Refer to Engine Manual
3702	6	Diesel Particulate Filter Active Regeneration Inhibited Status : Current Above Normal	Indicator Lamp Circuit- Test
4765	3	After treatment #1 Diesel Oxidation Catalyst Intake Gas Temperature :Voltage Above Normal	Engine Temperature Sensor Open or Short Circuit - Test
4765	4	After treatment #1 Diesel Oxidation Catalyst Intake Gas Temperature :Voltage Below Normal	Engine Temperature Sensor Open or Short Circuit- Test
5055	17	Engine Oil Viscosity : Low - least severe (1)	Oil Contains Fuel
5055	18	Engine Oil Viscosity : Low - moderate severity (2)	Oil Contains Fuel
5099	6	Engine Oil Pressure Low Lamp Data : Current Above Normal	Indicator Lamp Circuit- Test
5319	31	After treatment Diesel Particulate Filter Incomplete Regeneration	Diesel Particulate Filter Active Regeneration Was Interrupted
5324	7	Engine Glow Plug 1: Not Responding Properly	Glow Plug Starting Aid - Test
5325	7	Engine Glow Plug 2 :Not Responding Properly	Glow Plug Starting Aid - Test
5326	7	Engine Glow Plug 3 :Not Responding Properly	Glow Plug Starting Aid - Test
5327	7	Engine Glow Plug 4 :Not Responding Properly	Glow Plug Starting Aid - Test
5419	5	Engine Throttle Actuator #1 :Current Below Normal	Motorized Valve- Test
5419	6	Engine Throttle Actuator #1 :Current Above Normal	Motorized Valve - Test
5419	7	Engine Throttle Actuator #1 :Not Responding Properly	Motorized Valve- Test
5571	2	High Pressure Common Rail Fuel Pressure Relief Valve :Erratic, Intermittent, or Incorrect	Fuel Rail Pressure Problem
5571	7	High Pressure Common Rail Fuel Pressure Relief Valve :Not Responding Properly	Fuel Rail Pressure Problem
5571	10	High Pressure Common Rail Fuel Pressure Relief Valve : Abnormal Rate of Change	Fuel Rail Pressure Problem
5571	14	High Pressure Common Rail Fuel Pressure Relief Valve : Special Instruction	Fuel Rail Pressure Problem
5571	16	High Pressure Common Rail Fuel Pressure Relief Valve :High - moderate severity (2)	Fuel Rail Pressure Problem
5826	16	Emission Control System Operator Inducement Severity :High - moderate severity (2)	Refer to "Operator Inducement Codes".

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.

Wire Circuit Legend

Circuit numbering

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

2 The circuit number may be used more than once in a circuit.

For Example:

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

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

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

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

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

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

Circuit prefix

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

Wire Circuit Legend

Suffix	Definition
ABV	Auxiliary Boom Valve
AF	Alternator Field
AFV	Auxiliary Forward Valve
AH	Auxiliary Hydraulic Pump
ANG	Angle
APV	Auxiliary Platform Valve
ARV	Auxiliary Reverse Valve
ASV	Auxiliary Steer/Drive Valve
AXE	Axle Extend Valve
AXO	Axle Oscillate
AXR	Axle Retract Valve
BAT	Battery
BEX	Boom Extended
BRK	Brake
BST	Boom Stowed
BV	Bypass Valves
CAL	Calibrate
CAN	CAN Signal
CAT	CATS Module
CNK	Chain Break
DCN	Drive Chassis Controller
DE	Drive Enable
DEL	Drive Enable Left
DER	Drive Enable Right
DTH	Data High
DTL	Data Low
EDC	Electrical Displacement Control
ENL	Envelope Lockout
ENV	Envelope Light
ERL	Extend/Retract Lockout
ESL	Engine Status Lamp
ESP	Engine Speed Select
FAP	Axle Front Position
FB	Flashing Beacon
FE	Function Enable
FL	Fuel Select (gas/LP)
FLR	Filter Restricted
FLT	Filter Switch
FP	Fuel Pump
FS	Float Switch
FSL	Fuel Solenoid
FTS	Foot switch Signal
FWD	Forward
GEN	AC Generator
GND	Ground
HG	Hydraulic Generator
HRN	Horn
HS	High RPM
IGN	Ignition
JBD	Jib Bellcrank Down
JBE	Jib Extend
JBR	Jib Retract
JBS	Jib Sensor
JBU	Jib Bellcrank Up
JD	Jib Down
JER	Jib Extend/Retract Control
JFC	Jib Up/Down Flow Control
JPL	Propel Signal
JPW	Joystick 5V DC Power
JRL	Jib Rotate Left (CCW)
JRR	Jib Rotate Right (CW)

Wire Circuit Legend

Suffix	Definition
JSV	Jib Select Valve
JU	Jib Up
JUD	Jib Up/Down Control
LDS	Load Sensor
LF	Left Front
LFS	Left Front Steer Sensor
LO	Lockout
LOF	Low fuel
LPS	Lamps
LR	Left Rear
LRS	Left Rear Steer Sensor
LS	Limit Switch
LS	Low RPM
LSR	Lift Speed Reduction
MFV	Multi Function Valve
MS	Motor Shift (Speed)
PBD	Primary Boom Down
PBE	Primary Boom Extend
PBL	Primary Boom Extend/Retract Lockout Valve
PBR	Primary Boom Retract
PBS	Primary Boom Angle Sensor
PBU	Primary Boom Up
PCE	Pressure Comp Enable
PCN	Platform Control
PEL	Primary Ext/Ret Lockout
PER	Primary Boom Extend/Retract Flow Control
PES	Primary Boom Up/Down Signal
PL	Primary Lockout
PLD	Platform Level Down

Suffix	Definition
PLF	Platform Level Flow Control
PLL	Propel Lockout
PLS	Primary Boom Extend/Retract Signal
PLU	Platform Level Up
PRC	Platform Rotate Control
PRF	Platform Rotate Flow Control
PRL	Platform Rotate Left (CCW)
PRR	Platform Rotate Right (CW)
PRV	Proportional Valve
PS	Pressure Switches
PSE	Program Setup Enable
PSL	Power to Length Sensor
PSR	Pressure Sender
PTA	Platform Tilt Alarm
PTS	Platform Tilt Sensor
PUD	Primary Boom Up/Down Flow Control
PWR	Power
PXS	Proximity Sensor
RAP	Axle Rear Position
RCV	Recovery
REC	Receptacle
RET	Return
REV	Reverse
RF	Right Front
RFS	Right Front Steer Sensor
RL	Retract Lockout
RPM	RPM
RR	Right Rear

Wire Circuit Legend

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

Wire Color Legend

Wire Coloring

1 All cylinder extension colors are solid and all retract functions are striped black. When using black wire, the stripe shall be white.

2 All rotations that are LEFT or CW are solid, RIGHT or CCW are striped and black. When the wire is black, the stripe is white.

3 All proportional valve wiring is striped.

Wire Color Legend

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

Power Circuits

P9A	Primary up valve
P9B	Ignition/Fuel
P10	Primary boom extend valve
P11	Primary boom up valve
P12	Axle Retract
P22	Jib, Jib Level, Platform Level
P38	Propel (drive) valves
P39	Turntable rotate flow control valve

Wire Color Legend

Color	Circuit #	Primary Function
RD	1	Primary boom up driver
RD/BK	2	Primary boom down driver
RD/WH	3	Primary boom up/down flow control proportional valve driver
WH	4	Turntable rotate left valve driver
WH/BK	5	Turntable rotate right valve driver
WH/RD	6	Turntable rotate flow control proportional valve driver
BK	7	Primary boom extend
BK/WH	8	Primary boom retract
BK/RD	9	Primary boom Extend/Retract proportional valve driver
BL	10	Secondary boom up valve driver
BL/BK	11	Secondary boom down valve driver
BL/WH	12	Secondary boom up/down flow control proportional valve driver
BL/RD	13	Drive enable
OR	14	Platform level up valve
OR/BK	15	Platform level down valve
OR/RD	16	Platform up/down flow control proportional valve driver
GR	17	Platform rotate left valve driver
GR/BK	18	Platform rotate right valve driver
GR/WH	19	Jib select valve driver circuit
RD	20	12V DC battery supply
WH	21	12V DC ignition supply
BK	22	Key switch power to platform
WH	23	Power to platform
RD	24	Power to warning senders
WH/BK	25	Power to oil pressure sender
WH/RD	26	Power to temp sender
RD	27	Auxiliary Power
RD/BK	28	Platform level alarm
RD/WH	29	Drive Motor shift (speed)
WH	30	Forward/EDC-A
WH/BK	31	Reverse/EDC-B
WH/RD	32	Brake
BK	33	Start
BK/WH	34	Start Aid (glow plug or choke)
BK/RD	35	High Engine speed select
BL	36	Steer clockwise
BL/BK	37	Steer counterclockwise
BL/WH	38	Gasoline
BL/RD	39	LPG
OR	40	Limit switch signal stowed
OR/BK	41	RPM signal
OR/RD	42	Boom retracted signal
GR	43	Jib Up
GR/BK	44	Jib Down
GR/WH	45	AC Generator
WH	46	Horn
WH/BK	47	Output Power Enable
WH/RD	48	Work Lamp
WH/BK	49	Motion Lamp
BL	50	Auxiliary Boom
BL/WH	51	Auxiliary Steer
BL/RD	52	Auxiliary Platform
WH/BK	53	Boom envelope safety valve cutoff
BK/WH	54	Power to safety interlock switches (engine)

Wire Color Legend

Color	Circuit #	Primary Function
GR/BK	55	Axle oscillation
RD	56	Foot switch/TCON estop power
RD/WH	57	Boom down safety interlock
RD/BK	58	Safety interlock to engine
GR/WH	59	Chain break circuit
GR/WH	60	Axle extend
GR	61	Axle retract
OR	62	Boom stowed (safety)
OR/RD	63	Power to boom envelope safety switch
OR/BK	64	Power for operational switches
BL/WH	65	Low fuel indication
BL	66	Drive Enable
BL	67	Secondary boom not stowed
RD	68	Primary Boom lowered (operational)
BL	69	Primary boom #1 extended
BL/WH	70	Primary boom #2 retracted
BL/BK	71	Primary boom #2 extended
BL/WH	72	Secondary boom extended
BL/RD	73	Secondary boom retracted
RD	74	Primary #1 Lockout
RD/WH	75	Primary #2 Lockout
BL	76	Primary boom #3 extended
WH	77	Lower Angle #1 operational
WH/BK	78	Upper Angle #2 operational
BK	79	Power from TCON ESTOP
N/A	80	Can 2.0/J1939 Shield
GR	81	Can 2.0/J1939 Low
YL	82	Can 2.0/J1939 High
GR/WH	83	Tilt signal X axis
GR/BK	84	Tilt signal Y axis
GR	85	Tilt sensor power
OR	86	Hydraulic Filter restricted
RD	87	Platform Level Safety Power
RD/BK	88	Platform Level Safety Output
BR	89	Platform Level Safety Ground
RD/BK	90	Proximity Kill
RD/WH	91	Gate Interlock
WH/BK	92	Motor Speed (LO/HI)
WH/RD	93	Motor Bypass
WH	94	Load Sensor
OR	95	Tether ESTOP return
RD	96	Tether Power
BK	97	Tether ESTOP Power
WH	98	J1708 + (high)
BK	99	J1708- (low)
WH/RD	100	Outrigger lowered
WH/BK	101	Outrigger raised
OR	102	Pothole protector up
OR/RD	103	Pothole protector down
BK/WH	104	Proprietary Data buss - (I.e. ITT or AP)
BK/RD	105	Proprietary Data buss + (I.e. ITT or AP)
GR	106	Spare
RD	107	Alternator Field
BL/WH	108	Engine Status
GR/WH	109	Sensor Power
BK	110	Sensor Return
OR	111	Steer Signal
RD	112	Steer Signal to Solenoid Valve
OR/RD	113	Multi-function Valve
BK/RD	114	Load Moment Overweight
RD/BK	115	Load Moment Underweight
OR	116	Hydraulic Oil Cooler

Wire Color Legend

Color	Circuit #	Primary Function
RD	117	Flashing Beacon
OR	118	Lift Speed Reduction
BL	119	Hydraulic Pressure Sensor Output
OR	120	Oil Cooler Fan
GR	121	Axle Oscillate Left
GR/BK	122	Axle Oscillate Right
RD/BK	123	Primary Boom Angle Signal Operational
RD/WH	124	Secondary Boom Angle Signal Operational
WH/RD	125	Secondary Boom Lockout (Extend Enable)
WH/BK	126	Secondary Boom Lockout (Riser Down Enable)
GR	127	ECU Test Switch
OR/RD	128	Low Engine Speed
RD/BK	129	Descent Alarm
WH/RD	130	Travel Alarm
BL	131	Motion Alarm
GR	132	Platform Load Input
GR/WH	133	Platform Load Alarm
GR/BK	134	Key Switch power
BL/WH	135	Fuel Pump
RD	136	Power to Safety Module
RD/WH	137	Drive Power (P_38)
RD/BK	138	Primary Boom Up/Secondary Boom Down-Extend (P_11/30)
WH/RD	139	Turntable Rotate Flow Control Safety (P_39)
OR/RD	140	Boom Envelope Safety
RD	141	Primary Boom Angle Signal Safety
OR	142	Secondary Boom Angle Signal Safety
BL/RD	143	Drive Enable Left
BL/WH	144	Drive Enable Right
RD/WH	145	Calibrate
BL	146	Jib Bellcrank Up Flow Control
BL/BK	147	Jib Bellcrank Down Flow Control
BL/WH	148	Jib Bellcrank Sensor
GR/WH	149	Jib Up/Down Flow Control
GR/BK	150	Hydraulic Generator Bypass
GR	151	Hydraulic EDC Output
BK	152	Injector Retard
BK	153	Jib Extend
BK/WH	154	Jib Retract
OR/RD	155	Pressure Comp. Enable
GR/WH	156	Jib Up/Down
BK/RD	157	Jib Extend/Retract
BL/RD	158	Steer Signal Rocker
BL/WH	159	Steer Joystick Signal
WH/RD	160	Propel Joystick Signal
WH/BK	161	Secondary Boom Joystick Signal
OR	162	Joystick 5V DC power
BL/WH	163	Primary Extend/Retract Signal
RD/WH	164	Primary Up/Down Signal
WH/RD	165	TT Rotate Signal

Wire Color Legend

Color	Circuit #	Primary Function
OR	166	Boom Length Signal Safety
OR/BK	167	Boom Length Signal Operational
BL/RD	168	Primary Boom Hydraulic Valve Lockout
GR	169	Envelope Active LED
WH/RD	170	Load Sense Relay Source
WH/BK	171	Load Sense Relay Sink
BL	172	UP/DN Flow Control Ground
BK	173	Ext/Ret Flow Control Ground
WH	174	Key Switch Power, Ground Position
WH/BK	175	Load Sensor Signal Operational
GR/WH	176	Secondary Extend/Retract FC
BL/RD	177	Extend/Retract Lockout
BK	178	Control Module Status Light
GR	179	Drive Power Relay
BK	180	Lift Power Relay
OR	181	48 Volt Alternator field (or Battery)
RD	182	24 Volt Battery
BL	183	Envelope or Load Sense Recovery
WH	184	Program setup Enable
WH	185	Encode A
BL	186	Encode B
BL	187	Bootstrap or Program Enable
GR	188	Safety cross check
BK	189	Data Receive
BK/WH	190	Data Transmit
WH/RD	191	Multi-Function Pressure Relief
WH/BK	192	Jib Rotate Left
WH/RD	193	Jib Rotate Right
WH/RD	194	Speed Select Input
OR/RD	195	Electric Brake Source
YL	196	2.5V Sensor Power
WH	197	Hour Meter
RD	198	+12V Sensor Power
WH/RD	199	Thermal Switch
BL	226	Telematics Remote Disable
GR	227	Engine Control CAN 2.0 / J1939 Low
YL	228	Engine Control CAN 2.0 / J1939 High
BR	N/A	Ground or Return

Limit Switches and Angle Sensors

Types of Limit Switches

There are two types of limit switches, found in various locations throughout the machine: mechanical-type **operational/safety** switches and **rotation** or **angle** sensors. As in aircraft, which features redundant safety systems, each mechanical operational switch is backed up with a separate, independently functioning safety switch.

The mechanical-type **operational** or **safety** switches are used to sense a positive displacement or movement of the limit switch actuator, or arm, as the machine moves through its range of operational functions. The **rotation** or **angle** sensors utilize Hall Effect technology and must be calibrated when replaced. Included in this group are envelope limit switches which sense the extended length and angle of the booms and rotational position of the turntable.

An example is the drive enable limit switch, which disables the drive function anytime the boom is rotated past the rear tires, indicated by the 'circle' end of the drive chassis.In some cases, the engine will be stopped if safety parameters are exceeded.

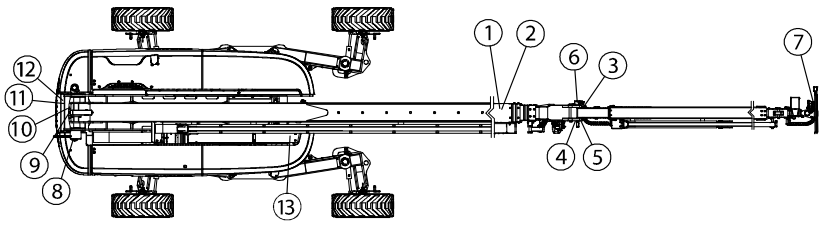
Numbering Legend

LS		FA		1	L		O	
LS	Limit Switch	FA	Front Axle	Circuit Number	L	Load moment	O	Operational
LT	Stringpot	RA	Rear Axle		A	Angle	S	Safety
RS	Rotary Sensor	LF	Left Front		D	Down		
		LR	Left Rear		E	Extend		
		RF	Right Front		R	Retract		
		RR	Right Rear					
		J	Jib Boom					
		P	Boom					
		T	Turntable					

Limit Switches and Angle Sensors

Switches and Sensors - Primary Boom

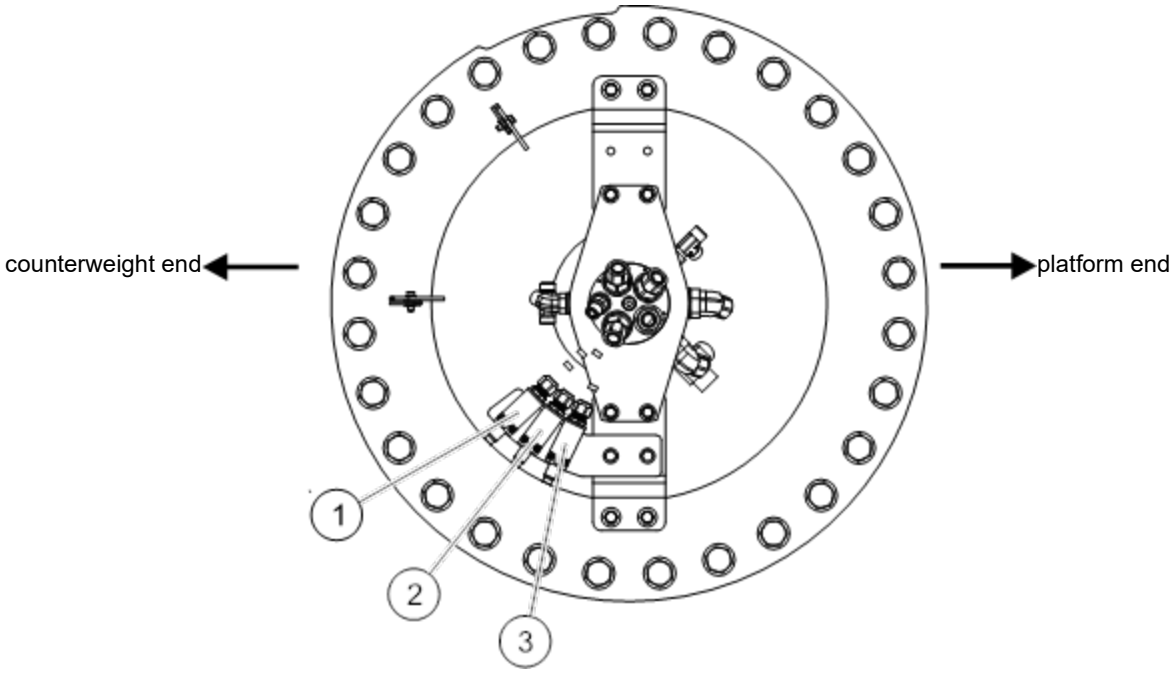
Index	Description	Schematic Item	Function Controlled	Switch Type and Operation
1	Primary Boom Extended Operational Limit Switch	LSB4EO	Primary boom fully extended	Normally closed; contacts open whenboom sections #2 and #3 fully extended
2	Primary Boom 3.5 ft extended Safety Limit Switch	LSB3RS	Primary boom extended >1 ft	Normally closed; contacts open when booms is extended
3	Jib Boom retracted Operational Proximity Switch	LSJ1RO	Jib boom fully retracted	Normally open switch;contacts close when jib is in stowed
4	Jib Boom retracted Safety Proximity Switch	LSJ1RS	Out of stowed safety	Normally closed; contacts open when jib boom is retracted
5	Jib Boom down Operational Proximity Switch	LSJ1DO		Normally open; contacts close when jib boom is in stowed position
6	Jib Bellcrank Sensor	Bellcrank Level Sensor		
7	Platform Overload Load Cell	LCP1LS		
8	Primary Boom Angle Sensor	RSB1AO/S		
9	Cable Tension Safety Limit Switch	LSB5S	Primary extend power	Normally closed
10	Boom #1 - 1 ft (boom fully retracted) Operational Limit Switch	LSB3RO	Out of stowed.	Normally open switch; closes when boom is retracted
11	Primary Boom down Operational Limit Switch	LSB1DO		Normally open; contacts close when boom angle is greater than 10°
12	Boom Length Operational/Safety Stringpot	LTB1LO/S		
13	Primary Boom Transport Rest Stop Operational Limit Switch	LST3DO	Primary boom stowed on chassis for transport	Normally closed; switch opens when contacted.



Limit Switches and Angle Sensors

Switches and Sensors - Turntable

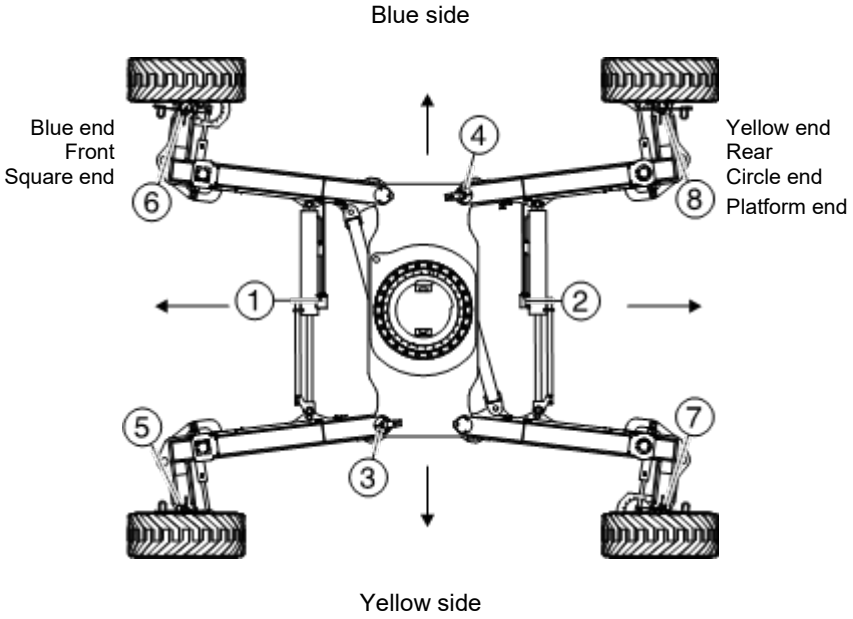
Index	Description	Schematic Item	Function Controlled	Switch Type and Operation
1	Turntable #1 Operational Limit Switch	LST1O	Activates the drive enable zone when the turntable is rotated in the right direction.	Normally closed switch;contacts open when turntable is rotated in the right direction.
2	Turntable #1 Safety Limit Switch	LST1S	Prevents the turntable from rotating past either rear tire when the axles are retracted.	Normally closed switch;contacts open when turntable is rotated past either rear tire with the axles retracted.
3	Turntable #2 Operational Limit Switch	LST2O	Activates the drive enable zone when the turntable is rotated in the left direction.	Normally closed switch;contacts open when turntable is rotated in the left direction.



Limit Switches and Angle Sensors

Switches and Sensors - Drive Chassis

Index	Description	Schematic Item	Function Controlled	Switch Type and Operation
1	Front Axle #1Extended Safety Limit Switch.	LSFA1ES	Disables boom functions when axles are retracted.	Normally open switch;contacts close when axle is fully extended.
2	Rear Axle #1Extended Safety Limit Switch	LSRA1ES	Disables boom functions when axles are retracted.	Normally open switch;contacts close when axle is fully extended
3	Front Axle #1 Angle Operational Rotary Sensor	RSFA1SO	Provides front axle positioning information for adjusting steering neutral setting during axle extension.	
4	Rear Axle #1 Angle Operational Rotary Sensor	RSRA1SO	Provides rear axle positioning information for adjusting steering neutral setting during axle extension.	
5	Left Front #1 Steer Operational Rotary Sensor	RSLF1SO	Provides wheel position information during steering. Master wheel in all steer modes except rear steer.	
6	Right Front #1 Steer Operational Rotary Sensor	RSRF1SO	Provides wheel position information during steering.	
7	Left Rear #1 Steer Operational Rotary Sensor	RSLR1SO	Provides wheel position information during steering. Master wheel when in rear steer mode.	
8	Right Rear #1 Steer Operational Rotary Sensor	RSRR1SO	Provides wheel position information during steering.	



Circuit Connector Legend

Number	Description
J1	Molex connector on toggle/LED pcb
J9	Ribbon connector from TCON to membrane #1
J10	Ribbon connector from TCON to membrane #2
J11	Black 23 pin AMP connector on TCON
J12	Black 35 pin AMP connector on TCON
J13	White 23 pin AMP connector on TCON
J14	White 35 pin AMP connector on TCON
J15	Black 4 pin DTP connector on PCON
J17	16 pin Molex mini fit circuit board to key switch
J20	8 pin Deutsch DT lower/upper LS harness
J20B	2 pin Deutsch DT cable tension #2 harness
J21	Black 23 pin AMP connector on PCON
J22	White 35 pin AMP connector on PCON
J24	10 pin connector PCON PCB to toggle/LED driver PCB
J25	6 pin Deutsch DTM conn on drive/steer joystick (JC3)
J26	6 pin Deutsch DTM conn on extend/retract joystick (JC2)
J29	16 pin Molex conn on PCON PCB
J31	Black 23 pin AMP connector on DCON
J32	White 23 pin AMP connector on DCON
J33	3 pin Deutsch SAE DT connector (swivel-upper)
J34	2 pin Deutsch DTP connector (swivel-upper)
J35	6 pin Deutsch DT connector (swivel-upper)
J36	3 pin Deutsch SAE DT connector (swivel-upper)
J37	2 pin Deutsch DTP connector (swivel-lower)
J38	6 pin Deutsch DTP connector (swivel-lower)
J55	6 pin Deutsch DT connector for platform tilt sensor (S6)
J57	4 pin Deutsch DTP connector for throttle solenoid
J58	2 pin Deutsch DT pri boom up/dwn F.C. valve #1 (Y45)
J58A	2 pin Deutsch DT pri boom up/dwn F.C. valve #2 (Y45A)
J59	2 pin Deutsch DT primary boom up valve (Y22)
J60	2 pin Deutsch DT primary boom down valve (Y21)
J61	2 pin Deutsch DT pri boom extend/retract F.C. valve (Y76)
J62	2 pin Deutsch DT pri boom extend valve (Y79)
J63	2 pin Deutsch DT pri boom retract valve (Y80)
J69	2 pin Deutsch DT TT rotate CW/CCW F.C. valve (Y77)
J70	2 pin Deutsch DT turntable rotate CW valve (Y52)
J71	2 pin Deutsch DT turntable rotate CCW valve (Y53)
J76	2 pin Deutsch DT platform rotate CW valve (Y70)
J77	2 pin Deutsch DT platform rotate CCW valve (Y71)
J78	2 pin Deutsch DT jib up valve (Y72)
J79	2 pin Deutsch DT jib down valve (Y73)
J80	2 pin Deutsch DT platform level up valve (Y20)
J81	2 pin Deutsch DT platform level down valve (Y19)
J82	4 pin Deutsch DT proximity kill (LSP1PROX)
J84	2 pin Deutsch DT footswitch (FS1)

Circuit Connector Legend

Number	Description
J87	2 pin Deutsch DT two speed motor stroke valve (Y27)
J91	2 pin Deutsch DT RR steer right valve (Y55)
J92	2 pin Deutsch DT RR steer left valve (Y56)
J93	2 pin Deutsch DT LR steer right valve (Y57)
J94	2 pin Deutsch DT LR steer left valve (Y58)
J95	2 pin Deutsch DT RF steer right valve (Y59)
J96	2 pin Deutsch DT RF steer left valve (Y60)
J97	2 pin Deutsch DT LF steer right valve (Y61)
J98	2 pin Deutsch DT LF steer left valve (Y62)
J99	2 pin Deutsch DT axle extend valve (Y99)
J100	2 pin Deutsch DT axle retract valve (Y100)
J106	2 pin Deutsch DT brake release valve (Y2)
J107	3 pin Deutsch DT RR steer sensor (RSRR1SO)
J108	3 pin Deutsch DT LR steer sensor (RSLR1SO)
J109	3 pin Deutsch DT RF steer sensor (RSRF1SO)
J110	3 pin Deutsch DT LF steer sensor (RSLF1SO)
J114	6 pin Deutsch DT pri boom angle sensor (RSB1AO/S)
J120	4 pin Packard weatherpack EDC connection
J121	12 pin Deutsch DTM gray SCON module #1
J122	12 pin Deutsch DTM green SCON module #2
J124	2 pin Deutsch DT drive enable right (LST1O)
J125	4 pin Deutsch DT drive enable left (LST2O)
J126	4 pin Deutsch DT drive enable safety (LST1S)
J127	6 pin Deutsch DTM pri boom up/dwn/TT rot joystick (JC7)

Number	Description
J135	2 pin Deutsch DT jib bellcrank up valve (Y85)
J136	2 pin Deutsch DT jib bellcrank down valve (Y86)
J137	4 pin Deutsch DT front axle safety switch (LSFA1ES)
J138	4 pin Deutsch DT rear axle safety switch (LSRA1ES)
J142	2 pin Deutsch DT boom cable to lower LS harness
J144	10 pin AMP connector to Deutz engine
J146	2 pin Deutsch DT lower LS to function harness
J147A	1 way Deutsch DTHD upper to lower boom cable
J147B	3/8 in stud term TCON to lower boom cable (P52PCON)
J148A	1 way Deutsch DTHD upper to lower boom cable
J148B	3/8 in stud term TCON to lower boom cable (GNDPCON)
J149	2 pin Deutsch DTP upper to lower boom cable
J150	4 pin Deutsch DT upper to lower boom cable
J151	3 pin Deutsch SAE DT upper to lower boom cable
J152A	3 pin Deutsch SAE tee harness
J152B	3 pin Deutsch SAE tee harness
J153	4 pin Deutsch DT engine to function harness
J155A	2 way Deutsch DTP plat to upper boom cable
J155B	2 way Deutsch DTP upper to lower boom cable
J155C	2 way Deutsch DTP lower boom cable to swing
J157	2 pin Deutsch DT plat harness to upper boom cable

Circuit Connector Legend

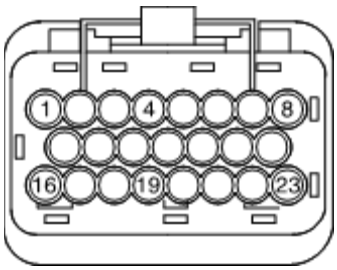
Number	Description
J160	6 pin Deutsch DT front axle sensor (RSFA10)
J161	6 pin Deutsch DT rear axle sensor (RSRA10)
J162	6 pin Deutsch DT jib bellcrank tilt sensor (S21)
J166	2 pin Deutsch DT function enable valve #1 (Y74)
J166A	2 pin Deutsch DT function enable valve #2 (Y74A)
J169	20 pin Molex conn on PCON PCB
J171	2 pin Deutsch DT hydraulic oil cooler sensor
J172	2 pin Deutsch DT hydraulic oil cooler fan
J173	2 pin Deutsch DT boom cable to engine harness
J192A	4 pin Deutsch DT cable break safety #1 (LSB5S)
J192B	2 pin Deutsch DT cable break safety #2 (LSB6S)
J199	6 pin Deutsch DT pri boom length sensor (LTB1LO/S)
J202	2 pin Deutsch DT jib rotate CW valve (Y89)
J203	2 pin Deutsch DT jib rotate CCW valve (Y90)
J205	4 pin Deutsch DT jib rotated CW (LSJ2RO)
J206	2 pin Deutsch DT jib rotated CCW (LSJ3RO)
J207	4 pin Deutsch DT 3.5ft extend safety (LSB3RS)
J208	12 pin Deutsch DT lower limit to zero tube cable
J209	4 pin Deutsch DT 151ft retract safety (LSB2RS)

Number	Description
J210	2 pin Deutsch DT 10 deg angle oper (LSB1DO)
J211	4 pin Deutsch DT 3ft extend oper (LSB3RO)
J213	4 pin Deutsch DT 150ft extend oper/safety (LSB4EO/S)
J215	2 pin Deutsch DT lower LS to engine harness
J216	2 pin Deutsch DT hyd generator valve (Y91)
J217	2 pin Deutsch DT hyd generator bypass valve (Y92)
J218	6 pin Deutsch DTM jib up/dwn/jib rot joystick (JC8)
J219	2 pin Deutsch DT primary lockout valve #1 (Y87)
J220	2 pin Deutsch DT primary lockout valve #2 (Y88)
J222A	4 pin Deutsch DT zero tube limit to cable tension cable #1
J222B	2 pin Deutsch DTP upper limit to cable tension cable #2

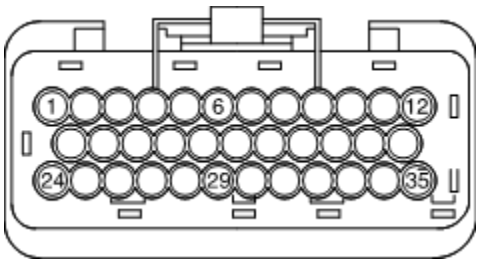
Connector Pin Legend



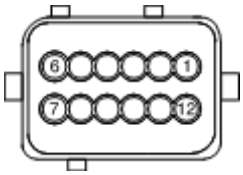
Pin location - 4 pin connector



Pin location - 23 pin connector



Pin location - 35 pin connector



Pin location - 12 pin connector

Abbreviation

OH	High Current	On/Off Solenoid Output (3 < x < 6 Amps)
OM	Medium Current	On/Off Solenoid Output (0.5 < x < 3 Amps)
OL	Low Current	On/Off Solenoid Output (0.1 < x < 3 Amps)
PM	Prop. Medium Current	Proportional Solenoid Output (0.5 < x < 3 Amps)
LED	LED Output	LED Output Driver
RLY	Relay Output	Relay Output Driver (0.1 < x < 0.3 Amps)
EDC	EDC Output	Linear Current Control (propel)
AI	Analog Input	(0 to +5 Vdc)
DI	Digital Input	(0 or 'Vbat' Voltage)
FAC	Frequency AC Input	(0 to 1 kHZ / 0 to 13.8 Vptop)
RDF	Ground	Ref signal power / GND to external sensors, input power(s) and ground
PWR	12V Power	(x > 6 Amps)
CONT	12V Power	(x < 1 Amp)
SNSR	Sensor Power	5.0 Vdc Supply for sensors

Connector Pin Legend

J11 Black 23 Pin Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P11-01	REF	P CON G ND	GNDPCON-BR	PCON ground
P11-02	PWR	P CON P OWE R	P 52PCON-WH	Power output to PCON. Unregulate d 12V auto motive power.
P11-03	RLY	HORN RELAY COIL	C46HRN-WH	Power to service horn relay
P11-04	CONT	OUT PWR ENBL	C47OUT-WH/BK	Bi -directional relay control signal. Normally low, switched to 12V PWR-PCON ESTOP is high and the emergency stop switch is closed.
P11-05	PWR	PWR-PCON ESTOP	P 23PCO N-BK	Output signal to PCON. Provides 12V power to the emergency stop switch.
P11-06	CONT	P _7	S 56PRV -RD	Bi -directional relay control signal. Normally low, switched to 12V when PCON POWER & OUT PWR ENBL are active and the foot-switch is closed.
P11-07	CONT	P _22	P 56PRV -RD/WH	Relay control signal or power signal o f PCON, normally controlled by the platform tilt safety switch output, but may be over-ridden in bypass / recovery mode.
P11-08	RLY	SPARE RLY OUT		Power relay coil
P11-09	RLY	FLASHING BEACON RLY	C117FB-RD	Flashing beacon relay
P11-10	COM	CAN SHIELD		Termination for CA N cable shield
P11-11	CONT	S ERV /CAL MODE	C145CAL-RD/WH	12V calibration mode signal for SCON
P11-12		NOT USED		No connection
P11-13		!BOOT		!BOOT
P11-14	FAC	CAL FREQ 1		Calibration frequency 1
P11-15		NOT USED		No connection
P11-16	FAC	CAL FREQ 2		Calibration frequency 2
P11-17	COM	CAN LO W	D81CAN(-)-G R	CAN bus connection
P11-18	COM	CAN HIGH	D82CAN(+)-YL	CAN bus connection
P11-19		NOT USED		No connection
P11-20		NOT USED		No connection
P11-21	REF	DIAG GND		Ground
P11-22	PWR	DIAG PWR (12V)		12V power for TCON, DCON, and SCON
P11-23		NOT USED		No connection

Connector Pin Legend

J12 Black 35 Pin Connector

Pin No.	Type	Signal Name	Circuit No.	Signal Description
P12-01	REF	SCON ECU GND	SCONGND-BR	Ground for SCON ECU
P12-02	PWR	DCON ECU PWR	P21DCON-WH	12V power for ECU power
P12-03	PWR	P_6R1	P53LS-WH/BK	Safety circuit power (to DCON, SCON)
P12-04	PWR	P_6R2	P54ENG-BK/WH	Safety circuit power (to SCON)
P12-05	PWR	P_7R	S56PRV-RD	Safety circuit power (to DCON, SCON)
P12-06	PWR	P_9A	P57PBD-RD/WH	Safety circuit for boom down (power)
P12-07	PWR	P_9B	P58LS-RD/BK	Safety circuit for fuel/ignition (power)
P12-08	PWR	P_10	S59CNBK-GR/WH	Safety circuit for boom extend - cable break (power)
P12-09	PWR	P_11	S140ENL-OR/RD	Safety circuit for boom up (power)
P12-10	PWR	P_12	C61AXRT-GR	Safety circuit for axle retract (signal)
P12-11	DI	P_14		Monitoring circuit
P12-12	DI	P_18		Monitoring circuit
P12-13	PWR	OPER SW PWR	C64LS-OR/BK	Power for Operational Limit Switches
P12-14	DI	LOW FUEL - FST1S	C65LOFL-BL/WH	Low fuel float switch
P12-15	DI	DRV ENBL R - LST1O	C144DER-BL/WH	Turntable stowed switch 1 (drive enable right)
P12-16	DI	LSB1DO	C68PBD-BL	Input - primary boom lowered (10 deg operational)
P12-17	DI	12V SIG TO PLD	C62PBS-OR	Transport chock limit switch
P12-18	DI	LSB3RP	C64LS-OR/BK	Tied high (12V) for proper operation of PLD
P12-19	DI	LSB3RO	C70PBE-BL/WH	Input - primary boom fully retracted for PLD (3ft retracted operational)
P12-20	DI	LSB4EO	C71PBE-BL/BK	Input - primary boom sections 2-4 extended (150ft extended operational)
P12-21	DI	LSB2RS	S69PBE-BK/WH	Input - primary boom section #1 retracted (151ft retracted safety)
P12-22	DI	SPARE DI		Spare
P12-23	OM	P1 SEQ		SX-180 only
P12-24	OM	P2 SEQ		SX-180 only
P12-25	REF	SNSR GND	SNSR GND-BR	Ground to angle sensor
P12-26	SNSR	SNSR PWR (5V)	P109ANG-GR/WH	Power to angle sensor (5.0VDC)
P12-27	AI	AUX HYD PRESSURE IN		Signal from auxiliary hydraulic pressure sensor
P12-28	DI	DRV ENBL L - LST2O	C143DEL-BL/RD	Turntable stowed switched 2 (drive enable left)
P12-29	DI	SPARE DI		Spare
P12-30	DI	SPARE DI		Spare
P12-31	DI	BOOM STOWED		Override for boom transport
P12-32	AI	RSB1AO (BOOM ANGLE)	C123PBS-RD/BK	Primary angle sensor input to TCON
P12-33	AI	LTB1LO (BOOM LENGTH)	C167PRS-OR/BK	Primary length sensor input to TCON
P12-34	PWR	P_30		Safety power feed to P_30
P12-35	REF	VALVE RETURN	VLVRET-BR	Valve return

Connector Pin Legend

J13 White 23 Pin Connector

Pin NO.	Type	Signal Name	Circuit NO.	Signal Description
P13-01	REF	VALVE_RETURN_1		Valve ground return (return for throttle RPM solenoid)
P13-02	RLY	THROTTLE	C35RPM-BK/RD	Provides power to throttle actuator relay
P13-03	RLY	FUEL/IGNITION	C21IGN-WH	Provides power to engine shutdown actuator relay coil
P13-04	RLY	START AID RLY	C34SA-BK/WH	Provides power to choke/glow plug relay
P13-05	PM	FWD PWM		Forward proportional PWM valve drive
P13-06	PM	REV PWM		Reverse proportional PWM valve drive
P13-07	RLY	SERVICE HORN	C46HRN-WH	Output to service horn
P13-08	OM	KEYSWITCH PWR		ON/OFF valve drive to LP selector on throttle body
P13-09	RLY	STARTER RELAY	C33STR-BK	Tier IV engines only
P13-10	EDC	EDC FWD	C30EDC(+)-WH	Electrical displacement control (forward)
P13-11	EDC	EDC REV	C31EDC(-)-WH/BK	Electrical displacement control (reverse)
P13-12	AI	OIL_PRESSURE	C25PSR-WH/BK	Input from oil pressure sender
P13-13	AI	OIL/WATER_TEMP	C26TSR-WH/RD	Input from oil/water temperature sender
P13-14	REF	TT_TILT_SNSR_GND		Ground for turntable tilt sensor
P13-15	SNSR	TT_TILT_SNSR_PWR (SNSR_5V)		Supply voltage for turntable tilt sensor
P13-16	REF	VALVE_RETURN_2		Valve ground return (return for glow plugs)
P13-17	PWR	P_38 PWR TO PROPEL	S137PLL-RD/WH	Safety power feed to propel drivers from SCON
P13-18	FAC	ALTERNATOR RPM	C41RPM-OR/BK	Input from alternator indicating engine RPM
P13-19	PWR	P_39 PWR TO TTROT FC	S139TRF-WH/RD	Safety power feed to turntable rotate flow control valve
P13-20	AI	TT_TILT_X_AXIS		Analog input from tilt sensor (spare)
P13-21	AI	TT_TILT_Y_AXIS		Analog input from tilt sensor (spare)
P13-22	OM	AC GENERATOR	V45HG-GR/WH	Output to ON/ OFF generator valve
P13-23	REF	VALVE_RETURN_3		Valve ground return

Connector Pin Legend

J14 White 35 Pin Connector

Pin NO.	Type	Signal Name	Circuit NO.	Signal Description
P14-01	REF	VALVE_RETURN_4	VLVRET4-BR	Valve ground return
P14-02	PM	PRI BM U/D FC VLV #2	V03PUD2-GR/WH	Proportional PWM valve drive (primary boom up/down valve #2 -GROSS-)
P14-03	PM	PRI BM E/R FC VLV	V09PER-BK/RD	Proportional PWM valve drive (primary boom extend/retract)
P14-04	PM	TT ROT FC VLV	V06TRF-WH/RD	Proportional PWM valve drive (turntable rotate)
P14-05	PM	PRI BM U/D FC VLV #1	V03PUD1-RD/WH	Proportional PWM valve drive (primary boom up/down valve #1 -FINE-)
P14-06	PM	SPARE PM		Proportional PWM valve drive
P14-07	OM	PRI_UP_VLV	V01PBU-RD	ON/OFF valve drive (primary boom up)
P14-08	OM	PRI_DOWN_VLV	V02PBD-RD/BK	ON/OFF valve drive (primary boom down)
P14-09	OM	PRI_EXTEND_VLV	V07PBE-BK	ON/OFF valve drive (primary boom extend)
P14-10	OM	PRI_RETRACT_VLV	V08PBR-BK/WH	ON/OFF valve drive (primary boom retract)
P14-11		NOT USED		No connection
P14-12	OM	SPARE OM		ON/OFF valve drive
P14-13	RLY	DRIVE LIGHT RELAY	C49LP-WH/BK	Feeds power to drive light relay
P14-14	REF	VALVE_RETURN_5		Valve ground return
P14-15	DI	HYD_FILTER1 DI		Grounding switch input from hydraulic filter #1
P14-16	DI	HYD_FILTER2 DI		Grounding switch input from hydraulic filter #2
P14-17	DI	BOOM REVERSE LOAD DI		Grounding switch input from boom reverse proximity switch
P14-18	DI	BOOM OVERLOAD DI		Grounding switch input from boom overload switch
P14-19	OH	SPARE OM		ON/OFF valve drive
P14-20	OH	SPARE OM		ON/OFF valve drive
P14-21	OM	SPARE OM		ON/OFF valve drive
P14-22		NOT USED		No connection
P14-23	OM	MULTI_FUNCT_VLV		ON/OFF valve drive
P14-24		NOT USED		No connection
P14-25	OM	ROTATE_CW_VLV	V04TRL-WH	ON/OFF valve drive (rotate clockwise)
P14-26	OM	ROTATE_CCW_VLV	V05TRR-WH/BK	ON/OFF valve drive (rotate counter-clockwise)
P14-27	REF	VALVE_RETURN_7	VLVRET7-BR	Valve ground return
P14-28		NOT USED		No connection
P14-29		NOT USED		No connection
P14-30	REF	VALVE_RETURN_6	VLVRET6-BR	Valve ground return
P14-31		NOT USED		No connection
P14-32	OM	AUX_RELAY	C27AUX-RD	Relay coil feed
P14-33	OM	PRESS COMP ENBL VLV #2	V155PCE2-OR/BL	ON/OFF valve drive (Activate Pressure Comp Valve on pump)
P14-34	OM	PRESS COMP ENBL VLV #1	V155PCE1-OR/RD	ON/OFF valve drive (Activate Pressure Comp Valve on pump)
P14-35	OM	AC GENERATOR BYPASS VALVE	V150BV-GR/BK	Output to ON/OFF Generator Bypass

Connector Pin Legend

J17 - 16 Pin Connector

Pin NO.	Type	Signal Name	Circuit NO.	Signal Description
J17-1	PWR	PWR TO TCON ESTOP	BL/BK	Power to TCON E-Stop (P1)
J17-2		NOT USED		
J17-3	PWR	SERV/CAL MODE	WH	Service/calibration mode signal
J17-4	CONT	ECU POWER	C47OUT-WH/BK	Power to TCON ECU
J17-5	PWR	PCON MODE	P23PCON-BK	Output signal to PCON. Provides 12V power to the emergency stop switch.
J17-6	CONT	OUTPUT PWR ENABLE	C47OUT-WH/BK	Function enable
J17-7	PWR	P_6R1	P53LS-BK/WH	Safety circuit power
J17-8	PWR	P_7R	S56PRV-RD/BK	Safety circuit power
J17-9	CONT	SERV. OR OPER. REC.	SRV REC-WH	Service/recovery mode signal
J17-10	PWR	P_22	P56PRV-RD	Safety circuit power (platform level bypass)
J17-11	CONT	OPER. REC.	P_15-OR/BK	Power to PLD while in recovery mode
J17-12	CONT	P_7	P_7 PLAT-GR/WH	Power for function enable while in recovery mode
J17-13	PWR	P_11	S140ENL-OR/RD	Power for boom up in service mode
J17-14	CONT	TCON MODE	RD/WH	TCON mode power
J17-15	CONT	ALARM PWR	ALM PWR-BL	TCON alarm signal
J17-16	REF	ALARM GND	ALM GND-BR	TCON alarm ground

Connector Pin Legend

J21 Black 23 Pin Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P21-01	REF	PCON GND	GNDPCON-BR	PCON ground
P21-02	PWR	PCON PWR	P52PCON-WH	Power for PCON
P21-03		NOT USED		
P21-04	CONT	P_7	S56PRV-RD	12V when footswitch is pressed
P21-05		NOT USED		
P21-06		NOT USED		
P21-07	PWR	P_22	P56PRV-RD/WH	Power for platform level up/down, jib up/down, and jib bellcrank up/down in TCON mode
P21-08		NOT USED		
P21-09		NOT USED		
P21-10	COM	CAN SHIELD		Termination for CAN cable shield
P21-11		NOT USED		
P21-12		NOT USED		
P21-13		!BOOT		!Boot
P21-14		NOT USED		
P21-15	CONT	OUT PWR ENBL	C47OUT-WH/BK	12V when platform E-Stop is pulled out
P21-16	CONT	HRN RLY CNTRL	C46HRN-WH	Output from horn membrane switch on PCON
P21-17	COM	CAN LOW	D81CAN(-)-GR	CAN bus connection
P21-18	COM	CAN HIGH	D82CAN(+)-YL	CAN bus connection
P21-19		NOT USED		
P21-20		NOT USED		
P21-21		NOT USED		
P21-22		NOT USED		
P21-23	PWR	PWR-PCON ESTOP	P23PCON-BK	Power to PCON E-Stop

Connector Pin Legend

J22 White 35 Pin Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P22-01	REF	VALVE_RETURN_1	VLVRET1-BR	Valve ground return
P22-02	OM	SPARE OM		ON/OFF valve drive
P22-03	OM	PLAT ROT CCW	V18PRR-GR/BK	ON/OFF valve drive (platform rotate CCW - right)
P22-04	OM	PLAT ROT CW	V17PRL-GR	ON/OFF valve drive (platform rotate CW - left)
P22-05	PM	JIB UP	V43JU-GR	Proportional PWM valve drive (jib up)
P22-06	PM	JIB DOWN	V44JD-GR/BK	Proportional PWM valve drive (jib down)
P22-07	PM	PLAT LEVEL UP	V14PLU-OR	Proportional PWM valve drive (platform level up)
P22-08	PM	PLAT LEVEL DOWN	V15PLD-OR/BK	Proportional PWM valve drive (platform level down)
P22-09	OM	SPARE OM		ON/OFF valve drive
P22-10	REF	PROX KILL GND		
P22-11	DI	PROX Kill IN	C90PXS-RD/BK	Jib Stowed signal (from LSJ4SO)
P22-12	REF	LOAD SNSR GND	GR/YL	Ground return for load sense switch
P22-13	DI	LOAD SNSR IN	OR	Digital signal input for load sense switch (CE)
P22-14	PWR	LOAD SNSR PWR	BK	12V Power for load sense switch
P22-15	PWR	SAFE PL TILT OUT	C88PJTS-RD/BK	Power for platform level up/down, jib up/down, and jib bellcrank up/down in PCON mode (platform and Jib bellcrank tilt sensor - safety)
P22-16	PWR	LIMIT SWITCH PWR	C64LS-OR/BK	Power for footswitch, prox sensor, and limit switches
P22-17	CONT	FOOT SW RTN	C56FTS-RD	Power from footswitch (P_7 circuit)
P22-18	DI	JIB ROTATED CCW	C215JRO-WH/RD	Jib rotated CCW operational signal (from LSJ3RO)
P22-19	REF	PL TILT SNSR GND	P85RET-BR	Ground for platform tilt sensor (operational)
P22-20	AI	PL TILT SNSR	C84TAY-GR/BK	Analog signal input for platform tilt sensor (operational)
P22-21	SNSR	PL TILT SNSR PWR	P85PTS-RD	5V Supply voltage for platform tilt sensor (operational)
P22-22	REF	SAFE PL TILT GND	P89RET-BR	Ground for platform tilt sensor (safety)
P22-23	PWR	SAFE PL TILT PWR	P87PTS-RD	12V Supply voltage for platform tilt sensor (safety)
P22-24	PM	JIB ROTATE CW	V192JRL-WH	Proportional PWM valve drive (jib rotate CW - left)
P22-25	OM	SPARE OM		ON/OFF valve drive
P22-26	OM	SPARE OM		ON/OFF valve drive
P22-27	PM	JIB ROTATE CCW	V193JRR-WH/BK	Proportional PWM valve drive (jib rotate CCW - right)
P22-28	PM	JIB BELLCRANK LEVEL UP	V146JBU-BL	Proportional PWM valve drive (jib bellcrank up)
P22-29	PM	JIB BELLCRANK LEVEL DOWN	V147JBD-BL/BK	Proportional PWM valve drive (jib bellcrank down)
P22-30	SNSR	JIB SNSR PWR	P109JBS-GR/WH	5V Supply voltage for jib bellcrank level sensor
P22-31	REF	JIB SNSR GND	P110JBS-BK	Ground for jib bellcrank level sensor
P22-32	AI	JIB SNSR IN	C148JBS-BL/WH	Analog signal input for jib bellcrank level sensor
P22-33	DI	JIB ROTATED CCW	C214JRS-RD/WH	Jib rotated CCW signal (from LSJ2RS)
P22-34	REF	VALVE_RETURN_2	VLVRET2-BR	Valve ground return
P22-35		NOT USED		No Connection

Connector Pin Legend

Circuit Board Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
J29-1	REF	JOYSTICK_GND_2	JSGND2-BR	Joystick signal ground (JC8)
J29-2	REF	JOYSTICK_GND_3	JSGND3-BR	Joystick signal ground (JC2)
J29-3	SNSR	JOYSTICK_PWR_2	P162JPW2-OR	Joystick power (JC8)
J29-4	SNSR	JOYSTICK_PWR_3	P162JPW3-OR	Joystick power (JC2)
J29-5		NOT USED		
J29-6	AI	STEER - ROCKER	C158STC-BL/RD	Rocker steer signal from propel joystick (JC3)
J29-7	AI	STEER - DUAL AXIS	C159STC-BL/WH	Dual axis steer signal from propel joystick (JC3)
J29-8	AI	PROPEL	C160JPL-WH/RD	Propel signal from propel joystick (JC3)
J29-9	AI	SPARE AI		
J29-10	AI	PRIMARY EXT/RET	C163PES-BL/WH	Boom extend/retract signal from boom joystick (JC2)
J29-11	AI	PRIMARY UP/DOWN	C164PLS-RD/WH	Boom up/down signal from boom joystick (JC7)
J29-12	AI	TT ROTATE	C165TRS-WH/RD	Turntable rotate CW/CCW signal from boom joystick (JC7)
J29-13	SNSR	JOYSTICK_PWR_4	P162JPW4-OR	Joystick power (JC7)
J29-14	SNSR	JOYSTICK_PWR_1	P162JPW1-OR	Joystick power (JC3)
J29-15	REF	JOYSTICK_GND_4	JSGND4-BR	Joystick signal ground (JC7)
J29-16	REF	JOYSTICK_GND_1	JSGND1-BR	Joystick signal ground (JC3)

Connector Pin Legend

Circuit Board Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
J169-1	AI	JIB ROTATE	C213JRS-RD/BK	Jib rotate CW/CCW signal from jib joystick (JC8)
J169-2	REF	GND	GND4-BR	Joystick case ground (JC7)
J169-3	AI	JIB UP/DOWN	C156JUD-GR/WH	Jib up/down signal from jib joystick (JC8)
J169-4	AI	SPARE AI		
J169-5	REF	GND	GND3-BR	Joystick case ground (JC2)
J169-6	REF	GND	GND6-BR	Return from platform level toggle switch (TS9)
J169-7	DI	PLAT LVL UP	PLAT LVL UP-OR	Platform level up signal (TS9)
J169-8	DI	PLAT LVL DOWN	PLAT LVL DN-OR/BK	Platform level down signal (TS9)
J169-9	REF	GND	GND2-BR	Joystick case ground (JC8)
J169-10	PWR	OUT PWR ENBL	ESTOP RET-BK	Return from PCON E-Stop (P2) - output power enable circuit
J169-11		!BOOT		
J169-12	REF	GND	GND12-BR	PCON alarm ground
J169-13	REF	GND	GND1-BR	Joystick case ground (JC3)
J169-14	DI	SPARE DI		
J169-15	DI	SPARE DI		
J169-16	REF	GND		
J169-17	DI	PLAT ROT CCW	PLAT ROT CCW-GR/BK	Platform Rotate CCW signal (TS7)
J169-18	DI	PLAT ROT CW	PLAT ROT CW-GR	Platform Rotate CW signal (TS7)
J169-19	CONT	ALARM	ALARM(+)-RD/BK	PCON alarm signal
J169-20	PWR	PWR-PCON ESTOP	ESTOP PWR-RD/BK	Power to PCON E-Stop (P2)

Connector Pin Legend

Circuit Board Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
J1-1	DI	PWR-HORN	HORN PWR-RD	Power for Service Horn button
J1-2	REF	RET-HORN	HORN RET-GR	Return for Service Horn button
J1-3	DI	GENERATOR ON/OFF	GEN ON/OFF-GR/WH	Generator toggle switch input
J1-4	DI	AUXILIARY PUMP	AUX PUMP-RD	Auxiliary Pump toggle switch input
J1-5	DI	START ASSIST	START ASST-BK/WH	Start Assist (Glow Plug) toggle switch input
J1-6	DI	ENGINE START	ENG START-BK	Engine Start toggle switch input
J1-7	DI	DRIVE ENABLE	DRV ENBL-BL/WH	Drive Enable toggle switch input
J1-8		NOT USED		
J1-9	DI	AXLE RETRACT	AXLE RET-GR	Axle Retract toggle switch input
J1-10	REF	GND1	GND1-BR	Ground for toggle switch inputs
J1-11	DI	ENGINE SPEED SELECT	ENG SPEED-BK/RD	Engine Speed toggle switch input
J1-12	DI	AXLE EXTEND	AXLE EXT-GR/WH	Axle Extend toggle switch input
J1-13	DI	DRIVE SPEED SELECT	DRV SPEED-RD/WH	Drive Speed toggle switch input
J1-14	DI	STEER MODE SELECT LEFT	STR MODE L-OR	Steer Mode Select - Left toggle switch input
J1-15		NOT USED		
J1-16		NOT USED		
J1-17	DI	STEER MODE SELECT RIGHT	STR MODE R-OR/BK	Steer Mode Select - Right toggle switch input
J1-18	DI	SPARE		Spare (option) toggle switch input
J1-19		NOT USED		
J1-20	REF	GND2	GND2-BR	Ground for toggle switch inputs

Connector Pin Legend

J31 Black 23 Pin Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P31-01	REF	DCON ECU GND	GNDDCON-BR	DCON ground
P31-02	PWR	DCON ECU PWR	P21DCON-WH	Power for DCON
P31-03	PWR	P_6R1	P53LS-WH/BK	Power for motor speed and brake valves
P31-04		NOT USED		
P31-05	PWR	P_7R	S56PRV-RD	Power for axle extend and steer valves
P31-06	PWR	P_12	C61AXRT-GR	Power for axle retract valve
P31-07		NOT USED		
P31-08	REF	AXLE NOT RET GND		Not used
P31-09	DI	AXLE NOT RET RTN		Not used (active low)
P31-10	COM	CAN SHIELD		Not used
P31-11	COM	RS232 RXD		Not used
P31-12	COM	RS232 TXD		Not used
P31-13		!BOOT		!BOOT
P31-14		NOT USED		
P31-15	DI	AXLE NOT EXT RTN		Not used (active high)
P31-16		NOT USED		
P31-17	COM	CAN LOW	D81CAN(-)-GR	CAN bus connection
P31-18	COM	CAN HIGH	D82CAN(+)-YL	CAN bus connection
P31-19	COM	RS232GND		Not used
P31-20	AI	FRONT AXLE POSITION SENSOR	C60FAP-GR/WH	Analog signal input for front axle position sensor (RSFA1O)
P31-21	AI	REAR AXLE POSITION SENSOR	C60RAP-GR/WH	Analog signal input for rear axle position sensor (RSRA1O)
P31-22	AI	SPARE		Not used (0-5V Analog Input - Biased to 2.5V)
P31-23	PWR	AXLE NOT EXT PWR	P61LSA-GR	Power to axle safety switches (LSFA1ES and LSRA1ES)

Connector Pin Legend

J32 White 23 Pin Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P32-01	REF	VALVE_RETURN_1	VLVRET1-BR	Valve ground return
P32-02	OM	AXLE RETRACT	V61AXRT-GR	ON/OFF valve drive (axle retract)
P32-03	OM	AXLE EXTEND	V60AXEX-GR/WH	ON/OFF valve drive (axle extend)
P32-04	OM	MOTOR SPEED	V29MS-RD/WH	ON/OFF valve drive (motor speed)
P32-05	OM	SPARE		Not used
P32-06	OH	SPARE		Not used (paired with P32-07)
P32-07	OH	SPARE		Not used (paired with P32-06)
P32-08	OM	RR STEER RIGHT	V36RRS-BL	ON/OFF valve drive (right rear steer right)
P32-09	OM	RR STEER LEFT	V37RRS-BL/BK	ON/OFF valve drive (right rear steer left)
P32-10	AI	RR STEER SNSR	C111RRS-OR	Analog signal input for right rear steer sensor
P32-11	AI	LR STEER SNSR	C111LRS-OR	Analog signal input for left rear steer sensor
P32-12	AI	RF STEER SNSR	C111RFS-OR	Analog signal input for right front steer sensor
P32-13	AI	LF STEER SNSR	C111LFS-OR	Analog signal input for left front steer sensor
P32-14	REF	VALVE_RETURN_2	VLVRET2-BR	Valve ground return
P32-15	OM	BRAKE	V32BRK-WH/RD	ON/OFF valve drive (brake)
P32-16	OM	LR STEER RIGHT	V36LRS-BL	ON/OFF valve drive (left rear steer right)
P32-17	OM	LR STEER LEFT	V37LRS-BL/BK	ON/OFF valve drive (left rear steer left)
P32-18	OM	RF STEER RIGHT	V36RFS-BL	ON/OFF valve drive (right front steer right)
P32-19	REF	STEER SNSR GND	P110RT-BK	Ground to steer sensors
P32-20	SNSR	STEER SNSR PWR (5.0 VDC)	P109ANG-GR/WH	Power to steer sensors (5.0VDC)
P32-21	OM	RF STEER LEFT	V37RFS-BL/BK	ON/OFF valve drive (right front steer left)
P32-22	OM	LF STEER RIGHT	V36LFS-BL	ON/OFF valve drive (left front steer right)
P32-23	OM	LF STEER LEFT	V37LFS-BL/BK	ON/OFF valve drive (left front steer left)

Connector Pin Legend

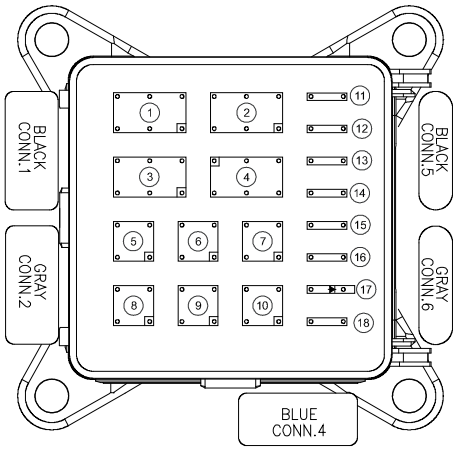
J121 Gray 12 Pin Connector

Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P121-01	DI	LOAD SENSE	S132LDS-BL/WH	Digital input from load sense switch
P121-02	DI	LSB3RS+LSB2RS (FULLY RETRACTED)	S42BRT-OR/RD	Digital input from LSB3RS+LSB2RS limit switches
P121-03	COM	RS232 TXD		RS232 serial - connected through tee harness
P121-04	DI	CALIBRATION IN	C145CAL-RD/WH	Digital input from calibration switch in TCON
P121-05	COM	RS232 RXD		RS232 serial - connected through tee harness
P121-06	COM	CAN HIGH	D82CAN(+)-YL	CAN bus connection
P121-07	COM	CAN LOW	D81CAN(-)-GR	CAN bus connection
P121-08	OM	P_12	C61AXRT-GR	Safety circuit for axle retract (power)
P121-09	PWR	P_7R	S56PRV-RD	Safety circuit power (from TCON)
P121-10	OM	P_38	S137PLL-RD/WH	Safety circuit for propel (power)
P121-11	OM	P_39	S139TRF-WH/RD	Safety circuit for turntable rotate (power)
P121-12	REF	GND	SCONGND-BR	Ground for SCON ECU

J122 Black 12 Pin Connector

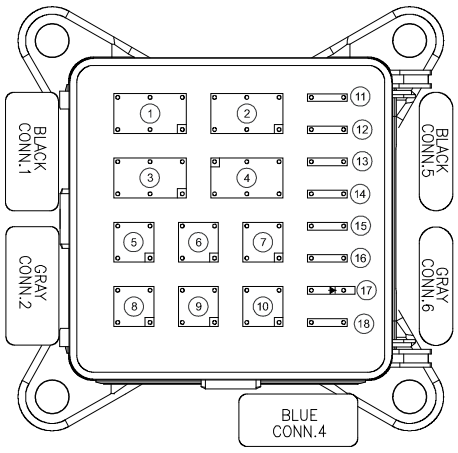
Pin NO.	Type*	Signal Name	Circuit NO.	Signal Description
P122-01	PWR	ECU PWR	P21DCON-WH	Power for SCON/DCON ECU
P122-02	AI	LTB1LS (BOOM LENGTH)	C166PRS-OR	Analog signal input for boom length (safety)
P122-03	AI	RSB1AS (BOOM ANGLE)	C141PBS-RD	Analog signal input for boom angle (safety)
P122-04	DI	AXLES EXTENDED	C60AXEX-GR/WH	Digital input from LSFA1ES and LSRA1ES (power from DCON)
P122-05	DI	LSB4ES (150FT EXTENDED)	S76BEX-BL	Digital input from LSB4ES
P122-06	DI	LST1S (DRIVE ENABLE)	S13DE-BL/RD	Digital input from LST1S limit switch
P122-07	PWR	P_6R1	P53LS-WH/BK	Safety circuit power (from TCON)
P122-08	OM	P_11	S140ENL-OR/RD	Safety circuit for boom up (power)
P122-09	PWR	P_6R2	P54ENG-BK/WH	Safety circuit power (from TCON)
P122-10	OM	P_9B	P58LS-RD/BK	Safety circuit for fuel/ignition (power)
P122-11	PWR	P_6R1	P53LS-WH/BK	Safety circuit power (from TCON)
P122-12	OM	P_9A+P_10	P57PBD-RD/WH	Safety circuit for boom down and extend (power)

VEC Module - Deutz TD2011L04i and Perkins 1104D-44T Models



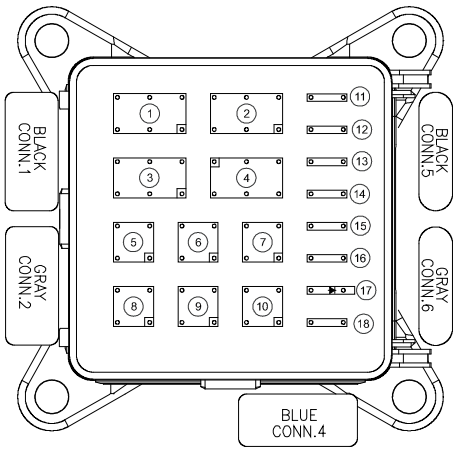
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2	CR15A	Glow Plugs
3	CR28	Fuel Power
4	SPARE	
5	CR5	Horn
6	CR77	Function Enable
7	CR2	Ignition
8	CR41	Flashing Beacons
9	CR49	Work / Drive Lights
10	CR17	Hydraulic Oil Cooler
11	F22A	Fuse 30A, Glow Plugs
12	F22C	Fuse, 2A, GP Signal
13	F22B	Fuse, 30A, Glow Plugs
14	F23	Fuse, 30A, Fuel, Ignition
15	F46	Fuse, 10A, Horn
16	F7	Fuse, 30A, Accessory
17	D1	Alternator Diode
18	F20	Fuse, 20A, Hi/Lo RPM

VEC Module - Deutz TD 2.9 L4 and TCD 2.2 L3 Models



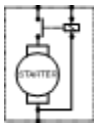
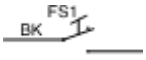
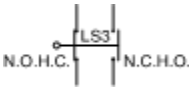
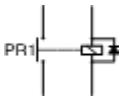
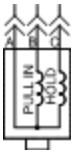
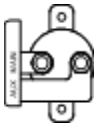
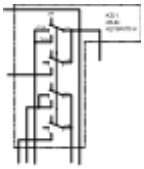
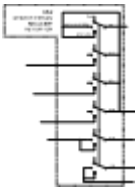
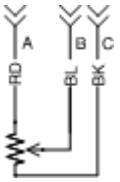
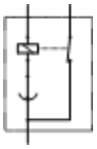
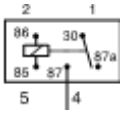
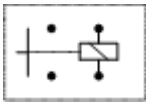
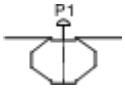
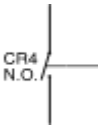
Number	Component	Description
1	CR15B	Glow Plugs
2	CR15A	Glow Plugs
3	CR28	Fuel Power
4	CR39	Deutz Aux. Shutdown
5	CR5	Horn
6	CR77	Function Enable
7	CR2	Ignition
8	CR41	Flashing Beacons
9	CR49	Work / Drive Lights
10	CR17	Hydraulic Oil Cooler
11	F22A	Fuse 30A, Glow Plugs
12	F22C	Fuse, 2A, GP Signal
13	F22B	Fuse, 30A, Glow Plugs
14	F23	Fuse, 30A, Fuel, Ignition
15	F46	Fuse, 10A, Horn
16	F7	Fuse, 30A, Accessory
17	D1	Alternator Diode
18	F20	Fuse, 20A, ECU Power

VEC Module - Perkins 854F Models

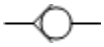
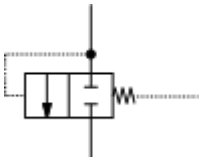
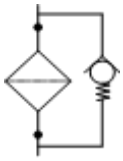
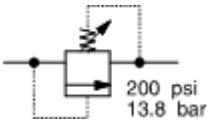
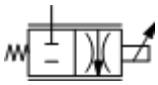
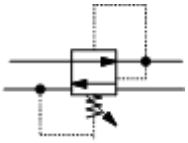
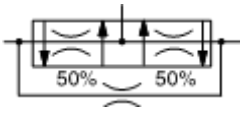
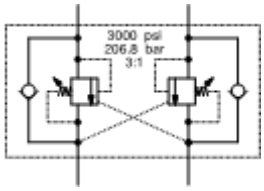
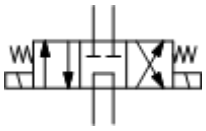
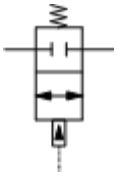
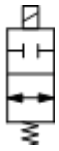


Number	Component	Description
1	CR81B	ECU Power
2	CR81A	ECU Power
3	CR1	Starter
4	SPARE	
5	CR5	Horn
6	CR77	Function Enable
7	CR2	Ignition
8	CR41	Flashing Beacons
9	CR49	Work / Drive Lights
10	CR17	Hydraulic Oil Cooler
11	F27A	Fuse 30A, ECU Power
12	F27C	Fuse, 2A, ECU Signal
13	F27B	Fuse, 30A, ECU Power
14	F23	Fuse, 30A, Start, Ignition
15	F46	Fuse, 10A, Horn
16	F7	Fuse, 30A, Accessory
17	D1	Alternator Diode
18	F27D	Fuse, 20A, Engine KSP

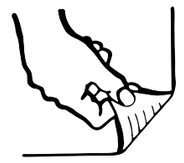
Electrical Symbols Legend

 Battery	 Motor	 Horn or alarm	 Flashing beacon	 Gauge
 Diode	 Hour meter	 LED	 Fuse with amperage	 Foot switch
 Circuit connection	 Limit switch	 Power relay	 Coil with suppression	 Fuel or RPM solenoid
 Connection - no terminal	 Battery separator	 Circuits crossing no connection	 Quick disconnect terminal	 Circuit breaker with amperage
 Main Key switch	 Service Bypass Key switch	 Steer sensor	 Auxiliary pump	 Tilt sensor
 Relay	 Power relay	 Emergency Stop button	 Hydraulic oil cooling fan	 Gauge sending unit
 Oil temperature switch normally open	 Coolant temperature switch - normally open	 Oil pressure switch normally closed	 Control relay contact normally open	 Diode starting aid, glow plug or flame ignitor

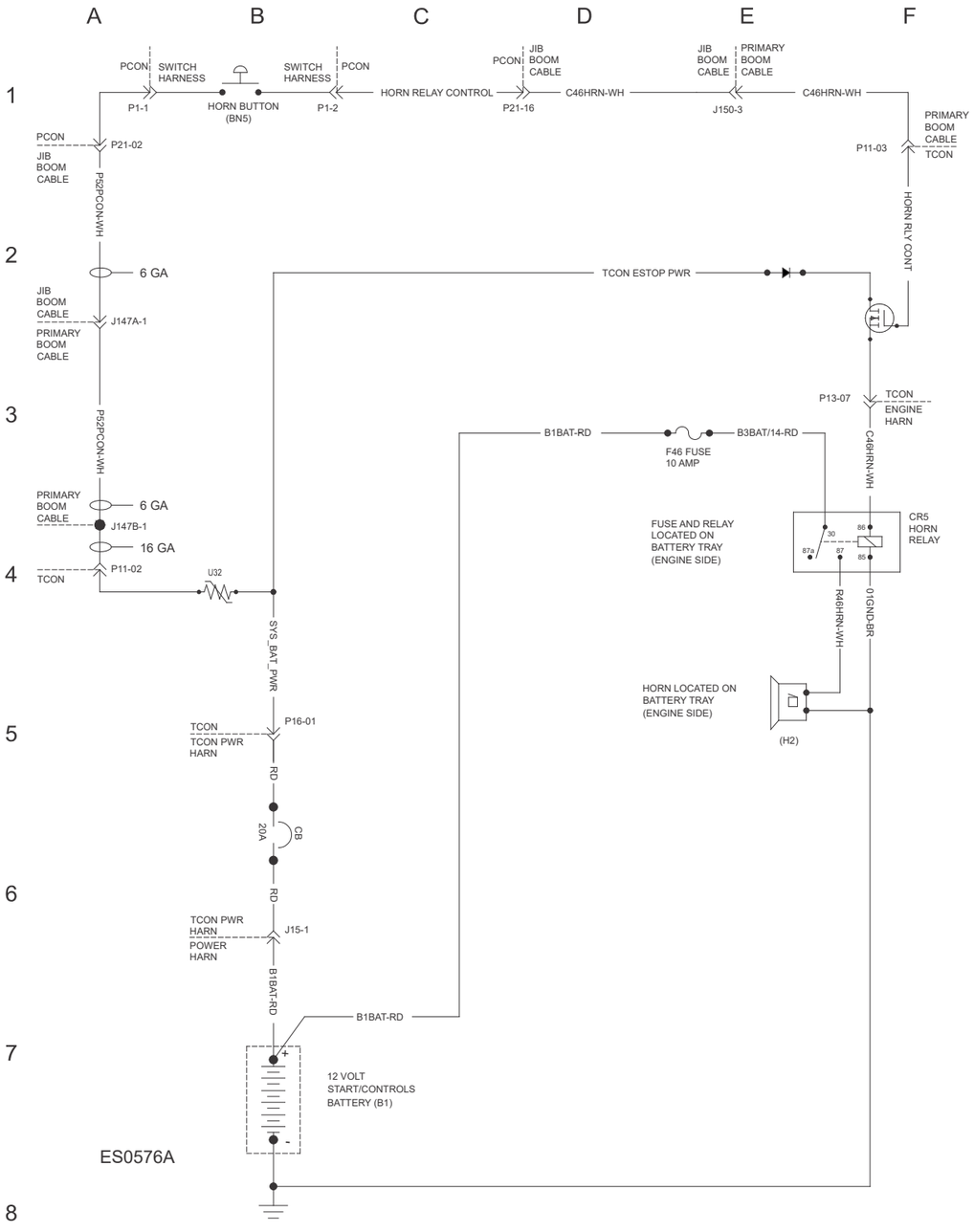
Hydraulic Symbols Legend

 Orifice with size	 Check valve	 Shut off valve	 Brake
 Pump, fixed displacement	 Pump, bi-directional variable displacement	 Motor, bi-directional	 Motor, 2 speed bi-directional
 Cylinder, double acting	 Pump, prime mover (engine or motor)	 Shuttle valve. 2 position, 3 way	 Differential sensing valve
 Filter with bypass relief valve	 Relief valve with pressure setting	 Priority flow regulator	 Solenoid operated proportional valve
 Pressure reducing valve	 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	 Pilot operated 2 position, 2 way directional valve	 2 position, 2 way solenoid valve

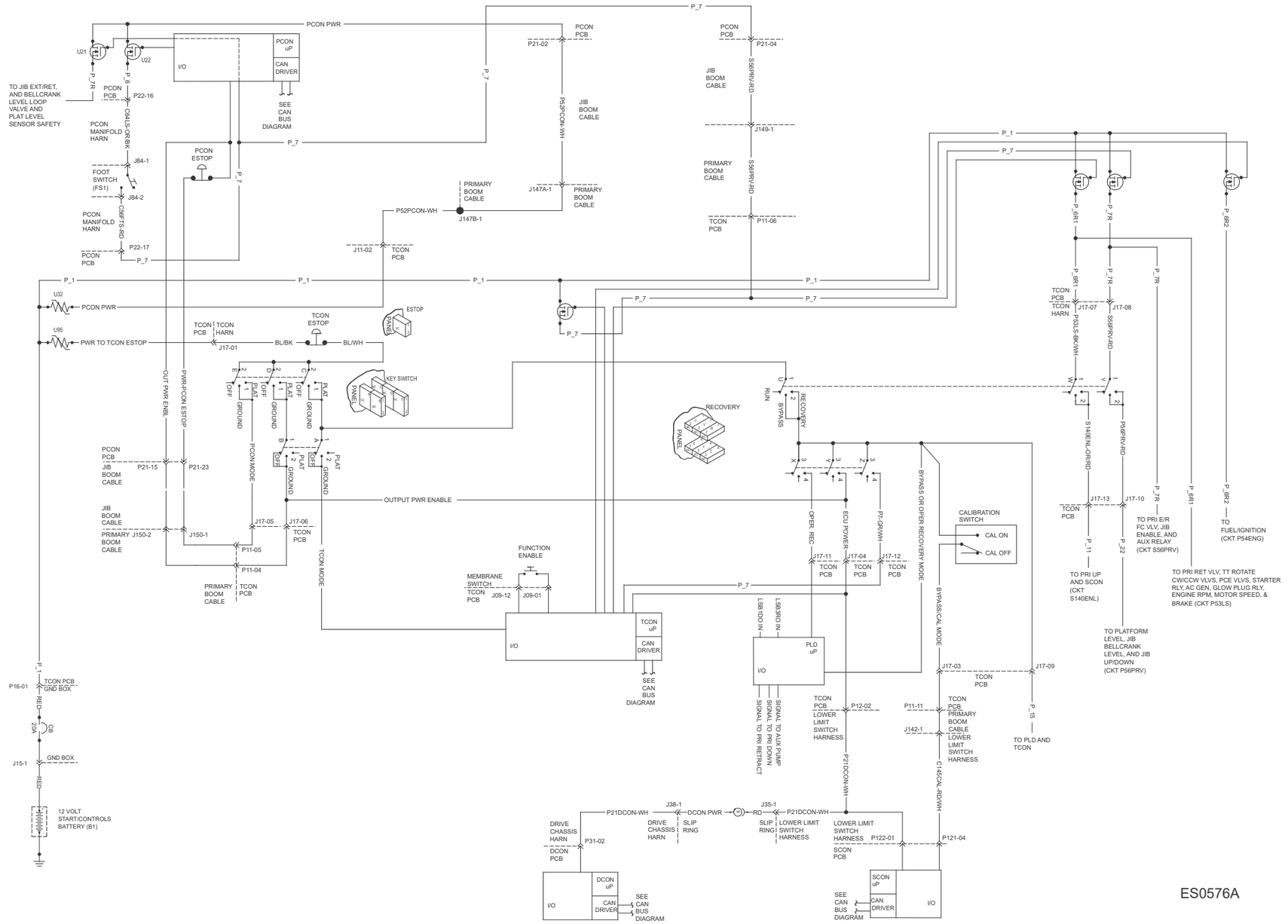
Control Circuit, Horn



Control Circuit, Horn

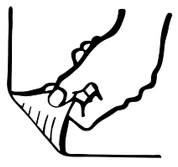


Control Circuit, Power

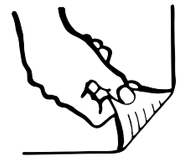


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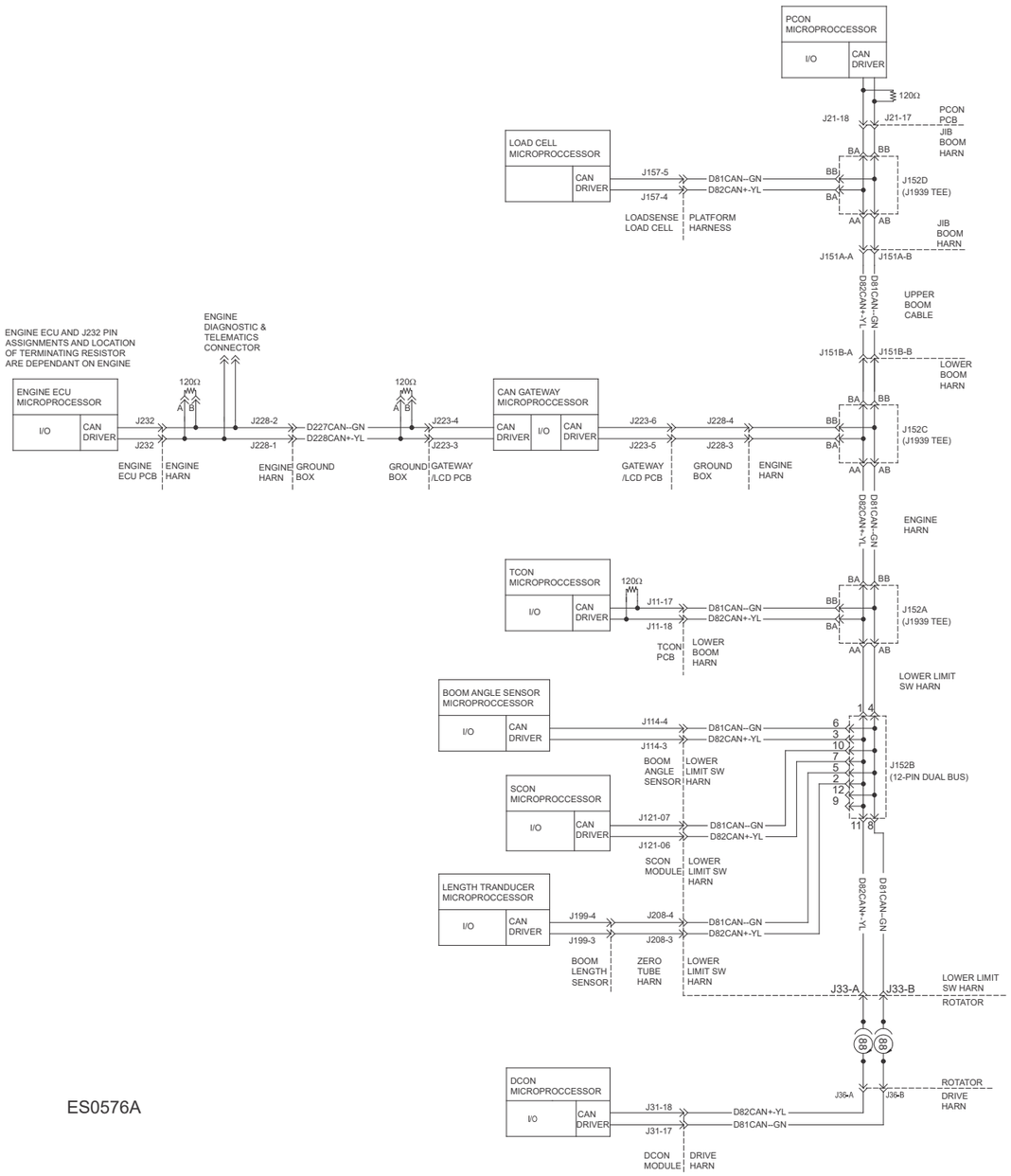
Control Circuit, Power



Control Circuit, CAN BUS

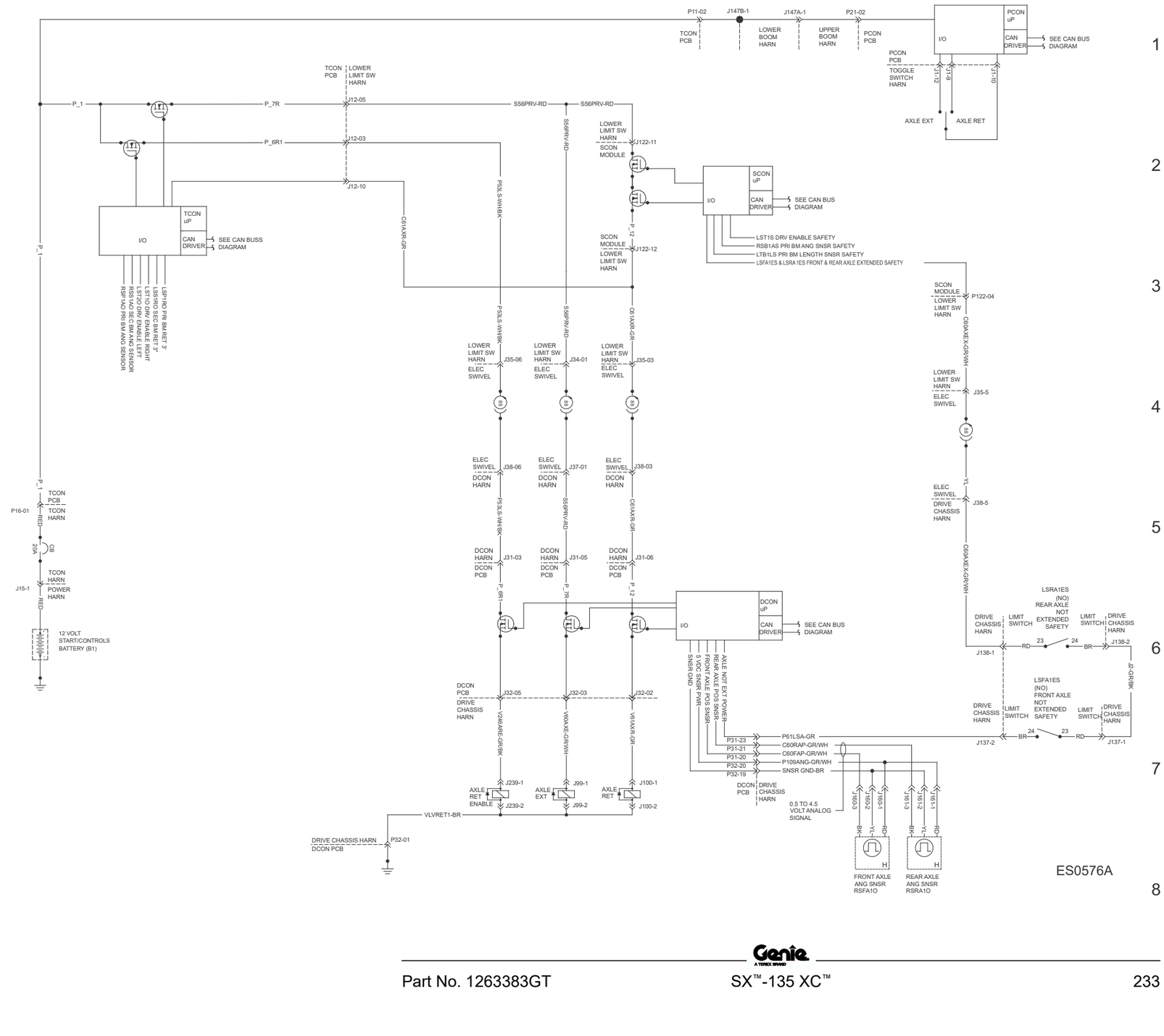


Control Circuit, CAN BUS

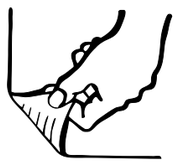


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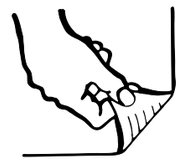
Control Circuit, Axle Extend/Retract



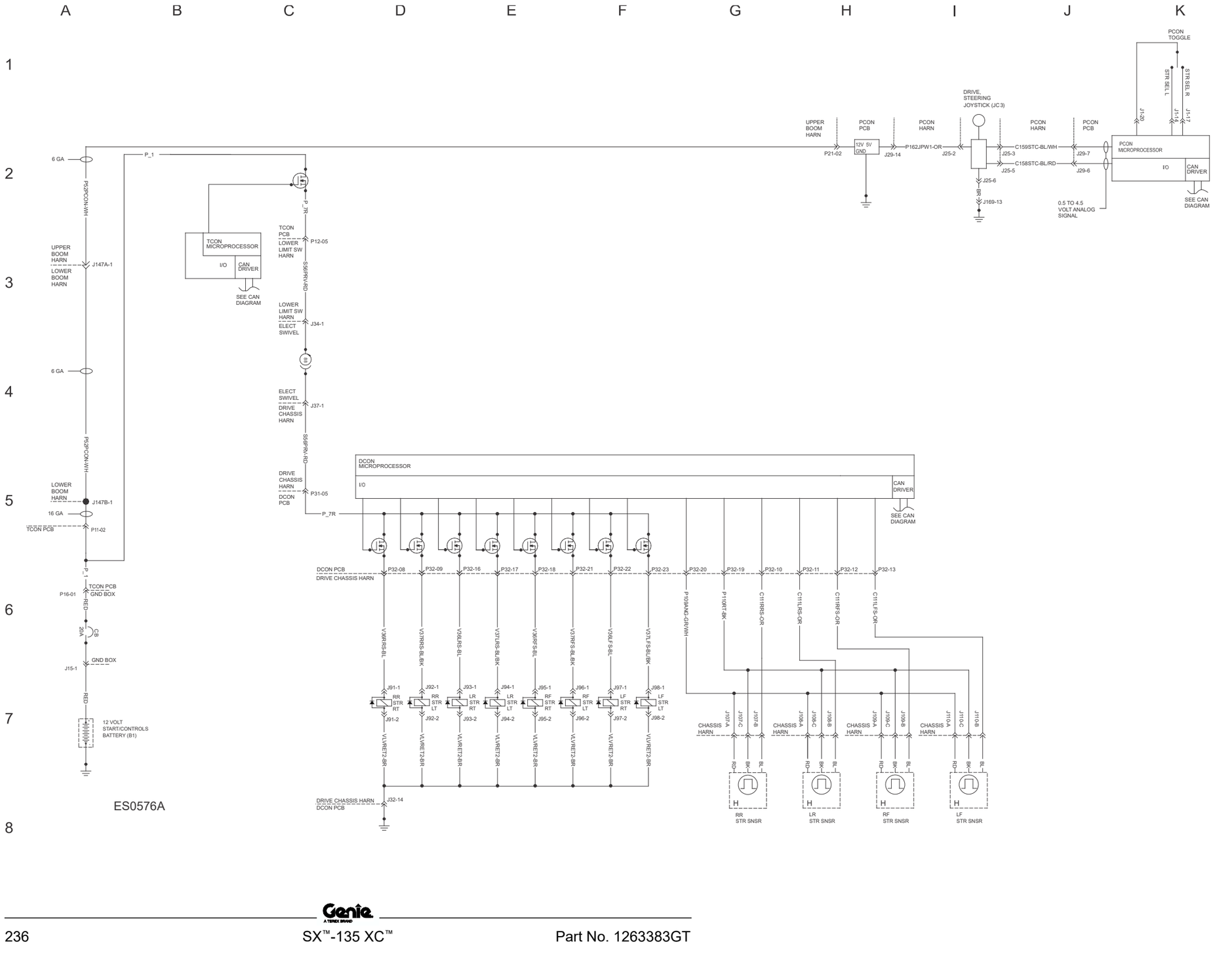
Control Circuit, Axle Extend/Retract



Control Circuit, Steer

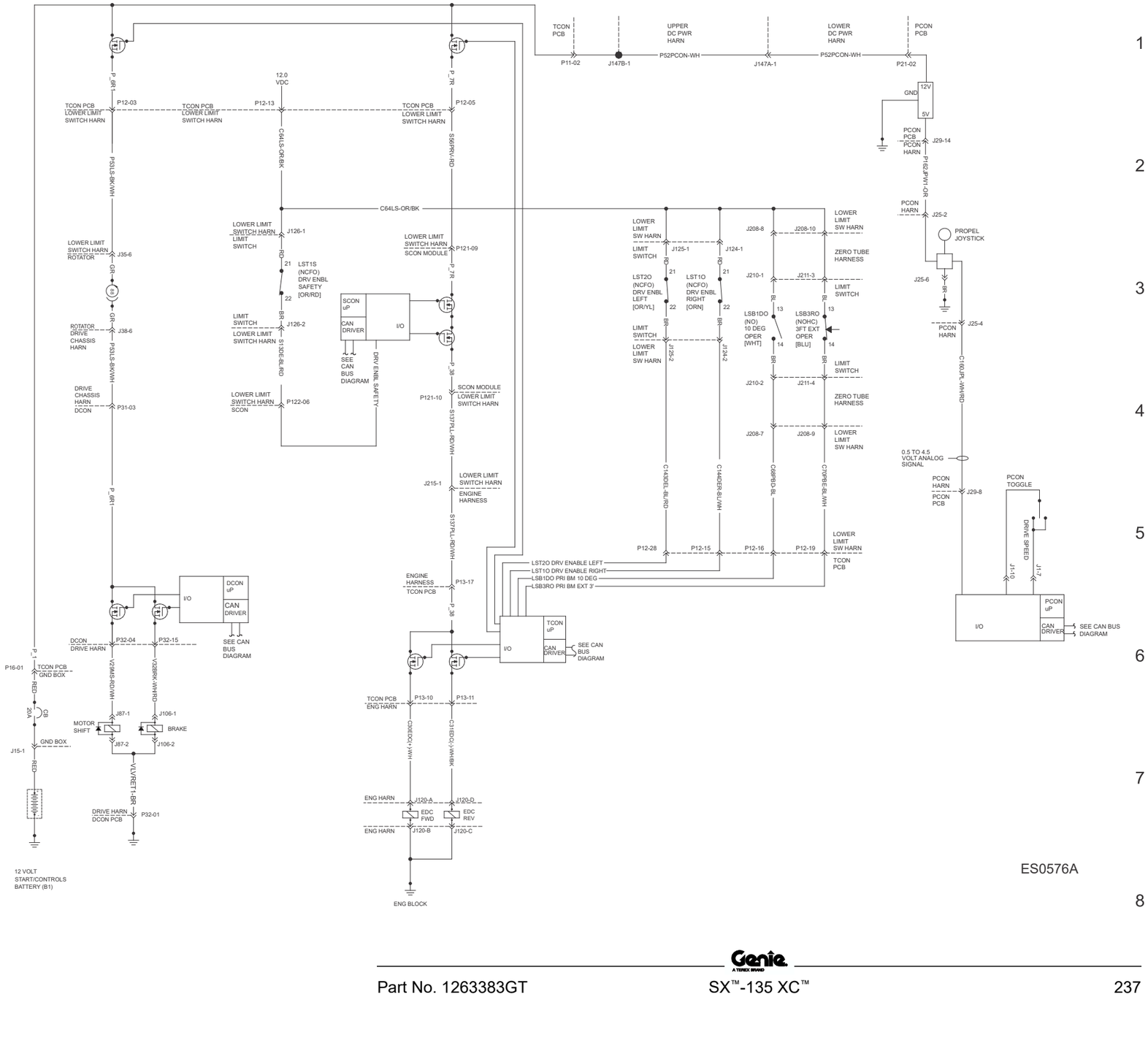


Control Circuit, Steer



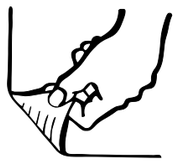
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Control Circuit, Propel

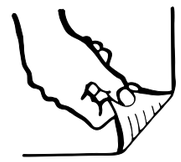


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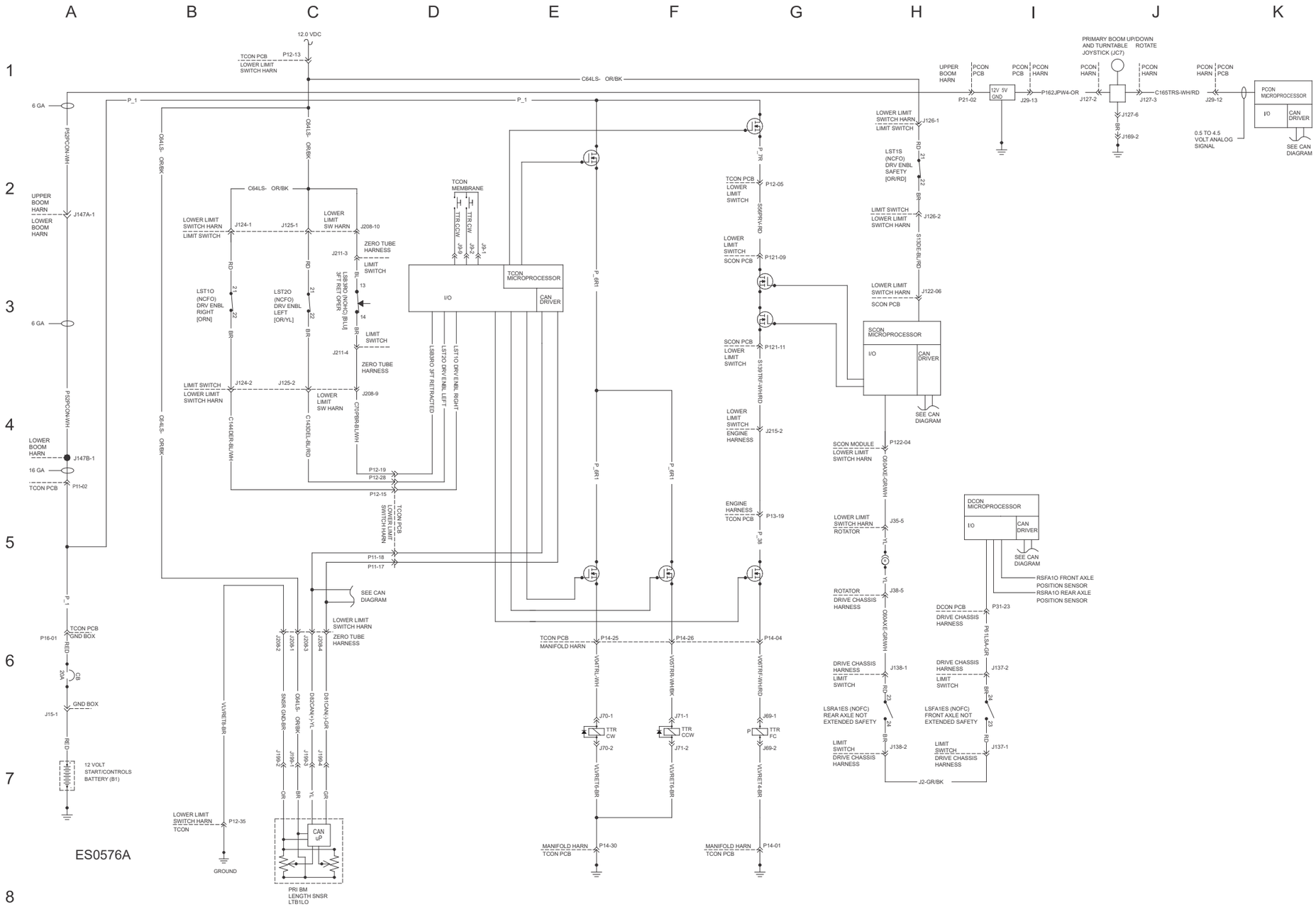
Control Circuit, Propel



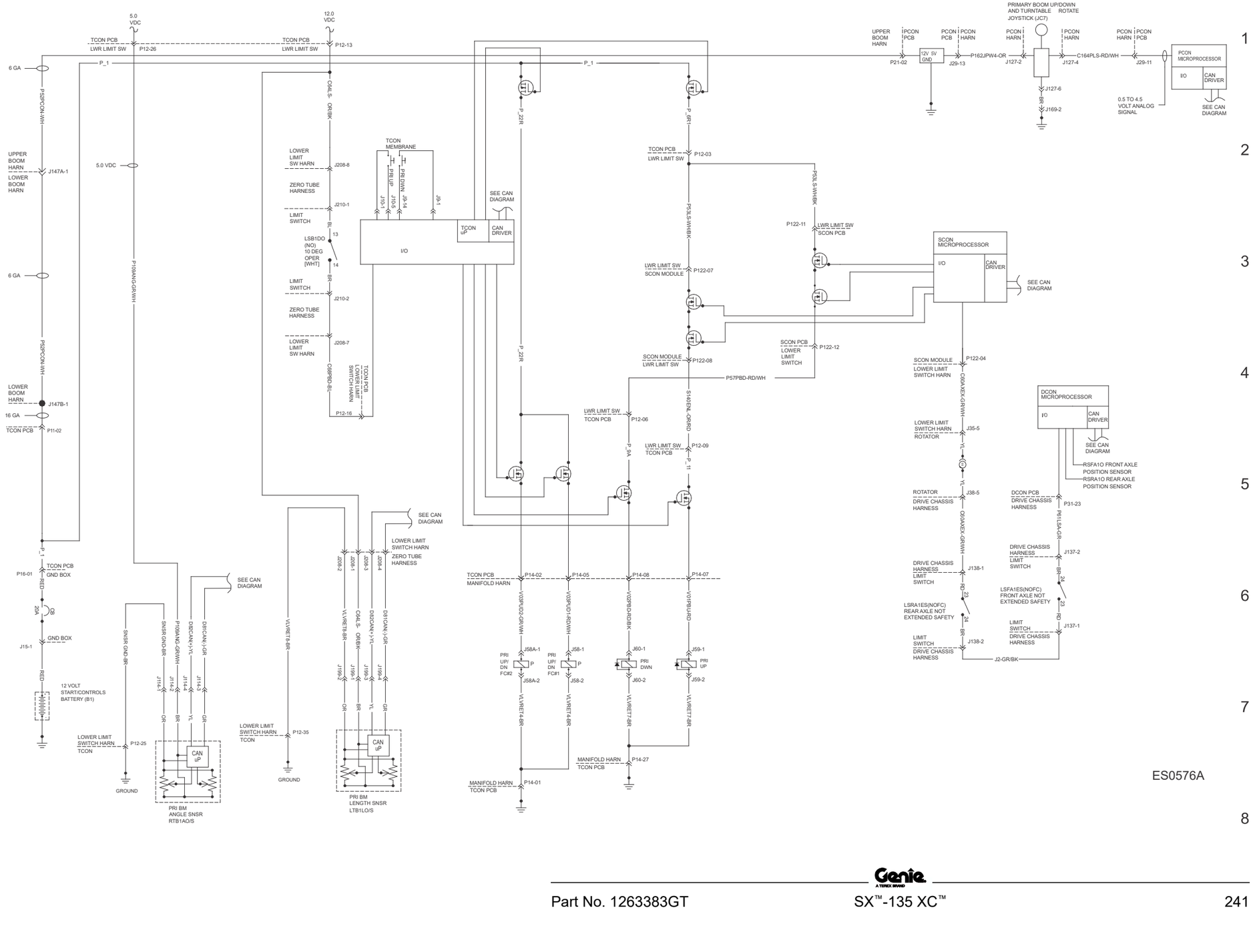
Control Circuit, Turntable Rotate



Control Circuit, Turntable Rotate

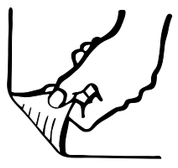


Control Circuit, Boom Up/Down

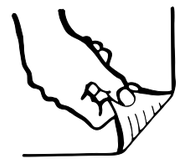


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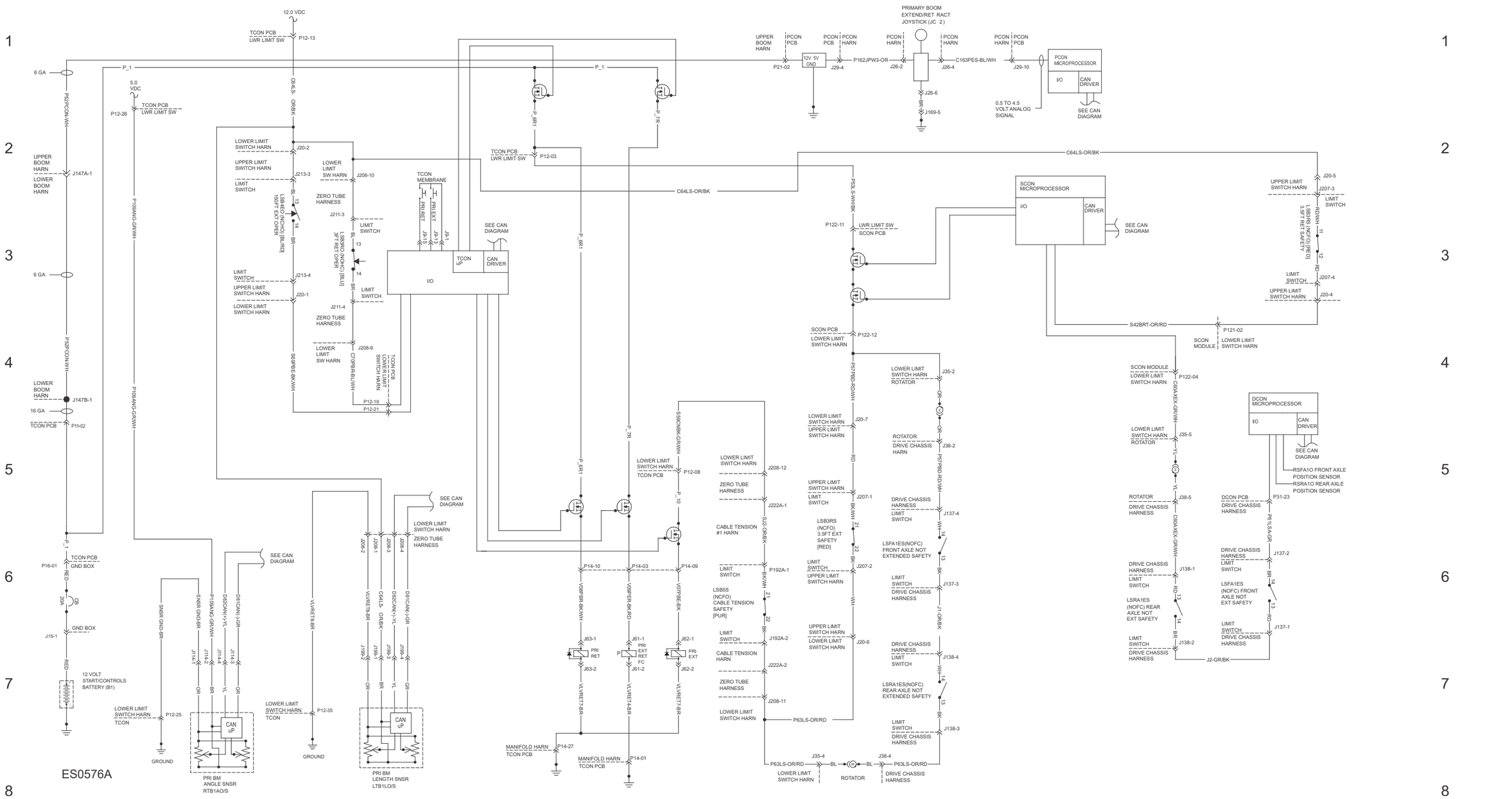
Control Circuit, Boom Up/Down



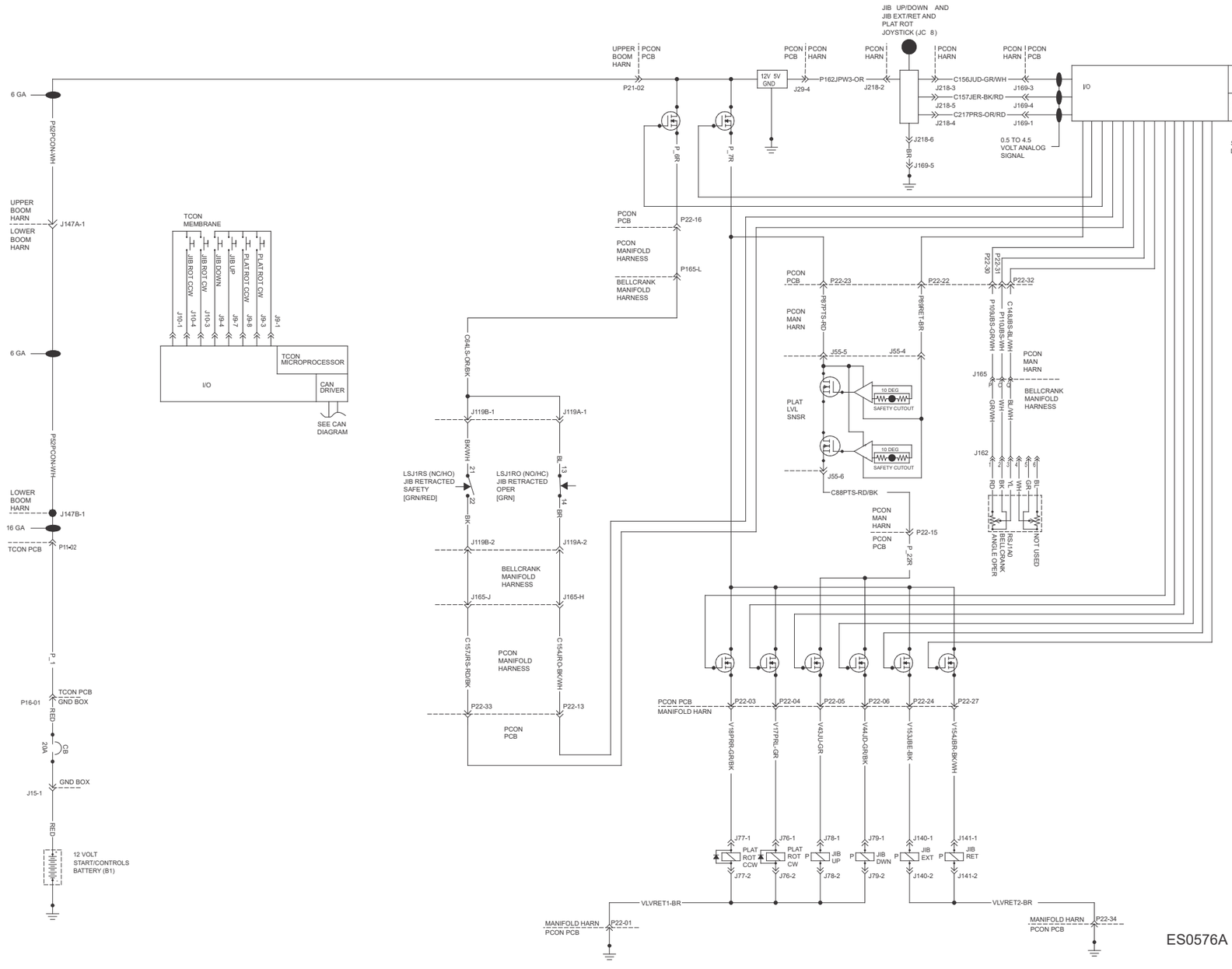
Control Circuit, Boom Extend/Retract



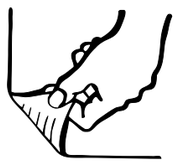
Control Circuit, Boom Extend/Retract



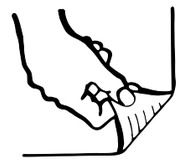
Control Circuit, Jib Up/Down, Jib Extend/Retract, Platform Rotate



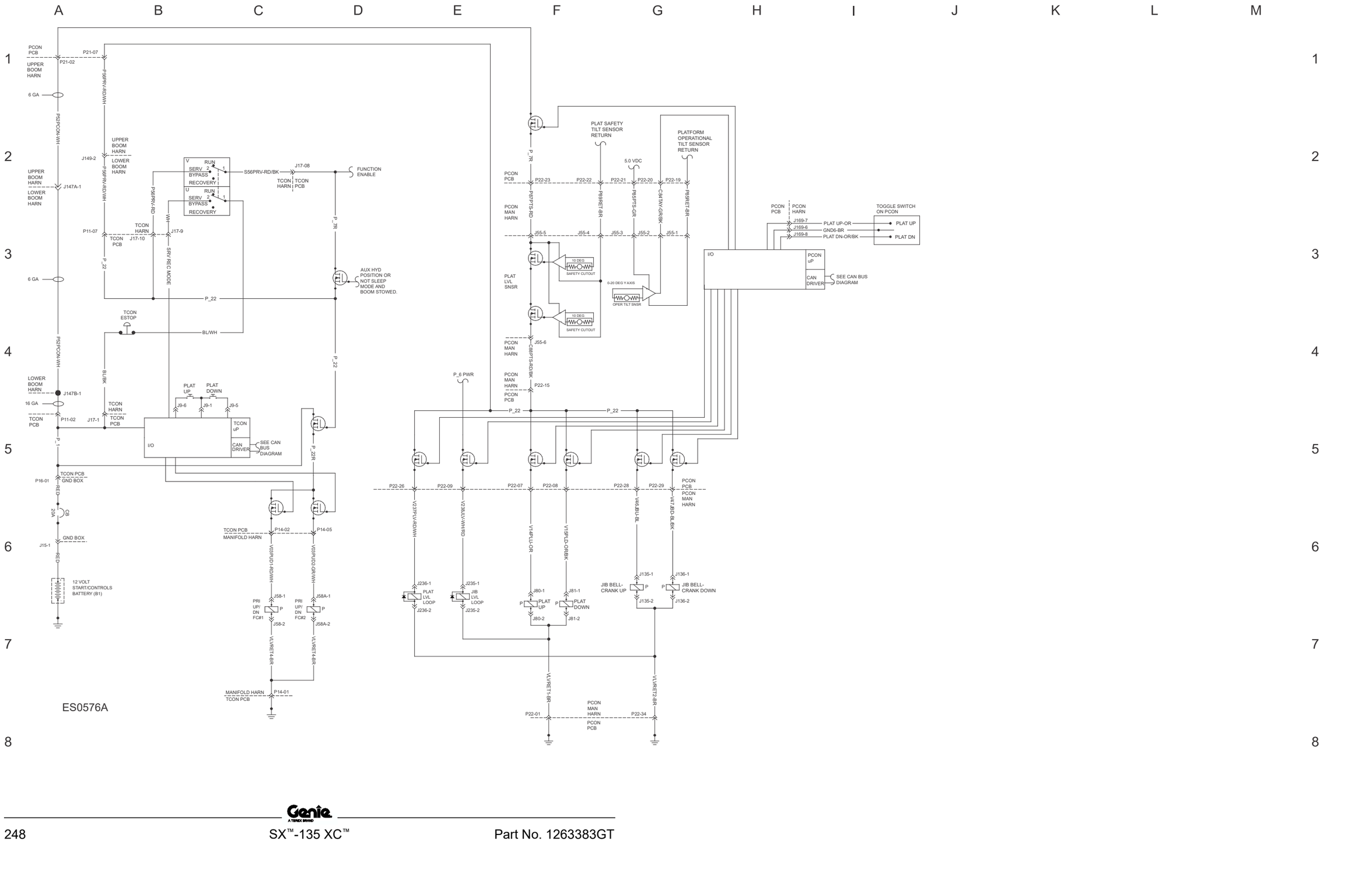
Control Circuit, Jib Up/Down, Jib Extend/Retract, Platform Rotate



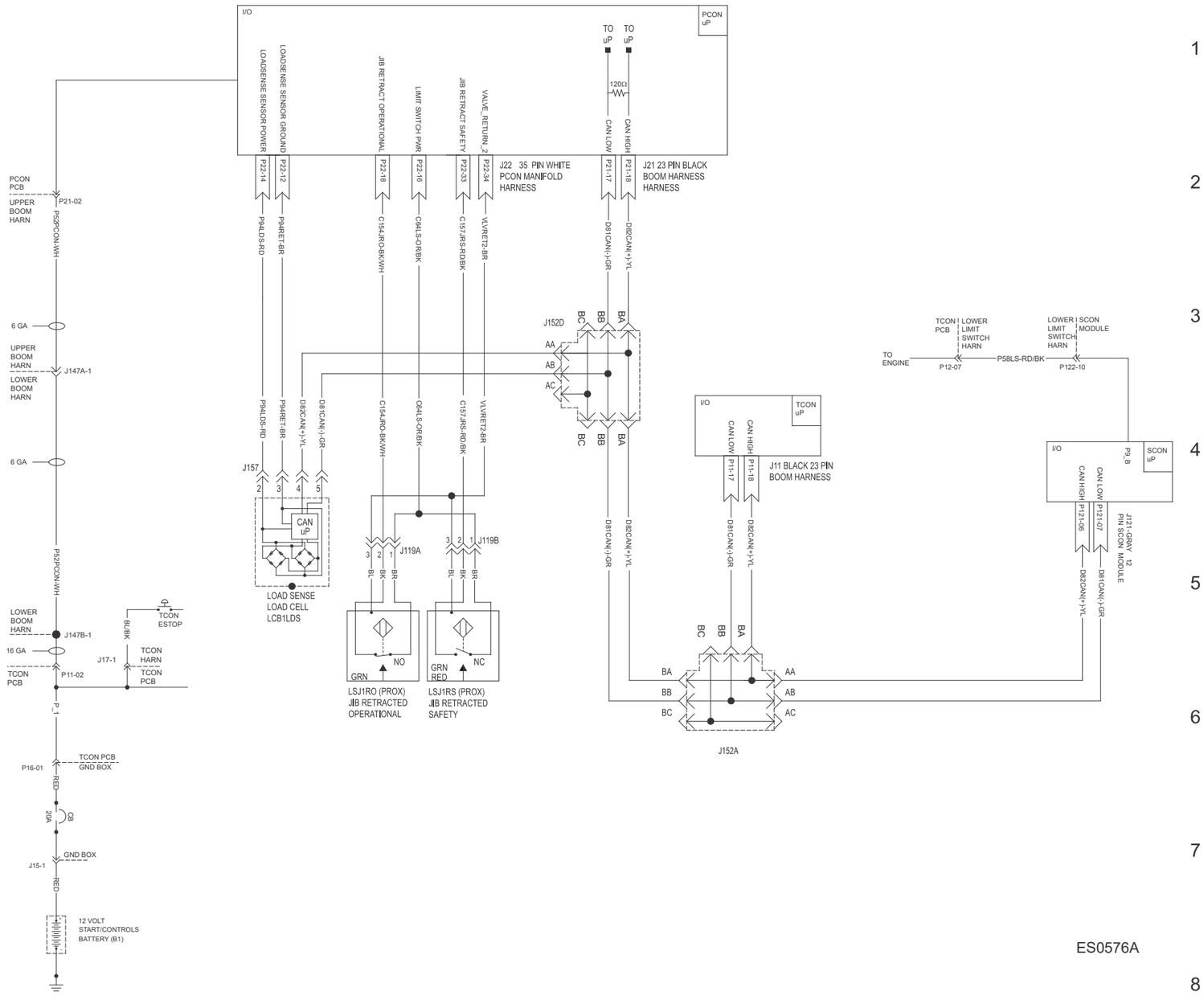
Control Circuit, Platform Level



Control Circuit, Platform Level

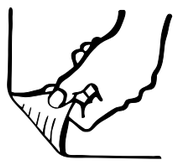


Control Circuit, Load Sense

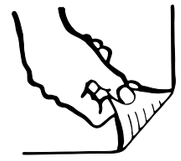


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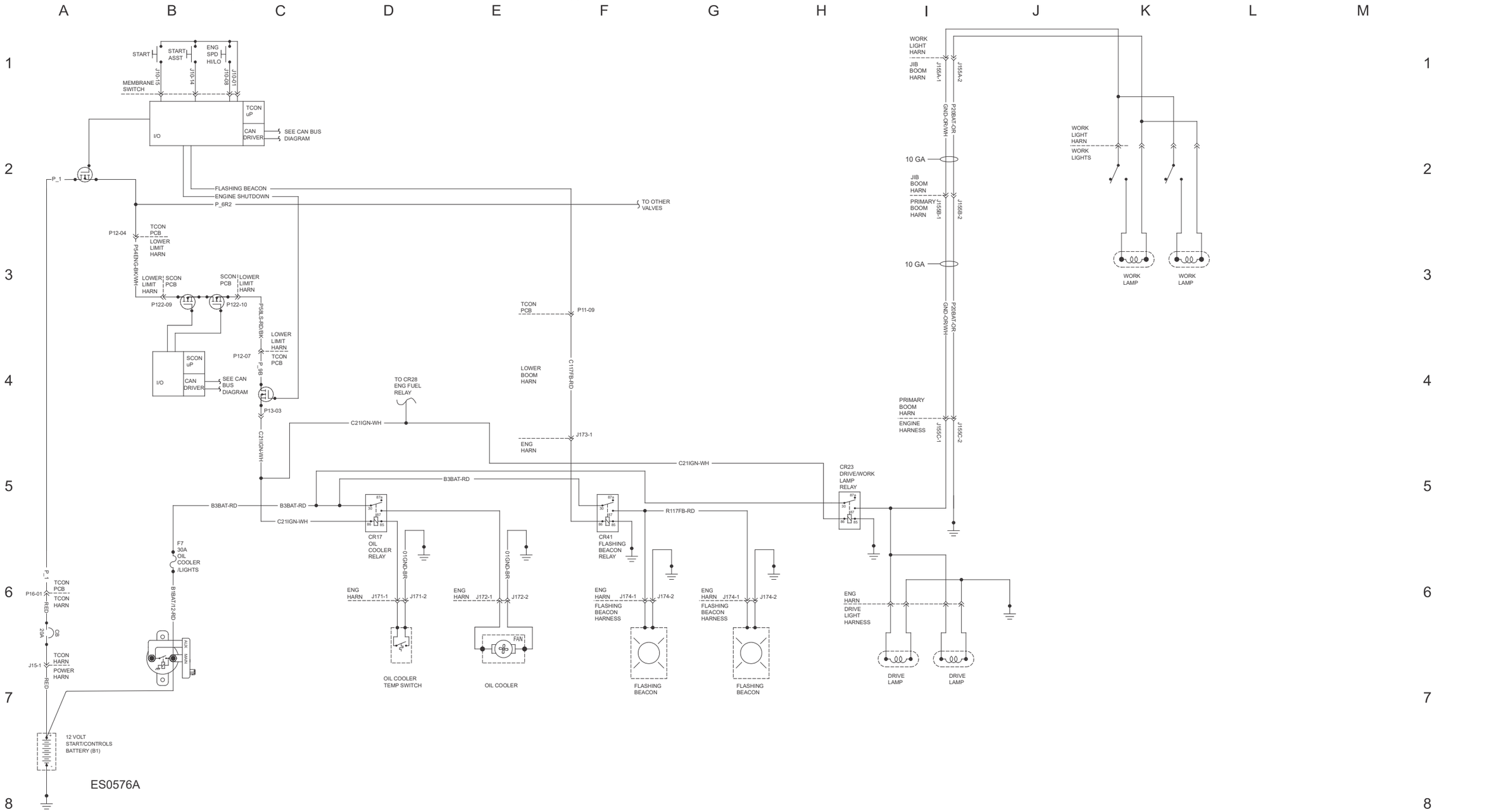
Control Circuit, Load Sense



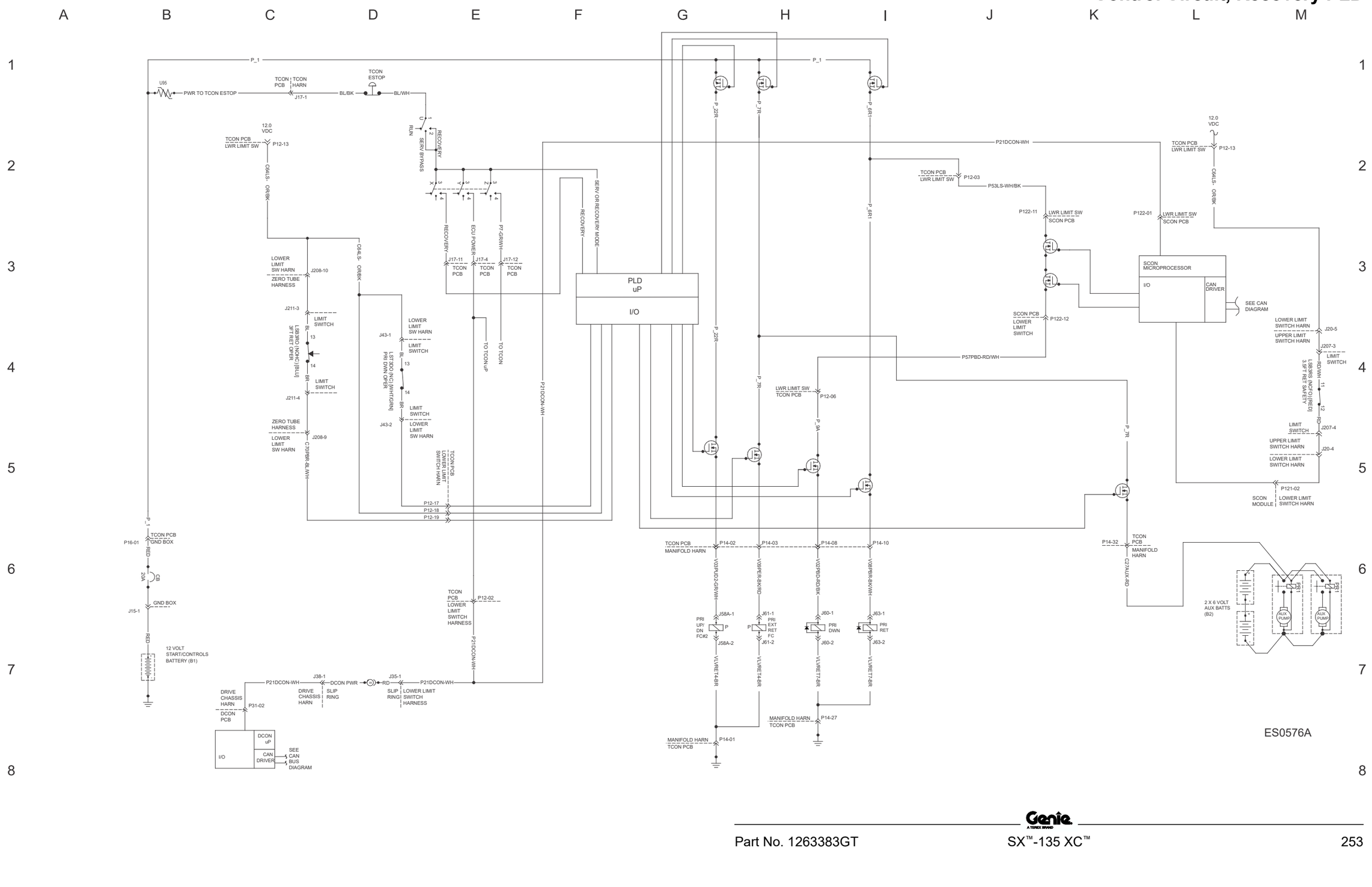
Control Circuit, Flashing Beacons, Oil Cooler, Drive/Work Lights



Control Circuit, Flashing Beacons, Oil Cooler, Drive/Work Lights

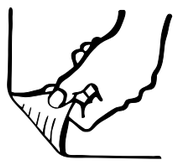


Control Circuit, Recovery PLD

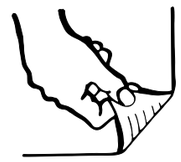


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Control Circuit, Recovery PLD

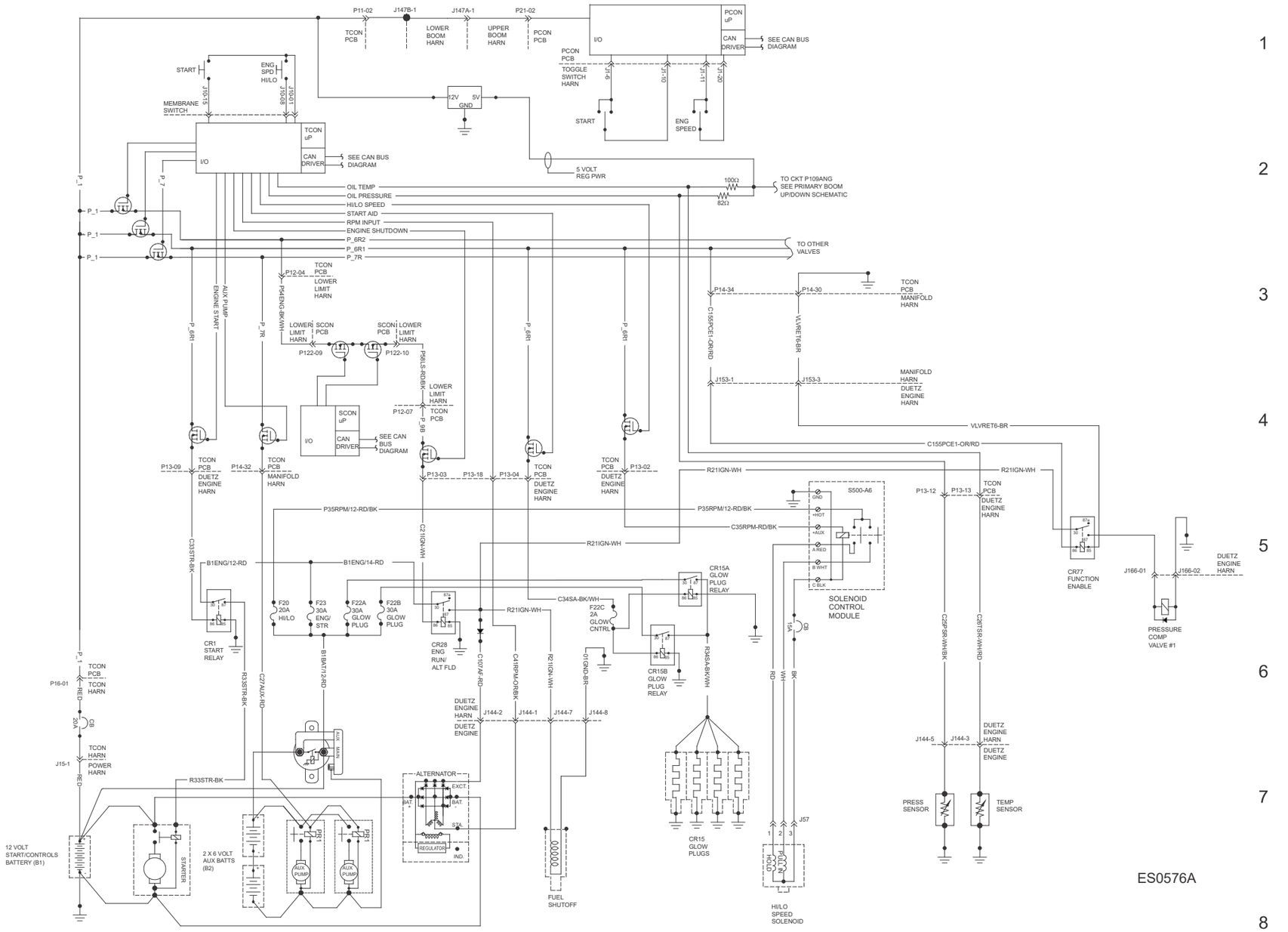


Control Circuit, Telematics

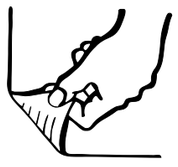


Control Circuit, Telematics

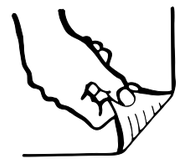
Control Circuit, Deutz TD2011L04i Engine



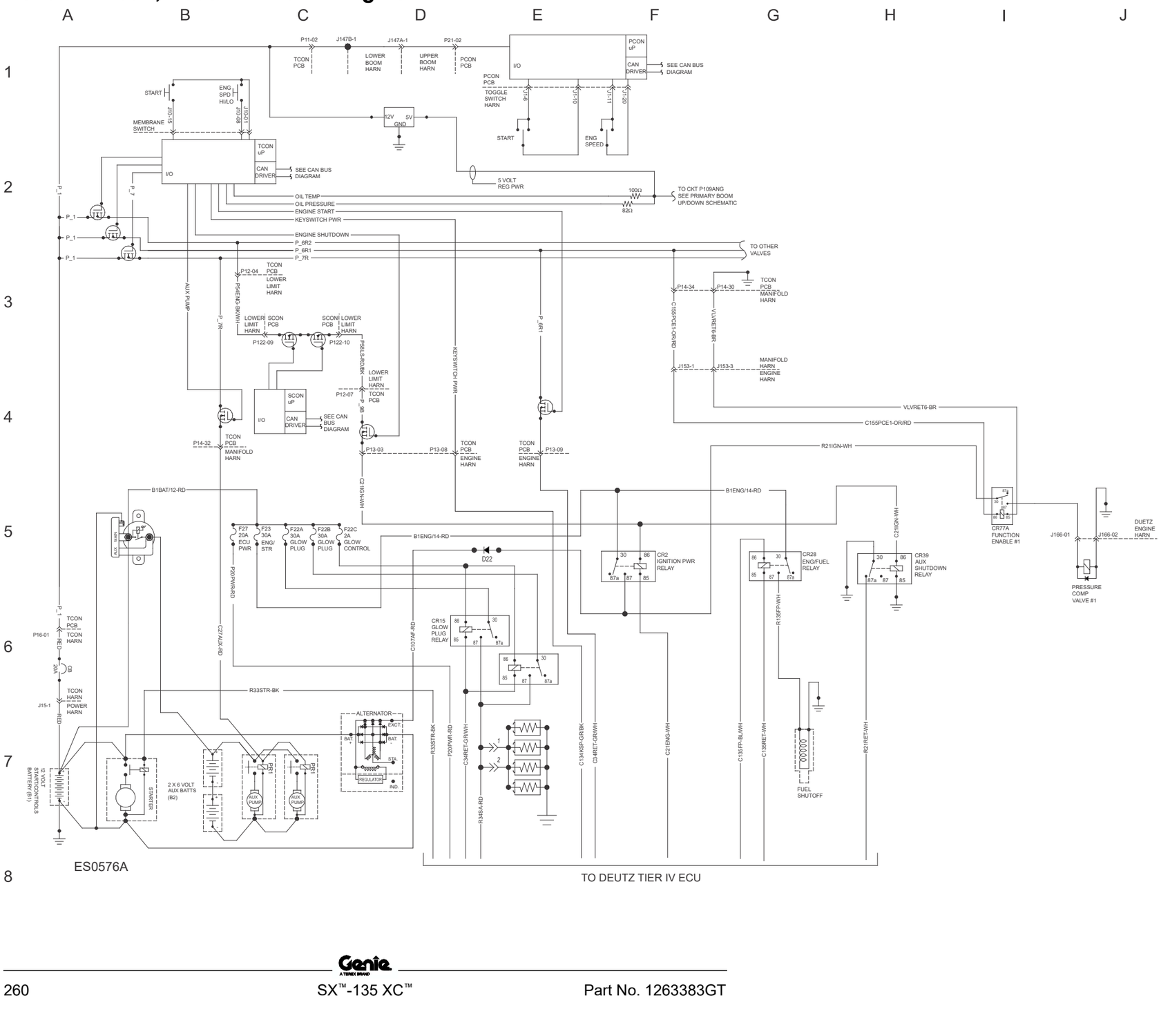
Control Circuit, Deutz TD2011L04i Engine



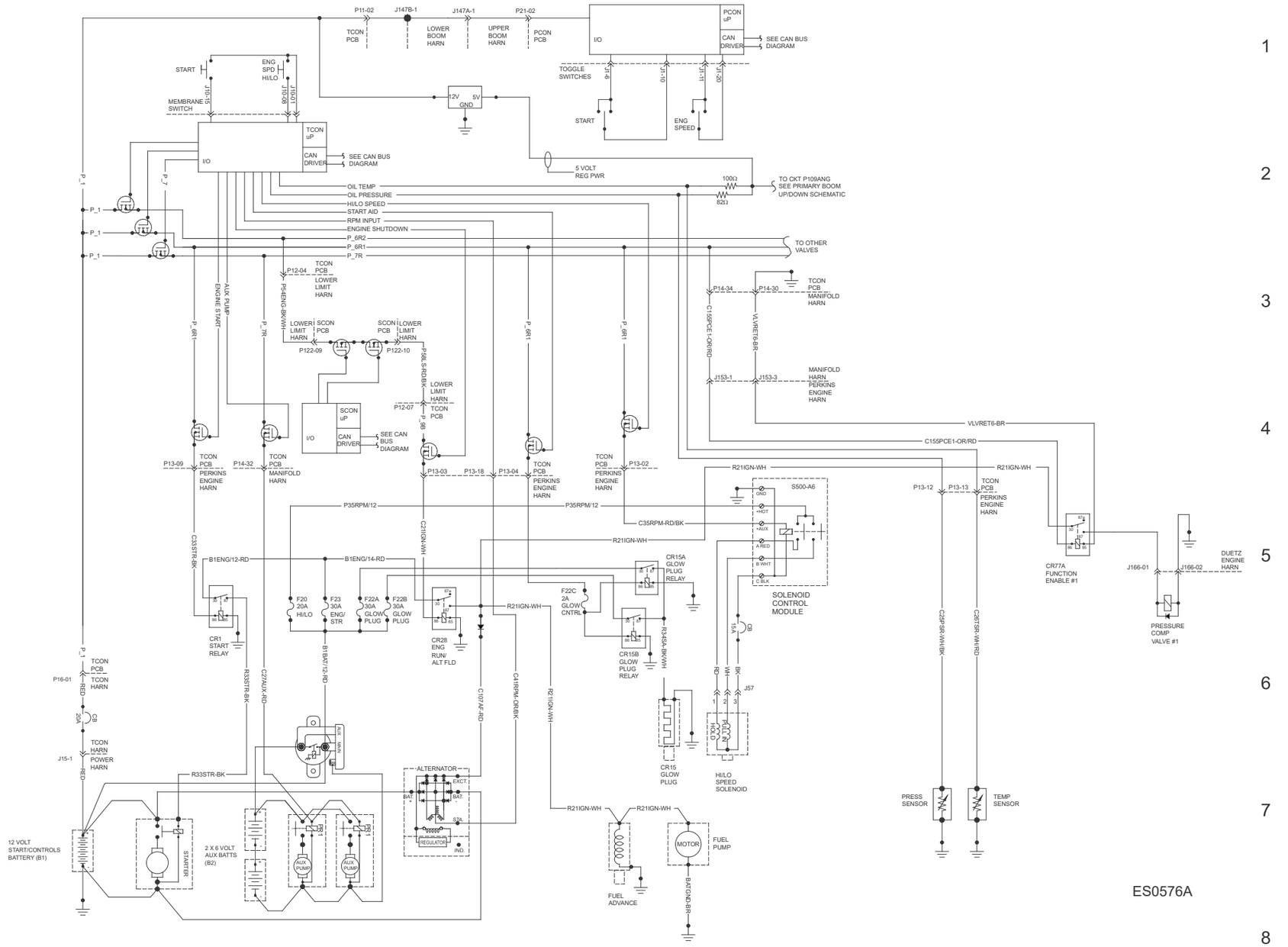
Control Circuit, Deutz TD 2.9 L4 Engine



Control Circuit, Deutz TD 2.9 L4 Engine

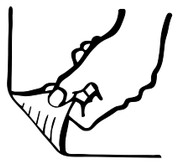


Control Circuit, Perkins 1104D-44T Engine

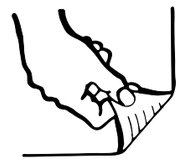


ES0576A

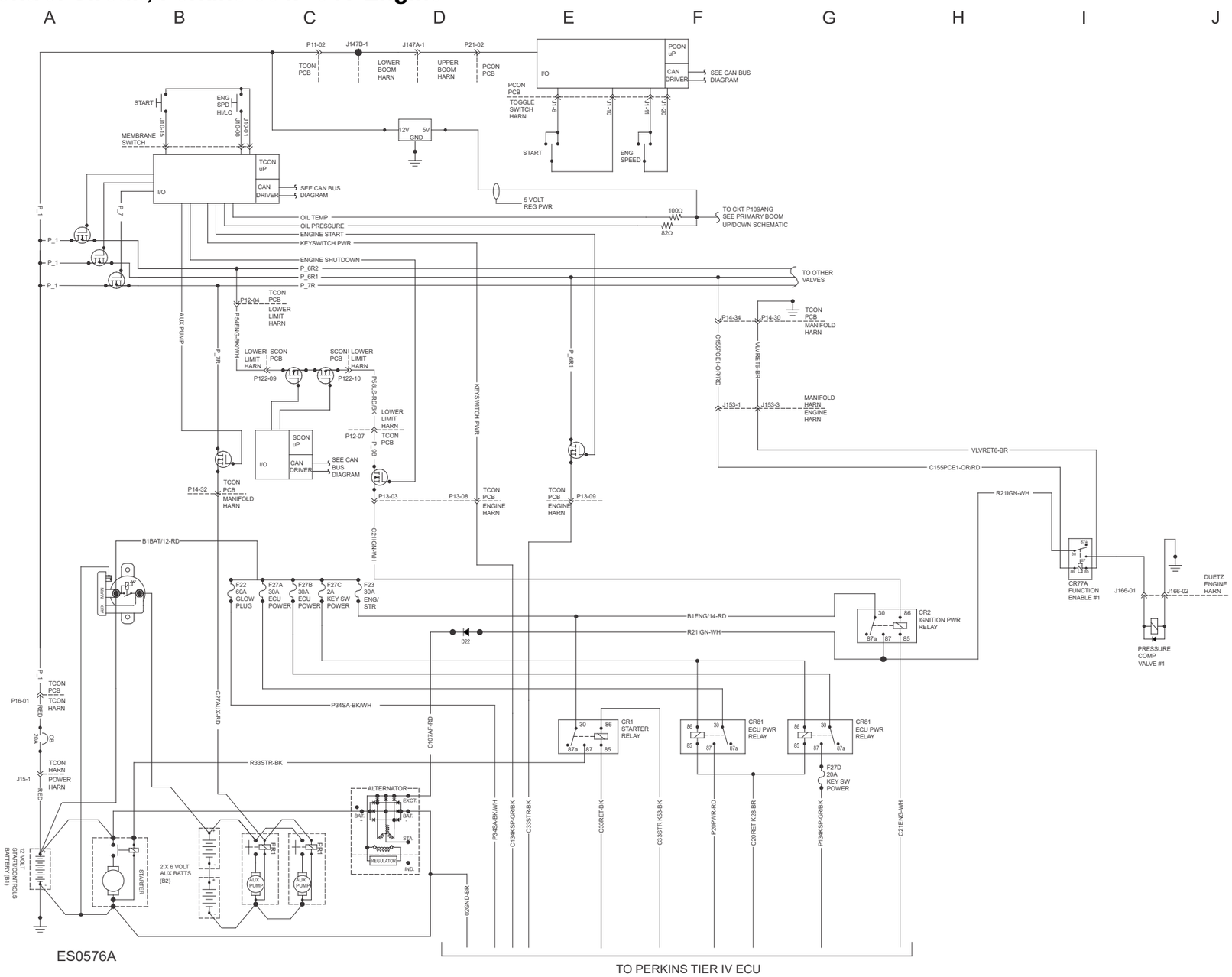
Control Circuit, Perkins 1104D-44T Engine



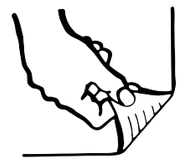
Control Circuit, Perkins 854F-34T Engine



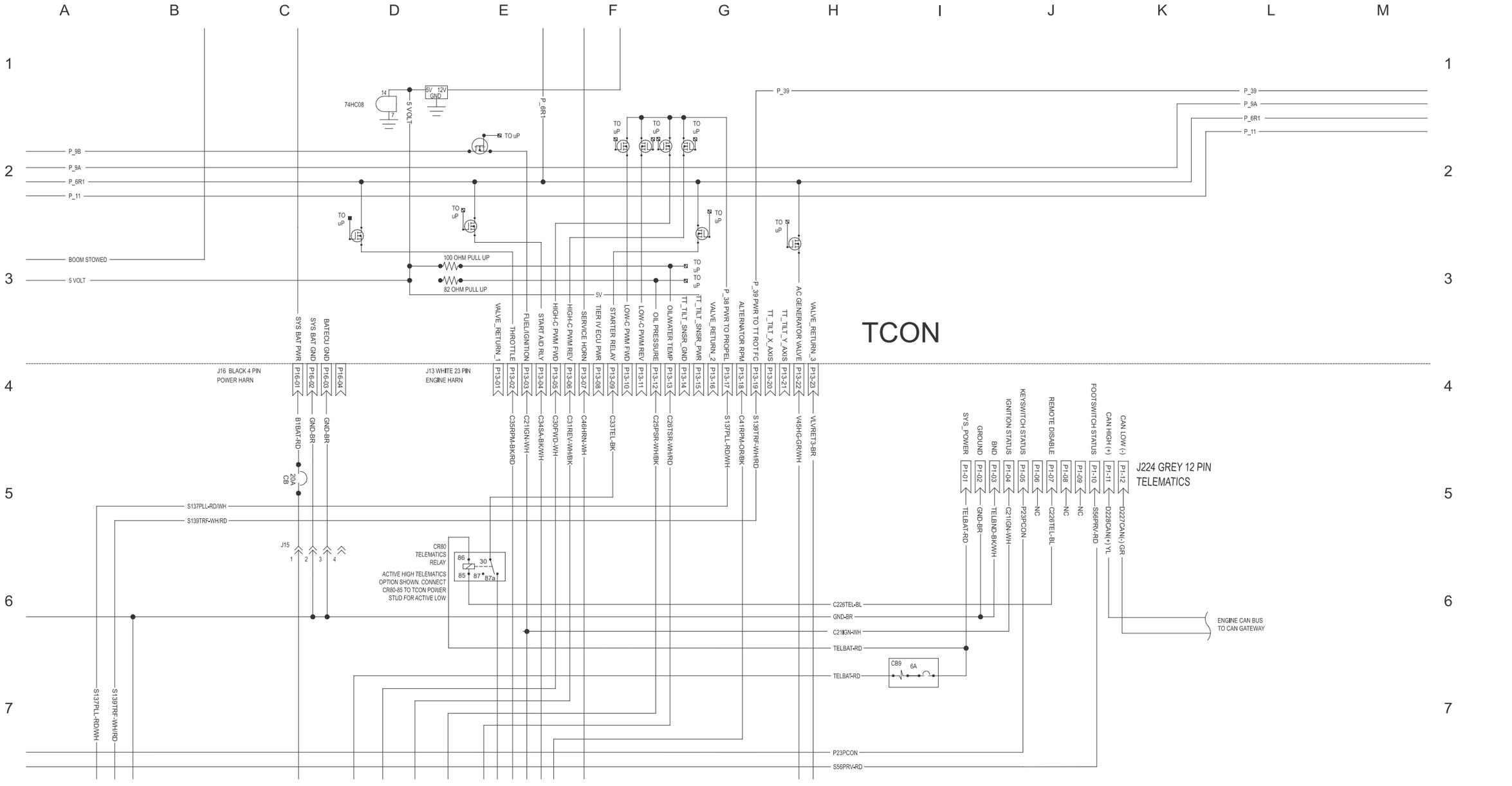
Control Circuit, Perkins 854F-34T Engine



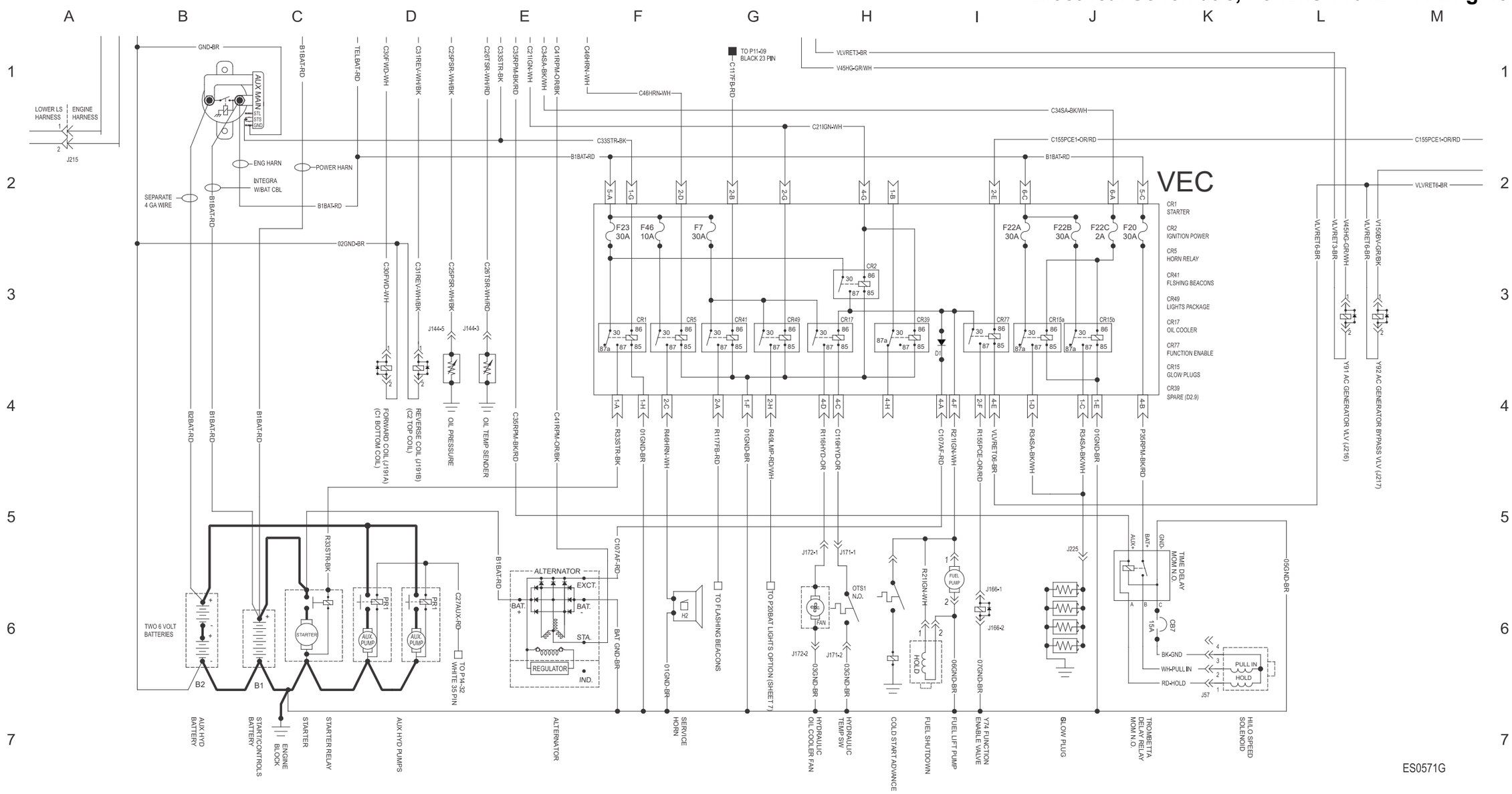
Electrical Schematic, Perkins 1104D-44T Engine



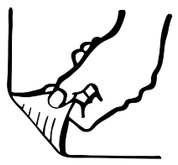
Electrical Schematic, Perkins 1104D-44T Engine



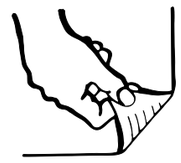
Electrical Schematic, Perkins 1104D-44T Engine



Electrical Schematic, Perkins 1104D-44T Engine



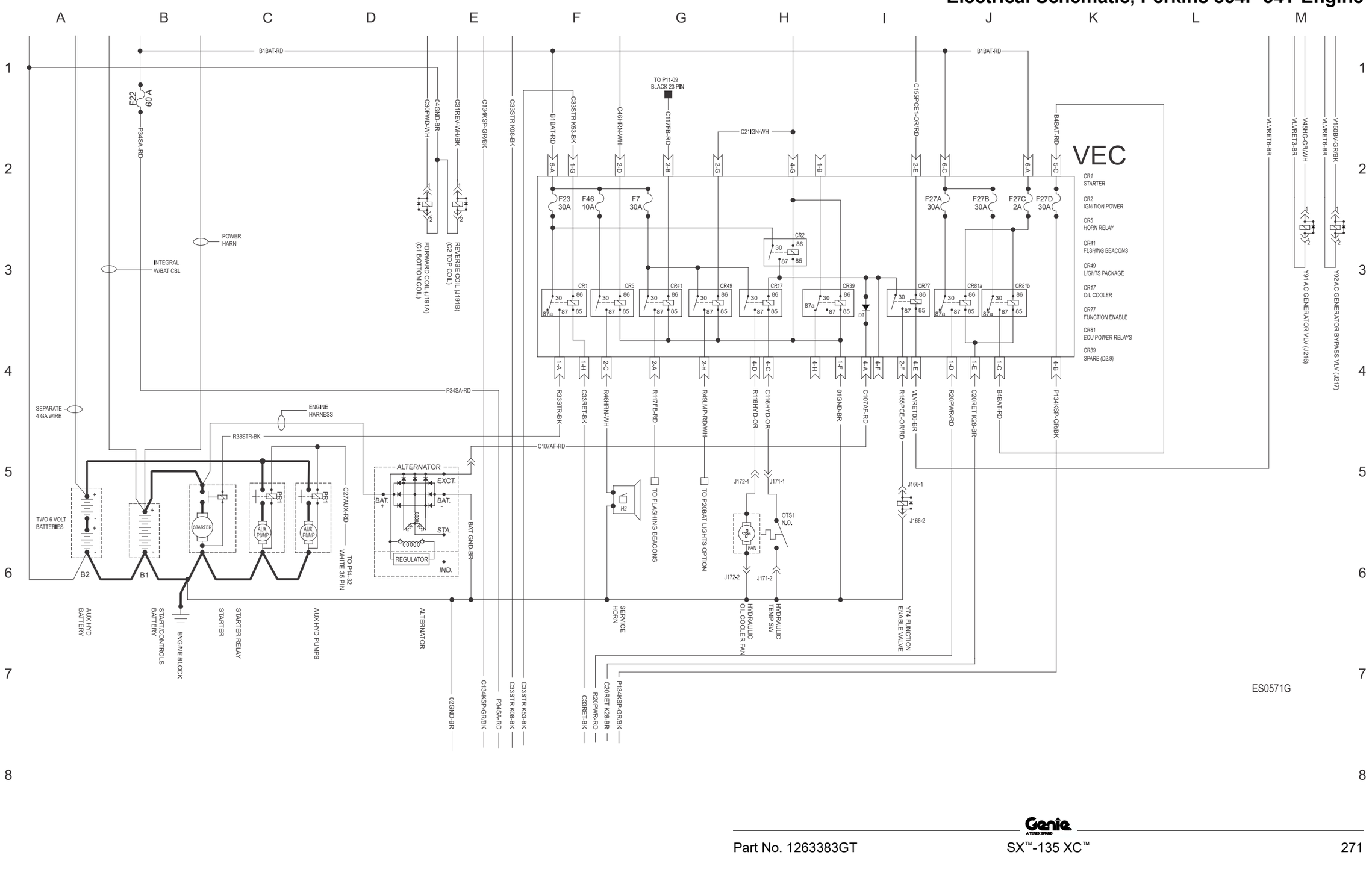
Electrical Schematic, Perkins 854F-34T Engine



Electrical Schematic, Perkins 854F-34T Engine

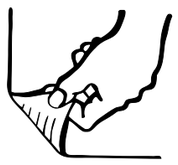
ES0571G

Electrical Schematic, Perkins 854F-34T Engine

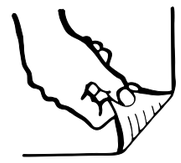


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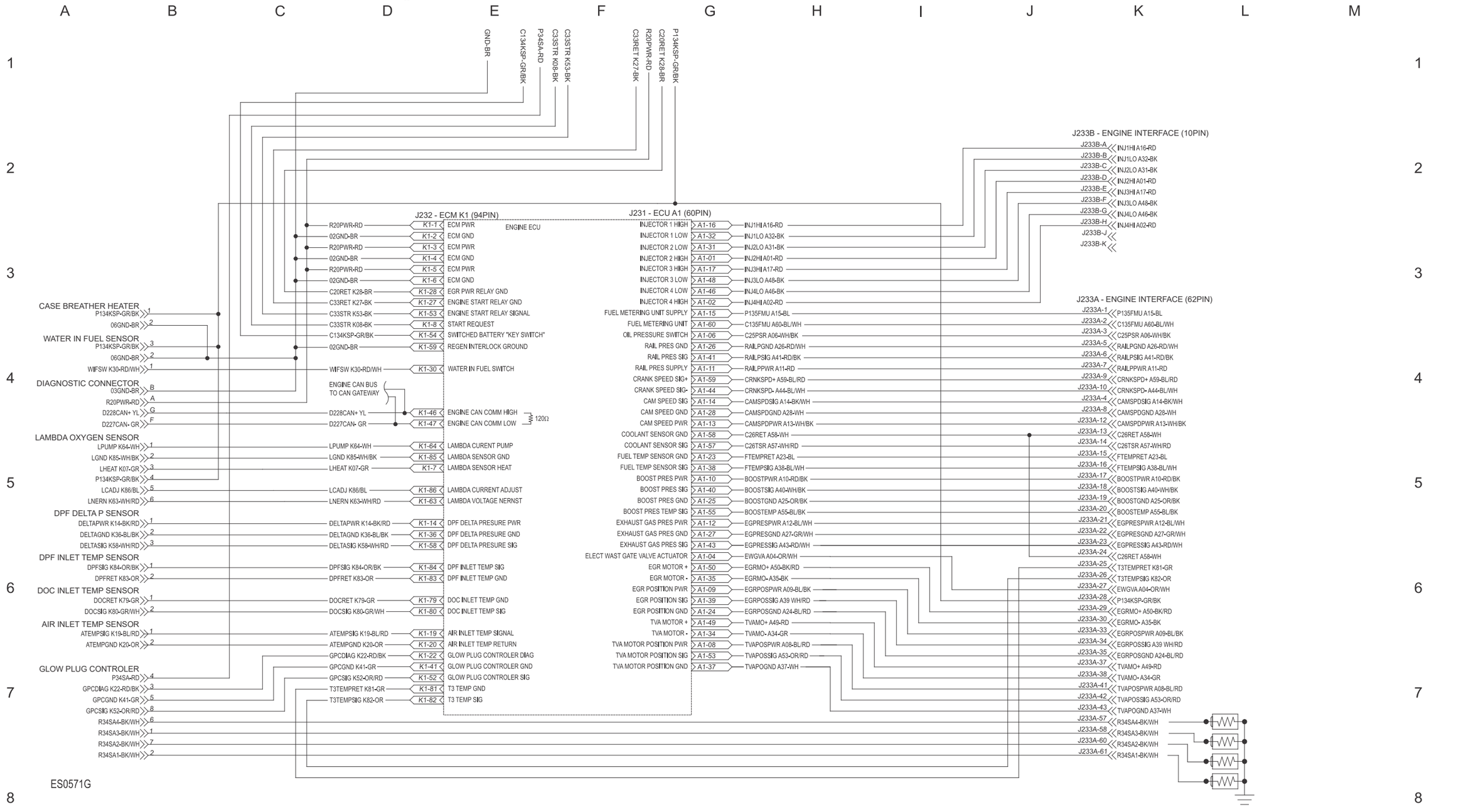
Electrical Schematic, Perkins 854F-34T Engine



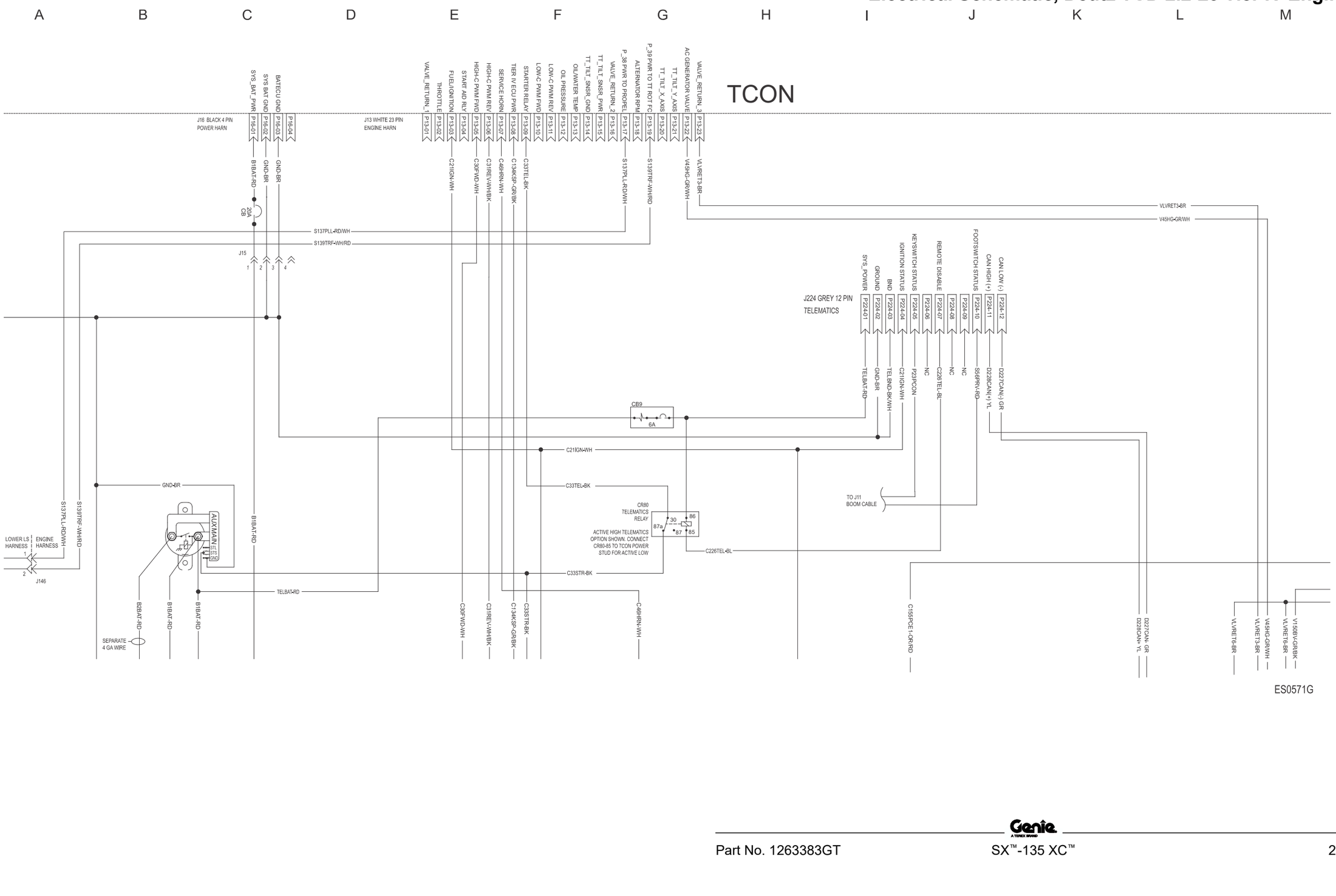
Electrical Schematic, Perkins 854F-34T Engine



Electrical Schematic, Perkins 854F-34T Engine

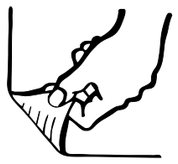


Electrical Schematic, Deutz TCD 2.2 L3 Tier IV Engine

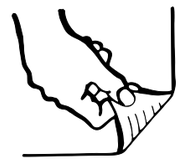


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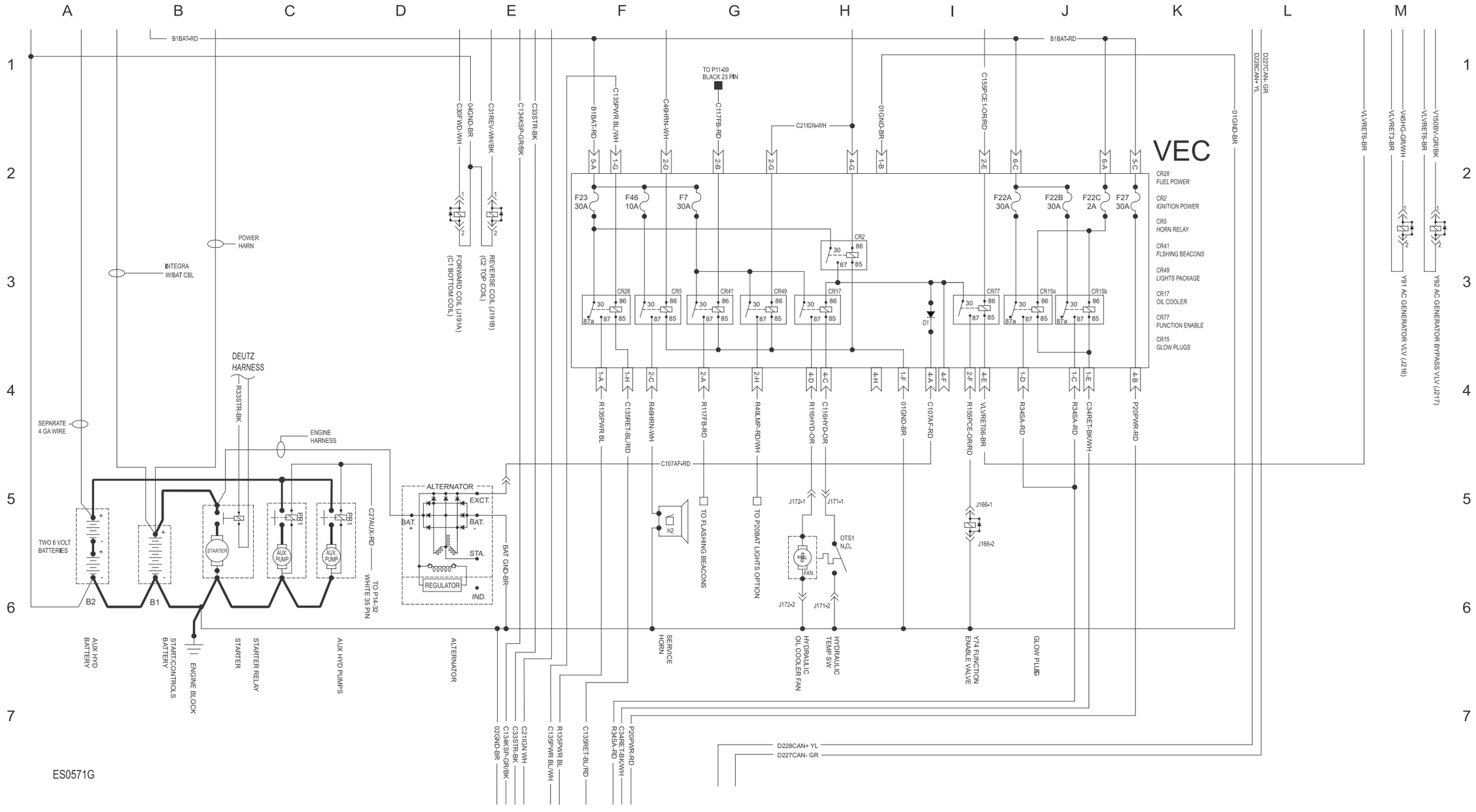
Electrical Schematic, Deutz TCD 2.2 L3 Tier IV Engine



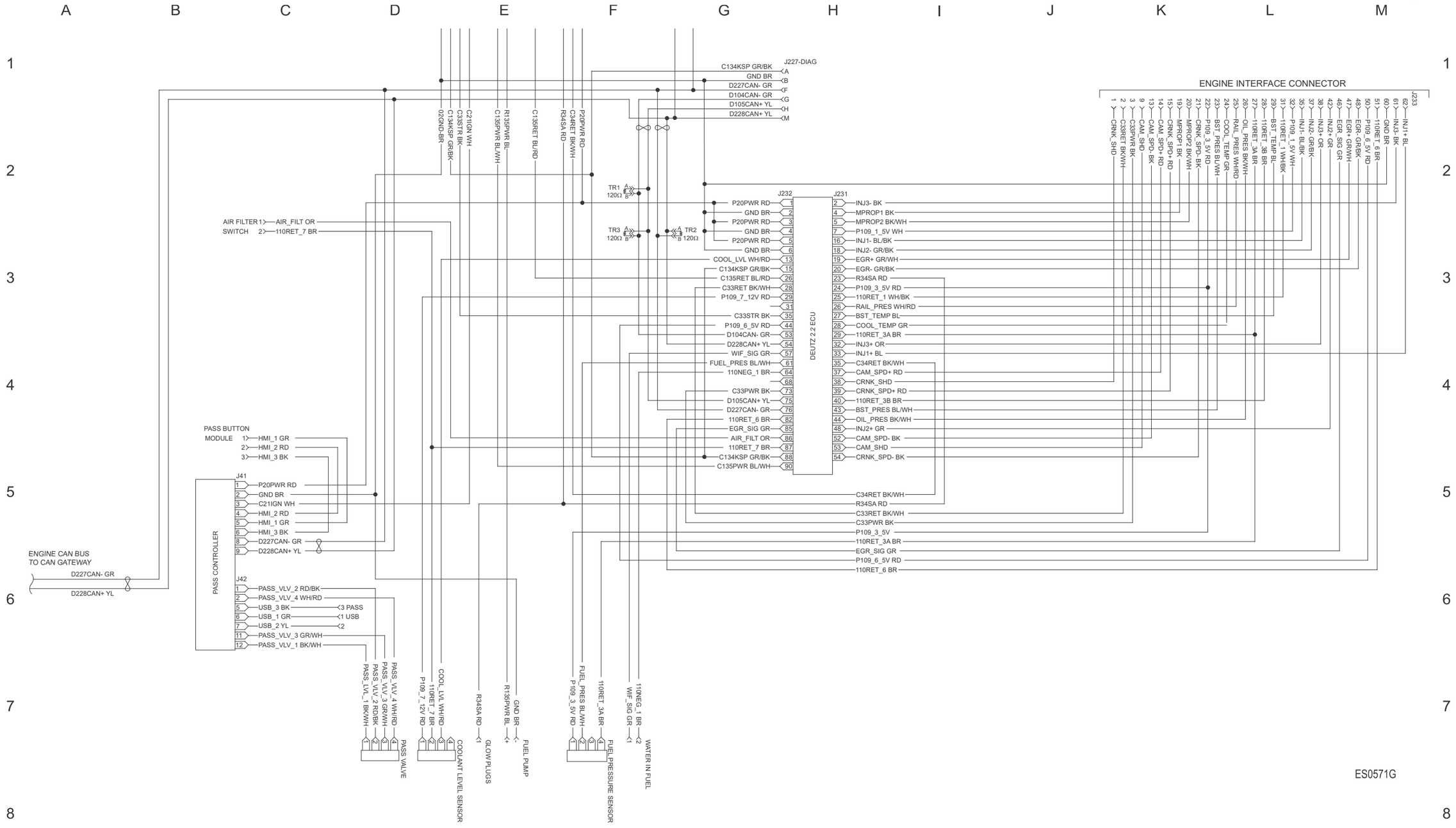
Electrical Schematic, Deutx TCD 2.2 L3 Tier IV Engine



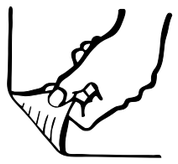
Electrical Schematic, Deutz TCD 2.2 L3 Tier IV Engine



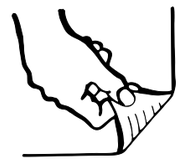
Electrical Schematic, Deutz TCD 2.2 L3 Tier IV Engine



Electrical Schematic, Deutz TCD 2.2 L3 Tier IV Engine



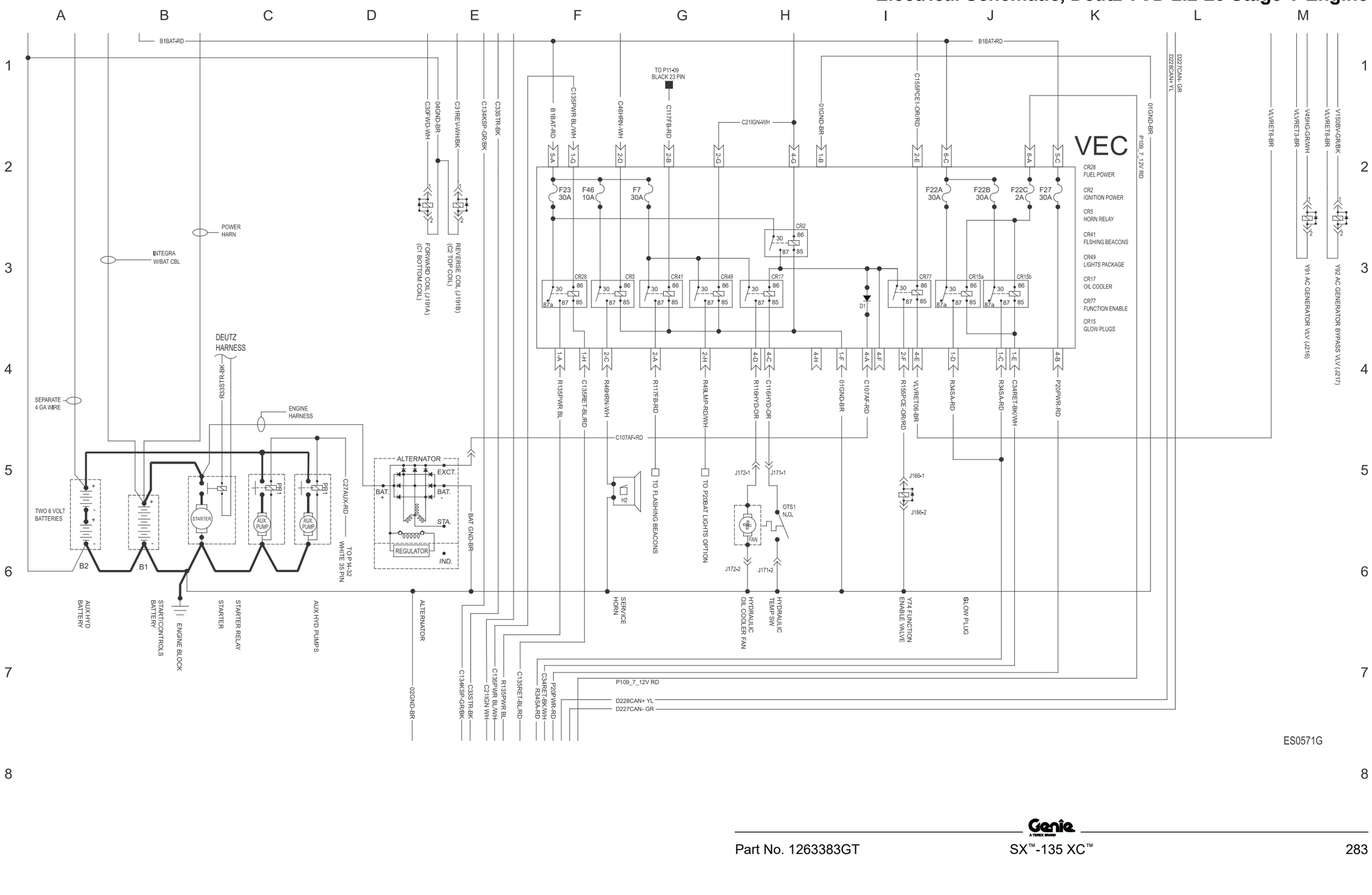
Electrical Schematic, Deutz TCD 2.2 L3 Stage V Engine



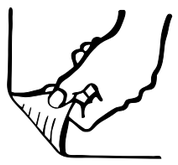
Electrical Schematic, Deutz TCD 2.2 L3 Stage V Engine

ES0571G

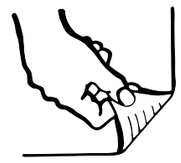
Electrical Schematic, Deutz TCD 2.2 L3 Stage V Engine



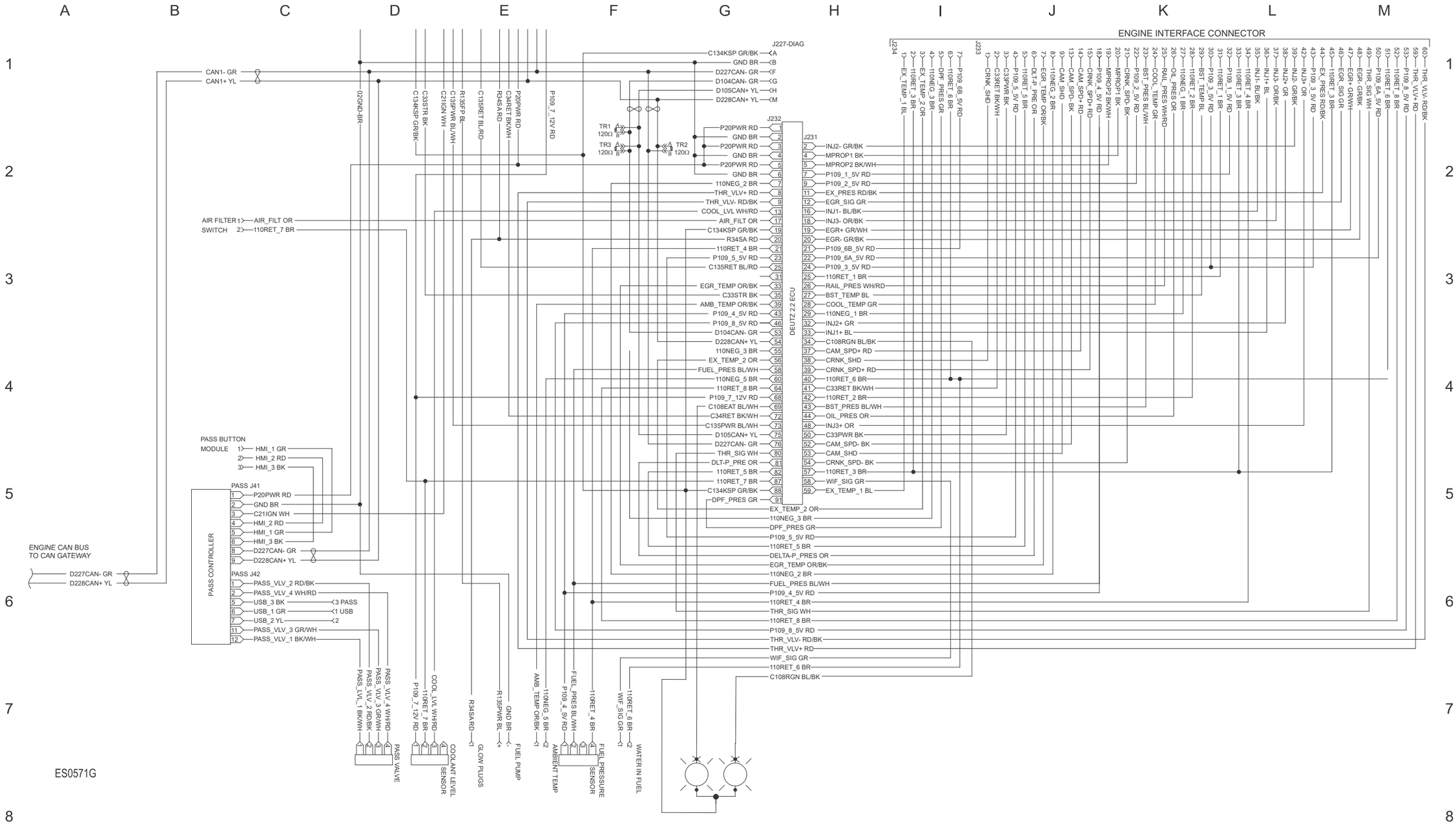
Electrical Schematic, Deutz TCD 2.2 L3 Stage V Engine



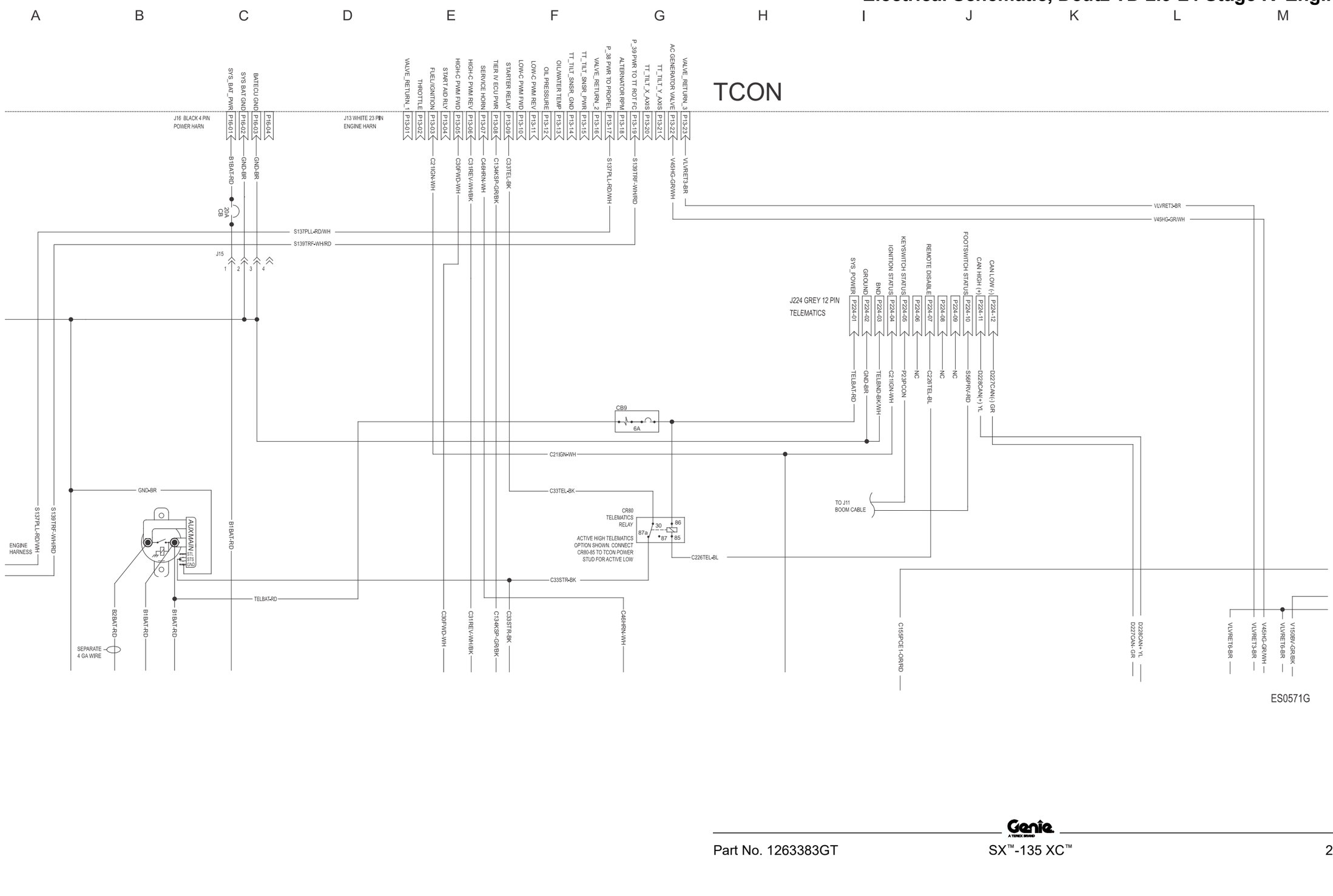
Electrical Schematic, Deutz TCD 2.2 L3 Stage V Engine



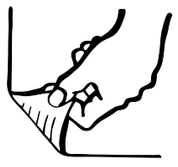
Electrical Schematic, Deutz TCD 2.2 L3 Stage V Engine



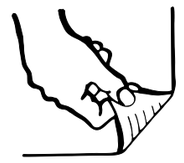
Electrical Schematic, Deutz TD 2.9 L4 Stage IV Engine



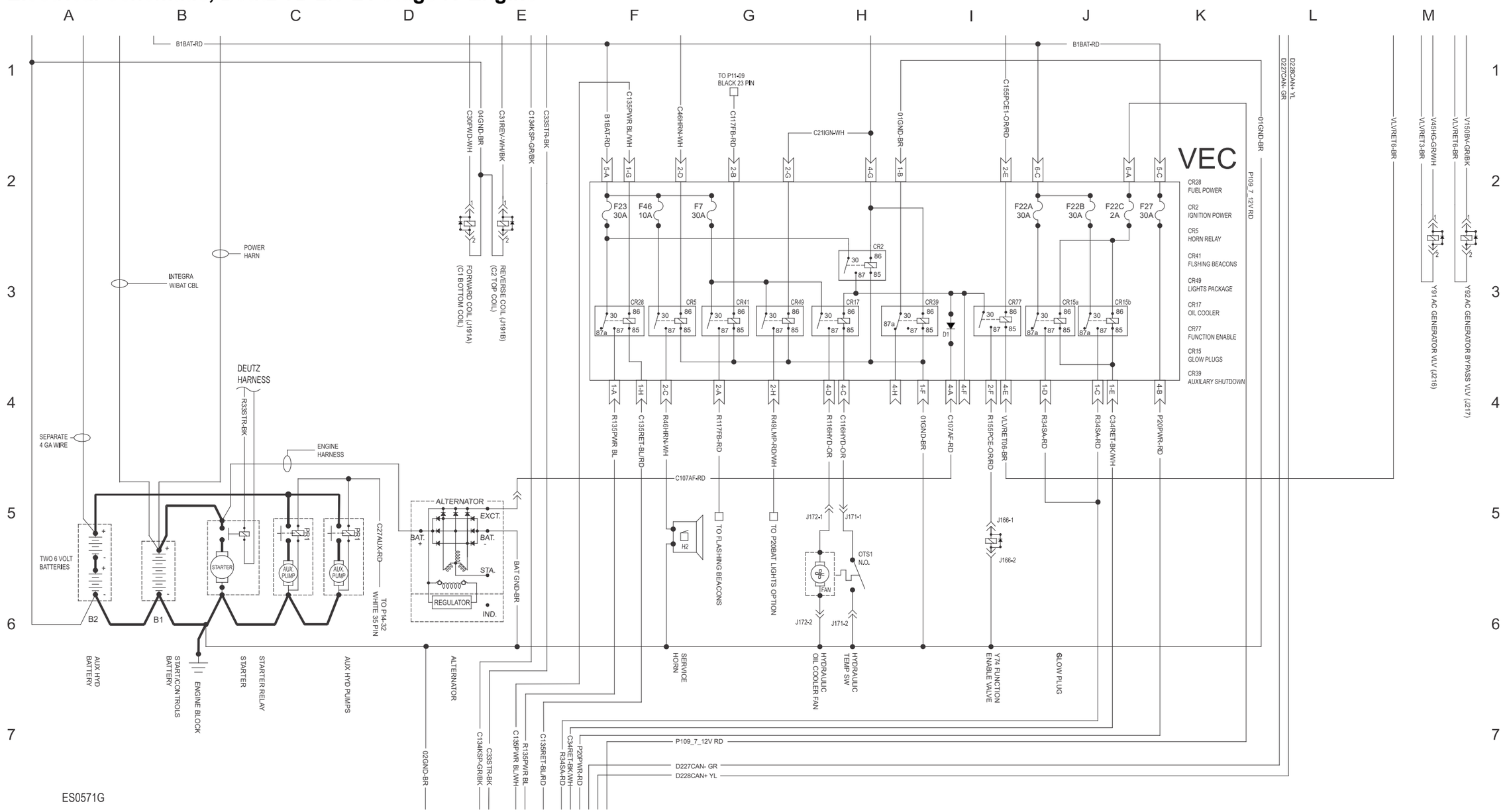
Electrical Schematic, Deutz TD 2.9 L4 Stage IV Engine



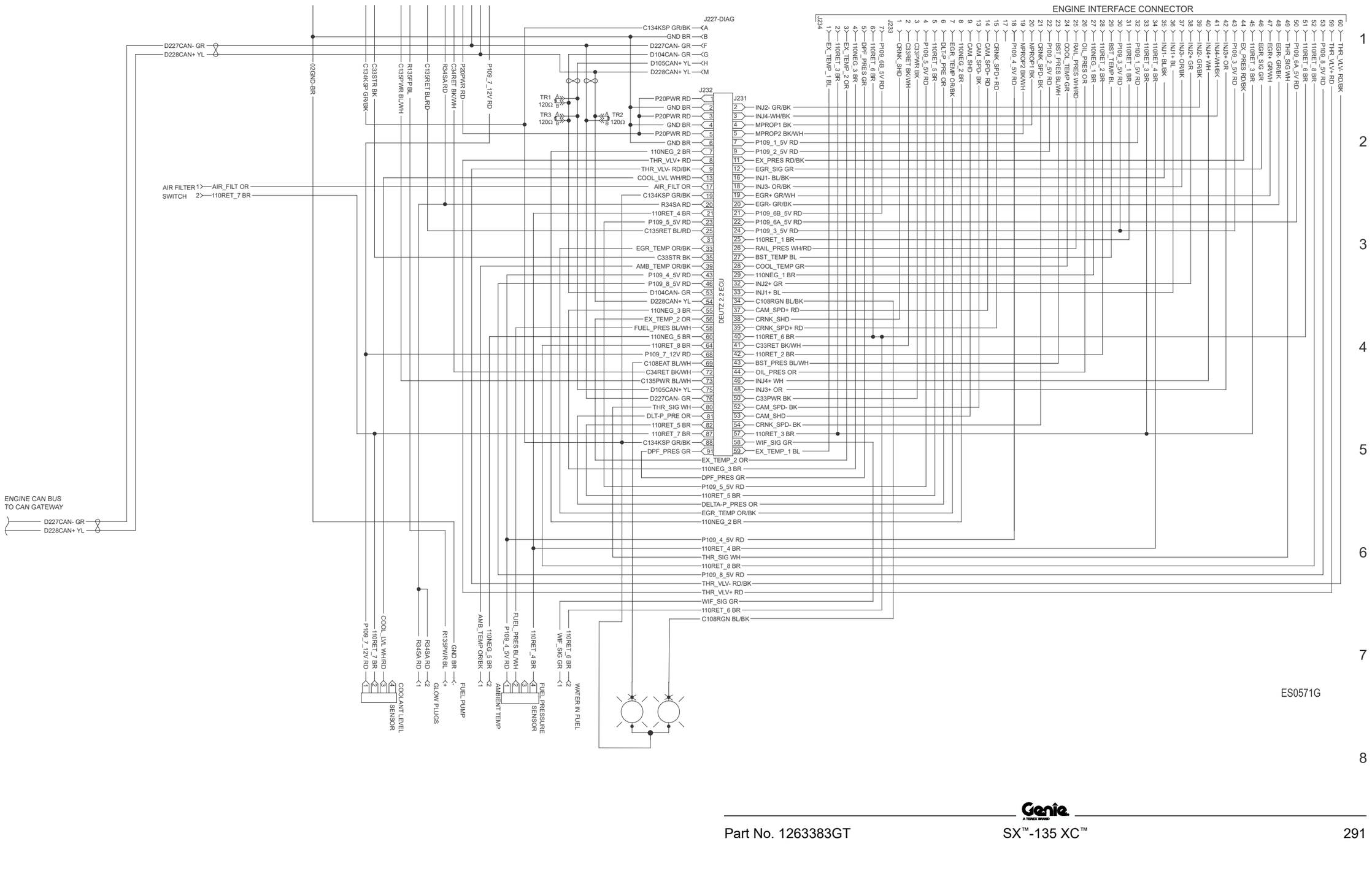
Electrical Schematic, Deutz TD 2.9 L4 Stage IV Engine



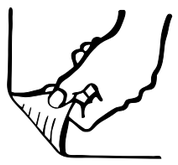
Electrical Schematic, Deutz TD 2.9 L4 Stage IV Engine



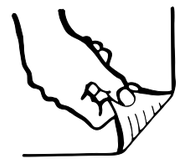
Electrical Schematic, Deutz TD 2.9 L4 Stage IV Engine



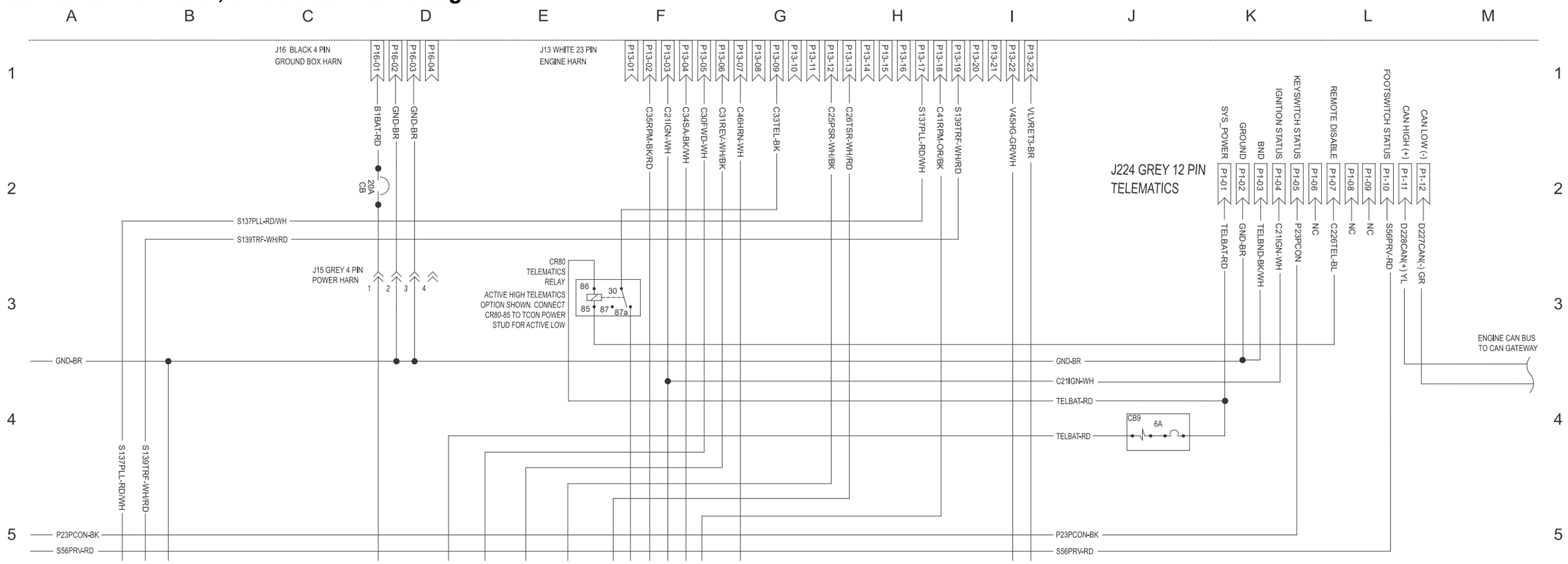
Electrical Schematic, Deutz TD 2.9 L4 Stage IV Engine



Electrical Schematic, Deutz TD2011L04i Engine

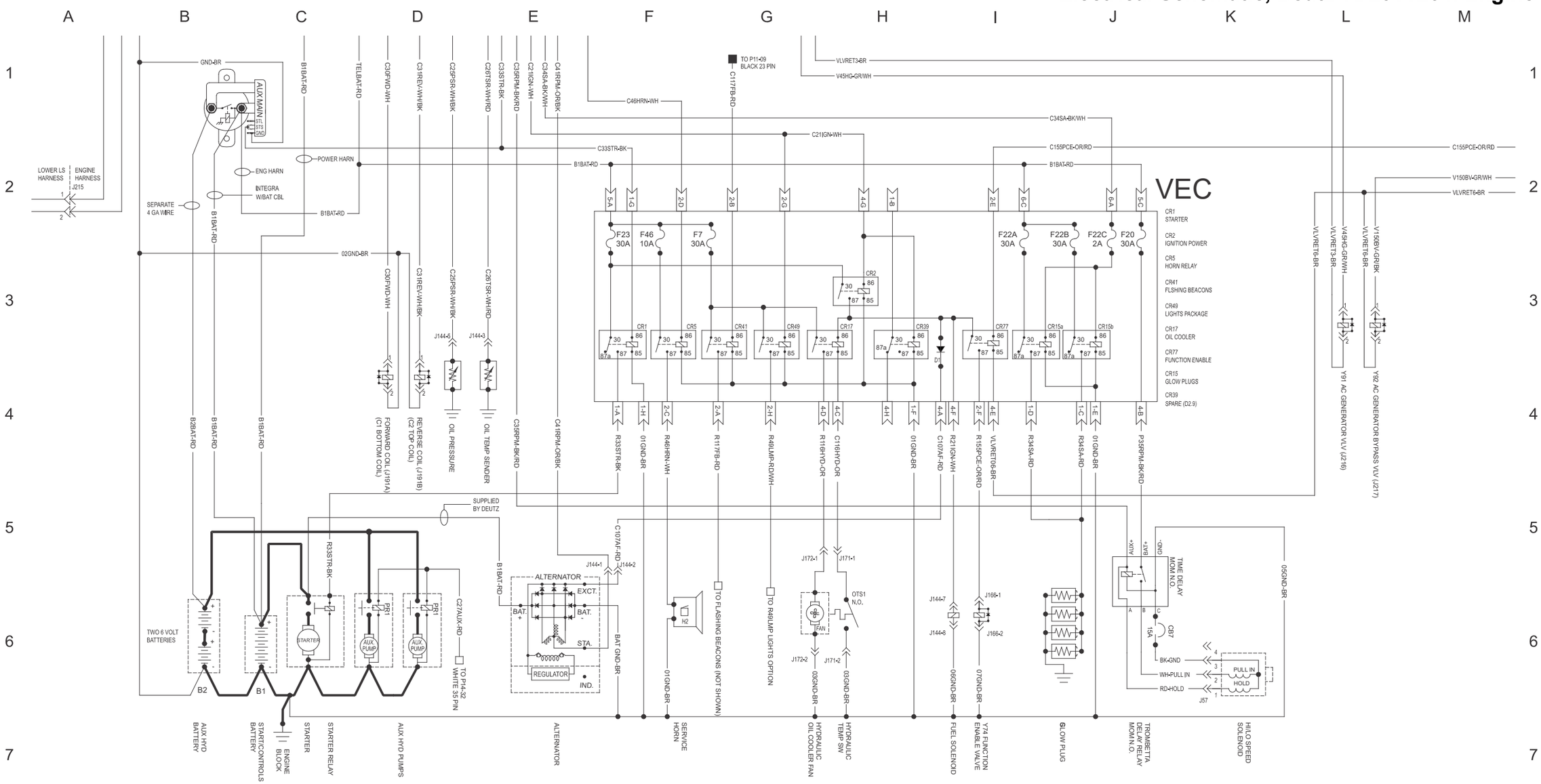


Electrical Schematic, Deutz TD2011L04i Engine



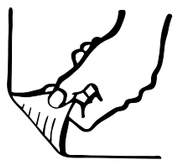
ES0571G

Electrical Schematic, Deutz TD2011L04i Engine

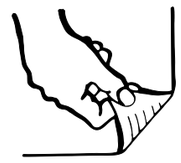


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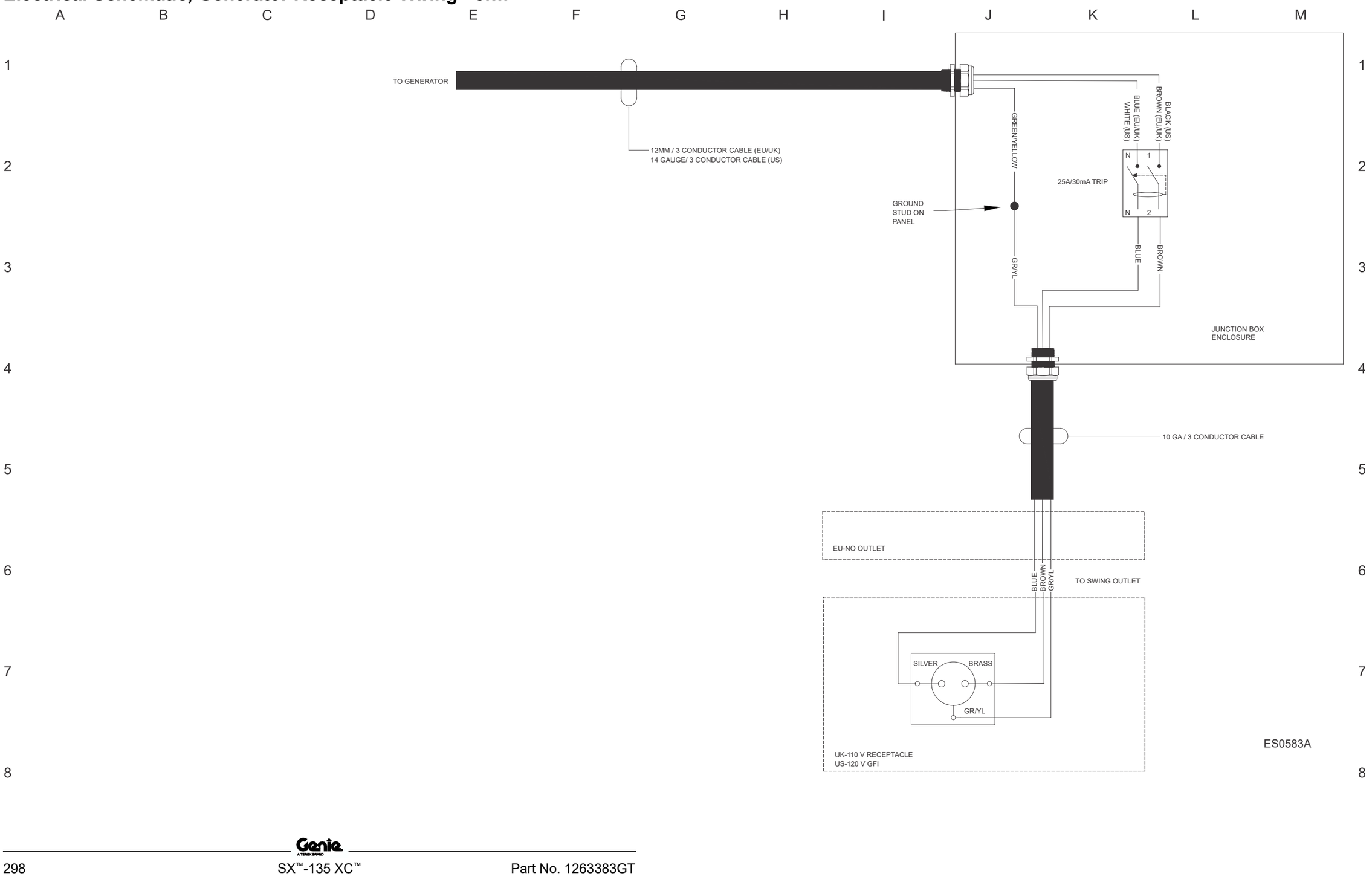
Electrical Schematic, Deutz TD2011L04i Engine



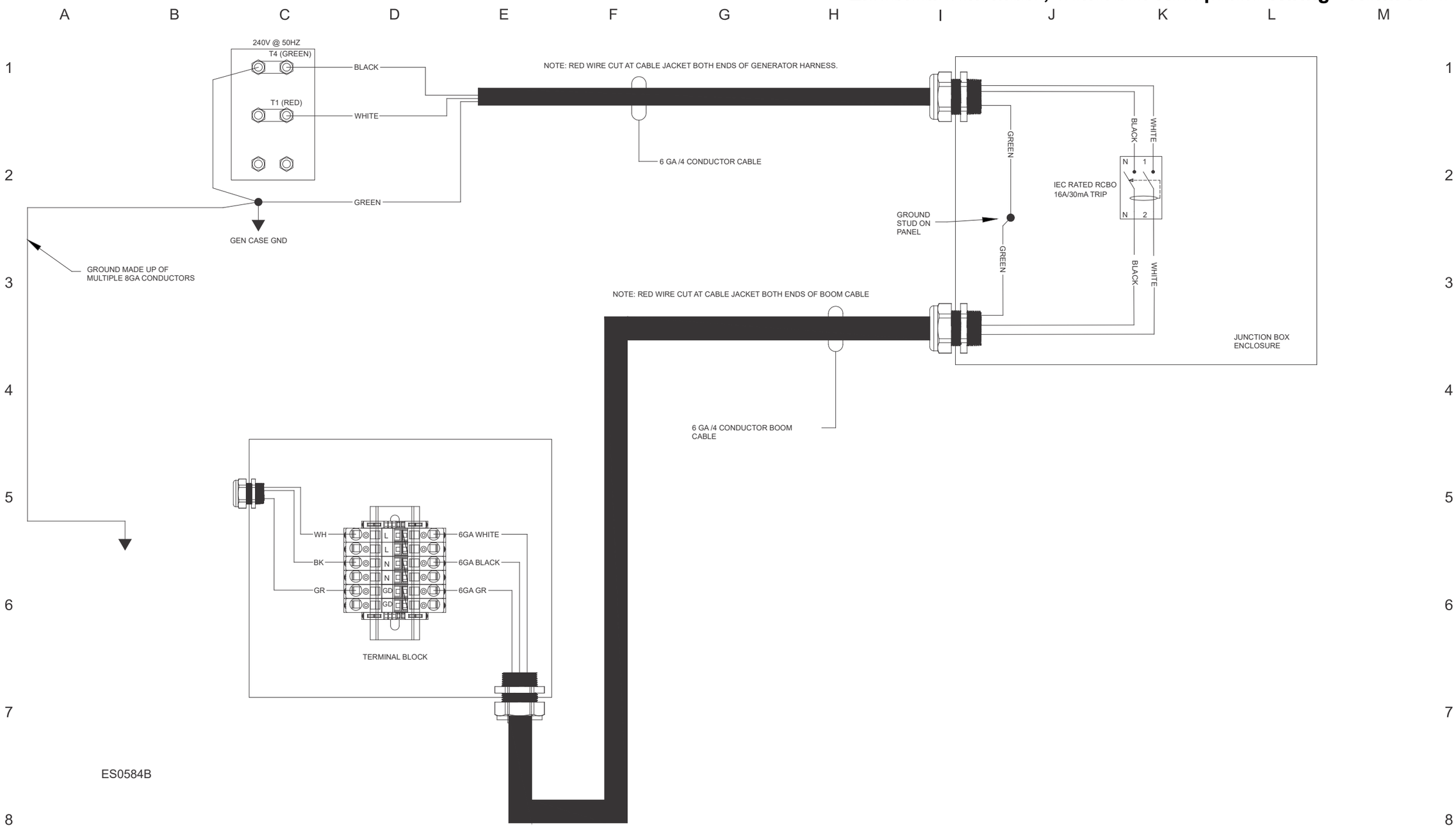
Electrical Schematic, Generator Receptacle Wiring - 3kw



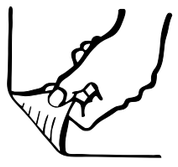
Electrical Schematic, Generator Receptacle Wiring - 3kw



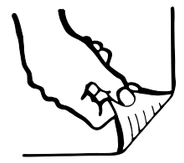
Electrical Schematic, Generator Receptacle Wiring - 7.5kw AUS



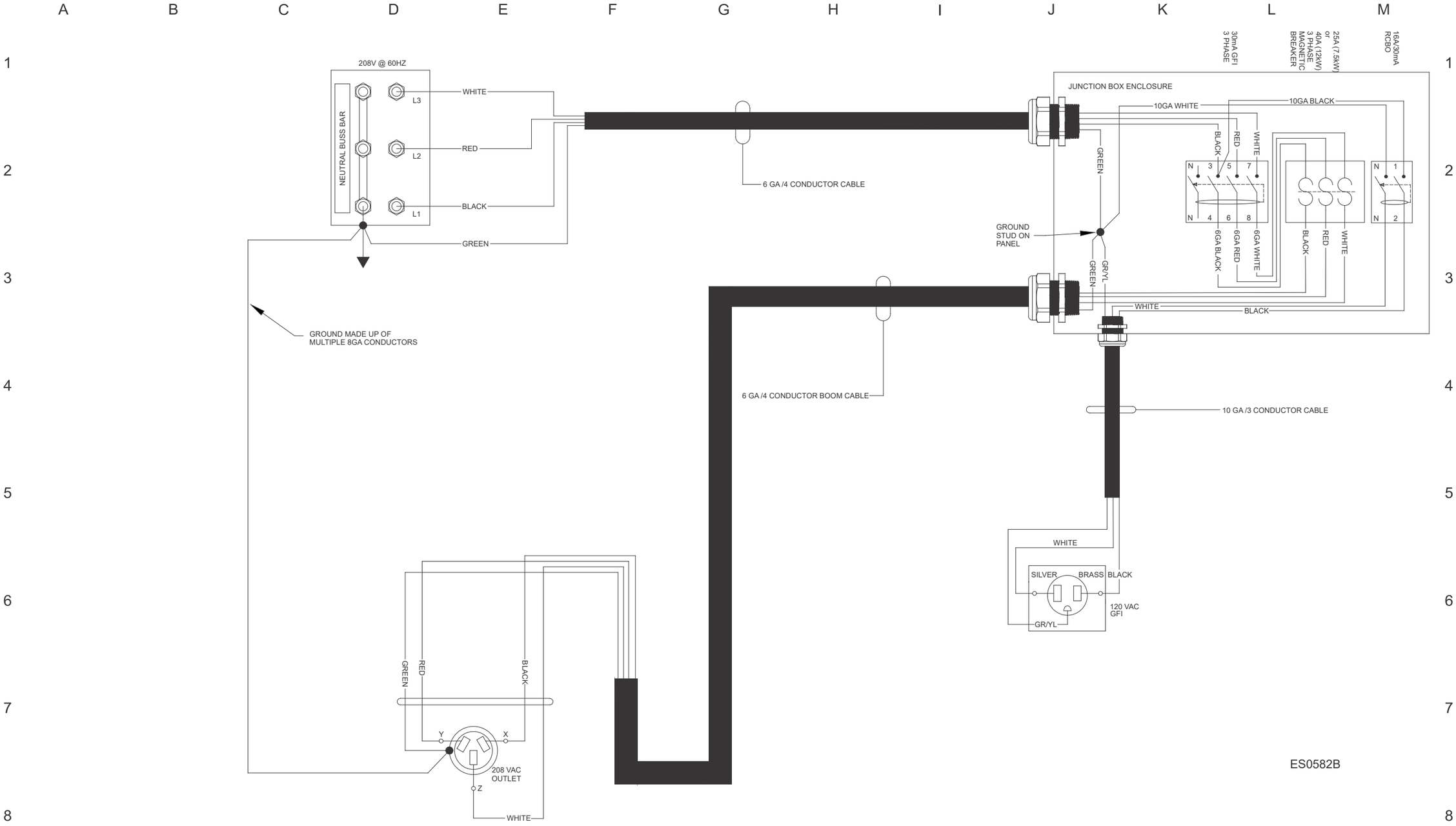
Electrical Schematic, Generator Receptacle Wiring - 7.5kw AUS



Electrical Schematic, Generator Receptacle Wiring - 7.5/12kw ANSI/CSA

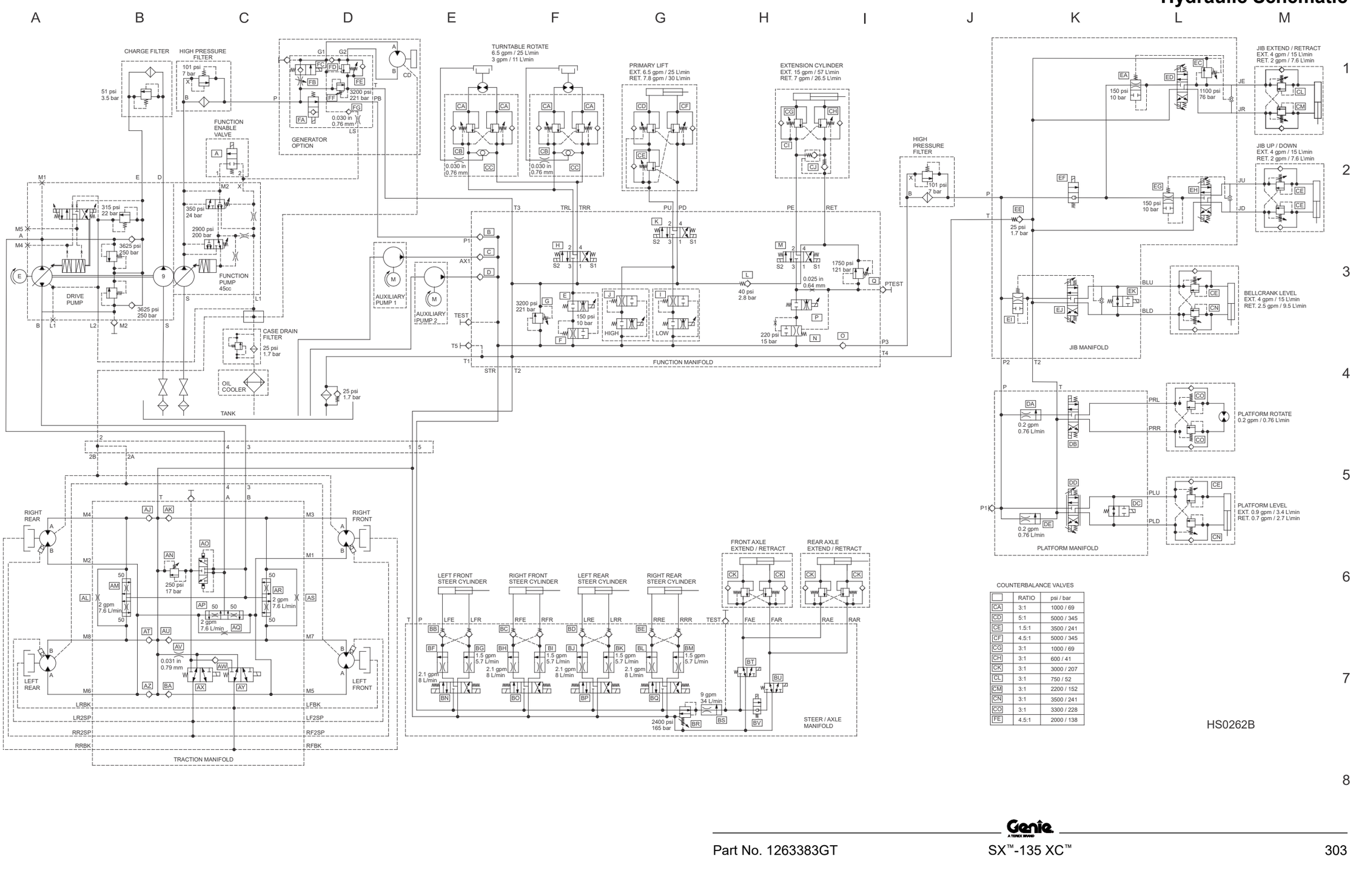


Electrical Schematic, Generator Receptacle Wiring - 7.5/12kw ANSI/CSA



ES0582B

Hydraulic Schematic



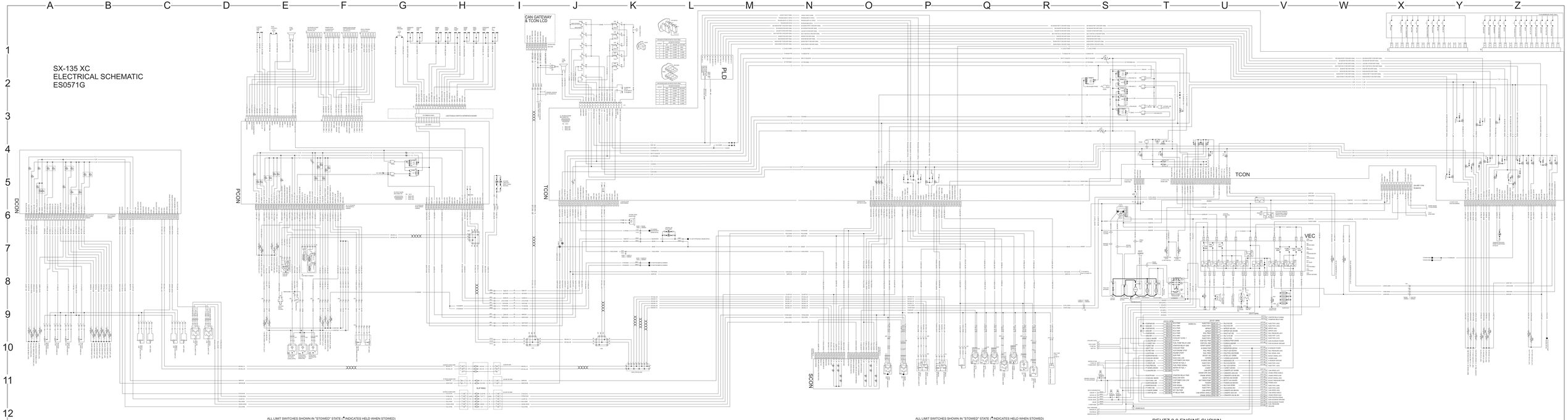
COUNTERBALANCE VALVES

	RATIO	psi / bar
CA	3:1	1000 / 69
CD	5:1	5000 / 345
CE	1.5:1	3500 / 241
CF	4.5:1	5000 / 345
CG	3:1	1000 / 69
CH	3:1	600 / 41
CK	3:1	3000 / 207
CL	3:1	750 / 52
CM	3:1	2200 / 152
CN	3:1	3500 / 241
CO	3:1	3300 / 228
FE	4.5:1	2000 / 138

HS0262B

Hydraulic Schematic

SX-135 XC
ELECTRICAL SCHEMATIC
ES0571G



California Proposition 65

WARNING

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

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

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

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

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