Genie
A TEREX BRAND

Service and Repair Manual

	Serial Number Range
S®-80 XC™	from S80XCH-104 to S80XCH-3100
S®-80 HF	
S®-85 XC™	from S85XCH-101 to S85XCH-3090
S®-85 HF	from S85XCD-101 to S85XCD-2001

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. 1280490GT
Rev E
April 2022

Introduction

Important

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

This manual provides detailed scheduled maintenance information for the machine owner and user. It also provides troubleshooting and repair procedures for qualified service professionals.

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

Compliance

Machine Classification

Group B/Type 3 as defined by ISO 16368

Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

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

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

Contact Us:

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

Find a Manual for this Model

Go to 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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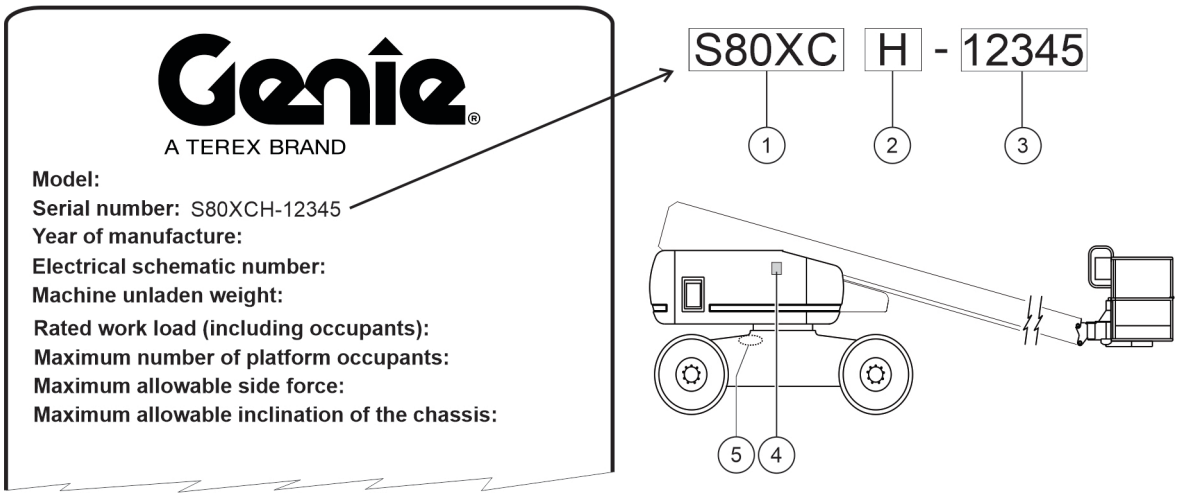
Revision History

Revision	Date	Section	Procedure / Page / Description
A	11/2017		New Release
B	12/2017	Schematics	Electrical schematics
C	1/2018	Specifications	Hydraulic Component Specifications
		Schematics	Electrical schematics
C1	4/2018	Repair	6-1
C2	7/2018	Repair	Move Ground Controls to Control System
		Schematics	Electrical schematics
C3	10/2018	Specifications	Machine Specifications
C4	5/2019	Specifications	Machine Torque Specifications
		Repair	Display Menu
		Fault Codes	Control System Fault Codes
		Schematics	Electrical schematics
C5	6/2019	Fault Codes	Control System Fault Codes
C6	7/2019	Repair	Display Menu
C7	10/2019	Schematics	Limit Switch Legend
D	5/2020	All Sections	Add Deutz TCD 2.2 L3 Engine
		Repair	2-4
E	4/2022	Front cover	Add ending serial break

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

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 Rough Terrain and Non Marking	
Tire size	18-625 FF
Tire ply rating	16 ply
Overall tire diameter	40.7 in 103,3 cm
Tire pressure	foam filled
Wheel diameter	24.5 in 62,2 cm
Wheel width	15 in 38,1 cm
Tire weight, new foam filled (minimum)	622 lbs 282 kg
High Flotation	
Tire size	41/18LL
Tire ply rating	20 ply
Overall tire diameter	41.2 in 104,6 cm
Tire pressure	100 psi 6,89 bar
Wheel diameter	22.5 in 57,2 cm
Wheel width	14 in 35,6 cm
Tire weight	250 lbs 113,4 kg

Lugs and Lug Nut Torque	
Wheel lugs	11 @ 3/4 - 16
Lug nut torque, dry	420 ft-lbs 569 Nm
Lug nut torque, lubricated	320 ft-lbs 434 Nm

Fluid capacities	
Fuel tank, Diesel models	35 gallons 132,5 liters
Fuel tank, Gas models	30 gallons 113,5 liters
LPG tank	33.5 lbs 15,2 kg
Hydraulic tank	40 gallons 151 liters
Hydraulic system (including tank)	64 gallons 242 liters
Turntable rotation drive hub (single fill port)	40 fl oz 1183 cc
Turntable rotation drive hub (dual fill port)	43 fl oz 1262 cc
Drive hubs four wheel drive	48 fl oz 1420 cc
Drive hub oil type: SAE 90 multipurpose hypoid gear oil API service classification GL5	

Specifications

Performance Specifications

Drive speed, maximum	
Stowed position, RT tires	40 ft / 9 - 11 sec 12,2 m / 9 - 11 sec
Raised or extended	40 ft / 55 - 65 sec 12,2 m / 55 - 65 sec
Braking distance, maximum	
High range on paved surface	3 - 6 ft / 0,91 - 1,8 m
Gradeability	Refer to Operator's Manual
Boom function speeds, maximum from platform controls	
Jib boom up (S-85 XC)	25 - 35 sec
Jib boom down (S-85 XC)	15 - 25 sec
Primary boom up	75 - 83 sec
Primary boom down	110 - 115 sec
Primary boom extend	59 - 67 sec
Primary boom retract	57 - 65 sec
Turntable rotate stowed, (360°)	95 - 103 sec
Turntable rotate raised or extended, (360°)	210 - 250 sec
Platform rotate, 160°	40 - 50 sec
Platform level (10° range of motion)	20 - 22 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
Viscosity grade	32
Viscosity index	200
Optional Hydraulic Fluids	
Mineral based	Shell Tellus S2 V 32 Shell Tellus S2 V 46 Shell Tellus S4 VX 32 Shell Donax TG (Dexron III) Chevron 5606A
Biodegradable	Petro Canada Environ MV 46
Fire resistant	UCON Hydrolube HP-5046

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

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

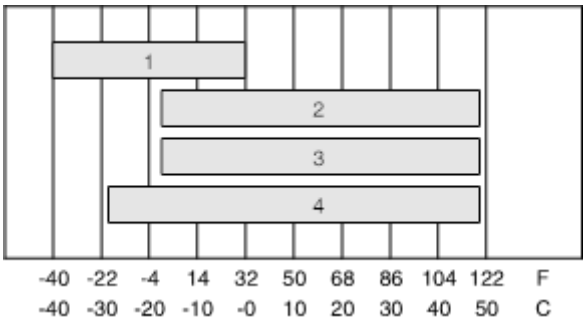
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond its maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

NOTICE

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

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

Hydraulic Fluid Temperature Range



Ambient air temperature

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

Chevron Rando HD Premium Oil MV Fluid Properties

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

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

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

Specifications

Chevron 5606A Hydraulic Oil Fluid Properties

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

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

NOTICE

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

Petro-Canada Environ MV 46 Fluid Properties

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

Shell Tellus S4 VX Fluid Properties

ISO Grade	32
Viscosity index	300
Kinematic Viscosity cSt @ 200°F / 100°C cSt @ 104°F / 40°C	 9 33.8
Brookfield Viscosity 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

Specifications

UCON Hydrolube HP-5046 Fluid Properties

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

Hydraulic Component Specifications

Drive Pump	
Type: bi-directional variable displacement piston pump	
Displacement per revolution	0 to 2.8 cu in 0 to 46 cc
Flow rate @ 2300 rpm	30.3 gpm 114,7 L/min
Drive pressure, maximum	3750 psi 259 bar
Charge Pump	
Type	gerotor
Displacement per revolution	0.85 cu in 13,9 cc
Flow rate @ 2300 rpm	9 gpm 34 L/min
Charge pressure @ 2300 rpm Neutral position	310 psi 21,4 bar
Function Pump	
Type: variable displacement piston pump	
Displacement per revolution	0 to 2.3 cu in 0 to 38 cc
Flow rate @ 2300 rpm	0 to 23 gpm 0 to 87 L/min
Pressure, maximum	2900 psi 200 bar
Pressure compensator	2900 psi 200 bar
Standby pressure	250 psi 17,3 bar
Auxiliary Pump	
Type: fixed displacement gear pump	
Displacement per revolution	0.15 cu in 2,47 cc
Generator Pump	
Displacement per revolution	1.4 cu in 23 cc

Specifications

Function manifold	
System relief valve pressure, maximum	3200 psi 221 bar
Primary boom extend relief pressure (measured at PTEST port)	2400 psi 165 bar
Platform Manifold and Oscillate Valve	
Platform level flow regulator	0.6 gpm 2,3 L/min
Platform rotate flow regulator	0.3 gpm 1,1 L/min
Oscillate relief valve pressure	950 psi 65,5 bar
Traction Manifold	
Hot oil relief pressure	280 psi 19,3 bar
Brakes	
Brake release pressure, Wheel drive hubs	240 psi 16,5 bar
Drive Motors	
Displacement per revolution high speed:	0.9 cu in 14.7 cc
Displacement per revolution low speed	2.7 cu in 45 cc
Hydraulic Filters	
High pressure filter:	Beta 3 ≥200
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	15 micron hydraulic 10 micron air breather
Drive motor case drain return filter	Beta 10 ≥2
Accumulator	
Relief pressure Note: This component is not serviceable.	1100 psi 75,8 bar

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 TD2011 L04i 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	1500 rpm
High idle	2350 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 sender	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Oil Pressure sender	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
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	2
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 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 to 60 psi 2,8 to 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

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
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	Low ash oil required
-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 sender	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Oil Pressure sender	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
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	2
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Alternator output	95A @ 14V DC
Fan belt deflection	3/8 to 1/2 inch 9 to 12 mm

Specifications

Perkins 404D-22T Engine

Displacement	134 cu in 2,2 liters
Number of cylinders	4
Bore and Stroke	3.31 x 3.94 inches 84 x 100 mm
Horsepower	58 @ 2500 rpm 44 kW @ 2500 rpm
Firing order	1 - 3 - 4 - 2
Low idle, standby	1000 rpm
Low idle, function enable	1500 rpm
High idle	2500 rpm
Compression ratio	23.3:1
Compression pressure	426 psi 29,4 bar

Pressure (psi) of lowest cylinder must be within 50 psi / 3.45 bar of highest cylinder

Governor	centrifugal mechanical
Valve clearance, cold	
Intake	0.008 in 0,2 mm
Exhaust	0.008 in 0,2 mm
Lubrication system	
Oil pressure, cold (at 2500 rpm)	60 psi 4,1 bar
Oil capacity (including filter)	9.3 quarts 8,8 liters
Oil viscosity requirements	
Below 86°F / 30°C	5W-20
-4°F to 104°F / -20°C to 40°C	10W-30
Above 14°F / -10°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.

Fuel injection system	
Injection pump make	Zexel
Injection pressure	2133 psi 147 bar
Fuel requirement	

For fuel requirements, refer to the engine Operator Manual for your engine.

Alternator output	55A @ 12V DC
Fan belt deflection	3/8 in 10 mm
Starter motor	
Current draw, no load	140-200A
Brush length, new	0.7480 in 19 mm
Brush length, minimum	0.5 in 12,7 mm
Battery	
Type	12V DC, Group 31
Quantity	2
Cold cranking ampere	1000A
Reserve capacity @ 25A rate	200 minutes
Engine coolant	
Capacity	7.7 quarts 7,3 liters

Specifications

Perkins 404F-E22TA Engine

Displacement	134 cu. in 2,2 liters
Number of cylinders	4
Bore and Stroke	3.31 x 3.94 inches 84 x 100 mm
Horsepower net intermittent @ 2800 rpm	55 hp / 41,1 kW
Horsepower continuous @ 2800 rpm	52 hp / 38,8 kW
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Low idle, standby	1100 rpm
Low idle, function enable	1500 rpm
High idle	2500 rpm
Compression ratio	23.3:1
Compression pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	electronic
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)	9.4 - 11.2 quarts 8,9 - 10,6 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-20 CJ4
-4°F to 104°F / -20°C to 40°C	10W-40 CJ4
Above 5°F / -15°C	15W-40 CJ4
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	14.2 psi 1 bar
Fuel injection system	
Injection pump make	Zexel
Injection pressure	2133 psi 147 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	140A - 200A
Cranking speed	200 - 250 rpm
Battery – Engine starting and control system	
Type	12V DC, Group 31
Quantity	2
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Engine coolant	
Capacity	13.3 quarts 12,6 liters
Coolant temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	221°F 105°C
Alternator output	85A @ 12V DC
Fan belt deflection	3/8 to 1/2 inch 9 to 12 mm

Specifications

Machine Torque Specifications

Platform Rotator	
1-8 center bolt, GR 5, dull gray, lubricated	500 ft-lbs 678 Nm
1/2-13 bolts, GR 8, dull gray, LOCTITE® 243™ threadlocker	80 ft-lbs 108 Nm
Turntable rotate assembly	
Rotate bearing mounting bolts, lubricated	180 ft-lbs 244 Nm
Rotate drive hub mounting bolts, lubricated	80 ft-lbs 108 Nm
Backlash plate mounting bolts, lubricated	280 ft-lbs 379 Nm
Drive motors and hubs	
Drive hub mounting bolts, lubricated	180 ft-lbs 217 Nm
Drive motor mounting bolts, dry	110 ft-lbs 149 Nm
Drive motor mounting bolts, lubricated LOCTITE® 243™ threadlocker	85 ft-lbs 115 Nm
Function Pump	
Pump mounting bolts, LOCTITE® 243™ threadlocker	57 ft lbs 77 Nm
Engine vibration isolators	
Compressed height	0.44 in - 0.56 in 11 mm - 14 mm

Machine Component Weights

Primary boom assembly (does not include jib assembly)	4808 lbs 2181 kg
Turntable assembly (does not include boom, jib or engine)	4441 lbs 2015 kg
Counterweight, S-80 XC/HF	12300 lbs 5580 kg
Counterweight, S-85 XC/HF	14200 lbs 6441 kg
Drive chassis assembly (does not include tire options)	8505 lbs 3858 kg
Tire and wheel assembly RT foam filled, max.	646 lbs 293 kg
Tire and wheel assembly High flotation, max.	258 lbs 117 kg
Drive motor and hub	282 lbs 128 kg
Engine assembly, max.	1300 lbs 590 kg
Primary boom lift cylinder	884 lbs 401 kg
Primary boom extend cylinder (includes cables and sheaves)	1000 lbs 454 kg
Jib boom assembly (does not include platform)	363 lbs 165 kg
Jib boom cylinder	62 lbs 28 kg
Oscillate cylinder	99 lbs 45 kg
Platform, 6 ft / 1,8 m	275 lbs 125 kg
Platform, 8 ft / 2,4 m	315 lbs 143 kg
Battery	63 lbs 29 kg

Hydraulic Hose and Fitting Torque Specifications

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

Seal-Lok™ Fittings

(hose end - ORFS)

SAE Dash Size	Torque
-4	18 ft-lbs / 25 Nm
-6	30 ft-lbs / 41 Nm
-8	40 ft-lbs / 55 Nm
-10	60 ft-lbs / 81 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	150 ft-lbs / 205 Nm
-24	230 ft-lbs / 315 Nm

JIC 37° Fittings

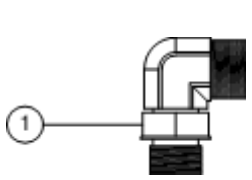
(swivel nut or hose connection)

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

SAE O-ring Boss Port

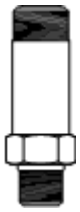
(tube fitting - installed into Aluminum)
(all types)

SAE Dash Size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31,2 Nm
-8	36 ft-lbs / 49 Nm
-10	62 ft-lbs / 84 Nm
-12	84 ft-lbs / 114 Nm
-16	125 ft-lbs / 169,5 Nm
-20	151 ft-lbs / 204,7 Nm
-24	184 ft-lbs / 249,5 Nm



Adjustable Fitting

1 jam nut



Non-adjustable fitting

SAE O-ring Boss Port

(tube fitting - installed into Steel)

SAE Dash Size		Torque
-4	ORFS / 37° (Adj) ORFS (Non-adj) 37° (Non-adj)	15 ft-lbs / 20,3 Nm 26 ft-lbs / 35,3 Nm 22 ft-lbs / 30 Nm
-6	ORFS (Adj / Non-adj) 37° (Adj / Non-adj)	35 ft-lbs / 47,5 Nm 29 ft-lbs / 39,3 Nm
-8	ORFS (Adj / Non-adj) 37° (Adj / Non-adj)	60 ft-lbs / 81,3 Nm 52 ft-lbs / 70,5 Nm
-10	ORFS (Adj / Non-adj) 37° (Adj / Non-adj)	100 ft-lbs / 135,6 Nm 85 ft-lbs / 115,3 Nm
-12	(All types)	135 ft-lbs / 183 Nm
-16	(All types)	200 ft-lbs / 271,2 Nm
-20	(All types)	250 ft-lbs / 339 Nm
-24	(All types)	305 ft-lbs / 413,5 Nm

Specifications

Torque Procedure

Seal-Lok™ fittings

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

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

2 Lubricate the O-ring before installation.

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

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

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

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

JIC 37° fittings

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

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

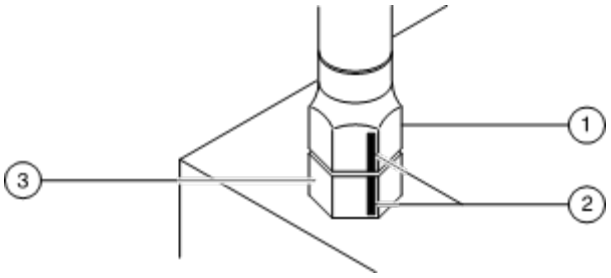


Illustration 1

1 hex nut
2 reference mark
3 body hex fitting

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

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

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

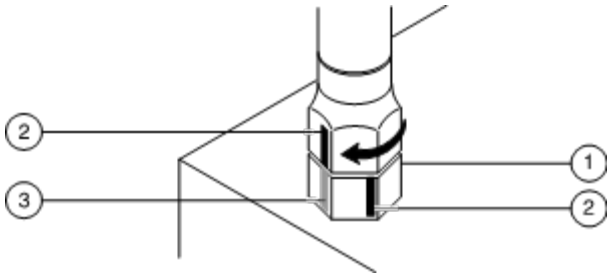


Illustration 2

1 body hex fitting
2 reference mark
3 second mark

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

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

Repair Procedures



Observe and Obey:

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

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

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

Before Repairs Start:

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

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

☑ Use only Genie approved replacement parts.

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

Machine Configuration:

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

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

Repair Procedures

About This Section

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

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

Symbols Legend



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

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

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

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

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

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

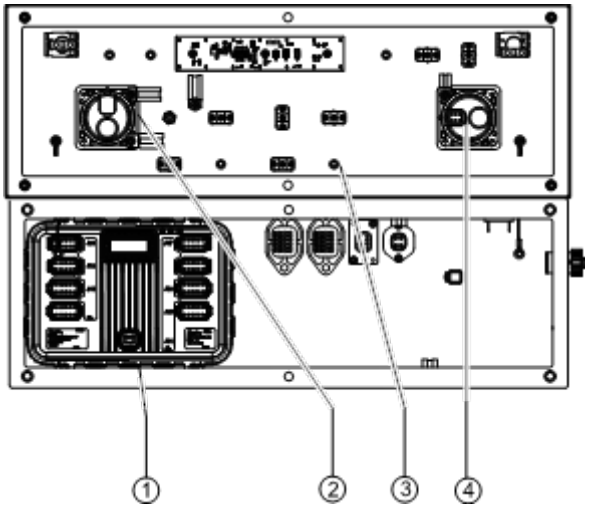
☒ Indicates that an incorrect result has occurred after performing a series of steps.

Control System

1-1 ALC-600 Control Module

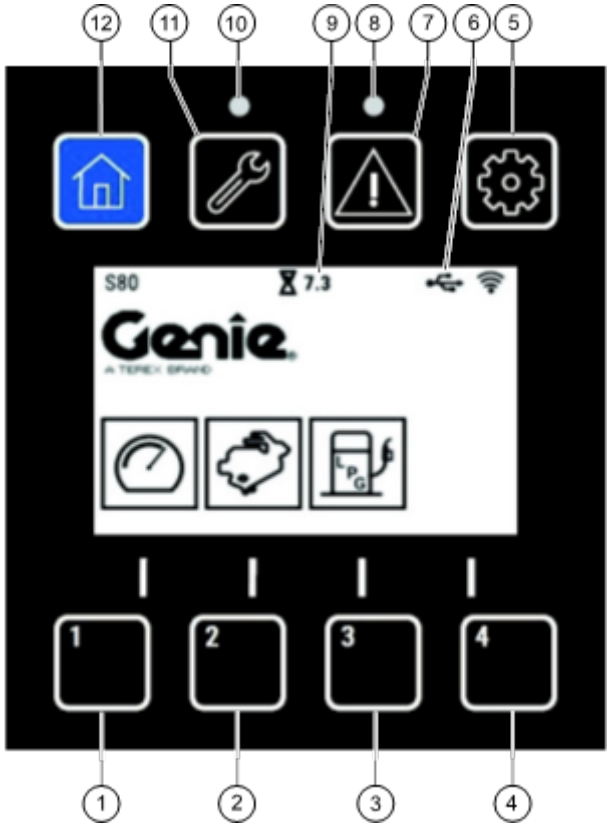
Platform Controls

The platform control box contains the ALC-600 platform Control Module. The platform Control Module receives all signals from the platform switches, joysticks and foot switch, and provides operator feedback through an Indicator Module. The joystick controllers at the platform controls utilize Hall Effect technology and require no calibration. Automatic calibration of center voltage occurs on power up if the signal value is in the valid range. Each joystick controller should operate smoothly and provide proportional speed control over its entire range of motion. The remaining boom functions operate by on/off toggle switches.



1 ALC-600 platform control module
2 primary boom up/down and turntable rotate left/right joystick controller
3 LED indicator module
4 drive/steer joystick controller

1-2 How to Enter ALC-600 Service Mode



ALC-600 Control System Display

1 Number 1 or Escape
2 Number 2 or UP arrow
3 Number 3 or DOWN arrow
4 Number 4 or OK
5 Settings menu
6 (not implemented)
7 Faults menu
8 Fault LED Indicator
9 Engine hours
10 Maintenance LED indicator
11 Maintenance menu
12 Home menu

The Control System on this machine allows access to calibrations through the Service Mode. The procedures that follow will require the operator to be in Service Mode. Service Mode can only be entered at machine start up and requires a special code.

1 At the ground controls, select the ground control mode using the key switch.

2 Push and hold buttons numbered **2** and **3** underneath the display screen.

3 Pull out the red Emergency Stop button.

4 You will be prompted for a password. Enter **3 - 3 - 2 - 4**.

5 Press the Gear button to access the settings menu.

Note: There will be a delay while the menu is being loaded on the display screen.

6 The machine will now operate normally and allow the viewing and modification of calibrations and parameters.

Note: When a parameter is changed in Service Mode, the change is effective immediately when button 4 (OK) is pushed. Machine restart is not required. A confirmation beep accompanies every save (button 4).

Note: Pushing in the red Emergency Stop button will exit Service Mode.

Note: If there has been no input for 10 minutes while in Service Mode, the ALC-600 will power down and Service Mode will be exited, unless the engine is running.

1-3 Full Machine Calibration

Full machine calibration must be completed in the proper sequence when the ALC-600 controller (TCON) in the ground control box 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: Start this procedure with the boom in the stowed position.

Full machine calibration must be completed in the following sequence:

- Select model, engine, tires, and region, then cycle power. Refer to Repair Section Display Module.
- Turntable level sensor. Refer to Repair Procedure, *How to Calibrate the Turntable Level Sensor*.
- Load cell sensor. Refer to Repair Procedure, *How to Calibrate the Load Cell Sensor.*
- 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*.
- Select option configuration. Refer to Repair Section, Display Module, *Options.*

Control System

1-4 Machine Functions

How to Adjust the Joystick Maximum Speed Setting

The maximum speed of a joystick controlled machine function can be modified from the ground controls display. Whenever a hydraulic cylinder, drive motor or hydraulic pump is replaced, the maximum speed setting should be adjusted to maintain optimum performance. The maximum speed settings on the 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.

1 Enter the Service Mode. See Repair Procedure, *How to Enter the Service Mode*.

2 Press the **SETTINGS** button above the display screen.

3 Select **SPEEDS** from the display screen.

4 Navigate to the desired function's Maximum Speed setting.

5 Select the desired setting to change and press **OK**.

6 In the parameter adjustment screen, use the display buttons to change the parameter. Note that the factory default speed is considered 100% for maximum speeds.

7 Scroll and press **OK**. The change is effective immediately.

8 Start the engine from the ground controls.

9 Start a timer and activate the machine function that needs to be adjusted. Using the ground control functions is the same as asking for full joystick deflection at the platform.

10 Record the time it takes for that function to complete a full cycle (ie; boom up).

11 Compare the machine function time with the function times listed in Refer to Specifications, *Performance Specifications*. Determine whether the function time needs to increase or decrease.

12 Adjust the parameter in the ground display to achieve the proper function cycle time.

How to Adjust the Joystick Ramp Rate Setting

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

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

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

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

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

1 Enter the Service Mode. See Repair Procedure, *How to Enter the Service Mode*.

2 Press the **SETTINGS** button above the display screen.

3 Select **SPEEDS** from the display screen.

4 Navigate to the desired function's Ramp setting.

5 Select the desired setting to change and press **OK**.

6 In the parameter adjustment screen, use the display buttons to change the parameter. Note that the ramp rate is expressed in seconds to complete the ramp.

7 Scroll and press **OK**. The change is effective immediately.

8 Start the engine from the ground controls.

9 Start a timer and activate the machine function that needs to be adjusted. Using the ground control functions is the same as asking for full joystick deflection at the platform.

10 Record the time it takes for that function to complete the ramp.

11 Compare the machine function time with the function times listed in Specifications, *Performance Specifications*. Determine whether the ramp time needs to increase or decrease.

12 Adjust the parameter in the ground display to achieve the proper ramp time.

Note: Refer to Repair Procedure, *Display Module Menus* for ramp rates.

Control System

How to Adjust the Joystick Threshold Setting

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

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

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

1 Enter the Service Mode.

2 Press the **SETTINGS** button above the display screen.

3 Select **SPEEDS** from the display screen.

4 Navigate to the desired function's Threshold setting.

5 Select the desired setting to change and press **OK**.

6 In the parameter adjustment screen, use the display buttons to change the parameter. Note that the factory default speed is considered 100% for threshold values.

7 Scroll and press **OK**. The change is effective immediately.

8 Switch the machine control to platform control and start the engine from the platform controls..

9 Using the joystick, verify that the function engages smoothly and without sudden movement or excessive joystick dead spots.

10 Adjust the parameter in the ground display to achieve a smooth function threshold.

1-5 How to Enter ALC600 Software Update Mode

1 Go to the Genie website http://firmware.ghttps://www.genielift.com/en/support/firmwareenielift.com/, select your **Machine Model** and select **Search**.

2 Download the software to a USB flash drive. If zipped, extract the files to the USB flash drive.

3 With the machine off, open the GBOX (ground box) lid and then remove the four Torx head screws securing the Display Controller (DISCON) door and remove the door to expose the USB port.

4 Insert the flash drive into the USB port.

5 Set key switch to ground and pull out the red ground ESTOP while holding buttons 1 and 4.

6 The Display Controller will go into the bootloader mode.

7 Browse and select the desired software. Follow the on-screen guidance to start the update procedure.

8 When complete, turn off machine.

9 Remove USB flash drive, re-install the Display Controller door and close the GBOX (ground box).

10 Power up normally.

11 As the display controller starts, operator shall verify on the start-up screen that the proper software and revision are displayed.

12 Perform a function check.

1-6
Display Module Menus

Screen or Menu	Item	Selection	Default
Display Settings	Backlight	0 - 100%	
	Contrast	0 - 100%	
	Display Inversion	On • Off	Off
Screen or Menu	**Item**	**Selection**	**Default**
Model Configuration	Model	S-40 • S-45 • S-60 • S-65 • S-80 • S-85 • S-60 J • S-80 J	Select Model
	Tires	Rough Terrain • High Float • Trax	Select Tires
(These are locked unless factory defaults are restored)	Engine	Deutz D 2.9L T4 • Deutz TD 2.9L T4 • Deutz TCD 2.2L S5 • Deutz TCD 2.2L T4 • Deutz TD 2.2L S5 • Deutz 2011 L03i • Deutz TD2011 L04i • Ford MSG425 EFI • GM 3.0L • Kubota D1105 • Kubota D1803 • Perkins 404D 22 • Perkins 404D 22T • Perkins 404F E22T • Perkins 404F E22TA	Select Engine
	Region:	ANSI/CSA • AUS • CE	Select Region
(Platform configuration is not locked)	Platform Width	Standard Platform 4m Platform	Standard Platform
	Platform Level	Hydraulic • eLevel	Select Platform Level
Screen or Menu	**Item**	**Selection**	**Default**
Options	Footswitch Timeout	10 sec • 2 min • 30 min	2 min
Note: Some options may not be visible with earlier software revisions.	Drive Priority	On • Off	Off
	Drive Cutout	On • Off	Off
	Platform Level	Priority • Cutout	Priority
	Generator	No Generator • Generator Installed	No Generator
	Contact Alarm	Gen 2 • Gen 1 • Off	Gen 2
	Platform Recirculation	On • Off	Off
	Units	US Customary • Metric	US Customary
	Aircraft Proximity	On • Off	Off
	Fuel Level Sensor	Installed • Not Installed	Installed
	Low Fuel Threshold	10% - 100%	10%
	Alarm Setting	Off • Travel • Motion	Travel
	Standby RPM	Default • High RPM	Default
	Power Save Timeout	10 min • 30 min • 60 min • 4 hrs • Off	Off
	Plat Level Threshold Cal	On • Off	On

Control System

Screen or Menu	Item	Default
Sensor Calibration	Chassis Tilt	Select OK to calibrate
	Load Sense	Select OK to calibrate
	Boom Angle	Select OK to calibrate
	Boom Length	Select OK to calibrate
	Platform Angle	Select OK to calibrate
Screen or Menu	**Item**	**Default**
Drive Speeds	Forward Threshold	1% - 128%, 100% = 800mA
	Reverse Threshold	1% - 134%, 100% = 720mA
	Forward Max	75% - 150%, 100% = 1665mA
	Reverse Max	73% - 150%, 100% = 1575mA
	Forward Out of Stowed High Max	82% - 150%, 100% = 1259mA
	Reverse Out of Stowed High Max	80% - 150%, 100% = 1211mA
Screen or Menu	**Item**	**Default**
Drive Ramps	Standard Acceleration	0.1 - 10 sec, 4 sec
	Standard Deceleration	0.1 - 5 sec, 1 sec
	Torque Switching Deceleration	0.5 - 5 sec, 4 sec
Screen or Menu	**Item**	**Default**
Deutz TD2011 L04i Anti-Stall	Threshold	2100 rpm
	Drive Minimum	50%
	Range	100 rpm
	Hysteresis	125 rpm
Screen or Menu	**Item**	**Default**
Deutz TD 2.9 T4 Anti-Stall	Threshold	2375 rpm
	Drive Minimum	50%
	Range	125 rpm
	Hysteresis	100 rpm

Screen or Menu	Item	Default
Deutz TCD 2.2L T4 Anti-Stall	Threshold	2375 rpm
	Drive Minimum	50%
	Range	125 rpm
	Hysteresis	100 rpm
Screen or Menu	**Item**	**Default**
Deutz TCD 2.2L S5 Anti-Stall	Threshold	2275 rpm
	Drive Minimum	50%
	Range	125 rpm
	Hysteresis	100 rpm
Screen or Menu	**Item**	**Default**
Perkins 404D 22T Anti-Stall	Threshold	2375 rpm
	Drive Minimum	50%
	Range	125 rpm
	Hysteresis	100 rpm
Screen or Menu	**Item**	**Default**
Perkins 404F E22T Anti-Stall	Threshold	2400 rpm
	Drive Minimum	30%
	Range	130 rpm
	Hysteresis	100 rpm
Screen or Menu	**Item**	**Default**
GM 3.0L Anti-Stall	Threshold	2250 rpm
	Drive Minimum	50%
	Range	400 rpm
	Hysteresis	375 rpm
Screen or Menu	**Item**	**Default**
Primary Lift Speeds	Extend Threshold	1% - 212%, 100% = 460mA
	Retract Threshold	1% - 169%, 100% = 460mA
	Up Threshold	1% - 186%, 100% = 560mA
	Down Threshold	1% - 292%, 100% = 400mA
	Extend Max	66% - 150%, 100% = 1499mA
	Retract Max	71% - 150%, 100% = 1096mA
	Retracted Up Max	32% - 150%, 100% = 1530mA
	Retracted Down Max	32% - 150%, 100% = 1937mA

Control System

Screen or Menu	Item	Default
Primary Lift Ramps	Extend Accelerating Rate	5000 ms max, 1000 ms min, 2500 ms
	Extend Decelerating Rate	5000 ms max, 250 ms min, 1000 ms
	Retract Accelerating Rate	5000 ms max, 1000 ms min, 2500 ms
	Retract Decelerating Rate	5000 ms max, 500 ms min, 1000 ms
	Up Accelerating Rate	5000 ms max, 1000 ms min, 3000 ms
	Up Decelerating Rate	5000 ms max, 500 ms min, 3000 ms
	Down Accelerating Rate	5000 ms max, 1000 ms min, 3000 ms
	Down Decelerating Rate	5000 ms max, 1000 ms min, 1000 ms
Screen or Menu	**Item**	**Default**
Turntable Speeds	Rotate CW Threshold	1% - 105%, 100% = 800mA
	Rotate CCW Threshold	1% - 105%, 100% = 800mA
	Rotate CW Max	84% - 150%, 100% = 1210mA
	Rotate CCW Max	84% - 150%, 100% = 1210mA
	CW Out of Stow Max	96% - 150%, 100% = 881mA
	CCW Out of Stow Max	96% - 150%, 100% = 881mA
Screen or Menu	**Item**	**Default**
Turntable Ramps	CW Accelerating	1 - 10 sec, 3 sec
	CW Decelerating	0.5 - 2 sec, 2 sec
	CCW Accelerating	1 - 10 sec, 3 sec
	CCW Decelerating	0.5 - 2 sec, 2 sec
Screen or Menu	**Item**	**Default**
Jib Boom and Platform Speeds	Jib Up Threshold	1% - 177%, 100% = 500mA
	Jib Down Threshold	1% - 173%, 100% = 500mA
	Platform Level Up Threshold	1% - 144%, 100% = 690mA
	Platform Level Down Threshold	1% - 146%, 100% = 680mA
	Jib Up Max	62% - 150%. 100% = 1014mA
	Jib Down Max	63% - 150%. 100% = 990mA
	Platform Level Up Max	73% - 150%, 100% = 1100mA
	Platform Level Down Max	72% - 150%, 100% = 1100mA

Screen or Menu	Item	Default
Jib and Platform Ramps	Jib Up/Down Ramp	0.2 - 2 sec. 0.75 sec
	Platform Level Ramp	0.2 - 2 sec. 0.5 sec
Screen or Menu	**Item**	**Default**
Machine Disable Options	Drive Disable	On / Off
	Machine Disable	On / Off
	Remote Disable	Disable Engine Start • Drive Speed Cripple • Lift Speed Cripple
Reset Defaults		OK to reset Model Configuration and Options
Software Update		OK to enter Software Update Mode

Control System

1-7 How to Replace the Display Controller (DISCON) Module

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

2 Disconnect the negative terminal from the start battery and auxiliary battery, if equipped.

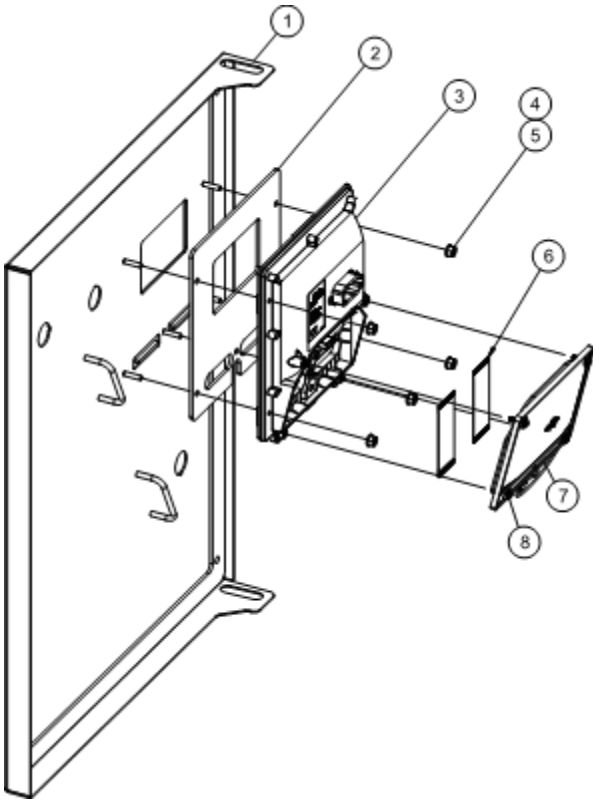


Illustration 1

1 ground box lid
2 DISCON gasket
3 DISCON
4 8/32 nylock nuts
5 #8 flat washers
6 ribbon cable
7 DISCON door
8 Torx head screws

3 Open the ground box lid (1) and disconnect the wire harness going to the display controller (DISCON).

4 Remove the DISCON door from the back by loosening the four Torx head screws (8) and remove the two ribbon cables (6) connecting the ground box overlay to the DISCON.

Note the orientation of the cables for reassembly.

5 Remove the DISCON from the ground control box lid by removing the five hex nuts and washers (4, 5). Discard the nuts and washers.

Note the lanyard attachment point for reassembly.

6 Remove the old DISCON gasket (2) from the ground box lid and clean the lid surface from any dirt, oil or old adhesive residue. Use a 99% solution of isopropyl alcohol to clean the surface. Allow the surface to completely dry.

Note: Both the ground box lid and new gasket must be 70° F / 21° C or higher at the time of application. Application of the new gasket at lower temperatures is not recommended.

7 Peel the adhesive protective film from the back of the new gasket. Carefully line up the new gasket over the ground box lid, making sure the cutouts for the LCD screen, ribbon cables and mounting studs are centered and lining up with the gasket. Apply the new gasket to the ground box lid and work from the center out to eliminate air bubbles and make sure all the gasket edges are securely fixed.

Note: Once applied it is not recommended to lift the gasket and attempt to reposition it.

8 Install the new DISCON onto the ground box lid and fasten it using the new hex nuts and washers. All five fastening points must be used. Attach the DISCON door's lanyard to the DISCON's mounting stud.

9 Evenly tighten the nuts, beginning with the lower center nut, working out and then up.

10 Install the new ribbon cables, connecting the ground box overlay to the DISCON and reinstall the DISCON door, using the Torx head screws removed in step 4. Be sure to fully lock the tabs after the ribbon cables have been fully inserted.

11 Reconnect the wire harness going to the DISCON, then close and fasten the ground box lid.

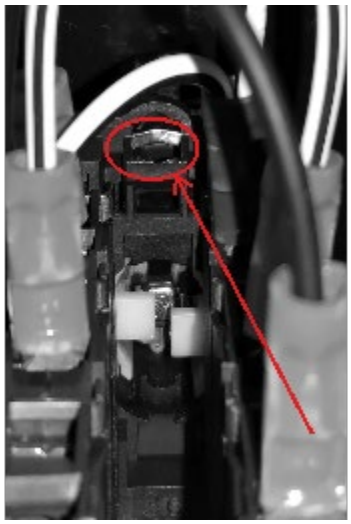
12 Reconnect the negative terminal to the start battery and auxiliary batteries, if equipped.

1-8 How to Replace the Ground Box Control Overlay

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

2 Disconnect the negative terminal from the start battery and auxiliary battery, if equipped.

3 Open the ground control box and remove the switch contacts from the function enable switch, key switch and the red emergency stop button. Do not disconnect the wires. Insert a small screwdriver into the loop at the base of the contacts and engage the release mechanism.



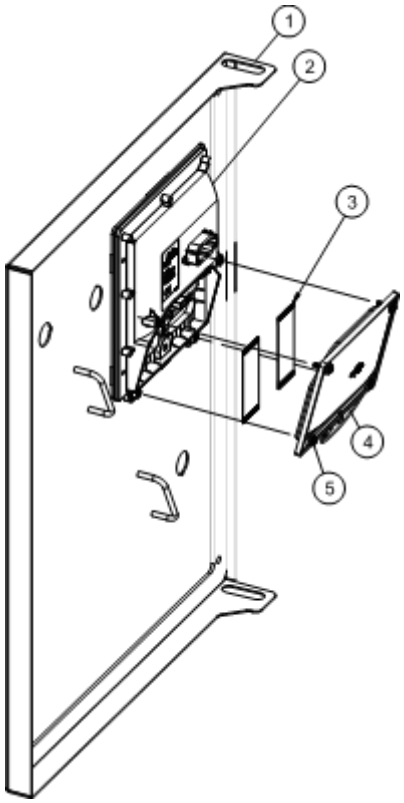
Control System

4 Unscrew the nut holding the buttons and key switch and remove the key switch and buttons.

Note the orientation of the key switch so it can be reassembled in the same position.

5 Disconnect the wire harness connected to the DISCON and cut the zip ties securing the harness to the ground box lid. Do not remove the wire harness from the ground box.

6 Remove the DISCON door (4) and disconnect the ribbon cables (3) from the Display Controller (DISCON) (2). Note the orientation of the cables for reassembling.



1 ground box lid
2 DISCON
3 ribbon cables
4 DISCON door
5 Torx head screws

7 Remove the ground box lid (1) from the ground box.

8 Remove the old overlay and clean the ground box lid surface from any dirt, oils or old adhesive residue. Clean the lid with 99% isopropyl alcohol. Allow the surface to completely dry.

9 Before placing the new overlay, make sure the temperature of the lid and overlay is between 80-100° F / 26-38° C. Application below 80° F / 26° C is not recommended.

10 Peel the adhesive protective film from the back of the overlay. Carefully align the overlay, making sure the LCD screen cutout, push buttons and key switch are centered. Apply the overlay to the ground box, applying pressure evenly to eliminate any air bubbles.

Note: Pay particular attention to the outside edges, the LCD cutout edges and the area around the ribbon cables, making sure there is complete contact between the overlay and the ground box.

Note: It is not recommended peeling and reapplying the overlay, so take time to align the overlay before making contact with the ground box.

11 Maintain the temperature of 80-100° F / 26-38° C for a minimum of 20 minutes to allow the adhesive to cure.

12 Install the provided ribbon cables, first to the overlay and then the DISCON. Be sure the connectors are applied evenly in the sockets and the tabs are fully locked.

13 Reinstall the DISCON door using the Torx head screws (5). Tighten, but do not overtighten.

14 Reinstall the ground box door to the ground box, using the fasteners removed in step 7. Tighten the fasteners securely.

15 Reinstall the E-Stop button, function enable button and key switch and the contact assemblies.

16 Reinstall the wire harness from the ground box to the DISCON. Secure the harness to the ground box lid using zip ties.

17 Close and fasten the ground box lid.

18 Reconnect the negative terminal to the start battery and auxiliary batteries, if equipped.

Platform Components

2-1 Platform

How to Remove the Platform

1 Remove the cable clamp from the top of the platform mounting weldment.

2 Remove the mounting fasteners from the power to platform outlet box bracket. Lay the outlet box and bracket assembly off to the side. Do not disconnect the wiring.

3 Remove the foot switch mounting fasteners.

4 Remove the cover plate from the bottom of the foot switch to access the foot switch wire terminals.

5 Tag and disconnect the foot switch wiring from the foot switch. Remove the cable from the back of the platform.

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

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

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

Note: If your machine is equipped with an airline to platform option, the airline must be disconnected from the platform before removal.

7 Support and secure the platform to an appropriate lifting device.

8 Remove the platform mounting fasteners and remove the platform from the machine.

⚠WARNING Crushing hazard. The platform could become unstable and fall when it is removed from the machine if not properly supported.

2-2
Platform Leveling Cylinder

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

How to Remove the Platform Leveling Cylinder

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

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

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

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

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

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

4 Remove the pin retaining fastener from the slave cylinder rod-end pivot pin. Use a soft metal drift to drive the rod-end pivot pin out.

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

5 Remove the external snap rings from the barrel-end pivot pin.

6 Use a soft metal drift to drive the barrel-end pivot pin out.

7 Carefully pull the cylinder out of the primary boom to access the hydraulic hoses.

8 Tag, disconnect and plug the hydraulic hoses from the slave 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.

How to Bleed the Slave Cylinder

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

1 Raise the boom to a horizontal position.

2 Move the platform level toggle switch up and down through two platform leveling cycles to remove any air that might be in the system.

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

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

3 S-85: Support the jib boom leveling arms and the platform mounting weldment with an appropriate lifting device. Do not apply any lifting pressure.

4 Remove the mounting bolts from the platform mounting weldment. 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.

5 Support the platform rotator with an appropriate lifting device. Do not apply any lifting pressure.

S-80:

6 Support the rod end of the platform leveling slave cylinder. Protect the cylinder rod from damage.

7 Remove the pivot pin retaining fasteners from both the slave cylinder rod-end pivot pin and the rotator pivot pin.

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

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

Note: When installing the platform rotator fasteners, torque the fasteners to specifications.

S-85:

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

10 Support the jib boom leveling arms.

11 Use a soft metal drift to drive both pins out, then remove the platform rotator from the machine.

⚠CAUTION Bodily injury hazard. The jib boom leveling arms may fall if not properly supported.

12 Lower the jib boom leveling arms.

⚠WARNING Crushing hazard. The platform rotator could fall when removed from the machine if not properly supported.

Note: When installing the platform rotator fasteners, torque the fasteners to specifications.

How to Bleed the Platform Rotator

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

1 Move the function enable toggle switch to either side and activate the platform rotate toggle switch to the right then the left through two platform rotation cycles, then hold the switch to the right position until the platform is fully rotated to the right.

2 Place a suitable container underneath the platform rotator.

3 Open the top bleed screw on the rotator, but do not remove it.

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

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

⚠WARNING Crushing hazard. Keep clear of the platform during rotation.

Platform Components

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

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

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

⚠WARNING Crushing hazard. Keep clear of the platform during rotation.

7 Clean up any hydraulic oil that may have spilled.

8 Rotate the platform fully in both directions and inspect the bleed screws for leaks.

2-4 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. 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 Enter Service Mode. Refer to Repair Procedure, *How to Enter the Service Mode*.

4 Press the settings button above the display and select the Calibrations menu.

5 Navigate to the Sensor calibration screen.

6 Navigate to the Load Sense calibration screen.

7 Select and start the calibration procedure.

8 Follow the on-screen prompts to set the zero load.

9 Follow the prompts to accept the weight.

10 Calibration is now complete.

⊙ Exit Service Mode.

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.

1 Fully retract and lower the 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 Enter Service Mode. Refer to Repair Procedure, *How to Enter the Service Mode*.

4 Press the settings button above the display and select the Calibrations menu.

5 Navigate to the Sensor calibration screen.

6 Navigate to the Load Sense calibration screen.

7 Select and start the calibration procedure.

8 Follow the on-screen prompts to set the zero load.

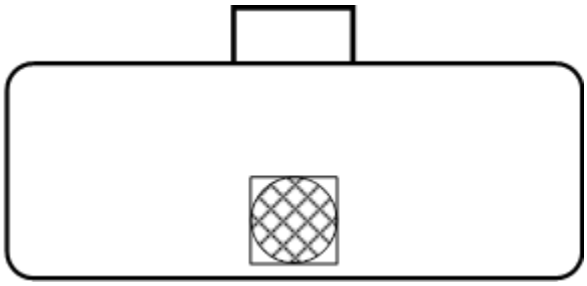
9 Continue with the on screen prompts to set the maximum load.

Platform Components

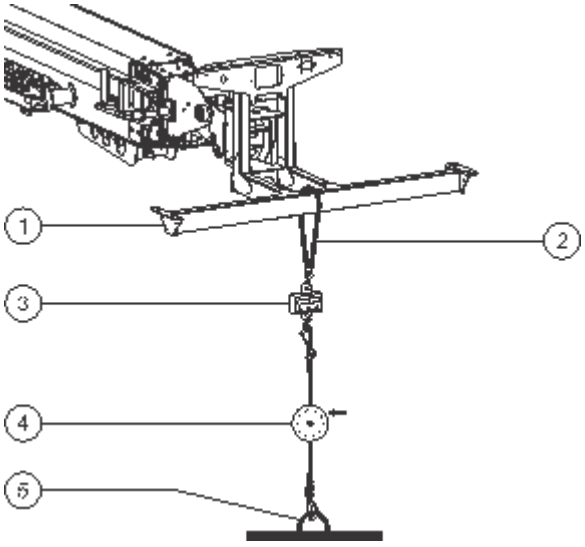
10 Place a test weight on the platform floor using a suitable lifting device. Place the weight near the center entry point of the platform, as far away from the operator controls as possible.

Weight = 1,000 lbs / 454 kg

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



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



Platform hidden from illustration for clarity

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

11 Follow the prompts to accept the weight.

12 Calibration is now complete.

13 Exit Service Mode.

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

Confirm calibration:

15 Start the engine from the ground controls.

16 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.

17 Test all machine functions from the ground controls.

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

18 Remove the weight or rated load from the platform.

How to Replace the Load Cell Sensor

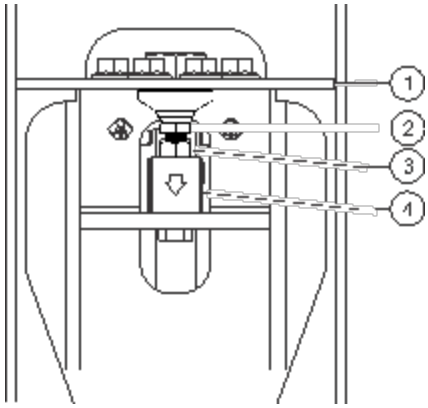
Note: The preload adjustment should only be performed after the load cell sensor has been replaced.

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.

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.*

Jib Boom Components

3-1
Jib Boom

How to Remove the Jib Boom

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

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

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

Note: If the platform overload components are disassembled and/or removed from the platform support, the platform overload system will need to be calibrated. Refer to Repair Procedure, *How to Calibrate the Platform Overload System*.

2 Tag and disconnect the electrical connector from the platform load sense cell.

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

4 Remove the hose and cable clamp from the jib boom pivot pin. Lay all hoses and cables to the side.

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

5 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.

6 Attach a lifting strap from an overhead crane to the jib boom assembly.

7 Place blocks under the platform leveling cylinder for support. Protect the cylinder rod from damage.

8 Remove the pin retaining fastener from the slave cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

⚠WARNING Crushing hazard. The jib boom could fall when the slave cylinder rod-end pivot pin is removed if not properly attached to the overhead crane.

9 Remove the pin retaining fastener from the jib boom bellcrank to primary boom pivot pin.

10 Use a soft metal drift to remove the pin and carefully remove the jib boom assembly from the primary boom.

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

3-2
Jib Boom Lift Cylinder

How to Remove the Jib Boom Lift Cylinder

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

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

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

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

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

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

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

4 Use a soft metal drift to tap the jib boom lift cylinder rod-end pivot pin half way out. Then lower one of the leveling arms to the ground. Tap the pin the other direction and lower the opposite leveling arm. Do not remove the pin.

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

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

⚠WARNING Crushing hazard. The platform and jib boom could become unbalanced and fall when the jib boom barrel-end pivot pin is removed if not properly supported.

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

8 Use a soft metal drift to remove the jib boom lift cylinder rod-end pin. Remove the 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 suitable lifting device.

Boom Components

4-1
Cable Track

The boom cable track guides 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 boom cable track is necessary when performing major repairs that involve removing the boom.

How to Remove the Cable Track

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

1 Open the platform control box.

2 Tag and disconnect the foot switch wiring from the terminal strip inside the platform control box.

3 Loosen the squeeze connector and remove the foot switch cable from the control box.

4 Disconnect the wire connectors from the bottom of the platform control box.

Note: When installing the wire connectors to the bottom of the platform control box, match the color of the connectors to those on the control box to be sure they are installed in the correct location.

5 Remove the mounting fasteners from the power to platform outlet box bracket. Lay the outlet box and bracket assembly off to the side.

6 **S-80XC**: Tag, disconnect and plug the hydraulic hoses from the counterbalance valve manifold located on the platform rotator. Cap the fittings on the manifold.

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

7 Tag, disconnect and plug the hydraulic hoses from the platform leveling slave cylinder at the platform manifold and cap the fittings.

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

8 Remove the timing link/timing link cam pin and gently rest the timing link against the counterweight.

9 **S-85XC**: Remove the hose and cable cover from the side of the jib boom.

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

11 Tag, disconnect and plug the wiring from the jib boom/platform rotate select manifold.

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

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

All models:

13 From the ground controls, raise the boom to a horizontal position.

14 Remove the cotter pin from the upper cable track at the platform end of the boom.

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

15 Remove the cable track guide fasteners from the cable track guides at the platform end of the boom. Remove the cable track guides from the boom.

16 Remove the cable clamp from the pivot end of the boom.

17 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.

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

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

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

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

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

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

Boom Components

How to Repair the Cable Track

NOTICE

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

Note: A cable track repair kit is available through Genie Service Parts, part no. 77896. The kit includes a 4-link section of cable track.

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

2 Carefully remove the snap rings from each end of the damaged section of cable track.

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

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

NOTICE

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

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

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

NOTICE

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

7 Connect the ends of the replacement cable track section to the existing cable track using the snap rings.

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

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

4-2 Boom

How to Shim the Boom

1 Measure each wear pad.

Boom wear pad specifications	
Boom number one	**Minimum**
Bottom wear pads (extension end of boom)	0.50 inch 12.7 mm
Top and side wear pads (extension end of boom)	0.625 inch 15.9 mm
Boom number two	
Top, bottom and side wear pads (extension end of boom)	0.50 inch 12.7 mm
Bottom wear pads (pivot end of boom)	0.50 inch 12.7 mm
Top and side wear pads (pivot end of boom)	0.625 inch 15.9 mm
Boom number three	
Top, bottom and side wear pads (pivot end of boom)	0.50 inch 12.7 mm

Note: Replace the pad if thickness is less than minimum specification. If thickness is more than minimum specification, perform the following procedure.

2 Extend the boom until the wear pads are accessible.

3 Loosen the wear pad mounting fasteners.

4 Install the new shims under the wear pad to obtain zero clearance and zero drag.

5 Tighten the mounting fasteners.

6 Extend and retract the boom through an entire cycle. Check for tight spots that could cause binding or scraping.

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

Boom Components

How to Remove the Boom

DANGER Tip-over hazard. This procedure requires the removal of the turntable counterweight. Failure to remove the counterweight before removing the boom assembly will result in the machine tipping over. Do not remove the boom without first removing the counterweight.

DANGER Tip-over hazard. When installing the boom onto the machine, the boom assembly must be first installed prior to the installation of the counterweight. If the counterweight is installed before the boom assembly, the machine will tip over resulting in death or serious injury.

DANGER Tip-over hazard. The turntable counterweight is essential for machine stability. Failure to install the counterweight after installing the boom assembly will compromise machine stability resulting in the machine tipping over. Death or serious injury will result.

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.

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

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

3 Raise the boom until the short and long link arm to boom pivot pins are above the turntable covers.

4 Place a block of wood measuring 4 x 4 x 60 inches / 10 x 10 x 152 cm under the long link arm, across the turntable covers.

5 Slowly lower the boom until the long link arm contacts the wood block. Do not rest the entire weight of the boom on the block. Turn the machine off.

NOTICE Component damage hazard. The turntable covers can become damaged if the weight of the boom is allowed to rest on the block.

6 Place wood blocks between the short link arm and the turntable weldment for support..

7 Securely attach shackles and lifting straps or chains with a minimum rating of 7.5 tons / 7000 kg to the lifting points on the top of the turntable counterweight. Attach the lifting straps or chains to a 7.5 ton / 7000 kg overhead crane.

Note: A spreader bar and other hardware may be needed to safely remove the counterweight.

8 Slowly operate the overhead crane to apply tension to the lifting straps. Do not attempt to lift the machine with the overhead crane.

Boom Components

9 Locate and remove the counterweight retaining fastener at the center of the counterweight. Carefully lift the counterweight upwards and remove the counterweight from the machine. Set the counterweight on the ground. Do not leave the counterweight suspended above the ground.

⚠ DANGER Crushing hazard. The turntable counterweight will fall if not properly supported by the overhead crane resulting in death or serious injury. Keep personnel away from the area when removing the counterweight.

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

11 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.

12 Disconnect the electrical connector from the string potentiometer.

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

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

14 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*.

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

16 Attach lifting straps from a 5 ton / 5000 kg overhead crane to each end of the boom. Support the boom. Do not apply any lifting pressure.

17 Support and secure the rod end of the boom lift cylinder to a second overhead crane or similar lifting device.

18 Remove the lift cylinder rod-end pivot pin retaining fasteners. Use a soft metal drift to remove the pin.

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

19 Using auxiliary power, activate the boom down function so the cylinder will retract. Retract the cylinder just enough until the rod end of the cylinder will clear the mounting bracket on the boom. Turn the machine off.

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

20 Using the overhead crane, carefully lower the boom lift cylinder and allow it to rest on the boom rest pad. Protect the cylinder rod from damage.

21 Remove the boom end cover retaining fasteners and remove the cover.

Boom Components

22 Tag, disconnect and plug the 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.

23 Tag and disconnect the electrical connector for the cable break limit switch.

24 Tag and disconnect all boom wire harness electrical connectors located at the pivot end of the boom.

25 Support the platform leveling master cylinder. Remove the master cylinder rod-end pivot pin retaining fasteners. Place a rod through the pin and twist to remove. Carefully lower the master cylinder down.

26 Tag, disconnect and plug the hydraulic hoses from the bulkhead fittings at the pivot end of the boom. Cap the bulkhead fittings.

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

27 Remove the external snap rings from both boom pivot pins at the short and long link arms. Do not remove the pins.

28 Using the overhead crane, adjust the boom as necessary to relieve pressure from the pivot pins.

29 Use a soft metal drift to remove each boom pivot pin. Carefully remove the boom assembly from the machine and place it on a structure capable of supporting it.

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

⚠CAUTION Crushing hazard. The long and short link arms may fall if not properly supported when the boom pivot pins are removed.

Boom Components

4-3
Boom Lift Cylinder

The boom lift cylinder raises and lowers the boom. The boom lift cylinder is equipped with counterbalance valves 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 to a horizontal position.

2 Attach a 5 ton / 5000 kg overhead crane to the boom at the platform end for support. Do not lift the boom.

3 Support and secure both ends of the boom lift cylinder to a second overhead crane or similar lifting device.

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

⚠WARNING Crushing hazard. The boom will fall if not properly supported when the primary boom rod-end pivot pin is removed.

5 Using auxiliary power, activate the boom down function so the cylinder will retract. Retract the cylinder just enough until the rod end of the cylinder will clear the mounting bracket on the boom. Turn the machine off.

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

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

7 Remove the pin retaining fasteners from the boom lift cylinder barrel-end pivot pins. Do not remove the pins.

8 Use a slide hammer to remove the barrel-end pivot pins.

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

9 Move the boom lift cylinder towards the counterweight end of the machine. Rotate the boom lift cylinder until the barrel-end pivot pin bores will clear the boom linkage.

10 Carefully remove the boom lift cylinder from the machine.

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

4-4
Boom Extension Cylinder

The boom extension cylinder is located inside the boom assembly and incorporates cables and pulleys that are responsible for extending the number 3 boom tube. The primary boom extension cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the 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.*

Note: Perform this procedure with the boom fully retracted.

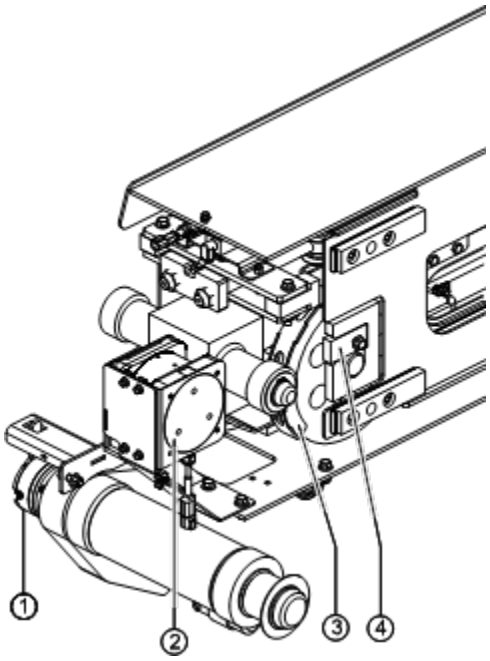
1 Raise the boom to a horizontal position.

2 Remove the boom end cover retaining fasteners and remove the cover.

3 Remove the access covers from both sides of the boom at the pivot end.

4 Remove the mounting plates and the string potentiometer.

5 Fully loosen the lock nuts on the extend cables. Do not remove the nuts.



1 boom angle sensor
2 string potentiometer
3 cable guard
4 cable guard retaining plate

6 Loosen the retract cable nut at the platform end of the boom. Pull the cable rod from the support and let it hang down.

7 Remove the cable guard fasteners and remove the cable guard.

8 Locate the retaining plates that secure the retract cables to the inside of the number 3 boom tube.

9 Remove the cable retaining plates and pull the retract cables off of the pulleys. Lay the cables flat and out of the way.

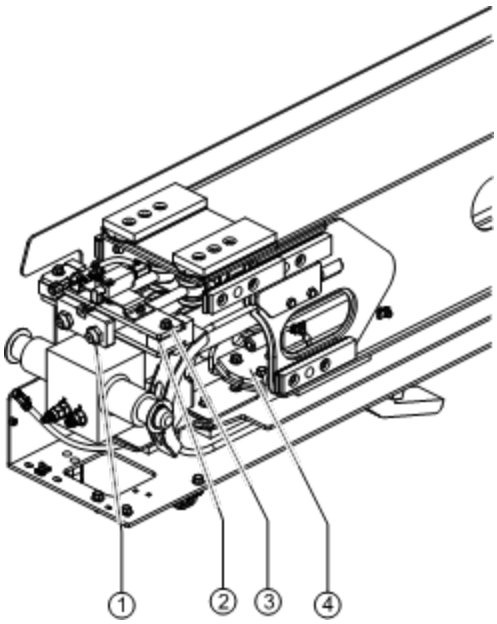
Boom Components

10 Remove the fasteners from the retaining blocks from the extension cylinder saddle. Remove the blocks.

Note: Access the fasteners through the access hole in the outer boom tube at the pivot end.

11 Disconnect the wire connector to the extend cable break limit switch.

12 Remove the retaining fasteners that secure the extend cable mounting plates to the inside of the number 1 boom tube.



1 extend cable lock nuts
2 extend cable mounting plate
3 extend cable mounting plate fastener
4 extend cable bracket

13 Pull back on the extend cable mounting plate until it clears the blocks welded to the inside of the number 1 boom tube.

14 Lift up the extend cable mounting plate and push the extend cables towards the platform to create slack in the cables. Rest the cable and bracket assembly on top of the extend cylinder.

15 Locate the lower extend cable bracket on the bottom of the number 3 boom tube.

16 Remove the lower extend cable bracket mounting fasteners and pull back on the bracket to release it from the number 3 boom tube.

17 While pushing the lower extend cable bracket towards the platform, pull the extend cable mounting plate towards the pivot end of the boom.

18 Secure the extend cable bracket and cables to the cylinder to prevent them from falling off when removing the cylinder.

19 Remove the external snap rings from the extension cylinder pin at the pivot end of the boom.

20 Use a soft metal drift to remove the pin.

21 Tag, disconnect and plug the 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.

22 Attach a lifting strap from a 5 ton / 5000 kg overhead crane to the lug at the rod end of the boom extension cylinder.

23 Lift the boom extension cylinder with the crane until it clears the cylinder saddle inside the number 2 boom tube.

24 Carefully support and slide the extension cylinder out of the boom.

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

NOTICE Component damage hazard. Be careful not to damage the cable break limit switch.

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

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

4-5 Boom Extend and Retract Cables

How to Adjust the Boom Extend/Retract Cables

The boom extend/retract cables are responsible for the extension and retraction of the number 3 boom tube. Proper adjustment of the boom extend/retract cables and related components on a regular basis is essential to good machine performance and safe machine operation. The boom extend and retract functions should operate smoothly and be free of hesitation, jerking and unusual noise.

Note: Perform this procedure with the boom in a horizontal position.

1 Start the engine from the ground controls.

2 Raise the boom to a horizontal position.

3 Fully retract the boom.

4 Stop the engine.

5 Remove the boom end cover retaining fasteners and remove the cover.

6 Inspect the threaded ends of the boom extend cables. The threads must be clean and in good condition with no damaged threads.

7 Locate the retract cable adjustment nut on the bottom of the number 1 boom tube at the platform end of the boom. Loosen the nut, but do not remove the nut.

Boom Components

8 Locate the extend cable adjustment nuts on the counterweight end of boom tube #1. Refer to Illustration 1. Loosen the nylock nuts and jam nuts on the cable tension equalizer bracket. Do not remove the nuts.

9 Adjust the extend cable adjustment nut to obtain 6 3/8 inches/16.2 cm to 6 1/2 inches/16.5 cm between the platform end of boom tube #2 and boom tube #3. Refer to illustration 2. There should be approximately 1/2 inch of exposed threads on the adjustment bolts. Refer to Illustration 1.

Note: If the cables have been replaced, be sure the adjustment nuts have been replaced. Do not re-use the existing nuts.

10 Extend the boom until there is approximately 3 feet / 1 m of travel left. Do not fully extend the boom.

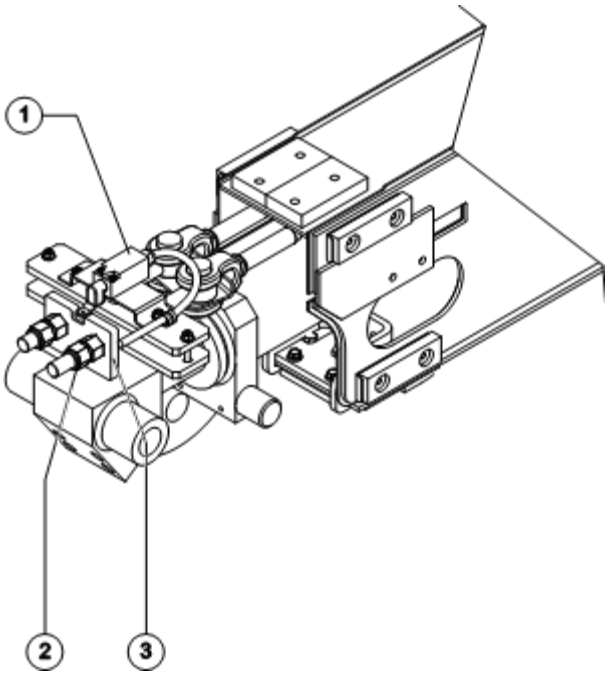


Illustration 1

1 cable break limit switch
2 extend cable adjustment nut
3 extend cable pivot plate

11 Locate the retract cable adjustment nut on the bottom of the number 1 boom tube at the platform end of the boom.

12 Using a dial type torque wrench, torque the retract cable adjustment nut to 32-36 ft lbs / 43-49 Nm using gentle and steady torque.

13 Retract and extend the boom approximately 3 feet / 1 m two times and stop during the extension cycle. This will create slack in the retract cables.

Note: Be sure to not fully extend the boom. Stop when there is approximately 3 feet / 1 m of travel left.

14 Repeat steps 12 and 13 two to three times.

15 Fully extend the boom then retract the boom approximately 12 inches / 30 cm.

16 At the pivot end of the boom, visually inspect the boom extend cables for even cable droop or sag.

Note: If the boom extend cables are uneven, tighten the boom extend cable adjustment nut at the pivot end of the boom for the appropriate cable.

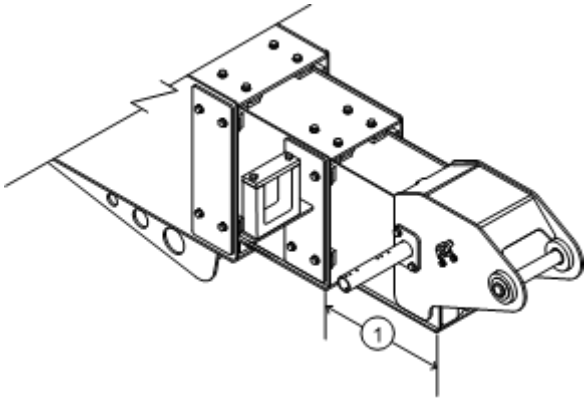


Illustration 2

1 6.375 inches / 16.2 cm

17 Visually inspect the cable break limit switch arm to be sure the wheel of the limit switch arm is centered in the notch of the pivot plate.

Note: If the boom extend cables are adjusted evenly, the wheel of the limit switch arm should be centered in the notch of the pivot plate.

18 Install the boom end cover at the pivot end of the boom.

19 Fully retract and lower the boom to the stowed position.

How to Replace the Boom Extend/Retract Cables

Note: The cable pulleys must also be replaced when replacing the cables.

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

Boom extend cables:

2 Remove the cables from the lower boom extend cable bracket that attaches to the number 3 boom tube.

3 Remove the rue rings and clevis pins from the boom extend cables located near the extend cable break limit switch.

4 Remove the external snap rings from the boom extend cable pulley pivot pin. Use a soft metal drift to remove the pin.

Note: When driving the pivot pin out, be sure to drive it from the shaped end of the pin.

5 Remove the pulley and boom extend cables from the extension cylinder assembly. Discard the old cables and pulleys.

6 Route the new boom extend cables through the boom extend pulley bracket.

7 Install the new boom extend cable pulley, pivot pin and snap rings.

Note: Be sure the boom extend cables are routed through the grooves of the pulley and the upper wear pad on the extension cylinder.

Boom Components

8 Install the boom extend cable clevis pins and rue rings to the pivot plate near the cable break limit switch.

9 Install the boom extend cables to the lower extend cable bracket that mounts to the number 3 boom tube.

Boom retract cables:

10 Remove the rue rings and clevis pins from the boom retract cables at the platform end of the boom.

11 Attach the cable pulling tool or a rope to one of the boom retract cables at the pivot end of the boom.

Note: A cable pulling tool is available through Genie Service Parts Department (Genie part no. 94510)

12 At the platform end of the boom, pull on the boom retract cable that has the rope attached to it.

13 Pull the old cable completely out of the boom tube. Remove the rope. Discard the old boom retract cable.

14 Securely attach the rope to the same end of the new boom retract cable.

15 At the pivot end of the boom, carefully pull the rope with the new retract cable attached.

16 Pull the new cable towards the pivot end of the boom until the end of the cable is at the end of the boom tube. Remove the rope.

17 Repeat steps 14 through 19 for the other boom retract cable.

18 At the platform end of the boom, install the retract cables, clevis pins and rue rings to the adjustment plate.

19 Remove and discard the old boom retract pulleys from the pivot end of the boom extension cylinder.

20 Install the new boom retract pulleys to the pivot end of the boom extension cylinder.

21 Install the boom extension cylinder assembly into the boom.

Note: Before lowering the extension cylinder into the saddles of the number 1 boom tube, wrap the boom retract cables around the pulleys.

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

4-6 Platform Leveling Master Cylinder

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

How to Remove the Platform Leveling Master Cylinder

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

1 Raise the boom until the master cylinder rod-end pivot pin is accessible.

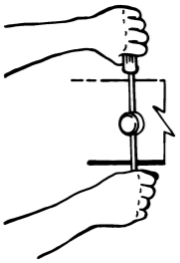
2 Remove the turntable end cover to access the master cylinder.

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

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

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

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



6 Attach a lifting strap from an overhead crane to the lug on the rod end of the master cylinder.

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

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

9 Remove the master cylinder from the machine.

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

Boom Components

4-7 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: Perform this procedure with the machine on a firm, level surface with the boom in the stowed position.

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

Note: This procedure will establish the cross-check angle with the boom limit switch LST3S. If LST3S does not switch its state properly during the calibration, the calibration will be invalidated.

1 Fully retract and lower the boom. Ensure the boom is in contact with the boom rest pad.

2 Enter Service Mode. Refer to Repair Procedure, *How to Enter the Service Mode*.

3 Press the settings button above the display and navigate to the Sensor Calibrations menu.

4 Navigate to the Boom Angle Sensor calibration screen.

5 Select and start the calibration procedure.

6 Start the engine.

7 When the display prompts the operator to lower the boom, press and hold the function enable button and the boom down buttons until the display indicates that the lower calibration point has been obtained. This may require holding the buttons for several seconds after the boom has touched the rest pad.

8 Press **OK** on the display to continue with the procedure to capture the maximum angle point.

9 Operate the boom up function until the boom reaches its maximum angle. Continue holding the function enable and boom up buttons for several seconds until the display indicates that the upper calibration point has been obtained. This may require holding the buttons for several seconds after the boom reaches its maximum angle.

10 Follow the on-screen prompts to lower the boom until the display indicates the calibration is complete. If this step isn't done, the boom will be in the safety envelope when the calibration procedure ends

11 The calibration is now complete.

12 Exit the Service Mode.

4-8
Boom Length Sensor

How to Calibrate the Primary Boom Length Sensor

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

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

Note: This procedure will establish the cross-check angle with the boom limit switch LSB1RS. If LSB1RS does not switch its state properly during calibration, the calibration will be invalidated.

1 Fully retract the boom. Ensure the boom angle is above 65°.

2 Enter Service Mode. See Repair Procedure, *How to Enter Service Mode*.

3 Press the settings button above the display and navigate to Sensor Calibrations.

4 Navigate to the Boom Length Sensor calibration screen.

5 Select and start the calibration procedure.

6 Start the engine.

7 When the display prompts the operator to retract the boom, press and hold the function enable and boom retract buttons until the display indicates the retracted calibration point has been obtained. This may require holding the buttons for several seconds after the boom has fully retracted.

8 Press the **OK** button to continue to capture the maximum extension point.

9 Press the function enable and boom extend buttons until the boom reaches its maximum extension. Continue holding the buttons for several seconds after the boom reaches its maximum extension until the display indicates the calibration point has been captured.

10 The calibration is complete.

11 Exit the Service Mode.

Engines

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.

Type "B" flex plates combines the pump coupler, as part of the flex plate, which is installed onto the engine flywheel.



Type "B"
(flexplate with coupler combined)

How to Remove the Flex Plate

Note: Perform this procedure with the engine off and cool to the touch.

1 Open the engine side turntable cover.

2 Tag and disconnect the battery cables from the battery(s).

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

3 Tag and disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

Deutz TD2011L04i models:

1 Tag and disconnect the wiring from the bell housing.

2 Remove the U-bolt from the exhaust flex pipe at the muffler.

⚠ CAUTION

Burn hazard. Beware of hot engine components. Contact with hot engine components may result in severe burns.

3 Remove the muffler bracket retaining fasteners from bell housing. Remove the muffler and bracket assembly from the engine.

4 Support the drive pump with an appropriate lifting device. Remove all of the remaining bell housing engine fasteners.

5 Carefully pull the pump and bell housing assembly away from the engine and secure it from moving.

NOTICE

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

6 Remove the flex plate mounting fasteners, and remove the flex plate from the engine flywheel.

Deutz TD 2.9, TCD 2.2 models:

1 Tag and disconnect the wiring from the bell housing.

2 Support the drive pump with an appropriate lifting device. Remove all of the remaining bell housing engine fasteners.

3 Carefully pull the pump and bell housing assembly away from the engine and secure it from moving.

NOTICE

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

4 Remove the flex plate mounting fasteners, and remove the flex plate from the engine flywheel.

Engines

Perkins models:

1 Tag and disconnect the wiring from the bell housing.

2 Remove the fasteners supporting the muffler assembly from the bell housing.

⚠ CAUTION Burn hazard. Beware of hot engine components. Contact with hot engine components may result in severe burns.

3 Support the drive pump with an appropriate lifting device. Remove all of the remaining bell housing engine fasteners.

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

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

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

GM model:

1 Tag and disconnect the wire harness from the oxygen sensor.

2 Remove the exhaust pipe heat shield fasteners from the top of the muffler.

⚠ CAUTION Burn hazard. Beware of hot engine components. Contact with hot engine components may result in severe burns.

3 Remove the muffler retainer bracket fasteners.

4 Remove the muffler fasteners securing the muffler to the exhaust manifold. Remove the muffler from the bracket.

5 Remove the relay housing from the muffler mount. Do not disconnect the relays.

6 Disconnect and remove the ECM from the muffler mount.

7 Close the shutoff valve on the Liquid Petroleum Gas (LPG) tank by turning it clockwise (if equipped).

8 Unbolt the EPR valve from the muffler mount. Leave the hoses attached to the EPR valve.

9 Remove the muffler mount.

10 Support the drive pump with an appropriate lifting device. Remove all of pump plate mounting fasteners.

11 Carefully pull the pump and bell housing assembly away from the engine and secure it from moving.

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

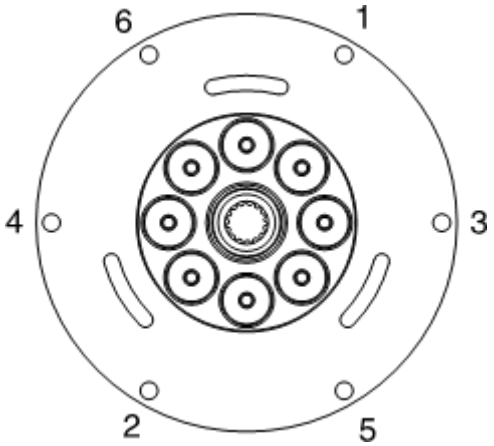
12 Remove the flex plate mounting fasteners, and remove the flex plate from the engine flywheel.

How to Install the Flex Plate

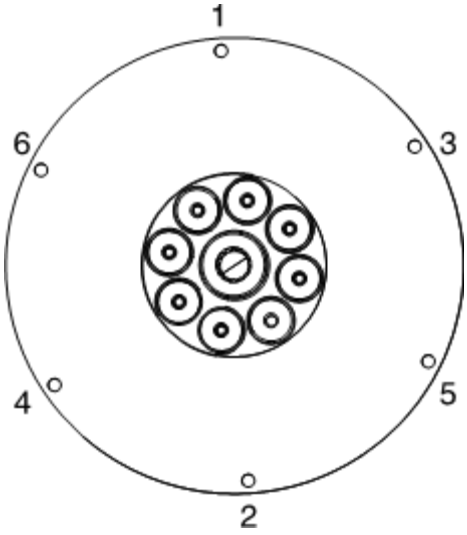
1 Install the flex plate onto the engine flywheel with the raised spline towards the pump. Apply Loctite® removable thread locker to the mounting fasteners.

Note: Torque the flex plate mounting fasteners in two stages.

2 Torque the flex plate mounting bolts in sequence to 28 ft-lbs / 38 Nm. Torque the flex plate mounting bolts in sequence to 40 ft-lbs / 54 Nm.



Deutz, Perkins



GM

3 Install the pump coupler onto the pump shaft with the set screw toward the pump. Leave the appropriate gap between coupler and pump end plate for your engine.

4 Apply Loctite® removable thread locker to the pump coupler set screw. Torque the set screw to 61 ft-lbs / 83 Nm.

5 Install the pump onto the pump mounting plate. Apply Loctite® removable thread sealant to the pump retaining fasteners. Torque the pump retaining fasteners to 57 ft-lbs / 77 Nm.

NOTICE

Component damage hazard. Do not force the drive pump during installation or the flex plate teeth may become damaged.

6 Install the pump coupler onto the pump shaft with the set screw toward the pump. Leave the appropriate gap between coupler and pump end plate for your engine.

7 Install the pump and pump mounting plate assembly onto the engine. Apply Loctite® removable thread locker to the mounting screws.

Engines

How to Install the Pump and Bell Housing Assembly

1 Install the pump and bell housing assembly.

Deutz models: Torque the bell housing mounting bolts in sequence to 28 ft-lbs / 38 Nm. Then torque the bell housing mounting bolts in sequence to 40 ft-lbs / 54 Nm.

Perkins 404D models: Torque the bell housing mounting bolts labeled "B" in sequence to 28 ft-lbs / 38 Nm and the mounting bolts labeled "A" to 49 ft-lbs / 66 Nm. Then torque the bell housing mounting bolts labeled "B" in sequence to 40 ft-lbs / 54 Nm and the mounting bolts labeled "A" to 70 ft-lbs / 95 Nm.

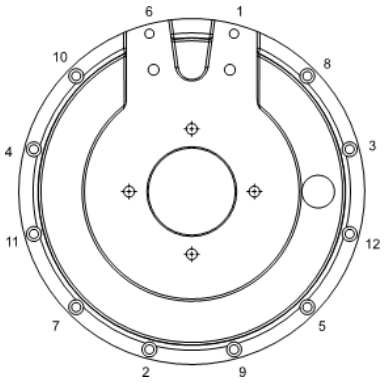
GM 3.0L model: Torque the bell housing mounting bolts in sequence to 28 ft-lbs / 38 Nm. Then torque the bell housing mounting in sequence to 40 ft-lbs / 54 Nm bolts.

NOTICE

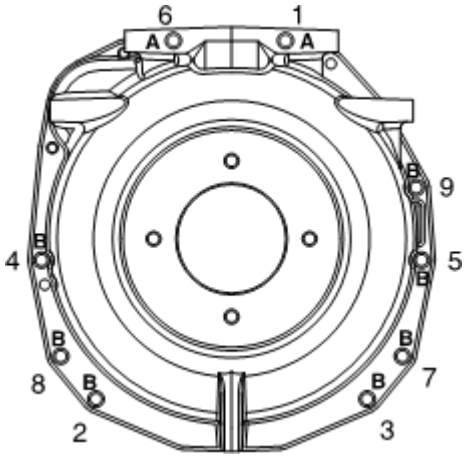
Component damage hazard. When installing the pump, do not force the pump coupler into the flexplate or damage to the pump shaft seal may occur.

NOTICE

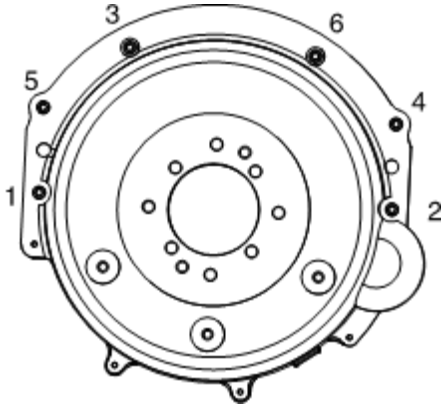
Component damage hazard. Do not force the drive pump during installation or the flex plate teeth may become damaged.



Deutz



Perkins



GM

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.

Hydraulic Pump

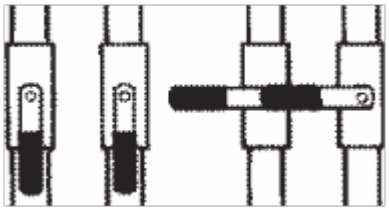
6-1
Function Pump

How to Remove the Function Pump

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

1 Locate the 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.



open closed

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 pump mounting bolts. 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.

6-2
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

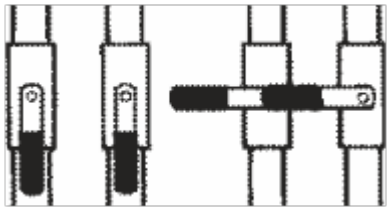
NOTICE

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.

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.

Hydraulic Pump

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. 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.

1 Connect a 0 to 600 psi / 0 to 40 bar pressure gauge to the diagnostic nipple on the drive pump.

2 **GM models:** If equipped, close the valve on the LPG tank, then disconnect the hose from the tank. Move the fuel select toggle switch to the LPG position.

Deutz and Perkins models: Disconnect the engine wiring harness from the fuel solenoid at the injector pump.

3 Crank the engine with the starter motor for 15 seconds, wait 15 seconds, then crank the engine an additional 15 seconds or until the pressure reaches 300 psi / 20.7 bar.

4 **GM models**: If equipped, connect the LPG hose to the LPG tank and open the valve on the tank.

Deutz and Perkins models: Connect the engine wiring harness to the fuel solenoid.

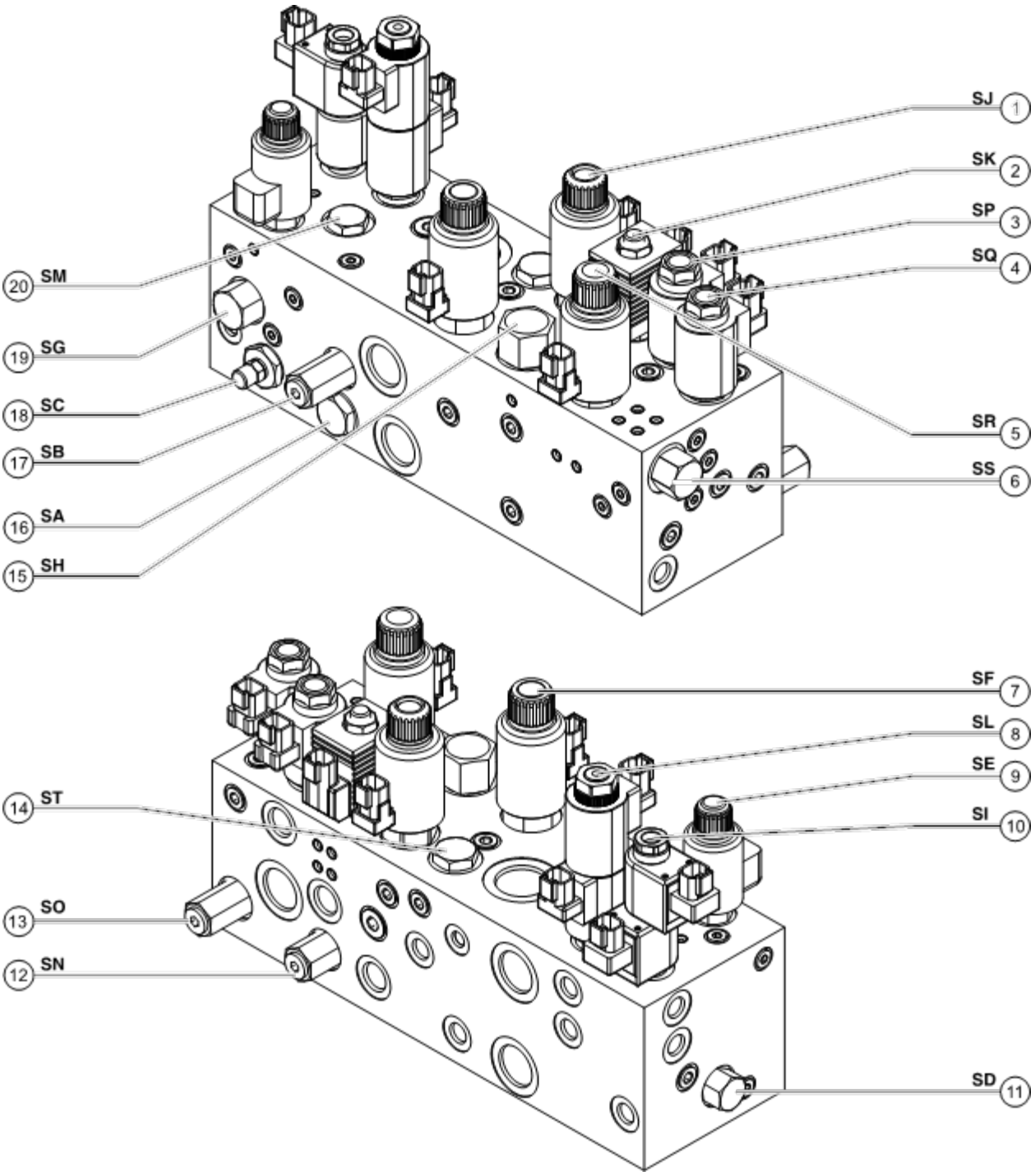
5 Start the engine from the ground controls. Check for hydraulic leaks.

7-1
Function Manifold Components

The function manifold assembly is located on the hydraulic tank side of the machine next to the batteries.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid Valve, 2 position 3 way	SJ	Boom up	50-55 ft-lbs / 68-75 Nm
2	Solenoid Valve, 2 position 3 way	SK	Boom down	30-35 ft-lbs / 41-47 Nm
3	Solenoid Valve, NO, Poppet	SP	Extend	33-37 ft-lbs / 45-50 Nm
4	Solenoid Valve, NO, Poppet	SQ	Retract	33-37 ft-lbs / 45-50 Nm
5	Proportional solenoid valve	SR	Extend proportional	20-25 ft-lbs / 27-34 Nm
6	Differential sensing valve	SS	Boom extend	30-35 ft-lbs / 41-47 Nm
7	Proportional solenoid valve	SF	Boom up/down proportional	33-37 ft-lbs / 45-50 Nm
8	Solenoid valve, 3 position 4 way	SL	Steering directional	20-25 ft-lbs / 27-34 Nm
9	Proportional solenoid valve	SE	Swing proportional	20-25 ft-lbs / 27-34 Nm
10	Solenoid valve, 3 position 4 way	SI	Swing directional	26-30 ft-lbs / 35-41 Nm
11	Flow regulator valve	SD	Oscillate flow control	20-25 ft-lbs / 27-34 Nm
12	Relief valve, 2600 psi / 179 bar	SN	Boom down relief	20-25 ft-lbs / 27-34 Nm
13	Relief valve, 2400 psi / 165 bar	SO	Boom extend relief	20-25 ft-lbs / 27-34 Nm
14	Check valve, 30 psi / 2.1 bar	ST	Return check valve	30-35 ft-lbs / 41-47 Nm
15	Differential sensing valve	SH	Primary lift	30-35 ft-lbs / 41-47 Nm
16	Check valve	SA	Back flow / check function pump	30-35 ft-lbs / 41-47 Nm
17	Relief valve, 3200 psi / 221 bar	SB	System relief	20-25 ft-lbs / 27-34 Nm
18	Pressure reducing valve	SC	Oscillate pressure control	30-35 ft-lbs / 41-47 Nm
19	Differential sensing valve	SG	Differential sensing/turntable rotate	30-35 ft-lbs / 41-47 Nm
20	Flow regulator valve	SM	Steering flow control	20-25 ft-lbs / 27-34 Nm

Manifolds


SJ 1
SK 2
SP 3
SQ 4
SR 5
SS 6
SF 7
SL 8
SE 9
SI 10
SD 11
SN 12
SO 13
ST 14
SH 15
SA 16
SB 17
SC 18
SG 19
SM 20

7-2 Valve Adjustments - Function Manifold

How to Adjust the System 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.

Note: Auxiliary power will be used to perform this procedure. Do not start the engine.

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the diagnostic nipple (ptest) located next to the auxiliary pump.

2 Simultaneously activate and hold the auxiliary power button and the primary boom retract button with the primary boom fully retracted. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

3 Locate the system relief valve on the function manifold. Use a wrench to hold the relief valve and remove the cap.

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

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

5 Repeat step 2 to confirm relief valve pressure.

6 Remove the pressure gauge.

How to Adjust the Boom Down Relief Valve

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

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

Note: Auxiliary power will be used to perform this procedure. Do not start the engine.

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the diagnostic nipple located next to the auxiliary pump.

2 Simultaneously activate and hold the auxiliary power button and the primary boom down button with the boom fully lowered. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

3 Use a wrench to hold the relief valve and remove the cap on the function manifold.

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

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

5 Repeat step 2 to confirm relief valve pressure.

6 Remove the pressure gauge.

Manifolds

How to Adjust the Boom Extend Relief Valve

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

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

1 From the ground controls, start the engine and raise the boom to the horizontal position.

2 Fully extend the boom. Turn the engine off.

3 Connect a 0 to 3000 psi / 0 to 200 bar pressure gauge to the diagnostic nipple located next to the auxiliary pump.

4 Simultaneously activate and hold the auxiliary power button and the primary boom extend button with the boom fully extended. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

5 Locate the boom extend relief valve on the function manifold. Use a wrench to hold the relief valve and remove the cap.

6 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.

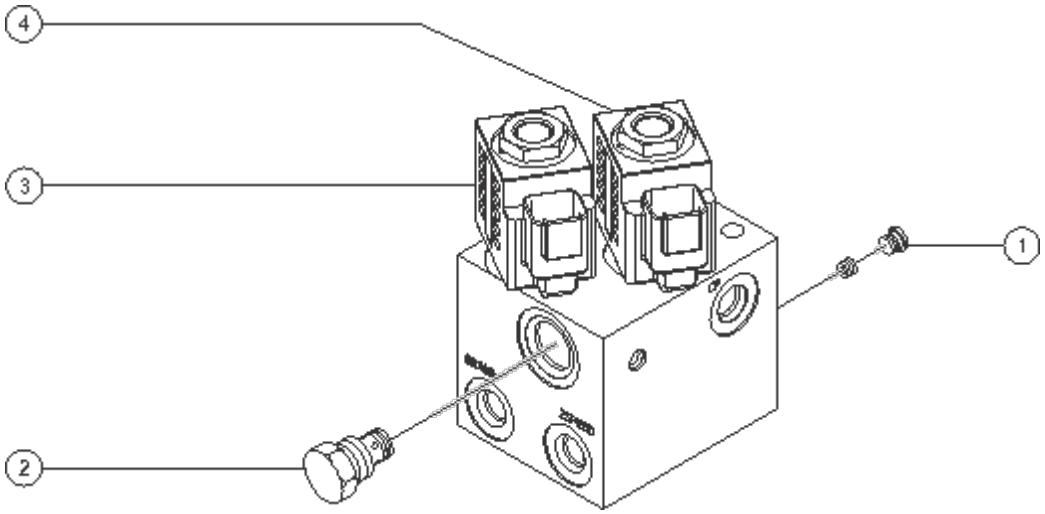
7 Repeat step 2 to confirm relief valve pressure.

8 Remove the pressure gauge.

7-3
Brake / Two Speed Manifold Components

The brake/two speed manifold is mounted on the engine side of the machine above the hydraulic filters.

Index No.	Description	Schematic Item	Function	Torque
1	Orifice, 0.025 inch / 0,635 mm	BE	Brake release circuit	
2	Check valve	BF	Brake release circuit	20-25 ft-lbs / 27-34 Nm
3	Solenoid Valve, 2 position 3 way	BG	Brake release	20-25 ft-lbs / 27-34 Nm
4	Solenoid Valve, 2 position 3 way	BH	Two-speed drive motor shift	20-25 ft-lbs / 27-34 Nm

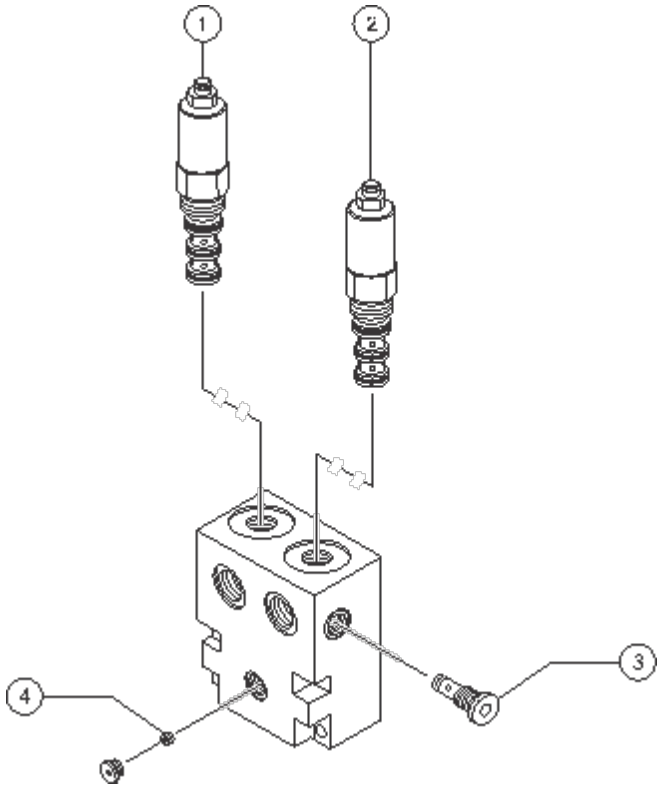


Manifolds

7-4
Turntable Rotation Manifold Components

The turntable rotation manifold is mounted to the turntable rotation motor at the ground control side of the machine.

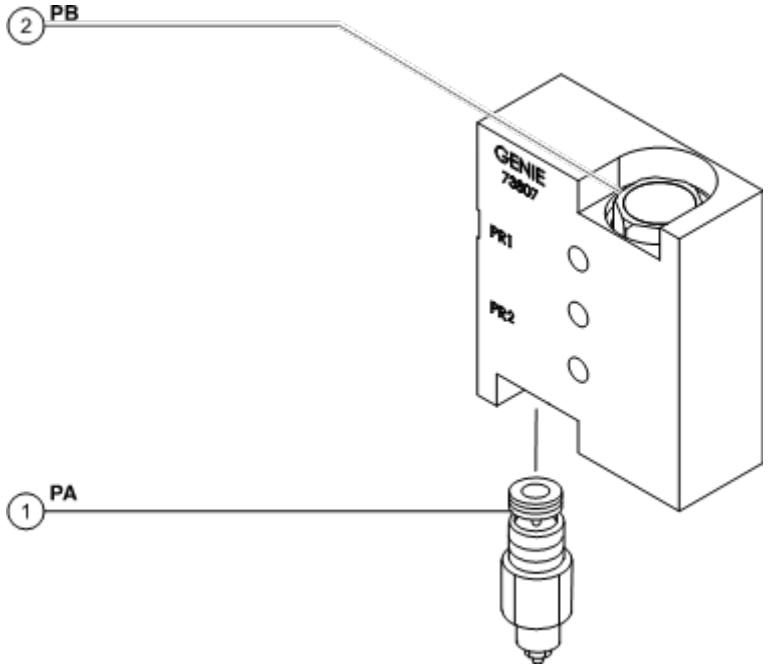
Index No.	Description	Schematic Item	Function	Torque
1	Counterbalance valve, 1000 psi / 69 bar	RA	Turntable rotate left	25-30 ft-lbs / 34-41 Nm
2	Counterbalance valve, 1000 psi / 69 bar	RB	Turntable rotate right	25-30 ft-lbs / 34-41 Nm
3	Shuttle valve, 2 position 3 way	RD	Turntable rotation brake release	8-10 ft-lbs / 10-15 Nm
4	Orifice, 0.030 inch / 0,8 mm	RC	Turntable rotate brake circuit	



7-5
Platform Rotate Manifold Components

The platform rotate manifold is mounted on the platform rotator.

Index No.	Description	Schematic Item	Function	Torque
1	Counterbalance valve, 3300 psi / 227 bar	PA	Platform rotate right	37-44 ft-lbs / 50-60 Nm
2	Counterbalance valve, 3300 psi / 227 bar	PB	Platform rotate left	37-44 ft-lbs / 50-60 Nm

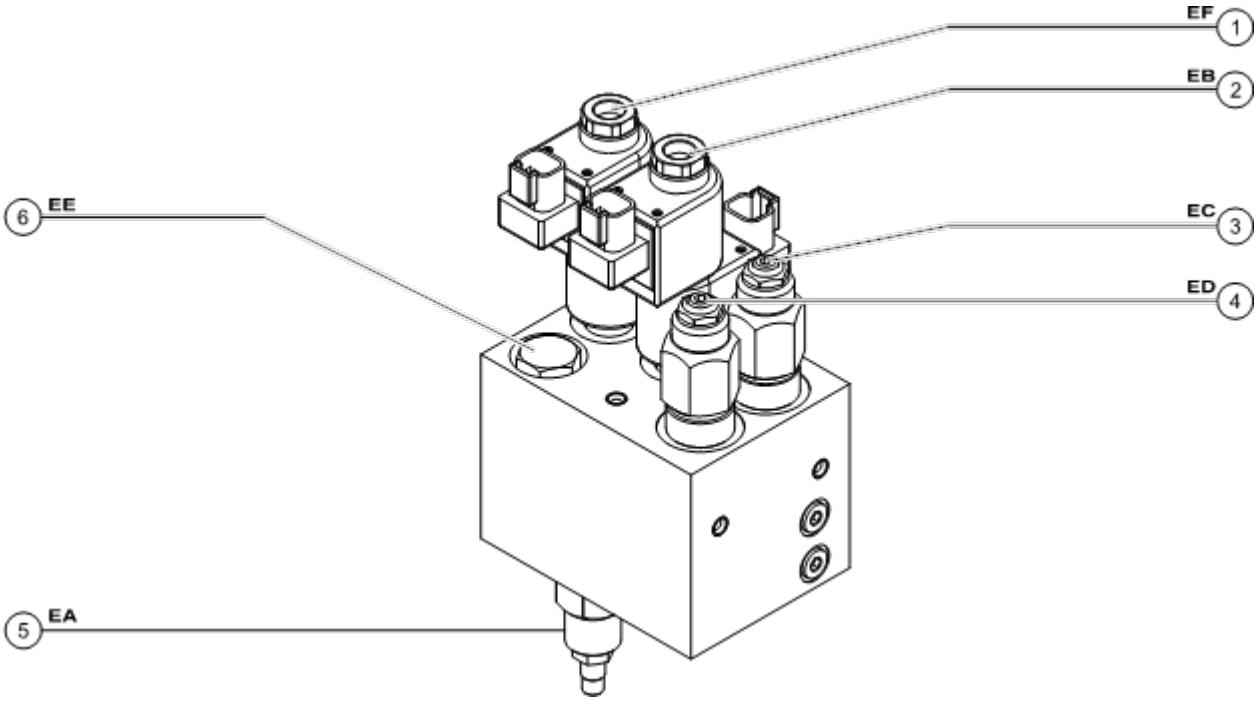


Manifolds

7-6
Platform Manifold Components, S-80 XC

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

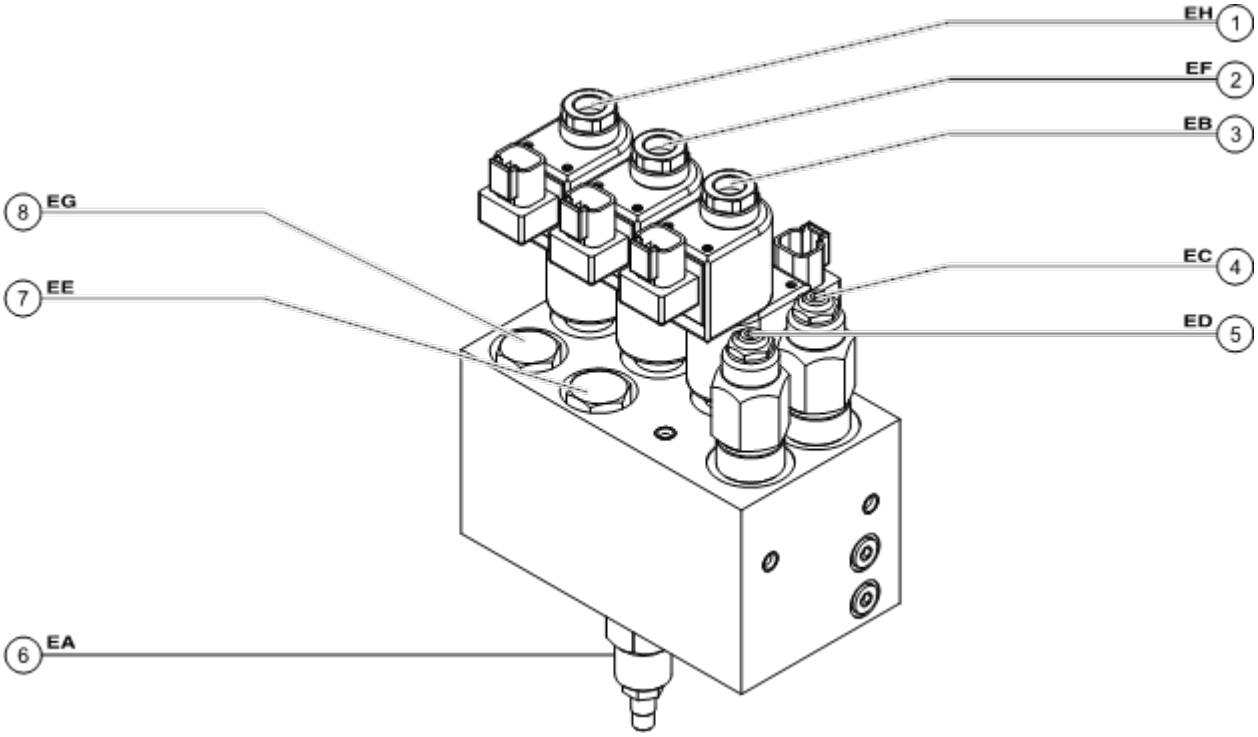
Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 3 position 4 way	EF	Platform rotate CW/CCW	30-35 ft-lbs / 41-47 Nm
2	Solenoid valve, 3 position 4 way	EB	Platform level up/down	30-35 ft-lbs / 41-47 Nm
3	Counterbalance valve, 3500 psi	EC	Platform level CB valve	26-30 ft-lbs / 35-41 Nm
4	Counterbalance valve, 3500 psi	ED	Platform level CB valve	26-30 ft-lbs / 35-41 Nm
5	Needle valve	EA	Platform level	20-25 ft-lbs / 27-34 Nm
6	Pressure comp., flow control valve	EE	Platform rotate flow control	33-37 ft-lbs / 45-50 Nm



7-7
Platform Manifold Components, S-85 XC

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

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 3 position 4 way	EF	Platform rotate CW/CCW	30-35 ft-lbs / 41-47 Nm
2	Solenoid valve, 3 position 4 way	EB	Platform level up/down	30-35 ft-lbs / 41-47 Nm
3	Solenoid valve, 3 position 4 way	EH	Jib boom up/down	30-35 ft-lbs / 41-47 Nm
4	Counterbalance valve, 3500 psi	EC	Platform level CB valve	26-30 ft-lbs / 35-41 Nm
5	Counterbalance valve, 3500 psi	ED	Platform level CB valve	26-30 ft-lbs / 35-41 Nm
6	Needle valve	EA	Platform level	20-25 ft-lbs / 27-34 Nm
7	Pressure comp., flow control valve	EE	Platform rotate flow control	33-37 ft-lbs / 45-50 Nm
8	Pressure comp., flow control valve	EG	Jib up/down flow control	33-37 ft-lbs / 45-50 Nm



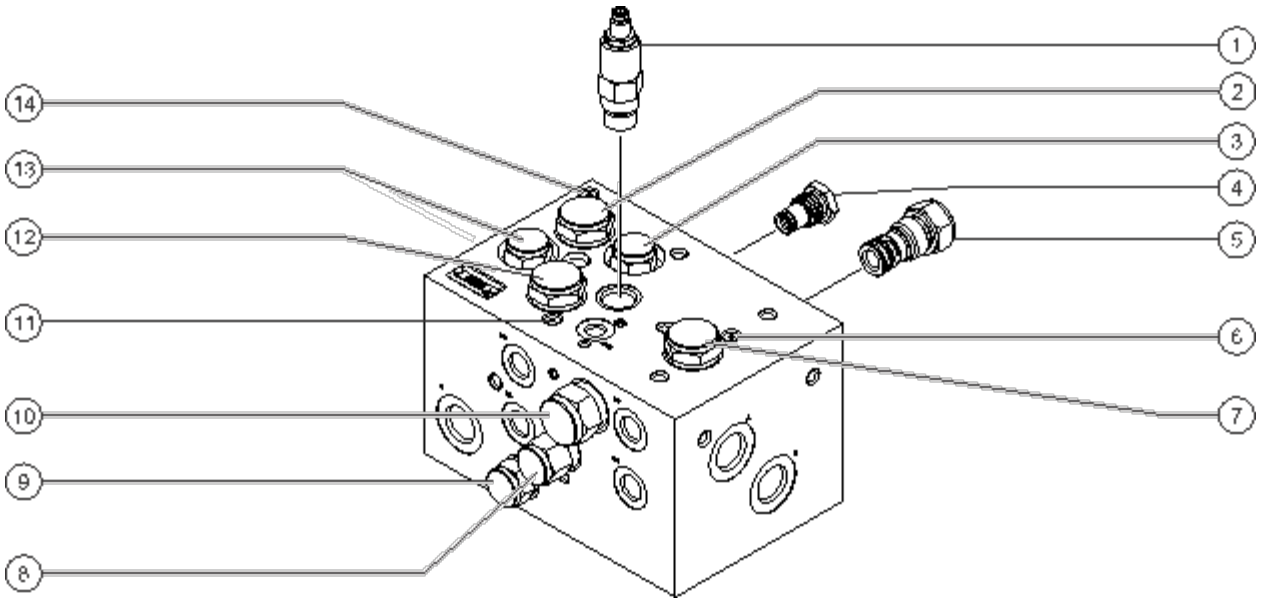
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7-8
Traction Manifold Components, 4WD

The drive manifold is mounted inside the drive chassis at the non-steer end of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Relief valve, 280 psi / 19.3 bar	DE	Charge pressure circuit	35-40 ft-lbs / 48-54 Nm
2	Flow divider/combiner valve	DB	Controls flow to non-steer end drive motors in forward and reverse	80-90 ft-lbs / 108-122 Nm
3	Check valve	DF	Steer end drive motor circuit	35-40 ft-lbs / 48-54 Nm
4	Check valve	DC	Non-steer end drive motor circuit	35-40 ft-lbs / 48-54 Nm
5	Flow divider/combiner valve	DK	Controls flow to flow divider/combiner valves 2 and 13	80-90 ft-lbs / 108-122 Nm
6	Check valve	DD	Non-steer end drive motor circuit	60-70 ft-lbs / 81-95 Nm
7	Orifice, 0.040 inch / 1 mm	DL	Equalizes pressure on both sides of flow divider/combiner valve 5	
8	Orifice, 0.040 inch / 1 mm	DA	Equalizes pressure on both sides of flow divider/combiner valve 2	
9	Orifice, 0.040 inch / 1 mm	DN	Equalizes pressure on both sides of flow divider/combiner valve 13	
10	Check valve	DG	Steer end drive motor circuit	60-70 ft-lbs / 81-95 Nm
11	Check valve	DH	Steer end drive motor circuit	35-40 ft-lbs / 48-54 Nm
12	Shuttle Valve, 3 position 3 way	DJ	Charge pressure circuit that directs hot oil out of low pressure side of drive pump	80-90 ft-lbs / 108-122 Nm
13	Flow divider/combiner valve	DM	Controls flow to steer end drive motors in forward and reverse	80-90 ft-lbs / 108-122 Nm
14	Check valve	DP	Non-steer end drive motor circuit	35-40 ft-lbs / 48-54 Nm

Manifolds



7-9
Valve Adjustments - Traction Manifold

How to Adjust the Hot Oil Relief Valve

Note: The pressure differential between the charge pump relief valve (located in the drive pump) and the hot oil shuttle relief valve (located in the traction manifold) is necessary to return hot oil from the closed loop drive circuit to the hydraulic tank for cooling. This pressure differential must be maintained at 40 psi / 3 bar.

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

1 Open the engine side turntable cover and connect a 0 to 600 psi / 0 to 40 bar pressure gauge to the diagnostic nipple on the drive pump.

2 Start the engine from the platform controls and allow the engine to run at low idle. Note the pressure reading on the pressure gauge.

3 Turn the engine off and connect a 0 to 600 psi / 0 to 40 bar pressure gauge to the diagnostic nipple located on the traction manifold.

4 Start the engine from the platform controls and drive the machine slowly in the forward direction. Note the pressure reading on the pressure gauge.

5 Turn the engine off, and remove the hot oil shuttle relief valve cap. Adjust the internal hex socket clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the valve cap.

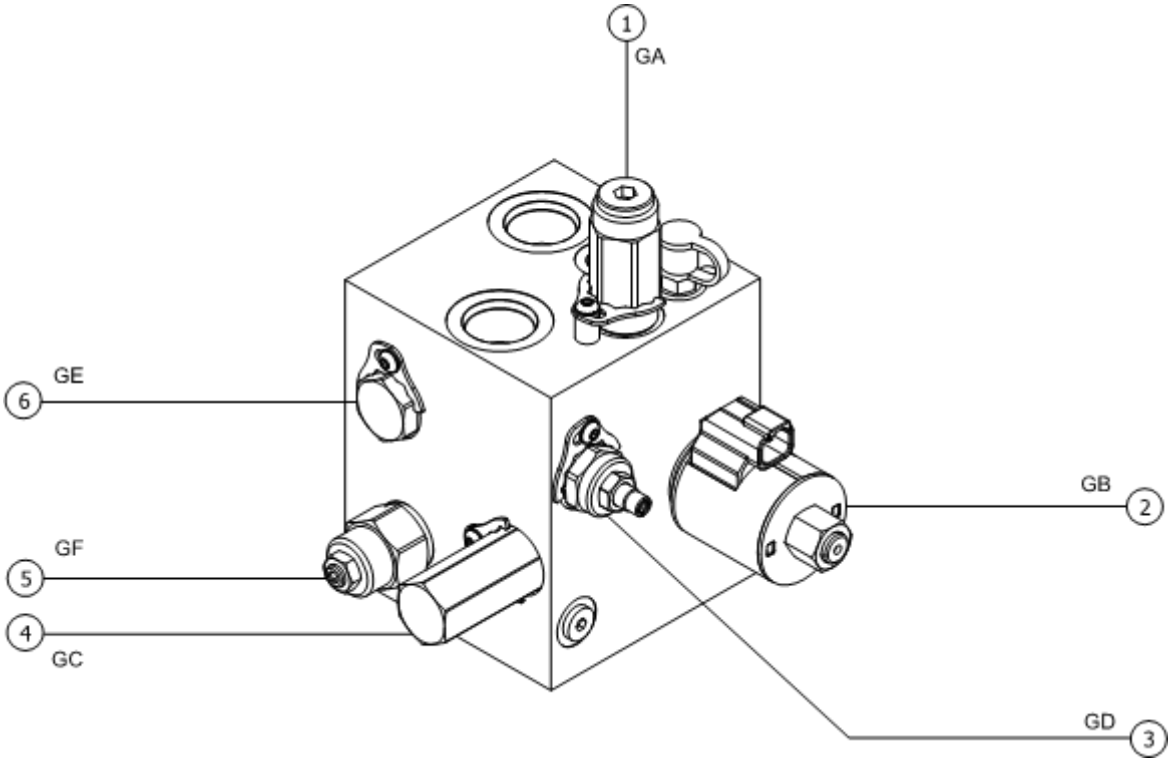
6 Repeat steps 4 and 5 until a pressure differential (between the charge pump reading and the hot oil shuttle relief valve) of 40 psi / 3 bar is obtained.

Manifolds

7-10
Generator Manifold

The generator manifold is mounted on the turntable tray by the fuel tank.

Index No.	Description	Schematic Item	Function	Torque
1	Relief valve	GA	Generator relief valve	50 ft-lbs / 67 Nm
2	Solenoid Valve	GB	Charge pressure circuit	60-65 ft lbs / 81-88 Nm
3	Needle valve	GD	Charge pressure circuit	50 ft-lbs / 67 Nm
4	Differential sensing valve	GC	Pilot valve to diverter valve	50 ft-lbs / 67 Nm
5	Counterbalance valve	GF	Adds backpressure to generator circuit	
6	Check valve	GE	Prevents oil to generator	24-26 ft-lbs / 32,5-35,3 Nm



7-11 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	
Proportional solenoid valve (schematic items SE, SF and SR)	4.8Ω
2 position 3 way solenoid valve (schematic items SJ and SK)	6.3Ω
2 position 2 way solenoid valve (schematic items SP and SQ)	5.9Ω
3 position 4 way solenoid valve (schematic items EB, EF, EH, SI and SL)	6.3Ω

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.

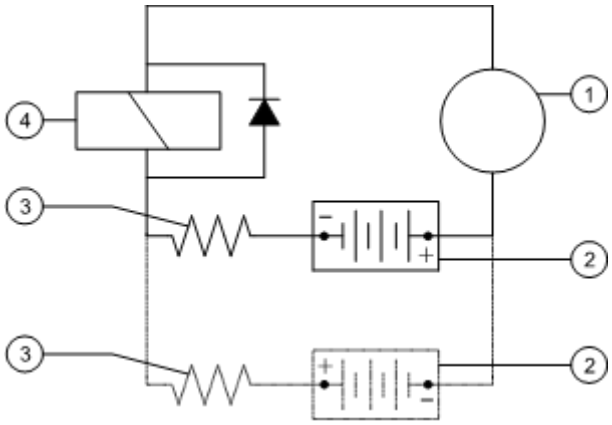
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.

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.

8-1 Fuel Tank

How to Remove the Fuel Tank

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

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

⚠ DANGER Explosion and fire hazard. Never drain or store fuel in an open container due to the possibility of fire.

1 Turn the manual fuel shutoff valve to the closed position (if equipped).

2 Remove the fuel filler cap from the tank.

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

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

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

4 Tag, disconnect, drain and plug the supply and return fuel hoses. Cap the fittings on the fuel tank.

5 Remove the fuel tank retaining fasteners.

6 Remove the fuel tank from the machine.

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

NOTICE Component damage hazard. When installing the plastic fuel tank, do not overtighten the retaining fasteners.

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

Fuel and Hydraulic Tanks

8-2 Hydraulic Tank

The primary functions of the hydraulic tank are to cool, clean and de-aerate the hydraulic fluid during operation. The tank utilizes internal suction strainers for the pump supply hoses and has an external return filter equipped with a filter condition indicator.

How to Remove the Hydraulic Tank

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.

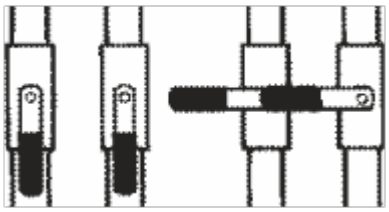
Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications.*

1 Remove the fuel tank. Refer to Repair Procedure, *How to Remove the Fuel Tank*.

2 Close the two hydraulic tank valves located at the hydraulic tank (if equipped).

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.



open closed

3 Remove the drain plug from the hydraulic tank and completely drain the tank into a container of suitable capacity. Refer to Specifications, *Machine Specifications*.

4 Tag, disconnect and plug the two suction hoses that are attached to the hydraulic tank.

5 Tag and disconnect and plug the hose from the return filter. Cap the fitting on the return filter housing.

6 Tag and disconnect and plug the supply hose for the auxiliary power unit. Cap the fitting on the hydraulic tank.

7 Support the hydraulic tank with 2 lifting straps. Place one lifting strap at each end of the tank and attach the lifting straps to an overhead crane.

8 Remove the four fasteners securing the tank to the chassis bulkhead.

9 Remove the hydraulic tank from the machine.

⚠WARNING Crushing hazard. The hydraulic tank could become unbalanced and fall if not properly supported when removed from the machine.

10 Remove the suction strainers from the tank and clean them using a mild solvent.

11 Rinse out the inside of the tank using a mild solvent.

12 Install the suction strainers using pipe thread sealant on the threads.

13 Install the drain plug using pipe thread sealant on the threads.

14 Install the hydraulic tank onto the machine.

15 Install the two suction hoses and the supply hose for the auxiliary power unit.

16 Fill the tank with hydraulic oil until the level is within the top 2 inches / 5 cm of the sight gauge. Do not overfill.

17 Clean up any oil that may have spilled.

18 Open the hydraulic tank shutoff valves (if equipped).

NOTICE Component damage hazard. Be sure to open the two hydraulic tank shutoff valves (if equipped) and prime the pump after installing the hydraulic tank.

Note: Always use pipe thread sealant when installing the drain plug and strainers.

Turntable Rotation Components

9-1
Turntable Rotation Drive Hub Assembly

How to Remove the Turntable Rotation Drive Hub Assembly

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

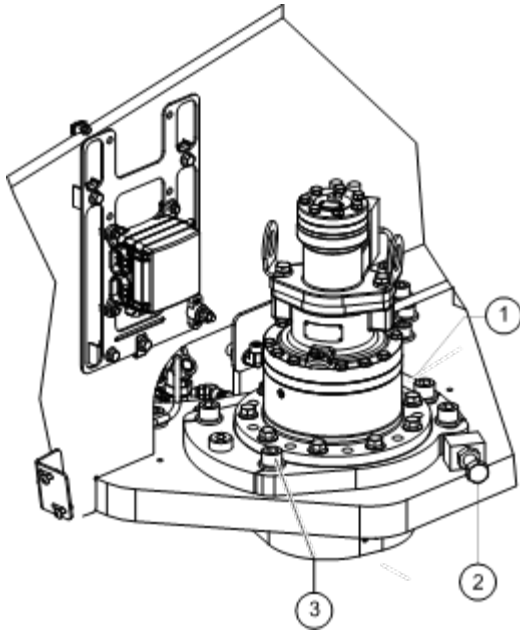
1 Secure the turntable from rotating with the turntable rotation lock pin.

2 Tag, disconnect and plug the hydraulic hoses from the drive 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.

3 Loosen the backlash pivot plate and adjustment bolts.

4 Attach a suitable lifting device to the lifting eyes on the drive hub assembly.



1 backlash pivot plate
2 adjustment bolt with lock nut
3 backlash pivot plate mounting bolts

5 Remove the backlash pivot plate mounting bolts. Carefully remove the drive hub assembly from the machine.

⚠WARNING Crushing hazard. The turntable rotate drive hub assembly could become unbalanced and fall when removed from the machine if not properly supported by the lifting device.

Turntable Rotation Components

When installing the drive hub assembly:

6 Install the drive hub. Apply removable thread locking compound to fastener threads.Torque the backlash pivot plate mounting fasteners to specification. Refer to Specifications, *Machine Torque Specifications*.

7 Install the brake and then the motor onto the drive hub. Apply removable thread locking compound to fastener threads.Torque the motor/brake mounting fasteners to specification. Refer to Specifications, *Machine Torque Specifications*.

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

How to Remove the Turntable Rotation Hydraulic Motor

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

2 Tag, disconnect and plug the hydraulic hoses from the drive 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.

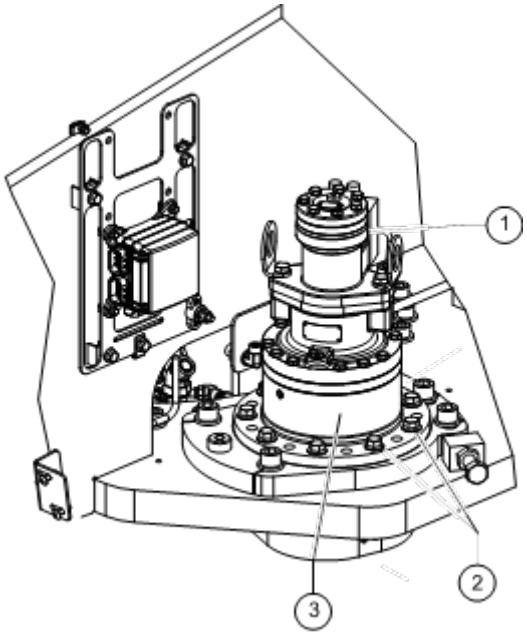
3 Remove the hydraulic tube that connects from the counterbalance manifold to the brake. Cap the fittings on the brake and manifold.

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

4 Remove the motor/brake mounting fasteners. Carefully remove the motor from the brake.

Turntable Rotation Components

5 Clean up any oil that may have spilled.



1 motor
2 drive hub mounting bolts
3 drive hub with brake

How to Adjust the Turntable Rotation Gear Backlash

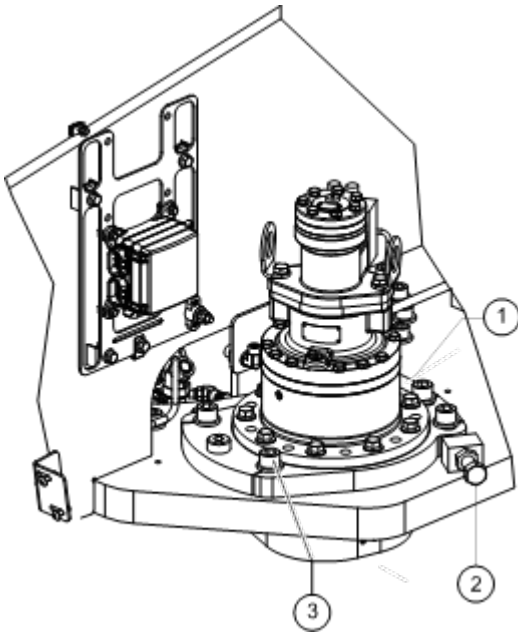
The turntable rotation drive hub is mounted on an adjustable plate that controls the gap between the rotation motor pinion gear and the turntable bearing ring gear.

Note: Perform this procedure with the boom between the non-steer end tires and with the machine on a firm and level surface.

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

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

2 Loosen the backlash pivot plate mounting fasteners.



1 backlash pivot plate
2 adjustment bolt with lock nut
3 backlash pivot plate mounting bolts

3 Push the backlash pivot plate towards the turntable as far as possible (this will push the rotation gear 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.

6 Turn the adjustment bolt one half turn counterclockwise. Tighten the lock nut on the adjustment bolt.

7 Rotate the backlash pivot plate away from the turntable until it contacts the adjustment bolt. Then torque the mounting fasteners on the backlash pivot plate. 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.

How to Calibrate the Turntable Tilt Sensor

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

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

1 Enter Service Mode. Refer to Repair Procedure, *How to Enter the Service Mode*.

2 Press the settings button above the display and navigate to the Sensor Calibrations menu.

3 Navigate to the Chassis Tilt Sensor calibration screen.

4 Select and start the calibration procedure.

5 If the machine is not sufficiently level, the procedure will fail with the message that the chassis no not sufficiently level. Move the machine to a more level location if this occurs.

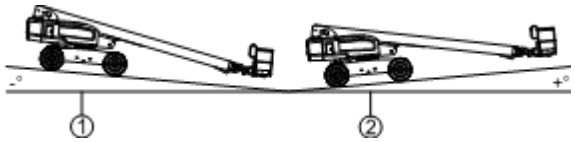
6 The first calibration is machine pitch. This is the pitch of the machine from the platform end to the counterweight end of the machine.

7 Place the digital level onto the swing chassis bearing plate, which is located to the left of the fuel tank. Orient the level along the pitch axis of the machine.

8 Enter the value as seen on the digital level into the ground control display. If the digital level is showing a negative value, enter it as a positive number. Press **OK** when the value on the ground control display matches the value of the digital level (excluding the plus/minus sign).

Turntable Rotation Components

9 A graphic of the machine pitch will now be shown on the display. By pressing the **UP** or **DOWN** buttons, the graphic will change to show the counterweight being uphill or downhill. Select the image that corresponds to the current pitch of the machine and press **OK**.



Turntable Pitch

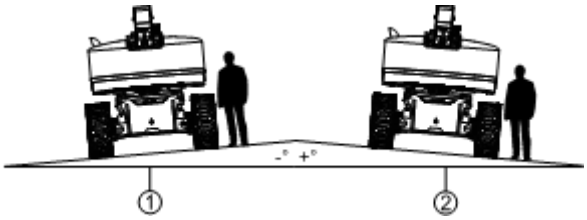
1 uphill
2 downhill

10 The next calibration of the machine is the machine roll. This is the angle of the machine from side to side.

11 Place the digital level onto the swing chassis bearing plate, which is located to the left of the fuel tank. Orient the level along the roll axis of the machine.

12 Enter the value as seen on the digital level onto the ground control display. If the level is showing a negative value, enter it as a positive number. Press **OK** when the value on the ground control display matches the value of the digital level sensor (excluding the plus/minus sign).

13 A graphic of the machine roll will now be shown on the display. By pressing the **UP** and **DOWN** buttons, the graphic will change to show whether the operator is on the uphill or downhill side of the machine.. Select the image that corresponds to the current roll of the machine and press **OK.**



Turntable Roll

1 uphill
2 downhill

14 The calibration is now complete.

15 Exit the Service Mode.

10-1
Yoke and Drive Hub

How to Remove the Yoke and Drive Hub Assembly

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

1 Remove the pin retaining fasteners from both the steer cylinder and the tie rod cylinder pivot pins. Remove the pins.

2 Tag, disconnect and plug the hydraulic hoses from the drive motor. Cap the fittings on the drive motor.

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

3 Loosen the wheel lug nuts. Do not remove them.

4 Block the non-steer wheels, and center a lifting jack of ample capacity under the steer axle.

5 Raise the machine approximately 6 inches / 15 cm and place blocks under the chassis for support.

6 Remove the lug nuts. Remove the tire and wheel assembly.

7 Remove the hydraulic hose clamp retaining fastener from the top of the yoke pivot pin.

8 Remove the drive motor mounting fasteners.

9 Slide the drive motor shaft out of the drive hub and remove the drive motor from the machine.

10 Remove the pin retaining fasteners from the upper and lower yoke pivot pins.

11 Support and secure the yoke and drive hub assembly to a lifting jack.

12 Use a slide hammer to remove the upper yoke pivot pin. Use a soft metal drift to drive the lower yoke pivot pin down and out.

⚠WARNING Crushing hazard. The yoke and drive hub assembly could become unbalanced and fall when the yoke pivot pins are removed if not properly supported and secured to the lifting jack.

13 Place the yoke and drive hub assembly on a flat surface with the drive hub facing down.

14 Remove the drive hub mounting fasteners that attach the drive hub to the yoke. Remove the yoke from the drive hub. Refer to Specifications, *Machine Torque Specifications*.

Note: Replace the thrust washer when installing the yoke and drive hub assembly onto the axle.

Steer Axle Components

10-2 Drive Motors

How to Remove a Drive Motor

NOTICE Component damage hazard. Repairs to the motor should only be performed by an authorized dealer.

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 Remove the drive motor access covers from both sides of the inner axle.

2 Tag, disconnect and plug the hydraulic hoses from the drive motor. Cap the fittings on the drive motor.

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

3 Remove the drive motor mounting fasteners.

4 Slide the drive motor shaft out of the drive hub, and remove the drive motor from the machine.

10-3 Drive Hub

How to Remove a Drive Hub

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 drive motor. Refer to Repair Procedure, *How to Remove a Drive Motor.*

2 Loosen the wheel lug nuts. Do not remove them.

3 Center a lifting jack of ample capacity under the non-steer axle.

4 Raise the machine approximately 6 inches / 15 cm and place blocks under the chassis for support.

5 Remove the wheel lug nuts, then the tire and wheel assembly.

6 Place a second lifting jack under the drive hub for support and secure the drive hub to the lifting jack.

7 Remove the drive hub mounting fasteners that attach the drive hub to the axle. Remove the drive hub.

⚠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: Do not re-use the drive hub mounting fasteners. Genie specifications require the use of new fasteners.

11-1
Hydraulic Generator

How to Adjust the Generator Frequency

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

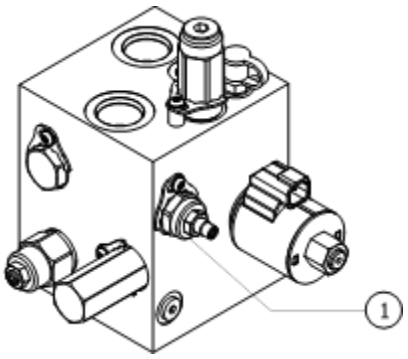
Note: Perform this procedure with the machine on a firm, level surface.

Note: This procedure will require a digital multimeter (DMM) with a frequency counter.

1 Set the multimeter to read frequency and 110 vac and connect the leads to the 110 vac receptacle.

2 Start the engine and then start the generator. The engine will go to high idle.

3 Locate the generator manifold on the turntable tray by the fuel tank and loosen the jam nut on the needle valve identified in the illustration.



Generator Manifold

1 needle valve

4 Adjust the valve counter-clockwise to increase the frequency and clockwise to decrease the frequency, until the correct value is reached according to the table below.

ANSI	12 kW Generator	61 Hz	+/- 0.5 Hz
ANSI	3 kW Generator	61 Hz	+/- 0.5 Hz
CE / ROW	3 kW Generator	51 Hz	+/- 0.5 Hz

5 Once the correct frequency is set, tighten the jam nut.

Fault Codes



Observe and Obey:

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

Before Troubleshooting:

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

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

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

Control System Fault Codes

Control System

How to Retrieve Control System Fault Codes

The machine control system contains two different types of fault codes

Active Faults: These faults have been detected in the current operating session. The presence of an active fault will be reflected by the System Fault Indicator lights and the alarm.

Logged Faults: The faults contained in the fault log have occurred in the past and may or may not still be in effect.

Both faults may be viewed by pressing the Fault Button above the ground display and navigating to either the Active Machine Faults screen or the Machine Fault Log screen. The list of faults will by shown by fault code and the hour meter of when it occurred.

The fault lists can be browsed. To learn more about a fault entry, select it and press OK. A screen will be shown that describes the fault in more detail.

Control System Fault Codes

Models with Revision G Software or Lower

ID	Component	ID	Name	Cause	Effect	Solution
6	Keyswitch	19	Fault	Signals C134PLT and C174GND from KS1 are both HIGH for at least 1 second, causing both control stations to be selected.	Machine will not be functional.	Verify with a voltmeter that signals switch properly. * With the keyswitch in the Ground position, C174GND (WH, TCON J5-12) should be 12 V and C134PLT (GR/BK, TCON J5-8) should be 0 V. * With the keyswitch in the Platform position, C174GND (WH, TCON J5-12) should be 0 V and C134PLT (GR/BK, TCON J5-8) should be 12 V. Cycle power to allow the machine to re-test the fault.
11	Engine Start Toggle Switch	19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	Engine start switch will not operate.	Verify with a voltmeter that the Engine Start Toggle Switch (TS2) is operating properly. * C33STR (BK, PCON J16-3) should be 0 V with the switch OFF and 12 V with the switch ON. Cycle power to allow the machine to re-test the fault.
12	CAN Bus	29	System not functioning	CAN bus system is not functioning properly.	Machine will not be functional.	Verify CAN bus is functional. Pull out connector J5 from the TCON and with a voltmeter set to resistance verify that pins 3 and 4 on the harness connector measure between 55 and 65 Ohms and that neither pin has a short to power or ground. Check wiring and boom cable for open or short circuits if resistance check fails.
13	Jib Up/Down Toggle Switch	19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	The Jib Up or Down functions will not operate.	Verify with a voltmeter that the Jib Up/Down Toggle Switch (TS8) is operating properly. * C43JU (BL, PCON J17-6) should be 0 V with the switch OFF and 12 V with the switch held in the UP position. * C44JD (BL/BK, PCON J17-8) should be 0 V with the switch OFF and 12 V with the switch held in the DOWN position. Cycle power to allow the machine to re-test the fault.
14	Battery Voltage	15	Voltage is low.	Battery voltage is too low while engine is running.	Advisory fault. Machine is fully functional.	Verify with a voltmeter that the alternator is operating properly. * With the engine running, battery voltage should be above 12.3 V. * Verify alternator and power wiring. * Replace alternator if necessary. * Replace battery if necessary.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
15	Foot Switch	19	Stuck ON at power up, or timeout occurred.	Foot switch input was detected as HIGH at start-up, or the footswitch was held for too long and caused the foot switch timer to elapse.	Machine will not be functional.	* Release foot switch and cycle power. * If problem persists, with a voltmeter verify that C24FS (WH, PCON J12-2) is LOW when foot switch is released and 12 V when held down.
19	APU Solenoid and Switch	12	Solenoid output shorted to V+	TCON detected that C27AUX circuit is shorted to 12 V.	Machine will not be functional.	Check C27AUX (RD, TCON J3-3) wiring. * With a voltmeter verify that C27AUX (RD, TCON J3-3) is 0 V when the Auxiliary Power toggle switch is OFF and 12 V when switch is ON. * Verify the terminals of the APU solenoid have a resistance greater than 5 ohms. If not, replace the solenoid.
		15	Solenoid output shorted to GND	TCON detected that C27AUX circuit is shorted to GND.	Auxiliary Power function will not operate.	
		19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	Auxiliary Power function will not operate from platform.	Verify with a voltmeter that the AUX Power Switch (TS1) is operating properly. * C47AUX (RD, PCON J17-10) should be 0 V with the switch OFF and 12 V with the switch ON. Cycle power to allow the machine to re-test the fault.
20	Primary Boom Extend / Retract Joystick	12	Joystick voltage too high.	Circuit C163PER is above 4.5 V.	Boom Extend and Retract functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C163PER (BL/WH, PCON J18-4) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		15	Joystick voltage too low.	Circuit C163PER is below 0.5 V.		
		19	Joystick held at startup.	Circuit C163PER voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
21	Primary Boom Up / Down Joystick	12	Joystick voltage too high.	Circuit C164PUD is above 4.5 V.	Boom Up and Down functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C164PUD (RD/WH, PCON J18-3) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		15	Joystick voltage too low.	Circuit C164PUD is below 0.5 V.		
		19	Joystick held at startup.	Circuit C164PUD voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
22	Primary Boom Up Valve	12	Circuit shorted to V+	TCON detected that C1PBU circuit is shorted to 12 V.	Boom Up function will not operate. Boom Down will also not operate if short is to 12 V.	* With a voltmeter, measure Y22. Proper resistance should be between 5 - 60 ohms. Replace Y22 if resistance is outside of those values. * Verify wiring for C1PBU (RD, TCON J4-10) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C1PBU circuit is shorted to GND.		
23	Primary Boom Down Valve	12	Circuit shorted to V+	TCON detected that C2PBD circuit is shorted to 12 V.	Boom Up and Down functions will not operate.	* With a voltmeter, measure Y21. Proper resistance should be between 5 - 60 ohms. Replace Y21 if resistance is outside of those values. * Verify wiring for C2PBD (RD/BK, TCON J4-9) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-2 and J37-11 is zero ohms.
		15	Circuit shorted to GND	TCON detected that C2PBD circuit is shorted to GND.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
24	Boom Angle Sensor	13	No signal	No CAN messages have been received by the TCON from the Angle Sensor.	Boom Up, Extend and Turntable Rotate functions will not operate.	* Verify sensor power P85PWR (GR, TCON J6-7) is at 12 V while the system is running. * Verify the sensor is receiving power. Unplug the sensor and verify 12 V across pins 2 (+) and 1 (-) on the harness connector. * Verify the CAN bus wiring. With the sensor still unplugged, measure resistance across harness connector pins 3 and 4. If resistance is not between 55 and 65 ohms, check CAN wire harnesses.* Replace sensor if necessary.
		17	Invalid calibration	Sensor has been replaced and requires calibration, or calibration in memory has been erased.		Run the boom angle calibration process and verify fault is no longer active.
		19	Out of range	Sensor disagrees with boom position sensed by LST3S, or boom exceeded the calibrated minimum or maximum values.		* Run the boom angle calibration process and verify fault is no longer active. * If fault persists, verify LST3S (C68LS, RD, TCON J7-3) operates properly. The signal should be 12 V when the boom is stowed and 0 V when the boom is up.
		36	Internal check	The two internal sensing channels inside the Angle Sensor have registered a significant difference.		* Run the boom angle calibration process and verify fault is no longer active. * If fault persists, replace the sensor.
25	Cable tension	21	Loose cable	Boom cable tension limit switch LSB2S indicates that the tension is loose on the boom cables.	Boom Up and Extend functions will not operate.	* Return boom to stowed position as quickly as possible. * Verify both boom cables are properly tensioned and that LST3S is properly centered in the bracket. * Verify LSB2S (C59CNK, BL/WH, TCON J7-5) operates properly. Signal should normally by 12 V. If cable tension is loose, signal should be 0 V.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
26	Primary Boom Extend Valve	12	Circuit shorted to V+	TCON detected that C7PBE circuit is shorted to 12 V.	Boom Extend and Retract functions will not operate.	* With a voltmeter, measure Y26. Proper resistance should be between 5 - 60 ohms. Replace Y26 if resistance is outside of those values. * Verify wiring for C7PBE (BK, TCON J4-7) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C7PBE circuit is shorted to GND.		
27	Primary Boom Retract Valve	12	Circuit shorted to V+	TCON detected that C8PBR circuit is shorted to 12 V.	Boom Extend and Retract functions will not operate.	* With a voltmeter, measure Y25. Proper resistance should be between 5 - 60 ohms. Replace Y25 if resistance is outside of those values. * Verify wiring for C8PBR (BK/WH, TCON J4-8) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-5 and J37-8 is zero ohms.
		15	Circuit shorted to GND	TCON detected that C8PBR circuit is shorted to GND.		
35	Ground Buttons	19	Held at startup	Buttons were held at system start, or are shorted on the ground control panel.	The function associated with the stuck button will not operate.	* Release the ground control buttons and cycle power. * If problem persists, open ground control box and open the Display Controller access door, being careful to keep water out. Verify the ribbon cables are properly seated and dry. * Re-seat and/or replace ribbon cables if necessary. * Replace ground control overlay.
36	Jib Up Valve	12	Circuit shorted to V+	PCON detected that V43JU circuit is shorted to 12 V.	Jip Up function will not operate.	* With a voltmeter, measure Y68. Proper resistance should be between 5 - 60 ohms. Replace Y68 if resistance is outside of those values. * Verify wiring for V43JU (BL, PCON J12-8) and check for open or short circuits.
		15	Circuit shorted to GND	PCON detected that V43JU circuit is shorted to GND.		
37	Jib Down Valve	12	Circuit shorted to V+	PCON detected that V44JD circuit is shorted to 12 V.	Jib Down function will not operate.	* With a voltmeter, measure Y69. Proper resistance should be between 5 - 60 ohms. Replace Y69 if resistance is outside of those values. * Verify wiring for V44JD (BL/BK, PCON J12-9) and check for open or short circuits.
		15	Circuit shorted to GND	PCON detected that V44JD circuit is shorted to GND.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
41	Turntable Rotate Joystick	12	Joystick voltage too high.	Circuit C165TTR is above 4.5 V.	Turntable Rotate functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C165TTR (WH/RD, PCON J18-2) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		15	Joystick voltage too low.	Circuit C165TTR is below 0.5 V.		
		19	Joystick held at startup.	Circuit C165TTR voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
42	Turntable Rotate CW Valve	12	Circuit shorted to V+	TCON detected that C4TRL circuit is shorted to 12 V.	Turntable Rotate functions will not operate.	* With a voltmeter, measure Y24. Proper resistance should be between 5 - 60 ohms. Replace Y24 if resistance is outside of those values. * Verify wiring for C4TRL (WH, TCON J3-12) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C4TRL circuit is shorted to GND.		
43	Turntable Rotate CCW Valve	12	Circuit shorted to V+	TCON detected that C5TRR circuit is shorted to 12 V.	Turntable Rotate functions will not operate.	* With a voltmeter, measure Y23. Proper resistance should be between 5 - 60 ohms. Replace Y23 if resistance is outside of those values. * Verify wiring for C5TRR (WH/BK, TCON J3-1) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C5TRR circuit is shorted to GND.		
44	Drive Enable Switch	19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	Drive Enable switch will not operate, possibly preventing drive while the turntable is rotated.	Verify with a voltmeter that the Drive Enable Toggle Switch (TS15) is operating properly. * C143DEL (BL/RD, PCON J16-7) should be 0 V with the switch OFF and 12 V with the switch held in the ON position. Cycle power to allow the machine to re-test the fault.
45	Platform Level Up/Down Switch	19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	Platform Level Up or Down functions may not operate, depending on which direction the switch fault occurred.	Verify with a voltmeter that the Platform Level Up/Down Toggle Switch (TS9) is operating properly. * C14PLU (OR, PCON J17-2) should be 0 V with the switch OFF and 12 V with the switch held in the UP position. * C15PLD (OR/BK, PCON J17-3) should be 0 V with the switch OFF and 12 V with the switch held in the DOWN position. Cycle power to allow the machine to re-test the fault.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
46	Platform Rotate CW Valve	12	Circuit shorted to V+	PCON detected that V17PRL circuit is shorted to 12 V.	Platform Rotate CW function will not operate.	* With a voltmeter, measure Y70. Proper resistance should be between 5 - 60 ohms. Replace Y70 if resistance is outside of those values. * Verify wiring for V17PRL (GR, PCON J12-5) and check for open or short circuits.
		15	Circuit shorted to GND	PCON detected that V17PRL circuit is shorted to GND.		
47	Platform Rotate CCW Valve	12	Circuit shorted to V+	PCON detected that V18PRR circuit is shorted to 12 V.	Platform Rotate CCW function will not operate.	* With a voltmeter, measure Y71. Proper resistance should be between 5 - 60 ohms. Replace Y71 if resistance is outside of those values. * Verify wiring for V18PRR (GR/BK, PCON J12-4) and check for open or short circuits.
		15	Circuit shorted to GND	PCON detected that V18PRR circuit is shorted to GND.		
51	Drive Forward / Reverse Joystick	12	Joystick voltage too high.	Circuit C160DRV is above 4.5 V.	Drive Forward and Reverse functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C160DRV (WH/RD, PCON J18-10) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		15	Joystick voltage too low.	Circuit C160DRV is below 0.5 V.		
		19	Joystick held at startup.	Circuit C160DRV voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
52	Drive Forward Valve	12	Circuit shorted to V+	TCON detected that C30FWD circuit is shorted to 12 V.	Drive Forward, Brake Release and possibly Engine will not operate.	* With a voltmeter, measure Y6. Proper resistance should be between 5 - 60 ohms. Replace Y6 if resistance is outside of those values. * Verify wiring for C30FWD (WH, TCON J2-6) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C30FWD circuit is shorted to GND.		
53	Drive Reverse Valve	12	Circuit shorted to V+	TCON detected that C31REV circuit is shorted to 12 V.	Drive Reverse, Brake Release and possibly Engine will not operate.	* With a voltmeter, measure Y5. Proper resistance should be between 5 - 60 ohms. Replace Y5 if resistance is outside of those values. * Verify wiring for C31REV (WH/BK, TCON J2-7) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C31REV circuit is shorted to GND.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
54	Brake Release Valve	12	Circuit shorted to V+	TCON detected that C32BRK circuit is shorted to 12 V.	Machine will not be functional.	* With a voltmeter, measure Y2. Proper resistance should be between 5 - 60 ohms. Replace Y2 if resistance is outside of those values. * Verify wiring for C32BRK (WH/RD, TCON J2-9) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C32BRK circuit is shorted to GND.		
55	Motor Stroke Valve	12	Circuit shorted to V+	TCON detected that C29MS circuit is shorted to 12 V.	Drive functions will not operate.	* With a voltmeter, measure Y27. Proper resistance should be between 5 - 60 ohms. Replace Y27 if resistance is outside of those values. * Verify wiring for C29MS (RD/WH, TCON J2-8) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C29MS circuit is shorted to GND.		
61	Steer Joystick	12	Joystick voltage too high.	Circuit C159STD or C159STA is above 4.5 V.	Drive and steer functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, identify which circuit is the steer circuit. Check C159STA (BL/WH, PCON J18-11) for a joystick steer option. Check C159STD (BL/RD, PCON J18-9) for the rocker joystick steer option. With a voltmeter check that the circuit is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		15	Joystick voltage too low.	Circuit C159STD or C159STA is below 0.5 V.		
		19	Joystick held at startup.	Circuit C159STD or C159STA voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
68	Safety Envelope Fault	21	Out of range	The system has determined that the platform position has exceeded the safety envelope boundary.	All functions will not operate except for the recovery procedure.	Use Auxiliary Power and the boom retract and/or down functions to bring the platform back within the operational envelope.
69	Generator Control Circuit	12	Circuit shorted to V+	TCON detected that C45GEN circuit is shorted to 12 V.	Generator function will not operate.	* With a voltmeter, measure Y29. Proper resistance should be between 5 - 60 ohms. Replace Y29 if resistance is outside of those values. * Verify wiring for C45GEN (GR/WH, TCON J3-2) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C45GEN circuit is shorted to GND.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
71	ESTOP Circuit	15	ESTOP Return circuit shorted to GND	Mistmatched signals detected on ESTOP Return circuits. Either: * PCON ESTOP 2 and ESTOP 4 do not match, or * TCON ESTOP 2 and ESTOP 4 do not match.	ESTOP circuit cannot complete, preventing machine functions.	* Inspect PCON J15 pins 11 and 12 for open or short circuits. Using a voltmeter, set to diode test mode and make sure the diode tests ok with the anode at pin 12 and cathode at pin 11. If test fails, replace the PCON. * Inspect TCON J5 pins 11 and 12 for open or short circuits. Using a voltmeter, set to diode test mode and make sure the diode tests ok with the anode at pin 12 and cathode at pin 11. If test fails, replace the PCON. * Check P23RET (BK) for shorts to ground or power.
		16	ESTOP Power circuit shorted to GND	TCON detected that P56PWR is shorted to GND, thereby preventing the ESTOP circuit from functioning.		Check P56PWR (RD, TCON J5-7) for open or short circuits. Verify power is reaching the P1 ESTOP contact block. When ESTOP is pulled out, verify power is reaching the KS1 keyswitch contact blocks.
		21	ESTOP Return circuit mismatch	TCON detected that ESTOP Return circuits are not matching, indicating a fault with either P23PWR or P23RET.		* Check for open and short circuits in the boom cable. * Verify that there is low resistance (less than five ohms) on the cabling between TCON J5-11 and PCON J15-11 (BK wire in harness and boom cable). An open circuit between these pins indicates a harness or cable fault. * Verify that there is low resistance (less than five ohms) on the cabling between TCON J5-10 and PCON J15-10 (RD wire in harness and boom cable). An open circuit between these pins indicates a harness or cable fault.
		22	ESTOP Source circuit is shorted to GND	TCON detected that ESTOP 1 is at 12 V but ESTOP 3 is at 0 V.		* Using a voltmeter and with the system turned OFF, check the resistance between TCON J5 pins 9 and 10. Replace TCON if resistance is more than 5 ohms. * Check P79PWR (BK, TCON J5-9) and P23PWR (RD, TCON J5-10) for open or short circuits.
		31	ESTOP Source circuit mismatch	TCON detected that ESTOP 1 is at 0 V but ESTOP 3 is at 12 V.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
72	Contact Alarm	36	Switch state mismatch	PCON detected that inputs from SW30 (contact alarm proximity sensor) are the same voltage.	Boom Up and Extend functions will not operate.	* Using a voltmeter, verify that the voltage on C248CA (OR/BK, PCON J12-1) is always the opposite of C247CA (OR, PCON J12-11). * Check wiring for open or short circuits. * Verify SW30 is receiving power and ground by verifying 12 V across C31 pins 1 and 3. * Replace SW30 if necessary.
75	TCON Secondary Processor Software	34	Incorrect software version	The TCON's secondary processor software version does not match the system software revision level.	Boom Up and Extend functions will not operate.	Reprogram the machine with latest software. Check http://firmware.genielift.com/ for the latest software version.
76	Platform Load Sensor	13	No signal	No CAN messages have been received by the TCON from the platform load sensor.	Boom Up, Extend and Turntable Rotate functions will not operate.	* Verify sensor power P26PWR (BK, PCON J13-9) is at 12 V while the system is running. * Verify 12 V across pins on C27-2 (+) and C27-3 (-) on the harness connector. * Measure resistance across C27 pins 4 and 5 on the harness connector. If resistance is not between 55 and 65 ohms, check CAN wire harnesses. * Replace sensor if necessary.
		15	Reverse loading	The sensor has reported a reversed or negative load condition. This fault is triggered when the boom up function has operated for at least 10 seconds and the platform load is consistently detected as less than -220 lbs.		* Make sure the platform is not touching the ground or an overhead obstruction. Cycle power and check that fault is no longer reported. * Perform the platform overload calibration procedure. * Replace sensor if necessary.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
76		17	Invalid calibration	The platform load sensor has no valid calibration data, either because the sensor was replaced or the prior calibration was cleared from memory or was unsuccessful.		* Run the platform overload calibration process and verify fault is no longer active.
		21	Internal check	The two internal sensing channels inside the Angle Sensor have registered a significant difference.		* Run the platform overload calibration process and verify fault is no longer active. * If fault persists, replace the sensor.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
77	Platform Overload Detection	21	Internal check	The secondary platform overload check detected overload before the operational platform overload check.	All functions will not operate except for the recovery procedure.	* Cycle power and verify condition clears itself. * If problem persists, run the platform overload calibration procedure. * If problem persists, replace the sensor.
78	Platform Controller (PCON)	13	Not detected	TCON has not detected the PCON primary processor on the communications bus.	Controls from the platform will not operate.	* Verify PCON is receiving power. Check for 12 V on J15-2 (+) and J15-1 (-). * Verify PCON is receiving ESTOP signals. With ground ESTOP pulled out and keyswitch set to Platform, verify 12 V is reaching PCON J15-10. * Verify CAN bus is functional. Pull out connector J15 from the PCON and with a voltmeter set to resistance verify that pins 3 and 4 on the harness connector measure between 110 and 130 Ohms. Check wiring and boom cable for open or short circuits if resistance check fails. * Replace PCON if necessary.
		34	Incorrect software version	PCON software revision does not match the system revision level.	Boom Up and Extend functions will not operate.	Reprogram the machine with latest software. Check http://firmware.genielift.com/ for the latest software version.
		36	Secondary processor not detected.	TCON has not detected the PCON secondary processor on the communications bus.	Controls from the platform will not operate.	Reprogram the machine with latest software. Check http://firmware.genielift.com/ for the latest software version.
79	Display Controller (DISCON)	13	Not detected	TCON has not detected the DISCON on the communications bus.	Controls from the ground will not operate.	* Verify DISCON is operating by checking that the display on the front is operating properly. * If there is no display, try to power up the DISCON by setting the keyswitch to Ground, pull out the ground ESTOP and press the Ground Function Enable button. The display should start. * If there is still no display, check DISCON power on J10 pins 2 (+) and 1 (-). * If DISCON operates but fault persists, check the CAN bus wiring. Disconnect J10 and with a voltmeter set to resistance verify that the resistance between pins 3 and 4 on the harness connector are between 55 and 65 ohms. Check CAN wiring if resistance check fails. * Replace DISCON if required.
		34	Incorrect software version	DISCON software revision does not match the system revision level.	Boom Up and Extend functions will not operate.	Reprogram the machine with latest software. Check http://firmware.genielift.com/ for the latest software version.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
80	Turntable Controller (TCON)	13	Not detected	The DISCON has not detected the TCON on the CAN bus.	Machine will not be functional.	* Verify TCON is receiving power. Check for 12 V on J5-2 (+) and J5-1 (-). * Verify TCON is receiving ESTOP signals. With ground ESTOP pulled out and keyswitch set to Ground, verify 12 V is reaching TCON J5-9 and J5-12. * Verify CAN bus is functional. Pull out connector J5 from the TCON and with a voltmeter set to resistance verify that pins 3 and 4 on the harness connector measure between 55 and 65 Ohms. Check wiring and boom cable for open or short circuits if resistance check fails. * Replace TCON if necessary.
		36	Incorrect software version	TCON's secondary processor software revision does not match the system revision level.		Reprogram the machine with latest software. Check http://firmware.genielift.com/ for the latest software version.
83	Telematics	21	Remote disable	The telematics module has locked out machine operation.	Machine will not be functional, or have limited functionality, depending on the telematics option.	Call machine owner to re-enable machine functions.
84	Turntable Tilt Sensor	13	Not detected	The tilt sensors (S8O and/or S8S) have not been detected on the CAN bus.	Boom Up, Extend and Drive functions will not operate.	* Verify S8O is receiving power. Disconnect sensor connector and verify harness connector pins 1 and 2 measure 12 V. * Verify S8S is receiving power. Disconnect sensor connector and verify harness connector pins 1 and 2 measure 12 V. * Verify CAN bus wiring. With a voltmeter set to resistance, check the resistance between pins 3 and 4 on the harness connector (not the sensor's integrated connector). Resistance should be between 55 and 65 ohms. Check CAN wiring if resistance check fails. * Replace sensor if required.
		17	Invalid calibration	The tilt sensors have no valid calibration data, either because the sensor(s) were replaced or the prior calibration was cleared from memory or was unsuccessful.	Boom Up and Extend functions will not operate.	Perform the tilt sensor calibration process.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
88	Function Enable Valve	12	Circuit shorted to V+	TCON detected that C155PCE circuit is shorted to 12 V.	Only Auxiliary Power is available.	* With a voltmeter, measure Y74. Proper resistance should be between 5 - 60 ohms. Replace Y74 if resistance is outside of those values. * Verify wiring for C155PCE (OR/RD, TCON J2-5) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C155PCE circuit is shorted to GND.		
92	Turntable Rotate Flow Valve	12	Circuit shorted to V+	TCON detected that C6TRF circuit is shorted to 12 V.	Turntable Rotate functions will not operate.	* With a voltmeter, measure Y13. Proper resistance should be between 5 - 60 ohms. Replace Y13 if resistance is outside of those values. * Verify wiring for C6TRF (WH/RD, TCON J4-1) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C6TRF circuit is shorted to GND.		
94	Boom Length Sensor	13	No signal	No CAN messages have been received by the TCON from the Length Sensor.	Boom Up, Extend and Turntable Rotate functions will not operate.	* Verify sensor power P85PWR (GR, TCON J6-7) is at 12 V while the system is running. * Verify the sensor is receiving power. Unplug the sensor and verify 12 V across pins 1 (+) and 2 (-) on the harness connector. * Verify the CAN bus wiring. With the sensor still unplugged, measure resistance across harness connector pins 3 and 4. If resistance is not between 55 and 65 ohms, check CAN wire harnesses. * Replace sensor if necessary.
		17	Invalid calibration	Sensor has been replaced and requires calibration, or calibration in memory has been erased.		Run the boom length calibration process and verify fault is no longer active.
		19	Out of range	Sensor disagrees with boom position sensed by LSB1RS, or boom exceeded the calibrated minimum or maximum values.		* Run the boom length calibration process and verify fault is no longer active. * If fault persists, verify LSB1RS C42LS, OR/RD, Recovery Module J36-4 and J36-9, TCON J7-4) operates properly. The signal should be 12 V when the boom is fully retracted and 0 V when the boom is extended at least 24 inches.
		36	Internal check	The two internal sensing channels inside the Length Sensor have registered a significant difference.		* Run the boom length calibration process and verify fault is no longer active. * If fault persists, replace the sensor.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
96	Engine Oil Pressure	21	Value too low	The engine oil pressure is measured as too low, potentially damaging the engine.	Engine may not attempt to start until system power cycle. Engine may be turned off by control system immediately.	* Stop engine as soon as possible. * Verify the engine oil level. * Verify the engine oil pump. * Power on the machine and start the engine. At the ground controls display, view the engine oil pressure gauge for proper operation. * If engine uses an analog oil pressure sensor, verify it is sending an analog voltage on C25PSR (WH/BK, TCON J6-9).
100	Platform Level Up Valve	12	Circuit shorted to V+	PCON detected that V14PLU circuit is shorted to 12 V.	Platform Level Up and possibly Level Down functions will not operate.	* With a voltmeter, measure Y20. Proper resistance should be between 5 - 60 ohms. Replace Y20 if resistance is outside of those values. * Verify wiring for V14PLU (OR, PCON J12-6) and check for open or short circuits.
		15	Circuit shorted to GND	PCON detected that V14PLU circuit is shorted to GND.		
101	Platform Level Down Valve	12	Circuit shorted to V+	PCON detected that V15PLD circuit is shorted to 12 V.	Platform Level Down and possibly Level Up functions will not operate.	* With a voltmeter, measure Y19. Proper resistance should be between 5 - 60 ohms. Replace Y19 if resistance is outside of those values. * Verify wiring for V15PLD (OR/BK, PCON J12-7) and check for open or short circuits.
		15	Circuit shorted to GND	PCON detected that V15PLD circuit is shorted to GND.		
150	Platform Overload Recovery	21	Condition occurred	This is a flag that indicates that the platform was overloaded and that auxiliary function enable was used while overloaded.	Advisory condition. Machine is fully functional.	Power up the machine in service mode and clear the flag in the service menu on the ground control display.
152	Primary Boom Up/Down Flow Valve	12	Circuit shorted to V+	TCON detected that C3PBF circuit is shorted to 12 V.	Boom Up and Down functions will not operate.	* With a voltmeter, measure Y12. Proper resistance should be between 5 - 60 ohms. Replace Y12 if resistance is outside of those values. * Verify wiring for C3PBF (RD/WH, TCON J4-4) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-3 and J37-10 is zero ohms.
		15	Circuit shorted to GND	TCON detected that C3PBF circuit is shorted to GND.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
160	Steer Left Valve	12	Circuit shorted to V+	TCON detected that C37STL circuit is shorted to 12 V.	Steer Left function will not operate.	* With a voltmeter, measure Y3. Proper resistance should be between 5 - 60 ohms. Replace Y3 if resistance is outside of those values. * Verify wiring for C37STL (BL/BK, TCON J4-11) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C37STL circuit is shorted to GND.		
161	Steer Right Valve	12	Circuit shorted to V+	TCON detected that C36STR circuit is shorted to 12 V.	Steer Right function will not operate.	* With a voltmeter, measure Y4. Proper resistance should be between 5 - 60 ohms. Replace Y4 if resistance is outside of those values. * Verify wiring for C36STR (BL, TCON J4-12) and check for open or short circuits.
		15	Circuit shorted to GND	TCON detected that C36STR circuit is shorted to GND.		
169	Primary Boom Extend / Retract Flow Valve	12	Circuit shorted to V+	TCON detected that C9PEF circuit is shorted to 12 V.	Boom Extend and Retract functions will not operate.	* With a voltmeter, measure Y15. Proper resistance should be between 5 - 60 ohms. Replace Y15 if resistance is outside of those values. * Verify wiring for C9PEF (BK/RD, TCON J4-5) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-6 and J37-7 is zero ohms.
		15	Circuit shorted to GND	TCON detected that C9PEF circuit is shorted to GND.		
174	Platform Rotate Toggle Switch	19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	Platform Rotate Left or Right will not operate, depending on which side of the switch was faulted.	Verify with a voltmeter that the Platform Rotate Toggle Switch (TS7) is operating properly. * C17PRL (GR, PCON J16-4) and C18PRR (GR/BK, PCON J17-5) should be 12 V when the switch is pressed in their respective directions. Cycle power to allow the machine to re-test the fault.
177	Engine Coolant Temperature	12	Value too high	The engine coolant temperature is measured as too high, potentially damaging the engine.	Engine will not restart until machine power is cycled. Engine may stop itself, depending on the engine option.	* Stop engine as soon as possible. * Verify the engine coolant level. * Verify the engine coolant/water pump. * Power on the machine and start the engine. At the ground controls display, view the engine temperature gauge for proper operation. * If engine uses an analog temperature sensor, verify it is sending an analog voltage on C26TSR (WH/RD, TCON J6-10).

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
178	Engine Warning Lamp	21	Fault	The engine has triggered the Engine Warning Lamp condition.	Machine will function as normal.	* Check the engine fault codes with an engine diagnostic tool.
179	Engine Stop Lamp	21	Fault	The engine has triggered the Engine Stop Lamp condition.	Control system will not allow engine restart until power cycle. Engine may stop itself, depending on the engine option.	* Stop engine immediately. * Check the engine fault codes with an engine diagnostic tool.
240	Sensor Power P85PWR	12	Circuit shorted to V+	TCON detected that P85PWR circuit is shorted to 12 V.	Boom Up and Extend functions will not operate.	* Turn on machine and verify sensor power P85PWR (GR, TCON J6-7) is at 12 V. * Inspect wiring for open or shorts circuits.
		15	Circuit shorted to GND	TCON detected that P85PWR circuit is shorted to GND.		
241	Sensor Power P109PWR	12	Circuit shorted to V+	TCON detected that P109PWR circuit is shorted to 12 V.	Boom Up and Extend functions will not operate.	* Turn on machine and verify sensor power P109PWR (GR/WH, TCON J7-7) is at 12 V. * Inspect wiring for open or shorts circuits.
		15	Circuit shorted to GND	TCON detected that P109PWR circuit is shorted to GND.		
242	Sensor Power P26PWR	12	Circuit shorted to V+	PCON detected that P26PWR circuit is shorted to 12 V.	Boom Up and Extend functions will not operate.	* Turn on machine and verify sensor power P26PWR (BK, PCON J13-9) is at 12 V. * Inspect wiring for open or shorts circuits.
		15	Circuit shorted to GND	PCON detected that P26PWR circuit is shorted to GND.		
243	Proximity Override Toggle Switch	19	Stuck ON at power up.	Toggle switch input was detected as HIGH at start-up.	Operator will be unable to override the proximity cutoff feature.	Verify with a voltmeter that the Proximity Override Toggle Switch (TS46) is operating properly. * C90PRX (RD/BK, PCON J17-9) should be 12 V when the switch is pressed. Cycle power to allow the machine to re-test the fault.

Control System Fault Codes

Models with Revision H software or higher

ID	Component	ID	Name	Cause	Effect	Solution
1	Engine Can Bus	13	Not detected	Engine CANBUS CAN+ or CAN- shorted to supply.	Disable engine start for tier 4F engines	*Verify with a voltmeter that CAN+ and CAN- lines are not shorted.* Measure the resistance between D228CAN+ (YL, TCON J9-3) and D228CAN- (GR, TCON J9-4); should be between 55 and 65 ohms. * D228CAN+ (YL, TCON J9-3) should be between 1V and 5V. * D228CAN- (GR, TCON J9-4) should be between 1V and 5V. Remove short(s) and cycle power.
7	Engine Warning	21	Fault	The engine has triggered the Engine Warning Lamp condition.	Machine will function as normal.	* Check the engine fault codes with an engine diagnostic tool.
8	Engine Stop	21	Fault	The engine has triggered the Engine Stop Lamp condition.	Control system will not allow engine restart until power cycle. Engine may stop itself, depending on the engine option.	* Check the engine fault codes with an engine diagnostic tool. Note: The control system shuts off the engine immediately upon receiving this fault from the engine.
9	Engine	21	Fault	Engine is reporting an engine-specific fault	This is a generic engine warning fault. Engine may enforce power reduction. Other effects vary depending on the fault.	Refer to the engine fault codes in the menu system.
10	Ground Controls Engine Start Switch	27	Active at startup	Engine start button held at startup.	Engine start is disabled	Release engine start button, check DISCON overlay and ribbon cable if issue persists.
11	Platform Controls Engine Start Switch	27	Active at startup	Platform controls engine start switch active at startup.	Engine start switch will not operate.	*Verify with a voltmeter that the Engine Start Toggle Switch (TS2) is operating properly. * C33STR (BK, PCON J16-3) should be 0 V with the switch OFF and 12 V with the switch ON. *Cycle power to allow the machine to re-test the fault.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
12	Machine CAN Bus	13	Not detected	Machine CANBUS CAN+ or CAN- shorted to supply	Machine will not be functional.	*Verify with a voltmeter that CAN+ and CAN- lines are not shorted. *Measure the resistance between D82CAN+ (YL, TCON J5-3) and D81CAN- (GR, TCON J5-4); should be between 55 and 65 ohms. *D81CAN+ (YL, TCON J5-3) should be between 1V and 5V. *D81CAN- (GR, TCON J5-4) should be between 1V and 5V. *Remove short(s) and cycle power.
13	Jib Up/Down Switch	27	Active at startup	Toggle switch input was detected as HIGH at start-up.	The Jib Up or Down functions will not operate.	*Verify with a voltmeter that the Jib Up/Down Toggle Switch (TS8) is operating properly. * C43JU (BL, PCON J17-6) should be 0 V with the switch OFF and 12 V with the switch held in the UP position. * C44JD (BL/BK, PCON J17-8) should be 0 V with the switch OFF and 12 V with the switch held in the DOWN position. *Cycle power to allow the machine to re-test the fault.
15	Foot Switch	27	Active at startup	Foot switch input was detected as HIGH at start-up, or the footswitch was held for too long and caused the footswitch timer to elapse.	Machine will not be functional.	* Release foot switch and cycle power. * If problem persists, with a voltmeter verify that C24FS (WH, PCON J12-2) is LOW when foot switch is released and 12 V when held down.
		28	Timeout	Foot switch depressed too long without action	Machine will not be functional.	
17	Aux Pump Coil	11	Shorted to supply voltage	TCON detected that C27AUX circuit is shorted to 12V.	Machine will not be functional.	*Check C27AUX (RD, TCON J3-3) wiring. *With a voltmeter verify that C27AUX (RD, TCON J3-3) is 0 V when the Auxiliary Power toggle switch is OFF and 12 V when switch is ON. *Verify the terminals of the APU solenoid have a resistance greater than 5 ohms. If not, replace the solenoid.
19	Aux Enable Switch	27	Active at startup	Aux button held at startup.	Machine will not be functional.	Release Aux button, check DISCON overlay and ribbon cable if issue persists.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
20	Pri Boom Ext / Ret Joystick	11	Shorted to supply voltage	Circuit C163PER is above 4.5 V.	Boom Extend and Retract functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C163PER (BL/WH, PCON J18-4) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		27	Active at startup	Circuit C163PER voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
21	Pri Boom Up / Down Joystick	11	Shorted to supply voltage	Circuit C164PUD is above 4.5 V.	Boom Up and Down functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C164PUD (RD/WH, PCON J18-3) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		27 28	Active at startup	Circuit C164PUD voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
22	Pri Boom Up coil	11	Shorted to supply voltage	TCON detected that C1PBU circuit is shorted to 12 V.	Boom Up function will not operate. Boom Down will also not operate if short is to 12 V.	* With a voltmeter, measure Y22. Proper resistance should be between 5 - 60 ohms. Replace Y22 if resistance is outside of those values. * Verify wiring for C1PBU (RD, TCON J4-10) and check for open or short circuits.
23	Pri Boom Down Coil	11	Shorted to supply voltage	TCON detected that C2PBD circuit is shorted to 12 V or GND.	Boom Up and Down functions will not operate.	* With a voltmeter, measure Y21. Proper resistance should be between 5 - 60 ohms. Replace Y21 if resistance is outside of those values. * Verify wiring for C2PBD (RD/BK, TCON J4-9) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-2 and J37-11 is zero ohms.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
24	Pri Boom Angle	13	Not detected	No CAN messages have been received by the TCON from the Angle Sensor.	Machine limited to recovery functions	* Verify sensor power P85PWR (GR, TCON J6-7) is at 12 V while the system is running. * Verify the sensor is receiving power. Unplug the sensor and verify 12 V across pins 2 (+) and 1 (-) on the harness connector. * Verify the CAN bus wiring. With the sensor still unplugged, measure resistance across harness connector pins 3 and 4. If resistance is not between 55 and 65 ohms, check CAN wire harnesses. * Replace sensor if necessary.
		14	Cross check failed	The two internal sensing channels inside the Angle Sensor have registered a significant difference.		* Calibrate boom angle sensor. * Check boom angle sensor mount, ensure all fasteners are tightened to spec. * Replace sensor if issue persists.
		17	Not calibrated	Sensor has been replaced and requires calibration, or calibration in memory has been erased.		Run the boom angle calibration process and verify fault is no longer active.
		19	Value out of expected range	Min or max boom angle out of expected range. Crosscheck limit switch disagrees with boom angle sensor.	Machine limited to recovery functions.	* Verify that with the boom stowed C68LS (BL, TCON J7-3) is 12V and that the boom is making contact with the LST3S limit switch arm. * Verify that with the boom above 12 degrees C68LS (BL, TCON J7-3) is 0V and that the boom is not making contact with the LST3S limit switch arm. * Check LST3S limit switch for physical damage. * Check bearings in rotary base housing. * Calibrate boom angle sensor.
25	Cable tension	21	Fault	Boom cable tension limit switch LSB2S indicates that the tension is loose on the boom cables.	Boom Up and Extend functions will not operate.	* Return boom to stowed position as quickly as possible. * Verify both boom cables are properly tensioned and that LST3S is properly centered in the bracket. * Verify LSB2S (C59CNK, BL/WH, TCON J7-5) operates properly. Signal should normally by 12 V. If cable tension is loose, signal should be 0 V.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
26	Pri Boom Ext Coil	11	Shorted to supply voltage	TCON detected that C7PBE circuit is shorted to 12 V or GND.	Boom Extend and Retract functions will not operate.	* With a voltmeter, measure Y26. Proper resistance should be between 5 - 60 ohms. Replace Y26 if resistance is outside of those values. * Verify wiring for C7PBE (BK, TCON J4-7) and check for open or short circuits.
27	Pri Boom Ret Coil	11	Shorted to supply voltage	TCON detected that C8PBR circuit is shorted to 12 V or GND.	Boom Extend and Retract functions will not operate.	* With a voltmeter, measure Y25. Proper resistance should be between 5 - 60 ohms. Replace Y25 if resistance is outside of those values. * Verify wiring for C8PBR (BK/WH, TCON J4-8) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-5 and J37-8 is zero ohms.
35	Ground Control Button	27	Active at startup	Buttons were held at system start, or are shorted on the ground control panel.	The function associated with the stuck button will not operate.	*Release the ground control buttons and cycle power. *If problem persists, open ground control box and open the Display Controller access door, being careful to keep water out. Verify the ribbon cables are properly seated and dry. *Re-seat and/or replace ribbon cables if necessary. *Replace ground control overlay.
36	Jib Up Coil	11	Shorted to supply voltage	PCON detected that V43JU circuit is shorted to 12 V or GND.	Jip Up function will not operate.	* With a voltmeter, measure Y68. Proper resistance should be between 5 - 60 ohms. Replace Y68 if resistance is outside of those values. * Verify wiring for V43JU (BL, PCON J12-8) and check for open or short circuits.
37	Jib Down Coil	11	Shorted to supply voltage	PCON detected that V44JD circuit is shorted to 12 V or GND.	Jib Down function will not operate.	* With a voltmeter, measure Y69. Proper resistance should be between 5 - 60 ohms. Replace Y69 if resistance is outside of those values. * Verify wiring for V44JD (BL/BK, PCON J12-9) and check for open or short circuits.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
40	Jib Select Coil	11	Shorted to supply voltage	PCON detected V18PRR is short to supply	Jib and platform functions will not operate	*With a voltmeter, measure Y18. Proper resistance should be between 5 - 60 ohms. Replace Y18 if resistance is outside of those values. *Verify wiring for V18PRR (GR/BK, PCON J12-4) and check for short circuits.
41	Turntable Rotate Joystick	11	Shorted to supply voltage	Circuit C165TTR is above 4.5 V.	Turntable Rotate functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C165TTR (WH/RD, PCON J18-2) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		27	Active at startup	Circuit C165TTR voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
42	Turntable Rotate CW Coil	11	Shorted to supply voltage	TCON detected that C4TRL circuit is shorted to 12 V or GND.	Turntable Rotate functions will not operate.	* With a voltmeter, measure Y24. Proper resistance should be between 5 - 60 ohms. Replace Y24 if resistance is outside of those values. * Verify wiring for C4TRL (WH, TCON J3-12) and check for open or short circuits.
43	Turntable Rotate CCW Coil	11	Shorted to supply voltage	TCON detected that C5TRR circuit is shorted to 12 V or GND.	Turntable Rotate functions will not operate.	* With a voltmeter, measure Y23. Proper resistance should be between 5 - 60 ohms. Replace Y23 if resistance is outside of those values. * Verify wiring for C5TRR (WH/BK, TCON J3-1) and check for open or short circuits.
44	Drive Enable Toggle Switch	27	Active at startup	Toggle switch input was detected as HIGH at start-up.	Drive Enable switch will not operate, possibly preventing drive while the turntable is rotated.	*Verify with a voltmeter that the Drive Enable Toggle Switch (TS15) is operating properly. * C143DEL (BL/RD, PCON J16-7) should be 0 V with the switch OFF and 12 V with the switch held in the ON position. *Cycle power to allow the machine to re-test the fault.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
45	Platform Level Toggle Switch	27	Active at startup	Toggle switch input was detected as HIGH at start-up.	Platform Level Up or Down functions may not operate, depending on which direction the switch fault occurred.	*Verify with a voltmeter that the Platform Level Up/Down Toggle Switch (TS9) is operating properly. * C14PLU (OR, PCON J17-2) should be 0 V with the switch OFF and 12 V with the switch held in the UP position. * C15PLD (OR/BK, PCON J17-3) should be 0 V with the switch OFF and 12 V with the switch held in the DOWN position. *Cycle power to allow the machine to re-test the fault.
46	Platform Rotate CW Coil	11	Shorted to supply voltage	PCON detected that V17PRL circuit is shorted to 12 V or GND.	Platform Rotate CW function will not operate.	* With a voltmeter, measure Y70. Proper resistance should be between 5 - 60 ohms. Replace Y70 if resistance is outside of those values. * Verify wiring for V17PRL (GR, PCON J12-5) and check for open or short circuits.
47	Platform Rotate CCW Coil	11	Shorted to supply voltage	PCON detected that V18PRR circuit is shorted to 12 V or GND.	Platform Rotate CCW function will not operate.	* With a voltmeter, measure Y71. Proper resistance should be between 5 - 60 ohms. Replace Y71 if resistance is outside of those values. * Verify wiring for V18PRR (GR/BK, PCON J12-4) and check for open or short circuits.
51	Drive Joystick	11	Shorted to supply voltage	Circuit C160DRV is above 4.5 V.	Drive Forward and Reverse functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, with a voltmeter check that C160DRV (WH/RD, PCON J18-10) is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		27	Active at startup	Circuit C160DRV voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
52	Drive Forward Pump Coil	11	Shorted to supply voltage	TCON detected that C30FWD circuit is shorted to 12 V or GND.	Drive Forward, Brake Release and possibly Engine will not operate.	* With a voltmeter, measure Y6. Proper resistance should be between 5 - 60 ohms. Replace Y6 if resistance is outside of those values. * Verify wiring for C30FWD (WH, TCON J2-6) and check for open or short circuits.
53	Drive Reverse Pump Coil	11	Shorted to supply voltage	TCON detected that C31REV circuit is shorted to 12 V or GND.	Drive Reverse, Brake Release and possibly Engine will not operate.	* With a voltmeter, measure Y5. Proper resistance should be between 5 - 60 ohms. Replace Y5 if resistance is outside of those values. * Verify wiring for C31REV (WH/BK, TCON J2-7) and check for open or short circuits.
54	Brake Release Coil	11	Shorted to supply voltage	TCON detected that C32BRK circuit is shorted to 12 V or GND.	Machine will not be functional.	* With a voltmeter, measure Y2. Proper resistance should be between 5 - 60 ohms. Replace Y2 if resistance is outside of those values. * Verify wiring for C32BRK (WH/RD, TCON J2-9) and check for open or short circuits.
55	High Drive Speed Coil	11	Shorted to supply voltage	TCON detected that C29MS circuit is shorted to 12 V or GND.	Drive functions will not operate.	* With a voltmeter, measure Y27. Proper resistance should be between 5 - 60 ohms. Replace Y27 if resistance is outside of those values. * Verify wiring for C29MS (RD/WH, TCON J2-8) and check for open or short circuits.
56	Telematics Device	13	Not detected	M7 telematics device not detected.	Information only	Cycle power. If fault persists, check telematics ready connector wiring. If there are no wiring issues replace M7.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
61	Steer Joystick	11	Shorted to supply voltage	Circuit C159STD or C159STA is above 4.5 V.	Drive and steer functions will not operate.	* Leave joystick in neutral position and cycle power. * If fault persists, identify which circuit is the steer circuit. Check C159STA (BL/WH, PCON J18-11) for a joystick steer option. Check C159STD (BL/RD, PCON J18-9) for the rocker joystick steer option. With a voltmeter check that the circuit is at 2. 5V +/- 0.2 V at startup and does not go above 4.5 V or below 0.5 V when fully stroked in each direction. * Replace joystick if voltage check fails.
		27	Active at startup	Circuit C159STD or C159STA voltage was not within the startup voltage range of 2.5 V +/- 0.2 V.		
62	Prox Override Togggle Switch	27	Active at startup	Toggle switch input was detected as HIGH at start-up.	The Jib Up or Down functions will not operate.	*Verify with a voltmeter that the Jib Up/Down Toggle Switch (TS8) is operating properly. * C43JU (BL, PCON J17-6) should be 0 V with the switch OFF and 12 V with the switch held in the UP position. * C44JD (BL/BK, PCON J17-8) should be 0 V with the switch OFF and 12 V with the switch held in the DOWN position. Cycle power to allow the machine to re-test the fault.
68	Ground Function Enable Button	27	Active at startup	Button was held at system start, or is shorted on the ground control panel.	The function associated with the stuck button will not operate.	* Release the ground control buttons and cycle power. * If problem persists, open ground control box and open the Display Controller access door, being careful to keep water out. Verify the ribbon cables are properly seated and dry. * Re-seat and/or replace ribbon cables if necessary. * Replace ground control overlay.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
69	AC Generator Output	11	Shorted to supply voltage	TCON detected that C45GEN circuit is shorted to 12 V.	Generator function will not operate.	* With a voltmeter, measure Y29. Proper resistance should be between 5 - 60 ohms. Replace Y29 if resistance is outside of those values. * Verify wiring for C45GEN (GR/WH, TCON J3-2) and check for open or short circuits.
72	Lift Guard Contact Alarm Switch	14	Cross check failed	PCON detected that inputs from SW30 (contact alarm proximity sensor) are the same voltage.	Boom Up and Extend functions will not operate.	* Using a voltmeter, verify that the voltage on C248CA (OR/BK, PCON J12-1) is always the opposite of C247CA (OR, PCON J12-11). * Check wiring for open or short circuits. * Verify SW30 is receiving power and ground by verifying 12 V across C31 pins 1 and 3. * Replace SW30 if necessary.
		21	Fault			
73	Engine Oil Pressure	12	Sensor value too high	Engine oil pressure sender is shorted to 12V.	Engine will not operate.	* With a voltmeter, check that C25PSR (WH/BK, TCON J6P9) is not shorted to 12V and voltage is between 0.1-11.5V * Replace sender if necessary
		24	Too low	The engine oil pressure is measured as too low, potentially damaging the engine.	Engine may not attempt to start until system power cycle. Engine may be turned off by control system immediately.	* Stop engine as soon as possible. * Verify the engine oil level. * Verify the engine oil pump. * Power on the machine and start the engine. At the ground controls display, view the engine oil pressure gauge for proper operation. * If engine uses an analog oil pressure sensor, verify it is sending an analog voltage on C25PSR (WH/BK, TCON J6-9).

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
74	Engine Temperature	15	Sensor value too low	Engine temperature sensor is shorted to ground	Engine will not operate	* With a voltmeter, check that C26TSR (WH/RD, TCON J6P8) is not shorted to ground and voltage is between 0.1-11.5V * Replace sensor if necessary
		23	Too high	The engine coolant temperature is measured as too high, potentially damaging the engine.	Engine will not restart until machine power is cycled. Engine may stop itself, depending on the engine option.	* Stop engine as soon as possible. * Verify the engine coolant level. * Verify the engine coolant/water pump. * Power on the machine and start the engine. At the ground controls display, view the engine temperature gauge for proper operation. * If engine uses an analog temperature sensor, verify it is sending an analog voltage on C26TSR (WH/RD, TCON J6-10).
76	Platform Load Sensor	13	Not detected	Load sensor not detected on the communications bus.	Boom Up, Extend and Turntable Rotate functions will not operate.	* Verify sensor power P26PWR (BK, PCON J13-9) is at 12 V while the system is running. * Verify 12 V across pins on C27-2 (+) and C27-3 (-) on the harness connector. * Measure resistance across C27 pins 4 and 5 on the harness connector. If resistance is not between 55 and 65 ohms, check CAN wire harnesses. * Replace sensor if necessary.
		14	Cross check failed	The two internal sensing channels inside the Load Sensor have registered a significant difference.	Boom Up, Extend and Turntable Rotate functions will not operate.	* Check that the load sensor is mounted correctly and all fasteners are tightened to spec. * Calibrate load sensor. * Replace sensor if issue persists.
		15	Value to low	Platform load sensor out of calibration	Machine limited to recovery functions	* Make sure the platform is not touching the ground or an overhead obstruction. Cycle power and check that fault is no longer reported. * Perform the platform overload calibration procedure. * Replace sensor if necessary.
		17	Not calibrated	Platform load sensor out of calibration		* Calibrate load sensor. * Replace sensor if issue persists.
		21	Fault	Platform load sensor out of calibration		* Check that the load sensor is mounted correctly and all fasteners are tightened to spec. * Calibrate load sensor. * Replace sensor if issue persists.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
78	Platform Controller (PCON)	13	Not detected	TCON has not detected the PCON primary processor on the communications bus.	Controls from the platform will not operate.	* Verify PCON is receiving power. Check for 12 V on J15-2 (+) and J15-1 (-). * Verify PCON is receiving ESTOP signals. With ground ESTOP pulled out and keyswitch set to Platform, verify 12 V is reaching PCON J15-10. * Verify CAN bus is functional. Pull out connector J15 from the PCON and with a voltmeter set to resistance verify that pins 3 and 4 on the harness connector measure between 110 and 130 Ohms. Check wiring and boom cable for open or short circuits if resistance check fails. * Replace PCON if necessary.
		29	Software version mismatch	PCON software is out of date.	Machine limited to recovery functions	Download latest software from firmware site and update machine.
79	Display Controller (DISCON)	13	Not detected	TCON has not detected the DISCON on the communications bus.	Controls from the ground will not operate.	* Verify DISCON is operating by checking that the display on the front is operating properly. * If there is no display, try to power up the DISCON by setting the keyswitch to Ground, pull out the ground ESTOP and press the Ground Function Enable button. The display should start. * If there is still no display, check DISCON power on J10 pins 2 (+) and 1 (-). * If DISCON operates but fault persists, check the CAN bus wiring. Disconnect J10 and with a voltmeter set to resistance verify that the resistance between pins 3 and 4 on the harness connector are between 55 and 65 ohms. Check CAN wiring if resistance check fails. * Replace DISCON if required.
		29	Software version mismatch	DISCON software is out of date.	Machine limited to recovery functions	Download latest software from firmware site and update machine.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
80	Turntable Controller (TCON)	13	Not detected	The DISCON has not detected the TCON on the CAN bus.	Machine limited to recovery functions	* Verify TCON is receiving power. Check for 12 V on J5-2 (+) and J5-1 (-). * Verify TCON is receiving ESTOP signals. With ground ESTOP pulled out and keyswitch set to Ground, verify 12 V is reaching TCON J5-9 and J5-12. * Verify CAN bus is functional. Pull out connector J5 from the TCON and with a voltmeter set to resistance verify that pins 3 and 4 on the harness connector measure between 55 and 65 Ohms. Check wiring and boom cable for open or short circuits if resistance check fails. * Replace TCON if necessary.
		29	Software version mismatch	TCON software is out of date		Download latest software from firmware site and update machine.
82	Overload	21	Recovery	This is a flag that indicates that the platform was overloaded and that auxiliary function enable was used while overloaded.	Advisory condition. Machine is fully functional.	Power up the machine in service mode and clear the flag in the service menu on the ground control display.
83	Disabled	21	By owner	The telematics module has locked out machine operation.	Machine will not be functional, or have limited functionality, depending on the telematics option.	Call machine owner to re-enable machine functions.
84	Chassis Angle	13	Not detected	The tilt sensor S80 has not been detected on the CAN bus.	Boom Up, Extend and Drive functions will not operate.	* Verify S8O is receiving power. Disconnect sensor connector and verify harness connector pins 1 and 2 measure 12 V. * Verify CAN bus wiring. With a voltmeter set to resistance, check the resistance between pins 3 and 4 on the harness connector (not the sensor's integrated connector). Resistance should be between 55 and 65 ohms. Check CAN wiring if resistance check fails. * Replace sensor if required.
		17	Not calibrated	Tilt sensor not calibrated	Machine limited to recovery functions	Calibrate tilt sensor.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
85	Chassis Angle Safety	13	Not detected	Tilt sensor not calibrated	Machine limited to recovery functions	Calibrate tilt sensor.
88	Function Enable Coil	11	Shorted to supply voltage	TCON detected that C155PCE circuit is shorted to 12 V or GND.	Only Auxiliary Power is available.	* With a voltmeter, measure Y74. Proper resistance should be between 5 - 60 ohms. Replace Y74 if resistance is outside of those values. * Verify wiring for C155PCE (OR/RD, TCON J2-5) and check for open or short circuits.
89	Fuel Level Sensor	12	Value to high	Fuel sensor shorted to B+	Information only	With a voltmeter, check voltage on C65FLI (BL/WH, TCON J7-11). The voltage should be between 1V and 5V. Check for shorts to B+.
		15	Value to low	Fuel sensor shorted to GND		With a voltmeter, check voltage on C65FLI (BL/WH, TCON J7-11). The voltage should be between 1V and 5V. Check for shorts to ground.
92	Turntable Rotate Flow Coil	11	Shorted to supply voltage	TCON detected that C6TRF circuit is shorted to 12 V or GND.	Turntable Rotate functions will not operate.	* With a voltmeter, measure Y13. Proper resistance should be between 5 - 60 ohms. Replace Y13 if resistance is outside of those values. * Verify wiring for C6TRF (WH/RD, TCON J4-1) and check for open or short circuits.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
94	Primary Boom Length	13	Not detected	No CAN messages have been received by the TCON from the Length Sensor.	Boom Up, Extend and Turntable Rotate functions will not operate.	* Verify sensor power P85PWR (GR, TCON J6-7) is at 12 V while the system is running. * Verify the sensor is receiving power. Unplug the sensor and verify 12 V across pins 1 (+) and 2 (-) on the harness connector. * Verify the CAN bus wiring. With the sensor still unplugged, measure resistance across harness connector pins 3 and 4. If resistance is not between 55 and 65 ohms, check CAN wire harnesses. * Replace sensor if necessary.
		14	Cross check failed	The two internal sensing channels inside the Length Sensor have registered a significant difference.	Machine limited to recovery functions	* Ensure that the boom angle sensor cord is hooked up to the bracket on the boom and that the cord extends and retracts smoothly. * Calibrate boom length sensor. * Replace sensor if necessary.
		17	Not calibrated	Boom length sensor not calibrated.		Calibrate boom length sensor.
		19	Value out of expected range	Min or max length out of expected range. Crosscheck limit switch disagrees with length sensor.		* Verify that with the boom retracted C24LS (OR/RD TCON J7-4) is 12V and that the boom is making contact with the LSB1RS limit switch arm. * Verify that when the boom is extended at least 10" C24LS (OR/RD, TCON J7-4) is OV and that the boom is not making contact with the LSB1RS limit switch arm. * Check LSB1RS limit switch for physical damage. * Calibrate length sensor.
99	Primary Boom Extend / Retract Flow Coil	11	Shorted to supply voltage	TCON detected that C9PEF circuit is shorted to 12 V or GND.	Boom Extend and Retract functions will not operate.	* With a voltmeter, measure Y15. Proper resistance should be between 5 - 60 ohms. Replace Y15 if resistance is outside of those values. * Verify wiring for C9PEF (BK/RD, TCON J4-5) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-6 and J37-7 is zero ohms.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
100	Platform Level Up Coil	11	Shorted to supply voltage	PCON detected that V14PLU circuit is shorted to 12 V or GND.	Platform Level Up and possibly Level Down functions will not operate.	* With a voltmeter, measure Y20. Proper resistance should be between 5 - 60 ohms. Replace Y20 if resistance is outside of those values. * Verify wiring for V14PLU (OR, PCON J12-6) and check for open or short circuits.
101	Platform Level Down Coil	11	Shorted to supply voltage	PCON detected that V15PLD circuit is shorted to 12 V or GND.	Platform Level Down and possibly Level Up functions will not operate.	* With a voltmeter, measure Y19. Proper resistance should be between 5 - 60 ohms. Replace Y19 if resistance is outside of those values. * Verify wiring for V15PLD (OR/BK, PCON J12-7) and check for open or short circuits.
110	Platform Rotate Toggle Switch @PC	27	Active at startup	Toggle switch input was detected as HIGH at start-up.	Platform Rotate Left or Right will not operate, depending on which side of the switch was faulted.	*Verify with a voltmeter that the Platform Rotate Toggle Switch (TS7) is operating properly. * C17PRL (GR, PCON J16-4) and C18PRR (GR/BK, PCON J17-5) should be 12 V when the switch is pressed in their respective directions. *Cycle power to allow the machine to re-test the fault.
116	Model Configuration	31	Setup invalid.	Machine is not fully configured or set to wrong model.	Machine will not operate.	Navigate to Settings -> Model Configuration and ensure model, engine, tires, and region are set and correct.
141	Boom	10	Safety Envelope Exceeded	The system has determined that the platform position has exceeded the safety envelope boundary.	All functions will not operate except for the recovery procedure.	Use Auxiliary Power and the boom retract and/or down functions to bring the platform back within the operational envelope.
150	Sensor Power P26PWR	11	Shorted to supply voltage	PCON detected that P26PWR circuit is shorted to 12 V or GND.	Boom Up and Extend functions will not operate.	* Turn on machine and verify sensor power P26PWR (BK, PCON J13-9) is at 12 V. * Inspect wiring for open or shorts circuits.
152	Primary Boom Up/Down Flow Coil	11	Shorted to supply voltage	TCON detected that C3PBF circuit is shorted to 12 V or GND.	Boom Up and Down functions will not operate.	* With a voltmeter, measure Y12. Proper resistance should be between 5 - 60 ohms. Replace Y12 if resistance is outside of those values. * Verify wiring for C3PBF (RD/WH, TCON J4-4) and check for open or short circuits. * Verify resistance between Recovery Module pins J37-3 and J37-10 is zero ohms.

Control System Fault Codes

ID	Component	ID	Name	Cause	Effect	Solution
160	LF Steer (L or R) Coil	11	Shorted to supply voltage	TCON detected that C37STL circuit is shorted to 12 V or GND.	Steer Left function will not operate.	* With a voltmeter, measure Y3. Proper resistance should be between 5 - 60 ohms. Replace Y3 if resistance is outside of those values. * Verify wiring for C37STL (BL/BK, TCON J4-11) and check for open or short circuits.
161	RF Steer (L or R) Coil	11	Shorted to supply voltage	TCON detected that C36STR circuit is shorted to 12 V or GND.	Steer Right function will not operate.	* With a voltmeter, measure Y4. Proper resistance should be between 5 - 60 ohms. Replace Y4 if resistance is outside of those values. * Verify wiring for C36STR (BL, TCON J4-12) and check for open or short circuits.
185	ESTOP Source	11	Shorted to supply voltage	TCON detected that ESTOP 1 is at 12 V but ESTOP 3 is at 0 V.	ESTOP circuit cannot complete, preventing machine functions.	* Using a voltmeter and with the system turned OFF, check the resistance between TCON J5 pins 9 and 10. Replace TCON if resistance is more than 5 ohms. * Check P79PWR (BK, TCON J5-9) and P23PWR (RD, TCON J5-10) for open or short circuits.
186	ESTOP Return	11	Shorted to supply voltage	Mismatched signals detected on ESTOP Return circuits. Either: * PCON ESTOP 2 and ESTOP 4 do not match, or * TCON ESTOP 2 and ESTOP 4 do not match.	ESTOP circuit cannot complete, preventing machine functions.	* Inspect PCON J15 pins 11 and 12 for open or short circuits. Using a voltmeter, set to diode test mode and make sure the diode tests ok with the anode at pin 12 and cathode at pin 11. If test fails, replace the PCON. * Inspect TCON J5 pins 11 and 12 for open or short circuits. Using a voltmeter, set to diode test mode and make sure the diode tests ok with the anode at pin 12 and cathode at pin 11. If test fails, replace the PCON. * Check P23RET (BK) for shorts to ground or power.
187	TCON Bank power	13	Not detected	Power plug not connected or loose. Internal TCON component failure.	TCON outputs will not turn on.	* Check J1, Bank Power, on TCON is making a good connection. * Verify pin 1 is grounded * Verify pins 2, 3, 4 are 12V * Replace TCON
188	PCON Bank power	13	Not detected	Power plug not connected or loose. Internal TCON component failure.	PCON outputs will not turn on.	* Check J11, Bank Power, on PCON is making a good connection. * Verify pin 1 is grounded * Verify pins 3, 4 are 12V * Replace PCON

Engine Fault Codes

Engine Fault Codes

Some engine options have their own Electronic Control Module that contains more detailed fault information that is specific to the engine. This system can be accessed by using the engine's dedicated service tool. This service tool may be connected to the Engine Service Connector, located to the right of the battery tray.

The ground controls display and fault menu will show basic engine faults, such as low oil pressure and high coolant temperature. It will also show faults for engine warning and engine stop, which correspond to the engine warning lamp and engine stop lamp indicators that the engine may require.

More advanced faults specific to the engine will require the use of a corresponding engine service tool.

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
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

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
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	Sensor error rail pressure; signal range check high
157	4	878	Sensor error rail pressure; signal range check low
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

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
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
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)
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

Deutz TD 2.9 L4 Engine Fault Codes

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SPN	FMI	KWP	Description
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)
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

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
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"
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
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

Deutz TD 2.9 L4 Engine Fault Codes

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SPN	FMI	KWP	Description
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
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

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	FMI	KWP	Description
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
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

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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	Zero fuel calibration injector 1 (in firing order); maximum value exceeded
523946	1	1164	Zero fuel 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.
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

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier
KWP = Keyword Protocol

SPN	FMI	KWP	Description
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
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

Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier
KWP = Keyword Protocol

SPN	FMI	KWP	Description
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
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

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	

Perkins 404-22 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description
29	3	Accelerator Pedal Position 2: Voltage Above Normal
29	4	Accelerator Pedal Position 2: Voltage Below Normal
91	3	Accelerator Pedal Position 1: Voltage Above Normal
91	4	Accelerator Pedal Position 1: Voltage Below Normal
100	1	Engine Oil Pressure :Low- most severe (3)
108	3	Barometric Pressure : Voltage Above Normal
108	4	Barometric Pressure : Voltage Below Normal
110	3	Engine Coolant Temperature : Voltage Above Normal
110	4	Engine Coolant Temperature : Voltage Below Normal
110	15	Engine Coolant Temperature : High -least severe (1)
168	0	Battery Potential/ Power Input 1 : High- most severe (3)
168	3	Battery Potential/ Power Input 1: Voltage Above Normal
168	4	Battery Potential/ Power Input 1: Voltage Below Normal
172	3	Engine Air Inlet Temperature: Voltage Above Normal
172	4	Engine Air Inlet Temperature: Voltage Below Normal
190	0	Engine Speed : High- most severe (3)
190	8	Engine Speed : Abnormal Frequency, Pulse Width or Period
558	3	Accelerator Pedal1 Low Idle Switch: Voltage Above Normal
558	4	Accelerator Pedal1 Low Idle Switch: Voltage Below Normal
638	6	Engine Fuel Rack Actuator: Current Above Normal
639	14	J1939 Network#1: Special Instruction
723	3	Engine Speed Sensor #2: Voltage Above Normal
723	4	Engine Speed Sensor #2: Voltage Below Normal
723	8	Engine Speed Sensor#2: Abnormal Frequency, Pulse Width or Period"
723	10	Engine Speed Sensor #2: Abnormal Rate of Change
733	3	Engine Rack Position Sensor: Voltage Above Normal
733	4	Engine Rack Position Sensor: Voltage Below Normal
1485	7	ECU Main Relay : Not Responding Property
2840	11	ECU Instance: Other Failure Mode
2840	12	ECU Instance: Failure
2840	13	ECU Instance: Out of Calibration
2970	3	Accelerator Pedal 2 Low Idle Switch: Voltage Above Normal
2970	4	Accelerator Pedal 2 Low Idle Switch: Voltage Below Normal
3241	1	Exhaust Gas Temperature 1: Low-most severe (3)
3241	3	Exhaust Gas Temperature 1: Voltage Above Normal
241	4	Exhaust Gas Temperature 1: Voltage Below Normal
3241	15	Exhaust Gas Temperature 1: High-least severe (1)
3241	16	Exhaust Gas Temperature 1: High-moderate severity (2)
3242	1	Particulate Trap Intake Gas Temp: Low- most severe(3)"
3242	3	Particulate Trap Intake Gas Temp: Voltage Above Normal"
3242	4	Particulate Trap Intake Gas Temp: Voltage Below Normal"
3242	15	Particulate Trap Intake Gas Temp: High - least severe(1)"
3242	16	Particulate Trap Intake Gas Temp: High-moderate severity (2)

Perkins 404-22 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description
3251	3	Particulate Trap Differential Pressure: Voltage Above Normal
3251	4	Particulate Trap Differential Pressure: Voltage Below Normal
3473	7	Aftertreatmert #1 Failed to Ignite: Not Responding Properly
3473	11	Aftertreatmert #1 Failed to Ignite : Other Failure Mode
3484	0	Aftertreatmert #1 Ignition : High-most severe (3)
3484	3	Aftertreatmert #1 Ignition : Voltage Above Normal
3484	4	Aftertreatmert #1 Ignition : Voltage Below Normal
3556	6	Aftertreatmert 1 Hydrocarbon Doser 1: Current Above Normal
3610	3	Diesel Particulate Filter Outlet Pressure or 1: Voltage Above Normal"
3610	4	DieselParticulate Filter Outlet Pressure Sensor 1: Voltage Below Normal
3713	7	DPF Active Regeneration Inhibited Due to System Timeout: Not Responding Properly
3713	31	DPF Active Regeneration Inhibited Due to System Timeout
3719	0	Particulate Trap #1 Soot Load Percent: High- most severe (3)
3719	16	Particulate Trap #1 Soot Load Percent: High-moderate severity (2)
4016	6	High Current Auxiliary Power Relay 1: Current Above Normal
4201	3	Engine Speed Sensor #1: Voltage Above Normal
4201	4	Engine Speed Sensor #1: Voltage Below Normal
4201	8	Engine Speed Sensor #1: Abnormal Frequency, Pulse \Nidth, or Period
4201	10	Engine Speed Sensor #1: Abnormal Rate of Change
4765	1	Aftertreatmert #1 Diesel Oxidation Catalyst Intake Gas Temperature: Low-most severe (3)
4765	3	Aftertreatmert #1 Diesel Oxidation Catalyst Intake Gas Temperature: Voltage Above Normal
4765	4	Aftertreatmert #1 Diesel Oxidation Catalyst Intake Gas Temperature: Voltage Below Normal
4765	15	Aftertreatmert #1Diesel Oxidation Catalyst Intake Gas Temperature: High-least severe (1)
4765	16	Aftertreatmert #1 Diesel Oxidation Catalyst Intake Gas Temperature: High-moderate severity (2)
5487	3	Aftertreatmert 1 Burner Unit Combustion Chamber Temperature: Voltage Above Normal
5487	4	Aftertreatmert 1 Burner Unit Combustion Chamber Temperature: Voltage Below Normal
6581	6	Aftertreatmert 1 Hydrocarbon Doser 2 : Current Above Normal

GM 3.0L Engine Fault Codes

Description	DTC Set 2 SPN-2/FMI-2	Description	DTC Set 2 SPN-2/FMI-2
DTC 11: Intake cam / distributor position error	520800 / 7	DTC 221: TPS1-2 higher than expected	653/6
DTC 16: Crank and/or cam no sync during start	636 / 8	DTC 222: TPS2 voltage low	520251 / 4
DTC 24: Exhaust cam position error	520801 / 7	DTC 223: TPS2 voltage high	520251 / 3
DTC 87 Fuel pressure lower than expected	94 / 1	DTC 234: Boost control overboost failure	1692 / 0
DTC 88 Fuel pressure higher than expected	94 / 0	DTC 236: TIP active	1692 / 2
DTC 91: FP low voltage	94 / 4	DTC 237: TIP low voltage	1127 / 4
DTC 92: FP high voltage	94 / 3	DTC 238: TIP high voltage	1127 / 3
DTC 107: MAP voltage low	106 / 4	DTC 261: Injector 1 open or short to ground	651 / 5
DTC 108: MAP pressure high	106 / 16	DTC 262: Injector 1 coil shorted	651 / 6
DTC 111: IAT higher than expected stage 1	105 / 15	DTC 264: Injector 2 open or short to ground	652 / 5
DTC 112: IAT voltage low	105 / 4	DTC 265: Injector 2 coil shorted	652 / 6
DTC 113: IAT voltage high	105 / 3	DTC 267: Injector 3 open or short to ground	653 / 5
DTC 116: ECT higher than expected stage 1	110 / 15	DTC 268: Injector 3 coil shorted	653/6
DTC 117: ECT voltage low	110 / 4	DTC 270: Injector 4 open or short to ground	654 / 5
DTC 118: ECT voltage high	110 / 3	DTC 271: Injector 4 coil shorted	654 / 6
DTC 121: TPS1-2 lower than expected	51 / 1	DTC 273: Injector 5 open or short to ground	655 / 5
DTC 122: TPS1 voltage low	51 / 4	DTC 274: Injector 5 coil shorted	655 / 6
DTC 123: TPS1 voltage high	51 / 3	DTC 276: Injector 6 open or short to ground	656 / 5
DTC 127: IAT higher than expected stage 2	105 / 0	DTC 277: Injector 6 coil shorted	656 / 6
DTC 129: BP pressure low	108 / 1	DTC 279: Injector 7 open or short to ground	657 / 5
DTC 134: EGO1 open / lazy	724 / 10	DTC 280: Injector 7 coil shorted	657 / 6
DTC 140: EGO3 open / lazy	520209 / 10	DTC 282: Injector 8 open or short to ground	658 / 5
DTC 154: EGO2 open / lazy	520208 / 10	DTC 283: Injector 8 coil shorted	658 / 6
DTC 160: EGO4 open / lazy	520210 / 10	DTC 285: Injector 9 open or short to ground	659 / 5
DTC 171: Adaptive-learn gasoline bank1 high	520200 / 0	DTC 308: Cylinder 8 emissions/catalyst damaging misfire	1330 / 31
DTC 172: Adaptive-learn gasoline bank1 low	520200 / 1	DTC 326: Knock1 excessive or erratic signal	731 / 2
DTC 174: Adaptive-learn gasoline bank2 high	520201 / 0	DTC 327: Knock1 sensor open or not present	731 / 4
DTC 175: Adaptive-learn gasoline bank2 low	520201 / 1	DTC 331: Knock2 excessive or erratic signal	520241 / 2
DTC 182: FT low voltage	174 / 4	DTC 332: Knock2 sensor open or not present	520241 / 4
DTC 183: FT high voltage	174 / 3	DTC 336: CRANK input signal noise	636 / 2
DTC 187: Gaseous fuel temp sender low voltage	520240 / 4	DTC 337: Crank signal loss	636 / 4
DTC 188: Gaseous fuel temp sendr high voltage	520240 / 3	DTC 341: CAM input signal noise	723 / 2
DTC 217: ECT higher than expected stage 2	110 / 0	DTC 342: Loss of CAM input signal	723 / 4
DTC 219: RPM higher than max allowed govern speed	515 / 15	DTC 359: Fuel run-out longer than expected	1239 / 7

GM 3.0L Engine Fault Codes

Description	DTC Set 2 SPN-2 / FMI-2	Description	DTC Set 2 SPN-2 / FMI-2
DTC 420: Catalyst inactive on gasoline (Bank 1)	520211 / 10	DTC 1111: RPM above fuel rev limit level	515 / 16
DTC 430: Catalyst inactive on gasoline (Bank 2)	520212 / 10	DTC 1112: RPM above spark rev limit level	515 / 0
DTC 502: Roadspeed input loss of signal	84 / 1	DTC 1121: FPP1/2 simultaneous voltages out-of-range	91 / 31
DTC 508: IAC ground short	520252 / 6	DTC 1122: FPP1/2 do not match each other or IVS	520250 / 31
DTC 509: IAC coil open/short	520252 / 5	DTC 1131: WGP voltage high	1192 / 3
DTC 520: Oil pressure sndr low prssure stage 1	100 / 18	DTC 1132: WGP voltage low	1192 / 4
DTC 521: Oil pressure sender high pressure	100/ 0	DTC 1151: Closed-loop LPG high	520206 / 0
DTC 522: Oil pressure sender low voltage	651 / 5	DTC 1152: Closed-loop LPG low	520206 / 1
DTC 523: Oil pressure sender high voltage	100 / 3	DTC 1153: Closed-loop NG high	520207 / 0
DTC 524: Oil pressure low	100 / 1	DTC 1154: Closed-loop NG low	520207 / 1
DTC 562: Vbat voltage low	168 / 17	DTC 1155: Closed-loop gasoline bank1 high	520204 / 0
DTC 563: Vbat voltage high	168 / 15	DTC 1156: Closed-loop gasoline bank1 low	520204 /
DTC 601: Microprocessor failure - FLASH	628 / 13	DTC 1157: Closed-loop gasoline bank2 high	520205 / 0
DTC 604: Microprocessor failure - RAM	630 / 12	DTC 1158: Closed-loop gasoline bank2 low	520205 / 1
DTC 606: Microprocessor failure - COP	629 / 31	DTC 1161: Adaptive-learn LPG high	520202 / 0
DTC 615: Start relay coil open	1321 / 5	DTC 1162: Adaptive-learn LPG low	520202 / 1
DTC 616: Start relay ground short	1321 / 4	DTC 1163: Adaptive-learn NG high	520203 / 0
DTC 617: Start relay coil short to power	1321 / 3	DTC 1164: Adaptive-learn NG low	520203 / 1
DTC 627: Fuel pump relay coil open	1348 / 5	DTC 1165: Catalyst inactive on LPG	520213 / 10
DTC 628: Fuel-pump high-side open or short to ground	1347 / 5	DTC 1166: Catalyst inactive on NG	520214 / 0
DTC 628: Fuel pump relay control ground short	1348 / 4	DTC 1171: MegaJector delivery pressure higher than expected	520260 / 0
DTC 629: Fuel-pump high-side short to power	1347 / 6	DTC 1172: MegaJector delivery pressure lower than expected	520260 / 1
DTC 629: Fuel pump relay coil short to power	1348 / 3	DTC 1173: MegaJector comm lost	520260 / 31
DTC 642: Sensor supply voltage 1 low	1079 / 4	DTC 1174: MegaJector voltage supply high	520260 / 3
DTC 643: Sensor supply voltage 1 high	1079 / 3	DTC 1175: MegaJector voltage supply low	520260 / 4
DTC 650: MIL open	1213 / 5	DTC 1176: MegaJector internal actuator fault detection	520260 / 12
DTC 652: Sensor supply voltage 2 low	1080 / 4	DTC 1177: MegaJector internal circuitry fault detection	520260 / 12
DTC 653: Sensor supply voltage 2 high	1080 / 3	DTC 1178: MegaJector internal comm fault detection	520260 / 12
DTC 685: Power relay coil open	1485 / 5	DTC 1182: Fuel impurity level high	520401 / 0
DTC 686: Power relay ground short	1485 / 4	DTC 1183: MegaJector autozero / lockoff failure	520803 / 31
DTC 687: Power relay coil short to power	1485 / 3	DTC 1311: Cylinder 1 misfire detected	1323 / 11
DTC 916: Shift actuator feedback out-of-range	520226 / 3	DTC 1312: Cylinder 2 misfire detected	1324 / 11
DTC 919: Shift unable to reach desired gear	520226 / 7	DTC 1313: Cylinder 3 misfire detected	1325 / 11
DTC 920: Shift actuator or drive circuit failed	520226 / 31	DTC 1314: Cylinder 4 misfire detected	1326 / 11

GM 3.0L Engine Fault Codes

Description	DTC Set 2 SPN-2 / FMI-2	Description	DTC Set 2 SPN-2 / FMI-2
DTC 1315: Cylinder 5 misfire detected	1327 / 11	DTC 1543: AUX analog Pull-Up/Down 2 high voltage	520220 / 3
DTC 1316: Cylinder 6 misfire detected	1328 / 11	DTC 1544: AUX analog Pull-Up/Down 2 low voltage	520220 / 4
DTC 1317: Cylinder 7 misfire detected	1329 / 11	DTC 1545: AUX analog Pull-Up/Down 3 high voltage	520221 / 3
DTC 1318: Cylinder 8 misfire detected	1330 / 11	DTC 1546: AUX analog Pull-Up/Down 3 low voltage	520221 / 4
DTC 1411: EMWT1 voltage high	441 / 3	DTC 1547: AUX analog Pull-Up/Down 4 high voltage	713 / 3
DTC 1412: EMWT2 voltage high	442 / 3	DTC 1548: AUX analog Pull-Up/Down 4 low voltage	713 / 4
DTC 1413: EMWT1 voltage low	441 / 4	DTC 1551: AUX digital 1 high voltage	520222 / 3
DTC 1414: EMWT2 voltage low	442 / 4	DTC 1552: AUX digital 1 low voltage	520222 / 4
DTC 1415: EMWT1 higher than expected stage 1	441 / 15	DTC 1553: AUX digital 2 high voltage	520223 / 3
DTC 1416: EMWT2 higher than expected stage 1	442 / 15	DTC 1554: AUX digital 2 low voltage	520223 / 4
DTC 1417: EMWT1 higher than expected stage 2	441 / 0	DTC 1555: AUX digital 3 high voltage	520224 / 3
DTC 1418: EMWT2 higher than expected stage 2	442 / 0	DTC 1555: Water Intrusion Detection	520224 / 3
DTC 1419: ERWT1 voltage high	443 / 3	DTC 1556: AUX digital 3 low voltage	520224 / 4
DTC 1420: ERWT2 voltage high	444 / 3	DTC 1561: AUX analog Pull-Down 2 high voltage	0 / 3
DTC 1421: ERWT1 voltage low	443 / 4	DTC 1561: AUX analog Pull-Down 3 high voltage	0 / 4
DTC 1422: ERWT2 voltage low	444 / 4	DTC 1561: AUX analog Pull-Down 2 low voltage	0 / 4
DTC 1423: ERWT1 higher than expected stage 1	443 / 15	DTC 1611: Sensor supply voltage 1 and 2 out-of-range	1079 / 31
DTC 1424: ERWT2 higher than expected stage 1	444 / 15	DTC 1612: Microprocessor failure - RTI 1	629 / 31
DTC 1425: ERWT1 higher than expected stage 2	443 / 0	DTC 1613: Microprocessor failure - RTI 2	629 / 31
DTC 1426: ERWT2 higher than expected stage 2	444 / 0	DTC 1614: Microprocessor failure - RTI 3	629 / 31
DTC 1511: AUX analog Pull-Up 1 high voltage	520216 / 3	DTC 1615: Microprocessor failure - A/D	629 / 31
DTC 1511: AUX analog Pull-Up 1 high voltage	520216 / 3	DTC 1616: Microprocessor failure - Interrupt	629 / 31
DTC 1512: AUX analog Pull-Up 1 low voltage	520216 / 4	DTC 1621: RS-485 Rx inactive	0 / 31
DTC 1513: AUX analog Pull-Up 2 high voltage	520217 / 3	DTC 1622: RS-485 Rx noise	0 / 31
DTC 1514: AUX analog Pull-Up 2 low voltage	520217 / 4	DTC 1623: RS-485 Rx bad packet format	0 / 31
DTC 1515: AUX analog Pull-Down 1 high voltage	520215 / 3	DTC 1624: RS-485 remote shutdown request	0 / 31
DTC 1516: AUX analog Pull-Down 1 low voltagee	520215 / 4	DTC 1625: J1939 shutdown request	1384 / 31

GM 3.0L Engine Fault Codes

Description	DTC Set 2 SPN-2 / FMI-2	Description	DTC Set 2 SPN-2 / FMI-2
DTC 1517: AUX analog Pull-Up 3 high voltage	520218 / 3	DTC 1626: CAN-J1939 Tx fault	639 / 12
DTC 1518: AUX analog Pull-Up 3 low voltage	520218 / 4	DTC 1627: CAN-J1939 Rx fault	639 / 12
DTC 1521: CHT higher than expected stage 1	110 / 16	DTC 1628: J1939 CAN address / engine-number conflict	639 /13
DTC 1522: CHT higher than expected stage 2	110 / 0	DTC 1629: J1939 TSC1 message receipt loss	639 / 9
DTC 1531: Gov1/2/3 interlock failure	520270 / 31	DTC 1630: J1939 ETC message receipt loss	91 / 2
DTC 1541: AUX analog Pull-Up/Down 1 high voltage	520219 / 3	DTC 1632: PWM1-Gauge1 short to power	697 / 6
DTC 1542: AUX analog Pull-Up/Down 1 low voltage	520219 / 4	DTC 1633: PWM2-Gauge2 open / ground short	698 / 5
DTC 1634: PWM2-Gauge2 short to power	698 / 6	DTC 2126: FPP1-2 higher than expected	91 / 16
DTC 1635: PWM3-Gauge3 open / ground short	699 / 6	DTC 2127: FPP2 voltage low	29 / 4
DTC 1636: PWM3-Gauge3 short to power	700 / 5	DTC 2128: FPP2 voltage high	29 / 3
DTC 1637: PWM4 open / ground short	700 / 6	DTC 2130: IVS stuck at-idle, FPP1/2 match	558 / 5
DTC 1638: PWM4 short to power	520230 / 5	DTC 2131: IVS stuck off-idle, FPP1/2 match	558 / 6
DTC 1639: PWM5 open / ground short	520230 / 5	DTC 2135: TPS1/2 simultaneous voltages out-of-range	51 / 31
DTC 1640: PWM5 short to power	520230 / 6	DTC 2139: FPP1 lower than IVS	91 / 1
DTC 1641: Buzzer control ground short	920 / 4	DTC 2140: FPP2 lower than IVS	29 / 1
DTC 1642: Buzzer open	920 / 5	DTC 2229: BP pressure high	108 / 0
DTC 1643: Buzzer control short to power	920 / 3	DTC 2300: Spark coil 1 primary open or short to ground	1268 / 5
DTC 1644: MIL control ground short	1213 / 4	DTC 2301: Spark coil 1 primary shorted	1268 / 6
DTC 1645: MIL control short to power	1213 / 3	DTC 2303: Spark coil 2 primary open or short to ground	1269 / 5
DTC 1651: J1939 ETC message receipt loss while in-gear	91 / 9	DTC 2304: Spark coil 2 primary shorted	1269 / 6
DTC 1661: PWM6 open / ground short	925 / 5	DTC 2306: Spark coil 3 primary open or short to ground	1270 / 5
DTC 1662: PWM6 short to power	925 / 3	DTC 2307: Spark coil 3 primary shorted	1270 / 6
DTC 1663: PWM7 open / ground short	926 / 5	DTC 2309: Spark coil 4 primary open or short to ground	1271 / 5
DTC 1664: PWM7 short to power	926 / 3	DTC 2310: Spark coil 4 primary shorted	1271 / 6
DTC 1665: PWM8 open / ground short	2646 / 5	DTC 2312: Spark coil 5 primary open or short to ground	1272 / 5
DTC 1666: PWM8 short to power	2646 / 3	DTC 2313: Spark coil 5 primary shorted	1272 / 6
DTC 1669: PWM9 open / ground short	2647 / 5	DTC 2315: Spark coil 6 primary open or short to ground	1273 / 5
DTC 1670: PWM9 short to power	2647 / 3	DTC 2316: Spark coil 6 primary shorted	1273 / 6
DTC 2111: Unable to reach lower TPS	51 / 7	DTC 2318: Spark coil 7 primary open or short to ground	1274 / 5
DTC 2112: Unable to reach higher TPS	51 / 7	DTC 2319: Spark coil 7 primary shorted	1274 / 6
DTC 2115: FPP1 higher than IVS	91 / 0	DTC 2321: Spark coil 8 primary open or short to ground	1275 / 5
DTC 2116: FPP2 higher than IVS	29 / 0	DTC 2322: Spark coil 8 primary shorted	1275 / 6
DTC 2120: FPP1 invalid voltage and FPP2 disagrees with IVS	520250 / 31	DTC 2324: Spark coil 9 primary open or short to ground	1276 / 5
DTC 2121: FPP1-2 lower than expected	91 / 18	DTC 2325: Spark coil 9 primary shorted	1276 / 6
DTC 2122: FPP1 voltage high	91 / 3	DTC 2327: Spark coil 10 primary open or short to ground	1277 / 5

GM 3.0L Engine Fault Codes

Description	**DTC Set 2 SPN-2 / FMI-2**	Description	**DTC Set 2 SPN-2 / FMI-2**
DTC 2123: FPP1 voltage low	91 / 4	DTC 2328: Spark coil 10 primary shorted	1277 / 6
DTC 2125: FPP2 invalid voltage and FPP1 disagrees with IVS	520250 / 31	DTC 2428: EGT temperature high	173 / 0
DTC 2618: Tach output ground short	645 / 4	DTC 8909: UEGO pump voltage shorted low	3218 / 3
DTC 2619: Tach output short to power	645 / 3	DTC 8910: UEGO sense cell voltage high	3218 / 3
DTC 8901: UEGO microprocessor internal fault	3221 / 1	DTC 8911: UEGO sense cell voltage low	3218 / 4
DTC 8902: UEGO heater supply high voltage	3222 / 3	DTC 8912: UEGO pump voltage at high drive limi	3217 / 3
DTC 8903: UEGO heater supply low voltage	3222 / 4	DTC 8913: UEGO pump voltage at low drive limit	3217 / 3
DTC 8904: UEGO cal resistor voltage high	3221 / 3	DTC 8914: UEGO sense cell slow to warm up	3225 / 4
DTC 8905: UEGO cal resistor voltage low	3221 / 4	DTC 8915: UEGO pump cell slow to warm up	3222 / 4
DTC 8906: UEGO return voltage shorted high	3056 / 3	DTC 8916: UEGO sense cell impedance high	3225 / 10
DTC 8907: UEGO return voltage shorted low	3056 / 4	DTC 8917: UEGO pump cell impedance high	3225 / 0
DTC 8908: UEGO pump voltage shorted high	3218 / 3	DTC 8918: UEGO pump cell impedance low	3225 / 1

Schematics



Observe and Obey:

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

Before Troubleshooting:

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

About This Section

There are two groups of schematics in this section.

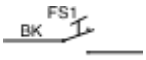
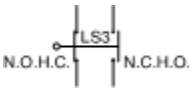
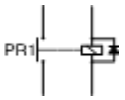
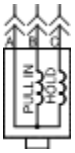
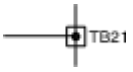
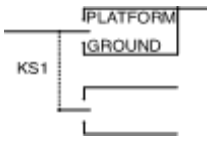
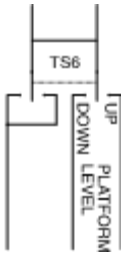
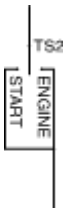
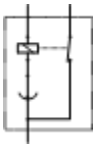
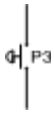
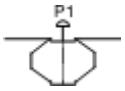
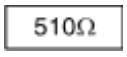
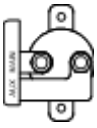
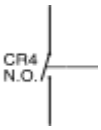
Electrical Schematics

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

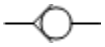
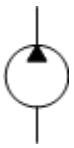
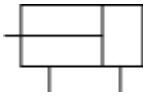
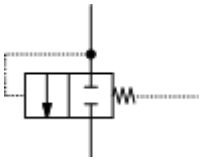
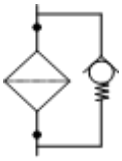
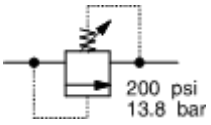
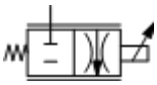
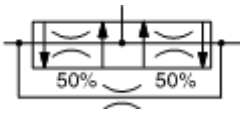
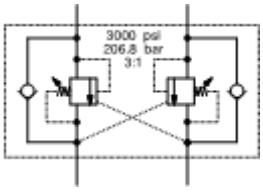
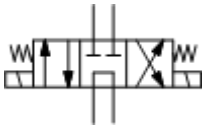
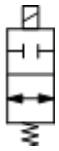
Hydraulic Schematics

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

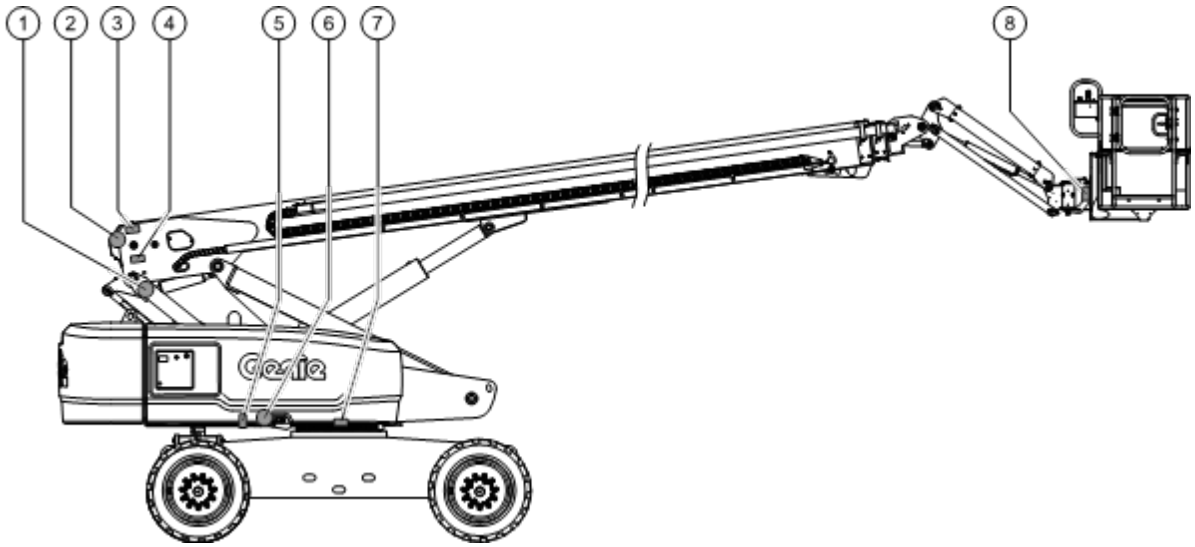
Electrical Symbol Legend

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

Hydraulic Symbols Legend

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

Limit Switch Location Legend

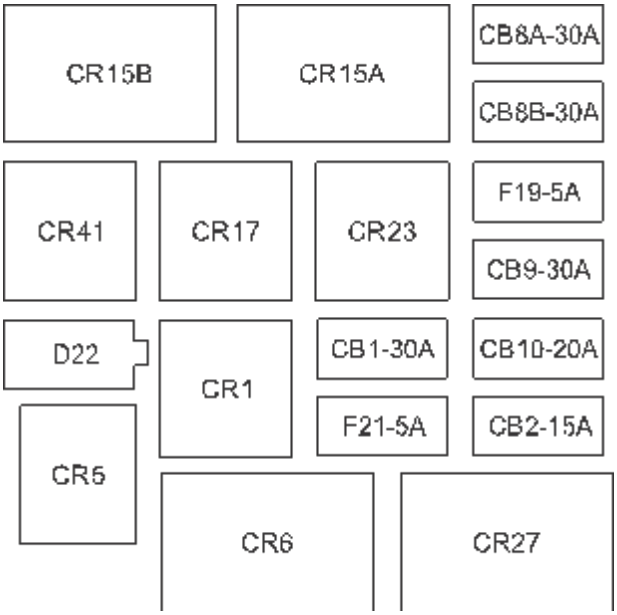


1 S17
2 S22
3 LSB2S
4 LSB1RS
5 LST3S
6 S8O, S8S
7 LST1O
8 S24

Limit Switches and Sensors

S17	Boom angle sensor
S22	Boom length sensor
LSB2S	Limit switch cable tension- safety
LSB1RS	Limit switch boom fully retracted- safety
LST3S	Limit switch boom angle- safety
S8O	Universal tilt sensor - operational
S8S	Universal tilt sensor - safety
LST1O	Limit switch turntable - operational
S24	Load cell - platform overload

Engine Relay Layout - Deutz TD2.9



Deutz TD 2.9 L4

Fuses

CB8A	30A	See Elec Schem for circuits
CB8B	30A	See Elec Schem for circuits
F19	15A	See Elec Schem for circuits
F21	10A	See Elec Schem for circuits
CB9	30A	See Elec Schem for circuits
CB10	20A	See Elec Schem for circuits
CB1	30A	See Elec Schem for circuits
CB2	15A	See Elec Schem for circuits

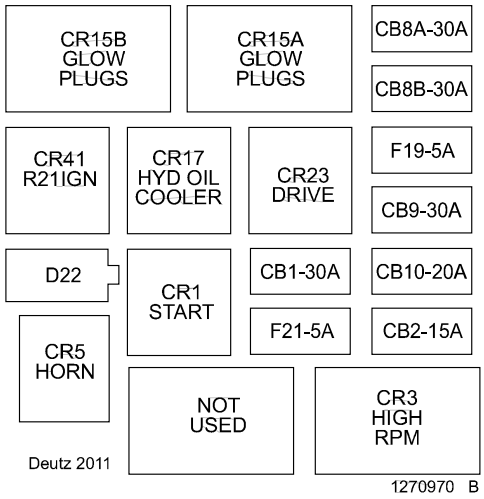
Diode

D22	6A	Alternator Ext.

Relays

CR1	Ignition on
CR5	Horn
CR6	Fuel pump
CR15A	Glow plugs
CR15B	Glow plugs
CR17	Hydraulic oil cooler
CR27	Auxiliary
CR41	R21IGN

Engine Relay Layout - Deutz TD2011L04i



Deutz TD2011L04i

Fuses

CB8A	30A	See Elec Schem for circuits
CB8B	30A	See Elec Schem for circuits
F19	5A	See Elec Schem for circuits
F21	5A	See Elec Schem for circuits
CB9	30A	See Elec Schem for circuits
CB10	20A	See Elec Schem for circuits
CB1	30A	See Elec Schem for circuits
CB2	15A	See Elec Schem for circuits

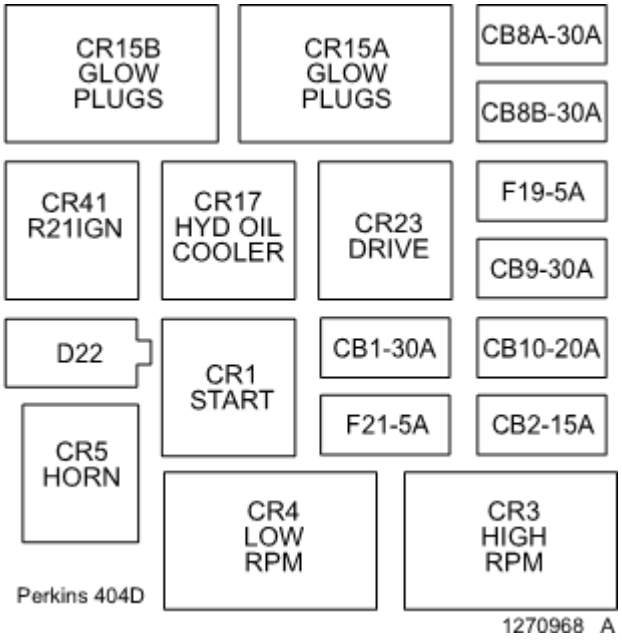
Diode

D22	6A	Alternator Ext.

Relays

CR1	Engine start
CR3	High RPM.
CR15A	Glow plug 1
CR15B	Glow plug 2
CR17	Hydraulic Oil Cooler
CR23	Drive
CR41	R21IGN

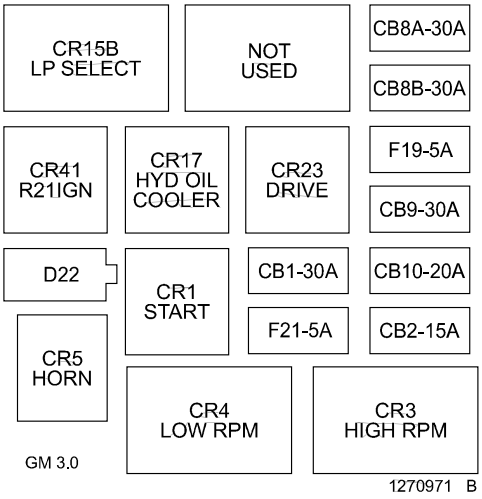
Engine Relay Layout - Perkins 404D-22T



Perkins 404D-22T

Circuit Breakers		
CB1	30A	See Elec Schem for circuits
CB2	15A	See Elec Schem for circuits
CB9	30A	See Elec Schem for circuits
CB10	20A	See Elec Schem for circuits
CB8A	30A	See Elec Schem for circuits
CB8B	30A	See Elec Schem for circuits
Fuses		
F19	5A	See Elec Schem for circuits
F21	5A	See Elec Schem for circuits
Diode		
D22	6A	Alternator Ext.
Relays		
CR1	Start	
CR3	High RPM	
CR4	Low RPM	
CR5	Horn	
CR17	Hydraulic oil cooler (option)	
CR15A	Glow plugs	
CR15B	Glow Plugs	

Engine Relay Layout - GM 3.0L



GM 3.0L

Fuses

CB8A	30A	See Elec Schem for circuits
CB8B	30A	See Elec Schem for circuits
F19	5A	See Elec Schem for circuits
F21	5A	See Elec Schem for circuits
CB9	30A	See Elec Schem for circuits
CB10	20A	See Elec Schem for circuits
CB1	30A	See Elec Schem for circuits
CB2	15A	See Elec Schem for circuits

Diode

D22	6A	Alternator Ext.

Relays

CR1	Engine start
CR3	High RPM.
CR5	Horn
CR17	Hydraulic OIl Cooler
CR23	Drive
CR41	R21IGN

Connector Pin Legend

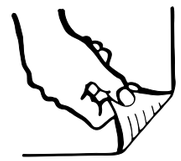
Number	Description
C1	Boom cable - Controls
C2	Boom cable - Power
C3	Boom sensors
C4	Function manifold
C5	Function manifold
C6	Engine
C7	Engine
C8	Engine - Power
C9	Foot switch
C10	Platform options
C11	Platform manifold
C12	Boom cable (platform) - Controls
C13	Drive lights
C14	Hydraulic oil cooler
C15	Flashing beacons
C16	Engine diagnostic port
C17	Boom cable (platform) - power
C18	D2.9 engine connector
C19	LST3S
C20	LST1O
C21	LSB1RS
C22	LSB2S
C23	Generator from engine harness
C24	Welder encloser
C25	GM3.0 vehicle interface conn. 1
C26	GM3.0 vehicle interface conn. 2
C27	Load sense
C28	Boom angle sensor
C29	Boom extension string pot
C30	Canbus terminating resistor
C31	Crew alarm proximity switch
C32	Crew alarm lights
C33	GBOX service port
C34	PBOX service port
C35	404D speed sensor
C36	404D fuel solenoid
C37	Work lights
C41	VEC - black - 8 pin
C42	VEC - gray - 8 pin
C43	VEC - blue - 8 pin
C44	VEC - green - 8 pin
C45	VEC- gray - 2 pin
C46	VEC - black - 2 pin
C47	Function enable
C48	Brake
C49	Motor stroke
C50	Drive pump
C51	Engine ECG
C52	Engine ECG
C53	Platform recirculation valve
C56	Telematics
C57	ACP
C72	ECU

Connector Pin Legend

Number	Description
J1	TCON power
J2	TCON engine
J3	TCON functions
J4	TCON functions
J5	TCON logic
J6	TCON limit switches
J7	TCON limit switches
J8	TCON unused
J9	TCON communication
J10	DISCON
J12	PCON power
J13	PCON functions
J14	PCON functions
J15	PCON logic
J16	PCON toggles
J17	PCON toggles
J18	PCON joysticks
J19	PCON unused
J20	Boom angle sensor operational- not used
J21	Boom angle sensor safety- not used
J22	Fuel level sensor
J23	Platform level sensor operational- not used
J24	Platform level sensor safety- not used
J25	Boom function- joystick
J26	Drive function- joystick
J27	404D ECG - black
J28	404D ECG - gray
J29	D2.9 ECU 1
J30	D2.9 ECU 2
J31	D2.9 engine interface
J32	Chassis tilt sensor operational
J33	Chassis tilt sensor safety
J34	D2011 engine interface
J35	LED PCB
J36	Recovery module power
J37	Recovery module I/O

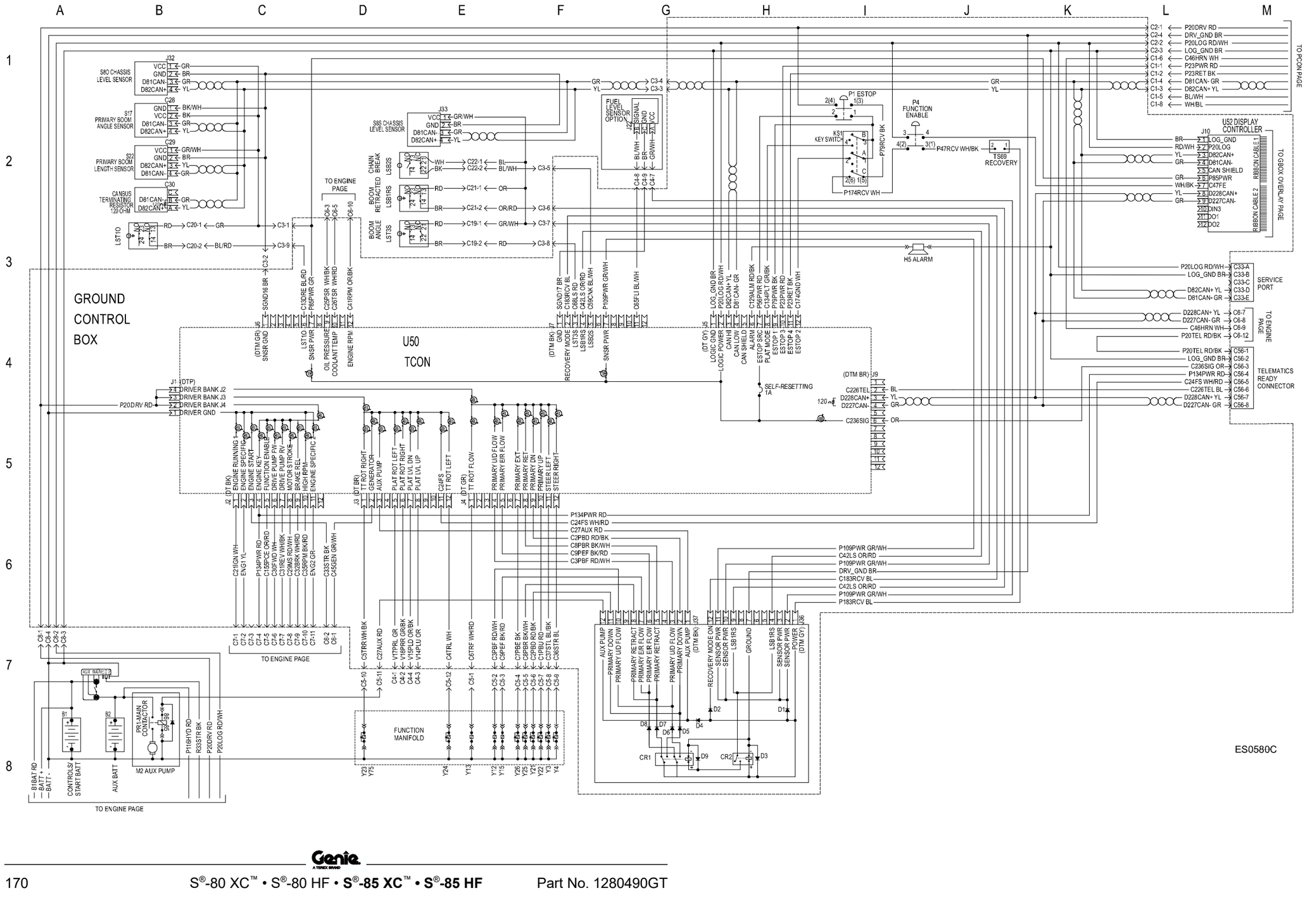
Electrical Schematic, Turntable Controller

(to serial number S80XCH-513, S85XCH- 518)



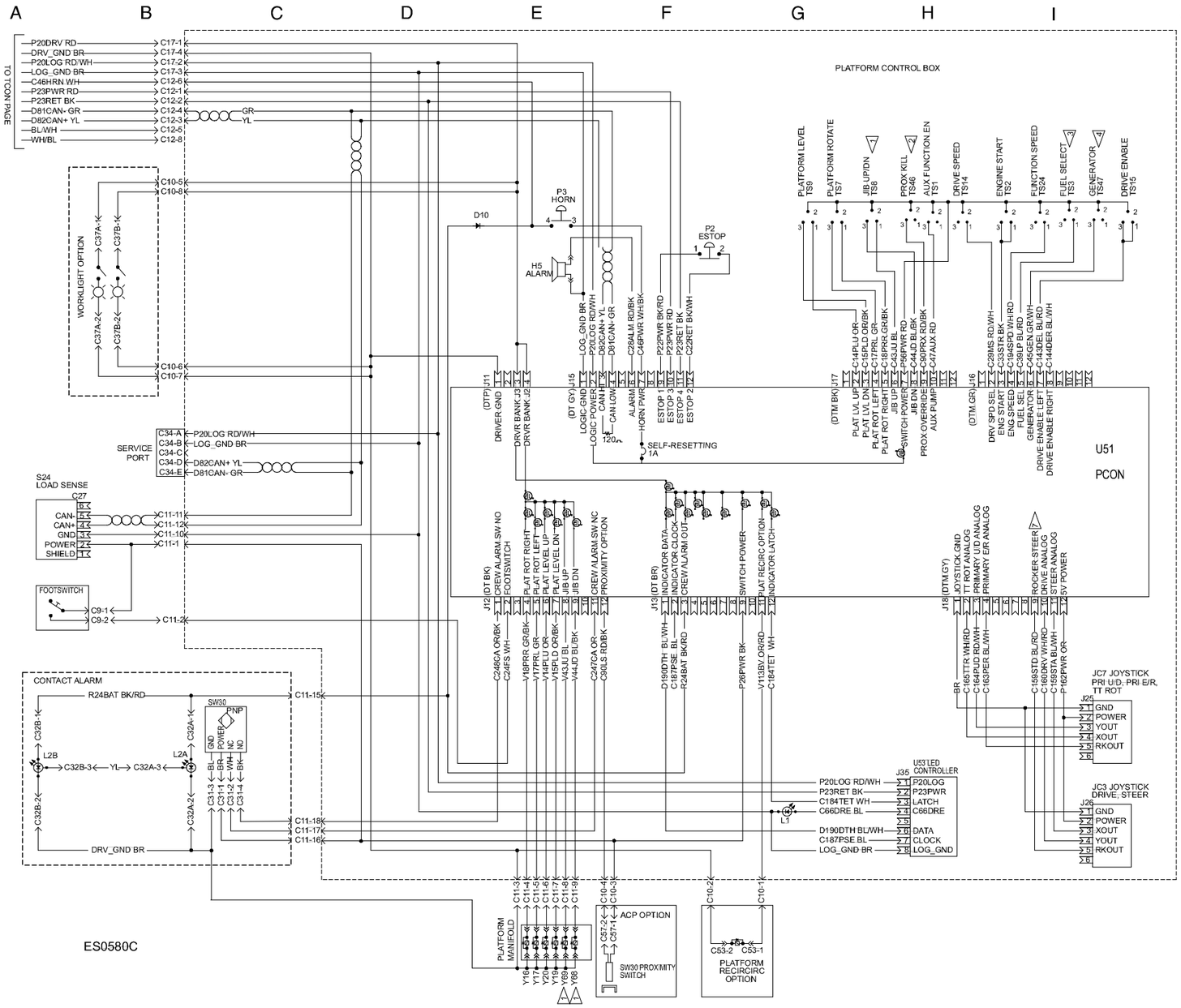
Electrical Schematic, Turntable Controller

(to serial number S80XCH-513, S85XCH- 518)



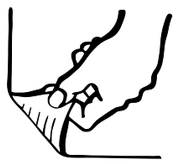
Electrical Schematic, Platform Controller

(to serial number S80XCH-513, S85XCH- 518)



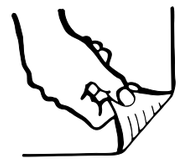
Electrical Schematic, Platform Controller

(to serial number S80XCH-513, S85XCH- 518)



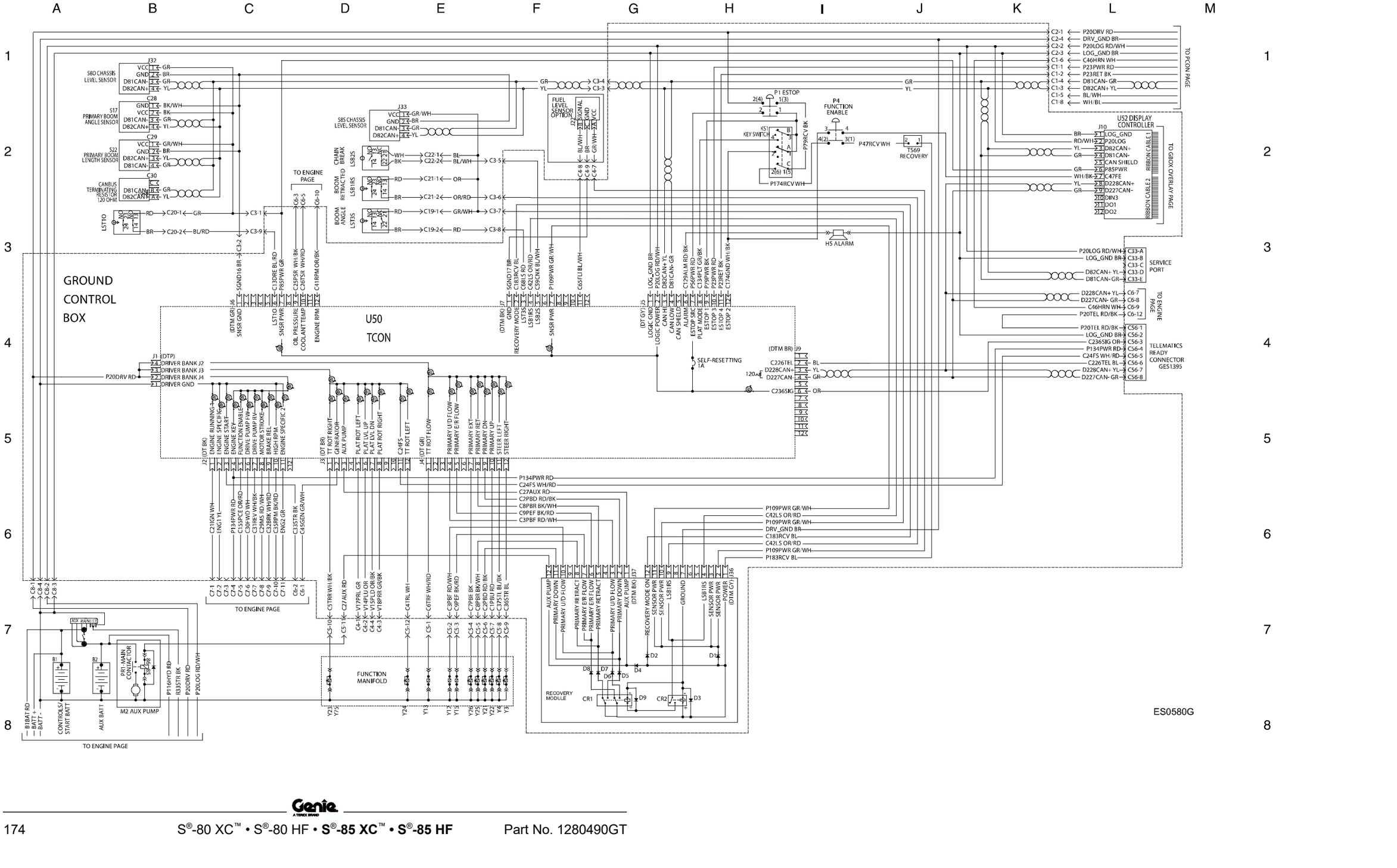
Electrical Schematic, Turntable Controller

(from S80XCH-514 to S80XCH-1393, S85XCH-519 to S85XCH-1399)



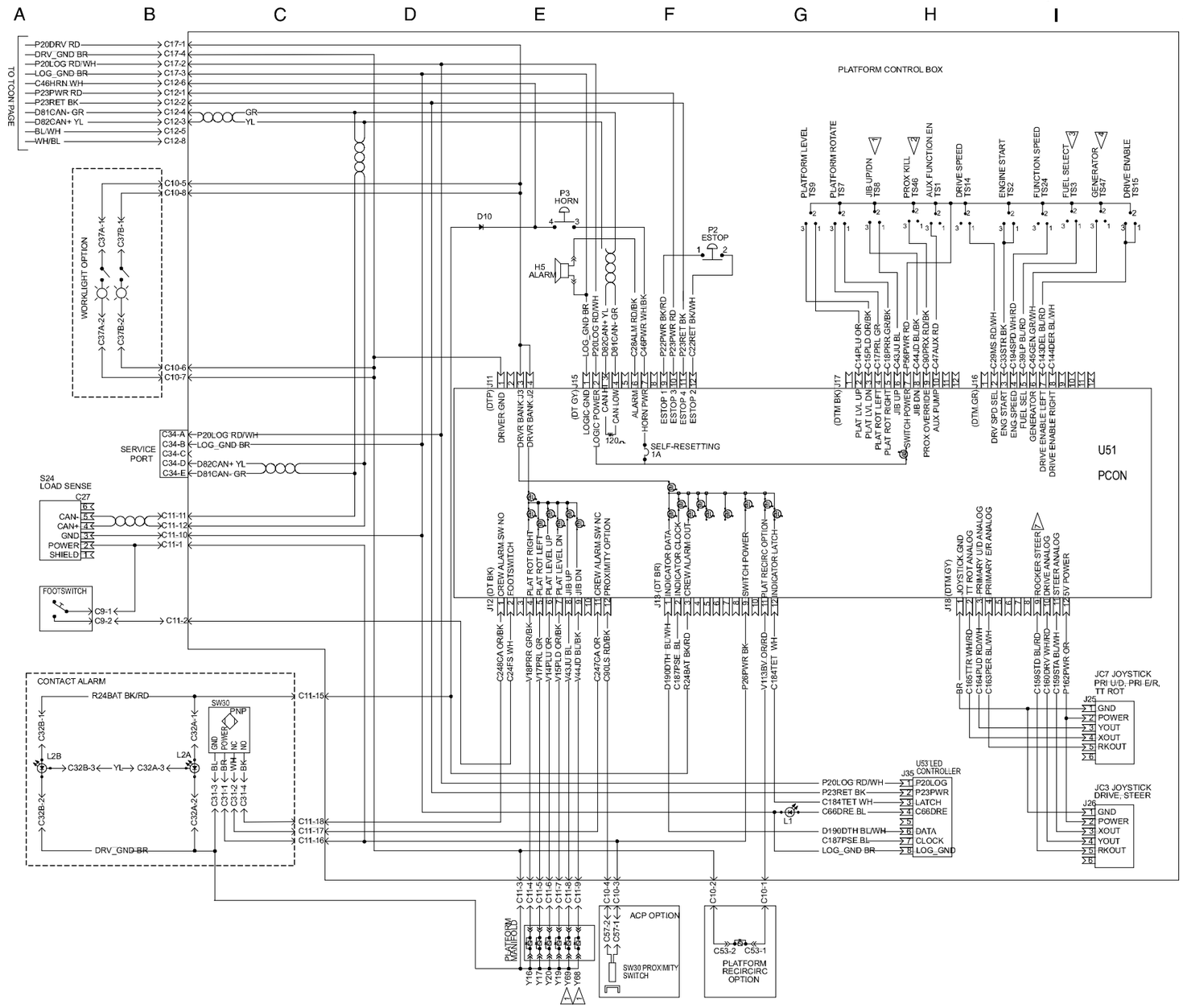
Electrical Schematic, Turntable Controller

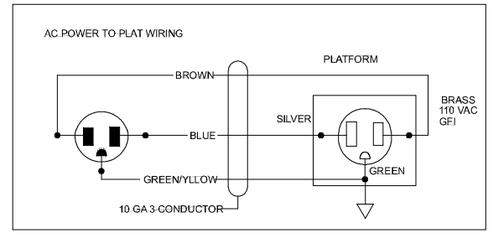
(from S80XCH-514 to S80XCH-1393, S85XCH-519 to S85XCH-1399)



Electrical Schematic, Platform Controller

(from S80XCH-514 to S80XCH-1393, S85XCH-519 to S85XCH-1399)

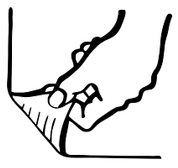




ES0580G

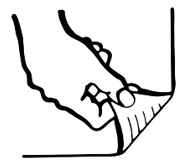
Electrical Schematic, Platform Controller

(from S80XCH-514 to S80XCH-1393, S85XCH-519 to S85XCH-1399)



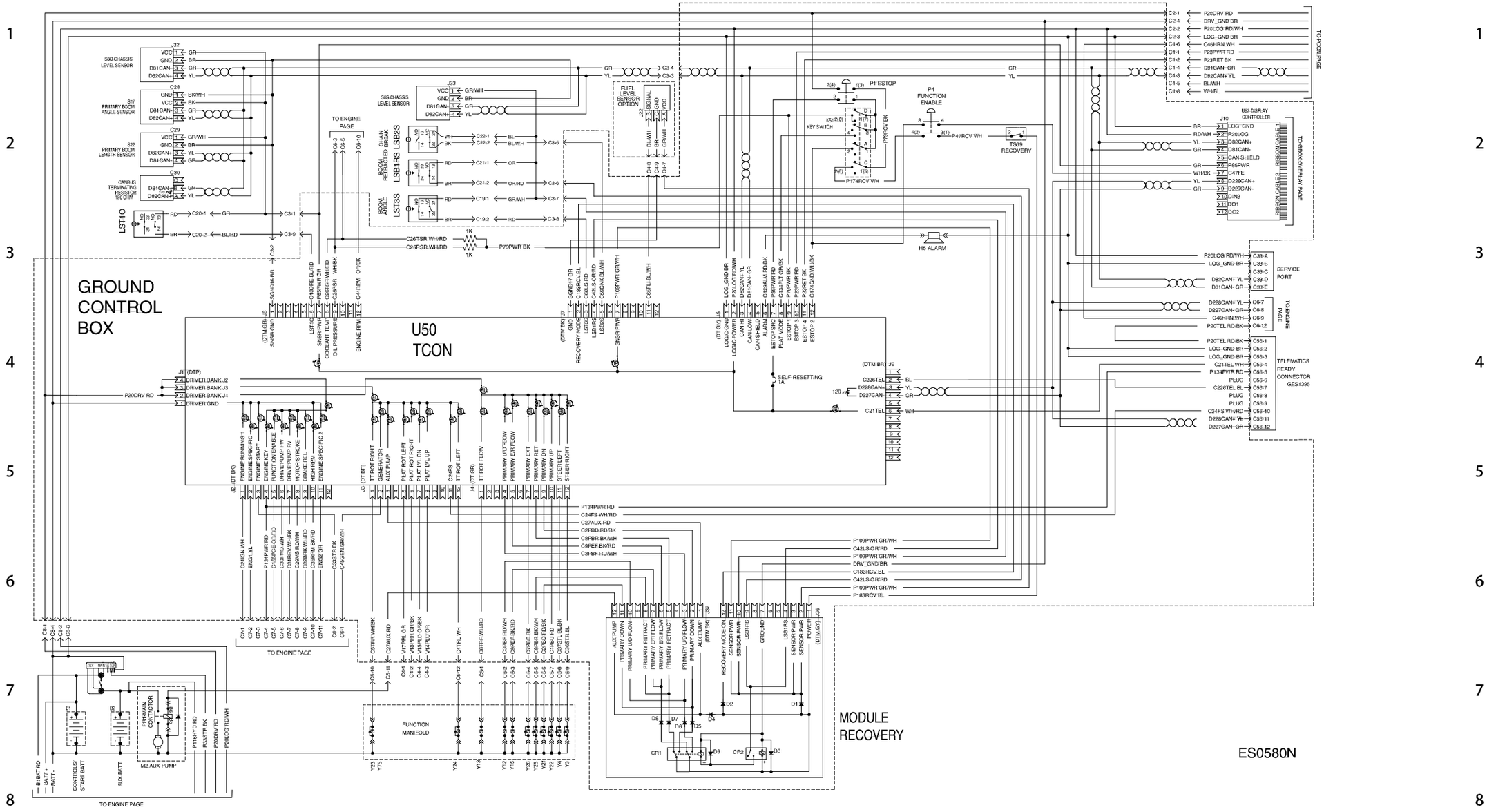
Electrical Schematic, Turntable Controller

(from S80XCD-101, S85XCD-101, S80XCH-1394, S85XCH-1400)



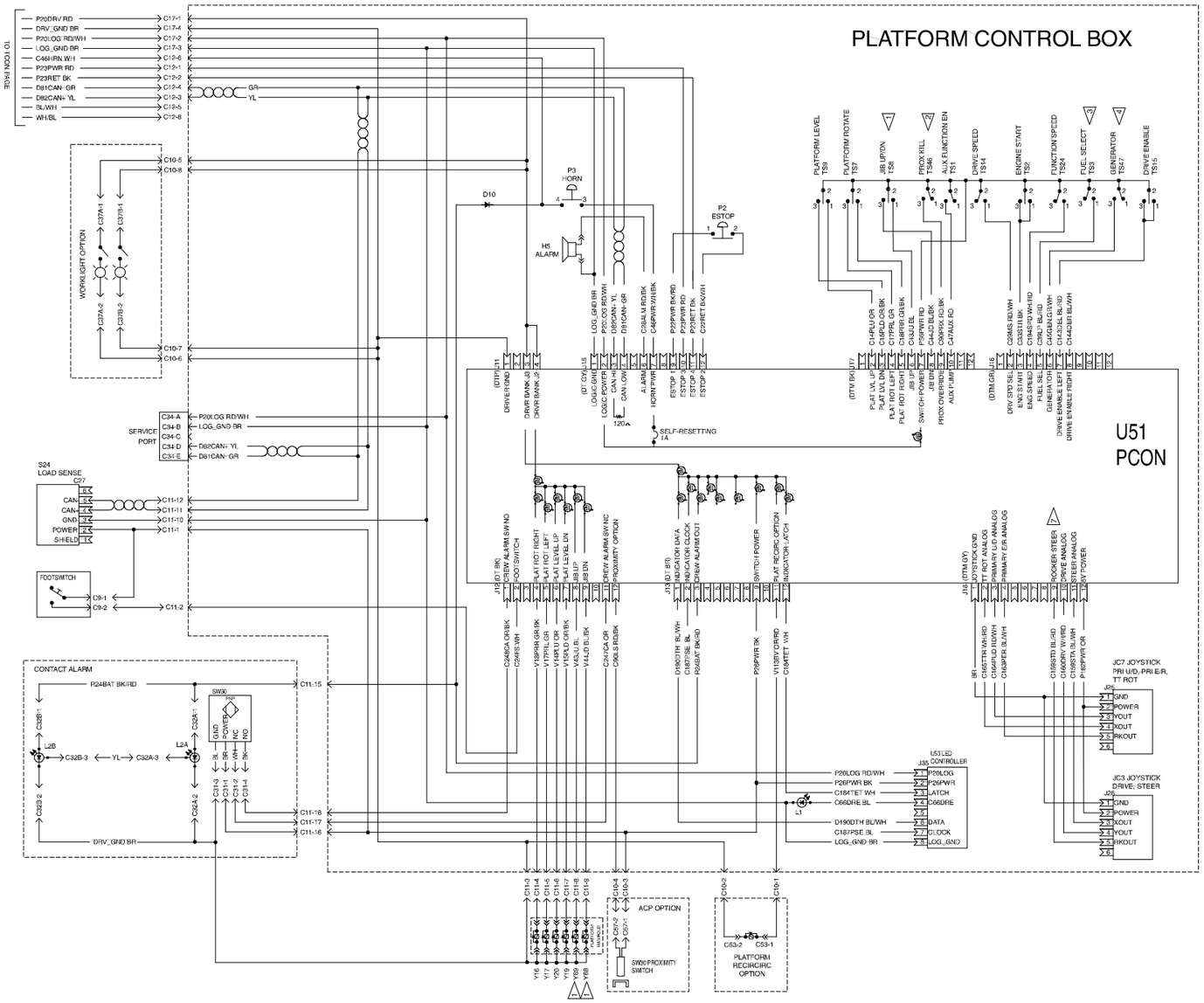
Electrical Schematic, Turntable Controller

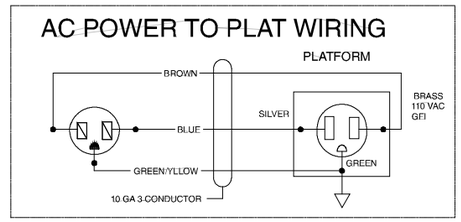
(from S80XCD-101, S85XCD-101, S80XCH-1394, S85XCH-1400)



Electrical Schematic, Platform Controller

(from S80XCD-101, S85XCD-101, S80XCH-1394, S85XCH-1400)



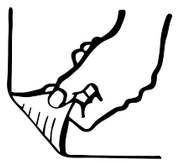


- S85 ONLY
- AIRCRAFT PROTECTION ONLY
- LP/GAS ENGINE ONLY
- GENERATOR OPTION ONLY
- DIESEL ENGINE ONLY
- UNUSED
- STEER ROCKER OPTION

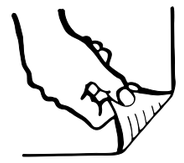
ES0580N

Electrical Schematic, Platform Controller

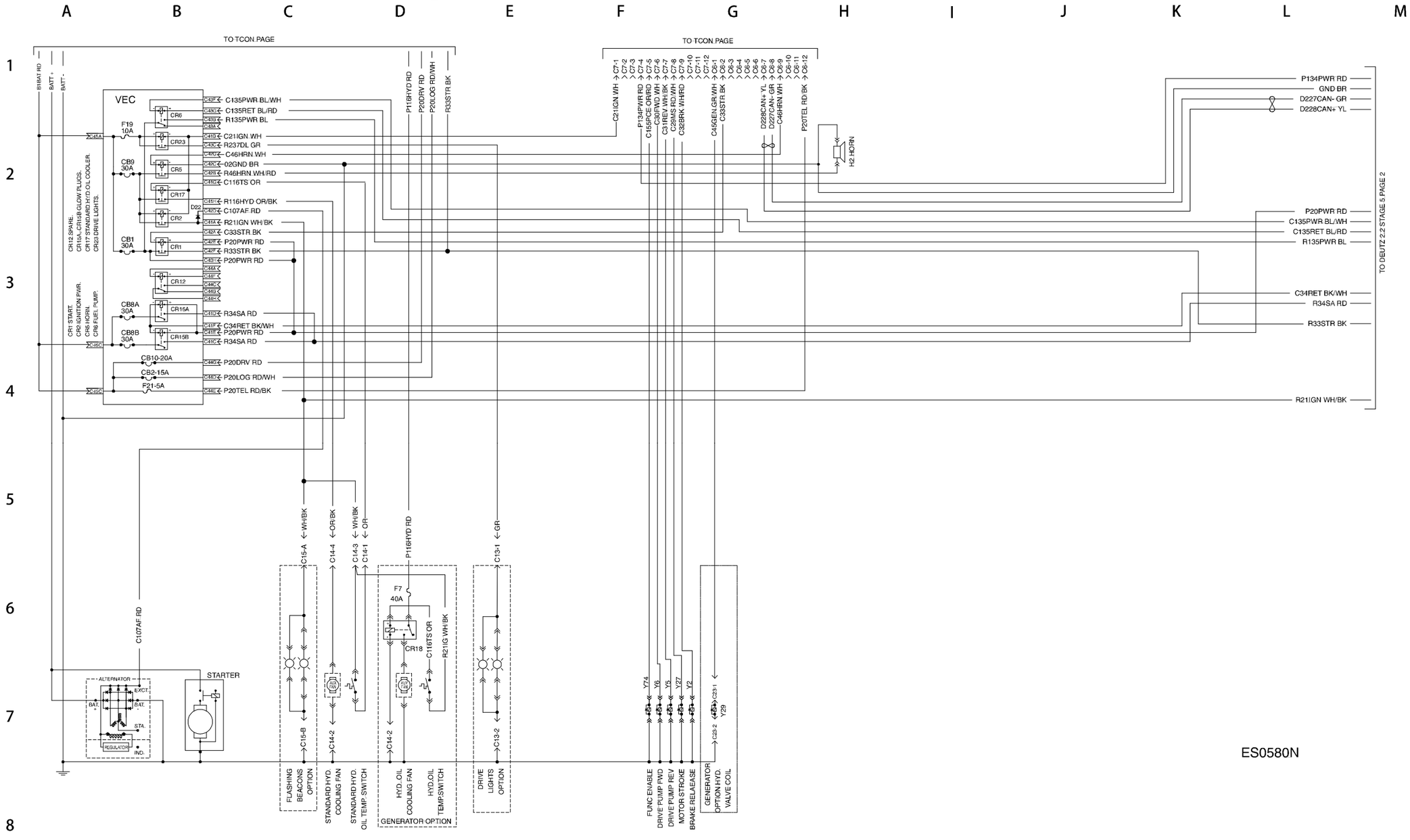
(from S80XCD-101, S85XCD-101, S80XCH-1394, S85XCH-1400)



Electrical Schematic, Deutz TCD 2.2 L3 Engine

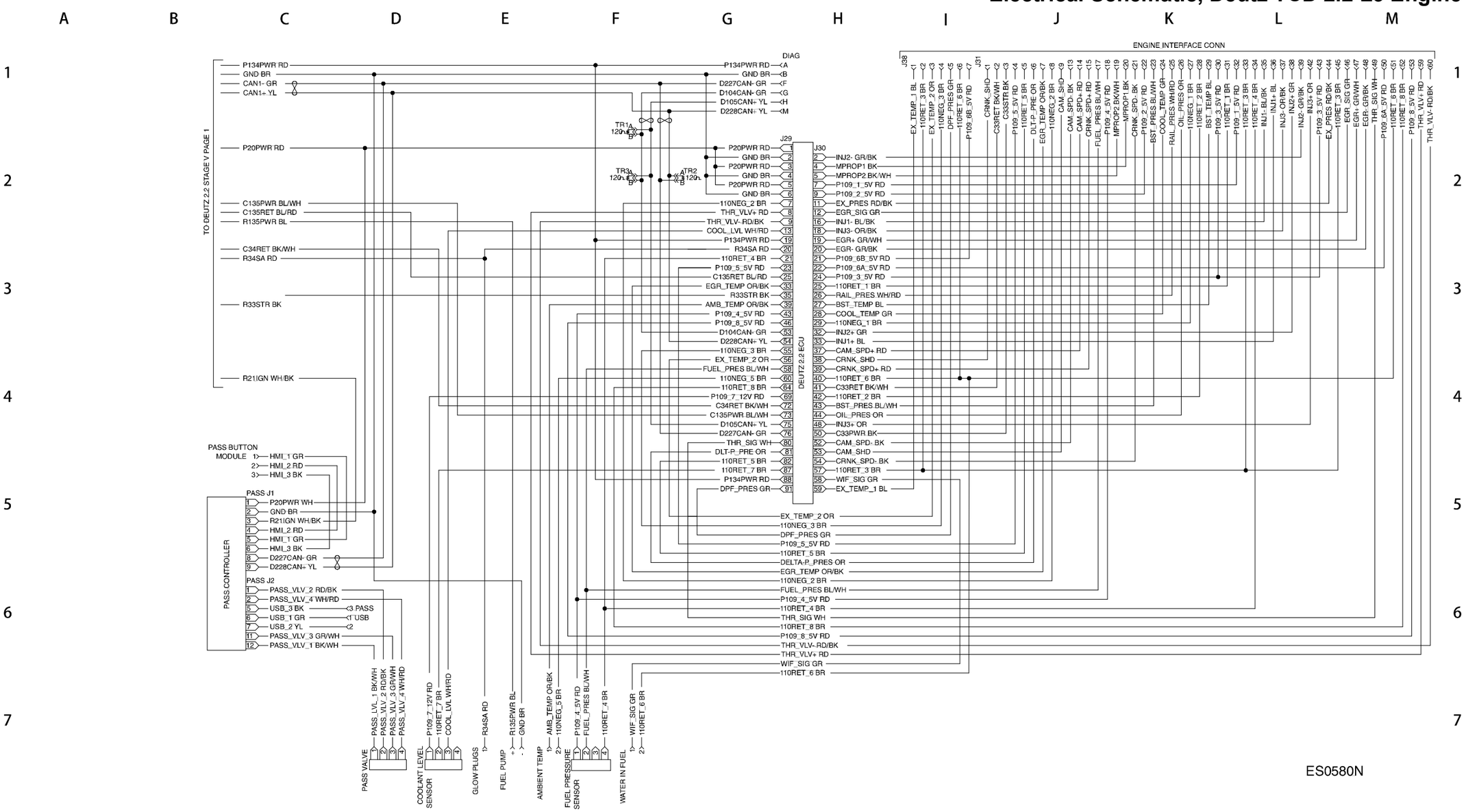


Electrical Schematic, Deutz TCD 2.2 L3 Engine



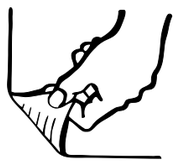
ES0580N

Electrical Schematic, Deutz TCD 2.2 L3 Engine

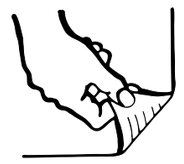


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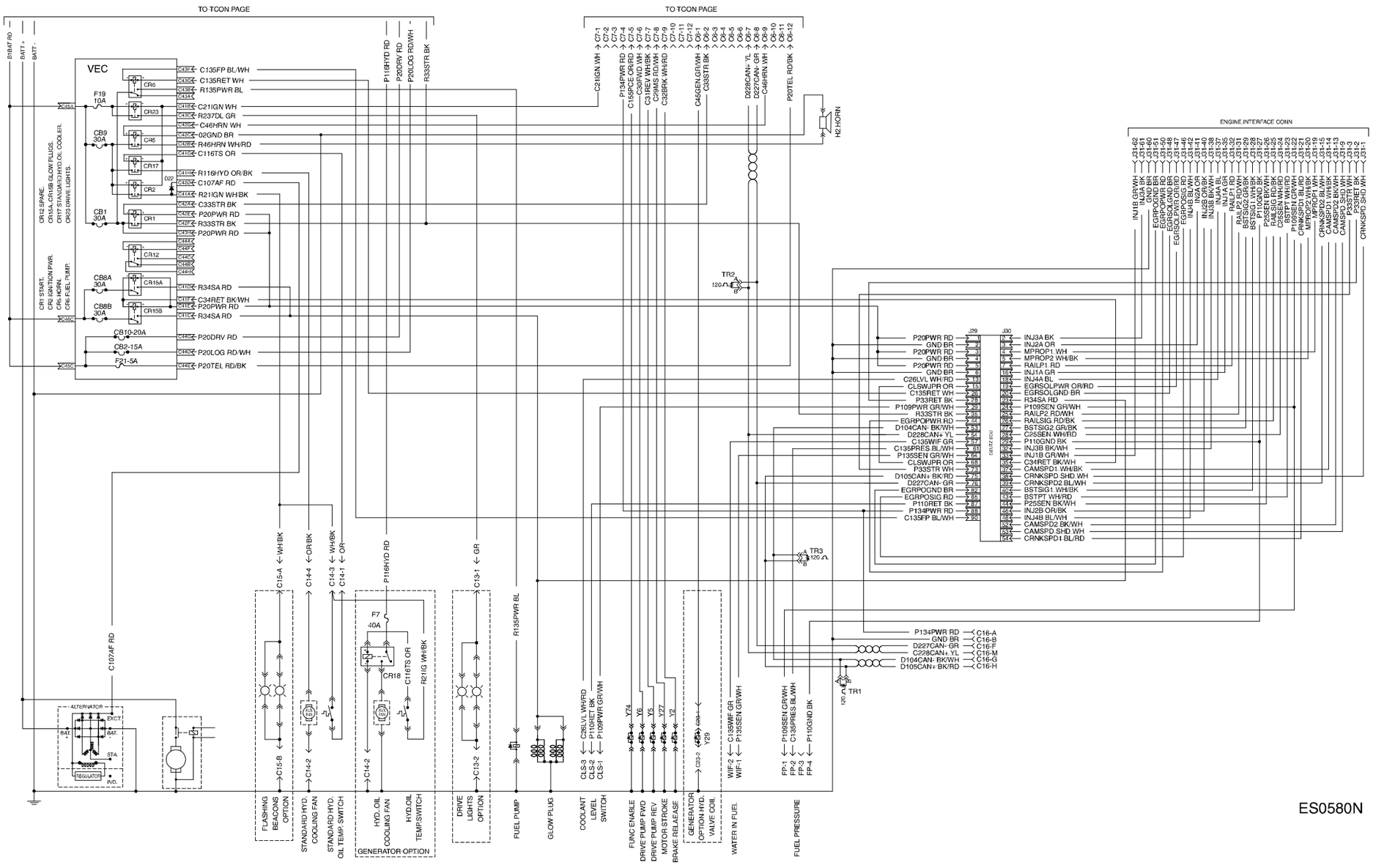
Electrical Schematic, Deutz TCD 2.2 L3 Engine



Electrical Schematic, Deutz TD 2.9 L4 Engine

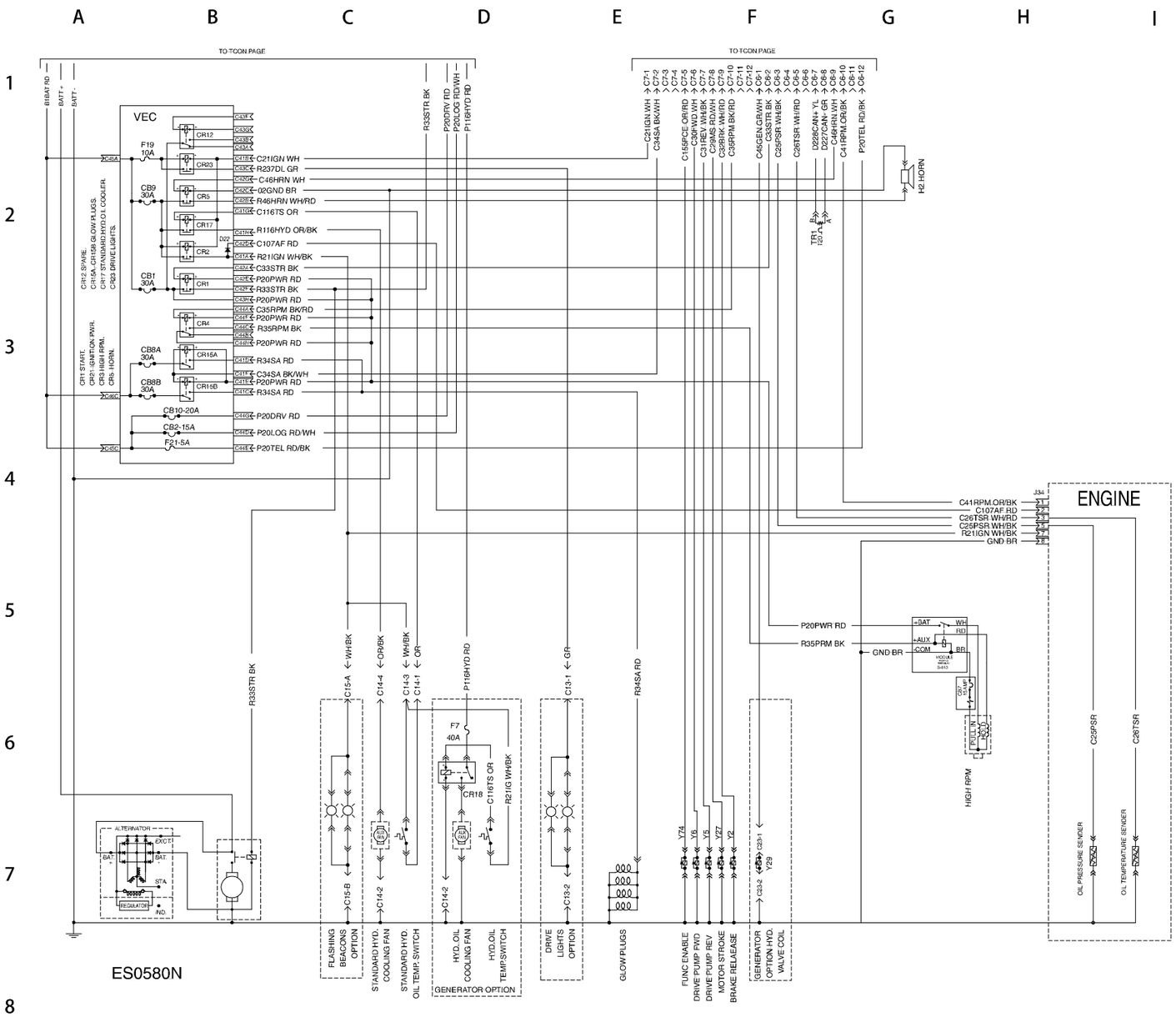


Electrical Schematic, Deutz TD 2.9 L4 Engine



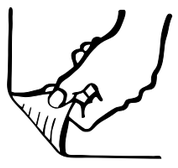
ES0580N

Electrical Schematic, Deutz TD2011 L04i Engine

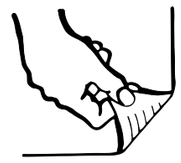


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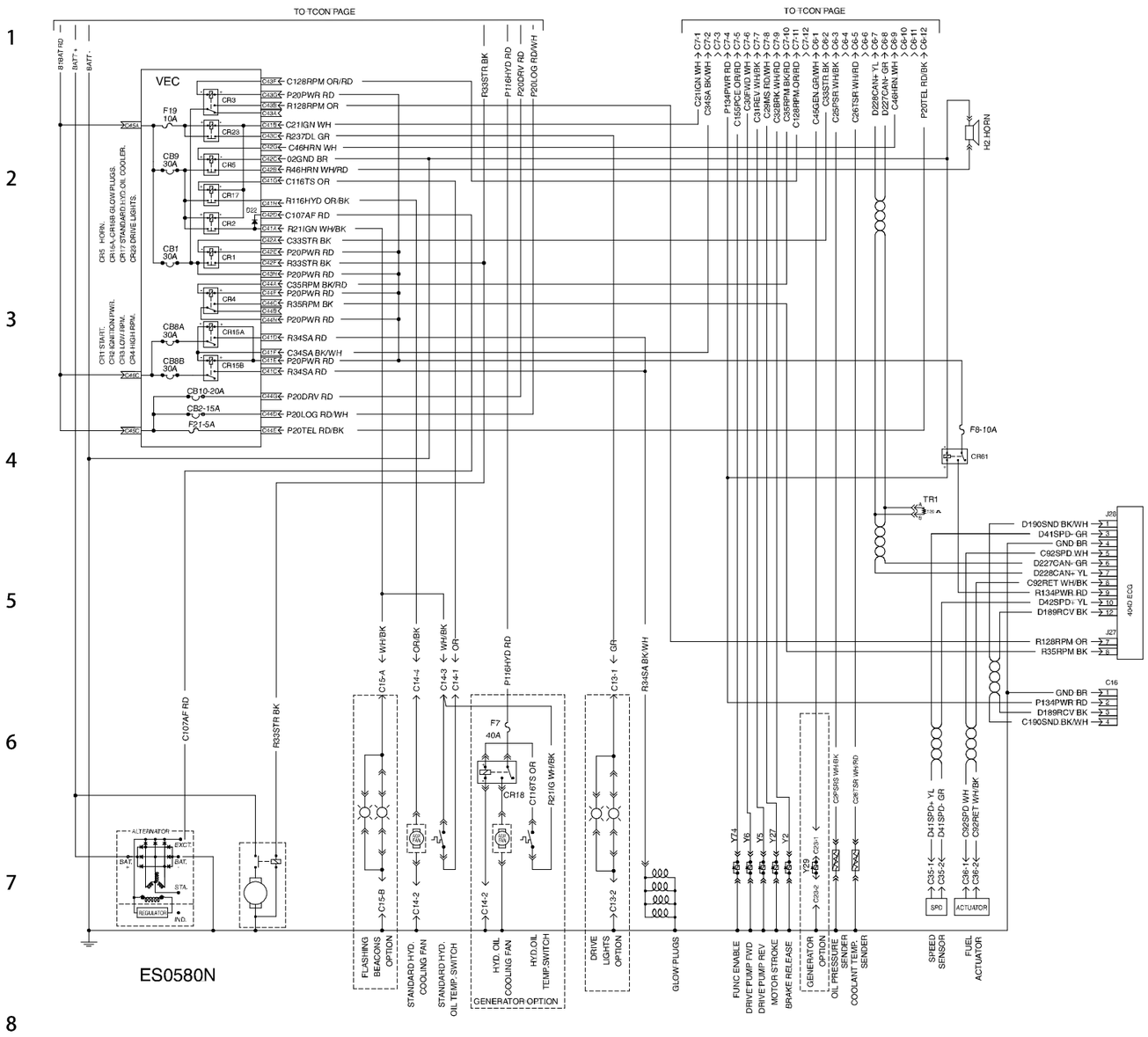
Electrical Schematic, Deutz TD2011 L04i Engine



Electrical Schematic, Perkins 404D-22T Engine

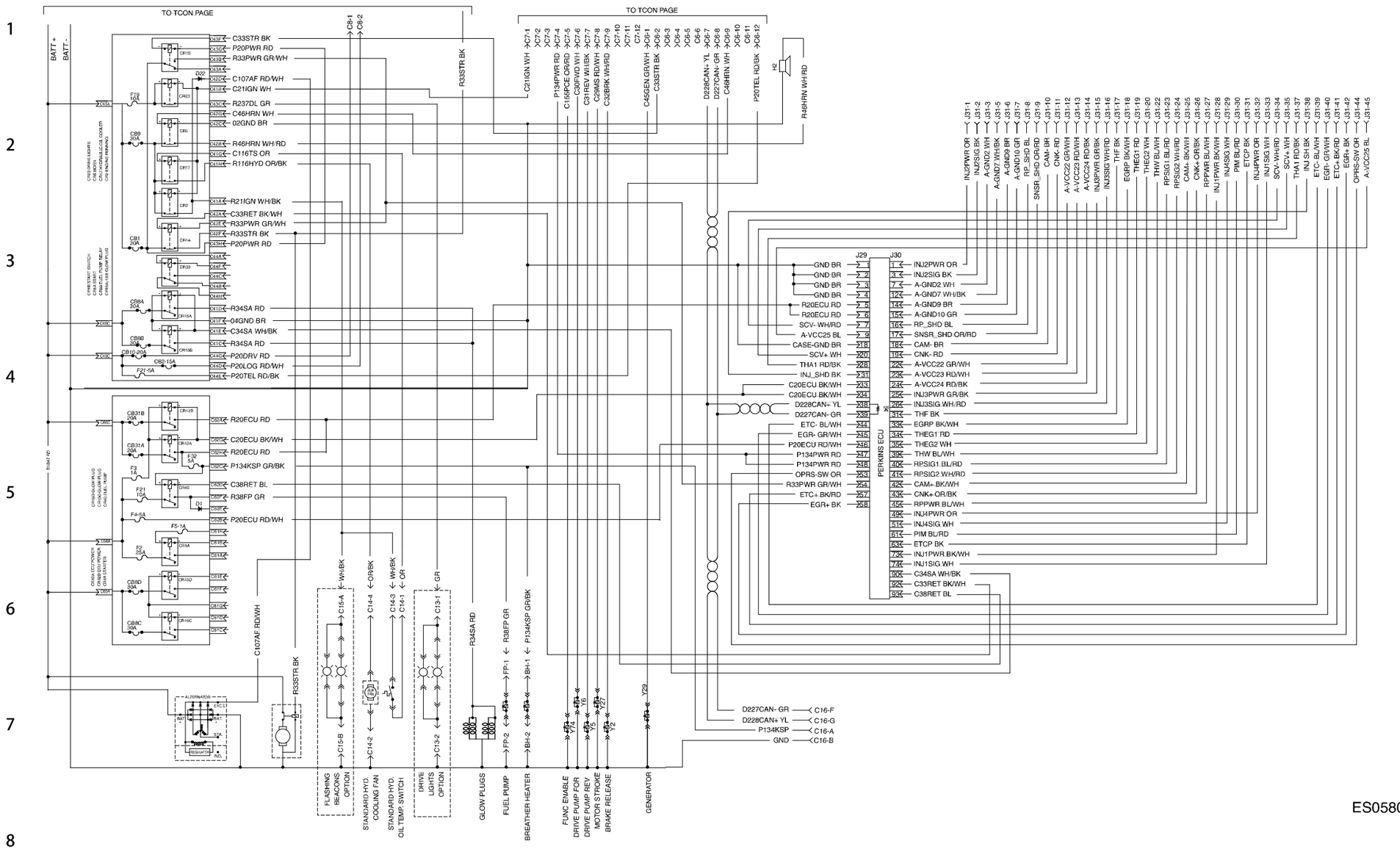


Electrical Schematic, Perkins 404D-22T Engine



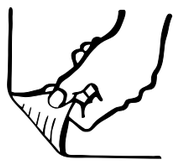
ES0580N

Electrical Schematic, Perkins 404F-E22TA Engine

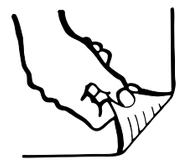


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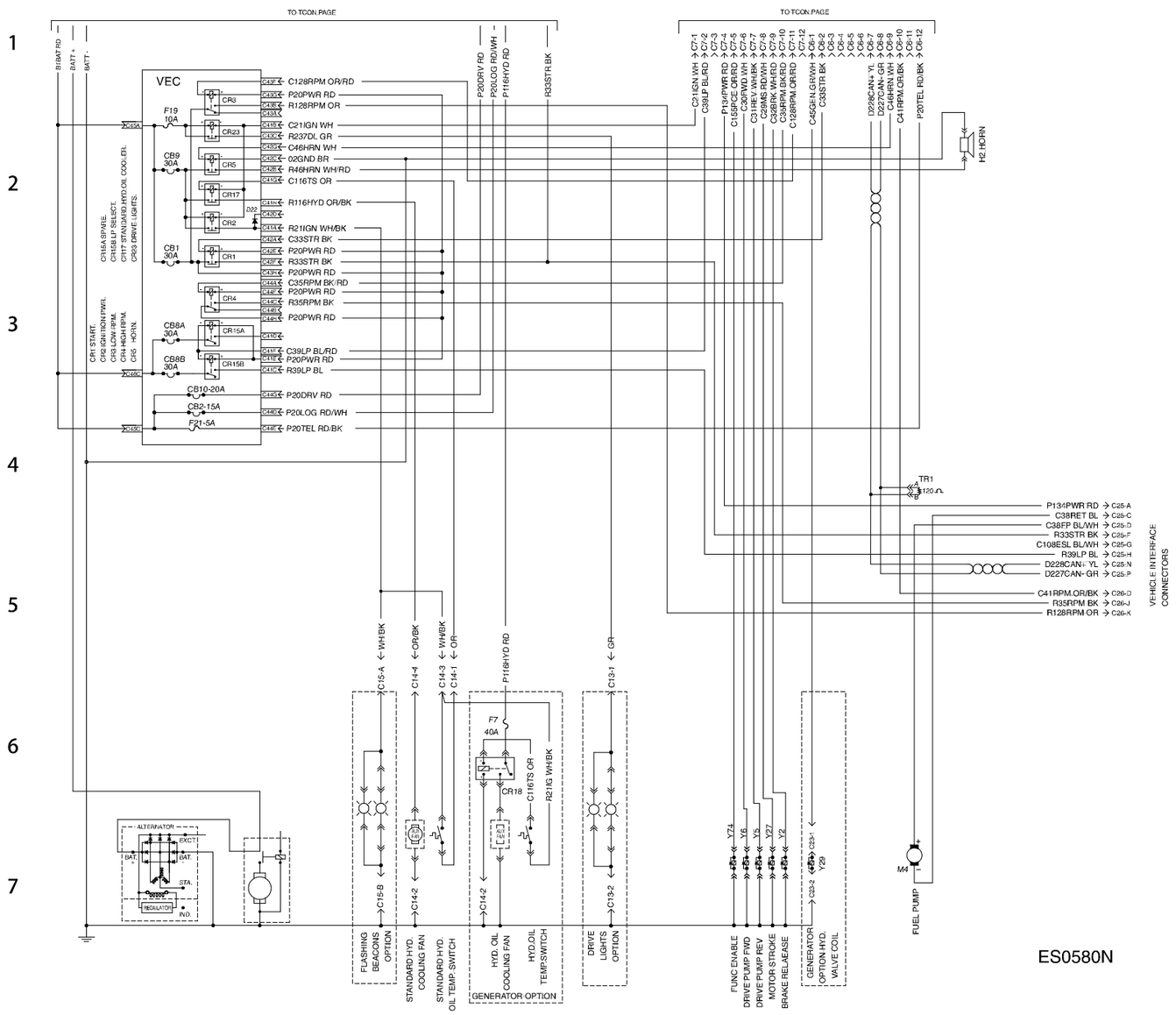
Electrical Schematic, Perkins 404F-E22TA Engine



Electrical Schematic, GM 3.0L Engine

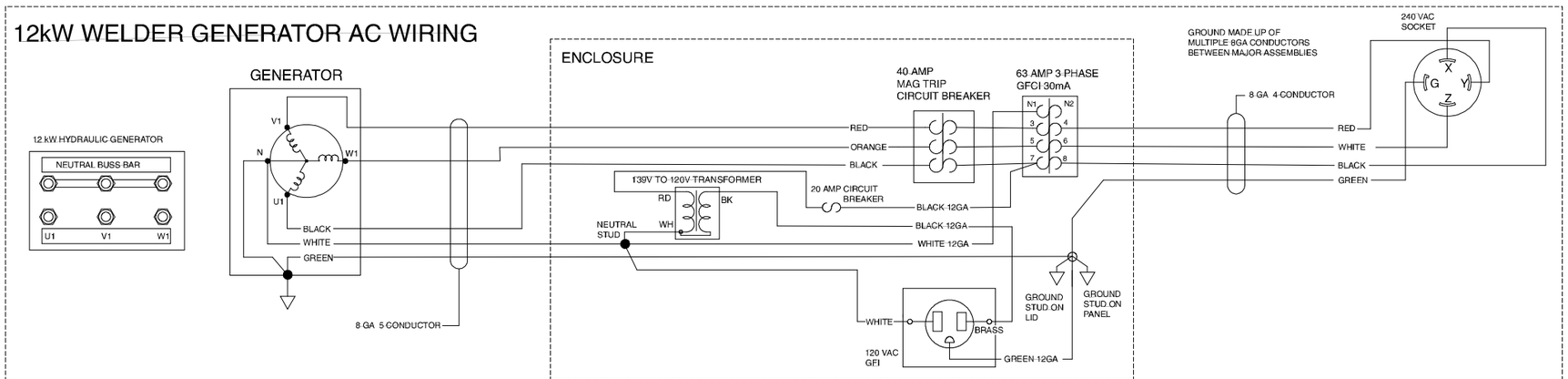


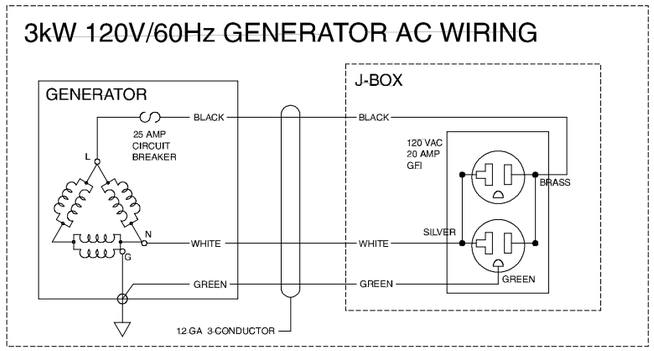
Electrical Schematic, GM 3.0L Engine

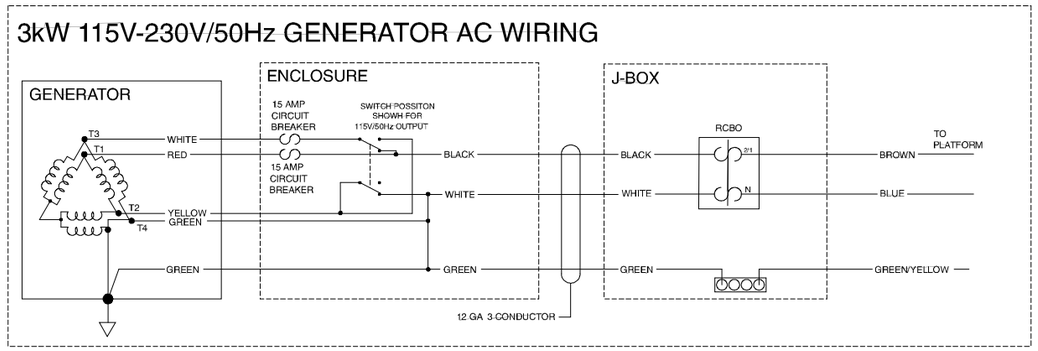


ES0580N

Electrical Schematic,
12 kW Welder Generator and 3 kW Generator



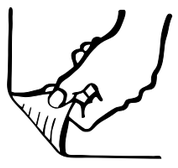




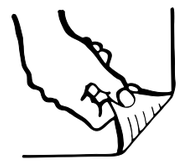
ES0580N

Electrical Schematic,

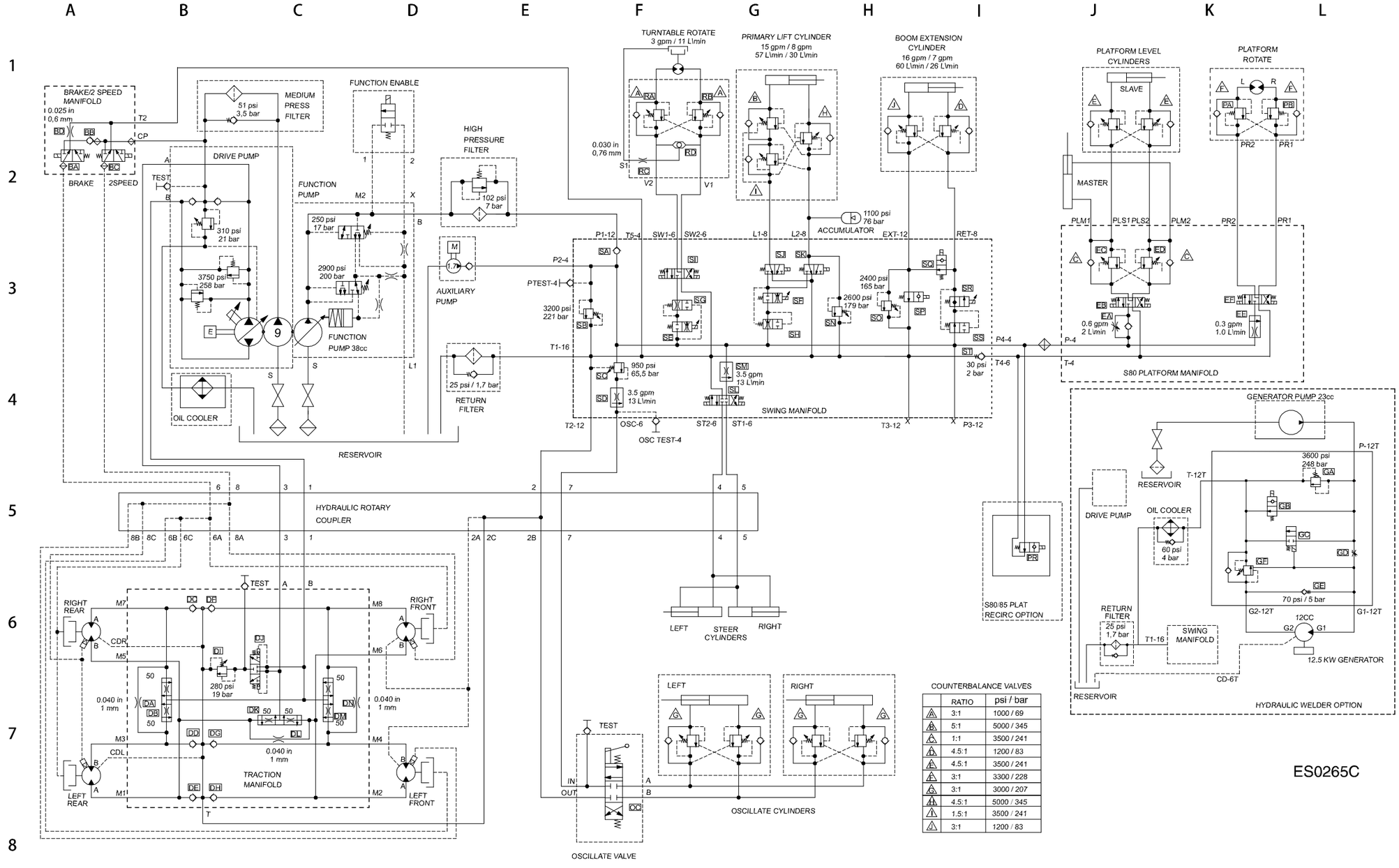
12 Kw Welder Generator and 3 kW Generator



Hydraulic Schematic, S-80 XC Models



Hydraulic Schematic, S-80 XC Models

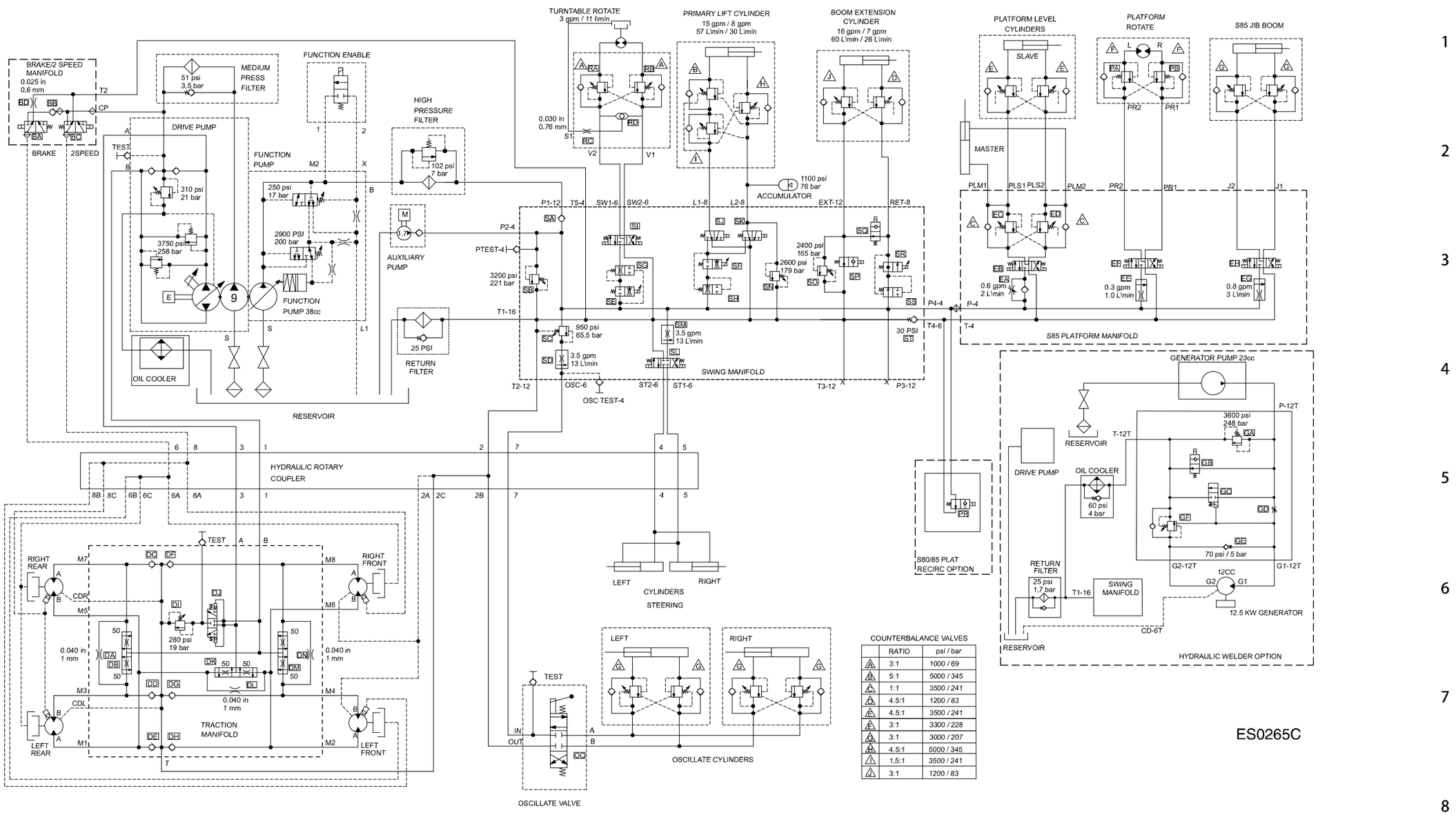


COUNTERBALANCE VALVES

	RATIO	psi / bar
A	3:1	1000 / 69
B	5:1	5000 / 345
C	1:1	3500 / 241
D	4.5:1	1200 / 83
E	4.5:1	3500 / 241
F	3:1	3300 / 228
G	3:1	3000 / 207
H	4.5:1	5000 / 345
I	1.5:1	3500 / 241
J	3:1	1200 / 83

ES0265C

Hydraulic Schematic, S-85 XC Models

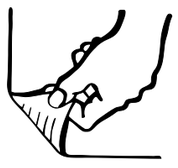


COUNTERBALANCE VALVES

	RATIO	psi / bar
A	3:1	1000 / 69
B	5:1	5000 / 345
C	1:1	3500 / 241
D	4.5:1	1200 / 83
E	4.5:1	3500 / 241
F	3:1	3300 / 228
G	3:1	3000 / 207
H	4.5:1	5000 / 345
I	1.5:1	3500 / 241
J	3:1	1200 / 83

ES0265C

Hydraulic Schematic, S-85 XC Models



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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