Genie®
A TEREX BRAND

Service and Repair Manual

Serial Number Range

Z®-80/60

from Z8013-4592
to Z8016H-6399
from Z80H-6400

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

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

Part No. 1268556GT
Rev C
June 2020

Introduction

Important

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

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

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

Compliance

Machine Classification

Group B/Type 3 as defined by ISO 16368

Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

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

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

Contact Us:

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.

1268556GT Rev C, June 2020

Third Edition, Third Printing

Revision History

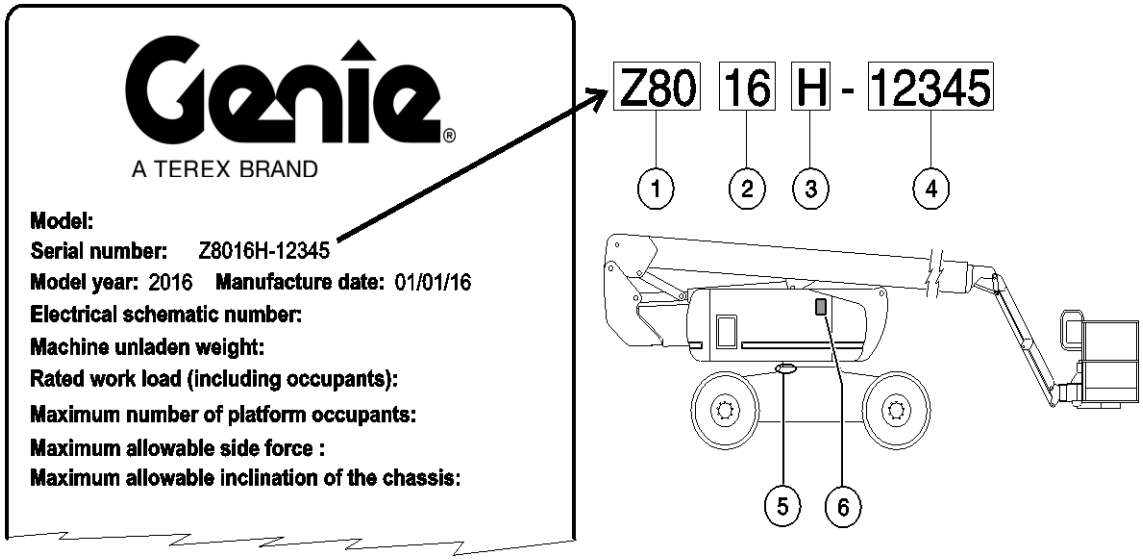
Revision	Date	Section	Procedure / Page / Description
A	9/2015		Initial Release
A1	11/2015	Schematics	Electrical Schematic (from Z8013-4592 to Z8015-5653)
A2	9/2016	Introduction	Serial Number Legend
		Specifications	GM 3.0L engine
		Fault Codes	GM 3.0L engine
		Schematics	GM 3.0L engine; Electrical Schematics
A3	1/2017	Repair	10-1 Calibrate Steer Sensors
B	12/2017	Specifications	Perkins 404D engine
		Schematics	Electrical Schematic (from Z8016H-6188)
C	5/2020	All Sections	Add Deutz TCD 2.2 L3 engine

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

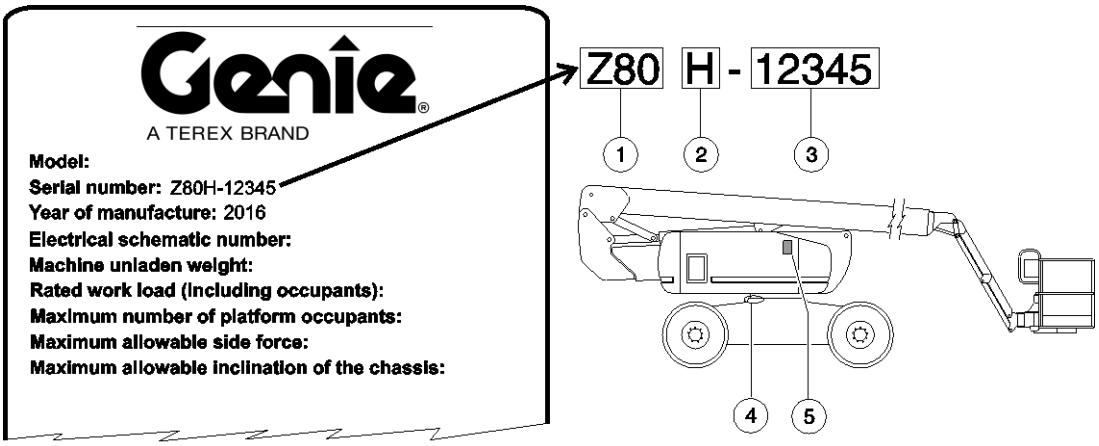
Serial Number Legend

To August 31, 2016



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

From September 1, 2016



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

Safety Rules

Danger

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

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

Do Not Perform Maintenance Unless:

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

☑ You read, understand and obey:

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

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

Safety Rules

Personal Safety

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

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

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

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

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

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

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

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

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

Workplace Safety

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

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

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

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

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

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

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

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Specifications

Machine Specifications

Tires and wheels	
Tire size (foam filled and non-marking)	18-625 FF
Tire size (Hi-flotation)	445D50/70
Tire ply rating (foam filled and non-marking)	16
Tire weight, new foam-filled (minimum) (Rough terrain)	622 lbs 282 kg
Tire ply rating (Hi-flotation)	14
Overall tire diameter (foam filled and non-marking)	40.7 in 103.3 cm
Overall tire diameter (Hi-flotation)	45.47 in 115.5 cm
Wheel diameter (foam filled and non-marking)	24.5 in 62.2 cm
Wheel diameter (Hi-flotation)	28 in 71.1 cm
Wheel width (foam filled, non-marking and Hi-flotation)	15 in 38.1 cm
Tire Pressure (Hi-flotation)	80 lbs 5.5 bar
Wheel lugs	11 @ 3/4 -16
Lug nut torque, dry	420 ft-lbs 570 Nm
Lug nut torque, lubricated	320 ft-lbs 434 Nm

Fluid capacities	
Fuel tank	35 gallons 132.5 liters
LPG tank	33.5 lbs 15.2 kg
Hydraulic tank	45 gallons 170 liters
Hydraulic system (including tank)	80 gallons 303 liters
Drive hubs, 2WD	30.5 fl oz 902 cc
Drive hubs, 4WD	23 fl oz 680 cc
Turntable rotation drive hub	40 fl oz 1183 cc
Drive hub oil type: SAE 90 multipurpose hypoid gear oil API service classification GL5	

Specifications

Performance Specifications

Drive speed, maximum (models with rough terrain tires)	
Stowed position	40 ft / 8.7 - 9.3 sec 12.2 m / 8.7 - 9.3 sec
Raised or extended	40 ft / 40 - 45 sec 12.2 m / 40 - 45 sec
Drive speed, maximum (models with Hi-flotation tires)	
Stowed position	40 ft / 13.6 - 14.5 sec 12.2 m / 13.6 - 14.5 sec
Raised or extended	40 ft / 62 - 70 sec 12.2 m / 62 - 70 sec
Braking distance, maximum	
High range on paved surface	6 ft 1.8 m
Gradeability	See Operator's Manual
Boom function speeds, maximum from platform controls	
Jib boom up	23 to 33 seconds
Jib boom down	21 to 31 seconds
Primary boom up, retracted -35° to 65°	60 to 70 seconds
Primary boom down, retracted -35° to 65°	75 to 85 seconds
Secondary boom up	38 to 48 seconds
Secondary boom down	38 to 48 seconds
Primary boom extend	48 to 52 seconds
Primary boom retract	38 to 42 seconds
Platform rotate, 160°	10 to 14 seconds
Turntable rotate, 360° boom fully retracted	114 to 126 seconds
Turntable rotate, 360° boom extended	200 to 240 seconds

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

Hydraulic Oil Specifications

Hydraulic Fluid Specifications

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

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

Recommended Hydraulic Fluid	
Hydraulic oil type	Chevron Rando HD Premium
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 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.

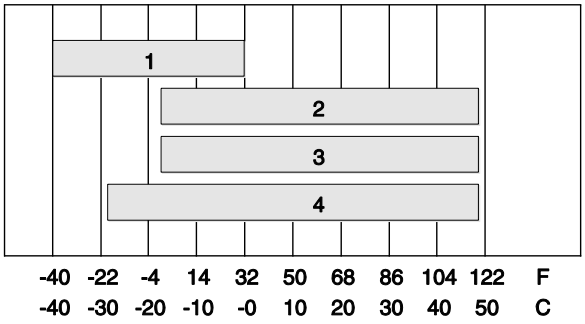
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond it's maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

NOTICE

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

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

Hydraulic Fluid Temperature Range



Ambient air temperature

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

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	5.5
cSt @ 104°F / 40°C	15.0
cSt @ -40°F / -40°C	510
Flash point	180°F / 82°C
Pour point	-81°F / -63°C
Maximum continuous operating temperature	124°F / 51°C

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

NOTICE

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

Petro-Canada Environ MV 46 Fluid Properties

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

Shell Tellus S4 VX Fluid Properties

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

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	2.8 cu in 46 cc
Flow rate @ 2300 rpm	28 gpm 106 L/min
Drive pressure, maximum	3625 psi 250 bar
Charge Pump	
Type	gerotor
Displacement per revolution	0.85 cu in 13.9 cc
Flow rate @ 2300 rpm	9 gpm 34 L/min
Charge pressure @ 2300 rpm Neutral position	320 psi 22 bar
Function Pump	
Type: two-section tandem gear pump	
Displacement per revolution Pump 1 (inner)	1.94 cu in 31.8 cc
Flow rate @ 2300 rpm	17 gpm 64 L/min
Displacement per revolution Pump 2 (outer)	0.58 cu in 9.5 cc
Flow rate @ 2300 rpm	5 gpm 19 L/min
Auxiliary Pump	
Type: two-section fixed displacement gear pump	
Displacement per revolution Section 1 (inner)	0.159 cu in 2.61 cc
Flow rate @ 2687 rpm	1.7 gpm 6.4 L/min
Displacement per revolution Section 2 (outer)	0.051 cu in 0.84 cc
Flow rate @ 2687 rpm	0.3 gpm 1.1 L/min

Specifications

Function manifold	
System relief valve pressure, maximum (measured at PTEST port)	3200 psi 220.6 bar
Primary boom down relief valve pressure (measured at LS port)	1300 psi 89.6 bar
Secondary boom down relief pressure (measured at LS port)	2500 psi 172 bar
Secondary boom up relief pressure (measured at LS port)	2500 psi 172 bar
Primary boom extend relief pressure (measured at LS port)	1300 psi 89.6 bar
Secondary boom extend relief pressure (measured at LS port)	2600 psi 179 bar
Platform manifold relief pressure	3000 psi 207 bar
Platform manifold flow regulator	3 gpm 11.4 L/min
Outrigger manifold	
Oscillate relief pressure (item BE or CH)	800 psi 55.1 bar
Drive manifold	
Hot oil relief pressure	280 psi 19.3 bar
Brakes	
Brake relief pressure	240 psi 16.5 bar
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	10 micron with 25 psi / 1.7 bar bypass

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

Valve coil resistance specifications	
Proportional solenoid valve, 12V DC (schematic items G, W and AB)	4.8Ω
Proportional solenoid valve, 12V DC (schematic items R)	9Ω
Solenoid valve, 3 position 4 way, 12V DC (schematic items BA, BB, CA, CB, CP, CQ, GB, GP and GQ)	9Ω
Solenoid valve, 3 position 4 way, 10V DC (schematic items O and S)	6.3Ω
Solenoid valve, 2 position 2 way, 10V DC (schematic items J)	3.3Ω
Solenoid valve, 2 position 2 way, 10V DC (schematic items C and P)	6.3Ω
Solenoid Valve, 2 position 3 way, 10V DC (schematic items H, V, X, Z, AA, EE and EF)	6.3Ω
Solenoid Valve, 2 position 3 way, 12V DC (schematic items BC, BD, CE, CF, FB and FC)	9Ω

Continuous improvement of our products is a Genie policy. Product specifications are subject to change without notice or obligation.

Specifications

Continental TME27 Engine

Displacement	164 cu. in 2.68 liters
Number of cylinders	4
Bore and Stroke	3.58 x 4.06 inches 91 x 103.2 mm
Horsepower, continuous @ 2500 rpm	59 hp / 43.9 kW
Firing order	1 - 3 - 4 - 2
Standby idle-computer controlled Frequency	1000 rpm
Low function idle-computer controlled Frequency	1500 rpm 53.33 Hz
High function idle-computer controlled Frequency	2500 rpm 83.33 Hz
Compression ratio	8.2:1
Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	electronic
Valve clearance, warm	
Intake	0.014 in 0.36 mm
Exhaust	0.018 in 0.45 mm
Lubrication system	
Oil pressure, hot	40 to 60 psi 2.8 to 4.1 bar
Oil capacity (including filter)	7 quarts 6.6 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-20
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	

Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	7 psi 0.55 bar
Fuel Pump	
Fuel pressure	39-40 psi 2.7 bar
Fuel flow rate	0.42 gpm 1.59 L/min
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	150-345A
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 (engine only)	10.7 quarts 10.1 liters
Coolant temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	230°F 110°C
Alternator output	65A @ 13.8V DC
Fan belt deflection	1/2 inch 12 mm

Specifications

GM 3.0L Engine

Displacement	183 cu. in 3.0 liters
Number of cylinders	4
Bore and Stroke	4.0 x 3.6 inches 101.6 x 91.44 mm
Horsepower @ 2500 rpm **Horsepower @ 1500 rpm**	70 hp / 52 kW 40 hp / 30kW
Firing order	1 - 3 - 4 - 2
Standby idle-computer controlled Frequency	1000 rpm
Low function idle-computer controlled Frequency	1500 rpm
High function idle-computer controlled Frequency	2500 rpm
Compression ratio	9.25:1
Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	electronic
Lubrication system	
Oil pressure, hot minimum @ 1000 rpm	6 psi 0.4 bar
Oil capacity (including filter)	5 quarts 4.7 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-20
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40

Unit ships with 5W-30.
Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.

Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
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	12 quarts 11.4 liters
Alternator output	70A @ 12V DC
Fan belt deflection	1/2 inch 12 mm

Specifications

Deutz TD2011L04i Engine

Displacement	220.9 cu. in 3.62 liters
Number of cylinders	4
Bore and Stroke	3.78 x 4.92 inches 96 x 125 mm
Horsepower net intermittent @ 2400 rpm	74 hp 55 kW
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Low idle	1500 rpm 383 Hz
High idle	2350 rpm 599 Hz
Compression ratio	17.5:1
Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder	
Governor	centrifugal mechanical
Valve clearance, cold	
Intake	0.012 in 0.3 mm
Exhaust	0.020 in 0.5 mm
Lubrication system	
Oil pressure, hot (@ 2000 rpm)	40 to 60 psi 2.8 to 4.1 bar
Oil capacity (including filter)	12.8 quarts 12.1 liters
Oil viscosity requirements	
-22°F to 86°F / -30°C to 30°C	5W-30 (synthetic)
-4°F to 104°F / -20°C to 40°C	10W-40
Above 5°F / -15°C	15W-40
Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine.	
Oil temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	275°F 135°C
Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	22 psi 1.5 bar
Fuel injection system	Motorpal
Injection pump pressure, maximum	15,000 psi 1034 bar
Injector opening pressure	3046 psi 210 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	140 - 200A
Cranking speed	250 - 350 rpm
Battery – 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	2500 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
Standby idle	1000 rpm
Low idle	1500 rpm
High idle	2500 rpm
Compression ratio	17.4:1
Compression pressure 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)	9.4 quarts 9 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 switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	275°F 135°C
Oil Pressure switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Pressure switch point	20 psi 1.4 bar
Fuel injection system	Motorpal
Injection pump pressure, maximum	15,000 psi 1034 bar
Injector opening pressure	3046 psi 210 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Starter motor	
Current draw, normal load	250 - 400A
Brush length, new	0.72 in 18.5 mm
Brush length, minimum	0.27 in 7 mm
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

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
Induction system	turbocharged
Firing order	1 - 3 - 4 - 2
Standby idle	1100 rpm
Low idle	1500 rpm
High idle	2500 rpm
Compression ratio	23.3:1
Compression pressure 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
Brush length, new	0.7480 in 199 mm
Brush length, minimum	0.5 in 12.7 mm
Battery	
Type	12V DC, Group 31
Quantity	2
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Engine coolant	
Capacity	14 quarts 13.3 liters
Coolant temperature switch	
Installation torque	8 - 18 ft-lbs 11 - 24 Nm
Temperature switch point	221°F 105°C

Specifications

Perkins 804D-33

Displacement	201 cu. in 3.3 liters
Number of cylinders	4
Bore and Stroke	3.70 x 4.72 inches 94 x 120 mm
Horsepower	63 @ 2600 rpm 47 KW @ 2600 rpm
Firing order	1 - 3 - 4 - 2
Compression ratio	22:1
Compression pressure	300 to 500 psi 20.7 to 34.5 bar
Pressure (psi) of lowest cylinder must be within 50 psi / 3.45 bar of highest cylinder	
Low idle **Frequency**	1650 rpm 335.5 Hz
Low idle with generator **Frequency**	1400 rpm 284.7 Hz
High idle **Frequency**	2300 rpm 467.7 Hz
Governor	mechanical all speed
Valve clearance, cold	
Intake	0.0098 in 0.25 mm
Exhaust	0.0098 in 0.25 mm
Lubrication system	
Oil pressure, hot (@ 2000 rpm)	40 to 60 psi 2.8 to 4.1 bar
Oil capacity (including filter)	10.6 quarts 10 liters
Oil viscosity requirements	
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.	
Injection system	
Injection pump make	Zexel
Injection pump pressure	1707 to 1849 psi 117.7 to 127.5 bar
Injector opening pressure	~2000 psi ~138 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Engine coolant	
Capacity	12.5 quarts 11.8 liters
Batteries	
Type	12V DC
Group	31
Quantity	2
Cold cranking ampere	1000A
Reserve capacity @ 25A rate	200 minutes
Alternator output	90A @ 12V DC
Fan belt deflection	3/8 to 1/2 inch 9 to 12 mm

Machine Torque Specifications

Platform Rotator	
1-8 center bolt, GR 5, dry (before SN 15-5630)	640 ft-lbs 867 Nm
1-8 center bolt, GR 5, dull gray (from SN 15-5630)	615 ft-lbs 834 Nm
3/8 -16 bolts, GR 8 *(use blue thread locking compound)	35 ft-lbs* 47.5 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	160 ft-lbs 217 Nm*
Drive hub mounting bolts, dry	210 ft-lbs 284 Nm
Drive motor mounting bolts, dry	110 ft-lbs 149 Nm
Drive motor mounting bolts, lubricated *(use blue thread locking compound)	80 ft-lbs* 108.4 Nm*
Drive motor mounting bolts, dry	110 ft-lbs 149 Nm
Drive hub oil plug, O-ring seal	13 ft-lbs 18 Nm

Please refer to online supplemental Torque Specifications, SAE, Metric Manual for complete specifications.

Specifications

Hydraulic Hose and Fitting Torque Specifications

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

Seal-Lok™ Fittings

(hose end - ORFS)

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

JIC 37° Fittings

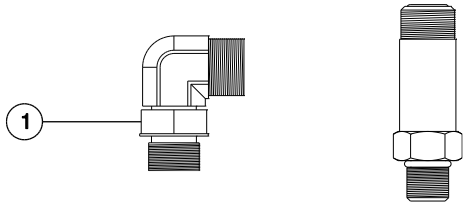
(swivel nut or hose connection)

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

SAE O-ring Boss Port

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

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



Adjustable Fitting

Non-adjustable fitting

1 jam nut

SAE O-ring Boss Port

(tube fitting - installed into Steel)

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

Torque Procedure

Seal-Lok™ fittings

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

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

2 Lubricate the O-ring before installation.

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

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

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

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

JIC 37° fittings

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

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

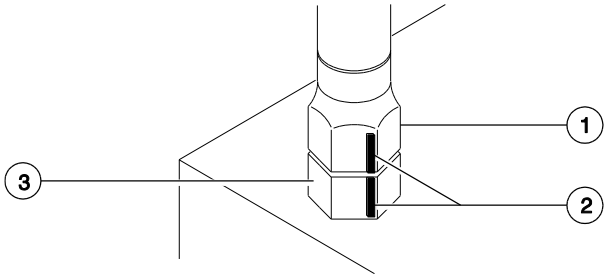


Illustration 1

1 hex nut
2 reference mark
3 body hex fitting

Specifications

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

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

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

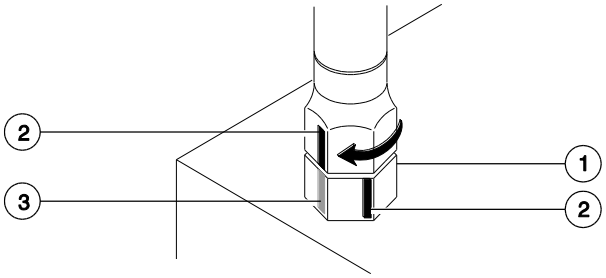


Illustration 2

1 body hex fitting
2 reference mark
3 second mark

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

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

Repair Procedures

Observe and Obey:

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

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

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

Before Repairs Start:

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

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

☑ Use only Genie approved replacement parts.

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

Machine Configuration:

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

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

Repair Procedures

About This Section

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

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

Symbols Legend

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

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

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

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

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

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

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

Platform Controls

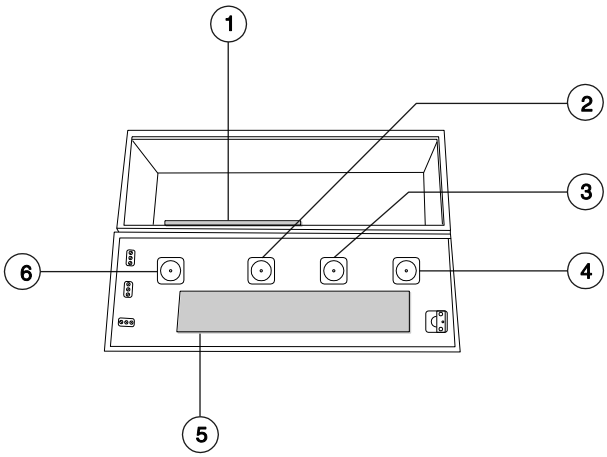
The platform controls contain two printed circuit boards:

The LED circuit board is mounted to the underside of the control box lid which contains the LEDs. The LED circuit board sends the input from the operator to the platform controls circuit board (PCON). The circuit board (PCON) sends the data to the turntable control box (TCON) for processing.

The platform controls ECM circuit board communicates with the turntable controls. The joystick controllers at the platform controls utilize Hall Effect technology and require no adjustment. The operating parameters of the joysticks are stored in memory at the turntable controls. If a joystick controller error occurs or if a joystick is replaced, it will need to be calibrated before that particular machine function will operate. Refer to Repair Procedure, *How to Calibrate a Joystick Controller*.

Each joystick controller should operate smoothly and provide proportional speed control over its entire range of motion.

For further information or assistance, consult Genie Product Support.



1 platform controls ALC-1000 circuit board
2 primary boom extend/retractjoystick
3 secondary boom up/extend anddown/retract joystick
4 drive/steer joystick controller
5 LED circuit board
6 primary boom up/down and turntable rotate left/right joystick

Platform Controls

1-1
Platform Circuit Board

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

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

How to Remove the Circuit Board

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

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

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

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

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

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

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

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

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

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

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

10 Remove the circuit board mounting fasteners.

11 Carefully remove the circuit board from the control box.

How to Remove the LED Circuit Board

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

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

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

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

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

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

5 Remove the circuit board mounting fasteners.

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

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

Platform Controls

1-2 Joysticks

How to Calibrate a Joystick

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

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

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

Note: Perform this procedure with the engine off.

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

Plus Minus Previous Enter

Drive functions:

1 Turn the key switch to the off position.

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

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

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

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

6 Do not start the engine.

7 Locate the drive/steer joystick.

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

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

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

Platform Controls

Steer functions:

1 Turn the key switch to the off position.

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

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

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

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

6 Do not start the engine.

7 Locate the drive/steer joystick.

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

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

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

Secondary boom up/down and extend/retract functions:

1 Turn the key switch to the off position.

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

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

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

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

6 Do not start the engine.

7 Locate the secondary boom up/down and extend/retract joystick.

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

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

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

Platform Controls

Primary boom extend/retract functions:

1 Turn the key switch to the off position.

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

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

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

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

6 Do not start the engine.

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

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

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

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

Primary boom up/down functions:

1 Turn the key switch to the off position.

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

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

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

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

6 Do not start the engine.

7 Locate the primary boom/turntable rotate joystick.

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

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

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

Turntable rotate functions:

1 Turn the key switch to the off position.

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

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

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

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

6 Do not start the engine.

7 Locate the primary boom/turntable rotate joystick.

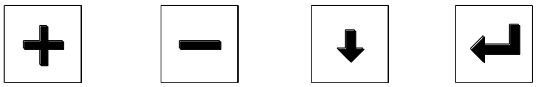
8 Move the boom/turntable joystick full stroke in the left direction and hold for 5 seconds, then return to the center or neutral position.

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

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

How to Reset a Proportional Valve Coil Default

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



Plus Minus Previous Enter

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

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

1 Turn the key switch to the off position.

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

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

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

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

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

Platform Controls

How to Set the Function Thresholds and Default Functions Speeds

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

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

1 Start the engine from the platform controls.

2 Press down the foot switch.

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

Function threshold:

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

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

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

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

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

8 Repeat steps for each joystick controlled machine function:

- Primary boom up/down
- Turntable rotate left/right
- Primary boom extend/retract
- Secondary up/down and extend/retract
- Drive forward/reverse

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

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

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

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

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

Function speeds:

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

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

Note: Unless the LCD screen displays NOT CALIBRATED, it will be necessary to enter the valve calibration menu.

12 Start the engine from the platform controls.

13 Select a function that needs the function speed set.

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

Boom extend/retract functions: Raise the primary boom until it no longer rests on the boom cradle. Then move the joystick full stroke in the extend direction. When the alarm sounds, move the joystick in the opposite direction full stroke until the alarm sounds again. Return the joystick to center.

Turntable rotate functions: Raise the primary boom until it no longer rests on the boom cradle. Move the joystick full stroke in either the left or right direction until a drive enable zone is reached. Move the joystick in the opposite direction full stroke until the alarm sounds. Now move the joystick in the opposite direction full stroke until the alarm sounds again. Return the joystick to center.

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

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

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

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

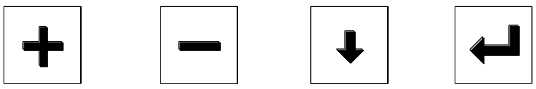
Note: There should be no calibration faults shown on the display. If calibration faults exist, repeat this procedure.

Platform Controls

How to Adjust the Function Speeds

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

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



Plus Minus Previous Enter

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

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

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

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

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

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

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

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

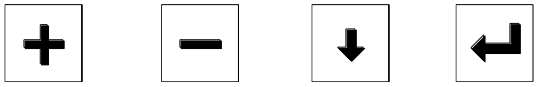
9 Continue to perform this procedure until the machine function speed meets specification. Refer to Specifications, *Performance Specifications*.

How to Adjust the Function Ramp Rate Setting

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

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

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



Plus Minus Previous Enter

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

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

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

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

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

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

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

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

Platform Controls

Ramp Rate Specifications

Ramp rate (factory settings)	
Turntable rotate	
accelerate	4 seconds
decelerate	1.0 second
Primary boom up/down	
accelerate	3 seconds
decelerate	0.25 second
Primary boom extend/retract	
accelerate	3 seconds
decelerate	0.75 second
Secondary boom up/down	
accelerate	7 seconds
decelerate	0.75 second
Secondary boom extend/retract	
accelerate	7 seconds
decelerate	0.75 second
Drive	
accelerate	1.5 seconds
decelerate to neutral	0.5 second
decelerate, change of direction	0.5 second
decelerate, coasting	0.75 second
decelerate, braking	2 seconds
decelerate, shift from low to high speed	1 second
decelerate, shift from high to low speed	4 seconds

Platform Components

2-1 Platform

How to Remove the Platform

1 Separate the foot switch quick disconnect plug.

2 Support the platform with an appropriate lifting device.

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

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

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

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

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

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

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

2-2 Platform Leveling Cylinder

The platform leveling cylinder keeps the platform level through the entire range of boom motion. The platform is maintained level to the turntable. To accomplish this, the ECM at the ground controls compares the difference in readings between the platform angle sensor and the turntable level sensor, which then sends a signal to the platform controls to open or close the appropriate platform level proportional valve on the platform manifold to maintain a level platform. The platform leveling cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the Platform Leveling Cylinder

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

1 Extend the boom until the platform leveling cylinder barrel-end pivot pin is accessible.

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

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

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

Platform Components

4 Tag, disconnect and plug the hydraulic hoses from the platform leveling cylinder at the bulkhead fittings located inside the boom tube at the platform end. Cap the bulkhead fittings on the boom tube.

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

5 Remove the pin retaining fasteners from the platform leveling cylinder rod-end pivot pin. Do not remove the pin.

6 Remove the external snap rings from the barrel-end pivot pin. Do not remove the pin.

7 Support and secure the jib boom cylinder to the jib boom with a strap or other suitable device. Protect the cylinder rod from damage.

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

8 Use a soft metal drift to remove the barrel-end pivot pin.

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

9 Support the rod end of the platform level cylinder.

10 Use a soft metal drift to tap the platform level cylinder rod-end pivot pin half way out and 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.

11 Use a soft metal drift to remove the platform level cylinder rod-end pivot pin.

12 Carefully pull the platform leveling cylinder out of the boom.

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

How to Bleed the Platform Leveling Cylinder

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

1 Raise the jib boom to a horizontal position.

2 Push the platform level up and down buttons through two complete platform leveling cycles to remove any air that might be in the system.

2-3 Platform Rotator

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

How to Remove the Platform Rotator

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

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

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

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

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

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

4 Remove the hose and cable clamp from the platform support.

5 Remove the platform manifold mounting fasteners. Lay the platform manifold to the side.

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

6 Remove the power to platform electrical outlet box bracket mounting fasteners.

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

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

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

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

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

Platform Components

11 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.

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

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

14 Support the jib boom leveling arms with a suitable lifting device.

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

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

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

How to Bleed the Platform Rotator

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

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

2-4
Platform Overload System (if equipped)

The platform overload system is designed to prevent the machine from continuing to operate when the load in the platform exceeds maximum rated capacity. Refer to the machine serial label for maximum capacity information.

If maximum platform capacity is exceeded, the alarm will sound and the platform overload indicator lights will flash at the platform control and "PLATFORM OVERLOAD" will display on the LCD screen at the ground control. The ground and platform controls will become disabled. Before normal machine operation can continue, the excess load will need to be removed from the platform.

If the excess load cannot be removed or if the operator at the platform controls is unable to correct the overloaded condition, another person at the ground controls can operate the machine using auxiliary power. There will be limited control of boom functions from the ground controls when using auxiliary power. Auxiliary power can be used to correct the overloaded platform condition in order to resume normal, safe operation of the machine.

Note: The engine must be turned off to use auxiliary power.

Note: **Software versions 1.03 and lower**. All ground control functions will not operate with auxiliary control. Refer to Repair Procedure, *How to Determine the Revision Level*.

Note: Recovery mode must be used. Refer to Repair Procedure, Bypass / Recovery Keyswitch.

Note: **Software versions 1.04 and higher**. All ground control functions will operate from auxiliary control. Refer to Repair Procedure, *How to Determine the Revision Level.*

How to Calibrate the Platform Overload System (if equipped)

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.

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

1 Turn the key switch to platform controls. Start the engine and level the platform.

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

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

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

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

Platform Components

5 Move the platform up and down by hand, so it bounces approximately 2.5 to 5 cm / 1 to 2 inches. Allow the platform to settle.

⊙ Result: The alarm should be off. The platform overload indicator light should be off at the platform controls and there should be no error message on the LCD display at the ground controls. Proceed to step 6.

⊠ Result: The alarm is sounding. The platform overload indicator light is flashing at the platform controls and “PLATFORM OVERLOAD” should is displayed on the LCD screen at the ground controls. Slowly tighten the load spring adjustment nut in a clockwise direction in 10° increments until the overload indicator light turns off, and the alarm does not sound. Proceed to step 8.

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

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

6 Move the platform up and down by hand, so it bounces approximately 2.5 to 5 cm / 1 to 2 inches. Allow the platform to settle.

⊙ Result: The alarm should be off. The platform overload indicator light should be off at the platform controls and there should be no error message on the LCD display at the ground controls. Slowly loosen the load spring adjustment nut in a counterclockwise direction in 10° increments until the overload indicator light flashes at both the platform and ground controls, and the alarm sounds. Proceed to step 7.

⊠ Result: The alarm should be sounding. The platform overload indicator light should be flashing at the platform controls and “PLATFORM OVERLOAD” should be displayed on the LCD screen at the ground controls. Repeat this procedure beginning with step 5.

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

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

7 Move the platform up and down by hand, so it bounces approximately 2.5 to 5 cm / 1 to 2 inches. Allow the platform to settle.

⊙ Result: The alarm should be off. The platform overload indicator light should be off at the platform controls and there should be no error message on the LCD display at the ground controls. Proceed to step 8.

⊠ Result: The overload indicator lights are flashing at the platform and ground controls, and the alarm is sounding. Repeat this procedure beginning with step 5.

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

8 Add an additional 10 lb / 4.5 kg test weight to the platform.

⊙ Result: The alarm should be sounding. The platform overload indicator light should be flashing at the platform controls and "PLATFORM OVERLOAD" should be displayed on the LCD screen at the ground controls. Proceed to step 9.

⊠ Result: The alarm should be off. The platform overload indicator light should be off at the platform controls and there should be no error message on the LCD display at the ground controls. Remove the additional 10 lb / 4.5 kg test weight. Repeat this procedure beginning with step 6.

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

9 Test all machine functions from the platform controls.

⊙ Result: All platform control functions should not operate.

10 Turn the key switch to ground controls.

11 Test all machine functions from the ground controls.

⊙ Result: All ground control functions should not operate.

12 Using a suitable lifting device, lift the test weight off the platform floor.

⊙ Result: The alarm should be off. The platform overload indicator light should be off at the platform controls and there should be no error message on the LCD display at the ground controls.

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

13 Test all machine functions from the ground controls.

⊙ Result: All ground control functions should operate normally.

14 Turn the key switch to platform controls.

15 Test all machine functions from the platform controls.

⊙ Result: All ground control functions should operate normally.

Platform Components

2-5 Platform Overload Recovery Message (software V2.04 and later)

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

How to Clear the Platform Overload Recovery Message

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

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

Plus Minus Previous Enter

1 Turn the key switch to the off position.

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

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

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

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

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

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

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

8 Turn the key switch to the off position.

3-1
Jib Boom

How to Remove the Jib Boom

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

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

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

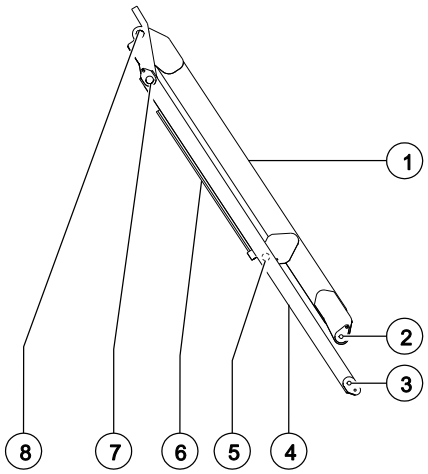
1 Remove the platform mounting weldment and the platform rotator. Refer to Repair Procedure, *How to Remove the Platform Rotator*.

2 Remove the hose and cable cover retaining fasteners from the jib boom. Remove the hose and cable cover from the machine.

3 Attach a lifting strap from an overhead crane to the jib boom for support. Do not apply lifting pressure.

4 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.



1 jib boom
2 platform rotator upper pivot pin
3 platform rotator lower pivot pin
4 jib boom leveling arm
5 jib cylinder pivot pin
6 jib boom cylinder
7 primary boom lower pivot pin
8 primary boom upper pivot pin

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

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

Jib Boom Components

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

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

8 Secure the jib boom bellcrank to prevent it from moving.

9 Remove the hose and cable clamp from the jib boom pivot pin.

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

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

12 Use a soft metal drift to remove the pin. Carefully remove the jib boom 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 crane.

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

14 Slide both of the jib boom leveling arms off of the jib boom cylinder rod-end pivot pin and lay them off to the side.

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

16 Attach a lifting strap from a second overhead crane to the jib boom bellcrank.

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

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

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

3-2
Jib Boom Lift Cylinder

How to Remove the Jib Boom Lift Cylinder

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

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

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

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

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

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

3 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 and 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.

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

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

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

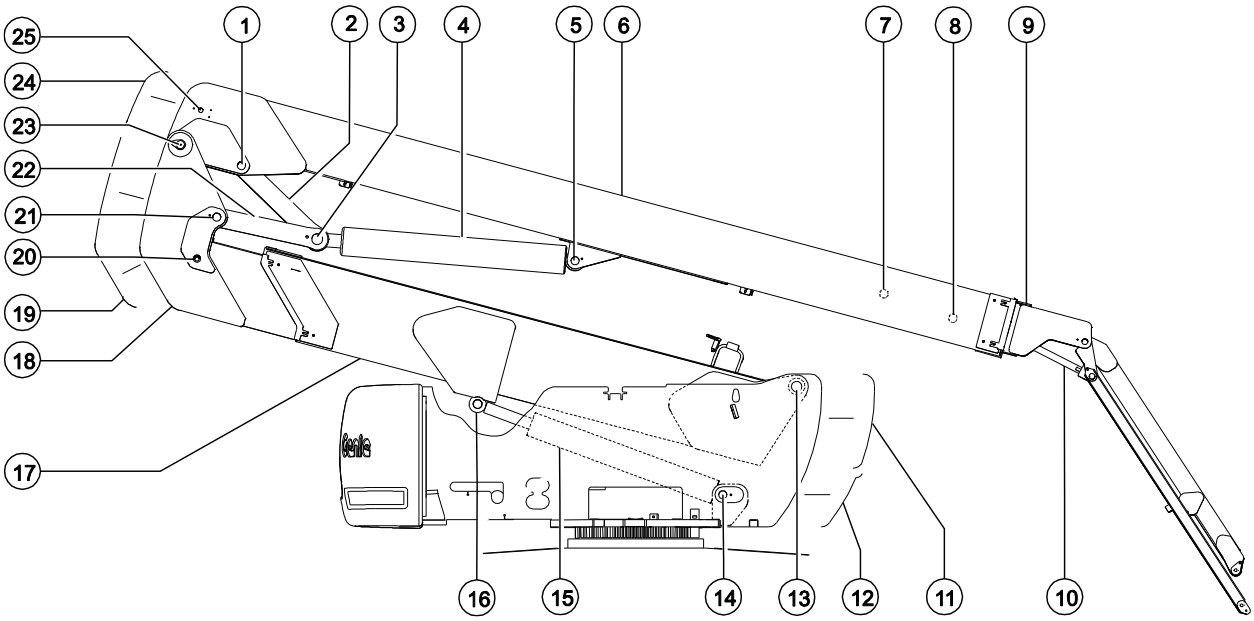
⚠WARNING Crushing hazard. The platform and jib boom lift cylinder could become unbalanced and fall if not properly supported when the jib boom lift cylinder barrel-end lift pivot pin is removed.

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

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

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

Boom Components



1 primary boom link arm pivot pin
2 primary boom lift cylinder link arm
3 primary lift cylinder pivot pin - rod end
4 primary boom lift cylinder
5 primary lift cylinder pivot pin - barrel end
6 primary boom
7 primary extend cylinder pivot pin - rod end
8 platform level cylinder pivot pin - barrel end
9 primary extension boom
10 platform leveling cylinder
11 upper turntable cover
12 lower turntable cover
13 secondary boom pivot pin
14 secondary lift cylinder pivot pin - barrel end
15 secondary boom lift cylinder
16 secondary lift cylinder pivot pin - rod end
17 secondary boom
18 secondary extension boom
19 secondary boom hose cover
20 secondary extend cylinder pivot pin - rod end
21 secondary boom lever arm pivot pin
22 primary boom lift cylinder lever arm
23 primary boom pivot pin
24 primary boom hose cover
25 primary extend cylinder pivot pins - barrel end

4-1
Primary Boom Cable Track

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

How to Remove the Primary Boom Cable Track

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

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

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

1 Tag and disconnect the wire connectors from the platform control box.

2 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.

3 Remove the mounting fasteners from the power to platform outlet box. Remove the outlet box and lay to the side.

4 Remove the hose clamp from the platform support.

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

Note: The platform angle sensor is mounted to the platform rotator.

6 Tag and disconnect the electrical connectors for the foot switch and jib boom limit switch.

7 Remove the platform manifold mounting fasteners. Remove the manifold and lay to the side.

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

8 Remove the hose and cable cover retaining fasteners from the jib boom. Remove the hose and cable cover from the machine.

9 Remove the hose and cable clamp from the jib boom pivot pin.

⚠CAUTION The jib boom may fall if not supported when the jib boom pivot pin is removed.

10 Tag, disconnect and plug the slave cylinder hydraulic hoses from the bulkhead fittings at the platform end of the primary 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.

Boom Components

11 Tag, disconnect and plug the jib boom cylinder hydraulic hoses. 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.

12 Remove the cotter pin from the platform end of the cable track tube.

Note: Always replace the cotter pin with a new one when installing the cable track.

13 Remove the fasteners from the cable track guide at the platform end of the primary boom. Remove the cable track guide from the machine.

14 Tag and disconnect the electrical connector from the limit switch at the pivot end of the primary boom.

15 Remove all hose clamps for the primary boom lift cylinder hydraulic hoses.

Note: The primary boom lift cylinder hydraulic hose clamps are located behind the cable track.

16 Support the end cover from the secondary boom at the pivot end of the primary boom.

17 Remove the cover retaining fasteners and remove the cover from the machine.

⚠WARNING Crushing hazard. The secondary boom hose cover could become unbalanced and fall if not properly supported when removed from the machine.

18 Tag, disconnect and plug each hydraulic hose from the bulkhead fittings that lead to the cable track. 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.

19 Tag and disconnect each electrical connector to wiring that leads to the cable track.

20 Pull all hoses and electrical cables through the opening in the primary boom at the pivot end.

21 Secure the upper and lower cable tracks together.

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

23 Remove all cable track mounting fasteners.

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

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

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

How to Repair the Primary Boom Cable Track

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Boom Components

4-2 Primary Boom

How to Shim the Boom

1 Measure each wear pad.

⊙ Result: Each wear pad meets minimum specification. Proceed to step 2.

⊠ Result: Each wear pad does not meet minimum specification. Replace any wear pad that does not meet minimum specification. Proceed to step 2.

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.

Primary boom wear pad specifications	**Minimum**
Top, bottom and side wear pads (platform end of boom)	0.625 inch 15.9 mm
Bottom and side wear pads (pivot end of boom)	0.50 in 12.7 mm
Top wear pads (pivot end of boom)	0.625 inch 15.9 mm
Secondary boom wear pad specifications	**Minimum**
Top, and side wear pads (extension end of boom)	0.625 inch 15.9 mm
Bottom wear pads (extension end of boom)	0.50 in 12.7 mm
Top wear pads (pivot end of boom)	0.50 in 12.7 mm
Bottom and side wear pads (pivot end of boom)	0.875 in 22.2 mm

How to Remove the Primary Boom

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

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

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

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

2 Remove the fasteners securing the limit switch to the primary boom at the pivot end of the boom. Do not disconnect the wiring. Move the limit switch to a safe location.

3 Tag and disconnect the wire harness from the primary boom angle sensor (PBAS).

Note: The primary boom angle sensor is located inside the primary boom at the pivot end.

4 Tag, disconnect and plug the primary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder. Tag, disconnect and plug the hydraulic hoses routed through the primary boom at the union.

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

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

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

7 Place blocks under both ends of the primary boom lift cylinder for support.

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

⚠WARNING Crushing hazard. The primary boom could become unbalanced and fall if not properly supported when the pivot pin is removed.

9 Attach a lifting strap from an overhead crane to the primary boom lift cylinder linkage arm. Support the arm.

10 Remove the pin retaining fasteners from the primary boom lift cylinder linkage arm where it connects to the primary boom.

11 Use a soft metal drift to remove the upper primary boom lift cylinder linkage arm pivot pin. Using a suitable lifting device remove the linkage arm from the machine.

⚠WARNING Crushing hazard. The upper primary boom lift cylinder linkage arm will fall if not properly supported when the pivot pin is removed.

12 Attach a 5 ton / 5000 kg overhead crane to the center point of the primary boom.

13 Remove the pin retaining fastener from the primary boom pivot pin.

14 Use a soft metal drift to remove the primary boom pivot pin.

⚠WARNING Crushing hazard. The primary boom could become unbalanced and fall if not properly supported when the pivot pin is removed.

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

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

Note: When the primary boom is installed, the primary boom angle sensor will need to be calibrated.

Boom Components

How to Disassemble the Primary Boom

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

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

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

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

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

3 Remove the pin retaining fastener from the extension cylinder barrel-end pivot pin at the pivot end of the primary boom.

4 Use a soft metal drift to remove the pin.

⚠WARNING Crushing hazard. The primary boom could become unbalanced and fall if not properly supported when the pivot pin is removed.

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

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

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

7 Support and slide the extension boom assembly out of the primary boom tube and place it on a structure capable of supporting it.

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

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

8 Remove the external snap rings from the extension cylinder rod-end pivot pin at the platform end of the extension tube.

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

9 Use a soft metal drift to remove the pin.

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

10 Attach a lifting strap from an overhead crane to the extension cylinder.

11 Working at the end of the extension boom tube opposite the jib boom mount, support and slide the extension cylinder out of the extension boom tube.

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

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

4-3 Primary Boom Lift Cylinder

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

How to Remove the Primary Boom Lift Cylinder

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

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

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

1 Raise the primary boom to a horizontal position.

2 Raise the secondary boom until the primary boom lift cylinder rod-end pivot pin is above the counterweight.

3 Attach a 5 ton / 5000 kg overhead crane to the platform end of the primary boom. Support the boom. Do not apply any lifting pressure.

4 Support both ends of the primary boom lift cylinder with a second overhead crane or similar lifting device.

Boom Components

5 Place blocks under the primary boom lift cylinder linkage arms for support.

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

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

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

8 Use a soft metal drift to remove the pin.

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

⚠CAUTION Crushing hazard. The lift cylinder will fall if not properly supported when the pivot pin is removed.

⚠WARNING Crushing hazard. The primary boom lift cylinder linkage arms may fall if not properly supported when the pivot pin is removed.

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

10 Use a soft metal drift to remove the barrel-end pivot pin. Remove the primary boom lift cylinder from the machine.

⚠WARNING Crushing hazard. The lift cylinder will become unbalanced and fall if not properly supported when the pin is removed.

4-4 Primary Boom Extension Cylinder

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

How to Remove the Primary Boom Extension Cylinder

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

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

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

1 Raise the primary boom to a horizontal position.

2 Extend the primary boom until the primary boom extension cylinder rod-end pivot pin is accessible.

Boom Components

3 Remove the access cover from the pivot end of the primary boom.

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

5 Tag, disconnect and plug the primary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

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

6 Working at the platform end of the boom, remove the external snap rings from the extension cylinder rod-end pivot pin.

7 Use a soft metal drift to remove the pin.

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

8 Remove the barrel-end pivot pin retaining fasteners.

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

10 Working at the pivot end of the boom, support and slide the extension cylinder out of the boom extension.

⚠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 primary boom angle sensor (PBAS) when removing the cylinder from the primary boom.

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

Note: Note the length of the cylinder after removal. For ease of installation, the cylinder must be at the same length for installation.

Boom Components

4-5
Primary Boom Angle Sensor

A properly functioning primary boom angle sensor (PBAS) is essential to safe machine operation. The primary boom angle sensor is used to limit the angle of the primary boom relative to ground. The ECM at the ground controls (TCON) monitors the position and angle of the primary boom using the signal from PBAS. The PBAS signal is used to control the ramping of the primary boom as well as velocity control, limiting the speed of the primary boom to 1.3 feet / 0.4 meters per second.

How to Replace the Primary Boom Angle Sensor

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

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

2 Locate the primary boom angle sensor inside the primary boom at the boom pivot pin.

3 Tag and disconnect the electrical connector from the sensor.

4 Remove the angle sensor mounting bracket retaining fasteners.

5 Remove the wing nut from the threaded rod. Do not disconnect the threaded rod from the clevis yoke.

6 Remove the angle sensor and bracket assembly.

7 Remove the sensor retaining fasteners from the sensor bracket. Remove the angle sensor.

8 Install the new angle sensor onto the mounting bracket.

9 Install the angle sensor and bracket assembly.

Note: The sensor should be installed rotated in a fully counter clock-wise position.

10 Insert the threaded rod through the threaded rod adjustment bracket.

11 Move the threaded rod to the top of the slotted hole. Tighten the wing nut and hex nut towards each other.

12 Connect the electrical connector to the angle sensor.

13 Calibrate the primary boom angle sensor. Refer to Repair Procedure, *How to Calibrate the Primary Boom Angle Sensor*.

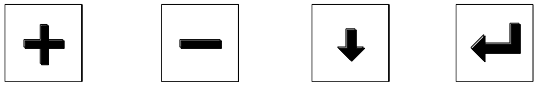
⚠ DANGER Tip-over hazard. Failure to calibrate the primary boom sensor could result in the machine tipping over resulting in death or serious injury.

How to Calibrate the Primary Boom Angle Sensor

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

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

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



Plus Minus Previous Enter

1 Pull out the red Emergency Stop button at the platform controls. From the ground control box, turn the key switch to ground control and pull out the red Emergency Stop button while holding the **enter** button (3 or 4 seconds) until the engine symbol appears on the display at the ground control box, then release.

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

3 Press the **previous** button until reset primary boom angle sensor is shown on the display.

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

5 Press the **previous** button until EXIT is shown on the display. Press the **plus** button to select YES, then press and hold the **enter** button to accept.

⊙ Result: The alarm should sound.

⊠ Result: The alarm does not sound. Repeat this procedure beginning with step 1.

6 Loosen the Primary Boom Angle Sensor (PBAS) assembly bracket fasteners attached to the primary boom. Loosen the wing nut and hex nut on the threaded rod to allow the threaded rod to move upward. Tighten the fasteners.

7 Set a digital level on top of the primary boom mast on a level part of the tube so it is viewable from the ground controls.

8 Start the engine.

9 Raise the boom until the digital level displays 70°.

10 Loosen the wing nut from threaded rod and move the threaded rod down until the engine turns off.

11 Screw threaded rod into clevis yoke. Tighten the wing nut to welded bracket. Tighten the jam nut to welded bracket. Tighten the PBAS fasteners to boom.

⊙ Result: The ground control box display should read P9B & P11 fault.

12 Push in the red Emergency Stop button to the off position. Wait until display turns off before proceeding.

13 Pull out the red Emergency Stop button while holding the **enter** button (3 or 4 seconds) until the engine symbol appears on the display at the ground control box, then release.

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

15 Press the **previous** button until PRIMARY BOOM ANGLE = 70° is shown on the display.

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

Boom Components

17 Press the **previous** button until EXIT is shown on the display. Press the **plus** button to select yes, then press the **enter** button to accept.

18 At the ground controls, use auxiliary power and lower the boom until the faults are no longer shown on the display.

⊙ Result: The flashing arrow in the display at the ground controls will turn off.

⊠ Result: The flashing arrow in the display at the ground controls does not turn off. Repeat this procedure beginning with step 1.

19 Start the engine and activate the primary boom down function. Release the function enable button when the digital level displays 40°. Push in the red Emergency Stop button to the off position.

20 Pull out the red Emergency Stop button while holding the **enter** button (3 or 4 seconds) until the engine symbol appears on the display at the ground control box, then release.

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

22 Press the **previous** button until PRIMARY BOOM ANGLE = 40° is shown on the display.

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

⊙ Result: The alarm should not sound.

⊠ Result: The alarm does sound. Repeat this procedure beginning with step 1.

24 Press the **previous** button until EXIT is shown on the display. Press the **plus** button to select yes, then press the **enter** button to accept.

25 Start the engine.

26 Activate the boom up function until the digital level reads 65°.

⊙ Result: The primary boom should stop.

⊠ Result: The primary boom does not stop. Immediately release the function enable button and lower the boom. Repeat this procedure beginning with step 1.

⚠ DANGER Tip-over hazard. If the boom does not stop at 65°, immediately release the function enable button and lower the primary boom. Failure to lower the boom could cause the machine to tip over resulting in death or serious injury.

4-6
Secondary Boom Cable Track

The secondary boom cable track guides the cables and hoses running up through the inside of the secondary boom. It can be repaired link by link without removing the cables and hoses that run through it. Removal of the secondary boom cable track is required to repair it.

How to Remove the Secondary Boom Cable Track

Note: The secondary boom cable track must be removed with the secondary boom extension cylinder. Refer to Repair Procedure, *How to Remove the Secondary Boom Extension Cylinder.*

How to Repair the Secondary Boom Cable Track

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

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

1 Remove the secondary boom extension cylinder.

Note: The secondary boom extension cylinder must be removed a*s a*n assembly with the cable tracks, cable track trays and cable track support tubes from the platform end of the secondary boom. Refer to Repair Procedure, *How to Remove the Secondary Boom Extension Cylinder.*

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

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

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

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

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

Note: If the section of cable track being replaced has clamps or wear pads, those items will need to be transferred to the replacement section of cable track.

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

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

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

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

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

10 Re-assemble and install the extension cylinder assembly into the secondary extension boom.

11 Operate the secondary boom up/extend and down/retract functions through a full cycle to ensure smooth operation of the new section of cable track.

Boom Components

4-7
Secondary Boom

How to Disassemble the Secondary Boom

Note: Complete disassembly of the secondary boom is only necessary if the outer or inner secondary boom tube must be replaced. The secondary extension boom tube can be removed with the secondary boom tube on the machine.

Note: The extension cylinder can be removed without completely disassembling the boom. Refer to Repair Procedure, *How to Remove the Secondary 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 machine on a firm, level surface and in the stowed position with the axles extended.

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

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

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

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

3 Attach a lifting strap from an overhead crane to the lug on the barrel end of the primary boom lift cylinder. Use the overhead crane to raise the primary boom lift cylinder to a vertical position.

4 Remove the pin retaining fastener from the primary boom rod end pivot pin.

5 Use a slide hammer to remove the pin. Remove the primary boom lift cylinder and linkage arms from the machine.

⚠WARNING Crushing hazard. The primary boom lift cylinder and linkage arms could become unbalanced and fall if not properly supported when the pin is removed.

6 At the platform end, remove the secondary boom access cover.

7 Tag, disconnect and plug the hydraulic hoses from the turntable. Cap the fittings.

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

8 Tag and disconnect the electrical cables from the turntable.

9 Remove the hose protector bracket.

10 Working at the platform end, place blocks under the barrel end of the secondary boom extension cylinder for support.

11 Remove the barrel-end retaining fasteners.

12 Using a suitable lifting device, lift the extension cylinder to clear the saddle blocks

13 Attach a lifting strap from an overhead crane to the secondary extension boom assembly.

14 Slide the secondary extension boom assembly out of the secondary boom tube approximately two feet and remove the wear pads from the secondary boom tube.

15 Support and slide the extension boom assembly out of the secondary boom tube and place it on a structure capable of supporting it.

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

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

16 To remove the secondary boom extension cylinder, Refer to Repair Procedure, *How to Remove the Secondary Boom Extension Cylinder.*

4-8 Secondary Boom Lift Cylinder

How to Remove the Secondary Boom Lift Cylinder

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

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

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

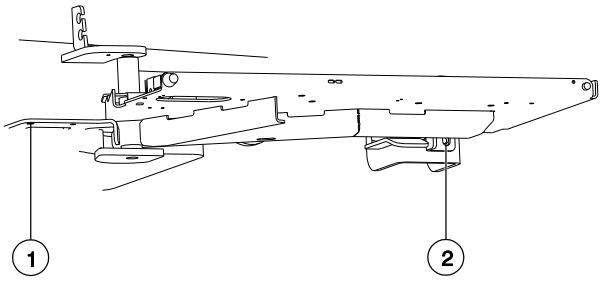
1 Tag, disconnect, secure and remove the battery cables connecting the batteries. Remove battery fasteners and hooks from battery tray. Remove the batteries and store them in a safe and secure location away from the machine.

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

2 Remove the retaining fasteners securing the upper and lower turntable covers from the turntable at the platform end. Remove the covers.

Boom Components

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



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

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

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

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

6 Remove the fuel tank filler cap.

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

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

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

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

8 Tag and disconnect the wire harness from the fuel level sending unit.

9 Tag, disconnect and plug the fuel hoses from the fuel tank.

10 Clean up any fuel that may have spilled.

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

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

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

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

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

13 Place blocks under each end of the secondary boom lift cylinder for support.

14 Remove the pin retaining fasteners from the secondary boom lift cylinder rod-end pivot pin.

15 Use a soft metal drift to remove the pin.

16 Remove the pin retaining fastener from the secondary boom lift cylinder barrel-end pivot pin.

17 Use a soft metal drift to remove the pin.

18 Remove the secondary boom lift cylinder from the machine by pulling it through the platform end of the secondary boom.

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

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

NOTICE Component damage hazard. Cables and hoses can be damaged if the cylinder is dragged across them.

4-9 Secondary Boom Extension Cylinder

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

How to Remove the Secondary 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: The secondary boom extension cylinder must be removed as an assembly with the cable tracks, cable track trays and cable track support tubes from the platform end of the secondary boom.

1 Raise the primary boom to a horizontal position.

2 Remove the access cover from the counterweight end of the secondary boom.

Boom Components

3 Remove the fasteners securing the cable track trays and cable track clamps to the secondary extension boom.

4 Remove the external snap rings from the extension cylinder rod-end pivot pin.

5 Use a soft metal drift to remove the pin.

6 Remove the access cover from the platform end of the secondary boom.

7 Working at the platform end, place blocks under the barrel end of the secondary boom extension cylinder for support.

8 Remove the barrel-end retaining fasteners.

9 Using a suitable lifting device, lift the extension cylinder to clear the saddle blocks.

10 Support and slide the extension cylinder out of the boom extension and place it on a structure capable of supporting it.

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

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

NOTICE Component damage hazard. Cables and hoses can be damaged if the cylinder is dragged across them.

11 Tag, disconnect and plug the secondary 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.

12 Remove the cable track fasteners and cable track support tubes from the extension cylinder.

NOTICE Component damage hazard. Be careful not to damage the secondary boom retract limit switch when installing the cylinder assembly into the secondary boom. Secure the roller arm to the switch body during assembly.

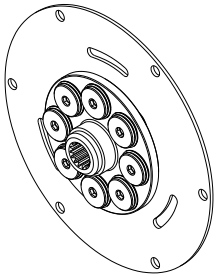
5-1
RPM Adjustment

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.

Engines

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 TCD 2.2 L3, TD 2.9 L4 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.

Perkins 804D models:

1 Tag and disconnect the wiring from the bell housing.

2 Remove the exhaust pipe clamp 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 mounting bracket fasteners. Remove the muffler and bracket assembly from the engine.

4 Remove the hose clamps from the air cleaner elbow and the engine intake manifold.

5 Remove the air cleaner mounting bracket fasteners. Remove the air cleaner and bracket assembly from the engine.

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

7 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.

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

Perkins 404F-22T 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.

Continental 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.

Engines

How to Install the Flex Plate

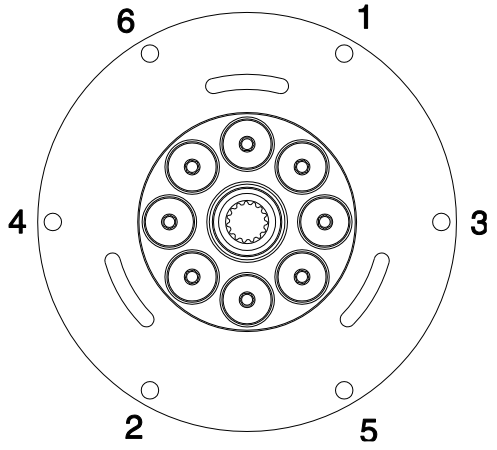
1 Install the flex plate onto the engine flywheel with the raised spline towards the pump. Apply Loctite® removable thread sealant to the mounting screws.

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

Continental models: Torque the flex plate mounting bolts in sequence to 20.8 ft-lbs / 28 Nm.

Deutz models: 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.

Perkins models: 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 and Continental Flex Plate

2 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.

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

4 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.

5 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.

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

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 labeled "C" in sequence to 28 ft-lbs / 38 Nm. Then torque the bell housing mounting bolts labeled "C" in sequence to 40 ft-lbs / 54 Nm.

Perkins 804D models: Torque the bell housing mounting bolts in sequence to 28 ft-lbs / 38 Nm and then to 49 ft-lbs / 66 Nm.

Perkins 404F 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.

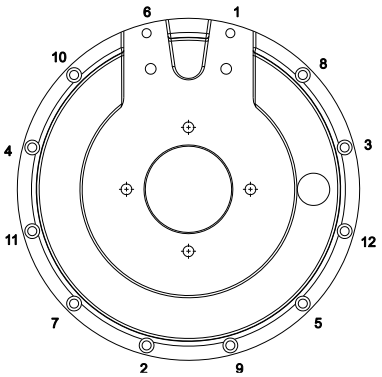
Continental model: Torque the pump mounting plate fasteners in sequence to 23 ft-lbs / 31.2 Nm.

NOTICE

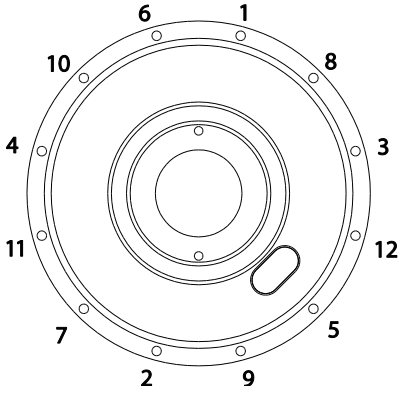
Component damage hazard. When installing the pump, do not force the pump coupler into the flexplate or damage to the pump shaft seal may occur.

NOTICE

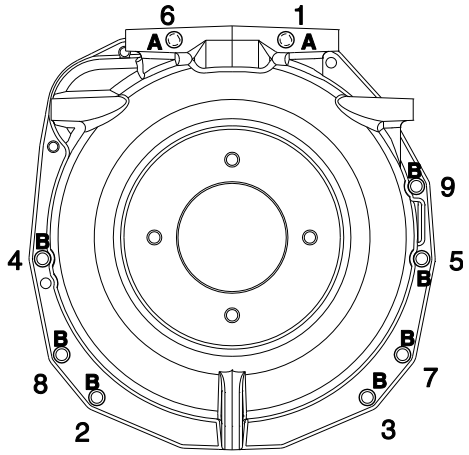
Component damage hazard. Do not force the drive pump during installation or the flex plate teeth may become damaged.



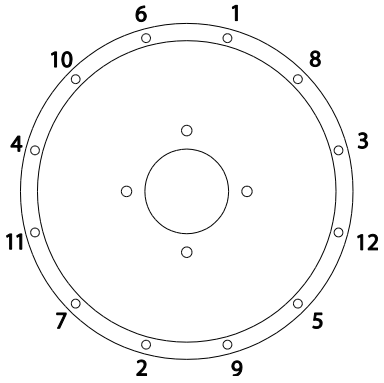
Deutz Pump Mounting Plate



Perkins 804D Pump Mounting Plate



Perkins 404F-22T Pump Mounting Plate



Continental Pump Mounting Plate

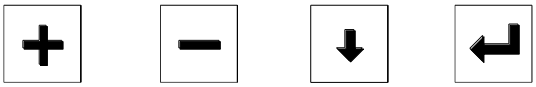
Engines

5-3
How to Access Perkins 404F Engine Regeneration Service

Machines equipped with Perkins 404F-22T Diesel engines will have a regeneration mode that should run automatically when soot levels in the Diesel Particulate Filter (DPF) reach specified levels.

How to Check the DPF Soot Percentage

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



Plus Minus Previous Enter

1 Turn the key switch to the on position.

2 Press the **plus** button and the **minus** button at the same time to access the Operator Status menu.

3 Press the **enter** button twice to display DPF SOOT PCT (0-150%).

How to Force or Inhibit DPF Regeneration

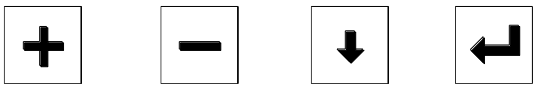
There are three modes available for DPF regeneration.

The default, AUTOMATIC MODE, allows for ECU controlled regeneration. The machine powers up in this mode.

INHIBIT DPF REGENERATION will disable regeneration. In this mode the exhaust temperatures will not raise due to regeneration. The mode will remain active until an ignition key cycle (power cycle) or FORCE DPF REGENERATION is selected. This mode will be indicaed by an LCD message while active.

FORCE DPF REGENERATION allow the operator to force active regeneration of the DPF. When Force mode is active the engine will enter regeneration once the engine reaches specific levels of DPF soot loading, exhaust temperature, and other constraints defined by the engine manufacturer. This mode will be indicated by an LCD message while active.

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



Plus Minus Previous Enter

1 Turn the key switch to the on position.

2 Press the **plus** button and the **minus** button at the same time to access the Operator Status menu.

3 Press the **enter** button until FORCE DPF REGENERATION or INHIBIT DPF REGENERATION is displayed.

4 Press the **plus** button or the **minus** button to select YES to change the regeneration mode from the default automatic mode. The selection will automatically return to NO. The LCD will display the current mode while it is Inhibited or Forced.

Note: The LCD messages REGEN FORCED and WARNING HIGH EXHAUST SYSTEM TEMP will be displayed while a regeneration mode is running. No service is required.

Note: The LCD message REGEN INHIBITED is displayed while in the Inhibit Regeneration mode is active. To exit this mode, push in the Red emergency stop button. Restart the engine.

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

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

Passive regeneration:

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

Standstill regeneration:

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

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

Service regeneration:

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

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

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

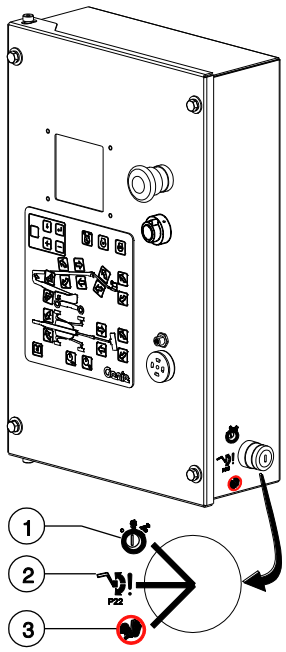
Ground Controls

6-1 Bypass/Recovery Key Switch

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

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

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



1 Run
2 Bypass
3 Recovery

How to Use the Bypass Mode

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

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

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

1 Turn the engine off.

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

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

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

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

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

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

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

Note: If the Bypass function has been used, there may be faults with the machine. Check the LCD screen on the ground control box for machine faults, then contact trained service personnel.

Ground Controls

How to Use the Recovery Mode

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

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

⚠WARNING Bodily injury hazard. Platform leveling is not active when using recovery mode. The platform could reach high out-of-level conditions when using this mode. The operator will need to secure themself to the platform to prevent falling injury.

The Recovery mode allows the platform to be lowered in the event the operator in the platform is unable to lower the platform using the platform controls, system failure or emergency situations. The recovery sequence will automatically retract the primary boom, lower the primary boom and then retract the secondary boom using the auxiliary power unit to allow the operator at the platform controls to exit the platform.

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

Note: If this procedure is performed with the main key switch in the off position an active latched safety fault will be set and will have to be cleared.

2 Turn and hold the bypass/recovery key switch to the recovery position. The switch must be held in the recovery position.

⊙ Result: The auxiliary power unit will turn on and the boom will begin the following recovery sequence.

- The primary boom will retract.
- The primary boom will lower.
- The secondary boom will retract.

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

Note: If any boom safety limit switches are faulty, the boom will only retract and not lower and the operator will need to be recovered from that point.

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

6-2
Circuit Boards

The ground control box (TCON) is the communication and operations center for the machine. The ground control box contains two key switches. The key switch towards the top of the control box is for selection of ground or platform controls. The key switch at the bottom of the control box is the Service Bypass key switch. It is used to correct an out-of-level platform. If the machine trips an envelope safety switch, the operator at the ground controls can turn and hold the Service Bypass key switch in the recover position, which will automatically retract the boom and lower the platform to the ground.

The ground control box contains a replaceable membrane decal with touch sensitive buttons for various machine functions. The ground control box also contains two printed circuit boards:

The **LCD (Liquid Crystal Display)** circuit board is mounted to the inside of the control box lid which controls the LCD display screen or CAN Gateway if equipped with a Tier IV engine.

The **TCON circuit board** is the main circuit board for the machine. There are relays on the ECM circuit board that can be replaced. All operating parameters and configuration of options for the machine are stored in the ECM memory.

Note: The ECM circuit board inside the ground control box (TCON) cannot be replaced by itself. If the ECM circuit board is faulty and needs to be replaced, contact the Genie Industries Service Department.

Note: When an ECM circuit board is replaced, the proportional valves will need to be calibrated. *Refer to Repair Procedure*, How to Calibrate a Joystick.

How to Determine the Revision Level

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

⊙ Result: The revision level of the TCON will appear in the LCD display window.

How to Remove the LCD Display Screen Circuit Board

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

2 Remove the ground control box lid fasteners.

3 Open the ground control box.

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

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

4 Carefully disconnect the LCD circuit board ribbon cable from the ECM circuit board.

5 Remove the LCD display circuit board retaining fasteners.

6 Carefully remove the LCD display circuit board from the ground control box lid.

Ground Controls

6-3
Membrane Decal

The membrane decal is a special decal that consists of a decal with an electronic membrane on the backside. The membrane contains touch sensitive areas that, when pushed, activate the machine functions. The membrane contains touch sensitive areas that activate the machine functions.

How to Replace the Membrane Decal

1 Turn the key switch to the off position and push in the red Emergency Stop button to the off position at both the ground and platform controls.

2 Remove the ground control box lid fasteners.

3 Open the ground control box.

4 Carefully disconnect the two ribbon cables from the membrane decal at the ECM circuit board.

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

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

5 Carefully remove the membrane decal from the control box lid while guiding the ribbon cables out of the control box lid.

6 Remove any decal adhesive from the control box lid with a mild solvent.

Note: Do not allow any solvent to come in contact with the LCD display screen.

7 Install the new membrane decal while guiding the ribbon cables through the control box lid.

8 Connect the ribbon cables to the ECM circuit board.

9 Close the control box lid and install the retaining fasteners.

Display Module

This table lists the various screens and menu options of the operating software. Some display menus are for informational purpose only, while others can be used to change the machine operating parameters.

⚠WARNING Tip-over hazard. Calibration and parameter settings must be completed by a person trained and qualified on the repair of this machine. Failure to properly calibrate or set parameters could cause the machine to tip over resulting in death or serious injury.

Note: The key switch must be in the off position before entering the programming mode.

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

Plus Minus Previous Enter

Activation of the **enter** or **previous** buttons scrolls through the screens. To change parameter values or select a setting, use the **plus** button (to increase or scroll forward) and the **minus** button (to decrease or scroll backwards). Then press the **enter** button to save the new value to memory. An audible beep will indicate a save to memory. Use the **enter** and **previous** buttons to scroll to the EXIT menu. Use the **plus** button to change to YES and use the **enter** button to exit.

Screen or Menu	Procedure	Description	Range or Selection
Operator	Default	Hourmeter (on power up)	
		Engine speed	
		Engine oil pressure PSI (English)	
		Engine oil pressure kPa (metric)	
		Engine temperature °F (Engiish)	engine temp will not display until temp is >100°F
		Engine temperature °C (metric)	engine temp will not display until temp is >38°C
		Primary boom angle to gravity	
		Turntable level sensor X° direction	
		Turntable level sensor Y° direction	
		Platform level sensor degree	
		Battery volts	

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Machine Status	With key switch on, press the **(plus)(minus)** buttons at the same time.	Hydraulic pressure PSI (English)	0-4500 PSI
		Hydraulic pressure kPa (metric)	0-31000 kPa
		DPF Soot	0-150%
		Force/Inhibit DPF Regeneration	(No/Yes)
		Primary Boom Zone	<=0 DEG, >0 DEG, =65 DEG
		Primary Boom Length	= 0', >0', >22'
		Secondary Boom Length	= 0 FT, > 0 FT
		Secondary Boom Angle	= 0 DEG, >0 DEG, = 65 DEG
Unit of Measure and Language	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(minus)(minus)(plus)**.	Metric/English (measurement units)	Use **plus**/**minus** buttons to change
		Display Language	English, German, French, Spanish, Portuguese, Italian, Dutch, and Swedish.
Default Reset	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(minus)(minus)(previous)(previous)**	Delete drive functions	
		Delete boom function speed	
		Delete lift function ramps	
		Delete all (Contact Genie Product Support before using this option)	
		Delete Faults	Delete faults will reset active latching faults. Delete faults will not clear fault history.

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Drive Functions	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(plus)(enter)(enter)**.	Forward not stowed drive speed %	120% (default) 50% (min)
		Forward low drive speed %	120% (default) 50% (min)
		Forward high drive speed %	120% (max) 100% (default) 50% (min)
		Reverse not stowed drive speed %	120% (max) 100% (default) 50% (min)
	Forward extended drive speed %	Reverse low drive speed %	120% (max) 100% (default) 50% (min)
	Reverse extended drive speed %	Reverse high drive speed %	120% (max) 100% (default) 50% (min)
		Drive acceleration %	125% (max) 100% (default) 25% (min)
		Drive deceleration %	125% (max) 100% (default) 25% (min)
		Speed limit on steer angle	100% (max) 75% (default) 0% (min)

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Boom Function Speeds	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(plus)(minus)(minus)**	Primary boom up speed stowed Primary boom up speed not stowed Primary boom down speed stowed Primary boom down speed not stowed Primary boom extend speed Primary boom retract speed Secondary boom up speed stowed Secondary boom up speed not stowed Secondary boom down speed stowed Secondary boom down speed not stowed Secondary boom extend speed Secondary boom retract speed Turntable rotate speed retracted Turntable rotate speed not retracted	120% max, 50% min, 100% (default)
		Jib boom up speed Jib boom down speed	120% max, 75% min, 100% (default)

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Lift Functions Ramps	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(plus)(previous)(previous)**.	Primary boom up/down ramp acceleration % Primary boom up/down ramp deceleration % Primary boom extend/retract ramp acceleration % Primary boom extend/retract ramp deceleration % Secondary boom up/down ramp acceleration % Secondary boom up/down ramp deceleration % Turntable rotate ramp acceleration % Turntable rotate ramp deceleration % Jib boom up/down ramp acceleration % Jib boom up/down ramp deceleration %	150% max and 50% min 100% (default), 5% increment

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Valve Calibration	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(minus)(minus)(enter)(enter)**.	Reset drive valve defaults Reset primary boom up/down valve defaults Reset primary boom ext/ret defaults Reset secondary boom valve defaults Reset turntable rotate valve defaults Allow primary boom up/down speed calibration Allow primary boom extend/retract speed calibration Allow secondary boom up/down speed calibration Allow turntable rotate speed calibration Reset Drive joystick defaults Reset primary boom up/down joystick defaults Reset primary boom extend/retract joystick defaults Reset secondary boom joystick defaults Reset turntable rotate joystick defaults Reset steer joystick defaults	YES/NO

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Sensor Calibration	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(plus)(enter)(enter)(plus)**.	Set unit levels to gravity Unit Level Y-axis millivolts per degree Unit Level X-axis millivolts per degree Set platform level to gravity Platform level sensor millivolts/degree Reset blue end blue side steer sensor Reset yellow end blue side steer sensor Reset blue end yellow side steer sensor Reset yellow end yellow side steer sensor Reset all steer sensors Reset primary boom angle sensor Primary boom angle = 40deg Primary boom angle = 70deg	YES/NO

Display Module

Screen or Menu	Procedure	Description	Range or Selection
Options	With key switch OFF, press and hold the **enter** button and turn key switch to on position. Release the **enter** button and press **(minus)(minus)(plus)(plus)**.	Boom Length Limit: No Limit (NO LT), Secondary Extend disabled (EXT LT), Secondary Function disabled (SEC LT)	
		AC Generator (NONE/BELT/HILO/HYDRL/GHG10)	
		Alarm No (NO AL)/Motion (MO AL)	
		Travel (TR AL)/ Descent (DE AL)/ Travel and Descent (TD AL)	
		Lift/Drive No (NO CO)/ Drive cut out while not stowed (DCONS)/ Lifting or driving (LORDR)	
		Aux Drive OPT: (YES/NO)	
		Proximity Kill Switch (NONE/PROX)	
		Platform Overload (NONE PLFTS)	
		Work Lights (YES/NO)	
		Flashing Beacon (YES/NO)	
		Drive Lights (YES/NO)	
		Disable Steer Mode Change while Driving (YES/NO)	
		Rocker Joystick Steering (YES/NO)	
		Chassis Tilt Cutout (YES/NO)	
		Foot Switch Lockout (0-30 minutes)	30.0 max and 0.0 min, 10.0 (default) Holding +/- button will cause display to scroll through options or increment number settings automatically at 0.2 min increase/decrease

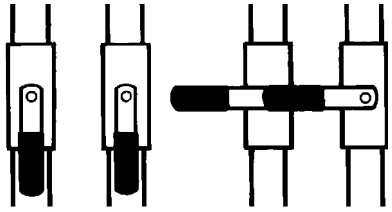
7-1 Function Pump

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 **Models without hydraulic tank shutoff valves:** Remove the drain plug from the hydraulic tank and completely drain the tank into a container of suitable capacity. Refer to Specifications, *Machine Specifications*.

Models with hydraulic tank shutoff valves: Locate the two hydraulic tank valves at the hydraulic tank through the access hole underneath the turntable. 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.

2 Tag, disconnect and plug the hydraulic hoses at the function pump. Cap the fittings on the pump.

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

3 Remove the function 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.

Hydraulic Pumps

7-2 Drive Pump

The drive pump is a bi-directional variable displacement piston pump. The pump output is controlled by the electronic displacement controller (EDC), located on the pump. The only adjustment that can be made to the pump is the neutral or null adjustment. Any internal service to the pump should be performed at an authorized Sauer-Danfoss service center. Contact Genie Product Support to locate your local authorized service center.

How to Remove the Drive Pump

NOTICE Component damage hazard. The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system and cause severe component damage. Dealer service is recommended.

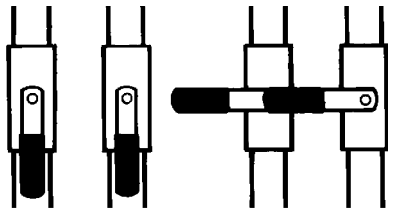
Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications.*

1 Disconnect the electrical connectors at the electrical proportional controller located on the drive pump.

2 **Models without hydraulic tank shutoff valves:** Remove the drain plug from the hydraulic tank and completely drain the tank into a container of suitable capacity. Refer to Specifications, *Machine Specifications*.

Models with hydraulic tank shutoff valves: Locate the two hydraulic tank valves at the hydraulic tank through the access hole underneath the turntable. 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

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 pump with a lifting device and remove the pump mounting fasteners.

5 Carefully pull the drive pump out until the pump coupler separates from the flex plate.

6 Remove the drive pump from the machine.

NOTICE Component damage hazard. Be sure to open the two hydraulic tank valves and prime the pump after installing the pump.

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 **Continental 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 **Continental 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.

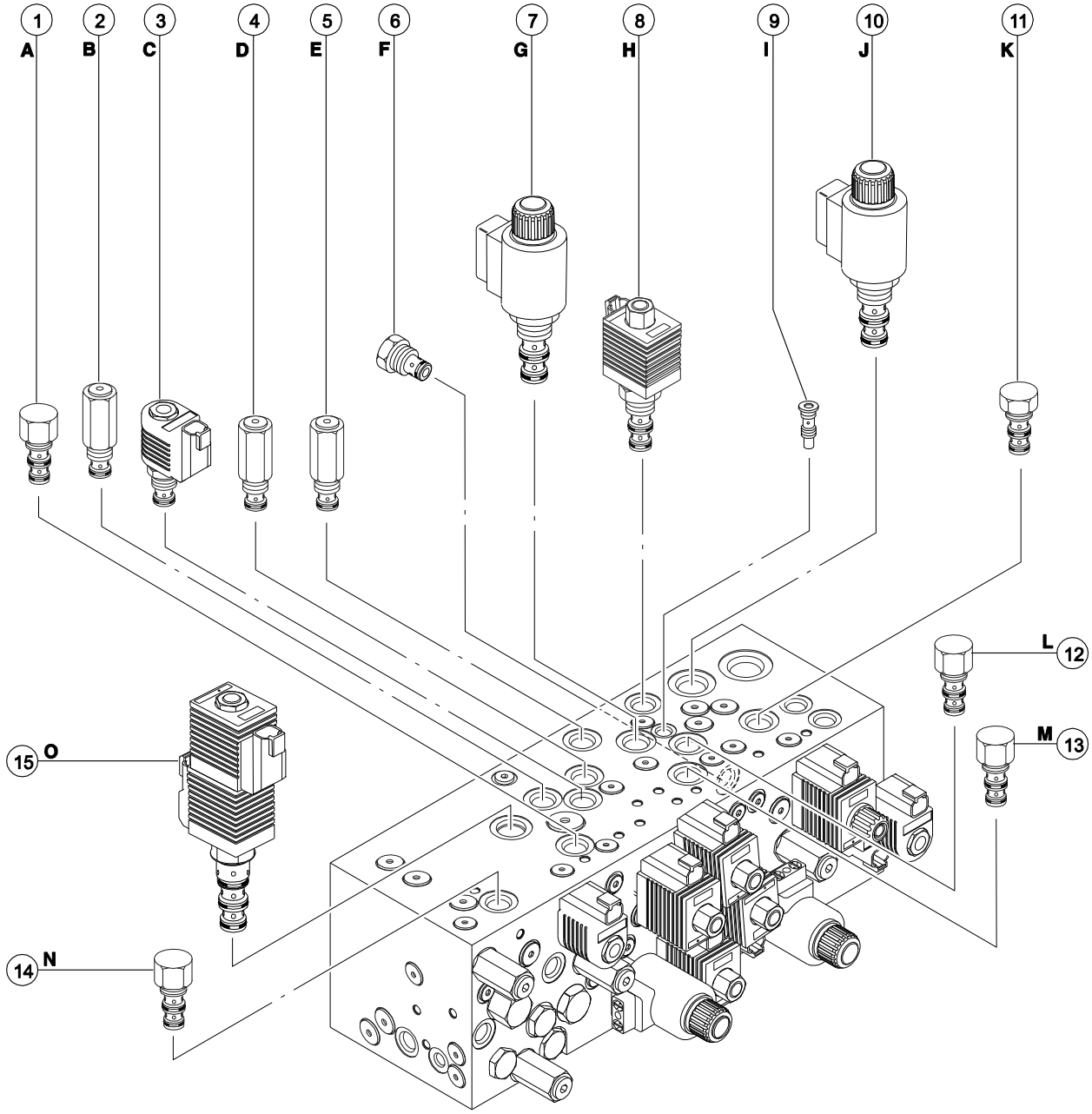
Manifolds

8-1
Function Manifold Components - View 1

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

Index No.	Description	Schematic Item	Function	Torque
1	Differential sensing valve	A	Secondary boom up/extend and down/retract	30-35 ft-lbs / 41-47 Nm
2	Relief valve, 2500 psi / 172 bar	B	Secondary boom up	20-25 ft-lbs / 27-34 Nm
3	Solenoid valve, 2 position 2 way	C	Secondary boom up circuit	20-25 ft-lbs / 27-34 Nm
4	Relief valve, 2500 psi / 172 bar	D	Secondary boom down	20-25 ft-lbs / 27-34 Nm
5	Relief valve, 1300 psi / 89.6 bar	E	Primary boom down	20-25 ft-lbs / 27-34 Nm
6	Flow regulator valve, 0.1 gpm / 0.38 L/min	F	Bleeds off check valves indifferential sensing circuits to tank	20-25 ft-lbs / 27-34 Nm
7	Proportional solenoid valve	G	Primary boom up/down	30-35 ft-lbs / 41-47 Nm
8	Solenoid Valve, 2 position 3 way	H	Primary boom retract	33-37 ft-lbs / 45-50 Nm
9	Check valve	I	Differential sensing circuit,primary boom extend/retract	8-10 ft-lbs / 11-14 Nm
10	Solenoid Valve, 2 position 3 way	J	Primary boom extend	50-55 ft-lbs / 68-75 Nm
11	Differential sensing valve	K	Turntable rotate left/right	30-35 ft-lbs / 41-47 Nm
12	Differential sensing valve	L	Primary boom extend/retract	30-35 ft-lbs / 41-47 Nm
13	Differential sensing valve	M	Primary boom up/down	30-35 ft-lbs / 41-47 Nm
14	Priority flow regulator, 3 gpm / 11.4 L/min	N	Controls flow to the oscillateand platform manifolds	30-35 ft-lbs / 41-47 Nm
15	Solenoid valve, 3 position 4 way	O	Secondary boom extend/retract	33-37 ft-lbs / 45-50 Nm

Manifolds



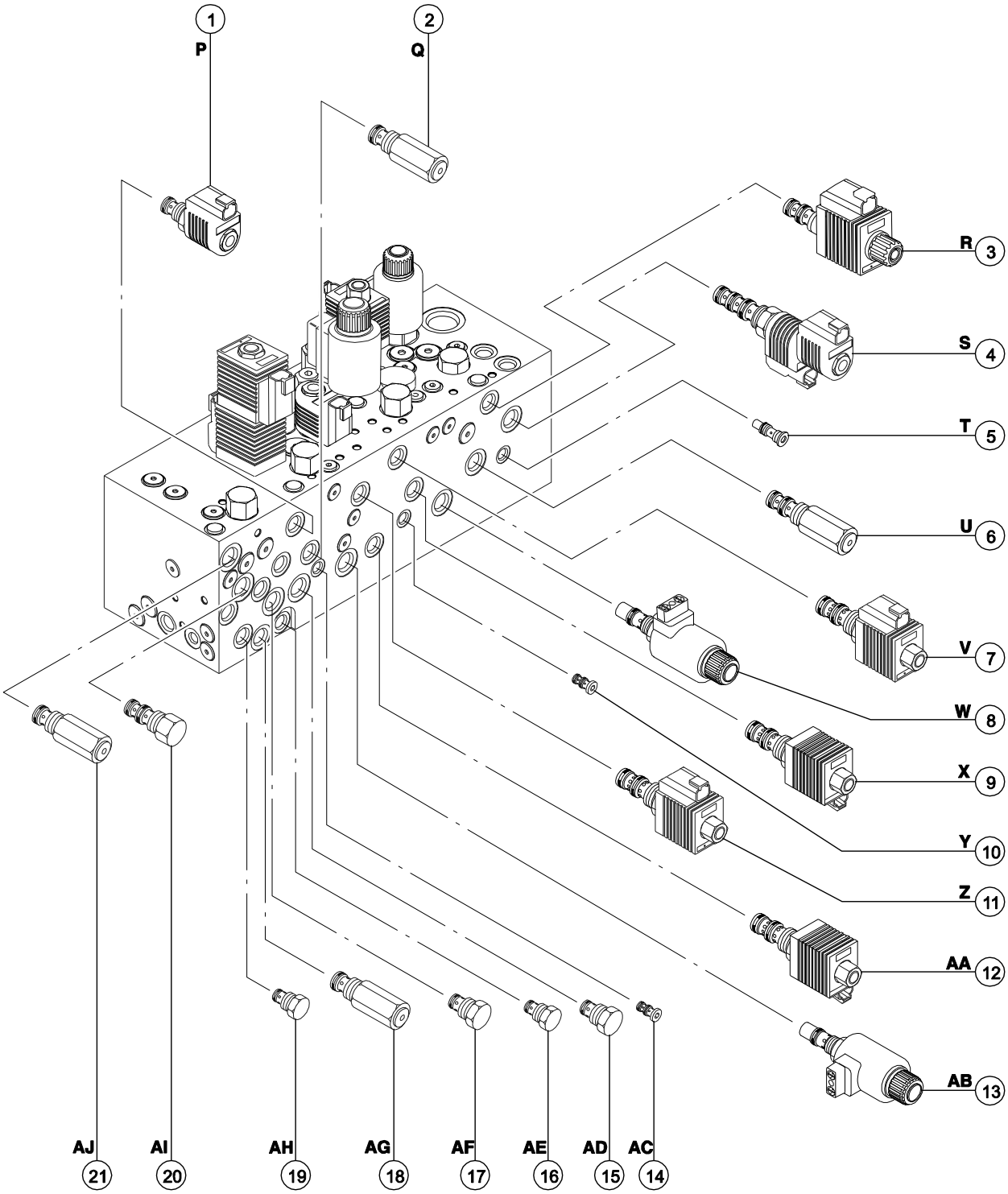
Manifolds

8-2
Function Manifold Components - View 2

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

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 2 position 2 way	P	Secondary boom extend circuit	20-25 ft-lbs / 27-34 Nm
2	Relief valve, 2600 psi / 179 bar	Q	Secondary boom extend	20-25 ft-lbs / 27-34 Nm
3	Proportional solenoid valve	R	Turntable rotate left/right	20-25 ft-lbs / 27-34 Nm
4	Solenoid valve, 3 position 4 way	S	Turntable rotate left/right	26-30 ft-lbs / 35-41 Nm
5	Check valve	T	Differential sensing circuit, turntable rotate	8-10 ft-lbs / 11-14 Nm
6	Relief valve, 1300 psi / 89.6 bar	U	Primary boom extend	30-35 ft-lbs / 41-47 Nm
7	Solenoid Valve, 2 position 3 way	V	Primary boom up	33-37 ft-lbs / 45-50 Nm
8	Proportional solenoid valve	W	Primary boom extend/retract	30-35 ft-lbs / 41-47 Nm
9	Solenoid Valve, 2 position 3 way	X	Primary boom down	33-37 ft-lbs / 45-50 Nm
10	Check valve	Y	Differential sensing circuit,primary boom up/down	8-10 ft-lbs / 11-14 Nm
11	Solenoid Valve, 2 position 3 way	Z	Secondary boom up	33-37 ft-lbs / 45-50 Nm
12	Solenoid Valve, 2 position 3 way	AA	Secondary boom down	33-37 ft-lbs / 45-50 Nm
13	Proportional solenoid valve	AB	Secondary boom extend/retract	30-35 ft-lbs / 41-47 Nm
14	Check valve	AC	Differential sensing circuit,secondary boom extend/retract	8-10 ft-lbs / 11-14 Nm
15	Check valve, 5 psi / 0.34 bar	AD	Blocks flow from auxiliarypump #1 to function pump #1	30-35 ft-lbs / 41-47 Nm
16	Check valve, 5 psi / 0.34 bar	AE	Blocks flow from function pump #1to auxiliary pump #1	20-25 ft-lbs / 27-34 Nm
17	Check valve, 5 psi / 0.34 bar	AF	Blocks flow from auxiliarypump #2 to function pump #2	20-25 ft-lbs / 27-34 Nm
18	Relief valve, 3000 psi / 207 bar	AG	Oscillate and platform manifold system relief	20-25 ft-lbs / 27-34 Nm
19	Check valve, 5 psi / 0.34 bar	AH	Blocks flow from function pump #2to auxiliary pump #2	20-25 ft-lbs / 27-34 Nm
20	Differential sensing valve,150 psi / 10.3 bar	AI	Meters flow to functions	30-35 ft-lbs / 41-47 Nm
21	Relief valve, 3200 psi / 220.6 bar	AJ	Boom functions system relief	30-35 ft-lbs / 41-47 Nm

Manifolds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Manifolds

8-3
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.

1 Locate the boom retracted limit switch (LSP1RO) limit switch on the outside of the primary boom at the pivot end of the primary boom.

2 Tag and disconnect the wire harness from the limit switch, and install a wire jumper between pins 1 and 2 of the limit switch connector. Place another wire jumper between pins 3 and 4 of the limit switch connector.

3 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ptest port on the function manifold.

4 Start the engine from the ground controls.

5 Press and release the rpm select button until the engine changes to high idle.

6 Simultaneously push and hold the function enable/high speed button and the primary boom retract button with the primary boom fully retracted. Observe the reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

7 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.

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

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

9 Repeat steps 4 through 8 confirm the relief valve pressure.

10 Remove the pressure gauge.

11 Remove the wire jumpers from the limit switch connector.

12 Securely install the LSP1RO pig tail into the wire harness.

How to Adjust the Primary 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 primary boom down relief valve.

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ls port on the function manifold.

2 Start the engine from the ground controls.

3 Press and release the rpm select button until the engine changes to high idle.

4 Raise the primary boom approximately 5 feet / 1.5 m.

5 Place a 4 x 4 inch / 10 x 10 cm block on the primary boom rest pad. Lower the primary boom onto the block.

⚠WARNING Crushing hazard. Keep hands clear of the block when lowering the primary boom.

6 Simultaneously push and hold the function enable/high speed button and the primary boom down button. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

7 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.

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

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

9 Start the engine and repeat steps 6 through 8 to confirm the relief valve pressure.

10 Start the engine and raise the primary boom approximately 12 inches / 30 cm. Remove the block and lower the primary boom to the stowed position.

11 Turn the engine off and remove the pressure gauge.

Manifolds

How to Adjust the Primary Boom Extend Relief Valve

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ls port on the function manifold.

2 Start the engine from the ground controls.

3 Raise the primary boom to a horizontal position. Turn the engine off.

4 Locate the boom extended limit switch (LSP1EO) on the outside of the primary boom.

5 Remove the limit switch mounting bracket retaining fasteners.

6 Pull the limit switch and bracket assembly out of the boom tube and let it hang down.

7 Start the engine from the ground controls and press and release the rpm select button until the engine changes to high idle.

8 Simultaneously push and hold the function enable/high speed button and the primary boom extend button with the primary boom fully extended. Observe the reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

9 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.

10 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.

11 Repeat steps 7 through 8 to confirm relief valve pressure.

12 Start the engine and fully retract the primary boom. Turn the engine off.

13 Install the limit switch and bracket assembly to the primary boom.

14 Remove the pressure gauge.

How to Adjust the Secondary Boom Up Relief Valve

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

1 Remove the cover retaining fasteners from the secondary boom end cover. Remove the cover from the machine.

2 Locate the wire connector for secondary boom limit switch LSS2AO. Disconnect the connector.

Note: The secondary boom limit switch LSS2AO is the upper limit switch located on the inside of the riser plate at the engine side of the machine.

3 Install a jumper wire between pins 3 and 4 of the LSS2AO Deutsch connector on the wire harness end.

4 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ls port on the function manifold.

5 Start the engine from the ground controls.

6 Simultaneously push and hold the function enable/high speed button and the secondary boom up/extend button and fully raise the secondary boom.

7 Continue holding the function enable/high speed button and the secondary boom up/extend button while observing the reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

8 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.

9 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.

10 Repeat steps 5 through 7 to confirm relief valve pressure.

11 Remove the pressure gauge.

12 Remove the jumper wire from LSS2AO limit switch connector. Connect the limit switch to the wire harness.

13 Install the secondary boom end cover and tighten the retaining fasteners.

Manifolds

How to Adjust the Secondary Boom Down Relief Valve

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ls port on the function manifold.

2 Start the engine from the ground controls.

3 Press and release the rpm select button until the engine changes to high idle.

4 Raise the secondary boom approximately 12 inches / 30 cm.

5 Place a 4 x 4 inch / 10 x 10 cm block on the secondary boom rest pad. Lower the secondary boom onto the block.

⚠WARNING Crushing hazard. Keep hands clear of the block when lowering the primary boom.

6 Simultaneously push and hold the function enable/high speed button and the secondary boom down button. Observe the reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

7 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.

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

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

9 Start the engine and repeat step to confirm relief valve pressure.

10 Start the engine and raise the secondary boom approximately 12 inches / 30 cm. Remove the block and lower the secondary boom to the stowed position.

11 Turn the engine off and remove the pressure gauge.

How to Adjust the Secondary Boom Extend Relief Valve

Note: Perform this procedure with the secondary boom fully raised.

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ls port on the function manifold.

2 Start the engine from the ground controls.

3 Simultaneously push and hold the function enable/high speed button and the secondary boom up/extend button with the secondary boom fully raised and extended. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

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

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

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

6 Repeat steps 2 through 5 to confirm relief valve pressure.

7 Remove the pressure gauge.

How to Adjust the Platform Manifold Relief Valve

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

Note: Refer to Function Manifold Component list to locate the platform manifold relief valve.

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the ptest 2 port on the function manifold.

2 Start the engine from the ground controls.

3 Simultaneously push and hold the function enable/high speed button and the jib boom down button with the jib boom fully lowered. Observe the reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.

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

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

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

6 Repeat steps 2 through 3 to confirm relief valve pressure.

7 Remove the pressure gauge.

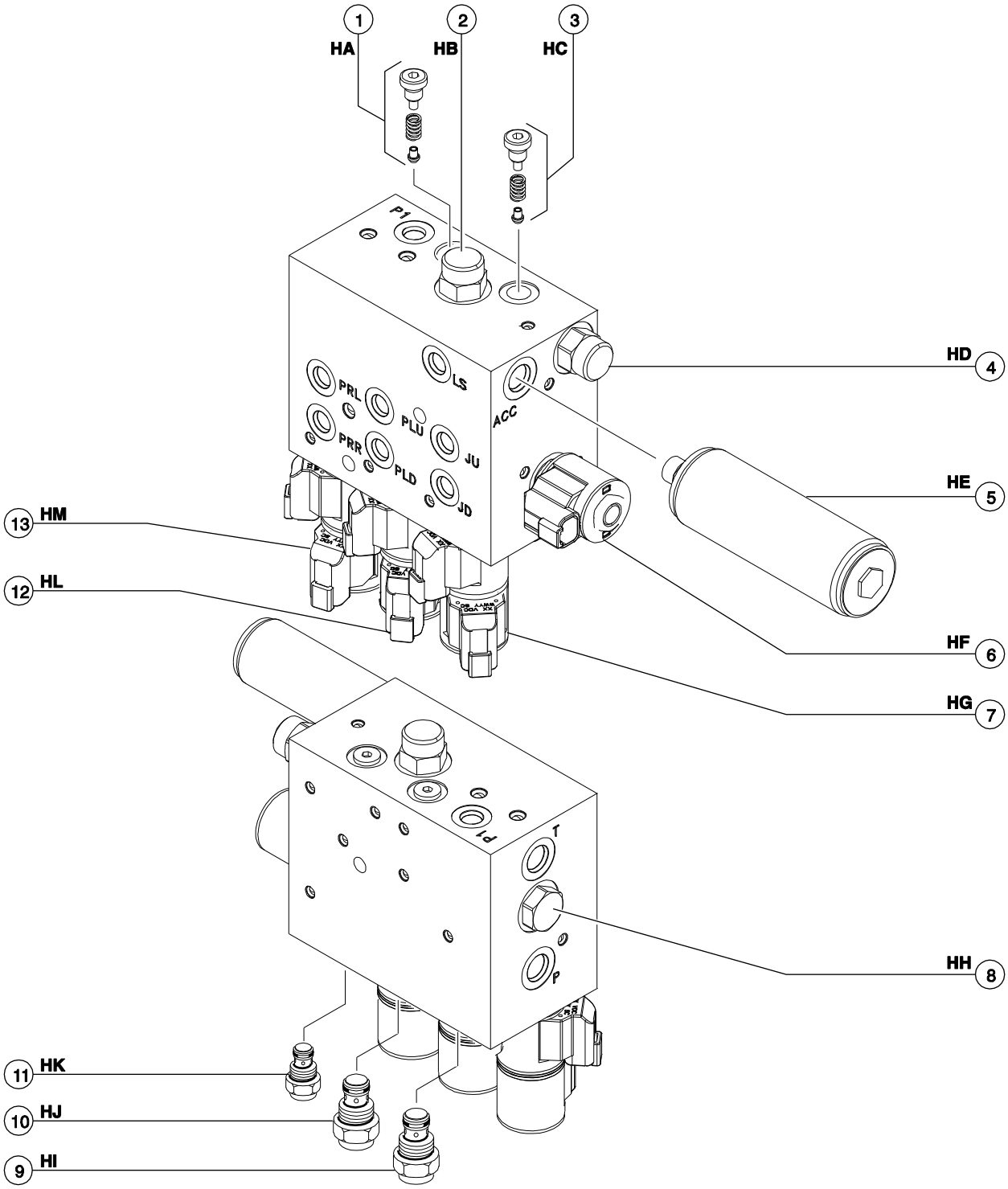
Manifolds

8-4
Platform Manifold

The platform manifold is mounted to the platform mounting weldment.

Index No.	Description	Schematic Item	Function	Torque
1	Check valve, 5 psi	HA	Platform load sense/level circuit	12-14 ft-lbs / 16-19 Nm
2	Differential sensing valve, N.C.	HB	Directs flow to functions	19-21 ft-lbs / 26-29 Nm
3	Check valve, 5 psi	HC	Jib load sense/up/down circuit	12-14 ft-lbs / 16-19 Nm
4	Flow control valve	HD	Bleeds off differential valve to tank	19-21 ft-lbs / 26-29 Nm
5	Accumulator, 500 psi / 34.5 bar	HE	Hydraulic dampening	23 ft-lbs / 31 Nm
6	Proportional solenoid valve, 2 position 2 way	HF		19-21 ft-lbs / 26-29 Nm
7	Proportional solenoid valve, 3 position 5 way	HG	Jib boom up/down circuit	19-21 ft-lbs / 26-29 Nm
8	Check valve, 10 psi	HH		19-21 ft-lbs / 26-29 Nm
9	Compensator valve	HI	Jib boom differential sensing circuit	33-37 ft-lbs / 45-50 Nm
10	Compensator valve	HJ	Platform level diff. sensing circuit	33-37 ft-lbs / 45-50 Nm
11	Pressure compensator valve	HK	Platform rotate diff. sensing circuit	19-21 ft-lbs / 26-29 Nm
12	Proportional solenoid valve, 3 position 5 way	HL	Platform level up/down circuit	19-21 ft-lbs / 26-29 Nm
13	Proportional solenoid valve, 3 position 5 way	HM	Platform rotate left/right circuit	19-21 ft-lbs / 26-29 Nm

Manifolds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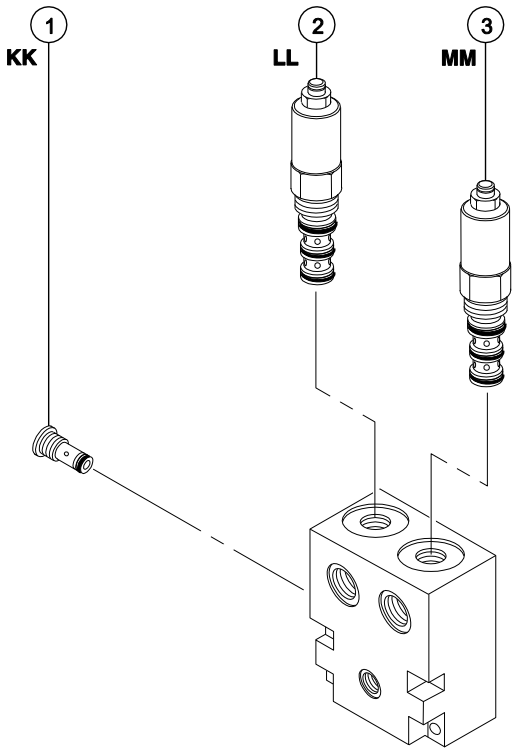
Manifolds

8-5
Turntable Rotation Manifold

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

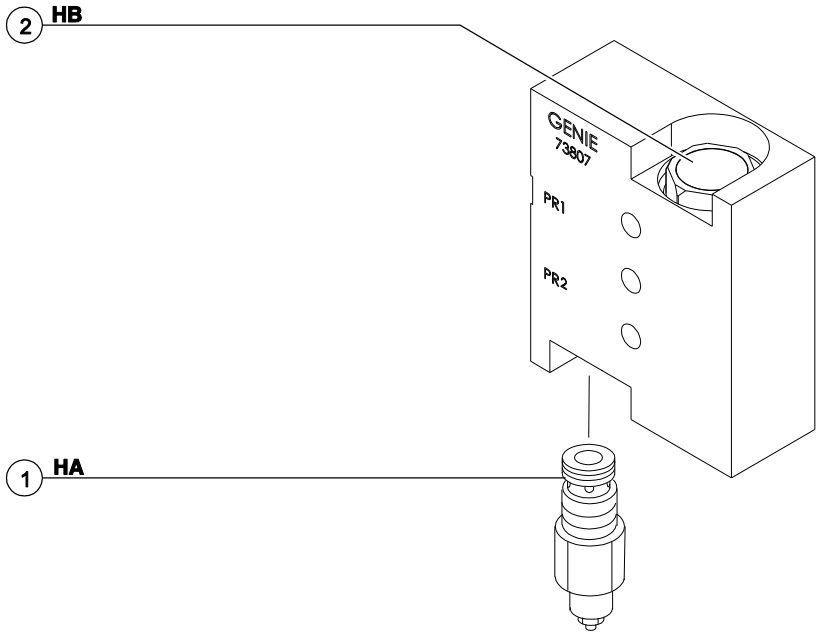
Index No.	Description	Schematic Item	Function	Torque
1	Shuttle valve. 2 position, 3 way	KK	Turntable rotation brake release	10-13 ft-lbs / 14-18 Nm
2	Counterbalance valve	LL	Turntable rotate right	35-40 ft-lbs / 47-54 Nm
3	Counterbalance valve	MM	Turntable rotate left	35-40 ft-lbs / 47-54 Nm



8-6
Platform Rotate Manifold

The platform rotate manifold is mounted on the platform rotator.

Index No.	Description	Schematic Item	Function	Torque
1	Counterbalance valve	HA	Turntable rotation brake release	35-40 ft-lbs / 47-54 Nm
2	Counterbalance valve	HB	Turntable rotate left	35-40 ft-lbs / 47-54 Nm



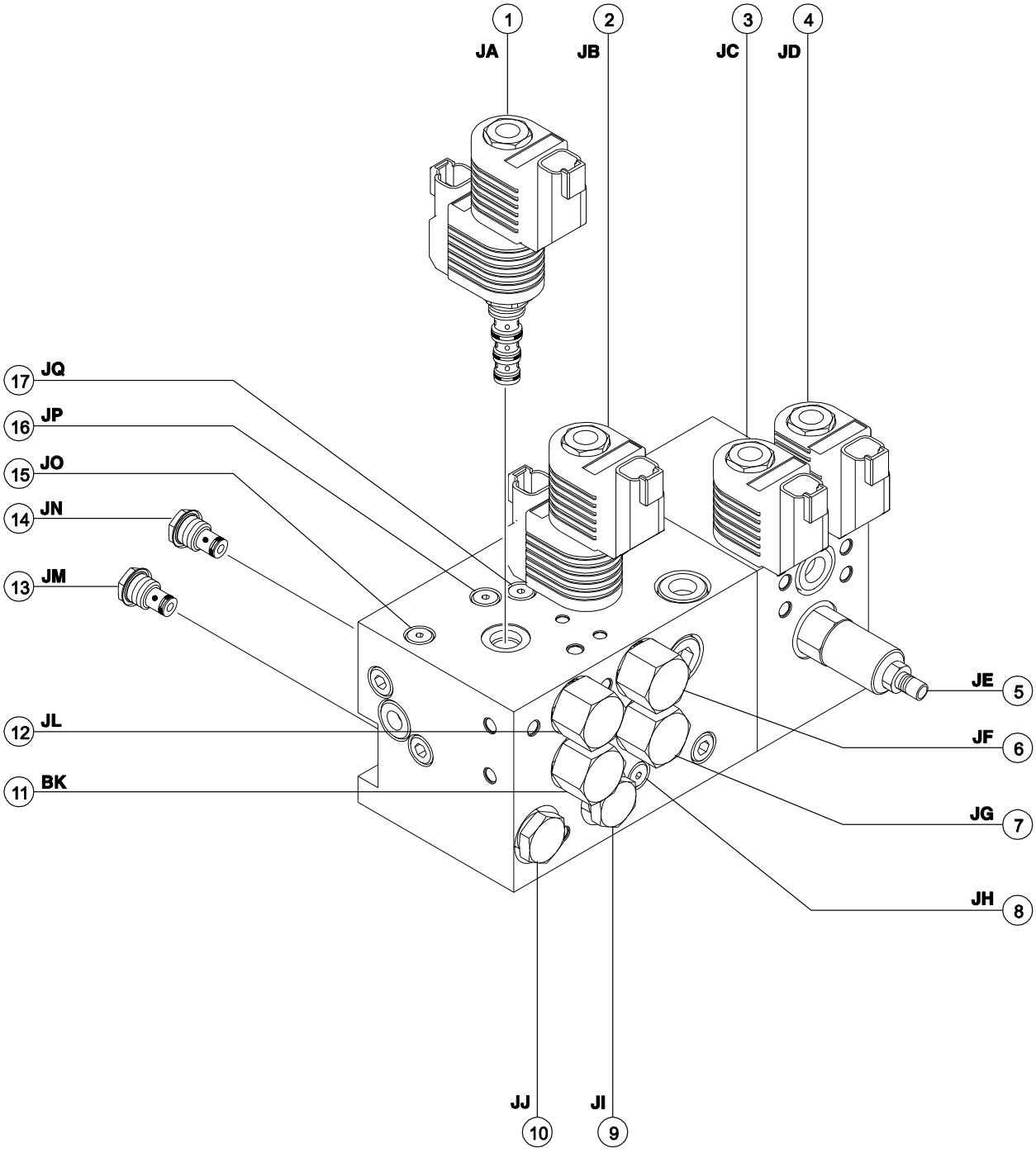
Manifolds

8-7
Two Wheel Steer and Oscillate Manifold

The Two Wheel Steer and Oscillate manifold is mounted inside the drive chassis at the square-end of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 3 position 4 way	JA	Steer left/right, yellow side steer cylinder	26-30 ft-lbs / 35-41 Nm
2	Solenoid valve, 3 position 4 way	JB	Steer left/right, blue side steer cylinder	26-30 ft-lbs / 35-41 Nm
3	Solenoid Valve, 2 position 3 way	JC	Oscillate cylinder, blue side	26-30 ft-lbs / 35-41 Nm
4	Solenoid Valve, 2 position 3 way	JD	Oscillate cylinder, yellow side	26-30 ft-lbs / 35-41 Nm
5	Relief valve, 750 to 860 psi / 51.71 to 59.3 bar	JE	Oscillate circuit	20-25 ft-lbs / 27-34 Nm
6	Flow regulator valve, 1.5 gpm / 5.7 L/min	JF	Blue side steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
7	Flow regulator valve, 1.0 gpm / 3.8 L/min	JG	Blue side steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
8	Check valve	JH	Load sensing circuit,blue side steer cylinder retract	8-10 ft-lbs / 11-14 Nm
9	Check valve	JI	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
10	Check valve	JJ	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
11	Flow regulator valve, 1.5 gpm / 5.7 L/min	JK	Yellow side steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
12	Flow regulator valve, 1.0 gpm / 3.8 L/min	JL	Yellow side steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
13	Check valve, 65 psi / 4.5 bar	JM	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
14	Check valve, 65 psi / 4.5 bar	JN	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
15	Check valve	JO	Load sensing circuit,yellow side steer cylinder retract	8-10 ft-lbs / 11-14 Nm
16	Check valve	JP	Load sensing circuit,yellow side steer cylinder extend	8-10 ft-lbs / 11-14 Nm
17	Check valve	JQ	Load sensing circuit,blue side steer cylinder extend	8-10 ft-lbs / 11-14 Nm

Manifolds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Manifolds

How to Adjust the Oscillate Relief Valve

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

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

Note: Refer to Oscillate Manifold Component list to locate the oscillate relief valve.

1 Remove the drive chassis cover from the square-end of the machine.

2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the two wheel steer and oscillate manifold.

3 Start the engine from the platform controls.

4 Press down the foot switch and manually activate one of the oscillate limit switches. Hold the switch in the activated position and observe the reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

5 Turn the engine off. 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 steps 3 through 4 to confirm relief valve pressure.

8 Remove the pressure gauge.

9 Install the drive chassis cover.

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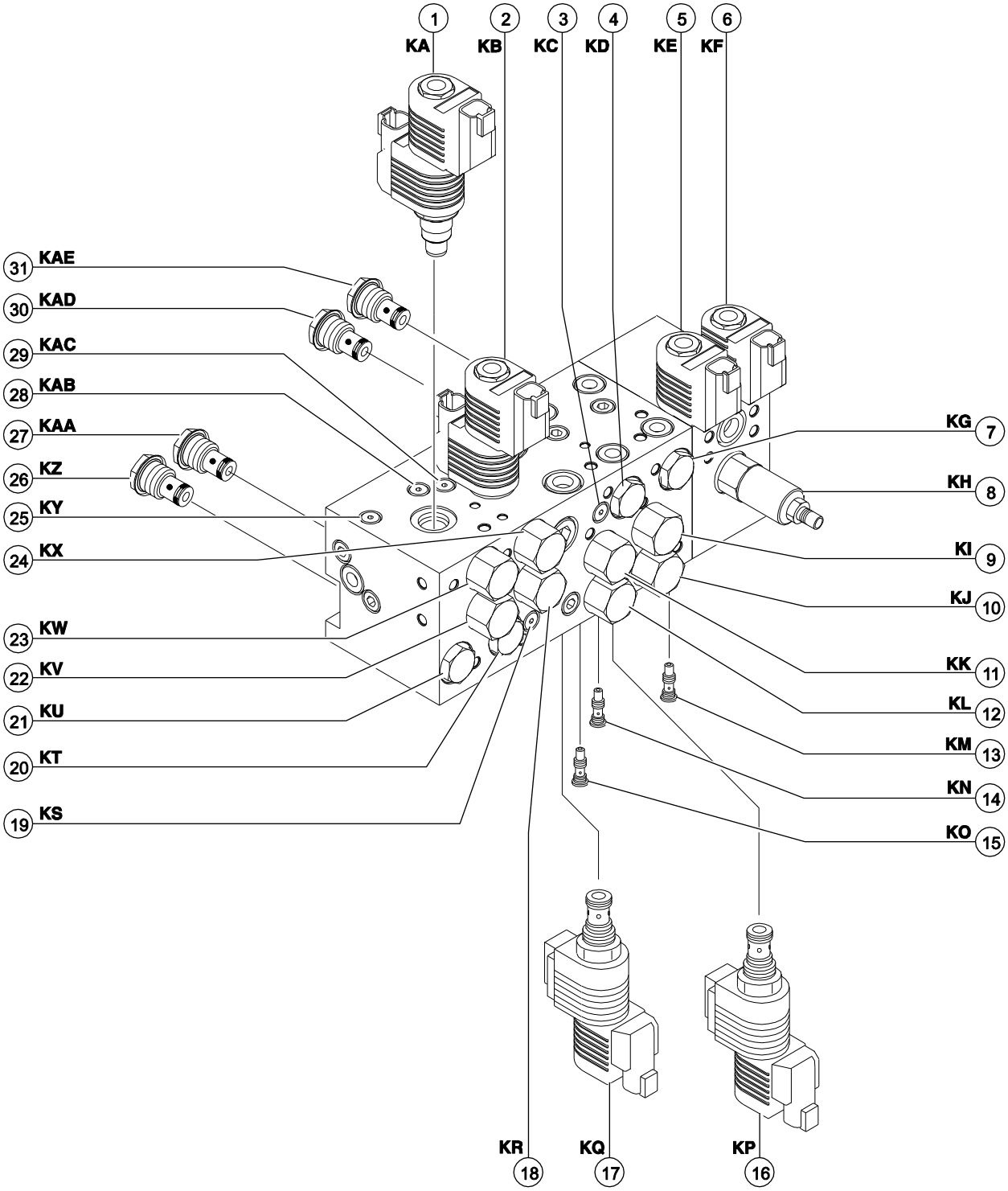
Manifolds

8-8
Four Wheel Steer and Oscillate Manifold

The Four Wheel Steer and Oscillate manifold is mounted inside the drive chassis at the square-end of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 3 position 4 way	KA	Steer left/right, square end yellow side steer cylinder	26-30 ft-lbs / 35-41 Nm
2	Solenoid valve, 3 position 4 way	KB	Steer left/right, square end blue side steer cylinder	26-30 ft-lbs / 35-41 Nm
3	Check valve	KC	Load sensing circuit, circle end yellow side steer cylinder retract	8-10 ft-lbs / 11-14 Nm
4	Check valve, 65 psi / 4.5 bar	KD	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
5	Solenoid Valve, 2 position 3 way	KE	Oscillate cylinder, blue side	26-30 ft-lbs / 35-41 Nm
6	Solenoid Valve, 2 position 3 way	KF	Oscillate cylinder, yellow side	26-30 ft-lbs / 35-41 Nm
7	Check valve, 65 psi / 4.5 bar	KG	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
8	Relief valve, 750 to 860 psi / 51.71 to 59.3 bar	KH	Oscillate circuit	20-25 ft-lbs / 27-34 Nm
9	Flow regulator valve, 1.5 gpm / 5.7 L/min	KI	Circle end, blue side steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
10	Flow regulator valve, 1.0 gpm / 3.8 L/min	KJ	Circle end, blue side steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
11	Flow regulator valve, 1.0 gpm / 3.8 L/min	KK	Circle end, yellow side steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
12	Flow regulator valve, 1.5 gpm / 5.7 L/min	KL	Circle end, yellow side steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
13	Check valve	KM	Load sensing circuit, circle end blue side steer cylinder retract	8-10 ft-lbs / 11-14 Nm
14	Check valve	KN	Load sensing circuit, circle end blue side steer cylinder extend	8-10 ft-lbs / 11-14 Nm
15	Check valve	KO	Load sensing circuit, circle end yellow side steer cylinder extend	8-10 ft-lbs / 11-14 Nm

Manifolds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KM 13
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KO 15
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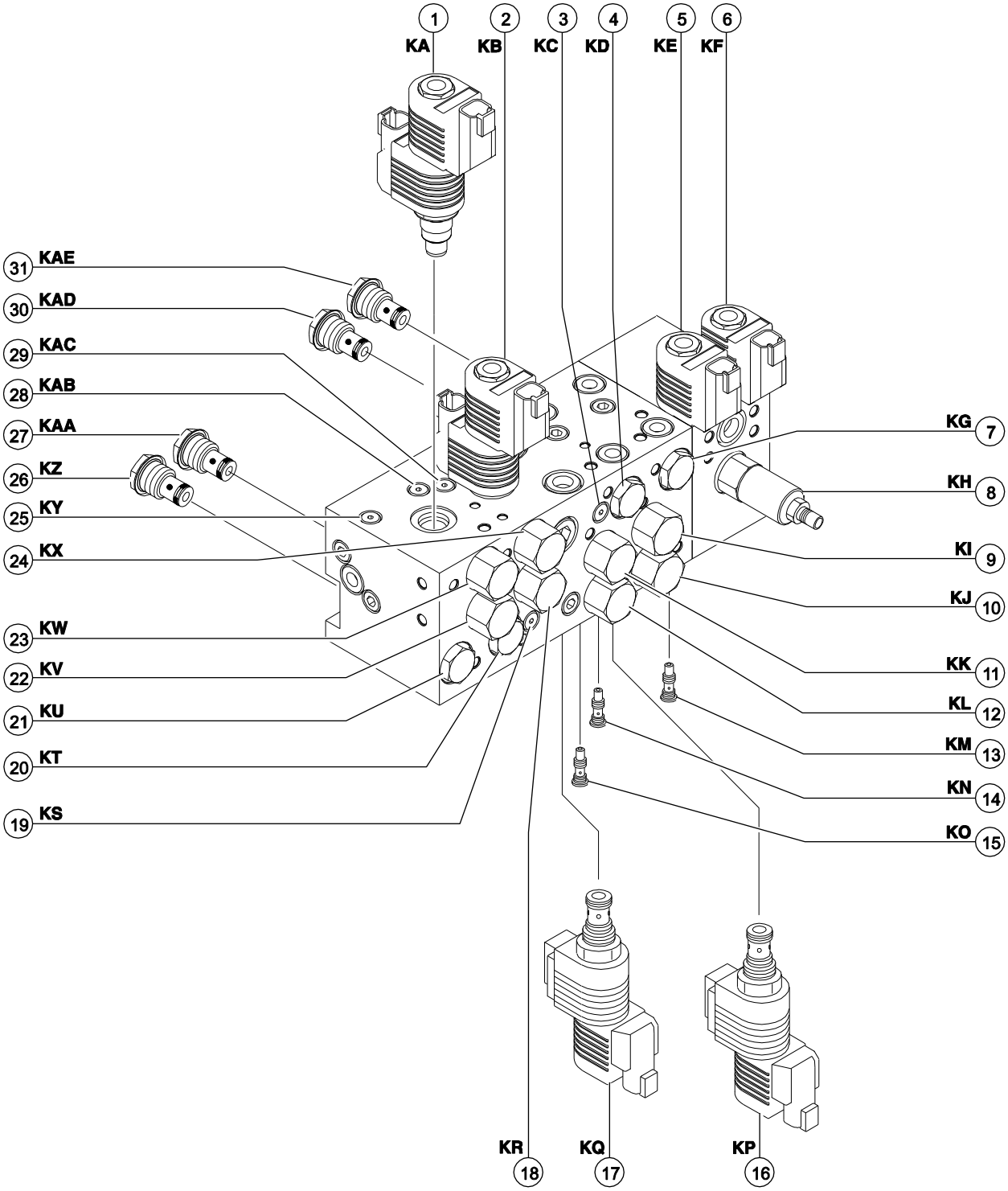
KQ 17
KP 16

Manifolds

Four Wheel Steer and Oscillate Manifold, continued

Index No.	Description	Schematic Item	Function	Torque
16	Solenoid valve, 3 position 4 way	KP	Steer left/right, circle end blue side steer cylinder	26-30 ft-lbs / 35-41 Nm
17	Solenoid valve, 3 position 4 way	KQ	Steer left/right, circle end yellow side steer cylinder	26-30 ft-lbs / 35-41 Nm
18	Flow regulator valve, 1.0 gpm / 3.8 L/min	KR	Square end, left side steer cylinder retract circuit	20-25 ft-lbs / 27-34 Nm
19	Check valve	KS	Load sensing circuit, square end blue side steer cylinder retract	20-25 ft-lbs / 27-34 Nm
20	Check valve, 65 psi / 4.5 bar	KT	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
21	Check valve, 65 psi / 4.5 bar	KU	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
22	Flow regulator valve, 1.5 gpm / 5.7 L/min	KV	Square end, yellow side steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
23	Flow regulator valve, 1.0 gpm / 3.8 L/min	KW	Square end, yellow side steer cylinder retract circuit	26-30 ft-lbs / 35-41 Nm
24	Flow regulator valve, 1.5 gpm / 5.7 L/min	KX	Square end, blue side steer cylinder extend circuit	20-25 ft-lbs / 27-34 Nm
25	Check valve	KY	Load sensing circuit, square end yellow side steer cylinder retract	8-10 ft-lbs / 11-14 Nm
26	Check valve, 65 psi / 4.5 bar	KZ	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
27	Check valve, 65 psi / 4.5 bar	KAA	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
28	Check valve	KAB	Load sensing circuit, square end yellow side steer cylinder extend	8-10 ft-lbs / 11-14 Nm
29	Check valve	KAC	Load sensing circuit, square end blue side steer cylinder extend	8-10 ft-lbs / 11-14 Nm
30	Check valve, 65 psi / 4.5 bar	KAD	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm
31	Check valve, 65 psi / 4.5 bar	KAE	Prevents steer cylinder from moving when not steering	20-25 ft-lbs / 27-34 Nm

Manifolds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KL 12
KM 13
KN 14
KO 15
KR 18
KQ 17
KP 16

Manifolds

How to Adjust the Oscillate Relief Valve

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

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

Note: Refer to Oscillate Manifold Component list to locate the oscillate relief valve.

1 Remove the drive chassis cover from the square-end of the machine.

2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the two wheel steer and oscillate manifold.

3 Start the engine from the platform controls.

4 Press down the foot switch and manually activate one of the oscillate limit switches. Hold the switch in the activated position and observe the reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

5 Turn the engine off. 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 steps 3 through 4 to confirm relief valve pressure.

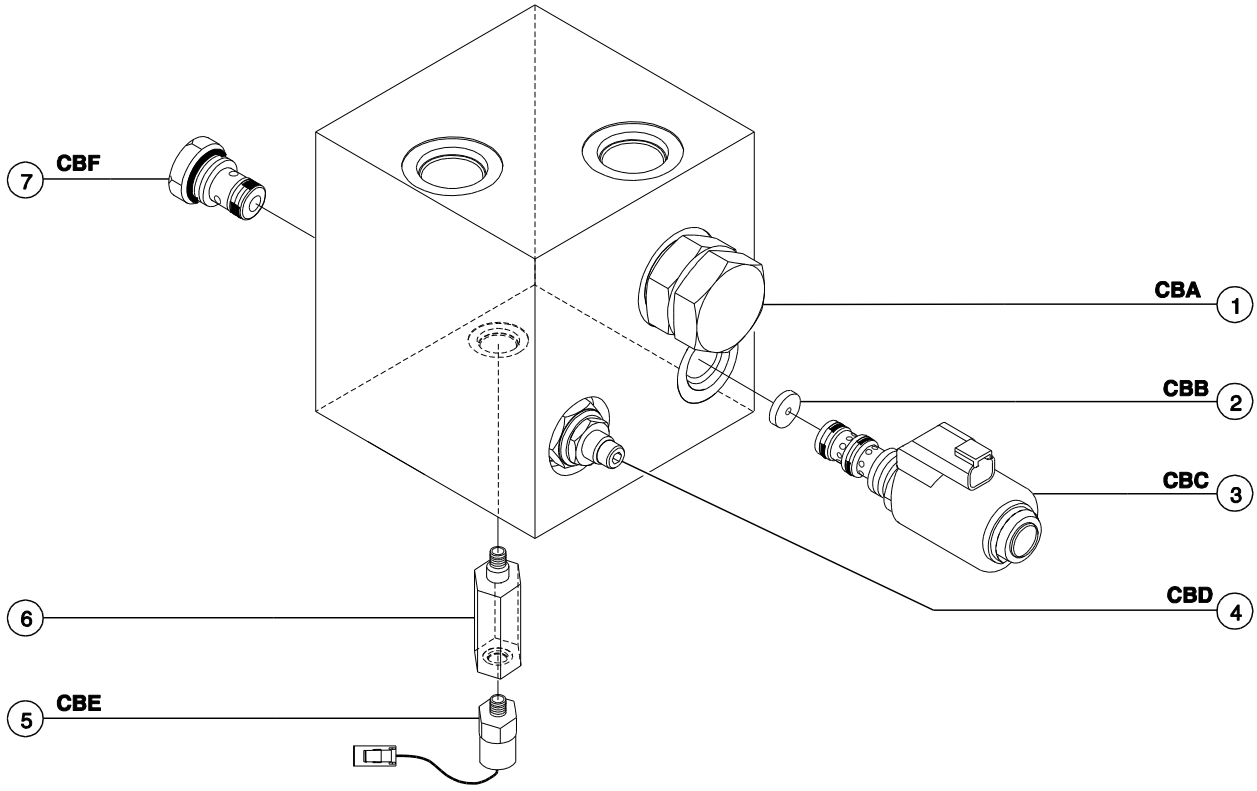
8 Remove the pressure gauge.

9 Install the drive chassis cover.

8-9
Oil Diverter Manifold Components (welder option)

The oil diverter manifold is mounted to the hydraulic generator located in the engine compartment.

Index No.	Description	Schematic Item	Function	Torque
1	Pilot Operated Directional valve, 2 position 3 way	CBA	Activates generator	80-90 ft-lbs / 108-122 Nm
2	Orifice disc, 0.031 inch / 0.79 mm	CBB	Delays shift to drive	35-40 ft-lbs / 47-54 Nm
3	Solenoid Valve, 2 position 3 way	CBC	Pilot valve to diverter	35-40 ft-lbs / 47-54 Nm
4	Relief valve, 280 psi @ 3.5 gpm / 19.3 bar @ 13.2 L/min	CBD	Charge pressure circuit	35-40 ft-lbs / 47-54 Nm
5	Pressure switch, 200 psi / 18.6 bar	CBE	Generator relay switch	16 ft-lbs / 22 Nm
6	Connector fitting			11 ft-lbs / 15 Nm
7	Check valve	CBF	Prevents oil to generator	35-40 ft-lbs / 47-54 Nm



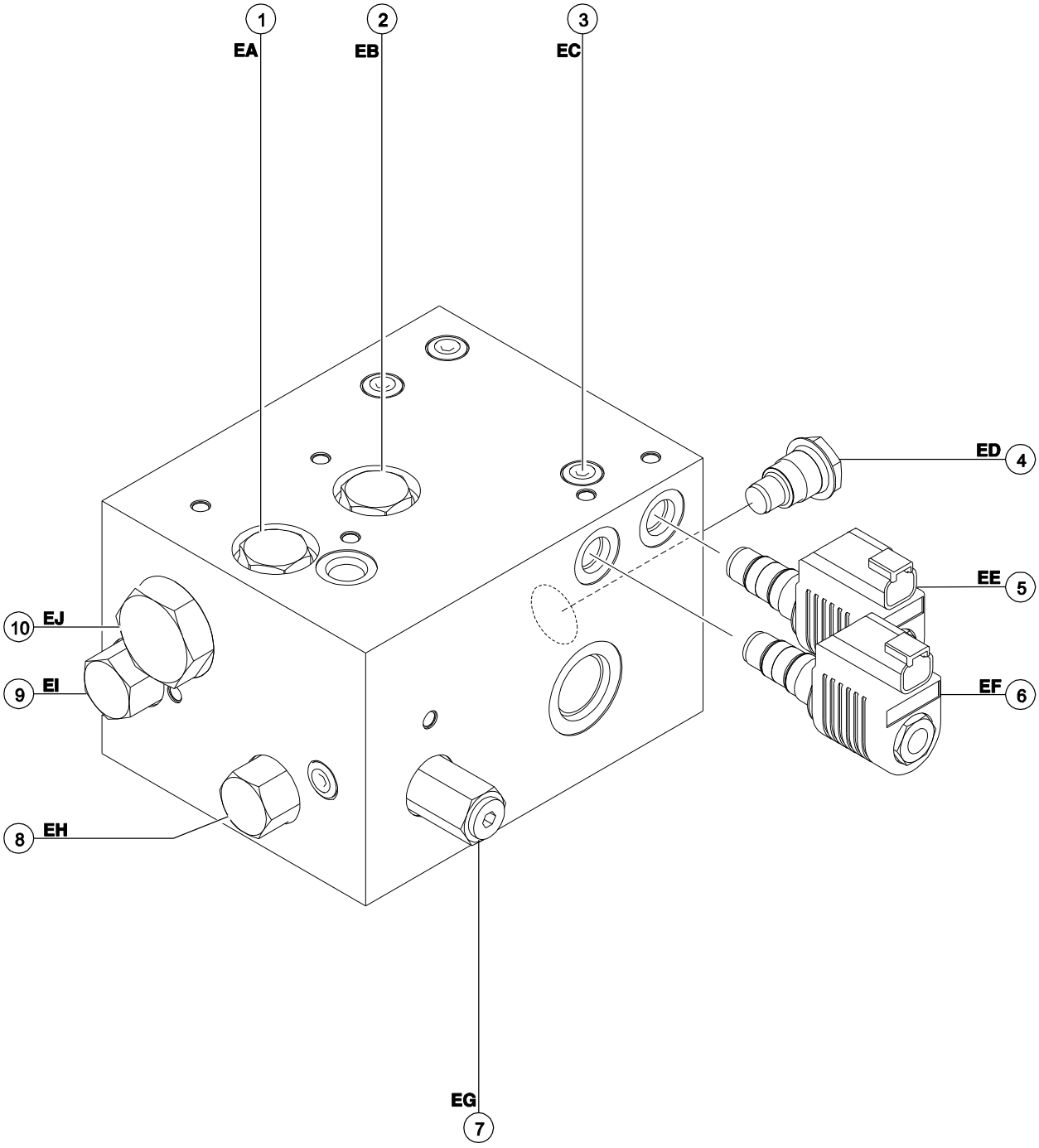
Manifolds

8-10
Traction Manifold Components, 2WD

The 2WD traction manifold is mounted inside the drive chassis at the circle-end of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Check valve, 5 psi / 0.34 bar	EA	Drive motor anti-cavitation	30-35 ft-lbs / 41-47 Nm
2	Check valve, 5 psi / 0.34 bar	EB	Drive motor anti-cavitation	30-35 ft-lbs / 41-47 Nm
3	Orifice, 0.031 in / 0.79 mm	EC	Brake and 2-speed circuit	
4	Check valve	ED	Keeps brakes released in case of temporary loss of charge pressure	20-25 ft-lbs / 27-34 Nm
5	Solenoid Valve, 2 position 3 way	EE	Brake release	26-30 ft-lbs / 35-41 Nm
6	Solenoid Valve, 2 position 3 way	EF	2-speed motor shift circuit	26-30 ft-lbs / 35-41 Nm
7	Relief valve, 280 psi / 19.3 bar	EG	Charge pressure circuit	20-25 ft-lbs / 27-34 Nm
8	Shuttle Valve, 3 position 3 way	EH	Charge pressure circuit that directs hot oil out of low pressure side of drive pump	30-35 ft-lbs / 41-47 Nm
9	Bi-directional flow control valve, 4.5 gpm / 17 L/min	EI	Equalizes pressure on both sides of divider/combiner valve EJ	30-35 ft-lbs / 41-47 Nm
10	Flow divider/combiner valve	EJ	Controls flow to drive motors in forward and reverse	90-100 ft-lbs / 122-136 Nm

Manifolds



Manifolds

8-11
Valve Adjustments, 2WD Traction Manifold

How to Adjust the Charge Pressure Relief Valve

Note: Refer to 2WD Traction Manifold Component list to locate the charge pressure relief valve.

Note: Perform this procedure with the hydraulic oil temperature at 100°F to 150°F / 38°C to 65.5°C.

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

1 Connect a 0 to 600 psi / 0 to 50 bar pressure gauge to the test port on the drive pump.

2 Start the engine from the ground controls.

3 Press the function enable/high rpm select button (rabbit symbol) position. Note the reading on the pressure gauge.

4 Turn the engine off.

5 Remove the pressure gauge from the drive pump. Connect the gauge to the test port located on the drive manifold.

6 Use a wrench to hold the charge pressure relief valve and remove the cap.

7 Start the engine from the platform controls.

8 Move rpm select switch to high rpm (rabbit symbol).

9 Begin driving the machine forward at a medium speed while one person monitors the pressure gauge. Continue driving until the pressure stabilizes.

Note: The pressure reading should be approximately 40 psi / 2.8 bar less than the pressure reading taken in step 3.

10 If it is not, stop the machine and adjust the internal hex socket on the pressure relief valve either up or down. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure.

11 Drive the machine forward and check the pressure.

12 Continue making small adjustments until the pressure reading on the gauge is approximately 40 psi / 2.8 bar less than the pressure reading taken in step 3.

13 Turn the engine off and remove the pressure gauge.

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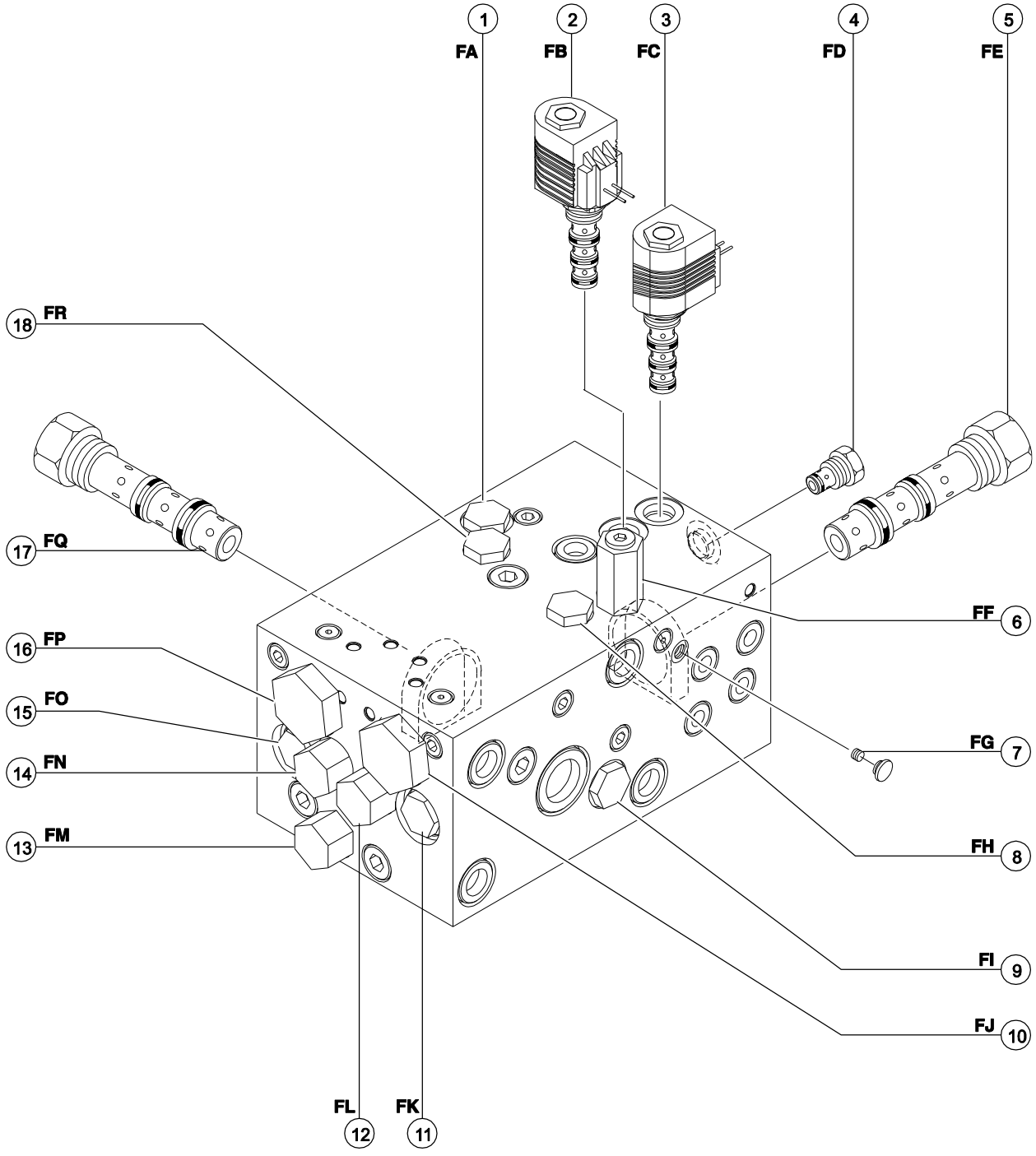
Manifolds

8-12
Traction Manifold Components, 4WD

The 4WD traction manifold is mounted inside the drive chassis at the circle-end of the machine.

Index No.	Description	Schematic Item	Function	Torque
1	Check valve, 5 psi / 0.34 bar	FA	Drive motor anti-cavitation	30-35 ft-lbs / 41-47 Nm
2	Solenoid Valve, 2 position 3 way	FB	2-speed motor shift circuit	26-30 ft-lbs / 35-41 Nm
3	Solenoid Valve, 2 position 3 way	FC	Brake release	26-30 ft-lbs / 35-41 Nm
4	Check valve	FD	Keeps brakes released if temporary loss of charge pressure	20-25 ft-lbs / 27-34 Nm
5	Shuttle Valve, 3 position 3 way	FE	Charge pressure circuit that directs hot oil out of low pressure side of drive pump	30-35 ft-lbs / 41-47 Nm
6	Relief valve, 280 psi / 19.3 bar	FF	Charge pressure circuit	20-25 ft-lbs / 27-34 Nm
7	Orifice, 0.030 in / 0.76 mm	FG	Brake and 2-speed circuit	
8	Check valve	FH	Drive motor anti-cavitation	20-25 ft-lbs / 27-34 Nm
9	Check valve	FI	Drive motor anti-cavitation	30-35 ft-lbs / 41-47 Nm
10	Flow divider/combiner valve	FJ	Controls flow to square end drive motors in forward and reverse	90-100 ft-lbs / 122-136 Nm
11	Check valve, 5 psi / 0.34 bar	FK	Drive motor anti-cavitation	20-25 ft-lbs / 27-34 Nm
12	Bi-directional flow control valve,2 gpm / 7.6 L/min	FL	Equalizes pressure on both sides of divider/combiner valve FJ	30-35 ft-lbs / 41-47 Nm
13	Bi-directional flow control valve,2 gpm / 7.6 L/min	FM	Equalizes pressure on both sides of divider/combiner valve FQ	30-35 ft-lbs / 41-47 Nm
14	Bi-directional flow control valve,2 gpm / 7.6 L/min	FN	Equalizes pressure on both sides of divider/combiner valve FP	30-35 ft-lbs / 41-47 Nm
15	Check valve	FO	Drive motor anti-cavitation	20-25 ft-lbs / 27-34 Nm
16	Flow divider/combiner valve	FP	Controls flow to circle end drive motors in forward and reverse	90-100 ft-lbs / 122-136 Nm
17	Flow divider/combiner valve	FQ	Controls flow to divider/combiner valves FJ and FP	90-100 ft-lbs / 122-136 Nm
18	Check valve	FR	Drive motor anti-cavitation	20-25 ft-lbs / 27-34 Nm

Manifolds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Manifolds

8-13
Valve Adjustments, 4WD Traction Manifold

How to Adjust the Charge Pressure Relief Valve

Note: Refer to 4WD Traction Manifold Component list to locate the charge pressure relief valve.

Note: Perform this procedure with the hydraulic oil temperature at 100°F to 150°F / 38°C to 65.5°C.

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

1 Connect a 0 to 600 psi / 0 to 50 bar pressure gauge to the test port on the drive pump.

2 Start the engine from the ground controls.

3 Press the function enable/high rpm select button (rabbit symbol) position. Note the reading on the pressure gauge.

4 Turn the engine off.

5 Remove the pressure gauge from the drive pump. Connect the gauge to the test port located on the drive manifold.

6 Use a wrench to hold the charge pressure relief valve and remove the cap.

7 Start the engine from the platform controls.

8 Move rpm select switch to high rpm (rabbit symbol).

9 Begin driving the machine forward at a medium speed while one person monitors the pressure gauge. Continue driving until the pressure stabilizes.

Note: The pressure reading should be approximately 40 psi / 2.8 bar less than the pressure reading taken in step 3.

10 If it is not, stop the machine and adjust the internal hex socket on the pressure relief valve either up or down. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure.

11 Drive the machine forward and check the pressure.

12 Continue making small adjustments until the pressure reading on the gauge is approximately 40 psi / 2.8 bar less than the pressure reading taken in step 3.

13 Turn the engine off and remove the pressure gauge.

8-14 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, 12V DC (schematic items G, W and AB)	4.8 Ω
Proportional solenoid valve, 12V DC (schematic items R)	9 Ω
Solenoid valve, 3 position 4 way, 12V DC (schematic items BA, BB, CA, CB, CP, CQ,GB, GP and GQ)	9 Ω
Solenoid valve, 3 position 4 way, 10V DC (schematic items O and S)	6.3 Ω
Solenoid valve, 2 position 2 way, 10V DC (schematic items J)	3.3 Ω
Solenoid valve, 2 position 2 way, 10V DC (schematic items C and P)	6.3 Ω
Solenoid Valve, 2 position 3 way, 10V DC (schematic items H, V, X, Z, AA, EE and EF)	6.3 Ω
Solenoid Valve, 2 position 3 way, 12V DC (schematic items BC, BD, CE, CF, FB and FC)	9 Ω

Manifolds

How to Test a Coil Diode

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

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

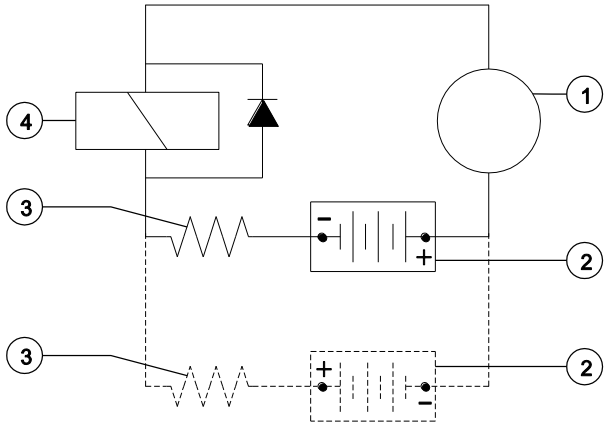
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.

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

Resistor 10Ω

Genie part number 27287

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



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

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

3 Set a multimeter to read DC current.

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

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

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

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

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

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

9-1 Turntable Rotation Assembly

How to Remove a Turntable Rotation Assembly

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

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

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

2 Remove the ground controls side fixed turntable cover.

3 Tag, disconnect the hydraulic hoses from the turntable rotation motor. Cap the fittings on the motor.

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

4 Attach a lifting strap from an overhead crane or other suitable lifting device to the lifting eye on the turntable rotation assembly.

5 Remove the drive hub mounting bolts and remove the turntable rotation assembly from the machine.

6 Repeat steps 3 through 5 for the other turntable rotation assembly.

⚠DANGER Tip-over hazard. If the turntable rotation lock pin is not properly installed, machine stability is compromised and the machine could tip over when the drive hub is removed from the machine, which could result in death or serious injury.

⚠WARNING Crushing hazard. The drive hub could become unbalanced and fall if not properly supported by an overhead crane or lifting device when removed from the machine.

Note: When installing a turntable rotation assembly, the rotation gear backlash must be adjusted. Refer to Repair Procedure, *Adjust the Turntable Rotation Gear Backlash*.

Turntable Rotation Components

How to Adjust the Turntable Rotation Gear Backlash

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 platform between the circle-end tires and with the machine on a firm, level surface.

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

2 Loosen the backlash pivot plate mounting fasteners.

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 1/2 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 to specification. Refer to Specifications, *Machine Torque Specifications*.

8 Rotate the turntable through an entire rotation. Check for tight spots that could cause binding. Readjust if necessary.

10-1
Steer Sensors

The steer sensor measures steer angle and communicates that information to the ground controls ECM. The steer sensor on the ground controls side of the machine at the square end acts as the lead sensor. The other three sensors follow the position, or steer angle, of the lead sensor. There is a steer sensor mounted to the top of each upper yoke pivot pin.

Note: If the square-end steering function becomes inoperative, switch to circle-end steer mode and the ground controls side circle-end steer sensor will become the lead sensor.

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

How to Measure the Tire Alignment

1 Start the engine from the platform controls.

2 Press down the foot switch.

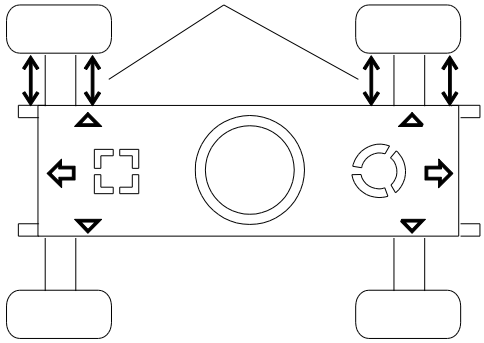
Measure the circle-end tires:

3 Press the square-end steer mode button.

4 Measure the distance between the inside of one circle-end tire and the chassis side plate on both sides of the axle.

⊙ Result: Both measurements should be the same to indicate that the tires are parallel with the chassis.

Square-end **Measure here** **Circle-end**



Note: If the measurements are different or if a tire is not parallel with the chassis, the steer sensor of that tire will need to be adjusted. Refer to Repair Procedure, *How to Adjust a Steer Sensor.*

5 Repeat step 4 for the other circle-end tire.

Measure the square-end tires:

6 Press the circle-end steer mode button.

7 Measure the distance between the inside of one square-end tire and the chassis side plate on both sides of the axle.

⊙ Result: Both measurements should be the same to indicate that the tires are parallel with the chassis.

Note: If the measurements are different or if a tire is not parallel with the chassis, the steer sensor of that tire will need to be adjusted. Refer to Repair Procedure, *How to Adjust a Steer Sensor.*

8 Repeat step 4 for the other square-end tire.

Axle Components

How to Adjust a Steer Sensor

1 Start the engine from the platform controls.

2 Press down the foot switch and push the engine idle select button until the engine switches to high rpm.

Square-end steer sensors:

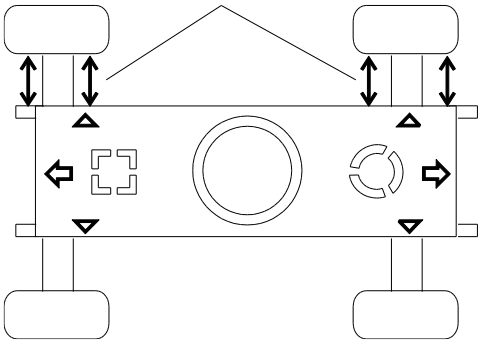
3 At the platform controls, press the circle-end steer mode button.

4 Locate the steer sensor on top of the yoke pivot pin.

5 Loosen the steer sensor cover retaining fasteners. Do not remove them.

6 Rotate the steer sensor cover either clockwise or counterclockwise. Measure the distance between the inside of tire and the chassis side plate on both sides of the axle.

Square-end **Measure here** **Circle-end**



7 Repeat step 4 until the tire is parallel with the chassis.

8 Tighten the steer sensor cover fasteners.

9 Repeat steps 2 through 6 for the other square-end steer sensor.

Circle-end steer sensors:

10 At the platform controls, press the square-end steer mode button.

11 Locate the steer sensor on top of the yoke pivot pin.

12 Loosen the steer sensor cover retaining fasteners. Do not remove them.

13 Rotate the steer sensor cover either clockwise or counterclockwise. Measure the distance between the inside of tire and the chassis side plate on both sides of the axle.

14 Repeat step 4 until the tire is parallel with the chassis.

15 Tighten the steer sensor cover fasteners.

16 Repeat steps 9 through 13 for the other circle-end steer sensor.

17 At the platform controls, press the four-wheel steer mode button. Measure the distance between the inside of the tire and the chassis side plate on both sides of the axle on each tire.

18 If any tire is not parallel, repeat the process beginning with step 3.

How to Calibrate the Steer Angle Sensor

If a steer sensor reaches the limit of travel before a tire is adjusted parallel to the chassis, the steer sensor must be calibrated. This procedure will re-establish a center position on the steer sensor.

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

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

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

Plus Minus Previous Enter

1 Start the engine from the platform controls.

2 Press down the foot switch.

3 Choose a steer mode based on the tire that needs alignment.

Note: If a circle-end tire cannot be aligned, press the square-end steer mode button. If a square-end tire cannot be aligned, press the circle-end steer mode button.

4 Loosen the steer sensor cover retaining fasteners. Do not remove them.

5 Rotate the steer sensor cover either clockwise or counterclockwise to bring the tire as close to alignment as possible.

6 Turn the engine off.

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

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

9 Use the **previous** button to scroll through the menu until the appropriate steer sensor is displayed. Choose from:

RESET BLUE END BLUE SIDE STEER SENSOR

RESET YELLOW END BLUE SIDE STEER SENSOR

RESET YELLOW END YELLOW SIDE STEER SENSOR

RESET BLUE END YELLOW SIDE STEER SENSOR

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

10 Exit the sensor calibration mode and turn the key switch to the off position.

11 Rotate the steer sensor to the opposite limit of travel.

12 Using a voltmeter set to DC voltage, probe the back of the steer sensor electrical connector at pins B and C.

13 Turn the key switch on at the ground controls. Rotate the sensor slowly until the voltage reading is between 2.4 to 2.5V DC. The alarm at the ground control box should sound.

14 Turn the key switch to platform controls. Start the engine from the platform controls.

15 Press down the foot switch.

16 Rotate the steer sensor cover to adjust the tire alignment. Measure the distance between the inside of the tire and the chassis side plate on both sides of the axle.

17 Repeat step 14 until the tire is parallel with the chassis.

18 Tighten the steer sensor cover fasteners.

Axle Components

How to Adjust the Oscillate Limit Switches

⚠ DANGER Tip-over hazard. Failure to perform this procedure on a firm, level surface could compromise the stability of the machine and could cause the machine to tip over which will result in death or serious injury.

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

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

1 Lower the boom to the stowed position.

2 Remove the drive chassis cover from the circle-end of the machine.

3 Remove the oscillate axle limit switch mounting fasteners. Remove the limit switches.

Note: The oscillate axle limit switches are located inside the drive chassis above the axle.

4 Place a digital level on the turntable rotate bearing plate.

5 Start the engine and level the drive chassis. Press down the foot switch and manually activate the oscillate limit switches until the machine is completely level.

6 Loosely install the limit switches. Using a feeler gauge, establish a gap of 0.015 - 0.030 inches / 0.381 - 0.762 mm between the limit switch plunger and the top of the axle.

7 Carefully hold the position of each limit switch and tighten the limit switch mounting fasteners.

8 Verify the gap is 0.015 - 0.030 inches / 0.381 - 0.762 mm between the limit switch plunger and the top of the axle.

9 Measure the distance between the drive chassis and the axle on both sides (from the inside of the drive chassis).

⊙ Result: The measurements should be equal.

Note: If the distance is not equal and the adjustment to the limit switches was completed with the ground and drive chassis level, consult Genie Product Support.

10-2
Oscillating Axle Cylinders

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

How to Remove an Oscillating Axle Cylinder

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

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

1 Rotate the boom until the turntable counterweight is between the circle-end and square-end tires.

2 Tag, disconnect and plug the oscillating axle cylinder hydraulic hoses. Cap the fittings on the oscillate cylinder.

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

3 Remove the pin retaining fasteners from the oscillate cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

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

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

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

6 Remove the oscillate cylinder from the machine.

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

How to Read Control System Fault Codes

Note: Initial fault testing occurs at power-up.

Faults are abnormal conditions that exist due to component failure or System misuse. CPU, memory, LCD, LED, limited joystick and limited operator switch testing is done on power-up. If an operator switch is depressed on power-up, the display should show and error and not allow any machine functions.

Releasing the switch will clear the error and allow all machine functions. The joystick operates similarly.

All other fault testing is done continuously.

1 When a fualt is diagnosed, the PCON fault indicator will flash and a fault message will be displayed on the TCON LCD. The message will contain the fault source and type.

2 Additional information, including the occurrence counter and a time-stamp is available with a PC, connected to one of the RS232 ports. Up to 30 unique fault messages can be saved. Each fault is saved with the device identity, fault type, engine hour time-stamp and an 8-bit occurrence counter.

3 The fault code table on the following pages lists the functions or components monitored by the system and recovery actions.

How to Clear Secondary Boom Safety Switch Faults

Note: Beginning with software release 2.0, the secondary boom envelope switches will latch and faults must be reset in software or through the use of the TCON LCD. They will not clear by re-powering the machine.

Note: There are two methods to reset the faults, by using Web GPI or through the menu available on the TCON LCD.

Using Web GPI

1 Connect the device containing the WEB GPI software to the TCON with an RS-232 cable.

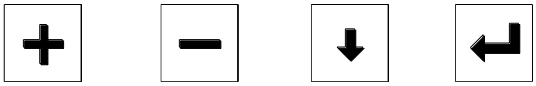
2 Select the Secondary Boom, then the Safety Switch Status Flags screen.

3 Change any safety switch drop down menus displaying fault to ok. Press send.

4 Exit Web GPI.

Using the TCON LCD

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



Plus Minus Previous Enter

Note: Take care when using this method to avoid resetting threshold defaults.

1 With the key switch off, press and hold the **enter** button and turn the key switch to the on position. Release the **enter** button after five seconds and then press the buttons in the following sequence: (**minus**)(**minus**)(**previous**)(**previous**).

2 Press the **previous** button until CLEAR ALL SAFETY SWITCH FAULTS appears.

3 Select YES, then press the **enter** button.

4 Press the **previous** button until EXIT appears.

5 Select YES, then press the **enter** button.

Note: This clears all latching faults, not standard faults.

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Primary Up/Down Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value Too High		
	Value Too Low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Primary Ext/Ret Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value Too High		
	Value Too Low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Primary Boom Up/Down Flow Valve(s) (#1 and #2)	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Calibrate Thresholds.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value Too High	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value Too Low		
Primary Boom Extend/Retract Flow Valve	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Calibrate Thresholds.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value Too High	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value Too Low		

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Primary Up/Down Speed	Not Calibrated	Display message on LCD and allow operation at default speed	Perform auto calibrate procedure.
Primary Extend/Retract Speed	Not Calibrated	Display message on LCD and allow operation at default speed	Perform auto calibrate procedure.
Primary Boom Up/Down buttons on TCON	Fault Check (both buttons pressed)	Primary Boom Up/Down disabled, display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Primary Boom Extend Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Primary Boom Retract Valve			
Primary Boom Up Valve			
Primary Boom Down Valve			
Primary Lock-Out Valve #1			
Primary Lock-Out Valve #2			
Primary Boom Length	Fault Check (unknown length)	Display message on LCD	Power up controller with problem corrected.
Primary Boom Angle	Fault Check (unknown length)	Allow only primary boom retract and down. Display message on LCD.	Power up controller with problem corrected.
Primary Boom Angle Sensor	Value at 5.0 V	Sound audible warning and flash primary boom down LED at the medium rate and display message on LCD screen PRI BOOM ANG SENSOR SHORTED HIGH. Primary boom up inhibited. Primary boom velocity limited to 50% of default value.	Power up controller with problem corrected.
	Value at 0 V	Sound audible warning and flash primary boom down LED at the medium rate and display message on LCD screen PRI BOOM ANG SENSOR SHORTED LOW. Primary boom up inhibited. Primary boom velocity limited to 50% of default value.	Power up controller with problem corrected.
	Not Calibrated	Sound audible warning at the medium rate and display message on LCD screen PRI BOOM ANG SENSOR NOT CALIBRATED, inhibit primary boom up from platform control.	Calibrate primary boom angle sensor.
	Just calibrated	Initiate one second beep of audible warning device.	Self-clearing (transient)

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Secondary Boom Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value Too High		
	Value Too Low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Secondary Boom Down Sequence Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Secondary Boom Down Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Secondary Boom Extend Sequence Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Secondary Boom Extend Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Secondary Boom Retract Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Secondary Boom Up Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Secondary Boom Up/Down/Extend/Retract Flow Valve	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value Too High	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value Too Low	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Secondary Boom Up/Down Speed	Not calibrated	Display message on LCD and allow operation at default speed	See service manual on how to perform this procedure.
Secondary Boom Up/Extend/Down/Retract Switches on TCON	Fault Check (both buttons pressed)	Secondary boom Up/Ext/Down/Retract disabled Display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Secondary Boom Length	Fault check (unknown length)	Stop all secondary boom functions, allow only secondary boom retract. Display message on LCD.	Power up controller with problem corrected.
Secondary Boom Angle	Fault check (unknown length)	Stop all secondary boom functions, allow only secondary boom retract. Once the boom is retracted allow secondary boom down. Display message on LCD.	Power up controller with problem corrected.
Turntable Rotate Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value Too High		
	Value Too Low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Turntable Rotate Flow Valve	Not Calibrated	Normal function except threshold for one or the other direction is zero. Display message on LCD.	Perform calibration procedure
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value Too High	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value Too Low		Check for shorts to ground in the wiring. Replace coil if necessary
Turntable Rotate Buttons on TCON	Fault Check (both buttons pressed)	Turntable rotate disabled Display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Turntable Rotate Clockwise Valve	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Turntable Rotate Counterclockwise Valve			
Turntable Rotate Speed	Not Calibrated	Display message on LCD and allow operation at default speed	Perform auto calibrate procedure.

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Steer Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value Too High		
	Value Too Low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Joystick.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Propel Joystick	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick.
	Value Too High		
	Value Too Low		
	Value at 0 V		
	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Thresholds.
	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
Axle Extend/Retract Buttons	Fault Check (both buttons pressed)	Axle extend/retract disabled. Display message on LCD	Check ribbon and connector from membrane switch. If necessary replace membrane switch.
Steer Valves - LF, RF, LR, RR	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Propel Valves Forward/Reverse	Not Calibrated	Joystick Speed and Direction frozen at zero and neutral.	Calibrate Thresholds.
Propel EDC Forward/Reverse	Just calibrated	Initiate one second beep of audible warning device	Self-clearing (transient)
	Value Too High	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for opens in the wiring or a bad ground. Replace coil if necessary
	Value Too Low		Check for shorts to ground in the wiring. Replace coil if necessary

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Motor Valve Speed	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Brake Valve			
Auxiliary Propel Valve	Fault Check	Fault Check	Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.
Platform Level Up/Down and Rotate Valves	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Power up controller with problem corrected.
Platform Rotate Switches	Fault Check, (both contacts closed)	Affected functions disabled, display message on LCD.	Power up controller with problem corrected.
Jib Boom Switches	Fault Check, (both contacts closed)	Affected functions disabled, display message on LCD.	Power up controller with problem corrected.
Jib Boom Up/Down Valves	Fault Check	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Power up controller with problem corrected.
Steer Angle Sensor(s) Right Front Left Front Right Rear Left Rear	Value at 5.0 V	Limited Speed and Direction frozen at zero and neutral, Alarm sounds.	Power up controller with problem corrected.
	Value Too High		
	Value Too Low		
	Value at 0 V		
Turntable Level Sensor X-Direction	Fault Check	Display message on LCD and sound audible alarm.	Correct problem.
Turntable Level Sensor Y-Direction			
Platform Level Sensor Y-Direction			
Footswitch Timeout	Calibration check	Display message on LCD	Recycle power
CAN Bus	Fault Check	Display message on LCD	Power up controller with problem corrected.
Oil Pressure	Range Check (low oil pressure)	Display message on LCD	Oil pressure is low. Check sender and oil level.
Water/Oil Temperature	Range Check (high temp)	Display message on LCD	Engine is overheating. Check sender, water or oil level or radiator/heat exchanger.
Oil Pressure Sender	Fault Check	Display message on LCD	Check wiring to senders for opens or shorts. Repair or replace senders.
Water/Oil Temp Sender			
Engine Speed	Range Check (underspeed)	Display message on LCD	Power up controller with problem corrected.

Control System Fault Codes

Error Source	Error Type	Effects	Recovery Actions
Safety Switch P3	Fault Check	Display message on LCD P3 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P6R1	Fault Check	Display message on LCD P6R1 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P6R2	Fault Check	Display message on LCD P6R2 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P7	Fault Check	Display message on LCD P7 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P7R	Fault Check	Display message on LCD P7R SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P9A	Fault Check	Display message on LCD P9A SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P9B	Fault Check	Display message on LCD P9B SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P10	Fault Check	Display message on LCD P10 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P11	Fault Check	Display message on LCD P11 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P12	Fault Check	Display message on LCD P12 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P14	Fault Check	Display message on LCD P14 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P18	Fault Check	Display message on LCD P18 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P22	Fault Check	Display message on LCD P22 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P22R	Fault Check	Display message on LCD P22R SAFETY SWITCH FAULT	Power up controller with problem corrected.
Safety Switch P30	Fault Check	Display message on LCD P30 SAFETY SWITCH FAULT	Power up controller with problem corrected.
Platform Overload	Fault Check (if active)	Display message on LCD	Power up controller with problem corrected.
Platform Overload Switches Inconsistent			
Boom Overload	Fault Check (if active)	Display message on LCD	Power up controller with problem corrected.

Control System Fault Codes

Fault Source and Type will display as:

Source	Type
“ ID XXX_xx FAULT “	

Where XXX is the one to three digit Fault Source and xx is the two digit Fault Type.

TCON - Turntable Controller

PCON - Platform Controller

SCON - Safety Controller

DCON - Drive Controller

Fault Type	
ID	**Description**
11	Value at 5V
12	Value too High
13	No Response
15	Value too Low
16	Value at 0V
17	Not Calibrated
21	Fault
26	Timeout
31	Invalid Setup
32	Min Cal Too Low
33	Min Cal Too High

Fault Source	
ID	**Description**
3	SCON Controller Area Network
4	Primary Boom Angle Zone
5	Primary Boom Length Switches Cross-Check
8	PCON Controller Area Network
9	Engine
18	DCON Controller Area Network
20	Boom Extend/Retract Joystick
21	Boom Up/Down Joystick
26	Boom Extend/Retract Buttons
27	Boom Up/Down Buttons
28	Boom Angle Sensors Cross-Check (SCON)
29	LSB2RS/LSB4ES Cross-Check (SCON)
30	Propel Joystick
35	Propel Valve
40	Turntable Rotate Joystick
43	Footswitch Timeout
44	Jib Up/Down Joystick
48	PBMAS Safety Envelope (SCON)
49	Jib Up/Down Buttons
50	Jib Up/Down Flow Valve
52	Steer Joystick
53	Left Front Steer Sensor
54	Right Front Steer Sensor
55	Left Rear Steer Sensor
56	Right Rear Steer Sensor
59	Rocker Steer Joystick
61	PBMLS Safety Envelope (SCON)
63	Front Axle Sensor
64	Rear Axle Sensor

Control System Fault Codes

Fault Source	
ID	**Description**
65	Turntable Level Sensor X-Direction
66	Turntable Level Snesor Y-Direction
67	Boom Length Sensors Cross-Check (SCON)
68	Boom Safety Envelope (SCON)
70	Turntable Controller - Platform Controller Software Version
73	Engine Pressure Sensor
74	Engine Temperature Sensor
75	LSB2RO/LSB4EO Cross-Check
80	TCON/SCON Calibration Inconsistent
81	Boom Up/Down Flow Valve (Fine)
82	Boom Extend/Retract Flow Valve
83	Boom Extend/Retract Speed
85	Boom Up/Down Speed
86	Boom Angle Sensor
90	Jib Rotate Flow Valve
91	Turntable Rotate Buttons
92	Turntable Rotate Flow Valve
93	Turntable Rotate Speed
94	Boom Length Sensor
95	Jib Rotate Joystick
98	Platform Level Sensor
99	Platform Level Buttons
110	Platform Rotate Buttons
113	Jib Rotate Buttons
117	Propel Power P38
118	Turntable Rotate Power P39
121	Valve Power P6R1
122	Engine Power P6R2
123	Enable Input Power P7

Fault Source	
ID	**Description**
124	Enable Output Power P7R
125	Primary Down Power P9A
126	IGN/Fuel Power P9B
127	Primary Extend Power P10
128	Primary Up Power P11
129	Axle Retract Power P12
132	Platform Level Power P22
133	Primary Up/Down Valve Power P22R
134	DCON Valve Power P7R
142	Turntable Rotate CW Valve
143	Turntable Rotate CCW Valve
144	Axle Safety Not Stowed (SCON)
145	Boom Up Valve
146	Boom Down Valve
147	Platform Overload Switches Inconsistent (SCON)
148	Boom Extend Valve
149	Boom Retract Valve
150	Overload Recovery
152	Boom Up/Down Flow Valve (Gross)
153	Primary Lockout P1 Valve
154	Primary Lockout P2 Valve
157	Axles Fully Extended Cross-Check (SCON)
158	Drive Disable Zone and Axles Not Fully Extended (SCON)
160	Left Front Steer Valve
161	Right Front Steer Valve
162	Left Rear Steer Valve
163	Right Rear Steer Valve
164	Axle Valve
165	Boom Not Retracted and Chassis Tilted (SCON)

Control System Fault Codes

Fault Source	
ID	**Description**
166	Brake Valve
167	Motor Shift Valve
168	Chassis Tilt Sensors Cross-Check (SCON)
170	Jib Bellcrank Level Sensor
171	Jib Bellcrank Level Flow Valve
172	AUX Relay
173	Platform Level Toggle Switch
174	Platform Rotate Toggle Switch
175	Platform Level Flow Valve
176	Platform Rotate Valve
180	Boom Length Sensor
195	Safety Platform Overload (SCON)
220	RSB1AO Active Cross-Check
221	LTB1LO Active Cross-Check
222	Axle Extend/Retract Toggle Switch
235	RSB1AO/LSB1DO Cross-Check
236	LTB1LO/LSB3RO Cross-Check
237	LTB1LO/LSB4EO Cross-Check
238	Pressure Comp Enable #1 Valve
239	Pressure Comp Enable #2/Generator Valve
245	Check Machine Software Type at TCON
246	Check Machine Software Type at SCON
247	TCON/SCON Software Inconsistent

Fault Code Display - Deutz and Perkins Models

How to Retrieve Active Engine Fault Codes - Deutz TCD 2.2 L3, TD 2.9 L4 and Perkins 404F-E22TA Models

The ECM constantly monitors the engine by the use of sensors on the engine. The ECM also uses signals from the sensors to initiate sequential fuel injection and make constant and instantaneous changes to ignition timing, fuel delivery and throttle position to maintain the engine's running condition at its highest efficiency while at the same time keeping exhaust emissions to a minimum. When a sensor fails or returns signals that are outside of set parameters, the ECM will store a fault code in memory that relates to the appropriate sensor. The active fault code will also be displayed on the LCD screen.

Note: The Perkins 404F-E22TA is equipped with an engine fault LED located at the platform control box.

If an engine fault occurs that does not result in an engine shutdown, the engine rpm will go into limp home mode resulting in the loss of high rpm..

Start the engine from the ground control box and operate various boom functions to verify that an active engine fault occurs and is shown on the display.

Note: All faults are stored in the Previous Fault history menu. These faults will not be erased when corrective action has been completed.

Note: Software is available from the engine manufacturer to perform diagnosis through the engine diagnostic port. Contact the specific engine manufacturer.

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
FMI = Failure Mode Identifier
KWP = Keyword Protocol

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
FMI = Failure Mode Identifier
KWP = Keyword Protocol

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

SPN = Suspect Parameter Number
FMI
KWP = Keyword Protocol

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
FMI = Failure Mode Identifier
KWP = Keyword Protocol

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
FMI = Failure Mode Identifier
KWP = Keyword Protocol

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

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

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
FMI = Failure Mode Identifier
KWP = Keyword Protocol

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

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

SPN	FMI	KWP	Description
523922	7	1262	Burner Shut Off Valve; blocked closed
523922	7	1264	Burner Shut Off Valve; blocked closed
523929	0	109	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
523929	1	115	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
523930	0	110	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
523930	1	116	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
523931	0	111	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
523931	1	117	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
523932	0	112	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
523932	1	118	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
523935	12	168	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
523936	12	169	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
523946	0	1158	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 404F-E22TA 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

Perkins 404F-E22TA Engine Fault Codes

SPN	FMI	Description
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 404F-E22TA 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

Continental TME27 Engine Fault Codes

How to Retrieve Active Engine Fault Codes - Continental Models

The ECM constantly monitors the engine by the use of sensors on the engine. The ECM also uses signals from the sensors to initiate sequential fuel injection and make constant and instantaneous changes to ignition timing, fuel delivery and throttle position to maintain the engine's running condition at its highest efficiency while at the same time keeping exhaust emissions to a minimum. When a sensor fails or returns signals that are outside of set parameters, the ECM will store a fault code in memory that relates to the appropriate sensor and will turn on the Check Engine Light.

Note: Perform this procedure with the key switch in the off position.

1 Open the ground controls side cover and locate the run/test toggle switch on the side of the ground control box.

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

3 Quickly activate and release the start toggle switch/button. Do not start the engine.

4 Move and hold the run/test toggle switch to the test position.

⊙ Result: The check engine light should turn on. The check engine light should begin to blink.

5 Continue to hold the run/test toggle switch in the test position and count the blinks.

Note: Before the fault codes are displayed, the check engine light will blink a code 1654 three times. After the fault codes, the check engine light will blink a code 1654 three times again indicating the end of the stored codes.

Note: If any fault codes are present, the ECM will blink a three or four digit code three times for each code stored in memory. It will blink the first digit of a three digit code, pause, blink the second digit, pause, blink the third digit, then pause and possibly a fourth digit. For example: the check engine light blinks 5 consecutive times, blinks 3 times and then 1 time. That would indicate code 531.

Note: Once a fault code has been retrieved and the repair has been completed, the ECM memory must be reset to clear the fault code from the ECM. Refer to *How to Clear Engine Fault Codes from the ECM*.

How to Clear Engine Fault Codes from the ECM

Note: Perform this procedure with the engine off and the key switch in the off position.

1 Open the engine side turntable cover and locate the battery.

2 Disconnect the negative battery cable from the battery for a minimum of 5 minutes.

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

3 Connect the negative battery cable to the battery.

Continental TME27 Engine Fault Codes

System	Code	Fault Name	1	2	3	4	5	6	Fault Conditions
MAP	108	MAP Pressure High		Y	Y				MAP pressure > 16 psi and TPS < 10% and RPM > 1800 To Unlatch, MAP pressure must be < 10 psi
	107	MAP Voltage Low		Y	Y				MAP voltage < 0.05 vdc and TPS > 2% and RPM < 7000 To Unlatch, MAP voltage must be > 0.5 vdc
ECT/ CHT	118	ECT Voltage High		Y					ECT voltage > 4.95 vdc
	117	ECT Voltage Low		Y					ECT voltage < 0.05 vdc
	116	ECT higher than expected 1		Y	Y	Y			ECT > 210° F and RPM > 600
	217	ECT higher than expected 2	Y						ECT > 230° F and RPM > 600
IAT	113	IAT Voltage High		Y					IAT voltage > 4.95 vdc
	112	IAT Voltage Low		Y					IAT voltage < 0.05 vdc
	111	IAT higher than expected 1		Y		Y			IAT > 200° F and RPM > 1000
	127	IAT higher than expected 2	Y						IAT > 210° F and RPM > 1000
BP	2229	BP Pressure High		Y	Y				BP pressure > 16 psi
	129	BP Pressure Low		Y	Y				BP pressure < 8.3 psi
Battery Voltage	563	Voltage High		Y	Y				Voltage > 18 vdc
	562	Voltage Low		Y	Y				Voltage < 9.5 vdc and RPM > 1500
5V External	643	5VE1 High Voltage		Y					5VE1 > 5.4 vdc
	642	5VE1 Low Voltage		Y					5VE1 < 4.6 vdc
TPS	123	TPS1 High Voltage	Y						TPS1 voltage > 4.8 vdc
	122	TPS1 Low Voltage	Y						TPS1 voltage < 0.2 vdc
	223	TPS2 High Voltage	Y						TPS2 voltage > 4.8 vdc
	222	TPS2 Low Voltage	Y						TPS2 voltage < 0.2 vdc
	221	TPS1 > than TPS2	Y						(TPS1 percent - TPS2 percent) > 20%
	121	TPS1 < than TPS2	Y						(TPS1 percent - TPS2 percent) < -20%
	2112	Unable to reach > TPS	Y						(target TPS - actual TPS) > 20%
	2111	Unable to reach < TPS	Y						(target TPS - actual TPS) < -20%
	2135	TPS1/2 simultaneous voltages out of range	Y						Uses same parameters as individual TPS1/2 voltage fault detection above

1 = Shutdown 2 = AL disable 3 = AL disable key-cycle 4 = Power derate 1 5 = Power derate 2 6 = Low rev limit

Continental TME27 Engine Fault Codes

System	Code	Fault Name	1	2	3	4	5	6	Fault Conditions
FPP	2122	FPP1 High Voltage						Y	FPP1 voltage > 4.8 vdc
	2123	FPP1 Low Voltage						Y	FPP1 voltage < 0.2 vdc
Engine Speed	219	Max Govern Speed Override							RPM > 3400
	1111	Rev Fuel Limit							RPM > 3600
	1112	Spark Rev Limit	Y						RPM > 3800
Oil Pressure	524	Oil Pressure Low	Y						Oil pressure pulled-up input with a threshold voltage of 2.5 vdc and RPM > 500 and run-time > 30 s
Adaptive Learn	171	AL High Gasoline Bank 1							AL_BM > 30% and RPM between 0-9999 and MAP between 0-99 psi
	172	AL Low Gasoline Bank 1							AL_BM < -30% and RPM between 0-9999 and MAP between 0-99 psi
	1161	AL High LPG							AL_BM > 30% and RPM between 0-9999 and MAP between 0-99 psi
	1162	AL Low LPG							AL_BM < -30% and RPM between 0-9999 and MAP between 0-99 psi
Closed Loop	1155	CL High Gasoline Bank 1							CL_BM > 40% and RPM between 0-9999 and MAP between 0-99 psi
	1156	CL Low Gasoline Bank 1							CL_BM <-40% and RPM between 0-9999 and MAP between 0-99 psi
	1151	CL High LPG							CL_BM > 35% and RPM between 0-9999 and MAP between 0-99 psi
	1152	CL Low LPG							CL_BM < -35% and RPM between 0-9999 and MAP between 0-99 psi
Catalyst Monitor	420	Gasoline Cat Monitor		Y	Y				EGO2 RMS > 0.005 phi and EGO2 RMS > EGO1 RMS* 50% and EGO2 RMS > CL waveform RMS* 50%
	1165	LPG Cat Monitor		Y	Y				EGO2 RMS > 0.005 phi and EGO2 RMS > EGO1 RMS* 50% and EGO2 RMS > CL waveform RMS* 50%

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Continental TME27 Engine Fault Codes

System	Code	Fault Name	1	2	3	4	5	6	Fault Conditions
FPP	2122	FPP1 High Voltage						Y	FPP1 voltage > 4.8 vdc
	2123	FPP1 Low Voltage						Y	FPP1 voltage < 0.2 vdc
Engine Speed	219	Max Govern Speed Override							RPM > 3400
	1111	Rev Fuel Limit							RPM > 3600
	1112	Spark Rev Limit	Y						RPM > 3800
Oil Pressure	524	Oil Pressure Low	Y						Oil pressure pulled-up input with a threshold voltage of 2.5 vdc and RPM > 500 and run-time > 30 s
Adaptive Learn	171	AL High Gasoline Bank 1							AL_BM > 30% and RPM between 0-9999 and MAP between 0-99 psi
	172	AL Low Gasoline Bank 1							AL_BM < -30% and RPM between 0-9999 and MAP between 0-99 psi
	1161	AL High LPG							AL_BM > 30% and RPM between 0-9999 and MAP between 0-99 psi
	1162	AL Low LPG							AL_BM < -30% and RPM between 0-9999 and MAP between 0-99 psi
Closed Loop	1155	CL High Gasoline Bank 1							CL_BM > 40% and RPM between 0-9999 and MAP between 0-99 psi
	1156	CL Low Gasoline Bank 1							CL_BM <-40% and RPM between 0-9999 and MAP between 0-99 psi
	1151	CL High LPG							CL_BM > 35% and RPM between 0-9999 and MAP between 0-99 psi
	1152	CL Low LPG							CL_BM < -35% and RPM between 0-9999 and MAP between 0-99 psi
Catalyst Monitor	420	Gasoline Cat Monitor		Y	Y				EGO2 RMS > 0.005 phi and EGO2 RMS > EGO1 RMS* 50% and EGO2 RMS > CL waveform RMS* 50%
	1165	LPG Cat Monitor		Y	Y				EGO2 RMS > 0.005 phi and EGO2 RMS > EGO1 RMS* 50% and EGO2 RMS > CL waveform RMS* 50%

1 = Shutdown 2 = AL disable 3 = AL disable key-cycle 4 = Power derate 1 5 = Power derate 2 6 = Low rev limit

Continental TME27 Engine Fault Codes

System	Code	Fault Name	1	2	3	4	5	6	Fault Conditions
EGO Sensors	134	EGO Open/Lazy Pre-cat 1		Y	Y				EGO cold persistently > 120 seconds
	154	EGO Open/Lazy Post-cat 1		Y	Y				EGO cold persistently > 120 seconds
Injectors	261	Injector Loop Open or Low-Side Short to Ground	n	Y	Y	Y			Injector off-state low-side < 4 vdc and battery voltage > 9 vdc
	262	Injector Coil Shorted		Y	Y	Y			Injector on-state low-side > 4 vdc and battery voltage < 16 vdc
Power Relay Control Coil	686	Relay Control Ground Short							
	685	Relay Coil Short							
	687	Relay Coil Short to Pwr							
Tach Output	2618	Tach Output Ground Short							Does not turn on MIL
	2619	Tach Output Short to Pwr							Does not turn on MIL
EPR Diagnostics LPG	1171	EPR Delivery Pressure > than expected		Y			Y		MJ actual-commanded press > 4 in. H20
	1172	EPR Delivery Pressure < than expected		Y			Y		MJ actual-commanded press < 4 in. H20
	1173	EPR Comm Lost		Y			Y		No MJ packets received within 500 ms
	1174	EPR Voltage Supply High		Y			Y		
	1175	EPR Voltage Supply Low		Y			Y		
	1176	EPR Internal Actuator		Y			Y		
		fault detection							
	1177	EPR Internal Circuitry fault detection	n	Y			Y		
	1178	EPR Internal Comm fault detection	n	Y			Y		

1 = Shutdown 2 = AL disable 3 = AL disable key-cycle 4 = Power derate 1 5 = Power derate 2 6 = Low rev limit

Continental TME27 Engine Fault Codes

System	Code	Fault Name	1	2	3	4	5	6	Fault Conditions
Cam Crank Sensors	342	Cam Loss		Y	Y				No cam pulse in 4 cycles and RPM > 1000
	337	Crank Loss							Cam pulses without crank activity > 6 cam pulses
	341	Cam Sync Noise		Y	Y				Number of invalid cam re-syncs = 1 within a time window of <= 700 ms
	336	Crank Sync Noise		Y	Y				Number of invalid crank re-syncs = 1 within a time window of <= 800 ms
	16	Never Crank Synced at Start							Cranking revs without sync < 4 revs and RPM > 90 rpm
Internal Process or Diagnostics	606	COP Failure			Y		Y		
	1612	RTI 1 Loss			Y		Y		
	1613	RTI 2 Loss			Y		Y		
	1614	RTI 3 Loss			Y		Y		
	1615	A/D Loss			Y		Y		
	1616	Invalid Interrupt			Y		Y		
	601	Flash Checksum Invalid			Y		Y		
	604	RAM Failure			Y		Y		
J1939 Network	1625	Shutdown Request							Number of shutdown requests >= 1
	1626	CAN Tx Failure							TX error counter > 100
	1627	CAN Rx Failure							Rx error counter > 100
	1628	CAN Address Conflict Failure							Address conflict counter > 5

1 = Shutdown 2 = AL disable 3 = AL disable key-cycle 4 = Power derate 1 5 = Power derate 2 6 = Low rev limit

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.

Wire Circuit Legend

Circuit numbering

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

2 The circuit number may be used more than once in a circuit.

For Example:

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

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

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

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

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

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

Circuit prefix

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

Wire Circuit Legend

Suffix	Definition
ABV	Auxiliary Boom Valve
AF	Alternator Field
AFV	Auxiliary Forward Valve
AH	Auxiliary Hydraulic Pump
ANG	Angle
APV	Auxiliary Platform Valve
ARV	Auxiliary Reverse Valve
ASV	Auxiliary Steer/Drive Valve
AXE	Axle Extend Valve
AXO	Axle Oscillate
AXR	Axle Retract Valve
BAT	Battery
BEX	Boom Extended
BRK	Brake
BST	Boom Stowed
BV	Bypass Valves
CAL	Calibrate
CAN	CAN Signal
CAT	CATS Module
CNK	Chain Break
DCN	Drive Chassis Controller
DE	Drive Enable
DEL	Drive Enable Left
DER	Drive Enable Right
DTH	Data High
DTL	Data Low
EDC	Electrical Displacement Control
ENL	Envelope Lockout
ENV	Envelope Light
ERL	Extend/Retract Lockout
ESL	Engine Status Lamp
ESP	Engine Speed Select
FAP	Axle Front Position
FB	Flashing Beacon
FE	Function Enable
FL	Fuel Select (gas/LP)
FLR	Filter Restricted
FLT	Filter Switch
FP	Fuel Pump
FS	Float Switch
FSL	Fuel Solenoid
FTS	Foot switch Signal
FWD	Forward
GEN	AC Generator
GND	Ground
HG	Hydraulic Generator
HRN	Horn
HS	High RPM
IGN	Ignition
JBD	Jib Bellcrank Down
JBE	Jib Extend
JBR	Jib Retract
JBS	Jib Sensor
JBU	Jib Bellcrank Up
JD	Jib Down
JER	Jib Extend/Retract Control
JFC	Jib Up/Down Flow Control
JPL	Propel Signal
JPW	Joystick 5V DC Power
JRL	Jib Rotate Left (CCW)
JRR	Jib Rotate Right (CW)

Wire Circuit Legend

Suffix	Definition
JSV	Jib Select Valve
JU	Jib Up
JUD	Jib Up/Down Control
LDS	Load Sensor
LF	Left Front
LFS	Left Front Steer Sensor
LO	Lockout
LOF	Low fuel
LPS	Lamps
LR	Left Rear
LRS	Left Rear Steer Sensor
LS	Limit Switch
LS	Low RPM
LSR	Lift Speed Reduction
MFV	Multi Function Valve
MS	Motor Shift (Speed)
PBD	Primary Boom Down
PBE	Primary Boom Extend
PBL	Primary Boom Extend/Retract Lockout Valve
PBR	Primary Boom Retract
PBS	Primary Boom Angle Sensor
PBU	Primary Boom Up
PCE	Pressure Comp Enable
PCN	Platform Control
PEL	Primary Ext/Ret Lockout
PER	Primary Boom Extend/Retract Flow Control
PES	Primary Boom Up/Down Signal
PL	Primary Lockout
PLD	Platform Level Down

Suffix	Definition
PLF	Platform Level Flow Control
PLL	Propel Lockout
PLS	Primary Boom Extend/Retract Signal
PLU	Platform Level Up
PRC	Platform Rotate Control
PRF	Platform Rotate Flow Control
PRL	Platform Rotate Left (CCW)
PRR	Platform Rotate Right (CW)
PRV	Proportional Valve
PS	Pressure Switches
PSE	Program Setup Enable
PSL	Power to Length Sensor
PSR	Pressure Sender
PTA	Platform Tilt Alarm
PTS	Platform Tilt Sensor
PUD	Primary Boom Up/Down Flow Control
PWR	Power
PXS	Proximity Sensor
RAP	Axle Rear Position
RCV	Recovery
REC	Receptacle
RET	Return
REV	Reverse
RF	Right Front
RFS	Right Front Steer Sensor
RL	Retract Lockout
RPM	RPM
RR	Right Rear

Wire Circuit Legend

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

Wire Color Legend

Wire Coloring

1 All cylinder extension colors are solid and all retract functions are striped black. When using black wire, the stripe shall be white.

2 All rotations that are LEFT or CW are solid, RIGHT or CCW are striped and black. When the wire is black, the stripe is white.

3 All proportional valve wiring is striped.

Wire Color Legend

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

Color	Circuit #	Primary Function
RD	1	Primary boom up drive
RD/BK	2	Primary boom down drive
RD/WH	3	Primary boom up/dwn FC proportional valve drive
WH	4	Turntable rotate left valve drive
WH/BK	5	Turntable rotate right valve drive
WH/RD	6	Turntable rotate FC proportional valve drive
BK	7	Primary boom extend
BK/WH	8	Primary boom retract
BK/RD	9	Primary boom Extend/Retract proportional valve drive
BL	10	Secondary boom up valve drive
BL/BK	11	Secondary boom down valve drive
BL/WH	12	Secondary boom up/dwn FC proportional valve drive
BL/RD	13	Drive enable
OR	14	Platform level up valve
OR/BK	15	Platform level down valve
OR/RD	16	Platform up/dwn FC proportional valve drive
GR	17	Platform rotate left valve driver
GR/BK	18	Platform rotate right valve driver
GR/WH	19	Jib select valve driver circuit
RD	20	12 battery supply
WH	21	12 ignition supply
BK	22	Keyswitch power to platform ESTOP
WH	23	Power to platform
RD	24	Power to warning senders
WH/BK	25	Power to oil pressure sender
WH/RD	26	Power to temp sender

Wire Color Legend

Color	Circuit #	Primary Function
RD	27	Auxiliary power
RD/BK	28	Platform level alarm
RD/WH	29	Drive motor shift (speed)
WH	30	Forward/EDC-A
WH/BK	31	Reverse/EDC-B
WH/RD	32	Brake
BK	33	Start
BK/WH	34	Start aid (glow plug or choke)
BK/RD	35	High engine speed select
BL	36	Steer clockwise
BL/BK	37	Steer counterclockwise
BL/WH	38	Gas
BL/RD	39	LP
OR	40	Limit switch signal stowed
OR/BK	41	RPM signal
OR/RD	42	Boom retracted signal
GR	43	Jib up
GR/BK	44	Jib down
GR/WH	45	AC Generator
WH	46	Drive horn
WH/BK	47	Output power enable
WH/RD	48	Work lamp
WH/BK	49	Motion lamp
BL	50	Auxiliary boom
BL/WH	51	Auxiliary steer
BL/RD	52	Auxiliary platform
WH/BK	53	Boom envelope safety valve cutoff
BK/WH	54	Power to safety interlock switches (engine)
GR/BK	55	Axle oscillation
RD	56	Foot switch/TCON estop power
RD/WH	57	Boom down safety interlock
RD/BK	58	Safety interlock to engine
GR/WH	59	Chain break circuit
GR/WH	60	Axle extend
GR	61	Axle retract
OR	62	Boom stowed (safety)
OR/RD	63	Power to boom envelope safety switch
OR/BK	64	Power for operational switches
BL/WH	65	Low fuel indication
BL	66	Drive enable
BL	67	Secondary boom not stowed
RD	68	Primary boom lowered (operational)
BL	69	Primary boom #1 extended
BL/WH	70	Primary boom #2 retracted
BL/BK	71	Primary boom #2 extended
GN	72	Secondary boom extend
GN/BK	73	Secondary boom retract
RD	74	Primary #1 Lockout
RD/WH	75	Primary #2 Lockout
BL	76	Pri boom #3 extended
WH	77	Lower angle #1 operational
WH/BK	78	Upper angle #2 operational
BK	79	power from TCON ESTOP
N/A	80	Can 2.0/J1939 Shield
GR	81	Can 2.0/J1939 Low
YL	82	Can 2.0/J1939 High
GR/WH	83	Tilt signal x axis
GR/BK	84	Tilt signal y axis
GR	85	Tilt sensor power
OR	86	Hydraulic filter restricted
RD	87	Platform level safety power
RD/BK	88	Platform level safety output
BR	89	Platform level safety ground
RD/BK	90	Proximity kill
RD/WH	91	Gate Interlock
WH/BK	92	Motor speed (LO/HI)
WH/RD	93	Motor bypass
WH	94	Load sensor
OR	95	Tether ESTOP return

Wire Color Legend

Color	Circuit #	Primary Function
RD	96	Tether power
BK	97	Tether ESTOP power
WH	98	J1708 + (high)
BK	99	J1708 - (low)
WH/RD	100	Outrigger lowered
WH/BK	101	Outrigger raised
OR	102	Pothole protector up
OR/RD	103	Pothole protector down
BK/WH	104	Proprietary data buss – (i.e. ITT or AP)
BK/RD	105	Proprietary data buss + (i.e. ITT or AP)
GR	106	Spare
RD	107	Alternator field
BL/WH	108	Engine status
GR/WH	109	Sensor pwr
BK	110	Sensor return
OR	111	Steer signal
RD	112	Steer signal to solenoid valve
OR/RD	113	Multi function valve
BK/RD	114	Load moment overweight
RD/BK	115	Load moment underweight
OR	116	Hydraulic oil cooler
RD	117	Flashing beacon
OR	118	Lift speed reduction
BL	119	Hydraulic pressure sensor output
OR	120	Oil cooler fan
GR	121	Axle oscillate LEFT
GR/BK	122	Axle oscillate RIGHT
RD/BK	123	Primary boom angle signal operational
RD/WH	124	Secondary boom angle signal operational
WH/RD	125	Secondary boomlockout (Ext Enable)
WH/BK	126	Secondary boom lockout (Riser Down Enable)
GR	127	ECU test switch
OR/RD	128	Low engine speed
RD/BK	129	Descent alarm
WH/RD	130	Travel alarm
BL	131	Motion alarm
GR	132	Platform load input
GR/WH	133	Platform load alarm
GR/BK	134	Key switch power
BL/WH	135	Fuel pump
RD	136	Power to safety module
RD/WH	137	Propel power (P_38)
RD/BK	138	Pri boom up/sec boom dwn-Ext (P_11/30)
WH/RD	139	Turntable rot FC safety (P_39)
OR/RD	140	Boom envelope safety
RD	141	Primary boom angle signal safety
OR	142	Secondary boom angle signal safety
BL/RD	143	Drive enable left
BL/WH	144	Drive enable right
RD/WH	145	Calibrate
BL	146	Jib bellcrank up FC
BL/BK	147	Jib bellcrank down FC
BL/WH	148	Jib bellcrank sensor
GR/WH	149	Jib Up/Down FC
GR/BK	150	Hydraulic generator bypass
GR	151	Hydraulic EDCoutput
BK	152	Injector retard
BK	153	Jib extend
BK/WH	154	Jib retract
OR/RD	155	Pressure comp enable
GN/WH	156	Jib Up/Down
BK/RD	157	Jib Ext/Ret

Wire Color Legend

Color	Circuit #	Primary Function
BL/RD	158	Spare
BL/WH	159	Steer joystick signal
WH/RD	160	Propel joystick signal
WH/BK	161	Sec boom joystick signal
OR	162	Joystick 5 VDC power
BL/WH	163	Pri extend/retract signal
RD/WH	164	Pri up/down signal
WH/RD	165	TT Rotate signal
OR	166	Boom length signal safety
OR/BK	167	Boom length signal operational
BL/RD	168	Primary boom hydraulic valve lockout
GN	169	Envelope active LED
WH/RD	170	Load sense relay source
WH/BK	171	Load sense relay sink
BL	172	UP/DN flow control ground
BK	173	Ext/Ret flow control ground
WH	174	Key switch power, ground position
WH/BK	175	Load sensor signal operational
GN/WH	176	Secondary extend/retract FC
BL/RD	177	Extend/retract lockout
BK	178	Control module status light
GN	179	Drive power relay
BK	180	Lift power relay
OR	181	48 Volt alternator field (or battery)
RD	182	24 Volt battery
BL	183	Envelope or load sense recovery
WH	184	Program setup enable
WH	185	Encode A
BL	186	Encode B
BL	187	Bootstrap or program enable
GR	188	Safety cross check
BK	189	Data receive
BK/WH	190	Data transmit
WH/RD	191	Multi-Function pressure relief
WH/BK	192	Jib rotate left
WH/RD	193	Jib rotate right
WH/RD	194	Speed select input
OR/RD	195	Electric brake source
YL	196	2.5V Sensor power
BR	N/A	Ground or return

Wire Color Legend

Types of Limit Switches

There are two types of limit switches, found in various locations throughout the machine: mechanical-type **operational or saf**ety switches. **As in ai**rcra**ft, w**hich features redundant safety systems, each mechanical operational switch is backed up with a separate, independently functioning safety switch.

The mechanical-type operational or safety switc**hes are use**d to **sense** a positive displacement or movement of the limit switch actuator, or arm, as the machine moves through its range of operational functions. Included in this group are enve**lope lim**it s**witch**es which sense the extended length and angle of the booms and rotational position of the turntable.

For example, when the secondary boom is fully raised and the operational switch is activated, it tells the ECM at the ground controls to start extending the secondary boom.

Another example is the drive enable limit switch, which disables the drive function anytime the boom is rotated past the rear axles, indicated by the 'circle' end of the drive chassis.

In some cases, the engine will be stopped if safety parameters are exceeded.

Types of Limit Switches

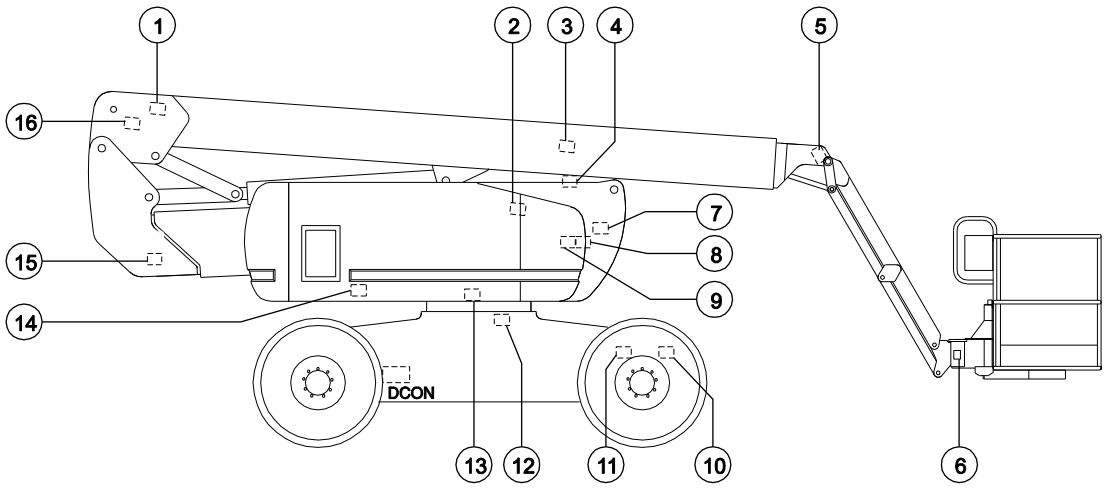
LSP1AO	Primary boom angle stowed
LSP1RO	Primary boom length retracted
LSP1EO	Primary boom length fully extended
LSS1AO	Secondary boom angle, fully stowed
LSS2AO	Secondary boom angle, fully raised
LSS3AO	Secondary boom angle, 25° to 30°
LSS2AS	Secondary boom angle safety
LSS1RO	Secondary boom fully retracted
LSS1RS	Secondary boom fully retracted, safety
LSJ1EO	Platform level fully extended
LST1O	Drive enable mechanical
LSA1OS	Oscillate axle, right side
LSA2OS	Oscillate axle, left side

Numbering Legend

LS		P		1	R		O	
LS	Limit Switch	J	Jib Boom	Circuit Number	A	Angle	O	Operational
		P	Boom		D	Down	S	Safety
		T	Turntable		E	Extend		
					R	Retract		

Limit Switches and Angle Sensors

Limit Switch Legend



1 LSP1RO
2 LSS2AO
3 LSP1EO
4 LSP1AO
5 LSJ1EO
6 Platform Angle Sensor
7 LSS1RO
8 LSS3AO
9 LSS2AS
10 LSA1OS
11 LSA2OS
12 LST1O
13 Turntable Angle Sensor
14 LSS1AO
15 LSS1RS
16 Primary Boom angle Sensor

Limit Switch Functions

LSA1OS: Limit switch, Axle #1 Oscillating Operational. Activates the axle oscillate circuit on the right side.

LSA2OS: Limit switch, Axle #2 Oscillating Operational. Activates the axle oscillate circuit on the left side.

LST1O: Limit switch, Operational. Activates the drive enable zone.

Turntable Angle Sensor: Measures the X axis and Y axis of the turntable. The alarm sounds at 4.5 degrees.

Primary Boom Angle Sensor (PBS): Measures the Y axis angle of the primary boom. The operational range shall be +33 degrees to +73 degrees. The safety cutouts are set at +70 degrees and will disable boom up and stop the engine.

Platform Angle Sensor: Measures the angle of the platform. The range of measurement is +/- 20 degrees. The safety cutout is set at +/- 10 degrees from gravity and will disable the primary and secondary boom up/down functions and the platform level up/down functions.

LSS2AO: Limit switch, Secondary Boom #2 Angle Operational Switch. Secondary boom angle full extension, angle up all the way (secondary boom extend allowed).

LSS3AO: Limit switch, Secondary Boom #3 Angle Operational Switch. Secondary boom elevated to 30-35 degrees. Used to switch platform/primary boom leveling parameters.

LSS2AS: Limit switch, Secondary Boom #2 Angle Safety Switch. Secondary boom angle full extension, angle up all the way (secondary boom extend allowed). Backup switch for LSS2AO.

LSS1RO: Limit switch, Secondary Boom #1 Retract Operational Switch. Secondary boom fully retracted (secondary boom down allowed).

LSS1RS: Limit switch, Secondary Boom #1 Retract Safety Switch. Secondary boom fully retracted (secondary boom down allowed). Backup switch for LSS1RO.

LSS1AO: Limit switch, Secondary Boom #1 Angle Operational Switch. Open when the secondary boom is fully lowered, closes when the boom is raised out of the stowed position. This switch limits the drive speed and disables the drive motor destroke. The other contacts close when the boom is fully lowered allowing the platform to be tucked underneath the mast for transport.

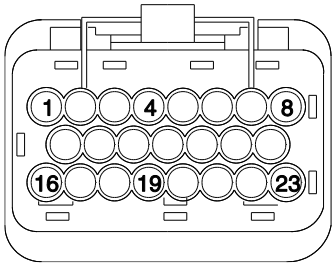
LSP1AO: Limit Switch, Primary Boom #1 Angle Operational. One side closes when the primary boom is raised from the stowed position, disabling the drive motor destroke and limiting the drive speed. The other side of the switch closes when the boom is fully lowered allowing the platform to be tucked underneath the mast for transport.

LSJ1EO: Limit Switch, Jib Boom #1. Closes when the platform leveling cylinder is fully extended, disabling the primary boom down function.

LSP1EO: Limit Switch, Primary Boom #1 Extend Operational. Switch closes as the primary boom extends the last 6 to 12 inches signaling the computer.

LSP1RO: Limit Switch, Primary Boom #1 Retract Operational. Switch closes when the primary boom is fully retracted.

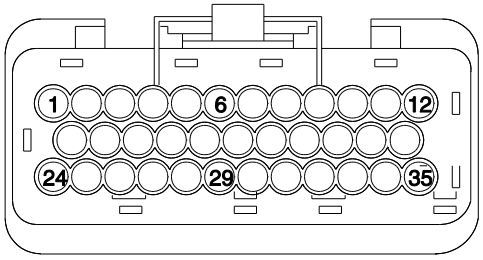
Drive Chassis and Platform Controller Pin Legend



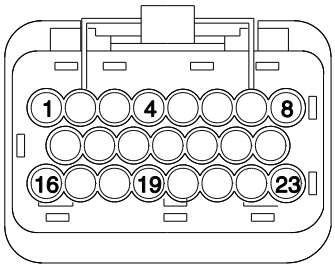
Pin Numbering - 23 pin connector

J21	Plat Controller	J22	Plat Controller	J31	Drive Chassis	J32	Drive Chassis
1	GND PCON - BR	1	VLVRET7 - BR	1	GND-DCON - BR	1	VLVRET - BR
2	P52PCON - BL/RD	2	(UNUSED)	2	P21DCON - WH	2	V61AXRT - GR
3	(UNUSED)	3	C17PRL - GR	3	P53LS – RD	3	V60AXEX - GR/WH
4	S56PRV - RD	4	C18PRR - GR/BK	4	(UNUSED)	4	V29MS - RD/WH
5	(UNUSED)	5	C43JU - GR	5	S56PRV - RD	5	(UNUSED)
6	(UNUSED)	6	C44JD - GR/BK	6	C61AXRT - GR	6	V52AFV - BL/RD
7	P56PRV - RD	7	C14PLU - OR	7	(UNUSED)	7	V52REV - BL/RD
8	(UNUSED)	8	C15PLD - OR/BK	8	AXLE RET GND	8	V36RRS - BL
9	(UNUSED)	9	(UNUSED)	9	C61LS - GR	9	V37RRS - BL/BK
10	D80SHIELD	10	R90PXS - RD/BK	10	D80SHLD	10	C111RRS - OR
11	(UNUSED)	11	C90PXS - RD/BK	11	RS232 RXD	11	C111LRS - OR
12	(UNUSED)	12	(UNUSED)	12	RS232 TXD	12	C111RFS - OR
13	(UNUSED)	13	(UNUSED)	13	BOOT	13	C111LFS - OR
14	(UNUSED)	14	(UNUSED)	14	(UNUSED)	14	VLVRET2 - BR
15	C47OUT - WH/BK	15	C88PTS - RD/BK	15	C61LS(A) - GR	15	V32BRK - WH/RD
16	C46HRN - WH	16	R56PTS - RD	16	(UNUSED)	16	V36LRS - BL
17	D81CAN (-) - GR	17	C56PTS - RD	17	D81CAN (-) - GR	17	V37LRS - BL/BK
18	D82CAN (+) - YL	18	S14PLU - RD	18	D82CAN (+) - YL	18	V36RFS - BL
19	(UNUSED)	19	PLATRET - BR	19	RS232 GND	19	P110RT - BK
20	(UNUSED)	20	C84TAY - GR/BK	20	(UNUSED)	20	P109ANG - GR/WH
21	(UNUSED)	21	P85PTS - GR	21	(UNUSED)	21	V37RFS - BL/BK
22	(UNUSED)	22	PTSRET - BR	22	(UNUSED)	22	V36LFS - BL
23	P23PCON - BK	23	P87PTS - RD	23	C61LS(A) - GR	23	V37LFS - BL/BK

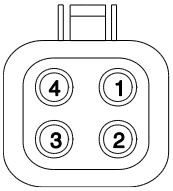
Turntable Controller Pin Legend



Pin Numbering - 35 pin connector



Pin Numbering - 23 pin connector



Pin Numbering - 4 pin connector

Turntable Controller Pin Legend

J11	Turntable Controller
1	GNDPCON - BR
2	P52PCON - BL/RD
3	C46HN - WH
4	C470UT - WH/IIK
5	P23PCON – BK
6	S56PRV - RD
7	P56PRV- RD
8	R48LP- WH/RD
9	R49LP- WH/BK
10	D080-SHIELD
11	(UNUSED)
12	(UNUSED)
13	(UNUSED)
14	S132LDS-BL/WH
15	P97TET- BK
16	(UNUSED)
17	DS1CAN (-) - GR
18	DS2CAN (+) - YL
19	(UNUSED)
20	TETFUNC - WH
21	TETGND - BR
22	P96TET - RD
23	P95TET - OR

J12	Turntable Controller
1	GNDDCON - BR
2	P21DCON - RD
3	P53LS - WH/BK
4	P54ENG - BK/WH
5	S56PRV - RD
6	P21DCON - RD
7	P58LS - RD/BK
8	S59SBE - GR/WH
9	S121PBU - GR
10	P53LS - WH/BK
11	P53LS - WH/BK
12	S59SBE - GR/WH
13	C64LS - OR/BL
14	C65LOF - BL/WH
15	C66DREN- BL
16	C73SBR - BL/RD
17	C68PBD- RD
18	C64LS - OR/BL
19	C70PBR - BL/WH
20	C71PBE - BL/BK
21	C67S8D - BL
22	C77SBU - WH
23	V74PRLO - RD
24	V75PRLO - RD/WH
25	SNSR GND - BR
26	BOOM ANGLE PWR
27	G119SR - BL
28	C124SBL - RD/BK
29	C77AS - WH
30	C78PS - WH/BK
31	P56PRV - RD
32	PRIMARYANGLE SENSOR INPUT
33	SEC.ANGLE SENSOR INPUT
34	P30
35	VLVRET1 - BR

J13	Turntable Controller
1	Vl.VRET1 - BR
2	C35RPM – BK/RD
3	C211GN - WH
4	C34SA - BK/WH
5	V30FWD - WH
6	V31REV - WH/BK
7	C48HN - WH
8	C39LP - BL/RD
9	C33STR - BK
10	C30EDC - WH
11	C31EDC - WH/BK
12	C25PSR - WH/BK
13	C26TSR – WH/RD
14	RET85TTSR - GR
15	P85TTSR - GR
16	VLVRET2 - BR
17	(UNUSED)
18	C41RPM - OR/BK
19	(UNUSED)
20	C83TAX- GR/WH
21	C84TAY- GR/BK
22	C45GEN- GR/WH
23	VLVRET3 - BR

J15	Turntable Controller
1	BATVLV - RD
2	BATGND - BR
3	BATGND - BR
4	BATECU - RD

J14	Turntable Controller
1	VLVRET4 - BR
2	C03PBF - RD/WH
3	C09PERF - BK/RD
4	C061RF - WH/RD
5	C12FBFC – BL/WH
6	C72SBE – BL/WH
7	C01PBU - RD
8	C02PBD – RD/BK
9	C07PBE - BK
10	COSPBR - BK/WH
11	(UNUSED)
12	C115SD – BL/BK
13	R49LP – WH/BK
14	VLVRET5 -BR
15	S73SLD – GR/BK
16	(UNUSED)
17	S10SLE - BL
18	C114LS – BK/RD
19	(UNUSED)
20	C73SBR - BL/RD
21	C72SBE – BL/WH
22	(UNUSED)
23	C113MFV – OR/RD
24	(UNUSED)
25	C04TRL - WH
28	COSTRR - WH/BK
27	Vl.VRTN7 - BR
28	(UNUSED)
29	(UNUSED)
30	VLVRETS - BR
31	(UNUSED)
32	C27AUX - RD
33	P125SBLE - WH/RD
34	P128SBLD – WH/BK
35	(UNUSED)

Relay and Fuse Panel Legends

Deutz BF4L2011i models

	CR23 Lights Option			
CR28 Eng. Run/ Alt. Field Relay	CR17 Oil Cooler Relay	F20 20A Hi/Lo RPM	F23 30A Eng/Str/Alt	B1 Battery
		F22 60A Glow Plug	F7 20A Cooler	B2 Battery
	CR5 Horn Relay	R21 Ignition	CR1 Start Relay	CR15 Glow Plug
		Ground		

Deutz 2.9TF models

CR2 Eng. Run/ Alt. Field Relay	CR17 Oil Cooler Relay	F27 30A ECU Power	F23 30A Eng/Str/Alt	B1 Battery ● ● B2 Battery
		F22 60A Glow plug	F7 30A Horn/Options	
CR28 Fuel Pump	CR5 Horn Relay	CR39 Engine Shutdown	CR23 Lights Relay Option	CR41 Flashing Beacons Option
		R21 Ignition ● ● Ground	70A	CR15 Glow Plug 70A

Relay and Fuse Panel Legends

Perkins 804D models

	CR23 Lights Option			
CR28 Eng. Run/ Alt. Field Relay	CR17 Oil Cooler Relay	CB20 10A Hi/Lo RPM	F23 30A Eng/Str/Alt	B1 Battery
		F22 60A Glow plug	F7 20A Cooler	B2 Battery
CR4 RPM Relay	CR5 Horn Relay	R21 Ignition / Ground	CR1 Start Relay	CR15 Glow Plug

Perkins 404TF models

CR2 Eng. Run/ Alt. Field Relay	CR17 Oil Cooler Relay	F27 30A ECU Power	F23 30A Eng/Str/Alt	B1 Battery ● ● B2 Battery
		F22 60A Glow plug	F7 30A Horn/Options	
CR28 Fuel Pump	CR5 Horn Relay	CR81 ECU Power Relay	CR23 Lights Relay Option	CR41 Flashing Beacons Option
CR15B ARD Glow Plug	CR79 Burner Air Pump	R21 Ignition ● ● Ground	CR1 Start Relay 70A	CR15 Glow Plug 70A

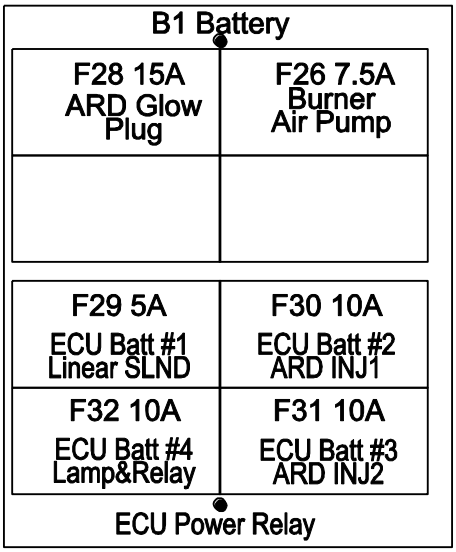
Perkins 404D models

	CR23 Lights Option			
CR28 Eng. Run/ Alt. Field Relay	CR17 Oil Cooler Relay	CB20 10A Hi/Lo RPM	F23 30A Eng/Str/Alt	B1 Battery
		F22 60A Glow plug	F7 20A Cooler	B2 Battery
CR61 ECG Power	CR5 Horn Relay	R21 Ignition / Ground	CR1 Start Relay	CR15 Glow Plug

Continental/GM models

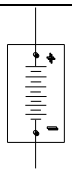
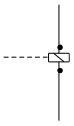
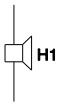
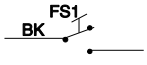
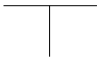
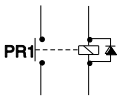
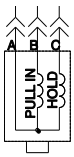
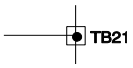
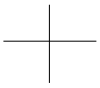
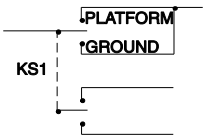
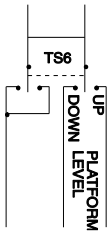
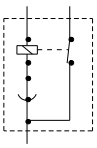
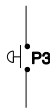
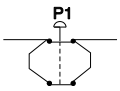
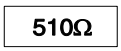
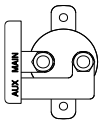
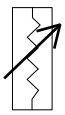
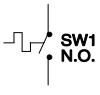
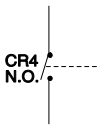
	CR23 Lights Option		
CR17 Oil Cooler Relay	F17 30A Engine		B1 Battery
		F7 20A Oil Cooler	B2 Battery
CR5 Horn Relay	R21 Ignition / Ground	CR1 Start Relay	

Perkins Tier 4 Fuse Panel

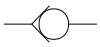
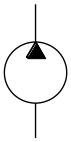
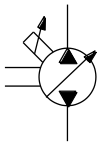
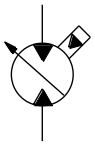
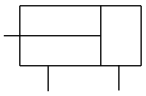
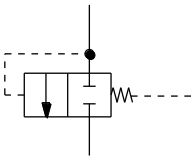
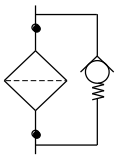
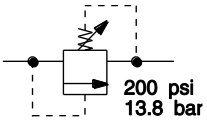
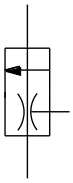
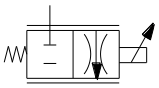
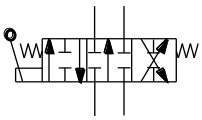
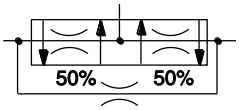
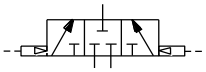
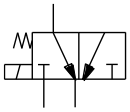
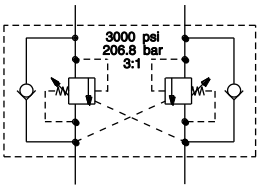
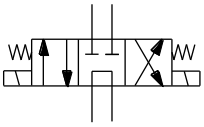
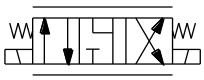
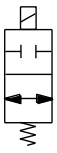


122864 D

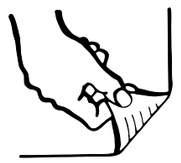
Electrical Symbol Legend

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

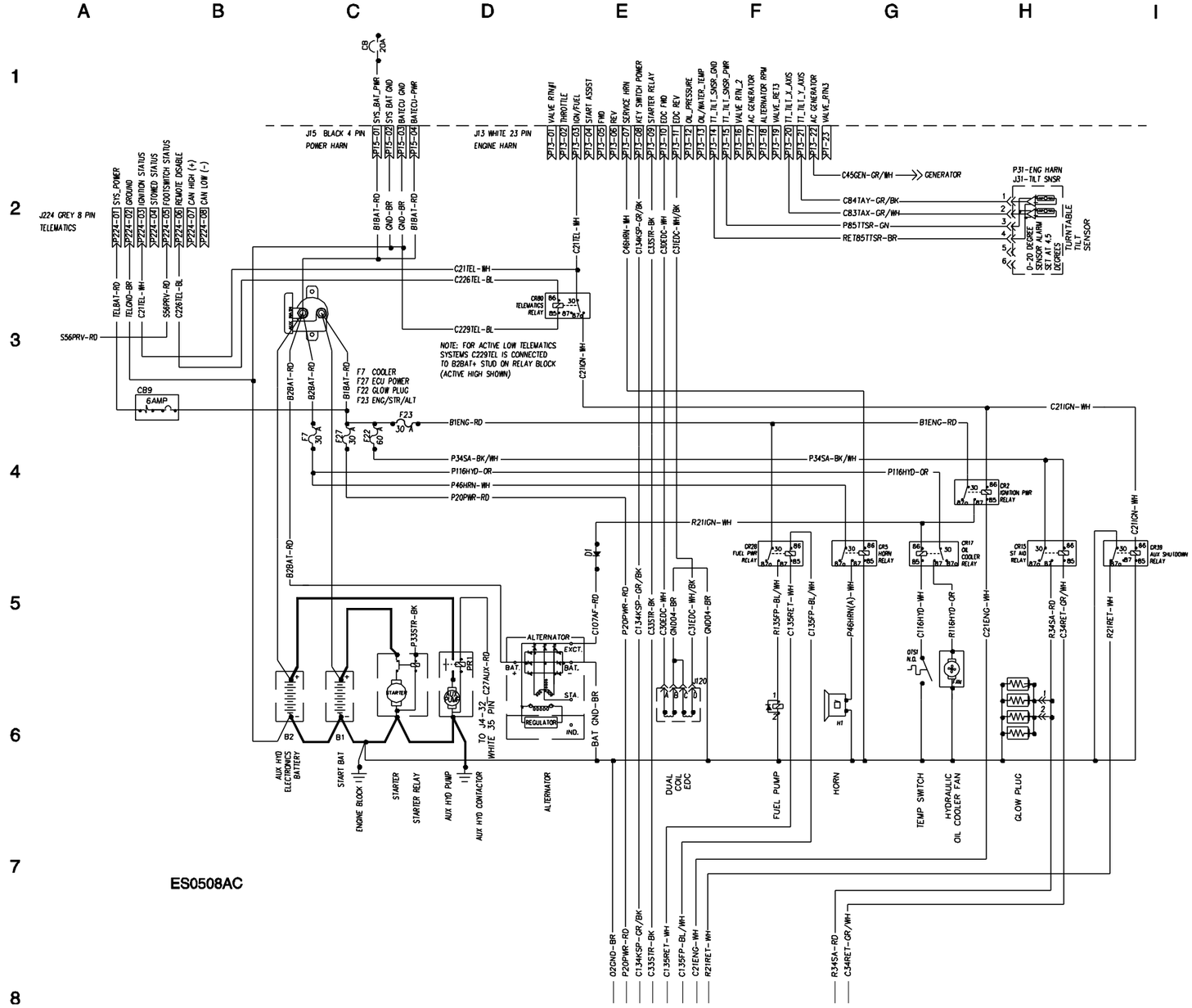
Hydraulic Symbols Legend

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

Electrical Schematic - Engine Options, Deutz TD 2.9 L4 Engine



Electrical Schematic - Engine Options, Deutz TD 2.9 L4 Engine



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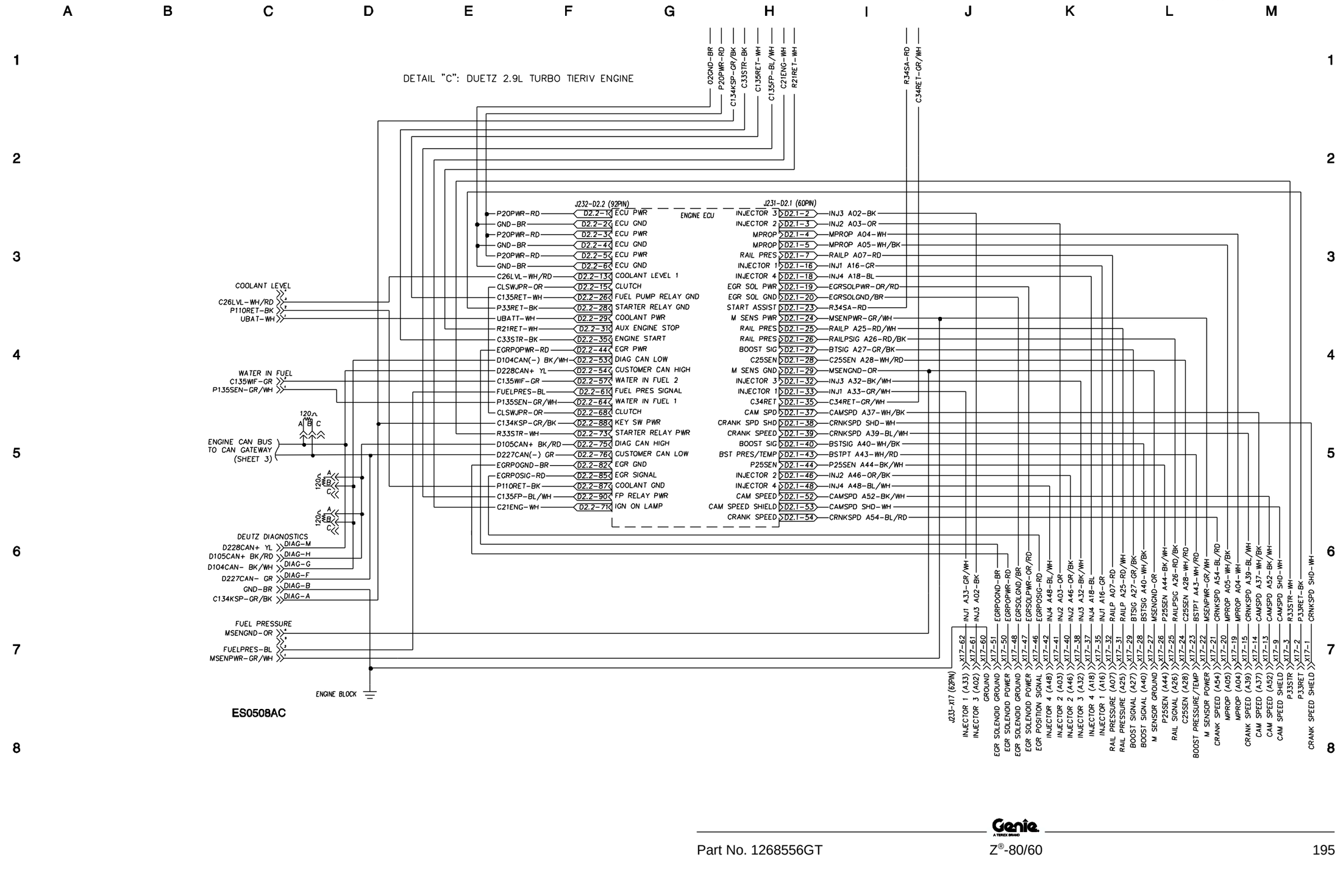
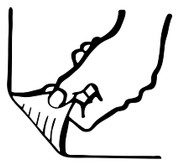
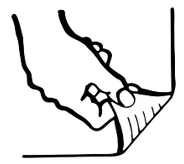
Electrical Schematic - Engine Options, Deutz TD 2.9 L4 Engine Harness



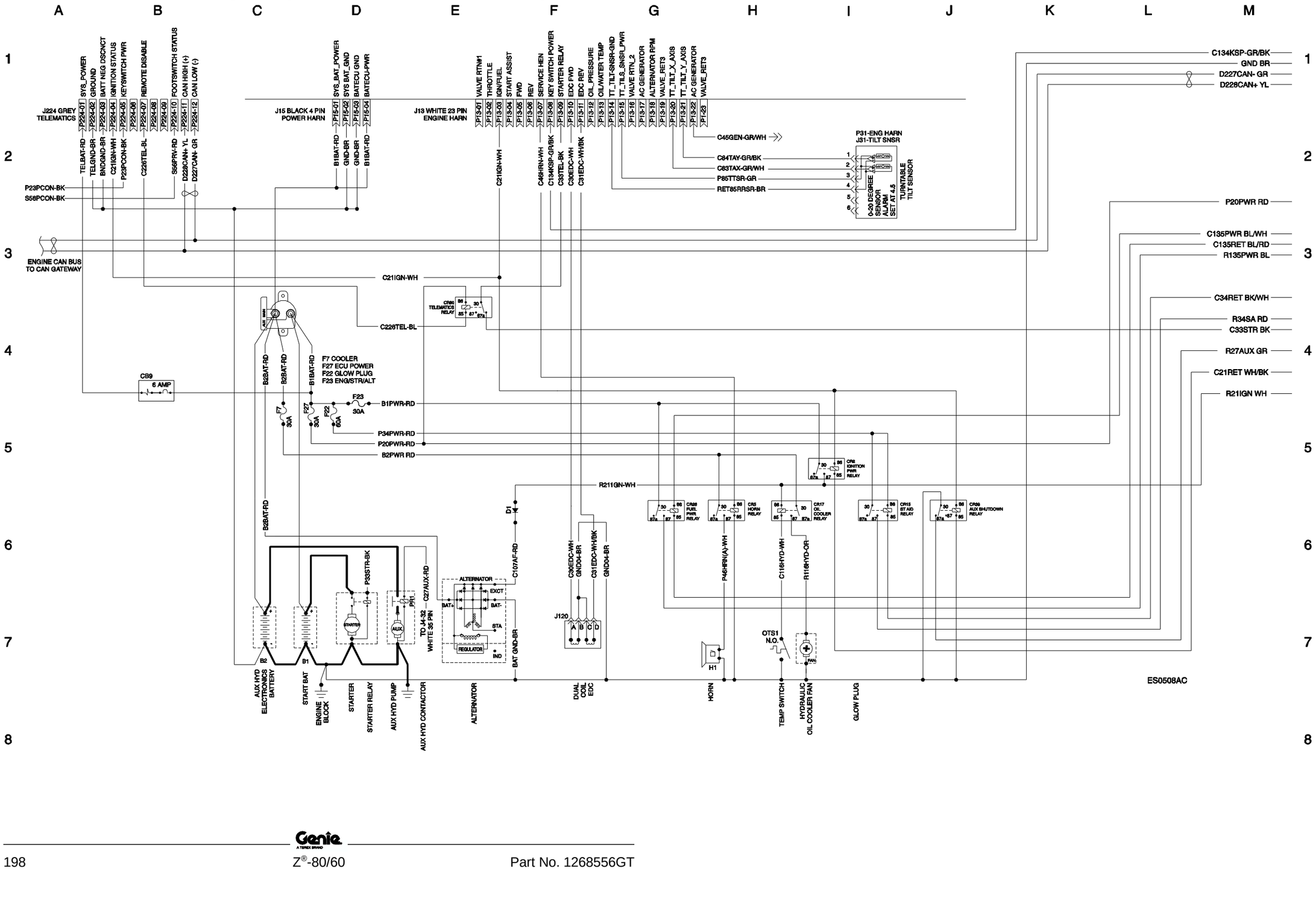
Electrical Schematic - Engine Options, Deutz TD 2.9 L4 Engine Harness



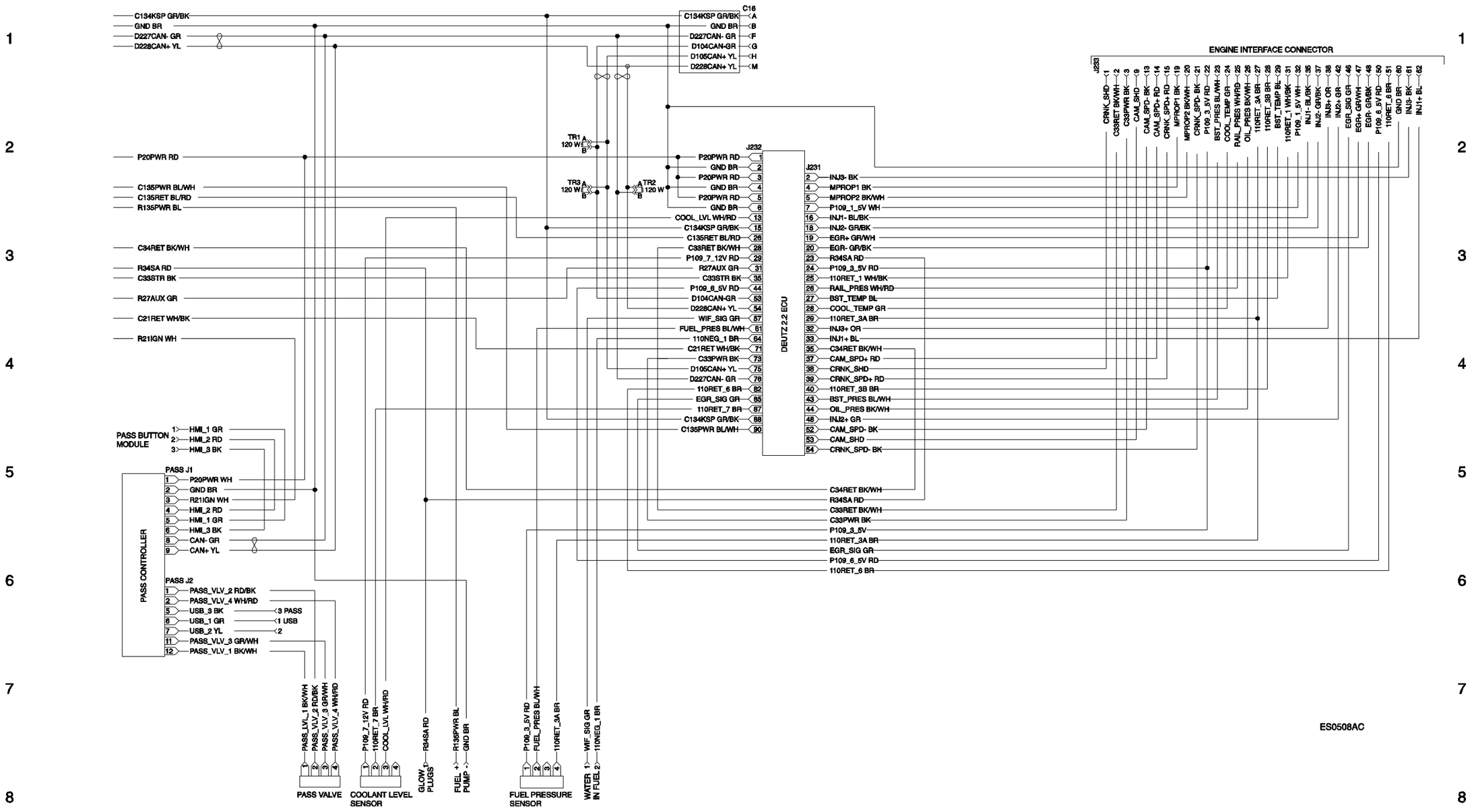
Electrical Schematic - Engine Options, Deutz TCD 2.2 L3 Engine



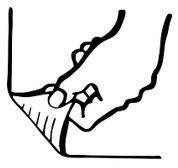
Electrical Schematic - Engine Options, Deutz TCD 2.2 L3 Engine



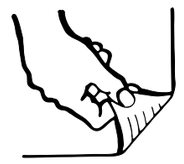
Electrical Schematic - Engine Options, Deutz TCD 2.2 L3 Engine Harness, Tier IV Models



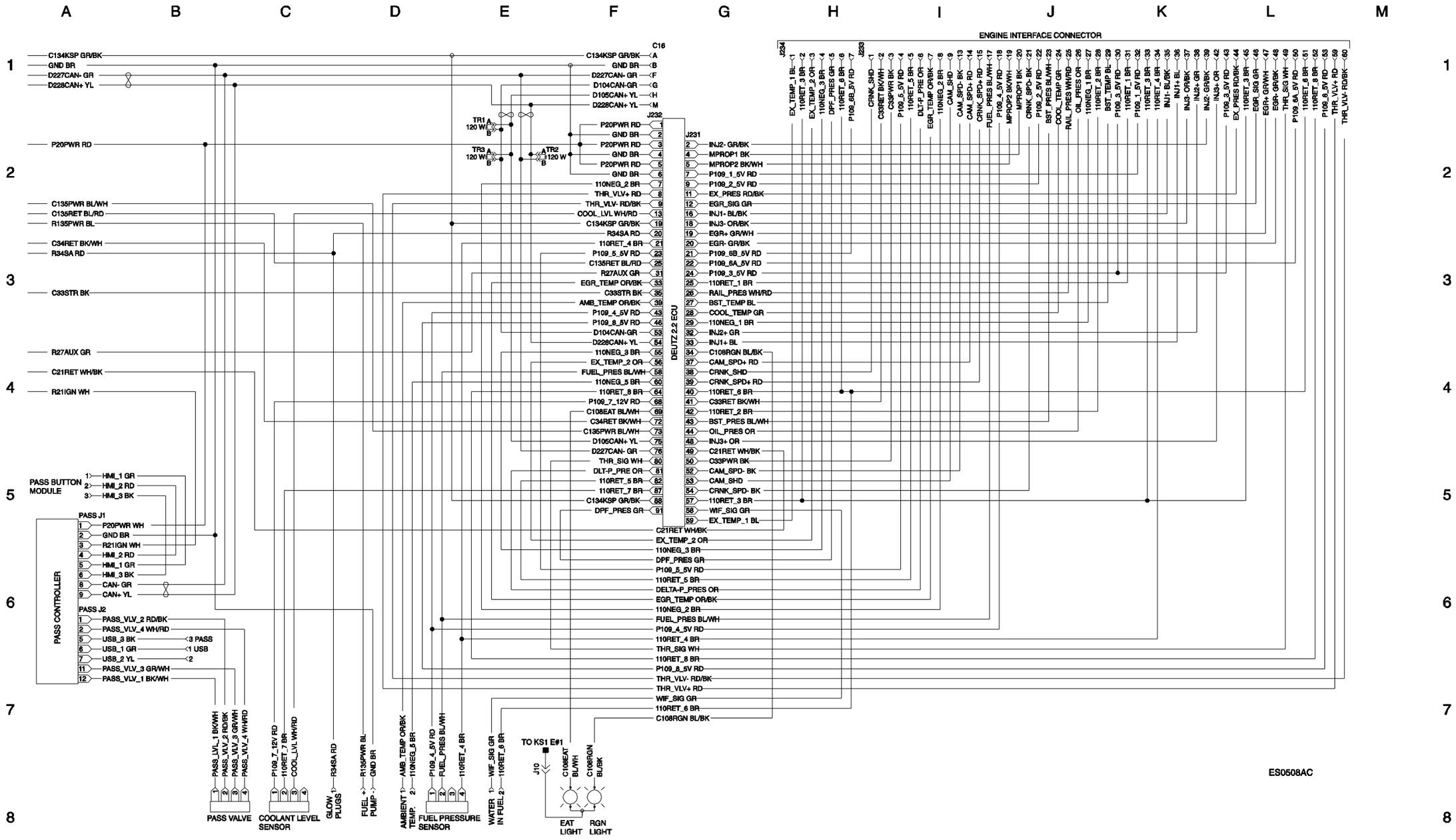
Electrical Schematic - Engine Options, Deutz TCD 2.2 L3 Engine Harness, Tier IV Models



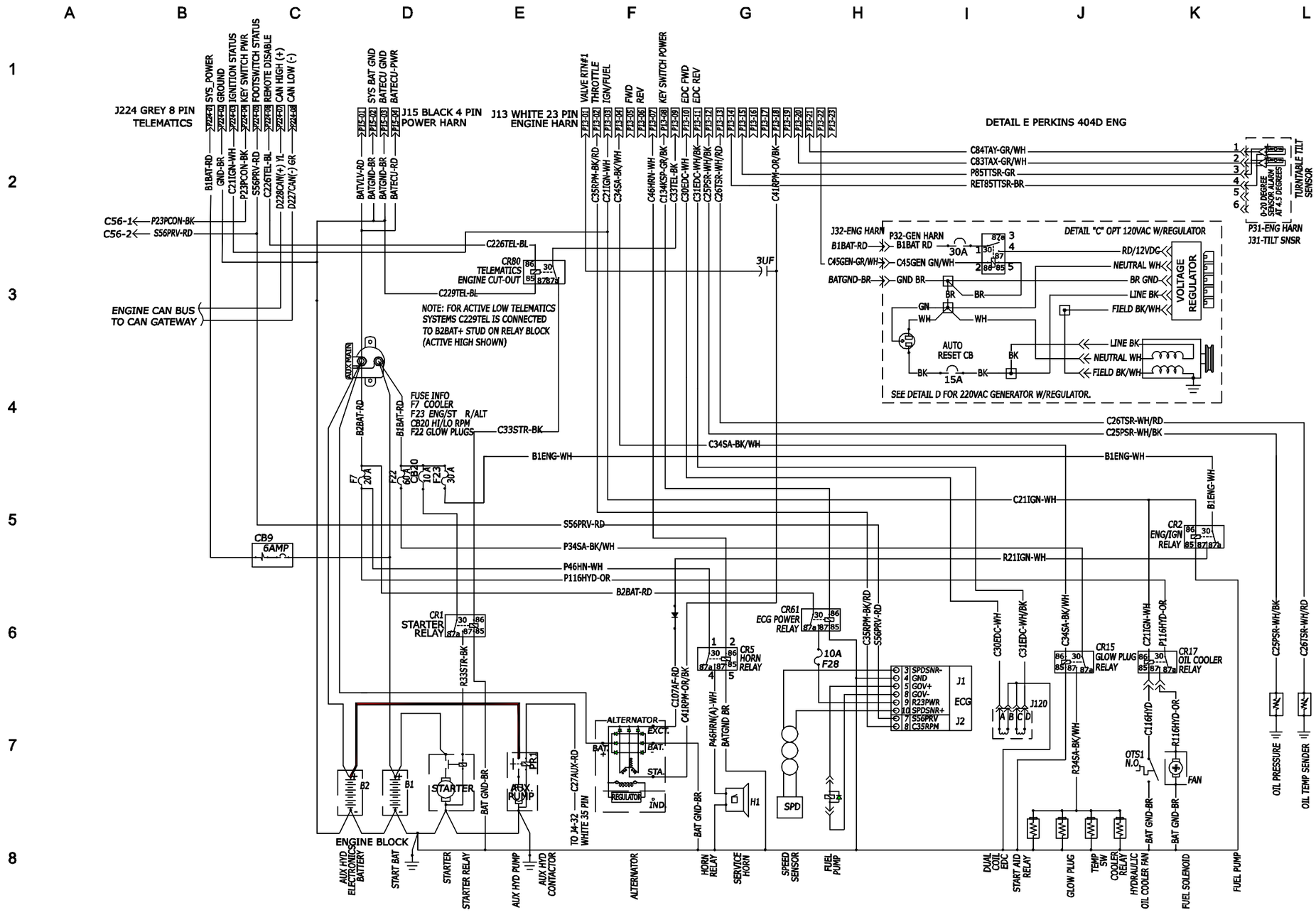
Electrical Schematic - Engine Options, Deutz TCD 2.2 L3 Engine Harness, Stage V Models



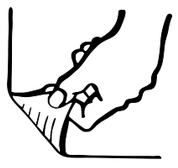
Electrical Schematic - Engine Options, Deutz TCD 2.2 L3 Engine Harness, Stage V Models



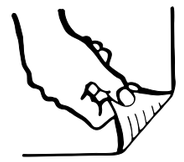
Electrical Schematic - Engine Options, Perkins 404D-22T Engine



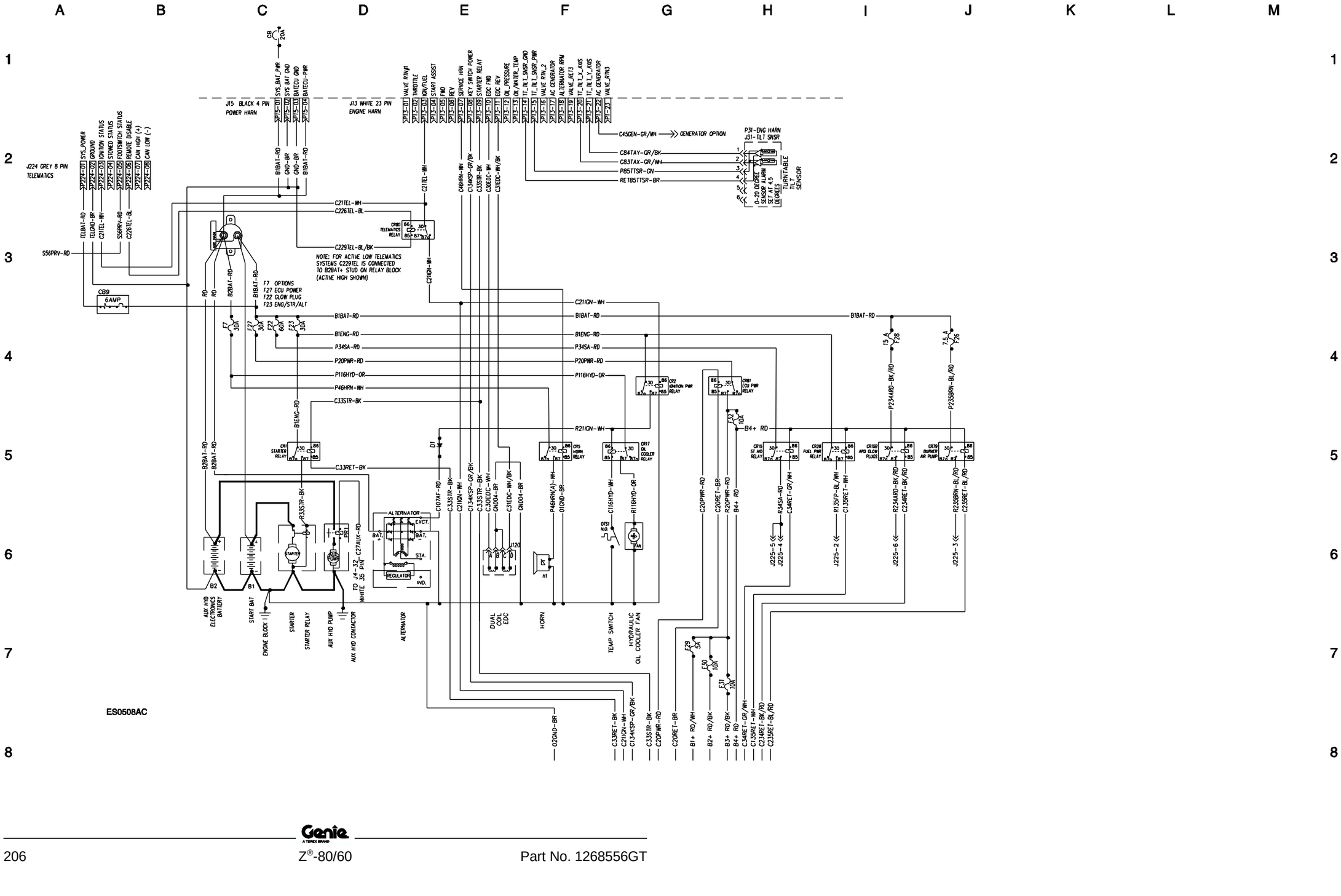
Electrical Schematic - Engine Options, Perkins 404D-22T



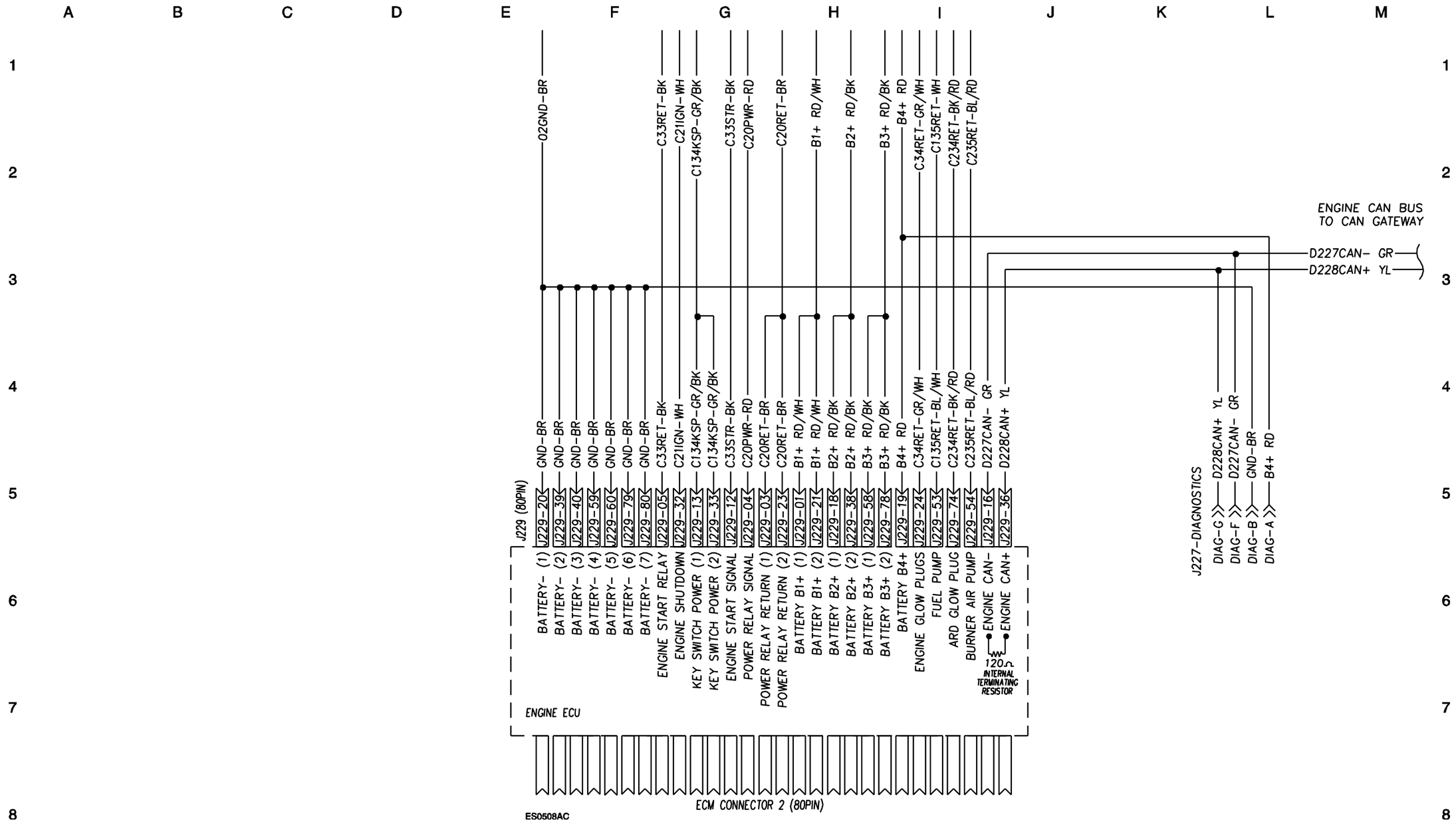
Electrical Schematic - Engine Options, Perkins 404F-E22TA Engine



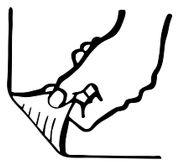
Electrical Schematic - Engine Options, Perkins 404F-E22TA Engine



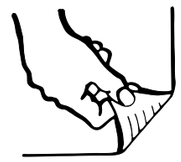
Electrical Schematic - Engine Options, Perkins 404F-E22TA Engine Harness



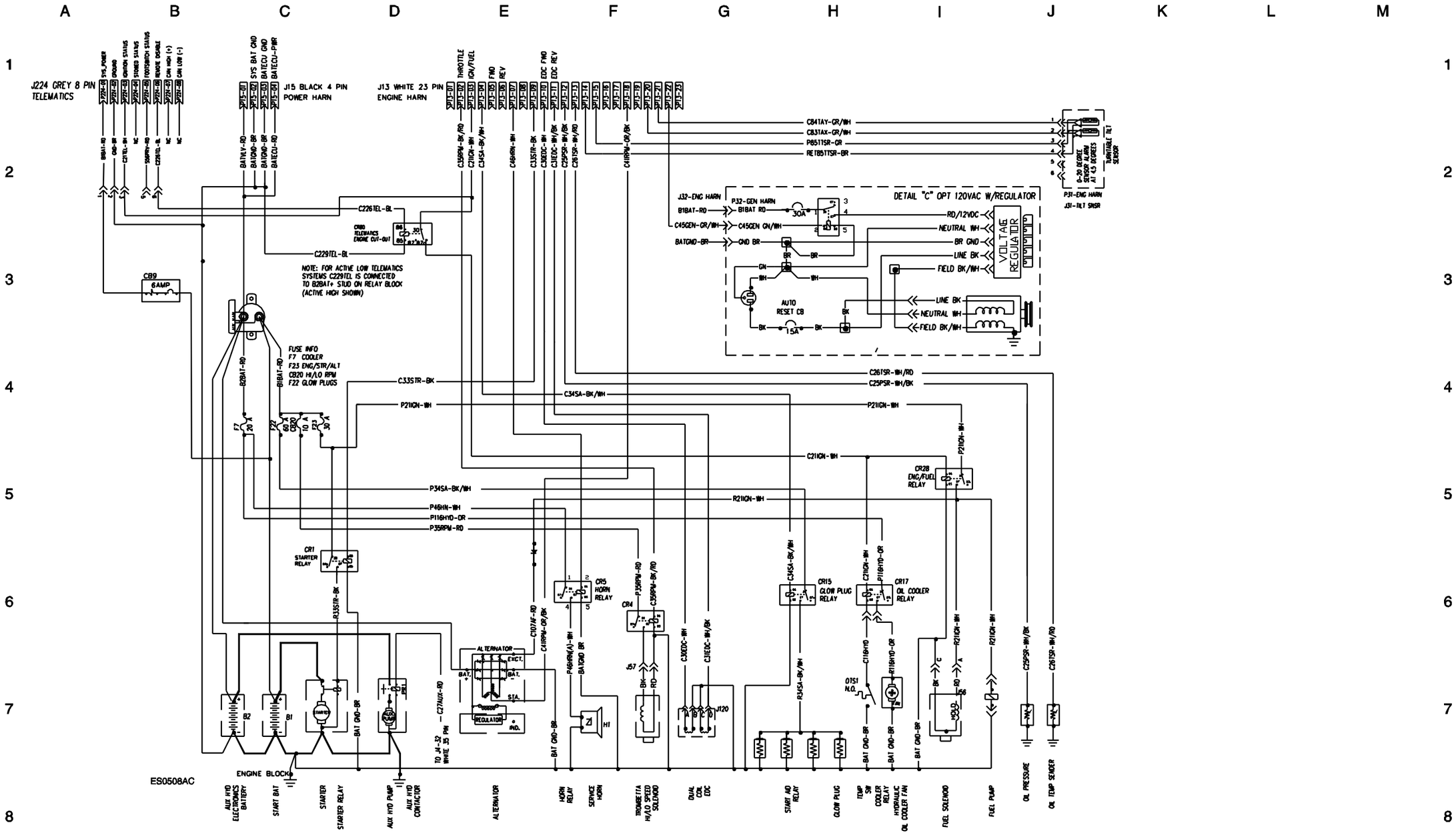
Electrical Schematic - Engine Options, Perkins 404F-E22TA Engine Harness



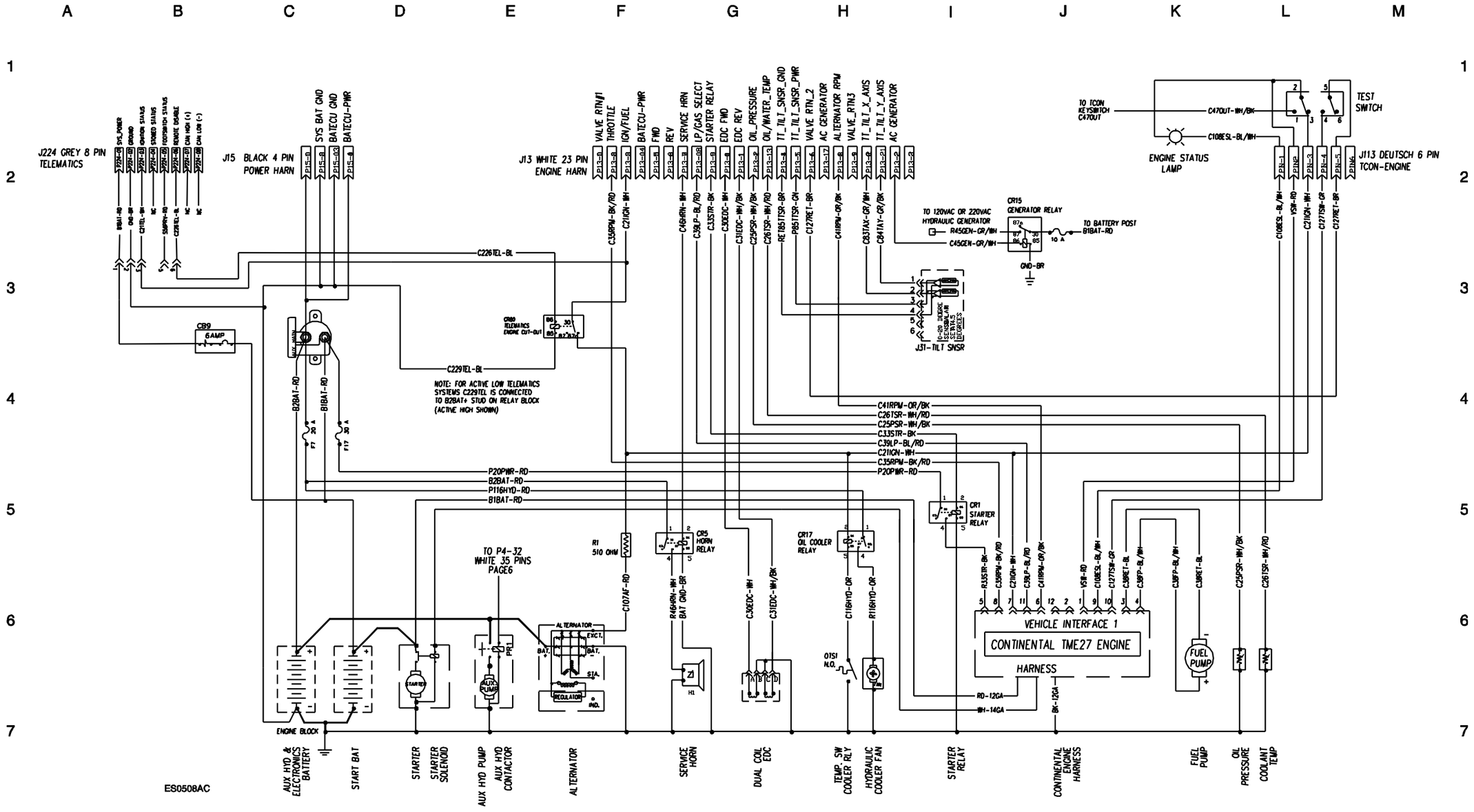
Electrical Schematic - Engine Options, Perkins 804D Engine



Electrical Schematic - Engine Options, Perkins 804D Engine



Electrical Schematic - Engine Options, Continental TME27 Engine



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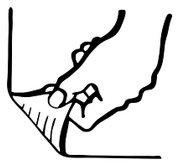
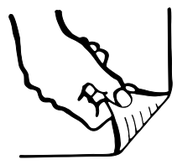
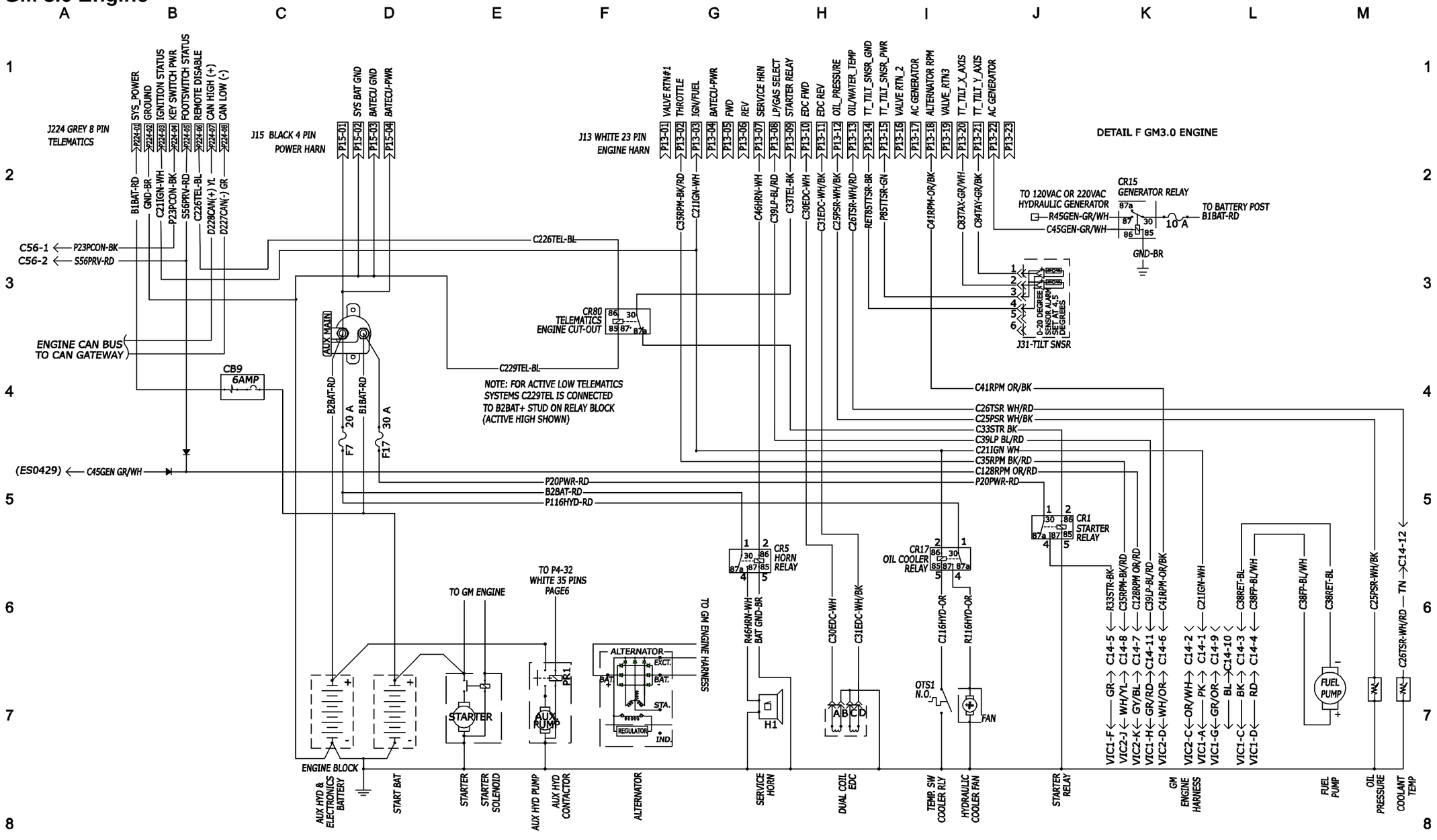
Electrical Schematic - Engine Options, Continental TME27 Engine



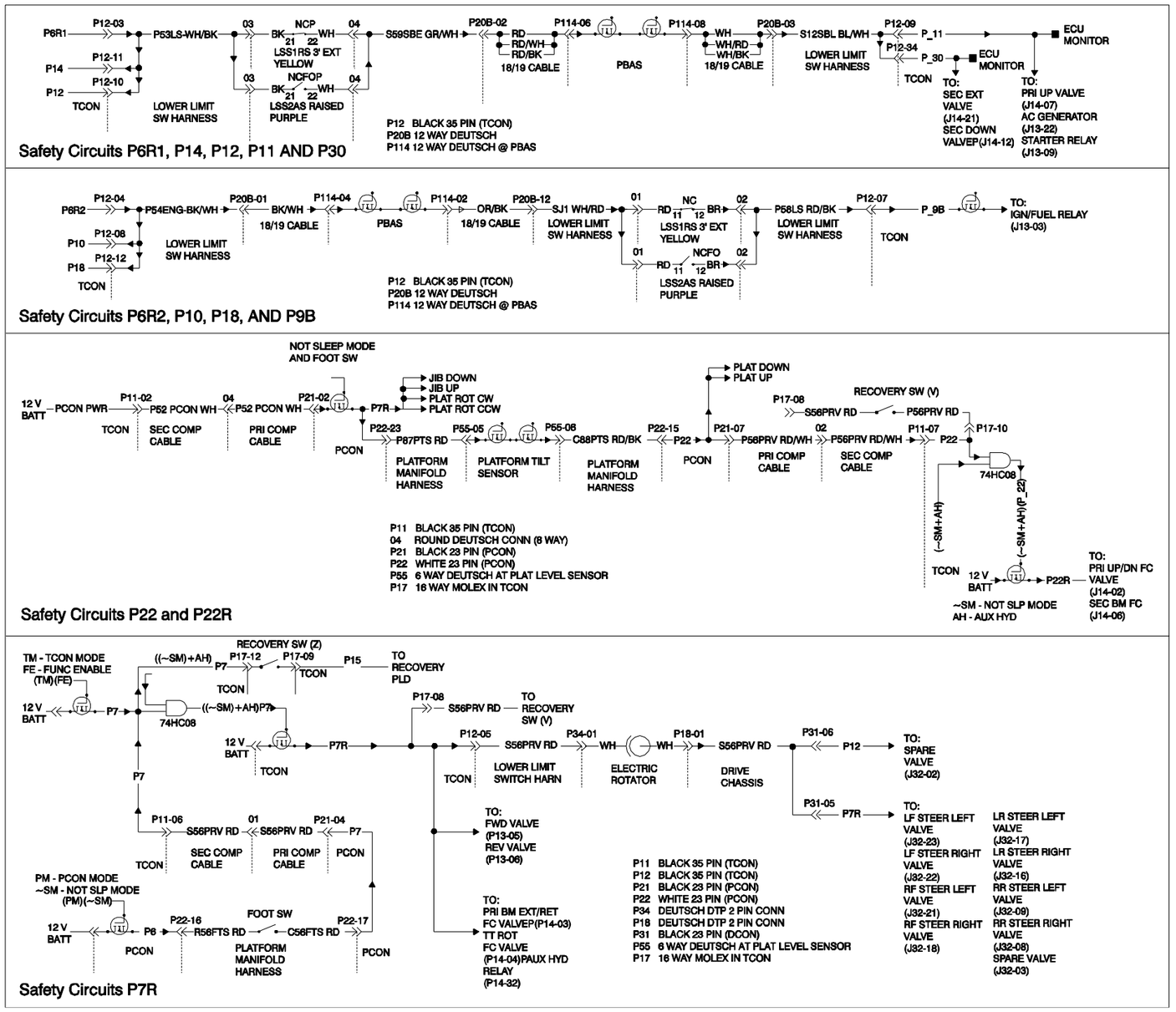
Electrical Schematic - Engine Options, GM 3.0 Engine



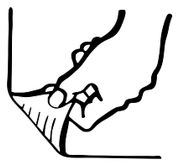
Electrical Schematic - Engine Options, GM 3.0 Engine



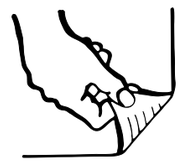
Electrical Schematic - Safety Circuits



Electrical Schematic - Safety Circuits

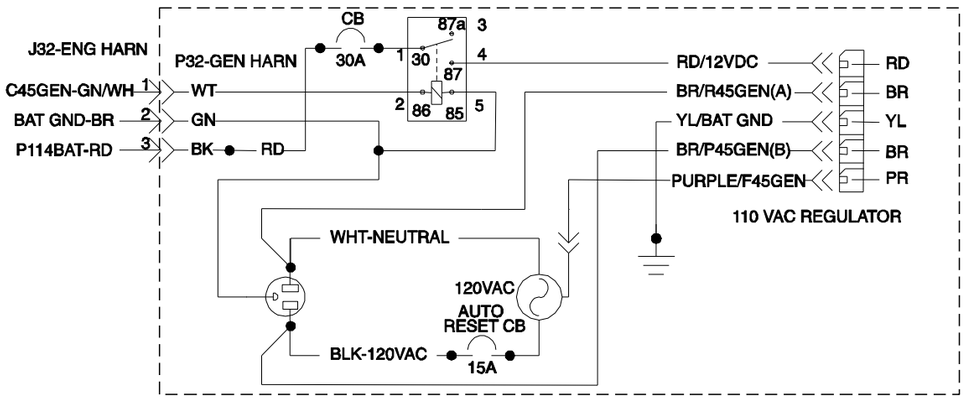


Electrical Schematic - Generator Options

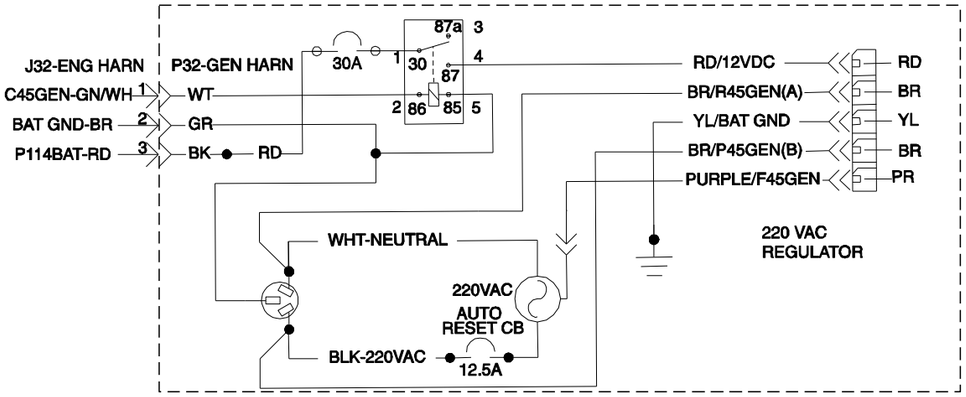


Electrical Schematic - Generator Options

Belt Driven Generator Option

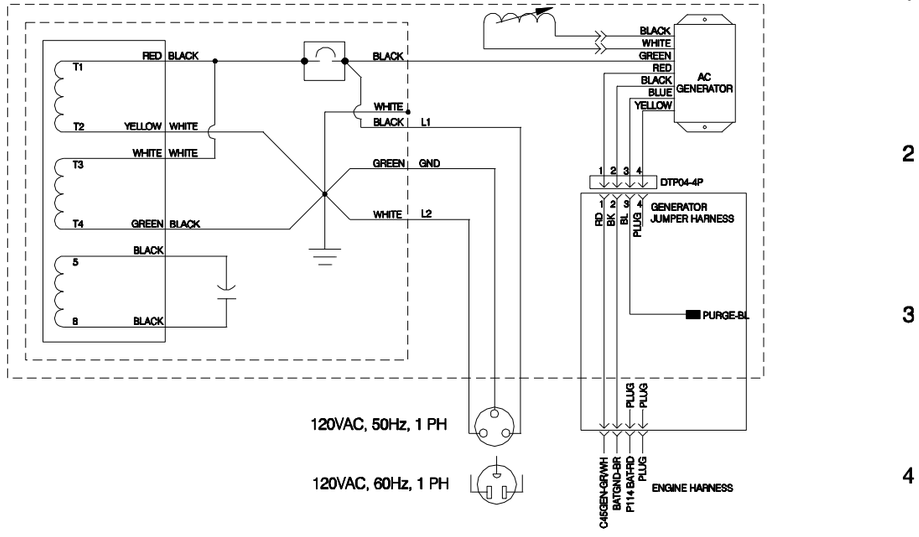


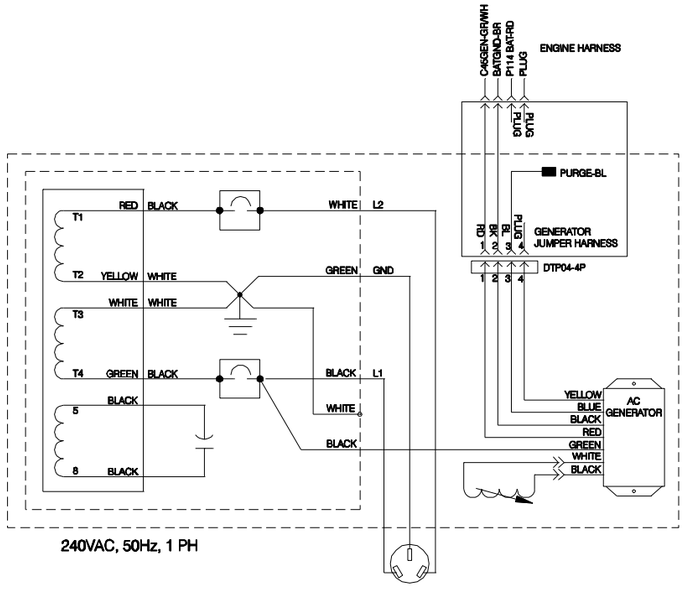
120VAC GENERATOR W/REGULATOR.



220VAC GENERATOR W/REGULATOR.

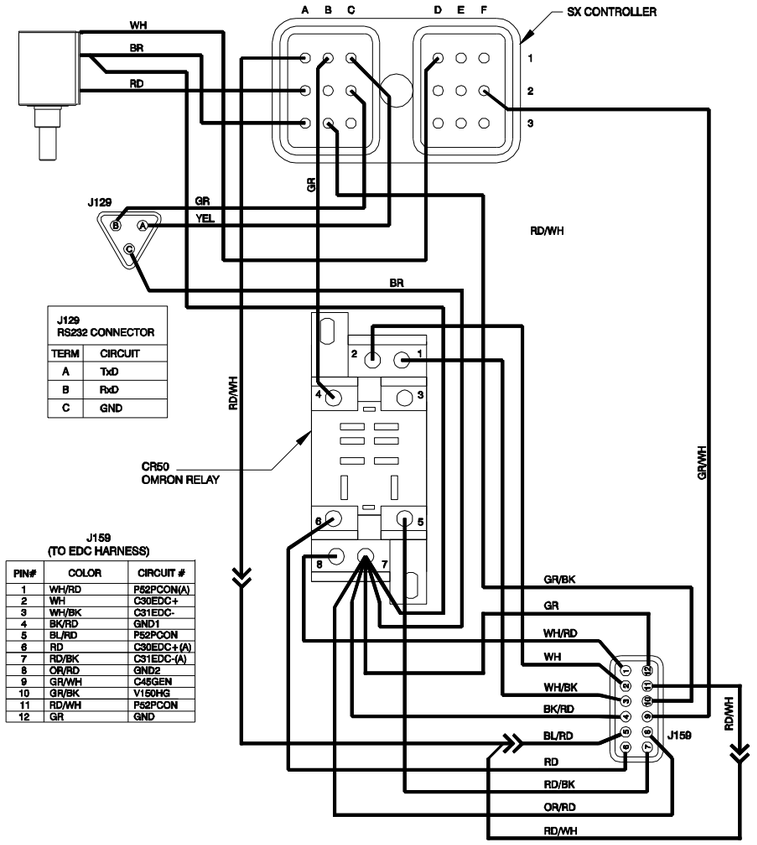
MTE Hydraulic Generator Option





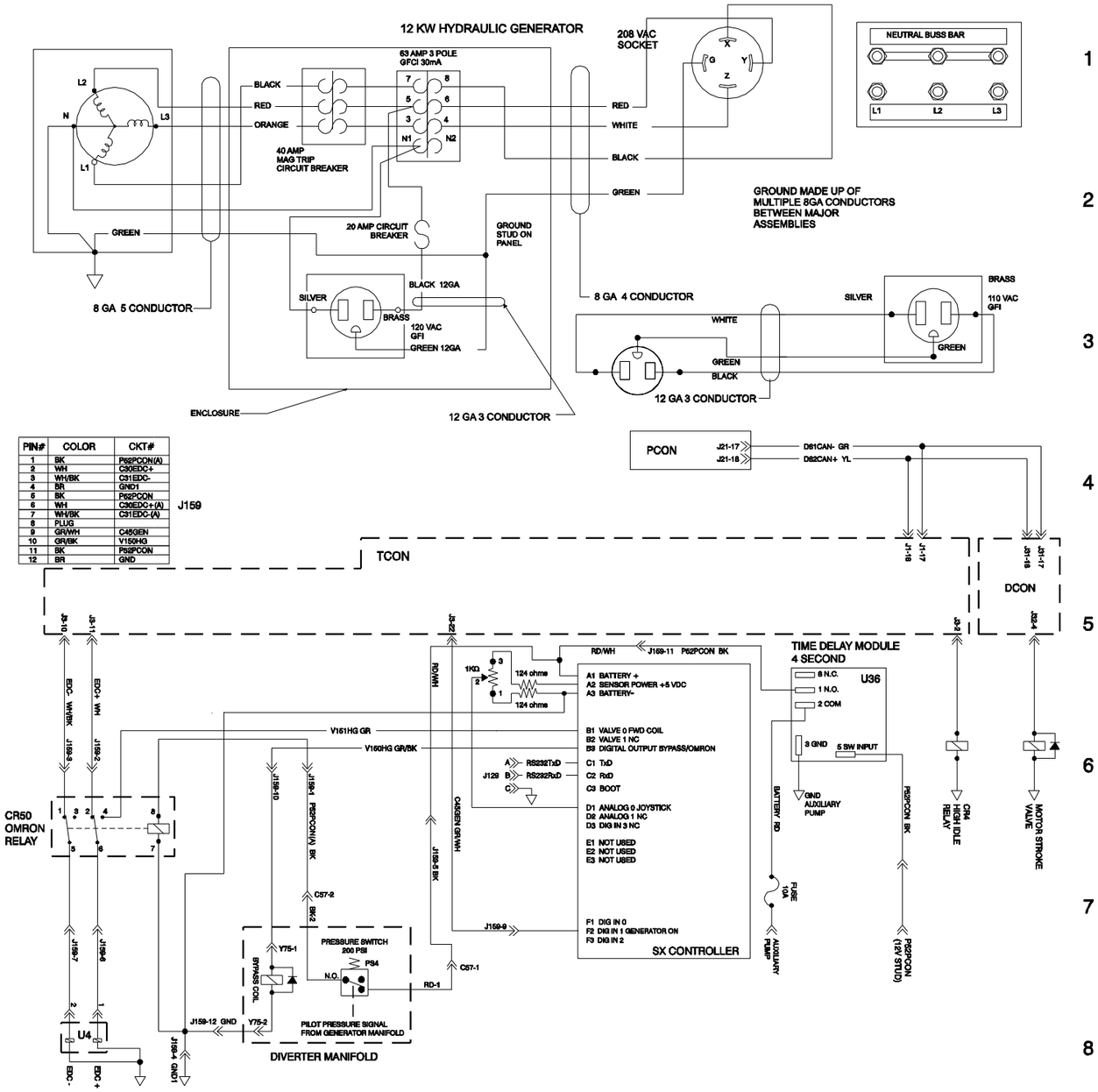
Electrical Schematic - Welder Generator Option

SX CONTROLLER SAUER #K23334		
TERMINAL	CIRCUIT	COLOR
A1	P52PCON	RD/WH
A2	SENSOR POWER +5V	RD
A3	BATTERY-	BR
B1	V151HG	GR
B2	NC	
B3	V150HG	GR/BK
C1	TxD	YEL
C2	RxD	GR
C3	/BOOT	
D1	JOYSTICK	WH
D2	NC	
D3	NC	
E1	NOT USED	
E2	NOT USED	
E3	NOT USED	
F1	NOT USED	
F2	C45GEN	GR/WH
F3	NOT USED	



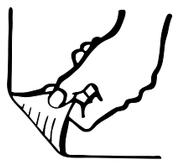
J129 RS232 CONNECTOR	
TERM	CIRCUIT
A	TxD
B	RxD
C	GND

J159 (TO EDC HARNESS)		
PIN#	COLOR	CIRCUIT #
1	WH/RD	P52PCON(A)
2	WH	C30EDC+
3	WH/BK	C31EDC-
4	BK/RD	GND1
5	BL/RD	P52PCON
6	RD	C30EDC+(A)
7	RD/BK	C31EDC-(A)
8	OR/RD	GND2
9	GR/WH	C45GEN
10	GR/BK	V150HG
11	RD/WH	P52PCON
12	GR	GND

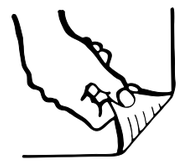


J159		
PIN#	COLOR	CKT#
1	BK	P52PCON(A)
2	WH	C30EDC+
3	WH/BK	C31EDC-
4	BR	GND1
5	BK	P52PCON
6	WH	C30EDC+(A)
7	WH/BK	C31EDC-(A)
8	PLUG	
9	GR/WH	C45GEN
10	GR/BK	V150HG
11	BK	P52PCON
12	BR	GND

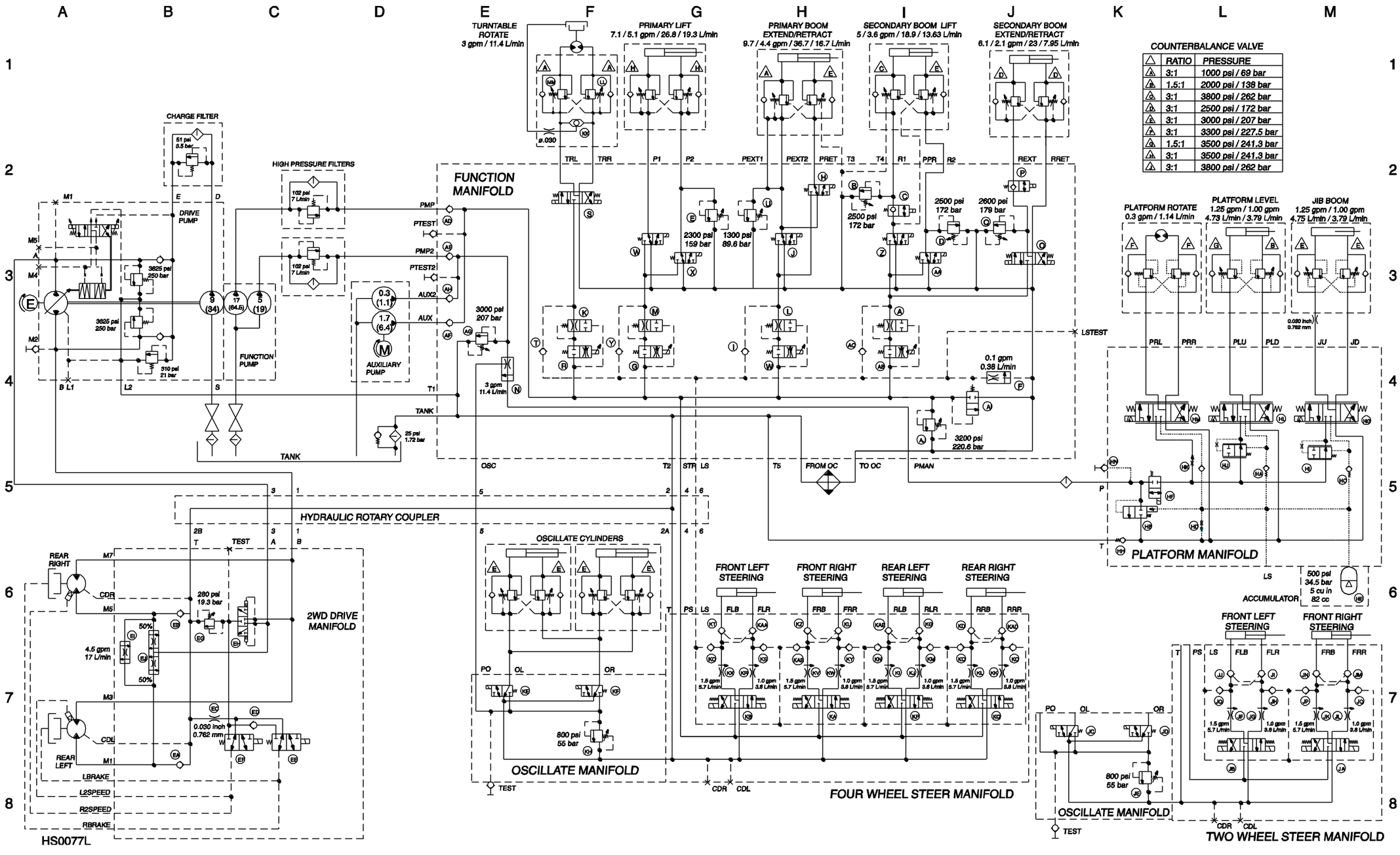
Electrical Schematic - Welder Generator Option



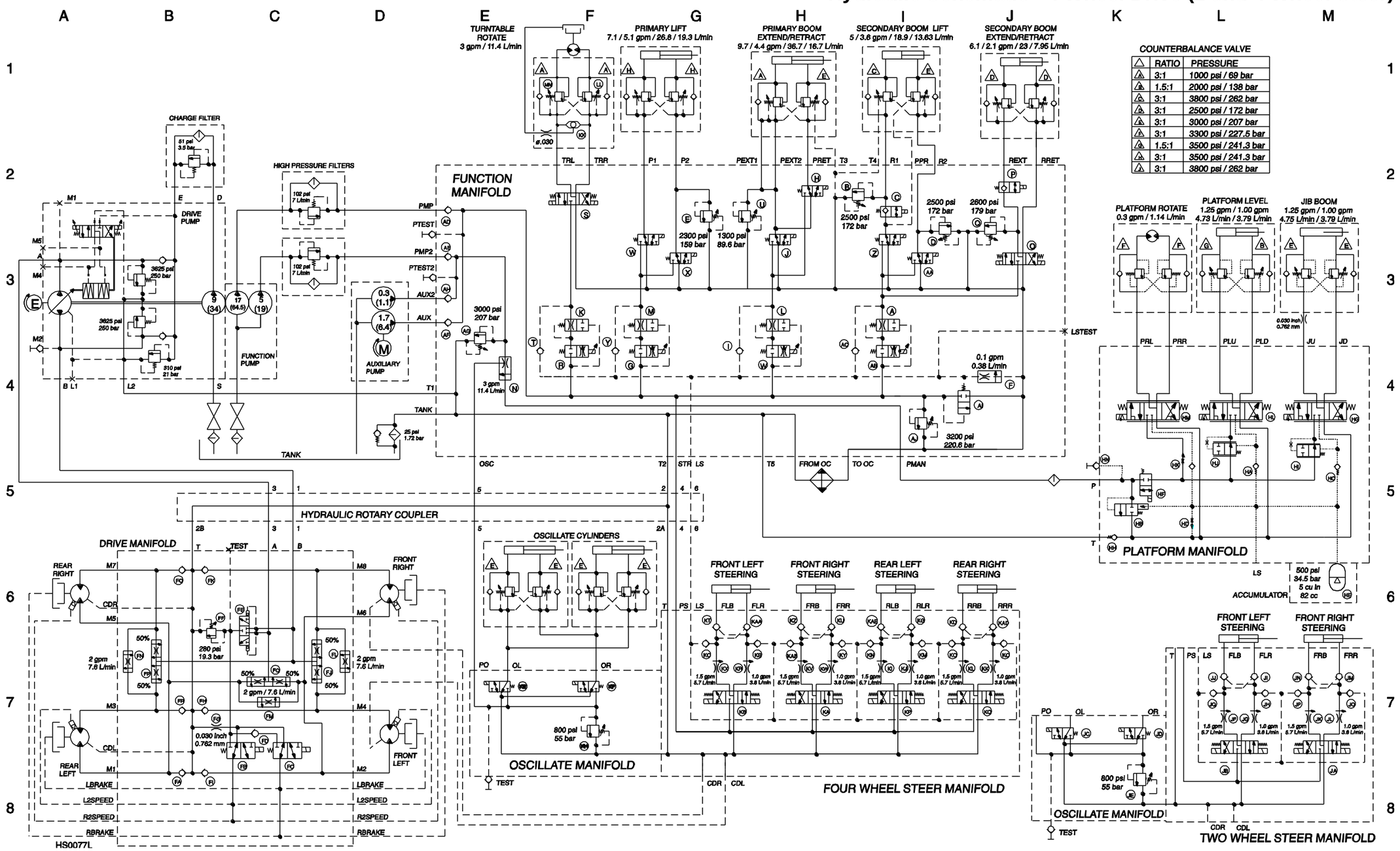
Hydraulic Schematic - 2 Wheel Drive (2 and 4 Wheel Steer)



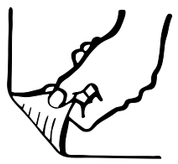
Hydraulic Schematic - 2 Wheel Drive (2 and 4 Wheel Steer)



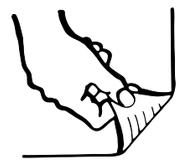
Hydraulic Schematic - 4 Wheel Drive (2 and 4 Wheel Steer)



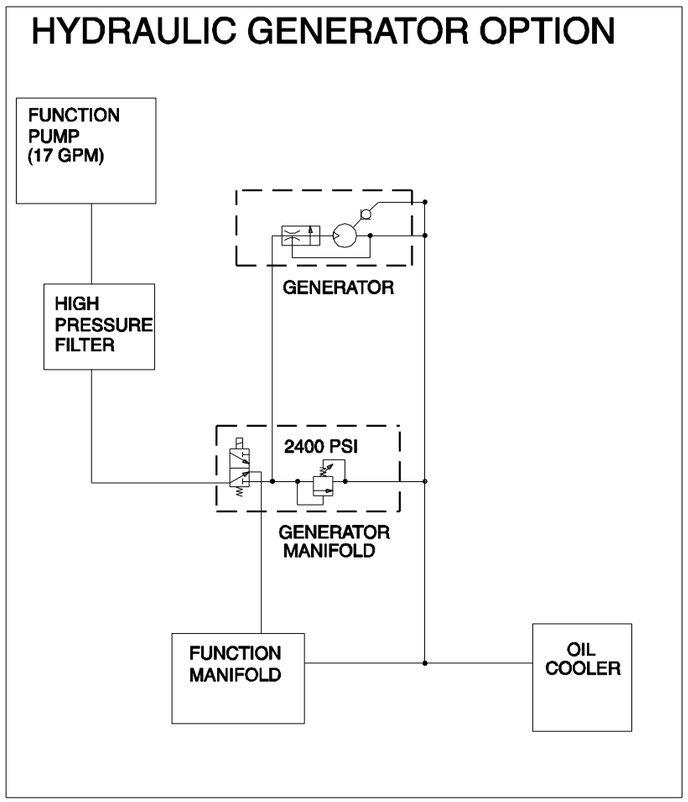
Hydraulic Schematic - 4 Wheel Drive (2 and 4 Wheel Steer)

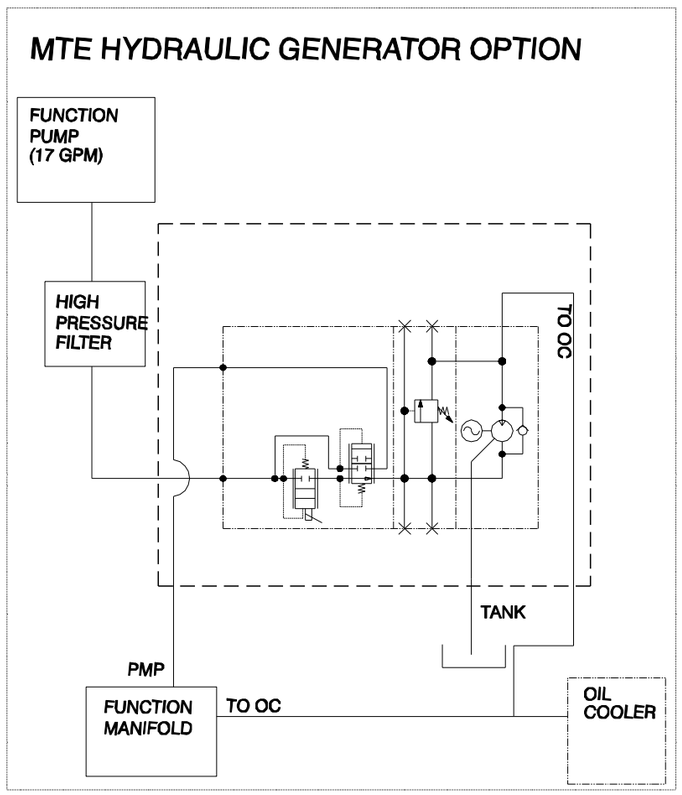


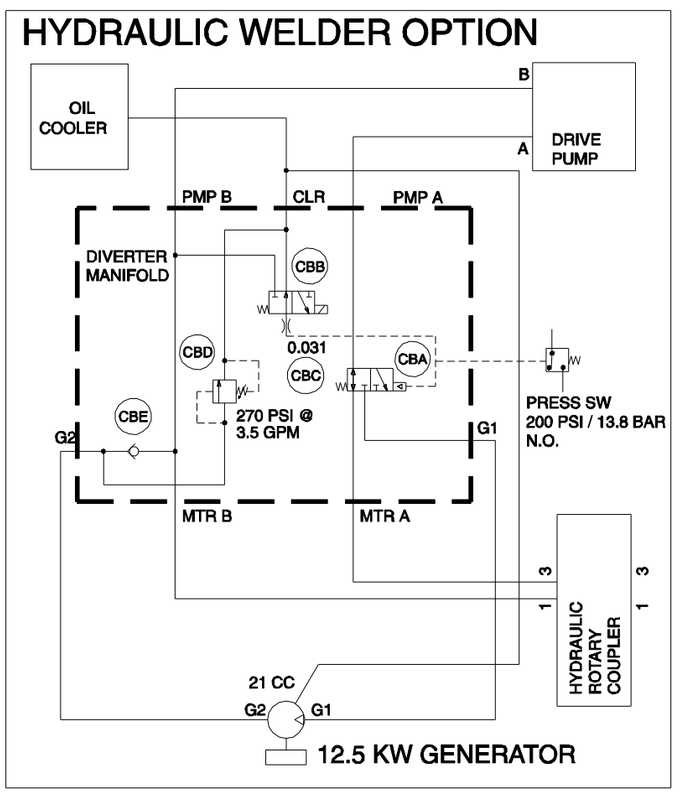
Hydraulic Schematic - Hydraulic Generator Options



Hydraulic Schematic - Hydraulic Generator Options

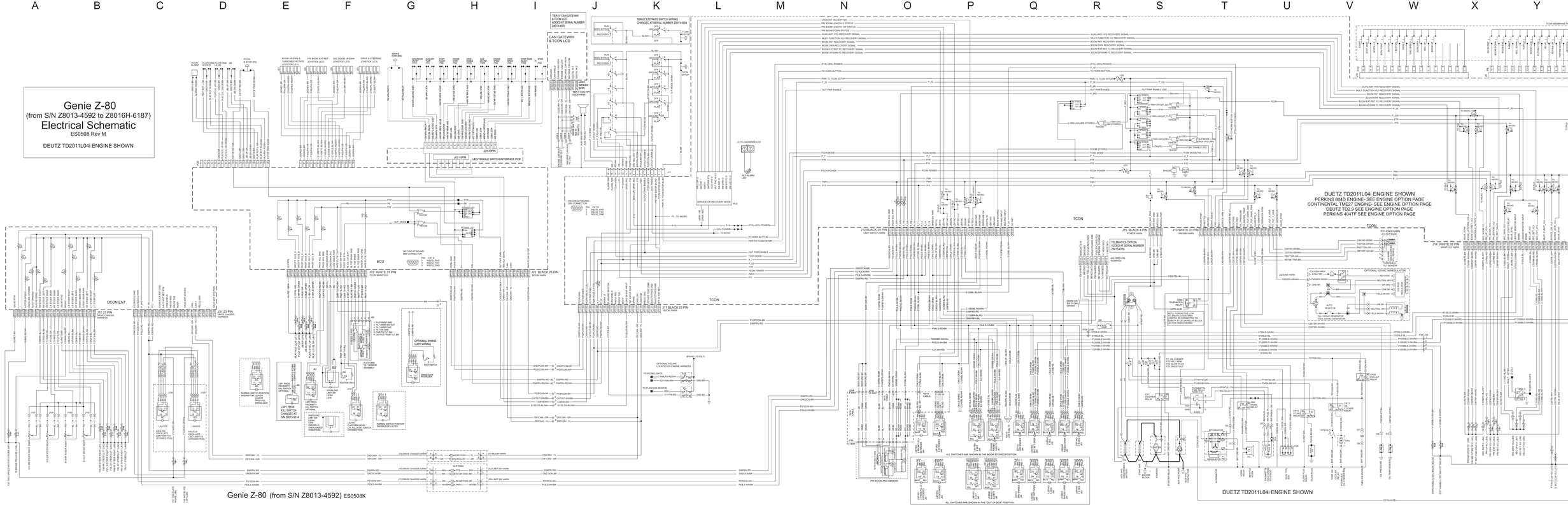






Genie Z-80
(from S/N Z8013-4592 to Z8016H-6187)
Electrical Schematic
ES0508 Rev M

DEUTZ TD2011L04i ENGINE SHOWN



Genie Z-80
(from S/N Z80H-6188)
Electrical Schematic
ES0508 Rev W
DEUTZ TD2011L04i ENGINE SHOWN
ECU
TCON

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.

www.genielift.com

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