Genie®
A TEREX BRAND

Service and Repair Manual

Serial Number Range

GTH™-1056

From GTH1016E-11305 to
GTH1016E-11799
includes GTH1016E-11281
GTH1016E-11282
GTH1016E-11286

from GTH10E-11800 to
GTH10E-12499

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. 1278145
Rev B2
April 2018

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 Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

Technical Publications

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

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

Contact Us:

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Find a Manual for this Model

Go to http://www.genielift.com

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

1278145 Rev B1, April 2018

Second Edition, First Printing

Revision History

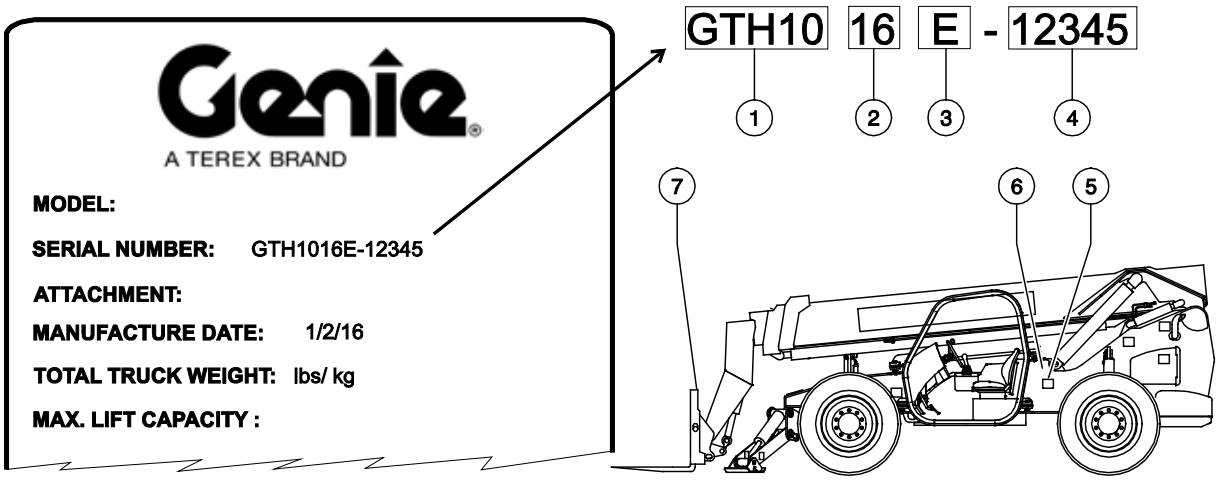
Revision	Date	Section	Procedure / Page / Description
A	3/2016		Initial Release
A1	4/2016	Repair	Revise manifold torque values
B	8/2017	Specifications Repair Schematics	added T4F specifications added ZF transmission repair manual updated fuse panel layout; updated electrical component legend; added ES0466B; updated HS0201H and HS0202H
B1	4/2018	Schematics	Added ES0603; added Deutz Engine Harness: added HS0212
B2	4/2018		Moved ES603 and HS0212 to new SRM; added final serial number

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

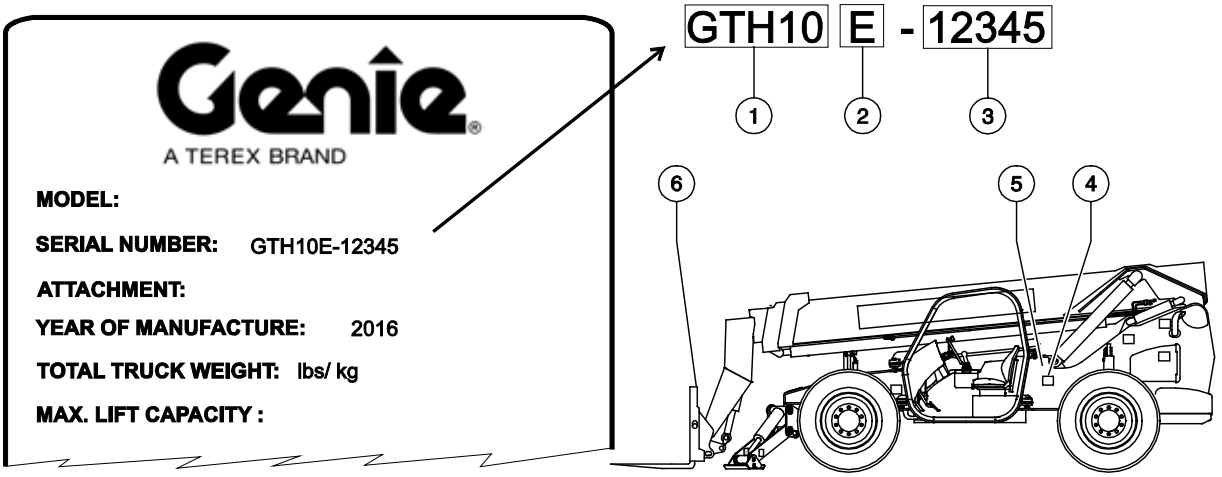
To August 31, 2016



1 Model
2 Model year
3 Facility code
4 Sequence number

1 Serial label
2 Serial number (stamped on chassis)
3 Serial label (located inside fork frame)

From September 1, 2016



1 Model
2 Facility code
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1 Serial label
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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:

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

R You read, understand and obey:

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

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

Safety Rules

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	14.00 x 24
Tire ply rating	12
Weight, rough terrain tire (air filled)	315 lbs 142.9 kg
Weight, rough terrain tire (foam filled)	967 ±35 lbs 439 ±16 kg
Weight, rock lug tire (foam filled)	1013 ±35 lbs 459 ±16 kg
Tire pressure (models with air-filled tires)	50 psi 3.45 bar
Lug nut torque	465 ft-lbs 630 Nm
Lug Pattern	10 x 13.189
Wheel diameter	24 in 60.1 cm
Wheel width	9 in 22.9 cm

Fluid capacities	
Fuel tank	35 gallons 132.5 liters
Hydraulic tank	44 gallons 166.5 liters
Hydraulic system (including tank)	55 gallons 208.2 liters
DEF tank	2.6 gallons 10 liters

Specifications

Performance Specifications

Drive speed, maximum	18 mph 29 km/h
Draw bar pull	29,000 lbs 13,154 kg
Lift capacity, maximum	10,000 lbs 4545 kg
Boom function speeds, maximum	
Boom up	17 to 19 seconds
Boom down	23 to 25 seconds
Boom extend	14 to 16 seconds
Boom retract	13 to 15 seconds
Fork rotate	3 to 6 seconds

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.

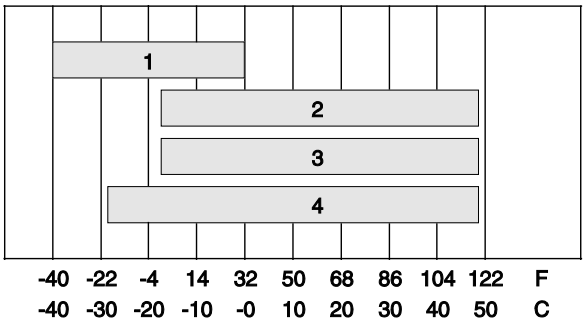
NOTICE Optional fluids may not have the same hydraulic lifespan and may result in component damage.

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

Function pump	
Type: variable displacement piston pump	
Displacement	0 to 3.66 cu in 0 to 60 cc
Flow rate @ 2400 rpm	38 gpm 144 L/min
Pump pressure, maximum	3190 psi 220 bar
Pressure compensator	3190 psi 220 bar
Standby pressure	464 psi 32 bar

Specifications

Primary Function Manifold	
System relief valve pressure, maximum (measured at test port TP)	3500 psi 241 bar
Boom extend relief valve pressure, maximum	3500 psi 241 bar
Fork tilt relief valve pressure, maximum	3500 psi 241 bar
Flow regulator, Fork tilt circuit	14 gpm 53 L/min
Flow regulator, Sway circuit	2 gpm 7.5 L/min
Flow regulator, Pilot pressure bleed circuit	0.1 gpm 1.4 L/min
Secondary Function Manifold	
Steer relief valve pressure, maximum (measured at test port TS)	2500 psi 172 bar
Parking brake relief valve pressure, maximum (measured at test port TPB)	400 psi 27.5 bar
Diff lock relief valve pressure, maximum (measured at test port TJ)	400 psi 27.5 bar
Rear lock-up relief valve pressure, maximum (measured at test port TR)	50 psi 3.4 bar
Outrigger Manifold	
Flow regulator, Outrigger circuit	6 gpm 22.7 L/min

Manifold Component Specifications

Plug torque	
SAE No. 2	50 in-lbs / 6 Nm
SAE No. 4	13 ft-lbs / 18 Nm
SAE No. 6	18 ft-lbs / 24 Nm
SAE No. 8	50 ft-lbs / 68 Nm
SAE No. 10	55 ft-lbs / 75 Nm
SAE No. 12	75 ft-lbs / 102 Nm

Air Conditioner Refrigerant Specifications

System Full Charge	
R134a	1 lb 14 oz

DEF Storage Specifications

Diesel Exhaust Fluid decomposes when exposed to elevated temperatures for an extended period of time. Therefore precautions must be taken to avoid prolonged exposure to elevated temperatures.

Temperature	Estimated Useful Life
32°F / 0°C	Indefinite
50°F / 10°C	75 years
68°F / 20°C	11 years
86°F / 30°C	23 months
95°F / 35°C	10 months
104°F / 40°C	4 months
122°F / 50°C	1 month
140°F / 60°C	1 week

Specifications

Deutz TCD3.6 L4 Engine

Displacement	221 cu in 3.62 liters
Number of cylinders	4
Bore and Stroke	3.86 x 4.72 inches 98 x 120 mm
Horsepower	100 @ 2300 rpm 74.6 kw @ 2300 rpm
Peak Torque	302 lb-ft @ 1600 rpm 409 Nm @ 1600 rpm
Firing order	1 - 3 - 4 - 2
Low idle Frequency	1000 rpm 200 Hz
High idle Frequency	2400 rpm 500 Hz
Compression ratio	17.2:1
Combustion	Direct injection
Governor	electronic
Lubrication system	
Minimum oil pressure (warm, at low idle)	23.5 psi 1.6 bar
Oil capacity (including filter)	9.5 quarts 9 liters
Oil viscosity requirements	
Unit ships with 15W-40 API CJ4 low ash oil. 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 pressure, maximum	23200 psi 1600 bar
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Engine coolant	
Capacity	4.5 gallons 17 liters
Type	Extended Life
Starter motor	
Normal load	300-400A
Relay max	60A
Relay continuous	12A
Cranking speed	>100 rpm
Glow Plugs	
Initial load (0-6 sec)	80 amps
Continuous load (>6 sec)	<40 amps
Battery Specifications	
Type	12V DC
Group	C31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Alternator output	95A @ 12V DC

Specifications

Deutz TCD3.6 L4 T4F Engine

Displacement	221 cu in 3.62 liters
Number of cylinders	4
Bore and Stroke	3.86 x 4.72 inches 98 x 120 mm
Horsepower	121 @ 2300 rpm 90 kw @ 2300 rpm
Peak Torque	354 lb-ft @ 1600 rpm 480 Nm @ 1600 rpm
Firing order	1 - 3 - 4 - 2
Induction System	turbocharged charge air cooled
Aftertreatment	DOC + SCR
Combustion	direct injection 252 cfm / 0.18 cmm
Exhaust	703 cfm @ 2300 rpm 894°F / 470°C @ 2300 rpm
Low idle Frequency	1000 rpm 200 Hz
High idle Frequency	2400 rpm Hz
Compression ratio	17.2:1

Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder

Governor	electronic
Lubrication system	
Minimum oil pressure (warm, at low idle)	23.5 psi 1.6 bar
Oil capacity (including filter) Low Emission Oil	9.5 quarts 9 liters

Oil viscosity requirements

Unit ships with 15W-40 API CJ4 low ash oil.
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 pressure, maximum	23200 psi 1600 bar
Max fuel consumption	6.5 gph / 24.6 lph

Fuel requirement

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

Engine coolant	
Capacity	4.5 gallons 17 liters
Type	Extended Life
Starter motor	
Normal load	300-400A
Relay max	60A
Relay continuous	12A
Cranking speed	>100 rpm
Glow Plugs	
Initial load (0-6 sec)	80 amps
Continuous load (>6 sec)	<40 amps
Battery Specifications	
Type	12V DC
Group	C31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Alternator output	120A @ 12V DC

Specifications

Perkins 1104D-E44TA Engine

Displacement	269 cu. in 4.4 liters
Number of cylinders	4
Bore and Stroke	4.13 x 5 inches 105 x 127 mm
Horsepower	125 @ 2400 rpm 93.2 kW @ 2400 rpm
Valve clearance, cold	
Intake	0.013 in 0.35 mm
Exhaust	0.013 in 0.35 mm
Firing order	1 - 3 - 4 - 2
Low idle	1000 rpm
High idle	2500 rpm
Compression ratio	16.2:1
Lubrication system	
Oil pressure at operating temperature	43 to 58 psi 2.9 to 4 bar
Oil capacity (including filter)	10 quarts 9.5 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.	
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Fuel injection pressure, minimum	23700 psi 1635 bar
Starter motor	
Normal load	68A
Relay max	50A
Relay continuous	20A
Cranking speed	130 - 200 rpm
Battery Specifications	
Type	12V DC, Group C31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Engine coolant	
Capacity	4.6 gallons 17.4 liters
Type	Extended Life
Glow Plugs	
Initial load (0-4 sec)	20A (EA)
Continuous load (>4 sec)	15A (EA)
Alternator output	85A @ 14V DC

Specifications

Perkins 1204E-E44TA Engine

Displacement	268.5 cu. in 4.4 liters
Number of cylinders	4
Bore and Stroke	4.13 x 4.99 inches 105 x 124 mm
Horsepower	124 @ 2000 rpm 92.7 kW @ 2000 rpm
Peak Torque	391 lb-ft @ 1400 rpm 530 Nm @ 1400 rpm
Firing order	1 - 3 - 4 - 2
Compression ratio	16.5:1
Low idle	800 rpm
High idle	2200 rpm
Lubrication system	
Pressure (Hot @ 2300 rpm)	28 - 64 psi 1.9 to 4.4 bar
Minimum oil pressure	7.1 psi 0.49 bar
Oil capacity (including filter)	8.8 quarts 8.3 liters
Oil viscosity requirements	
Units ship with 15W-40 API CJ4 low ash oil. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operation and Maintenance Manual on your machine.	
Fuel requirement	
For fuel requirements, refer to the engine Operator Manual for your engine.	
Fuel injection pressure, minimum	23000 psi 1585 bar
Starter motor	
Normal load	155A
Relay max	50A
Relay continuous	15A
Cranking speed	200 - 300 rpm
Battery Specifications	
Type	12V DC, Group C31
Quantity	1
Battery capacity, maximum	1000A
Reserve capacity @ 25A rate	200 Minutes
Engine coolant	
Capacity	4.9 gallons 18.5 liters
Type	Extended Life
Glow Plugs	
Initial load (0-6 sec)	12A (EA)
Continuous load (>6 sec)	16A (EA)
Alternator output	120A @ 12V DC

Specifications

ZF 4 WG-98 TC Transmission

Transmission Type	4 speed powershift converter
Speeds, Forward	4
Speeds, Reverse	3
Torque Converter	
Maximum input	2600 rpm
Maximum torque	480 Nm
Lubrication	
Oil capacity	16.9 quarts 16 liters
Oil viscosity requirements	
Units ship with Chevron Delo 400 LE SAE 15W40. Extreme operating temperatures may require the use of alternative transmission oils. For oil requirements, refer to the ZF 4 WG-98 TC Maintenance Manual.	
Manual,Workshop,ZF Transmission, 4 WG-98 TC	
Genie part number	1284042GT

Dana Planetary Drive Axle

Steering	Integrated steer cylinder
Joints	Heavy duty double U-joints
Steering angle, maximum	45°
Front Axle Lubrication	
Front differential	15 quarts 14.2 liters
Axle planetary end (each)	2 quarts 1.9 liters
Rear Axle Lubrication	
Rear differential	15 quarts 14.2 liters
Axle planetary end (each)	2 quarts 1.9 liters
Oil viscosity requirements	
Differential	Chevron Supreme 80W90 LS
Planetary ends	Chevron Supreme 80W90 LS
For additional axle information, refer to the Dana Axle Maintenance and Repair Manual	
Dana 223 Axle Maintenance and Repair Manual	
Genie part number	1284290GT
Dana 212 Axle Maintenance and Repair Manual	
Genie part number	1284291GT

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	10 ft-lbs / 13.6 Nm
-6	30 ft-lbs / 40.7 Nm
-8	40 ft-lbs / 54.2 Nm
-10	60 ft-lbs / 81.3 Nm
-12	85 ft-lbs / 115 Nm
-16	110 ft-lbs / 150 Nm
-20	140 ft-lbs / 190 Nm
-24	180 ft-lbs / 245 Nm

JIC 37° Fittings

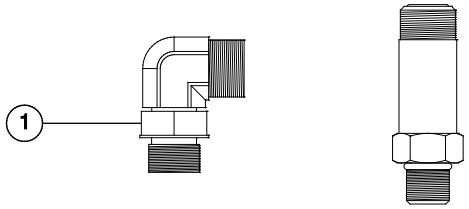
(swivel nut or hose connection)

SAE Dash Size	Thread Size	Flats
-4	7/16-20	2
-6	9/16-18	1 ¼
-8	3/4-16	1
-10	7/8-14	1
-12	1 1/16-12	1
-16	1 5/16-12	1
-20	1 5/8-12	1
-24	1 7/8-12	1

SAE O-ring Boss Port

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

SAE Dash Size	Torque
-4	14 ft-lbs / 19 Nm
-6	23 ft-lbs / 31.2 Nm
-8	36 ft-lbs / 54.2 Nm
-10	62 ft-lbs / 84 Nm
-12	84 ft-lbs / 114 Nm
-16	125 ft-lbs / 169.5 Nm
-20	151 ft-lbs / 204.7 Nm
-24	184 ft-lbs / 249.5 Nm



Adjustable Fitting

1 jam nut

Non-adjustable fitting

SAE O-ring Boss Port

(tube fitting - installed into Steel)

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

Specifications

Torque Procedure

Seal-Lok™ fittings

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

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

2 Lubricate the O-ring before installation.

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

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

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

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

JIC 37° fittings

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

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

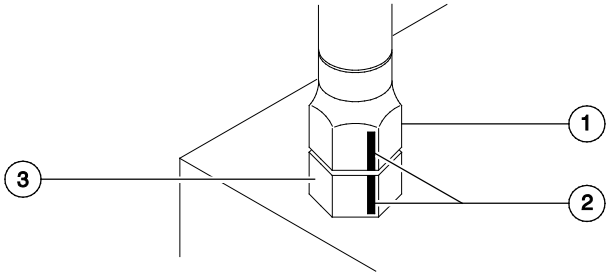


Illustration 1

1 hex nut
2 reference mark
3 body hex fitting

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

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

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

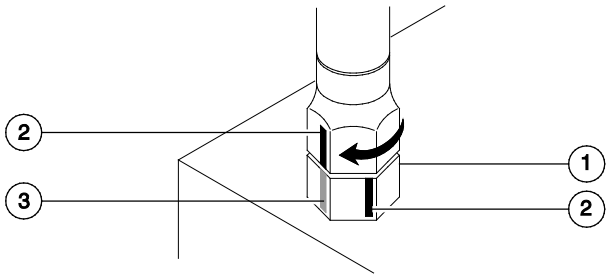


Illustration 2

1 body hex fitting
2 reference mark
3 second mark

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

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

Repair Procedures

Observe and Obey:

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

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

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

Before Repairs Start:

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

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

R Use only Genie approved replacement parts.

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

Machine Configuration:

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

- Machine parked on a firm, level surface
- Boom in the stowed position
- Key switch in the off position with the key removed
- Wheels chocked

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.

Boom Components

1-1 Boom Proximity Switch

The boom angle switch is a proximity switch. This switch functions by sensing a change in the electromagnetic field of the switch, due to the introduction of metal into the field. A proximity switch is, simply, a metal detector.

The switch generates an electromagnetic field at the face of the switch. This field senses when steel has been moved close to the switch as well as when the steel has been moved away, which is how the switch contacts open and close.

These switches are of a fail-safe design. Should the switch or the switch wire circuit be faulty, the machine will not function outside its designed range of use.

The boom proximity switch is a component of the drive circuit and the chassis sway circuit. Both the drive and the chassis sway functions are disabled when the boom is raised to 60° or higher.

How to Test a Proximity Switch

1 Remove the switch from the machine. Do not disconnect the switch wire harness from the machine.

2 Start the engine.

3 Move the switch away from any ferrous or metallic object

⊙ Result: The light of the limit switch assembly is not illuminated.

4 Move the switch close to any ferrous or metallic object

⊙ Result: The light of the proximity switch assembly turns on. The switch is functioning correctly.

Boom Components

How to Adjust the Boom Angle Proximity Switch

The boom angle proximity switch is attached to a mounting bracket, located between the boom and the chassis directly beneath the boom pivot pin. The switch location is adjustable.

1 Start the engine.

2 Raise the boom to 60°. Confirm with a digital level.

3 Working at the pivot end of the boom, locate the boom angle proximity switch. Loosen the fasteners, securing the proximity switch assembly to the chassis, just enough to allow the bracket to move.

4 Move the proximity switch assembly until the light of the proximity switch turns on, then move the proximity switch assembly until the light of the proximity switch just turns off.

5 Securely tighten the fasteners. Do not over tighten.

6 Lower the machine to 55°.

⊙ Result: The light of the proximity switch assembly is illuminated.

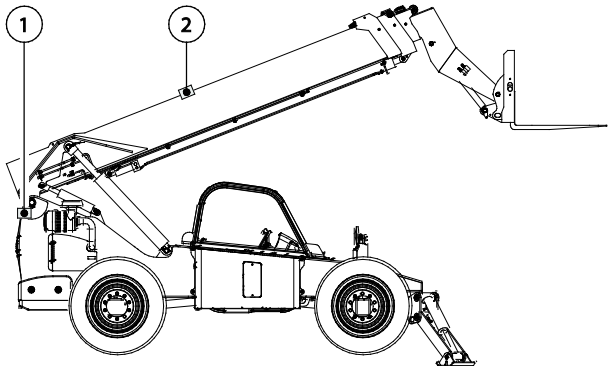
7 Raise the boom to 60°. Confirm with a digital level.

⊙ Result: The light of the proximity switch assembly is not illuminated. The proximity switch is properly calibrated.

⊠ Result: The light of the proximity switch assembly is illuminated. The proximity switch is not calibrated correctly. Repeat this procedure beginning with step 4.

How to Adjust the Boom Extend Proximity Switch

The boom extend proximity switch assembly is secured to the top surface of the number 0 boom tube at the center of the boom. The proximity switch assembly is fixed in position and is not adjustable.



1 boom angle proximity switch
2 boom extend proximity switch

Boom Components

1-2 Boom

How to Replace the Boom Wear Pads

1 **Lower wear pads**: Using a lifting strap from an overhead crane or a fork lift of sufficient capacity, lift the boom tube just enough to remove the weight from the pads.

2 Remove the wear pad mounting fasteners and remove the wear pads from the boom.

3 Lubricate the wear surface of the new pads. Refer to Maintenance Procedure in the appropriate Service or Maintenance Manual for your machine, *Lubricate the Boom*.

Note: Do not lubricate the side wear pads.

4 Install the wear pads. Install and securely tighten the fasteners. Do not over tighten.

How to Remove the Lifting Fork Frame

1 With the boom in the stowed position, attach a lifting strap from an overhead crane to the top of the lifting fork frame at the front of the boom. Support the frame. Do not apply any lifting pressure.

2 Working from the rear of the frame, lift the spring-assisted handle of the lock securing the lower fork frame lock pin to the fork frame mount. Use a soft metal drift to remove the pin.

3 Using the overhead crane, lift and remove the fork frame from the boom.

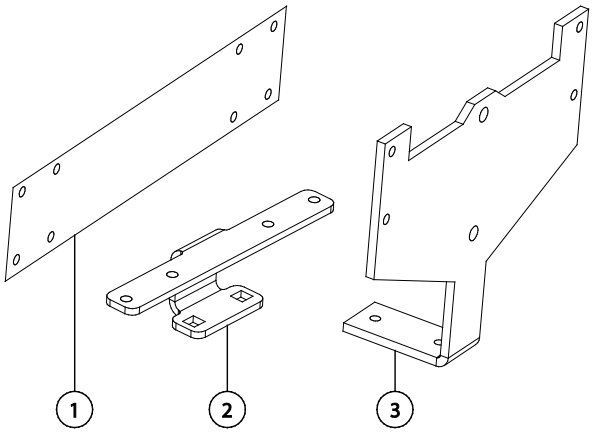
⚠ CAUTION Crushing hazard. The fork frame could fall if not properly supported when the lock pin is removed from the machine.

How to Remove the Cable Bridge Assembly

Inside the four-section boom, a cable bridge is used to route hydraulic lines through the boom assembly to the fork level cylinder and auxiliary connections (if equipped).

1 Remove the inspection cover at the pivot end of the boom.

2 Working at the pivot end of the boom, remove the fasteners securing the cable bridge rear mount bracket to the boom assembly. Remove the bracket from the boom.



1 cable bridge mount bracket
2 cable track mount bracket
3 cable bridge slider

3 Working at the pivot end of the boom, tag, disconnect and plug the hydraulic hoses at the hard lines of the cable bridge. Cap the fittings.

4 Working at the pivot end of the boom, remove the fasteners securing the hose roller assembly to boom tube number 1. Remove the hose roller assembly from the boom.

5 Working at the fork end of the boom, remove the fasteners securing the cable track mount bracket to boom tube number 3.

6 Working at the fork end of the boom, remove the fasteners securing the cable bridge slider to the cable bridge. Remove the slider from the boom.

Note: Pay attention to how the hoses are routed before removing the slider from the boom.

Note: During reassembly, it may be helpful to use tape to secure the bolts to the cable bridge when installing the cable bridge slider.

7 Working at the fork end of the boom, securely attach the loose end of the cable track to the cable bridge using a cable tie or similar device.

8 Working at the pivot end of the boom, carefully remove the cable bridge from the boom.

Boom Components

How to Replace the Retraction Chain

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

1 Start the engine and allow the engine to idle.

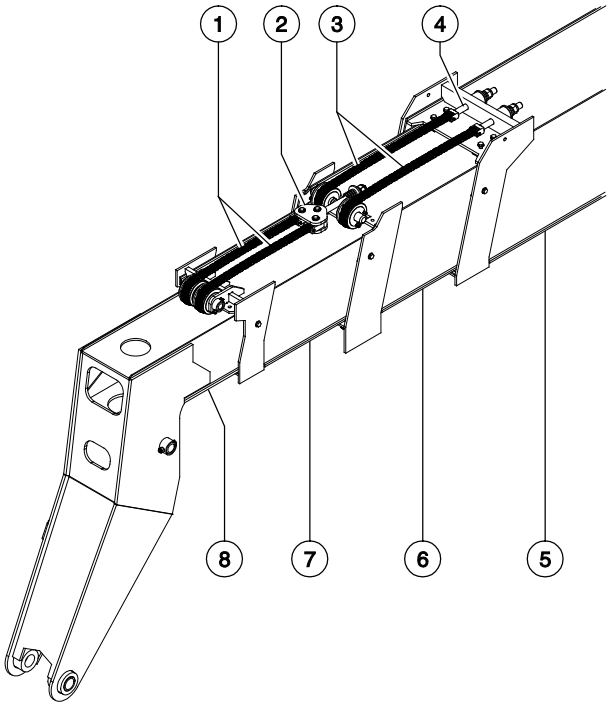
2 Raise the boom to a horizontal position.

3 Fully retract the boom.

4 Extend the boom approximately 1 inch / 2.5 cm.

5 Turn the machine off and remove the key from the key switch.

6 Working at the fork end of the boom, loosen the fasteners securing the dual-chain tensioner to the top of boom tube number 1. After noting the orientation and assembly order of the components, remove the fasteners and pull the tensioner free of the boom.

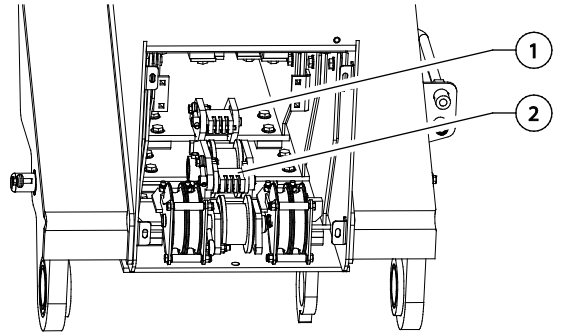


1 tube 3 extension chains
2 dual-chain tensioner
3 tube 2 extension chains
4 single-chain tensioner
5 boom tube number 0
6 boom tube number 1
7 boom tube number 2
8 boom tube number 3

7 Working at the fork end of the boom, loosen evenly the fasteners securing the single-chain tensioners to the top of boom tube number 0. After noting the orientation and assembly order of the components, remove the fasteners and pull the tensioners free of the boom.

8 Remove the inspection cover from the pivot end of the boom.

9 Locate the two chain anchors of the boom retraction chains where they attach to the chain anchor mount at the lower side of boom tube 2 and 3.



1 chain anchor - boom tube number 3
2 chain anchor - boom tube number 2

10 Select a chain anchor. Remove the fasteners securing the chain anchor pivot pin to the anchor mount of the boom tube. Remove the pivot pin and pull the chain anchor free of the mount.

11 Using a strap from an overhead crane, support the extend cylinder. Do not apply any lifting pressure

12 Working at the fork end of the boom, remove the fasteners securing the boom extend cylinder pivot pin to the boom.

13 Use a soft metal drift to remove the pivot pin. Lower the cylinder just enough for access to the chain anchor bolts.

14 Working at the fork end of the boom, securely connect a 30 foot / 10 m length of rope to the end of the chain. Securely tie off the other end of the rope to the boom structure.

15 Working at the pivot end of the boom, pull the chain out of the boom.

Note: Rope coming loose from the chain during removal may result in a difficult reassembly. Be sure the rope is securely attached to the chain and boom structure before pulling the chain out of the boom.

16 Remove the rope from the end of the chain and securely attach the rope to the new chain.

17 Working at the fork end of the boom, use the rope to carefully pull the chain through the boom just until the end of the chain is accessible. Remove the rope from the chain.

18 Working at the pivot end of the boom, install the chain anchor into the chain anchor mount. Secure the chain anchor to the mount using the pivot pin and fasteners removed in step 10. Securely tighten the fasteners. Do not over tighten.

Boom Components

19 Working at the pivot end of the boom, route the chain over the roller and install the chain onto the boom assembly using the pivot pin removed in step 10. Securely tighten the fasteners. Do not over tighten.

20 Repeat this procedure, beginning with step 10, for the remaining chain anchor.

21 Install the inspection cover, removed in step 8, onto the boom. Install and securely tighten the fasteners. Do not over tighten.

22 Working at the fork end of boom tube number 1, install the dual-chain tensioner into the tensioner mount. Install the mounting components, removed in step 6, and securely tighten the fasteners.

23 Install the chain tensioners into the tensioner mount at the fork end of boom tube number 0. Install the mounting components, removed in step 7. Evenly tighten the chain tensioners to the top of the boom tube until they are securely tightened.

24 Adjust the chains. Refer to Maintenance Procedure in the appropriate Service or Maintenance Manual for your machine, *Adjust the Boom Sequencing Chains*.

NOTICE Component damage hazard. Chains can be damaged if the boom is used while the chains are out of adjustment. Do not return the machine to use until the chains have been correctly adjusted.

How to Replace the Extension Chains

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

1 Start the engine and allow the engine to idle.

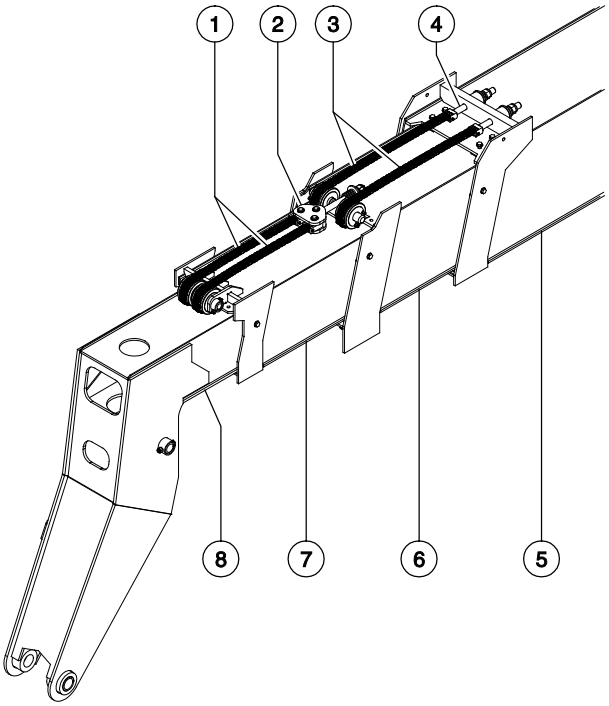
2 Raise the boom to a horizontal position.

3 Fully retract the boom.

4 Turn the machine off and remove the key from the key switch.

5 Working at the fork end of the boom, loosen the fasteners securing the dual-chain tensioner to the top of boom tube number 1. After noting the orientation and assembly order of the components, remove the fasteners and pull the tensioner free of the boom.

Boom Components



1 tube 3 extension chains
2 dual-chain tensioner
3 tube 2 extension chains
4 single-chain tensioner
5 boom tube number 0
6 boom tube number 1
7 boom tube number 2
8 boom tube number 3

6 Working at the fork end of the boom, loosen evenly the fasteners securing the single-chain tensioners to the top of boom tube number 0. After noting the orientation and assembly order of the components, remove the fasteners and pull the tensioners free of the boom.

7 Select a chain tensioner. Remove the bow tie clip securing the chain anchor pin to the chain assembly. Remove the chain anchor pin from the assembly and remove the chain anchor from the tensioner assembly.

8 Repeat this procedure, beginning with step 8, for the other chains.

9 Working at the fork end of the boom, select a chain. Securely connect a 30 foot / 10 m length of rope to the end of the chain. Securely tie off the other end of the rope to the boom structure.

10 Remove the inspection cover from the pivot end of the boom and locate the chain anchors of the extension chains at the top of boom tubes 2 and 3.

11 Remove the fasteners securing the extension chain anchors to the boom tubes.

12 Working at the pivot end of the boom, pull the chain out of the boom.

Note: Rope coming loose from the chain during removal may result in a difficult reassembly. Be sure the rope is securely attached to the chain and boom structure before pulling the chain out of the boom.

13 On a workbench, remove the bow tie clip securing the chain anchor pin to the chain assembly. Remove the pin and chain anchor pin from the assembly.

14 Install the chain anchor, pin and clip onto the new chain.

15 Remove the rope from the end of the old chain and securely attach the rope to the new chain.

Boom Components

16 Working at the fork end of the boom, use the rope to carefully pull the chain through the boom just until the end of the chain is accessible.

17 Working at the pivot end of the boom and using the fasteners removed in step 11, install the chain anchor onto the boom tube. Securely tighten the fasteners. Do not over tighten.

18 Remove the rope from the chain and install the chain into the chain anchor of the tensioner assembly. Secure the chain to the chain anchor using the pin and clip removed in step 7.

19 Repeat this procedure, beginning with step 9, for the other chains.

20 Install the inspection cover, removed in step 7, onto the boom. Install and securely tighten the fasteners. Do not over tighten.

21 Working at the fork end of boom tube number 1, install the dual-chain tensioner into the tensioner mount. Install the mounting components, removed in step 5, and securely tighten the fasteners.

22 Install the chain tensioners into the tensioner mount at the fork end of boom tube number 0. Install the mounting components, removed in step 6. Evenly tighten the chain tensioners to the top of the boom tube until they are securely tightened.

23 Adjust the chains. Refer to Maintenance Procedure in the appropriate Service or Maintenance Manual for your machine, *Adjust the Boom Sequencing Chains*.

NOTICE Component damage hazard. Chains can be damaged if the boom is used while the chains are out of adjustment. Do not return the machine to use until the chains have been correctly adjusted.

How to Remove the Boom

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

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

1 Remove the lifting fork and frame. Refer to Repair Procedure, *How to Remove the Lifting Fork Frame.*

2 Attach a lifting strap from an overhead 10 ton / 10,000 kg crane to the fork end of the boom. Support the boom. Do not apply any lifting pressure.

3 Select a fork level cylinder. Remove the fasteners securing the fork level cylinder rod-end pivot pin to the boom.

4 Using a lifting strap from another overhead crane, support the rod-end of the fork level cylinder. Do not apply any lifting pressure.

5 Use a soft metal drift to remove the fork level cylinder pivot pin.

6 Lower the fork level cylinder onto the chassis.

⚠WARNING Crushing hazard. Keep hands clear of the cylinder manifold when lowering the cylinder.

7 Repeat this procedure beginning with step 3 for the other fork level cylinder.

8 Select a lift cylinder. Tag, disconnect and plug the hydraulic hoses at the lift cylinder manifold. Cap the fittings on the cylinder manifold.

9 Remove the fasteners securing the lift cylinder barrel-end pivot pin to the chassis.

10 Support and secure the barrel end of the lift cylinder to the boom.

11 Use a soft metal drift to remove the lift cylinder pivot pin.

12 Repeat this procedure beginning with step 8 for the other lift cylinder.

13 Tag, disconnect and plug the hydraulic hoses at the hydraulic hard line connections at the pivot end of the boom. Cap the fittings.

14 Using the overhead crane, raise the boom to a horizontal position.

⚠WARNING Crushing hazard. The lift cylinder will fall if not properly supported when the boom is raised.

15 Remove the fasteners securing the boom pivot pin to the chassis.

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

⚠DANGER Crushing hazard. The boom will fall if not properly supported when the pivot pin is removed from the machine.

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

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

NOTICE Component damage hazard. The weight of the boom assembly may crush the hydraulic hard lines under the boom. Use caution when placing the boom assembly onto a structure capable of supporting it.

Boom Components

How to Disassemble the Boom - GTH1056

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

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

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

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

3 Select a lift cylinder. Remove the fasteners securing the lift cylinder rod-end pivot pin to the boom.

4 Using a lifting strap from an overhead crane, support the lift cylinder. Do not apply any lifting pressure.

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

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

6 Repeat this procedure beginning with step 3 for the other lift cylinder.

7 Remove the fastener securing the fork level cylinder rod-end pivot pin to the fork frame mount.

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

9 Attach a lifting strap from an overhead crane to the barrel end of the fork level cylinder. Support the cylinder. Do not apply any lifting pressure.

10 Tag, disconnect and plug the fork level cylinder hoses from the cylinder manifolds. 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.

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

11 Remove the fasteners securing the fork level cylinder barrel-end pivot pin to the boom.

12 Use a soft metal drift to remove the pivot pin. Remove the cylinder from the machine.

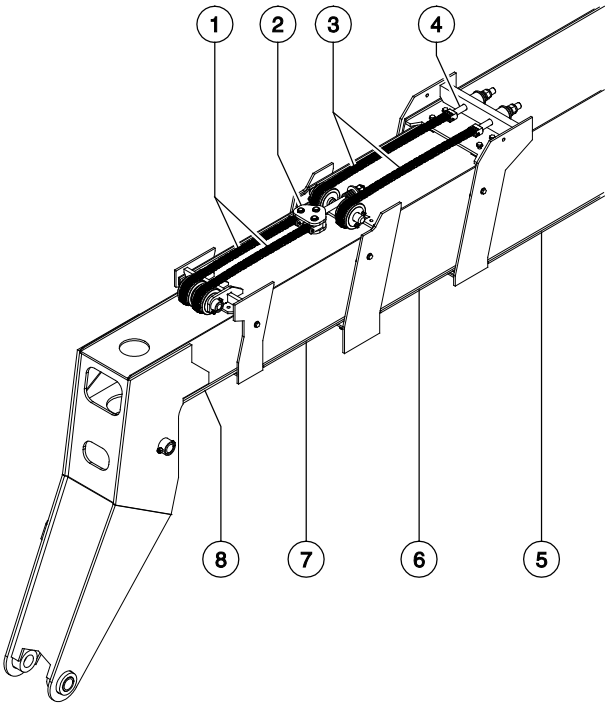
⚠WARNING Crushing hazard. The cylinder could fall if not properly supported when the pivot pin is removed from the machine.

13 Remove the inspection cover at the pivot end of the boom.

Boom Components

14 Working at the pivot end of the boom, remove the hose keepers from the hose roller assembly.

Note: The hose keepers ensure that the hoses do not jump off the hose rollers.



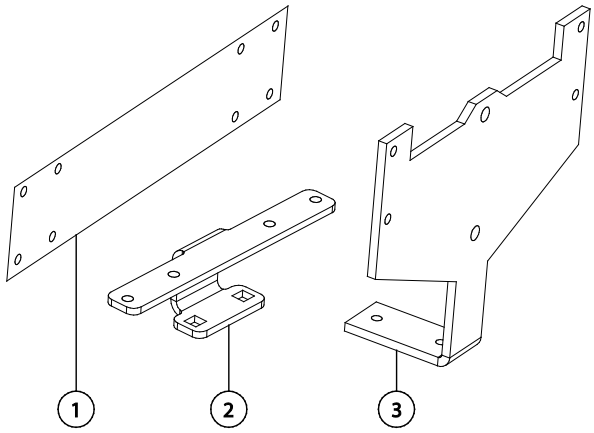
1 tube 3 extension chains
2 dual-chain tensioner
3 tube 2 extension chains
4 single-chain tensioner
5 boom tube number 0
6 boom tube number 1
7 boom tube number 2
8 boom tube number 3

15 Working at the pivot end of the boom, remove the fasteners securing the cable bridge rear mount bracket to the boom assembly. Remove the bracket from the boom.

16 Working at the pivot end of the boom, tag, disconnect and plug the hydraulic hoses at the hard lines of the cable bridge. Cap the fittings.

17 Working at the pivot end of the boom, remove the fasteners securing the hose roller assembly to boom tube number 1. Remove the hose roller assembly from the boom.

18 Working at the fork end of the boom, remove the fasteners securing the cable track mount bracket to boom tube number 3.



1 cable bridge mount bracket
2 cable track mount bracket
3 cable bridge slider

19 Working at the fork end of the boom, remove the fasteners securing the cable bridge slider to the cable bridge. Remove the slider from the boom.

Note: Pay attention to how the hoses are routed before removing the slider from the boom.

Note: During reassembly, it may be helpful to use tape to secure the bolts to the cable bridge when installing the cable bridge slider.

20 Working at the fork end of the boom, securely attach the loose end of the cable track to the cable bridge using a cable tie or similar device.

Boom Components

21 Working at the pivot end of the boom, carefully remove the cable bridge from the boom.

22 Working at the fork end of the boom, remove the fasteners securing the dual-chain tensioner to the top of boom tube number 1.

23 Working at the fork end of the boom, remove the fasteners securing the extension chain rollers to the top of boom tube number 2. Remove the chain rollers from the boom.

24 Working at the pivot end of the boom, remove the fasteners securing the retraction chain block pivot pin to boom tube number 3. Remove the pivot pin.

25 Working at the fork end of the boom, remove the wear pads from boom tube number 2.

26 Support and slide boom tube number 3 out of boom tube number 2. Place boom tube number 3 on a structure capable of supporting it.

⚠WARNING Crushing hazard. Boom tube number 3 could become unbalanced and fall when removed from the boom tube number 2 if not properly supported and attached to the overhead crane.

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

27 Working at the fork end of the boom, loosen evenly, then remove, the fasteners securing the chain tensioners to the top of boom tube number 0.

28 Working at the fork end of the boom, remove the fasteners securing the extension chain rollers to the top of boom tube number 1. Remove the chain rollers from the boom.

29 Working at the pivot end of the boom, remove the fasteners securing the retraction chain block pivot pin to boom tube number 2. Remove the pivot pin.

30 Working at the pivot end of the boom, remove the fasteners securing the chain roller to boom tube number 2. Remove the chain roller from the boom.

31 Working at the fork end of the boom, remove the wear pads from boom tube number 1.

32 Support and slide boom tube number 2 out of boom tube number 1. Place boom tube number 2 on a structure capable of supporting it.

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

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

33 Working at the pivot end of the boom, remove the fasteners securing the chain roller to boom tube number 1. Remove the chain roller from the boom.

34 Working at the fork end of the boom, remove the wear pads from boom tube number 0.

35 Support and slide boom tube number 1 out of boom tube number 0. Place boom tube number 1 on a structure capable of supporting it.

⚠WARNING Crushing hazard. Boom tube number 1 could become unbalanced and fall when removed from the boom tube number 0 if not properly supported and attached to the overhead crane.

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

1-3
Boom Lift Cylinder

How to Remove the Lift 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 Attach a lifting strap from an overhead 10 ton / 10,000 kg crane to the fork end of the boom. Support the boom. Do not apply any lifting pressure.

2 Tag, disconnect and plug the hydraulic hoses at the lift cylinder manifold. Cap the fittings.

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

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

3 Attach a lifting strap from an overhead crane to the rod end of the lift cylinder. Support the cylinder. Do not apply any lifting pressure.

4 Remove the fasteners securing the lift cylinder barrel-end pivot pin to the chassis.

5 Use a soft metal drift to remove the pivot pin.

6 Remove the fasteners securing the lift cylinder rod-end pivot pin to the boom.

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

⚠DANGER Crushing hazard. The boom will fall if not properly supported when the pivot pin is removed from the machine.

8 Using the overhead crane, raise the boom to a horizontal position. Remove the cylinder from the machine.

⚠DANGER Crushing hazard. The cylinder will fall if not properly supported when removed from the machine.

Boom Components

1-4
Boom Extension Cylinder

How to Remove the Extension Cylinder

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

1 Raise the boom to a horizontal position.

2 Tag, disconnect and plug the hydraulic hoses at the boom extension cylinder manifold. Cap the fittings.

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

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

3 Attach a lifting strap from an overhead crane to the center point of the boom extension cylinder. Support the cylinder. Do not apply any lifting pressure.

4 Remove the extension cylinder support loop from the underside of the boom.

Note: The extension cylinder support loop is located at the fork end of the boom.

5 Remove the fasteners securing the extension cylinder pivot pins to the boom.

6 Use a soft metal drift to remove both pivot pins. Remove the cylinder from the machine.

⚠DANGER Crushing hazard. The boom will fall if not properly supported when the pivot pins are removed from the machine.

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

1-5
Fork Level Cylinder

How to Remove the Fork Level 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 Remove the lifting fork frame. Refer to Repair Procedure, *How to Remove the Lifting Fork Frame*.

2 Remove the fastener securing the fork level cylinder rod-end pivot pin to the fork frame mount.

3 Use a soft metal drift to remove the pivot pin.

4 Attach a lifting strap from an overhead crane to the barrel end of the fork level cylinder. Support the cylinder. Do not apply any lifting pressure.

5 Tag, disconnect and plug the fork level cylinder hoses from the cylinder manifolds. 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.

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

6 Remove the fasteners securing the fork level cylinder barrel-end pivot pin to the boom.

7 Use a soft metal drift to remove the pivot pin. Remove the cylinder from the machine.

⚠WARNING Crushing hazard. The cylinder could fall if not properly supported when the pivot pin is removed from the machine.

Boom Components

1-6 Hydraulic Hoses

How to Replace the Fork Level and/or Auxiliary Cylinder Hoses, GTH-1056

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.*

Replace the lower hoses:

1 Fully retract the boom.

2 Fully lower the tips of the lifting forks.

3 Remove the covers from the pivot end of the boom.

4 Attach a lifting strap from an overhead crane to the top of the lifting fork frame. Support the frame. Do not apply any lifting pressure.

5 Working at the pivot end of the boom, remove the fasteners securing the cable bridge rear mount bracket to the boom assembly. Remove the bracket from the boom.

6 Tag, disconnect and plug the hydraulic hoses at the hard lines of the cable bridge. 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.

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

7 Working near the center of the boom assembly, tag, disconnect and plug the hydraulic hoses from the hydraulic hard lines under boom tube number number 1. Cap the hard lines.

8 Securely connect a 30 feet / 10 m length of rope to the end of each hose disconnected in steps 6 and 7. Securely tie off the other end of each section of rope to the boom structure.

9 Working at the pivot end of the boom, select one of the hoses. Pull the hose out of the boom.

Note: Rope coming loose from either end of the hose or the boom during hose removal may result in a difficult reassembly. Be sure each section of rope is securely attached to both the hose and the boom structure before pulling the hose out of the boom.

10 Remove the rope from the hose. Discard the hose.

11 Securely install a section of rope onto the correct end of the new hose assembly.

12 Install the new hose assembly into the boom by routing the hose under the roller at the pivot end of the boom. Using the rope, carefully pull the hose through the boom until the end is accessible.

13 Install both ends of the hose assembly onto the correct connection points. Torque to specification. Refer to Specifications.

14 Repeat this procedure for the remaining hose to be replaced, beginning with step 8.

15 Install the cable bridge rear mount bracket onto the cable bridge and the boom assembly. Securely tighten the fasteners. Do not over tighten.

16 Remove the lifting strap from the fork frame.

17 Install the cover onto the rear of the boom. Install and securely tighten the retaining fasteners.

Replace the upper hoses:

1 Fully retract the boom.

2 Fully lower the tips of the lifting forks.

3 Remove the covers from the pivot end of the boom.

4 Attach a lifting strap from an overhead crane to the top of the lifting fork frame. Support the frame. Do not apply any lifting pressure.

5 Working at the pivot end of the boom, remove the fasteners securing the cable bridge rear mount bracket to the boom assembly. Remove the bracket from the boom.

6 Tag, disconnect and plug the hydraulic hoses at the hard lines of the cable bridge. 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.

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

7 Return the cable bridge to its original position.

8 Working at the fork end of the boom, tag, disconnect and plug the fork level cylinder hoses at the cylinder manifolds. Cap the fittings.

9 **Models with auxiliary function**: Working at the fork end of the boom, tag, disconnect and plug the auxiliary hoses at the fittings. Cap the fittings.

10 Working at the fork end of the boom, remove the fasteners securing the cable bridge slider to the cable bridge. Remove the slider from the boom.

Note: Pay attention to how the hoses are routed before removing the slider from the boom.

Note: During reassembly, it may be helpful to use tape to secure the bolts to the cable bridge when installing the cable bridge slider.

11 Remove the fasteners securing the cable track to the cable track mount bracket.

12 Remove the fasteners securing the cable track mount bracket to the cable bridge. Remove the bracket from the boom.

13 Carefully pull the cable track through the opening at the front of boom until the hose connections are accessible.

14 Tag, disconnect and plug the affected hoses. Cap the fitting. Remove the hose from the cable track.

15 Install the new hose assembly and torque to specification. Refer to Specifications.

16 Install the cable bridge and cable track into the boom.

17 Install the cable track mount bracket and cable bridge slider. Securely tighten all fasteners. Do not over tighten.

18 Working at the pivot end of the boom, install the hydraulic hoses onto the hard lines of the cable bridge and torque to specification. Refer to Specifications.

19 Install the cable bridge mount bracket onto the cable bridge and the boom assembly. Securely tighten all fasteners. Do not over tighten.

20 Install the cover onto the rear of the boom. Install and securely tighten the retaining fasteners.

Operator's Compartment

2-1
Operator's Compartment

How to Remove the Operator's Compartment

The operator's compartment is used to activate machine functions while sitting in the operator's drivers seat.

Within the operator's compartment there is a transmission column shifter, steering selector, 4-way controller, accelerator pedal, brake pedal and a differential lock switch. All of these components are replaceable.

For further information or assistance, consult the Genie Product Support.

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

1 Open the access door above the hydraulic tank.

2 Disconnect the battery 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.

3 Locate the secondary function manifold under the manifold inspection cover. Tag, disconnect and plug the hydraulic hoses at ports BP and BT of the secondary function manifold. Cap the fittings. Refer to *Secondary Function Manifold Components*.

4 Locate the brake manifold under the manifold inspection cover. Tag, disconnect and plug the hydraulic hose at the underside of the brake manifold. Cap the fitting. Refer to *Brake Manifold Components*.

5 Working under the dashboard, locate the hydraulic hose at port L of the steering orbitral.

6 Working at the front axle, locate the hydraulic hose connected to the front axle steer cylinder at the operator's compartment side of the machine. Tag, disconnect and plug the hydraulic hose. Cap the fitting.

7 Tag, disconnect and plug the hydraulic hoses at ports SUP, SUR and SUT of the secondary function manifold. Cap the fitting.

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

8 Tag, disconnect and plug the hydraulic hose at port SULS of the primary function manifold. Cap the fitting.

9 Tag, disconnect and plug the hydraulic hose at port JP of the secondary function manifold. Cap the fitting.

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

10 Tag, disconnect and plug the hydraulic hoses at ports J1, J2, J3 and J4 of the primary function manifold. Cap the fittings.

11 **Models with dual joystick**: Tag, disconnect and plug the hydraulic hoses at ports JT2, JT4, JS3 and JS1 of the primary function manifold. Cap the fittings.

12 Remove the fasteners securing the joystick mount to the operator's compartment. Remove the joystick assembly.

13 **Models with single joystick**: With the base of the joystick above the top of the hydraulic tank, tag disconnect and plug the hydraulic hose at port T of the joystick. Cap the fitting.

Note: Removing the hydraulic hose from port T of the joystick with the joystick below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not disconnect the hose from the joystick if the joystick is below the hydraulic oil level in the hydraulic tank.

14 **Models with dual joystick**: Locate the tee fitting which joins together the hydraulic hoses from port T of both joysticks to the tank return hydraulic hose.

15 **Models with dual joystick**: With the tee fitting above the top of the hydraulic tank, tag, disconnect and plug the tank return hydraulic hose from the tee fitting. Cap the fitting.

Note: Removing the hydraulic hose from the tee fitting with the tee fitting below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not disconnect the hose from the tee fitting if the tee fitting is below the hydraulic oil level in the hydraulic tank.

16 Working inside the chassis, tag and disconnect the wire harnesses at the connectors next to the operator's compartment.

17 Support and secure the operator's compartment to an adjustable table capable of supporting the weight and that will allow the operator's compartment to remain in an upright and stable position.

NOTICE Component damage hazard. Wrapping a strap around the cab and lifting using an overhead crane can put excessive pressure on the glass windows of the cab, causing the windows to break. Do not lift the cab using a strap from an overhead crane if the strap contacts the windows.

Note: Placing a wedge between the operator's compartment and the adjustable table may be required to keep the operator's compartment stable.

18 Remove the lower fasteners securing the operator's compartment to the chassis.

19 Remove the upper fasteners securing the operator's compartment to the chassis.

⚠WARNING Crushing hazard. The operator's compartment will fall if not properly supported when the fasteners are removed from the machine.

20 Slowly move the operator's compartment away from the chassis while feeding all loose hoses, cables and wires through the opening of the chassis.

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

Bolt torque specification	
Operator's cab mounting bolts	750 ft-lbs 1017 Nm

Operator's Compartment

2-2
Machine Controls

How to Remove the Steering Column

1 Disconnect the battery 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 fasteners securing the transmission control lever and turn signal shifter, if equipped, to the column. Carefully separate the lever from the column.

3 Remove the nut securing the key switch to the dash panel. Gently push the key switch through the opening.

4 Remove the fasteners securing the dash panel to the dashboard.

5 Carefully pull the dash panel towards the seat of the operator's compartment.

6 Tag and disconnect the wire harness from the componments of the dash panel. Remove the dash panel from the machine.

7 Loosen the two lower fasteners securing the dash frame to the operator's compartment.

8 Remove the two upper fasteners securing the dash frame to the operator's compartment.

9 Rotate the dash frame towards the seat of the operator's compartment.Remove the dashboard from the machine.

10 Tag and disconnect the ground wire of the steer column.

11 Support and secure the steer orbitral to the dash frame.

12 Remove the fasteners securing the steer column and steer orbitral to the dash frame.

13 Lower the steer orbitral and remove the steer column from the machine.

How to Remove the Steering Wheel

1 Open the access door above the hydraulic tank.

2 Disconnect the battery from the machine.

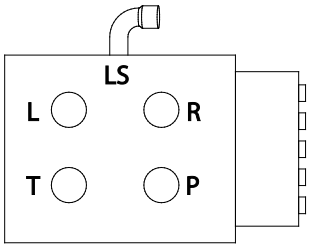
⚠WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

3 Remove the horn button from the steering wheel. Remove the nut securing the steering wheel to the column and remove the steering wheel.

How to Remove the Steer Orbitral

1 Remove the steering column. Refer to Repair Procedure, *How to Remove the Steering Column*.

2 Working under the dashboard, locate the hydraulic hose at port L of the steering orbitral.



3 Follow the hydraulic hose from port L of the steer orbitral to its connection at the front axle of the machine. Tag, disconnect and plug the hydraulic hose at the front axle. Cap the fitting.

4 Tag, disconnect and plug the hydraulic hoses at ports SUP, SUR and SUT of the secondary function manifold. Cap the fitting.

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

5 Tag, disconnect and plug the hydraulic hose at port SULS of the primary function manifold. Cap the fitting.

6 Slowly move the steer orbitral away from the dash frame while feeding all loose hoses through the opening of the chassis.

How to Remove the Joystick - Models with Single Joystick

1 Disconnect the battery from the machine.

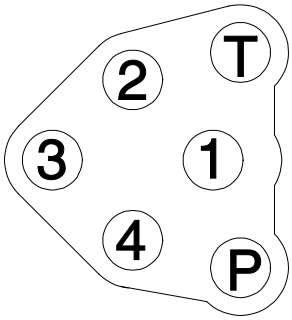
⚠WARNING Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

2 Tag and disconnect the joystick wire harness from the machine.

3 Remove the fasteners securing the joystick mount panel to the side console.

4 Tag, disconnect and plug the hoses from ports 1, 2, 3, 4, P and T of the joystick. Cap the fittings.

Note: Removing the hydraulic hose from port T of the joystick with the joystick below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not disconnect the hose from the port if the joystick is below the hydraulic oil level in the hydraulic tank.



5 Remove the fasteners securing the joystick to the mount panel. Remove the joystick.

Operator's Compartment

How to Remove the Joystick - Models with Dual Joysticks

1 Disconnect the battery 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 fasteners securing the joystick mount panel to the side console.

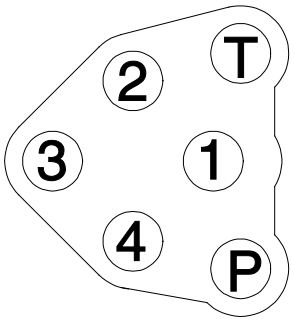
3 Tag and disconnect the joystick wire harness from the machine.

4 Tag, disconnect and plug the hoses from ports 1, 2, 3, 4 and P of the joystick. Cap the fittings.

5 Locate the tee fitting which joins together the hydraulic hoses from port T of both joysticks to the tank return hydraulic hose.

6 With the tee fitting above the top of the hydraulic tank, tag, disconnect and plug the tank return hydraulic hose from the tee fitting. Cap the fitting.

Note: Removing the hydraulic hose from port T of the joystick with the joystick below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not disconnect the hose from the port if the joystick is below the hydraulic oil level in the hydraulic tank.



7 Remove the fasteners securing the joystick to the mount panel. Remove the joystick.

How to Remove the Brake Pedal Assembly

1 Disconnect the battery 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 Fully press and release the brake pedal a minimum of 10 times to release the hydraulic pressure in the brake system.

3 Tag, disconnect and plug the hydraulic hoses at ports BP and BT of the secondary hydraulic manifold. Cap the fittings.

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

4 Follow the hydraulic hose from port A of the brake pedal manifold to the brake manifold. Tag, disconnect and plug this hydraulic hose at the brake manifold. Cap the fitting.

5 Remove the fasteners securing the brake pedal assembly to the dash frame.

6 Gently rotate the brake pedal in an upwards direction and slowly move the brake pedal assembly away from the dash frame while feeding all loose hoses through the opening of the chassis.

How to Remove the Gauge Cluster Assembly

1 Disconnect the battery 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 fasteners securing the transmission control lever to the column. Carefully separate the lever from the column.

3 Grasp the edge of the dash cluster and pull the cluster through the opening in the dashboard.

4 Tag and disconnect the wire harness from the dash cluster. Remove the dash cluster from the machine.

How to Remove the Gauge Cluster Assembly

1 Disconnect the battery 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 Reach under the dashboard and gently loosen and remove the locknut securing the diagnostic display to the dashboard. Gently push the diagnostic display through the opening in the dashboard.

3 Tag and disconnect the wire harness from the diagnostic display. Remove the diagnostic display from the machine.

Fuel and Hydraulic Tanks

3-1
Fuel and Hydraulic Tanks

How to Remove the Fuel and Hydraulic Tank Assembly

⚠ DANGER Explosion and fire hazard. Engine fuels are combustible. Remove the fuel tank 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. Never drain or store fuel in an open container due to the possibility of fire.

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

1 Disconnect the battery 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 battery from the machine.

3 Tag and disconnect the wire harness from the fuel level terminals.

4 Remove the filler cap from the hydraulic tank.

5 Place a drain pan or other suitable container under the hydraulic tank. Refer to Specifications, *Machine Specifications.*

6 Remove the drain plug from the hydraulic tank and completely drain the tank.

⚠ CAUTION Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

7 Remove the filler cap from the fuel tank.

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

⚠ DANGER Explosion and fire hazard. 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/or diesel fuel.

9 Tag, disconnect and plug the fuel supply and return hoses. Cap the fittings.

10 Tag, disconnect and plug the supply and return hoses from the hydraulic tank. Cap the fittings.

11 Support and secure the tank assembly to an appropriate lifting device.

12 Remove the fasteners securing the tank assembly to the chassis. Remove the tank from the machine.

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

4-1 Engines

How to Repair the Perkins 1104D-E44TA Engine

Repair procedures and additional engine information is available in the Perkins 1100 Operation and Maintenance Manual and the Perkins 1104 Service Manual and the Perkins 1100 Troubleshooting Manual.

Perkins 1100 Operation and Maintenance Manual	
Genie part number	123702
Perkins 1104 Service Manual	
Genie part number	117764
Perkins 1100 Troubleshooting Manual	
Genie part number	123583

How to Repair the Deutz TCD3.6 Engine

Maintenance procedures and additional engine information is available in the Deutz TCD3.6 Workshop Manual.

Deutz TCD3.6 T3/T4i Workshop Manual	
Genie part number	218704
Deutz TCD3.6 T4F Workshop Manual	
Genie part number	1270993

How to Remove the Engine

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.*

All Models:

1 Open the access door above the hydraulic tank.

2 Disconnect the battery 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.

3 Remove the fasteners securing the engine access cover from the rear of the machine. Remove the cover from the machine.

4 **Perkins models**: Open the engine access cover at the tank side of the machine. Locate the fuel supply line where it is attached to the fuel filter/water separator.

Tag, disconnect and plug the fuel supply hose at the fuel filter/water separator. Cap the fitting.

Locate the fuel return hose connection just above the fuel filter/water separator.

Tag, disconnect and plug the fuel return hose at the fuel filter/water separator. Cap the fitting.

5 **John Deere models**: Open the engine access cover at the tank side of the machine. Locate the fuel supply line where it is attached to the fuel filter/water separator.

Tag, disconnect and plug the fuel supply hose at the fuel filter/water separator. Cap the fitting.

Open the engine access cover at the operator's compartment side of the machine. Locate the fuel return hose at the fuel pump.

Tag, disconnect and plug the fuel return hose at the fuel pump. Cap the fitting.

All Models:

6 Open the transmission access cover at the top of the machine. Locate the transmission cooler.

7 Tag, disconnect and plug the coolant hoses at the transmission cooler. Cap the fittings.

8 Tag and disconnect the engine wire harnesses near the operator's compartment.

9 Remove the air cleaner from the machine. Remove all intake and exhaust components which would interfere with the removal of the engine from the chassis.

10 Remove the fasteners securing the driveshaft to the transmission. Secure the bearing caps onto the universal joint of the driveshaft.

Note: Using adhesive tape to secure the caps to the universal joint may be helpful.

11 Remove the fasteners securing the engine tray to the chassis.

12 Support and secure the engine tray to a forklift of adequate capacity.

13 Remove the engine tray from the machine.

4-2
Engine Fault Codes

How to Retrieve Engine Fault Codes

When the engine Electronic Control Module (ECM) detects an abnormal operating condition, a fault code is immediately stored in the ECM memory. At the same time, a colored warning lamp is illuminated and the fault code is shown on the engine diagnostic display, is located on the dashboard in the operator's compartment.

To learn the specifics of and how to use the fault codes, refer to, Fault Codes Section.

5-1 Transmission

How to Repair the Transmission

Repair procedures and additional transmission information is available in the ZF WG-98 Transmission Repair Manual.

Repair Manual, ZF Transmission, 4 WG-98 TC	
Genie part number	1284042GT

How to Remove the Transmission

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

1 Open the access door above the hydraulic tank.

2 Disconnect the battery 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.

3 Place a drain pan or other suitable container under the hydraulic tank. Refer to Specifications, *Machine Specifications.*

4 Remove the drain plug from the hydraulic tank and completely drain the tank.

⚠CAUTION Bodily injury hazard. Beware of hot oil. Contact with hot oil may cause severe burns.

5 Tag, disconnect and plug the transmission oil cooler lines at the cooler. 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.

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

Transmission

6 Tag, disconnect and plug the hydraulic pump high pressure line at the function manifold. Cap the fitting.

⚠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.

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

7 Tag, disconnect and plug the hydraulic pump supply line at the pump. Cap the orifice on the pump.

8 Remove the fasteners securing the transmission mounting flange to the chassis.

9 Tag and disconnect the driveshafts from the transmission.

Note: To avoid damage to the driveshaft universal joints, secure the driveshafts to the chassis.

10 Tag and disconnect the wiring harness from the transmission.

11 Attach a lifting strap from an overhead crane to the center point of the transmission.

12 Remove the fasteners securing the transmission mounting flange to the chassis. Remove the transmission from the machine.

⚠DANGER Crushing hazard. The transmission will fall if not properly supported when removed from the machine.

6-1 Hydraulic Pump

How to Test 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 Tag, disconnect and plug the high pressure hydraulic hose from the primary function manifold. Cap the fitting on the main valve.

⚠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.

Note: The high pressure hose is the smaller of the two hoses.

2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the high pressure hose disconnected in step 1.

3 Hold the manual fuel shut-off lever on the engine in the closed position.

4 Observe the pressure gauge while cranking the engine in one second intervals.

⊙ Result: If the pressure gauge reads 3190 psi / 220 bar, immediately stop. The pump is good.

☒ Result: If the pressure fails to reach 3190 psi / 220 bar, the pump needs to be adjusted OR or the pump or pump coupling is faulty and will need to be serviced or replaced.

NOTICE Component damage hazard. There is no relief valve in the hydraulic pump and the pump can be damaged if the pressure is allowed to exceed specification. When testing the pump, crank the engine in one second intervals until the correct pressure is confirmed. Do not over-pressurize the pump.

5 Remove the pressure gauge and install the high pressure hose onto the pump. Torque to specification. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

⚠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.

Hydraulic Pump

How to Remove the Function Pump

⚠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 engine off and cool.

1 Open the access door above the hydraulic tank.

2 Disconnect the battery 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.

3 Tag and disconnect the wire harness from the pump.

4 Tag and disconnect the case drain hose at the top of the pump. Cap the fitting on the pump.

Note: Placing the open end of the case drain hose below the hydraulic oil level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not lower the open end of the case drain hose to below the fluid level of the hydraulic tank until the hose is plugged.

5 Tag, disconnect and plug the large hydraulic pump supply hose at the pump. Cap the fitting on the pump.

Note: Placing the open end of the pump supply hose below the fluid level in the hydraulic tank will result in excessive hydraulic fluid leaking from the hose. Do not lower the open end of the pump supply hose to below the fluid level of the hydraulic tank until the hose is plugged.

6 Tag, disconnect and plug the high pressure hose at the pump. Cap the fitting 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.

7 Tag and disconnect the transmission cooler hoses at the transmission cooler. Cap the fittings.

⚠CAUTION Burn hazard. Contact with hot engine components may cause severe burns.

8 Remove the fasteners securing the pump to the transmission. Remove the pump from the machine.

Hydraulic Pump

How to Install the Function Pump

1 Carefully install the hydraulic pump onto the transmission. Install the fasteners and tighten to finger tight.

2 Torque the fasteners evenly to 85 ft-lbs / 115 Nm.

3 Install the smaller high pressure hose onto the pump outlet. Torque the fasteners to 27-37 ft-lbs / 37-50 Nm.

4 Install the larger low pressure hose onto the pump outlet. Install the hose retaining rings and fasteners. Torque the fasteners to 55-66 ft-lbs / 74-90 Nm.

5 Working at the case drain at the top of the pump, fill the pump with hydraulic fluid until the fluid is at the top of the case drain fitting.

6 Install the case drain hose onto the pump and torque to specification. Refer to Specifications, *Hydraulic Specifications*.

7 Securely install the wire harness onto the pump.

8 Check the level of the hydraulic fluid in the hydraulic tank. Add fluid if needed.

9 Prime the pump. Refer to Repair Procedure, *How to Prime the Function Pump*.

10 Start the engine and inspect for leaks.

11 Turn the machine off.

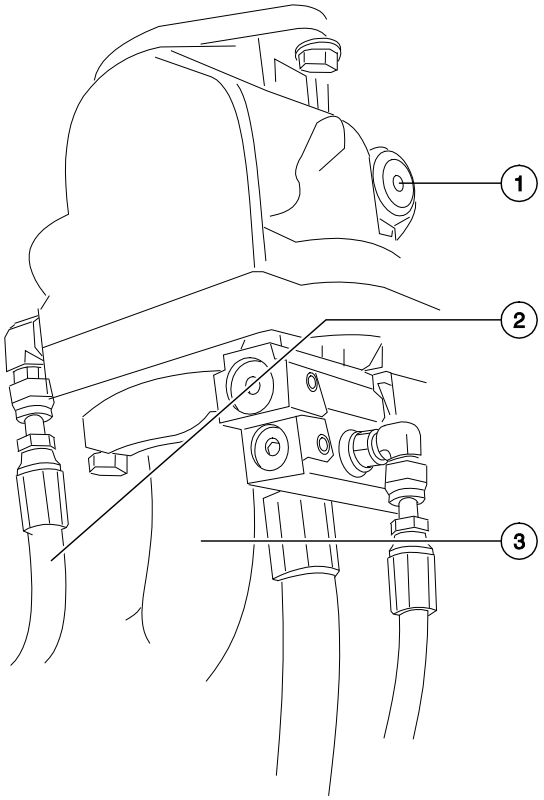
12 Adjust the pump pressure. Refer to Repair Procedures, *How to Adjust the Function Pump Standby Pressure* and *How to Adjust the Function Pump Pressure Pressure Compensator*.

How to Prime the Function Pump

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

1 Install all hoses onto the hydraulic pump. Torque to specification.Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

2 Locate the case drain filler plug at the side of the function pump.



1 case drain filler plug
2 case drain hose
3 hydraulic supply line (from tank)

Hydraulic Pump

3 Remove the plug and slowly fill the case drain port of the pump with hydraulic fluid until the oil level is even with the bottom of the hole. Install the plug and torque to 40 ft-lbs / 54 Nm.

4 Start the engine, allow the engine to run at low idle for 15 seconds then shut off the engine. Wait 15 seconds, then start the engine again. Allow the engine to run at low idle for 15 seconds and then shut off the engine.

5 Check for hydraulic leaks and clean up any oil that may have spilled.

How to Adjust the Function Pump Standby Pressure

1 Connect a 0 to 1000 psi / 0 to 100 bar pressure gauge to test port 'TP' on the primary function manifold. Refer to *Primary Function Manifold Components.*

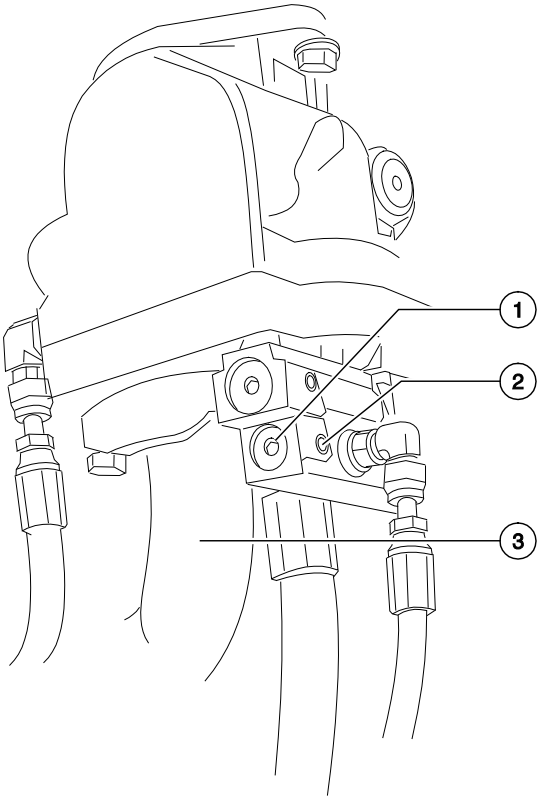
2 Start the engine and allow the engine to run at low idle.

3 Observe the pressure reading on the pressure gauge.

⊙ Result: The pressure gauge reads 450 ±25 psi / 31 ±1.7 bar. The pump is functioning correctly. Proceed to step 6.

☒ Result: The pressure gauge fails to read 450 ±25 psi / 31 ±1.7 bar. The pressure setting needs to be adjusted. Proceed to step 4.

4 Loosen the set screw for the standby pressure adjustment screw.



1 standby pressure adjustment screw
2 set screw
3 hydraulic supply line (from tank)

5 Adjust the function pump standby pressure. Turn the adjustment screw clockwise to increase the pressure or counterclockwise to decrease the pressure. Tighten the set screw.

6 Turn the engine off and remove the pressure gauge.

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

How to Adjust the Function Pump Standby Pressure

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to test port 'TP' on the primary function manifold. Refer to *Primary Function Manifold Components*.

2 Start the engine and allow the engine to run at low idle.

3 Fully retract the boom.

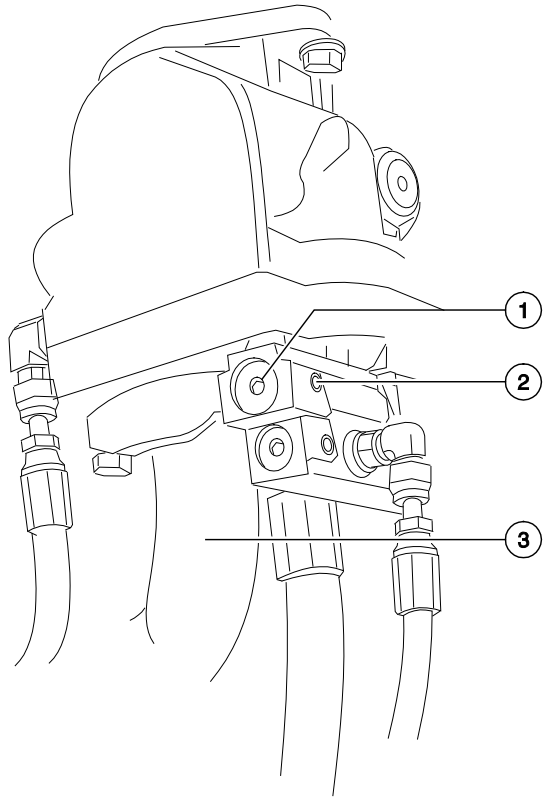
4 Continue to activate the boom retract function and observe the pressure reading on the pressure gauge.

⊙ Result: The pressure gauge reads 3190±50 psi / 220±3.4 bar. The pump is functioning correctly. Proceed to step 7.

⊠ Result: The pressure gauge fails to read 3190±50 psi / 220±3.4 bar. The pressure setting needs to be adjusted. Proceed to step 5.

Hydraulic Pump

5 Loosen the set screw for the pressure compensator adjustment screw.



1 pressure compensator adjustment screw
2 set screw
3 hydraulic supply line (from tank)

6 Adjust the pressure compensator pressure. Turn the adjustment screw clockwise to increase the pressure or counterclockwise to decrease the pressure. Tighten the set screw.

NOTICE Component damage hazard. Do not adjust the pressure compensator higher than specified.

7 Turn the engine off and remove the pressure gauge.

⚠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.

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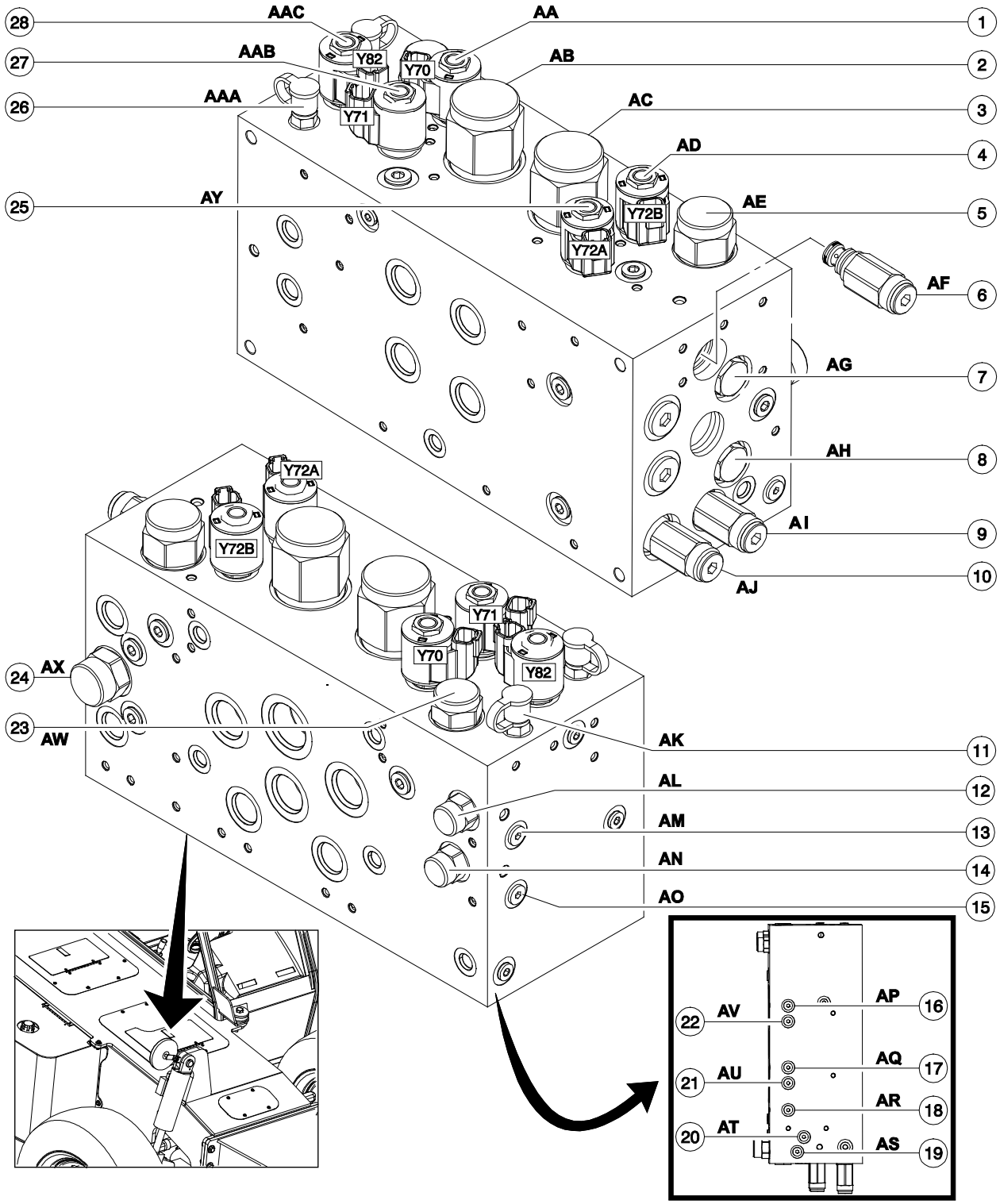
Manifolds

7-1
Primary Function Manifold Components - Models with Single Joystick

The primary function manifold is located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 2 position 4 way	AA	Function select -boom extend and sway left	40 ft-lbs / 54 Nm
2	Directional valve, 3 position 4 way, pilot operated	AB	Boom extend/retract	140 ft-lbs / 189 Nm
3	Directional valve, 3 position 4 way, pilot operated	AC	Boom up/down	140 ft-lbs / 189 Nm
4	Solenoid valve, 2 position 4 way	AD	Function select -boom down and fork tilt down	40 ft-lbs / 54 Nm
5	Directional valve, 3 position 4 way, pilot operated	AE	Fork tilt up/down	50 ft-lbs / 68 Nm
6	Relief valve, 3500 psi / 241 bar	AF	Fork tilt up relief	25-30 ft-lbs / 34-41 Nm
7	Check valve, pilot operated 100 psi / 6.9 bar	AG	Fork tilt down circuit	40-45 ft-lbs / 54-61 Nm
8	Check valve, pilot operated 100 psi / 6.9 bar	AH	Fork tilt up circuit	40-45 ft-lbs / 54-61 Nm
9	Relief valve, 3500 psi / 241 bar	AI	Fork tilt down relief	25-30 ft-lbs / 34-41 Nm
10	Relief valve, 3500 psi / 241 bar	AJ	System relief	40-45 ft-lbs / 54-61 Nm
11	Diagnostic nipple	AK	Test port 'LS'	
12	Flow regulator valve, 0.1 gpm / 0.4 L/min	AL	Load sense drain circuit	33-37 ft-lbs / 45-50 Nm
13	Check valve, 5 psi / 0.3 bar	AM	Sway right circuit	20 ft-lbs / 27 Nm
14	Priority flow regulator valve, 2 gpm / 7.6 L/min	AN	Sway left/right circuit	33-37 ft-lbs / 45-50 Nm
15	Check valve, 5 psi / 0.3 bar	AO	Sway left circuit	20 ft-lbs / 27 Nm

Manifolds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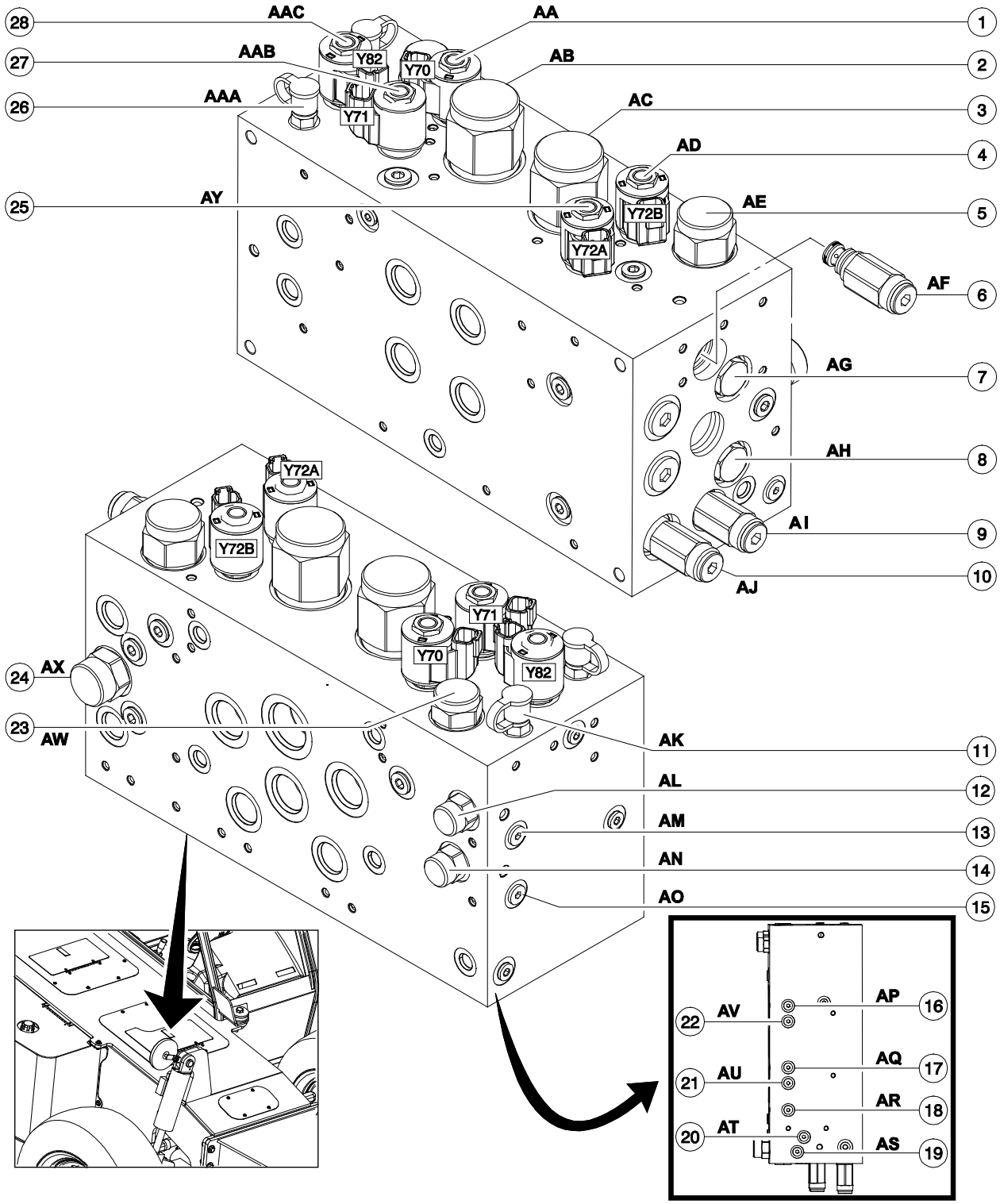
Manifolds

Primary Function Manifold Components - Models with Single Joystick

The primary function manifold is located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
16	Check valve, 5 psi / 0.3 bar	AP	Boom extend circuit	20 ft-lbs / 27 Nm
17	Check valve, 5 psi / 0.3 bar	AQ	Boom down circuit	20 ft-lbs / 27 Nm
18	Check valve, 5 psi / 0.3 bar	AR	Fork tilt up circuit	20 ft-lbs / 27 Nm
19	Check valve, 5 psi / 0.3 bar	AS	Steer left/right circuit	20 ft-lbs / 27 Nm
20	Check valve, 5 psi / 0.3 bar	AT	Fork tilt down circuit	20 ft-lbs / 27 Nm
21	Check valve, 5 psi / 0.3 bar	AU	Boom up circuit	20 ft-lbs / 27 Nm
22	Check valve, 5 psi / 0.3 bar	AV	Boom retract circuit	20 ft-lbs / 27 Nm
23	Directional valve, 3 position 4 way, pilot operated	AW	Sway left/right	50 ft-lbs / 68 Nm
24	Flow regulator valve, 14 gpm / 53 L/min	AX	Fork tilt up/down circuit	70-75 ft-lbs / 95-102 Nm
25	Solenoid valve, 2 position 4 way	AY	Function select -boom up and fork tilt up	40 ft-lbs / 54 Nm
26	Diagnostic nipple	AAA	Test port 'TP'	
27	Solenoid valve, 2 position 4 way	AAB	Function select -boom extend and sway right	40 ft-lbs / 54 Nm
28	Solenoid valve, 2 position 2 way	AAC	Function select - sway left/right	40 ft-lbs / 54 Nm

Manifolds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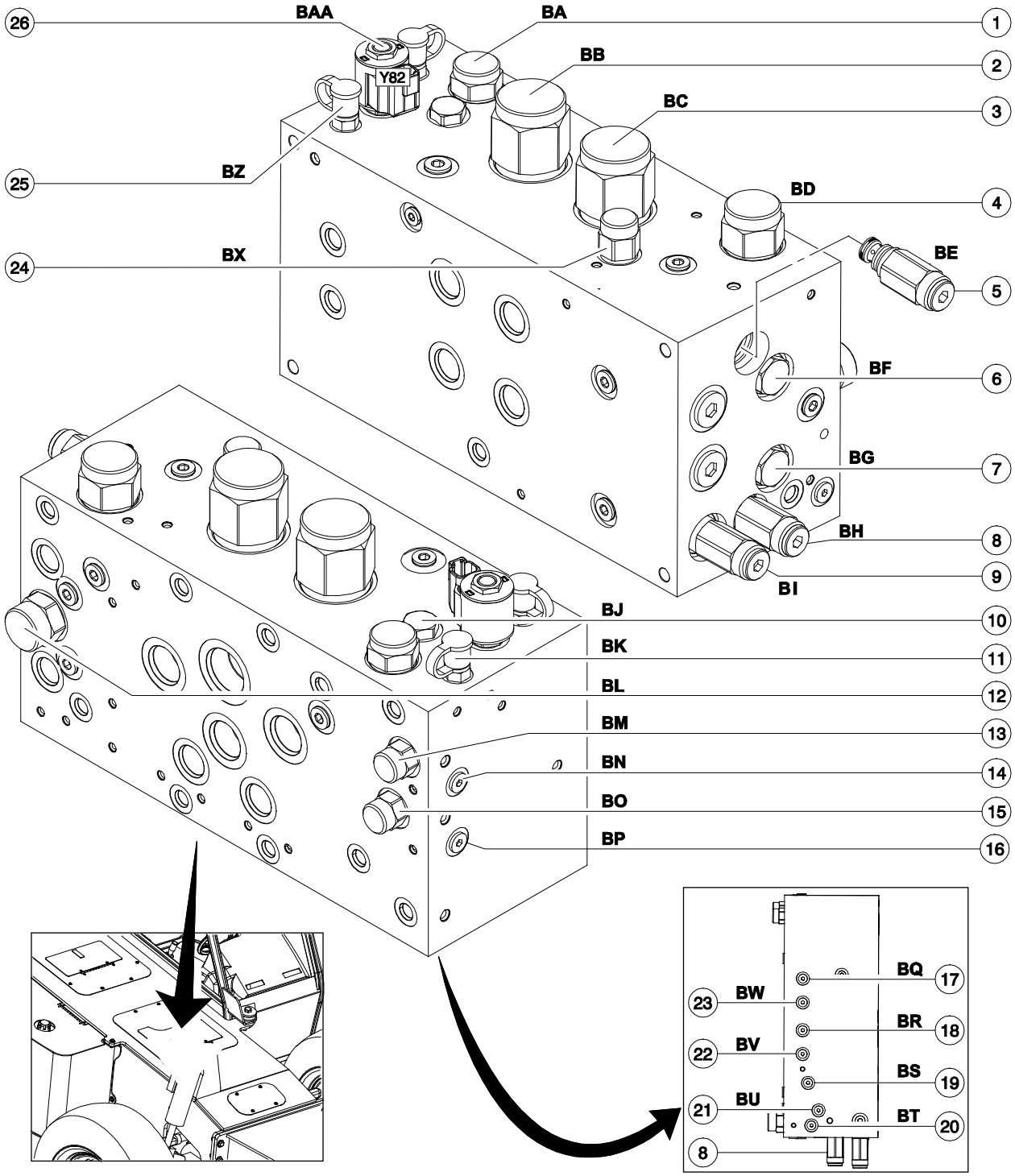
Manifolds

7-2
Primary Function Manifold Components - Models with Dual Joysticks

The primary function manifold is located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
1	Directional valve, 3 position 4 way, pilot operated	BA	Sway left/right	50 ft-lbs / 68 Nm
2	Directional valve, 3 position 4 way, pilot operated	BB	Boom extend/retract	140 ft-lbs / 189 Nm
3	Directional valve, 3 position 4 way, pilot operated	BC	Boom up/down	140 ft-lbs / 189 Nm
4	Directional valve, 3 position 4 way, pilot operated	BD	Fork tilt up/down	70 ft-lbs / 95 Nm
5	Relief valve, 3500 psi / 241 bar	BE	Fork tilt up relief	25-30 ft-lbs / 33.9-40.7 Nm
6	Check valve, pilot operated 100 psi / 6.9 bar	BF	Fork tilt down circuit	40-45 ft-lbs / 54-61 Nm
7	Check valve, pilot operated 100 psi / 6.9 bar	BG	Fork tilt up circuit	40-45 ft-lbs / 54-61 Nm
8	Relief valve, 3500 psi / 241 bar	BH	Fork tilt down relief	25-30 ft-lbs / 33.9-40.7 Nm
9	Relief valve, 3500 psi / 241 bar	BI	System relief	40-45 ft-lbs / 54-61 Nm
10	Shuttle valve	BJ	Function select - sway left/right	40 ft-lbs / 54 Nm
11	Diagnostic nipple	BK	Test port 'LS'	
12	Flow regulator valve, 14 gpm / 53 L/min	BL	Fork tilt up/down circuit	70-75 ft-lbs / 95-101.9 Nm
13	Flow regulator valve, 0.1 gpm / 0.4 L/min	BM	Pilot pressure drain circuit	33-37 ft-lbs / 44.9-50.3 Nm
14	Check valve, 5 psi / 0.3 bar	BN	Sway left circuit	20 ft-lbs / 27.1 Nm
15	Priority flow regulator valve, 2 gpm / 7.6 L/min	BO	Sway left/right circuit	33-37 ft-lbs / 44.9-50.3 Nm

Manifolds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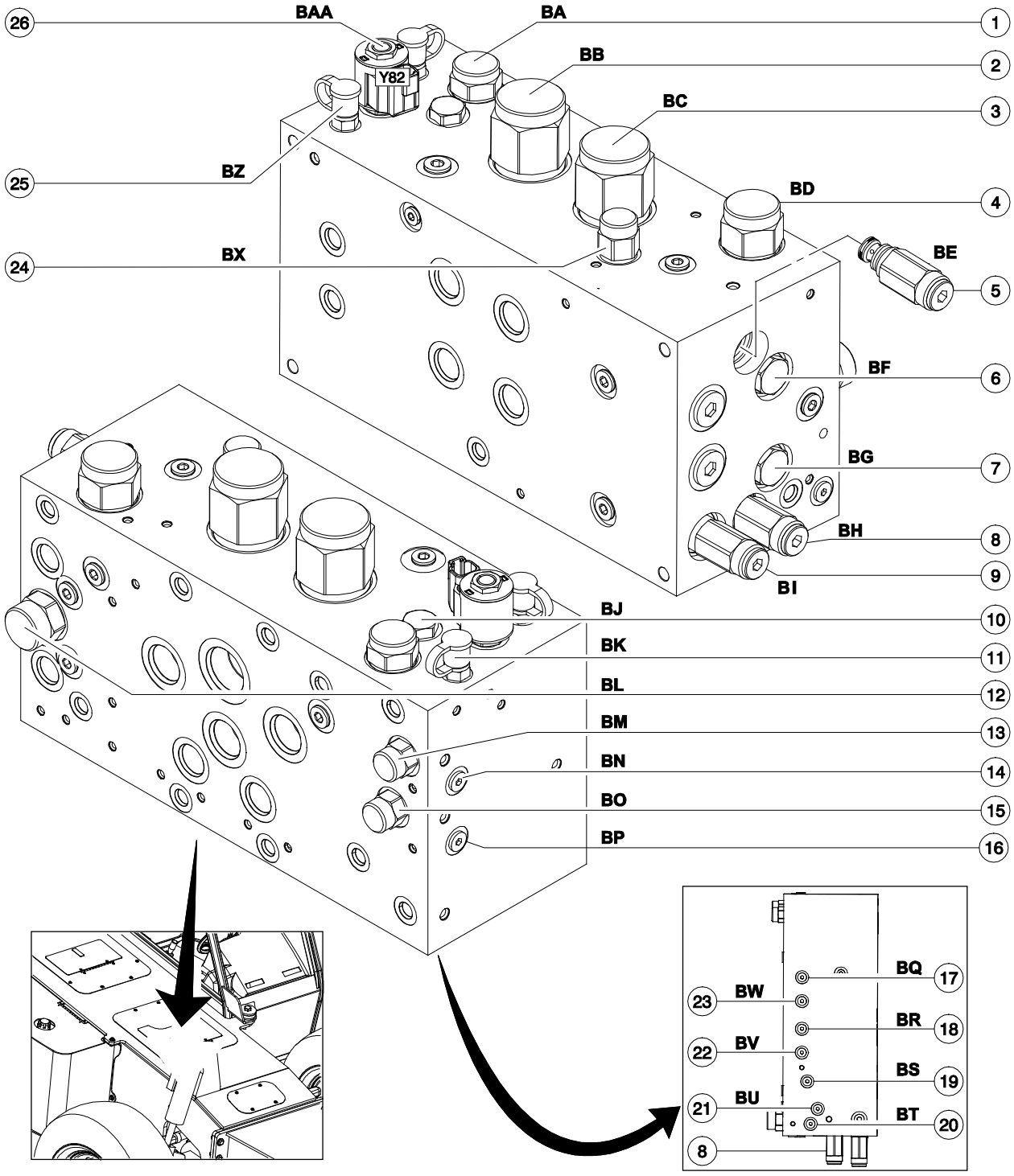
Manifolds

7-2
Primary Function Manifold Components - Models with Dual Joysticks

The primary function manifold is located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
16	Check valve, 5 psi / 0.3 bar	BP	Sway right circuit	20 ft-lbs / 27.1 Nm
17	Check valve, 5 psi / 0.3 bar	BQ	Boom extend circuit	20 ft-lbs / 27.1 Nm
18	Check valve, 5 psi / 0.3 bar	BR	Boom down circuit	20 ft-lbs / 27.1 Nm
19	Check valve, 5 psi / 0.3 bar	BS	Fork tilt down circuit	20 ft-lbs / 27.1 Nm
20	Check valve, 5 psi / 0.3 bar	BT	Steer left/right circuit	20 ft-lbs / 27.1 Nm
21	Check valve, 5 psi / 0.3 bar	BU	Fork tilt up circuit	20 ft-lbs / 27.1 Nm
22	Check valve, 5 psi / 0.3 bar	BV	Boom up circuit	20 ft-lbs / 27.1 Nm
23	Check valve, 5 psi / 0.3 bar	BW	Boom retract circuit	20 ft-lbs / 27.1 Nm
24	Directional valve, 2 position 2 way, pilot operated	BX	Fork tilt circuit	50 ft-lbs / 68 Nm
25	Diagnostic nipple	BZ	Test port 'TP'	
26	Solenoid valve, 2 position 2 way	BAA	Function select - sway left/right	40 ft-lbs / 54 Nm

Manifolds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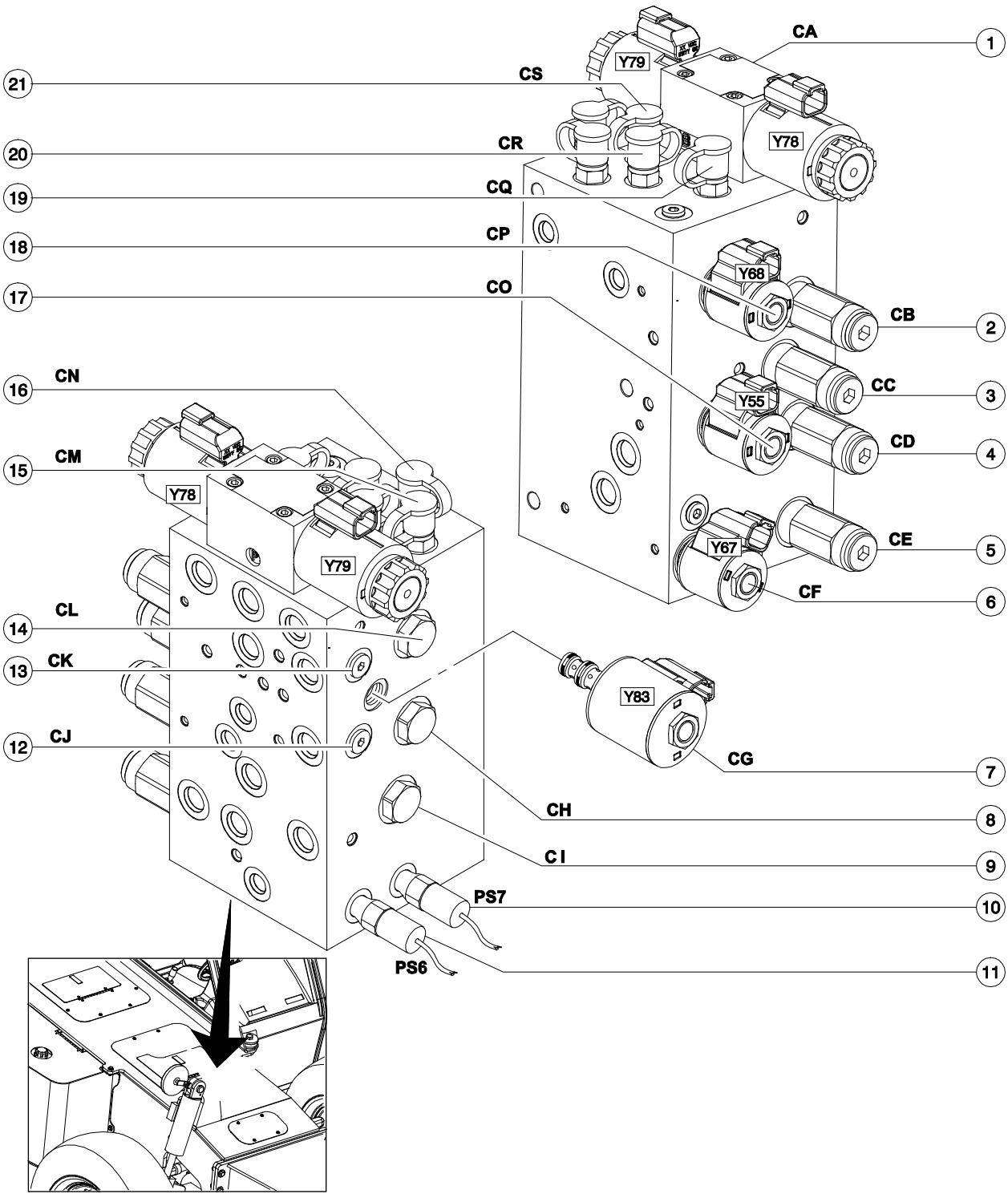
Manifolds

7-3
Secondary Function Manifold Components

The secondary function manifold is located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
1	DO3 valve, 3 position 4 way	CA	Steer left/right	60 in-lbs / 6.8 Nm
2	Pressure reducing/relief valve, 50 psi / 3.4 bar	CB	Rear lock-up circuit	35 ft-lbs / 47.5 Nm
3	Pressure reducing/relief valve, 400 psi / 27.5 bar	CC	Differential lock-up circuit	50 ft-lbs / 67.8 Nm
4	Pressure reducing/relief valve, 2500 psi / 172 bar	CD	Steer circuit	50 ft-lbs / 67.8 Nm
5	Pressure reducing/relief valve, 400 psi / 27.5 bar	CE	Drive brake circuit	50 ft-lbs / 67.8 Nm
6	Solenoid valve, 2 position 3 way	CF	Parking brake select	20 ft-lbs / 27 Nm
7	Solenoid valve, 2 position 4 way	CG	Rear axle fast oscillate select	50 ft-lbs / 67.8 Nm
8	Check valve, 4 psi / 0.3 bar	CH	Rear lock-up extend circuit	25-30 ft-lbs / 34-40.7 Nm
9	Check valve, 25 psi / 1.7 bar	CI	Drive brake circuit	25-30 ft-lbs / 34-40.7 Nm
10	Pressure switch, 350 psi / 24 bar	PS7	Low brake pressure	11 ft-lbs / 14.9 Nm
11	Pressure switch, 250 psi / 17.2 bar	PS6	Parking brake pressure	11 ft-lbs / 14.9 Nm
12	Orifice, 0.059 in / 1.5 mm	CJ	Rear lock-up extend circuit	
13	Orifice, 0.051 in / 1.3 mm	CK	Rear lock-up retract circuit	
14	Check valve, 4 psi / 0.3 bar	CL	Rear lock-up retract circuit	25-30 ft-lbs / 34-40.7 Nm
15	Diagnostic nipple	CM	Test port 'TB'	
16	Diagnostic nipple	CN	Test port 'TPB'	
17	Solenoid valve, 2 position 3 way	CO	Rear axle oscillate enable select	20 ft-lbs / 27 Nm
18	Solenoid valve, 2 position 3 way	CP	Differential lock-up select	20 ft-lbs / 27 Nm
19	Diagnostic nipple	CQ	Test port 'TJ'	
20	Diagnostic nipple	CR	Test port 'TS'	
21	Diagnostic nipple	CS	Test port 'TR'	

Manifolds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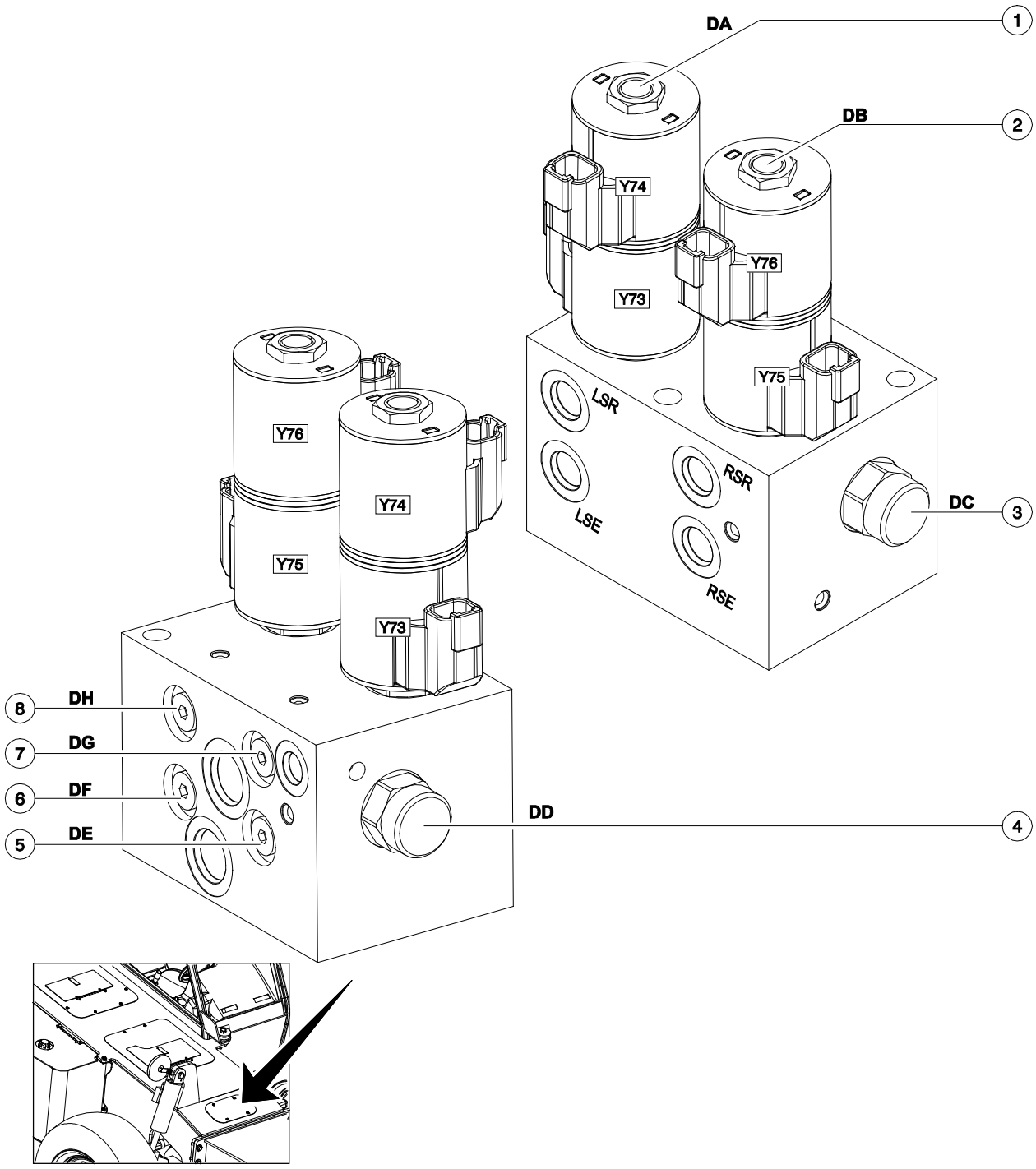
Manifolds

7-4
Outrigger Manifold Components

The outrigger manifold is located under the outrigger inspection cover.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 3 position 4 way	DA	Left outrigger extend/retract	40 ft-lbs / 54 Nm
2	Solenoid valve, 3 position 4 way	DB	Right outrigger extend/retract	40 ft-lbs / 54 Nm
3	Flow regulator valve, 6 gpm / 22.7 L/min	DC	Right outrigger circuit	45-50 ft-lbs / 61-67.8 Nm
4	Flow regulator valve, 6 gpm / 22.7 L/min	DD	Left outrigger circuit	45-50 ft-lbs / 61-67.8 Nm
5	Check valve, 5 psi / 0.3 bar	DE	Left outrigger extend circuit	13 ft-lbs / 17.6 Nm
6	Check valve, 5 psi / 0.3 bar	DF	Right outrigger extend circuit	13 ft-lbs / 17.6 Nm
7	Check valve, 5 psi / 0.3 bar	DG	Left outrigger retract circuit	13 ft-lbs / 17.6 Nm
8	Check valve, 5 psi / 0.3 bar	DH	Right outrigger retract circuit	13 ft-lbs / 17.6 Nm

Manifolds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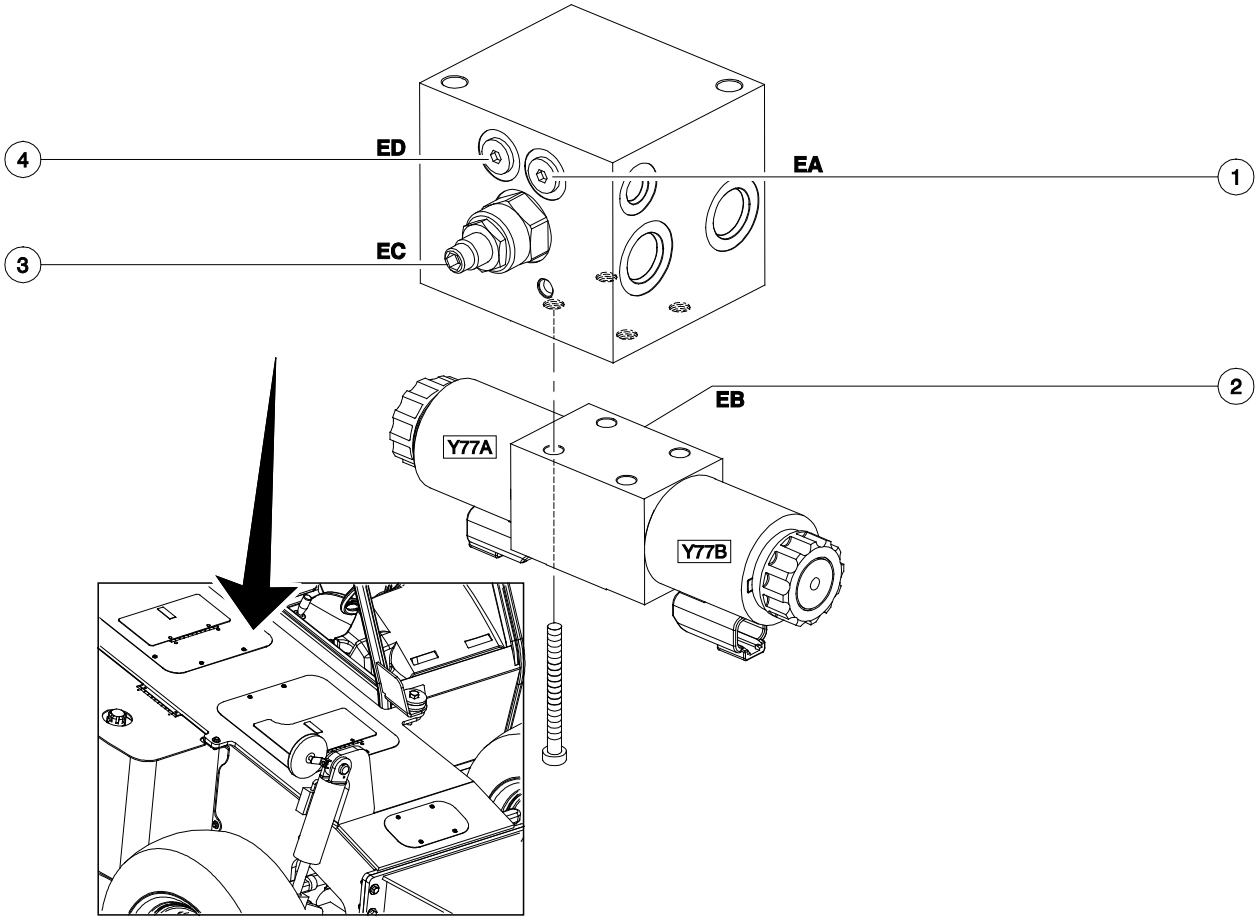
Manifolds

7-5
Auxiliary Manifold Components (option)

The auxiliary manifold is located under the transmission inspection cover.

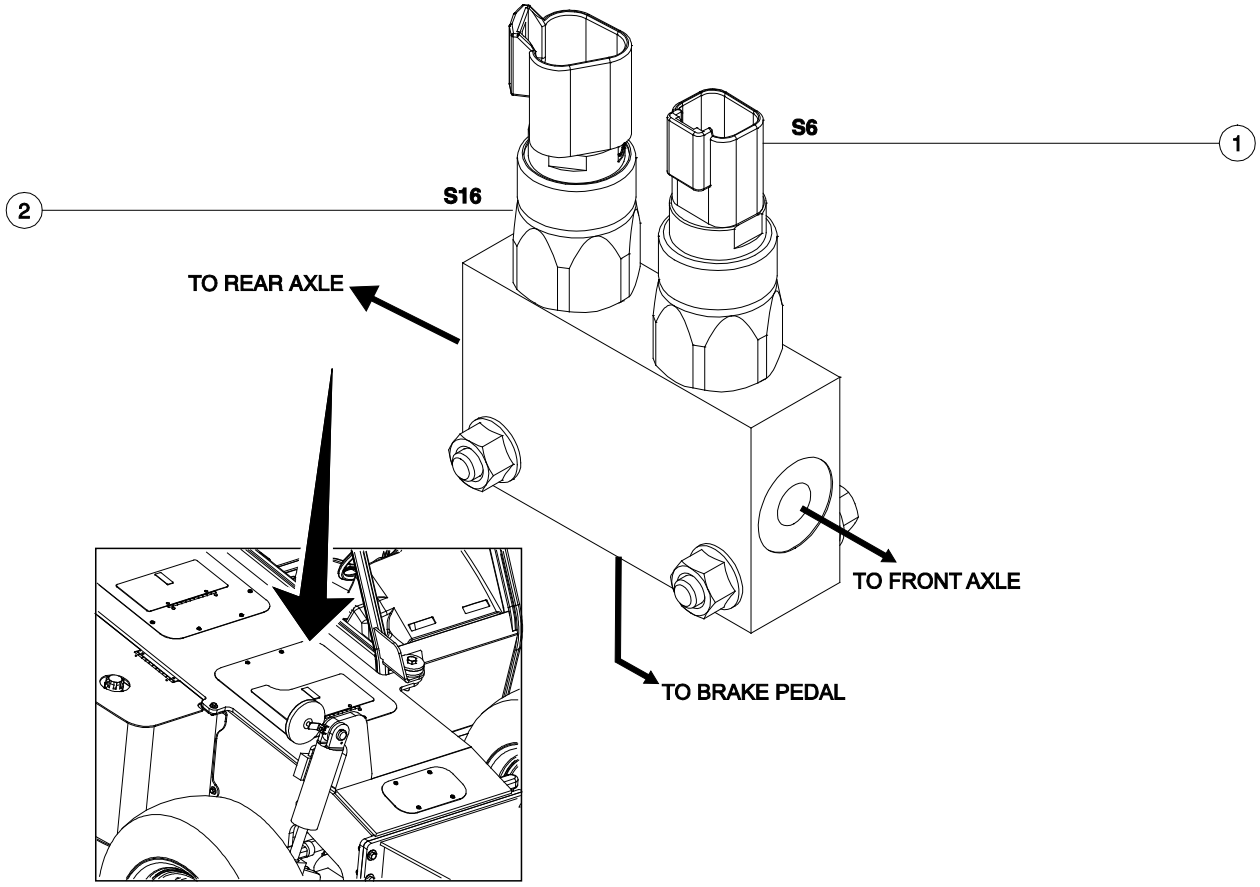
Index No.	Description	Schematic Item	Function	Torque
1	Check valve, 5 psi / 0.3 bar	EA	Auxiliary 'A1' circuit	12-14 ft-lbs / 16-19 Nm
2	DO3 valve, 3 position 4 way	EB	Auxiliary function enable	60 in-lbs / 6.8 Nm
3	Flow regulator valve	EC	Function speed control	25 ft-lbs / 34 Nm
4	Check valve, 5 psi / 0.3 bar	ED	Auxiliary 'A2' circuit	12-14 ft-lbs / 16-19 Nm



7-6
Brake Manifold Components

The brake manifold is located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
1	Pressure switch, 450 psi / 31 bar	PS4	Clutch cut-off pressure	11 ft-lbs / 14.9 Nm
2	Pressure switch, 50 psi / 3.4 bar	PS5	Brake light pressure (option)	11 ft-lbs / 14.9 Nm

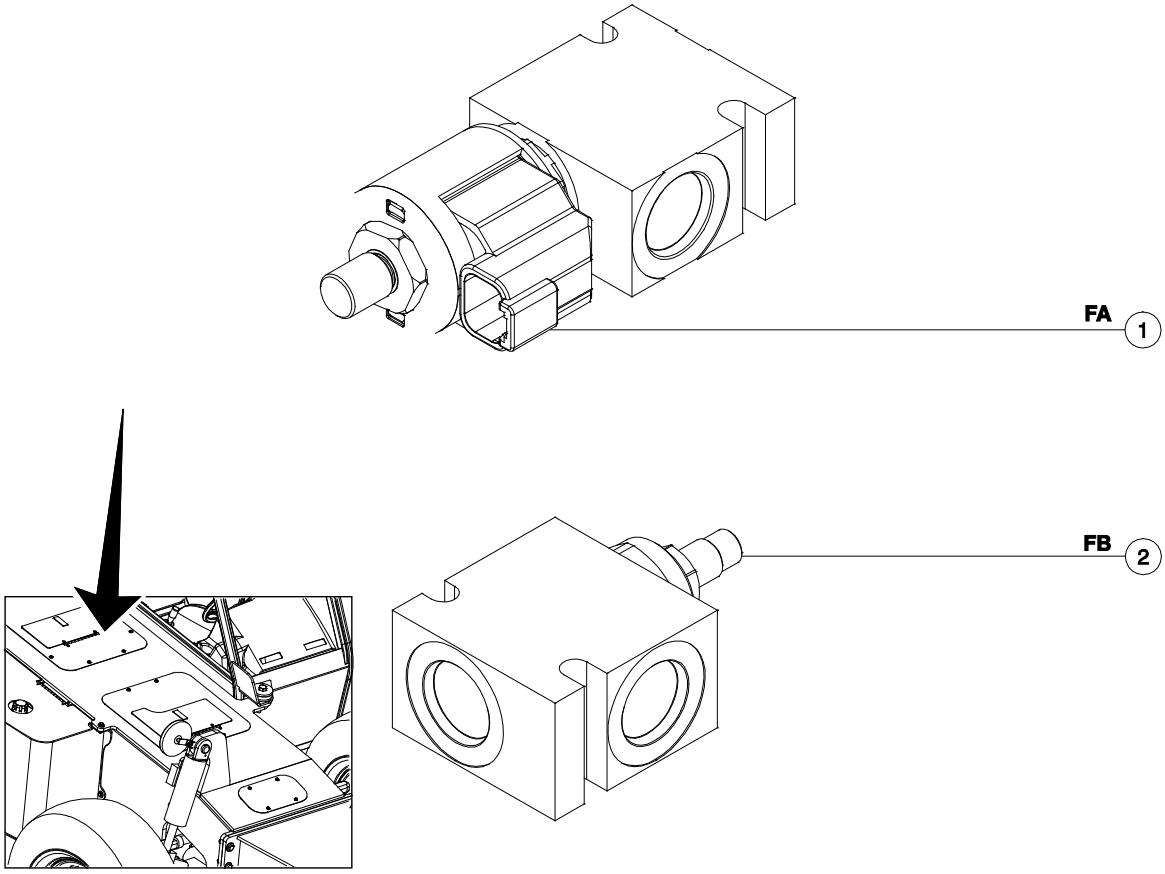


Manifolds

7-7
AC Hydraulic Manifold Components

The AC Hydraulic manifolds are located under the manifold inspection cover.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 2 position 2 way	FA	Controls motor	20 ft-lbs / 27.1 Nm
2	Flow control valve, 3 gpm/ 11.3 lpm	FB	Regulates flow	33-37 ft-lbs / 45-50 Nm



7-8 Valve Adjustments - Secondary Function Manifold

How to Set the Steer System Pressure

Note: Be sure that the hydraulic oil level is visible in the inspection glass of the hydraulic tank.

1 Install a 0 to 1000 psi / 0 to 100 bar pressure gauge into test port 'TP' at the top of the secondary function manifold, refer to *Secondary Function Manifold Components.*

2 Start the engine. Allow the engine to idle after warming the engine to operating temperature.

3 Without operating any machine controls, observe the reading on the pressure gauge.

⊙ Result: The pressure gauge reads 450 ±25 psi / 31 ±1.7 bar. The pump is functioning correctly.

⊠ Result: The pressure gauge fails to read 450 ±25 psi / 31 ±1.7 bar. The pressure setting needs to be adjusted. Refer to Repair Procedure, *How to Adjust the Function Pump Pressure*.

4 Turn the machine off. Remove the pressure gauge from the test port.

⚠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 Install a 0 to 3500 psi / 0 to 250 bar pressure gauge into test port 'TS' at the top of the secondary function manifold. Refer to *Secondary Function Manifold Components*.

6 Start the engine. Allow the engine to idle.

7 Fully turn and hold the steering wheel in the left direction and allow the wheels to fully turn to the left. Continue holding the steering while observing the pressure reading on the pressure gauge.

⊙ Result: The pressure gauge reads 2500 psi / 172 bar. The pressure setting is correct. Proceed to step 12.

⊠ Result: The pressure gauge fails to read 2500 psi / 172 bar. The pressure setting needs to be adjusted. Proceed to step 8.

8 Turn the machine off. Hold the steer pressure reducing/relief valve with a wrench and remove the cap.

9 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure.

NOTICE Component damage hazard. Do not adjust the relief valve pressures higher than specifications.

10 Install the relief valve cap.

11 Repeat this procedure beginning with step 6.

12 Turn the machine off. Remove the pressure gauge from the test port.

⚠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.

Manifolds

How to Set the Parking Brake System Pressure

Note: Be sure that the hydraulic oil level is visible in the inspection glass of the hydraulic tank.

1 Install a 0 to 1000 psi / 0 to 100 bar pressure gauge into test port 'TP' at the top of the primary function manifold, Refer to Primary Function Manifold Components.

2 Start the engine. Allow the engine to idle after warming the engine to operating temperature.

3 Without operating any machine controls, observe the reading on the pressure gauge.

⊙ Result: The pressure gauge reads 450 ±25 psi / 31 ±1.7 bar. The pump is functioning correctly.

⊠ Result: The pressure gauge fails to read 450 ±25 psi / 31 ±1.7 bar. The pressure setting needs to be adjusted. Refer to Repair Procedure, *How to Adjust the Function Pump Pressure*.

4 Turn the machine off. Remove the pressure gauge from the test port.

⚠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 Install a 0 to 1000 psi / 0 to 100 bar pressure gauge into test port 'TPB' at the top of the secondary function manifold, Refer to Secondary Function Manifold Components.

6 Start the engine. Allow the engine to idle.

⊙ Result: The pressure gauge reads 400 psi / 27.5 bar. The pressure setting is correct. Proceed to step 11.

⊠ Result: The pressure gauge fails to read 400 psi / 27.5 bar. The pressure setting needs to be adjusted. Proceed to step 7.

7 Turn the machine off. Hold the brake pressure reducing/relief valve with a wrench and remove the cap.

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

NOTICE Component damage hazard. Do not adjust the relief valve pressures higher than specifications.

9 Install the relief valve cap.

10 Repeat this procedure beginning with step 6.

11 Turn the machine off. Remove the pressure gauge from the test port.

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

How to Set the Differential Lock/Joystick System Pressure

Note: Be sure that the hydraulic oil level is visible in the inspection glass of the hydraulic tank.

1 Install a 0 to 1000 psi / 0 to 100 bar pressure gauge into test port 'TP' at the top of the primary function manifold, Refer to Primary Function Manifold Components.

2 Start the engine. Allow the engine to idle after warming the engine to operating temperature.

3 Without operating any machine controls, observe the reading on the pressure gauge.

⊙ Result: The pressure gauge reads 450 ±25 psi / 31 ±1.7 bar. The pump is functioning correctly.

⊠ Result: The pressure gauge fails to read 450 ±25 psi / 31 ±1.7 bar. The pressure setting needs to be adjusted. Refer to Repair Procedure, *How to Adjust the Function Pump Pressure*.

4 Turn the machine off. Remove the pressure gauge from the test port.

⚠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 Install a 0 to 1000 psi / 0 to 100 bar pressure gauge into test port 'TJ' at the top of the secondary function manifold, Refer to Secondary Function Manifold Components.

6 Start the engine. Allow the engine to idle.

⊙ Result: The pressure gauge reads 400 psi / 27.5 bar. The pressure setting is correct. Proceed to step 11.

⊠ Result: The pressure gauge fails to read 400 psi / 27.5 bar. The pressure setting needs to be adjusted. Proceed to step 7.

7 Turn the machine off. Hold the differential lock/joystick pressure reducing/relief valve with a wrench and remove the cap.

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

NOTICE Component damage hazard. Do not adjust the relief valve pressures higher than specifications.

9 Install the relief valve cap.

10 Repeat this procedure beginning with step 6.

11 Turn the machine off. Remove the pressure gauge from the test port.

⚠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.

Manifolds

How to Set the Rear Lock-up System Pressure

Note: Be sure that the hydraulic oil level is visible in the inspection glass of the hydraulic tank.

1 Install a 0 to 1000 psi / 0 to 100 bar pressure gauge into test port 'TP' at the top of the primary function manifold. Refer to Primary Function Manifold Components.

2 Start the engine. Allow the engine to idle after warming the engine to operating temperature.

3 Without operating any machine controls, observe the reading on the pressure gauge.

⊙ Result: The pressure gauge reads 450 ±25 psi / 31 ±1.7 bar. The pump is functioning correctly.

☒ Result: The pressure gauge fails to read 450 ±25 psi / 31 ±1.7 bar. The pressure setting needs to be adjusted. Refer to Repair Procedure, *How to Adjust the Function Pump Pressure*.

4 Turn the machine off. Remove the pressure gauge from the test port.

⚠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 Install a 0 to 500 psi / 0 to 50 bar pressure gauge into test port 'TR' at the top of the secondary function manifold, Refer to Secondary Function Manifold Components.

6 Start the engine. Allow the engine to idle.

⊙ Result: The pressure gauge reads 50 psi / 3.4 bar. The pressure setting is correct. Proceed to step 11.

☒ Result: The pressure gauge fails to read 50 psi / 3.4 bar. The pressure setting needs to be adjusted. Proceed to step 7.

7 Turn the machine off. Hold the rear lockup pressure reducing/relief valve with a wrench and remove the cap.

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

NOTICE Component damage hazard. Do not adjust the relief valve pressures higher than specifications.

9 Install the relief valve cap.

10 Repeat this procedure beginning with step 6.

11 Turn the machine off. Remove the pressure gauge from the test port.

⚠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.

7-9 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

Description	Specification
Solenoid valve, 2 position 4 way 12V DC with diode (schematic items AA, AD, AY, AAB and BAA)	8.9Ω
Solenoid valve, 2 position 2 way 12V DC with diode (schematic items AAC and EA)	8.9Ω
DO3 valve, 3 position 4 way 12V DC with diode (schematic items CA and EB)	5.6Ω
Solenoid valve, 2 position 2 way 12V DC with diode (schematic items FA)	8.8Ω
Solenoid valve, 2 position 3 way 12V DC with diode (schematic items CF, CO and CP)	8.9Ω
Solenoid valve, 2 position 4 way 12V DC with diode (schematic items CG)	7.3Ω
Solenoid valve, 3 position 4 way 12V DC with diode (schematic items DA and DB)	7.3Ω

Manifolds

How to Test a Coil Diode

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

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

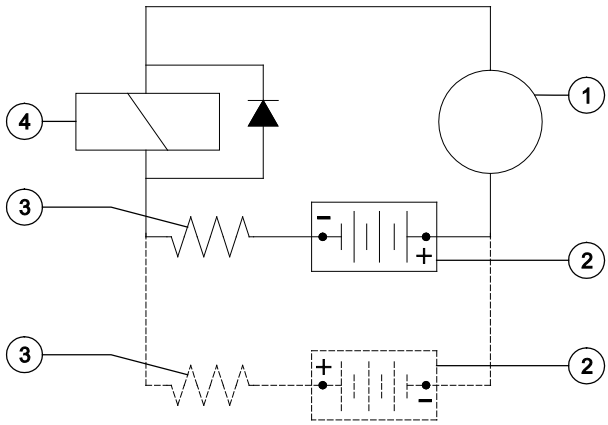
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.

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

Resistor 10Ω

Genie part number 27287

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



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

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

3 Set a multimeter to read DC current.

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

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

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

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

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

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

8-1 Axles

How to Remove the Axle

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

1 Chock the wheels.

2 Remove the fasteners securing the driveshaft to the transmission. Lower the end of the driveshaft to the ground.

3 Remove the fasteners securing the driveshaft to the axle. remove the driveshaft from the machine.

4 Loosen the lug nuts of both wheels on the axle to be removed. Do not remove the lug nuts.

5 Raise the end of the machine until the tires are off the ground. Place blocks under the chassis for support.

⚠DANGER Crushing hazard. The chassis will fall if not properly supported.

6 Remove the lug nuts. Remove the tire and wheel assembly from both ends of the axle.

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

8 Remove the fasteners securing the sway cylinder rod-end pivot pin to the chassis.

9 Use a soft metal drift to remove the pivot pin.

10 Remove the fasteners securing the axle to the chassis. Remove the axle from the machine.

⚠DANGER Crushing hazard. The axle will fall if not properly supported when the fasteners are removed from the machine.

Bolt torque specification	
Axle mounting bolts (before SN GTH10E-11937	650 ft-lbs (lubed) 881 Nm (lubed)
Front axle mounting bolts (from SN GTH10E-11937	650 ft-lbs (lubed) 881 Nm (lubed)
Rear axle mounting bolts (from SN GTH10E-11937)	282 ft-lbs (lubed) 383 Nm (lubed)

How to Repair the Axle

Repair procedures and additional axle information is available in the Dana 213 Axle Maintenance and Repair Manual.

Dana 213 Axle Maintenance and Repair Manual	
Genie part number	115026

Outriggers

9-1 Outriggers

How to Remove an Outrigger

1 Extend the outrigger until the pad just touches the ground. Do not rest the weight of the machine on the outrigger.

2 Tag, disconnect and plug the hydraulic supply hoses at the outrigger cylinder. 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.

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

3 Attach a lifting strap from an overhead crane to the barrel end of the fork level cylinder. Support the cylinder. Do not apply any lifting pressure.

4 Remove the fasteners securing the outrigger cylinder barrel-end pivot pin to the machine.

5 Use a soft metal drift to remove the outrigger cylinder barrel-end pivot pin. Lower the cylinder onto the outrigger.

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

6 Attach a lifting strap from an overhead crane to the outrigger assembly. Support the outrigger. Do not apply any lifting pressure.

7 Remove the fasteners securing the outrigger pivot pin to the machine.

8 Use a soft metal drift to remove the pivot pin. Remove the outrigger assembly from the machine.

⚠WARNING Crushing hazard. The outrigger will fall if not properly supported when the pivot pin is removed from the machine.

How to Remove an Outrigger 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 outrigger until the pad just touches the ground. Do not rest the weight of the machine on the outrigger.

2 Tag, disconnect and plug the two hydraulic supply hoses at the outrigger cylinder. 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.

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

3 Attach a lifting strap from an overhead crane to the barrel end of the outrigger cylinder. Support the cylinder. Do not apply any lifting pressure.

4 Remove the fasteners securing the outrigger cylinder barrel-end pivot pin to the chassis.

5 Use a soft metal drift to remove the pivot pin.

⚠WARNING Crushing hazard. The cylinder will fall if not properly supported when the pivot pin is removed from the machine.

6 Raise the cylinder to a vertical position.

7 Remove the fasteners securing the outrigger cylinder rod-end pivot pin to the machine.

8 Use a soft metal drift to remove the pivot pin. Remove the cylinder from the machine.

⚠WARNING Crushing hazard. The cylinder will fall if not properly supported when the pivot pin is removed from the machine.

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Fault Codes

Observe and Obey:

- R Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine
- R Immediately tag and remove from service a damaged or malfunctioning machine.
- R Repair any machine damage or malfunction before operating the machine.
- R Unless otherwise specified, perform each procedure with the machine in the following configuration:
  - Machine parked on a firm, level surface
  - Boom in the stowed position
  - Key switch in the off position with the key removed
  - Wheels chocked

Before Troubleshooting:

- R Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- R Be sure that all necessary tools and test equipment are available and ready for use.
- R Read each appropriate fault code thoroughly. Attempting short cuts may produce hazardous conditions.
- R 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.

Diagnostic Display

When the engine Electronic Control Module (ECM) detects an abnormal operating condition, a fault code is immediately stored in the ECM memory.

The fault code is displayed on the LCD display which is located on the gauge cluster in the operator's compartment.

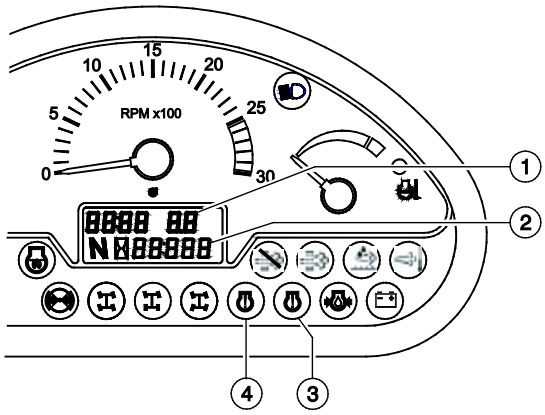
The gauge cluster also includes two warning lights.

They are an amber colored light which signals an abnormal engine condition which should be corrected as soon as possible and a red colored light which signals an engine condition which requres the operator to shut down the engine as soon as possible.

The ECM will, in some cases, automatically shut down the engine when the red light is displayed.

Active Fault Codes

Active Fault Codes will be displayed on the gauge cluster whenever a fault is detected. If multiple fault codes are detected, the fault codes will scroll on the display.



1 FMI Code
2 SPN Code
3 amber warning light
4 red stop engine light

Active Codes vs Stored Codes

Active fault codes, indicating an engine condition or conditions which have not been corrected, are displayed at the moment the fault is detected.

Stored fault codes are the cumulative history of fault codes which the ECM has detected. These fault codes may be recalled by service personnel at a later time even if the condition which caused the engine fault has ceased to exist.

Note: Additional hardware will be necessary to access stored codes.

Decoding Fault Codes

The Suspect Parameter Number (SPN) and the Failure Mode Identifier (FMI), when combined, are the basis for an engine fault code. The SPN number indicates the affected component; the FMI number reveals the type of failure that has occurred. Comparing the combination of numbers to the fault code chart on the following pages will help to determine the exact engine fault and a corrective course of action. For additional information, refer to the engine operator's manual which came with your machine.

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
29		3	Handthrottle; signal out of range, short circuit to battery
		4	Handthrottle; signal out of range, short circuit to ground
51		3	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
		4	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
		5	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
		6	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
		7	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
		11	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
		12	Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); internal error
84		2	Sensor vehicle speed; plausibility error
91		3	Sensor error accelerator pedal; signal range check high
		4	Sensor error accelerator pedal; signal range check low
		11	Plausibility error between APP1 and APP2 or APP1 and idle switch
94		1	Low fuel pressure; system reaction initiated
		3	Sensor error low fuel pressure; signal range check high
		4	Sensor error low fuel pressure; signal range check low
97		3	Sensor error water in fuel; signal range check high
		4	Sensor error water in fuel; signal range check low
		12	Water in fuel level prefilter; maximum value exceeded
100		0	High oil pressure; system reaction initiated
		1	High oil pressure; system reaction initiated
		3	Sensor error oil pressure; signal range check high
		4	Sensor error oil pressure sensor; signal range check low
102		2	Charged air pressure; system reaction initiated
		3	Sensor error charged air pressure; signal range check high
		4	Sensor error charged air pressure; signal range check low
105		0	Charged air cooler temperature; system reaction initiated
		3	Sensor error charged air temperature; signal range check high
		4	Sensor error charged air temperature; signal range check low

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
107		0	Air filter differential pressure; system reaction initiated
		3	Sensor error airfilter differential pressure; short circuit to battery
		4	Sensor error airfilter differential pressure; short circuit to ground
108		3	Sensor error ambient air pressure; signal range check high
		4	Sensor error ambient air pressure; signal range check low
110		0	Coolant temperature; system reaction initiated
		3	Sensor error coolant temperature; signal range check high
		4	Sensor error coolant temperature; signal range check low
111		1	Coolant level too low
132		11	Air flow sensor; sensor error
157		3	Sesnor error rail pressure; signal range check high
		4	Sensor error rail pressure; signal range check low
164		2	Rail pressure safety function is not executed correctly
168		0	Physikal range check high for battery voltage
		1	Physikal range check low for battery voltage
		2	High battery voltate; warning threshold exceeded
		2	Battery voltage; system reaction initiated
		3	Sensor error battery voltage; signal range check high
		3	Sensor error battery voltage; signal range check high
		4	Sensor error battery voltage; signal range check low
		4	Sensor error battery voltage; signal range check low
171		3	Sensor error environment temperature; signal range check high
		4	Sensor error environment temperature; signal range check low
172		0	Physical range check high for intake air temperature
		1	Physical range check low for intake air temperature
		2	Intake air sensor; plausibility error
		3	Sensor error intake air; signal range check high
		4	Sensor error intake air sensor; signal range check low
			Sensor ambient air temperature; plausibility error
174		0	High Low fuel temperature; shut off threshold exceeded
			High low fuel temperature; warning threshold exceeded

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
175		0	Oil temperature; out of range, system reaction initiated
		1	Physical range check low for oil temperature
		2	Oil temperature; plausibility error
		3	Sensor error oil temperature; signal range check high
		4	Sensor error oil temperature; signal range check low
190		0	Engine speed above warning threshold (FOC-Level 1)
		2	Offset angle between crank- and camshaft sensor is too large
		8	Speed detection; out of range, signal disrupted
		11	Engine speed above warning threshold (FOC-Level 2)
		12	Speed detection; out of range, signal disrupted
		14	Speed detection; out of range, signal disrupted
411		0	Physical range check high for differential pressure Venturiunit (EGR)
		1	Physical range check low for differential pressure Venturiunit (EGR)
		3	Sensor error differential pressure Venturiunit (EGR); signal range check high
		4	Physical range check low for EGR differential pressure
			Sensor error differential pressure Venturiunit (EGR); signal range check low
412		3	Sensor error EGR cooler downstream temperature; signal range check high
		4	Sensor error EGR cooler downstream temperature; signal range check low
520		9	Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint
597		2	Break lever mainswitch and break lever redundancyswitch status not plausible
624		3	SVS lamp; short circuit to battery
		4	SVS lamp; short circuit to ground
		5	SVS lamp; open load
		12	SVS lamp; powerstage over temperature
630		12	Access error EEPROM
639		14	CAN-Bus 0 "BusOff-Status"

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
651		3	Injector 1 (in firing order); short circuit
		4	High side to low side short circuit in the injector 1 (in firing order)
		5	Injector 1 (in firing order); interruption of electric connection
652		3	Injector 2 (in firing order); short circuit
		4	High side to low side short circuit in the injector 2 (in firing order)
		5	Injector 2 (in firing order); interruption of electric connection
653		3	Injector 3 (in firing order); short circuit
		4	High side to low side short circuit in the injector 3 (in firing order)
		5	Injector 3 (in firing order); interruption of electric connection
654		3	Injector 4 (in firing order); short circuit
		4	High side to low side short circuit in the injector 4 (in firing order)
		5	Injector 4 (in firing order); interruption of electric connection
655		3	Injector 5 (in firing order); short circuit
		4	High side to low side short circuit in the injector 5 (in firing order)
		5	Injector 5 (in firing order); interruption of electric connection
656		3	Injector 6 (in firing order); short circuit
		4	High side to low side short circuit in the injector 6 (in firing order)
		5	Injector 6 (in firing order); interruption of electric connection
676		11	Cold start aid relay; open load, relay error.
677		3	Starter relay; short circuit
		4	Starter relay; short circuit
		5	Starter relay; no load error
		12	Starter relay; powerstage over temperature
703		3	Engine running lamp; short circuit to battery
		4	Engine running lamp; short circuit to ground
		5	Engine running lamp; open load
		12	Engine running lamp; powerstage over temperature

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
729		5	Cold start aid relay open load
		12	Cold start aid relay; over temperature error
898		9	Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
975		3	Fan control; short circuit to battery
		4	Fan control; short circuit to ground
		5	Fan control; open load
		12	Fan control; internal error
1079		13	Sensor supply voltage monitor 1 error (ECU)
1080		13	Sensor supply voltage monitor 2 error (ECU)
1109		2	Engine shut off demand ignored
1136		0	Physikal range check high for ECU temperature
		1	Physikal range check low for ECU temperature
		3	Sensor error ECU temperature; signal range check high
		4	Sensor error ECU temperature; signal range check low
1176		3	Sensor error pressure sensor upstream turbine; signal range check high
		4	Sensor error pressure sensor downstream turbine; signal range check high
1180		0	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
		1	Exhaust gas temperature turbine upstream; out of range, system reaction initiated
		3	Sensor error exhaust gas temperature upstream turbine; signal range check high
		4	Sensor error exhaust gas temperature upstream turbine; signal range check low
		11	Sensor exhaust gas temperature upstream turbine; plausibility error
			Exhaust gas temperature upstream turbine; out of range, system reaction initiated
			Exhaust gas temperature upstream turbine; out of range, system reaction initiated

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
1188		2	Wastegate; status message from ECU missing
		7	Wastegate actuator; blocked
		11	Turbo charger wastegate actuator; internal error
		13	Wastegate actuator calibration deviation too large, recalibration required
1231		14	CAN-Bus 1 "BusOff-Status"
1235		14	CAN-Bus 2 "BusOff-Status"
1237		2	Override switch; plausibility error
1322		12	Too many recognized misfires in more than one cylinder
1323		12	Too many recognized misfires in cylinder 1 (in firing order)
		12	Too many recognized misfires in cylinder 1 (in firing order)
1324		12	Too many recognized misfires in cylinder 2 (in firing order)
1325		12	Too many recognized misfires in cylinder 3 (in firing order)
1326		12	Too many recognized misfires in cylinder 4 (in firing order)
1327		12	Too many recognized misfires in cylinder 5 (in firing order)
1328		12	Too many recognized misfires in cylinder 6 (in firing order)
1639		0	Sensor error fan speed; signal range check high
		1	Sensor error fan speed; signal range check low
1761		14	Urea tank level; warning threshold exceeded
2621		3	Flush valve burner (EPV DPF-System); short circuit to battery
		4	Flush valve burner (EPV DPF-System); short circuit to ground
		5	Flush valve burner (EPV DPF-System); open load
		12	Flush valve burner (EPV DPF-System); powerstage over temperature
2659		0	Physical range check high for EGR exhaust gas mass flow
		1	Physical range check low for EGR exhaust gas mass flow
		2	AGS sensor temperature exhaust gas mass flow; plausibility error
		12	Exhaust gas recirculation; AGS sensor has "burn off" not performed
			Exhaust gas recirculation AGS sensor; plausibility error

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
2791		0	EGR actuator, temperature critical high
		2	EGR actuator, CAN error
		3	EGR actuator supply voltage is above the maximum threshold
		4	EGR actuator supply voltage is below minimum threshold
		6	EGR actuator current is above maximum threshold
		7	EGR actuator, actuator blocked or broken spring detected
		12	EGR actuator, internal electrical fault
		13	EGR actuator, EOL calibration error or learning process aborted or learning process out of range
		16	EGR actuator, temperature high
2797		4	Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 0
2798		4	Injector diagnostics; short circuit Bank 0, Bank 1
			Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1
3031		0	AdBlue-Tank temperature: maximum exceeded
		1	DEF-Tank temperature: below minimum
		3	Sensor error urea tank temperature; short circuit to battery
		4	Sensor error urea tank temperature; short circuit to ground
3224		1	Nox sensor upstream of SCR Catalysator; low signal not plausible
		2	NOx Sensor; CAN DLC error
		9	NOx Sensor; CAN Timeout
3234		2	NOx Sensor; CAN DLC error
		9	NOx Sensor; CAN Timeout
		11	Nox Sensor downstream of SCR Catalysator; plausibility error "stuk in range"
3241		0	Sensor SCR catalyst upstream temperature too high; plausibility error
		1	Sensor SCR catalyst upstream temperature too low; plausibility error

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
3248		0	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
		1	Exhaust gas temperature particulate filter downstream; out of range, system reaction initiated
		2	Sensor exhaust gas temperature downstream DPF; plausibility error
		4	Sensor error particle filter downstream temperature; signal range check low
3251		0	Physical range check high for differential pressure (DPF); shut off regeneration
		1	Physical range check low for differential pressure (DPF); shut off regeneration
3253		2	Sensor differential pressure (DPF); plausibility error
		3	Sensor error differential pressure (DPF); signal range check high
		4	Sensor error differential pressure (DPF); signal range check low
3361		3	Urea dosing valve; short circuit to battery
		4	Urea dosing valve; short circuit to ground
		7	AdBlue dosing valve blocked (SCR)
3519		3	DEF quality sensor, internal temperature sensor short circuit to battery or open lead
		4	DEF quality sensor, internal temperature sensor short circuit to ground
		12	DEF tank temperature, temperature too high
		13	Temperature at UQS invalid
3520		3	DEF quality sensor, short circuit to battery or open load
		4	DEF quality sensor, short ciruit to ground
		13	Urea quality at UQS invalid
3532		3	DEF level at UQS out of max. physical range
		3	Sensor error urea tank level; signal range check high
		4	Quality at UQS of of min. physical range
		4	Sensor error urea tank level; signal range check low
3699		2	DPF differential pressure sensor and a further sensor or actuator CRT system defective
		14	Maximum stand-still-duration reached; oil exchange required
			Temperature sensor us. and ds. DOC simultaneously defect
3711		12	Regeneration temperature (PFltRgn LigtOff) not reached; regeneration aborted
3936		14	Standstill request ignored too long

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
4243		11	SCR system heater diagnostic reports error; shut off SCR-system
4334		0	Urea pump pressure; out of range
		1	Urea pump pressure; out of range
		3	Sensor error urea pump pressure; signal range check high
		4	Sensor error urea pump pressure; signal range check low
4341		3	SCR-heater urea supplyline; short circuit to battery
		4	SCR-heater urea supplyline; short circuit to ground
		5	SCR heater relay urea supplyline; open load
4343		3	SCR heater urea pressureline; short circuit to battery
		4	SCR heater urea pressureline; short circuit to ground
		5	SCR heater relay urea pressureline; open load
		11	General pressure check error (SCR)
4345		3	SCR heater urea returnline; short circuit to battery
		4	SCR heater urea returnline; short circuit to ground
		5	SCR heater relay urea returnline; open load
		11	Sensor backflow line pressure (SCR); plausibility error
4360		0	Physical range check high for urea catalyst upstream temperature
		1	Physical range low for urea catalyst upstream temperature
		3	Sensor error urea catalyst exhaust gas temperature upstream; signal range check high
		4	Sensor error urea catalyst exhaust gas temperature upstream; signal range check low
4365		0	Urea tank temperature too high
4366		3	SCR Tank heating valve; short circuit to battery
		4	SCR Tank heating valve; short circuit to ground
		5	SCR main relay (secondary side): open load
		12	SCR-heater relay urea tank powerstage output; over temperature
			SCR main relay; short circuit
			SCR Tank heating valve; open load
4374		13	Pressure stabilisation error dosing valve (SCR)

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
4375		3	Urea pump motor; short circuit to battery
		4	Urea pump motor; short circuit to ground
		5	Urea pump motor; open load
4376		3	SCR reversing valve; short circuit to battery
		4	SCR reversing valve; short circuit to ground
		5	SCR reversing valve; open load
		12	SCR reversing valve; over temperature
4765		0	Physical range check high for exhaust gas temperature upstream (DOC)
		1	Physical range check low for exhaust gas temperature upstream (DOC)
4766		0	Physical range check high for exhaust gas temperature downstream (DOC)
		1	Physical range check low for exhaust gas temperature downstream (DOC)
4768		2	Sensor exhaust gas temperature upstream (DOC); plausibility error
		3	Sensor error exhaust gas temperature upstream (DOC); signal range check high
		4	Sensor error exhaust gas temperature upstream (DOC); signal range check low
4769		2	Sensor exhaust gas temperature (DOC) downstream; plausibility error
		3	Sensor error exhaust gas temperature downstream (DOC); signal range check high
		4	Sensor error exhaust gas temperature downstream (DOC); signal range check low
			Sensor exhaust gas temperature downstream (DOC); plausibility error
5763		0	Warning threshold for an internal actuator error exceeded, <4L EGR actuator and >4L Air Intake Flap
		1	Shutoff threshold for an internal actuator error exceeded, <4L EGR actuator and >4L Air Intake Flap
		3	Position sensor error of actuator EGR-Valve (2.9; 3.6) Signal range check high
		3	Actuator EGR-Valve (2.9; 3.6); short circuit to battery
		4	Actuator EGR-Valve (2.9; 3.6); short circuit to ground; Voltage below threshold
		5	Actuator EGR-Valve (2.9; 3.6); Open load on ECU output is detected
		6	Actuator error EGR-Valve; signal range check high
		7	Actuator position for EGR-Valve (2.9; 3.6)
		11	Power stage over temperature due to high current
20521		5	Actuator error EGR-Valve (2.9;3.6) Signal range check low

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
23006	64254	3	Controller mode switch; short circuit to battery
		4	Controller mode switch; short circuit to ground
23008	64256	1	Manipulation control was triggered
		2	Timeout error in Manipulation control
23009	64257	9	Pressure Relief Valve (PRV) reached maximun allowed opening count
		10	Pressure relief valve (PRV) reached maximun allowed open time
23090		2	Engine Brake Pre-Selection switch; Plausibiliy Error
23212	64460	9	Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection
23216	64464	9	Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command
23240	64488	9	Timeout CAN-message FunModCtl; Function Mode Control
23330	64578	14	Immobilizer status; fuel blocked
23350	64598	4	Injector cylinder-bank 1; short circuit
23352	64600	4	Injector cylinder-bank 2; short circuit
23354	64602	12	Injector powerstage output defect
23450	64698	2	Multiple Stage Switch constant speed; plausibility error
		3	Multiple Stage Switch constant speed; short circuit to battery
		4	Multiple Stage Switch constant speed; short circuit to ground
23451	64699	2	Multiple Stage Switch engine speed control parameter; plausibility error
		3	Multiple Stage Switch engine speed control parameter; short circuit to battery
		4	Multiple Stage Switch engine speed control parameter; short circuit to ground
23452	64700	2	Multiple Stage Switch engine torque limitation curve; plausibility error
		3	Multiple Stage Switch engine torque limitation curve; short circuit to battery
		4	Multiple Stage Switch engine torque limitation curve; short circuit to ground

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
23470	64718	2	Pressure Relief Valve (PRV) forced to open
		7	Maximum rail pressure in limp home mode exceeded (PRV)
		11	Pressure Relief Valve (PRV) error; Rail pressure out of tolerance range
		12	Pressure Relief Valve (PRV) forced to open; system reaction initiated
		14	Pressure Relief Valve (PRV) is open
			Rail pressure out of tolerance range
23550	64798	12	T50 start switch active for too long
23601	64849	13	Sensor supply voltage monitor 3 error (ECU)
23602	64850	0	Fan control; out of range, system reaction initiated
23603	64851	9	Timeout Error of CAN-Receive-Frame AMB; Ambient Temperature Sensor
23605	64853	9	Timeout Error of CAN-Receive-Frame TSC1AE; Traction Control
23606	64854	9	Timeout Error of CAN-Receive-Frame TSC1AR; Retarder
23612	64860	12	ECU reported internal software error
		14	Softwarereset CPU
			Internal software error ECU
23613	64861	0	Rail pressure disrupted
		1	Minimum rail pressure exceeded (RailMeUn3)
		2	Setpoint of metering unit in overrun mode not plausible
23615	64863	3	Metering unit (Fuel-System); short circuit to battery
		4	Metering unit (Fuel-System); short circuit to ground
		5	Metering unit (Fuel-System); open load
		12	Metering unit (Fuel-System); powerstage over temperature
23619	64867	2	Physical range check high for exhaust gas temperature upstrem (SCR-CAT)
23632	64880	0	Pressure overload of SCR-System
		1	Pressure build-up error SCR-System
		2	Metering control is not performed in time error
		16	Pump pressure SCR metering unit too high
		18	Pump pressure SCR metering unit too low
23633	64881	11	Nox conversion rate insufficient

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
23698	64946	11	Shut off request from supervisory monitoring function
23704		12	Timeout Error of CAN-Transmit_Frame EEC3
23717	64965	12	Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments
23718	64966	3	SCR main relay (primary side); short circuit to battery
		4	SCR main relay (primary side); short circuit to ground
		5	SCR main relay (primary side); open load
		12	SCR mainrelay; powerstage over temperature (only CV56B)
			SCR mainrelay; short circuit to battery (only CV56B)
			SCR mainrelay; short circuit to ground (only CV56B)
			SCR mainrelay; open load (only CV56B)
23719	64967	3	SCR heater urea supplymodule; short circuit to battery
		4	SCR heater urea supplymodule; short circuit to ground
		5	SCR heater relay urea supply module; open load
23720	64968	2	Urea supply module heater temperature; plausibility error
		8	Urea supply module heater temperature; signal disrupted
23721	64969	2	Urea supply module heater temperature; plausibility error
		8	Urea supply module temperature; signal disrupted
		11	Urea supply module temperature measurement not available
23722	64970	8	Urea supply module PWM signal; signal disrupted

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
23723	64971	11	Detection of AdBlue filled SCR system in Init-State
23766	65014	9	Timeout Error of CAN-Receive-Frame Active TSC1AE
23767	65015	9	Timeout Error of CAN-Receive-Frame Passive TSC1AE
23768	65016	9	Timeout Error of CAN-Receive-Frame Active TSC1AR
23769	65017	9	Timeout Error of CAN-Receive-Frame Passive TSC1AR
23770	65018	9	Timeout Error of CAN-Receive-Frame Passive TSC1DE
23776	65024	9	Timeout Error of CAN-Receive-Frame TSC1TE - active
23777	65025	9	Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint
23778	65026	9	Active Timeout Errorof CAN-Receive-Frame TSC1TR
23779	65027	9	Passive Timeout Error of CAN-Receive-Frame TSC1TR
23788	65036	0	Turbo charger wastegate; CAN Fehler
		12	Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate
23793	65041	9	Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message
23794	65042	9	Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data
23803	65051	9	Timeout Error of CAN-Receive-Frame RxEngPres; Status burner airpump
23867	65115	12	Timeout Error of CAN-Transmit-Frame UAA1 on CAN 2; Burner Air Pump Control
23895	65143	13	Check of missing injector adjustment value programming (IMA) injector 1 (in firing order)
23896	65144	13	check of missing injector adjustment value programming (IMA) injector 2 (in firing order)
23897	65145	13	check of missing injector adjustment value programming (IMA) injector 3 (in firing order)
23898	65146	13	check of missing injector adjustment value programming (IMA) injector 4 (in firing order)
23899	65147	13	check of missing injector adjustment value programming (IMA) injector 5 (in firing order)
23900	65148	13	check of missing injector adjustment value programming (IMA) injector 6 (in firing order)
23910	65158	0	Air Pump; internal error
		6	Air Pump; over current
		7	Air pump; CAN communication interrupted no purge function available
		9	Air Pump; CAN communication lost
		12	Air Pump; internal error
		14	Air pump doesn´t achieve air mass flow setpoint

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
23911	65159	0	Burner dosing valve (DV2); overcurrent at the end of the injection phase
		3	Burner dosing valve (DV2); short circuit to battery
		4	Burner dosing valve (DV2); short circuit to ground
		7	Burner dosing valve (DV2); blocked closed
		11	Burner dosing valve (DV2); short circuit high side powerstage
		12	Burner dosing valve (DV2); powerstage over temperature
23912	65160	0	Physical range check high for burner dosing valve (DV2) downstream pressure; shut off regeneration
		1	Physical range check low for burner dosing valve (DV2) downstream pressure; shut off regeneration. When burner injector is actuated, the measured pressure does not rise above ca. 1250mbar abs (expected: ca. 2400mbar).
		2	Burner dosing valve (DV2) downstream pressure sensor; plausibility error
		3	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check high
		4	Sensor error burner dosing valve (DV2) downstream pressure sensor; signal range check low
23913	65161	3	Sensor error glow plug control diagnostic line voltage; signal range check high
		4	Sensor error glow plug control diagnostic line voltage; signal range check low
23914	65162	3	Glow plug control; short circuit to battery
		4	Glow plug control; short circuit to ground
		5	Glow plug control; open load
		11	Glow plug control; internal error
		12	Glow plug control; powerstage over temperature
23915	65163	0	HCI dosing valve (DV1); overcurrent at the end of the injection phase
		3	HCI dosing valve (DV1); short circuit to battery
		4	HCI dosing valve (DV1); short circuit to ground
		7	HCI dosing valve (DV1); blocked
		11	HCI dosing valve (DV1); short circuit high side powerstage
		12	HCI dosing valve (DV1); powerstage over temperature
23916	65164	0	Physical range check high for HCI dosing valve (DV1) downstream pressure; shut off regeneration
		1	Physical range check low for HCI dosing valve (DV1) downstream pressure; shut off regeneration
		2	Sensor HCI dosing valve (DV1) downstream pressure; plausibility error
		3	Sensor error HCI dosing valve (DV1) downstream pressure; signal range check high
		4	Sensor error HCI dosing valve (DV1) downstream pressure; signal range check low

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
23917	65165	0	Physical range check high for DV1 & DV2 upstream pressure; shut off regeneration
		1	Physical range check low for DV1 & DV2 upstream pressure; shut off regeneration
		2	Sensor DV1 & DV2 upstream pressure; plausibility error
		3	Sensor error DV1 & DV2 upstream pressure; signal range check high
		4	Sensor error DV1 & DV2 upstream pressure; signal range check low
23918	65166	0	Physical range check high for DV1 & DV2 upstream temperature; shut off regeneration
		1	Physical range check low for DV1 & DV2 upstream temperature; shut off regeneration
		2	Sensor DV1 & DV2 upstream temperature; plausibility error
		3	Sensor error DV1 & DV2 upstream temperature; signal range check high
		4	Sensor error DV1 & DV2 upstream temperature; signal range check low
23919	65167	0	Physical range check high for airpump pressure; shut off regeneration
		1	Physical range check low for airpump pressure; shut off regeneration
		2	Sensor airpump pressure; plausibility error
		3	Sensor error airpump pressure; signal range check high
		4	Sensor error airpump pressure; signal range check low
23920	65168	0	Physical range check high for exhaustgas back pressure burner; shut off regeneration
		1	Physical range check low for exhaustgas back pressure burner; shut off regeneration
		2	Sensor exhaustgas back pressure; plausibility error
		3	Sensor error exhaustgas back pressure burner; signal range check high
		4	Sensor error exhaustgas back pressure burner; signal range check low
23921	65169	0	Physical range check high for burner temperature
		1	Physical range check low for burner temperature
		2	Sensor burner temperature; plausibility error
		3	Sensor error burner temperature; signal range check high
		4	Sensor error burner temperature; signal range check low
		11	Sensor burner temperature; plausibility error
23922	65170	3	Burner shut of valve; short circuit to battery
		4	Burner shut of valve; short circuit to ground
		5	Burner shut off valve; open load
		7	Shut off valve: blocked
		12	Over temperature error on burner shut of valve

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
23924		4	Short circuit to ground actuator relay 2
23925		3	Short cicuit to battery error of actuator relay 3
		4	Short circuit to ground actuator relay 3
23926		4	Short cirucit to dround actuator relay 4
23927		3	Short cicuit to battery error of actuator relay 5
23929	65177	0	Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded
23930	65178	0	Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded
23931	65179	0	Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded
23932	65180	0	Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded
23933	65181	0	Fuel Balance Control integrator injector 5 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 5 (in firing order); minimum value exceeded
23934	65182	0	Fuel Balance Control integrator injector 6 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 6 (in firing order); minimum value exceeded
23935	65183	12	Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages
23936	65184	12	Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages
23938	65186	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
23939	65187	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF- system downstream cat)
23940	65188	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1IGCVol1 information; factors & Sensorcalibration for NOX Sensor (SCR-system upstream cat; DPF-system downstream cat)
23941	65189	9	Timeout Error (BAM to packet) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
23942	65190	9	Timeout Error (BAM to BAM) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)

Deutz TCD3.6 Engine Fault Codes

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SPN	ASPN	FMI	Description
23943	65191	9	Timeout Error (PCK2PCK) for CAN-Receive-Frame AT1OGCVol2 information; factors & Sensorcalibration for NOX Sensor (SCR-system downstream cat; DPF- system downstream cat)
23946	65194	0	Zerofuel calibration injector 1 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 1 (in firing order); minimum value exceeded
23947	65195	0	Zerofuel calibration injector 2 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 2 (in firing order); minimum value exceeded
23948	65196	0	Zerofuel calibration injector 3 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 3 (in firing order); minimum value exceeded
23949	65197	0	Zerofuel calibration injector 4 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 4 (in firing order); minimum value exceeded
23950	65198	0	Zerofuel calibration injector 5 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 5 (in firing order); minimum value exceeded
23951	65199	0	Zerofuel calibration injector 6 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 6 (in firing order); minimum value exceeded
23960	65208	0	EGR cooler downstream temperature; out of range, system reaction initiated
		1	EGR cooler downstream temperature; out of range, system reaction initiated
			Exhaust gas temperature EGR downstream; out of range, system reaction initiated
			Exhaust gas temperature EGR downstream; out of range, system reaction initiated
23973	65221	14	SCR Tamper detection; derating timer below limit 1
23974	65222	14	SCR Tamper detection; derating timer below limit 2
23975	65223	14	Urea quality; derating timer below limit 1
23976	65224	14	Urea qulaity; derating timer below limit 2
23977	65225	14	Urea tank level; derating timer below limit 1
23978	65226	14	Urea tank level; derating timer below limit 2
23980	65228	14	Bad quality of reduction agent detected
23981	65229	11	Urea-tank without heating function (heating phase)
23982	65230	0	Powerstage diagnosis disabled; high battery voltage
		1	Powerstage diagnosis disabled; low battery voltage

Deutz TCD3.6 Engine Fault Codes

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SPN	ASPN	FMI	Description
23984		3	UB6; Short circuit to battery error of actuator relay 6
23986		4	Actuator relay 5; voltage measured by ECU is out of target range
23987		4	Actuator relay 6; voltage measured by ECU is out of target range
23988	65236	3	Charging lamp; short circuit to battery
		4	Charging lamp; short circuit to ground
		5	Charging lamp; open load
		12	Charging lamp; over temperature
23989	65237	0	Fuel Balance Control integrator injector 7 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 7 (in firing order); minimum value exceeded
23990	65238	0	Fuel Balance Control integrator injector 8 (in firing order); maximum value exceeded
		1	Fuel Balance Control integrator injector 8 (in firing order); minimum value exceeded
23992	65240	9	Timeout Error of CAN-Receive-Frame DM19Vol1; NOX sensor upstream
23993	65241	9	Timeout Error of CAN-Receive-Frame DM19Vol2; NOX sensor downstream
23995	65243	13	check of missing injector adjustment value programming (IMA) injector 7 (in firing order)
23996	65244	13	check of missing injector adjustment value programming (IMA) injector 8 (in firing order)
23998	65246	4	Injector cylinder bank 2 slave; short circuit
23999	65247	12	Injector powerstage output Slave defect
24000	65248	3	Injector 7 (in firing order); short circuit
		4	High side to low side short circuit in the injector 7 (in firing order)
		5	Injector 7 (in firing order); interruption of electric connection
24001	65249	3	Injector 8 (in firing order); short circuit
		4	High side to low side short circuit in the injector 8 (in firing order)
		5	Injector 8 (in firing order); interruption of electric connection
24004	65252	12	Too many recognized misfires in cylinder 7 (in firing order)
24005	65253	12	Too many recognized misfires in cylinder 8 (in firing order)

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
24011	65259	0	Zerofuel calibration injector 7 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 7 (in firing order); minimum value exceeded
24012	65260	0	Zerofuel calibration injector 8 (in firing order); maximum value exceeded
		1	Zerofuel calibration injector 8 (in firing order); minimum value exceeded
24013	65261	7	Burner operation disturbed
24014	65262	1	Air pressure glow plug flush line; below limit
24016	65264	2	Air Pump; air flow is not plausible
		11	HFM sensor; electrical fault
24017	65265	12	Spark plug control unit (SPCU); internal error
24018	65266	14	DPF wasn´t regenerated, power reduction phase 1 (manuell regeneration request)
24019	65267	11	Air Pump; air lines blocked
24020	65268	14	Engine power; Not enough oxygen for regeneration
24021	65269	11	Burner fuel line pipe leak behind Shut Off Valve
24022	65270	14	DPF wasn´t regenerated, power reduction phase 2 (manuell regeneration request)
24023	65271	14	DPF wasn´t regenerated, warning condition (manuell regeneration mode)
24024	65272	11	Deviation of the exhaust gas temperature setpoint to actual value downstream (DOC) too high
24025	65273	5	DPF system; operating voltage error
		14	Particulate filter; regeneration not succesful
24028	65276	2	CAN message PROEGRActr; plausibility error
24029	65277	2	Timeout Error of CAN-Receive-Frame ComEGRActr - exhaust gas recirculation positioner
24030	65278	7	EGR actuator; internal error
24031	65279	13	EGR actuator; calibration error
24032	65280	2	EGR actuator; status message "EGRCust" is missing
24033	65281	7	EGR actuator; due to overload in Save Mode
24034	65282	3	Disc separator; short circuit to battery
		4	Disc separator; short circuit to ground
		5	Disc Separator; open load
		12	Disc Separator; powerstage over temperature

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
24035	65283	12	Injector diagnostics; time out error in the SPI communication
24036	65284	12	Injector diagnostics Slave; time out error in the SPI communication
24037	65285	3	Ashlamp; short circuit to battery
		4	Ashlamp; short circuit to ground
		5	Ashlamp; open load
24038	65286	9	Timeout error of CAN-Receive-Frame ComMS_Sys1TO (error memory Slave); Master-Slave internal CAN message
24039	65287	9	Timeout error of CAN-Receive-Frame ComMS_Sys2TO (error memory Slave); Master-Slave internal CAN message
24040	65288	9	Timeout error of CAN-Receive-Frame ComMS_Sys3TO (error memory Slave); Master-Slave internal CAN message
24041	65289	9	Timeout error of CAN-Receive-Frame ComMS_Sys4TO (error memory Slave); Master-Slave internal CAN message
24042	65290	9	Timeout error of CAN-Receive-Frame ComMS_Sys5TO (error memory Slave); Master-Slave internal CAN message
24043	65291	9	Timeout error of CAN-Receive-Frame ComMS_Sys6TO (error memory Slave); Master-Slave internal CAN message
24044	65292	9	CAN message ComMS_Sys7 not received from slave
24045	65293	9	Master-Slave CAN; Message-Counter-Error of CAN-Receive-Frame ComMSMoFOvR
24046	65294	9	Master-Slave CAN; Checksum-Error of CAN-Receive-Frame ComMSMoFOvR
24047	65295	9	Master-Slave CAN; Messsage-Length-Error of CAN-Receive-Frame ComMSMoFOvR
24048	65296	9	Timeout error CAN message ComMSMoFOvR1TO error memory Slave
24049	65297	9	Message copy error in the Master / Slave data transfer
24052	65300	11	MS ECU reported internal error
24055	65303	4	Spark Plug Control Unit (SPCU); short circuit to ground
24057	65305	2	Electric fuel pump; fuel pressure build up error
24062	65310	12	EAT-system HMI disrupted
24063		3	SCR main relay; short circuit to battery
		4	SCR heater main relay load side (K31 on heating valve (Y31)
		5	SCR heater return line; open load or SCR main relay not connected; or SCR heater pressureline; open load or SCR or SCR relay for suction line not connected or SCR heater supply module; open load or SCR heater tank; open loac
		12	DEF supply module, time for defrosting too long or DEF tank, time for defrosting too long

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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SPN	ASPN	FMI	Description
24065		0	Pressure sensor upstream SCR-CAT, pressure above upper physical threashold
		1	Pressure sensor upstream SCR-CAT, pressure below lower physical threashold
		2	Pressure sensor upstream SCR-CAT, plausibility error
		3	Pressure sensor upstream SCR-CAT, short circuit battery or open load
		4	Pressure sensor upstream SCR-CAT, short circuit ground
24067		0	DEF supply module, heater temperature above upper physical threshold
		1	DEF supply module, heater temperature below lower physical threshold
		2	Supply module heather temperature, plausibility error
24068	65316	2	Master ECU and Slave ECU have been identified as the same types
24069	65317	9	Timeout Error of CAN-Receive-Frame MSMon_FidFCCTO; Master-Slave CAN communication faulty
24074		9	NOx sensor downstream SCR-CAT, sensor internally open load
24075		11	NOx sensor downstream SCR-CAT, sensor internally short circuit
24076		9	NOx sensor downstream SCR-CAT, sensor internally open line
24077		11	NOx sensor upstream SCR-CAT, sensor internally short circuit
24078		9	NOx sensor downstream SCR-CAT, lambda value above upper physical threshold
24079		9	NOx sensor downstream SCR-CAT, lambda value below lower physical threshold
24080		9	NOx sensor upstream SCR-CAT, lambda value above upper physical threshold
24081		9	NOx sensor upstream SCR-CAT, lambda value below lower physical threshold
24083		9	NOx sensor downstream SCR-CAT, NOx value below minimum value
24085		9	NOx sensor upstream SCR-CAT, NOx value below lower physical threshold

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
24097	65345	9	Timeout error of CAN-Transmit-Frame DPFBrnAirPmpCtl
24098	65346	9	Timeout error of CAN-Transmit-Frame ComDPFBrnPT
24099	65347	9	Timeout error of CAN-Transmit-Frame ComDPFC0
24100	65348	9	Timeout error of CAN-Transmit-Frame ComDPFHisDat
24101	65349	9	Timeout error of CAN-Transmit-Frame ComDPFTstMon
24102	65350	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl
24103	65351	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
24104	65352	9	Timeout error of CAN-Receive-Frame ComRxDPFCtl
24105	65353	9	Timeout error of CAN-Transmit-Frame ComEGRMsFlw
24106	65354	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1
24107	65355	9	Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2
24108	65356	9	Timeout error of CAN-Transmit-Frame ComEGRTVActr
24109	65357	9	Timeout error of CAN-Receive-Frame ComRxEGRTVActr
24110	65358	9	Timeout error of CAN-Transmit-Frame ComETVActr
24111	65359	9	Timeout error of CAN-Receive-Frame ComRxETVActr
24112	65360	9	Timeout ComITVActr
24113	65361	9	Timeout error of CAN-Receive-Frame ComRxITVActr
24114	65362	9	Timeout error of CAN-Transmit-Frame A1DOC
24115	65363	9	Timeout error of CAN-Transmit-Frame AT1S

Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
ASPN = Alternate Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	ASPN	FMI	Description
24116	65364	9	Timeout error of CAN-Transmit-Frame SCR2
24117	65365	9	Timeout error of CAN-Transmit-Frame SCR3
24118	65366	9	Timeout error of CAN-Receive-Frame ComRxCM0
24119	65367	9	Timeout error of CAN-Receive-Frame ComRxCustSCR2
24120	65368	9	Timeout error of CAN-Receive-Frame ComRxSCRHtDiag
24121	65369	9	Timeout error of CAN-Receive-Frame ComRxTrbChActr
24122	65370	9	Timeout error of CAN-Receive-Frame ComRxUQSens
24123	65371	9	Timeout error of CAN-Receive-Frame ComSCRHtCtl
24124	65372	9	Timeout error of CAN-Receive-Frame ComTxAT1IMG
24125	65373	9	Timeout error of CAN-Receive-Frame ComTxTrbChActr
24141		7	DEF dosing valve, dosing valve blocked
24147		7	SCR System, reverting valve blocked
		13	SCR System, pressure build up not possible
24152		2	Urea Quality Sensor, Timout CAN message
24153		2	Urea tank level & urea tank temperature via CAN bus, timeout of CAN message
24156		9	Timeout error of CAN-Receive-Frame ComRxEBC2
24175		0	SCR-CAT, Nox emissions above minimum threshold
24177		7	SCR System, DEF suction line blocked
24178		7	SCR System, DEF pressure ot of range
24190		14	Not enough urea in tank or low urea quality or hardware tampering failure is detected or hardware failure is detected
24191		14	A low DEF tank level or a low DEF quality is detected or hardware tampering or hardware failures
24193		8	The standstill-regeneration mode time exceeds the long limit threshold; Vehicle was too long or too often in standstill mode; Change oil and reset counter
24194		8	The standstill-regeneration mode time exceeds the short limit threshold; Vehicle was too long or too often within a short time in standstill mode; Change oil and reset counter
24195		14	Standstill request due to crystalization ignored too long

Perkins 1104 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description
91	2	Incorrect throttle switch inputs
	3	Throttle position sensor: voltage above normal or shorted high
	4	Throttle position sensor: voltage below normal or shorted low
	8	Throttle position sensor: abnormal frequency, pulse width or period
100	3	Engine oil pressure sensor: voltage above normal or shorted high
	4	Engine oil pressure sensor :voltage below normal or shorted low
102	3	Boost pressure sensor voltage: voltage above normal or shorted high
	4	Boost pressure sensor voltage: voltage below normal or shorted low
	10	No 5V to sender
105	3	Intake manifold temperature sensor: temperature above normal or shorted high
	4	Intake manifold temperature sensor: temperature below normal or shorted low
105	3	Intake manifold air temperature open/short to battery positive (+)
	4	Intake manifold air temperature short to ground
110	3	Engine coolant temperature open/short to battery positive (+)
	4	Engine coolant temperature short to ground
157	3	Fuel rail pressure open/short to battery positive (+)
	4	Fuel rail pressure short to ground
168	0	System voltage high
	1	System voltage low
	2	ECM battery power intermittent/erratic
172	3	Air inlet temperature voltage high
	4	Air inlet temperature voltage low
174	2	Fuel temperature sensor: data erratic/intermittent or incorrect
190	8	Engine speed signal abnormal
	15	Engine speed: overspeed WARNING
190	0	Engine overspeed
626	5	Ether start aid current low
	6	Ether start aid current high
630	2	System parameters incorrect
631	2	Personality module mismatch
637	11	Engine timing calibration invalid
637	139	Engine timing calibration required
639	9	J1939 data link communications
	12	J1939 data link malfunction
651	2	Cylinder #1 injector data incorrect
	5	Cylinder #1 injector open circuit
	6	Cylinder #1 injector short
	7	Cylinder #1 injector not responding
652	2	Cylinder #2 injector data incorrect
	5	Cylinder #2 injector open circuit
	6	Cylinder #2 injector short
	7	Cylinder #2 injector not responding

Perkins 1104 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

SPN	FMI	Description
653	2	Cylinder #3 injector data incorrect
	5	Cylinder #3 injector open circuit
	6	Cylinder #3 injector short
	7	Cylinder #3 injector not responding
654	2	Cylinder #4 injector data incorrect
	5	Cylinder #4 injector open circuit
	6	Cylinder #4 injector short
	7	Cylinder #4 injector not responding
678	3	8V DC supply short to battery positive (+)
	4	8V DC supply shorted to ground
723	8	Secondary engine speed signal abnormal
1188	5	Turbo wastegate drive current low
1196	9	Machine security system module non-communication
1347	5	Fuel rail pump output current low
	6	Fuel rail pump output current high
	7	Fuel rail pressure valve solenoid not responding
2882	2	Mode selector switch: data erratic/intermittent or incorrect
3509	3	5V DC power supply sensor short to battery positive (+)
	4	5V DC power supply sensor short to ground

Perkins 1100 Troubleshooting Manual	
Genie part number	123583

Schematics

Observe and Obey:

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

Before Troubleshooting:

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

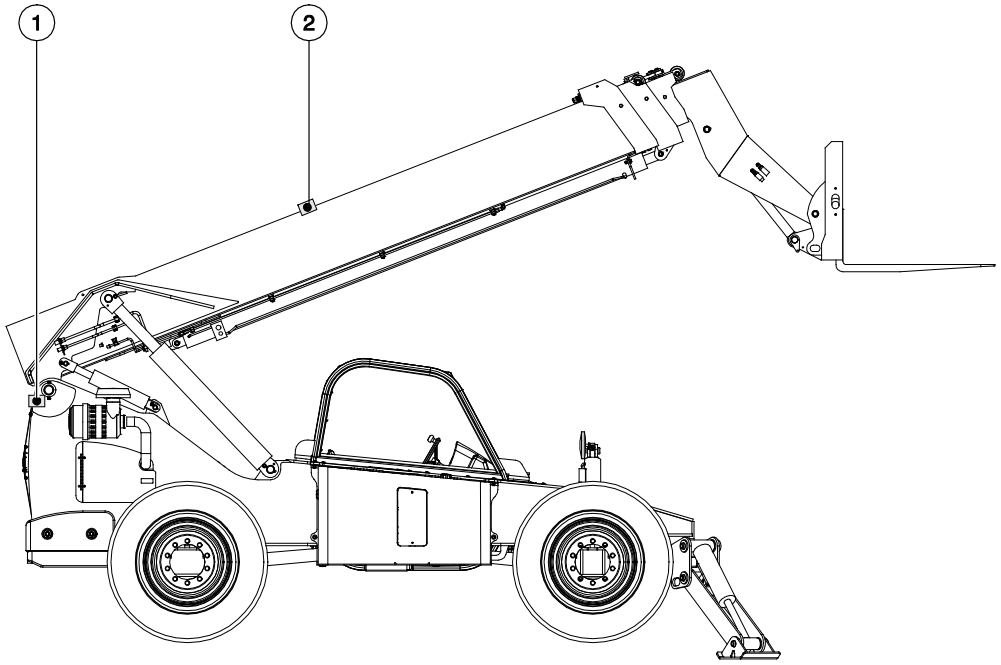
Electrical Schematics

⚠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

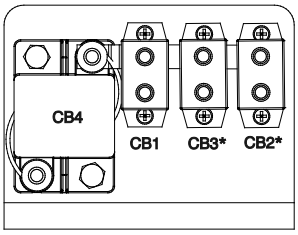
⚠WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

Proximity Switch Legend



1 Boom Angle Proximity Switch PX2 (under boom pivot pin)
2 Boom Extend Proximity Switch PX1 (under plate at top of boom tube, GTH-1056 only)

Fuse Panel Layout



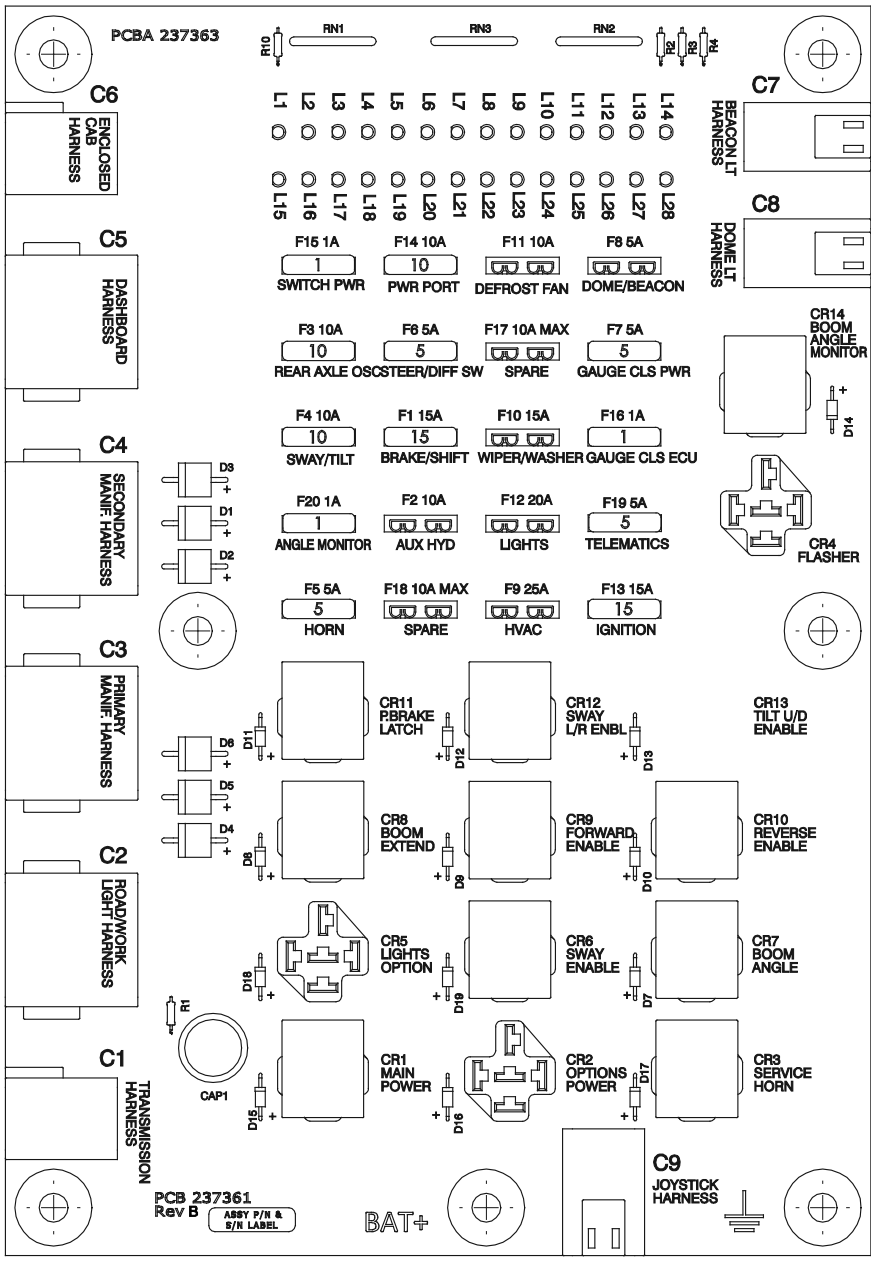
Circuit Breakers located in the tank assembly

All Engine Options
CB4- 60A- Glow Plugs
CB3- 500A- Control System Power

Deutz T3; Perkins T3
CB1- 30A- ECM Power
CB2 not used

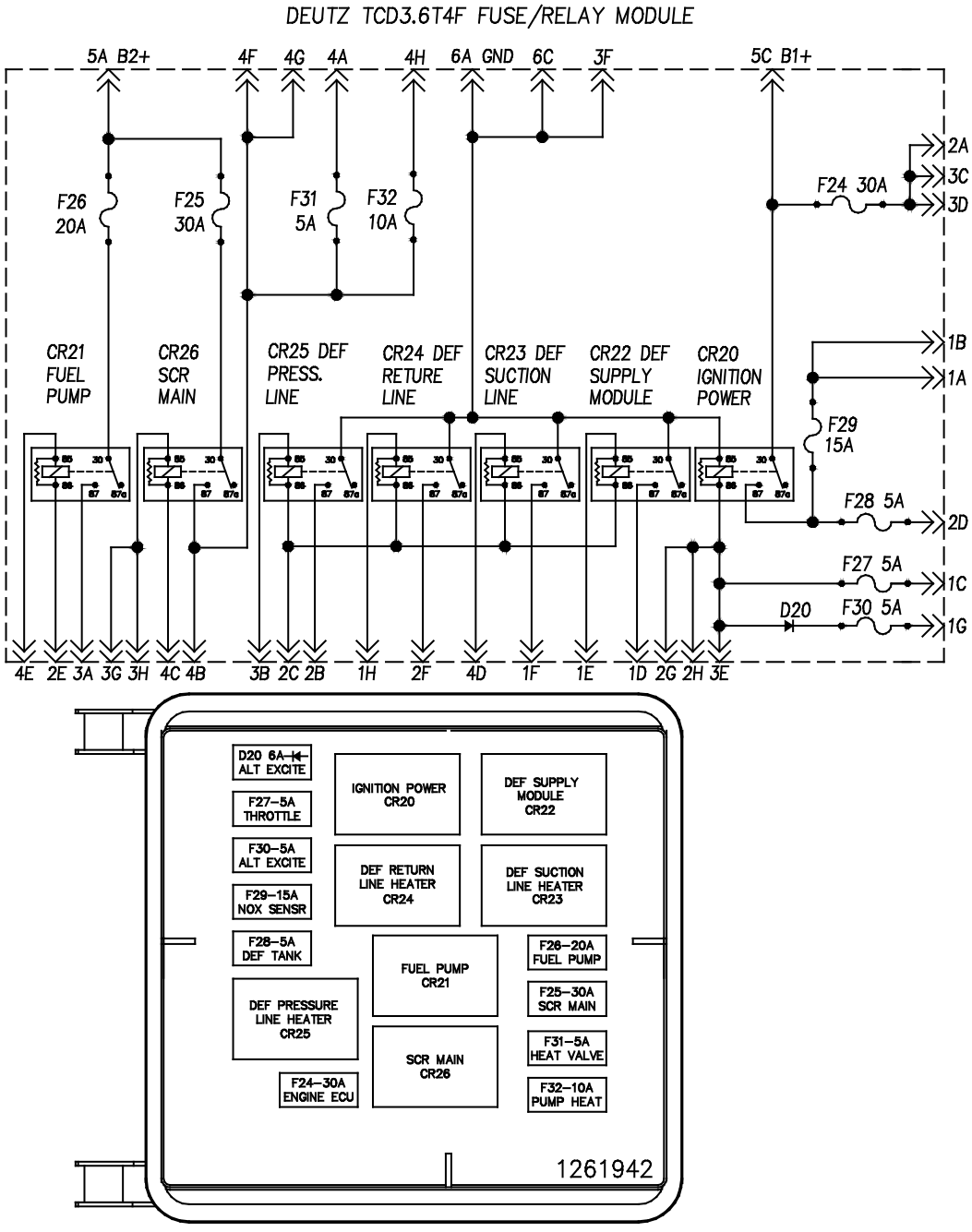
Perkins T4i
CB1- 50A- ECM Power
CB2 not used

Deutz T4F
CB1- 50A- ECM Power
CB2- 50A- EAT Power



Fuse Board located in the Cab

Deutz TCD3.6 T4F Module



Deutz TCD3.6 T4F Engine only

Located in the Tank Assembly with the circuit breaker panel

Electrical Component & Wire Color Abbreviation Legend

Item	Description
ALT	**Alternator**
B	**Battery**
B1	Main Battery
CB	**Circuit Breaker**
CB1	30 Amp or 50 Amp Circuit Breaker
CB2	50 Amp Circuit Breaker
CB3	50 Amp Circuit Breaker
CB4	60 Amp Circuit Breaker
C	**Capacitor**
C1	4700 uf
CR	**Control Relay**
CR1	Main Power
CR2	Options Power
CR3	Service Horn
CR4	Flasher
CR5	Lights Option
CR6	Sway Enable
CR7	Boom Angle
CR8	Boom Extend
CR9	Forward Enable
CR10	Reverse Enable
CR11	Parking Brake Latch
CR12	Sway Left/Right Enable
CR13	Tilt Up/Down Enable
CR14	Boom Angle Monitor
CR15	HVAC Blower L
CR16	HVAC Blower M
CR17	HVAC Blower H

Item	Description
D	**Diode**
EMS	**Engine Management System**
F	**Fuse**
F1	15 Amp - Break/Shift
F2	10 Amp - Aux Hydraulics
F3	10 Amp – Rear Axle Oscillate
F4	10 Amp – Sway/Tilt
F5	5 Amp - Horn
F6	5 Amp - Steer/Differential Switch
F7	5 Amp - Gauge Cluster Power
F8	5 Amp - Dome/Beacon Light
F9	25 Amp – HVAC
F10	15 Amp – Windshield Wiper/Washer
F11	10 Amp – Defrost Fan
F12	20 Amp – Lights
F13	15 Amp – Ignition
F14	10 Amp – Power Port
F15	1 Amp - Switch Power
F16	1 Amp – Gauge Cluster ECU
F17	Not Used
F18	Not Used
F19	5 Amp - Telematics
F20	1 Amp - Boom Angle Monitor
F21	5 Amp - HVAC Control Panel

Electrical Component & Wire Color Abbreviation Legend

Item	Description
L	**LED Light**
L1	Ignition Power ON
L2	Options Power Relay ON
L3	Horn Relay ON
L4	Turn Signal ON
L5	Road Lights, Work Lights ON
L6	Sway Enable Coil Power ON
L9	Brake Pressure ON
L10	Backup Light, Alarm ON
L11	Parking Brake Latch ON
L12	Sway Enable ON
L13	Tilt Circuit Power ON
L14	Horn Power ON
L15	Cab, Tail Light Power ON
L16	Rear Axle Float Coil Power ON
L18	Parking Brake Power ON
L19	Forward Coil Power ON
L20	Reverse Coil Power ON
L21	PB Release Coil Power ON
L22	Sway L/R Enable Coil Power ON
L23	Tilt U/D Enable Coil Power ON
L24	Forward Shift ON
L25	Parking Brake Release OFF
L26	Brake Light Power ON
L27	Hazard Power ON
L28	Not Used
M	**Motor**
R	**Resistor**

Item	Description
S	**Switch**
S1	Key Start Switch
S4	Boom Extend Switch
S5	Parking Brake Pressure Switch
S6	Service Brake Pressure Switch
S7	Sway Enable Pressure Switch
S8	Sway Enable Switch
S9	Tilt Enable Switch
S10	Steer Select Switch
S11	Left Stabilizer Switch
S12	Right Stabilizer Switch
S13	Differential Lock Switch
S14	Auxiliary Cont. Switch
S15	Horn Switch
S16	Brake Light Pressure Switch
S17	Windshield Wiper Motor Switch
S17	Windshield Washer Switch
S18	Windshield Wiper Motor Switch
S18	Windshield Washer Switch
S19	Dome Light Switch
S21	Enclosed Cab Fan Switch
S22	Road / Work Light Switch
S23	Brake Pressure Warning Switch
S24	Transmission Oil Pressure Switch
S25	Transmission Oil Temp. Switch
TP	**Throttle Pedal**
TSS	**Turn Signal Shifter**

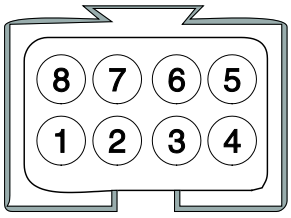
Electrical Component & Wire Color Abbreviation Legend

Item	Description
Y	**Valve Coil**
Y1	Sway Left Enable SV1
Y2	Tilt Up Enable SV2
Y3	Sway Right Enable SV3
Y4	Tilt Down Enable SV4
Y5	Parking Brake Release SV5
Y6	Differential Lock SV6
Y7	Rear Axle Float SV7
Y8	Rear Axle Fast SV8
Y9	Sway Enable SV9
YA	Auxiliary A
YB	Auxiliary B
YD	D Transmission
YE	E Transmission
YF	Transmission Forward
YR	Transmission Reverse
YD1A	4Wheel Steer SVD1A
YD1B	Crab Steer SVD1B
YLD	Left Stabilizer Down
YLU	Left Stabilizer Up
YRD	Right Stabilizer Down
YRU	Right Stabilizer Up

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

Telematics Connector Pin Legend

Genie installed Telematics connector is wired with an Active High digital input.



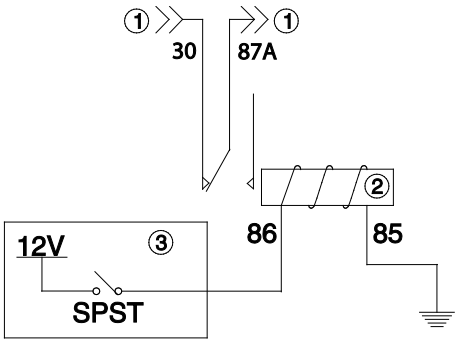
Pin	Circuit Type	Circuit Properties	Genie Machine Function(s)	Telematics Use Case
1	System Power	12 VDC 5 Amp Max. allowed draw	Battery Positive – constant power	Supply power to device
2	System Ground	0 VDC	Battery Negative	Device Ground
3	Digital Output 1	12 VDC	Engine Run Hour Meter 12V = engine run, 0V = engine off	Monitor Engine Hours
4*	Digital Output 2	12 VDC	Boom Angle Status 12V = boom >55°, 0V <55°	Monitor Machine Utilization
5	Digital Output 3	12 VDC	Parking Brake 12V = active, 0V = inactive	Monitor Machine Utilization
6	Digital Input 1	12 VDC (standard) or Ground (optional)	Remote Disable Engine Start	Remotely Prevent Engine Start
7	CAN HIGH	J1939	Databus HIGH J1939	Receive J1939 Engine Data
8	CAN LOW	J1939	Databus LOW J1939	Receive J1939 Engine Data

* Not available on GTH-636

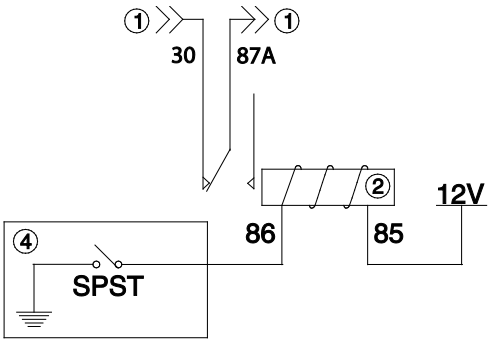
Telematics Connector Pin Legend

Remote Disable Engine Start Relay Configuration

Telematics Active High - Schematic
(standard wiring)



Telematics Active Low - Schematic
(optional wiring)



1 Ignition Start Input
2 Relay
3 Telematics with Active High input
4 Telematics with Active Low input

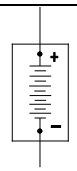
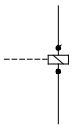
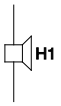
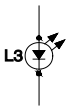
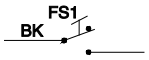
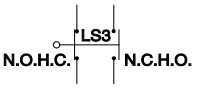
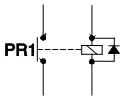
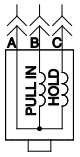
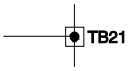
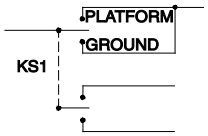
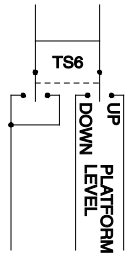
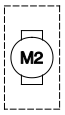
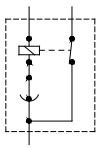
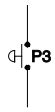
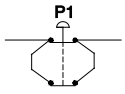
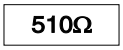
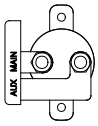
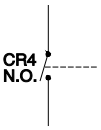
Wireless Certifications

Telematic device(s) should comply with specific wireless carrier certifications where applicable and comply with the following:

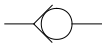
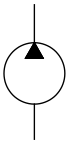
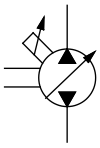
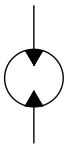
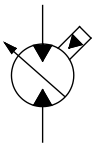
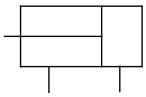
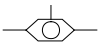
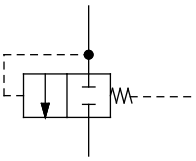
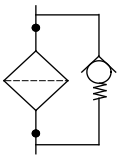
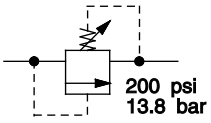
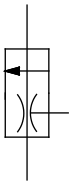
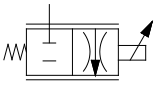
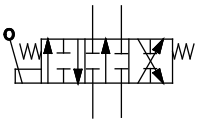
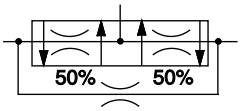
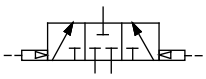
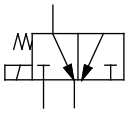
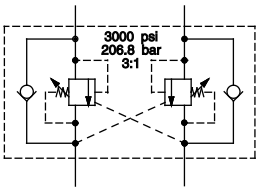
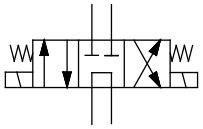
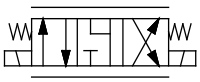
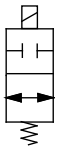
N. America – PTCRB, FCC/IC

Europe – CE, R&TTE

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

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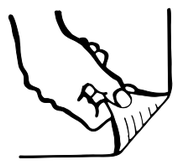
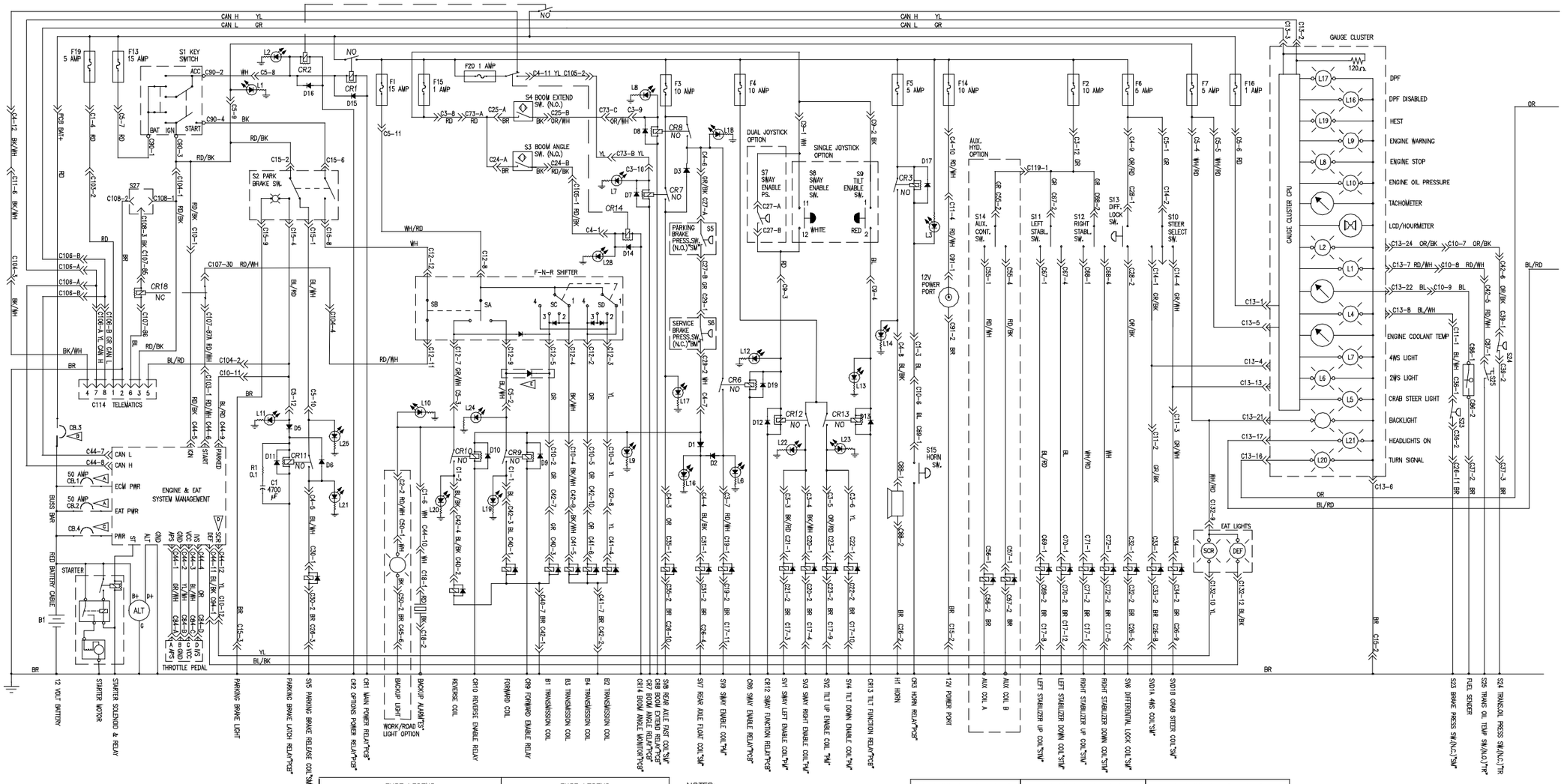
Electrical Schematic (before GTH10E-11890)



Electrical Schematic (before GTH10E-11890)



FUSE LEGEND			FUSE LEGEND		
FUSE	RATING	DESCRIPTION	FUSE	RATING	DESCRIPTION
F1	15A	PARKING BRAKE SWITCH, F-N-R SHIFTER	F14	10A	POWER PORT
F2	10A	AUX HYDRAULICS	F15	1A	SENSOR/SWITCH POWER
F3	10A	SWAY/DRIVE ENABLE	F16	1A	GAUGE CLUSTER ECU POWER
F4	10A	SWAY/TILT COIL POWER	F19	5A	TELEMATICS POWER
F5	5A	SERVICE HORN	F20	1A	BOOM ANGLE MONITOR RELAY POWER
F6	5A	STEER SELECT, DIFFERENTIAL LOCK	CB1&2	50A	ECM/EAT POWER <A>
F7	5A	GAUGE CLUSTER KEY POWER, BACK LIGHT	CB3	<B>	ELECTRIC CONTROL SYSTEM POWER
F13	15A	IGNITION KEY SWITCH POWER	CB4	<C>	<E>

NOTES:

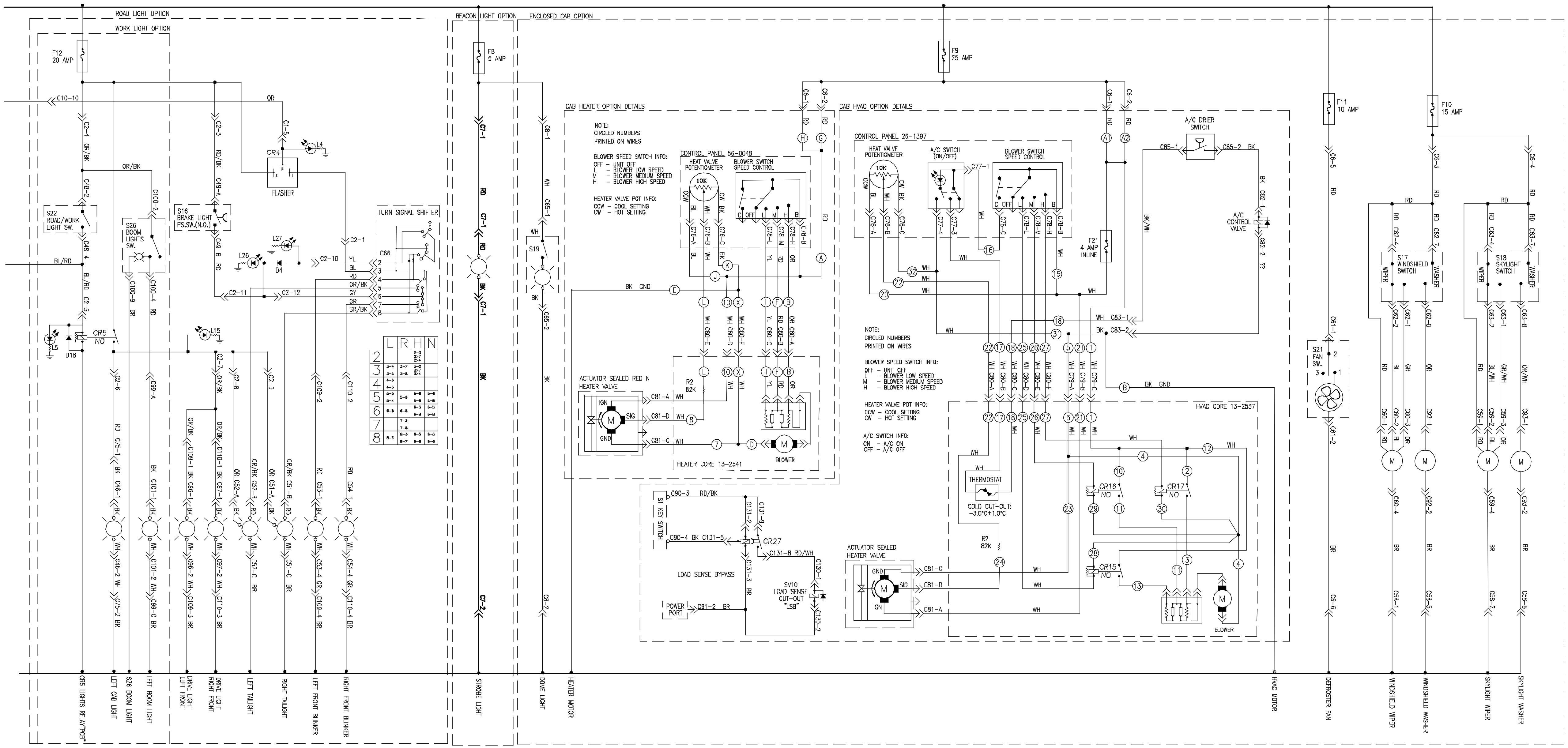
SEE 1267001 HARNESS MAP FOR HARNESSES LIST

- <A> DEUTZ T4F ONLY
- <B> 50AMP CIRCUIT BREAKER WITH DEUTZ T4F 60AMP FUSE WITH PERKINS T4F
- <C> PERKINS T4F 175AMP ECM/EAT POWER FUSE DEUTZ T4F 60AMP GLOW PLUGS POWER C.B.
- <D> PERKINS T4F ONLY
- <E> TOP GEAR LOCKOUT OPTION

DIAGNOSTIC LED LEGEND		DIAGNOSTIC LED LEGEND		DIAGNOSTIC LED LEGEND	
LED	FUNCTION	LED	FUNCTION	LED	FUNCTION
L1	IGNITION SWITCH POWER ON	L11	PARKING BRAKE ON	L20	REVERSE COIL POWER ON
L2	ACCESSORIES POWER ON	L12	SWAY ENAGLE SWITCH ON	L21	PARKING BRAKE RELEASE COIL POWER ON
L3	HORN SWITCH ON	L13	TILT ENABLE SWITCH ON	L22	SWAY L/R ENABLE COIL POWER ON
L6	SWAY ENABLE COIL ON	L14	HORN POWER ON	L23	TILT U/D ENABLE COIL POWER ON
L7	BOOM ANGLE	L16	REAR AXLE FLOAT COIL POWER ON	L24	FORWARD ON
L8	BOOM EXTEND SWITCH ON	L17	BOOM ANGLE RELAY ON	L25	PARKING BRAKE OFF
L9	BRAKE PRESSURE SWITCH ON	L18	BRAKE PRESSURE SWITCH POWER	L28	BOOM ANGLE SWITCH ON
L10	REVERSE ON	L19	FORWARD COIL POWER ON		

ES0466A

Electrical Schematic (before GTH10E-11890)



FUSE LEGEND		
FUSE	RATING	DESCRIPTION
F8	5A	DOME/FLASHING BEACON LIGHT POWER
F9	25A	CAB HEATER POWER
F10	15A	WINDSHIELD/SKYLIGHT WIPER/WASHER POWER
F11	10A	WINDSHIELD DEFROSTER FAN POWER
F12	20A	WORK/ROAD LIGHTS POWER
F21	4A	HVAC CONTROL PANEL POWER

NOTES:

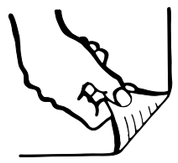
SEE 823112 HARNESS MAP FOR HARNESS LIST
"PCB" – LOCATION PCB
"PM" – LOCATION PRIMARY MANIFOLD
"SM" – LOCATION SECONDARY MANIFOLD
"TM" – LOCATION TRANSMISSION
"EM" – LOCATION ENGINE SKID
"STM" – LOCATION STABILIZERS MANIFOLD
"LSB" – LOCATION LOAD SENSE BYPASS MANIFOLD

DIAGNOSTIC LED LEGEND	
LED	FUNCTION
L4	BLINKERS/PILOT LIGHT ON
L5	LIGHT SWITCH ON
L15	LIGHTS POWER ON
L26	BRAKE LIGHTS PRESSURE SWITCH ON
L27	HAZARD SWITCH ON

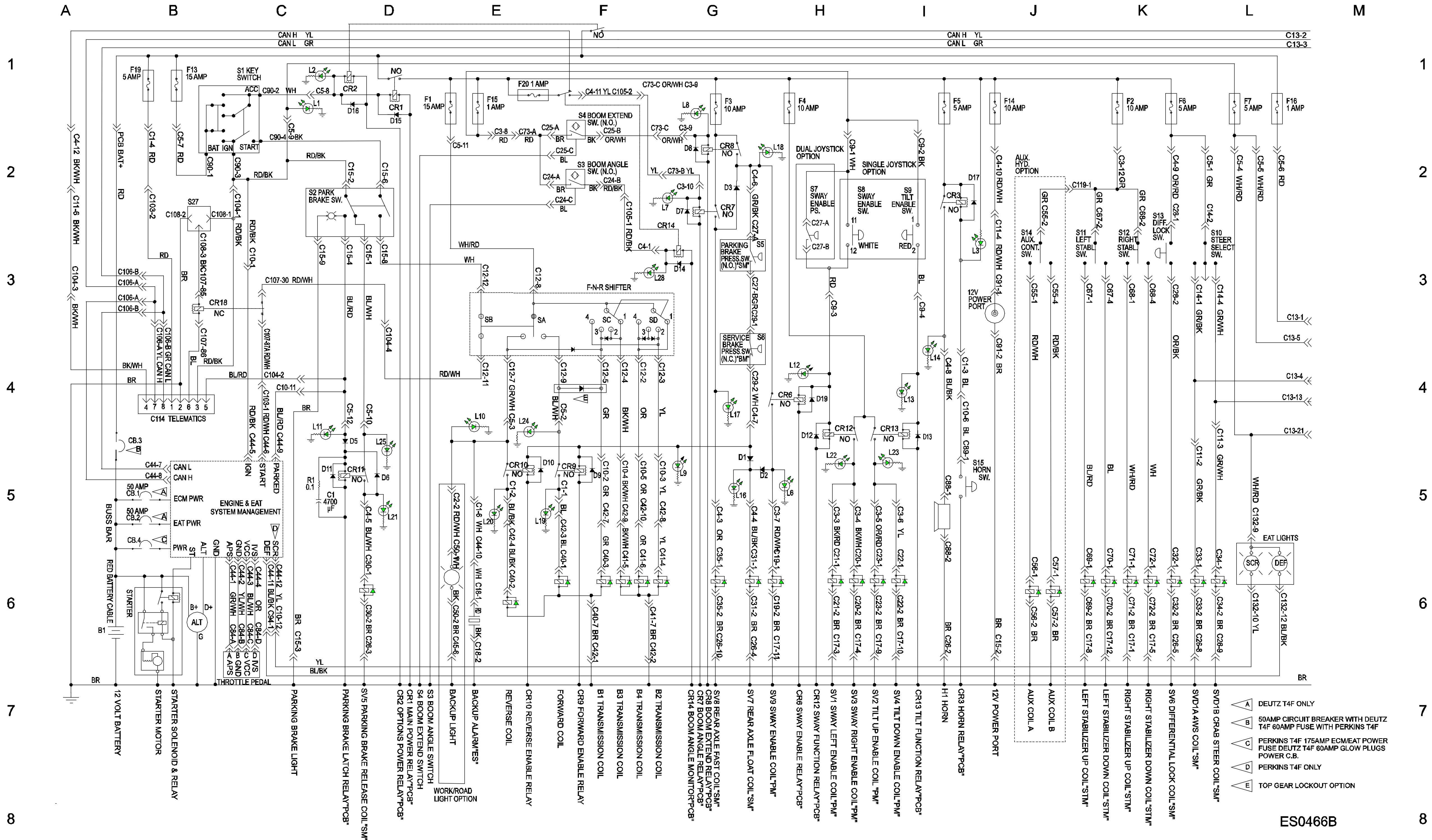
ES0466A

Electrical Schematic (before GTH10E-11890)

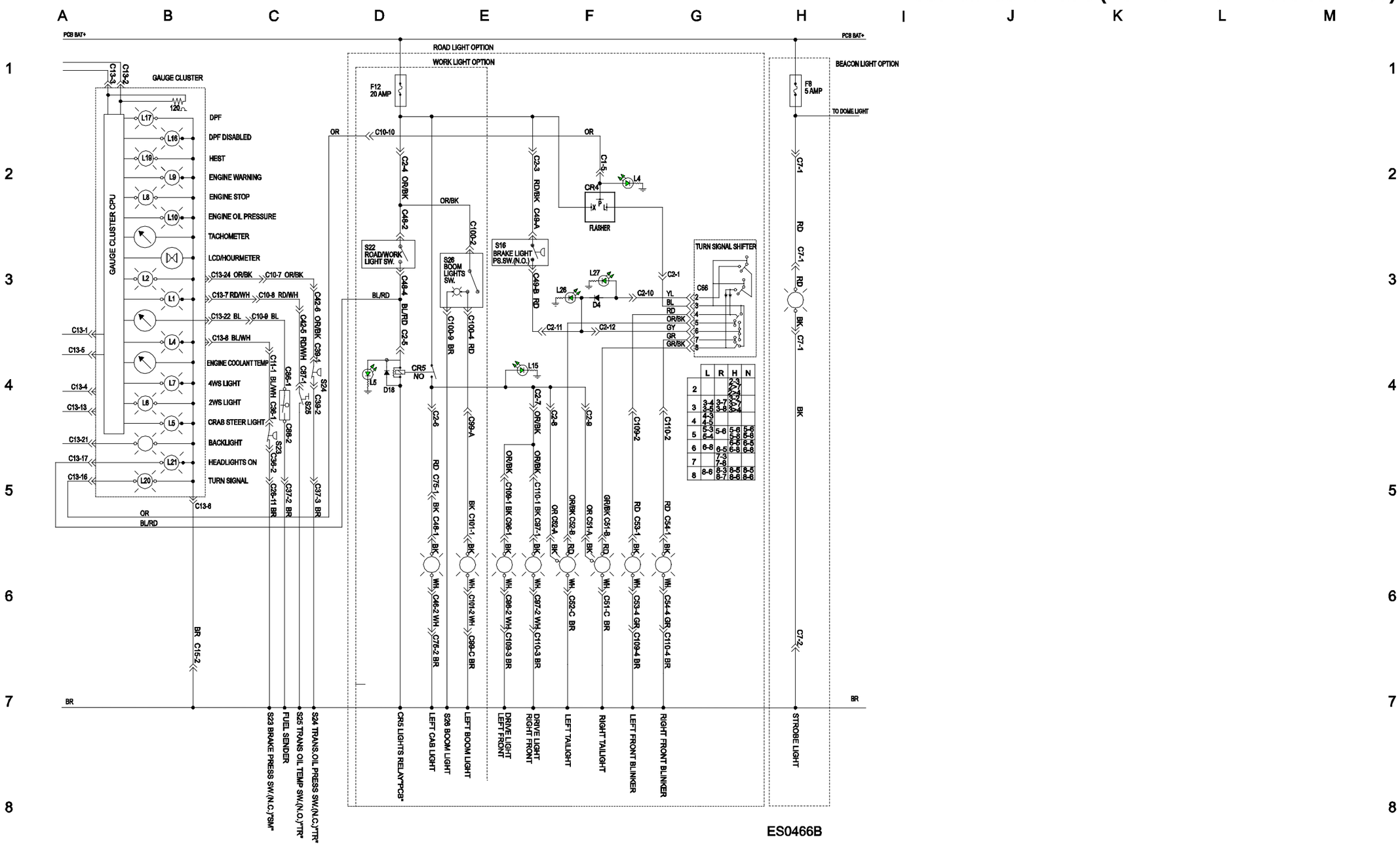
Electrical Schematic (from GTH10E-11890 to 12499)



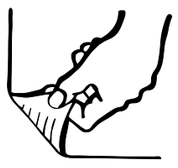
Electrical Schematic (from GTH10E-11890 to 12499)



Electrical Schematic (from GTH10E-11890 to 12499)

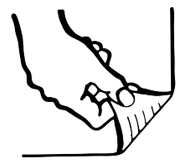


Electrical Schematic (from GTH10E-11890 to 12499)



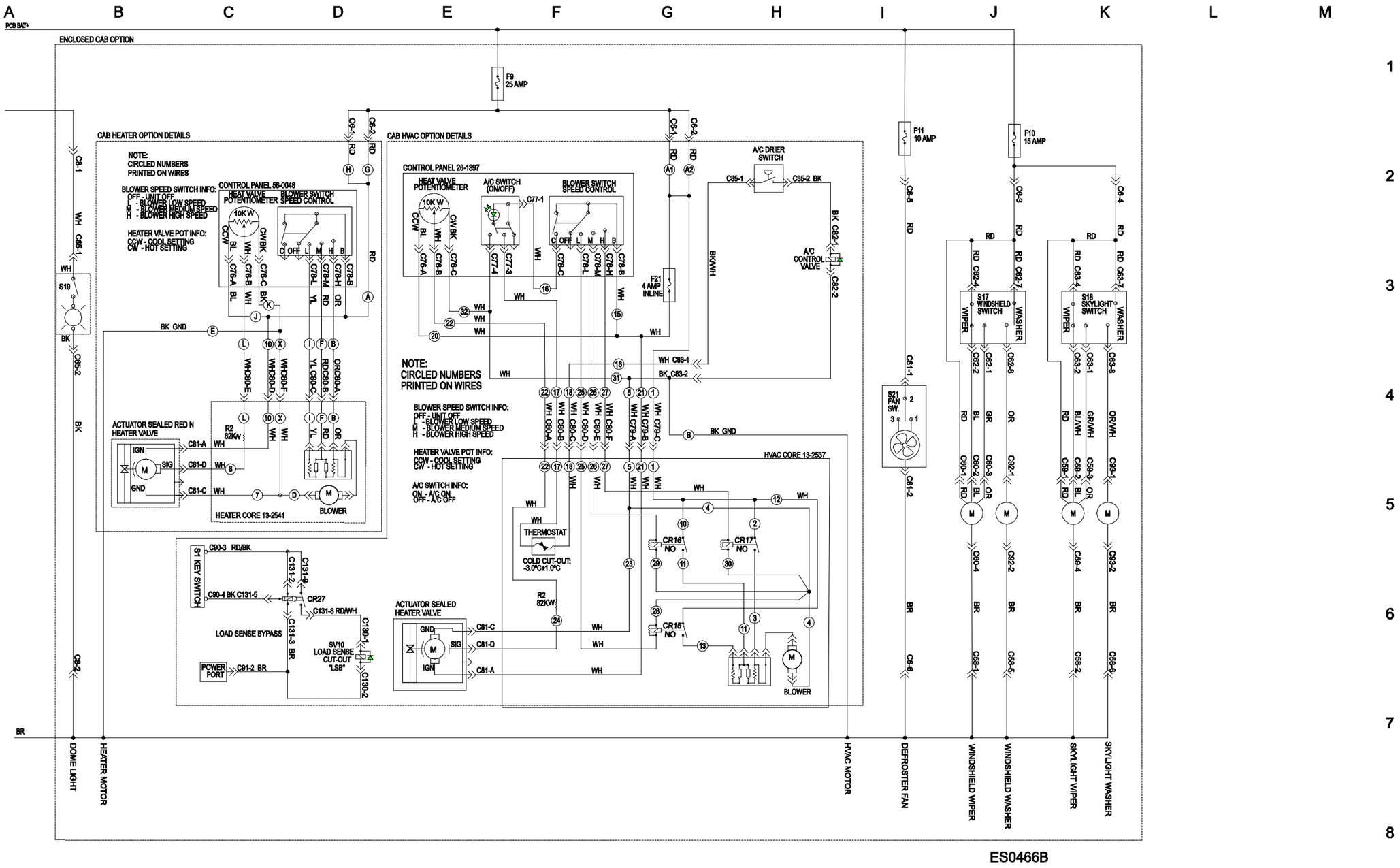
Electrical Schematic (from GTH10E-11890 to 12499)

Enclosed Cab Option



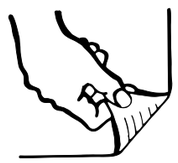
Electrical Schematic (from GTH10E-11890 to 12499)

Enclosed Cab Option



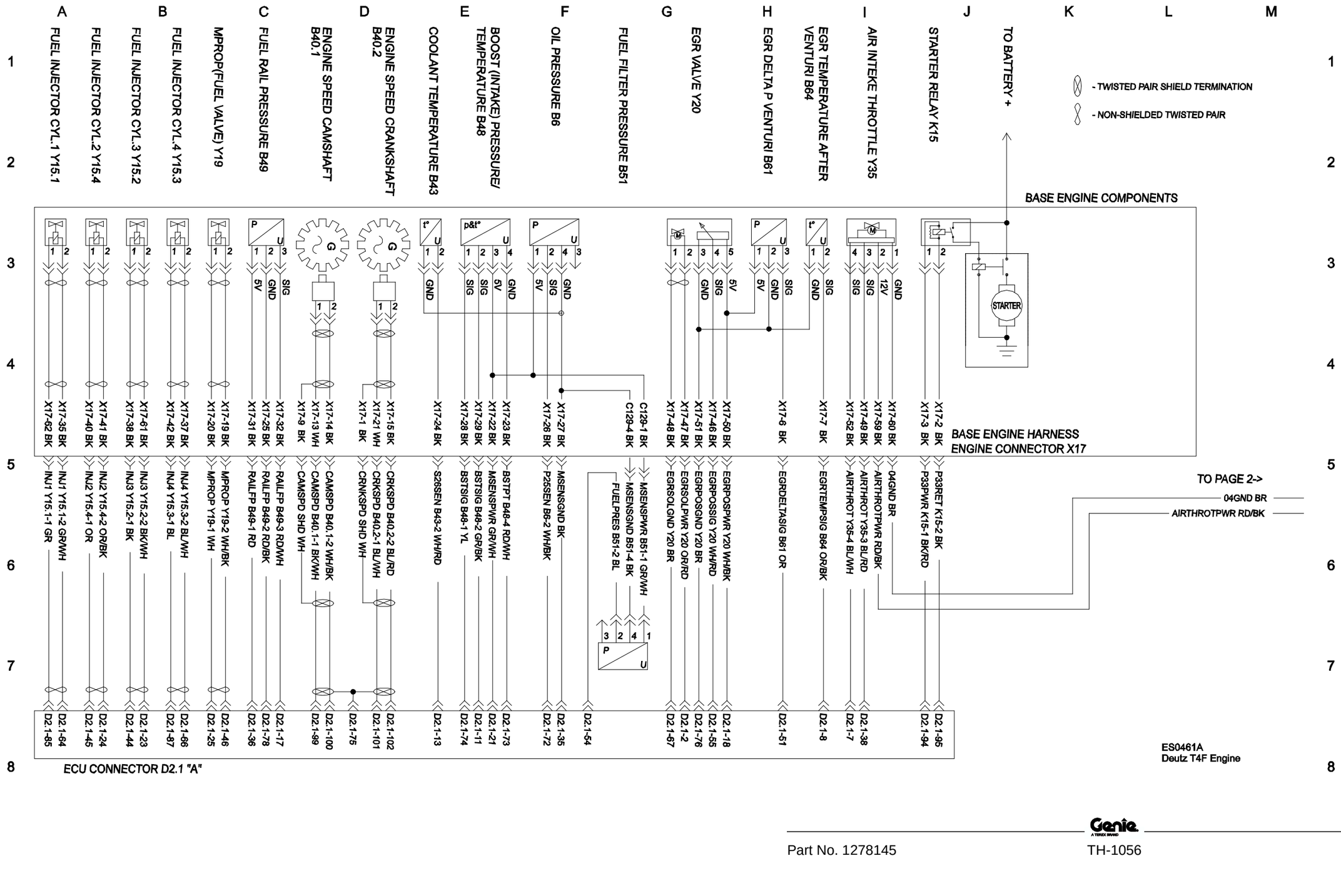
ES0466B

Electrical Schematic (from GTH10E-11890 to GTH10E-12499)



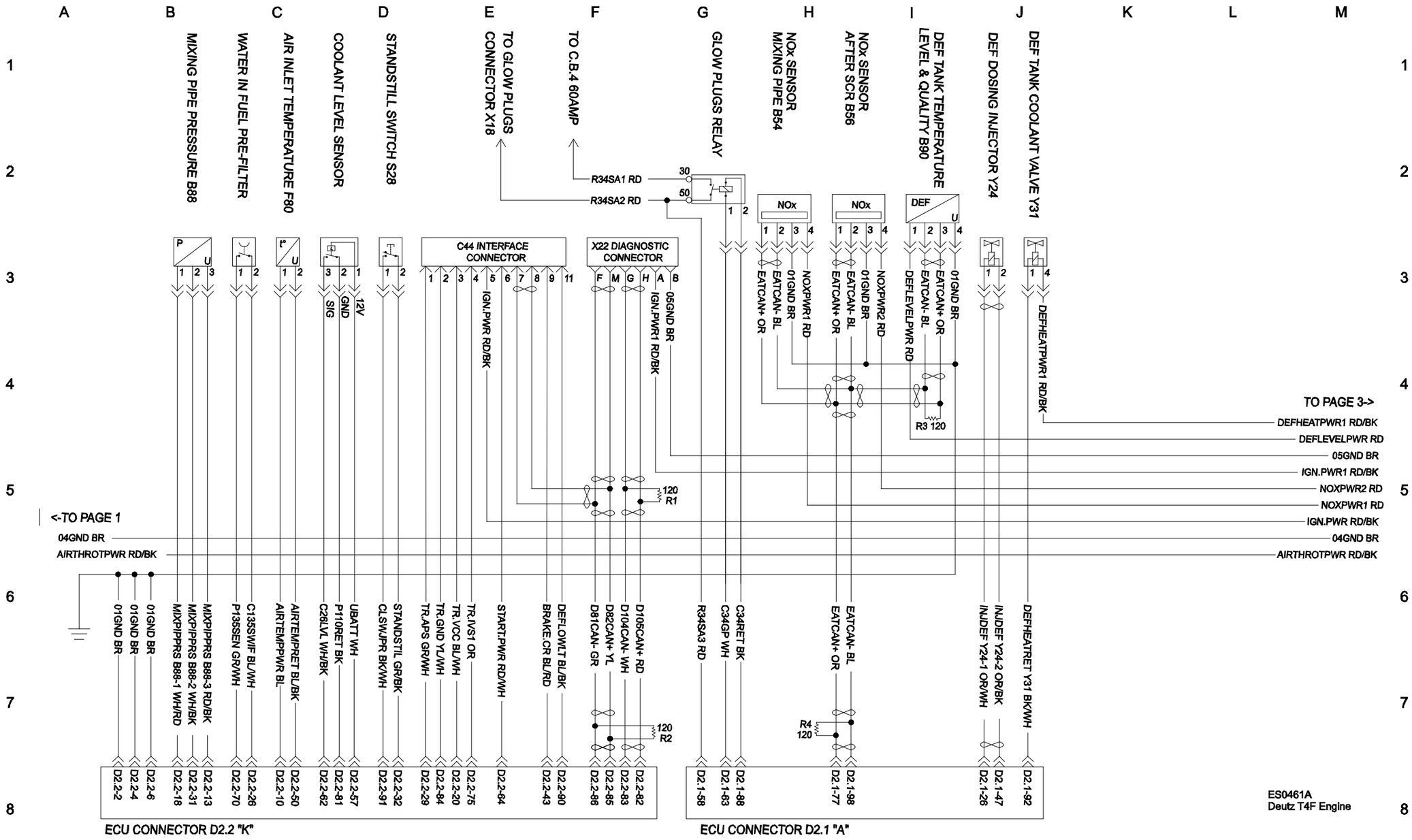
Electrical Schematic- Deutz T4F Eng Harness

Electrical Schematic- Deutz T4F Eng Harness
Page 1 of 3

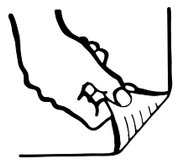


Electrical Schematic- Deutz T4F Eng Harness

Page 2 of 3

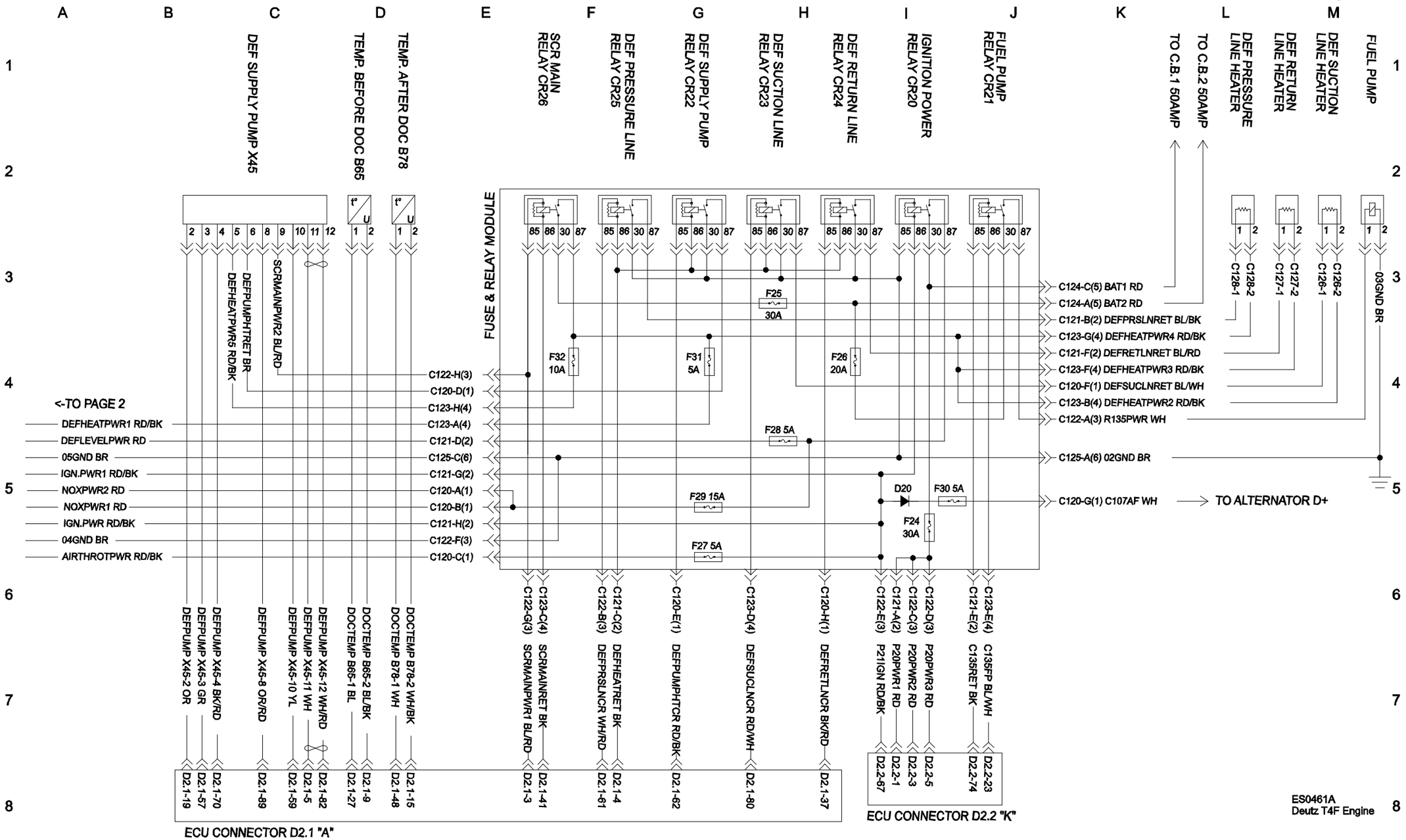


Electrical Schematic- Deutz T4F Eng Harness

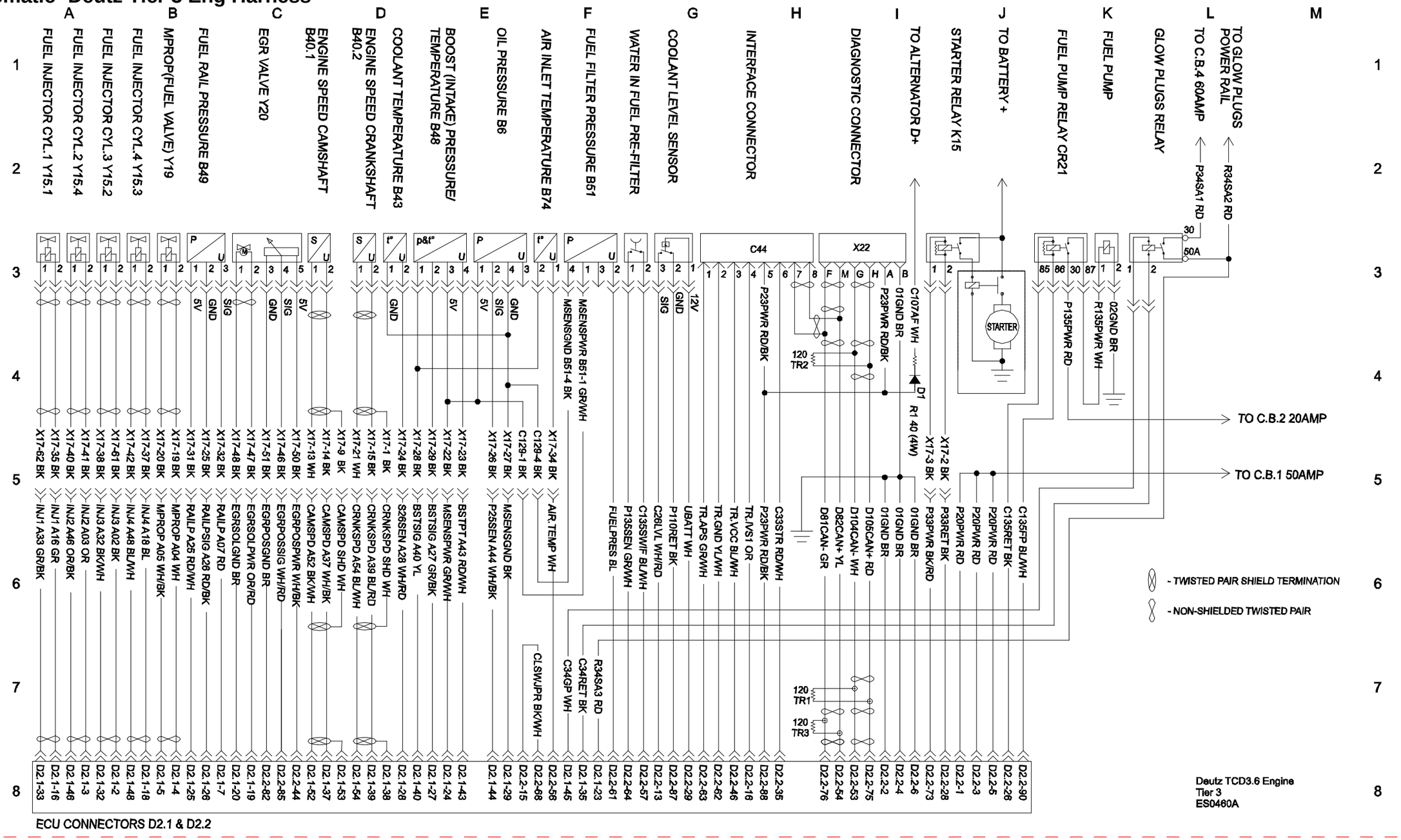


Electrical Schematic- Deutz T4F Eng Harness

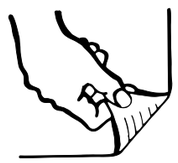
Electrical Schematic- Deutz T4F Eng Harness



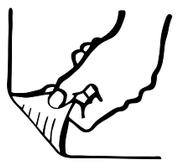
Electrical Schematic- Deutz Tier 3 Eng Harness



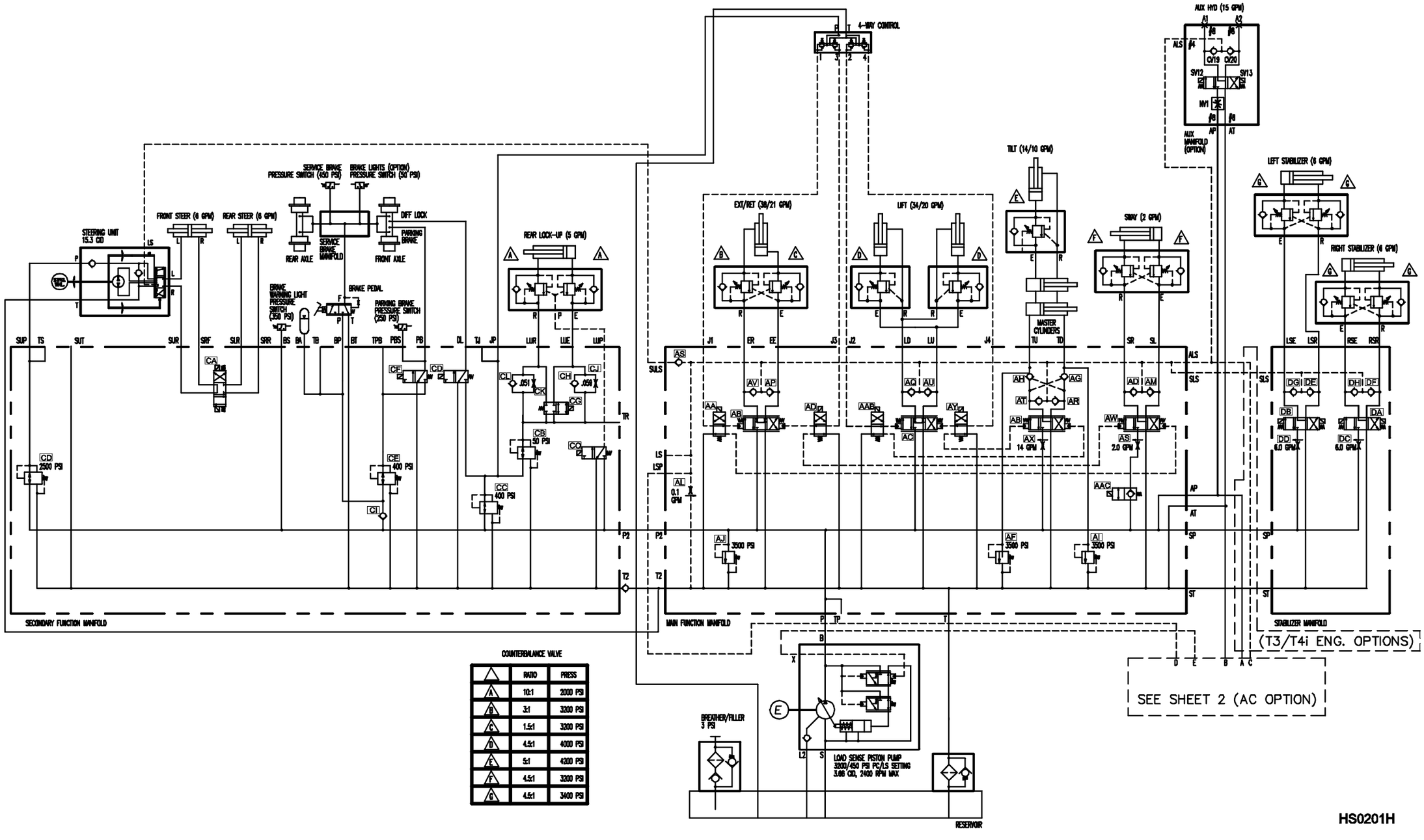
Electrical Schematic- Deutz T3 Eng Harness



Hydraulic Schematic - Models with Single Joystick



Hydraulic Schematic - Models with Single Joystick

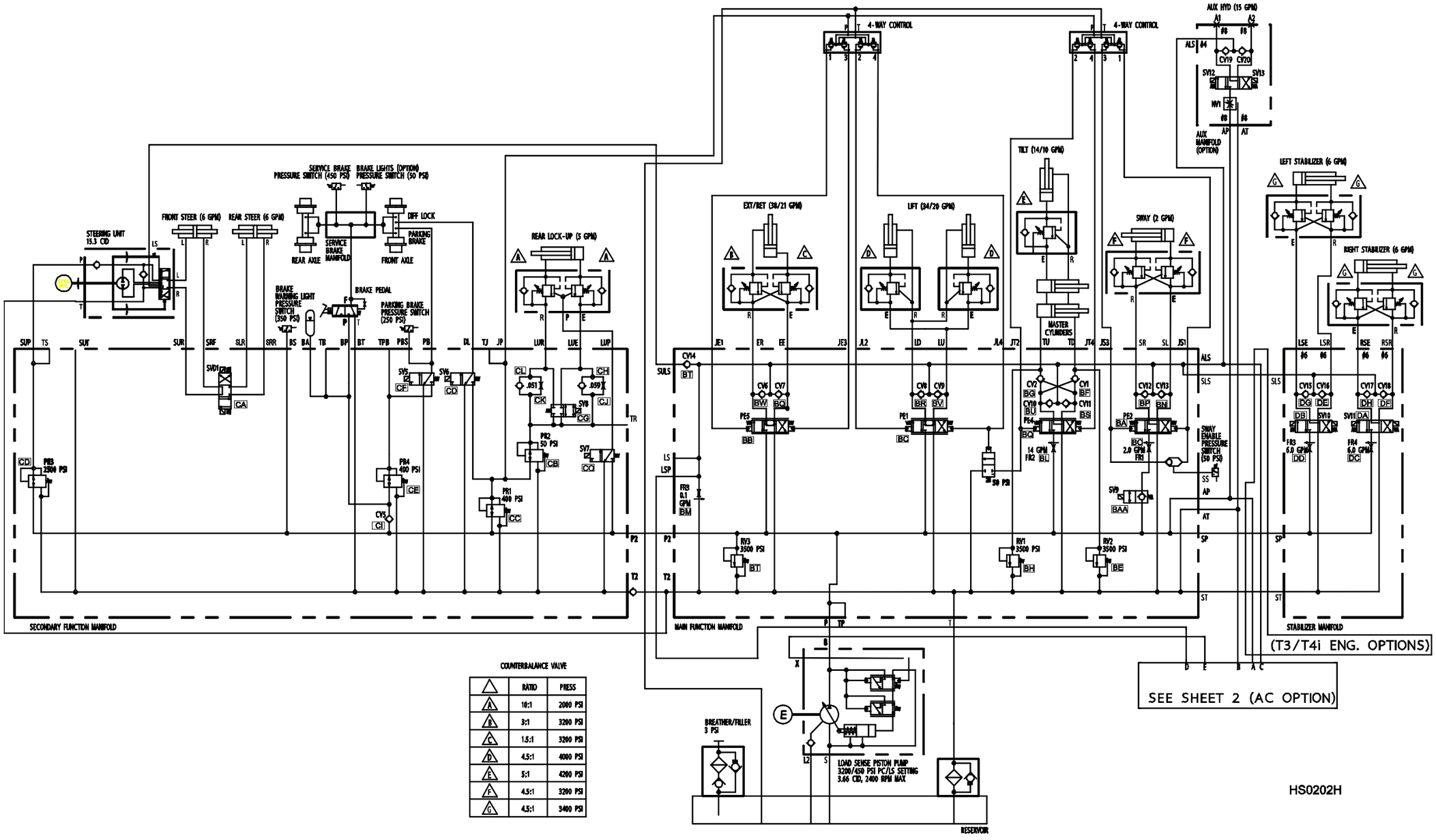


COUNTERBALANCE VALVE

	RATIO	PRESS
A	10:1	2000 PSI
B	3:1	3200 PSI
C	1.5:1	3200 PSI
D	4.5:1	4000 PSI
E	5:1	4200 PSI
F	4.5:1	3200 PSI
G	4.5:1	3400 PSI

HS0201H

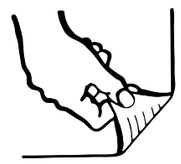
Hydraulic Schematic - Models with Dual Joystick

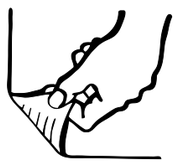


COUNTERBALANCE VALVE

	RATIO	PRESS
A	10:1	2000 PSI
B	3:1	3200 PSI
C	1.5:1	3200 PSI
D	4.5:1	4000 PSI
E	5:1	4200 PSI
F	4.5:1	3200 PSI
G	4.5:1	3400 PSI

Hydraulic Schematic - Models with Dual Joystick





California Proposition 65

WARNING

Operating, servicing and maintaining this equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. These chemicals can be emitted from or contained in other various parts and systems, fluids and some component wear by-products. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your equipment and vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your equipment or vehicle and after operation. For more information go to www.P65Warnings.ca.gov/passenger-vehicle.

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

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

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

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