



# ***Service and Repair Manual***

Serial Number Range

***SX<sup>TM</sup>-105 XC<sup>TM</sup>***

from SX105D-174

***SX<sup>TM</sup>-125 XC<sup>TM</sup>***

from SX125D-101

This manual includes:

Repair procedures

Fault Codes

Electrical and

Hydraulic Schematics

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

Part No. 1271700GT

Rev E

May 2020

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# Introduction

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## 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.

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## Compliance

### Machine Classification

Group B/Type 3 as defined by ISO 16368

### Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

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## 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.

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## Contact Us:

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## Find a Manual for this Model

Go to <http://www.genielift.com>

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

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# Introduction

## Revision History

| Revision                                     | Date    | Section                                                                                                                                            | Procedure / Page / Description                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                                            | 2/2017  |                                                                                                                                                    | Initial Release                                                                                                                                                                                                                                                                                                                                                       |
| B                                            | 5/2017  | Repair                                                                                                                                             | 1-2 Joysticks<br>2-5 Platform Overload System<br>2-6 platform Overload Recovery Message<br>4-6 Primary Boom Angle Sensor<br>4-7 Boom Length Seneor<br>6-1 Bypass / Recovery key switch<br>10-4 Axle Angle Sensors<br>Display Module – Sensor Calibration<br>Display Module - Options<br>Display Module – Boom Function Speeds                                         |
| C                                            | 7/2017  |                                                                                                                                                    | Add SX-105 XC information                                                                                                                                                                                                                                                                                                                                             |
| C1                                           | 5/2018  | Specifications                                                                                                                                     | Drive speed                                                                                                                                                                                                                                                                                                                                                           |
| D                                            | 9/2018  | Schematics                                                                                                                                         | Control Circuits - Deutz TD2011L04i Engine<br>Control Circuits - Deutz 2.9 Engine<br>Control Circuits - Perkins 1104D-44T Engine<br>Control Circuits - Perkins 854 Engine<br>Perkins 1104D-44T Engine Electrical Schematic<br>Perkins 854F-34T Engine Electrical Schematic<br>Deutz TD2011L04i Engine Electrical Schematic<br>Deutz TD2.9 Engine Electrical Schematic |
| D1                                           | 12/2018 | Steer Sensors                                                                                                                                      | Left front and right rear angle sensors<br>Right front and left rear angle sensors                                                                                                                                                                                                                                                                                    |
| E                                            | 5/2020  | 1.Control System Fault Codes<br>2.Electrical Schematics<br>3. Serial Number Range<br>4.Specifications<br>5. Fault Codes<br>6.Electrical Schematics | 1.Add 150 Overload Recovery, 218 Fuel Lever Sensor, 251 Overload<br>2.Add contact alarm<br>3.from SX125D-375 replace with from SX125D-101<br>4.Add deutz TCD 2.2 L3 engine<br>5.Add deutz TCD 2.2 L3 engine fault codes<br>6. Add deutz TCD 2.2 L3 engine electrical schematics and harness.                                                                          |
| Reference Examples:                          |         |                                                                                                                                                    | <div>Electronic Version</div> <div>Click on any content or procedure in the Table of Contents to view the update.</div>                                                                                                                                                                                                                                               |
| Section – Repair Procedure, 4-2              |         |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                       |
| Section – Fault Codes, All charts            |         |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                       |
| Section – Schematics, Legends and schematics |         |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                       |

# Introduction

## Serial Number Legend



**Genie**  
A TEREX BRAND

**Model:** SX-125XC  
**Serial number:** SX125XCD-12345  
**Year of manufacture:** 2016  
**Electrical schematic number:** ES0555  
**Machine unladen weight:**

**Rated work load (including occupants):** 750 lb / 340 kg  
**Maximum number of platform occupants:** 2  
**Maximum allowable side force :** 150 lb / 670 N  
**Maximum allowable inclination of the chassis:**  
 0 deg  
**Maximum wind speed :** 28 mph/ 12.5 m/s  
**Maximum platform height :** 180 ft/ 54.83 m  
**Maximum platform reach :** 80 ft / 24.4 m  
**Gradeability:** 45%  
**Country of manufacture:** USA  
**This machine complies with:**  
 ANSI A92.5  
 CAN B.354.4

**Terex South Dakota, Inc.**  
 500 Oakwood Road  
 PO Box 1150  
 Watertown, SD 57201  
 USA



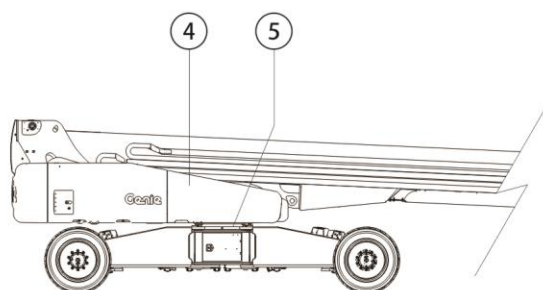
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SX125XC D - 12345

1

2

3



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

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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:

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

# Safety Rules

## Personal Safety

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



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



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



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



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



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



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



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



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

## Workplace Safety

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



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



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



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



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



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



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

# Safety Rules

|                     |                                                        |           |
|---------------------|--------------------------------------------------------|-----------|
| <b>Introduction</b> | <b>Introduction.....</b>                               | <b>ii</b> |
|                     | Important Information .....                            | ii        |
|                     | Find a Manual for this Model .....                     | ii        |
|                     | Serial Number Legend .....                             | iv        |
| <b>Section 1</b>    | <b>Safety Rules .....</b>                              | <b>v</b>  |
|                     | General Safety Rules .....                             | v         |
| <b>Section 2</b>    | <b>Specifications .....</b>                            | <b>1</b>  |
|                     | Machine Specifications.....                            | 1         |
|                     | Performance Specifications.....                        | 2         |
|                     | Hydraulic Specification .....                          | 3         |
|                     | Hydraulic Component Specifications.....                | 6         |
|                     | Manifold Component Specifications .....                | 7         |
|                     | Deutz TD2011L04i Engine Specifications .....           | 8         |
|                     | Deutz TD 2.9 Engine Specifications .....               | 9         |
|                     | Deutz TCD 2.2 L3 Engine Fault Codes.....               | 10        |
|                     | Perkins 1104D-44T Engine Specifications.....           | 11        |
|                     | Perkins 854F-34T Engine Specifications .....           | 13        |
|                     | Machine Torque Specifications .....                    | 14        |
|                     | Hydraulic Hose and Fitting Torque Specifications ..... | 15        |
|                     | Torque Procedure .....                                 | 16        |

# Safety Rules

|                  |                                                                       |           |
|------------------|-----------------------------------------------------------------------|-----------|
| <b>Section 3</b> | <b>Repair Procedures .....</b>                                        | <b>17</b> |
|                  | Introduction .....                                                    | 17        |
|                  | <b>Platform Controls.....</b>                                         | <b>19</b> |
|                  | 1-1 Platform Circuit Board.....                                       | 19        |
|                  | How to Remove the LED Circuit Board .....                             | 20        |
|                  | 1-2 Joysticks .....                                                   | 20        |
|                  | How to Reset a Proportional Valve Coil Default .....                  | 24        |
|                  | How to Set the Function Thresholds and Default Functions Speeds ..... | 24        |
|                  | How to Adjust the Function Speeds .....                               | 26        |
|                  | How to Adjust the Function Ramp Rate Setting .....                    | 27        |
|                  | <b>Platform Components .....</b>                                      | <b>28</b> |
|                  | 2-1 Platform.....                                                     | 28        |
|                  | 2-2 Platform Leveling Cylinder .....                                  | 29        |
|                  | 2-3 Platform Rotator.....                                             | 31        |
|                  | How to Remove the Platform Rotator .....                              | 33        |
|                  | How to Bleed the Platform Rotator .....                               | 33        |
|                  | 2-4 Platform Level Sensor .....                                       | 33        |
|                  | 2-5 Platform Overload System (if equipped).....                       | 35        |
|                  | How to Calibrate the Platform Overload System .....                   | 35        |
|                  | How to Replace the Platform Overload Load Cell .....                  | 37        |
|                  | 2-6 Platform Overload Recovery Message .....                          | 35        |
|                  | <b>Jib Boom Components.....</b>                                       | <b>40</b> |
|                  | 3-1 Jib Boom.....                                                     | 40        |
|                  | 3-2 Jib Boom Components.....                                          | 42        |



## Safety Rules

|                                                                        |           |
|------------------------------------------------------------------------|-----------|
| <b>Boom Components .....</b>                                           | <b>43</b> |
| 4-1 Cable Track .....                                                  | 44        |
| 4-2 Primary Boom .....                                                 | 47        |
| 4-3 Primary Boom Lift Cylinder .....                                   | 59        |
| 4-4 Extension Cylinder .....                                           | 61        |
| 4-5 Boom Extend and Retract Cables.....                                | 64        |
| How to Replace the Boom Extend/Retract Cables .....                    | 66        |
| 4-6 Primary Boom Angle Sensor .....                                    | 68        |
| 4-7 Boom Length Sensor .....                                           | 71        |
| <b>Engines.....</b>                                                    | <b>74</b> |
| 5-1 RPM Adjustment .....                                               | 74        |
| 5-2 Flex Plate .....                                                   | 74        |
| How to Install the Flex Plate.....                                     | 75        |
| 5-3 Diesel Particle Filter Regeneration – Deutz TCD 2.2 L3 Engine..... | 76        |
| <b>Ground Controls.....</b>                                            | <b>77</b> |
| 6-1 Bypass/Recovery Key Switch .....                                   | 77        |
| 6-2 Circuit Boards.....                                                | 79        |
| 6-3 Membrane Decal.....                                                | 81        |
| 6-4 Full Machine Calibration.....                                      | 82        |
| <b>Display Module .....</b>                                            | <b>83</b> |
| <b>Hydraulic Pumps .....</b>                                           | <b>91</b> |
| 7-1 Function Pump .....                                                | 91        |
| How to Prime the Function Pump .....                                   | 92        |
| How to Adjust the Function Pump Standby Pressure .....                 | 92        |
| How to Adjust the Function Pump Pressure Compensator .....             | 94        |
| 7-2 Drive Pump.....                                                    | 95        |
| How to Prime the Drive Pump.....                                       | 97        |

# Safety Rules

|                                                                    |            |
|--------------------------------------------------------------------|------------|
| <b>Manifolds .....</b>                                             | <b>98</b>  |
| 8-1 Function Manifold .....                                        | 98         |
| 8-2 Valve Adjustments - Function Manifold .....                    | 104        |
| 8-3 Platform Level and Rotation Manifold .....                     | 105        |
| 8-4 Platform Rotate Counterbalance Valve Manifold Components ..... | 106        |
| 8-5 Function Enable Manifold .....                                 | 107        |
| 8-6 Steer and Axle Manifold .....                                  | 109        |
| 8-7 Valve Adjustments - Steer and Axle Manifold .....              | 112        |
| 8-8 Traction Manifold Components .....                             | 113        |
| 8-9 Valve Adjustments - Traction Manifold .....                    | 118        |
| 8-10 Valve Adjustments - Traction Manifold .....                   | 118        |
| 8-11 Valve Coils .....                                             | 119        |
| How to Test a Coil Diode .....                                     | 120        |
| <b>Turntable Rotation Components .....</b>                         | <b>121</b> |
| 9-1 Turntable Rotation Assembly .....                              | 121        |
| 9-2 Turntable Level Sensor .....                                   | 123        |
| <b>Axle Components .....</b>                                       | <b>126</b> |
| 10-1 Steer Sensors .....                                           | 126        |
| How to Calibrate a Replacement Steer Sensor .....                  | 128        |
| How to Calibrate All Steer Sensors .....                           | 129        |
| 10-2 Steer Cylinders .....                                         | 131        |
| 10-3 Axle Extension Cylinders .....                                | 132        |
| 10-4 Axle Angle Sensors .....                                      | 133        |
| <b>Repair Procedures .....</b>                                     | <b>135</b> |
| 11-1 Welder Generator .....                                        | 135        |

# Safety Rules

|                  |                                                                                    |            |
|------------------|------------------------------------------------------------------------------------|------------|
| <b>Section 4</b> | <b>Fault Codes .....</b>                                                           | <b>136</b> |
|                  | Introduction .....                                                                 | 136        |
|                  | <b>Control System Fault Codes .....</b>                                            | <b>137</b> |
|                  | Fault Matrix .....                                                                 | 155        |
|                  | Fault Code Source .....                                                            | 156        |
|                  | <b>Fault Code Display – Deutz Models.....</b>                                      | <b>159</b> |
|                  | <b>Deutz TD 2.9 L4 Engine Fault Codes.....</b>                                     | <b>160</b> |
|                  | <b>Deutz TCD 2.2 L3 Engine Fault Codes .....</b>                                   | <b>160</b> |
|                  | <b>Perkins 854F-34T Engine Fault Code .....</b>                                    | <b>185</b> |
| <b>Section 5</b> | <b>Schematics.....</b>                                                             | <b>194</b> |
|                  | Introduction .....                                                                 | 194        |
|                  | Wire Circuit Legend .....                                                          | 195        |
|                  | Wire Color Legend .....                                                            | 199        |
|                  | Limit Switches and Angle Sensors .....                                             | 204        |
|                  | Circuit Connector Legend.....                                                      | 209        |
|                  | Connector Pin Legend.....                                                          | 212        |
|                  | Engine Relay and Fuse Panel Legend-<br>Deutz TD2011 and Perkins 1104D Models ..... | 228        |
|                  | Engine Relay and Fuse Panel Legend- Deutz TD2.9 Models .....                       | 229        |
|                  | Engine Relay and Fuse Panel Legend- Perkins 854F Models .....                      | 230        |
|                  | Telematics Connector Pin Legend .....                                              | 231        |
|                  | Electrical Symbols Legend .....                                                    | 232        |
|                  | Hydraulic Symbols Legend.....                                                      | 233        |
|                  | <b>Electrical Schematics – Control Circuits .....</b>                              | <b>234</b> |
|                  | Control Circuits - Horn .....                                                      | 235        |
|                  | Control Circuits - Power .....                                                     | 236        |
|                  | Control Circuits - Can Bus .....                                                   | 239        |
|                  | Control Circuits - Deutz TD2011L04i Engine .....                                   | 241        |

# Safety Rules

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| Control Circuits - Deutz 2.9 Engine/Deutz TCD 2.2 L3.....                   | 245 |
| Control Circuits - Perkins 1104D-44T Engine .....                           | 245 |
| Control Circuits - Perkins 854 Engine .....                                 | 249 |
| Control Circuits - Axle Extend/Retract .....                                | 250 |
| Control Circuits - Steering .....                                           | 253 |
| Control Circuits - Propel .....                                             | 254 |
| Control Circuits - Turntable Rotate .....                                   | 257 |
| Control Circuits - Boom Up/Down .....                                       | 258 |
| Control Circuits - Boom Extend/Retract .....                                | 263 |
| Control Circuits - Jib Up/Down, Jib Rotate and Platform Rotate .....        | 266 |
| Control Circuits - Platform Level and Jib Bellcrank Level .....             | 269 |
| Control Circuits - Platform Load Sense .....                                | 270 |
| Control Circuits - Flashing Beacons, Oil Cooler and Drive/Work Lights ..... | 273 |
| Control Circuits - Recovery PLD .....                                       | 274 |
| Control Circuits - Telematics .....                                         | 279 |
| Generator Receptacle Wiring- ANSI/CSA .....                                 | 280 |
| Generator Receptacle Wiring- AUS .....                                      | 280 |
| Generator Receptacle Wiring- CE .....                                       | 284 |
| Perkins 1104D-44T Engine Electrical Schematic .....                         | 285 |
| Perkins 854F-34T Engine Electrical Schematic.....                           | 289 |
| Perkins 854F-34T Engine Harness.....                                        | 290 |
| Deutz TD2011L04i Engine Electrical Schematic.....                           | 292 |
| Deutz TD2.9 Engine Electrical Schematic .....                               | 295 |
| Deutz TD2.9 Engine Harness .....                                            | 296 |
| Deutz TCD2.2 L3 Engine Electrical Schematic .....                           | 297 |
| Deutz TCD2.2 L3 Engine Harmess.....                                         | 297 |
| Electrical Schematic - Contact Alarm.....                                   | 300 |
| Hydraulic Schematic, SX-125 XC .....                                        | 302 |
| Hydraulic Schematic, SX-105 XC .....                                        | 304 |

## Specifications

### Machine Specifications, SX-105 XC model

| Tires and wheels                                                                       |                      |
|----------------------------------------------------------------------------------------|----------------------|
| Tire size                                                                              | 385/65 D22.5         |
| Tire ply rating                                                                        | 16                   |
| Tire weight, new foam-filled (minimum)                                                 | 625 lbs<br>284 kg    |
| Overall tire diameter                                                                  | 43.1 in<br>109.5 cm  |
| Wheel diameter                                                                         | 22.5 in<br>57.2 cm   |
| Wheel width                                                                            | 11.75 in<br>29.9 cm  |
| Wheel lugs                                                                             | 10 @ 3/4 - 16        |
| Lug nut torque, dry                                                                    | 320 ft-lbs<br>434 Nm |
| Fluid capacities                                                                       |                      |
| Fuel tank                                                                              | 40 gal<br>151 liters |
| Hydraulic tank                                                                         | 55 gal<br>208 liters |
| Hydraulic system (including tank)                                                      | 78 gal<br>296 liters |
| Drive hubs                                                                             | 67 fl oz<br>1981 cc  |
| Turntable rotation drive hub                                                           | 43 fl oz<br>1262 cc  |
| Drive hub oil type: SAE 90 multipurpose hypoid gear oil API service classification GL5 |                      |

### Machine Specifications, SX-125 XC model

| Tires and wheels                                                                       |                      |
|----------------------------------------------------------------------------------------|----------------------|
| Tire size                                                                              | 445D50/710           |
| Tire ply rating                                                                        | 18                   |
| Tire weight, new foam-filled (minimum)                                                 | 850 lbs<br>386 kg    |
| Overall tire diameter                                                                  | 45.47 in<br>115.5 cm |
| Wheel diameter                                                                         | 28 in<br>71.1 cm     |
| Wheel width                                                                            | 15 in<br>38.1 cm     |
| Wheel lugs                                                                             | 10 @ 3/4 - 16        |
| Lug nut torque, dry                                                                    | 320 ft-lbs<br>434 Nm |
| Fluid capacities                                                                       |                      |
| Fuel tank                                                                              | 40 gal<br>151 liters |
| Hydraulic tank                                                                         | 55 gal<br>208 liters |
| Hydraulic system (including tank)                                                      | 85 gal<br>322 liters |
| Drive hubs                                                                             | 67 fl oz<br>1981 cc  |
| Turntable rotation drive hub                                                           | 43 fl oz<br>1262 cc  |
| Drive hub oil type: SAE 90 multipurpose hypoid gear oil API service classification GL5 |                      |

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

## Specifications

### Performance Specifications, SX-105 XC model

#### Drive speed, maximum

|                             |                                                                |
|-----------------------------|----------------------------------------------------------------|
| Stowed position, high speed | 3 mph<br>4.8 km/h<br>36 ft / 8.0–8.4 sec<br>11 m / 8.0–8.4 sec |
|-----------------------------|----------------------------------------------------------------|

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| Raised or extended | 0.7 mph<br>1.09 km/h<br>18 ft / 18-20 sec<br>5.5 m / 18-20 sec |
|--------------------|----------------------------------------------------------------|

|                          |                                                                  |
|--------------------------|------------------------------------------------------------------|
| Boom above 80ft / 24.4 m | 0.4 mph<br>0.61 km/h<br>18 ft / 32-36 sec<br>5.5 m / 32 - 36 sec |
|--------------------------|------------------------------------------------------------------|

#### Braking distance, maximum

|                             |               |
|-----------------------------|---------------|
| High range on paved surface | 7 ft / 2.13 m |
|-----------------------------|---------------|

|                     |                            |
|---------------------|----------------------------|
| <b>Gradeability</b> | Refer to Operator's Manual |
|---------------------|----------------------------|

#### Boom function speeds, maximum from platform controls

|                  |             |
|------------------|-------------|
| Jib boom up/down | 28 - 32 sec |
|------------------|-------------|

|                             |             |
|-----------------------------|-------------|
| Platform rotate CW80/CCW 80 | 37 - 47 sec |
|-----------------------------|-------------|

|                     |               |
|---------------------|---------------|
| Boom extend/retract | 120 - 140 sec |
|---------------------|---------------|

|                       |                   |
|-----------------------|-------------------|
| Boom up/down (stowed) | 80 - 88 sec / 83° |
|-----------------------|-------------------|

|                                               |                     |
|-----------------------------------------------|---------------------|
| Boom up/down<br>(stringpot = 120 in / 305 cm) | 100 - 110 sec / 83° |
|-----------------------------------------------|---------------------|

|                                               |                   |
|-----------------------------------------------|-------------------|
| Boom up/down<br>(stringpot = 225 in / 571 cm) | 33 - 38 sec / 20° |
|-----------------------------------------------|-------------------|

|                                               |                   |
|-----------------------------------------------|-------------------|
| Boom up/down<br>(stringpot = 285 in / 724 cm) | 40 - 45 sec / 20° |
|-----------------------------------------------|-------------------|

|                                               |                  |
|-----------------------------------------------|------------------|
| Boom up/down<br>(stringpot = 345 in / 876 cm) | 18 - 23 sec / 5° |
|-----------------------------------------------|------------------|

|                                |               |
|--------------------------------|---------------|
| Turntable rotate, fully stowed | 170 - 190 sec |
|--------------------------------|---------------|

|                                                                 |             |
|-----------------------------------------------------------------|-------------|
| Turntable rotate, drive enable to drive enable (40°)<br>< 80 ft | 31 - 35 sec |
|-----------------------------------------------------------------|-------------|

|                                                                 |               |
|-----------------------------------------------------------------|---------------|
| Turntable rotate, drive enable to drive enable (40°)<br>> 80 ft | 54.5 - 60 sec |
|-----------------------------------------------------------------|---------------|

### Performance Specifications, SX-125 XC model

#### Drive speed, maximum

|                             |                                                                |
|-----------------------------|----------------------------------------------------------------|
| Stowed position, high speed | 3 mph<br>4.8 km/h<br>36 ft / 8.0–8.4 sec<br>11 m / 8.0–8.4 sec |
|-----------------------------|----------------------------------------------------------------|

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| Raised or extended | 0.7 mph<br>1.09 km/h<br>18 ft / 18-20 sec<br>5.5 m / 18-20 sec |
|--------------------|----------------------------------------------------------------|

|                          |                                                                  |
|--------------------------|------------------------------------------------------------------|
| Boom above 80ft / 24.4 m | 0.4 mph<br>0.61 km/h<br>18 ft / 32-36 sec<br>5.5 m / 32 - 36 sec |
|--------------------------|------------------------------------------------------------------|

#### Braking distance, maximum

|                             |            |
|-----------------------------|------------|
| High range on paved surface | 6 ft / 2 m |
|-----------------------------|------------|

|                     |                            |
|---------------------|----------------------------|
| <b>Gradeability</b> | Refer to Operator's Manual |
|---------------------|----------------------------|

#### Boom function speeds, maximum from platform controls

|                  |             |
|------------------|-------------|
| Jib boom up/down | 28 - 32 sec |
|------------------|-------------|

|                             |             |
|-----------------------------|-------------|
| Jib boom rotate CW80/CCW 70 | 28 - 32 sec |
|-----------------------------|-------------|

|                     |               |
|---------------------|---------------|
| Boom extend/retract | 170 - 190 sec |
|---------------------|---------------|

|                       |                   |
|-----------------------|-------------------|
| Boom up/down (stowed) | 80 - 88 sec / 83° |
|-----------------------|-------------------|

|                                               |                     |
|-----------------------------------------------|---------------------|
| Boom up/down<br>(stringpot = 120 in / 305 cm) | 100 - 110 sec / 83° |
|-----------------------------------------------|---------------------|

|                                               |                   |
|-----------------------------------------------|-------------------|
| Boom up/down<br>(stringpot = 225 in / 571 cm) | 33 - 38 sec / 20° |
|-----------------------------------------------|-------------------|

|                                               |                   |
|-----------------------------------------------|-------------------|
| Boom up/down<br>(stringpot = 285 in / 724 cm) | 40 - 45 sec / 20° |
|-----------------------------------------------|-------------------|

|                                               |                  |
|-----------------------------------------------|------------------|
| Boom up/down<br>(stringpot = 345 in / 876 cm) | 18 - 23 sec / 5° |
|-----------------------------------------------|------------------|

|                                                |                  |
|------------------------------------------------|------------------|
| Boom up/down<br>(stringpot = 537 in / 1364 cm) | 34 - 39 sec / 5° |
|------------------------------------------------|------------------|

|                                |               |
|--------------------------------|---------------|
| Turntable rotate, fully stowed | 170 - 190 sec |
|--------------------------------|---------------|

|                                                                 |             |
|-----------------------------------------------------------------|-------------|
| Turntable rotate, drive enable to drive enable (40°)<br>< 80 ft | 31 - 35 sec |
|-----------------------------------------------------------------|-------------|



## Specifications

|                                                      |               |
|------------------------------------------------------|---------------|
| Turntable rotate, drive enable to drive enable (40°) | 54.5 - 60 sec |
| > 80 ft                                              |               |

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

### Hydraulic Oil Specifications

#### Hydraulic Fluid Specifications

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

|                            |           |
|----------------------------|-----------|
| Cleanliness level, minimum | ISO 15/13 |
|----------------------------|-----------|

|                        |         |
|------------------------|---------|
| Water content, maximum | 250 ppm |
|------------------------|---------|

#### Recommended Hydraulic Fluid

|                    |                          |
|--------------------|--------------------------|
| Hydraulic oil type | Chevron Rando HD Premium |
| Viscosity grade    | 32                       |
| Viscosity index    | 200                      |

#### Optional Hydraulic Fluids

|                |                                                                                                                             |
|----------------|-----------------------------------------------------------------------------------------------------------------------------|
| Mineral based  | Shell Tellus S2 V 32<br>Shell Tellus S2 V 46<br>Shell Tellus S4 VX 32 Shell<br>Shell Donax TG (Dexron III)<br>Chevron 5606A |
| Biodegradable  | Petro Canada Environ MV 46                                                                                                  |
| Fire resistant | UCON Hydrolube HP-5046                                                                                                      |

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

#### NOTICE

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

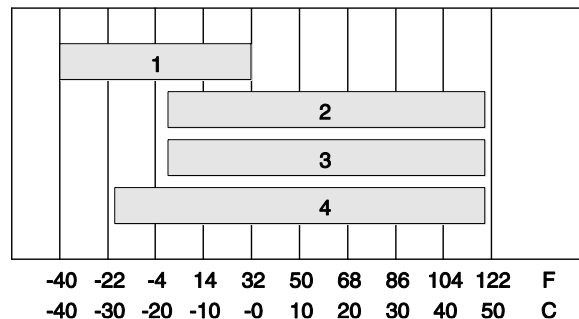
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond its maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

#### NOTICE

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

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

### Hydraulic Fluid Temperature Range



Ambient air temperature

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

## Specifications

### Chevron Rando HD Premium Oil MV Fluid Properties

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

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

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

### Chevron 5606A Hydraulic Oil Fluid Properties

|                                          |               |
|------------------------------------------|---------------|
| ISO Grade                                | 15            |
| Viscosity index                          | 300           |
| Kinematic Viscosity                      |               |
| cSt @ 200°F / 100°C                      | 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



## Specifications

### 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                      | 22            |
| cSt @ 104°F / 40°C                       | 46            |
| 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  |

### UCON Hydrolube HP-5046 Fluid Properties

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

# Specifications

## Hydraulic Component Specifications

### Drive Pump

|                                                        |                     |
|--------------------------------------------------------|---------------------|
| Type: bi-directional variable displacement piston pump |                     |
| Displacement per revolution                            | 2.8 cu in<br>46 cc  |
| Flow rate @ 2450 rpm                                   | 30 gpm<br>114 L/min |
| Drive pressure, maximum                                | 3625 psi<br>250 bar |

### Charge Pump

|                             |                       |
|-----------------------------|-----------------------|
| Type                        | gerotor               |
| Displacement per revolution | 0.85 cu in<br>13.9 cc |
| Flow rate @ 2450 rpm        | 9 gpm<br>34 L/min     |
| Charge pressure @ 2450 rpm  | 315 psi               |
| Neutral position            | 21.7 bar              |

### Function pump

|                                         |                                 |
|-----------------------------------------|---------------------------------|
| Type: variable displacement piston pump |                                 |
| Displacement per revolution             | 0 to 2.8 cu in<br>0 to 45 cc    |
| Flow rate @ 2450 rpm                    | 0 to 29 gpm<br>0 to 109.7 L/min |
| Pressure, maximum                       | 2900 psi<br>200 bar             |
| Pressure compensator                    | 2900 psi<br>200 bar             |
| Standby pressure                        | 350 psi<br>24 bar               |

### Auxiliary Pump

|                             |                              |
|-----------------------------|------------------------------|
| Type                        | fixed displacement gear pump |
| Displacement per revolution | 0.15 cu in<br>2.47 cc        |

### Function manifold

|                                                              |                     |
|--------------------------------------------------------------|---------------------|
| System relief valve pressure, maximum                        | 3200 psi<br>221 bar |
| Primary boom extend relief pressure (measured at PTEST port) | 2350 psi<br>162 bar |

### Platform Manifold

|                                                   |                       |
|---------------------------------------------------|-----------------------|
| Platform rotate and platform level flow regulator | 0.2 gpm<br>0.76 L/min |
|---------------------------------------------------|-----------------------|

### Steer/Axle Manifold

|                             |                     |
|-----------------------------|---------------------|
| Axle extend relief pressure | 2400 psi<br>165 bar |
|-----------------------------|---------------------|

### Traction Manifold

|                         |                     |
|-------------------------|---------------------|
| Hot oil relief pressure | 240 psi<br>16.5 bar |
|-------------------------|---------------------|

# Specifications

## Brakes

|                       |                   |
|-----------------------|-------------------|
| Brake relief pressure | 160 psi<br>11 bar |
|-----------------------|-------------------|

## Drive Motors

|                                            |                       |
|--------------------------------------------|-----------------------|
| Displacement per revolution<br>high speed: | 1.19 cu in<br>19.5 cc |
| Displacement per revolution<br>low speed   | 2.7 cu in<br>45 cc    |

## Hydraulic Filters

|                                           |                                              |
|-------------------------------------------|----------------------------------------------|
| High pressure filter:                     | Beta 5 $\geq 1000$                           |
| High pressure filter bypass pressure      | 102 psi<br>7 bar                             |
| Medium pressure filter                    | Beta 3 $\geq 200$                            |
| Medium pressure filter bypass<br>pressure | 51 psi<br>3.5 bar                            |
| Hydraulic tank return filter              | 10 micron with<br>25 psi / 1.7 bar<br>bypass |
| Drive motor case drain return filter      | Beta 10 $\geq 2$                             |

## Manifold Component Specifications

### Plug torque

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

# Specifications

## Deutz TD2011L04i Engine

|                                                                                                                                                                                   |                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>Displacement</b>                                                                                                                                                               | 220.9 cu. in<br>3.62 liters       |
| <b>Number of cylinders</b>                                                                                                                                                        | 4                                 |
| <b>Bore and Stroke</b>                                                                                                                                                            | 3.78 x 4.92 inches<br>96 x 125 mm |
| <b>Horsepower net intermittent @ 2400 rpm</b>                                                                                                                                     | 74 hp<br>55 kW                    |
| <b>Induction system</b>                                                                                                                                                           | turbocharged                      |
| <b>Firing order</b>                                                                                                                                                               | 1 - 3 - 4 - 2                     |
| <b>Low idle</b>                                                                                                                                                                   | 1300 rpm                          |
| <b>High idle</b>                                                                                                                                                                  | 2450 rpm                          |
| <b>Compression ratio</b>                                                                                                                                                          | 17.5:1                            |
| Compression pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder                                                                             |                                   |
| <b>Governor</b>                                                                                                                                                                   | centrifugal mechanical            |
| <b>Valve Clearance, cold</b>                                                                                                                                                      |                                   |
| Intake                                                                                                                                                                            | 0.012 in<br>0.3 mm                |
| Exhaust                                                                                                                                                                           | 0.020 in<br>0.5 mm                |
| <b>Lubrication system</b>                                                                                                                                                         |                                   |
| Oil pressure, hot (@ 2000 rpm)                                                                                                                                                    | 40 to 60 psi<br>2.8 to 4.1 bar    |
| Oil capacity (including filter)                                                                                                                                                   | 12.8 quarts<br>12.1 liters        |
| <b>Oil viscosity requirements</b>                                                                                                                                                 |                                   |
| -22°F to 86°F / -30°C to 30°C                                                                                                                                                     | 5W-30<br>(synthetic)              |
| -4°F to 104°F / -20°C to 40°C                                                                                                                                                     | 10W-40                            |
| Above 5°F / -15°C                                                                                                                                                                 | 15W-40                            |
| Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine. |                                   |

|                                                                             |                               |
|-----------------------------------------------------------------------------|-------------------------------|
| <b>Oil temperature switch</b>                                               |                               |
| Installation torque                                                         | 8 - 18 ft-lbs<br>11 - 24 Nm   |
| Temperature switch point                                                    | 275°F<br>135°C                |
| <b>Oil Pressure switch</b>                                                  |                               |
| Installation torque                                                         | 8 - 18 ft-lbs<br>11 - 24 Nm   |
| Pressure switch point                                                       | 22 psi<br>1.5 bar             |
| <b>Fuel injection system</b>                                                |                               |
| Injection pump pressure, maximum                                            | 15,000 psi<br>1034 bar        |
| Injector opening pressure                                                   | 3046 psi<br>210 bar           |
| <b>Fuel requirement</b>                                                     |                               |
| For fuel requirements, refer to the engine Operator Manual for your engine. |                               |
| <b>Starter motor</b>                                                        |                               |
| Current draw, normal load                                                   | 140 - 200A                    |
| Cranking speed                                                              | 250 - 350 rpm                 |
| <b>Battery – Auxiliary power units</b>                                      |                               |
| Type                                                                        | 12V DC                        |
| Quantity                                                                    | 1                             |
| Battery capacity, maximum                                                   | 210 AH                        |
| Reserve capacity @ 25A rate                                                 | 400 minutes                   |
| <b>Battery – Engine starting and control system</b>                         |                               |
| Type                                                                        | 12V DC, GC 12                 |
| Quantity                                                                    | 1                             |
| Battery capacity, maximum                                                   | 1100A                         |
| Reserve capacity @ 25A rate                                                 | 175 Minutes                   |
| <b>Alternator output</b>                                                    | 80A @ 14V DC                  |
| <b>Fan belt deflection</b>                                                  | 3/8 to 1/2 inch<br>9 to 12 mm |

## Specifications

### Deutz TD 2.9 Engine

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

#### Oil temperature switch

|                          |                             |
|--------------------------|-----------------------------|
| Installation torque      | 8 - 18 ft-lbs<br>11 - 24 Nm |
| Temperature switch point | 275°F<br>135°C              |

#### Oil Pressure switch

|                       |                             |
|-----------------------|-----------------------------|
| Installation torque   | 8 - 18 ft-lbs<br>11 - 24 Nm |
| Pressure switch point | 22 psi<br>1.5 bar           |

#### Fuel injection system

|                                  |                        |
|----------------------------------|------------------------|
| Injection pump pressure, maximum | 15,000 psi<br>1034 bar |
| Injector opening pressure        | 3046 psi<br>210 bar    |

#### Fuel requirement

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

#### Starter motor

|                           |               |
|---------------------------|---------------|
| Current draw, normal load | 140 - 200A    |
| Cranking speed            | 250 - 350 rpm |

#### Battery – Engine starting and control system

|                             |               |
|-----------------------------|---------------|
| Type                        | 12V DC, GC 12 |
| Quantity                    | 1             |
| Battery capacity, maximum   | 1100A         |
| Reserve capacity @ 25A rate | 175 Minutes   |

#### Alternator output

|                            |                               |
|----------------------------|-------------------------------|
| <b>Fan belt deflection</b> | 3/8 to 1/2 inch<br>9 to 12 mm |
|----------------------------|-------------------------------|

## Specifications

### Deutz TCD 2.2 L3 Engine

|                                                                                                                                                                                   |                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Displacement</b>                                                                                                                                                               | 134 cu. in<br>2.2 liters        |
| <b>Number of cylinders</b>                                                                                                                                                        | 3                               |
| <b>Bore and Stroke</b>                                                                                                                                                            | 3.6 x 4.3 inches<br>92 x 110 mm |
| <b>Horsepower net intermittent @ 2600 rpm</b>                                                                                                                                     | 74 hp<br>55 kW                  |
| <b>Induction system</b>                                                                                                                                                           | turbocharged                    |
| <b>Firing order</b>                                                                                                                                                               | 1 - 2 - 3                       |
| <b>Low idle, standby</b>                                                                                                                                                          | 1000 rpm                        |
| <b>Low idle, function enable</b>                                                                                                                                                  | 1500 rpm                        |
| <b>High idle</b>                                                                                                                                                                  | 2500 rpm                        |
| <b>Governor</b>                                                                                                                                                                   | electronic                      |
| <b>Lubrication system</b>                                                                                                                                                         | Low ash oil required            |
| <b>Oil pressure, hot (@ 2000 rpm)</b>                                                                                                                                             | 40 to 60 psi<br>2.8 to 4.1 bar  |
| <b>Oil capacity (including filter)</b>                                                                                                                                            | 8 quarts<br>7.6 liters          |
| <b>Oil viscosity requirements</b>                                                                                                                                                 |                                 |
| -22°F to 86°F / -30°C to 30°C                                                                                                                                                     | 5W-30<br>(synthetic)            |
| -4°F to 104°F / -20°C to 40°C                                                                                                                                                     | 10W-40                          |
| Above 5°F / -15°C                                                                                                                                                                 | 15W-40                          |
| Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine. |                                 |

#### Oil temperature switch

|                                 |                             |
|---------------------------------|-----------------------------|
| <b>Installation torque</b>      | 8 - 18 ft-lbs<br>11 - 24 Nm |
| <b>Temperature switch point</b> | 257°F<br>125°C              |

#### Oil Pressure switch

|                              |                             |
|------------------------------|-----------------------------|
| <b>Installation torque</b>   | 8 - 18 ft-lbs<br>11 - 24 Nm |
| <b>Pressure switch point</b> | 17.4 psi<br>1.2 bar         |

#### Fuel requirement

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

|                                |                              |
|--------------------------------|------------------------------|
| <b>Engine coolant capacity</b> | 2.5<br>gallons<br>9.5 liters |
|--------------------------------|------------------------------|

Unit ships with Ethylene Glycol engine coolant. Consult Your local supplier for compatibility before mixing alternative engine coolants.

#### Starter motor

|                                  |               |
|----------------------------------|---------------|
| <b>Current draw, normal load</b> | 140 - 200A    |
| <b>Cranking speed</b>            | 250 - 350 rpm |

#### Battery – Engine starting and control system

|                                    |                  |
|------------------------------------|------------------|
| <b>Type</b>                        | 12V DC, Group 31 |
| <b>Quantity</b>                    | 1                |
| <b>Battery capacity, maximum</b>   | 1000A            |
| <b>Reserve capacity @ 25A rate</b> | 200 Minutes      |
| <b>Alternator output</b>           | 95A @ 14V DC     |

## Specifications

### Perkins 1104D-44T

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

#### Oil Pressure switch

|                       |                             |
|-----------------------|-----------------------------|
| Installation torque   | 8 - 18 ft-lbs<br>11 - 24 Nm |
| Pressure switch point | 8 psi<br>0.55 bar           |

#### Oil Sensor Settings

|        |          |
|--------|----------|
| 0 psi  | 10 ohms  |
| 50 psi | 120 ohms |

#### Fuel injection system

|                        |                              |
|------------------------|------------------------------|
| Transfer pump pressure | 10-12 psi / 0.69-0.83 bar    |
| Injection pressure     | (4264+116 psi) / (294+8 bar) |

#### Fuel requirement

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

#### Starter motor

|                           |               |
|---------------------------|---------------|
| Current draw, normal load | 115A          |
| Cranking speed            | 200 - 250 rpm |

#### Battery – Auxiliary power units

|                             |             |
|-----------------------------|-------------|
| Type                        | 12V DC      |
| Quantity                    | 1           |
| Battery capacity, maximum   | 210 AH      |
| Reserve capacity @ 25A rate | 400 minutes |

#### Battery – Engine starting and control system

|                             |               |
|-----------------------------|---------------|
| Type                        | 12V DC, GC 12 |
| Quantity                    | 1             |
| Battery capacity, maximum   | 1100A         |
| Reserve capacity @ 25A rate | 175 Minutes   |

## Specifications

**Perkins 1104D-44T cont.****Engine coolant**

|               |            |
|---------------|------------|
| Capacity      | 9.5 quarts |
| (engine only) | 9 liters   |

**Coolant temperature switch**

|                     |                             |
|---------------------|-----------------------------|
| Installation torque | 8 - 18 ft-lbs<br>11 - 24 Nm |
|---------------------|-----------------------------|

|                          |                |
|--------------------------|----------------|
| Temperature switch point | 230°F<br>110°C |
|--------------------------|----------------|

**Temperature Sensor Settings**

|                |         |
|----------------|---------|
| 215°F<br>102°C | 37 ohms |
|----------------|---------|

|               |         |
|---------------|---------|
| 170°F<br>82°C | 78 ohms |
|---------------|---------|

|                          |              |
|--------------------------|--------------|
| <b>Alternator output</b> | 85A @ 12V DC |
|--------------------------|--------------|

|                            |                               |
|----------------------------|-------------------------------|
| <b>Fan belt deflection</b> | 3/8 to 1/2 inch<br>9 to 12 mm |
|----------------------------|-------------------------------|



## Specifications

### Perkins 854F-34T

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

#### Oil Pressure switch

|                       |                      |
|-----------------------|----------------------|
| Installation torque   | 18.4 ft-lbs<br>25 Nm |
| Pressure switch point | 12 psi<br>0.82 bar   |

#### Oil Sensor Settings

|        |          |
|--------|----------|
| 0 psi  | 10 ohms  |
| 50 psi | 120 ohms |

#### Fuel injection system

|                        |                           |
|------------------------|---------------------------|
| Transfer pump pressure | 10-12 psi / 0.69-0.83 bar |
| Injection pressure     | 23000 psi / (1600 bar)    |

#### Fuel requirement

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

#### Glow plugs

|                           |     |
|---------------------------|-----|
| Initial load (0-10 sec)   | 80A |
| Continuous load (>10 sec) | 40A |

#### Starter motor

|                           |               |
|---------------------------|---------------|
| Current draw, normal load | 68A           |
| Cranking speed            | 130 - 200 rpm |

#### Battery – Auxiliary power units

|                             |             |
|-----------------------------|-------------|
| Type                        | 12V DC      |
| Quantity                    | 1           |
| Battery capacity, maximum   | 210 AH      |
| Reserve capacity @ 25A rate | 400 minutes |

#### Battery – Engine starting and control system

|                             |               |
|-----------------------------|---------------|
| Type                        | 12V DC, GC 12 |
| Quantity                    | 1             |
| Battery capacity, maximum   | 1100A         |
| Reserve capacity @ 25A rate | 175 Minutes   |

# Specifications

## Perkins 854F-34T cont.

### Engine coolant

|                       |             |
|-----------------------|-------------|
| Capacity              | 16.5 quarts |
| (50/50 extended life) | 15.6 liters |

### Coolant temperature switch

|                     |                      |
|---------------------|----------------------|
| Installation torque | 18.4 ft-lbs<br>25 Nm |
|---------------------|----------------------|

|                                |                |
|--------------------------------|----------------|
| Maximum continuous temperature | 226°F<br>108°C |
|--------------------------------|----------------|

### Temperature Sensor Settings

|                |         |
|----------------|---------|
| 215°F<br>102°C | 37 ohms |
|----------------|---------|

|               |         |
|---------------|---------|
| 170°F<br>82°C | 78 ohms |
|---------------|---------|

|                   |               |
|-------------------|---------------|
| Alternator output | 120A @ 12V DC |
|-------------------|---------------|

|                     |                               |
|---------------------|-------------------------------|
| Fan belt deflection | 3/8 to 1/2 inch<br>9 to 12 mm |
|---------------------|-------------------------------|

## Machine Torque Specifications

### Platform Rotator

|                             |                      |
|-----------------------------|----------------------|
| 1-8 center bolt, GR 5, dry) | 615 ft-lbs<br>834 Nm |
|-----------------------------|----------------------|

|                                   |            |
|-----------------------------------|------------|
| 1/2-13 bolts, GR 8                | 80 ft-lbs* |
| *use blue thread locking compound | 108 Nm*    |

### Turntable rotate assembly

|                                                              |                     |
|--------------------------------------------------------------|---------------------|
| Rotate bearing mounting bolts, lubricated<br>(30w motor oil) | 320ft-lbs<br>434 Nm |
|--------------------------------------------------------------|---------------------|

|                                      |                     |
|--------------------------------------|---------------------|
| Rotate drive hub mounting bolts, dry | 95 ft-lbs<br>129 Nm |
|--------------------------------------|---------------------|

|                                           |                      |
|-------------------------------------------|----------------------|
| Backlash plate mounting bolts, lubricated | 320 ft-lbs<br>434 Nm |
|-------------------------------------------|----------------------|

### Drive motors and hubs

|                                      |                      |
|--------------------------------------|----------------------|
| Drive hub mounting bolts, lubricated | 205 ft-lbs<br>288 Nm |
|--------------------------------------|----------------------|

|                                 |                      |
|---------------------------------|----------------------|
| Drive motor mounting bolts, dry | 165 ft-lbs<br>224 Nm |
|---------------------------------|----------------------|

### Engine vibration isolators

|                   |           |
|-------------------|-----------|
| Compressed height | >0.375 in |
|-------------------|-----------|

|                   |           |
|-------------------|-----------|
| Compressed height | <0.625 in |
|-------------------|-----------|

## Specifications

### Hydraulic Hose and Fitting Torque Specifications

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

#### Seal-Lok™ Fittings

(hose end - ORFS)

| SAE Dash Size | Torque              |
|---------------|---------------------|
| -4            | 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

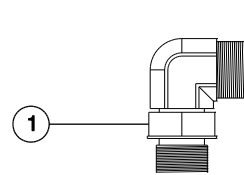
(swivel nut or hose connection)

| 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



Non-adjustable fitting

1 jam nut

### SAE O-ring Boss Port

(tube fitting - installed into Steel)

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

# Specifications

## Torque Procedure

### Seal-Lok™ fittings

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

Note: The O-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.

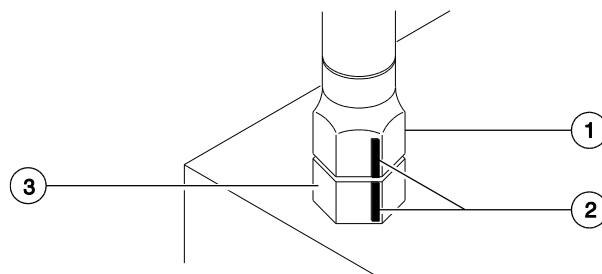


Illustration 1

- 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.

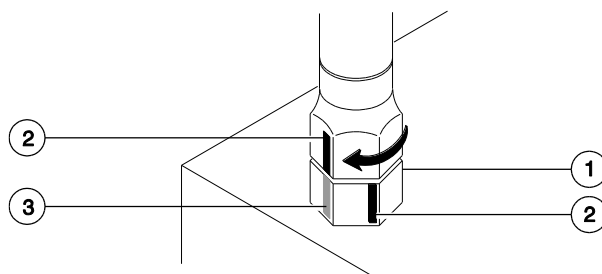


Illustration 2

- 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.

## Platform Controls



### Observe and Obey:

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

### Before Repairs Start:

- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and parts are available and ready for use.
- ☑ Use only Genie approved replacement parts.
- ☑ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous conditions.

### Machine Configuration:

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

# Platform Controls

## 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.



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



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



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



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

- ⦿ Indicates that a specific result is expected after performing a series of steps.
- ⊗ Indicates that an incorrect result has occurred after performing a series of steps.

## Platform Controls

### 1-1 Platform Circuit Board

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

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

#### How to Remove the Circuit Board

- 1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.
- 2 Locate the cables that connect to the bottom of the control box. Number each cable and its location at the control box.
- 3 Disconnect the cables from the bottom of the platform control box.
- 4 Remove the control cable receptacle retaining fasteners from the bottom of the platform control box.
- 5 Remove the platform control box lid retaining fasteners. Open the control box lid.
- 6 Locate the circuit board mounted to the inside of the platform control box.

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

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

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

- 8 Tag and carefully disconnect the wire connectors from the circuit board.
- 9 Tag and disconnect the ribbon cable from the LED circuit board.
- 10 Remove the circuit board mounting fasteners.
- 11 Carefully remove the circuit board from the control box.

## Platform Controls

### How to Remove the LED Circuit Board

- 1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.
- 2 Remove the platform control box lid retaining fasteners. Open the control box lid.
- 3 Locate the circuit board mounted to the inside of the platform control box.

#### **WARNING**

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

#### **NOTICE**

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

- 4 Tag and carefully disconnect the ribbon cables from the membrane circuit board.
- 5 Remove the circuit board mounting fasteners.
- 6 Carefully remove the LED circuit board from the platform control box lid. Do not lose the plastic spacers.

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

### 1-2 Joysticks

#### How to Calibrate a Joystick

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

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

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

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

Note: Perform this procedure with the engine off.

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



Plus



Minus



Previous



Enter



## Platform Controls

### Drive functions:

- 1 Turn the key switch to the off position.
  - 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
  - 3 Press the **minus** button twice, then press the **enter** button twice.
  - 4 Use the scroll button enter or previous to scroll through the menu until DELETE DRIVE JOYSTICK DEFAULTS is displayed.
  - 5 Press the **plus** button to select YES, then press the **enter** button.
  - 6 Do not start the engine.
  - 7 Locate the drive/steer joystick.
  - 8 Move the drive/steer joystick full stroke in the forward direction and hold for 5 seconds, then return to the center or neutral position for 2 seconds.
  - 9 Move the drive/steer joystick full stroke in the reverse direction and hold for 5 seconds, then return to the center or neutral position.
- ⦿ Result: The alarm at the ground controls should sound for a successful calibration.

### Steer functions:

- 1 Turn the key switch to the off position.
  - 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
  - 3 Press the **minus** button twice, then press the **enter** button twice.
  - 4 Use the scroll button to scroll through the menu until DELETE STEER JOYSTICK DEFAULTS is displayed.
  - 5 Press the **plus** button to select YES, then press the **enter** button.
  - 6 Do not start the engine.
  - 7 Locate the drive/steer joystick.
  - 8 Move the drive/steer joystick or thumb rocker switch (if equipped) full stroke in the left direction and hold for 5 seconds, then return to the center or neutral position.
  - 9 Move the drive/steer joystick or thumb rocker switch (if equipped) full stroke in the right direction and hold for 5 seconds, then return to the center or neutral position.
- ⦿ Result: The alarm at the ground controls should sound for a successful calibration.

## Platform Controls

### Primary boom extend/retract functions:

- 1 Turn the key switch to the off position.
  - 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
  - 3 Press the **minus** button twice, then press the **enter** button twice.
  - 4 Use the scroll button to scroll through the menu until DELETE PRIMARY BOOM EXTEND/RETRACT JOYSTICK DEFAULTS is displayed.
  - 5 Press the **plus** button to select YES, then press the **enter** button.
  - 6 Do not start the engine.
  - 7 Locate the thumb rocker switch on top of the primary boom/turntable rotate joystick.
  - 8 Move the primary boom extend/retract thumb rocker switch full stroke in the extend direction and hold for 5 seconds, then return to the center or neutral position.
  - 9 Move the primary boom extend/retract thumb rocker switch full stroke in the retract direction and hold for 5 seconds, then return to the center or neutral position.
- ⦿ Result: The alarm at the ground controls should sound for a successful calibration.

### Primary boom up/down functions:

- 1 Turn the key switch to the off position.
  - 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
  - 3 Press the **minus** button twice, then press the **enter** button twice.
  - 4 Use the scroll button to scroll through the menu until DELETE PRIMARY BOOM UP/DOWN JOYSTICK DEFAULTS is displayed.
  - 5 Press the **plus** button to select YES, then press the **enter** button.
  - 6 Do not start the engine.
  - 7 Locate the primary boom/turntable rotate joystick.
  - 8 Move the boom/turntable rotate joystick full stroke in the up direction and hold for 5 seconds, then return to the center or neutral position.
  - 9 Move the boom/turntable rotate joystick full stroke in the down direction and hold for 5 seconds, then return to the center or neutral position.
- ⦿ Result: The alarm at the ground controls should sound for a successful calibration.

## Platform Controls

### Jib boom up/down functions:

- 1 Turn the key switch to the off position.
  - 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
  - 3 Press the **minus** button twice, then press the **enter** button twice.
  - 4 Use the scroll button to scroll through the menu until RESET JIB BOOM UP/DOWN JOYSTICK DEFAULTS is displayed.
  - 5 Press the **plus** button to select YES, then press the **enter** button.
  - 6 Do not start the engine.
  - 7 Locate the jib boom joystick.
  - 8 Move the jib boom joystick full stroke in the up direction and hold for 5 seconds, then return to the center or neutral position.
  - 9 Move the jib boom joystick full stroke in the down direction and hold for 5 seconds, then return to the center or neutral position.
- ⦿ Result: The alarm at the ground controls should sound for a successful calibration.

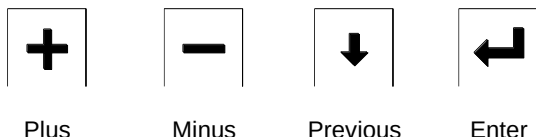
### Turntable rotate functions:

- 1 Turn the key switch to the off position.
  - 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
  - 3 Press the **minus** button twice, then press the **enter** button twice.
  - 4 Use the scroll button to scroll through the menu until DELETE TURNTABLE ROTATE JOYSTICK DEFAULTS is displayed.
  - 5 Press the **plus** button to select YES, then press the **enter** button.
  - 6 Do not start the engine.
  - 7 Locate the primary boom/turntable rotate joystick.
  - 8 Move the boom/turntable joystick full stroke in the left direction and hold for 5 seconds, then return to the center or neutral position.
  - 9 Move the boom/turntable joystick full stroke in the right direction and hold for 5 seconds, then return to the center or neutral position.
- ⦿ Result: The alarm at the ground controls should sound for a successful calibration.

## Platform Controls

### How to Reset a Proportional Valve Coil Default

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



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

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

- 1 Turn the key switch to the off position.
- 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
- 3 Press the **minus** button twice, then press the **enter** button twice.
- 4 Use the **previous** button to scroll through the menu until the function valve that needs to be reset is displayed. Press the **plus** button to select yes, then press the **enter** button to save the setting.
- 5 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 6 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

### How to Set the Function Thresholds and Default Functions Speeds

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

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

- 1 Start the engine from the platform controls.
- 2 Press down the foot switch.

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

#### Function threshold:

- 3 Select a joystick controlled function that needs to have the threshold set.
- 4 Slowly move the joystick off center in either direction just until the machine function starts to move, then move the joystick very slowly towards the neutral or center position just before the machine function stops. Do not let go of the joystick.
- 5 While holding the joystick in position, press the engine start button at the platform controls to set the joystick controller threshold.

## Platform Controls

- 6 Slowly move the joystick off center in the opposite direction just until the machine function starts to move, then move the joystick very slowly towards the neutral or center position just before the machine function stops. Do not let go of the joystick.
- 7 While holding the joystick in position, press the engine start button at the platform controls to set the joystick controller threshold.
- 8 Repeat steps for each joystick controlled machine function:
  - turntable rotate left/right.
  - primary boom extend/retract.
  - drive forward/reverse.
- 9 Once the threshold has been set, press and hold the engine start button until the engine shuts off. Do not press the red Emergency Stop button.

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

- 10 At the ground controls, turn the key switch to the off position, wait a moment and then turn the key switch to platform controls.
- 11 Check the display at the ground controls to be sure there are no calibration faults.

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

### Function speeds:

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

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

- 12 Start the engine from the platform controls.
- 13 Select the function that needs the function speeds set.
- 14 **Primary boom extend/retract functions:** Move the joystick full stroke in the extend direction. When the alarm sounds, move the joystick in the opposite direction full stroke until the alarm sounds again. Return the joystick to center.

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

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

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

## Platform Controls

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

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

- 16 At the ground controls, turn the key switch to the off position, wait a moment and then turn the key switch to platform controls.
- 17 Check the display at the ground controls to be sure there are no calibration faults.

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

## How to Adjust the Function Speeds

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

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



Plus Minus Previous Enter

- 1 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
- 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
- 3 Press the **plus** button twice, then press the **minus** button twice.
- 4 Press the **previous** button until the function to be adjusted is displayed.
- 5 Press the **plus** button to increase the speed or press the **minus** button to decrease the speed.
- 6 Press the **enter** button to save the setting in memory.
- 7 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 8 Press the **plus** button or **minus** button to select YES and then press the **enter** button.
- 9 Continue to perform this procedure until the machine function speed meets specification. Refer to Specifications, *Performance Specifications*.

## Platform Controls

### How to Adjust the Function Ramp Rate Setting

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

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

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



Plus

Minus

Previous

Enter

- 1 Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
- 2 Press and hold the **enter** button on the ground control panel while turning the key switch to platform controls. Hold the **enter** button for approximately 5 seconds.
- 3 Press the **plus** button twice, then press the **previous** button twice.
- 4 Press the **previous** button until the function to be adjusted is displayed.
- 5 Press the **plus** button to increase the ramp rate or press the **minus** button to decrease the ramp rate.
- 6 Press the **enter** button to save the setting in memory.
- 7 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 8 Press the **plus** button or **minus** button to select YES and then press the **enter** button.

## Platform Components

### 2-1 Platform

#### How to Remove the Platform

- 1 Separate the foot switch quick disconnect plug.
- 2 Support the platform with an appropriate lifting device.
- 3 Locate the cables that connect to the bottom of the control box. Number each cable and its location at the platform control box.
- 4 Disconnect the cables from the bottom of the platform control box.
- 5 Remove the platform control box mounting fasteners. Remove the platform control box and set it aside.
- 6 Remove the air line to platform bracket retaining fasteners (if equipped).
- 7 Remove the power to platform cover plate from the electrical outlet box. Do not disconnect the wiring.

**⚠ WARNING**

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

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

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

**⚠ WARNING**

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

- 10 Support the platform mounting weldment, but do not apply any lifting pressure.
- 11 Remove the eight mounting bolts from the platform mounting weldment.
- 12 Remove the center bolt and slide the platform mounting weldment off of the platform rotator.

**⚠ WARNING**

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



## Platform Components

### 2-2

#### Platform Leveling Cylinder

The platform leveling cylinder keeps the platform level through the entire range of boom motion. The platform is maintained level to the turntable. To accomplish Note: Do not rest the entire weight of the boom on the blocks. This, the ECM at the ground controls compares the difference in readings between the platform angle sensor and the turntable level sensor, which then sends a signal to the platform controls to open or close the appropriate platform level proportional valve on the platform manifold to maintain a level platform. The platform leveling cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

#### How to Remove the Platform Leveling Cylinder

Note: When removing a hose assembly or fitting, the O-ring (if equipped) on the fitting and/or hose end must be replaced. All connections must be torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*. Extend the boom until the platform leveling cylinder barrel-end pivot pin is accessible.

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

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

- 3 Secure the platform leveling cylinder to the jib boom for support.
- 4 Tag, disconnect and plug the hydraulic hoses from the platform leveling cylinder at the bulkhead fittings located inside the boom tube at the platform end and connect them together using a connector. Cap the bulkhead fittings on the boom tube.

#### **⚠ WARNING**

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

- 5 Remove the pin retaining fasteners from the platform leveling cylinder rod-end pivot pin. Do not remove the pin.
- 6 Remove the external snap ring from the barrel-end pivot pin. Do not remove the pin.
- 7 Support the platform leveling cylinder with a suitable lifting device. Protect the cylinder rod from damage.

## Platform Components

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

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

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

**NOTICE** Component damage hazard. The platform leveling cylinder rod can become damaged if it is allowed to fall.

- 9 Use a soft metal drift to remove the barrel-end pivot pin.
- 10 Carefully pull the platform leveling cylinder out of the boom.

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

## How to Bleed the Platform Leveling Cylinder

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

Note: The boom must remain below 10° to properly perform this procedure.

- 1 Raise the boom to a horizontal position.
- 2 Activate auxiliary power.
- 3 Push the platform level up and down buttons through two complete platform leveling cycles to remove any air that might be in the system.

## Platform Components

### 2-3

### Platform Rotator

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

### How to Remove the Platform Rotator

**NOTICE**

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

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

- 1 Remove the platform. Refer to Repair Procedure, *How to Remove the Platform*.
- 2 Tag and disconnect the electrical connector from the platform angle sensor.

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

**NOTICE**

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

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

**⚠ WARNING**

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

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

**⚠ WARNING**

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

- 6 Remove the platform manifold mounting fasteners. Lay the platform manifold to the side.

**NOTICE**

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

## Platform Components

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

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

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

- 9 Remove the weld cable from the platform (if equipment).

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

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

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

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

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

- 13 Support the platform rotator. Do not apply any lifting pressure.

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

- 15 Attach a lifting strap from an overhead crane to the jib boom. Support the jib boom leveling arms with a suitable lifting device.

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

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

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

## Platform Components

### How to Bleed the Platform Rotator

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

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

### 2-4 Platform Level Sensor

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

### How to Calibrate the Platform Level Sensor

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

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

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



Plus



Minus



Previous



Enter

- 1 Secure a digital level to one of the side railings of the platform.
- 2 Start the machine and level the platform to gravity. Turn the machine off.
- 3 Open the ground control box.

## Platform Components

- 4 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.
  - 5 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.
  - 6 Insert the key into the bypass/recovery key switch and turn it to the bypass position.
  - 11 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
  - 12 Press the **plus** button or **minus** button to select YES and then press the **enter** button.
  - 13 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.
- Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.

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

- 7 Press and hold the **enter** button on the ground control panel while turning the key switch to ground controls. Hold the **enter** button for approximately 5 seconds.
- 8 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
- 9 Press the **enter** or **previous** button on the LCD screen until SET PLATFORM LEVEL SENSOR TO GRAVITY is displayed.
- 10 Press the **plus** button to select YES, then press the **enter** button to accept.

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

## Platform Components

### 2-5 Platform Overload System

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

### How to Calibrate the Platform Overload System

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

- 1 Fully retract the boom. Level the platform.
- 2 Remove all equipment or tools from the platform. Remove the welder if equipped.
- 3 Determine the maximum platform capacity. Refer to the machine serial plate.
- 4 Push in the ground controls red Emergency Stop button to the off position.
- 5 Turn the key switch to ground controls.
- 6 Open the ground control box.
- 7 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.
- 8 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.

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

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

- 10 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.
- 11 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
- 12 Press the **enter** or **previous** button on the LCD screen until DELETE LOAD CELL FACTORY CALIBRATION is displayed.
- 13 Press the **plus** button to select YES, then press the **enter** button to accept.
- 14 Press the **enter** or **previous** button on the LCD screen until CALIBRATE LOAD CELL ZERO is displayed.
- 15 Press the **plus** button to select YES, then press the **enter** button to accept.
- 16 Add weight to the platform corresponding to the rated capacity of the machine, determined in step 3. Place the weight near the center entry point of the platform, farthest away from the rotator as possible.

Note: The calibration weight may be  $\pm 5\%$  of the rated capacity. It is advisable that it be slightly less than the rated capacity.

## Platform Components

- 17 Press the **enter** or **previous** button on the LCD screen until LOAD CELL FULL LOAD LBS or LOAD CELL FULL LOAD KGS is displayed. Press the **plus** or **minus** button to adjust the display to indicate the actual weight.
- 18 Press the **enter** button to accept.
- 19 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 20 Press the **plus** button to select YES, then press the **enter** button to accept.
- 21 Turn the key back to the run position and remove the key from the bypass/recovery key switch. Insert the key into the main key switch.
- 22 Wait approximately 20 seconds and turn the machine off by pressing the red Emergency Stop button in.
- 23 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.
- 24 Note: When the control box door is closed, the calibration toggle switch is automatically activated to exit out of calibration mode.
- 25 Pull out the red Emergency Stop button.
- 29 Add an additional test weight equal to 5% of the rated capacity onto the calibration weight to overload the platform.
  - ⦿ Result: The alarm should be sounding. The platform overload indicator light should be flashing at the platform controls and platform overload should be displayed on the LCD screen at the ground controls. The engine should shut down.
- 30 Test all machine functions from the ground controls.
  - ⦿ Result: All ground control functions should not operate. The engine should not start or run. There should be limited APU functionality. The primary boom up/extend or jib extend should not operate.
  - ⦿ Remove the test weight and calibration weight from the platform.

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

### Confirm the setting:

- 26 Lift the calibration weight off the platform floor using a suitable lifting device.
- 27 Start the engine from the ground control.
- 28 Place the calibration weight back onto the center of the platform floor using a suitable lifting device.
- ⦿ Result: The alarm should be off. The platform overload indicator light should be off at the platform controls and there should be no error message on the LCD display at the ground controls.



## Platform Components

### How to Perform a Zero Load Cell Calibration

Perform this procedure when the required weight for full load calibration is not available. This procedure will re-calibrate the zero load point without effecting a previous full load calibration. The platform load capacity will be reduced until a full load calibration has been performed. A full load calibration is required for rated load performance.

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

- 1 Fully retract the boom. Level the platform.
- 2 Remove all equipment or tools from the platform. Remove the welder if equipped.
- 3 Push in the ground controls red Emergency Stop button to the off position.
- 4 Turn the key switch to ground controls.
- 5 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.
- 6 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
- 7 Press the **enter** or **previous** button on the LCD screen until CALIBRATE LOAD CELL ZERO is displayed.
- 8 Press the **plus** button to select YES, then press the **enter** button to accept.
- 9 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 10 Press the **plus** button to select YES, then press the **enter** button to accept.
- 11 Wait approximately 20 seconds and turn the machine off by pressing the red Emergency Stop button in.

### How to Replace the Load Cell Sensor

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

- 1 Remove all equipment or tools from the platform. Remove the welder if equipped.
- 2 At the platform, remove the plastic instruction holder from the document mount plate.
- 3 Tag and disconnect the load cell sensor harness.
- 4 Loosen the jam nut securing the load cell sensor foot and rotate the foot screw clockwise to remove the preload.
- 5 Remove the fasteners securing the load cell sensor and remove the sensor.

#### Install the new Load Cell Sensor

- 6 Screw the foot with jam nut into the top of the load cell sensor until the foot bolt extends out of the bottom of the sensor. The foot should not contact the flex plate when assembling onto the platform support.
- 7 Assemble the load cell and foot assembly to the platform and securely tighten the two mounting screws. Torque the bolts to 101 ft-lbs / 137 Nm.

#### Set the Load Cell Sensor Preload

- 8 Rotate the foot screw counter clockwise until the foot just contacts the flex plate (finger tight).
- 9 Using an open end wrench, continue to rotate the foot counter clockwise an additional 1/2 turn (180°). Then, while holding the foot bolt, securely tighten the jam nut. Torque the jam nut to 55 ft-lbs / 75 Nm.
- 10 Attach the load cell sensor harness.
- 11 Install the plastic instruction holder.
- 12 Calibrate the platform overload system. Refer to Repair Procedure *How to Calibrate the Platform Overload System*.

## Platform Components

### 2-6 Platform Overload Recovery Message

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

### How to Clear the Platform Overload Recovery Message

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

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



Plus

Minus

Previous

Enter

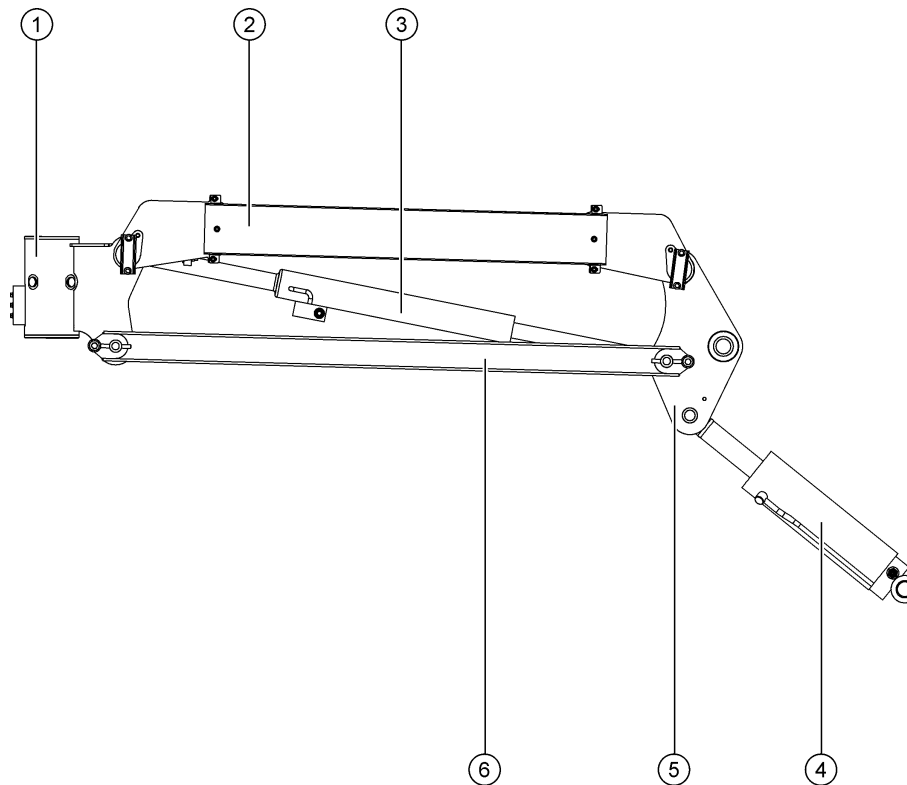
- 1 Turn the key switch to the off position.
- 2 Press and hold the **enter** button on the ground control panel while turning the key switch to ground controls. Hold the **enter** button for approximately 5 seconds.

- 3 Press the buttons on the ground controls in the following sequence:  
**(plus)(minus)(minus)(plus)**.
- 4 Press the **enter** or **previous** button on the LCD screen until CLEAR OVERLOAD RECOVERY is displayed.
- 5 Press the **plus** button or the **minus** button to select YES. Then press the buttons in the following sequence:  
**(plus)(plus)(plus)(minus)**. and press the **enter** button to accept.

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

- 6 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 7 Press the **plus** button or **minus** button to select YES and then press the **enter** button.
- 8 Turn the key switch to the off position.

## Repair Procedures



- 1 platform rotator
- 2 jib arm
- 3 jib cylinder

- 4 platform leveling cylinder
- 5 bell crank
- 6 jib compression arm

## Jib Boom Components

### 3-1 Jib Boom

#### How to Remove the Jib Boom

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

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

- 1 Remove the platform. See Repair Procedure, *How to Remove the Platform*.
- 2 Remove the platform mounting weldment and the platform rotator. See Repair Procedure, *How to Remove the Platform Rotator*.
- 3 Remove the hose and cable cover retaining fasteners from the jib boom leveling arm. Remove the hose and cable cover from the machine.
- 4 Support the jib boom and jib cylinder with a suitable lifting device.

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

#### **⚠ WARNING**

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

- 6 Loose the strap attaching jib boom and barrel end of jib cylinder. Let the cylinder hang down.
- 7 Attach a lifting strap from an overhead crane to the jib boom.
- 8 Remove the pin retaining fastener from the jib boom pivot pin.
- 9 Use a soft metal drift to remove the pin and remove the jib boom from the primary boom.

#### **⚠ WARNING**

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

## Jib Boom Components

- 10 Remove the pin retaining fasteners from the jib boom lift cylinder rod-end pivot pin. Do not remove the pin.
- 11 Slide both of the jib boom leveling arms off of the jib boom pivot pin and lay them off to the side.
- 12 Attach a lifting strap from an overhead crane to the lug on the rod end of the jib boom lift cylinder.
- 13 Use a soft metal drift to remove the jib boom lift cylinder rod-end pivot pin. Remove the jib boom lift cylinder from the jib boom bellcrank.

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

- 14 Attach a lifting strap from an overhead crane to the jib boom bellcrank.
- 15 Support the rod end of the platform leveling cylinder with a suitable lifting device. Protect the cylinder rod from damage.

- 16 Remove the pin retaining fastener from the platform leveling cylinder rod-end pivot pin.
- 17 Use a soft metal drift to remove the platform leveling cylinder rod-end pivot pin.

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

**⚠ CAUTION** Crushing hazard. The jib boom bellcrank may fall if it is not properly supported when the platform leveling cylinder rod-end pivot pin is removed.

- 18 Remove the pin retaining fastener from the jib boom bellcrank pivot pin.
- 19 Use a soft metal drift to remove the jib boom bellcrank pivot pin. Remove the jib boom bellcrank from the machine.

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

## Jib Boom Components

### 3-2

### Jib Boom Lift Cylinder

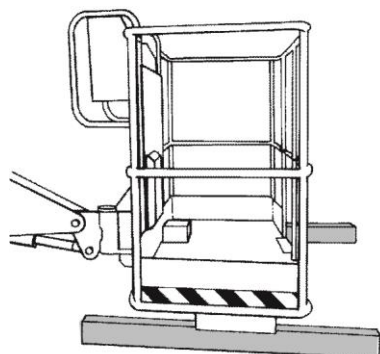
#### How to Remove the Jib Boom Lift Cylinder

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

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

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

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



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

#### **⚠ WARNING**

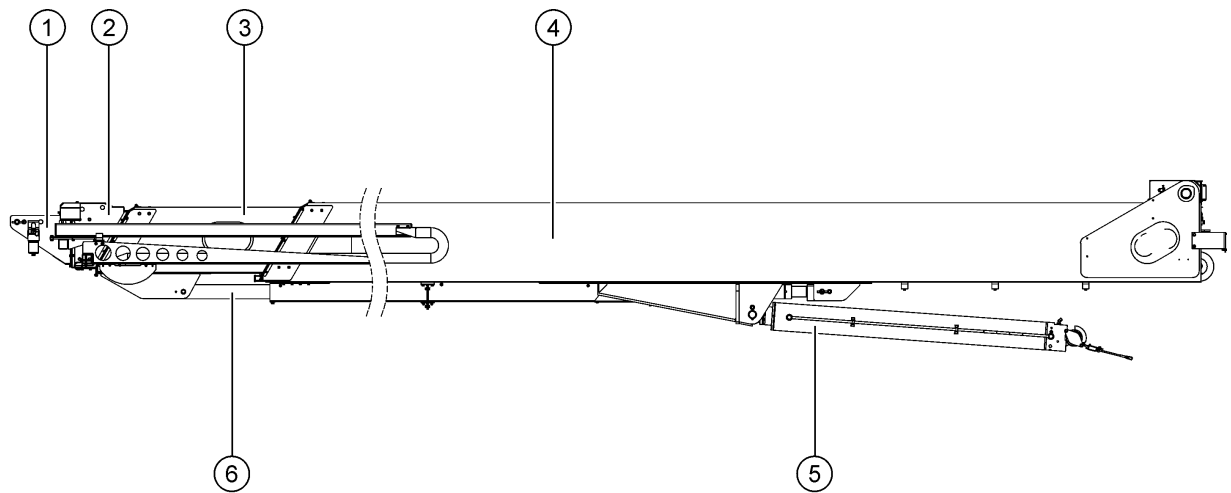
Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

- 3 Remove the cable guide clamp from the pin of platform end of jib arm.
- 4 Attach a lifting strap from an overhead crane to the jib boom.
- 5 Remove the pin retaining fasteners from the jib boom lift cylinder rod-end pivot pin. Do not remove the pin.
- 6 Use a soft metal drift to tap the jib boom lift cylinder rod-end pivot pin half way out and lower one of the leveling arms to the ground. Tap the pin the other direction and lower the opposite leveling arm. Do not remove the pin.
- 7 Support the jib boom lift cylinder with a suitable lifting device.
- 8 Remove the pin retaining fasteners from the jib boom lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the barrel-end pivot pin.
- 9 Use a soft metal drift to remove the jib boom lift cylinder rod-end pivot pin. Remove the jib boom lift cylinder from the machine.

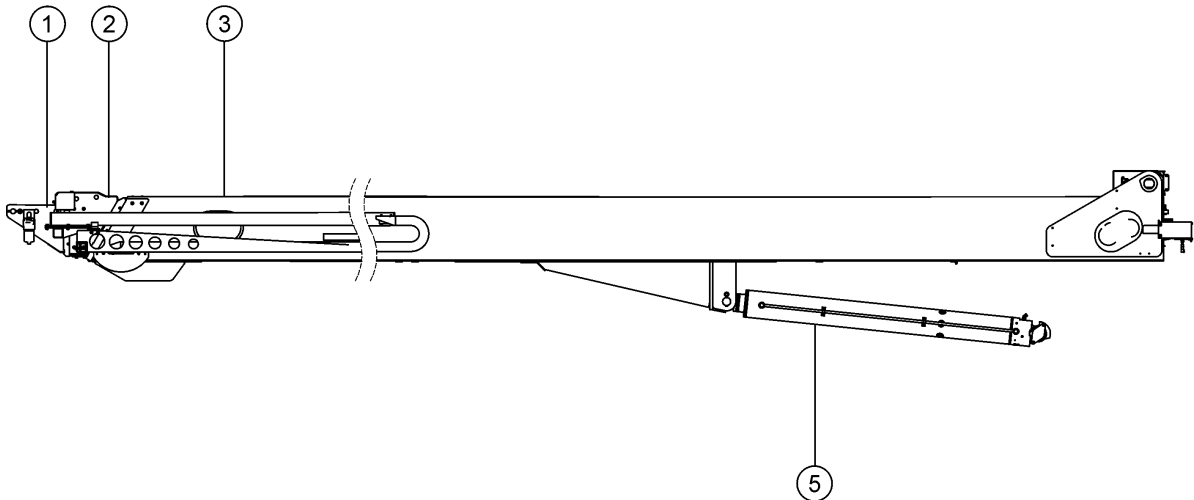
#### **⚠ WARNING**

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

## Repair Procedures



SX-125 XC



SX-105 XC

- 1 boom tube #3
- 2 boom tube #2
- 3 boom tube #1

- 4 boom tube #0
- 5 primary lift cylinder
- 6 secondary extension cylinder

## Boom Components

### 4-1 Cable Track

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

### How to Remove the Boom Cable Track

**Note:** When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation.

Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

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

**Note:** Perform this procedure with the boom fully stowed.

- 1 Remove the hose and cable cover retaining fasteners from the jib boom leveling arm. Remove the hose and cable cover from the machine.
- 2 Remove the protective coil sleeve from the hose and cable bundle at the platform end of the boom cable tube.
- 3 Tag, disconnect and plug all hydraulic hoses from the boom cable tube to the platform manifold.

**Note:** If your machine is equipped with an airline to platform option and/or weld cable option, the airline and/or cable must be disconnected from the platform before the cable track is removed.

- 4 Tag and disconnect the black electrical connector from the bottom of the control box.
- 5 Remove the platform-end boom cable tube mounting fasteners at the engine side of the machine.
- 6 Remove the cable track mounting fasteners from the cable track support at the engine side of the machine.
- 7 Remove the wear pad mounting weldment from the cable track support bracket at the engine side of the machine.
- 8 Remove the hose and cable clamp from the cable track support bracket at the engine side of the machine.
- 9 Place blocks between the cable track and the boom cable tube for support.
- 10 Strap together the boom cable tube, blocks of wood, and the cable track at the engine side of the machine.

#### NOTICE

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

- 11 Remove the limit switch cover retaining fasteners from the top of the number 2 boom tube at the platform end of the machine. Remove the limit switch cover.
- 12 Tag and disconnect the wiring connectors from the proximity and limit switches on the top of the number 2 boom tube at the platform end of the machine.



## Boom Components

- 13 Remove the cable track roller guide mounting fasteners from the ground controls side of the machine at the platform end.
- 14 Remove the roller guide from the cable track guide bracket at the ground control side of the machine.
- 15 Tag, disconnect and plug the hydraulic hoses from the bottom of the bulkhead fittings on the cable track support at the ground controls side of the machine.

**⚠ 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.

- 16 Remove the bulkhead fitting locknuts from the bulkhead fittings on the cable track support at the ground controls side of the machine. Remove and cap the fittings.
- 17 Tag and disconnect the wiring connectors.

Note: The wiring connectors that need to be disconnected are located next to the hose fittings that were removed in step 16.

**If not removing the boom from the machine, proceed to step 19.**

- 18 Tag, disconnect and plug the primary extension cylinder hydraulic hoses on the side of the number 2 boom tube at the ground controls side of the machine. Cap the fittings.

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

- 19 Remove the cable track mounting fasteners from the cable track support at the ground controls side of the machine.
- 20 Remove the side panels from the boom cable tube located under the cable track at the ground controls side of the machine.
- 21 Remove the hose and cable cover mounting fasteners from the pivot end of the boom at the ground controls side of the machine. Remove the cover.
- 22 Remove the hose and cable clamps from the hoses and cables located below the boom pivot on the inside of the turntable riser at the ground controls side of the machine.
- 23 Tag and disconnect the electrical cables from the cable track to the ground controls side of the machine.

## Boom Components

**If not removing the boom from the machine, proceed to step 25.**

- 24 Pull the hydraulic hoses from the boom cable tube located under the cable track at the ground controls side of the machine.
- 25 Place blocks between the cable track and the cable track tube at the ground controls side of the machine. Secure the cable track and the cable track tube together.

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

- 26 Attach a lifting strap from an overhead crane to the cable track assembly at the engine side of the boom. Lift the cable track assembly over the boom and carefully set the assembly on top of longer boom cable tube at the ground controls side of the machine.

**⚠ WARNING** Crushing hazard. If the cable track assemblies are not properly secured together, the cable track may become unbalanced and fall when it is removed from the machine.

- 27 Strap both cable track assemblies together.

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

**NOTICE** Component damage hazard. Cable tracks can be damaged if it is twisted.

- 28 Attach a lifting strap from an overhead crane to each end of the cable track assembly. Carefully lift the assembly. Carefully lift the assembly from the boom and set it on a structure capable of supporting it.

**⚠ WARNING** Crushing hazard. If the cable track assemblies are not properly secured together, the cable track assemblies may become unbalanced and fall when it is removed from the machine.

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

**NOTICE** Component damage hazard. The boom cable tube and cable tracks can be damaged if it is twisted.

## Boom Components

### How to Repair the Boom Cable Track

#### NOTICE

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

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

- 1 Visually inspect the cable track and determine which section needs to be replaced.
- 2 Remove the snap-on cable track spacers.
- 3 Remove the external snap rings from the pivot pins at each end of the 3-link section to be removed.
- 4 Lift up the hoses and cables and carefully remove the damaged 3-link section of cable track.

#### NOTICE

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

- 5 Remove the snap-on spacers from the replacement section of cable track.
- 6 Lift up the hoses and cables and carefully insert the new 3-link section of cable track.

#### NOTICE

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

- 7 Connect the ends of the replacement cable track section to the existing cable track using the pivot pins and external snap rings.

Note: Be sure that the pivot pins are installed from the inside out so the external snap rings are on the outside of the cable track.

- 8 Install the cable track snap-on spacers.

### 4-2 Boom

#### How to Shim the Boom

- 1 Measure each upper, side and lower wear pad.

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

##### Platform end wear pads

- 2 Remove the retaining fasteners from the boom wipers at the platform end of the boom. Remove the wipers.
- 3 Extend the boom until the wear pads are accessible.
- 4 Loosen the wear pad mounting fasteners.
- 5 Add shims by hand until snug.

Note: Do not use force when adding the shims.

- 6 Tighten the mounting fasteners.
- 7 Remove the boom end cover retaining fasteners at the pivot end of the boom. Remove the boom end cover from the machine.

##### Pivot end side wear pads

- 8 Remove the boom inspection cover from the machine to access boom 3 wear pads.
- 9 Loosen the wear pad mounting fasteners.
- 10 Add shims by hand until snug.

Note: Do not use force when adding the shims.

- 11 Tighten the mounting fasteners.

## Boom Components

### Pivot end upper wear pads

12 Loosen the wear pad mounting fasteners.

13 Add shims by hand until snug.

Note: Do not use force when adding the shims.

14 Remove one shim from each upper wear pad only.

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

15 Tighten the mounting fasteners.

16 Replace the covers.

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

| Primary boom wear pad specifications | Minimum          |
|--------------------------------------|------------------|
| <b>Platform end</b>                  |                  |
| Bottom and side wear pads            | 0.63 in<br>16 mm |
| Top wear pads<br>(#0 to #1)          | 0.35 in<br>9 mm  |
| Top wear pads<br>(#1 to #2)          | 0.35 in<br>9 mm  |
| Top wear pads<br>(#2 to #3)          | 0.63 in<br>16 mm |
| <b>Pivot end</b>                     |                  |
| Top wear pads                        | 0.63 in<br>16 mm |
| Side wear pads                       | 0.47 in<br>12 mm |
| <b>Grease Specification</b>          |                  |
| <b>Lube a Boom grease</b>            |                  |
| Genie part number                    | 110147           |

### 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 on the fitting and/or hose end must be replaced and then torqued to specification during installation. Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

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

- 1 Remove the platform. See Repair Procedure, *How to Remove the Platform*.
- 2 Remove the platform rotator. See Repair Procedure, *How to Remove the Platform Rotator*.
- 3 Remove the Jib Boom. See Repair Procedure, *How to Remove the Jib Boom*.

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

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

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

## Boom Components

- 5 Disconnect the electrical connector from the primary boom angle sensor.
- 6 Raise the boom approximately 4 feet / 1.2m.
- 7 Attach a lifting strap from an overhead crane to the rod end of the boom lift cylinder.
- 8 Attach an overhead 10 ton / 10,000 kg crane to the platform end of the boom for support. Do not lift the boom.
- 9 Remove the boom storage area cover retaining fasteners. Remove the cover from the machine.
- 10 Place support blocks under the boom lift cylinder.
- 11 Remove the pin retaining fastener from the boom lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.
- 14 Lower the boom with the overhead crane to a horizontal position.
- 15 Remove the boom end cover retaining fasteners from the pivot end of the boom. Remove the cover.
- 16 Locate the cable break limit switch above the primary boom extension cylinder at the pivot end of the boom.
- 17 Tag and disconnect the wiring connector from the cable break limit switch.
- 18 Tag and disconnect the wiring connector from the string pot.
- 19 Tag, disconnect and plug the hydraulic hoses from the primary boom extension cylinder. Cap the fittings on the cylinder.

**⚠ WARNING**

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

**⚠ WARNING**

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

- 12 Carefully raise the boom with the overhead crane until the rod end of the boom lift cylinder can be removed.
- 13 Carefully lower the rod end of the boom lift cylinder down onto the support blocks.
- 20 Attach a second overhead 10 ton / 10,000 kg crane to the pivot end of the boom for support. Do not apply any lifting pressure.
- 21 Remove the clamp cover retaining fastener from the boom pivot pin. Remove the clamp cover.

**⚠ WARNING**

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

## Boom Components

- 22 Remove the rue ring from the devis from the boom pivot pin. Remove the devis pin.
- 23 Remove the anti rotation clamp retaining fastener from the boom pivot pin. Remove the anti rotation clamp.
- 24 Use a soft metal drift to remove the boom pivot pin.

### NOTICE

Component damage hazard. Be careful not to damage the boom envelope limit switch(s) located on the inside of the engine side turntable riser when removing the boom assembly. The boom envelopes switch(s) can be damaged even if the damage is not visible.

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

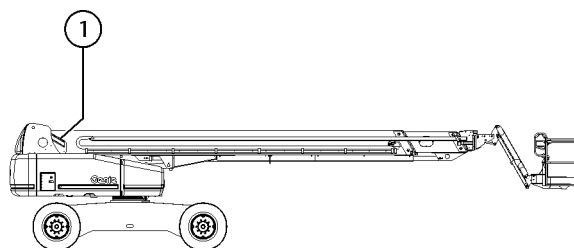
### WARNING

Crushing hazard. The boom may become unbalanced and fall when removed from the machine if not properly supported by the overhead cranes.

## How to Disassemble the Boom, SX-125 XC Models

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

- 1 Remove the boom. See Repair Procedure, *How to Remove the boom*.
- 2 Remove the access covers.

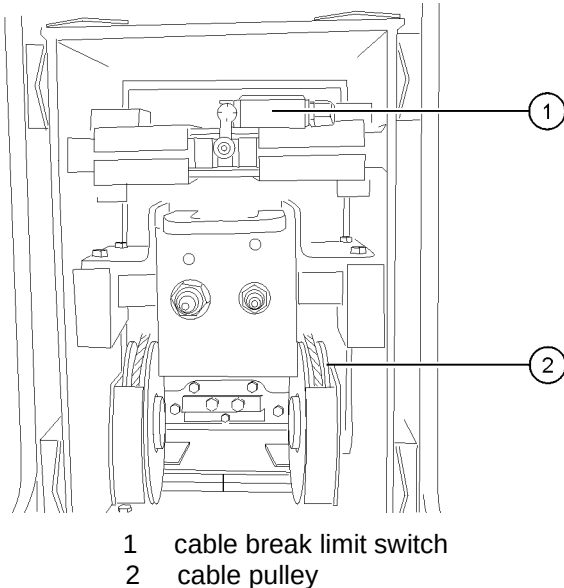


1 side access covers

- 3 Secure the number 2 and number 3 boom tubes together with a strap or chain to prevent them from moving.
- 4 Unlock length transducer from the cable guard.
- 5 Remove the length transducer bracket retaining fastener.
- 6 Remove the length transducer with the bracket.

## Boom Components

- 7 Remove the cable clamp from the cable break limit switch wiring.



- 1 cable break limit switch  
2 cable pulley
- 8 Disconnect the wiring connector from the cable break limit switch.
- 9 Tag, disconnect and plug the hydraulic hoses from the primary boom extension cylinder. Cap the fittings on the cylinder.
- WARNING** Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.
- 10 Remove the fasteners from the inner cable track mounting bracket at the primary boom extension cylinder.
- 11 Lay the inner cable track and hoses down and out of the way.

- 12 Remove the pulley pivot pin retaining fasteners from the number 2 boom tube at the pivot end of the boom.
- 13 Remove the pulley pivot pins, cable guards and pulleys.

Note: When installing the pulleys, be sure that the side of the pulley with the taller flange is facing the center of the boom tube.

- 14 Locate the number 3 boom tube extension cable clevis pins on both sides of the number 2 boom tube at the pivot end of the boom.
- 15 Remove the cotter pin and clevis pin from both cables.

Note: When installing a clevis pin, always replace the cotter pin with a new one.

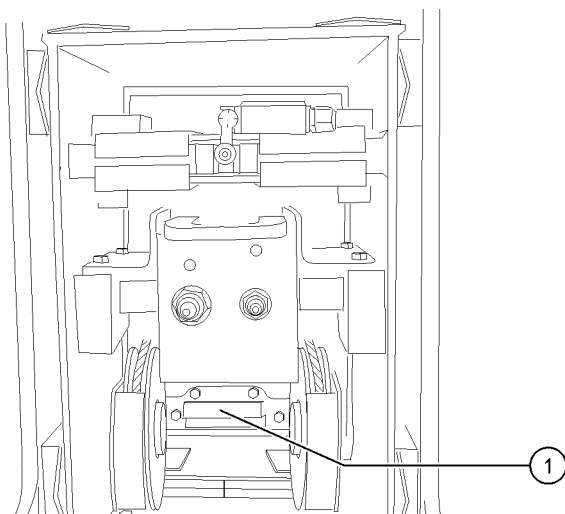
- 16 Remove the lower external snap ring and washer from the cable break limit switch actuator pivot pin.
- 17 Remove the cable break actuator mounting plate retaining fasteners. Remove the lower plate from the machine.
- 18 Remove the upper plate and actuator pivot pin. Do not remove the cable break limit switch from the mounting plate.
- 19 Push the cable break actuator and cables towards the platform end of the boom approximately 18 inches / 46 cm.

## Boom Components

- 20 Remove the red cable adjustment locking bracket retaining fasteners. Remove the red locking bracket from the machine.

### **⚠ WARNING**

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



1 red cable adjustment locking bracket

- 21 Remove the two cable adjustment bolts.
- 22 Remove the cable-end block mounting plate fasteners. Remove the cable-end block mounting plate from the machine.
- 23 Remove the trunnion pin retaining fasteners.
- 24 Use a slide hammer to remove the trunnion pins from the primary boom extension cylinder.
- 25 Remove the primary boom extension cylinder hold down brackets at the pivot end of the boom.

- 26 Attach a lifting strap from an overhead crane to the lifting eye on the primary boom extension cylinder.
- 27 Support and slide the primary boom extension cylinder out of the boom assembly while guiding the cables out of the boom and place it on a structure capable of supporting it.

### **⚠ WARNING**

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

### **NOTICE**

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

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

- 28 Remove the retaining fasteners from the limit switch cover on top of the number 2 boom tube at the platform end of the machine.
- 29 Carefully remove the cover with proximity and limit switches from the top of the number 2 boom tube at the platform end of the boom.

### **⚠ DANGER**

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

- 30 Tag and disconnect the wiring connectors from the proximity and limit switches at the top of the number 2 boom tube at the platform end of the boom. Do not remove the proximity or limit switches.



## Boom Components

- 31 Remove the retaining fasteners from the limit switch cover on the side of the number 0 boom tube at the platform end of the boom.
- 32 Carefully remove the cover with proximity and limit switches from the number 0 boom tube at the platform end of the boom.

**⚠ DANGER**

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

- 33 Tag and disconnect the wiring connectors from the proximity and limit switches at the ground controls side of the number 0 boom tube at the platform end of the boom. Do not remove the proximity or limit switches.
- 34 Remove the retaining fasteners from each boom tube wiper at the platform end of the machine. Remove the covers.
- 35 Remove and label the top and side wear pads of the number 3 boom tube at the pivot end of the boom. Do not remove the bottom wear pads.

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

- 36 Remove and label the top and side wear pads from the number 2 boom tube at the platform end of the boom. Do not remove the bottom wear pads.

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

- 37 Attach a lifting strap from an overhead crane to the number 3 boom tube at the platform end of the boom.
- 38 Support and slide the number 3 boom tube out of the number 2 boom tube. When the number 3 boom tube is approximately halfway removed, remove the bottom wear pads from the number 2 boom tube at the platform end of the boom.

**⚠ WARNING**

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

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

- 39 Remove and label the top and side wear pads from the number 2 boom tube at the pivot end of the boom. Do not remove the bottom wear pads.

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

- 40 Remove and label the top and side wear pads from the number 1 boom tube at the platform end of the boom. Do not remove the bottom wear pads.

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

- 41 Attach a lifting strap from an overhead crane to the number 2 boom tube at the platform end of the boom.

## Boom Components

- 42 Support and slide the number 2 boom tube out of the number 1 boom tube. When the number 2 boom tube is approximately halfway removed, remove the bottom wear pads from the number 1 boom tube at the platform end of the boom.

**⚠ WARNING**

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

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

- 43 Remove the secondary boom extend cylinder cover retaining fasteners. Remove the covers.

**⚠ WARNING**

Bodily injury hazard. Do not operate the machine unless the secondary extend cylinder covers are properly installed. Operating the machine with the covers removed could result in death or serious injury.

- 44 Tag, disconnect and plug the secondary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

**⚠ WARNING**

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

- 45 Support the secondary boom extend cylinder with an overhead crane or other suitable lifting device.

- 46 Remove the pin retaining fasteners from both the rod-end and barrel-end pivot pins. Do not remove the pins.

- 47 Use a soft metal drift to remove both pivot pins and remove the secondary boom extension cylinder from the machine while guiding the barrel end of the cylinder out of the boom.

**⚠ WARNING**

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

**NOTICE**

Component damage hazard. The boom lift cylinder rod can become damaged if the barrel end of the secondary boom extension cylinder is allowed to come in contact with it.

- 48 Remove and label the top and side wear pads from the number 1 boom tube at the pivot end of the boom. Do not remove the bottom wear pads.

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

## Boom Components

- 49 Remove and label the top and side wear pads from the number 0 boom tube at the platform end of the boom. Do not remove the bottom wear pads.

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

- 50 Attach a lifting strap from an overhead crane to the number 1 boom tube at the platform end of the boom.
- 51 Support and slide the number 1 boom tube out of the number 0 boom tube. When the number 1 boom tube is approximately halfway removed, remove the bottom wear pads from the number 0 boom tube at the platform end of the boom.

### **⚠ WARNING**

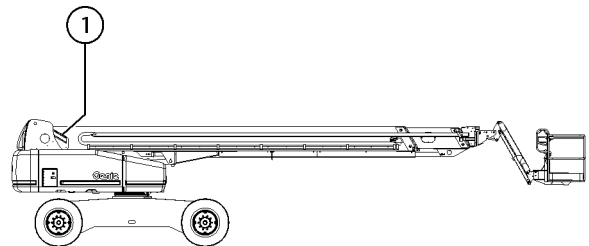
Crushing hazard. The number 1 boom tube may become unbalanced and fall when it is removed from the number 0 boom tube if it is not properly supported and attached to the overhead crane.

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

### How to Disassemble the Boom, SX-105 Models

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

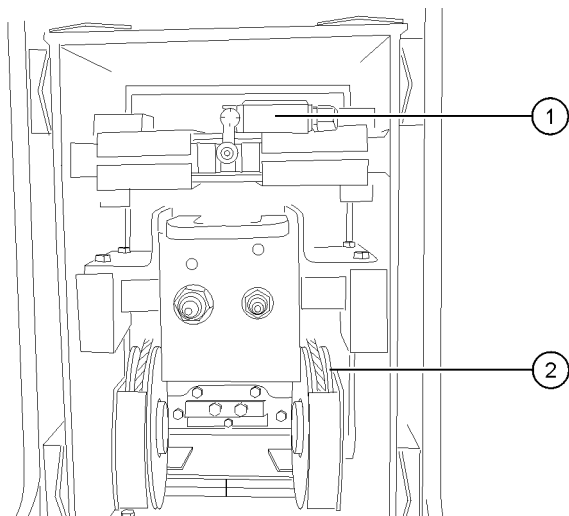
- 1 Remove the boom. See Repair Procedure, *How to Remove the boom*.
- 2 Remove the retaining fasteners from the access covers on both sides of the boom at the pivot end. Remove the access covers.



1 side access covers

- 3 Secure the number 2 and number 3 boom tubes together with a strap or chain to prevent them from moving.
- 4 Remove the cable clamp from the cable break limit switch wiring.

## Boom Components



- 1 cable break limit switch  
2 cable pulley

- 5 Disconnect the wiring connector from the cable break limit switch.
- 6 Tag, disconnect and plug the hydraulic hoses from the primary boom extension cylinder. Cap the fittings on the cylinder.

### **⚠ WARNING**

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

- 7 Remove the pulley pivot pin retaining fasteners from the number 2 boom tube at the pivot end of the boom.
- 8 Remove the pulley pivot pins, cable guards and pulleys.

Note: When installing the pulleys, be sure that the side of the pulley with the taller flange is facing the center of the boom tube.

- 9 Locate the number 3 boom tube extension cable clevis pins on both sides of the number 2 boom tube at the pivot end of the boom.

- 10 Remove the cotter pin and clevis pin from both cables.

Note: When installing a clevis pin, always replace the cotter pin with a new one.

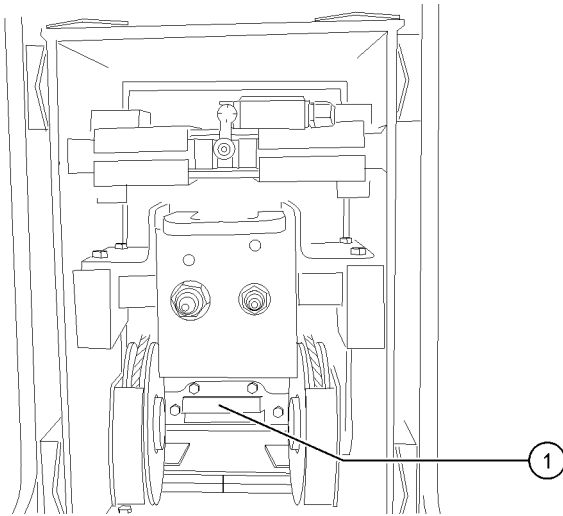
- 11 Remove the lower external snap ring and washer from the cable break limit switch actuator pivot pin.
- 12 Remove the cable break actuator mounting plate retaining fasteners. Remove the lower plate from the machine.
- 13 Remove the upper plate and actuator pivot pin. Do not remove the cable break limit switch from the mounting plate.
- 14 Push the cable break actuator and cables towards the platform end of the boom approximately 18 inches / 46 cm.
- 15 Remove the red cable adjustment locking bracket retaining fasteners. Remove the red locking bracket from the machine.

### **⚠ WARNING**

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

- 16 Remove the two cable adjustment bolts.
- 17 Remove the cable-end block mounting plate fasteners. Remove the cable-end block mounting plate from the machine.
- 18 Remove the trunnion pin retaining fasteners.
- 19 Use a slide hammer to remove the trunnion pins from the primary boom extension cylinder.

## Boom Components



1 red cable adjustment locking bracket

- 20 Remove the primary boom extension cylinder hold down brackets at the pivot end of the boom.
- 21 Attach a lifting strap from an overhead crane to the lifting eye on the primary boom extension cylinder.
- 22 Support and slide the primary boom extension cylinder out of the boom assembly while guiding the cables out of the boom and place it on a structure capable of supporting it.

### ⚠ WARNING

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

### NOTICE

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

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

- 23 Remove the retaining fasteners from the limit switch cover on top of the number 2 boom tube at the platform end of the machine.
- 24 Carefully remove the cover with proximity and limit switches from the top of the number 2 boom tube at the platform end of the boom.

### ⚠ DANGER

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

- 25 Tag and disconnect the wiring connectors from the proximity and limit switches at the top of the number 2 boom tube at the platform end of the boom. Do not remove the proximity or limit switches.
- 26 Remove the retaining fasteners from the limit switch cover on the side of the number 1 boom tube at the platform end of the boom.
- 27 Carefully remove the cover with proximity and limit switches from the number 1 boom tube at the platform end of the boom.
- 28 Tag and disconnect the wiring connectors from the proximity and limit switches at the ground controls side of the number 1 boom tube at the platform end of the boom. Do not remove the proximity or limit switches.
- 29 Remove the retaining fasteners from each black plastic boom tube cover at the platform end of the machine. Remove the covers.

- 30 Remove and label the top and side wear pads of the number 3 boom tube at the pivot end of

## Boom Components

the boom. Do not remove the bottom wear pads.

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

- 31 Remove and label the top and side wear pads from the number 2 boom tube at the platform end of the boom. Do not remove the bottom wear pads.

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

- 32 Attach a lifting strap from an overhead crane to the number 3 boom tube at the platform end of the boom.
- 33 Support and slide the number 3 boom tube out of the number 2 boom tube. When the number 3 boom tube is approximately halfway removed, remove the bottom wear pads from the number 2 boom tube at the platform end of the boom.

### **⚠ WARNING**

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

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

of the boom. Do not remove the bottom wear pads.

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

- 35 Remove and label the top and side wear pads from the number 1 boom tube at the platform end of the boom. Do not remove the bottom wear pads.

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

- 36 Attach a lifting strap from an overhead crane to the number 2 boom tube at the platform end of the boom.
- 37 Support and slide the number 2 boom tube out of the number 1 boom tube. When the number 2 boom tube is approximately halfway removed, remove the bottom wear pads from the number 1 boom tube at the platform end of the boom.

### **⚠ WARNING**

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

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

- 34 Remove and label the top and side wear pads from the number 2 boom tube at the pivot end

## Boom Components

### 4-3 Boom Lift Cylinder

#### How to Remove the Boom Lift Cylinder

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

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation.

Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the boom until there is approximately 4 feet / 1.2 m between the turntable and boom rest pad.
- 2 Attach a lifting strap from an overhead crane or other suitable lifting device to the rod end of the boom lift cylinder.
- 3 Attach an overhead 10 ton / 10,000 kg crane to the platform end of the boom for support. Do not lift the boom.
- 4 Remove the boom storage area cover retaining fasteners. Remove the cover from the machine.

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

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

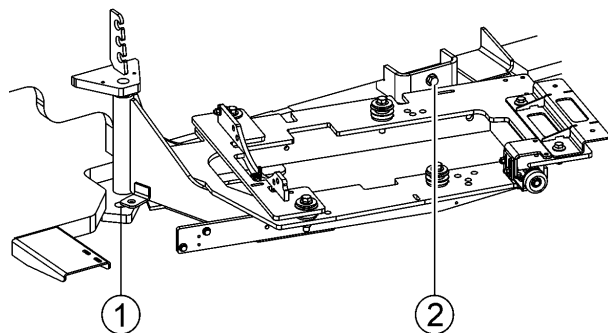
**▲WARNING** Crushing hazard. The boom may fall when the rod-end pivot pin is removed if the boom is not properly supported by the overhead crane.

- 7 Carefully raise the boom with the overhead crane until the rod end of the boom lift cylinder can be removed..
- 8 Carefully lower the rod end of the boom lift cylinder down onto the support blocks.
- 9 Carefully raise the boom with the overhead crane until the barrel end of the boom lift cylinder is accessible.
- 10 Tag, disconnect and plug the boom lift cylinder hydraulic hoses. Cap the fitting on the cylinder.

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

## Boom Components

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



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

- 12 Locate the engine pivot plate anchor hole at the pivot end of the engine pivot plate.  
13 Install the bolt that was just removed into the anchor hole to secure the engine pivot plate from moving.

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

- 14 Remove the pin retaining fastener from the barrel-end pivot pin. Do not remove the pin.  
15 Support the boom lift cylinder with an overhead crane.  
16 Use a slide hammer to remove the boom lift cylinder barrel-end pivot pin through the access hole in the engine side turntable riser.

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

### WARNING

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

### NOTICE

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

### NOTICE

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



## Boom Components

### 4-4

### Extension Cylinders

The primary boom extension cylinder is located inside the boom assembly and incorporates cables and pulleys that are responsible for extending the number 2 and 3 boom tubes. The secondary boom extension cylinder (SX-125 XC models) is located underneath the number 0 boom tube and is responsible for extending the number 1 boom tube. The extension cylinders are equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

### How to Remove the Primary Boom Extension Cylinder

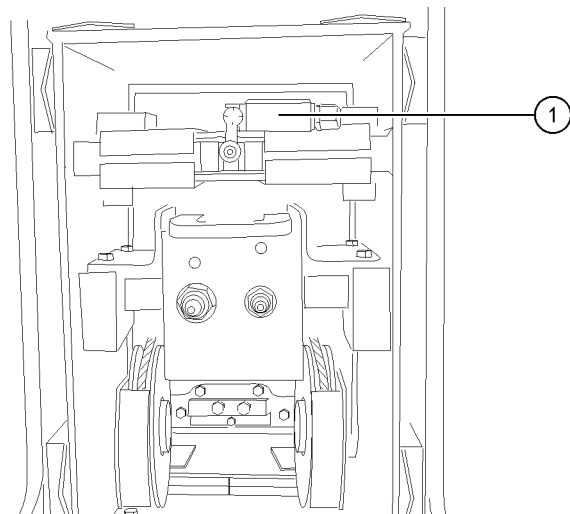
**⚠ WARNING** Bodily injury hazard. This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools could result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose end must be replaced and then torqued to specification during installation.

Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the boom to a horizontal position.
- 2 Remove the retaining fasteners from the boom end cover at the pivot end of the boom. Remove the cover from the machine.

- 3 Remove the access covers.
- 4 Secure the number 2 and number 3 boom tubes together with a strap or chain to prevent them from moving.
- 5 Unhook length transducer from the cable guard.
- 6 Disconnect the wiring connector from the length transducer.
- 7 Remove the transducer bracket retaining fastener.
- 8 Remove the length transducer with the bracket.
- 9 Remove the cable clamp from the cable break limit switch wiring.



1 cable break limit switch

- 10 Disconnect the wiring connector from the cable break limit switch.

## Boom Components

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

### **⚠ WARNING**

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

- 12 **SX-125 XC models:** Remove the fasteners from the inner cable track mounting bracket at the primary boom extension cylinder.
- 13 **SX-125 XC models:** Lay the inner cable track and hoses down and out of the way.
- 14 Remove the pulley pivot pin retaining fasteners from the number 2 boom tube at the pivot end of the boom.
- 15 Remove the pulley pivot pins, cable guards and pulleys.

Note: When installing the pulleys, be sure that the side of the pulley with the shorter flange is facing the inside of the boom tube.

- 16 Locate the number 3 boom tube extension cable clevis pins on both sides of the number 2 boom tube at the pivot end of the boom.
- 17 Remove the cotter pin and clevis pin from both cables.

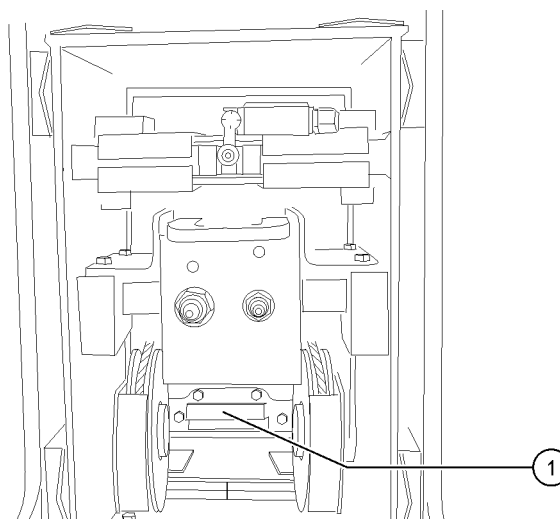
Note: When installing a clevis pin, always replace the cotter pin with a new one.

- 18 Remove the lower external snap ring and washer from the cable break limit switch actuator pivot pin.
- 19 Remove the cable break actuator mounting plate retaining fasteners. Remove the lower plate.
- 20 Remove the upper plate and actuator mounting plate retaining fasteners. Remove the lower plate.

- 21 Push the cable break actuator and cables towards the platform end of the boom approximately 18 inches / 46 cm.
- 22 Remove the retaining fasteners from the red cable adjustment locking brackets. Remove the red locking brackets.

### **⚠ WARNING**

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



1 red cable adjustment locking bracket

## Boom Components

- 23 Remove the two cable adjustment bolts.
  - 24 Remove the cable-end block mounting plate fasteners. Remove the cable-end block mounting plate.
  - 25 Remove the trunnion pin retaining fasteners.
  - 26 Use a slide hammer to remove the trunnion pins from the primary boom extension cylinder.
- Note: Use a ½-13 bolt thread on each end of the slide hammer.
- 27 Attach a lifting strap from an overhead crane to the lifting eye on the primary boom extension cylinder.
  - 28 Support and slide the primary boom extension cylinder out of the boom assembly while guiding the cables out of the boom and place it on a structure capable of supporting it.

**⚠ WARNING**

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

**NOTICE**

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

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

### How to Remove the Secondary Boom Extension Cylinder, SX-125 XC Models

**⚠ 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 on the fitting and/or hose end must be replaced and then torqued to specification during installation.

Refer to Specifications, *Hydraulic Hose and Fitting Torque Specifications*.

- 1 Raise the boom until the secondary boom extension cylinder barrel-end pivot pin is above the turntable covers.
- 2 Remove the secondary boom extend cylinder cover retaining fasteners. Remove the covers.

**⚠ WARNING**

Bodily injury hazard. Do not operate the machine unless the secondary extend cylinder covers are properly installed. Operating the machine with the covers removed could result in death or serious injury.

## Boom Components

- 3 Tag, disconnect and plug the secondary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

### **⚠ WARNING**

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

- 4 Support the secondary boom extension cylinder with an overhead crane or other suitable lifting device.
- 5 Remove the pin retaining fasteners from both the rod-end and barrel-end pivot pins. Do not remove the pins.
- 6 Protect the boom lift cylinder rod from damage.
- 7 Use a soft metal drift to remove both pivot pins.
- 8 Remove the secondary boom extension cylinder from the machine while guiding the barrel end of the cylinder out of the boom.

### **⚠ WARNING**

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

### **⚠ WARNING**

Component damage hazard. The boom lift cylinder rod can become damaged if the barrel end of the secondary boom extension cylinder is allowed to come in contact with it.

## 4-5

### Boom Extend / Retract Cables

#### How to Adjust the Boom Extend/Retract Cables

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

Note: A flashlight may be necessary to be able to see the extend/retract cables inside of the boom assembly.

Note: Perform this procedure with the boom fully retracted.

- 1 Start the engine from the ground controls.
- 2 Raise the boom to a horizontal position.
- 3 Stop the engine.
- 4 Remove the boom end cover from the pivot end of the machine.
- 5 Unhook length transducer from the cable guard.
- 6 Disconnect the wiring connector from the length transducer.
- 7 Remove the transducer bracket retaining fastener.
- 8 Remove the length transducer with the bracket.

## Boom Components

- 9 Locate the red locking bracket (c) covering the cable adjustment bolts at the pivot end of the boom (Illustration 1).
- 10 Remove the retaining fastener from the red locking bracket and remove the bracket from the machine.
- 11 Locate the retract cable equalizer bolt under the number 1 boom tube at the platform end of the boom assembly (Illustration 3).
- 12 Loosen the lock (g) and jam nut (h) on the cable tension equalizer bracket. Do not remove the nuts.

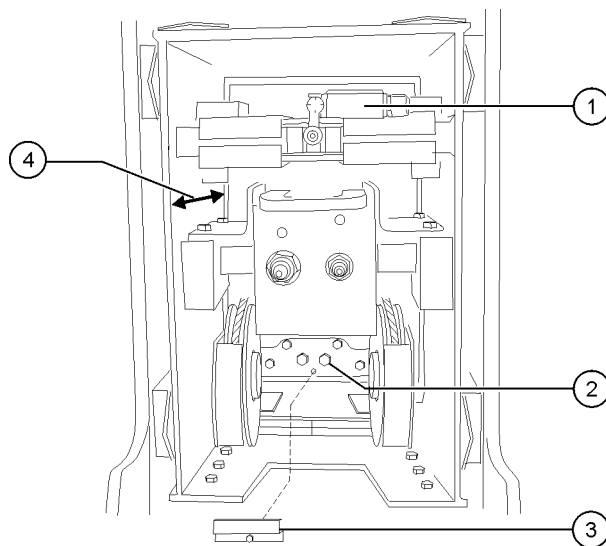


Illustration 1

- 1 limit switch
- 2 extend cable adjustment bolts
- 3 red cable adjustment locking bracket
- 4 boom tube distance

- 13 At the pivot end of the boom (Illustration 1), turn the cable adjustment bolts (b) clockwise to obtain  $6\frac{3}{4}$  inches / 17 cm between the end of the number 3 boom tube and the end of the number 2 boom tube (d). As a guide (Illustration 2), the end of the extension cable coupling (i) should be approximately mid-point (k) between the guide plate (l) and the cable retainer bracket (j). Illustration 2 is visible by removing the boom side covers.

Note: Adjust the cable adjustment bolts evenly so the cable break limit switch (a) stays centered in the limit switch actuator (Illustration 1).

Note: If the distance is greater than  $6\frac{3}{4}$  inches / 17 cm, loosen the extend cable adjustment bolts and tighten the hex jam nut on the cable tension equalizer bolt until the distance is less than  $6\frac{3}{4}$  inches / 17 cm. Loosen the jam nut and repeat step 9.

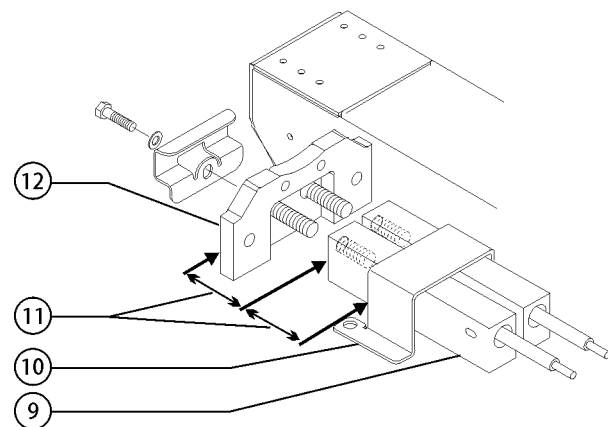


Illustration 2

- 9 extend cable coupling
- 10 cable retainer bracket
- 11 equal distance
- 12 guide plate

## Boom Components

- 14 At the platform end of the boom, tighten the hex jam nut (h) on the cable tension equalizer bracket located underneath the number 1 boom tube (Illustration 3). Tighten the hex jam nut until it is snug. Do not overtighten.
  - 15 Hold the hex jam nut with a wrench and tighten the nylock nut (g) against the hex jam nut.
  - 16 Re-check that the cable break limit switch is centered in the limit switch actuator. Adjust the extension cable adjustment bolts to center it.
  - 17 At the pivot end of the boom, measure the distance between the end of the number 3 boom tube and the end of the number 2 boom tube.
- ⊙ Result: The measurement between the end of the number 3 boom tube and the end of the number 2 boom tube should be  $6\frac{3}{4}$  to  $6\frac{7}{8}$  inches / 17 to 17.5 cm (d).

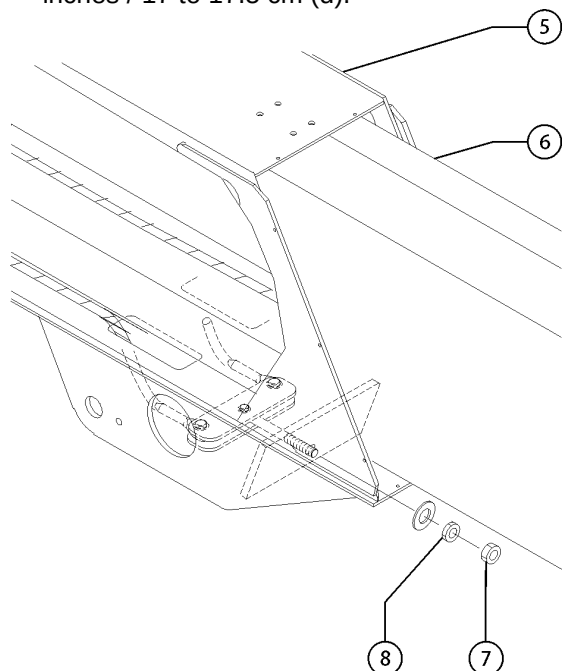


Illustration 3

- 5 boom tube 1
- 6 boom tube 2
- 7 nylock nut
- 8 hex jam nut

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

### ⚠ WARNING

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

- 19 Lower the boom to the stowed position.
  - 20 Start the engine from the platform controls.
  - 21 Extend the boom approximately 2 feet / 0.6 m.
  - 22 Retract the boom. While retracting the boom, visually inspect the number 2 and number 3 boom tubes.
- ⊙ Result: The number 2 should not move more than  $\frac{1}{2}$  inch (13 mm) before the number 3 boom tube begins to retract.

Note: If the number 2 boom tube moves more than  $\frac{1}{2}$  inch (13 mm) before the number 3 boom tube begins to retract, repeat the procedure until the number 2 boom moves less than  $\frac{1}{2}$  inch before the number 3 boom begins to retract.

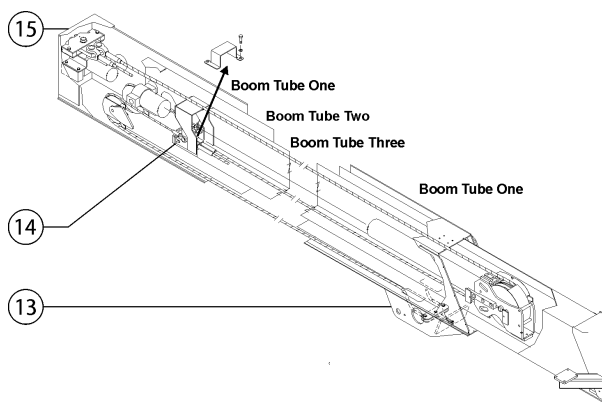


Illustration 4

- 13 figure 3 platform end
- 14 figure 2, boom tube 3
- 15 figure 1, pivot end

## Boom Components

### How to Replace the Boom Extend/ Retract Cables

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

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

#### Boom extend cables:

- 2 Remove the retaining fasteners that secure the extension cable retainer to the pulley mount. Remove the retainer.
- 3 Remove the cables from the lower boom extend cable bracket that attaches to the number 3 boom tube.
- 4 Remove the front and rear fasteners from the anchor bracket that supports the cable anchors. Remove the bracket.
- 5 Remove the pulley and boom extend cables from the extension cylinder assembly. Discard the old cables and pulleys.
- 6 Route the new boom extend cables through the boom extend pulley bracket.

Note: Be sure before installing the extend cables through the boom adjustment coupling that the tall end of the cable anchors are facing down.

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

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

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

#### Boom retract cables:

- 9 Remove the fastener from the boom retract cable at the platform end of the #1 boom.
- 10 Attach a rope to one of the boom retract cables at the pivot end of the boom.
- 11 At the platform end of the boom, pull on the boom retract cable that has the rope attached to it.
- 12 Pull the old cable completely out of the boom tube. Discard the old boom retract cable.
- 13 Remove the rope from the old cable and securely attach the rope to the same end of the new boom retract cable.
- 14 At the pivot end of the boom, carefully pull the rope with the new retract cable attached.
- 15 Pull the new cable towards the pivot end of the boom until the end of the cables is at the end of the boom tube. Remove the rope.
- 16 Repeat steps 11 through 16 for the other boom retract cable.
- 17 At the platform end of the boom, install the retract cables and fasteners to the adjustment plate.
- 18 Remove and discard the old boom retract pulleys from the pivot end of the boom extension cylinder.
- 19 Install the new boom retract pulleys to the pivot end of the boom extension cylinder.

## Boom Components

- 20 Secure the number 2 and number 3 booms together at the platform end with a chain or strap to prevent them from moving.
  - 21 Install the boom extension cylinder assembly into the boom.
- Note: Before lowering the extension cylinder into the saddles of the number 1 boom tube, wrap the boom retract cables around the pulleys.
- 22 Remove the chain or strap from the platform end of the number 2 and number 3 boom tubes.
  - 23 Adjust the boom extend/retract cables. Refer to Repair Procedure, *How to Adjust the Boom Extend and Retract Cables*.

### 4-6

#### Primary Boom Angle Sensor

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

#### How to Calibrate the Primary Boom Angle Sensor

Note: If the angle sensor is replaced, both the sensor and magnet must be replaced as a set.

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

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

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

Note: Primary boom angle must be calibrated before calibrating boom length.

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

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

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



## Boom Components

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



Plus

Minus

Previous

Enter

- 1 Push in the ground controls red Emergency Stop button to the off position.
  - 2 Turn the key switch to ground controls.
  - 3 Open the ground control box.
  - 4 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.
  - 5 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.
  - 6 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.
- Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.
- 7 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.
  - 8 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
  - 9 Press the **enter** or **previous** button on the LCD screen until DELETE PRIMARY BOOM ANGLE SENSOR is displayed.
  - 10 Press the **plus** button to select YES, then press the **enter** button to accept.
  - 11 Place the digital level on top of the primary boom near the pivot and note the angle displayed on the digital level.
  - 12 Press the **enter** button until PRIMARY BOOM ANGLE TO GRAVITY -9.5 DEG is displayed, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.
- Note: If the measured angle already matches the angle shown on the display at the ground controls, press the **plus** button or **minus** button to change the angle and then change back to the measured value. The system must detect a change in displayed value to record the calibrated value.
- Note: If the system exits out of calibration mode when the engine is started, repeat step 8 and continue to step 13.

## Boom Components

- 13 Start the engine from the ground controls.
- 14 Press and hold a function enable/speed select button and the primary boom up button until the digital level displays 6 degrees.
- 15 At the PRIMARY BOOM ANGLE TO GRAVITY 6 DEG screen, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

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

- 16 Press and hold a function enable/speed select button and the primary boom up button until the digital level displays 23 degrees.
- 17 At the PRIMARY BOOM ANGLE TO GRAVITY 23 DEG screen, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

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

- 18 Press and hold a function enable/speed select button and the primary boom up button until the digital level displays 40 degrees.
- 19 At the PRIMARY BOOM ANGLE TO GRAVITY 40 DEG screen, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

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

- 20 Press and hold a function enable/speed select button and the primary boom up button until the digital level displays 57 degrees.
- 21 At the PRIMARY BOOM ANGLE TO GRAVITY 57 DEG screen, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

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

- 22 Press and hold a function enable/speed select button and the primary boom button until the boom is fully raised.

## Boom Components

- 23 At the PRIMARY BOOM ANGLE TO GRAVITY 74 DEG screen, press the **plus** or **minus** button to adjust the display to the exact value shown on the digital level, then press the **enter** button.

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

- 24 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.
- ⦿ Result: An audible alarm sounds for 1 second. Calibration has been stored.

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

- 25 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 26 Press the **plus** button to select YES, then press the **enter** button to accept.
- 27 Turn the key back to the run position and remove the key from the bypass/recovery key switch. Insert the key into the main key switch.
- 28 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

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

- 29 Pull out the red Emergency Stop button. Start the engine and lower the boom to the stowed position. Be sure there are no calibration faults shown on the display.

### 4-7

## Boom Length Sensor

### How to Calibrate the Primary Boom Length Sensor

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

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

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

Note: Primary boom angle must be calibrated before calibrating boom length.

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

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

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

## Boom Components

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



Plus

Minus

Previous

Enter

- 1 With the boom in the stowed position, start the engine and fully raise the boom to its maximum angle.
- 2 Push in the ground controls red Emergency Stop button to the off position.
- 3 Turn the key switch to ground controls.
- 4 Open the ground control box.
- 5 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.
- 6 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.
- 7 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.
- 8 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.
- 9 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
- 10 Press the **enter** or **previous** button on the LCD screen until DELETE PRIMARY BOOM LENGTH CALIBRATION is displayed.
- 11 Press the **plus** button to select YES, then press the **enter** button to accept.
- 12 Start the engine and attempt to retract the boom to insure it is fully retracted.
- 13 Press the **enter** or **previous** button on the LCD screen until BOOM FULLY RETRACTED? is displayed.
- 14 Press the **plus** button to select YES, then press the **enter** button to accept.
- 15 Fully extend the boom.
- 16 Press the **enter** or **previous** button on the LCD screen until BOOM FULLY EXTENDED? is displayed.
- 17 Press the **plus** button to select YES, then press the **enter** button to accept.

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

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## Boom Components

- 18 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.
- ◉ Result: An audible alarm sounds for 1 second  
Calibration has been stored.

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

- 19 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 20 Press the **plus** button to select YES, then press the **enter** button to accept.
- 21 Turn the key back to the run position and remove the key from the bypass/recovery key switch. Insert the key into the main key switch.
- 22 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

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

- 23 Pull out the red Emergency Stop button. Start the engine and retract the boom to the stowed position. Be sure there are no calibration faults shown on the display.

# Engines

## 5-1 RPM Adjustment

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

## 5-2 Flex Plate

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

### How to Remove the Flex Plate

- 1 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.
- 2 Remove the hose clamp from the air cleaner hose at the air cleaner. Carefully disconnect the hose from the air cleaner.
- 3 Remove the air cleaner mounting fasteners. Remove the air cleaner from the machine.
- 4 Remove the fuel filter/water separator retaining fasteners from the pump mounting plate. Do not disconnect the fuel hoses.
- 5 Remove the fuel filter/water separator and lay it to the side.
- 6 Support the drive pump with an appropriate lifting device. Then remove all of the pump mounting plate to engine bell housing bolts.
- 7 Carefully pull the pump away from the engine and secure it from moving.

### NOTICE

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

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

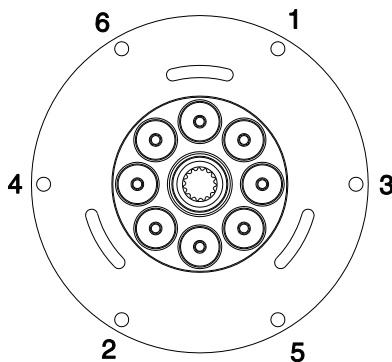
# Engines

## How to Install a Flex Plate

- 1 Install the flex plate onto the engine flywheel with the rubber vibration isolators towards the pump.
- 2 Use blue thread locking compound and torque the flex plate mounting bolts in sequence to 28 ft-lbs / 38 Nm. Then torque the flex plate mounting bolts in sequence to 40 ft-lbs / 54 Nm.
- 3 Apply a high viscosity coupling grease (Genie part number 128025) to the splines of the pump shaft and flex plate.
- 4 Install the pump plate and pump assembly onto the engine.

### Grease Specification

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

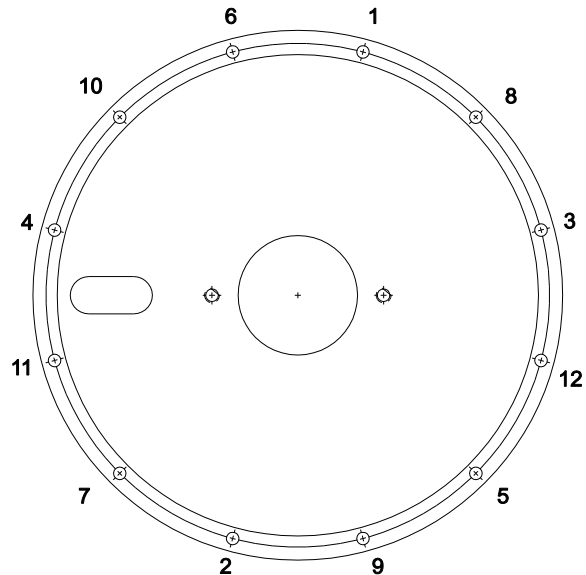


Deutz and Perkins models

## How to Install the Pump Plate

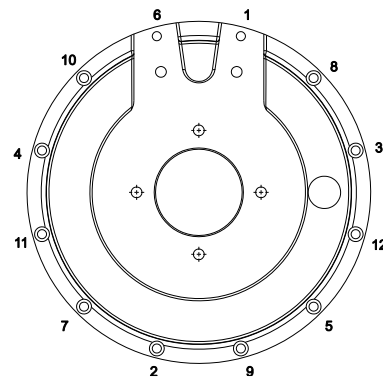
- 1 Using a suitable lifting device, install the pump plate and pump assembly onto the engine.
- 2 **Deutz engines:** Torque the pump plate mounting bolts in sequence to 23 ft-lbs / 31 Nm. Then torque the pump plate mounting bolts in sequence to 47 ft-lbs / 63 Nm.
- 3 **Perkins engines:** Torque the pump plate mounting bolts in sequence to 23 ft-lbs / 31

Nm. Then torque the pump plate mounting bolts in sequence to 47 ft-lbs / 63 Nm.



Perkins 1104D pump plate

Perkins 854F pump plate



Deutz TD2011L04i pump plate

Deutz TD2.9 pump plate

# Engines

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

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

### **Passive regeneration:**

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

### **Standstill regeneration:**

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

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

### **Service regeneration:**

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

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

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



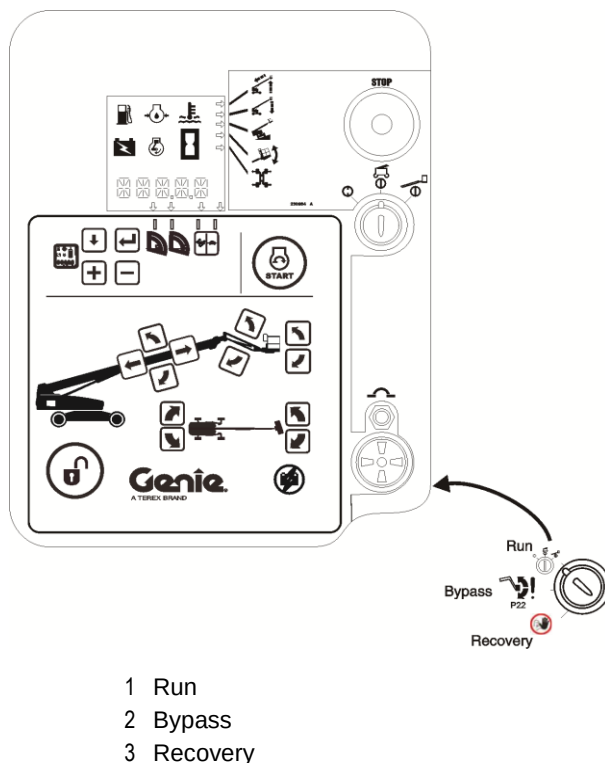
## Ground Controls

### 6-1 Bypass/Recovery Key Switch

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

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

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



### How to Use the Bypass Mode

#### **⚠ DANGER**

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

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

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

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

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

## Ground Controls

- 3 Turn the bypass/recovery key switch to the bypass position.
- 4 Using auxiliary power, operate the ground control buttons to level the platform.

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

- 5 Turn the bypass/recovery key switch to the run position.
- 6 Remove the key from the bypass/recovery key switch and insert the key into the main key switch.

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

## How to Use the Recovery Mode

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

### **⚠ WARNING**

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

### **⚠ WARNING**

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

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

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

---

## Ground Controls

- 2 Turn and hold the bypass/recovery key switch to the recovery position. The switch must be held in the recovery position.
- ⦿ Result: The auxiliary power unit will turn on and the boom will begin the following recovery sequence.
  - The primary boom will retract.
  - The primary boom will lower.

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

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

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

### 6-2 Circuit Boards

---

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

**The LCD (Liquid Crystal Display) circuit board** is mounted to the inside of the control box lid which controls the LCD display screen.

**The ECM circuit board** is the main circuit board for the machine. All operating parameters and configuration of options for the machine are stored in the ECM memory.

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

Note: When the ECM circuit board is replaced, all the boom, platform and axle angle sensors will need to be calibrated and in a specific order. Contact Genie Product Support.

## Ground Controls

### How to Remove the LCD Display Screen Circuit Board

- 1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.
- 2 Remove the ground control box lid fasteners.
- 3 Open the ground control box.

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

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

- 4 Carefully disconnect the LCD circuit board ribbon cable from the ECM circuit board.
- 5 Remove the LCD display circuit board retaining fasteners.
- 6 Carefully remove the LCD display circuit board from the ground control box lid.

### How to Remove the ALC-1000 Circuit Board

- 1 Push in the red Emergency Stop button to the off position at both the ground and platform controls.
- 2 Remove the ground control box lid fasteners.
- 3 Open the ground control box.
- 4 Tag and disconnect the harnesses from the ground control box.
- 5 Remove the control cable receptacle retaining fasteners from the side of the control box.
- 6 Attach a grounded wrist strap to the ground screw inside the control box.

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

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

- 7 Tag and carefully disconnect the wire connectors from the circuit board.
- 8 Carefully disconnect the LCD circuit board ribbon cable from the ECM circuit board.
- 9 Carefully disconnect the two ribbon cables from the membrane decal at the ECM circuit board.
- 10 Remove the circuit board mounting fasteners.
- 11 Carefully remove the circuit board from the control box.

## Ground Controls

### 6-3 Membrane Decal

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

### How to Replace the Membrane Decal

- 1 Turn the key switch to the off position and push in the red Emergency Stop button to the off position at both the ground and platform controls.
- 2 Remove the ground control box lid fasteners.
- 3 Open the ground control box.

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

#### **WARNING**

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

#### **NOTICE**

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

- 5 Carefully remove the membrane decal from the control box lid while guiding the ribbon cables out of the control box lid.
- 6 Remove any decal adhesive from the control box lid with a mild solvent.

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

- 7 Install the new membrane decal while guiding the ribbon cables through the control box lid.
- 8 Connect the ribbon cables to the ECM circuit board.
- 9 Close the control box lid and install the retaining fasteners.

## Ground Controls

### 6-4

### Full Machine Calibration

Full machine calibration must be completed in the proper sequence when the ALC-1000 circuit board (TCON) in the ground control box has been replaced or the turntable level sensor (SCON) has been replaced.

### How to Fully Calibrate the Machine

Calibration procedures shall only be completed by qualified technicians that have Genie factory service training.

#### **⚠ WARNING**

Tip-over hazard. Failure to calibrate the machine in the proper sequence could cause the machine to tip over resulting in death or serious injury.

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

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

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



Plus



Minus



Previous



Enter

Note: Start this procedure with the booms in the fully stowed position and the axle retracted.

Full machine calibration must be completed in the following sequence:

- Select engine configuration. Refer to Repair Section Display Module. *Unit of Measure and Language*.
- Joysticks. Refer to Repair Procedure, *How to Calibrate a Joystick*.
- Turntable level sensor. Refer to Repair Procedure, *How to Calibrate the Turntable Level Sensor*.
- Platform level sensor. Refer to Repair Procedure, *How to Calibrate the Platform Level Sensor*.
- Load cell. Refer to Repair Procedure, *How to Calibrate the Load Cell*.
- Axle angle sensors. Refer to Repair Procedure, *How to Calibrate the Axle Angle Sensors*.
- Steer sensors. Refer to Repair Procedure, *How to Calibrate All Steer Sensors*.
- Primary boom angle sensor. Refer to Repair Procedure, *How to Calibrate the Primary Boom Angle Sensor*.
- Primary boom length sensor. Refer to Repair Procedure, *How to Calibrate the Primary Boom Length Sensor*.
- Select option configuration. Refer to Repair Section, Display Module, *Options*.

## Display Module

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

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

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

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



Plus



Minus



Previous



Enter

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

| Screen or Menu  | Procedure | Description                                                                                                                                                                                                                                                                                                                        | Range or Selection                                                                                    |
|-----------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Operator</b> | Default   | Hourmeter (on power up)<br>Engine speed<br>Fuel Level<br>Engine oil pressure PSI (English)<br>Engine oil pressure kPa (metric)<br>Engine temperature °F (English)<br>Engine temperature °C (metric)<br>Turntable level sensor X° direction<br>Turntable level sensor Y° direction<br>Platform level sensor degree<br>Battery volts | engine temp will not display until temp is >100°F<br>engine temp will not display until temp is >38°C |

## Display Module

| Screen or Menu                      | Procedure                                                                                                                                                                              | Description                                                                                                                                                                | Range or Selection                                                                                                                                                                                                                         |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Machine Status</b>               | With key switch on, press the <b>(plus)(minus)</b> buttons at the same time.                                                                                                           | Primary angle degrees<br><br>Length sensor extension inches<br>Length sensor extension centimeters<br>Axles fully extended<br><br>DPF regeneration mode Auto/force/inhibit | -2° to +83°<br><br>0in to 682in<br>0cm to 1732cm<br>YES/NO                                                                                                                                                                                 |
| <b>Unit of Measure and Language</b> | With key switch OFF, press and hold the <b>enter</b> button and turn key switch to on position.<br>Release the <b>enter</b> button and press <b>(plus)(minus)(minus)(plus)</b>         | Metric/English (measurement units)<br><br>Display Language<br><br>Set engine<br><br>Display Faults as<br>Clear Overload Recovery?                                          | English, German, French, Spanish, Portuguese, Italian, Dutch, and Swedish.<br><br>Deutz 2.9L Turbo (D2.9T)<br>Deutz TD2011L04i (DL04i)<br><br>Perkins 1104D-44T (P1104)<br>Perkins 854F (P854T)<br>A passcode is required to clear message |
| <b>Default Reset</b>                | With key switch OFF, press and hold the <b>enter</b> button and turn key switch to on position.<br>Release the <b>enter</b> button and press <b>(minus)(minus)(previous)(previous)</b> | Delete drive functions<br><br>Delete boom function speeds<br><br>Delete lift function ramps<br><br>Delete all sensor calibration                                           |                                                                                                                                                                                                                                            |



## Display Module

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

## Display Module

| Screen or Menu              | Procedure                                                                                                                                                                      | Description                          | Range or Selection |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------|
| <b>Boom Function Speeds</b> | With key switch OFF, press and hold the <b>enter</b> button and turn key switch to on position.<br>Release the <b>enter</b> button and press <b>(plus)(plus)(minus)(minus)</b> | Primary boom up speed stowed         |                    |
|                             |                                                                                                                                                                                | Primary boom up speed >40ft          |                    |
|                             |                                                                                                                                                                                | Primary boom up speed >80ft          |                    |
|                             |                                                                                                                                                                                | Primary boom up speed >90ft          |                    |
|                             |                                                                                                                                                                                | Primary boom up speed >100ft         |                    |
|                             |                                                                                                                                                                                | Primary boom up speed >115ft         |                    |
|                             |                                                                                                                                                                                | Primary boom down speed stowed       |                    |
|                             |                                                                                                                                                                                | Primary boom down speed >40ft        |                    |
|                             |                                                                                                                                                                                | Primary boom down speed >80ft        | 120% max, 50% min, |
|                             |                                                                                                                                                                                | Primary boom down speed >90ft        | 100% (default)     |
|                             |                                                                                                                                                                                | Primary boom down speed >100ft       |                    |
|                             |                                                                                                                                                                                | Primary boom down speed >115ft       |                    |
|                             |                                                                                                                                                                                | Primary boom extend speed            |                    |
|                             |                                                                                                                                                                                | Primary boom retract speed           |                    |
|                             |                                                                                                                                                                                | Jib up speed                         |                    |
|                             |                                                                                                                                                                                | Jib down speed                       |                    |
|                             |                                                                                                                                                                                | Turntable rotate speed retracted     |                    |
|                             |                                                                                                                                                                                | Turntable rotate speed not retracted |                    |
|                             |                                                                                                                                                                                | Turntable rotate speed > 75'         |                    |

## Display Module

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

## Display Module

| Screen or Menu           | Procedure                                                                                                                                                                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                         | Range or Selection |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>Valve Calibration</b> | With key switch OFF, press and hold the <b>enter</b> button and turn key switch to on position.<br>Release the <b>enter</b> button and press <b>(minus)(minus)(enter)(enter)</b> . | Delete drive valve calibration<br>Delete boom extend/retract valve calibration<br>Delete turntable rotate valve calibration<br>Allow turntable rotate speed calibration<br>Delete drive joystick calibration<br><br>Delete boom up/down joystick calibration<br>Delete boom extend/retract joystick calibration<br>Delete turntable rotate joystick calibration<br>Delete steer joystick calibration<br><br>Delete jib up/down joystick calibration | YES/NO             |

## Display Module

| Screen or Menu            | Procedure                                                                                                                                                                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Range or Selection        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| <b>Sensor Calibration</b> | With key switch OFF, press and hold the <b>enter</b> button and turn key switch to on position.<br>Release the <b>enter</b> button and press <b>(plus)(enter)(enter)(plus)</b> . | Delete TT level sensor cal<br>Set unit X-axis to gravity<br>Set unit Y-axis to gravity<br>Set platform level to gravity (YES/NO)<br>Platform level sensor millivolts/degree<br>Delete load cell calibration<br>Calibrate load cell zero<br>Platform rated load lbs<br>Platform rate load kg<br>Delete axles angle sensors calibration? (YES/NO)<br>Axle angle fully retracted (YES/NO)<br>Axle angle fully extended (YES/NO)<br>Delete all steer sensors calibrations? (YES/NO)<br>Delete blue end blue side steer sensor (LF) calibration? (YES/NO)<br>Delete yellow end blue side steer sensor (LR) calibration? (YES/NO)<br>Delete blue end yellow side steer sensor (RF) calibration? (YES/NO)<br>Delete yellow end yellow side steer sensor (RR) calibration? (YES/NO)<br>Delete primary boom angle sensor calibration? (YES/NO)<br>primary boom angle to gravity -9.5°<br>primary boom angle to gravity 6°<br>primary boom angle to gravity 23°<br>primary boom angle to gravity 40°<br>primary boom angle to gravity 57°<br>primary boom angle to gravity 74°<br>Delete boom length sensor calibration? (YES/NO)<br>Boom fully retracted (YES/NO)<br>Boom fully extended (YES/NO) | Use +/- buttons to adjust |

## Display Module

| Screen or Menu | Procedure                                                                                                                                                                        | Description                                | Range or Selection                                                                                                                                                           |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Options</b> | With key switch OFF, press and hold the <b>enter</b> button and turn key switch to on position.<br>Release the <b>enter</b> button and press <b>(minus)(minus)(plus)(plus)</b> . | AC Generator                               | (NONE/3KW/7.5KW/12.5KW)                                                                                                                                                      |
|                |                                                                                                                                                                                  | Engine start Aid Time                      | 0-30 sec                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Alarm options                              | No (NO AL)/Motion (MO AL)/Travel (TR AL)/ Descent (DE AL)/ Travel and Descent (TD AL)                                                                                        |
|                |                                                                                                                                                                                  | Lift/Drive                                 | No (NO CO)/ Drive cut out while not stowed (DCONS)/ Lifting or driving (LORDR)                                                                                               |
|                |                                                                                                                                                                                  | Proximity Kill Switch?                     | (NONE/PROX)                                                                                                                                                                  |
|                |                                                                                                                                                                                  | Flashing Beacon?                           | (NO/YES)                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Boom extend cut out if boom angle < 10 deg | (NO/YES)                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Disable Steer Mode Change while Driving?   | (NO/YES)                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Rocker Switch steering?                    | (NO/YES)                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Foot Switch Lockout (0-30 minutes)         | 30.0 max and 0.0 min, 10.0 (default) Holding +/- button will cause display to scroll through options or increment number settings automatically at 0.2 min increase/decrease |
|                |                                                                                                                                                                                  | Platform Always Level to Gravity?          | (NO/YES)                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Axle Motion Only While Driving?            | (NO/YES)                                                                                                                                                                     |
|                |                                                                                                                                                                                  | Chassis Tilt Options                       | (CODRV/COALL)                                                                                                                                                                |
|                |                                                                                                                                                                                  | Boom Length Limit                          | (NONE/100FT/80FT)                                                                                                                                                            |

## Hydraulic Pumps

### 7-1 Function Pump

The function pump is a pressure compensated, variable displacement piston pump. Any internal service to the pump should be performed at an authorized Sauer-Danfoss service center. Contact Genie Product Support to locate your local authorized service center.

### How to Remove the Function Pump

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

- 1 Locate the two hydraulic tank valves at the hydraulic tank. Close the valves.

#### NOTICE

Component damage hazard. The engine must not be started with the hydraulic tank shut-off valves in the closed position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

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

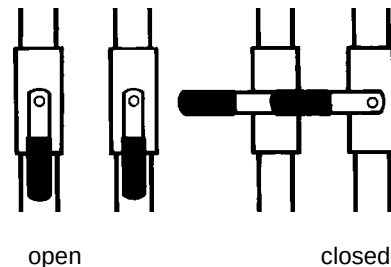
#### WARNING

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

- 3 Support the pump with a suitable lifting device.
- 4 Remove the two pump mounting fasteners. Carefully remove the pump.

#### NOTICE

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



## Hydraulic Pumps

### How to Prime the Function Pump

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

- 1 Remove the case drain hydraulic hose from the top of the function pump.

Note: The case drain hose is the smaller of the two hoses on top of the function pump and closest to the drive pump.

- 2 Locate and open the hydraulic tank shut-off valve at the hydraulic tank that supplies hydraulic oil to the function pump. Do not open the valve for the drive pump.
- 3 When hydraulic fluid begins to come out of the case drain port of the function pump, install the function pump case drain hose.
- 4 Clean up any oil that may have spilled. Properly discard the used oil.
- 5 Start the engine from the ground controls.
- 6 Check for hydraulic leaks.

### How to Adjust the Function Pump Standby Pressure

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the function manifold
- 2 Start the engine from the ground controls and allow the engine to run at low idle.
- 3 Observe the pressure reading on the pressure gauge.
  - ⦿ Result: The pressure gauge shows 350 psi / 25 bar. One or both of the functions pumps are correctly set. Proceed to step 4.
  - ✗ Result: If the gauge shows a reading lower than 350 psi / 25 bar, both the function pumps need to be adjusted higher. Proceed to step 6.
  - ✗ Result: If the gauge shows a reading higher than 350 psi / 25 bar, one or both of the function pumps need to be adjusted lower. Proceed to step 8.

Note: The reading will show the higher pressure of the two function pumps.



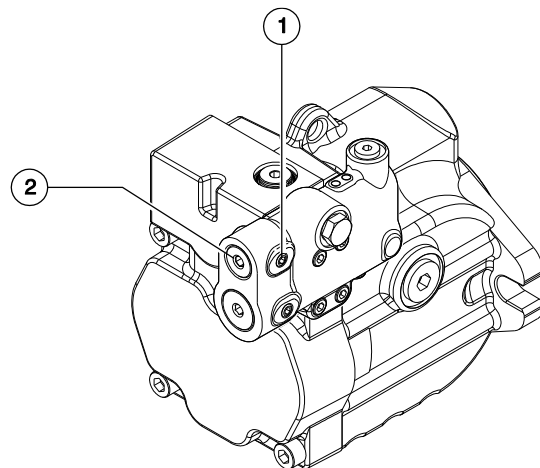
## Hydraulic Pumps

### Pressure reads 350 psi / 25 bar

- 4 One or both of the function pumps may be at the correct pressure. Loosen the set screw for the standby pressure adjustment on the rear function pump and turn the adjustment screw clockwise (higher pressure). If the pressure increases above 350 psi / 25 bar, turn the screw counterclockwise (lower pressure) until the gauge shows 350 psi / 25 bar. Tighten the set screw.
- 5 Loosen the set screw for the standby pressure adjustment on the middle function pump and turn the adjustment screw clockwise until the pressure reads higher than 350 psi / 25 bar. Once the gauge reads higher than 350 psi / 25 bar, turn the adjustment screw counterclockwise until the gauge reads 350 psi / 25 bar. Tighten the set screw. Proceed to step 11.

### Pressure reads less than 350 psi / 25 bar

- 6 Loosen the set screw for the standby pressure adjustment screw on the rear function pump. Turn the adjustment screw clockwise (higher pressure) until the pressure reads 350 psi / 25 bar. Tighten the set screw.
- 7 Loosen the set screw for the standby pressure adjustment screw on the mid function pump. Turn the adjustment screw clockwise (higher pressure) until the pressure reads greater than 350 psi / 25 bar, then turn the adjustment screw counterclockwise (lower pressure) until the pressure reads 350 psi / 25 bar. Tighten the set screw. Proceed to step 11.



- 1 standby pressure set screw
- 2 standby pressure adjustment screw

## Hydraulic Pumps

### Pressure reads more than 350 psi / 25 bar

- 8 Loosen the set screw for the standby pressure adjustment screw on the rear function pump. Turn the adjustment screw counterclockwise (lower pressure) and note if the pressure drops. If so turn the adjust screw counterclockwise (higher pressure) until the pressure reads 350 psi / 25 bar. If the pressure does not drop, turn the screw slightly counterclockwise to lower the pressure and proceed to step 7.
- 9 Loosen the set screw for the standby pressure adjustment screw on the mid function pump. Turn the adjustment screw counterclockwise until the pressure reads 350 psi / 25 bar. Tighten the set screw. Proceed to step 8.
- 10 Turn the adjustment screw on the rear function pump clockwise until the pressure reads greater than 350 psi / 25 bar, then turn the screw counterclockwise until the gauge reads 350 psi / 25 bar. Tighten the adjustment screw.
- 11 Turn the engine off and remove the pressure gauge.

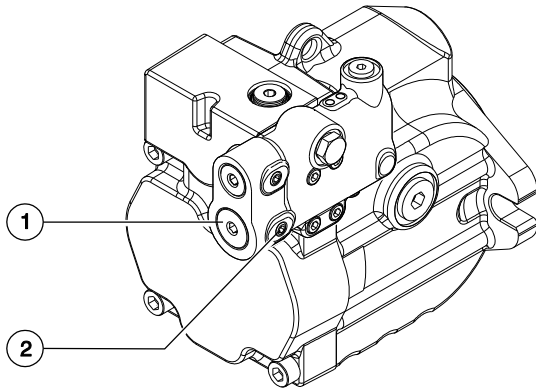
### How to Adjust the Function Pump Pressure Compensator

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

- 1 Confirm the system relief pressure is set to specification. Refer to Repair Procedure, *Valve Adjustments - Function Manifold*.
- 2 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the function manifold
- 3 Start the engine from the ground controls and change the rpm to high idle.
- 4 Push and hold the high speed function enable button (rabbit symbol). Do not activate any boom functions.
- 5 Locate the function enable solenoids below the function pumps on the engine tray. Disconnect the wire connector from the inside solenoid and observe the pressure reading on the pressure gauge.
  - ⦿ Result: The gauge should show 2900 psi / 200 bar on the end pump.
  - ✗ Result: If the gauge does not show 2900 psi / 200 bar, proceed to step 7 to adjust the function pump pressure compensator.
- 6 Reconnect the wire connector to the inside solenoid and disconnect the wire connector from the outer solenoid.
  - ⦿ Result: The gauge should show 2700 psi / 186 bar on the middle pump.
  - ✗ Result: If the gauge does not show 2700 psi / 186 bar, proceed to step 7 to adjust the function pump pressure compensator.

## Hydraulic Pumps

- 7 Loosen the set screw for the pressure compensator adjustment screw.



- 1 pressure compensator set screw
- 2 pressure compensator adjustment screw

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

### NOTICE

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

- 9 Verify that the wire connectors to both solenoids are securely connected.
- 10 Turn the engine off and remove the pressure gauge.

## 7-2

### Drive Pump

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

### How to Remove the Drive Pump

#### NOTICE

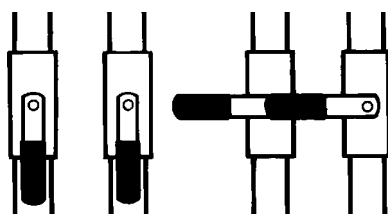
Component damage hazard. The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system and cause severe component damage. Dealer service is recommended.

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

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

## Hydraulic Pumps

- 2 Locate the two hydraulic tank valves at the hydraulic tank. Close the valves.



open

closed

### NOTICE

Component damage hazard. The engine must not be started with the hydraulic tank shut-off valves in the closed position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

- 3 Tag, disconnect and plug the hydraulic hoses from the drive and function pumps. Cap the fittings on the pumps.

### ⚠ WARNING

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

- 4 Support the pumps with a suitable lifting device and remove the two drive pump mounting fasteners.

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

- 6 Remove the drive pump from the machine.

### NOTICE

Component damage hazard. The pump(s) may become unbalanced and fall if not properly supported.

### NOTICE

Component damage hazard. The engine must not be started with the hydraulic tank shut-off valves in the closed position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

---

# Hydraulic Pumps

## How to Prime the Drive Pump

**NOTICE**

Component damage hazard.  
Be sure to open the two  
hydraulic tank valves before  
performing this procedure.

- 1 Connect a 0 to 600 psi / 0 to 50 bar pressure gauge to either the "A" or "B" test port on the drive pump.
- 2 **Perkins models:** Disconnect the engine wiring harness from the fuel shutoff solenoid at the injector pump.  
**Deutz models:** Hold the manual fuel shutoff valve clockwise to the closed position.
- 3 Have another person crank the engine with the starter motor for 15 seconds, wait 15 seconds, then crank the engine an additional 15 seconds or until the pressure reaches approximately 250 psi / 17 bar.
- 4 **Perkins models:** Connect the engine wiring harness to the fuel solenoid.  
**Deutz models:** Release the manual fuel shutoff valve.
- 5 Start the engine from the ground controls.
- 6 Check for hydraulic leaks.

# Manifolds

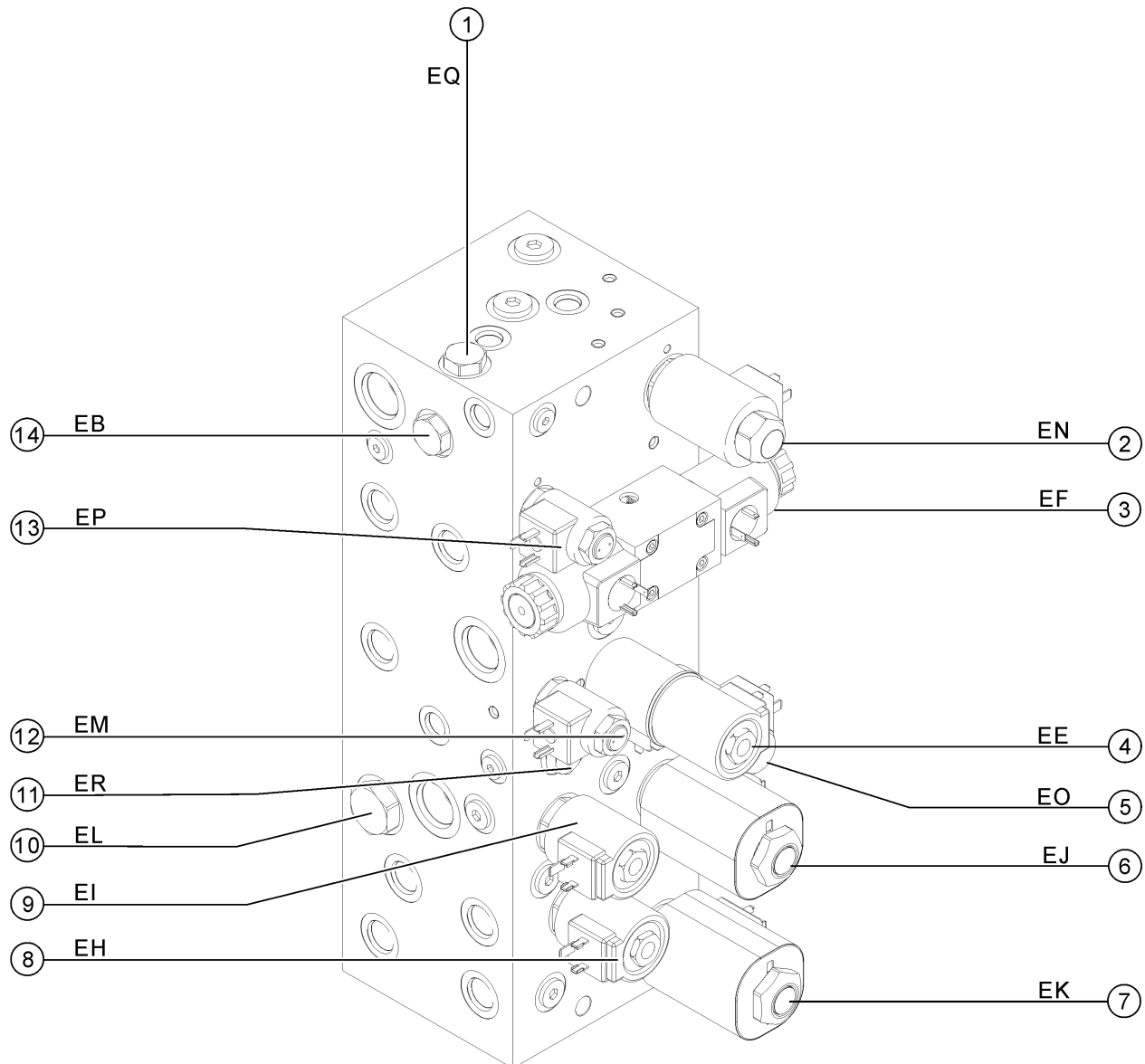
## 8-1

### Function Manifold Components, SX-125 XC – View 1

The function manifold is mounted next to the hydraulic tank on the ground control side of the machine.

| Index No. | Description                                                          | Schematic Item | Function                                                                 | Torque                    |
|-----------|----------------------------------------------------------------------|----------------|--------------------------------------------------------------------------|---------------------------|
| 1         | Check valve, 10 psi / 0.7 bar                                        | EQ             | Prevents the draining of hydraulic oil from the platform manifold        | 18-20 ft-lbs / 25-27 Nm   |
| 2         | Proportional solenoid valve                                          | EN             | Primary lift, proportional speed control                                 | 28-30 ft-lbs / 38-40 Nm   |
| 3         | Solenoid operated 3 position 4 way directional valve                 | EF             | Boom up/down                                                             | 22-25 ft-lbs / 29.5-34 Nm |
| 4         | Solenoid operated 3 position 4 way directional valve                 | EE             | Turntable rotate control, left/right                                     | 22-25 ft-lbs / 29.5-34 Nm |
| 5         | Proportional solenoid valve                                          | EO             | Boom extend/retract, proportional speed control                          | 28-30 ft-lbs / 38-40 Nm   |
| 6         | Solenoid operated 2 position 3 way directional valve                 | EJ             | Boom extend control                                                      | 28-30 ft-lbs / 38-40 Nm   |
| 7         | Solenoid operated 2 position 3 way directional valve                 | EK             | Boom retract control                                                     | 28-30 ft-lbs / 38-40 Nm   |
| 8         | Solenoid operated 2 position 2 way directional valve normally closed | EH             | Boom retract sequence control                                            | 22-35 ft-lbs / 43-47 Nm   |
| 9         | Solenoid operated 2 position 2 way directional valve normally closed | EI             | Boom extend sequence control                                             | 22-35 ft-lbs / 43-47 Nm   |
| 10        | Check valve, 30 psi / 2.1 bar                                        | EL             | Back pressure check, boom extend                                         | 28-30 ft-lbs / 38-40 Nm   |
| 11        | Check valve, 25 psi / 1.7 bar                                        | ER             | System relief valve circuit                                              | 18-20 ft-lbs / 25-27 Nm   |
| 12        | Proportional solenoid valve                                          | EM             | Turntable rotate, proportional speed control left/right                  | 18-20 ft-lbs / 25-27 Nm   |
| 13        | Proportional solenoid valve                                          | EP             | Boom extend/retract, proportional speed control                          | 18-20 ft-lbs / 25-27 Nm   |
| 14        | Check valve, 10 psi / 0.7 bar                                        | EB             | Block flow from function pump and auxiliary pump #2 to auxiliary pump #1 | 18-20 ft-lbs / 25-27 Nm   |

# Manifolds



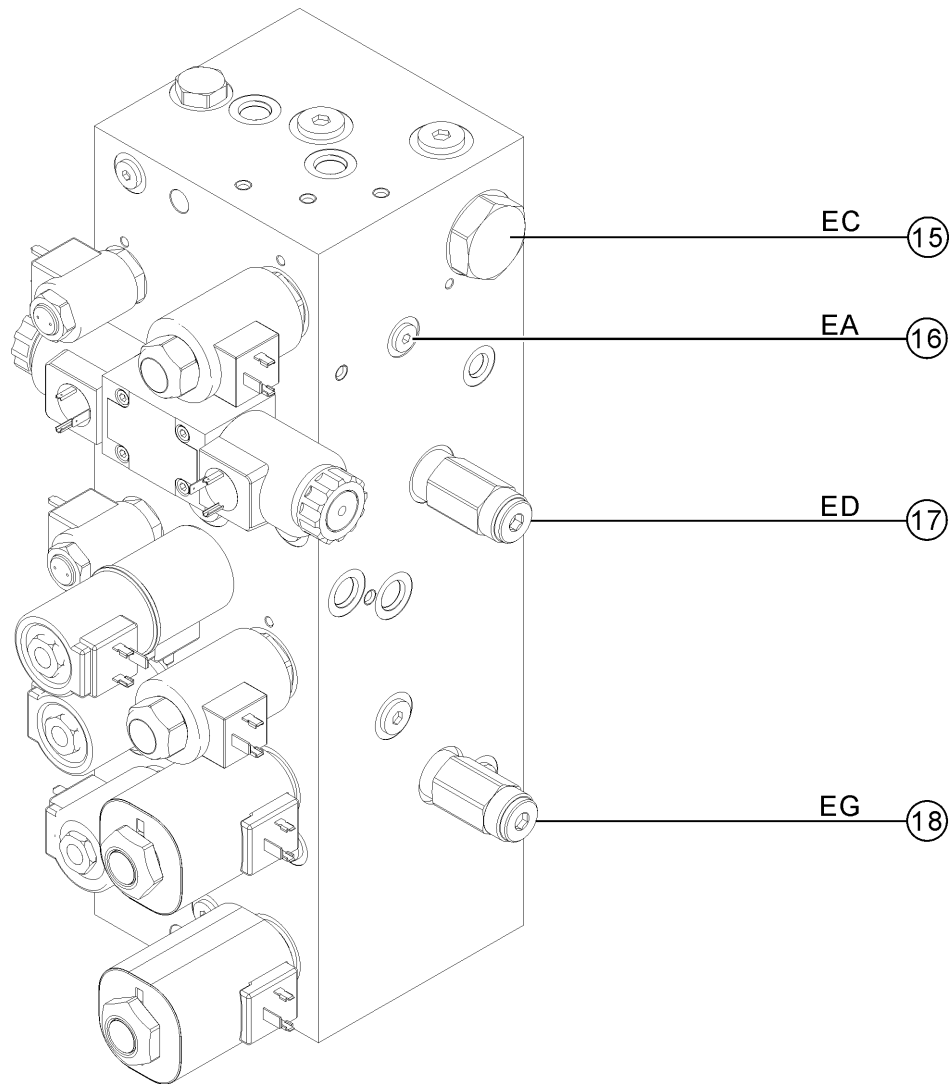
# Manifolds

## Function Manifold Components, SX-125 XC – View 2

| Index No. | Description                        | Schematic Item | Function                                                                 | Torque                  |
|-----------|------------------------------------|----------------|--------------------------------------------------------------------------|-------------------------|
| 15        | Check valve, 5 psi / 0.35 bar      | EC             | Block flow from function pump and auxiliary pump #1 to auxiliary pump #2 | 46-50 ft-lbs / 62-67 Nm |
| 16        | Check valve, 5 psi / 0.3 bar       | EA             | Block flow from auxiliary pump to function pump                          | 12-14 ft-lbs / 16-19 Nm |
| 17        | Relief valve, 3200 psi / 220.7 bar | ED             | Function manifold pressure limit                                         | 28-30 ft-lbs / 38-40 Nm |
| 18        | Relief valve, 1950 psi / 134.5 bar | EG             | Boom extend pressure limit                                               | 18-20 ft-lbs / 25-27 Nm |



## Manifolds

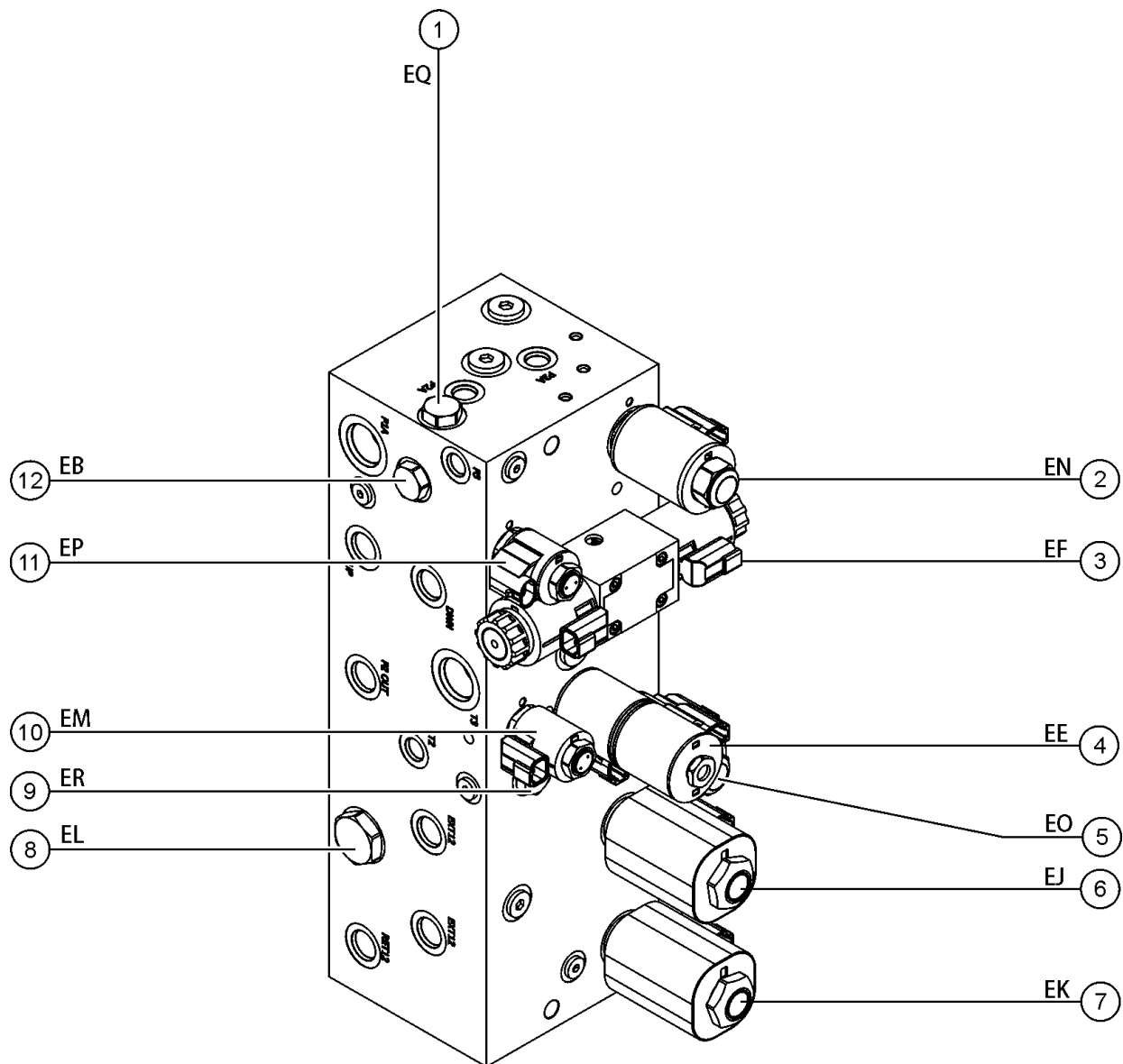


## Manifolds

### Function Manifold Components, SX-105 XC

| Index No. | Description                                          | Schematic Item | Function                                                                 | Torque                    |
|-----------|------------------------------------------------------|----------------|--------------------------------------------------------------------------|---------------------------|
| 1         | Check valve, 10 psi / 0.7 bar                        | EQ             | Prevents the draining of hydraulic oil from the platform manifold        | 18-20 ft-lbs / 25-27 Nm   |
| 2         | Proportional solenoid valve                          | EN             | Primary lift, proportional speed control                                 | 28-30 ft-lbs / 38-40 Nm   |
| 3         | Solenoid operated 3 position 4 way directional valve | EF             | Boom up/down                                                             | 22-25 ft-lbs / 29.5-34 Nm |
| 4         | Solenoid operated 3 position 4 way directional valve | EE             | Turntable rotate control, left/right                                     | 22-25 ft-lbs / 29.5-34 Nm |
| 5         | Proportional solenoid valve                          | EO             | Boom extend/retract, proportional speed control                          | 28-30 ft-lbs / 38-40 Nm   |
| 6         | Solenoid operated 2 position 3 way directional valve | EJ             | Boom extend control                                                      | 28-30 ft-lbs / 38-40 Nm   |
| 7         | Solenoid operated 2 position 3 way directional valve | EK             | Boom retract control                                                     | 28-30 ft-lbs / 38-40 Nm   |
| 8         | Check valve, 30 psi / 2.1 bar                        | EL             | Back pressure check, boom retract                                        | 28-30 ft-lbs / 38-40 Nm   |
| 9         | Check valve, 25 psi / 1.7 bar                        | ER             | System relief valve circuit                                              | 18-20 ft-lbs / 25-27 Nm   |
| 10        | Proportional solenoid valve                          | EM             | Turntable rotate, proportional speed control left/right                  | 18-20 ft-lbs / 25-27 Nm   |
| 11        | Proportional solenoid valve                          | EP             | Primary lift, proportional speed control                                 | 18-20 ft-lbs / 25-27 Nm   |
| 12        | Check valve, 10 psi / 0.7 bar                        | EB             | Block flow from function pump and auxiliary pump #2 to auxiliary pump #1 | 18-20 ft-lbs / 25-27 Nm   |

# Manifolds



## Manifolds

### 8-2 Valve Adjustments - Function Manifold

#### How to Adjust the Function Manifold Relief Valve

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

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

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the function manifold
- 2 Start the engine and raise the boom slightly and completely lower the jib boom. Turn off the engine.
- 3 Push and hold the auxiliary pump button and the jib down button and observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.
- 4 Use a wrench to hold the relief valve and remove the cap.
- 5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the relief valve cap.

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

- 6 Repeat step 3 to confirm relief valve pressure.
- 7 Remove the pressure gauge.

#### How to Adjust the Boom Extend Relief Valve

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

- 1 Locate limit switch LSB4EO/S on the cable track side of boom #2.
- 2 Disconnect the wire connector from the limit switch and connect a jumper wire to pin 1 and pin 2 of the deutsch connector on the upper limit switch cable.

Note: The correct wire connector will be a 4 pin connector with a red and blue marker on the cable.

- 3 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the function manifold.
- 4 Start the engine from the ground controls.
- 5 Fully raise and extend the boom.
- 6 Simultaneously push and hold the function enable/high speed button and the boom extend button with the boom fully extended. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Specifications*.
- 7 Turn the engine off. Use a wrench to hold the relief valve and remove the cap.
- 8 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Install the relief valve cap.

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

- 9 Repeat step 2 through 6 to confirm relief valve pressure.

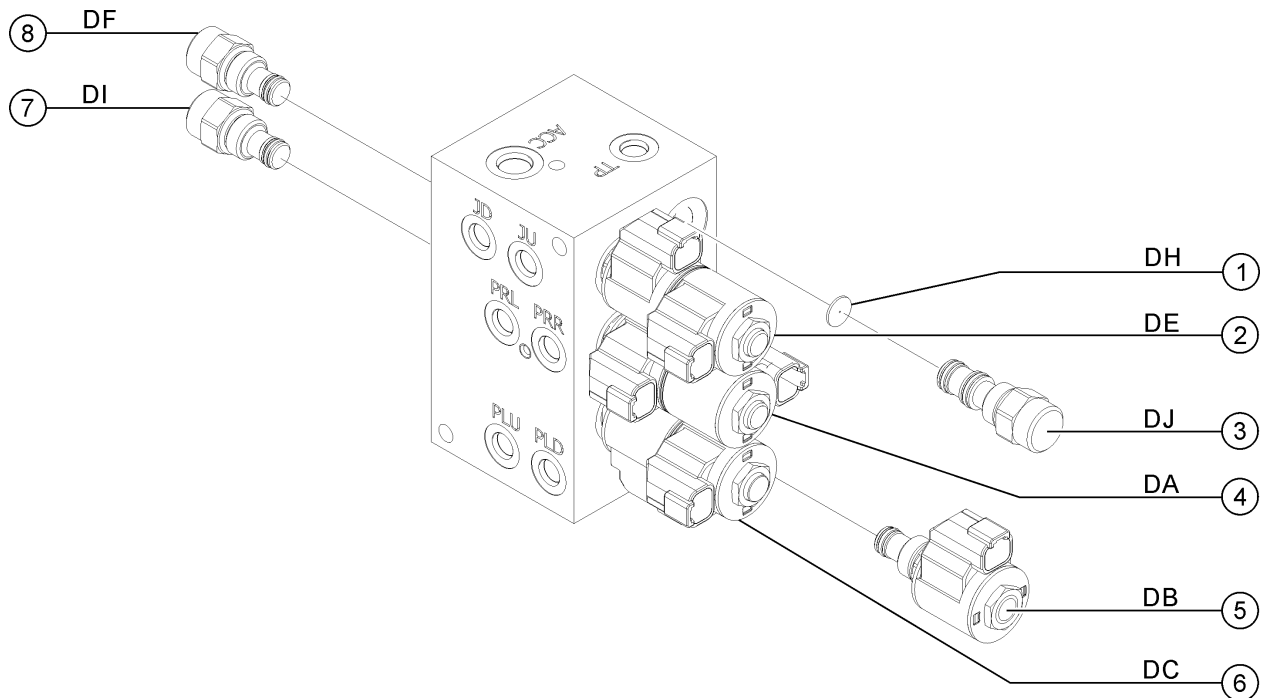
# Manifolds

## 8-3

### Platform Manifold Components

The platform manifold is mounted to the platform mounting weldment.

| Index No. | Description                                                        | Schematic Item | Function                                                                                     | Torque                  |
|-----------|--------------------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------|-------------------------|
| 1         | Orifice, 0.03in / 0.76mm                                           | DH             |                                                                                              |                         |
| 2         | Proportional solenoid operated 3 position 5 way directional valve  | DE             | Jib boom control, up/down                                                                    | 18-20 ft-lbs / 24-27 Nm |
| 3         | Pressure compensator valve, 150 Psi /10.3 bar                      | DJ             | Jib boom up/down circuit, regulates pressure drop across jib boom up/down proportional valve | 18-20 ft-lbs / 24-27 Nm |
| 4         | Solenoid operated 3 position 4 way directional valve               | DA             | Platform rotate control, left/right                                                          | 18-20 ft-lbs / 24-27 Nm |
| 5         | Solenoid operated 2 position 2 way directional valve normally open | DB             | Enable platform level up/down                                                                | 18-20 ft-lbs / 24-27 Nm |
| 6         | Proportional solenoid operated 3 position 4 way directional valve  | DC             | Platform level control, up/down                                                              | 18-20 ft-lbs / 24-27 Nm |
| 7         | Flow control valve, 0.2 GPM /0.76 LPM                              | DI             | Platform level up/down circuit                                                               | 18-20 ft-lbs / 24-27 Nm |
| 8         | Flow control valve, 0.2 GPM /0.76 LPM                              | DF             | Platform rotate left/right circuit                                                           | 18-20 ft-lbs / 24-27 Nm |

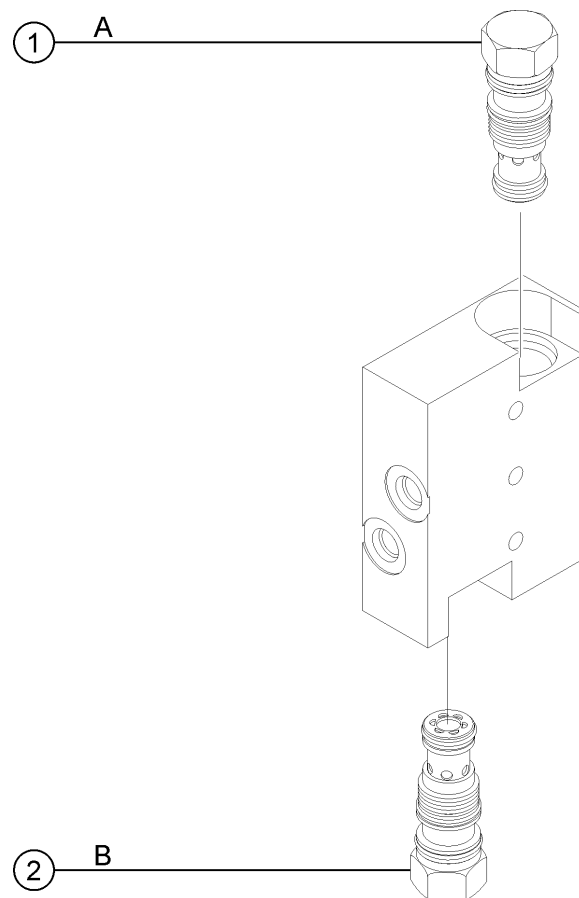


# Manifolds

## 8-4

### Platform Rotate Counterbalance Valve Manifold Components

| Index No. | Description          | Schematic Item | Function              | Torque                     |
|-----------|----------------------|----------------|-----------------------|----------------------------|
| 1         | Counterbalance valve | A              | Platform rotate left  | 37-44 ft-lbs /<br>50-60 Nm |
| 2         | Counterbalance valve | B              | Platform rotate right | 37-44 ft-lbs /<br>50-60 Nm |



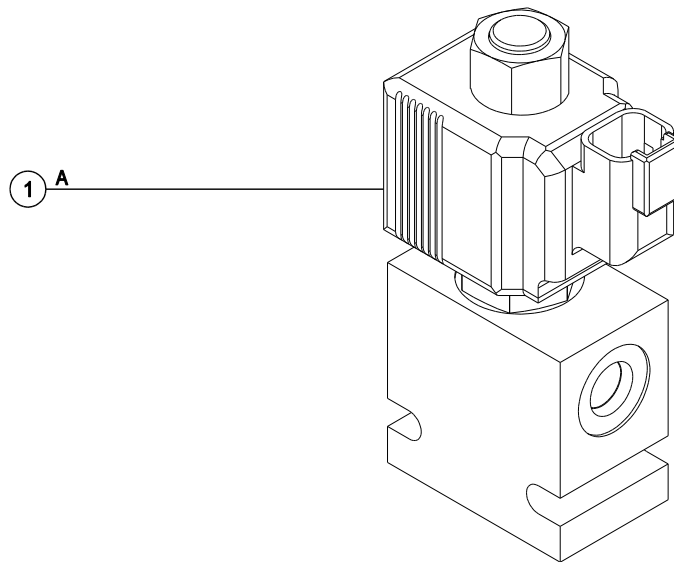
## Manifolds

### 8-5

#### Function Enable Manifold

The function enable manifold is mounted on the charge filter mount forming beside the function pump.

| Index No. | Description                       | Schematic Item | Function                                                                                   | Torque                  |
|-----------|-----------------------------------|----------------|--------------------------------------------------------------------------------------------|-------------------------|
| 1         | Solenoid valve, 2 position, 2 way | A              | Enables function pumps to provide hydraulic pressure for all boom and steer/axle functions | 20-25 ft-lbs / 27-34 Nm |



# Manifolds

## 8-6

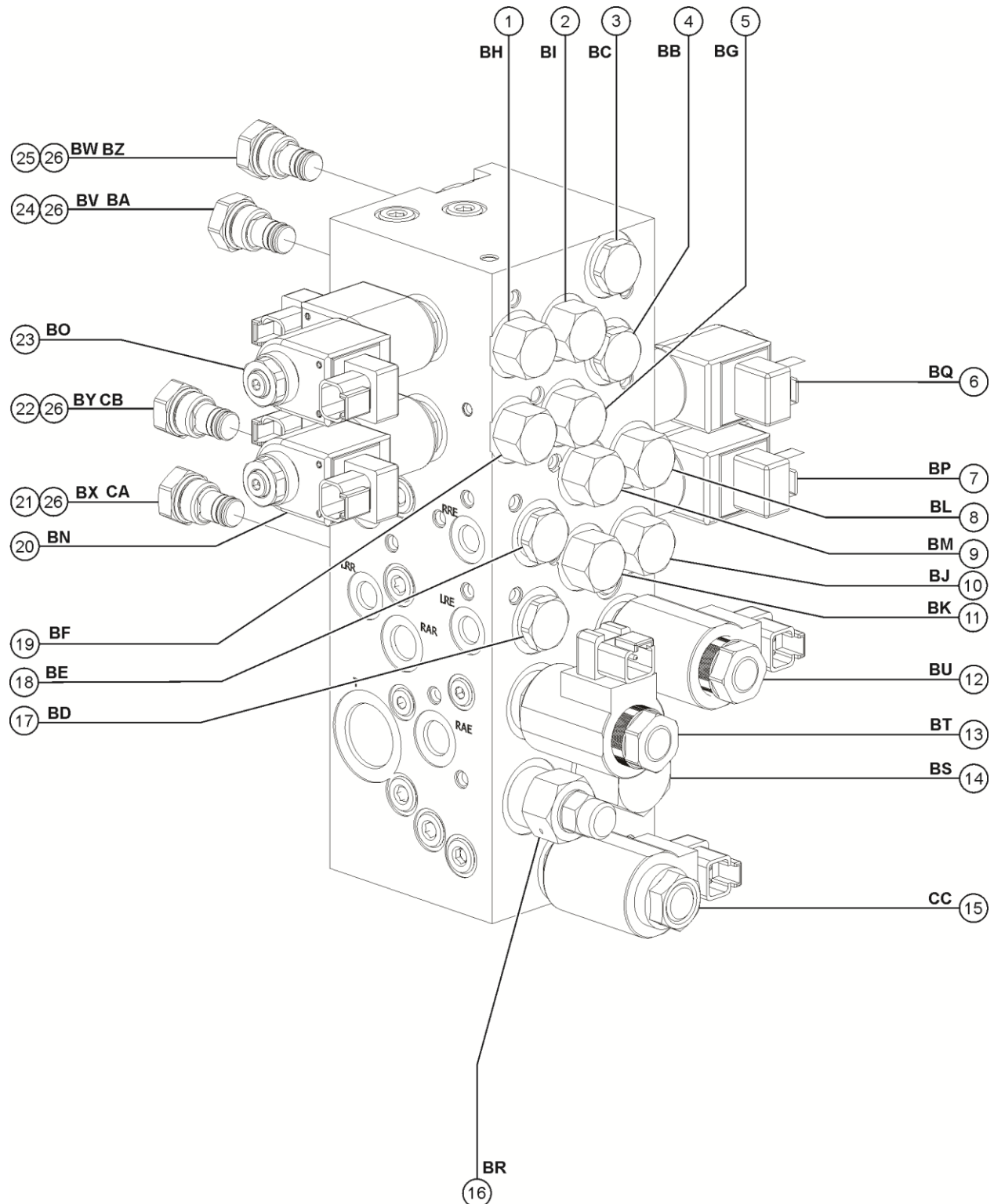
### Steer and Axle Manifold

The steer and axle manifold is mounted inside the manifold box at the yellow triangle side of the machine.

| Index No. | Description                             | Schematic Item | Function                                                          | Torque                  |
|-----------|-----------------------------------------|----------------|-------------------------------------------------------------------|-------------------------|
| 1         | Flow control valve, 2.1 gpm / 8 L/min   | BH             | Right front steer cylinder extend circuit                         | 20-25 ft-lbs / 27-34 Nm |
| 2         | Flow control valve, 1.5 gpm / 5.7 L/min | BI             | Right front steer cylinder retract circuit                        | 20-25 ft-lbs / 27-34 Nm |
| 3         | Check valve                             | BC             | Prevents right front steer cylinder from moving when not steering | 20-25 ft-lbs / 27-34 Nm |
| 4         | Check valve                             | BB             | Prevents left front steer cylinder from moving when not steering  | 20-25 ft-lbs / 27-34 Nm |
| 5         | Flow control valve, 1.5 gpm / 5.7 L/min | BG             | Left front steer cylinder retract circuit                         | 20-25 ft-lbs / 27-34 Nm |
| 6         | Solenoid valve, 3 position 4 way        | BQ             | Steer left/right, right rear steer cylinder                       | 20-25 ft-lbs / 27-34 Nm |
| 7         | Solenoid valve, 3 position 4 way        | BP             | Steer left/right, left rear steer cylinder                        | 20-25 ft-lbs / 27-34 Nm |
| 8         | Flow control valve, 2.1 gpm / 8 L/min   | BL             | Right rear steer cylinder extend circuit                          | 20-25 ft-lbs / 27-34 Nm |
| 9         | Flow control valve, 1.5 gpm / 5.7 L/min | BM             | Right rear steer cylinder retract circuit                         | 20-25 ft-lbs / 27-34 Nm |
| 10        | Flow control valve, 2.1 gpm / 8 L/min   | BJ             | Left rear steer cylinder extend circuit                           | 20-25 ft-lbs / 27-34 Nm |
| 11        | Flow control valve, 1.5 gpm / 5.7 L/min | BK             | Left rear steer cylinder retract circuit                          | 20-25 ft-lbs / 27-34 Nm |
| 12        | Solenoid Valve, 2 position 3 way        | BU             | Axle retract                                                      | 50-55 ft-lbs / 68-75 Nm |
| 13        | Solenoid Valve, 2 position 3 way        | BT             | Axle extend                                                       | 50-55 ft-lbs / 68-75 Nm |
| 14        | Flow control valve, 9 gpm / 34 L/min    | BS             | Axle extend/retract circuit                                       | 50-55 ft-lbs / 68-75 Nm |
| 15        | Solenoid Valve, 2 position 2 way        | CC             | Axle retract                                                      | 33-37 ft-lbs / 45-50 Nm |



# Manifolds

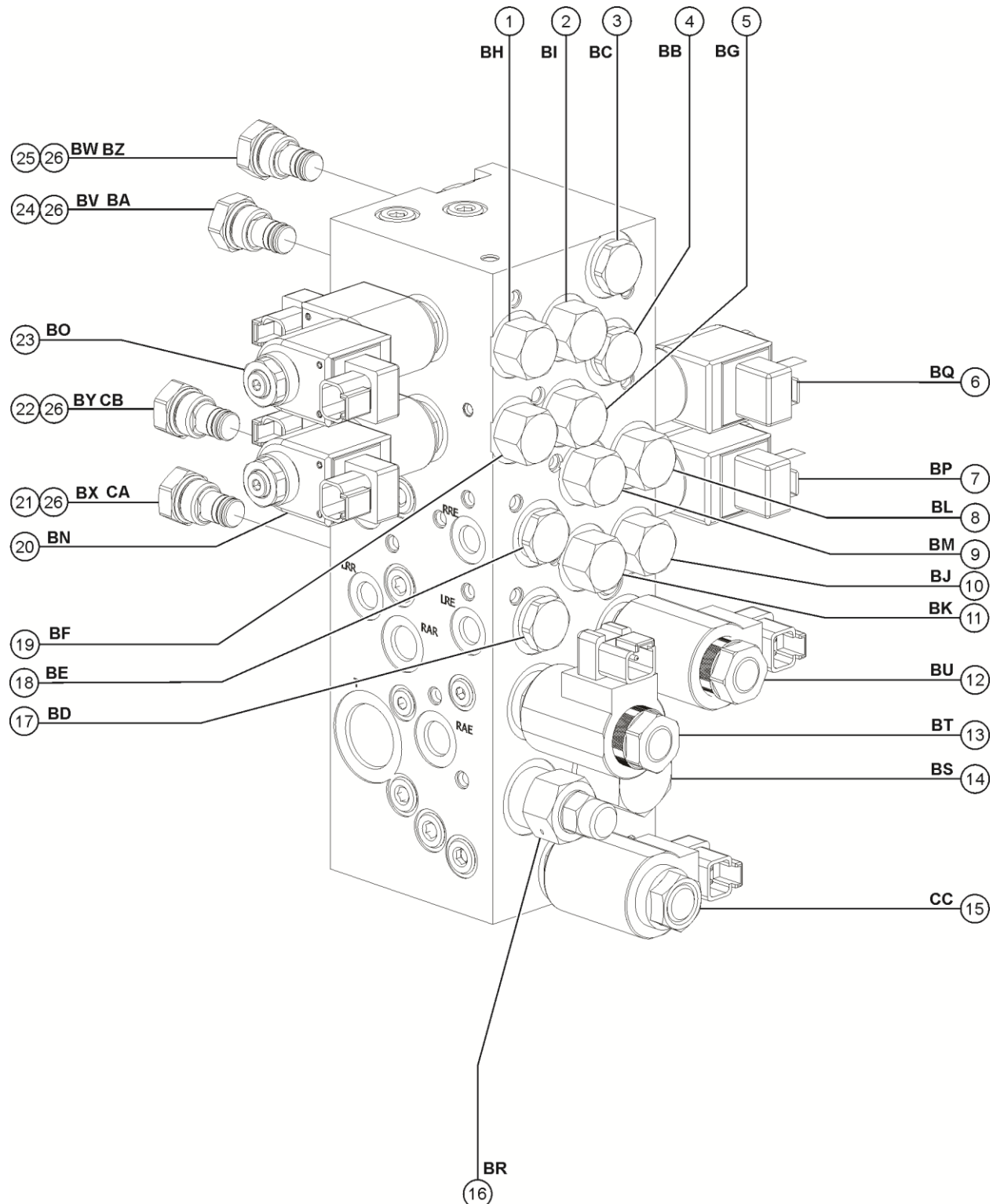


# Manifolds

## Steer and Axle Manifold, continued

| Index No. | Description                                 | Schematic Item | Function                                                          | Torque                  |
|-----------|---------------------------------------------|----------------|-------------------------------------------------------------------|-------------------------|
| 16        | Pressure reducing valve, 2400 psi / 165 bar | BR             | Axle extend/retract circuit                                       | 30-35 ft-lbs / 41-47 Nm |
| 17        | Check valve                                 | BD             | Prevents left rear steer cylinder from moving when not steering   | 20-25 ft-lbs / 27-34 Nm |
| 18        | Check valve                                 | BE             | Prevents right rear steer cylinder from moving when not steering  | 20-25 ft-lbs / 27-34 Nm |
| 19        | Flow control valve, 2.1 gpm / 8 L/min       | BF             | Left front steer cylinder extend circuit                          | 20-25 ft-lbs / 27-34 Nm |
| 20        | Solenoid valve, 3 position 4 way            | BN             | Steer left/right, left front steer cylinder                       | 20-25 ft-lbs / 27-34 Nm |
| 21        | Check valve                                 | BX             | Prevents left rear steer cylinder from moving when not steering   | 20-25 ft-lbs / 27-34 Nm |
| 22        | Check valve                                 | BY             | Prevents right rear steer cylinder from moving when not steering  | 20-25 ft-lbs / 27-34 Nm |
| 23        | Solenoid valve, 3 position 4 way            | B0             | Steer left/right, right front steer cylinder                      | 20-25 ft-lbs / 27-34 Nm |
| 24        | Check valve                                 | BV             | Prevents left front steer cylinder from moving when not steering  | 20-25 ft-lbs / 27-34 Nm |
| 25        | Check valve                                 | BW             | Prevents right front steer cylinder from moving when not steering | 20-25 ft-lbs / 27-34 Nm |
| 26        | Pilot operated piston                       | BA, BZ, CA, CB |                                                                   |                         |

# Manifolds



## Manifolds

### 8-7

### Valve Adjustments - Steer and Axle Manifold

---

#### How to Adjust the Axle Relief Valve

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

Note: Refer to Steer and Axle Manifold list to locate the axle relief valve.

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

- 1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to the test port on the steer and axle manifold.
- 2 Locate the axle relief valve on the steer and axle manifold. Hold the relief valve with a wrench and remove the cap.
- 3 Start the engine from the platform controls and press down the foot switch. Press and hold the axle extend button at the platform controls. Observe the pressure reading on the pressure gauge. Refer to Specifications, *Hydraulic Component Specifications*.

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

#### NOTICE

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

- 6 Repeat steps 3 through 5 to confirm relief valve pressure.
- 7 Remove the pressure gauge.

## Manifolds

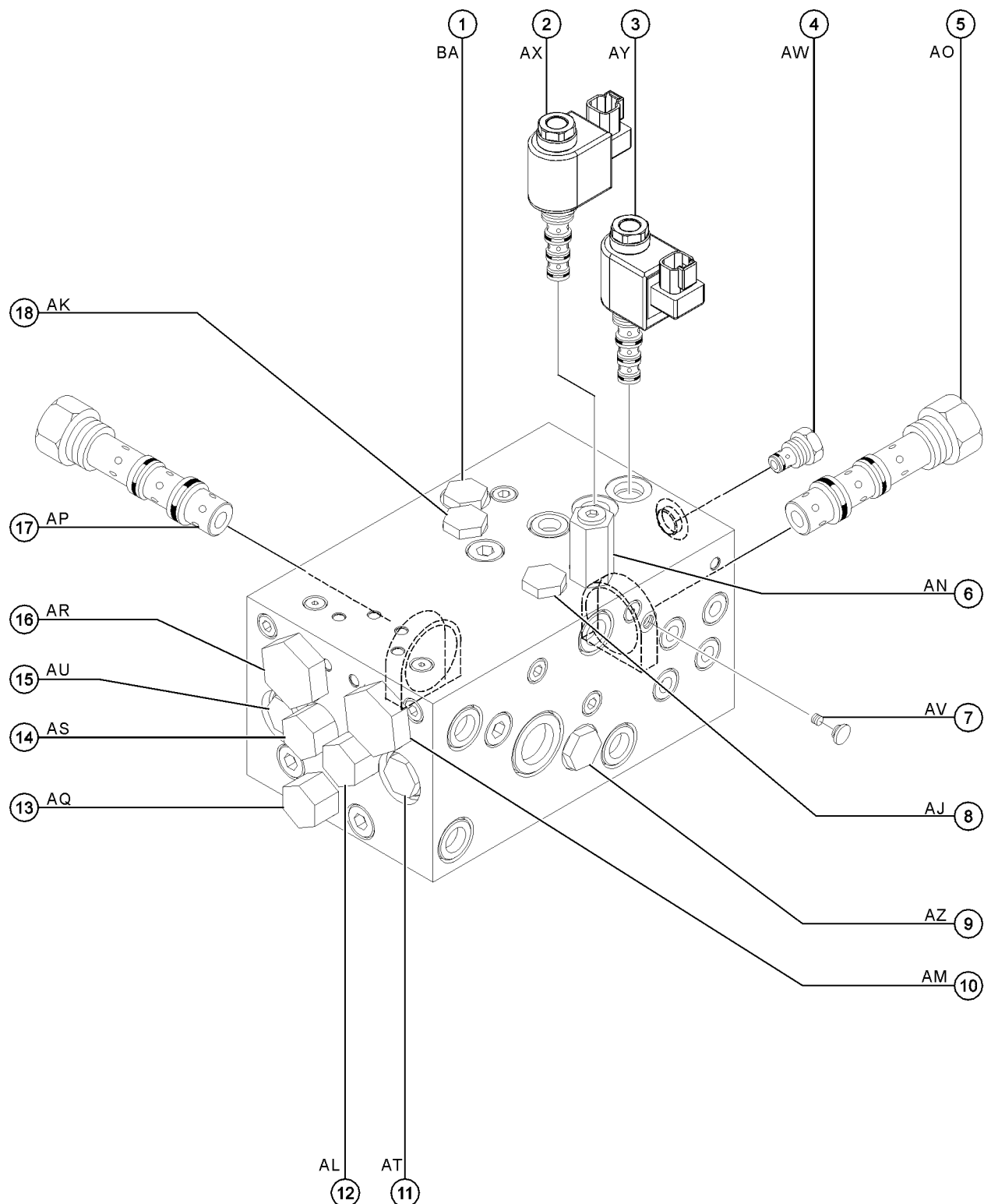
### 8-8

#### Traction Manifold Components

The traction manifold is mounted inside the drive chassis at the circle end of the machine

| Index No. | Description                         | Schematic Item | Function                                                                            | Torque                          |
|-----------|-------------------------------------|----------------|-------------------------------------------------------------------------------------|---------------------------------|
| 1         | Check valve                         | BA             | Anti-cavitation                                                                     | 30-35 ft-lbs /<br>40.7-47.5 Nm  |
| 2         | Solenoid Valve, 2 position 3 way    | AX             | Two-speed drive motor shift                                                         | 26-30 ft-lbs /<br>35.3-40.7 Nm  |
| 3         | Solenoid Valve, 2 position 3 way    | AY             | Brake release                                                                       | 26-30 ft-lbs /<br>35.3-40.7 Nm  |
| 4         | Check valve                         | AW             | Keeps brakes released if temporary loss of charge pressure                          | 20-25 ft-lbs /<br>27.1-33.9 Nm  |
| 5         | Shuttle Valve, 3 position 3 way     | AO             | Charge pressure circuit that directs hot oil out of low pressure side of drive pump | 50-55 ft-lbs /<br>67.8-74.6 Nm  |
| 6         | Relief valve, 250 psi / 17.23 bar   | AN             | Charge pressure circuit                                                             | 20-25 ft-lbs /<br>27.1-33.9 Nm  |
| 7         | Orifice Plug, 0.030 inch / 0.762 mm | AV             | Brake and two-speed circuit                                                         | 20-25 ft-lbs /<br>27.1-33.9 Nm  |
| 8         | Check valve                         | AJ             | Anti-cavitation                                                                     | 20-25 ft-lbs /<br>27.1-33.9 Nm  |
| 9         | Check valve                         | AZ             | Anti-cavitation                                                                     | 30-35 ft-lbs /<br>40.7-47.5 Nm  |
| 10        | Flow divider/combiner valve         | AM             | Controls flow to circle end drive motors in forward and reverse                     | 90-100 ft-lbs /<br>122-135.6 Nm |
| 11        | Check valve                         | AT             | Anti-cavitation                                                                     | 20-25 ft-lbs /<br>27.1-33.9 Nm  |
| 12        | Orifice, 2 gpm / 7.6 L/min          | AL             | Equalizes pressure on both sides of divider/combiner valve AM                       | 30-35 ft-lbs /<br>40.7-47.5 Nm  |

## Manifolds



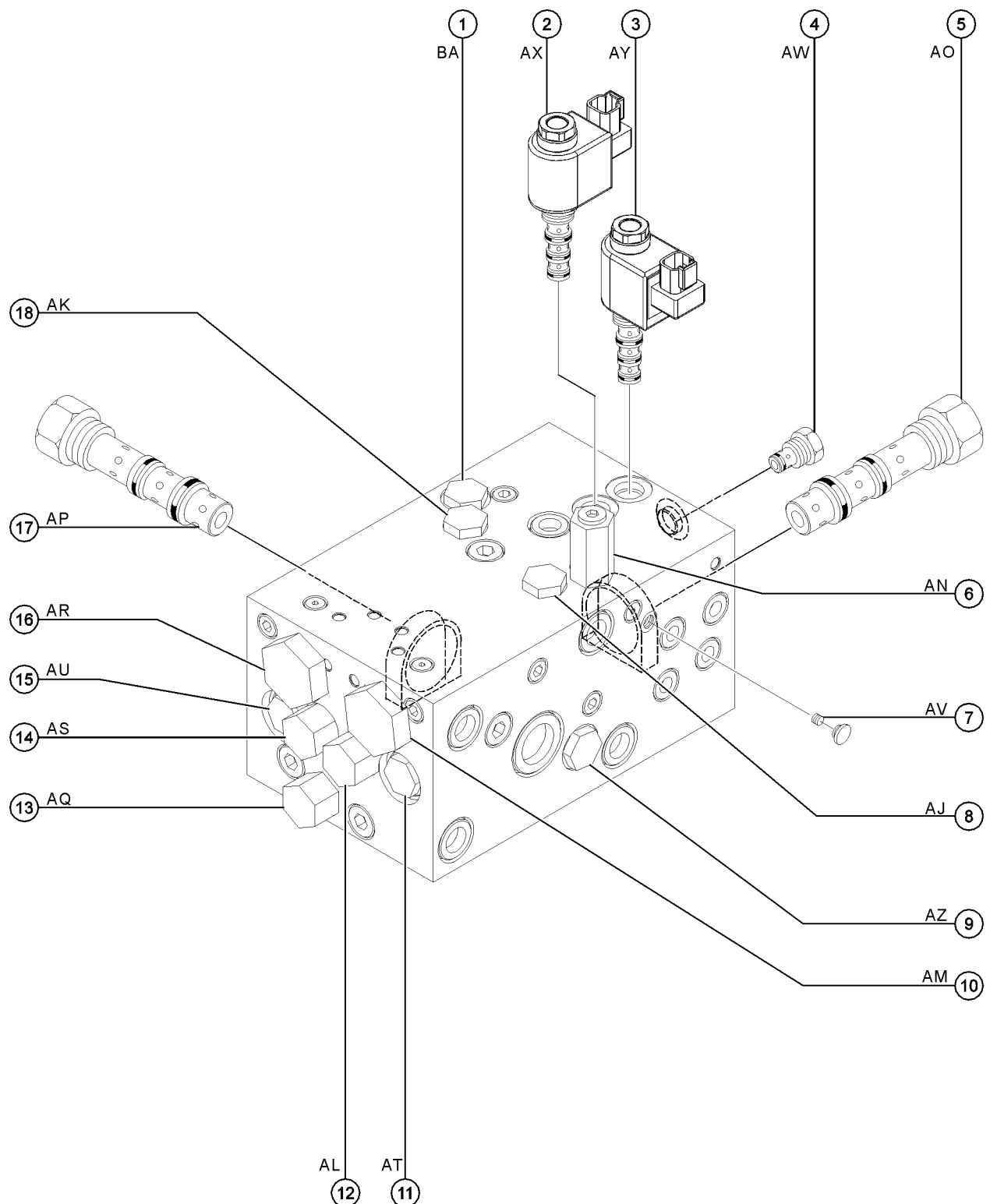
# Manifolds

## Traction Manifold Components

The traction manifold is mounted inside the drive chassis at the circle end of the machine

| Index No. | Description                 | Schematic Item | Function                                                        | Torque                       |
|-----------|-----------------------------|----------------|-----------------------------------------------------------------|------------------------------|
| 13        | Orifice, 2 gpm / 7.6 L/min  | AQ             | Equalizes pressure on both sides of divider/combiner valve AP   | 30-35 ft-lbs / 40.7-47.5 Nm  |
| 14        | Orifice, 2 gpm / 7.6 L/min  | AS             | Equalizes pressure on both sides of divider/combiner valve AR   | 30-35 ft-lbs / 40.7-47.5 Nm  |
| 15        | Check valve                 | AU             | Anti-cavitation                                                 | 20-25 ft-lbs / 27.1-33.9 Nm  |
| 16        | Flow divider/combiner valve | AR             | Controls flow to square end drive motors in forward and reverse | 90-100 ft-lbs / 122-135.6 Nm |
| 17        | Flow divider/combiner valve | AP             | Controls flow to divider/combiner valves AM and AR              | 90-100 ft-lbs / 122-135.6 Nm |
| 18        | Check valve                 | AK             | Anti-cavitation                                                 | 20-25 ft-lbs / 27.1-33.9 Nm  |

# Manifolds





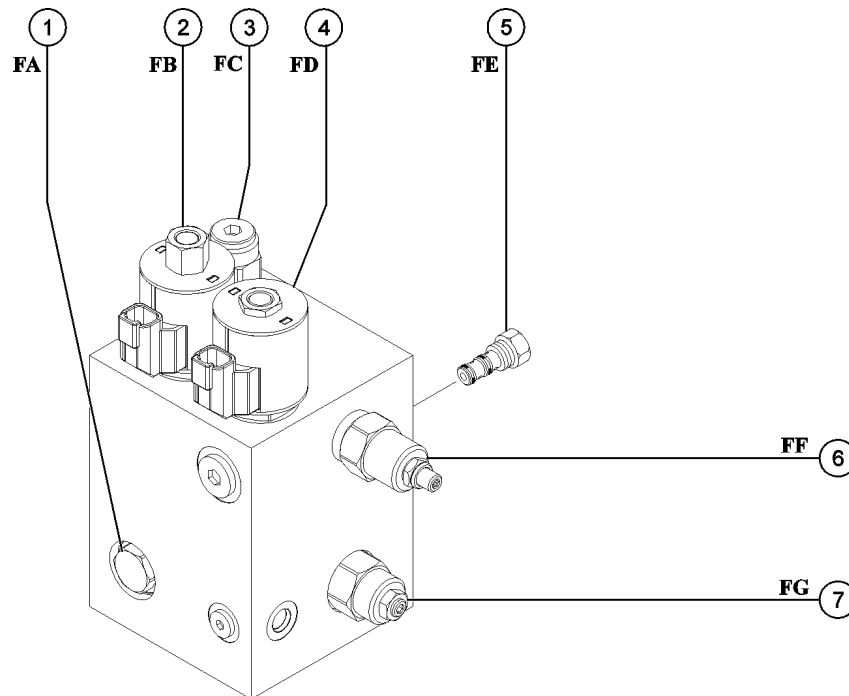
# Manifolds

## 8-9

### Generator Manifold Components

The generator manifold is mounted near the hydraulic generator located above the function manifold.

| Index No. | Description                                      | Schematic Item | Function                               | Torque                      |
|-----------|--------------------------------------------------|----------------|----------------------------------------|-----------------------------|
| 1         | Check valve                                      | FA             | Controls flow to diverter valve        | 19-21 ft-lbs / 25.7-28.5 Nm |
| 2         | Solenoid valve                                   | FB             | Pilot valve to diverter valve          | 33-37 ft-lbs / 45-50 Nm     |
| 3         | Relief valve, 3200 psi / 221 bar                 | FC             | Generator relief valve                 | 24-26 ft-lbs / 32.6-35.4 Nm |
| 4         | Solenoid valve                                   | FD             | Change pressure circuit                | 33-37 ft-lbs / 45-50 Nm     |
| 5         | Check valve                                      | FE             | Prevents oil to generator              | 7-8 ft-lbs / 9.5-10.8 Nm    |
| 6         | Check valve                                      | FF             | Change pressure circuit                | 45-50 ft-lbs / 61-68 Nm     |
| 7         | Counterbalance valve 4.5:1<br>2000 psi / 138 bar | FG             | Adds backpressure to generator circuit | 45-50 ft-lbs / 61-68 Nm     |



## Manifolds

### 8-10 Valve Adjustments - Traction Manifold

---

#### How to Adjust the Hot Oil Relief Valve

Note: The hydraulic oil temperature must be 100°F to 150°F / 38°C to 65.5°C before performing this procedure.

- 1 Connect a 0 to 600 psi / 0 to 50 bar pressure gauge to either the "A" or "B" test port on the drive pump.
- 2 Start the engine from the platform controls.
- 3 Trode and hold the foot switch.
- 4 Another person note the reading on the pressure gauge.
- 5 Turn the engine off.
- 6 Remove the pressure gauge from the drive pump. Connect the gauge to the test port located on the traction manifold.
- 7 Hold the hot oil relief valve and remove the cap.
- 8 Start the engine from the platform controls.
- 9 Drive the machine at low speed with the joystick small angle.
- 10 Note the reading on the pressure gauge.
- 11 Turn the engine off.
- 12 Adjust the internal hex socket. Turn it counterclockwise to decrease the pressure. Install the relief valve cap.
- 13 Repeat steps 8 through 12 until the pressure reading on the gauge is 40 psi / 2.8 bar less than the pressure reading on the pump.
- 14 Remove the pressure gauge.

# Manifolds

## 8-11 Valve Coils

### How to Test a Coil

A properly functioning coil provides an electromotive force which operates the solenoid valve. Critical to normal operation is continuity within the coil that provides this force field.

Since coil resistance is sensitive to temperature, resistance values outside specification can produce erratic operation. When coil resistance decreases below specification, amperage increases. As resistance rises above specification, voltage increases.

While valves may operate when coil resistance is outside specification, maintaining coils within specification will help ensure proper valve function over a wide range of operating temperatures.

#### **⚠ WARNING**

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

- 1 Tag and disconnect the wiring from the coil to be tested.
- 2 Test the coil resistance.
- ⦿ Result: The resistance should be within specification, plus or minus 30%.
- ✗ Result: If the resistance is not within specification, plus or minus 30%, replace the coil.

## Valve Coil Resistance Specification

Note: The following coil resistance specifications are at an ambient temperature of 68°F / 20°C. As valve coil resistance is sensitive to changes in air temperature, the coil resistance will typically increase or decrease by 4% for each 18°F / 10°C that your air temperature increases or decreases from 68°F / 20°C.

### Valve Coil Resistance Specification

#### Function Manifold

|                           |                |
|---------------------------|----------------|
| schematic item EJ, EK     | 4.6Ω@12v       |
| schematic item EO, EN     | 4.65/5.15Ω@12v |
| schematic item J, N, T, U | 7.1Ω@12v       |
| schematic item W, X       | 6.2Ω@12v       |
| schematic Item M          | 8.8Ω@12v       |

#### Steer Manifold

|                               |          |
|-------------------------------|----------|
| schematic item BT, BU         | 5.6Ω@12v |
| schematic item BF, BH, BJ, BL | 7.2Ω@12v |

#### Traction Manifold

|                       |          |
|-----------------------|----------|
| schematic item AX, AY | 7.2Ω@12v |
|-----------------------|----------|

#### Jib Manifold

|                       |          |
|-----------------------|----------|
| schematic item EB, ED | 6.2Ω@10v |
|-----------------------|----------|

#### Platform Manifold

|                           |          |
|---------------------------|----------|
| schematic item DB, DD, DG | 6.2Ω@10v |
|---------------------------|----------|

#### Function Enable Manifold

|                  |          |
|------------------|----------|
| schematic item A | 7.2Ω@12v |
|------------------|----------|

#### Generator Manifold

|                       |          |
|-----------------------|----------|
| schematic item FB, FD | 7.1Ω@12v |
|-----------------------|----------|

# Manifolds

## How to Test a Coil Diode

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

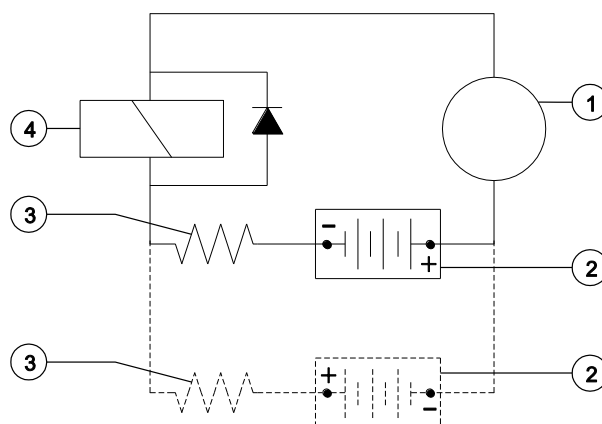
**⚠ WARNING** Electrocutation/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

- 1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.
- 2 Connect a 10Ω resistor to the negative terminal of a known good 9V DC battery. Connect the other end of the resistor to a terminal on the coil.

### Resistor 10Ω

Genie part number 27287

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



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

- 3 Set a multimeter to read DC current.

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

- 4 Connect the negative lead to the other terminal on the coil.
  - 5 Momentarily connect the positive lead from the multimeter to the positive terminal on the 9V DC battery. Note and record the current reading.
  - 6 At the battery or coil terminals, reverse the connections. Note and record the current reading.
- ⦿ Result: Both current readings are greater than 0 mA and are different by a minimum of 20%. The coil is good.
  - ✗ Result: If one or both of the current readings are 0 mA, or if the two current readings do not differ by a minimum of 20%, the coil and/or its internal diode are faulty and the coil should be replaced.

## Turntable Rotation Components

### 9-1

#### Turntable Rotation Assembly

#### How to Remove a Turntable Rotation Assembly

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

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

- 1 Secure the turntable from rotating with the turntable rotation lock pin.
- 2 Remove the ground controls side fixed turntable cover.
- 3 Tag, disconnect the hydraulic hoses from the turntable rotation motor. Cap the fittings on the motor.

#### **⚠ WARNING**

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

- 4 Attach a lifting strap from an overhead crane or other suitable lifting device to the lifting eye on the turntable rotation assembly.

- 5 Remove the drive hub mounting bolts and remove the turntable rotation assembly from the machine.
- 6 Repeat steps 3 through 5 for the other turntable rotation assembly.

#### **⚠ DANGER**

Tip-over hazard. If the turntable rotation lock pin is not properly installed, machine stability is compromised and the machine could tip over when the drive hub is removed from the machine, which could result in death or serious injury.

#### **⚠ WARNING**

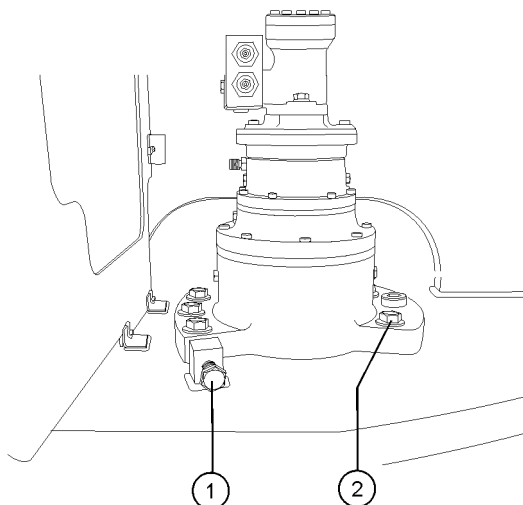
Crushing hazard. The drive hub may become unbalanced and fall if is not properly supported by an overhead crane or lifting device when removed from the machine.

Note: When installing a turntable rotation assembly, the rotation gear backlash must be adjusted. Refer to Repair Procedure, *Adjust the Turntable Rotation Gear Backlash*.

## Turntable Rotation Components

### How to Adjust the Turntable Rotation Gear Backlash

- 1 Secure the turntable from rotating with the turntable rotation lock pin.
- 2 Remove the fixed turntable cover at the ground controls side of the machine.
- 3 Loosen the backlash pivot plate mounting bolts.
- 4 Push the backlash pivot plate towards the turntable as far as possible (this will push the rotation pinion gears into the turntable bearing ring gear).
- 5 Loosen the lock nut on the adjustment bolt.
- 6 Turn the adjustment bolt clockwise until it contacts the backlash pivot plate.
- 7 Turn the adjustment bolt 1/2 to 3/4 turn counterclockwise. Tighten the lock nut on the adjustment bolt.
- 8 Pull the backlash pivot plate away from the turntable until it contacts the adjustment bolt. Then lubricate the mounting fasteners on the backlash pivot plate and torque to specification. Refer to Specifications, *Machine Torque Specifications*.
- 9 Rotate the turntable through an entire rotation. Check for tight spots that could cause binding. Readjust if necessary.



- 1 Adjustment bolt with lock nut
- 2 Pivot plate mounting bolts

- 7 Turn the adjustment bolt 1/2 to 3/4 turn counterclockwise. Tighten the lock nut on the adjustment bolt.

## Turntable Rotation Components

### 9-2 Turntable Level Sensor

#### How to Calibrate the Turntable Level Sensor

Note: If the Safety Controller (SCON) has been replaced, the entire machine needs to be calibrated in a specific order. Consult Genie Product Support.

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

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

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

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



Plus



Minus



Previous

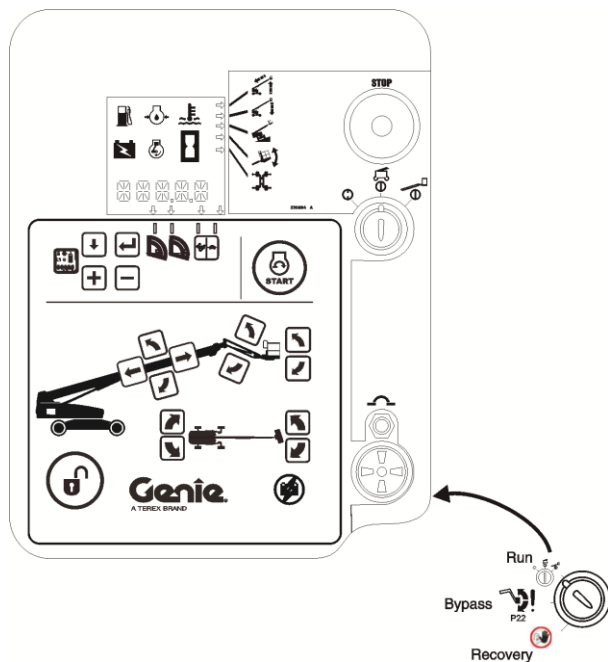


Enter

- 1 Push in the ground controls red Emergency Stop button to the off position.
  - 2 Open the ground control box.
  - 3 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.
  - 4 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.
  - 5 Turn the key switch to ground controls.
  - 6 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.
- Note: The angle sensor calibration values will not be saved correctly unless the key switch is in the bypass position and the calibration toggle switch is activated.
- 7 Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button to the on position. Hold the **enter** button for approximately 5 seconds and then release it.

## Turntable Rotation Components

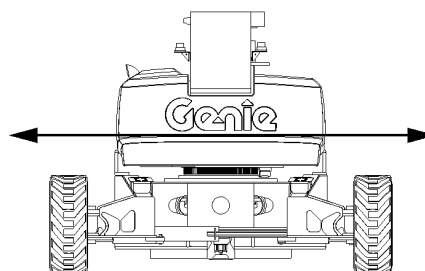
- 8 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.



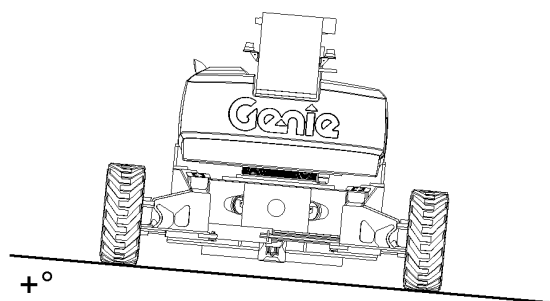
- 1 Run
- 2 Bypass
- 3 Recovery

- 9 Press the **enter** or **previous** button on the LCD screen until SET UNIT X AXIS LEVEL TO GRAVITY is displayed.

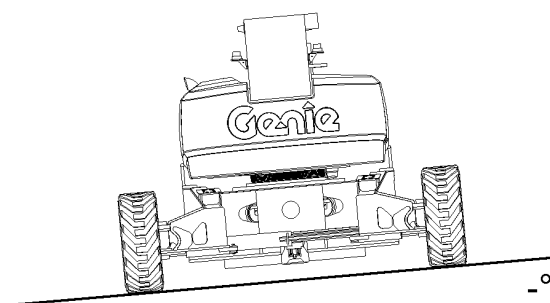
- 10 Place the digital level along the X axis of the turntable.



X axis



positive degree side slope



negative degree side slope

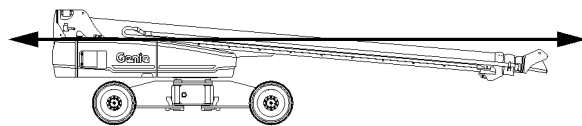
- 11 Press the **plus** button or **minus** button to adjust the display to the exact value shown on the digital level and press the **enter** button.



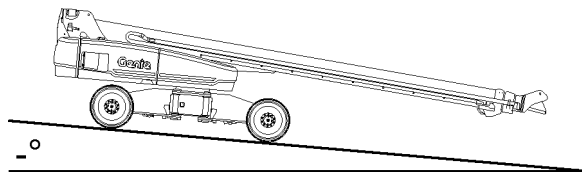
## Turntable Rotation Components

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

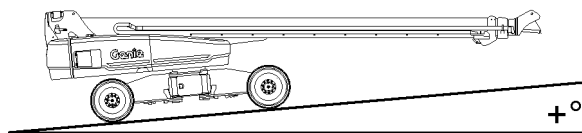
- 12 Press the **enter** or **previous** button on the LCD screen, until SET UNIT Y AXIS LEVEL TO GRAVITY is displayed. Place the digital level along the Y axis of the turntable.



Y axis



negative degree side slope



positive degree side slope

- 13 Press the **plus** button or **minus** button to adjust the display to the exact value shown on the digital level and press the **enter** button.

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

- 14 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 15 Press the **plus** button to select YES, then press the **enter** button to accept.
- 16 Wait approximately 20 seconds and turn the machine off by pressing the red Emergency Stop button in.
- 17 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

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

- 18 Use the key to turn the bypass / recovery key switch to the run position.

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

- 19 Start the engine. Be sure there are no calibration faults shown on the display.

## Axle Components

### 10-1 Steer Sensors

The steer sensors measure steer angle and communicates that information to the ground controls ECM. The steer sensor on the ground controls side of the machine at the square-end acts as the lead sensor when in front wheel steer mode. In rear wheel steer mode, the steer sensor on the ground controls side of the machine at the circle-end acts as the lead sensor. The other three sensors follow the position, or steer angle, of the lead sensor. There is a steer sensor mounted to the top of each steer yoke upper pivot pin.

#### How to Replace a Steer Sensor

Note: When the steer sensor is replaced, both the sensor and magnet must be replaced as a set.

Note: Perform this procedure with the axles fully retracted and the boom in the stowed position.

- 1 Align the remaining wheels on the machine so they are visually parallel to the chassis as close as possible.
- 2 Disconnect the steer sensor assembly cable from the main harness to be replaced.

- 3 Remove the steer sensor cover retaining fasteners. Remove the steer sensor assembly.

Note: If the sensor activator pin needs to be replaced, install the new activator pin per Illustration 1.

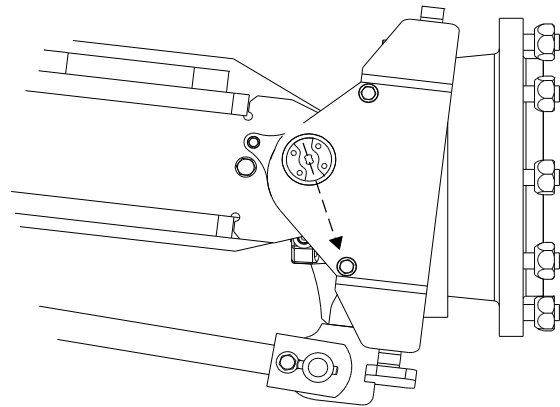


Illustration 1  
(square end, yellow side and circle end, blue side shown)

## Axle Components

**Left front (square-end, blue side) and right rear (circle-end, yellow side) angle sensors:**

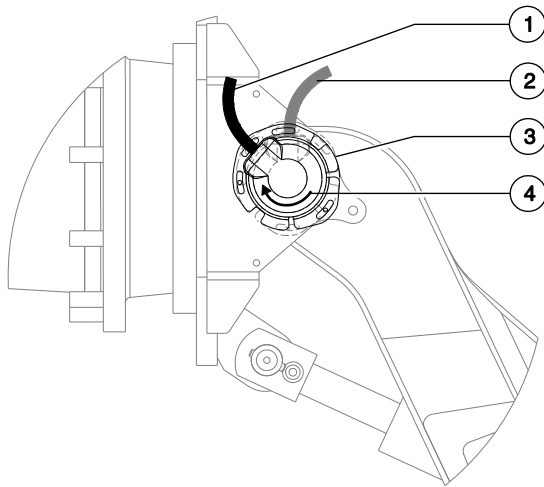


Illustration 2

- 1 installed position
- 2 starting position
- 3 sensor cover
- 4 rotation arrow

- 4 Position the new steer sensor assembly over the sensor activator pin with the sensor cable angled towards the tire. Refer to Illustration 2.
- 5 Align the sensor with the pin and install the sensor on to the pin.

**Note:** Be sure the sensor activator pin is engaged into the sensor.

- 6 Rotate the sensor housing in a clockwise direction until the sensor cable is pointing away from the machine. Refer to Illustration 2.
- 7 Install the steer sensor cover retaining fasteners. Do not tighten the cover retaining fasteners.
- 8 Connect the steer sensor assembly cable to the main harness.
- 9 Calibrate the steer sensor. Refer to Repair Procedure, *How to Calibrate a Replacement Steer Sensor*.

**Note:** Be sure the yoke pivot pin retaining plate is fully engaged into the pivot pin and that the fasteners are securely tightened.

**Right front (square-end, yellow side) and left rear (circle-end, blue side) angle sensors:**

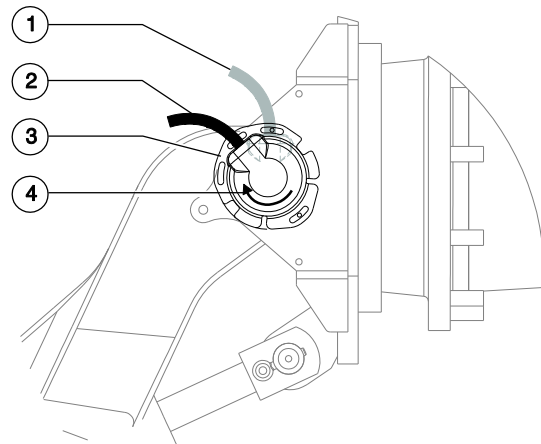


Illustration 3

- 1 starting position
- 2 installed position
- 3 sensor cover
- 4 rotation arrow

## Axle Components

- 10 Position the new steer sensor assembly over the sensor activator pin with the sensor cable angled away from the tire. Refer to Illustration 3.
- 11 Align the sensor with the pin and install the sensor on to the pin.

Note: Be sure the sensor activator pin is engaged into the sensor.

- 12 Rotate the sensor housing in a clockwise direction until the sensor cable is pointing away from the machine. Refer to Illustration 2.
- 13 Install the steer sensor cover retaining fasteners. Do not tighten the cover retaining fasteners.
- 14 Connect the steer sensor assembly cable to the main harness.
- 15 Calibrate the steer sensor. Refer to Repair Procedure, *How to Calibrate a Replacement Steer Sensor*.

Note: Be sure the yoke pivot pin retaining plate is fully engaged into the pivot pin and that the fasteners are securely tightened.

## How to Calibrate a Replacement Steer Sensor

Note: If a steer angle sensor has been removed or replaced, the steer angle sensors will need to be calibrated.

Note: Perform this procedure with the axles retracted and the tires straightened.

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

Note: Be sure the yoke pivot pin retaining plate is fully engaged into the pivot pin and that the fasteners are securely tightened.

- 1 Start the engine from the platform controls.
- 2 Select the proper steer mode. If a front (square-end) steer angle sensor has been replaced, select rear steer mode. If a rear (circle-end) steer angle sensor has been replaced, select front steer mode.
- 3 Have another person press down the foot switch.
- 4 At the new steer angle sensor, loosen the steer angle sensor cover retaining fasteners. Do not remove the fasteners or the sensor cover.
- 5 Rotate the sensor cover clockwise or counterclockwise until the tire is straight in relation with the other tires. Tighten the sensor cover fasteners.

Note: If available, WebGPI can also be used for this procedure.

- 6 Push in the red Emergency Stop button to the off position.

## Axle Components

### How to Calibrate All Steer Sensors

Note: This procedure will only need to be performed if the ground controls circuit board (TCON) has been replaced.

Note: Perform this procedure with the axles retracted and the tires straightened.

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



Plus

Minus

Previous

Enter

- 1 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.
- 2 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.
- 3 Turn the key switch to ground controls and pull out the ground controls red Emergency Stop button to the on position.
- 4 Loosen the steer angle sensor cover retaining fasteners. Do not remove the fasteners or the sensor cover.

- 5 Using a voltmeter set to DC voltage, probe the back of the electrical connector at pins B and C.
- 6 **Left front (square-end, blue side) and right rear (circle-end, yellow side) angle sensors:** Rotate the sensor cover clockwise or counterclockwise until the voltage reading is between 0.8 to 1.2V DC. Tighten the sensor cover fasteners.  
  
**Right front (square-end, yellow side) and left rear (circle-end, blue side) angle sensors:** Rotate the sensor cover clockwise or counterclockwise until the voltage reading is between 3.6 to 4.0V DC. Tighten the sensor cover fasteners.

Note: If available, WebGPI can also be used for this procedure.

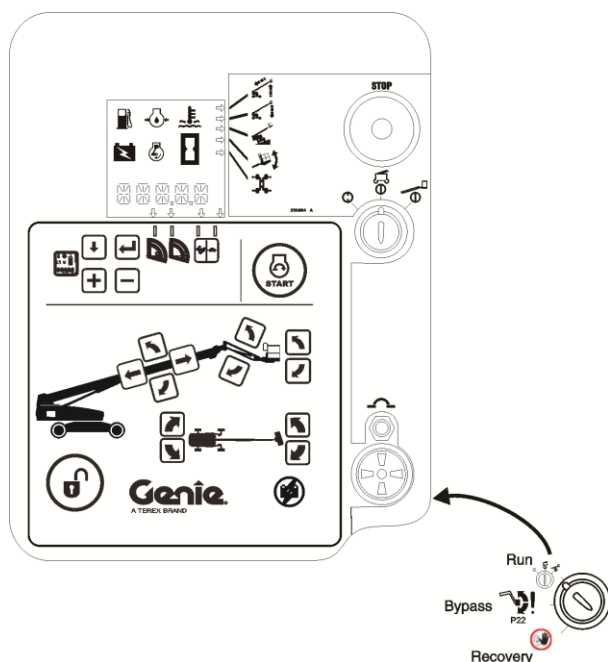
- 7 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.

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

- 8 Push in the red Emergency Stop button to the off position.

## Axle Components

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



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

### Delete all Steer Sensor Calibrations

- 11 Press the **enter** or **previous** button on the LCD screen until DELETE ALL STEER SENSORS CALIBRATION is displayed. Press the **plus** button to select YES, then press the **enter** button to accept.
- 12 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 13 Press the **plus** button to select YES, then press the **enter** button to accept.
- 14 Proceed to step 21.

### Delete a Single Steer Sensor Calibration

- 15 To calibrate a single steer sensor, delete the specific steer sensor calibration
- 16 Press the **enter** or **previous** button on the LCD screen until DELETE \_\_\_\_ STEER SENSORS CALIBRATION is displayed. Example: DELETE BLUE END BLUE SIDE STEER SENSORS CALIBRATION (FL).
- 17 Press the **plus** button to select YES, then press the **enter** button to accept.
- 18 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 19 Press the **plus** button to select YES, then press the **enter** button to accept.

## Axle Components

- 20 Push in the red Emergency Stop button to the off position.
- 21 Remove the fastener that was temporarily installed. Close the control box door and install the door retaining fasteners.

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

- 22 Use the key to turn the bypass / recovery key switch to the run position.

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

### 10-2 Steer Cylinders

#### How to Remove a Steer Cylinder

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

Note: Perform this procedure with the axles extended.

- 1 Tag, disconnect and plug the hydraulic hoses from the steer cylinder. Cap the fittings on the cylinder.

#### **⚠ WARNING**

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

- 2 Support the steer cylinder with a suitable lifting device. Protect the cylinder rod from damage.
- 3 Remove the pin retaining fasteners from both steer cylinder pivot pins.
- 4 Use a soft metal drift to remove the pins.
- 5 Remove the steering cylinder from the machine.

#### **⚠ CAUTION**

Crushing hazard. The steer cylinder may become unbalanced and fall if not properly supported by the lifting device when removed from the machine.

## Axle Components

### 10-3

### Axle Extension Cylinders

#### How to Remove an Axle Extension Cylinder

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

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

Note: This procedure will require the use of a portable hydraulic power unit.

- 1 Tag, disconnect and plug the hydraulic hoses from the axle extension cylinder. Cap the fittings on the cylinder.

#### **⚠ WARNING**

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

- 2 Remove the axle extension limit switch cover fasteners. Remove the cover.
- 3 Remove the limit switch mounting fasteners and remove the limit switch. Do not disconnect the wiring.

- 4 Connect the hydraulic hoses from a portable hydraulic power unit to the axle extension cylinder.

Note: Connect the pressure hose from the power unit to the "R" port of the cylinder and the return hose from the power unit to the "E" port on the cylinder.

- 5 Support the axle extension cylinder with a suitable lifting device. Protect the cylinder rod from damage.
- 6 Remove the pin retaining fasteners from both axle extension cylinder pivot pins.
- 7 Use a soft metal drift to remove the pins.
- 8 Using the portable hydraulic power unit, retract the axle extension cylinder until the ends of the cylinder clear the axles.
- 9 Remove the axle extension cylinder from the machine.

#### **⚠ CAUTION**

Crushing hazard. The axle extension cylinder may become unbalanced and fall if not properly supported by the lifting device.



## Axle Components

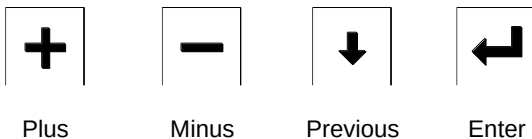
### 10-4

#### Axle Angle Sensors

The axle angle sensors measure the axle angle and communicates that information to the ground controls ECM. There are two axle angle sensors. They are located on opposite axle pivot pins at each end of the chassis.

#### How to Calibrate the Axle Angle Sensors

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

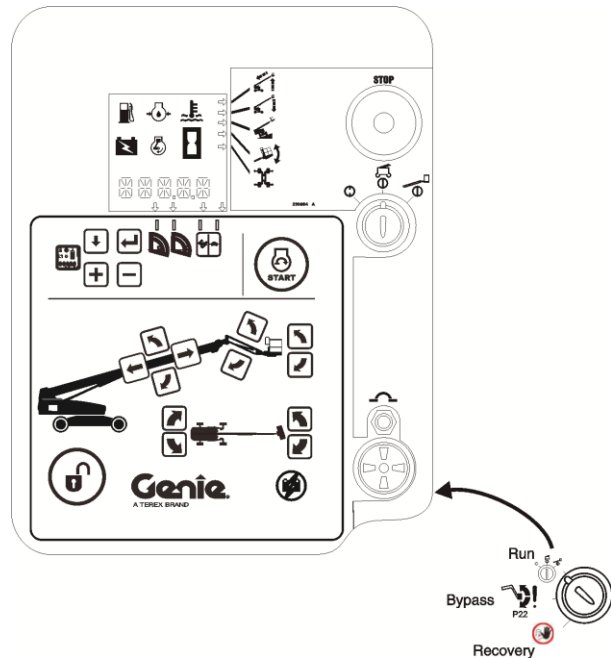


Note: If an axle angle sensor has been removed or replaced, the axle angle sensors will need to be calibrated.

Note: Perform this procedure with the axles fully retracted and the boom in the stowed position.

- 1 Push in the ground controls red Emergency Stop button to the off position.
- 2 Turn the key switch to ground controls.
- 3 Locate the calibration toggle switch at the top of the ground control box. Activate calibration mode by moving the toggle switch in the left direction.

- 4 Temporarily install a control box door retaining fastener between the door and the box to prevent the control box door from moving the toggle switch while calibrating the machine.
- 5 Remove the key from the main key switch. Insert the key into the bypass/recovery key switch and turn it to the bypass position.



- 1 Run
- 2 Bypass
- 3 Recovery

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

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

## Axle Components

- 7 Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence: **(plus)(enter)(enter)(plus)**.
- 8 Press the **enter** or **previous** button on the LCD screen until DELETE AXLE ANGLE SENSORS CALIBRATION is displayed.
- 9 Press the **plus** button to select YES, then press the **enter** button to accept.
- 10 At the AXLE ANGLES FULLY RETRACTED screen, press the **plus** button to select YES, then press the **enter** button to accept.
- 11 When the AXLE ANGLES FULLY EXTENDED screen is displayed, turn the main key switch to platform controls, start the engine and fully extend the axles.

Note: If the system exits out of calibration mode when the engine is started, perform the following from the ground controls after fully extending the axles.

- Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.
- Push in the ground controls red Emergency Stop button to the off position.
- Press and hold the **enter** button on the ground control panel while pulling out the ground controls red Emergency Stop button for approximately 5 seconds and then release it.
- Enter sensor calibration mode by pressing the buttons at the ground controls in the following sequence:  
**(plus)(enter)(enter)(plus)**.
- Press the **enter** or **previous** button on the LCD screen until AXLE ANGLES FULLY EXTENDED is displayed.
- Start the engine.
- Continue with step 12.

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

- 13 Press the **enter** or **previous** button on the LCD screen until EXIT is displayed.
- 14 Press the **plus** button to select YES, then press the **enter** button to accept.
- 15 Press and hold the engine start button for approximately 5 seconds to shut off the engine and to save the calibration settings.

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

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

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

- 17 Use the key to turn the bypass / recovery key switch to the run position.

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

## Repair Procedures

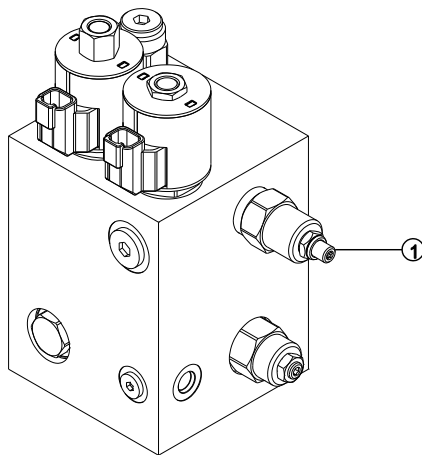
### 11-1 Welder Generator

#### How to Set the Welder Generator Frequency

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

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

- 1 Plug a 1000 watt load into the generator outlet like a portable work light or heater.
- 2 Loosen the retaining nut on the needle valve and screw the adjustment screw clockwise until it stops.



1 Needle valve

- 3 Turn the adjusting screw counterclockwise two turns.

- 4 Start the engine from the platform controls.
- 5 Turn on the generator from the platform controls and let the generator run for at least three minutes.
- 6 Insert the leads from a multimeter set to register frequency (HZ) and turn the needle valve until the frequency is 2 Hz above the normal frequency.

Note: The normal frequency will be either 50 Hz or 60 Hz, depending on the country.

- 7 While holding the adjusting screw, tighten the retaining nut on the needle valve.
- 8 Turn off the generator and then turn off the engine.

## Generators



### Observe and Obey:

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

### Before Troubleshooting:

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

#### **⚠ WARNING**

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

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

## Control System Fault Codes

| Error Source             | Error Type      | Effects                                                              | Recovery Actions                                                                                                                                                                                        |
|--------------------------|-----------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Primary Ext/Ret Joystick | Value at 5.0 V  | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
|                          | Value Too High  |                                                                      |                                                                                                                                                                                                         |
|                          | Value Too Low   |                                                                      |                                                                                                                                                                                                         |
|                          | Value at 0 V    |                                                                      |                                                                                                                                                                                                         |
|                          | Not calibrated  | Joystick Speed and Direction frozen at zero and neutral              | Calibrate Joystick                                                                                                                                                                                      |
|                          | Just calibrated | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                                                                                                               |
| Primary Up/Down Joystick | Value at 5.0 V  | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
|                          | Value Too High  |                                                                      |                                                                                                                                                                                                         |
|                          | Value Too Low   |                                                                      |                                                                                                                                                                                                         |
|                          | Value at 0 V    |                                                                      |                                                                                                                                                                                                         |
|                          | Not calibrated  | Joystick Speed and Direction frozen at zero and neutral              | Calibrate Joystick                                                                                                                                                                                      |
|                          | Just calibrated | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                                                                                                               |
| Steer Joystick           | Value at 5.0 V  | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
|                          | Value Too High  |                                                                      |                                                                                                                                                                                                         |
|                          | Value Too Low   |                                                                      |                                                                                                                                                                                                         |
|                          | Value at 0 V    |                                                                      |                                                                                                                                                                                                         |
|                          | Not calibrated  | Joystick Speed and Direction frozen at zero and neutral              | Calibrate Joystick                                                                                                                                                                                      |
|                          | Just calibrated | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                                                                                                               |

## Control System Fault Codes

| Error Source                           | Error Type                         | Effects                                                                                                                                                                                                                | Recovery Actions                                                                       |
|----------------------------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Primary Boom Up/Down buttons on TCON   | Fault Check (both buttons pressed) | Primary Boom Up/Down disabled, display message on LCD                                                                                                                                                                  | Check ribbon and connector from membrane switch. If necessary replace membrane switch. |
| Primary Boom Ext/Ret buttons on TCON   | Fault Check (both buttons pressed) | Primary Boom Ext/Retract disabled, display message on LCD                                                                                                                                                              | Check ribbon and connector from membrane switch. If necessary replace membrane switch. |
| Primary Extend/Retract Speed           | Not calibrated                     | Display message on LCD and allow operation at default speed                                                                                                                                                            | Perform auto calibrate procedure.                                                      |
| Operational Primary Boom Length Sensor | Value at 5.0 V                     | Disable Boom Up, Extend Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allowed once boom is fully stowed. Display message on LCD. Alarm sounds | Power up controller with problem corrected.                                            |
|                                        | Value Too High                     |                                                                                                                                                                                                                        |                                                                                        |
|                                        | Value Too Low                      |                                                                                                                                                                                                                        |                                                                                        |
|                                        | Value at 0 V                       |                                                                                                                                                                                                                        |                                                                                        |
|                                        | Not calibrated                     | Primary Up only active from TCON activate alarm                                                                                                                                                                        | Calibrate Sensor                                                                       |
|                                        | Just calibrated                    | Initiate one second beep of audible warning device                                                                                                                                                                     | Self-clearing (transient)                                                              |
| Safety Primary Boom Length Sensor      | Value at 5.0 V                     | Disable Boom Up, Extend Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allowed once boom is fully stowed. Display message on LCD. Alarm sounds | Power up controller with problem corrected.                                            |
|                                        | Value Too High                     |                                                                                                                                                                                                                        |                                                                                        |
|                                        | Value Too Low                      |                                                                                                                                                                                                                        |                                                                                        |
|                                        | Value at 0 V                       |                                                                                                                                                                                                                        |                                                                                        |
|                                        | Not calibrated                     | Primary up only active from TCON, activate alarm                                                                                                                                                                       | Calibrate Sensor                                                                       |
|                                        | Just calibrated                    | Initiate one second beep of audible warning device                                                                                                                                                                     | Self-clearing (transient)                                                              |

## Control System Fault Codes

| Error Source                            | Error Type  | Effects                                                                                                                                                                                                                                                                       | Recovery Actions                            |
|-----------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| RSB1AO/RSB1AS Cross-check               | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RS. Alarm sounds. Propel allowed once boom is fully stowed. Display message on LCD: BOOM ANGLE SENSORS CROSS CHECK FAULT. | Power up controller with problem corrected. |
| LTB1LO/LTB1LS Cross-check               | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RS. Alarm sounds. Display message on LCD: BOOM LENGTH SENSORS CROSS CHECK FAULT.                                          | Power up controller with problem corrected. |
| RSB1AO (boom angle) Active Cross-check  | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: RSB1AO ACTIVE CROSS CHECK FAULT.                                                | Power up controller with problem corrected. |
| LTB1LO (boom length) Active Cross-check | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LTB1AO ACTIVE CROSS CHECK FAULT.                                                | Power up controller with problem corrected. |

## Control System Fault Codes

| Error Source                                  | Error Type  | Effects                                                                                                                                                                                                                        | Recovery Actions                            |
|-----------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| RSB1AO/LSB1DO (10°)<br>Cross-check            | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LTB1AO ACTIVE CROSS CHECK FAULT. | Power up controller with problem corrected. |
| LTB1LO/LSB3RO (3 ft)<br>Cross-check           | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RS. Alarm sounds. Display message on LCD: LTB1LO/LSB4RO CROSS CHECK FAULT. | Power up controller with problem corrected. |
| LSB2RO (101ft)/LSB4EO<br>(100 ft) Cross-check | Fault Check | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LSB2RO/LSB4EO CROSS CHECK FAULT. | Power up controller with problem corrected. |



## Control System Fault Codes

| Error Source                               | Error Type                     | Effects                                                                                                                                                                                                                        | Recovery Actions                                                                                                |
|--------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| LSB2RS (101ft)/LSB4ES (100 ft) Cross-check | Fault Check                    | Disable Boom Up, Extend, Down, TT Rotate, and Propel powers in SCON. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Alarm sounds. Display message on LCD: LSB2RS/LSB4ES CROSS CHECK FAULT. | Power up controller with problem corrected.                                                                     |
| Primary Boom Extend Valve                  | Fault Check                    | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                                                                                                                                                           | Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary. |
| Primary Boom Retract Valve                 |                                |                                                                                                                                                                                                                                |                                                                                                                 |
| Primary Boom Up Valve                      |                                |                                                                                                                                                                                                                                |                                                                                                                 |
| Primary Boom Down Valve                    |                                |                                                                                                                                                                                                                                |                                                                                                                 |
| Primary Lock-Out Valve #1                  |                                |                                                                                                                                                                                                                                |                                                                                                                 |
| Primary Lock-Out Valve #2                  |                                |                                                                                                                                                                                                                                |                                                                                                                 |
| Engine Speed                               | Range Check (underspeed)       | Display message on LCD                                                                                                                                                                                                         | Engine is running below 50 RPM. Check fuel system.                                                              |
| Oil Pressure                               | Range Check (low oil pressure) | Display message on LCD                                                                                                                                                                                                         | Oil pressure is low. Check sender and oil level.                                                                |
| Water/Oil Temperature                      | Range Check (high temp)        | Display message on LCD                                                                                                                                                                                                         | Engine is overheating. Check sender, water or oil level or radiator/heat exchanger.                             |
| Oil Pressure Sender                        | Fault Check                    | Display message on LCD                                                                                                                                                                                                         | Check wiring to senders for opens or shorts. Repair or replace senders.                                         |
| Water/Oil Temp Sender                      |                                |                                                                                                                                                                                                                                |                                                                                                                 |

## Control System Fault Codes

| Error Source                 | Error Type  | Effects                                                              | Recovery Actions                                                                                                |
|------------------------------|-------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Axle Extend/Retract Switches | Fault Check | Axle extend/retract disabled. Display message on LCD                 | Check for defective or damaged wiring or switches. Power up controller with problem corrected.                  |
| Axle Valves                  | Fault Check | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary. |
| DCON CAN Bus                 | Fault Check | Display message on LCD Disable propel                                | Check CAN bus wiring from TCON to DCON through rotator. Repair or replace wiring or DCON.                       |
| CAN Bus                      | Fault Check | Display message on LCD                                               | Check CAN bus wiring from TCON to SCON/PCON. Repair or replace wiring or SCON/PCON.                             |
| Tether Power P3              | Fault Check | Display message on LCD TETHER POWER P3 FAULT                         | Power up controller with problem corrected.                                                                     |
| Valve Power P6R1             | Fault Check | Display message on LCD VALVE POWER P6R1 FAULT                        | Power up controller with problem corrected.                                                                     |
| Engine Power P6R2            | Fault Check | Display message on LCD ENGINE POWER P3 FAULT                         | Power up controller with problem corrected.                                                                     |
| Enable Input P7              | Fault Check | Display message on LCD ENABLE INPUT P7 FAULT                         | Power up controller with problem corrected.                                                                     |
| Enable Output P7R            | Fault Check | Display message on LCD ENABLE OUTPUT P7R FAULT                       | Power up controller with problem corrected.                                                                     |
| DCON Valve Power P7R         | Fault Check | Display message on LCD DCON VALVE POWER P7R FAULT                    | Power up controller with problem corrected.                                                                     |
| Primary Down Power P9A       | Fault Check | Display message on LCD PRI DOWN POWER P9A FAULT                      | Power up controller with problem corrected.                                                                     |
| Ignition/Fuel Power P9B      | Fault Check | Display message on LCD IGN/FUEL POWER P9B FAULT                      | Power up controller with problem corrected.                                                                     |

## Control System Fault Codes

| Error Source                                       | Error Type                 | Effects                                                | Recovery Actions                               |
|----------------------------------------------------|----------------------------|--------------------------------------------------------|------------------------------------------------|
| Primary Extend Power P10                           | Fault Check                | Display message on LCD PRI<br>EXTEND POWER P10 FAULT   | Power up controller with problem<br>corrected. |
| Primary Up Power P11                               | Fault Check                | Display message on LCD PRI UP<br>POWER P11 FAULT       | Power up controller with problem<br>corrected. |
| Axle Retract Power P12                             | Fault Check                | Display message on LCD AXLE<br>RETRACT POWER P12 FAULT | Power up controller with problem<br>corrected. |
| Test Point P14 (not currently<br>used)             | Fault Check                | Display message on LCD TEST<br>POINT P14 FAULT         | Power up controller with problem<br>corrected. |
| Test Point P18 (not currently<br>used)             | Fault Check                | Display message on LCD TEST<br>POINT P18 FAULT         | Power up controller with problem<br>corrected. |
| Platform Level Valve P22                           | Fault Check                | Display message on LCD PLAT<br>LEVEL VALVE P22 FAULT   | Power up controller with problem<br>corrected. |
| Primary Up/Down Valve<br>Power P22R                | Fault Check                | Display message on LCD PRI UP/DN<br>VLV PWR P22R FAULT | Power up controller with problem<br>corrected. |
| Propel Power P38                                   | Fault Check                | Display message on LCD PROPEL<br>PWR P38 FAULT         | Power up controller with problem<br>corrected. |
| Turntable Rotate Power P39                         | Fault Check                | Display message on LCD<br>TURNTABLE ROTATE P39 FAULT   | Power up controller with problem<br>corrected. |
| Secondary Up/Ext Power<br>P30 (not currently used) | Fault Check                | Display message on LCD SEC<br>UP/EXT POWER P30 FAULT   | Power up controller with problem<br>corrected. |
| Platform Overload                                  | Fault Check<br>(if active) | Display message on LCD                                 | Power up controller with problem<br>corrected. |
| Platform Overload Switches<br>Inconsistent         |                            |                                                        |                                                |

## Control System Fault Codes

| Error Source                     | Error Type                         | Effects                                                                                         | Recovery Actions                                                                                                                                                                                        |
|----------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Turntable Rotate Joystick        | Value at 5.0 V                     | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
|                                  | Value Too High                     |                                                                                                 |                                                                                                                                                                                                         |
|                                  | Value Too Low                      |                                                                                                 |                                                                                                                                                                                                         |
|                                  | Value at 0 V                       |                                                                                                 |                                                                                                                                                                                                         |
|                                  | Not calibrated                     | Joystick Speed and Direction frozen at zero and neutral                                         | Calibrate Joystick                                                                                                                                                                                      |
|                                  | Just calibrated                    | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                                                                                                                                               |
| Turntable Rotate Buttons on TCON | Fault Check (both buttons pressed) | Turntable rotate disabled Display message on LCD                                                | Check ribbon and connector from membrane switch. If necessary replace membrane switch.                                                                                                                  |
| Turntable Rotate Speed           | Not calibrated                     | Display message on LCD and allow operation at default speed                                     | Perform auto calibrate procedure.                                                                                                                                                                       |
| Turntable Rotate Flow Valve      | Not calibrated                     | Normal function except threshold for one or the other direction is zero. Display message on LCD | Perform calibration procedure                                                                                                                                                                           |
|                                  | Just calibrated                    | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                                                                                                                                               |
|                                  | Value Too High                     | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for opens in the wiring or a bad ground. Replace coil if necessary                                                                                                                                |
|                                  | Value Too Low                      |                                                                                                 | Check for shorts to ground in the wiring. Replace coil if necessary                                                                                                                                     |

## Control System Fault Codes

| Error Source                                   | Error Type       | Effects                                                              | Recovery Actions                                                                                                |
|------------------------------------------------|------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Turntable Rotate Clockwise Valve               | Fault Check      | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary. |
| Turntable Rotate Counterclockwise Valve        |                  |                                                                      |                                                                                                                 |
| Operational Turntable Level Sensor X Direction | Value at 5.0 V   | Flash unit out of level icon and LED and activate alarm              | Check that SCON is grounded                                                                                     |
|                                                | Value Too High   |                                                                      | Replace SCON                                                                                                    |
|                                                | Value Too Low    |                                                                      |                                                                                                                 |
|                                                | Value at 0 V     |                                                                      |                                                                                                                 |
|                                                | Out of Tolerance |                                                                      |                                                                                                                 |
|                                                | Just calibrated  | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                       |
| Safety Turntable Level Sensor X Direction      | Value at 5.0 V   | Flash unit out of level icon and LED and activate alarm              | Check that SCON is grounded                                                                                     |
|                                                | Value Too High   |                                                                      | Replace SCON                                                                                                    |
|                                                | Value Too Low    |                                                                      |                                                                                                                 |
|                                                | Value at 0 V     |                                                                      |                                                                                                                 |
|                                                | Out of Tolerance |                                                                      |                                                                                                                 |
|                                                | Just calibrated  | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                       |
| Operational Turntable Level Sensor Y Direction | Value at 5.0 V   | Primary up and extend disabled, Alarm sounds                         | Check that SCON is grounded                                                                                     |
|                                                | Value Too High   |                                                                      | Replace SCON                                                                                                    |
|                                                | Value Too Low    |                                                                      |                                                                                                                 |
|                                                | Value at 0 V     |                                                                      |                                                                                                                 |
|                                                | Out of Tolerance |                                                                      |                                                                                                                 |
|                                                | Just calibrated  | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                       |

## Control System Fault Codes

| Error Source                                   | Error Type       | Effects                                                                                         | Recovery Actions                                                         |
|------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Safety Turntable Level Sensor Y Direction      | Value at 5.0 V   | Primary up and extend disabled, Alarm sounds                                                    | Check that SCON is grounded                                              |
|                                                | Value Too High   |                                                                                                 | Replace SCON                                                             |
|                                                | Value Too Low    |                                                                                                 |                                                                          |
|                                                | Value at 0 V     |                                                                                                 |                                                                          |
|                                                | Out of Tolerance |                                                                                                 |                                                                          |
|                                                | Just calibrated  | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                |
| Primary Boom Up/Down Flow Valve(s) (#1 and #2) | Not calibrated   | Normal function except threshold for one or the other direction is zero. Display message on LCD | Calibrate Thresholds                                                     |
|                                                | Just calibrated  | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                |
|                                                | Value Too High   | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for opens in the wiring or a bad ground. Replace coil if necessary |
|                                                | Value Too Low    |                                                                                                 |                                                                          |
| Primary Boom Extend/Retract Flow Valve         | Not calibrated   | Normal function except threshold for one or the other direction is zero. Display message on LCD | Calibrate Thresholds                                                     |
|                                                | Just calibrated  | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                |
|                                                | Value Too High   | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for opens in the wiring or a bad ground. Replace coil if necessary |
|                                                | Value Too Low    |                                                                                                 |                                                                          |

## Control System Fault Codes

| Error Source                          | Error Type      | Effects                                                                                                                                                                                                                | Recovery Actions                            |
|---------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| Operational Primary Boom Angle Sensor | Value at 5.0 V  | Disable Boom Up, Extend, Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allow once boom is fully stowed. Display message on LCD. Alarm sounds. | Power up controller with problem corrected. |
|                                       | Value Too High  |                                                                                                                                                                                                                        |                                             |
|                                       | Value Too Low   |                                                                                                                                                                                                                        |                                             |
|                                       | Value at 0 V    |                                                                                                                                                                                                                        |                                             |
|                                       | Not calibrated  | Primary up only active from TCON, activate alarm                                                                                                                                                                       | Calibrate Sensor                            |
|                                       | Just calibrated | Initiate one second beep of audible warning device                                                                                                                                                                     | Self-clearing (transient)                   |
| Safety Primary Boom Angle Sensor      | Value at 5.0 V  | Disable Boom Up, Extend, Down, TT Rotate, and Propel. Boom Retract allowed and Boom Down allowed if fully retracted as sensed by LSB3RO. Propel allow once boom is fully stowed. Display message on LCD. Alarm sounds. | Power up controller with problem corrected. |
|                                       | Value Too High  |                                                                                                                                                                                                                        |                                             |
|                                       | Value Too Low   |                                                                                                                                                                                                                        |                                             |
|                                       | Value at 0 V    |                                                                                                                                                                                                                        |                                             |
|                                       | Not calibrated  | Primary up only active from TCON, activate alarm                                                                                                                                                                       | Calibrate Sensor                            |
|                                       | Just calibrated | Initiate one second beep of audible warning device                                                                                                                                                                     | Self-clearing (transient)                   |

## Control System Fault Codes

| Error Source                           | Error Type      | Effects                                                                                         | Recovery Actions                                                                                                |
|----------------------------------------|-----------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Platform Level Sensor Y Direction      | Value at 5.0 V  | Primary up and extend disabled, Alarm sounds                                                    | Power up controller with problem corrected.                                                                     |
|                                        | Value Too High  |                                                                                                 |                                                                                                                 |
|                                        | Value Too Low   |                                                                                                 |                                                                                                                 |
|                                        | Value at 0 V    |                                                                                                 |                                                                                                                 |
|                                        | Just calibrated | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                                                       |
| Platform Rotate Clockwise Valve        | Fault Check     | Fault Check                                                                                     | Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary. |
| Platform Rotate Counterclockwise Valve |                 |                                                                                                 |                                                                                                                 |
| Jib Up/Down Flow Valve(s)              | Not calibrated  | Normal function except threshold for one or the other direction is zero. Display message on LCD | Perform calibration procedure                                                                                   |
|                                        | Just calibrated | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                                                       |
|                                        | Value Too High  | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for opens in the wiring or a bad ground. Replace coil if necessary                                        |
|                                        | Value Too Low   |                                                                                                 |                                                                                                                 |



## Control System Fault Codes

| Error Source                                       | Error Type                                                        | Effects                                                                                         | Recovery Actions                                                                                                                                                                                        |
|----------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Platform Level Up / Platform Level Down Flow Valve | Not calibrated                                                    | Normal function except threshold for one or the other direction is zero. Display message on LCD | Perform calibration procedure                                                                                                                                                                           |
|                                                    | Just calibrated                                                   | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                                                                                                                                               |
|                                                    | Value Too High                                                    | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for opens in the wiring or a bad ground. Replace coil if necessary                                                                                                                                |
|                                                    | Value Too Low                                                     | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for shorts to ground in the wiring. Replace coil if necessary                                                                                                                                     |
| Platform Level Switches                            | Fault Check (both buttons pressed)                                | Primary Boom Ext/Ret disabled. Display message on LCD                                           | Power up controller with problem corrected.                                                                                                                                                             |
| Platform Rotate Joystick                           | Value at 5.0 V<br>Value Too High<br>Value Too Low<br>Value at 0 V | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
| Jib Up/Down Joystick                               | Value at 5.0 V                                                    | Limited Speed and Direction frozen at zero and neutral, Alarm sounds                            | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
|                                                    | Value Too High                                                    |                                                                                                 |                                                                                                                                                                                                         |
|                                                    | Value Too Low                                                     |                                                                                                 |                                                                                                                                                                                                         |
|                                                    | Value at 0 V                                                      |                                                                                                 |                                                                                                                                                                                                         |
|                                                    | Not calibrated                                                    | Joystick Speed and Direction frozen at zero and neutral                                         |                                                                                                                                                                                                         |
|                                                    | Just calibrated                                                   | Initiate one second beep of audible warning device                                              | Self-clearing (transient)                                                                                                                                                                               |

## Control System Fault Codes

| Error Source            | Error Type      | Effects                                                           | Recovery Actions                                                                                                                                                    |
|-------------------------|-----------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Front Axle Angle Sensor | Value at 5.0 V  | Primary up and Extend disabled, axle extend and retract LED flash | Check for an open ground circuit going to the sensor                                                                                                                |
|                         | Value Too High  | Primary up and Extend disabled, axle extend and retract LED flash | Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.                                           |
|                         | Value Too Low   |                                                                   |                                                                                                                                                                     |
|                         | Value at 0 V    | Primary up and Extend disabled, axle extend and retract LED flash | Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary |
|                         | Not calibrated  | Primary up only active from TCON, activate alarm                  | Perform calibration procedure                                                                                                                                       |
|                         | Just calibrated | Initiate one second beep of audible warning device                | Self-clearing (transient)                                                                                                                                           |
| Rear Axle Angle Sensor  | Value at 5.0 V  | Primary up and Extend disabled, axle extend and retract LED flash | Check for an open ground circuit going to the sensor                                                                                                                |
|                         | Value Too High  | Primary up and Extend disabled, axle extend and retract LED flash | Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.                                           |
|                         | Value Too Low   |                                                                   |                                                                                                                                                                     |
|                         | Value at 0 V    | Primary up and Extend disabled, axle extend and retract LED flash | Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary |
|                         | Not calibrated  | Primary up only active from TCON, activate alarm                  | Perform calibration procedure                                                                                                                                       |
|                         | Just calibrated | Initiate one second beep of audible warning device                | Self-clearing (transient)                                                                                                                                           |

## Control System Fault Codes

| Error Source                  | Error Type      | Effects                                                              | Recovery Actions                                                                                                                                                                                        |
|-------------------------------|-----------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Propel Joystick               | Value at 5.0 V  | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for damaged wiring to the joystick. Check the connections to ensure the connector terminals have not backed out. Substitute a known good joystick. If necessary replace and recalibrate joystick. |
|                               | Value Too High  |                                                                      |                                                                                                                                                                                                         |
|                               | Value Too Low   |                                                                      |                                                                                                                                                                                                         |
|                               | Value at 0 V    |                                                                      |                                                                                                                                                                                                         |
|                               | Not calibrated  | Joystick Speed and Direction frozen at zero and neutral              | Calibrate Thresholds                                                                                                                                                                                    |
|                               | Just calibrated | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                                                                                                               |
| Propel Valves Forward/Reverse | Not calibrated  | Joystick Speed and Direction frozen at zero and neutral              | Calibrate Thresholds                                                                                                                                                                                    |
| Propel EDC Forward/Reverse    | Just calibrated | Initiate one second beep of audible warning device                   | Self-clearing (transient)                                                                                                                                                                               |
|                               | Value Too High  | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for opens in the wiring or a bad ground. Replace coil if necessary                                                                                                                                |
|                               | Value Too Low   |                                                                      | Check for shorts to ground in the wiring. Replace coil if necessary                                                                                                                                     |
| Motor Valve Speed             | Fault Check     | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.                                                                                         |
| Brake Valve                   |                 |                                                                      |                                                                                                                                                                                                         |

## Control System Fault Codes

| Error Source                   | Error Type     | Effects                                                              | Recovery Actions                                                                                                                                                    |
|--------------------------------|----------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Left Front Steer Angle Sensor  | Value at 5.0 V | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for an open ground circuit going to the sensor                                                                                                                |
|                                | Value Too High | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.                                           |
|                                | Value Too Low  |                                                                      |                                                                                                                                                                     |
|                                | Value at 0 V   | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary |
| Right Front Steer Angle Sensor | Value at 5.0 V | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for an open ground circuit going to the sensor                                                                                                                |
|                                | Value Too High | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.                                           |
|                                | Value Too Low  |                                                                      |                                                                                                                                                                     |
|                                | Value at 0 V   | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary |
| Left Rear Steer Angle Sensor   | Value at 5.0 V | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for an open ground circuit going to the sensor                                                                                                                |
|                                | Value Too High | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.                                           |
|                                | Value Too Low  |                                                                      |                                                                                                                                                                     |
|                                | Value at 0 V   | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary |

## Control System Fault Codes

| Error Source                  | Error Type        | Effects                                                              | Recovery Actions                                                                                                                                                    |
|-------------------------------|-------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Right Rear Steer Angle Sensor | Value at 5.0 V    | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for an open ground circuit going to the sensor                                                                                                                |
|                               | Value Too High    | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Sensor is out of range. Check sensor and actuating pin for proper installation. Repair or replace sensor and recalibrate.                                           |
|                               | Value Too Low     |                                                                      |                                                                                                                                                                     |
|                               | Value at 0 V      | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for 5.0 VDC at the sensor. Check for damaged wiring going to the sensor. Check that the % .0 VDC LED is lit on the TCON board. Repair or replace as necessary |
| Steer Valves - LF, RF, LR, RR | Fault Check       | Limited Speed and Direction frozen at zero and neutral, Alarm sounds | Check for defective or damaged wiring. Check for an open or shorted valve coil. Repair or replace as necessary.                                                     |
| SCON Tilt Sensor              | Calibration check | Display X direction and Y direction not calibrated                   | Re-power after entering tilt x axis and y axis matrix information                                                                                                   |
| Footswitch Timeout            | Calibration check | Display message on LCD                                               | Recycle power                                                                                                                                                       |

## Control System Fault Codes

| Error Source          | Error Type     | Effects                                                                                                                                                                                                                          | Recovery Actions                             |
|-----------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| PBMAS Safety Envelope | Position Check | Disable Boom Up, TT Rotate, Propel and Ignition/Fuel. Boom Down and Retract allowed. All functions allowed once boom is lowered back into envelope. Alarm Sounds. Display message on LCD PRIMARY BOOM PBMAS SAFETY ENVELOPE      | Return Boom back inside Operational Envelope |
| PBMLS Safety Envelope | Position Check | Disable Boom Up, Down, Extend, TT Rotate, Propel and Ignition/Fuel. Boom Retract allowed. All functions allowed once boom is lowered back into envelope. Alarm Sounds. Display message on LCD PRIMARY BOOM PBMLS SAFETY ENVELOPE | Return Boom back inside Operational Envelope |
| Boom Envelope Safety  | Position Check | Disable Boom Down, Extend, and Ignition/Fuel. Boom Retract and Up allowed. All functions allowed once boom is lowered back into envelope. Alarm Sounds. Display message on LCD PRIMARY BOOM SAFETY ENVELOPE                      | Return Boom back inside Operational Envelope |

## Control System Fault Codes

| P_38 - Propel<br>(P13-17 TCON)                                                     | P_39 - Turntable<br>Rotate (P13-19<br>TCON) | P_10 - Primary<br>Boom Extend<br>(P12-08 TCON) | P_11 - Primary<br>Up (P12-09<br>TCON) | P_9A - Primary<br>Down (P12-06<br>TCON) | P_9B -<br>Ignition/Fuel<br>(P12-07 TCON) |      |      |      |       |      |
|------------------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------|---------------------------------------|-----------------------------------------|------------------------------------------|------|------|------|-------|------|
| P_22 - Jib Jib Lvl<br>Pwr                                                          | P_22R - Primary<br>Up/Down FC               | P_12 - Axle<br>Retract (P121-08<br>SCON)       |                                       |                                         |                                          |      |      |      |       |      |
|                                                                                    |                                             | P_38                                           | P_39                                  | P_10                                    | P_11                                     | P_9A | P_9B | P_22 | P_22R | P_12 |
| Turntable tilt Y axis (+5°, secondary boom not stowed)                             |                                             | OFF                                            | OFF                                   |                                         | OFF                                      |      |      |      |       |      |
| Primary Boom Angle (crosscheck)                                                    |                                             | OFF                                            | OFF                                   | OFF                                     | OFF                                      | OFF* |      |      |       |      |
| Primary Boom Length (crosscheck)                                                   |                                             | OFF                                            | OFF                                   | OFF                                     | OFF                                      | OFF* |      |      |       |      |
| Primary 2 Cylinder (crosscheck)                                                    |                                             |                                                |                                       | OFF                                     | OFF                                      | OFF* |      |      |       |      |
| Boom Envelope Safety Interlock                                                     |                                             |                                                |                                       | OFF                                     |                                          | OFF  | OFF  |      |       |      |
| Axle Safety Not Stowed                                                             |                                             |                                                | OFF                                   |                                         | OFF                                      |      |      |      |       |      |
| Axles crosscheck Angle sensor vs. safety switch(es)                                |                                             |                                                | OFF                                   | OFF                                     | OFF                                      | OFF  |      |      |       |      |
| Axle (not fully extended) and TT Rotate (stowed and in drive disable zone)         |                                             | OFF                                            | OFF                                   |                                         |                                          |      |      |      |       |      |
| Turntable Tilt Angle (crosscheck SCON internal sensors 3 in a delta configuration) |                                             | OFF                                            | OFF                                   | OFF                                     | OFF                                      | OFF  |      |      |       |      |
| Loss of CAN                                                                        |                                             | OFF                                            | OFF                                   | OFF                                     | OFF                                      | OFF* | OFF  |      |       |      |
| Platform Overload (SCON)                                                           |                                             |                                                |                                       |                                         |                                          |      | OFF  |      |       |      |
| Platform Out of Level (>10°)                                                       |                                             |                                                |                                       |                                         |                                          |      |      | OFF  |       |      |
| Boom Safety (max angle)                                                            |                                             | OFF                                            | OFF                                   |                                         | OFF                                      |      | OFF  |      |       |      |
| Boom Safety (max length)                                                           |                                             | OFF                                            | OFF                                   | OFF                                     | OFF                                      | OFF  | OFF  |      |       |      |
| Axle Retract Safety                                                                |                                             |                                                |                                       |                                         |                                          |      |      |      |       | OFF  |
| Cable Tension (#1)                                                                 |                                             |                                                |                                       | OFF                                     |                                          |      |      |      |       |      |

\* P-9A and P-10 energized if boom is fully retracted as indicated by LSB3RS and LSB2RS

## Control System Fault Codes

Fault Source and Type will display as:

| Source              | Type |
|---------------------|------|
| " ID XXX_xx FAULT " |      |

Where XXX is the one to three digit Fault Source and xx is the two digit Fault Type.

TCON - Turntable Controller

PCON - Platform Controller

SCON - Safety Controller

DCON - Drive Controller

| Fault Type |                  |
|------------|------------------|
| ID         | Description      |
| 11         | Value at 5V      |
| 12         | Value too High   |
| 13         | No Response      |
| 15         | Value too Low    |
| 16         | Value at 0V      |
| 17         | Not Calibrated   |
| 21         | Fault            |
| 26         | Timeout          |
| 31         | Invalid Setup    |
| 32         | Min Cal Too Low  |
| 33         | Min Cal Too High |

| Fault Source |                                          |
|--------------|------------------------------------------|
| ID           | Description                              |
| 3            | SCON Controller Area Network             |
| 4            | Primary Boom Angle Zone                  |
| 5            | Primary Boom Length Switches Cross-Check |
| 8            | PCON Controller Area Network             |
| 9            | Engine                                   |
| 18           | DCON Controller Area Network             |
| 20           | Boom Extend/Retract Joystick             |
| 21           | Boom Up/Down Joystick                    |
| 26           | Boom Extend/Retract Buttons              |
| 27           | Boom Up/Down Buttons                     |
| 28           | Boom Angle Sensors Cross-Check (SCON)    |
| 29           | LSB2RS/LSB4ES Cross-Check (SCON)         |
| 30           | Propel Joystick                          |
| 35           | Propel Valve                             |
| 40           | Turntable Rotate Joystick                |
| 43           | Footswitch Timeout                       |
| 44           | Jib Up/Down Joystick                     |
| 48           | PBMAS Safety Envelope (SCON)             |
| 49           | Jib Up/Down Buttons                      |
| 50           | Jib Up/Down Flow Valve                   |
| 52           | Steer Joystick                           |
| 53           | Left Front Steer Sensor                  |
| 54           | Right Front Steer Sensor                 |
| 55           | Left Rear Steer Sensor                   |
| 56           | Right Rear Steer Sensor                  |
| 59           | Rocker Steer Joystick                    |
| 61           | PBMLS Safety Envelope (SCON)             |
| 63           | Front Axle Sensor                        |
| 64           | Rear Axle Sensor                         |



## Control System Fault Codes

| Fault Source |                                                             |
|--------------|-------------------------------------------------------------|
| ID           | Description                                                 |
| 65           | Turntable Level Sensor X-Direction                          |
| 66           | Turntable Level Sensor Y-Direction                          |
| 67           | Boom Length Sensors Cross-Check (SCON)                      |
| 68           | Boom Safety Envelope (SCON)                                 |
| 70           | Turntable Controller - Platform Controller Software Version |
| 73           | Engine Pressure Sensor                                      |
| 74           | Engine Temperature Sensor                                   |
| 75           | LSB2RO/LSB4EO Cross-Check                                   |
| 80           | TCON/SCON Calibration Inconsistent                          |
| 81           | Boom Up/Down Flow Valve (Fine)                              |
| 82           | Boom Extend/Retract Flow Valve                              |
| 83           | Boom Extend/Retract Speed                                   |
| 85           | Boom Up/Down Speed                                          |
| 86           | Boom Angle Sensor                                           |
| 90           | Jib Rotate Flow Valve                                       |
| 91           | Turntable Rotate Buttons                                    |
| 92           | Turntable Rotate Flow Valve                                 |
| 93           | Turntable Rotate Speed                                      |
| 94           | Boom Length Sensor                                          |
| 95           | Jib Rotate Joystick                                         |
| 98           | Platform Level Sensor                                       |
| 99           | Platform Level Buttons                                      |
| 110          | Platform Rotate Buttons                                     |
| 113          | Jib Rotate Buttons                                          |
| 117          | Propel Power P38                                            |
| 118          | Turntable Rotate Power P39                                  |
| 121          | Valve Power P6R1                                            |
| 122          | Engine Power P6R2                                           |
| 123          | Enable Input Power P7                                       |

| Fault Source |                                                        |
|--------------|--------------------------------------------------------|
| ID           | Description                                            |
| 124          | Enable Output Power P7R                                |
| 125          | Primary Down Power P9A                                 |
| 126          | IGN/Fuel Power P9B                                     |
| 127          | Primary Extend Power P10                               |
| 128          | Primary Up Power P11                                   |
| 129          | Axle Retract Power P12                                 |
| 132          | Platform Level Power P22                               |
| 133          | Primary Up/Down Valve Power P22R                       |
| 134          | DCON Valve Power P7R                                   |
| 142          | Turntable Rotate CW Valve                              |
| 143          | Turntable Rotate CCW Valve                             |
| 144          | Axle Safety Not Stowed (SCON)                          |
| 145          | Boom Up Valve                                          |
| 146          | Boom Down Valve                                        |
| 147          | Platform Overload Switches Inconsistent (SCON)         |
| 148          | Boom Extend Valve                                      |
| 149          | Boom Retract Valve                                     |
| 150          | Overload Recovery                                      |
| 152          | Boom Up/Down Flow Valve (Gross)                        |
| 153          | Primary Lockout P1 Valve                               |
| 154          | Primary Lockout P2 Valve                               |
| 157          | Axles Fully Extended Cross-Check (SCON)                |
| 158          | Drive Disable Zone and Axles Not Fully Extended (SCON) |
| 160          | Left Front Steer Valve                                 |
| 161          | Right Front Steer Valve                                |
| 162          | Left Rear Steer Valve                                  |
| 163          | Right Rear Steer Valve                                 |
| 164          | Axle Valve                                             |
| 165          | Boom Not Retracted and Chassis Tilted (SCON)           |

## Control System Fault Codes

| Fault Source |                                         |
|--------------|-----------------------------------------|
| ID           | Description                             |
| 166          | Brake Valve                             |
| 167          | Motor Shift Valve                       |
| 168          | Chassis Tilt Sensors Cross-Check (SCON) |
| 170          | Jib Bellcrank Level Sensor              |
| 171          | Jib Bellcrank Level Flow Valve          |
| 172          | AUX Relay                               |
| 173          | Platform Level Toggle Switch            |
| 174          | Platform Rotate Toggle Switch           |
| 175          | Platform Level Flow Valve               |
| 176          | Platform Rotate Valve                   |
| 180          | Boom Length Sensor                      |
| 195          | Safety Platform Overload (SCON)         |
| 218          | Fuel Lever Sensor                       |
| 220          | RSB1AO Active Cross-Check               |
| 221          | LTB1LO Active Cross-Check               |
| 222          | Axle Extend/Retract Toggle Switch       |
| 235          | RSB1AO/LSB1DO Cross-Check               |
| 236          | LTB1LO/LSB3RO Cross-Check               |
| 237          | LTB1LO/LSB4EO Cross-Check               |
| 238          | Pressure Comp Enable #1 Valve           |
| 239          | Pressure Comp Enable #2/Generator Valve |
| 245          | Check Machine Software Type at TCON     |
| 246          | Check Machine Software Type at SCON     |
| 247          | TCON/SCON Software Inconsistent         |
| 251          | Overload                                |

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## Fault Code Display – Deutz Models

### How to Retrieve Active Engine Fault Codes - Deutz TCD 2.2 L3 and TD 2.9 L4 Models

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The ECM constantly monitors the engine by the use of sensors on the engine. The ECM also uses signals from the sensors to initiate sequential fuel injection and make constant and instantaneous changes to ignition timing, fuel delivery and throttle position to maintain the engine's running condition at its highest efficiency while at the same time keeping exhaust emissions to a minimum. When a sensor fails or returns signals that are outside of set parameters, the ECM will store a fault code in memory that relates to the appropriate sensor. The active fault code will also be displayed on the LCD screen.

If an engine fault occurs that does not result in an engine shutdown, the engine rpm will go into limp home mode resulting in the loss of high rpm..

Start the engine from the ground control box and operate various boom functions to verify that an active engine fault occurs and is shown on the display.

Note: All faults are stored in the Previous Fault history menu. These faults will not be erased when corrective action has been completed.

Note: Software is available from the engine manufacturer to perform diagnosis through the engine diagnostic port. Contact the specific engine manufacturer.

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

KWP = Keyword Protocol

| SPN | FMI | KWP  | Description                                                          |
|-----|-----|------|----------------------------------------------------------------------|
| 51  | 3   | 1019 | EGR-Valve, short circuit to battery                                  |
| 51  | 3   | 1024 | Position sensor error of actuator EGR-Valve; signal range check high |
| 51  | 3   | 1226 | EGR-Valve; short circuit to battery (A02)                            |
| 51  | 3   | 1227 | EGR-Valve; short circuit to battery (A67)                            |
| 51  | 4   | 1020 | EGR-Valve; short circuit to ground                                   |
| 51  | 4   | 1025 | Position sensor error actuator EGR-Valve; signal range check low     |
| 51  | 4   | 1228 | EGR-Valve; short circuit to ground (A02)                             |
| 51  | 4   | 1229 | EGR-Valve; short circuit to ground (A67)                             |
| 1   | 4   | 1232 | Actuator error EGR-Valve; Voltage below threshold                    |
| 51  | 5   | 1015 | Actuator error EGR-Valve; signal range check low                     |
| 51  | 5   | 1017 | Actuator EGR-Valve; open load                                        |
| 51  | 5   | 1023 | Actuator error EGR-Valve; signal range check low                     |
| 51  | 5   | 1223 | Actuator EGR-Valve; open load                                        |
| 51  | 6   | 1014 | Actuator error EGR-Valve; signal range check high                    |

| SPN | FMI | KWP  | Description                                                         |
|-----|-----|------|---------------------------------------------------------------------|
| 51  | 6   | 1022 | Actuator error EGR-Valve; signal range check high                   |
| 51  | 6   | 1224 | Actuator EGR-Valve; over current                                    |
| 51  | 6   | 1230 | Actuator error EGR-Valve; Overload by short-circuit                 |
| 51  | 7   | 1016 | Actuator position for EGR-Valve not plausible                       |
| 51  | 11  | 1231 | Actuator error EGR-Valve; Power stage over temp due to high current |
| 51  | 12  | 1018 | Actuator EGR-Valve; powerstage over temperature                     |
| 51  | 12  | 1021 | Mechanical actuator defect EGR-Valve                                |
| 51  | 12  | 1225 | Actuator EGR-Valve; over temperature                                |
| 94  | 1   | 474  | Low fuel pressure; warning threshold exceeded                       |
| 94  | 1   | 475  | Low fuel pressure; shut off threshold exceeded                      |
| 94  | 3   | 472  | Sensor error low fuel pressure; signal range check high             |
| 94  | 4   | 473  | Sensor error low fuel pressure; signal range check low              |
| 97  | 3   | 464  | Sensor error water in fuel; signal range check high                 |
| 97  | 4   | 465  | Sensor error water in fuel; signal range check low                  |
| 97  | 12  | 1157 | Water in fuel level prefilter; maximum value exceeded               |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

KWP = Keyword Protocol

| SPN | FMI | KWP | Description                                                      |
|-----|-----|-----|------------------------------------------------------------------|
| 100 | 0   | 734 | High oil pressure; warning threshold exceeded                    |
| 100 | 0   | 735 | High oil pressure; shut off threshold exceeded                   |
| 100 | 1   | 736 | Low oil pressure; warning threshold exceeded                     |
| 100 | 1   | 737 | Low oil pressure; shut off threshold exceeded                    |
| 100 | 3   | 732 | Sensor error oil pressure; signal range check high               |
| 100 | 4   | 733 | Sensor error oil pressure sensor; signal range check low         |
| 102 | 2   | 88  | Charged air pressure above warning threshold                     |
| 102 | 2   | 89  | Charged air pressure above shut off threshold                    |
| 102 | 4   | 777 | Sensor error charged air press.; signal range check low          |
| 105 | 0   | 996 | High charged air cooler temperature; warning threshold exceeded  |
| 105 | 0   | 997 | High charged air cooler temperature; shut off threshold exceeded |
| 105 | 3   | 994 | Sensor error charged air temperature; signal range check high    |
| 105 | 4   | 995 | Sensor error charged air temperature; signal range check low     |

| SPN | FMI | KWP | Description                                                                                  |
|-----|-----|-----|----------------------------------------------------------------------------------------------|
| 108 | 3   | 412 | Sensor error ambient air press.; signal range check high                                     |
| 108 | 4   | 413 | Sensor error ambient air press.; signal range check low                                      |
| 110 | 0   | 98  | High coolant temperature; warning threshold exceeded                                         |
| 110 | 0   | 99  | High coolant temperature; shut off threshold exceeded                                        |
| 110 | 3   | 96  | Sensor error coolant temp.; signal range check high                                          |
| 110 | 4   | 97  | Sensor error coolant temp.; signal range check low                                           |
| 111 | 1   | 101 | Coolant level too low                                                                        |
| 132 | 11  | 1   | Air flow sensor load correction factor exceeding the maximum drift limit; plausibility error |
| 132 | 11  | 2   | Air flow sensor load correction factor exceeding drift limit; plausibility error             |
| 132 | 11  | 3   | Air flow sensor low idle correction factor exceeding the maximum drift limit                 |
| 132 | 11  | 4   | Air flow sensor load correction factor exceeding the maximum drift limit                     |
| 157 | 3   | 877 | Sensor error rail pressure; signal range check high                                          |
| 157 | 4   | 878 | Sensor error rail pressure; signal range check low                                           |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

KWP = Keyword Protocol

| SPN | FMI | KWP  | Description                                                   |
|-----|-----|------|---------------------------------------------------------------|
| 168 | 0   | 1180 | Physical range check high for battery voltage                 |
| 168 | 1   | 1181 | Physical range check low for battery voltage                  |
| 168 | 2   | 47   | High battery voltage; warning threshold exceeded              |
| 168 | 2   | 48   | Low battery voltage; warning threshold exceeded               |
| 168 | 3   | 45   | Sensor error battery voltage; signal range check high         |
| 168 | 4   | 46   | Sensor error battery voltage; signal range check low          |
| 171 | 3   | 417  | Sensor error environment temperature; signal range check high |
| 171 | 4   | 418  | Sensor error environment temperature; signal range check low  |
| 172 | 0   | 1182 | Physical range check high for intake air temperature          |
| 172 | 1   | 1183 | Physical range check low for intake air temperature           |
| 172 | 2   | 9    | Sensor ambient air temperature; plausibility error            |
| 172 | 2   | 983  | Intake air sensor; plausibility error                         |
| 172 | 3   | 981  | Sensor error intake air; signal range check high              |
| 172 | 4   | 982  | Sensor error intake air sensor; signal range check low        |

| SPN | FMI | KWP | Description                                                         |
|-----|-----|-----|---------------------------------------------------------------------|
| 174 | 0   | 481 | High low fuel temperature; warning threshold exceeded               |
| 174 | 0   | 482 | High Low fuel temperature; shut off threshold exceeded              |
| 175 | 0   | 740 | Physical range check high for oil temperature                       |
| 175 | 0   | 745 | High oil temperature; warning threshold exceeded                    |
| 175 | 0   | 746 | High oil temperature; shut off threshold exceeded                   |
| 175 | 1   | 741 | Physical range check low for oil temperature                        |
| 175 | 2   | 738 | Sensor oil temperature; plausibility error                          |
| 175 | 2   | 739 | Sensor oil temperature; plausibility error oil temperature too high |
| 175 | 3   | 743 | Sensor error oil temperature; signal range check high               |
| 175 | 4   | 744 | Sensor error oil temperature; signal range check low                |
| 190 | 0   | 389 | Engine speed above warning threshold (FOC-Level 1)                  |
| 190 | 2   | 421 | Offset angle between crank- and camshaft sensor is too large        |
| 190 | 8   | 419 | Sensor camshaft speed; disturbed signal                             |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

KWP = Keyword Protocol

| SPN | FMI | KWP  | Description                                                                   |
|-----|-----|------|-------------------------------------------------------------------------------|
| 190 | 8   | 422  | Sensor crankshaft speed; disturbed signal                                     |
| 190 | 11  | 390  | Engine speed above warning threshold (FOC-Level 2)                            |
| 190 | 12  | 420  | Sensor camshaft speed; no signal                                              |
| 190 | 12  | 423  | Sensor crankshaft speed; no signal                                            |
| 190 | 14  | 391  | Engine speed above warning threshold (Overrun Mode)                           |
| 190 | 14  | 1222 | Camshaft- and Crankshaft speed sensor signal not available on CAN             |
| 411 | 0   | 791  | Physical range check high for differential pressure Venturiunit (EGR)         |
| 411 | 1   | 792  | Physical range check low for differential pressure Venturiunit (EGR)          |
| 411 | 3   | 795  | Sensor error differential pressure Venturiunit (EGR); signal range check high |
| 411 | 4   | 381  | Physical range check low for EGR differential pressure                        |
| 411 | 4   | 796  | Sensor error differential pressure Venturiunit (EGR); signal range check low  |

| SPN | FMI | KWP  | Description                                                                   |
|-----|-----|------|-------------------------------------------------------------------------------|
| 412 | 3   | 1007 | Sensor error EGR cooler downstream temperature; signal range check high       |
| 412 | 4   | 1008 | Sensor error EGR cooler downstream temperature; signal range check low        |
| 520 | 9   | 306  | Timeout Error of CAN-Receive-Frame TSC1TR; Setpoint                           |
| 597 | 2   | 49   | Break lever mainswitch and break lever redundancy switch status not plausible |
| 624 | 3   | 971  | SVS lamp; short circuit to batt.                                              |
| 624 | 4   | 972  | SVS lamp; short circuit to grd.                                               |
| 624 | 5   | 969  | SVS lamp; open load                                                           |
| 624 | 12  | 970  | SVS lamp; powerstage over temperature                                         |
| 630 | 12  | 376  | Access error EEPROM memory (delete)                                           |
| 630 | 12  | 377  | Access error EEPROM memory (read)                                             |
| 630 | 12  | 378  | Access error EEPROM memory (write)                                            |
| 639 | 14  | 84   | CAN-Bus 0 "BusOff-Status"                                                     |
| 651 | 3   | 580  | Injector 1 (in firing order); short circuit                                   |
| 651 | 4   | 586  | High side to low side short circuit in the injector 1 (in firing order)       |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

KWP = Keyword Protocol

| SPN | FMI | KWP | Description                                                             |
|-----|-----|-----|-------------------------------------------------------------------------|
| 651 | 5   | 568 | Injector 1 (in firing order); interruption of electric connection       |
| 652 | 3   | 581 | Injector 2 (in firing order); short circuit                             |
| 652 | 4   | 587 | High side to low side short circuit in the injector 2 (in firing order) |
| 652 | 5   | 569 | Injector 2 (in firing order); interruption of electric connection       |
| 653 | 3   | 582 | Injector 3 (in firing order); short circuit                             |
| 653 | 4   | 588 | High side to low side short circuit in the injector 3 (in firing order) |
| 653 | 5   | 570 | Injector 3 (in firing order); interruption of electric connection       |
| 654 | 3   | 583 | Injector 4 (in firing order); short circuit                             |
| 654 | 4   | 589 | High side to low side short circuit in the injector 4 (in firing order) |
| 654 | 5   | 571 | Injector 4 (in firing order); interruption of electric connection       |
| 676 | 11  | 543 | Cold start aid relay error.                                             |
| 676 | 11  | 544 | Cold start aid relay open load                                          |

| SPN  | FMI | KWP | Description                                         |
|------|-----|-----|-----------------------------------------------------|
| 677  | 3   | 956 | Starter relay high side; short circuit to battery   |
| 677  | 3   | 960 | Starter relay low side; short circuit to battery    |
| 677  | 4   | 957 | Starter relay high side; short circuit to ground    |
| 677  | 4   | 961 | Starter relay low side; short circuit to ground     |
| 677  | 5   | 958 | Starter relay; no load error                        |
| 677  | 12  | 959 | Starter relay; powerstage over temperature          |
| 703  | 3   | 426 | Engine running lamp; short circuit to battery       |
| 703  | 4   | 427 | Engine running lamp; short circuit to ground        |
| 703  | 5   | 424 | Engine running lamp; open load                      |
| 703  | 12  | 425 | Engine running lamp; powerstage over temperature    |
| 729  | 5   | 545 | Cold start aid relay open load                      |
| 729  | 12  | 547 | Cold start aid relay; over temperature error        |
| 898  | 9   | 305 | Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint |
| 1079 | 13  | 946 | Sensor supply voltage monitor 1 error (ECU)         |
| 1080 | 13  | 947 | Sensor supply voltage monitor 2 error (ECU)         |



## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

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| SPN  | FMI | KWP  | Description                                                              |
|------|-----|------|--------------------------------------------------------------------------|
| 1109 | 2   | 121  | Engine shut off demand ignored                                           |
| 1136 | 0   | 1398 | Physikal range check high for ECU temperature                            |
| 1136 | 1   | 1399 | Physikal range check low for ECU temperature                             |
| 1136 | 3   | 1400 | Sensor error ECU temperature; signal range check high                    |
| 1136 | 4   | 1401 | Sensor error ECU temperature; signal range check low                     |
| 1176 | 3   | 849  | Sensor error pressure sensor upstream turbine; signal range check high   |
| 1176 | 4   | 850  | Sensor error pressure sensor downstream turbine; signal range check high |
| 1180 | 0   | 1193 | Physical range check high for exhaust gas temperature upstream turbine   |
| 1180 | 0   | 1460 | Turbocharger Wastegate CAN feedback; warning threshold exceeded          |
| 1180 | 0   | 1462 | Exhaust gas temperature upstream turbine; warning threshold exceeded     |
| 1180 | 1   | 1194 | Physical range check low for exhaust gas temperature upstream turbine    |
| 1180 | 1   | 1461 | Turbocharger Wastegate CAN feedback; shut off threshold exceeded         |

| SPN  | FMI | KWP  | Description                                                                    |
|------|-----|------|--------------------------------------------------------------------------------|
| 1180 | 1   | 1463 | Exhaust gas temperature upstream turbine; shut off threshold exceeded          |
| 1180 | 3   | 1067 | Sensor error exhaust gas temperature upstream turbine; signal range check high |
| 1180 | 11  | 1066 | Sensor exhaust gas temperature upstream turbine; plausibility error            |
| 1188 | 2   | 1414 | Wastegate; status message from ECU missing                                     |
| 1188 | 7   | 1415 | Wastegate actuator; blocked                                                    |
| 1188 | 11  | 1411 | Wastegate actuator; internal error                                             |
| 1188 | 11  | 1412 | Wastegate actuator; EOL calibration not performed correctly                    |
| 1188 | 11  | 1416 | Wastegate actuator; over temperature (> 145°C)                                 |
| 1188 | 11  | 1417 | Wastegate actuator; over temperature (> 135°C)                                 |
| 1188 | 11  | 1418 | Wastegate actuator; operating voltage error                                    |
| 1188 | 13  | 1413 | Wastegate actuator calibration deviation too large, recalibration required     |
| 1231 | 14  | 85   | CAN-Bus 1 "BusOff-Status"                                                      |
| 1235 | 14  | 86   | CAN-Bus 2 "BusOff-Status"                                                      |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

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| SPN  | FMI | KWP  | Description                                                                            |
|------|-----|------|----------------------------------------------------------------------------------------|
| 1237 | 2   | 747  | Override switch; plausibility error                                                    |
| 1322 | 12  | 610  | Too many recognized misfires in more than one cylinder                                 |
| 1323 | 12  | 604  | Too many recognized misfires in cylinder 1 (in firing order)                           |
| 1324 | 12  | 605  | Too many recognized misfires in cylinder 2 (in firing order)                           |
| 1325 | 12  | 606  | Too many recognized misfires in cylinder 3 (in firing order)                           |
| 1326 | 12  | 607  | Too many recognized misfires in cylinder 4 (in firing order)                           |
| 2659 | 0   | 1524 | Physical range check high for EGR exhaust gas mass flow                                |
| 2659 | 1   | 1525 | Physical range check low for EGR exhaust gas mass flow                                 |
| 2659 | 2   | 1523 | Exhaust gas recirculation AGS sensor; plausibility error                               |
| 2659 | 2   | 1527 | AGS sensor temperature exhaust gas mass flow; plausibility error                       |
| 2659 | 12  | 1526 | Exhaust gas recirculation; AGS sensor has "burn off" not performed                     |
| 2797 | 4   | 1337 | Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 0 |

| SPN  | FMI | KWP  | Description                                                                                                                      |
|------|-----|------|----------------------------------------------------------------------------------------------------------------------------------|
| 2798 | 4   | 1338 | Injector diagnostics; timeout error of short circuit to ground measurement cyl. Bank 1                                           |
| 2798 | 4   | 1339 | Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 0                                                     |
| 2798 | 4   | 1340 | Injector diagnostics; short circuit to ground monitoring Test in Cyl. Bank 1                                                     |
| 3224 | 2   | 127  | DLC Error of CAN-Receive-Frame AT1IG1 NOX Sensor (SCR-system upstream cat; DPF-system downstream cat); length of frame incorrect |
| 3224 | 9   | 128  | Timeout Error of CAN-Receive-Frame AT1IG1; NOX sensor upstream                                                                   |
| 3248 | 4   | 1047 | Sensor error particle filter downstream temperature; signal range check low                                                      |
| 3699 | 2   | 1616 | DPF differential pressure sensor and a further sensor or actuator CRT system defective                                           |
| 3699 | 2   | 1617 | Temperature sensor us. and ds. DOC simultaneously defect                                                                         |
| 3699 | 14  | 1615 | Maximum stand-still-duration reached; oil exchange required                                                                      |
| 4765 | 0   | 1039 | Physical range check high for exhaust gas temperature upstream (DOC)                                                             |
| 4765 | 1   | 1042 | Physical range check low for exhaust gas temperature upstream (DOC)                                                              |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

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| SPN    | FMI | KWP  | Description                                                                    |
|--------|-----|------|--------------------------------------------------------------------------------|
| 4766   | 0   | 1029 | Physical range check high for exhaust gas temperature downstream (DOC)         |
| 4766   | 1   | 1032 | Physical range check low for exhaust gas temperature downstream (DOC)          |
| 4768   | 2   | 1036 | Sensor exhaust gas temperature upstream (DOC); plausibility error              |
| 4768   | 3   | 1044 | Sensor error exhaust gas temperature upstream (DOC); signal range check high   |
| 4768   | 4   | 1045 | Sensor error exhaust gas temperature upstream (DOC); signal range check low    |
| 4769   | 2   | 1026 | Sensor exhaust gas temperature downstream (DOC); plausibility error            |
| 4769   | 3   | 1034 | Sensor error exhaust gas temperature downstream (DOC); signal range check high |
| 4769   | 4   | 1035 | Sensor error exhaust gas temperature downstream (DOC); signal range check low  |
| 523006 | 3   | 34   | Controller mode switch; short circuit to battery                               |
| 523006 | 4   | 35   | Controller mode switch; short circuit to ground                                |
| 523008 | 1   | 648  | Manipulation control was triggered                                             |

| SPN    | FMI | KWP | Description                                                                    |
|--------|-----|-----|--------------------------------------------------------------------------------|
| 523008 | 2   | 649 | Timeout error in Manipulation control                                          |
| 523009 | 9   | 825 | Pressure Relief Valve (PRV) reached maximum allowed opening count              |
| 523009 | 10  | 833 | Pressure relief valve (PRV) reached maximum allowed open time                  |
| 523212 | 9   | 171 | Timeout Error of CAN-Receive-Frame ComEngPrt; Engine Protection                |
| 523216 | 9   | 198 | Timeout Error of CAN-Receive-Frame PrHtEnCmd; pre-heat command, engine command |
| 523240 | 9   | 179 | Timeout CAN-message FunModCtl; Function Mode Control                           |
| 523350 | 4   | 565 | Injector cylinder-bank 1; short circuit                                        |
| 523352 | 4   | 566 | Injector cylinder-bank 2; short circuit                                        |
| 523354 | 12  | 567 | Injector powerstage output defect                                              |
| 523470 | 2   | 826 | Pressure Relief Valve (PRV) forced to open; performed by pressure increase     |
| 523470 | 2   | 827 | Pressure Relief Valve (PRV) forced to open; performed by pressure shock        |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

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| SPN    | FMI | KWP | Description                                                             |
|--------|-----|-----|-------------------------------------------------------------------------|
| 523470 | 7   | 876 | Maximum rail pressure in limp home mode exceeded (PRV)                  |
| 523470 | 11  | 831 | The PRV can not be opened at this operating point with a pressure shock |
| 523470 | 11  | 832 | Rail pressure out of tolerance range                                    |
| 523470 | 12  | 828 | Open Pressure Relief Valve (PRV); shut off condition                    |
| 523470 | 12  | 829 | Open Pressure Relief Valve (PRV); warning condition                     |
| 523470 | 14  | 830 | Pressure Relief Valve (PRV) is open                                     |
| 523550 | 12  | 980 | T50 start switch active for too long                                    |
| 523601 | 13  | 948 | Sensor supply voltage monitor 3 error (ECU)                             |
| 523603 | 9   | 126 | Timeout Error of CAN-Receive-Frame AMB; Ambient Temperature Sensor      |
| 523605 | 9   | 300 | Timeout Error of CAN-Receive-Frame TSC1AE; Traction Control             |
| 523606 | 9   | 301 | Timeout Error of CAN-Receive-Frame TSC1AR; Retarder                     |
| 523612 | 12  | 387 | Internal software error ECU; injection cut off                          |
| 523612 | 12  | 612 | Internal ECU monitoring detection reported error                        |

| SPN    | FMI | KWP | Description                                      |
|--------|-----|-----|--------------------------------------------------|
| 523612 | 12  | 613 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 614 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 615 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 616 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 617 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 618 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 619 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 620 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 621 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 623 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 624 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 625 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 627 | Internal ECU monitoring detection reported error |
| 523612 | 12  | 628 | Internal ECU monitoring detection reported error |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

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| SPN    | FMI | KWP  | Description                                                                       |
|--------|-----|------|-----------------------------------------------------------------------------------|
| 523612 | 12  | 637  | Internal ECU monitoring detection reported error                                  |
| 523612 | 12  | 1170 | Internal software error ECU                                                       |
| 523612 | 14  | 973  | Softwarereset CPU SWReset_0                                                       |
| 523612 | 14  | 974  | Softwarereset CPU SWReset_1                                                       |
| 523612 | 14  | 975  | Softwarereset CPU SWReset_2                                                       |
| 523613 | 0   | 856  | Maximum positive deviation of rail pressure exceeded (RailMeUn0)                  |
| 523613 | 0   | 857  | Maximum positive deviation of rail pressure in metering unit exceeded (RailMeUn1) |
| 523613 | 0   | 858  | Railsystem leakage detected (RailMeUn10)                                          |
| 523613 | 0   | 859  | Maximum negative deviation of rail pressure in metering unit exceeded (RailMeUn2) |
| 523613 | 0   | 860  | Negative deviation of rail pressure second stage (RailMeUn22)                     |
| 523613 | 0   | 862  | Maximum rail pressure exceeded (RailMeUn4)                                        |
| 523613 | 1   | 861  | Minimum rail pressure exceeded (RailMeUn3)                                        |
| 523613 | 2   | 864  | Setpoint of metering unit in overrun mode not plausible                           |
| 523615 | 3   | 594  | Metering unit (Fuel-System); short circuit to battery highside                    |

| SPN    | FMI | KWP  | Description                                                              |
|--------|-----|------|--------------------------------------------------------------------------|
| 523615 | 3   | 596  | Metering unit (Fuel-System); short circuit to battery low side           |
| 523615 | 4   | 595  | Metering unit (Fuel-System); short circuit to ground high side           |
| 523615 | 4   | 597  | Metering Unit (Fuel-System); short circuit to ground low side            |
| 523615 | 5   | 592  | Metering unit (Fuel-System); open load                                   |
| 523615 | 12  | 593  | Metering unit (Fuel-System); powerstage over temperature                 |
| 523619 | 2   | 488  | Physical range check high for exhaust gas temperature upstream (SCR-CAT) |
| 523698 | 11  | 122  | Shut off request from supervisory monitoring function                    |
| 523717 | 12  | 125  | Timeout Error of CAN-Transmit-Frame AmbCon; Weather environments         |
| 523718 | 3   | 1488 | SCR mainrelay; short circuit to battery (only CV56B)                     |
| 523718 | 4   | 1489 | SCR mainrelay; short circuit to ground (only CV56B)                      |
| 523718 | 5   | 1486 | SCR mainrelay; open load (only CV56B)                                    |
| 523718 | 12  | 1487 | SCR mainrelay; powerstage over temperature (only CV56B)                  |
| 523766 | 9   | 281  | Timeout Error of CAN-Receive-Frame Active TSC1AE                         |
| 523767 | 9   | 282  | Timeout Error of CAN-Receive-Frame Passive TSC1AE                        |

## Deutz TD 2.9 L4 Engine Fault Codes

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| SPN    | FMI | KWP | Description                                                                               |
|--------|-----|-----|-------------------------------------------------------------------------------------------|
| 523768 | 9   | 283 | Timeout Error of CAN-Receive-Frame Active TSC1AR                                          |
| 523769 | 9   | 284 | Timeout Error of CAN-Receive-Frame Passive TSC1AR                                         |
| 523770 | 9   | 285 | Timeout Error of CAN-Receive-Frame Passive TSC1DE                                         |
| 523776 | 9   | 291 | Timeout Error of CAN-Receive-Frame TSC1TE - active                                        |
| 523777 | 9   | 292 | Passive Timeout Error of CAN-Receive-Frame TSC1TE; Setpoint                               |
| 523778 | 9   | 293 | Active Timeout Error of CAN-Receive-Frame TSC1TR                                          |
| 523779 | 9   | 294 | Passive Timeout Error of CAN-Receive-Frame TSC1TR                                         |
| 523788 | 12  | 299 | Timeout Error of CAN-Transmit-Frame TrbCH; Status Wastegate                               |
| 523793 | 9   | 202 | Timeout Error of CAN-Receive-Frame UAA10; AGS sensor service message                      |
| 523794 | 9   | 203 | Timeout Error of CAN-Receive-Frame UAA11; AGS sensor data                                 |
| 523895 | 13  | 559 | Check of missing injector adjustment value programming (IMA) injector 1 (in firing order) |
| 523896 | 13  | 560 | check of missing injector adjustment value programming (IMA) injector 2 (in firing order) |

| SPN    | FMI | KWP  | Description                                                                               |
|--------|-----|------|-------------------------------------------------------------------------------------------|
| 523897 | 13  | 561  | check of missing injector adjustment value programming (IMA) injector 3 (in firing order) |
| 523898 | 13  | 562  | check of missing injector adjustment value programming (IMA) injector 4 (in firing order) |
| 523910 | 6   | 1261 | Air Pump; over current                                                                    |
| 523913 | 3   | 74   | Sensor error glow plug control diagnostic line voltage; signal range check high           |
| 523913 | 4   | 75   | Sensor error glow plug control diagnostic line voltage; signal range check low            |
| 523914 | 3   | 78   | Glow plug control; short circuit to battery                                               |
| 523914 | 4   | 79   | Glow plug control; short circuit to ground                                                |
| 523914 | 5   | 76   | Glow plug control; open load                                                              |
| 523914 | 5   | 1216 | Glow plug control release line; short circuit error                                       |
| 523914 | 11  | 1217 | Glow plug control; internal error                                                         |
| 523914 | 12  | 77   | Glow plug control; powerstage over temperature                                            |
| 523919 | 2   | 1378 | Sensor air pump airpressure; plausibility error                                           |
| 523920 | 2   | 1379 | Sensor exhaust gas back pressure burner; plausibility error                               |

## Deutz TD 2.9 L4 Engine Fault Codes

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| SPN    | FMI | KWP  | Description                                                                          |
|--------|-----|------|--------------------------------------------------------------------------------------|
| 523922 | 7   | 1262 | Burner Shut Off Valve; blocked closed                                                |
| 523922 | 7   | 1264 | Burner Shut Off Valve; blocked closed                                                |
| 523929 | 0   | 109  | Fuel Balance Control integrator injector 1 (in firing order); maximum value exceeded |
| 523929 | 1   | 115  | Fuel Balance Control integrator injector 1 (in firing order); minimum value exceeded |
| 523930 | 0   | 110  | Fuel Balance Control integrator injector 2 (in firing order); maximum value exceeded |
| 523930 | 1   | 116  | Fuel Balance Control integrator injector 2 (in firing order); minimum value exceeded |
| 523931 | 0   | 111  | Fuel Balance Control integrator injector 3 (in firing order); maximum value exceeded |
| 523931 | 1   | 117  | Fuel Balance Control integrator injector 3 (in firing order); minimum value exceeded |
| 523932 | 0   | 112  | Fuel Balance Control integrator injector 4 (in firing order); maximum value exceeded |
| 523932 | 1   | 118  | Fuel Balance Control integrator injector 4 (in firing order); minimum value exceeded |
| 523935 | 12  | 168  | Timeout Error of CAN-Transmit-Frame EEC3VOL1; Engine send messages                   |

| SPN    | FMI | KWP  | Description                                                               |
|--------|-----|------|---------------------------------------------------------------------------|
| 523936 | 12  | 169  | Timeout Error of CAN-Transmit-Frame EEC3VOL2; Engine send messages        |
| 523946 | 0   | 1158 | Zerofuel calibration injector 1 (in firing order); maximum value exceeded |
| 523946 | 1   | 1164 | Zerofuel calibration injector 1 (in firing order); minimum value exceeded |
| 523947 | 0   | 1159 | Zerofuel calibration injector 2 (in firing order); maximum value exceeded |
| 523947 | 1   | 1165 | Zerofuel calibration injector 2 (in firing order); minimum value exceeded |
| 523948 | 0   | 1160 | Zerofuel calibration injector 3 (in firing order); maximum value exceeded |
| 523948 | 1   | 1166 | Zerofuel calibration injector 3 (in firing order); minimum value exceeded |
| 523949 | 0   | 1161 | Zerofuel calibration injector 4 (in firing order); maximum value exceeded |
| 523949 | 1   | 1167 | Zerofuel calibration injector 4 (in firing order); minimum value exceeded |
| 523960 | 0   | 1011 | Physical range check high for EGR cooler downstream temp.                 |

## Deutz TD 2.9 L4 Engine Fault Codes

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| SPN    | FMI | KWP  | Description                                                                     |
|--------|-----|------|---------------------------------------------------------------------------------|
| 523960 | 0   | 1458 | High exhaust gas temperature EGR cooler downstream; warning threshold exceeded  |
| 523960 | 1   | 1012 | Physical range check low for EGR cooler downstream temp.                        |
| 523960 | 1   | 1459 | High exhaust gas temperature EGR cooler downstream; shut off threshold exceeded |
| 523980 | 14  | 1187 | Bad quality of reduction agent detected                                         |
| 523981 | 11  | 918  | Urea-tank without heating function (heating phase)                              |
| 523982 | 0   | 360  | Powerstage diagnosis disabled; high battery voltage                             |
| 523982 | 1   | 361  | Powerstage diagnosis disabled; low battery voltage                              |
| 523988 | 3   | 1245 | Charging lamp; short circuit to battery                                         |
| 523988 | 4   | 1246 | Charging lamp; short circuit to ground                                          |
| 523988 | 5   | 1243 | Charging lamp; open load                                                        |
| 523988 | 12  | 1244 | Charging lamp; over temp.                                                       |
| 523998 | 4   | 1327 | Injector cylinder bank 2 slave; short circuit                                   |
| 523999 | 12  | 1328 | Injector powerstage output Slave defect                                         |
| 524014 | 1   | 1254 | Air pressure glow plug flush line; below limit                                  |

| SPN    | FMI | KWP  | Description                                                                           |
|--------|-----|------|---------------------------------------------------------------------------------------|
| 524016 | 2   | 1259 | Amount of air is not plausible to pump speed                                          |
| 524016 | 2   | 1260 | Calculated amount of air is not plausible to HFM reading                              |
| 524016 | 11  | 1258 | HFM sensor; electrical fault                                                          |
| 524021 | 11  | 1263 | Burner fuel line pipe leak behind Shut Off Valve                                      |
| 524024 | 11  | 1302 | Deviation of the exhaust gas temp. setpoint to actual value downstream (DOC) too high |
| 524028 | 2   | 1431 | CAN message PROEGRActr; plausibility error                                            |
| 524029 | 2   | 1432 | Timeout Error of CAN-Receive-Frame ComEGRActr - exhaust gas recirculation positioner  |
| 524030 | 7   | 1440 | EGR actuator; internal error                                                          |
| 524031 | 13  | 1441 | EGR actuator; calibration error                                                       |
| 524032 | 2   | 1442 | EGR actuator; status message EGRCust is missing                                       |
| 524033 | 7   | 1443 | EGR actuator; due to overload in Save Mode                                            |
| 524034 | 3   | 1438 | Disc separator; short circuit to battery                                              |
| 524034 | 4   | 1439 | Disc separator; short circuit to ground                                               |
| 524034 | 5   | 1436 | Disc Separator; open load                                                             |
| 524034 | 12  | 1437 | Disc Separator; powerstage over temperature                                           |



## Deutz TD 2.9 L4 Engine Fault Codes

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| SPN    | FMI | KWP  | Description                                                   |
|--------|-----|------|---------------------------------------------------------------|
| 524035 | 12  | 1341 | Injector diagnostics; time out error in the SPI communication |
| 524057 | 2   | 1505 | Electric fuel pump; fuel pressure build up error              |
| 524097 | 9   | 1663 | Timeout error of CAN-Transmit-Frame DPFBrnAirPmpCtl           |
| 524098 | 9   | 1664 | Timeout error of CAN-Transmit-Frame ComDPFBrnPT               |
| 524099 | 9   | 1665 | Timeout error of CAN-Transmit-Frame ComDPFC1                  |
| 524100 | 9   | 1666 | Timeout error of CAN-Transmit-Frame ComDPFHisDat              |
| 524101 | 9   | 1667 | Timeout error of CAN-Transmit-Frame ComDPFTstMon              |
| 524102 | 9   | 1674 | Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmpCtl       |
| 524103 | 9   | 1675 | Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp          |
| 524104 | 9   | 1676 | Timeout error of CAN-Receive-Frame ComRxDPFCtl                |
| 524105 | 9   | 1668 | Timeout error of CAN-Transmit-Frame ComEGRMsFlw               |
| 524106 | 9   | 1677 | Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1             |
| 524107 | 9   | 1678 | Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2             |

| SPN    | FMI | KWP  | Description                                       |
|--------|-----|------|---------------------------------------------------|
| 524108 | 9   | 1669 | Timeout error of CAN-Transmit-Frame ComEGRTVActr  |
| 524109 | 9   | 1679 | Timeout error of CAN-Receive-Frame ComRxEGRTVActr |
| 524110 | 9   | 1670 | Timeout error of CAN-Transmit-Frame ComETVActr    |
| 524111 | 9   | 1680 | Timeout error of CAN-Receive-Frame ComRxETVActr   |
| 524112 | 9   | 1671 | Timeout ComITVActr                                |
| 524113 | 9   | 1681 | Timeout error of CAN-Receive-Frame ComRxITVActr   |
| 524114 | 9   | 1659 | Timeout error of CAN-Transmit-Frame A1DOC         |
| 524115 | 9   | 1660 | Timeout error of CAN-Transmit-Frame AT1S          |
| 524116 | 9   | 1661 | Timeout error of CAN-Transmit-Frame SCR2          |
| 524117 | 9   | 1662 | Timeout error of CAN-Transmit-Frame SCR3          |
| 524118 | 9   | 1672 | Timeout error of CAN-Receive-Frame ComRxCM1       |
| 524119 | 9   | 1673 | Timeout error of CAN-Receive-Frame ComRxCustSCR3  |

## Deutz TD 2.9 L4 Engine Fault Codes

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

KWP = Keyword Protocol

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**SPN    FMI    KWP    Description**

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524120   9        1682    Timeout error of CAN-Receive-  
Frame ComRxSCRHtDiag

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524121   9        1683    Timeout error of CAN-Receive-  
Frame ComRxTrbChActr

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524122   9        1684    Timeout error of CAN-Receive-  
Frame ComRxUQSens

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524123   9        1685    Timeout error of CAN-Receive-  
Frame ComSCRHtCtl

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524124   9        1686    Timeout error of CAN-Receive-  
Frame ComTxAT1IMG

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524125   9        1687    Timeout error of CAN-Receive-  
Frame ComTxTrbChActr

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## Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code

FMI = Failure Mode Identifier

SPN = Suspect Parameter Number

| DTC  | SPN | FMI | Description                                                                                 |
|------|-----|-----|---------------------------------------------------------------------------------------------|
| 1000 | 98  | 2   | Engine oil level sensor internal error. Sensor reports error. Open/short transduce.         |
| 1001 | 98  | 31  | Engine oil level out of range. Level low, high, foaming.                                    |
| 1002 | 98  | 31  | Oil sensor voltage out of range. <8,SV ±0,SV; >16,SV ±0,SV.                                 |
| 1003 | 98  | 2   | Oil sensor invalid sensor status.                                                           |
| 1004 | 98  | 31  | Oil sensor temperature out of range.                                                        |
| 1005 | 98  | 14  | Oil sensor is broken or disconnected.                                                       |
| 1021 | 100 | 3   | Oil pressure voltage above normal or shorted to high.                                       |
| 1022 | 100 | 1   | Oil pressure voltage below normal or shorted to low.                                        |
| 1025 | 100 | 1   | Low oil pressure. Warning threshold exceeded.                                               |
| 1026 | 100 | 1   | Low oil pressure. shut off threshold exceeded.                                              |
| 1043 | 107 | 0   | Air filter differential pressure; air filter clogged.                                       |
| 1071 | 411 | 2   | Engine exhaust gas recirculation. Pressure does not change between engine operating points. |
| 1072 | 411 | 0   | Engine exhaust gas recirculation. Pressure above normal operational range.                  |
| 1073 | 411 | 1   | Engine exhaust gas recirculation. Pressure below normal operational range.                  |
| 1074 | 411 | 2   | Engine exhaust gas recirculation. Negative measured differential pressure.                  |
| 1075 | 411 | 2   | Engine exhaust gas recirculation. Positive measured differential pressure.                  |

| DTC  | SPN   | FMI | Description                                                                                                |
|------|-------|-----|------------------------------------------------------------------------------------------------------------|
| 1077 | 411   | 3   | Engine exhaust gas recirculation. Signal value above maximum limit.                                        |
| 1078 | 411   | 4   | Engine exhaust gas recirculation. Signal value below maximum limit.                                        |
| 1079 | 108   | 0   | Ambient air pressure sensor above normal operational range.                                                |
| 1080 | 108   | 1   | Ambient air pressure sensor below normal operational range.                                                |
| 1081 | 108   | 15  | Fault check max signal range violated for ambient air pressure sensor.                                     |
| 1082 | 108   | 17  | Fault check min signal range violated for ambient air pressure sensor.                                     |
| 1083 | 108   | 2   | Ambient air pressure sensor error by component self diagnosis.                                             |
| 1084 | 3720  | 0   | DPF ash load above normal operational range.                                                               |
| 1086 | 3734  | 0   | DPF soot load exceeded. Remove filter level.                                                               |
| 1087 | 4781  | 14  | DPF soot load exceeded shut off level.                                                                     |
| 1088 | 4781  | 0   | DPF soot load exceeded warning level.                                                                      |
| 1089 | 4781  | 16  | DPF. Too much standstill time in short time interval.                                                      |
| 1090 | 10156 | 0   | DPF. The standstill-regeneration mode time exceeds the short-limit.                                        |
| 1091 | 3735  | 16  | DPF. Standstill required and no successful standstill longer than escalation threshold. Moderately severe. |
| 1092 | 3735  | 0   | DPF. Standstill required and no successful standstill longer than escalation threshold. Most severe.       |
| 1093 | 4766  | 1   | DOC. Regeneration temperature in standstill main phase not reached.                                        |
| 1102 | 171   | 2   | Ambient air temperature shows a deviation from expected value at cold start conditions.                    |

## Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code

FMI = Failure Mode Identifier

SPN = Suspect Parameter Number

| DTC  | SPN  | FMI | Description                                                                                                           |
|------|------|-----|-----------------------------------------------------------------------------------------------------------------------|
| 111  | 102  | 0   | Engine intake manifold pressure above normal operational range.                                                       |
| 1114 | 102  | 1   | Engine intake manifold pressure below normal operational range.                                                       |
| 1115 | 102  | 3   | Intake manifold pressure sensor voltage above normal or shorted to high.                                              |
| 1116 | 102  | 4   | Intake manifold pressure sensor voltage below normal or shorted to low.                                               |
| 1118 | 102  | 1   | Intake manifold pressure below normal operational range.                                                              |
| 1121 | 102  | 2   | DFC for signal variation check for pressure sensor of the intake manifold.                                            |
| 1122 | 102  | 0   | Intake air pressure valve sensor, warning condition exceeded.                                                         |
| 1123 | 102  | 1   | Intake air pressure valve sensor, shutoff condition exceeded.                                                         |
| 1124 | 1209 | 2   | Engine exhaust pressure turbine upstream differs from ambient pressure while engine not running.                      |
| 1125 | 1209 | 15  | Engine exhaust pressure turbine upstream above upper limit.                                                           |
| 1126 | 1176 | 1   | Engine turbocharger compressor intake pressure below normal operational range.                                        |
| 1127 | 1209 | 2   | Engine exhaust pressure turbine upstream tuck check failed. Pressure does not change between engine operating points. |
| 1130 | 1209 | 3   | Engine exhaust pressure sensor voltage above normal or shorted to high.                                               |
| 1131 | 1209 | 4   | Engine exhaust pressure sensor voltage below normal or shorted to low.                                                |

| DTC  | SPN  | FMI | Description                                                                              |
|------|------|-----|------------------------------------------------------------------------------------------|
| 1134 | 3251 | 3   | DPF voltage above normal or shorted to high.                                             |
| 1135 | 3251 | 4   | DPF voltage below normal or shorted to low.                                              |
| 1136 | 3251 | 14  | DPF reporting communication error.                                                       |
| 1137 | 3251 | 14  | DPF reporting data error.                                                                |
| 1138 | 3251 | 14  | DPF reporting fast channel 1 error.                                                      |
| 1139 | 3251 | 14  | DPF reporting fast channel 2 signal range error.                                         |
| 1149 | 3251 | 2   | DPF difference pressure value not plausible.                                             |
| 1150 | 3251 | 0   | DPF difference pressure above shut off threshold.                                        |
| 1151 | 3251 | 16  | DPF difference pressure above warning threshold.                                         |
| 1152 | 3251 | 1   | DPF difference pressure below shut off threshold.                                        |
| 1153 | 3251 | 18  | DPF difference pressure below warning threshold.                                         |
| 1161 | 5571 | 16  | Rail fuel pressure relief valve above normal operational range.                          |
| 1162 | 5571 | 2   | Rail fuel pressure relief valve is forced to open. Perform pressure increase.            |
| 1163 | 5571 | 2   | Rail fuel pressure relief valve is forced to open. Performed by pressure increase.       |
| 1164 | 5571 | 16  | Rail fuel pressure relief valve is forced to open. Shutoff conditions.                   |
| 1165 | 5571 | 15  | Rail fuel pressure relief valve is forced to open. Warning conditions.                   |
| 1166 | 5571 | 0   | Open rail fuel pressure relief valve was detected.                                       |
| 1167 | 5571 | 2   | Unexpected opening of the rail fuel pressure relief valve.                               |
| 1168 | 5571 | 2   | Successful rail fuel pressure relief valve opening cannot be ensured.                    |
| 1169 | 5571 | 13  | Averaged rail fuel pressure after valve opening is outside the expected tolerance range. |

## Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code

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| DTC  | SPN  | FMI | Description                                                                          |
|------|------|-----|--------------------------------------------------------------------------------------|
| 1170 | 5571 | 16  | Open time of rail fuel pressure relief valve for wear out monitoring had exceeded.   |
| 1171 | 94   | 1   | Fuel pressure build up during engine start not successful.                           |
| 1172 | 1347 | 5   | Electrical fuel pump current below normal or open circuit.                           |
| 1174 | 1347 | 3   | Electrical fuel pump voltage above normal or shorted to high.                        |
| 1175 | 1347 | 4   | Electrical fuel pump voltage below normal or shorted to low.                         |
| 119  | 1231 | 14  | CAN Bus 2 off Error for Application CAN.                                             |
| 1190 | 7103 | 13  | Rail fuel pressure below set point, speed-dependent threshold exceeded.              |
| 1191 | 7103 | 13  | Rail fuel pressure metering unit. Fuel quantity balance is disrupted.                |
| 1194 | 7103 | 13  | Negative rail fuel pressure governor deviation at zero delivery by metering unit.    |
| 1195 | 7103 | 1   | Rail fuel pressure value is below minimum rail pressure threshold.                   |
| 1197 | 7103 | 0   | Maximum rail pressure exceeded.                                                      |
| 1198 | 7103 | 2   | Set point of fuel metering unit in overrun mode not plausible.                       |
| 120  | 639  | 14  | CAN Bus 1 off Error for Power train CAN.                                             |
| 1200 | 5357 | 14  | Shut-off due to undershoot of minimum rail pressure.                                 |
| 1202 | 157  | 0   | Maximum rail pressure exceeded in limp home mode.                                    |
| 1208 | 157  | 3   | Engine fuel injector metering rail pressure voltage above normal or shorted to high. |

| DTC  | SPN    | FMI | Description                                                                                  |
|------|--------|-----|----------------------------------------------------------------------------------------------|
| 1209 | 157    | 4   | Engine fuel injector metering rail pressure voltage below normal or shorted to low.          |
| 121  | 520252 | 2   | Wrong checksum in the CAN message EAT Control.                                               |
| 1212 | 629    | 12  | ECU. Keep alive error during runtime at an external device.                                  |
| 1213 | 629    | 12  | ECU. Keep alive error during initialization phase at an external device.                     |
| 1215 | 629    | 12  | ECU. Read diagnosis error for non volatile memory.                                           |
| 1216 | 629    | 12  | ECU. Write diagnosis error for non volatile memory.                                          |
| 1218 | 629    | 12  | ECU. Stack memory threshold overrun.                                                         |
| 1219 | 629    | 12  | ECU. Observation Counter irregular switch off counter triggered by engine running.           |
| 122  | 4207   | 2   | TSC1 message checksum fault.                                                                 |
| 123  | 4207   | 2   | TSC1 message checksum fault.                                                                 |
| 1233 | 5826   | 15  | Emission control system operator inducement level 1 severity above normal operational range. |
| 1235 | 5826   | 0   | Emission control system operator inducement level 2 severity above normal operational range. |
| 1236 | 5826   | 14  | Emission control system operator pre-trigger inducement level 2 severity.                    |
| 124  | 4207   | 2   | TSC1 message checksum fault.                                                                 |
| 125  | 4207   | 2   | TSC1 message checksum fault.                                                                 |
| 1274 | 91     | 3   | Accelerator pedal sensor position 1 voltage above normal or shorted to high.                 |
| 1275 | 2623   | 3   | Accelerator pedal 1, channel 2 voltage above normal or shorted to high.                      |
| 1276 | 29     | 3   | Accelerator pedal 2, voltage above normal or shorted to high.                                |

## Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code

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| DTC  | SPN  | FMI | Description                                                                 |
|------|------|-----|-----------------------------------------------------------------------------|
| 1277 | 2625 | 3   | Accelerator pedal 2, channel 2 voltage above normal or shorted to high.     |
| 1280 | 91   | 4   | Accelerator pedal sensor position 1 voltage below normal or shorted to low. |
| 1281 | 2623 | 4   | Accelerator pedal 1, channel 2 voltage below normal or shorted to low.      |
| 1282 | 29   | 4   | Accelerator pedal 2 voltage below normal or shorted to low.                 |
| 1283 | 2625 | 4   | Accelerator pedal 2, channel 2 voltage below normal or shorted to low.      |
| 1289 | 3509 | 14  | Failure of sensor supply voltage 1 from ECU.                                |
| 1290 | 3509 | 0   | Sensor supply voltage 1 from ECU above normal operational range.            |
| 1291 | 3509 | 6   | Sensor supply voltage 1 from ECU above normal or grounded circuit.          |
| 1292 | 3509 | 1   | Sensor supply voltage 1 from ECU below normal operational range.            |
| 1293 | 3510 | 14  | Failure of sensor supply voltage 2 from ECU.                                |
| 1294 | 3510 | 0   | Sensor supply voltage 2 from ECU above normal operational range.            |
| 1295 | 3510 | 6   | Sensor supply voltage 2 from ECU above normal or grounded circuit.          |
| 1296 | 3510 | 1   | Sensor supply voltage 2 from ECU below normal operational range.            |
| 1306 | 677  | 3   | Engine starter motor relay voltage above normal or shorted to high.         |
| 1307 | 677  | 4   | Engine starter motor relay voltage below normal or shorted to low.          |

| DTC  | SPN  | FMI | Description                                                                                           |
|------|------|-----|-------------------------------------------------------------------------------------------------------|
| 1308 | 677  | 5   | Engine starter motor relay current below normal or shorted to low.                                    |
| 1310 | 677  | 3   | Engine starter motor relay current above normal or shorted to high.                                   |
| 1311 | 677  | 4   | Engine starter motor relay voltage below normal or shorted to low.                                    |
| 1323 | 91   | 11  | Accelerator pedal position 1. Possible error between APP1 and APP2 or APP1 and idle switch.           |
| 1326 | 29   | 11  | Accelerator pedal 2 position. Possible error between APP1 and idle switch.                            |
| 1346 | 1041 | 14  | Start signal indicator. Terminal 50 was operated too long.                                            |
| 1354 | 105  | 0   | Engine intake manifold 1 temperature data above normal operational range. Warning threshold exceeded. |
| 1355 | 105  | 0   | Engine intake manifold 1 temperature above normal operational range. Shutoff threshold exceeded.      |
| 1357 | 1136 | 0   | Engine ECU temperature above normal operational range. Most severe.                                   |
| 1358 | 1136 | 1   | Engine ECU temperature below normal operational range. Most severe.                                   |
| 1359 | 1136 | 15  | Engine ECU temperature above normal operational range. Least severe.                                  |
| 1360 | 1136 | 17  | Engine ECU temperature below normal operational range. Least severe.                                  |
| 1361 | 1136 | 2   | Engine ECU temperature fault check.                                                                   |
| 1362 | 412  | 15  | Engine exhaust gas recirculation temperature above normal operational range.                          |

## Deutz TCD 2.2 L3 Engine Fault Codes

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| DTC  | SPN | FMI | Description                                                                                                   |
|------|-----|-----|---------------------------------------------------------------------------------------------------------------|
| 1363 | 412 | 17  | Engine exhaust gas recirculation temperature below normal operational range.                                  |
| 1364 | 412 | 3   | Engine exhaust gas recirculation temperature voltage above normal or shorted to high.                         |
| 1365 | 412 | 4   | Engine exhaust gas recirculation temperature voltage below normal or shorted to low.                          |
| 1372 | 51  | 5   | Engine throttle valve 1, position 1 current below normal or open circuit.                                     |
| 1375 | 51  | 3   | Engine throttle valve 1, position 1 voltage above normal or shorted to high. Short circuit to battery 1.      |
| 1376 | 51  | 3   | Engine throttle valve 1, position 1 voltage above normal or shorted to high. Short circuit to battery 2.      |
| 1377 | 51  | 4   | Engine throttle valve 1, position 1 voltage below normal or shorted to low. Short circuit to ground 1.        |
| 1378 | 51  | 4   | Engine throttle valve 1, position 1 voltage below normal or shorted to low. Short circuit to ground 2.        |
| 1379 | 51  | 6   | Engine throttle valve 1, position 1 current above normal or grounded circuit.                                 |
| 1382 | 51  | 7   | Engine throttle valve 1 position 1 mechanical system not responding or out of adjustment. Valve stuck closed. |
| 1383 | 51  | 7   | Engine throttle valve 1 position 1 mechanical system not responding or out of adjustment. Valve stuck open.   |
| 1391 | 51  | 3   | Engine throttle valve 1, position 1 voltage above normal or shorted to high.                                  |

| DTC  | SPN    | FMI | Description                                                                 |
|------|--------|-----|-----------------------------------------------------------------------------|
| 1392 | 51     | 4   | Engine throttle valve 1, position 1 voltage below normal or shorted to low. |
| 1397 | 105    | 0   | Engine intake manifold 1 temperature above normal operational range.        |
| 1398 | 105    | 1   | Engine intake manifold 1 temperature below normal operational range.        |
| 1399 | 4766   | 2   | DOC temperature too high.                                                   |
| 1400 | 4766   | 2   | DOC temperature too low.                                                    |
| 1401 | 4766   | 15  | DOC outlet temperature above normal operational range.                      |
| 1402 | 4766   | 3   | DOC outlet temperature voltage above normal or shorted to high.             |
| 1403 | 4766   | 4   | DOC outlet temperature voltage below normal or shorted to low.              |
| 1404 | 4766   | 2   | DOC intake temperature error.                                               |
| 1405 | 4766   | 15  | DOC intake temperature above normal operational range.                      |
| 1406 | 4766   | 3   | DOC intake temperature voltage above normal or shorted to high.             |
| 1407 | 4766   | 4   | DOC intake temperature voltage below normal or shorted to low.              |
| 1408 | 4766   | 2   | DOC intake temperature does not change.                                     |
| 142  | 520256 | 9   | Timeout of EAT control receive message. CAN message is not received.        |
| 144  | 523211 | 9   | Timeout error of CAN receive frame EBC1.                                    |
| 154  | 523212 | 9   | Timeout error of CAN receive frame engine protection.                       |
| 1540 | 520254 | 8   | The stand still regeneration mode time exceeds the long limit threshold.    |
| 1541 | 520255 | 2   | Hoses connected to the dp DPF SENT sensor inverted. Swap hoses.             |
| 155  | 523741 | 14  | Engine shutdown request via CAN.                                            |



## Deutz TCD 2.2 L3 Engine Fault Codes

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| DTC  | SPN    | FMI | Description                                                  |
|------|--------|-----|--------------------------------------------------------------|
| 1587 | 97     | 0   | Water in fuel level prefilter; maximum value exceeded.       |
| 188  | 523240 | 9   | Timeout CAN message function mode control.                   |
| 219  | 520253 | 2   | Rolling counter fault CAN message EAT control.               |
| 220  | 4206   | 2   | Fault check for Rolling Counter of TSC1AE.                   |
| 221  | 4206   | 2   | Fault check for Rolling Counter of TSC1AR.                   |
| 222  | 4206   | 2   | Fault check for Rolling Counter of TSC1TE.                   |
| 223  | 4206   | 2   | Fault check for Rolling Counter of TSC1TR.                   |
| 349  | 3349   | 0   | Timeout error of CAN receive frame active TSC1AE.            |
| 350  | 3349   | 0   | Timeout error of CAN receive frame passive TSC1AE.           |
| 351  | 3349   | 0   | Timeout error of CAN receive frame active TSC1AR.            |
| 352  | 3349   | 0   | Timeout error of CAN receive frame passive TSC1AR.           |
| 353  | 3349   | 0   | Timeout error of CAN receive frame TSC1TE active.            |
| 354  | 3349   | 0   | TSC1 receive timeout error. Shout circuit to ground error.   |
| 355  | 3349   | 0   | Timeout error of CAN receive frame TSC1TR.                   |
| 356  | 3349   | 0   | Passive timeout error of CAN receive frame TSC1TR.           |
| 361  | 3349   | 0   | Timeout error of CAN receive frame TSC1AE. Traction Control. |
| 363  | 3349   | 0   | Timeout error of CAN receive frame TSC1AR. Retarder.         |
| 365  | 3349   | 0   | Timeout error of CAN receive frame TSC1TE. Setpoint.         |

| DTC | SPN    | FMI | Description                                                                                     |
|-----|--------|-----|-------------------------------------------------------------------------------------------------|
| 367 | 3349   | 0   | Timeout error of CAN receive frame TSC1TR; control signal.                                      |
| 38  | 1485   | 3   | ECM main relay voltage above normal or shorted to high.                                         |
| 39  | 1485   | 3   | ECM main relay voltage above normal or shorted to high of actuator relay 2.                     |
| 40  | 1485   | 3   | ECM main relay voltage above normal or shorted to high of actuator relay 3.                     |
| 41  | 1485   | 4   | ECM main relay voltage below normal or shorted to low.                                          |
| 42  | 1485   | 4   | ECM main relay voltage below normal or shorted to low of actuator relay 2.                      |
| 43  | 1485   | 4   | ECM main relay voltage below normal or shorted to low of actuator relay 3.                      |
| 48  | 168    | 0   | Battery voltage above normal operational range.                                                 |
| 49  | 168    | 1   | Battery voltage low normal operational range.                                                   |
| 50  | 168    | 3   | Battery voltage above normal or shorted to high.                                                |
| 51  | 168    | 4   | Battery voltage above normal or shorted to low.                                                 |
| 516 | 523982 | 0   | Power stage diagnosis disabled. High battery voltage.                                           |
| 517 | 523982 | 1   | Power stage diagnosis disabled. Low battery voltage.                                            |
| 52  | 168    | 0   | High battery voltage. Warning threshold is exceeded.                                            |
| 567 | 27     | 5   | Engine exhaust gas recirculation 1 valve position voltage above normal or open circuit.         |
| 570 | 27     | 3   | Engine exhaust gas recirculation 1 valve position voltage above normal or shorted to battery 1. |
| 571 | 27     | 3   | Engine exhaust gas recirculation 1 valve position voltage above normal or shorted to battery 2. |



## Deutz TCD 2.2 L3 Engine Fault Codes

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| DTC | SPN  | FMI | Description                                                                                                                   |
|-----|------|-----|-------------------------------------------------------------------------------------------------------------------------------|
| 572 | 27   | 4   | Engine exhaust gas recirculation 1 valve position voltage below normal or shorted to ground 1.                                |
| 573 | 27   | 4   | Engine exhaust gas recirculation 1 valve position voltage below normal or shorted to ground 2.                                |
| 574 | 27   | 6   | Engine exhaust gas recirculation 1 valve position current above normal or grounded circuit.                                   |
| 577 | 27   | 7   | Engine exhaust gas recirculation 1 valve position. Mechanical system not responding or out of adjustment. Valve stuck closed. |
| 578 | 27   | 7   | Engine exhaust gas recirculation 1 valve position. Mechanical system not responding or out of adjustment. Valve stuck open.   |
| 582 | 5763 | 3   | Engine exhaust gas recirculation 1, catuator 1 voltage above normal or shorted to high.                                       |
| 583 | 5763 | 4   | Engine exhaust gas recirculation 1, catuator 1 voltage below normal or shorted to low.                                        |
| 586 | 3055 | 14  | Internal software error ECU. Injection cut off.                                                                               |
| 587 | 190  | 0   | Engine speed above warning threshold. Over speed detection in component engine protection.                                    |
| 588 | 190  | 0   | Engine speed above warning threshold. FOC-Level 1.                                                                            |
| 589 | 190  | 0   | Engine speed above warning threshold. FOC-Level 2.                                                                            |
| 590 | 190  | 0   | Engine speed above warning threshold. Overrun Mode.                                                                           |
| 610 | 171  | 15  | Environment temperature sensor, temperature above upper physical threshold.                                                   |
| 613 | 171  | 3   | Ambient air temperature sensor voltage above normal or shorted to high.                                                       |

| DTC | SPN  | FMI | Description                                                                            |
|-----|------|-----|----------------------------------------------------------------------------------------|
| 614 | 171  | 4   | Ambient air temperature sensor voltage below normal or shorted to low.                 |
| 615 | 723  | 8   | Camshaft speed sensor abnormal frequency or pulse width or period.                     |
| 616 | 723  | 14  | Camshaft sensor detection. Out of range, signal disrupted, no signal.                  |
| 617 | 723  | 13  | Offset angle between crank and camshaft sensor is too large.                           |
| 618 | 4201 | 8   | Crankshaft sensor detection. Out of range, signal disrupted, no signal.                |
| 619 | 4201 | 14  | Crankshaft speed sensor. Speed detection, out of range, signal disrupted or no signal. |
| 68  | 1669 | 14  | CAN Bus ID-5. CAN Hardware registers are not updated within the expected time.         |
| 70  | 110  | 2   | Engine Coolant Temperature. Data erratic, intermittent or incorrect.                   |
| 709 | 97   | 3   | Water in fuel indicator 1. Voltage above normal or shorted to high.                    |
| 710 | 97   | 4   | Water in fuel indicator 1. Voltage below normal or shorted to low.                     |
| 721 | 94   | 15  | Low fuel pressure system, max. physical range exceeded.                                |
| 723 | 94   | 3   | Engine fuel pressure sensor voltage above normal or shorted to high.                   |
| 724 | 94   | 4   | Engine fuel pressure sensor voltage below normal or shorted to low.                    |
| 725 | 94   | 1   | Low fuel pressure system, warning threshold exceeded.                                  |
| 726 | 94   | 1   | Low fuel pressure, shut off threshold exceeded.                                        |
| 75  | 110  | 3   | Engine coolant temperature voltage above normal or shorted to high.                    |
| 76  | 110  | 4   | Engine coolant temperature voltage below normal or shorted to low.                     |

## Deutz TCD 2.2 L3 Engine Fault Codes

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| DTC | SPN  | FMI | Description                                                                                    |
|-----|------|-----|------------------------------------------------------------------------------------------------|
| 77  | 110  | 0   | High coolant temperature. Warning threshold exceeded.                                          |
| 78  | 110  | 0   | Coolant temperature. System reaction initiated.                                                |
| 797 | 676  | 12  | Engine cold start aid relay error.                                                             |
| 798 | 676  | 5   | Engine cold start aid relay current below normal or open circuit.                              |
| 799 | 676  | 5   | Engine cold start aid relay current below normal or open circuit.                              |
| 80  | 411  | 2   | Intake air massflow not in expected range.                                                     |
| 803 | 676  | 3   | Engine cold start aid relay voltage above normal or shorted to high.                           |
| 805 | 676  | 4   | Engine cold start aid relay voltage below normal or shorted to low.                            |
| 807 | 2797 | 14  | Engine fuel 1 injector, Group 1. Number of possible injections limited by the injection valve. |
| 815 | 2797 | 4   | Engine fuel 1 injector, Group 1 voltage below normal or shorted to low.                        |
| 816 | 5358 | 5   | Engine cylinder 1 fuel injection quantity current below normal or open circuit.                |
| 817 | 5359 | 5   | Engine cylinder 2 fuel injection quantity current below normal or open circuit.                |
| 818 | 5360 | 5   | Engine cylinder 3 fuel injection quantity current below normal or open circuit.                |
| 819 | 5361 | 5   | Engine cylinder 4 fuel injection quantity current below normal or open circuit.                |
| 820 | 5362 | 5   | Engine cylinder 5 fuel injection quantity current below normal or open circuit.                |

| DTC | SPN  | FMI | Description                                                                                                                                  |
|-----|------|-----|----------------------------------------------------------------------------------------------------------------------------------------------|
| 821 | 5363 | 5   | Engine cylinder 6 fuel injection quantity current below normal or open circuit.                                                              |
| 822 | 2797 | 6   | Engine fuel 1 injector. Group 1 current above normal or grounded circuit.                                                                    |
| 823 | 2798 | 6   | Engine fuel 1 injector. Group 2 current above normal or grounded circuit.                                                                    |
| 824 | 5358 | 6   | Engine cylinder 1 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.                       |
| 825 | 5359 | 6   | Engine cylinder 2 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.                       |
| 826 | 5360 | 6   | Engine cylinder 3 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.                       |
| 827 | 5361 | 6   | Engine cylinder 4 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.                       |
| 828 | 5362 | 6   | Engine cylinder 5 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.                       |
| 829 | 5363 | 6   | Engine cylinder 6 fuel injection quantity above normal or grounded circuit. Short circuit of the power stage low-side.                       |
| 83  | 111  | 1   | Coolant level too low.                                                                                                                       |
| 830 | 5358 | 6   | Engine cylinder 1 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage. |

## Deutz TCD 2.2 L3 Engine Fault Codes

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| DTC | SPN  | FMI | Description                                                                                                                                  |
|-----|------|-----|----------------------------------------------------------------------------------------------------------------------------------------------|
| 831 | 5359 | 6   | Engine cylinder 2 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage. |
| 832 | 5360 | 6   | Engine cylinder 3 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage. |
| 833 | 5361 | 6   | Engine cylinder 4 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage. |
| 834 | 5362 | 6   | Engine cylinder 5 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage. |
| 835 | 5363 | 6   | Engine cylinder 6 fuel injection quantity above normal or grounded circuit. Short circuit between high-side and low-side of the power stage. |
| 836 | 105  | 3   | Engine intake manifold temperature voltage above normal or shorted to high.                                                                  |
| 837 | 105  | 4   | Engine intake manifold temperature voltage below normal or shorted to low.                                                                   |
| 838 | 2797 | 14  | Engine fuel 1 injector, group 1 missing injector adjustment value programming injector 1.                                                    |
| 839 | 2798 | 14  | Engine fuel 1 injector, group 2 missing injector adjustment value programming injector 2.                                                    |

| DTC | SPN  | FMI | Description                                                                                                                               |
|-----|------|-----|-------------------------------------------------------------------------------------------------------------------------------------------|
| 840 | 4257 | 14  | Engine fuel 1 injector, group 3 missing injector adjustment value programming injector 3.                                                 |
| 854 | 7103 | 5   | Engine fuel metering rail pump current below normal or open circuit.                                                                      |
| 855 | 7103 | 3   | Engine fuel metering rail pump voltage above normal or shorted to high. Short circuit to battery on the high side power stage.            |
| 856 | 7103 | 3   | Engine fuel metering rail pump voltage above normal or shorted to high. Short circuit to battery on the low side power stage.             |
| 857 | 7103 | 4   | Engine fuel metering rail pump voltage below normal or shorted to low. Short circuit to battery on the high side power stage.             |
| 858 | 7103 | 4   | Engine fuel metering rail pump voltage below normal or shorted to low. Short circuit to battery on the low side power stage.              |
| 859 | 7103 | 6   | Engine fuel metering rail pump current above normal or grounded circuit.                                                                  |
| 868 | 629  | 12  | Fun monitoring: fault of ECU ADC. Null load test pulse.                                                                                   |
| 869 | 629  | 12  | Fun monitoring: fault of ECU ADC. Test voltage.                                                                                           |
| 870 | 629  | 12  | ECU. DFC to indicate ICO request from MoCSOP module.                                                                                      |
| 871 | 91   | 14  | Fun monitoring: Monitoring of accelerator pedal position.                                                                                 |
| 875 | 190  | 2   | Fun monitoring: Fault of engine speed check.                                                                                              |
| 876 | 5357 | 2   | Engine fuel injection error for multiple cylinders. Diagnostic fault check error between level 1 energizing time and level 2 information. |

## Deutz TCD 2.2 L3 Engine Fault Codes

DTC = Diagnostic Trouble Code

FMI = Failure Mode Identifier

SPN = Suspect Parameter Number

| DTC | SPN    | FMI | Description                                                                                                                                                         |
|-----|--------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 877 | 5441   | 2   | Engine fuel injection timing error for multiple cylinders.                                                                                                          |
| 878 | 5357   | 2   | Engine fuel injection error for multiple cylinders. Diagnostic fault check to report the error due to non plausibility in ZFC.                                      |
| 879 | 523612 | 12  | Internal recovery. Diagnosis fault check to report the error to demand for an ICO due to an error in the Pol2 shut-off.                                             |
| 88  | 598    | 10  | Clutch switch. Abnormal rate of change.                                                                                                                             |
| 880 | 523612 | 12  | Internal recovery. Diagnosis fault check to report the error to demand for an ICO due to an error in the Pol3 efficiency factor.                                    |
| 881 | 523612 | 12  | Internal recovery. Diagnosis fault check to report the error to demand for an ICO due to an error in change of EOM.                                                 |
| 882 | 5357   | 2   | Engine fuel injection error for multiple cylinders. Diagnostic fault check to report the error demand for an ICO due to an error in total torque relevant quantity. |
| 883 | 5357   | 2   | Engine fuel injection error for multiple cylinders. Diagnostic fault check to report the error due to injection quantity correction.                                |
| 884 | 5442   | 2   | Engine fuel injection pressure error for multiple cylinders.                                                                                                        |
| 885 | 29     | 2   | Accelerator pedal 2 position.                                                                                                                                       |
| 886 | 677    | 2   | Engine starter motor relay. Function monitoring: Fault of ECU power train active.                                                                                   |

| DTC | SPN    | FMI | Description                                                                                           |
|-----|--------|-----|-------------------------------------------------------------------------------------------------------|
| 887 | 513    | 2   | Actual engine percent torque. DFC to report the fault in energizing time comparison.                  |
| 888 | 513    | 2   | Actual engine percent torque. DFC to report in torque comparison error.                               |
| 889 | 520250 | 2   | Function monitoring: Error in the post-build selectable monitoring.                                   |
| 890 | 629    | 12  | ECU. Status of the EMM alarm FCCU0 which is read out of the FCCU hardware module.                     |
| 91  | 1109   | 2   | Engine protection system approaching shutdown. Engine shut off demand ignored.                        |
| 92  | 1109   | 14  | Engine protection system approaching shutdown. Shut off request from supervisory monitoring function. |
| 996 | 629    | 12  | ECU. Diagnostic fault check to report ABE active state.                                               |
| 997 | 629    | 12  | Function monitoring: Fault of ECU, WDA active by inquiry/ response communication.                     |
| 998 | 629    | 12  | Function monitoring: fault of ECU. Error Pin active suspicion of HW fault.                            |
| 999 | 629    | 12  | Function monitoring: Fault of ECU, WDA active by overvoltage detection.                               |

The following DTC fault code range shares the same description. Replace the ECU.

| DTC | 891-945 | Description         |
|-----|---------|---------------------|
| SPN | 629     | Internal ECU error. |
| FMI | 12      |                     |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN | FMI | Description                                                                  | Refer to Engine Manual                                 |
|-----|-----|------------------------------------------------------------------------------|--------------------------------------------------------|
| 27  | 3   | Engine Exhaust Gas Recirculation Valve Position :Voltage Above Normal        | Valve Position Sensor- Test                            |
| 27  | 4   | Engine Exhaust Gas Recirculation Valve Position :Voltage Below Normal        | Valve Position Sensor - Test                           |
| 29  | 3   | Accelerator Pedal Position 2 :Voltage Above Normal                           | Analog Throttle Position Sensor Circuit - Test         |
| 29  | 4   | Accelerator Pedal Position 2 :Voltage Below Normal                           | Analog Throttle Position Sensor Circuit - Test         |
| 51  | 3   | Engine Throttle Valve 1Position :Voltage Above Normal                        | Valve Position Sensor - Test                           |
| 51  | 4   | Engine Throttle Valve 1 Position :Voltage Below Normal                       | Valve Position Sensor - Test                           |
| 91  | 3   | Accelerator Pedal Position 1 :Voltage Above Normal                           | Analog Throttle Position Sensor Circuit - Test         |
| 91  | 4   | Accelerator Pedal Position 1: Voltage Below Normal                           | Analog Throttle Position Sensor Circuit - Test         |
| 97  | 15  | Water In Fuel Indicator :High - least severe                                 | Fuel Contains Water                                    |
| 100 | 2   | Engine Oil Pressure :Erratic,Intermittent,or Incorrect                       | Switch Circuits - Test                                 |
| 100 | 17  | Engine Oil Pressure :Low - least severe (1)                                  | Oil Pressure Is Low                                    |
| 102 | 3   | Engine Intake Manifold #1 Pressure:Voltage Above Normal                      | Engine Pressure Sensor Open or Short Circuit - Test    |
| 102 | 4   | Engine Intake Manifold #1 Pressure :Voltage Below Normal                     | Engine Pressure Sensor Open or Short Circuit - Test    |
| 102 | 20  | Engine Intake Manifold #1Pressure :Data Drifted High                         | Engine Pressure Sensor Open or Short Circuit - Test    |
| 102 | 21  | Engine Intake Manifold #1Pressure :Data Drifted Low                          | Engine Pressure Sensor Open or Short Circuit - Test    |
| 105 | 3   | Engine Intake Manifold #1 Temperature :Voltage Above Normal                  | Engine Temperature Sensor Open or Short Circuit - Test |
| 105 | 4   | Engine Intake Manifold #1 Temperature :Voltage Below Normal                  | Engine Temperature Sensor Open or Short Circuit-Test   |
| 107 | 2   | Engine Air Filter 1Differential Pressure : Erratic,Intermittent,or Incorrect | Switch Circuits - Test                                 |
| 107 | 15  | Engine Air Filter 1Differential Pressure :High - least severe (1)            | Inlet Air Is Restricted                                |
| 107 | 16  | Engine Air Filter 1Differential Pressure :High - moderate severity(2)        | Inlet Air Is Restricted                                |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN | FMI | Description                                                                                 | Refer to Engine Manual                                       |
|-----|-----|---------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| 108 | 3   | Barometric Pressure :Voltage Above Normal                                                   | Engine Pressure Sensor Open or Short Circuit - Test          |
| 108 | 4   | Barometric Pressure :Voltage Below Normal                                                   | Engine Pressure Sensor Open or Short Circuit - Test          |
| 110 | 3   | Engine Coolant Temperature :Voltage Above Normal                                            | Engine Temperature Sensor Open or Short Circuit - Test       |
| 110 | 4   | Engine Coolant Temperature :Voltage Below Normal                                            | Engine Temperature Sensor Open or Short Circuit - Test       |
| 110 | 15  | Engine Coolant Temperature :High - least severe (1)                                         | Coolant Temperature Is High                                  |
| 110 | 16  | Engine Coolant Temperature:High - moderate severity (2)                                     | Coolant Temperature Is High                                  |
| 152 | 2   | Number Of ECU Resets :Erratic,Intermittent,or Incorrect                                     | ECM Memory - Test                                            |
| 157 | 0   | Engine Injector Metering Rail#1Pressure : High - Fuel Rail Pressure Problem most severe (3) |                                                              |
| 157 | 2   | Engine Injector Metering Rail #1 Pressure : Erratic, Intermittent, or Incorrect             | Fuel Rail Pressure Problem                                   |
| 157 | 3   | Engine Injector Metering Rail#1 Pressure : Voltage Above Normal                             | Engine Pressure Sensor Open or Short Circuit - Test          |
| 157 | 4   | Engine Injector Metering Rail #1 Pressure :Voltage Below Normal                             | Engine Pressure Sensor Open or Short Circuit - Test          |
| 157 | 10  | Engine Injector Metering Rail#1 Pressure : Abnormal Rate of Change                          | Engine Pressure Sensor Open or Short Circuit - Test          |
| 157 | 16  | Engine Injector Metering Rail#1 Pressure : High - moderate severity (2)                     | Fuel Rail Pressure Problem                                   |
| 157 | 17  | Engine Injector Metering Rail#1Pressure :Low - least severe (1)                             | Fuel Rail Pressure Problem                                   |
| 157 | 18  | Engine Injector Metering Rail#1Pressure :Low - moderate severity (2)                        | Fuel Rail Pressure Problem                                   |
| 168 | 3   | Battery Potential/ Power Input 1 :Voltage Above Normal                                      | Ignition Keyswitch Circuit and Battery Supply Circuit - Test |
| 166 | 2   | Engine Rated Power :Erratic, Intermittent or Incorrect                                      | ECM Memory- Test                                             |
| 166 | 14  | Engine Rated Power :Special Instruction                                                     | ECM Memory - Test                                            |
| 168 | 4   | Battery Potential/ Power Input 1 :Voltage Below Normal                                      | Ignition Keyswitch Circuit and Battery Supply Circuit - Test |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN | FMI | Description                                                            | Refer to Engine Manual                                                                                                                                                           |
|-----|-----|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 172 | 3   | Engine Air Inlet Temperature Sensor :Voltage Above Normal              | Engine Temperature Sensor Open or Short Circuit-Test                                                                                                                             |
| 172 | 4   | Engine Air Inlet Temperature Sensor :Voltage Below Normal              | Engine Temperature Sensor Open or Short Circuit - Test                                                                                                                           |
| 173 | 3   | Engine Exhaust Gas Temperature : Voltage Above Normal                  | Engine Temperature Sensor Open or Short Circuit - Test                                                                                                                           |
| 173 | 4   | Engine Exhaust Gas Temperature :Voltage Below Normal                   | Engine Temperature Sensor Open or Short Circuit-Test                                                                                                                             |
| 174 | 3   | Engine Fuel Temperature1 :Voltage Above Normal                         | Engine Temperature Sensor Open or Short Circuit - Test                                                                                                                           |
| 174 | 4   | Engine Fuel Temperature 1 :Voltage Below Normal                        | Engine Temperature Sensor Open or Short Circuit - Test                                                                                                                           |
| 190 | 8   | Engine Speed :Abnormal Frequency,Pulse Width,or Period                 | Engine Speed/Timing Sensor Circuit - Test                                                                                                                                        |
| 190 | 15  | Engine Speed :High - least severe (1)                                  | Engine Over speeds                                                                                                                                                               |
| 558 | 2   | Accelerator Pedal1Low Idle Switch :Erratic, Intermittent, or Incorrect | Idle Validation Switch Circuit- Test                                                                                                                                             |
| 593 | 31  | Engine Idle Shutdown has Shutdown Engine                               | This code indicates that an engine idle shutdown is about to occur. This code does not represent a fault. If equipped, the warning lamp will come on.                            |
| 594 | 31  | Engine Idle Shutdown Driver Alert Mode                                 | This code indicates that an engine idle shut down has occurred.This code does not represent a fault. If equipped,the warning lamp will flash and the shutdown lamp will come on. |
| 623 | 6   | Red Stop Lamp :Current Above Normal                                    | Indicator Lamp Circuit- Test                                                                                                                                                     |
| 624 | 6   | Amber Warning Lamp :Current Above Normal                               | Indicator Lamp Circuit - Test                                                                                                                                                    |
| 630 | 2   | Calibration Memory :Erratic, Intermittent, or Incorrect                | Injector Data Incorrect- Test                                                                                                                                                    |
| 637 | 11  | Engine Timing Sensor :Other Failure Mode                               | Engine Speed/Timing Sensor Circuit- Test                                                                                                                                         |
| 639 | 9   | J1939 Network #1 :Abnormal Update Rate                                 | CAN Data Link Circuit - Test                                                                                                                                                     |
| 639 | 14  | J1939 Network #1:Special Instruction                                   | CAN Data Link Circuit - Test                                                                                                                                                     |
| 651 | 5   | Engine Injector Cylinder #01 : Current Below Normal                    | Injector Solenoid Circuit - Test                                                                                                                                                 |
| 651 | 6   | Engine Injector Cylinder #01 : Current Above Normal                    | Injector Solenoid Circuit- Test                                                                                                                                                  |
| 651 | 20  | Engine Injector Cylinder#01 :Data Drifted High                         | Injector Data Incorrect- Test                                                                                                                                                    |
| 651 | 21  | Engine Injector Cylinder#01 :Data Drifted Low                          | Injector Data Incorrect - Test                                                                                                                                                   |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN  | FMI | Description                                                       | Refer to Engine Manual                    |
|------|-----|-------------------------------------------------------------------|-------------------------------------------|
| 652  | 5   | Engine Injector Cylinder #02 :Current Below Normal                | Injector Solenoid Circuit - Test          |
| 652  | 6   | Engine Injector Cylinder #02 :Current Above Normal                | Injector Solenoid Circuit - Test          |
| 652  | 20  | Engine Injector Cylinder #02 :Data Drifted High                   | Injector Data Incorrect- Test             |
| 652  | 21  | Engine Injector Cylinder #02 :Data Drifted Low                    | Injector Data Incorrect- Test             |
| 653  | 5   | Engine Injector Cylinder #03 :Current Below Normal                | Injector Solenoid Circuit - Test          |
| 653  | 6   | Engine Injector Cylinder #03 :Current Above Normal                | Injector Solenoid Circuit - Test          |
| 653  | 20  | Engine Injector Cylinder #03 :Data Drifted High                   | Injector Data Incorrect- Test             |
| 653  | 21  | Engine Injector Cylinder #03 :Data Drifted Low                    | Injector Data Incorrect - Test            |
| 654  | 5   | Engine Injector Cylinder #04 :Current Below Normal                | Injector Solenoid Circuit - Test          |
| 654  | 6   | Engine Injector Cylinder #04 :Current Above Normal                | Injector Solenoid Circuit - Test          |
| 654  | 20  | Engine Injector Cylinder #04 :Data Drifted High                   | Injector Data Incorrect- Test             |
| 654  | 21  | Engine Injector Cylinder #04 :Data Drifted Low                    | Injector Data Incorrect - Test            |
| 676  | 5   | Engine GloW Plug Relay : Current Below Normal                     | Glow Plug Starting Aid - Test             |
| 676  | 6   | Engine Glow Plug Relay :Current Above Normal                      | Glow Plug Starting Aid - Test             |
| 676  | 19  | Engine Glow Plug Relay :Data Error                                | Glow Plug Starting Aid- Test              |
| 677  | 3   | Engine Starter Motor Relay :Voltage Above Normal                  | Start Relay Circuit - Test                |
| 677  | 5   | Engine Starter Motor Relay :Current Below Normal                  | Start Relay Circuit - Test                |
| 677  | 6   | Engine Starter Motor Relay :Current Above Normal                  | Start Relay Cricuit - Test                |
| 723  | 8   | Engine Speed Sensor #2 :Abnormal Frequency,Pulse Width, or Period | Engine Speed/liming Sensor Circuit - Test |
| 976  | 2   | PTO Governor State : Erratic,Intermittent, or Incorrect           | PTO Switch Circuit - Test                 |
| 1041 | 2   | Start Signal Indicator :Erratic,Intermittent,or Incorrect         | Start Relay Circuit- Test                 |



## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN  | FMI | Description                                                                        | Refer to Engine Manual                                                                                                                                                                                                              |
|------|-----|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1076 | 2   | Engine Fuel Injection Pump Fuel Control Valve :Erratic, Intermittent, or Incorrect | Solenoid Valve - Test                                                                                                                                                                                                               |
| 1076 | 5   | Engine Fuel Injection Pump Fuel Control Valve :Current Below Normal                | Solenoid Valve - Test                                                                                                                                                                                                               |
| 1076 | 6   | Engine Fuel Injection Pump Fuel Control Valve :Current Above Normal                | Solenoid Valve- Test                                                                                                                                                                                                                |
| 1081 | 5   | Engine Wait to Start Lamp :Current Below Normal                                    | Indicator Lamp Circuit - Test                                                                                                                                                                                                       |
| 1081 | 6   | Engine Wait to Start Lamp :Current Above Normal                                    | Indicator Lamp Circuit- Test                                                                                                                                                                                                        |
| 1127 | 16  | Engine Turbocharger 1 Boost Pressure : High - moderate severity (2)                | Intake Manifold Air Pressure Is High                                                                                                                                                                                                |
| 1127 | 18  | Engine Turbocharger 1 Boost Pressure :Low - moderate severity (2)                  | Intake Manifold Air Pressure Is Low                                                                                                                                                                                                 |
| 1188 | 5   | Engine Turbocharger Wastegate Actuator 1 Position :Current Below Normal            | Solenoid Valve - Test                                                                                                                                                                                                               |
| 1188 | 6   | Engine Turbocharger Wastegate Actuator 1 Position :Current Above Normal            | Solenoid Valve - Test                                                                                                                                                                                                               |
| 1209 | 3   | Engine Exhaust Gas Pressure :Voltage Above Normal                                  | Engine Pressure Sensor Open or Short Circuit - Test                                                                                                                                                                                 |
| 1209 | 4   | Engine Exhaust Gas Pressure :Voltage Below Normal                                  | Engine Pressure Sensor Open or Short Circuit- Test                                                                                                                                                                                  |
| 1221 | 2   | Continuously Monitored Systems Support/Status ;Erratic,Intermittent,or Incorrect   | ECM Memory- Test                                                                                                                                                                                                                    |
| 1221 | 14  | Continuously Monitored Systems Support/Status : Special Instruction                | Another diagnostic code has requested engine speed limitation. The warning lamp will flash.The engine speed is limited to 1200rpm. Troubleshoot all other diagnostic codes.No troubleshooting is required for this diagnostic code. |
| 1239 | 0   | Engine Fuel Leakage 1 :High- most severe (3)                                       | Fuel Rail Pressure Problem                                                                                                                                                                                                          |
| 1485 | 7   | ECM Main Relay :Not Responding Properly                                            | Electrical Power Supply- Test                                                                                                                                                                                                       |
| 1485 | 14  | ECM Main Relay :Special Instruction                                                | Electrical Power Supply- Test                                                                                                                                                                                                       |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN  | FMI | Description                                                                           | Refer to Engine Manual               |
|------|-----|---------------------------------------------------------------------------------------|--------------------------------------|
| 2791 | 5   | Engine Exhaust Gas Recirculation (EGR) Valve Control:Current Below Normal             | Motorized Valve- Test                |
| 2791 | 6   | Engine Exhaust Gas Recirculation (EGR) Valve Control :Current Above Normal            | Motorized Valve - Test               |
| 2791 | 7   | Engine Exhaust Gas Recirculation (EGR) Valve Control :Not Responding Properly         | Motorized Valve- Test                |
| 2797 | 6   | Engine Injector Group 1 :Current Above Normal                                         | Injector Solenoid Circuit- Test      |
| 2797 | 7   | Engine Injector Group 1 :Not Responding Property                                      | Injector Solenoid Circuit - Test     |
| 2798 | 6   | Engine Injector Group 2 :Current Above Normal                                         | Injector Solenoid Circuit- Test      |
| 2840 | 12  | ECU Instance :Failure                                                                 | ECM Memory- Test                     |
| 2840 | 14  | ECU Instance :Special Instruction                                                     | Electrical Power Supply- Test        |
| 2880 | 2   | Engine Operator Primary Intermediate Speed Select :Erratic, Intermittent,or Incorrect | Throttle Switch Circuit - Test       |
| 2880 | 3   | Engine Operator Primary Intermediate Speed Select :Voltage Above Normal               | Throttle Switch Circuit - Test       |
| 2880 | 4   | Engine Operator Primary Intermediate Speed Select : Voltage Below Normal              | Throttle Switch Circuit - Test       |
| 2970 | 2   | Accelerator Pedal 2 Low Idle Switch :Erratic, Intermittent, or Incorrect              | Idle Validation Switch Circuit- Test |
| 3217 | 3   | After treatment #1 Intake O2 :Voltage Above Normal                                    | Oxygen Level- Test                   |
| 3217 | 4   | After treatment #1 Intake O2 :Voltage Below Normal                                    | Oxygen Level - Test                  |
| 3217 | 5   | After treatment #1 Intake O2 :Current Below Normal                                    | Oxygen Level- Test                   |
| 3217 | 6   | After treatment #1 Intake O2 :Current Above Normal                                    | Oxygen Level- Test                   |
| 3217 | 12  | After treatment #1 Intake O2 :Failure                                                 | Oxygen Level- Test                   |
| 3217 | 13  | After treatment #1 Intake O2 : Out of Calibration                                     | Oxygen Level- Test                   |
| 3217 | 15  | After treatment #1 Intake O2 : High - least severe (1)                                | Oxygen Level- Test                   |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN  | FMI | Description                                                                  | Refer to Engine Manual                                      |
|------|-----|------------------------------------------------------------------------------|-------------------------------------------------------------|
| 3219 | 15  | After treatment #1 Intake Gas Sensor at Temperature : High- least severe (1) | Oxygen Level- Test                                          |
| 3219 | 17  | After treatment #1 Intake Gas Sensor at Temperature : Low - least severe (1) | Oxygen Level- Test                                          |
| 3222 | 3   | After treatment #1 Intake Gas Sensor Heater : Voltage Above Normal           | Oxygen Level- Test                                          |
| 3222 | 4   | After treatment #1 Intake Gas Sensor Heater :Voltage Below Normal            | Oxygen Level- Test                                          |
| 3222 | 5   | After treatment #1 Intake Gas Sensor Heater :Current Below Normal            | Oxygen Level- Test                                          |
| 3242 | 3   | Particulate Trap Intake Gas Temperature :Voltage Above Normal                | Engine Temperature Sensor Open or Short Circuit-Test        |
| 3242 | 4   | Particulate Trap Intake Gas Temperature :Voltage Below Normal                | Engine Temperature Sensor Open or Short Circuit-Test        |
| 3251 | 0   | Particulate Trap Differential Pressure : High-most severe (3)                | Diesel Particulate Filter Collects Excessive Soot           |
| 3251 | 3   | Particulate Trap Differential Pressure:Voltage Above Normal                  | Engine Pressure Sensor Open or Short Circuit - Test         |
| 3251 | 4   | Particulate Trap Differential Pressure :Voltage Below Normal                 | Engine Pressure Sensor Open or Short Circuit- Test          |
| 3251 | 7   | Particulate Trap Differential Pressure :Not Responding Properly              | Diesel Particulate Filter Has Differential Pressure Problem |
| 3251 | 10  | Particulate Trap Differential Pressure :Abnormal Rate of Change              | Diesel Particulate Filter Has Differential Pressure Problem |
| 3251 | 16  | Particulate Trap Differential Pressure :High-moderate severity (2)           | Diesel Particulate Filter Collects Excessive Soot           |
| 3251 | 17  | Particulate Trap Differential Pressure : Low - least severe (1)              | Diesel Particulate Filter Has Differential Pressure Problem |
| 3509 | 2   | Sensor Supply Voltage 1: Erratic,Intermittent,or Incorrect                   | 5 Volt Sensor Supply Circuit- Test                          |
| 3510 | 2   | Sensor Supply Voltage 2 : Erratic,Intermittent, or Incorrect                 | 5 Volt Sensor Supply Circuit- Test                          |
| 3511 | 2   | Sensor Supply Voltage 3 : Erratic,Intermittent,or Incorrect                  | 5 Volt Sensor Supply Circuit - Test                         |
| 3697 | 6   | Particulate Trap Lamp Command :Current Above Normal                          | Indicator Lamp Circuit- Test                                |
| 3698 | 6   | Exhaust System High Temperature Lamp Command :Current Below Normal           | Indicator Lamp Circuit- Test                                |

## Perkins 854F-34T Engine Fault Code

SPN = Suspect Parameter Number

FMI = Failure Mode Identifier

| SPN  | FMI | Description                                                                               | Refer to Engine Manual                                        |
|------|-----|-------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| 3702 | 6   | Diesel Particulate Filter Active Regeneration Inhibited Status : Current Above Normal     | Indicator Lamp Circuit- Test                                  |
| 4765 | 3   | After treatment #1 Diesel Oxidation Catalyst Intake Gas Temperature :Voltage Above Normal | Engine Temperature Sensor Open or Short Circuit - Test        |
| 4765 | 4   | After treatment #1 Diesel Oxidation Catalyst Intake Gas Temperature :Voltage Below Normal | Engine Temperature Sensor Open or Short Circuit- Test         |
| 5055 | 17  | Engine Oil Viscosity : Low - least severe (1)                                             | Oil Contains Fuel                                             |
| 5055 | 18  | Engine Oil Viscosity : Low - moderate severity (2)                                        | Oil Contains Fuel                                             |
| 5099 | 6   | Engine Oil Pressure Low Lamp Data : Current Above Normal                                  | Indicator Lamp Circuit- Test                                  |
| 5319 | 31  | After treatment Diesel Particulate Filter Incomplete Regeneration                         | Diesel Particulate Filter Active Regeneration Was Interrupted |
| 5324 | 7   | Engine Glow Plug 1: Not Responding Properly                                               | Glow Plug Starting Aid - Test                                 |
| 5325 | 7   | Engine Glow Plug 2 :Not Responding Properly                                               | Glow Plug Starting Aid - Test                                 |
| 5326 | 7   | Engine Glow Plug 3 :Not Responding Properly                                               | Glow Plug Starting Aid - Test                                 |
| 5327 | 7   | Engine Glow Plug 4 :Not Responding Properly                                               | Glow Plug Starting Aid - Test                                 |
| 5419 | 5   | Engine Throttle Actuator #1 :Current Below Normal                                         | Motorized Valve- Test                                         |
| 5419 | 6   | Engine Throttle Actuator #1 :Current Above Normal                                         | Motorized Valve - Test                                        |
| 5419 | 7   | Engine Throttle Actuator #1 :Not Responding Properly                                      | Motorized Valve- Test                                         |
| 5571 | 2   | High Pressure Common Rail Fuel Pressure Relief Valve :Erratic, Intermittent, or Incorrect | Fuel Rail Pressure Problem                                    |
| 5571 | 7   | High Pressure Common Rail Fuel Pressure Relief Valve :Not Responding Properly             | Fuel Rail Pressure Problem                                    |
| 5571 | 10  | High Pressure Common Rail Fuel Pressure Relief Valve : Abnormal Rate of Change            | Fuel Rail Pressure Problem                                    |
| 5571 | 14  | High Pressure Common Rail Fuel Pressure Relief Valve : Special Instruction                | Fuel Rail Pressure Problem                                    |
| 5571 | 16  | High Pressure Common Rail Fuel Pressure Relief Valve :High - moderate severity (2)        | Fuel Rail Pressure Problem                                    |
| 5826 | 16  | Emission Control System Operator Inducement Severity :High - moderate severity (2)        | Refer to "Operator Inducement Codes".                         |

## Fault Codes

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# Introduction



## Observe and Obey:

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

## Before Troubleshooting:

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

## About This Section

There are two groups of schematics in this section.

### Electrical Schematics

#### **⚠ WARNING**

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

### Hydraulic Schematics

#### **⚠ WARNING**

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

## Wire Circuit Legend

### Circuit numbering

- 1 Circuit numbers consist of three parts: the circuit prefix, circuit number and circuit suffix. The circuit prefix indicates the type of circuit. The circuit number describes the function of the circuit. The circuit suffix provides an abbreviation for the number or may be used to further define the function of this portion of the circuit. It also may be used to indicate the final end of the circuit, i.e., LS or limit sw.
- 2 The circuit number may be used more than once in a circuit.

### Circuit prefix

|          |              |
|----------|--------------|
| <b>C</b> | Control      |
| <b>D</b> | Data         |
| <b>E</b> | Engine       |
| <b>G</b> | Gauges       |
| <b>N</b> | Neutral      |
| <b>P</b> | Power        |
| <b>R</b> | Relay Output |
| <b>S</b> | Safety       |
| <b>V</b> | Valve        |

#### For Example:

C 74 PL – This is the circuit for the lockout valve #1. C stands for control, 74 is the number of the circuit for the primary #1 lock out valve. PL stands for Primary Lockout.

S 62 BST – This is the circuit that communicates to the onboard computers of the machine that the boom is fully stowed. S stands for safety, 62 is the number of the circuit for boom stowed and BST stands for Boom Stowed.

P 48 LP – P stands for power. 48 is the circuit number for work lamps and LP stands for Lamp.

R 48 LP – R stands for relay. In this case it is the wire that feeds the relay coil for the work lamp. All other numbers remain the same.

V61AXR – V stands for valve power. Number 61 stands for axle retracted circuit; AXR stands for Axle retracted.

R46HRN – R stands for Relay output, supplying power to the horn (HRN). Number 46 is the circuit number for the horn.

## Wire Circuit Legend

| Suffix | Definition                      | Suffix | Definition                 |
|--------|---------------------------------|--------|----------------------------|
| ABV    | Auxiliary Boom Valve            | ESP    | Engine Speed Select        |
| AF     | Alternator Field                | FAP    | Axle Front Position        |
| AFV    | Auxiliary Forward Valve         | FB     | Flashing Beacon            |
| AH     | Auxiliary Hydraulic Pump        | FE     | Function Enable            |
| ANG    | Angle                           | FL     | Fuel Select (gas/LP)       |
| APV    | Auxiliary Platform Valve        | FLR    | Filter Restricted          |
| ARV    | Auxiliary Reverse Valve         | FLT    | Filter Switch              |
| ASV    | Auxiliary Steer/Drive Valve     | FP     | Fuel Pump                  |
| AXE    | Axle Extend Valve               | FS     | Float Switch               |
| AXO    | Axle Oscillate                  | FSL    | Fuel Solenoid              |
| AXR    | Axle Retract Valve              | FTS    | Foot switch Signal         |
| BAT    | Battery                         | FWD    | Forward                    |
| BEX    | Boom Extended                   | GEN    | AC Generator               |
| BRK    | Brake                           | GND    | Ground                     |
| BST    | Boom Stowed                     | HG     | Hydraulic Generator        |
| BV     | Bypass Valves                   | HRN    | Horn                       |
| CAL    | Calibrate                       | HS     | High RPM                   |
| CAN    | CAN Signal                      | IGN    | Ignition                   |
| CAT    | CATS Module                     | JBD    | Jib Bellcrank Down         |
| CNK    | Chain Break                     | JBE    | Jib Extend                 |
| DCN    | Drive Chassis Controller        | JBR    | Jib Retract                |
| DE     | Drive Enable                    | JBS    | Jib Sensor                 |
| DEL    | Drive Enable Left               | JBU    | Jib Bellcrank Up           |
| DER    | Drive Enable Right              | JD     | Jib Down                   |
| DTH    | Data High                       | JER    | Jib Extend/Retract Control |
| DTL    | Data Low                        | JFC    | Jib Up/Down Flow Control   |
| EDC    | Electrical Displacement Control | JPL    | Propel Signal              |
| ENL    | Envelope Lockout                | JPW    | Joystick 5V DC Power       |
| ENV    | Envelope Light                  | JRL    | Jib Rotate Left (CCW)      |
| ERL    | Extend/Retract Lockout          | JRR    | Jib Rotate Right (CW)      |
| ESL    | Engine Status Lamp              |        |                            |



## Wire Circuit Legend

| Suffix | Definition                                | Suffix | Definition                         |
|--------|-------------------------------------------|--------|------------------------------------|
| JSV    | Jib Select Valve                          | PLF    | Platform Level Flow Control        |
| JU     | Jib Up                                    | PLL    | Propel Lockout                     |
| JUD    | Jib Up/Down Control                       | PLS    | Primary Boom Extend/Retract Signal |
| LDS    | Load Sensor                               | PLU    | Platform Level Up                  |
| LF     | Left Front                                | PRC    | Platform Rotate Control            |
| LFS    | Left Front Steer Sensor                   | PRF    | Platform Rotate Flow Control       |
| LO     | Lockout                                   | PRL    | Platform Rotate Left (CCW)         |
| LOF    | Low fuel                                  | PRR    | Platform Rotate Right (CW)         |
| LPS    | Lamps                                     | PRV    | Proportional Valve                 |
| LR     | Left Rear                                 | PS     | Pressure Switches                  |
| LRS    | Left Rear Steer Sensor                    | PSE    | Program Setup Enable               |
| LS     | Limit Switch                              | PSL    | Power to Length Sensor             |
| LS     | Low RPM                                   | PSR    | Pressure Sender                    |
| LSR    | Lift Speed Reduction                      | PTA    | Platform Tilt Alarm                |
| MFV    | Multi Function Valve                      | PTS    | Platform Tilt Sensor               |
| MS     | Motor Shift (Speed)                       | PUD    | Primary Boom Up/Down Flow Control  |
| PBD    | Primary Boom Down                         | PWR    | Power                              |
| PBE    | Primary Boom Extend                       | PXS    | Proximity Sensor                   |
| PBL    | Primary Boom Extend/Retract Lockout Valve | RAP    | Axle Rear Position                 |
| PBR    | Primary Boom Retract                      | RCV    | Recovery                           |
| PBS    | Primary Boom Angle Sensor                 | REC    | Receptacle                         |
| PBU    | Primary Boom Up                           | RET    | Return                             |
| PCE    | Pressure Comp Enable                      | REV    | Reverse                            |
| PCN    | Platform Control                          | RF     | Right Front                        |
| PEL    | Primary Ext/Ret Lockout                   | RFS    | Right Front Steer Sensor           |
| PER    | Primary Boom Extend/Retract Flow Control  | RL     | Retract Lockout                    |
| PES    | Primary Boom Up/Down Signal               | RPM    | RPM                                |
| PL     | Primary Lockout                           | RR     | Right Rear                         |
| PLD    | Platform Level Down                       |        |                                    |

## Wire Circuit Legend

| Suffix | Definition                                | Suffix | Definition                    |
|--------|-------------------------------------------|--------|-------------------------------|
| RRS    | Right Rear Steer Sensor                   | STR    | Starter                       |
| RS     | Rotary Sensor                             | SUD    | Sec Boom Up/Down Flow Control |
| SA     | Start Aid (Glow Plug or choke)            | TAX    | Tilt Alarm X axis             |
| SB     | Secondary Boom                            | TAY    | Tilt Alarm Y axis             |
| SBD    | Sec Boom Down                             | TCN    | Ground Control                |
| SBE    | Sec Boom Extend                           | TCN    | Ground Control Panel          |
| SBL    | Sec Boom Elevated                         | TET    | Tether                        |
| SBR    | Sec Boom Retract                          | TRF    | Turntable Rotate Flow Control |
| SBS    | Sec Boom Angle Sensor                     | TRR    | Turntable Rotate Right (CW)   |
| SBU    | Sec Boom Up                               | TS     | Temp Switches                 |
| SCC    | Steering Valve (CCW)                      | TSR    | Temp Sender                   |
| SCW    | Steering Valve (CW)                       | TSW    | Test Switch                   |
| SEN    | Sensor                                    | TTA    | Turntable Tilt Alarm          |
| SER    | Sec Boom Extend/Retract Flow Control      | TTS    | Turntable Tilt Sensor         |
| SHD    | CAN Shield                                |        |                               |
| SLD    | Secondary Boom Lockout Valve (riser down) |        |                               |
| SLE    | Secondary Boom Lockout Valve (extend)     |        |                               |
| SP     | Spare                                     |        |                               |
| SS     | Speed Sensor                              |        |                               |
| STC    | Steer Control Signal                      |        |                               |

## Wire Color Legend

### Wire Coloring

- 1 All cylinder extension colors are solid and all retract functions are striped black. When using black wire, the stripe shall be white.
- 2 All rotations that are LEFT or CW are solid, RIGHT or CCW are striped and black. When the wire is black, the stripe is white.
- 3 All proportional valve wiring is striped.

### Wire Color Legend

|       |              |
|-------|--------------|
| BL    | Blue         |
| BL/BK | Blue/Black   |
| BL/RD | Blue/Red     |
| BL/WH | Blue/White   |
| BK    | Black        |
| BK/RD | Black/Red    |
| BK/WH | Black/White  |
| BK/YL | Black/Yellow |
| BR    | Brown        |
| GR    | Green        |
| GR/BK | Green/Black  |
| GR/WH | Green/White  |
| RD    | Red          |
| RD/BK | Red/Black    |
| RD/WH | Red/White    |
| OR    | Orange       |
| OR/BK | Orange/Black |
| OR/RD | Orange/Red   |
| WH    | White        |
| WH/BK | White/Black  |
| WH/RD | White/Red    |
| YL    | Yellow       |

### Power Circuits

|     |                                     |
|-----|-------------------------------------|
| P9A | Primary up valve                    |
| P9B | Ignition/Fuel                       |
| P10 | Primary boom extend valve           |
| P11 | Primary boom up valve               |
| P12 | Axle Retract                        |
| P22 | Jib, Jib Level, Platform Level      |
| P38 | Propel (drive) valves               |
| P39 | Turntable rotate flow control valve |

## Wire Color Legend

| Color | Circuit # | Primary Function                                              | Color | Circuit # | Primary Function                            |
|-------|-----------|---------------------------------------------------------------|-------|-----------|---------------------------------------------|
| RD    | 1         | Primary boom up driver                                        | WH/RD | 26        | Power to temp sender                        |
| RD/BK | 2         | Primary boom down driver                                      | RD    | 27        | Auxiliary Power                             |
| RD/WH | 3         | Primary boom up/down flow control proportional valve driver   | RD/BK | 28        | Platform level alarm                        |
| WH    | 4         | Turntable rotate left valve driver                            | RD/WH | 29        | Drive Motor shift (speed)                   |
| WH/BK | 5         | Turntable rotate right valve driver                           | WH    | 30        | Forward/EDC-A                               |
| WH/RD | 6         | Turntable rotate flow control proportional valve driver       | WH/BK | 31        | Reverse/EDC-B                               |
| BK    | 7         | Primary boom extend                                           | WH/RD | 32        | Brake                                       |
| BK/WH | 8         | Primary boom retract                                          | BK    | 33        | Start                                       |
| BK/RD | 9         | Primary boom Extend/Retract proportional valve driver         | BK/WH | 34        | Start Aid (glow plug or choke)              |
| BL    | 10        | Secondary boom up valve driver                                | BK/RD | 35        | High Engine speed select                    |
| BL/BK | 11        | Secondary boom down valve driver                              | BL    | 36        | Steer clockwise                             |
| BL/WH | 12        | Secondary boom up/down flow control proportional valve driver | BL/BK | 37        | Steer counterclockwise                      |
| BL/RD | 13        | Drive enable                                                  | BL/WH | 38        | Gasoline                                    |
| OR    | 14        | Platform level up valve                                       | BL/RD | 39        | LPG                                         |
| OR/BK | 15        | Platform level down valve                                     | OR    | 40        | Limit switch signal stowed                  |
| OR/RD | 16        | Platform up/down flow control proportional valve driver       | OR/BK | 41        | RPM signal                                  |
| GR    | 17        | Platform rotate left valve driver                             | OR/RD | 42        | Boom retracted signal                       |
| GR/BK | 18        | Platform rotate right valve driver                            | GR    | 43        | Jib Up                                      |
| GR/WH | 19        | Jib select valve driver circuit                               | GR/BK | 44        | Jib Down                                    |
| RD    | 20        | 12V DC battery supply                                         | GR/WH | 45        | AC Generator                                |
| WH    | 21        | 12V DC ignition supply                                        | WH    | 46        | Horn                                        |
| BK    | 22        | Key switch power to platform                                  | WH/BK | 47        | Output Power Enable                         |
| WH    | 23        | Power to platform                                             | WH/RD | 48        | Work Lamp                                   |
| RD    | 24        | Power to warning senders                                      | WH/BK | 49        | Motion Lamp                                 |
| WH/BK | 25        | Power to oil pressure sender                                  | BL    | 50        | Auxiliary Boom                              |
|       |           |                                                               | BL/WH | 51        | Auxiliary Steer                             |
|       |           |                                                               | BL/RD | 52        | Auxiliary Platform                          |
|       |           |                                                               | WH/BK | 53        | Boom envelope safety valve cutoff           |
|       |           |                                                               | BK/WH | 54        | Power to safety interlock switches (engine) |

## Wire Color Legend

| Color | Circuit # | Primary Function                     | Color | Circuit # | Primary Function                         |
|-------|-----------|--------------------------------------|-------|-----------|------------------------------------------|
| GR/BK | 55        | Axle oscillation                     | OR    | 86        | Hydraulic Filter restricted              |
| RD    | 56        | Foot switch/TCON estop power         | RD    | 87        | Platform Level Safety Power              |
| RD/WH | 57        | Boom down safety interlock           | RD/BK | 88        | Platform Level Safety Output             |
| RD/BK | 58        | Safety interlock to engine           | BR    | 89        | Platform Level Safety Ground             |
| GR/WH | 59        | Chain break circuit                  | RD/BK | 90        | Proximity Kill                           |
| GR/WH | 60        | Axle extend                          | RD/WH | 91        | Gate Interlock                           |
| GR    | 61        | Axle retract                         | WH/BK | 92        | Motor Speed (LO/HI)                      |
| OR    | 62        | Boom stowed (safety)                 | WH/RD | 93        | Motor Bypass                             |
| OR/RD | 63        | Power to boom envelope safety switch | WH    | 94        | Load Sensor                              |
| OR/BK | 64        | Power for operational switches       | OR    | 95        | Tether ESTOP return                      |
| BL/WH | 65        | Low fuel indication                  | RD    | 96        | Tether Power                             |
| BL    | 66        | Drive Enable                         | BK    | 97        | Tether ESTOP Power                       |
| BL    | 67        | Secondary boom not stowed            | WH    | 98        | J1708 + (high)                           |
| RD    | 68        | Primary Boom lowered (operational)   | BK    | 99        | J1708- (low)                             |
| BL    | 69        | Primary boom #1 extended             | WH/RD | 100       | Outrigger lowered                        |
| BL/WH | 70        | Primary boom #2 retracted            | WH/BK | 101       | Outrigger raised                         |
| BL/BK | 71        | Primary boom #2 extended             | OR    | 102       | Pothole protector up                     |
| BL/WH | 72        | Secondary boom extended              | OR/RD | 103       | Pothole protector down                   |
| BL/RD | 73        | Secondary boom retracted             | BK/WH | 104       | Proprietary Data buss - (I.e. ITT or AP) |
| RD    | 74        | Primary #1 Lockout                   | BK/RD | 105       | Proprietary Data buss + (I.e. ITT or AP) |
| RD/WH | 75        | Primary #2 Lockout                   | GR    | 106       | Spare                                    |
| BL    | 76        | Primary boom #3 extended             | RD    | 107       | Alternator Field                         |
| WH    | 77        | Lower Angle #1 operational           | BL/WH | 108       | Engine Status                            |
| WH/BK | 78        | Upper Angle #2 operational           | GR/WH | 109       | Sensor Power                             |
| BK    | 79        | Power from TCON ESTOP                | BK    | 110       | Sensor Return                            |
| N/A   | 80        | Can 2.0/J1939 Shield                 | OR    | 111       | Steer Signal                             |
| GR    | 81        | Can 2.0/J1939 Low                    | RD    | 112       | Steer Signal to Solenoid Valve           |
| YL    | 82        | Can 2.0/J1939 High                   | OR/RD | 113       | Multi-function Valve                     |
| GR/WH | 83        | Tilt signal X axis                   | BK/RD | 114       | Load Moment Overweight                   |
| GR/BK | 84        | Tilt signal Y axis                   | RD/BK | 115       | Load Moment Underweight                  |
| GR    | 85        | Tilt sensor power                    | OR    | 116       | Hydraulic Oil Cooler                     |

## Wire Color Legend

| Color | Circuit # | Primary Function                                     | Color | Circuit # | Primary Function                   |
|-------|-----------|------------------------------------------------------|-------|-----------|------------------------------------|
| RD    | 117       | Flashing Beacon                                      | RD    | 141       | Primary Boom Angle Signal Safety   |
| OR    | 118       | Lift Speed Reduction                                 | OR    | 142       | Secondary Boom Angle Signal Safety |
| BL    | 119       | Hydraulic Pressure Sensor Output                     | BL/RD | 143       | Drive Enable Left                  |
| OR    | 120       | Oil Cooler Fan                                       | BL/WH | 144       | Drive Enable Right                 |
| GR    | 121       | Axle Oscillate Left                                  | RD/WH | 145       | Calibrate                          |
| GR/BK | 122       | Axle Oscillate Right                                 | BL    | 146       | Jib Bellcrank Up Flow Control      |
| RD/BK | 123       | Primary Boom Angle Signal Operational                | BL/BK | 147       | Jib Bellcrank Down Flow Control    |
| RD/WH | 124       | Secondary Boom Angle Signal Operational              | BL/WH | 148       | Jib Bellcrank Sensor               |
| WH/RD | 125       | Secondary Boom Lockout (Extend Enable)               | GR/WH | 149       | Jib Up/Down Flow Control           |
| WH/BK | 126       | Secondary Boom Lockout (Riser Down Enable)           | GR/BK | 150       | Hydraulic Generator Bypass         |
| GR    | 127       | ECU Test Switch                                      | GR    | 151       | Hydraulic EDC Output               |
| OR/RD | 128       | Low Engine Speed                                     | BK    | 152       | Injector Retard                    |
| RD/BK | 129       | Descent Alarm                                        | BK    | 153       | Jib Extend                         |
| WH/RD | 130       | Travel Alarm                                         | BK/WH | 154       | Jib Retract                        |
| BL    | 131       | Motion Alarm                                         | OR/RD | 155       | Pressure Comp. Enable              |
| GR    | 132       | Platform Load Input                                  | GR/WH | 156       | Jib Up/Down                        |
| GR/WH | 133       | Platform Load Alarm                                  | BK/RD | 157       | Jib Extend/Retract                 |
| GR/BK | 134       | Key Switch power                                     | BL/RD | 158       | Steer Signal Rocker                |
| BL/WH | 135       | Fuel Pump                                            | BL/WH | 159       | Steer Joystick Signal              |
| RD    | 136       | Power to Safety Module                               | WH/RD | 160       | Propel Joystick Signal             |
| RD/WH | 137       | Drive Power (P_38)                                   | WH/BK | 161       | Secondary Boom Joystick Signal     |
| RD/BK | 138       | Primary Boom Up/Secondary Boom Down-Extend (P_11/30) | OR    | 162       | Joystick 5V DC power               |
| WH/RD | 139       | Turntable Rotate Flow Control Safety (P_39)          | BL/WH | 163       | Primary Extend/Retract Signal      |
| OR/RD | 140       | Boom Envelope Safety                                 | RD/WH | 164       | Primary Up/Down Signal             |
|       |           |                                                      | WH/RD | 165       | TT Rotate Signal                   |

## Wire Color Legend

| Color | Circuit # | Primary Function                      | Color | Circuit # | Primary Function                       |
|-------|-----------|---------------------------------------|-------|-----------|----------------------------------------|
| OR    | 166       | Boom Length Signal Safety             | GR    | 188       | Safety cross check                     |
| OR/BK | 167       | Boom Length Signal Operational        | BK    | 189       | Data Receive                           |
| BL/RD | 168       | Primary Boom Hydraulic Valve Lockout  | BK/WH | 190       | Data Transmit                          |
| GR    | 169       | Envelope Active LED                   | WH/RD | 191       | Multi-Function Pressure Relief         |
| WH/RD | 170       | Load Sense Relay Source               | WH/BK | 192       | Jib Rotate Left                        |
| WH/BK | 171       | Load Sense Relay Sink                 | WH/RD | 193       | Jib Rotate Right                       |
| BL    | 172       | UP/DN Flow Control Ground             | WH/RD | 194       | Speed Select Input                     |
| BK    | 173       | Ext/Ret Flow Control Ground           | OR/RD | 195       | Electric Brake Source                  |
| WH    | 174       | Key Switch Power, Ground Position     | YL    | 196       | 2.5V Sensor Power                      |
| WH/BK | 175       | Load Sensor Signal Operational        | WH    | 197       | Hour Meter                             |
| GR/WH | 176       | Secondary Extend/Retract FC           | RD    | 198       | +12V Sensor Power                      |
| BL/RD | 177       | Extend/Retract Lockout                | WH/RD | 199       | Thermal Switch                         |
| BK    | 178       | Control Module Status Light           | BL    | 226       | Telematics Remote Disable              |
| GR    | 179       | Drive Power Relay                     | GR    | 227       | Engine Control<br>CAN 2.0 / J1939 Low  |
| BK    | 180       | Lift Power Relay                      | YL    | 228       | Engine Control<br>CAN 2.0 / J1939 High |
| OR    | 181       | 48 Volt Alternator field (or Battery) | BR    | N/A       | Ground or Return                       |
| RD    | 182       | 24 Volt Battery                       |       |           |                                        |
| BL    | 183       | Envelope or Load Sense Recovery       |       |           |                                        |
| WH    | 184       | Program setup Enable                  |       |           |                                        |
| WH    | 185       | Encode A                              |       |           |                                        |
| BL    | 186       | Encode B                              |       |           |                                        |
| BL    | 187       | Bootstrap or Program Enable           |       |           |                                        |

# Limit Switches and Angle Sensors

## Types of Limit Switches

There are two types of limit switches, found in various locations throughout the machine: mechanical-type **operational/safety** switches and **rotation** or **angle** sensors. As in aircraft, which features redundant safety systems, each mechanical operational switch is backed up with a separate, independently functioning safety switch.

The mechanical-type **operational** or **safety** switches are used to sense a positive displacement or movement of the limit switch actuator, or arm, as the machine moves through its range of operational functions. The **rotation** or **angle** sensors utilize Hall Effect technology and must be calibrated when replaced. Included in this group are envelope limit switches which sense the extended length and angle of the booms and rotational position of the turntable.

An example is the drive enable limit switch, which disables the drive function anytime the boom is rotated past the rear tires, indicated by the 'circle' end of the drive chassis. In some cases, the engine will be stopped if safety parameters are exceeded.

Numbering Legend

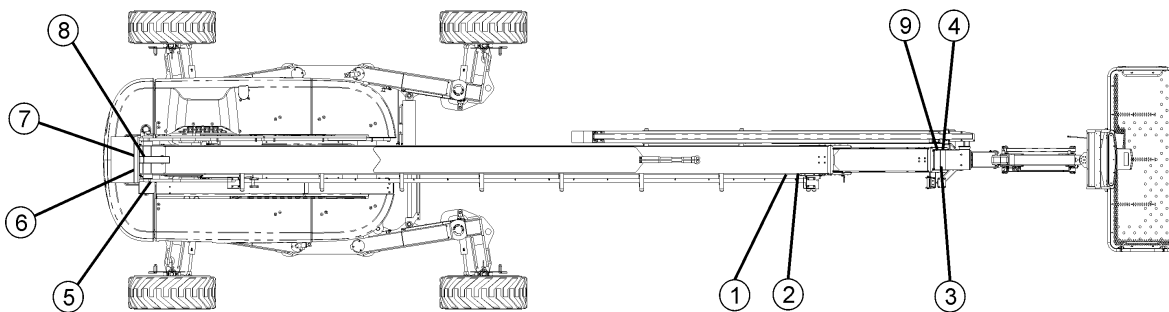
| LS |               | FA |             | 1              | L |             | O |             |
|----|---------------|----|-------------|----------------|---|-------------|---|-------------|
| LS | Limit Switch  | FA | Front Axle  | Circuit Number | L | Load moment | O | Operational |
| LT | Stringpot     | RA | Rear Axle   |                | A | Angle       | S | Safety      |
| RS | Rotary Sensor | LF | Left Front  |                | D | Down        |   |             |
|    |               | LR | Left Rear   |                | E | Extend      |   |             |
|    |               | RF | Right Front |                | R | Retract     |   |             |
|    |               | RR | Right Rear  |                |   |             |   |             |
|    |               | J  | Jib Boom    |                |   |             |   |             |
|    |               | P  | Boom        |                |   |             |   |             |
|    |               | T  | Turntable   |                |   |             |   |             |



# Limit Switches and Angle Sensors

## Switches and Sensors - Primary Boom, SX-125 XC

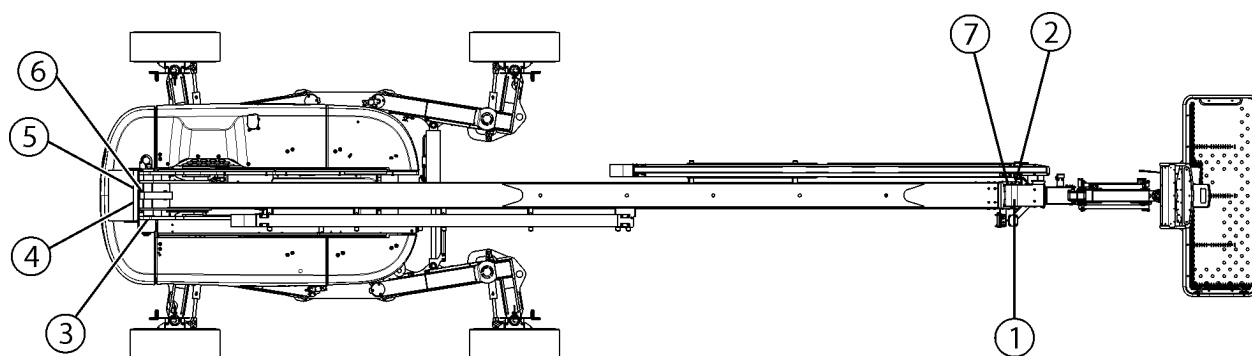
| Index | Description                                                                       | Schematic Item | Function Controlled                        | Switch Type and Operation                                                 |
|-------|-----------------------------------------------------------------------------------|----------------|--------------------------------------------|---------------------------------------------------------------------------|
| 1     | Boom #0 - 101ft (boom fully retracted) Operational Limit Switch                   | LSB2RO         | Activates P1 lockout valve during retract. | Normally open switch                                                      |
| 2     | Boom #0 - 101 ft (boom fully retracted) Safety Limit Switch                       | LSB2RS         | Cross-checked with LSB4ES.                 | .                                                                         |
| 3     | Boom #2 - 100 ft (boom #2, #3, #4 fully extended) Operational/Safety Limit Switch | LSB4EO/S       |                                            |                                                                           |
| 4     | Boom #2 - 3. ft' (boom fully retracted) Safety Limit Switch                       | LSB3RS         | Out of stowed safety                       |                                                                           |
| 5     | Boom Angle Operational/Safety Rotary Sensor                                       | RSB1AO/S       | .                                          |                                                                           |
| 6     | Boom Angle - 10°Operational Limit Switch                                          | LSB1DO         |                                            |                                                                           |
| 7     | Cable Tension #1Safety Limit Switch                                               | LSB5S          |                                            |                                                                           |
| 8     | Boom Length Operational/Safety Stringpot                                          | LTB1LO/S       | .                                          |                                                                           |
| 9     | Boom #0 - 3 ft (boom fully retracted) Operational Limit Switch                    | LSB3RO         | Out of stowed.                             | Normally open switch;contacts close when primary boom is fully retracted. |



# Limit Switches and Angle Sensors

## Switches and Sensors - Primary Boom, SX-105 XC

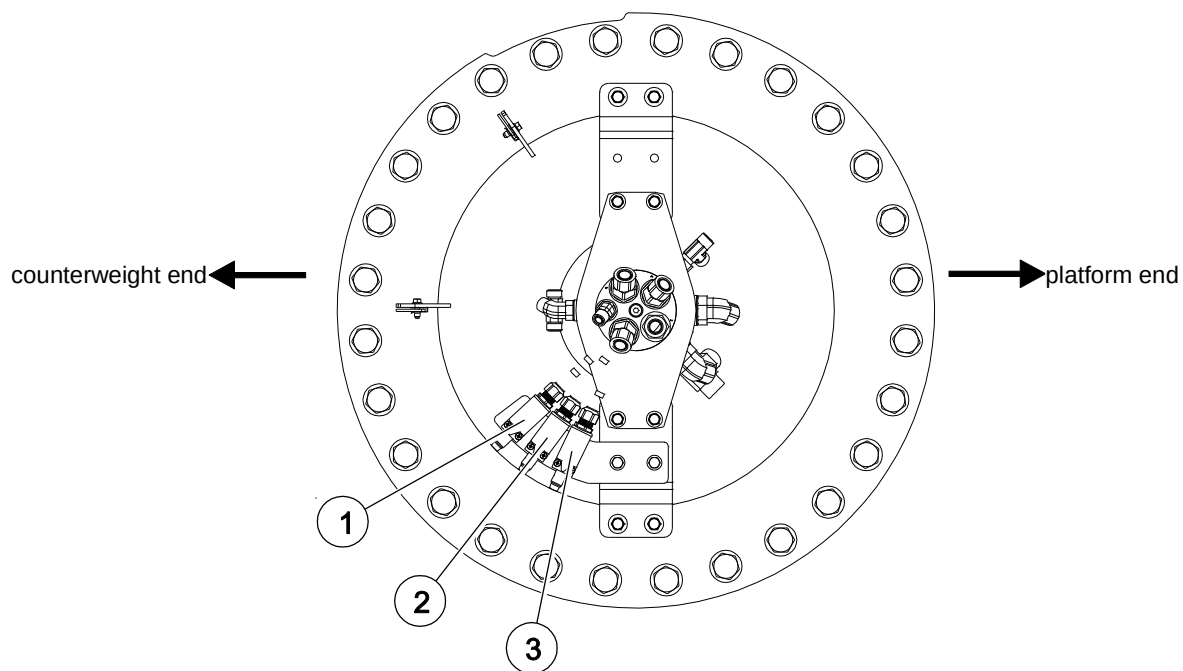
| Index | Description                                                            | Schematic Item | Function Controlled  | Switch Type and Operation                                                  |
|-------|------------------------------------------------------------------------|----------------|----------------------|----------------------------------------------------------------------------|
| 1     | Boom #2 - 100 ft (boom #2, #3 fully extended) Operational Limit Switch | LSB4EO         |                      |                                                                            |
| 2     | Boom #2 - 3. ft' (boom fully retracted) Safety Limit Switch            | LSB3RS         | Out of stowed safety |                                                                            |
| 3     | Boom Angle Operational/Safety Rotary Sensor                            | RSB1AO/S       |                      |                                                                            |
| 4     | Boom Angle - 10° Operational Limit Switch                              | LSB1DO         |                      |                                                                            |
| 5     | Cable Tension #1 Safety Limit Switch                                   | LSB5S          |                      |                                                                            |
| 6     | Boom Length Operational/Safety Stringpot                               | LTB1LO/S       |                      |                                                                            |
| 7     | Boom #1 - 3 ft (boom fully retracted) Operational Limit Switch         | LSB3RO         | Out of stowed.       | Normally open switch; contacts close when primary boom is fully retracted. |



# Limit Switches and Angle Sensors

## Switches and Sensors - Turntable

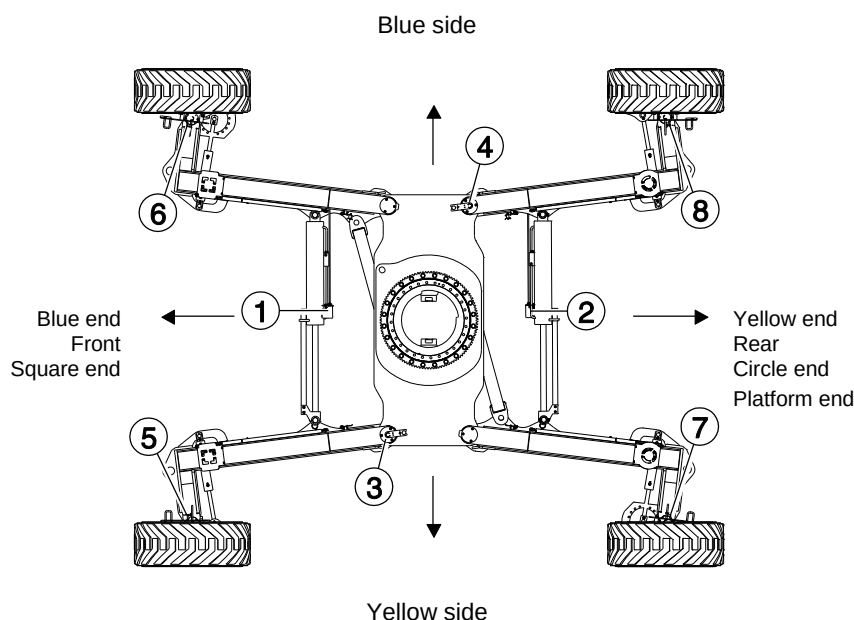
| Index | Description                           | Schematic Item | Function Controlled                                                                      | Switch Type and Operation                                                                                      |
|-------|---------------------------------------|----------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1     | Turntable #1 Operational Limit Switch | LST1O          | Activates the drive enable zone when the turntable is rotated in the right direction.    | Normally closed switch;contacts open when turntable is rotated in the right direction.                         |
| 2     | Turntable #1 Safety Limit Switch      | LST1S          | Prevents the turntable from rotating past either rear tire when the axles are retracted. | Normally closed switch;contacts open when turntable is rotated past either rear tire with the axles retracted. |
| 3     | Turntable #2 Operational Limit Switch | LST2O          | Activates the drive enable zone when the turntable is rotated in the left direction.     | Normally closed switch;contacts open when turntable is rotated in the left direction.                          |



# Limit Switches and Angle Sensors

## Switches and Sensors - Drive Chassis

| Index | Description                                    | Schematic Item | Function Controlled                                                                                       | Switch Type and Operation                                         |
|-------|------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1     | Front Axle #1 Extended Safety Limit Switch.    | LSFA1ES        | Disables boom functions when axles are retracted.                                                         | Normally open switch; contacts close when axle is fully extended. |
| 2     | Rear Axle #1 Extended Safety Limit Switch      | LSRA1ES        | Disables boom functions when axles are retracted.                                                         | Normally open switch; contacts close when axle is fully extended  |
| 3     | Front Axle #1 Angle Operational Rotary Sensor  | RSFA1SO        | Provides front axle positioning information for adjusting steering neutral setting during axle extension. |                                                                   |
| 4     | Rear Axle #1 Angle Operational Rotary Sensor   | RSRA1SO        | Provides rear axle positioning information for adjusting steering neutral setting during axle extension.  |                                                                   |
| 5     | Left Front #1 Steer Operational Rotary Sensor  | RSLF1SO        | Provides wheel position information during steering. Master wheel in all steer modes except rear steer.   |                                                                   |
| 6     | Right Front #1 Steer Operational Rotary Sensor | RSRF1SO        | Provides wheel position information during steering.                                                      |                                                                   |
| 7     | Left Rear #1 Steer Operational Rotary Sensor   | RSLR1SO        | Provides wheel position information during steering. Master wheel when in rear steer mode.                |                                                                   |
| 8     | Right Rear #1 Steer Operational Rotary Sensor  | RSRR1SO        | Provides wheel position information during steering.                                                      |                                                                   |



## Circuit Connector Legend

| Number | Description                                             | Number | Description                                              |
|--------|---------------------------------------------------------|--------|----------------------------------------------------------|
| J1     | Molex connector on toggle/LED pcb                       | J37    | 2 pin Deutsch DTP connector (swivel-lower)               |
| J9     | Ribbon connector from TCON to membrane #1               | J38    | 6 pin Deutsch DTP connector (swivel-lower)               |
| J10    | Ribbon connector from TCON to membrane #2               | J55    | 6 pin Deutsch DT connector for platform tilt sensor (S6) |
| J11    | Black 23 pin AMP connector on TCON                      | J57    | 4 pin Deutsch DTP connector for throttle solenoid        |
| J12    | Black 35 pin AMP connector on TCON                      | J58    | 3 pin DIN pri boom up/dwn F.C. valve #1 (Y45)            |
| J13    | White 23 pin AMP connector on TCON                      | J58A   | 3 pin DIN pri boom up/dwn F.C. valve #2 (Y45A)           |
| J14    | White 35 pin AMP connector on TCON                      | J59    | 3 pin DIN primary boom up valve (Y22)                    |
| J15    | Black 4 pin DTP connector on TCON                       | J60    | 3 pin DIN primary boom down valve (Y21)                  |
| J16    | Black 4 pin MOLEX connector on TCON                     | J61    | 3 pin DIN pri boom extend/retract F.C. valve (Y76)       |
| J17    | 16 pin Molex mini fit circuit board to key switch       | J62    | 3 pin DIN pri boom extend valve (Y79)                    |
| J21    | Black 23 pin AMP connector on PCON                      | J63    | 2 pin Deutsch DT pri boom retract valve (Y80)            |
| J22    | White 35 pin AMP connector on PCON                      | J69    | 2 pin Deutsch DT TT rotate CW/CCW F.C. valve (Y77)       |
| J24    | 10 pin connector PCON PCB to toggle/LED driver PCB      | J70    | 2 pin Deutsch DT turntable rotate CW valve (Y52)         |
| J25    | 6 pin Deutsch DTM conn on drive/steer joystick (JC3)    | J71    | 2 pin Deutsch DT turntable rotate CCW valve (Y53)        |
| J26    | 6 pin Deutsch DTM conn on extend/retract joystick (JC2) | J76    | 2 pin Deutsch DT platform rotate CW valve (Y70)          |
| J29    | 16 pin Molex conn on PCON PCB                           | J77    | 2 pin Deutsch DT platform rotate CCW valve (Y71)         |
| J31    | Black 23 pin AMP connector on DCON                      | J78    | 2 pin Deutsch DT jib up valve (Y72)                      |
| J32    | White 23 pin AMP connector on DCON                      | J79    | 2 pin Deutsch DT jib down valve (Y73)                    |
| J33    | 3 pin Deutsch SAE DT connector (swivel-upper)           | J80    | 2 pin Deutsch DT platform level up valve (Y20)           |
| J34    | 2 pin Deutsch DTP connector (swivel-upper)              | J81    | 2 pin Deutsch DT platform level down valve (Y19)         |
| J35    | 6 pin Deutsch DT connector (swivel-upper)               | J82    | 2 pin Deutsch DT proximity kill (LSP1PROX)               |
| J36    | 3 pin Deutsch SAE DT connector (swivel-upper)           | J84    | 2 pin Deutsch DT footswitch (FS1)                        |

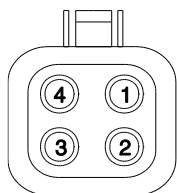
## Circuit Connector Legend

| Number | Description                                             | Number  | Description                                           |
|--------|---------------------------------------------------------|---------|-------------------------------------------------------|
| J87    | 2 pin Deutsch DT two speed motor stroke valve (Y27)     | J128    | 6 pin Deutsch DTM jib up/down/plat rot joystick (Jcb) |
| J91    | 2 pin Deutsch DT RR steer right valve (Y55)             | J137    | 4 pin Deutsch DT front axle safety switch (LSFA1ES)   |
| J92    | 2 pin Deutsch DT RR steer left valve (Y56)              | J138    | 4 pin Deutsch DT rear axle safety switch (LSRA1ES)    |
| J93    | 2 pin Deutsch DT LR steer right valve (Y57)             | J142    | 2 pin Deutsch DT boom cable to lower LS harness       |
| J94    | 2 pin Deutsch DT LR steer left valve (Y58)              | J144    | 10 pin AMP connector to Deutz engine                  |
| J95    | 2 pin Deutsch DT RF steer right valve (Y59)             | J148B   | 3/8 in stud term TCON to lower boom cable (GNDPCON)   |
| J96    | 2 pin Deutsch DT RF steer left valve (Y60)              | J151    | 3 pin Deutsch SAE DT upper to lower boom cable        |
| J97    | 2 pin Deutsch DT LF steer right valve (Y61)             | J152A   | 3 pin Deutsch SAE tee harness                         |
| J98    | 2 pin Deutsch DT LF steer left valve (Y62)              | J152C   | 3 pin Deutsch SAE tee harness                         |
| J99    | 2 pin Deutsch DT axle extend valve (Y99)                | J152D/E | 3 pin Deutsch SAE tee harness                         |
| J100   | 2 pin Deutsch DT axle retract valve (Y100)              | J153    | 4 pin Deutsch DT engine to function harness           |
| J106   | 2 pin Deutsch DT brake release valve (Y2)               | J155A   | 2 way Deutsch DTP plat to upper boom cable            |
| J107   | 3 pin Deutsch DT RR steer sensor (RSRR1SO)              | J155C   | 2 way Deutsch DTP lower boom cable to swing           |
| J108   | 3 pin Deutsch DT LR steer sensor (RSLR1SO)              |         |                                                       |
| J109   | 3 pin Deutsch DT RF steer sensor (RSRF1SO)              |         |                                                       |
| J110   | 3 pin Deutsch DT LF steer sensor (RSLF1SO)              |         |                                                       |
| J114   | 6 pin Deutsch DT pri boom angle sensor (RSB1AO/S)       |         |                                                       |
| J120   | 4 pin Packard weatherpack EDC connection                |         |                                                       |
| J121   | 12 pin Deutsch DTM gray SCON module #1                  |         |                                                       |
| J122   | 12 pin Deutsch DTM black SCON module #2                 |         |                                                       |
| J124   | 6 pin Deutsch DT drive enable right (LST1O)             |         |                                                       |
| J125   | 4 pin Deutsch DT drive enable left (LST2O)              |         |                                                       |
| J126   | 4 pin Deutsch DT drive enable safety (LST1S)            |         |                                                       |
| J127   | 6 pin Deutsch DTM pri boom up/dwn/TT rot joystick (JC7) |         |                                                       |

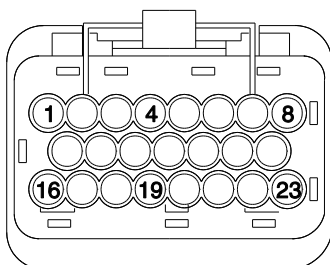
## Circuit Connector Legend

| Number | Description                                        | Number | Description                                                |
|--------|----------------------------------------------------|--------|------------------------------------------------------------|
| J160   | 6 pin Deutsch DT front axle sensor (RSFA10)        | J210   | 4 pin Deutsch DT 10 deg angle oper (LSB1DO)                |
| J161   | 6 pin Deutsch DT rear axle sensor (RSRA10)         | J211   | 4 pin Deutsch DT 3ft extend oper (LSB3RO)                  |
| J162   | 6 pin Deutsch DT load sensor                       | J213   | 4 pin Deutsch DT 100ft extend oper/safety (LSB4EO/S)       |
| J166   | 2 pin Deutsch DT function enable valve #1 (Y74)    | J214   | 4 pin Deutsch DT 101ft retract oper (LSB2RO)               |
| J169   | 20 pin Molex conn on PCON PCB                      | J215   | 2 pin Deutsch DT lower LS to engine harness                |
| J171   | 2 pin Deutsch DT hydraulic oil cooler sensor       | J216   | 2 pin Deutsch DT hyd generator valve (Y91)                 |
| J172   | 2 pin Deutsch DT hydraulic oil cooler fan          | J217   | 2 pin Deutsch DT hyd generator bypass valve (Y92)          |
| J173   | 2 pin Deutsch DT boom cable to engine harness      | J219   | 2 pin Deutsch DT primary lockout valve #1 (Y87)            |
| J192A  | 4 pin Deutsch DT cable break safety #1 (LSB5S)     | J220   | 2 pin Deutsch DT primary lockout valve #2 (Y88)            |
| J199   | 6 pin Deutsch DT pri boom length sensor (LTB1LO/S) | J222A  | 4 pin Deutsch DT zero tube limit to cable tension cable #1 |
| J207   | 4 pin Deutsch DT 3.5ft extend safety (LSB3RS)      | J223   | 8 pin molex GBox harm                                      |
| J208   | 12 pin Deutsch DT lower limit to zero tube cable   | J224   | 8 pin gary Deutsch DTP telematics                          |
| J209   | 4 pin Deutsch DT 101ft retract safety (LSB2RS)     | J225   | 2 pin engine glow plugs                                    |
|        |                                                    | J236   | 2 pin Deutsh Plat level loop valve (Y101)                  |
|        |                                                    | J237   | 3 pin Deutsch DT fuel level sensor                         |
|        |                                                    | J239   | 2 pin Deutsh DT axle retract enable valve (Y81)            |

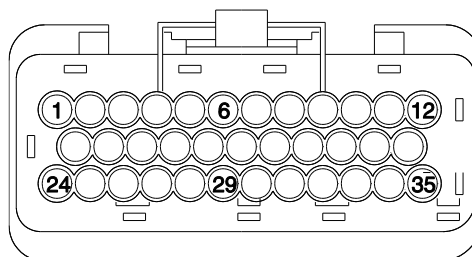
## Connector Pin Legend



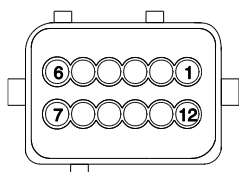
Pin location - 4 pin connector



Pin location - 23 pin connector



Pin location - 35 pin connector



Pin location - 12 pin connector

### Abbreviation

|      |                      |                                                                       |
|------|----------------------|-----------------------------------------------------------------------|
| OH   | High Current         | On/Off Solenoid Output ( $3 < x < 6$ Amps)                            |
| OM   | Medium Current       | On/Off Solenoid Output ( $0.5 < x < 3$ Amps)                          |
| OL   | Low Current          | On/Off Solenoid Output ( $0.1 < x < 3$ Amps)                          |
| PM   | Prop. Medium Current | Proportional Solenoid Output ( $0.5 < x < 3$ Amps)                    |
| LED  | LED Output           | LED Output Driver                                                     |
| RLY  | Relay Output         | Relay Output Driver ( $0.1 < x < 0.3$ Amps)                           |
| EDC  | EDC Output           | Linear Current Control (propel)                                       |
| AI   | Analog Input         | (0 to +5 Vdc)                                                         |
| DI   | Digital Input        | (0 or 'Vbat' Voltage)                                                 |
| FAC  | Frequency AC Input   | (0 to 1 kHz / 0 to 13.8 Vptop)                                        |
| RDF  | Ground               | Ref signal power / GND to external sensors, input power(s) and ground |
| PWR  | 12V Power            | ( $x > 6$ Amps)                                                       |
| CONT | 12V Power            | ( $x < 1$ Amp)                                                        |
| SNSR | Sensor Power         | 5.0 Vdc Supply for sensors                                            |



## Connector Pin Legend

### J11 Black 23 Pin Connector

| Pin NO. | Type* | Signal Name         | Circuit NO.    | Signal Description                                                                                                                                             |
|---------|-------|---------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P11-01  | REF   | P CON G ND          | GNDP CON-BR    | PCON ground                                                                                                                                                    |
| P11-02  | PWR   | P CON P OWE R       | P 52PCON-WH    | Power output to PCON. Unregulated 12V automotive power.                                                                                                        |
| P11-03  | RLY   | HORN RELAY COIL     | C46HRN-WH      | Power to service horn relay                                                                                                                                    |
| P11-04  | CONT  | OUT PWR ENBL        | C47OUT-WH/BK   | Bi-directional relay control signal. Normally low, switched to 12V PWR-PCON ESTOP is high and the emergency stop switch is closed.                             |
| P11-05  | PWR   | PWR-PCON ESTOP      | P 23PCON-BK    | Output signal to PCON. Provides 12V power to the emergency stop switch.                                                                                        |
| P11-06  | CONT  | P_7                 | S 56PRV -RD    | Bi-directional relay control signal. Normally low, switched to 12V when PCON POWER & OUT PWR ENBL are active and the foot-switch is closed.                    |
| P11-07  | CONT  | P_22                | P 56PRV -RD/WH | Relay control signal or power signal of PCON, normally controlled by the platform tilt safety switch output, but may be over-ridden in bypass / recovery mode. |
| P11-08  | RLY   | SPARE RLY OUT       |                | Power relay coil                                                                                                                                               |
| P11-09  | RLY   | FLASHING BEACON RLY | C117FB-RD      | Flashing beacon relay                                                                                                                                          |
| P11-10  | COM   | CAN SHIELD          |                | Termination for CAN cable shield                                                                                                                               |
| P11-11  | CONT  | SERV /CAL MODE      | C145CAL-RD/WH  | 12V calibration mode signal for SCON                                                                                                                           |
| P11-12  |       | NOT USED            |                | No connection                                                                                                                                                  |
| P11-13  |       | !BOOT               |                | !BOOT                                                                                                                                                          |
| P11-14  | FAC   | CAL FREQ 1          |                | Calibration frequency 1                                                                                                                                        |
| P11-15  |       | NOT USED            |                | No connection                                                                                                                                                  |
| P11-16  | FAC   | CAL FREQ 2          |                | Calibration frequency 2                                                                                                                                        |
| P11-17  | COM   | CAN LOW             | D81CAN(-)-GR   | CAN bus connection                                                                                                                                             |
| P11-18  | COM   | CAN HIGH            | D82CAN(+)-YL   | CAN bus connection                                                                                                                                             |
| P11-19  |       | NOT USED            |                | No connection                                                                                                                                                  |
| P11-20  |       | NOT USED            |                | No connection                                                                                                                                                  |
| P11-21  | REF   | DIAG GND            |                | Ground                                                                                                                                                         |
| P11-22  | PWR   | DIAG PWR (12V)      |                | 12V power for TCON, DCON, and SCON                                                                                                                             |
| P11-23  |       | NOT USED            |                | No connection                                                                                                                                                  |

## Connector Pin Legend

### J12 Black 35 Pin Connector, SX-125 XC

| Pin No. | Type | Signal Name          | Circuit No.   | Signal Description                                                       |
|---------|------|----------------------|---------------|--------------------------------------------------------------------------|
| P12-01  | REF  | SCON ECU GND         | SCONGND-BR    | Ground for SCON ECU                                                      |
| P12-02  | PWR  | DCON ECU PWR         | P21DCON-WH    | 12V power for ECU power                                                  |
| P12-03  | PWR  | P_6R1                | P53LS-WH/BK   | Safety circuit power (to DCON, SCON)                                     |
| P12-04  | PWR  | P_6R2                | P54ENG-BK/WH  | Safety circuit power (to SCON)                                           |
| P12-05  | PWR  | P_7R                 | S56PRV-RD     | Safety circuit power (to DCON, SCON)                                     |
| P12-06  | PWR  | P_9A                 | P57PBD-RD/WH  | Safety circuit for boom down (power)                                     |
| P12-07  | PWR  | P_9B                 | P58LS-RD/BK   | Safety circuit for fuel/ignition (power)                                 |
| P12-08  | PWR  | P_10                 | S59CNBK-GR/WH | Safety circuit for boom extend - cable break (power)                     |
| P12-09  | PWR  | P_11                 | S140ENL-OR/RD | Safety circuit for boom up (power)                                       |
| P12-10  | PWR  | P_12                 | C61AXRT-GR    | Safety circuit for axle retract (signal)                                 |
| P12-11  | DI   | P_14                 |               | Monitoring circuit                                                       |
| P12-12  | DI   | P_18                 |               | Monitoring circuit                                                       |
| P12-13  | PWR  | OPER SW PWR          | C64LS-OR/BK   | Power for Operational Limit Switches                                     |
| P12-14  | DI   | LOW FUEL - FST1S     | C65LOFL-BL/WH | Low fuel float switch                                                    |
| P12-15  | DI   | DRV ENBL R - LST1O   | C144DER-BL/WH | Turntable stowed switch 1 (drive enable right)                           |
| P12-16  | DI   | LSB1DO               | C68PBD-BL     | Input - primary boom lowered (10 deg operational)                        |
| P12-17  | DI   | 12V SIG TO PLD       | C64LS-OR/BK   | Tied high (12V) for proper operation of PLD                              |
| P12-18  | DI   | LSB2RO               | C69PBE-BK     | Input - primary boom section #1 retracted (125ft retracted operational)  |
| P12-19  | DI   | LSB3RO               | C70PBE-BL/WH  | Input - primary boom fully retracted for PLD (3ft retracted operational) |
| P12-20  | DI   | LSB4EO               | C71PBE-BL/BK  | Input - primary boom sections 2-4 extended (125ft extended operational)  |
| P12-21  | DI   | LSB2RS               | S69PBE-BK/WH  | Input - primary boom section #1 retracted (125ft retracted safety)       |
| P12-22  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-23  | OM   | P1 SEQ VLV           | V74PRLO-RD    | Primary lockout VLV #1                                                   |
| P12-24  | OM   | P2 SEQ VLV           | V75PRLO-RD    | Primary lockout VLV #2                                                   |
| P12-25  | REF  | SNSR GND             | SNSR GND-BR   | Ground to angle sensor                                                   |
| P12-26  | SNSR | SNSR PWR (5V)        | P109ANG-GR/WH | Power to angle sensor (5.0VDC)                                           |
| P12-27  | AI   | FUEL LEVEL SENSOR IN | C65FLVL-BL/WH | Signal from fuel level sensor                                            |
| P12-28  | DI   | DRV ENBL L - LST2O   | C143DEL-BL/RD | Turntable stowed switched 2 (drive enable left)                          |
| P12-29  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-30  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-31  | DI   | BOOM STOWED          |               | Override for boom transport                                              |
| P12-32  | AI   | RSB1AO (BOOM ANGLE)  | C123PBS-RD/BK | Primary angle sensor input to TCON                                       |
| P12-33  | AI   | LTB1LO (BOOM LENGTH) | C167PRS-OR/BK | Primary length sensor input to TCON                                      |
| P12-34  | PWR  | P_30                 |               | Safety power feed to P_30                                                |
| P12-35  | REF  | VALVE RETURN         | VLVRET-BR     | Valve return                                                             |

## Connector Pin Legend

### J12 Black 35 Pin Connector, SX-105 XC

| Pin No. | Type | Signal Name          | Circuit No.   | Signal Description                                                       |
|---------|------|----------------------|---------------|--------------------------------------------------------------------------|
| P12-01  | REF  | SCON ECU GND         | SCONGND-BR    | Ground for SCON ECU                                                      |
| P12-02  | PWR  | DCON ECU PWR         | P21DCON-WH    | 12V power for ECU power                                                  |
| P12-03  | PWR  | P_6R1                | P53LS-WH/BK   | Safety circuit power (to DCON, SCON)                                     |
| P12-04  | PWR  | P_6R2                | P54ENG-BK/WH  | Safety circuit power (to SCON)                                           |
| P12-05  | PWR  | P_7R                 | S56PRV-RD     | Safety circuit power (to DCON, SCON)                                     |
| P12-06  | PWR  | P_9A                 | P57PBD-RD/WH  | Safety circuit for boom down (power)                                     |
| P12-07  | PWR  | P_9B                 | P58LS-RD/BK   | Safety circuit for fuel/ignition (power)                                 |
| P12-08  | PWR  | P_10                 | S59CNBK-GR/WH | Safety circuit for boom extend - cable break (power)                     |
| P12-09  | PWR  | P_11                 | S140ENL-OR/RD | Safety circuit for boom up (power)                                       |
| P12-10  | PWR  | P_12                 | C61AXRT-GR    | Safety circuit for axle retract (signal)                                 |
| P12-11  | DI   | P_14                 |               | Monitoring circuit                                                       |
| P12-12  | DI   | P_18                 |               | Monitoring circuit                                                       |
| P12-13  | PWR  | OPER SW PWR          | C64LS-OR/BK   | Power for Operational Limit Switches                                     |
| P12-14  | DI   | LOW FUEL - FST1S     | C65LOFL-BL/WH | Low fuel float switch                                                    |
| P12-15  | DI   | DRV ENBL R - LST1O   | C144DER-BL/WH | Turntable stowed switch 1 (drive enable right)                           |
| P12-16  | DI   | LSB1DO               | C68PBD-BL     | Input - primary boom lowered (10 deg operational)                        |
| P12-17  | DI   | 12V SIG TO PLD       | C64LS-OR/BK   | Tied high (12V) for proper operation of PLD                              |
| P12-18  | DI   | 12V SIG TO PLD       | C64LS-OR/BK   | Tied high (12V) for proper operation of PLD                              |
| P12-19  | DI   | LSB3RO               | C70PBE-BL/WH  | Input - primary boom fully retracted for PLD (3ft retracted operational) |
| P12-20  | DI   | LSB4EO               | C71PBE-BL/BK  | Input - primary boom sections 2-4 extended (125ft extended operational)  |
| P12-21  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-22  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-23  | OM   | P1 SEQ VLV           | V74PRLO-RD    | Primary lockout VLV #1                                                   |
| P12-24  | OM   | P2 SEQ VLV           | V75PRLO-RD    | Primary lockout VLV #2                                                   |
| P12-25  | REF  | SNSR GND             | SNSR GND-BR   | Ground to angle sensor                                                   |
| P12-26  | SNSR | SNSR PWR (5V)        | P109ANG-GR/WH | Power to angle sensor (5.0VDC)                                           |
| P12-27  | AI   | FUEL LEVEL SENSOR IN | C65FLVL-BL/WH | Signal from fuel level sensor                                            |
| P12-28  | DI   | DRV ENBL L - LST2O   | C143DEL-BL/RD | Turntable stowed switched 2 (drive enable left)                          |
| P12-29  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-30  | DI   | SPARE DI             |               | Spare                                                                    |
| P12-31  | DI   | BOOM STOWED          |               | Override for boom transport                                              |
| P12-32  | AI   | RSB1AO (BOOM ANGLE)  | C123PBS-RD/BK | Primary angle sensor input to TCON                                       |
| P12-33  | AI   | LTB1LO (BOOM LENGTH) | C167PRS-OR/BK | Primary length sensor input to TCON                                      |
| P12-34  | PWR  | P_30                 |               | Safety power feed to P_30                                                |
| P12-35  | REF  | VALVE RETURN         | VLVRET-BR     | Valve return                                                             |

## Connector Pin Legend

### J13 White 23 Pin Connector

| Pin NO. | Type | Signal Name                | Circuit NO.     | Signal Description                                       |
|---------|------|----------------------------|-----------------|----------------------------------------------------------|
| P13-01  | REF  | VALVE_RETURN_1             |                 | Valve ground return (return for throttle RPM solenoid)   |
| P13-02  | RLY  | THROTTLE                   | C35RPM-BK/RD    | Provides power to throttle actuator relay                |
| P13-03  | RLY  | FUEL/IGNITION              | C21IGN-WH       | Provides power to engine shutdown actuator relay coil    |
| P13-04  | RLY  | START AID RLY              | C34SA-BK/WH     | Provides power to choke/glow plug relay                  |
| P13-05  | PM   | FWD PWM                    |                 | Forward proportional PWM valve drive                     |
| P13-06  | PM   | REV PWM                    |                 | Reverse proportional PWM valve drive                     |
| P13-07  | RLY  | SERVICE HORN               | C46HRN-WH       | Output to service horn                                   |
| P13-08  | OM   | KEYSWITCH PWR              |                 | ON/OFF valve drive to LP selector on throttle body       |
| P13-09  | RLY  | STARTER RELAY              | C33STR-BK       | Tier IV engines only                                     |
| P13-10  | EDC  | EDC FWD                    | C30EDC(+)-WH    | Electrical displacement control (forward)                |
| P13-11  | EDC  | EDC REV                    | C31EDC(-)-WH/BK | Electrical displacement control (reverse)                |
| P13-12  | AI   | OIL_PRESSURE               | C25PSR-WH/BK    | Input from oil pressure sender                           |
| P13-13  | AI   | OIL/WATER_TEMP             | C26TSR-WH/RD    | Input from oil/water temperature sender                  |
| P13-14  | REF  | TT_TILT_SNSR_GND           |                 | Ground for turntable tilt sensor                         |
| P13-15  | SNSR | TT_TILT_SNSR_PWR (SNSR_5V) |                 | Supply voltage for turntable tilt sensor                 |
| P13-16  | REF  | VALVE_RETURN_2             |                 | Valve ground return (return for glow plugs)              |
| P13-17  | PWR  | P_38 PWR TO PROPEL         | S137PLL-RD/WH   | Safety power feed to propel drivers from SCON            |
| P13-18  | FAC  | ALTERNATOR RPM             | C41RPM-OR/BK    | Input from alternator indicating engine RPM              |
| P13-19  | PWR  | P_39 PWR TO TTROT FC       | S139TRF-WH/RD   | Safety power feed to turntable rotate flow control valve |
| P13-20  | AI   | TT_TILT_X_AXIS             |                 | Analog input from tilt sensor (spare)                    |
| P13-21  | AI   | TT_TILT_Y_AXIS             |                 | Analog input from tilt sensor (spare)                    |
| P13-22  | OM   | AC GENERATOR               | V45HG-GR/WH     | Output to ON/ OFF generator valve                        |
| P13-23  | REF  | VALVE_RETURN_3             |                 | Valve ground return                                      |

## Connector Pin Legend

### J14 White 35 Pin Connector

| Pin NO. | Type | Signal Name               | Circuit NO.    | Signal Description                                                   |
|---------|------|---------------------------|----------------|----------------------------------------------------------------------|
| P14-01  | REF  | VALVE_RETURN_4            | VLVRET4-BR     | Valve ground return                                                  |
| P14-02  | PM   | PRI BM U/D FC VLV #2      | V03PUD2-GR/WH  | Proportional PWM valve drive (primary boom up/down valve #2 -GROSS-) |
| P14-03  | PM   | PRI BM E/R FC VLV         | V09PER-BK/RD   | Proportional PWM valve drive (primary boom extend/retract)           |
| P14-04  | PM   | TT ROT FC VLV             | V06TRF-WH/RD   | Proportional PWM valve drive (turntable rotate)                      |
| P14-05  | PM   | PRI BM U/D FC VLV #1      | V03PUD1-RD/WH  | Proportion PWM valve drive( primary boom up/down valve #1 -fine-)    |
| P14-06  | PM   | SPARE PM                  |                | Proportional PWM valve drive                                         |
| P14-07  | OM   | PRI_UP_VLV                | V01PBU-RD      | ON/OFF valve drive (primary boom up)                                 |
| P14-08  | OM   | PRI_DOWN_VLV              | V02PBD-RD/BK   | ON/OFF valve drive (primary boom down)                               |
| P14-09  | OM   | PRI_EXTEND_VLV            | V07PBE-BK      | ON/OFF valve drive (primary boom extend)                             |
| P14-10  | OM   | PRI_RETRACT_VLV           | V08PBR-BK/WH   | ON/OFF valve drive (primary boom retract)                            |
| P14-11  |      | NOT USED                  |                | No connection                                                        |
| P14-12  | OM   | SPARE OM                  |                | ON/OFF valve drive                                                   |
| P14-13  | RLY  | SPARE RLY OUT             |                | Relay coil puk                                                       |
| P14-14  | REF  | VALVE_RETURN_5            |                | Valve ground return                                                  |
| P14-15  | DI   | HYD_FILTER1 DI            |                | Grounding switch input from hydraulic filter #1                      |
| P14-16  | DI   | HYD_FILTER2 DI            |                | Grounding switch input from hydraulic filter #2                      |
| P14-17  | DI   | BOOM REVERSE LOAD DI      |                | Grounding switch input from boom reverse proximity switch            |
| P14-18  | DI   | BOOM OVERLOAD DI          |                | Grounding switch input from boom overload switch                     |
| P14-19  | OH   | SPARE OM                  |                | ON/OFF valve drive                                                   |
| P14-20  | OH   | SPARE OM                  |                | ON/OFF valve drive                                                   |
| P14-21  | OM   | SPARE OM                  |                | ON/OFF valve drive                                                   |
| P14-22  |      | NOT USED                  |                | No connection                                                        |
| P14-23  | OM   | MULTI_FUNC_VLV            |                | ON/OFF valve drive                                                   |
| P14-24  |      | NOT USED                  |                | No connection                                                        |
| P14-25  | OM   | ROTATE_CW_VLV             | V04TRL-WH      | ON/OFF valve drive (rotate clockwise)                                |
| P14-26  | OM   | ROTATE_CCW_VLV            | V05TRR-WH/BK   | ON/OFF valve drive (rotate counter-clockwise)                        |
| P14-27  | REF  | VALVE_RETURN_7            | VLVRET7-BR     | Valve ground return                                                  |
| P14-28  |      | NOT USED                  |                | No connection                                                        |
| P14-29  |      | NOT USED                  |                | No connection                                                        |
| P14-30  | REF  | VALVE_RETURN_6            | VLVRET6-BR     | Valve ground return                                                  |
| P14-31  |      | NOT USED                  |                | No connection                                                        |
| P14-32  | OM   | AUX_RELAY                 | C27AUX-RD      | Relay coil feed                                                      |
| P14-33  | OM   | PRESS COMP ENBL VLV #2    |                | NO connection                                                        |
| P14-34  | OM   | PRESS COMP ENBL VLV #1    | V155PCE1-OR/RD | ON/OFF valve drive (Activate Pressure Comp Valve on pump)            |
| P14-35  | OM   | AC GENERATOR BYPASS VALVE | V150BV-GR/BK   | Output to ON/OFF Generator Bypass                                    |

## Connector Pin Legend

### J17 - 16 Pin Connector

| Pin NO. | Type | Signal Name         | Circuit NO.    | Signal Description                                                      |
|---------|------|---------------------|----------------|-------------------------------------------------------------------------|
| J17-1   | PWR  | PWR TO TCON ESTOP   | BL/BK          | Power to TCON E-Stop (P1)                                               |
| J17-2   |      | NOT USED            |                |                                                                         |
| J17-3   | PWR  | SERV/CAL MODE       | WH             | Service/calibration mode signal                                         |
| J17-4   | CONT | ECU POWER           | C47OUT-WH/BK   | Power to TCON ECU                                                       |
| J17-5   | PWR  | PCON MODE           | P23PCON-BK     | Output signal to PCON. Provides 12V power to the emergency stop switch. |
| J17-6   | CONT | OUTPUT PWR ENABLE   | C47OUT-WH/BK   | Function enable                                                         |
| J17-7   | PWR  | P_6R1               | P53LS-BK/WH    | Safety circuit power                                                    |
| J17-8   | PWR  | P_7R                | S56PRV-RD/BK   | Safety circuit power                                                    |
| J17-9   | CONT | SERV. OR OPER. REC. | SRV REC-WH     | Service/recovery mode signal                                            |
| J17-10  | PWR  | P_22                | P56PRV-RD      | Safety circuit power (platform level bypass)                            |
| J17-11  | CONT | OPER. REC.          | P_15-OR/BK     | Power to PLD while in recovery mode                                     |
| J17-12  | CONT | P_7                 | P_7 PLAT-GR/WH | Power for function enable while in recovery mode                        |
| J17-13  | PWR  | P_11                | S140ENL-OR/RD  | Power for boom up in service mode                                       |
| J17-14  | CONT | TCON MODE           | RD/WH          | TCON mode power                                                         |
| J17-15  | CONT | ALARM PWR           | ALM PWR-BL     | TCON alarm signal                                                       |
| J17-16  | REF  | ALARM GND           | ALM GND-BR     | TCON alarm ground                                                       |

## Connector Pin Legend

### J21 Black 23 Pin Connector

| Pin NO. | Type* | Signal Name       | Circuit NO.  | Signal Description                                                                    |
|---------|-------|-------------------|--------------|---------------------------------------------------------------------------------------|
| P21-01  | REF   | PCON GND          | GNDPCON-BR   | PCON ground                                                                           |
| P21-02  | PWR   | PCON PWR          | P52PCON-WH   | Power for PCON                                                                        |
| P21-03  |       | NOT USED          |              |                                                                                       |
| P21-04  | CONT  | P_7               | S56PRV-RD    | 12V when footswitch is pressed                                                        |
| P21-05  |       | NOT USED          |              |                                                                                       |
| P21-06  |       | NOT USED          |              |                                                                                       |
| P21-07  | PWR   | P_22              | P56PRV-RD/WH | Power for platform level up/down, jib up/down, and jib bellcrank up/down in TCON mode |
| P21-08  |       | NOT USED          |              |                                                                                       |
| P21-09  |       | NOT USED          |              |                                                                                       |
| P21-10  | COM   | CAN SHIELD        |              | Termination for CAN cable shield                                                      |
| P21-11  |       | NOT USED          |              |                                                                                       |
| P21-12  |       | NOT USED          |              |                                                                                       |
| P21-13  |       | !BOOT             |              | !Boot                                                                                 |
| P21-14  |       | NOT USED          |              |                                                                                       |
| P21-15  | CONT  | OUT PWR ENBL      | C47OUT-WH/BK | 12V when platform E-Stop is pulled out                                                |
| P21-16  | CONT  | HRN RLY CNTRL     | C46HRN-WH    | Output from horn membrane switch on PCON                                              |
| P21-17  | COM   | CAN LOW           | D81CAN(-)-GR | CAN bus connection                                                                    |
| P21-18  | COM   | CAN HIGH          | D82CAN(+)-YL | CAN bus connection                                                                    |
| P21-19  |       | NOT USED          |              |                                                                                       |
| P21-20  |       | NOT USED          |              |                                                                                       |
| P21-21  |       | NOT USED          |              |                                                                                       |
| P21-22  |       | NOT USED          |              |                                                                                       |
| P21-23  | PWR   | PWR-PCON<br>ESTOP | P23PCON-BK   | Power to PCON E-Stop                                                                  |

## Connector Pin Legend

### J22 White 35 Pin Connector

| Pin NO. | Type* | Signal Name               | Circuit NO.   | Signal Description                                                                                                                      |
|---------|-------|---------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| P22-01  | REF   | VALVE_RETURN_1            | VLVRET1-BR    | Valve ground return                                                                                                                     |
| P22-02  | OM    | JIB EXTEND                |               | NO connection                                                                                                                           |
| P22-03  | OM    | PLAT ROT CCW              | V18PRR-GR/BK  | ON/OFF valve drive (platform rotate CCW - right)                                                                                        |
| P22-04  | OM    | PLAT ROT CW               | V17PRL-GR     | ON/OFF valve drive (platform rotate CW - left)                                                                                          |
| P22-05  | PM    | JIB UP                    | V43JU-GR      | Proportional PWM valve drive (jib up)                                                                                                   |
| P22-06  | PM    | JIB DOWN                  | V44JD-GR/BK   | Proportional PWM valve drive (jib down)                                                                                                 |
| P22-07  | PM    | PLAT LEVEL UP             | V14PLU-OR     | Proportional PWM valve drive (platform level up)                                                                                        |
| P22-08  | PM    | PLAT LEVEL DOWN           | V15PLD-OR/BK  | Proportional PWM valve drive (platform level down)                                                                                      |
| P22-09  | OM    | JIB RETRACT               |               | NO connection                                                                                                                           |
| P22-10  | REF   | PROX KILL GND             |               |                                                                                                                                         |
| P22-11  | DI    | PROX Kill IN              | C90PXS-RD/BK  | Option, all platform functions disable when triggered                                                                                   |
| P22-12  | REF   | LOAD SNSR GND             | P94RET-BR     | Ground return for load sense switch                                                                                                     |
| P22-13  | DI    | JIB STOWED OPERATIONAL    |               | NO connection                                                                                                                           |
| P22-14  | PWR   | LOAD SNSR PWR             | P94LDS-WH     | 12V Power for load sense switch                                                                                                         |
| P22-15  | PWR   | SAFE PL TILT OUT          | C88PJTS-RD/BK | Power for platform level up/down, jib up/down, and jib bellcrank up/down in PCON mode (platform and Jib bellcrank tilt sensor - safety) |
| P22-16  | PWR   | LIMIT SWITCH PWR          | C64LS-OR/BK   | Power for footswitch, prox sensor, and limit switches                                                                                   |
| P22-17  | CONT  | FOOT SW RTN               | C56FTS-RD     | Power from footswitch (P_7 circuit)                                                                                                     |
| P22-18  | DI    | JIB RETRACT OPERATIONAL   |               | NO connection                                                                                                                           |
| P22-19  | REF   | PL TILT SNSR GND          | P85RET-BR     | Ground for platform tilt sensor (operational)                                                                                           |
| P22-20  | AI    | PL TILT SNSR              | C84TAY-GR/BK  | Analog signal input for platform tilt sensor (operational)                                                                              |
| P22-21  | SNSR  | PL TILT SNSR PWR          | P85PTS-RD     | 5V Supply voltage for platform tilt sensor (operational)                                                                                |
| P22-22  | REF   | SAFE PL TILT GND          | P89RET-BR     | Ground for platform tilt sensor (safety)                                                                                                |
| P22-23  | PWR   | SAFE PL TILT PWR          | P87PTS-RD     | 12V Supply voltage for platform tilt sensor (safety)                                                                                    |
| P22-24  | PM    | JIB EXT/RET F.C.          |               | NO connection                                                                                                                           |
| P22-25  | OM    | SPARE OM                  |               | ON/OFF valve drive                                                                                                                      |
| P22-26  | OM    | PLATFORM LEVEL LOOP VALVE | V237PLV-RD/WH | Power for platform level loop valve                                                                                                     |
| P22-27  | PM    | SPARE OM                  |               | ON/OFF valve drive                                                                                                                      |
| P22-28  | PM    | JIB BELLCRANK LEVEL UP    |               | NO connection                                                                                                                           |
| P22-29  | PM    | JIB BELLCRANK LEVEL DOWN  |               | NO connection                                                                                                                           |
| P22-30  | SNSR  | JIB SNSR PWR              |               | NO connection                                                                                                                           |
| P22-31  | REF   | JIB SNSR GND              |               | NO connection                                                                                                                           |
| P22-32  | AI    | JIB TILT SNSR IN          |               | NO connection                                                                                                                           |
| P22-33  | DI    | JIB ROTATED SAFETY        |               | NO connection                                                                                                                           |
| P22-34  | REF   | VALVE_RETURN_2            | VLVRET2-BR    | Valve ground return                                                                                                                     |
| P22-35  |       | NOT USED                  |               | No Connection                                                                                                                           |



## Connector Pin Legend

### Circuit Board Connector

| Pin NO. | Type* | Signal Name          | Circuit NO.   | Signal Description                                      |
|---------|-------|----------------------|---------------|---------------------------------------------------------|
| J29-1   | REF   | JOYSTICK_GND_2       | JSGND2-BR     | Joystick signal ground (JC8)                            |
| J29-2   | REF   | JOYSTICK_GND_3       | JSGND3-BR     | Joystick signal ground (JC2)                            |
| J29-3   | SNSR  | JOYSTICK_PWR_2       | P162JPW2-OR   | Joystick power (JC8)                                    |
| J29-4   | SNSR  | JOYSTICK_PWR_3       | P162JPW3-OR   | Joystick power (JC2)                                    |
| J29-5   |       | NOT USED             |               |                                                         |
| J29-6   | AI    | STEER - ROCKER       | C158STC-BL/RD | Rocker steer signal from propel joystick (JC3)          |
| J29-7   | AI    | STEER - DUAL<br>AXIS | C159STC-BL/WH | Dual axis steer signal from propel joystick (JC3)       |
| J29-8   | AI    | PROPEL               | C160JPL-WH/RD | Propel signal from propel joystick (JC3)                |
| J29-9   | AI    | SPARE AI             |               |                                                         |
| J29-10  | AI    | PRIMARY EXT/RET      | C163PES-BL/WH | Boom extend/retract signal from boom joystick (JC2)     |
| J29-11  | AI    | PRIMARY<br>UP/DOWN   | C164PLS-RD/WH | Boom up/down signal from boom joystick (JC7)            |
| J29-12  | AI    | TT ROTATE            | C165TRS-WH/RD | Turntable rotate CW/CCW signal from boom joystick (JC7) |
| J29-13  | SNSR  | JOYSTICK_PWR_4       | P162JPW4-OR   | Joystick power (JC7)                                    |
| J29-14  | SNSR  | JOYSTICK_PWR_1       | P162JPW1-OR   | Joystick power (JC3)                                    |
| J29-15  | REF   | JOYSTICK_GND_4       | JSGND4-BR     | Joystick signal ground (JC7)                            |
| J29-16  | REF   | JOYSTICK_GND_1       | JSGND1-BR     | Joystick signal ground (JC3)                            |

## Connector Pin Legend

### Circuit Board Connector

| Pin NO. | Type* | Signal Name       | Circuit NO.       | Signal Description                                         |
|---------|-------|-------------------|-------------------|------------------------------------------------------------|
| J169-1  | AI    | PLAT ROTATE       | C16PRL-OR/RD      | Platform rotate CW/CCW signal from jib joystick (JC6)      |
| J169-2  | REF   | GND               | GND4-BR           | Joystick case ground (JC7)                                 |
| J169-3  | AI    | JIB UP/DOWN       | C156JUD-GR/WH     | Jib up/down signal from jib joystick (JC6)                 |
| J169-4  | AI    | SPARE AI          |                   |                                                            |
| J169-5  | REF   | GND               | GND3-BR           | Joystick case ground (JC2)                                 |
| J169-6  | REF   | GND               | GND6-BR           | Return from platform level toggle switch (TS9)             |
| J169-7  | DI    | PLAT LVL UP       | PLAT LVL UP-OR    | Platform level up signal (TS9)                             |
| J169-8  | DI    | PLAT LVL DOWN     | PLAT LVL DN-OR/BK | Platform level down signal (TS9)                           |
| J169-9  | REF   | GND               | GND2-BR           | Joystick case ground (JC6)                                 |
| J169-10 | PWR   | OUT PWR ENBL      | ESTOP RET-BK      | Return from PCON E-Stop (P2) - output power enable circuit |
| J169-11 |       | !BOOT             |                   |                                                            |
| J169-12 | REF   | GND               | GND12-BR          | PCON alarm ground                                          |
| J169-13 | REF   | GND               | GND1-BR           | Joystick case ground (JC3)                                 |
| J169-14 | DI    | SPARE DI          |                   |                                                            |
| J169-15 | DI    | SPARE DI          |                   |                                                            |
| J169-16 | REF   | GND               |                   |                                                            |
| J169-17 | DI    | SPARE DI          |                   |                                                            |
| J169-18 | DI    | SPARE DI          |                   |                                                            |
| J169-19 | CONT  | ALARM             | ALARM(+)-RD/BK    | PCON alarm signal                                          |
| J169-20 | PWR   | PWR-PCON<br>ESTOP | ESTOP PWR-RD/BK   | Power to PCON E-Stop (P2)                                  |

## Connector Pin Legend

### Circuit Board Connector

| Pin NO. | Type* | Signal Name             | Circuit NO.      | Signal Description                            |
|---------|-------|-------------------------|------------------|-----------------------------------------------|
| J1-1    | DI    | PWR-HORN                | HORN PWR-RD      | Power for Service Horn button                 |
| J1-2    | REF   | RET-HORN                | HORN RET-GR      | Return for Service Horn button                |
| J1-3    | DI    | GENERATOR ON/OFF        | GEN ON/OFF-GR/WH | Generator toggle switch input                 |
| J1-4    | DI    | AUXILIARY PUMP          | AUX PUMP-RD      | Auxiliary Pump toggle switch input            |
| J1-5    | DI    | START ASSIST            | START ASST-BK/WH | Start Assist (Glow Plug) toggle switch input  |
| J1-6    | DI    | ENGINE START            | ENG START-BK     | Engine Start toggle switch input              |
| J1-7    | DI    | DRIVE ENABLE            | DRV ENBL-BL/WH   | Drive Enable toggle switch input              |
| J1-8    |       | PROX OVERRIDE           |                  |                                               |
| J1-9    | DI    | AXLE RETRACT            | AXLE RET-GR      | Axle Retract toggle switch input              |
| J1-10   | REF   | GND1                    | GND1-BR          | Ground for toggle switch inputs               |
| J1-11   | DI    | ENGINE SPEED SELECT     | ENG SPEED-BK/RD  | Engine Speed toggle switch input              |
| J1-12   | DI    | AXLE EXTEND             | AXLE EXT-GR/WH   | Axle Extend toggle switch input               |
| J1-13   | DI    | DRIVE SPEED SELECT      | DRV SPEED-RD/WH  | Drive Speed toggle switch input               |
| J1-14   | DI    | STEER MODE SELECT LEFT  | STR MODE L-OR    | Steer Mode Select - Left toggle switch input  |
| J1-15   |       | NOT USED                |                  |                                               |
| J1-16   |       | NOT USED                |                  |                                               |
| J1-17   | DI    | STEER MODE SELECT RIGHT | STR MODE R-OR/BK | Steer Mode Select - Right toggle switch input |
| J1-18   | DI    | SPARE                   |                  | Spare (option) toggle switch input            |
| J1-19   |       | NOT USED                |                  |                                               |
| J1-20   | REF   | GND2                    | GND2-BR          | Ground for toggle switch inputs               |

## Connector Pin Legend

### J31 Black 23 Pin Connector

| Pin NO. | Type* | Signal Name                | Circuit NO.  | Signal Description                                          |
|---------|-------|----------------------------|--------------|-------------------------------------------------------------|
| P31-01  | REF   | DCON ECU GND               | GNDDCON-BR   | DCON ground                                                 |
| P31-02  | PWR   | DCON ECU PWR               | P21DCON-WH   | Power for DCON                                              |
| P31-03  | PWR   | P_6R1                      | P53LS-WH/BK  | Power for motor speed and brake valves                      |
| P31-04  |       | NOT USED                   |              |                                                             |
| P31-05  | PWR   | P_7R                       | S56PRV-RD    | Power for axle extend and steer valves                      |
| P31-06  | PWR   | P_12                       | C61AXRT-GR   | Power for axle retract valve                                |
| P31-07  |       | NOT USED                   |              |                                                             |
| P31-08  | REF   | AXLE NOT RET GND           |              | Not used                                                    |
| P31-09  | DI    | AXLE NOT RET RTN           |              | Not used (active low)                                       |
| P31-10  | COM   | CAN SHIELD                 |              | Not used                                                    |
| P31-11  | COM   | RS232 RXD                  |              | Not used                                                    |
| P31-12  | COM   | RS232 TXD                  |              | Not used                                                    |
| P31-13  |       | !BOOT                      |              | !BOOT                                                       |
| P31-14  |       | NOT USED                   |              |                                                             |
| P31-15  | DI    | AXLE NOT EXT RTN           |              | Not used (active high)                                      |
| P31-16  |       | NOT USED                   |              |                                                             |
| P31-17  | COM   | CAN LOW                    | D81CAN(-)-GR | CAN bus connection                                          |
| P31-18  | COM   | CAN HIGH                   | D82CAN(+)-YL | CAN bus connection                                          |
| P31-19  | COM   | RS232GND                   |              | Not used                                                    |
| P31-20  | AI    | FRONT AXLE POSITION SENSOR | C60FAP-GR/WH | Analog signal input for front axle position sensor (RSFA1O) |
| P31-21  | AI    | REAR AXLE POSITION SENSOR  | C60RAP-GR/WH | Analog signal input for rear axle position sensor (RSRA1O)  |
| P31-22  | AI    | SPARE                      |              | Not used (0-5V Analog Input - Biased to 2.5V)               |
| P31-23  | PWR   | AXLE NOT EXT PWR           | P61LSA-GR    | Power to axle safety switches (LSFA1ES and LSRA1ES)         |

## Connector Pin Legend

### J32 White 23 Pin Connector

| Pin NO. | Type* | Signal Name                  | Circuit NO.   | Signal Description                               |
|---------|-------|------------------------------|---------------|--------------------------------------------------|
| P32-01  | REF   | VALVE_RETURN_1               | VLVRET1-BR    | Valve ground return                              |
| P32-02  | OM    | AXLE RETRACT                 | V61AXRT-GR    | ON/OFF valve drive (axle retract)                |
| P32-03  | OM    | AXLE EXTEND                  | V60AXEX-GR/WH | ON/OFF valve drive (axle extend)                 |
| P32-04  | OM    | MOTOR SPEED                  | V29MS-RD/WH   | ON/OFF valve drive (motor speed)                 |
| P32-05  | OM    | AXLE RETRACT<br>ENABLE VALVE | V246ARE-GR/BK | ON/OFF VALVE DRIVE(AXLE RETRACT)                 |
| P32-06  | OH    | SPARE                        |               | Not used (paired with P32-07)                    |
| P32-07  | OH    | SPARE                        |               | Not used (paired with P32-06)                    |
| P32-08  | OM    | RR STEER RIGHT               | V36RRS-BL     | ON/OFF valve drive (right rear steer right)      |
| P32-09  | OM    | RR STEER LEFT                | V37RRS-BL/BK  | ON/OFF valve drive (right rear steer left)       |
| P32-10  | AI    | RR STEER SNSR                | C111RRS-OR    | Analog signal input for right rear steer sensor  |
| P32-11  | AI    | LR STEER SNSR                | C111LRS-OR    | Analog signal input for left rear steer sensor   |
| P32-12  | AI    | RF STEER SNSR                | C111RFS-OR    | Analog signal input for right front steer sensor |
| P32-13  | AI    | LF STEER SNSR                | C111LFS-OR    | Analog signal input for left front steer sensor  |
| P32-14  | REF   | VALVE_RETURN_2               | VLVRET2-BR    | Valve ground return                              |
| P32-15  | OM    | BRAKE                        | V32BRK-WH/RD  | ON/OFF valve drive (brake)                       |
| P32-16  | OM    | LR STEER RIGHT               | V36LRS-BL     | ON/OFF valve drive (left rear steer right)       |
| P32-17  | OM    | LR STEER LEFT                | V37LRS-BL/BK  | ON/OFF valve drive (left rear steer left)        |
| P32-18  | OM    | RF STEER RIGHT               | V36RFS-BL     | ON/OFF valve drive (right front steer right)     |
| P32-19  | REF   | STEER SNSR GND               | P110RT-BK     | Ground to steer sensors                          |
| P32-20  | SNSR  | STEER SNSR PWR<br>(5.0 VDC)  | P109ANG-GR/WH | Power to steer sensors (5.0VDC)                  |
| P32-21  | OM    | RF STEER LEFT                | V37RFS-BL/BK  | ON/OFF valve drive (right front steer left)      |
| P32-22  | OM    | LF STEER RIGHT               | V36LFS-BL     | ON/OFF valve drive (left front steer right)      |
| P32-23  | OM    | LF STEER LEFT                | V37LFS-BL/BK  | ON/OFF valve drive (left front steer left)       |

## Connector Pin Legend

### J121 Gray 12 Pin Connector

| Pin NO. | Type* | Signal Name                        | Circuit NO.   | Signal Description                              |
|---------|-------|------------------------------------|---------------|-------------------------------------------------|
| P121-01 | DI    | LOAD SENSE                         |               | Digital input from load sense switch            |
| P121-02 | DI    | LSB3RS+LSB2RS<br>(FULLY RETRACTED) | S42BRT-OR/RD  | Digital input from LSB3RS+LSB2RS limit switches |
| P121-03 | COM   | RS232 TXD                          |               | RS232 serial - connected through tee harness    |
| P121-04 | DI    | CALIBRATION IN                     | C145CAL-RD/WH | Digital input from calibration switch in TCON   |
| P121-05 | COM   | RS232 RXD                          |               | RS232 serial - connected through tee harness    |
| P121-06 | COM   | CAN HIGH                           | D82CAN(+)-YL  | CAN bus connection                              |
| P121-07 | COM   | CAN LOW                            | D81CAN(-)-GR  | CAN bus connection                              |
| P121-08 | OM    | P_12                               | C61AXRT-GR    | Safety circuit for axle retract (power)         |
| P121-09 | PWR   | P_7R                               | S56PRV-RD     | Safety circuit power (from TCON)                |
| P121-10 | OM    | P_38                               | S137PLL-RD/WH | Safety circuit for propel (power)               |
| P121-11 | OM    | P_39                               | S139TRF-WH/RD | Safety circuit for turntable rotate (power)     |
| P121-12 | REF   | GND                                | SCONGND-BR    | Ground for SCON ECU                             |

### J122 Black 12 Pin Connector, SX-125 XC



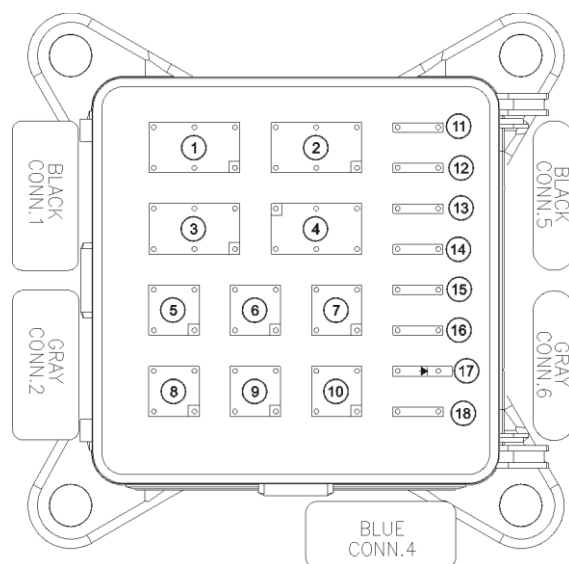
## Connector Pin Legend

| Pin NO. | Type* | Signal Name             | Circuit NO.   | Signal Description                                       |
|---------|-------|-------------------------|---------------|----------------------------------------------------------|
| P122-01 | PWR   | ECU PWR                 | P21DCON-WH    | Power for SCON/DCON ECU                                  |
| P122-02 | AI    | LTB1LS (BOOM LENGTH)    | C166PRS-OR    | Analog signal input for boom length (safety)             |
| P122-03 | AI    | RSB1AS (BOOM ANGLE)     | C141PBS-RD    | Analog signal input for boom angle (safety)              |
| P122-04 | DI    | AXLES EXTENDED          | C60AXEX-GR/WH | Digital input from LSFA1ES and LSRA1ES (power from DCON) |
| P122-05 | DI    | LSB4ES (100FT EXTENDED) | S76BEX-BL     | Digital input from LSB4ES                                |
| P122-06 | DI    | LST1S (DRIVE ENABLE)    | S13DE-BL/RD   | Digital input from LST1S limit switch                    |
| P122-07 | PWR   | P_6R1                   | P53LS-WH/BK   | Safety circuit power (from TCON)                         |
| P122-08 | OM    | P_11                    | S140ENL-OR/RD | Safety circuit for boom up (power)                       |
| P122-09 | PWR   | P_6R2                   | P54ENG-BK/WH  | Safety circuit power (from TCON)                         |
| P122-10 | OM    | P_9B                    | P58LS-RD/BK   | Safety circuit for fuel/ignition (power)                 |
| P122-11 | PWR   | P_6R1                   | P53LS-WH/BK   | Safety circuit power (from TCON)                         |
| P122-12 | OM    | P_9A+P_10               | P57PBD-RD/WH  | Safety circuit for boom down and extend (power)          |

### J122 Green 12 Pin Connector, SX-105 XC

| Pin NO. | Type* | Signal Name             | Circuit NO.   | Signal Description                                       |
|---------|-------|-------------------------|---------------|----------------------------------------------------------|
| P122-01 | PWR   | ECU PWR                 | P21DCON-WH    | Power for SCON/DCON ECU                                  |
| P122-02 | AI    | LTB1LS (BOOM LENGTH)    | C166PRS-OR    | Analog signal input for boom length (safety)             |
| P122-03 | AI    | RSB1AS (BOOM ANGLE)     | C141PBS-RD    | Analog signal input for boom angle (safety)              |
| P122-04 | DI    | AXLES EXTENDED          | C60AXEX-GR/WH | Digital input from LSFA1ES and LSRA1ES (power from DCON) |
| P122-05 | DI    | LSB4ES (100FT EXTENDED) |               |                                                          |
| P122-06 | DI    | LST1S (DRIVE ENABLE)    | S13DE-BL/RD   | Digital input from LST1S limit switch                    |
| P122-07 | PWR   | P_6R1                   | P53LS-WH/BK   | Safety circuit power (from TCON)                         |
| P122-08 | OM    | P_11                    | S140ENL-OR/RD | Safety circuit for boom up (power)                       |
| P122-09 | PWR   | P_6R2                   | P54ENG-BK/WH  | Safety circuit power (from TCON)                         |
| P122-10 | OM    | P_9B                    | P58LS-RD/BK   | Safety circuit for fuel/ignition (power)                 |
| P122-11 | PWR   | P_6R1                   | P53LS-WH/BK   | Safety circuit power (from TCON)                         |
| P122-12 | OM    | P_9A+P_10               | P57PBD-RD/WH  | Safety circuit for boom down and extend (power)          |

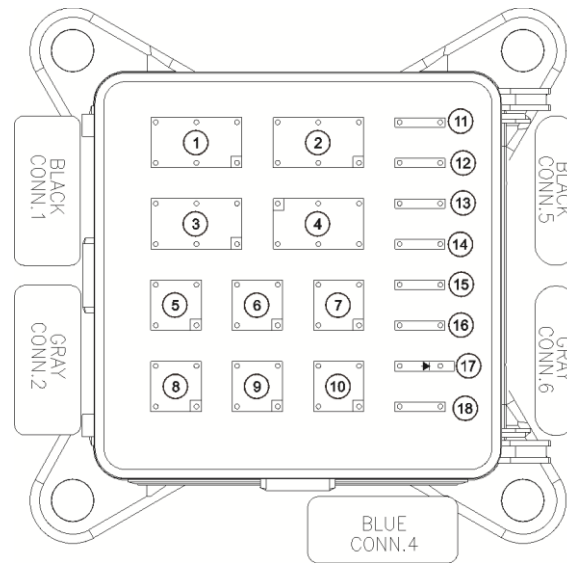
## Engine Relay and Fuse Panel Legend- Deutz TD2011 and Perkins 1104D Models



| Number | Component | Description               |
|--------|-----------|---------------------------|
| 1      | CR15B     | Glow Plugs                |
| 2      | CR15A     | Glow Plugs                |
| 3      | CR28      | Fuel Power                |
| 4      | SPARE     |                           |
| 5      | CR5       | Horn                      |
| 6      | CR77      | Function Enable           |
| 7      | CR2       | Ignition                  |
| 8      | CR41      | Flashing Beacons          |
| 9      | CR49      | Work / Drive Lights       |
| 10     | CR17      | Hydraulic Oil Cooler      |
| 11     | F22A      | Fuse, 30A, Glow Plugs     |
| 12     | F22C      | Fuse, 2A, GP Signal       |
| 13     | F22B      | Fuse, 30A, Glow Plugs     |
| 14     | F23       | Fuse, 30A, Fuel, Ignition |
| 15     | F46       | Fuse, 10A, Horn           |
| 16     | F7        | Fuse, 30A, Accessory      |
| 17     | D1        | Alternator Diode          |
| 18     | F20       | Fuse, 20A, Hi/Lo RPM      |

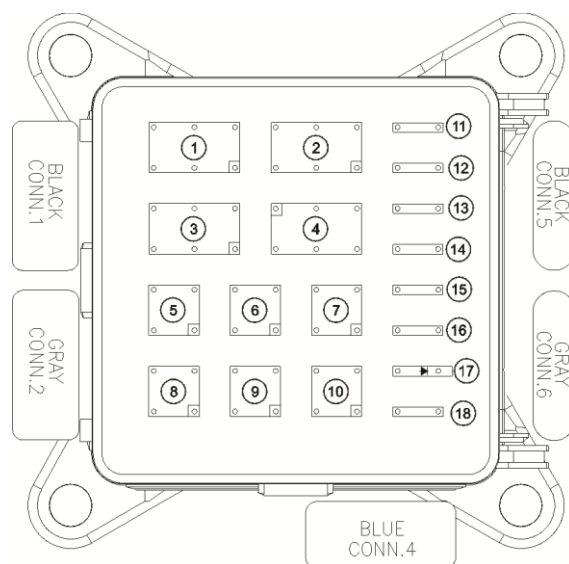


# Engine Relay and Fuse Panel Legend- Deutz TD2.9 Models



| Number | Component | Description               |
|--------|-----------|---------------------------|
| 1      | CR15B     | Glow Plugs                |
| 2      | CR15A     | Glow Plugs                |
| 3      | CR28      | Fuel Power                |
| 4      | CR39      | Deutz Aux. ShUTDOWN       |
| 5      | CR5       | Horn                      |
| 6      | CR77      | Function Enable           |
| 7      | CR2       | Ignition                  |
| 8      | CR41      | Flashing Beacons          |
| 9      | CR49      | Work / Drive Lights       |
| 10     | CR17      | Hydraulic Oil Cooler      |
| 11     | F22A      | Fuse, 30A, Glow Plugs     |
| 12     | F22C      | Fuse, 2A, GP Signal       |
| 13     | F22B      | Fuse, 30A, Glow Plugs     |
| 14     | F23       | Fuse, 30A, Fuel, Ignition |
| 15     | F46       | Fuse, 10A, Horn           |
| 16     | F7        | Fuse, 30A, Accessory      |
| 17     | D1        | Alternator Diode          |
| 18     | F20       | Fuse, 20A, ECU Power      |

## Engine Relay and Fuse Panel Legend- Perkins 854F Models

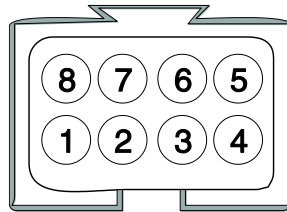


| Number | Component | Description                |
|--------|-----------|----------------------------|
| 1      | CR81B     | ECU Power                  |
| 2      | CR81A     | ECU Power                  |
| 3      | CR1       | Starter                    |
| 4      | SPARE     |                            |
| 5      | CR5       | Horn                       |
| 6      | CR77      | Function Enable            |
| 7      | CR2       | Ignition                   |
| 8      | CR41      | Flashing Beacons           |
| 9      | CR49      | Work / Drive Lights        |
| 10     | CR17      | Hydraulic Oil Cooler       |
| 11     | F27A      | Fuse, 30A, ECU Power       |
| 12     | F27C      | Fuse, 2A, ECU Signal       |
| 13     | F27B      | Fuse, 30A, ECU Power       |
| 14     | F23       | Fuse, 30A, start, Ignition |
| 15     | F46       | Fuse, 10A, Horn            |
| 16     | F7        | Fuse, 30A, Accessory       |
| 17     | D1        | Alternator Diode           |
| 18     | F27D      | Fuse, 20A, Engine KSP      |

## Telematics Connector Pin Legend

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

Connector Pin Numbering



Note: A Deutsch plug p/n DT06-08SA mates with the Genie Telematics connector

| Pin | Circuit Type     | Circuit Properties                | Genie Machine Function(s)                                         | Telematics Use Case                                                 |
|-----|------------------|-----------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------|
| 1   | System Power     | 12 VDC<br>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<br>12V = engine run, 0V = engine off        | Monitor Engine Hours                                                |
| 4   | Digital Output 2 | 12 VDC                            | Key Switch Activation<br>12V = key switch on, 0V = key switch off | Monitor machine utilization                                         |
| 5   | Digital Output 3 | 12 VDC                            | Foot switch<br>12V = active, 0V = inactive                        | Monitor machine utilization                                         |
| 6   | Digital Input 1  | 12 VDC                            | Remote Disable Engine Start                                       | Remotely Prevent Engine Start                                       |
| 7*  | Databus H        | CAN HIGH                          | Genie Databus                                                     | J1939 Engine Messages, Receive Proprietary Genie Telematics Message |
| 8*  | Databus L        | CAN LOW                           | Genie Databus                                                     | J1939 Engine Messages, Receive Proprietary Genie Telematics Message |

\* Tier IV engine models only, J1939 engine message available.

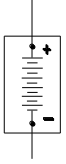
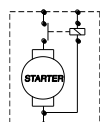
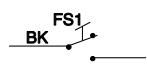
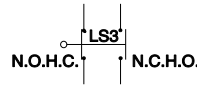
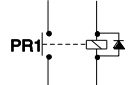
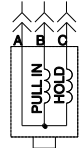
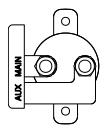
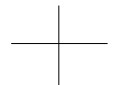
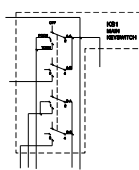
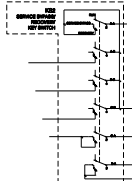
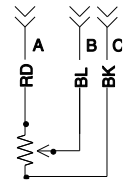
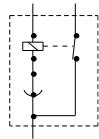
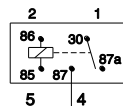
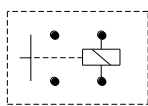
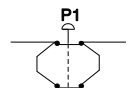
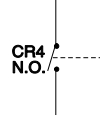
\* Genie proprietary databus support.

### Wireless Certifications

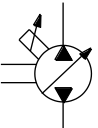
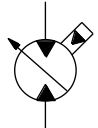
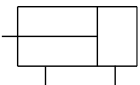
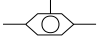
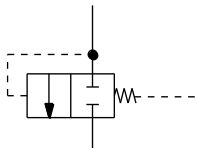
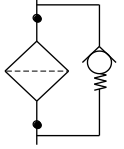
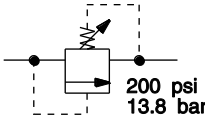
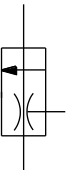
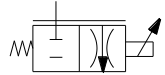
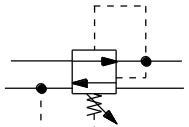
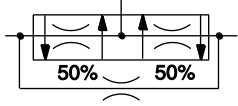
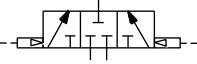
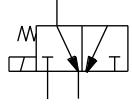
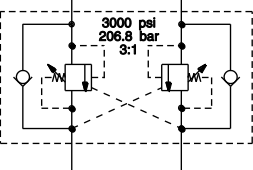
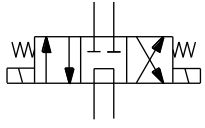
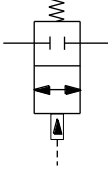
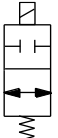
Telematic device(s) should comply with specific wireless carrier certifications where applicable and comply with the following:

|               |               |
|---------------|---------------|
| North America | PTCRB, FCC/IC |
| Europe        | CE, R&TTE     |

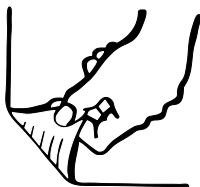
# Electrical Symbols Legend

|                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |    |    |    |    |
| Battery                                                                             | Motor                                                                               | Horn or alarm                                                                       | Flashing beacon                                                                       | Gauge                                                                                 |
|    |    |    |    |    |
| Diode                                                                               | Hour meter                                                                          | LED                                                                                 | Fuse with amperage                                                                    | Foot switch                                                                           |
|    |    |    |    |    |
| Circuit connection                                                                  | Limit Switch                                                                        | Power relay                                                                         | Coil with suppression                                                                 | Fuel or RPM solenoid                                                                  |
|   |   |   |   |   |
| Connection - no terminal                                                            | Battery separator                                                                   | Circuits crossing no connection                                                     | Quick disconnect terminal                                                             | Circuit breaker with amperage                                                         |
|  |  |  |  |  |
| Main Key switch                                                                     | Service Bypass Key switch                                                           | Steer sensor                                                                        | Auxiliary Pump                                                                        | Tilt sensor                                                                           |
|  |  |  |  |  |
| Relay                                                                               | Power relay                                                                         | Emergency Stop button                                                               | Hydraulic oil cooling fan                                                             | Gauge sending unit                                                                    |
|  |  |  |  |  |
| Oil temperature switch normally open                                                | Coolant temperature switch - normally open                                          | Oil pressure switch normally closed                                                 | Control relay contact normally open                                                   | Diode starting aid, glow plug or flame ignitor                                        |

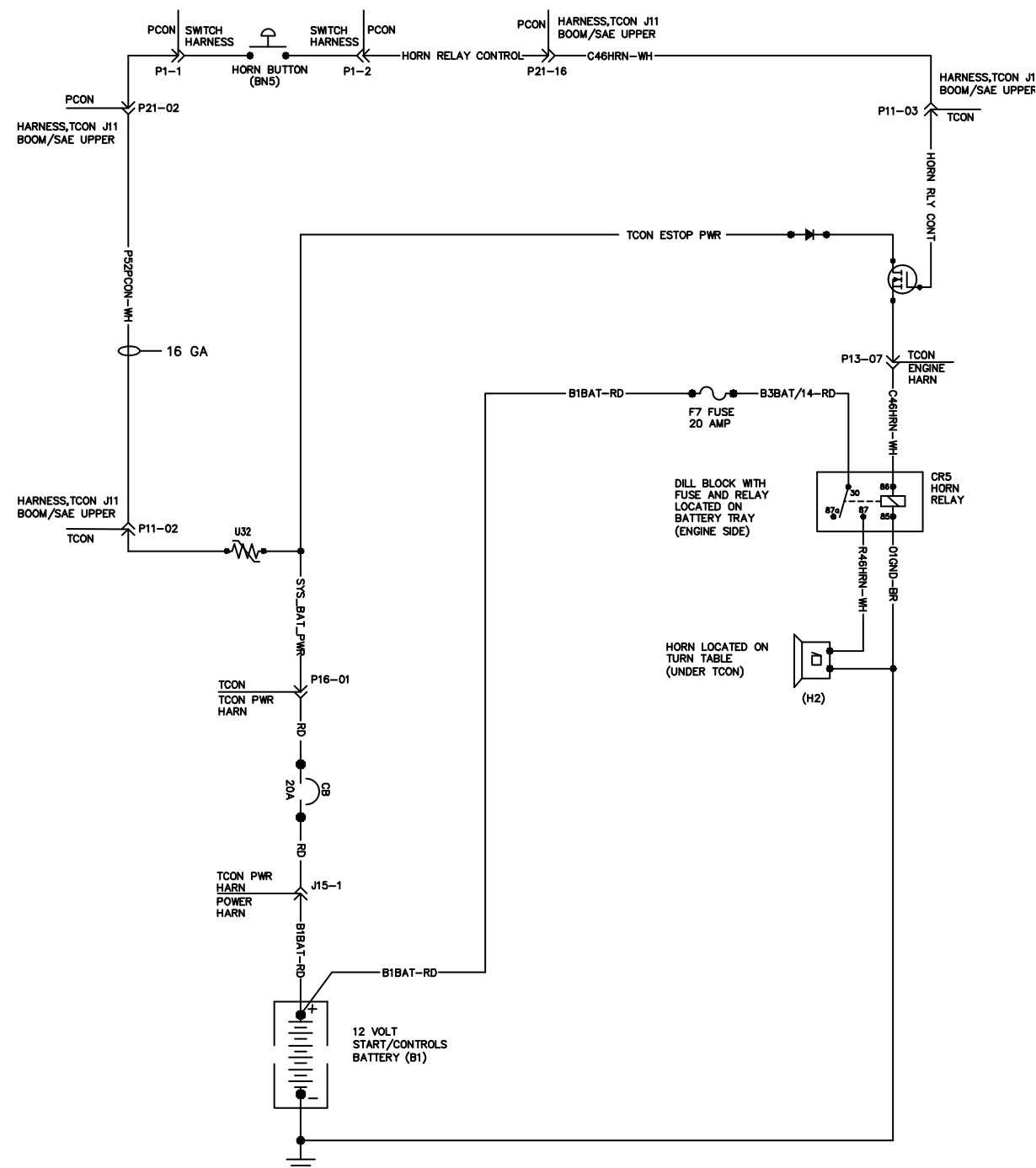
## Hydraulic Symbols Legend

|                                                                                     |                                                                                     |                                                                                      |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |    |     |    |
| Orifice with size                                                                   | Check valve                                                                         | Shut off valve                                                                       | Brake                                                                                 |
|    |    |     |    |
| Pump, fixed displacement                                                            | Pump, bi-directional variable displacement                                          | Motor, bi-directional                                                                | Motor, 2 speed bi-directional                                                         |
|    |    |    |    |
| Cylinder, double acting                                                             | Pump, prime mover (engine or motor)                                                 | Shuttle valve, 2 position, 3 way                                                     | Differential sensing valve                                                            |
|   |   |    |  |
| Filter with bypass relief valve                                                     | Relief valve with pressure setting<br>200 psi<br>13.8 bar                           | Priority flow regulator                                                              | Solenoid operated proportional valve                                                  |
|  |  |  |  |
| Pressure reducing valve                                                             | Flow divider/combiner valve                                                         | Pilot operated 3 position, 3 way shuttle valve                                       | Solenoid operated 2 position, 3 way directional valve                                 |
|  |  |  |  |
| Counterbalance valve with pressure and pilot ratio<br>3000 psi<br>206.8 bar<br>3:1  | Solenoid operated 3 position 4 way directional valve                                | Pilot operated 2 position, 2 way directional valve                                   | 2 position, 2 way solenoid valve                                                      |

Control Circuits - Horn



Control Circuits - Horn



The diagram illustrates the electrical architecture of a control system, featuring three main control units: PCON (Platform Control), TCON (Trolley Control), and DCON (Drive Control). Each unit includes a CAN bus driver and an I/O module.

**Power Distribution:** A 12V START/CONTROLS BATTERY (B1) provides power through a 20A fuse. Power lines (P\_1, P\_7, P\_15, P\_22) are distributed to various components, including relays and solenoids.

**Signal and Control Lines:**

- PCON:** Includes inputs for platform rotation, jib rotation, and bellcrank level sensor safety. It also features a foot switch (FS1) and manifold harn connections.
- TCON:** Manages trolley functions, including emergency stop (ESTOP), key switch, and recovery. It interfaces with a recovery panel and various limit switches.
- DCON:** Controls drive chassis functions, including slip ring and lower limit switch signals.

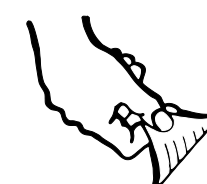
**Relays and Actuators:** The system uses several relays (e.g., P52PCON-WH, P56PRV-RD, P53LS-BK/WH) to control various actuators and solenoids, such as the platform level and jib up/down, fuel/ignition, and engine RPM.

**Connectors and Wiring:** Numerous connectors (e.g., J17-01, J17-02, J17-03, J17-04, J17-05, J17-06, J17-07, J17-08, J17-09, J17-10, J17-11, J17-12, J17-13, J17-14, J17-15, J17-16, J17-17, J17-18, J17-19, J17-20, J17-21, J17-22, J17-23, J17-24, J17-25, J17-26, J17-27, J17-28, J17-29, J17-30, J17-31, J17-32, J17-33, J17-34, J17-35, J17-36, J17-37, J17-38, J17-39, J17-40, J17-41, J17-42, J17-43, J17-44, J17-45, J17-46, J17-47, J17-48, J17-49, J17-50, J17-51, J17-52, J17-53, J17-54, J17-55, J17-56, J17-57, J17-58, J17-59, J17-60, J17-61, J17-62, J17-63, J17-64, J17-65, J17-66, J17-67, J17-68, J17-69, J17-70, J17-71, J17-72, J17-73, J17-74, J17-75, J17-76, J17-77, J17-78, J17-79, J17-80, J17-81, J17-82, J17-83, J17-84, J17-85, J17-86, J17-87, J17-88, J17-89, J17-90, J17-91, J17-92, J17-93, J17-94, J17-95, J17-96, J17-97, J17-98, J17-99, J17-100) are used to connect the various components.

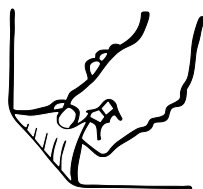
**Calibration and Safety:** A calibration switch (CAL ON/OFF) is provided for system calibration. Safety features include emergency stop (ESTOP) and various limit switches to prevent overtravel.



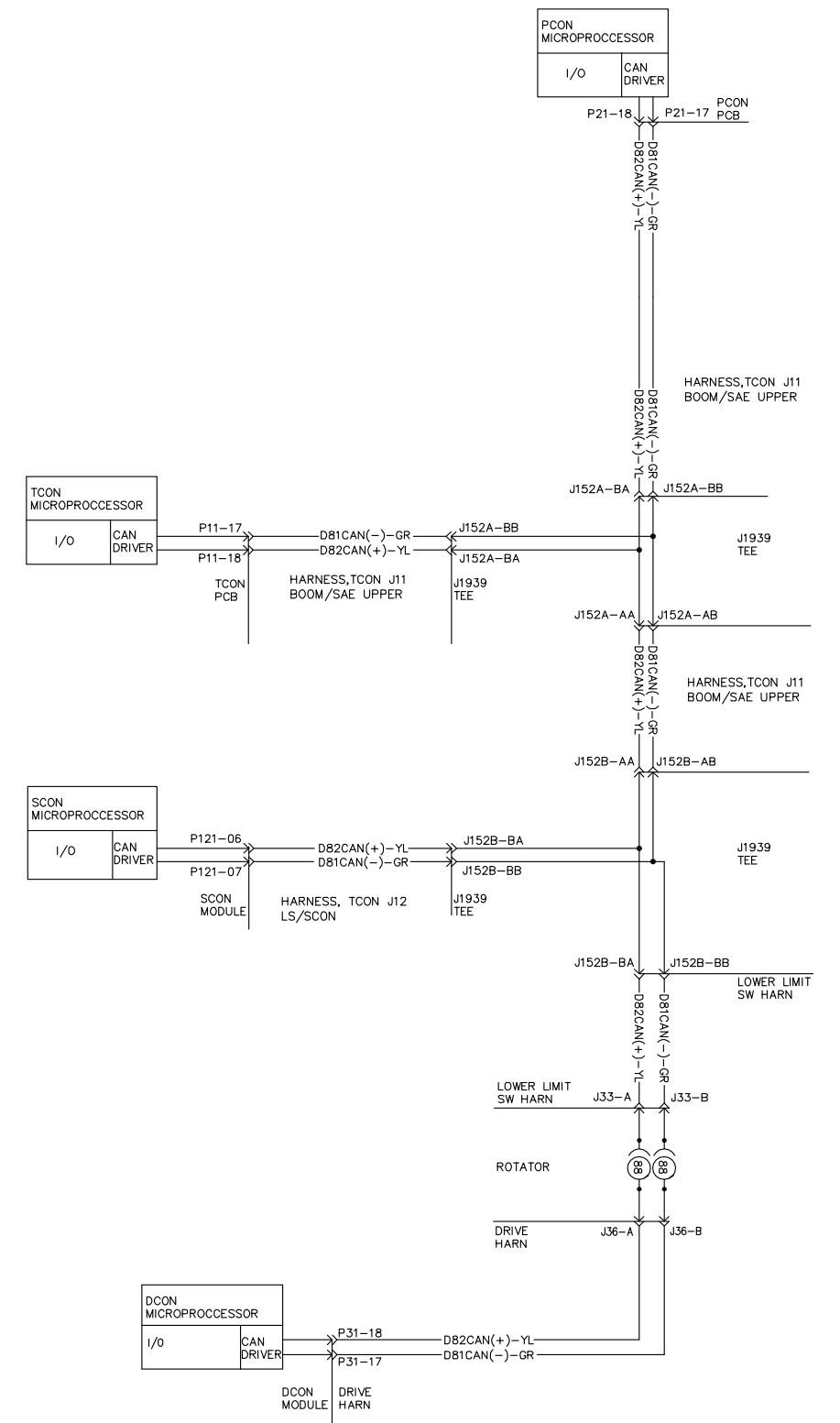
## Control Circuits - Power



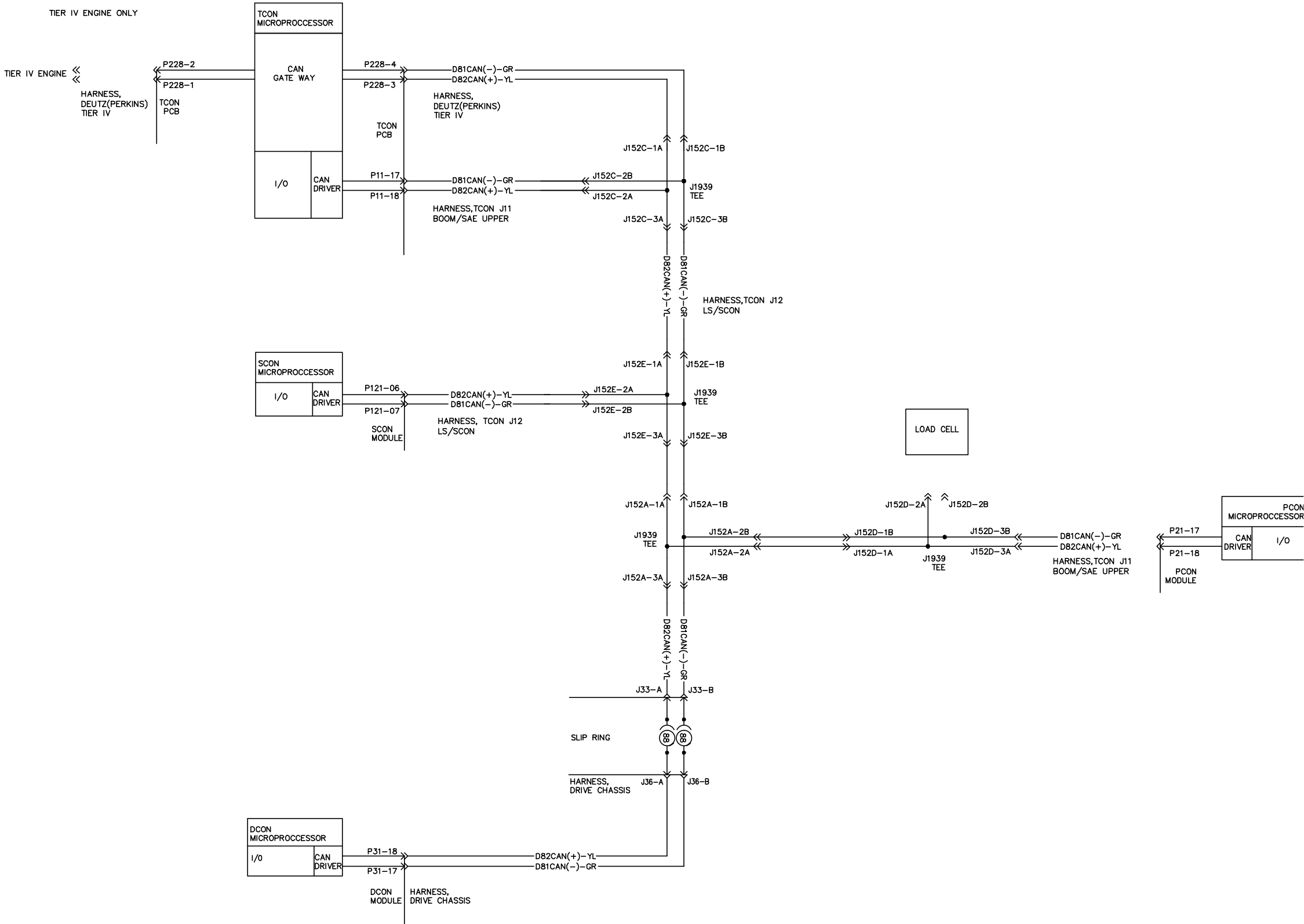
**Control Circuits - Can Bus, SX-125 XC**



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Control Circuits - Can Bus, SX-105 XC

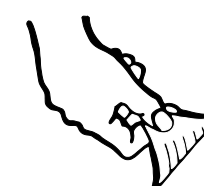


## Control Circuits - Can Bus, SX-105 XC

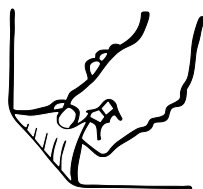




## Control Circuits - Deutz TD2011L04i Engine

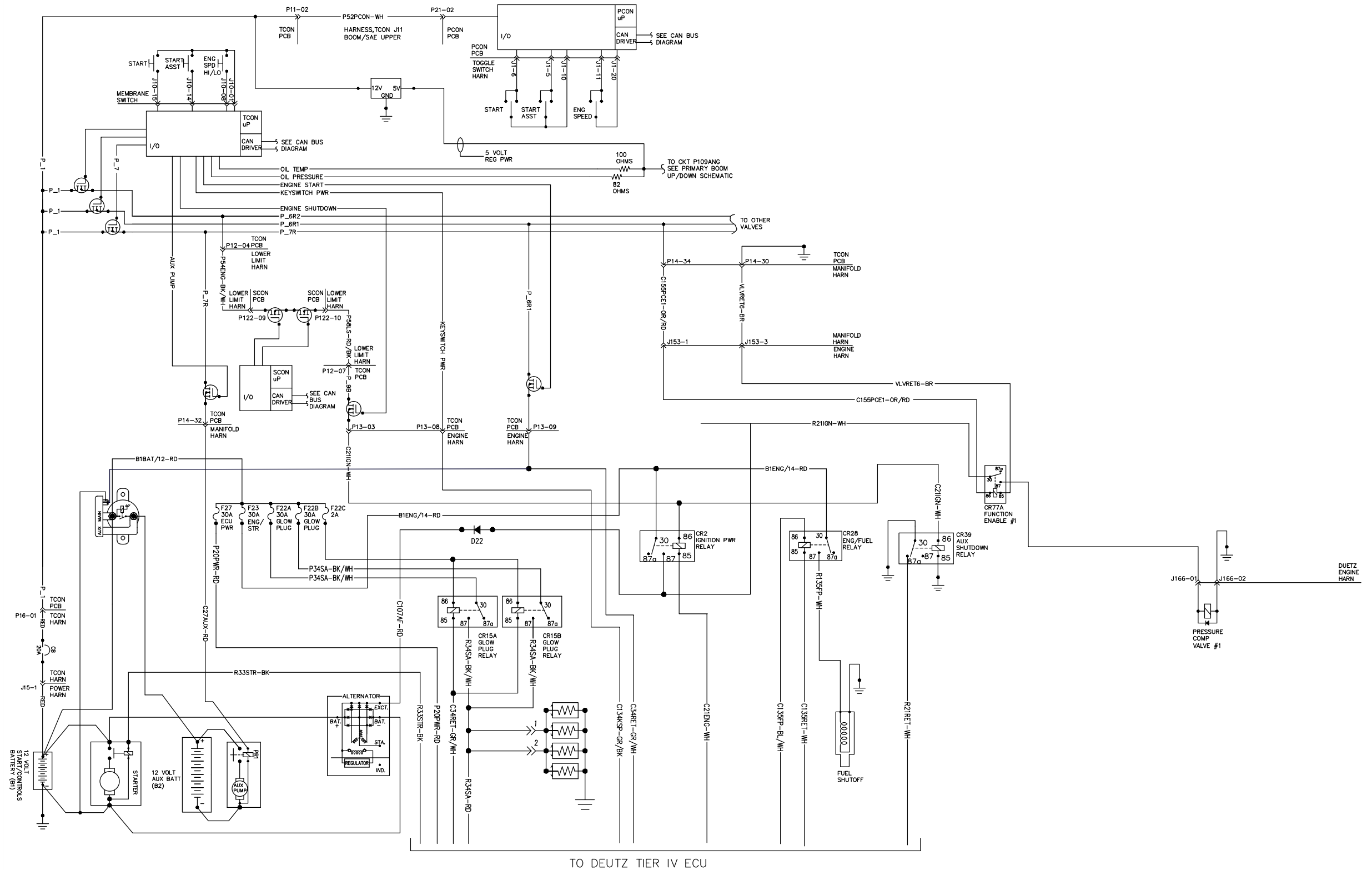


**Control Circuits - Deutz 2.9 Engine/ Deutz TCD 2.2 L3 Engine**

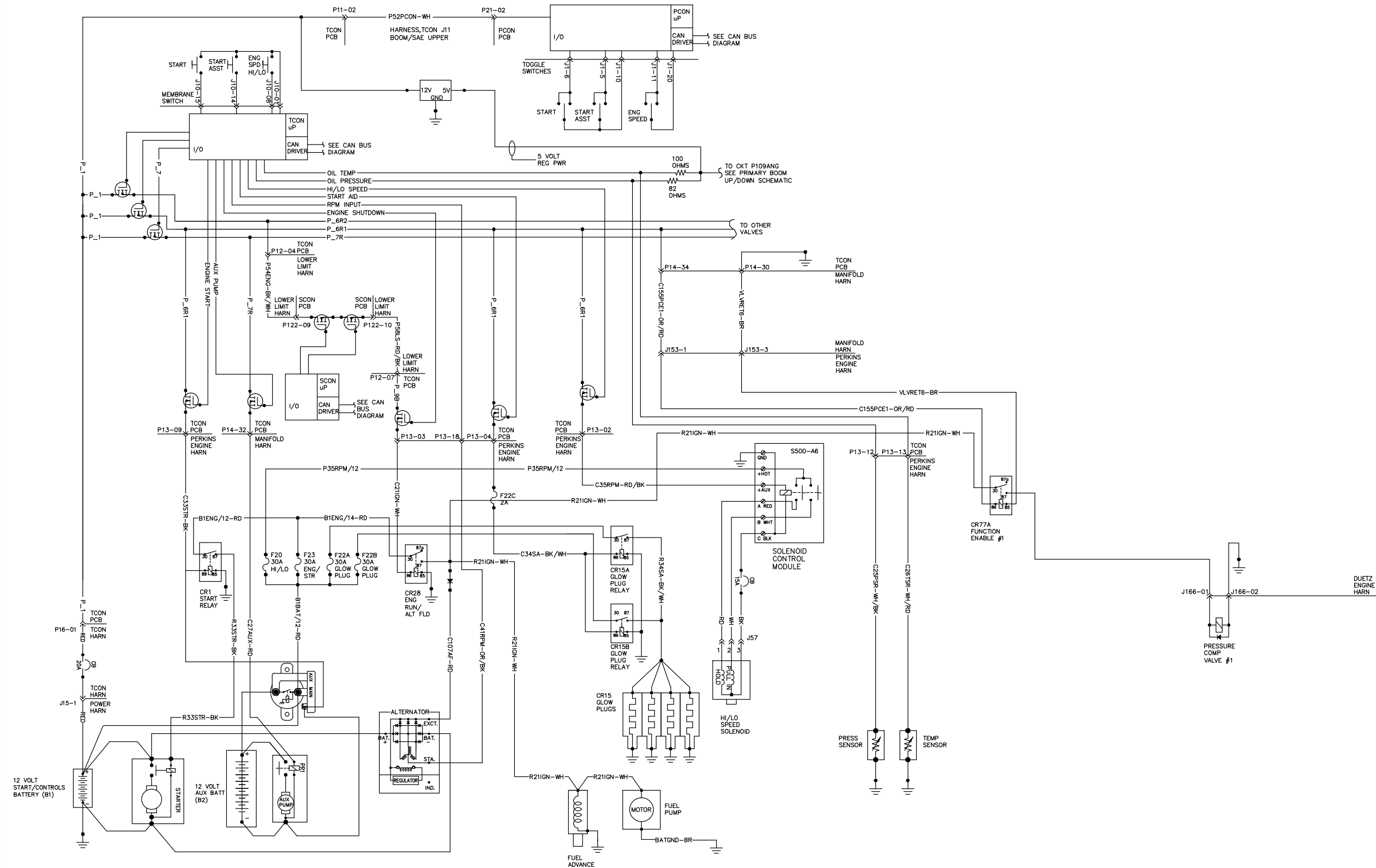




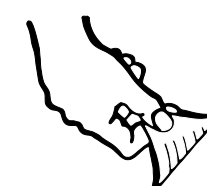
## Control Circuits - Deutz 2.9 Engine/ Deutz TCD 2.2 L3 Engine



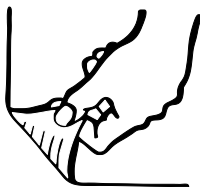
Control Circuits - Perkins 1104D-44T Engine



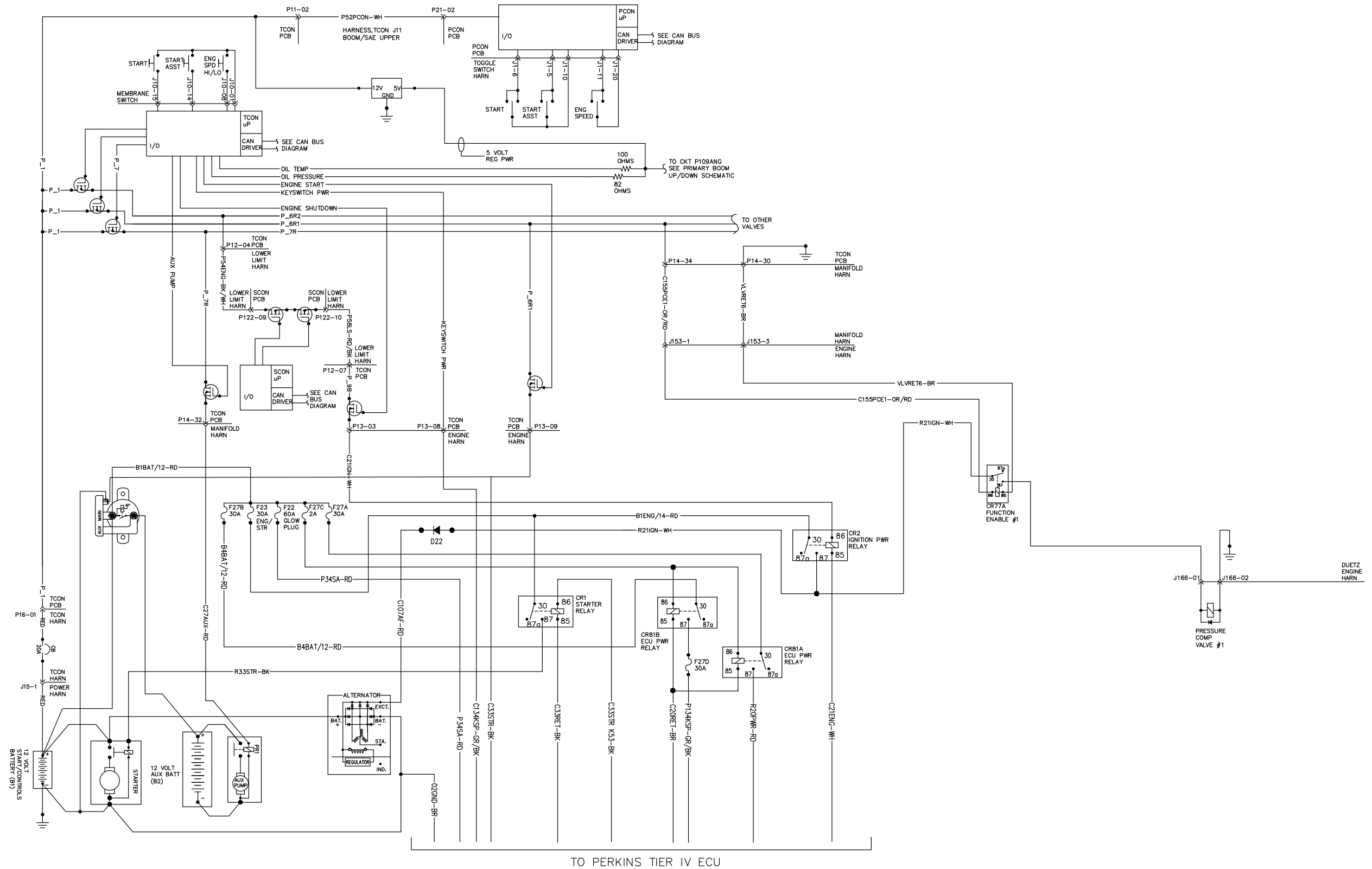
## Control Circuits - Perkins 1104D-44T Engine



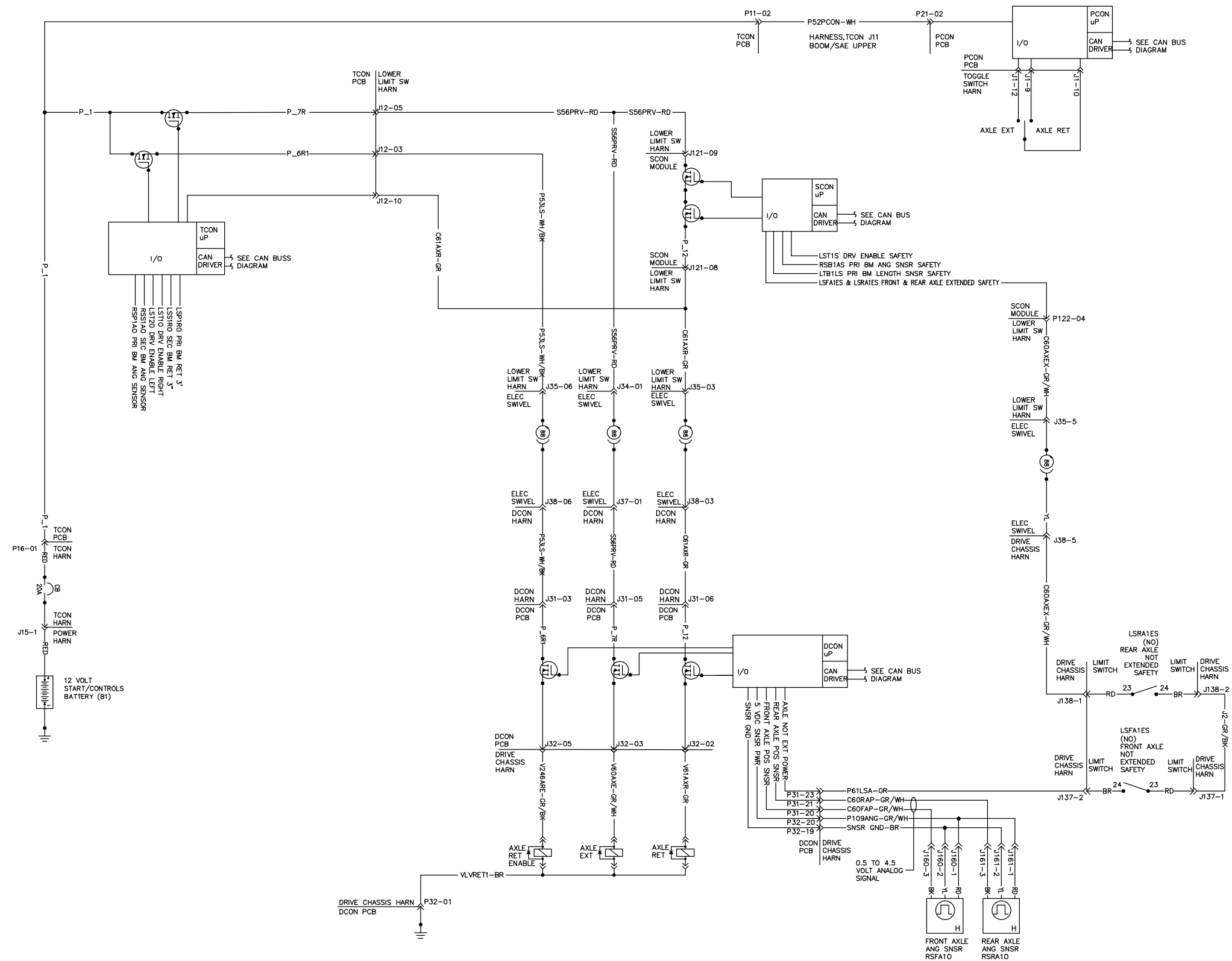
**Control Circuits - Perkins 854 Engine**



## Control Circuits - Perkins 854 Engine

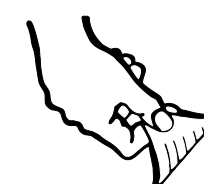


Control Circuits - Axle Extend/Retract

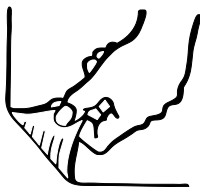




## Control Circuits - Axle Extend/Retract

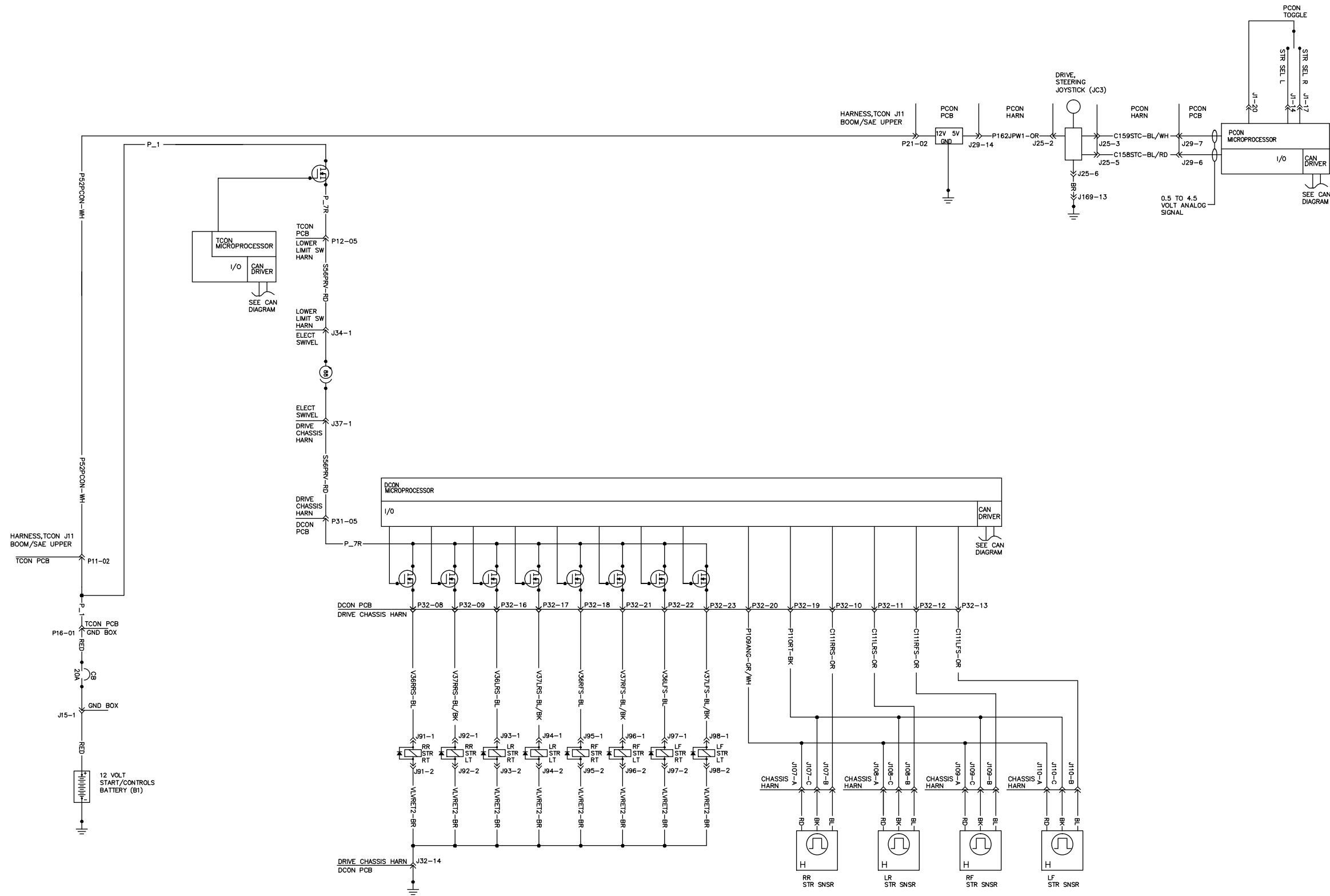


Control Circuits - Steering

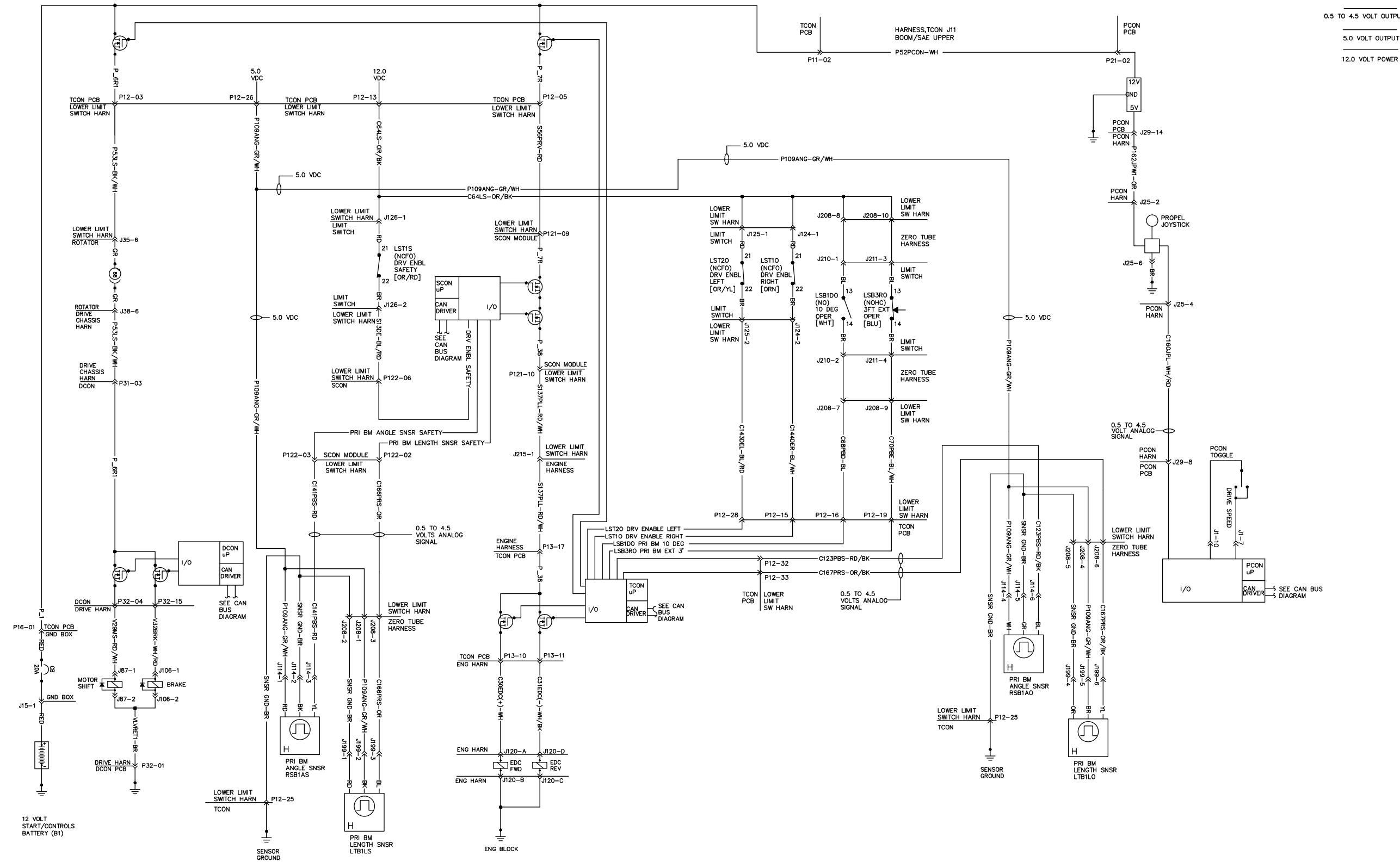




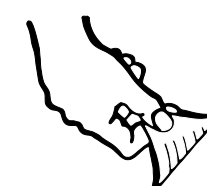
Control Circuits - Steering



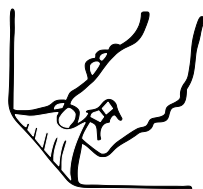
Control Circuits - Propel



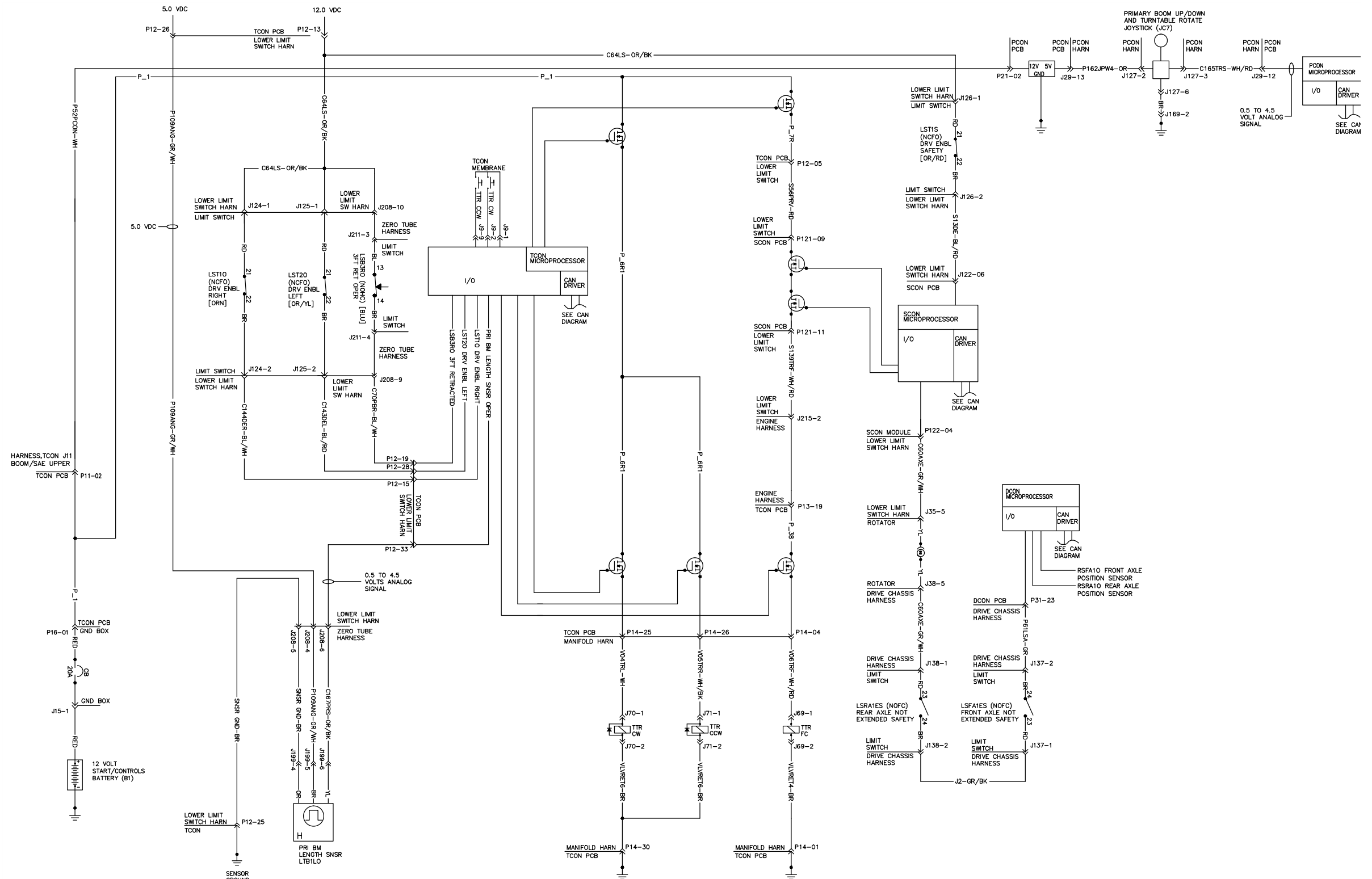
## Control Circuits - Propel



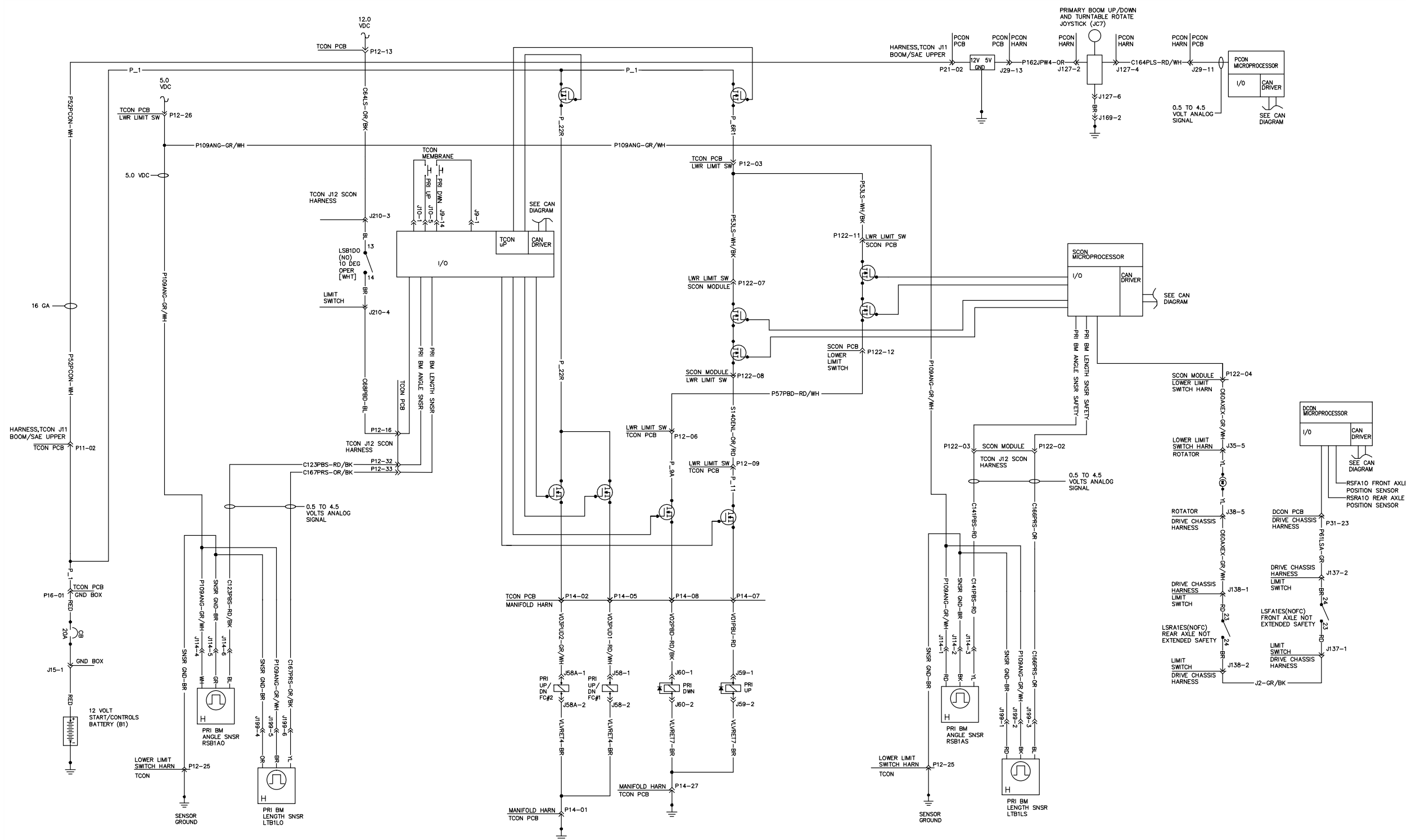
**Control Circuits - Turntable Rotate**



## Control Circuits - Turntable Rotate



Control Circuits - Boom Up/Down, SX-125 XC





Control Circuits - Boom Up/Down, SX-125 XC

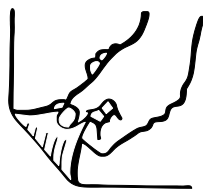


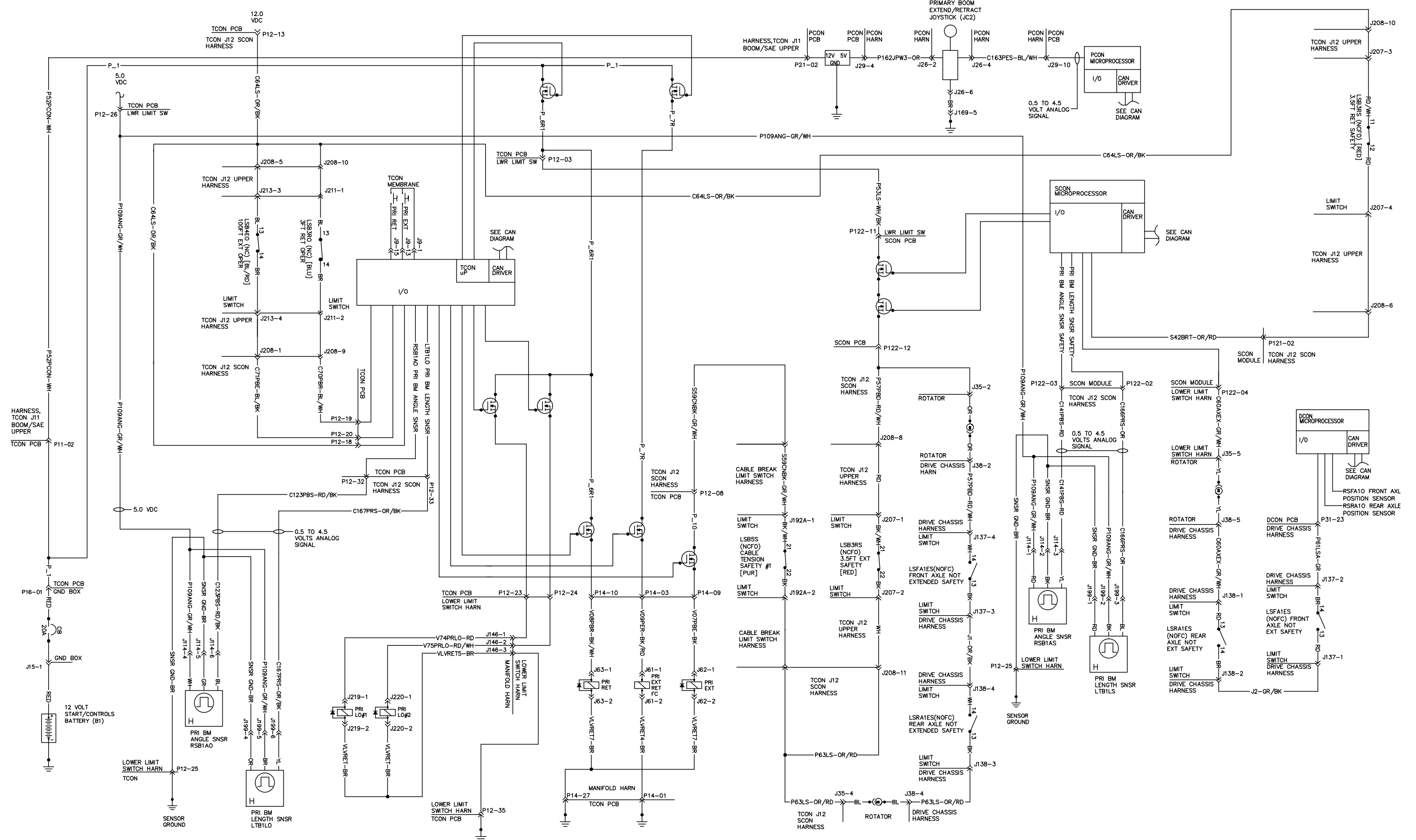


## Control Circuits - Boom Up/Down, SX-105 XC

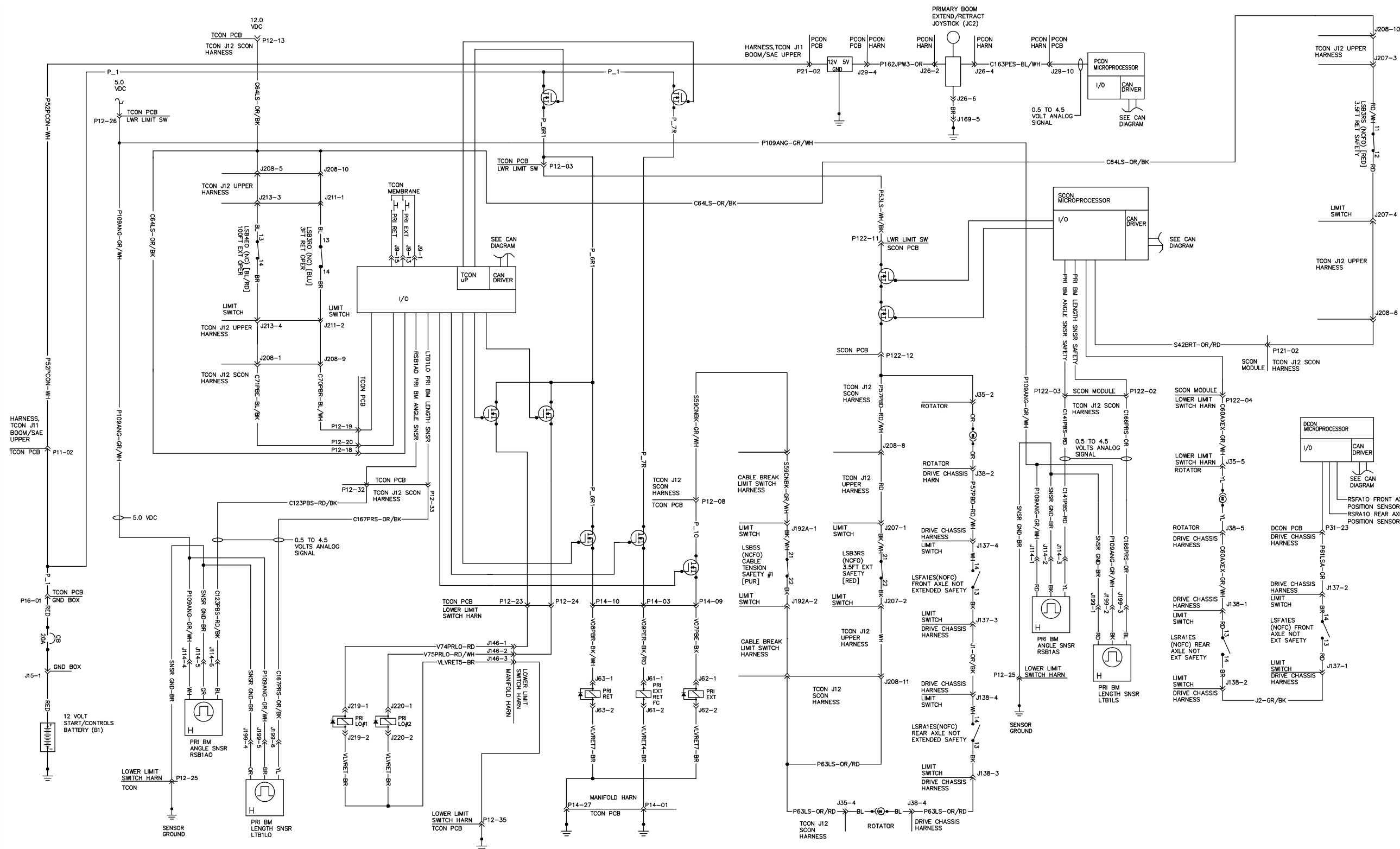


**Control Circuits - Boom Extend/Retract, SX-125 XC**



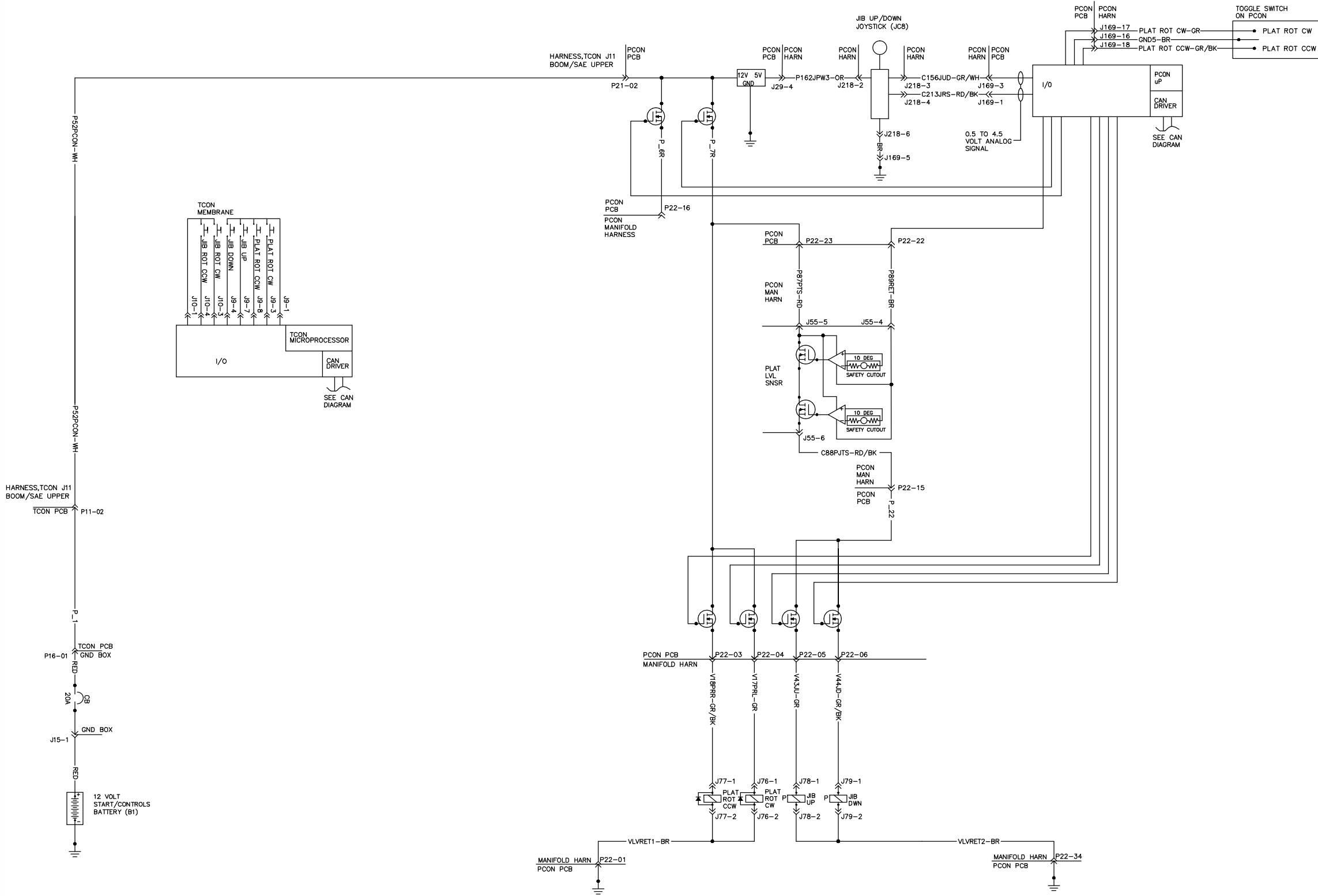


Control Circuits - Boom Extend/Retract, SX-105 XC



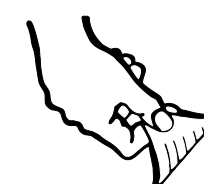
## Control Circuits - Boom Extend/Retract, SX-105 XC

Control Circuits - Jib Up/Down and Platform Rotate

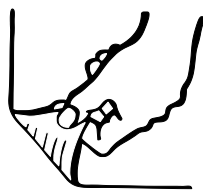




## Control Circuits - Jib Up/Down and Platform Rotate

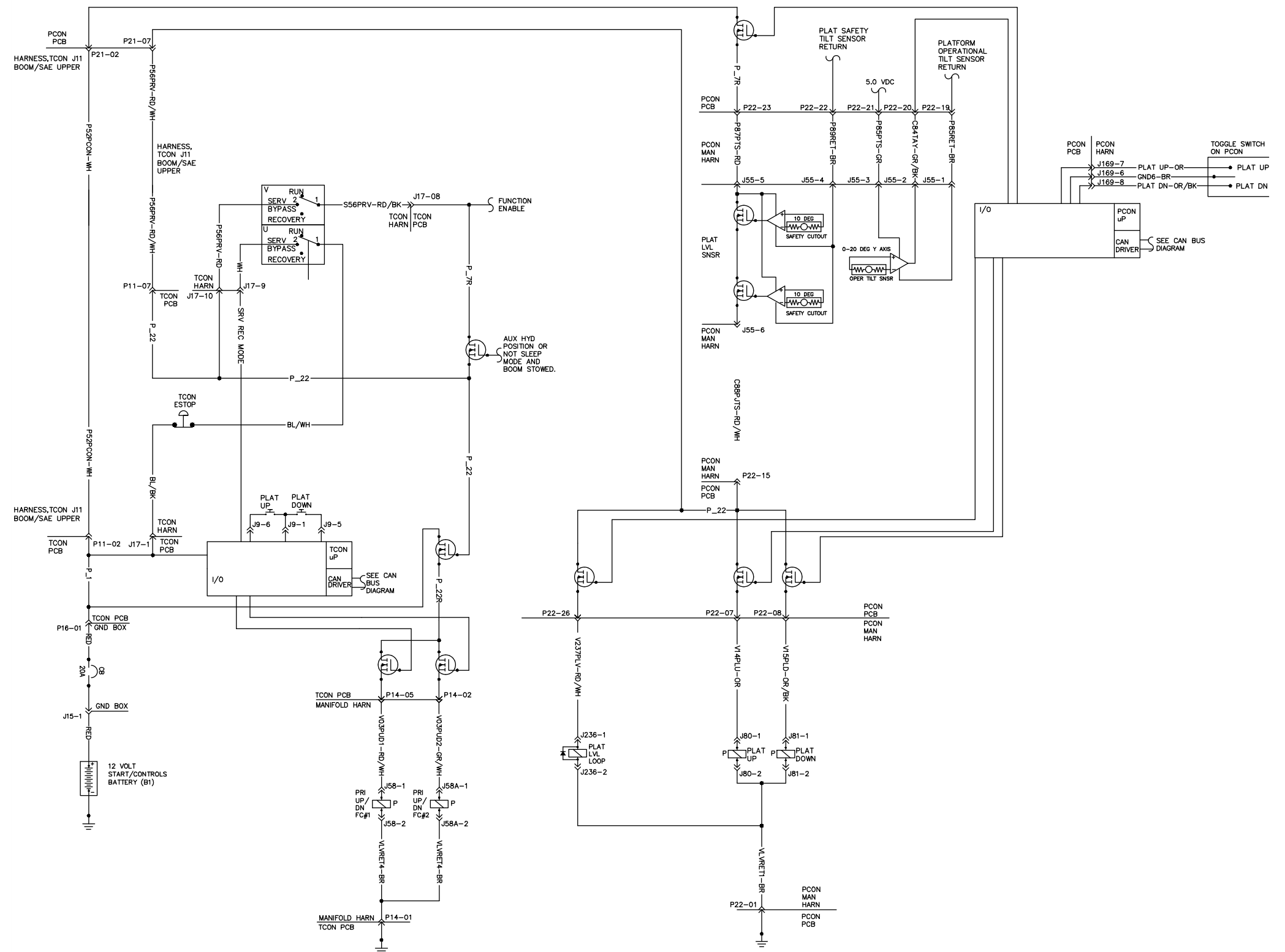


**Control Circuits - Platform Level**

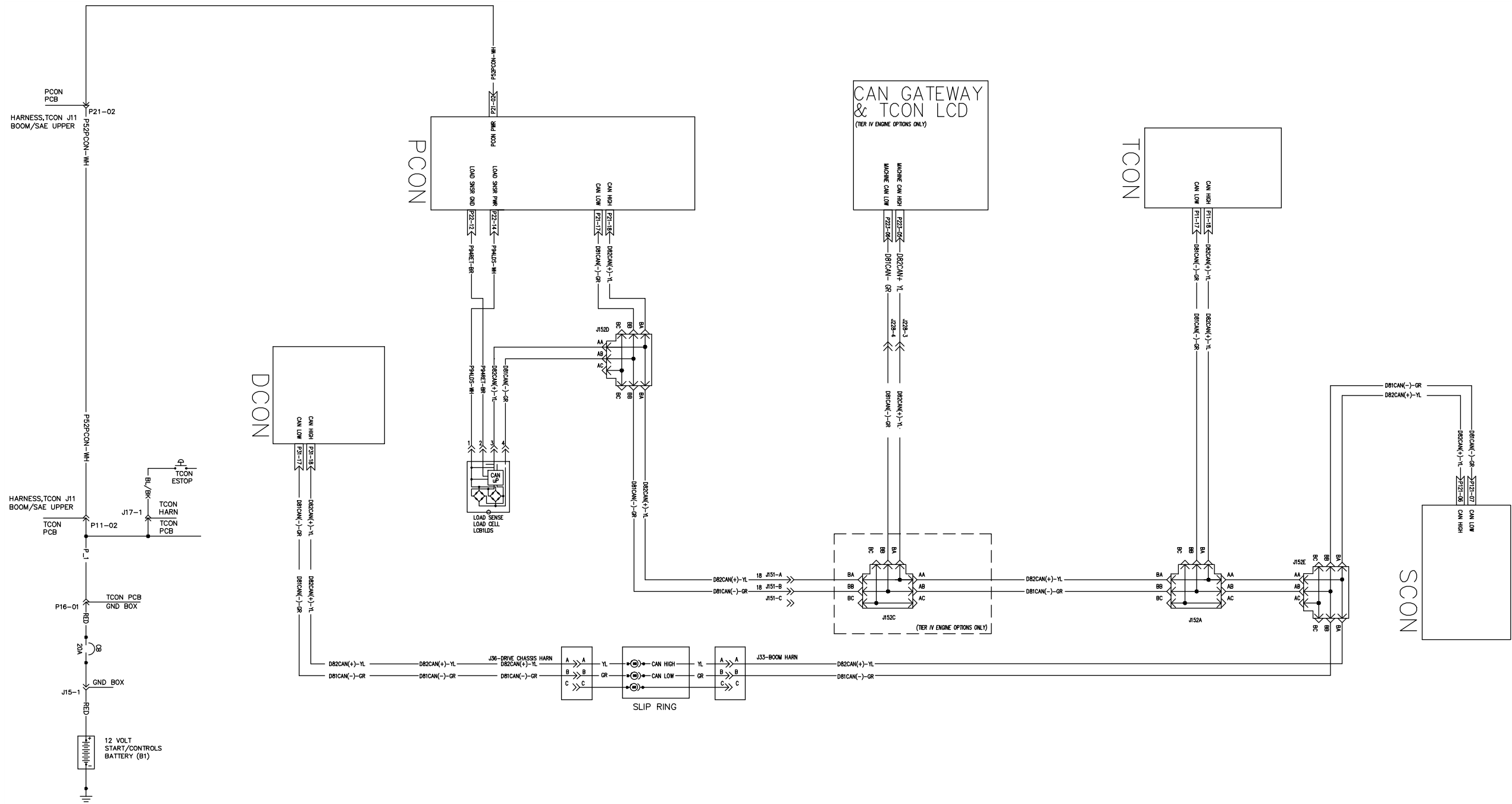




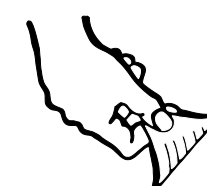
## Control Circuits - Platform Level



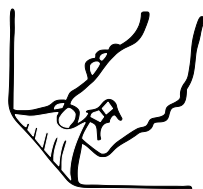
Control Circuits - Platform Load Sense



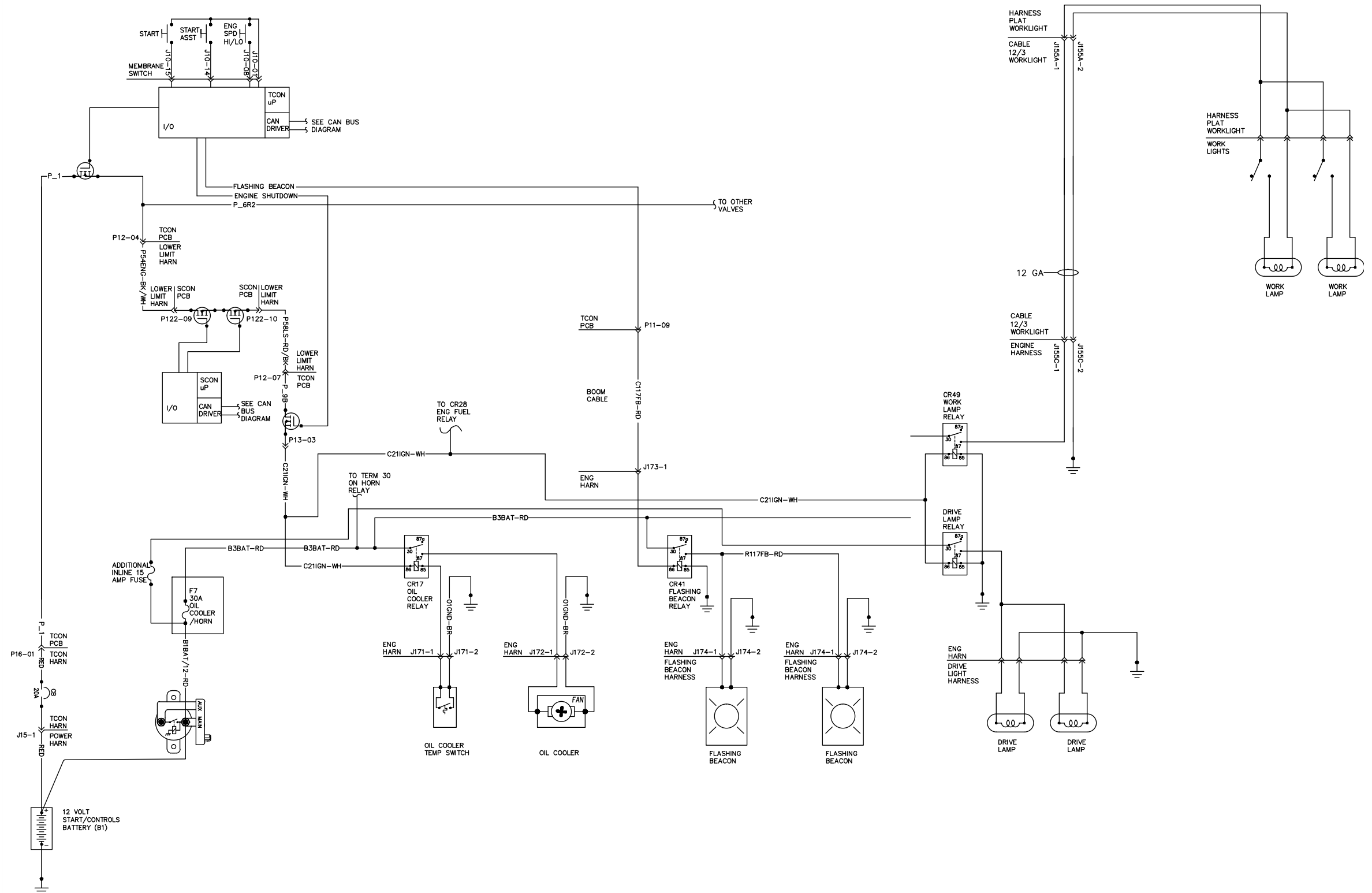
## Control Circuits - Platform Load Sense



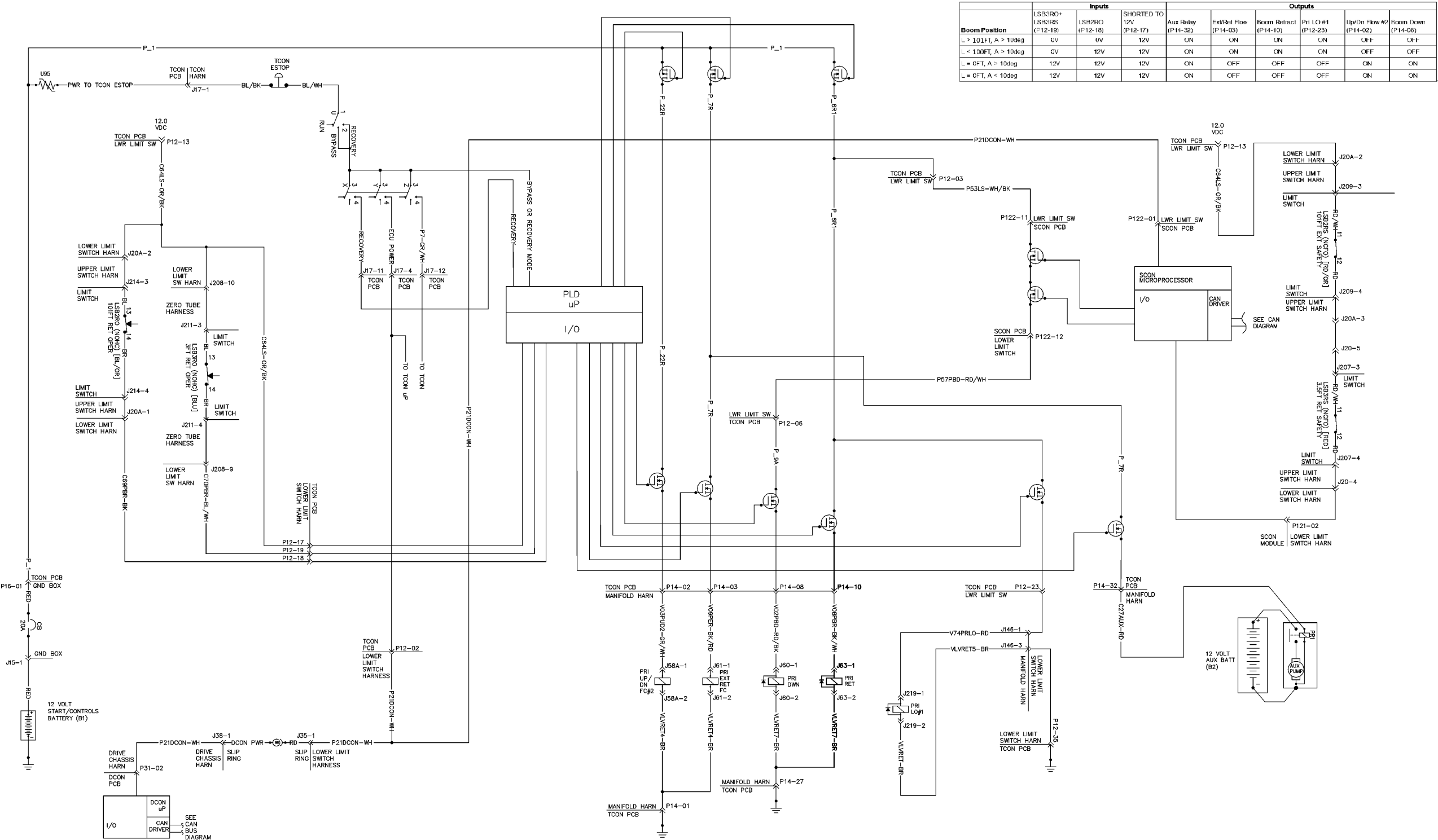
**Control Circuits - Flashing Beacons, Oil Cooler and Drive Lamps**



## Control Circuits - Flashing Beacons, Oil Cooler and Drive Lamps



Control Circuits - Recovery PLD, SX-125 XC

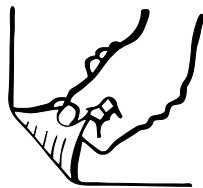
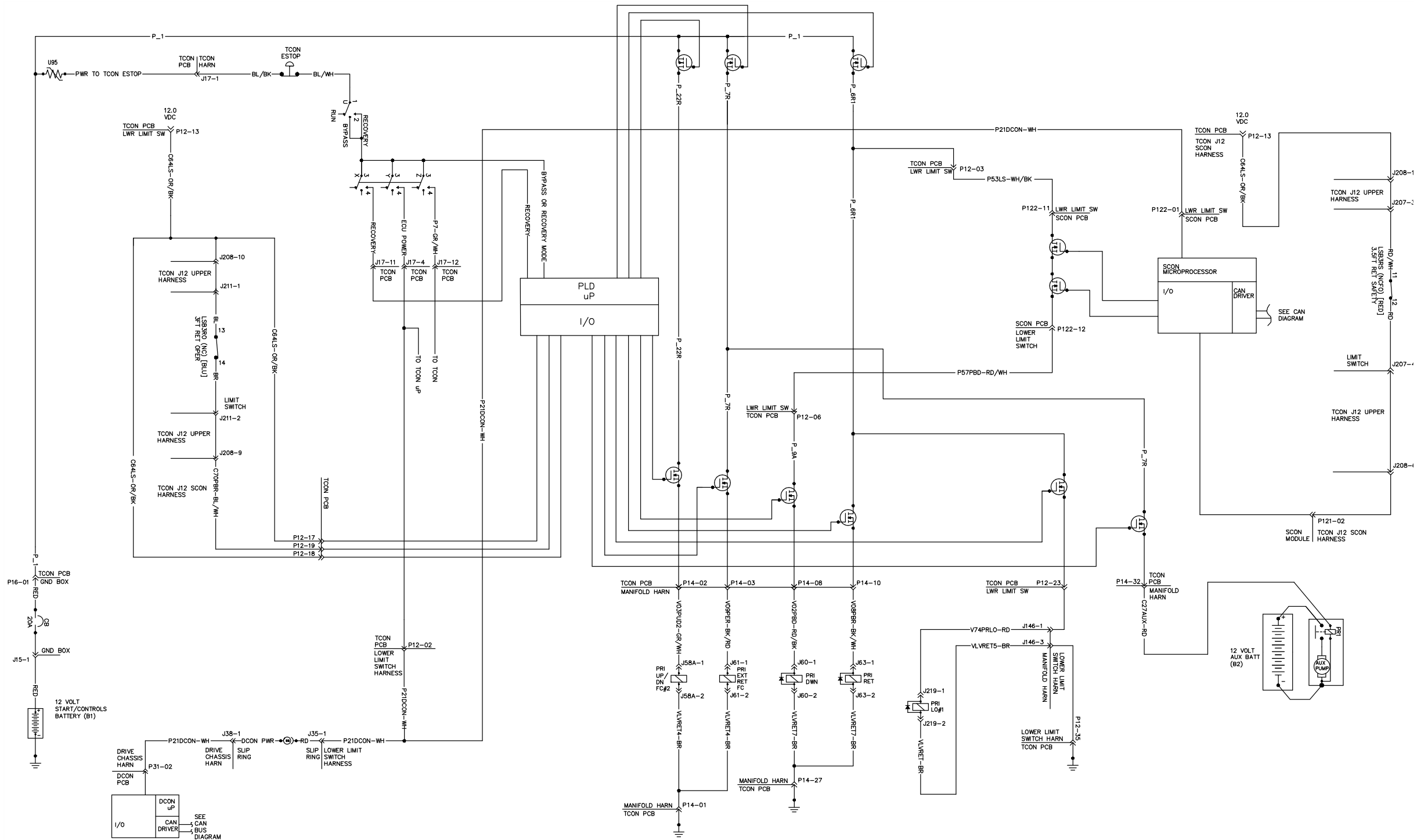




Control Circuits - Recovery PLD, SX-125 XC

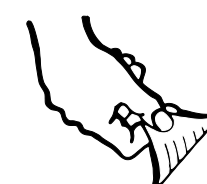


Control Circuits - Recovery PLD, SX-105 XC

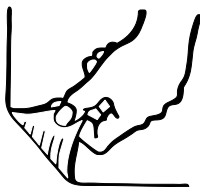




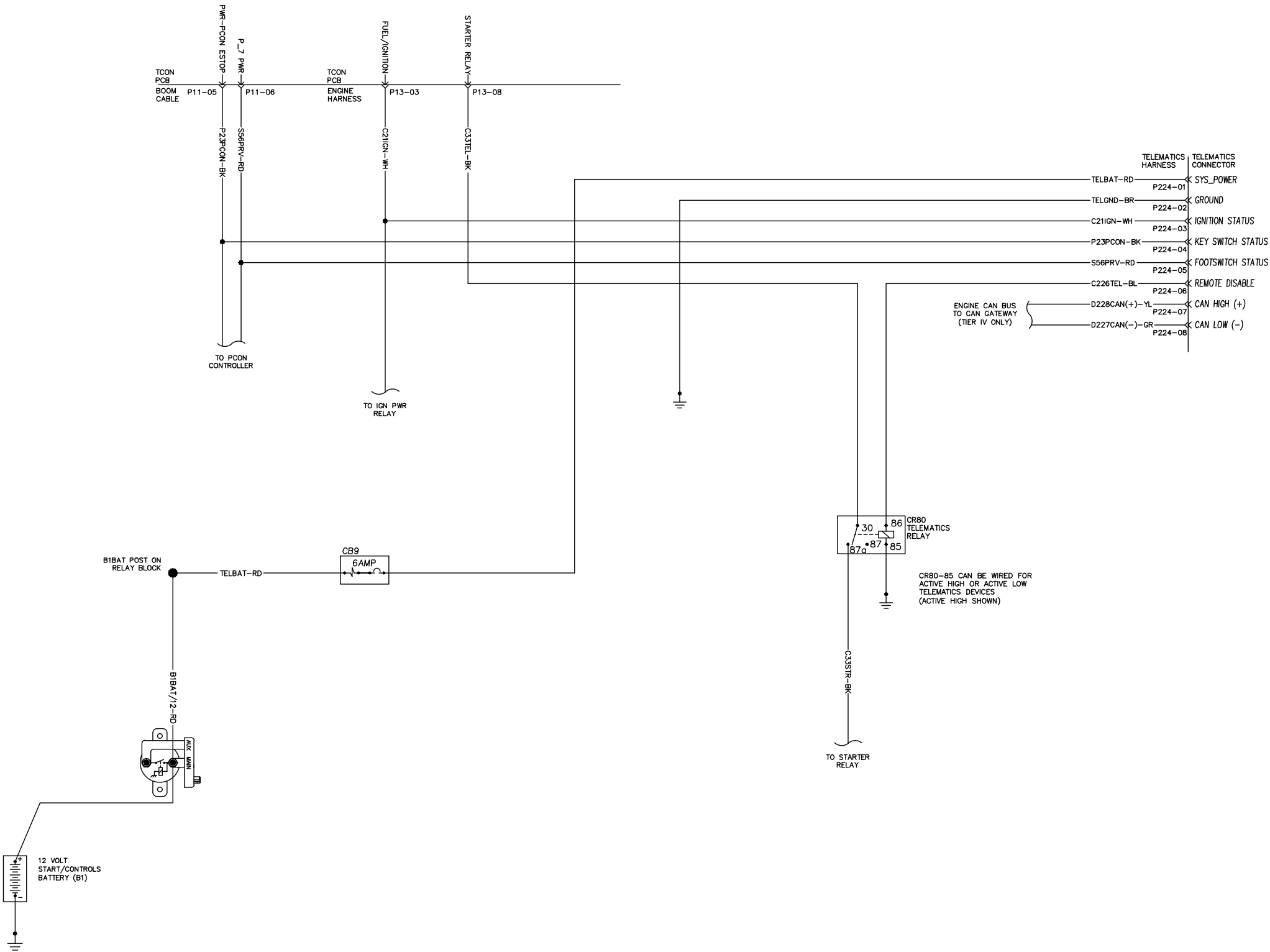
## Control Circuits - Recovery PLD, SX-105 XC



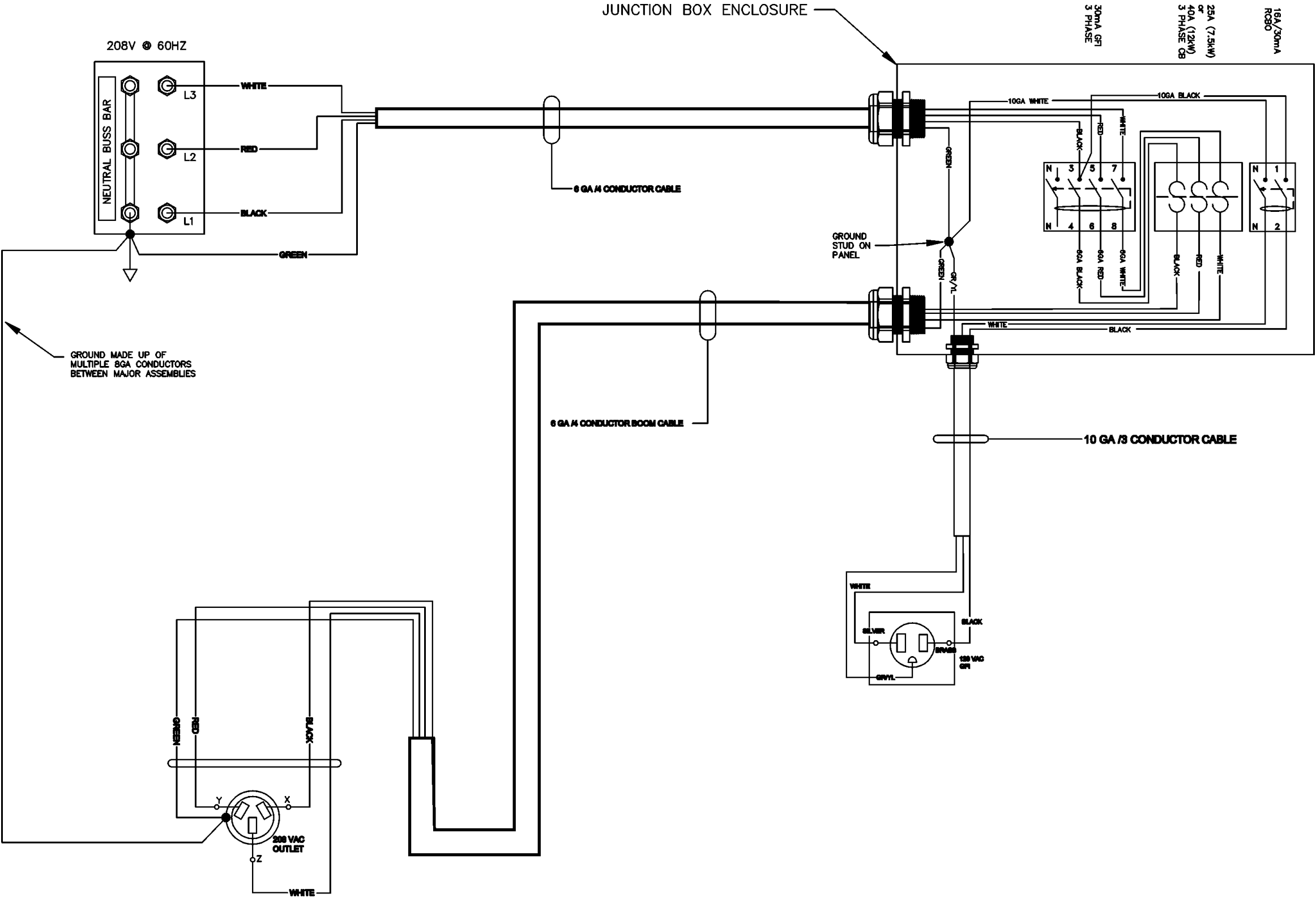
Control Circuits - Telematics



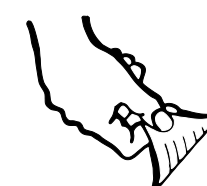
Control Circuits - Telematics



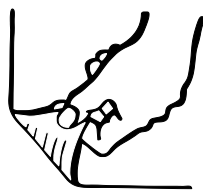
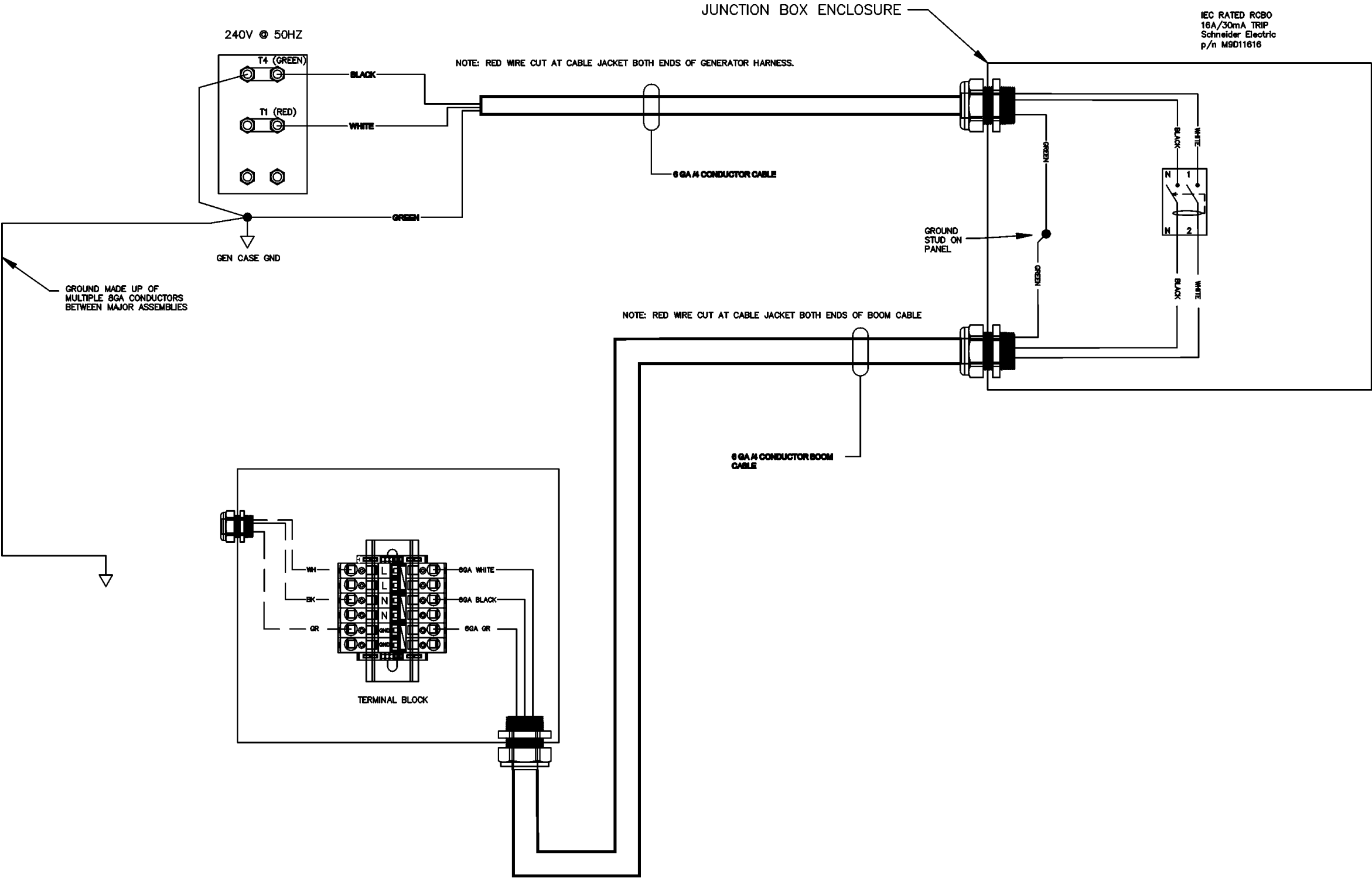
Generator Receptacle Wiring- ANSI/CSA



## Generator Receptacle Wiring- ANSI/CSA

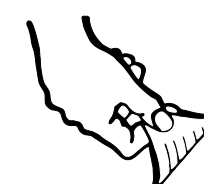


Generator Receptacle Wiring-AUS

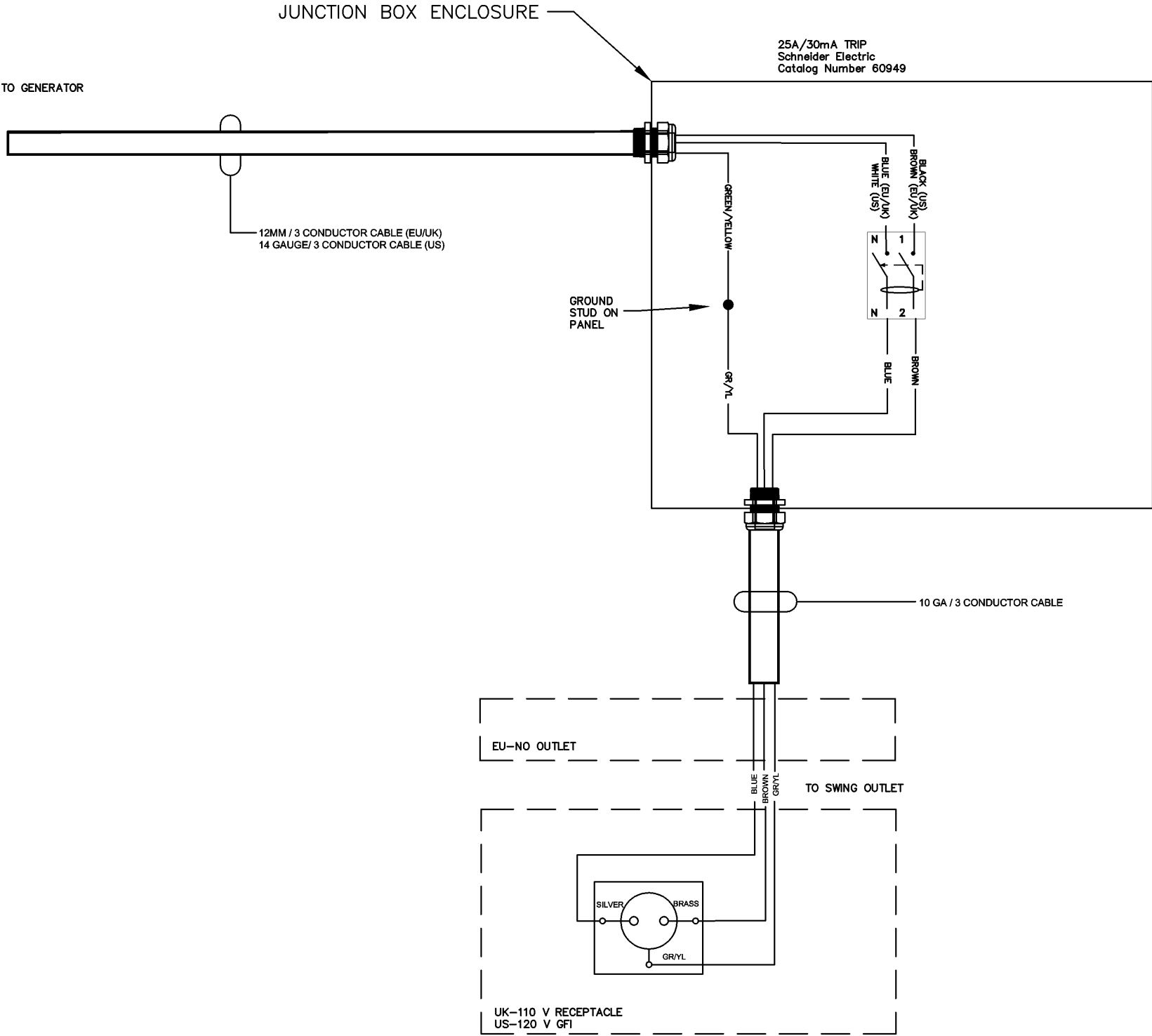




## Generator Receptacle Wiring-AUS



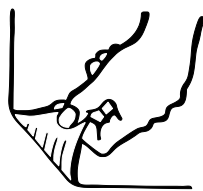
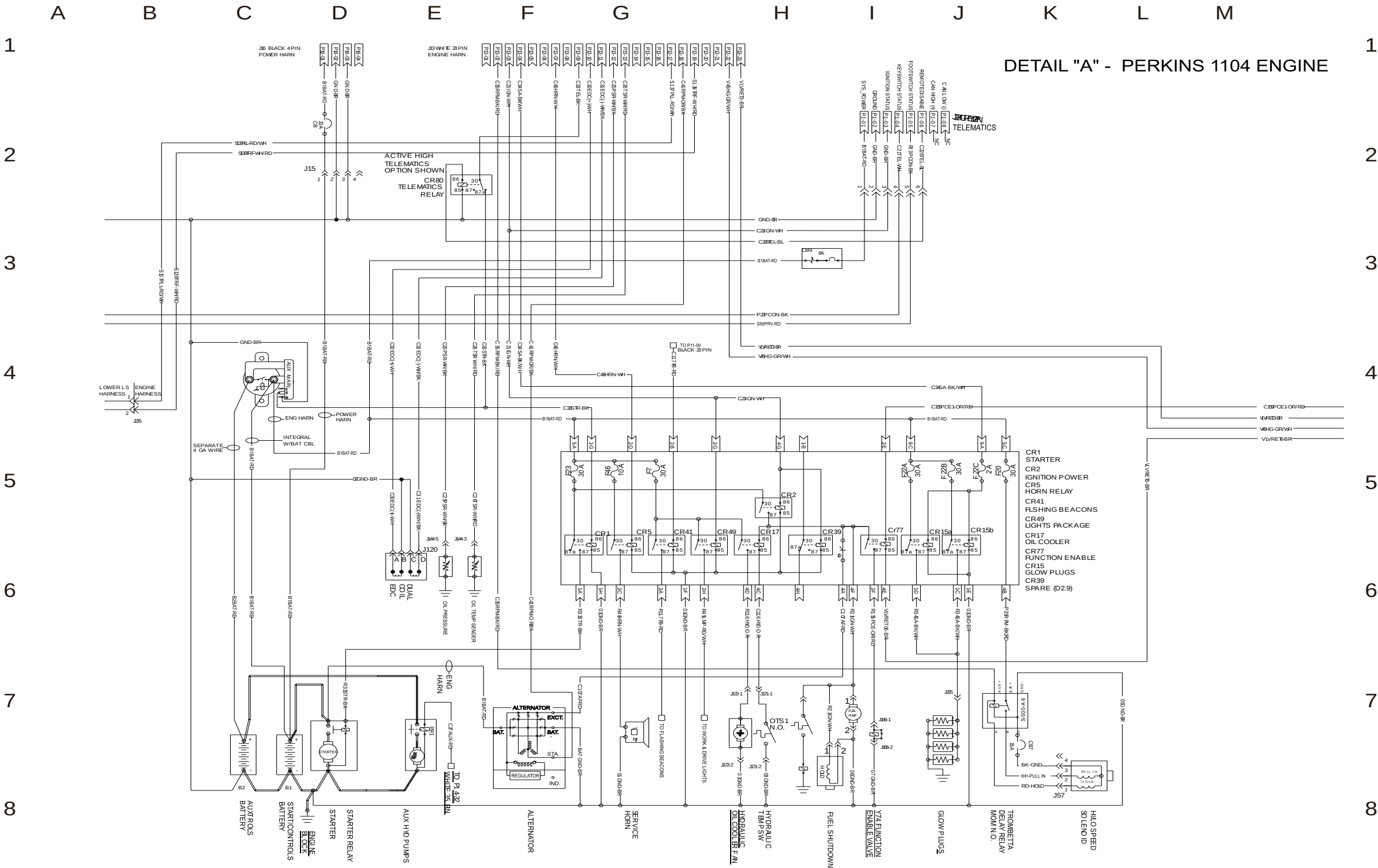
Generator Receptacle Wiring - CE



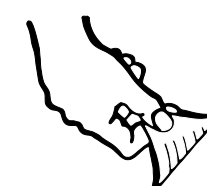


Generator Receptacle Wiring - CE

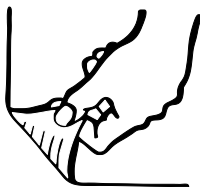
Perkins 1104D-44T Engine Electrical Schematic



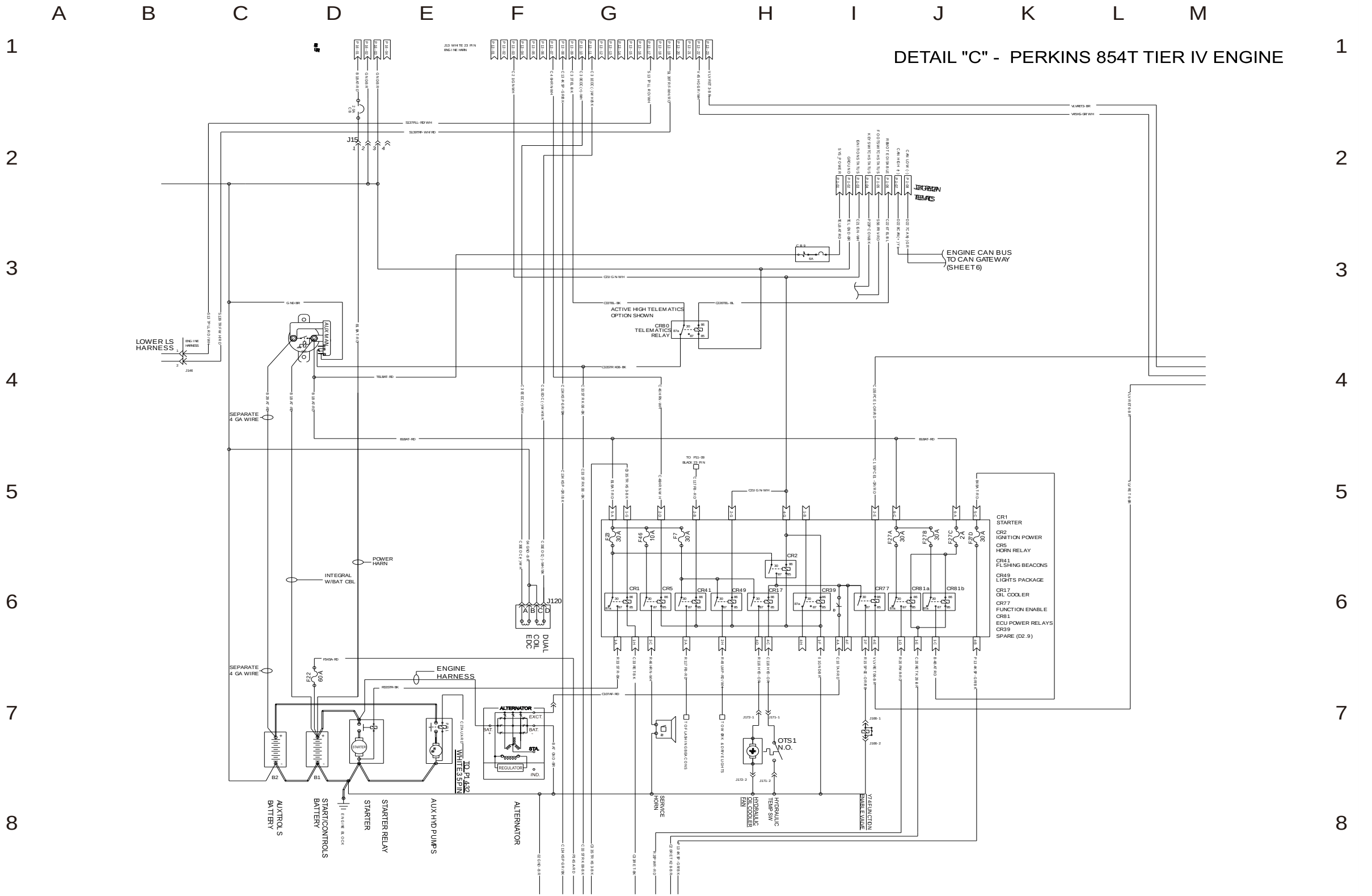
## Perkins 1104D-44T Engine Electrical Schematic



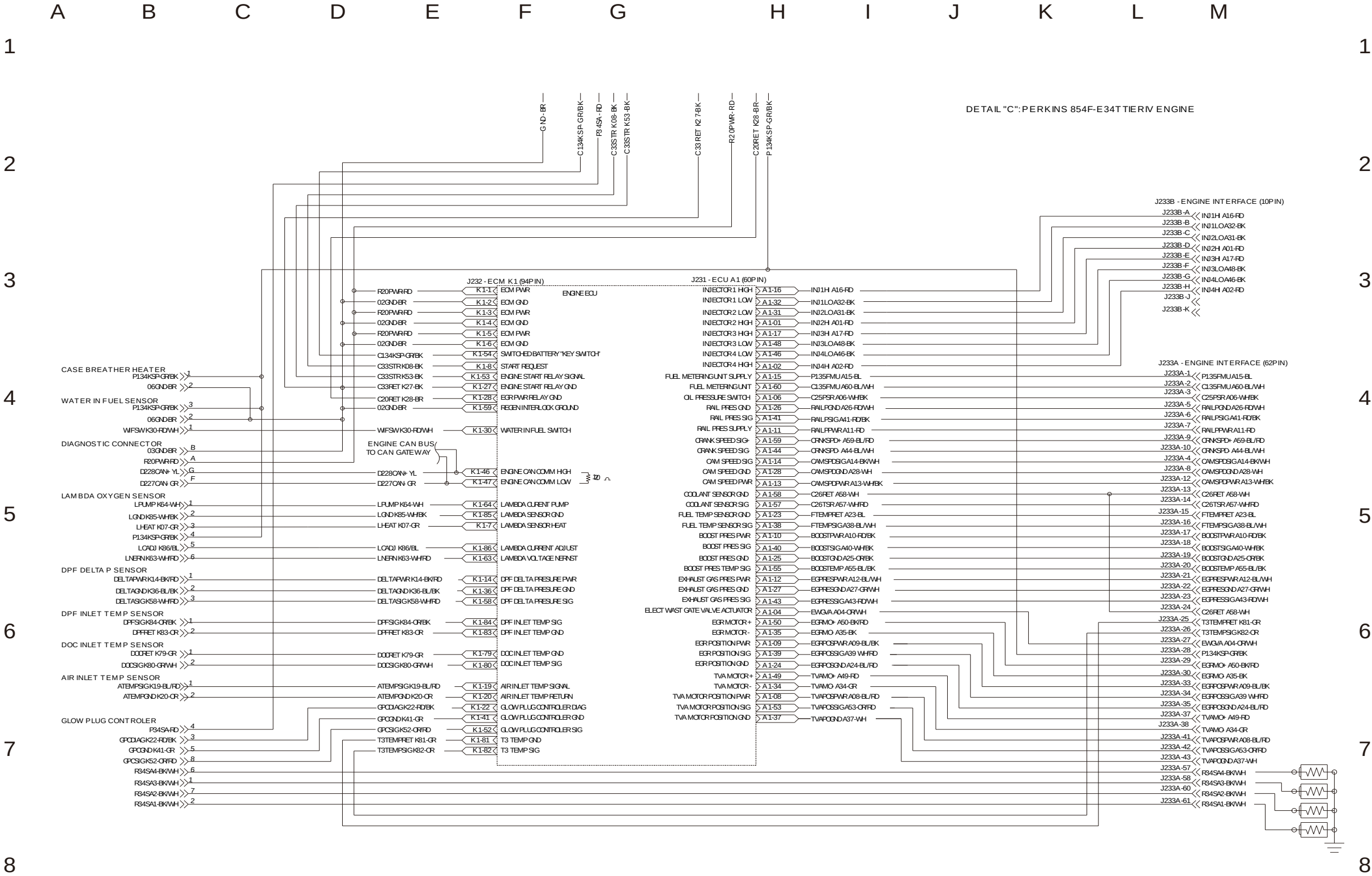
**Perkins 854F-34T Engine Electrical Schematic**



Perkins 854F-34T Engine Electrical Schematic



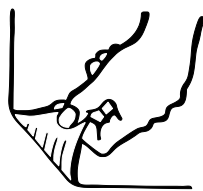
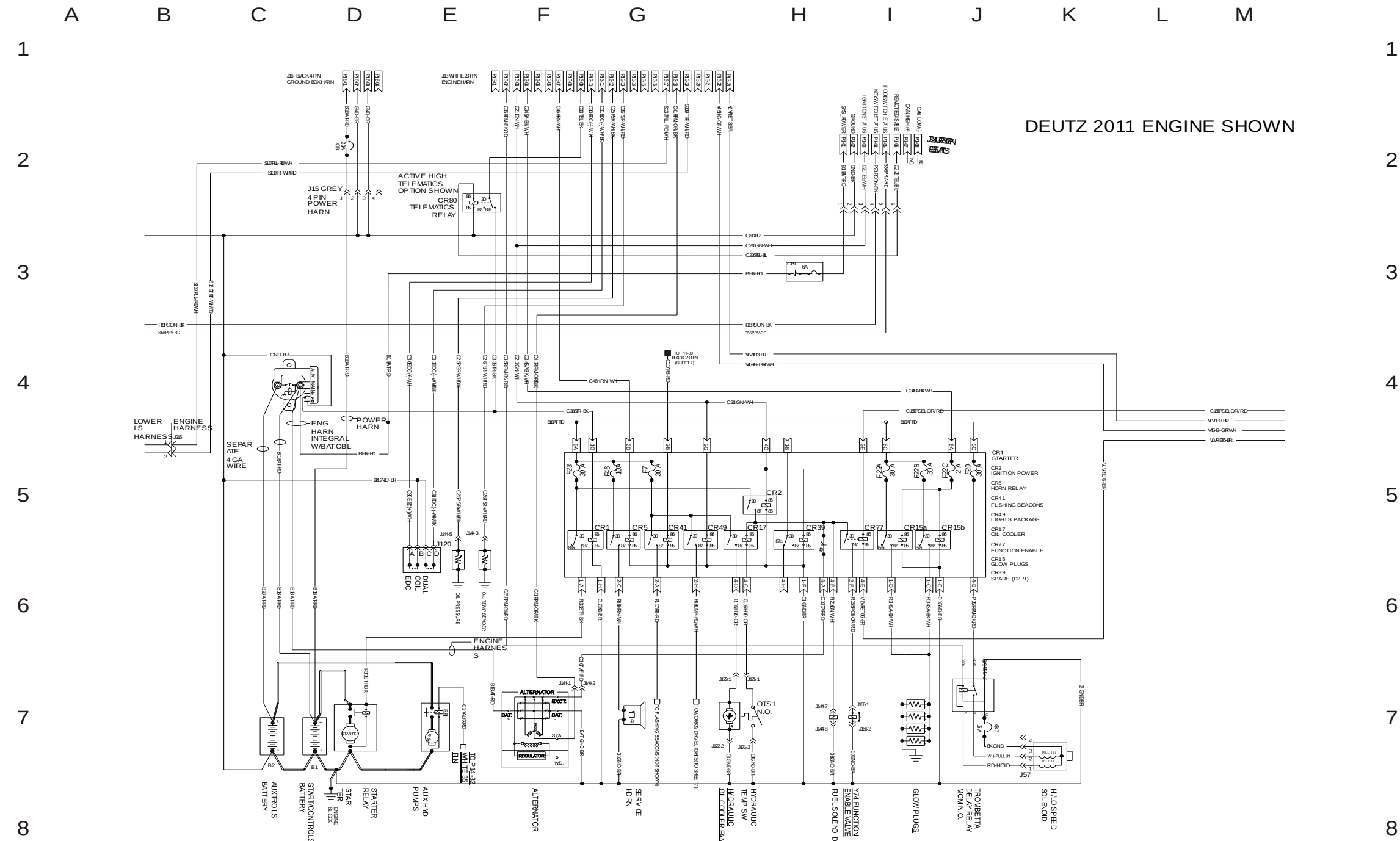
Perkins 854F-34T Engine Harness





## Perkins 854F-34T Engine Harness

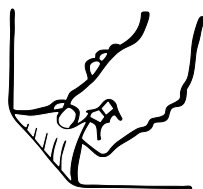
Deutz TD2011L04i Engine Electrical Schematic





Deutz TD2011L04i Engine Electrical Schematic

Deutz TD2.9 Engine Electrical Schematic

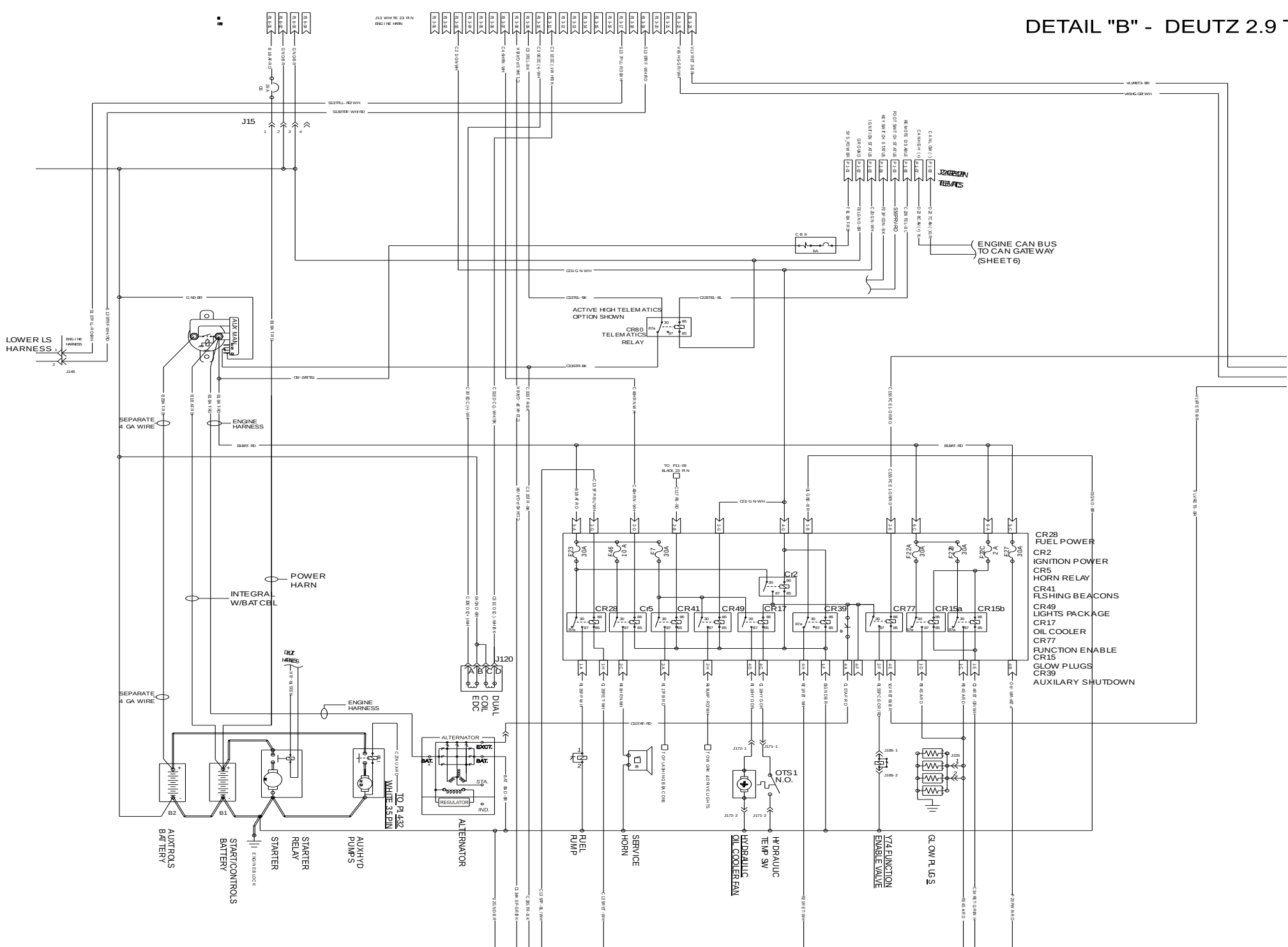


Deutz TD2.9 Engine Electrical Schematic

A B C D E F G H I J K L M

1 2 3 4 5 6 7 8

DETAIL "B" - DEUTZ 2.9 TIER IV ENGINE



| A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|---|---|---|---|---|---|---|---|---|---|---|---|---|



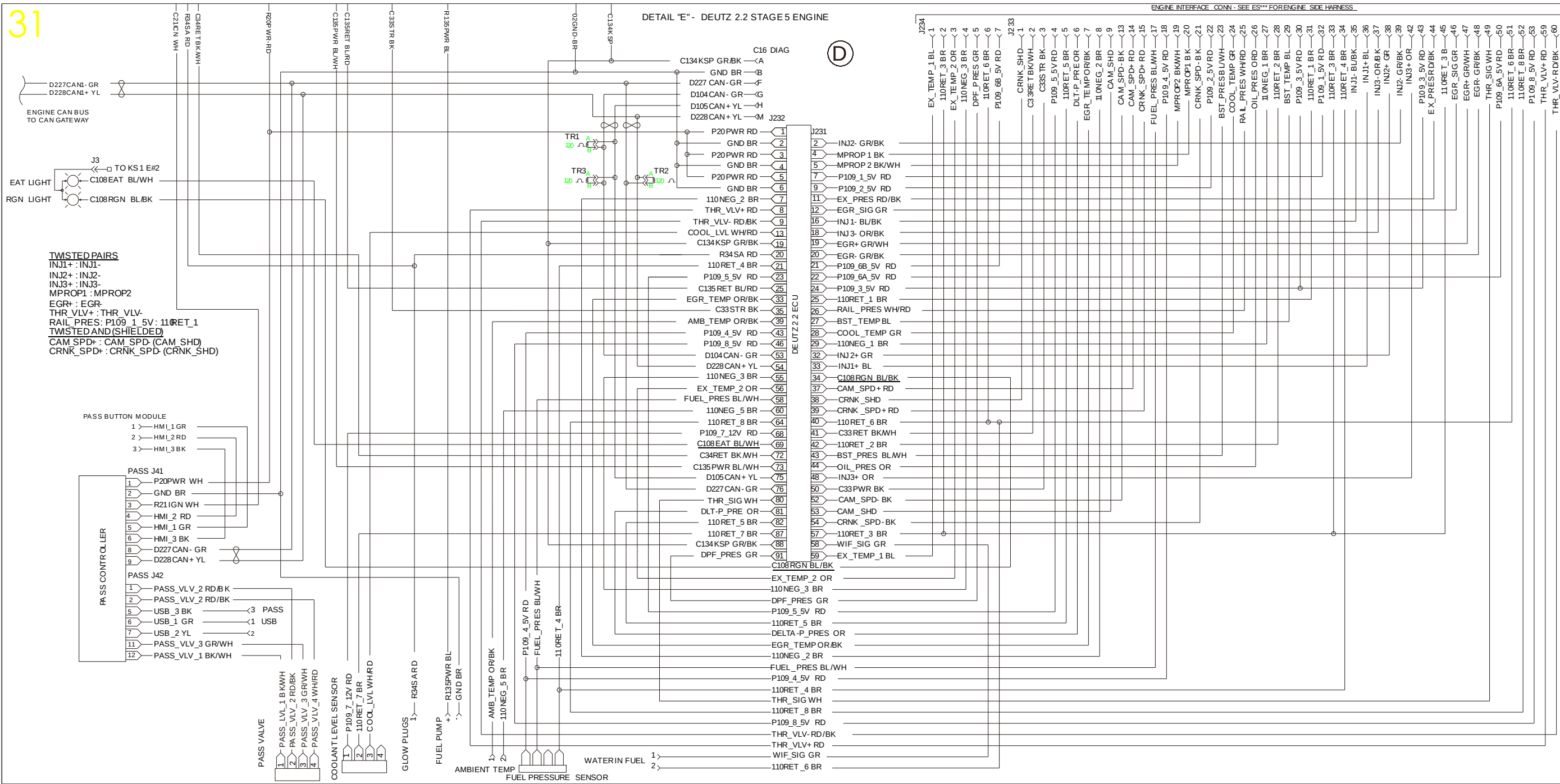
## Deutz TD2.9 Engine Harness

DETAIL "E" - DEUTZ 2.2 STAGE 5 ENGINE

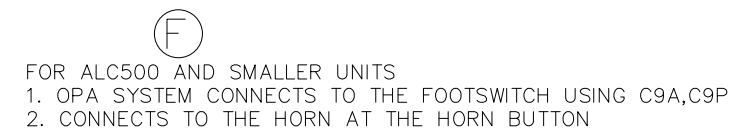




Deutz TCD2.2 L3 Engine Harness



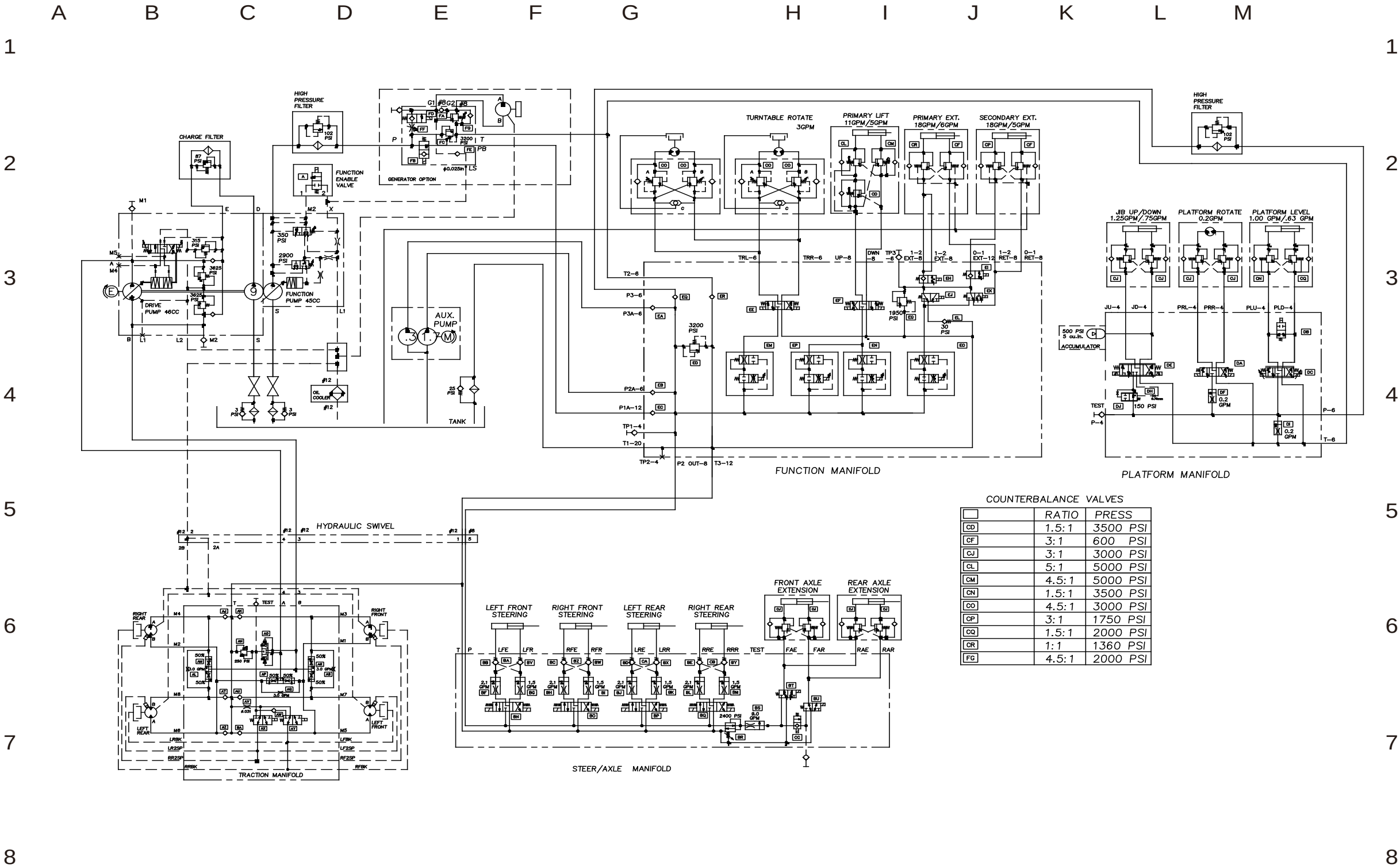
## Electrical Schematic - Contact Alarm





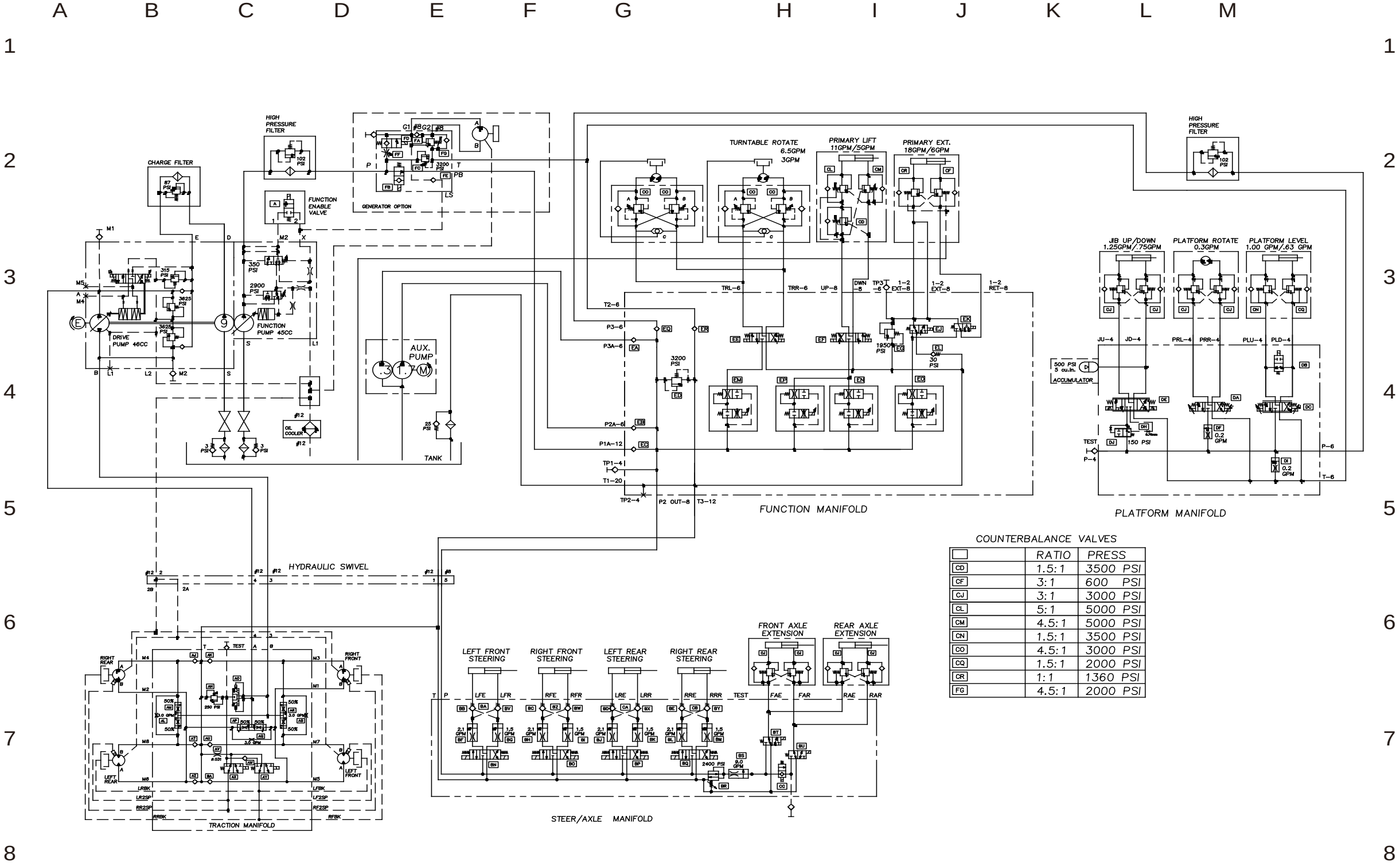
Electrical Schematic - Contact Alarm

Hydraulic Schematic, SX-125 XC

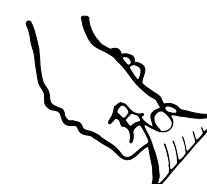


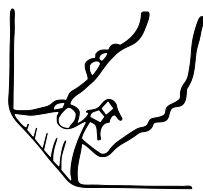
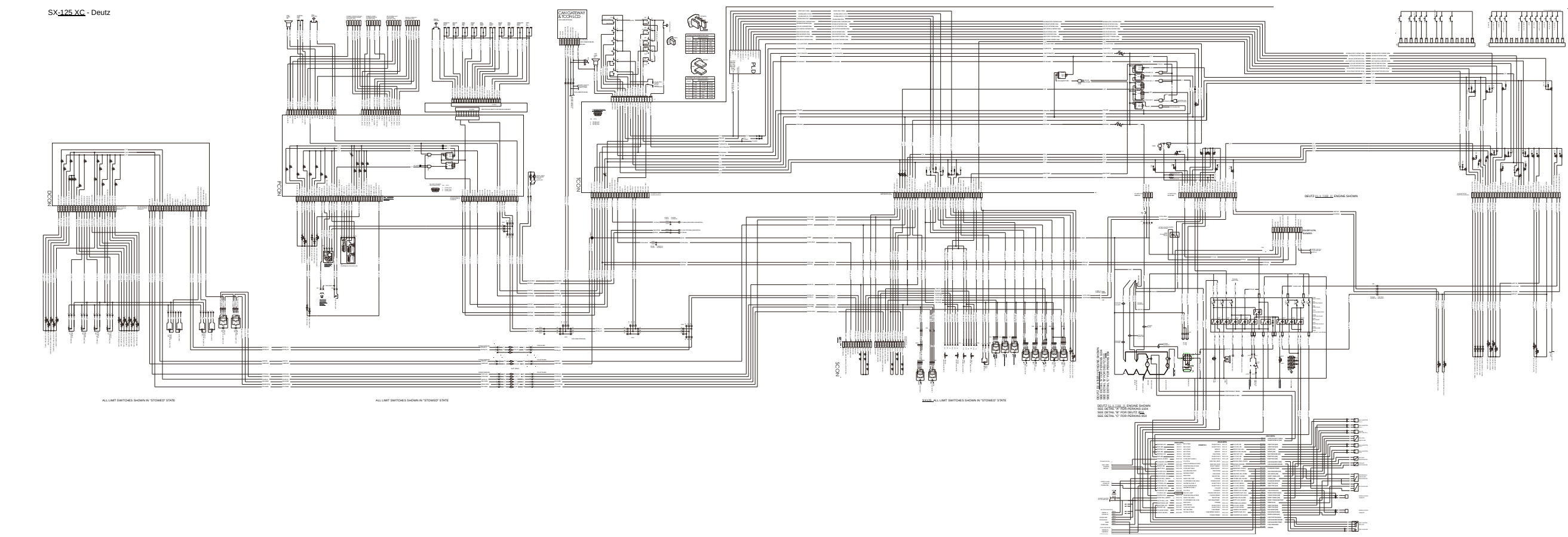
Hydraulic Schematic, SX-125 XC

Hydraulic Schematic, SX-105 XC



## Hydraulic Schematic, SX-105 XC





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](http://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](http://www.P65warnings.ca.gov/diesel).