from

Genie®
A TEREX BRAND

# Service and Repair Manual

Serial Number Range

## GTH-844

from GTH0813-16606 to GTH0816-21572

from GTH0816E-10000 to GTH0816E-10699

from GTH08E-10700

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. 1272854
Rev A2
April 2017

# Introduction

## Important

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

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

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

## Compliance

### Machine Design Life

Unrestricted with proper operation, inspection and scheduled maintenance.

## Technical Publications

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

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

## Contact Us:

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

## Find a Manual for this Model

Go to
http://www.genielift.com/en/service-support/manuals/index.htm

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

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First Edition, First Printing

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# Introduction

## Revision History

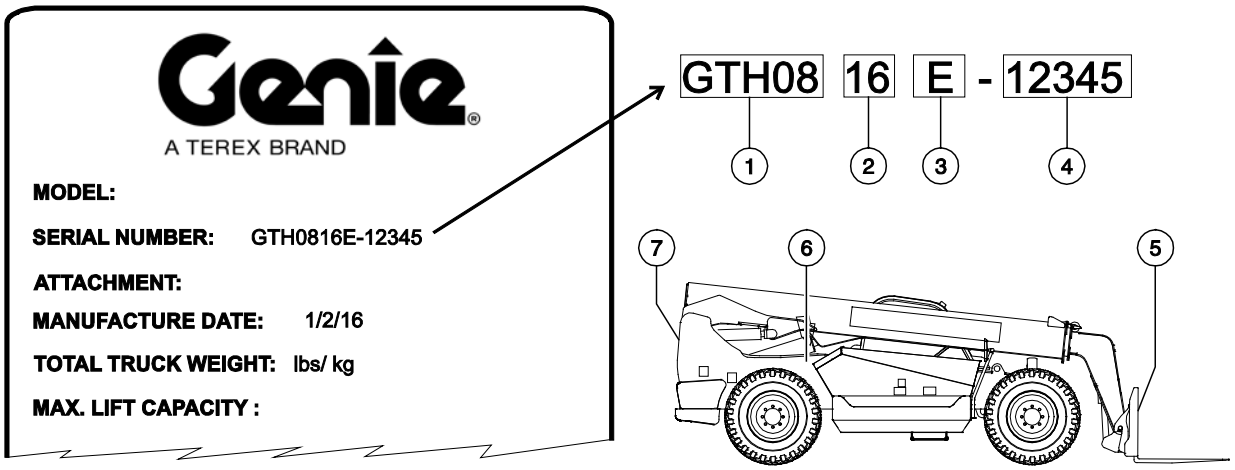
| Revision | Date | Section | Procedure / Page / Description |
|---|---|---|---|
| A | 3/2016 | | Initial Release |
| A1 | 9/2016 | Introduction | Serial Number Legend |
| A2 | 4/2017 | Repair | Revise manifold torque values |
| | | Schematics | Hydraulic schematics |

| Reference Examples: | |
|---|---|
| Section – Repair Procedure, 4-2 | **Electronic Version**<br>Click on any content or procedure in the Table of Contents to view the update. |
| Section – Fault Codes, All charts | |
| Section – Schematics, Legends and schematics | |

# Introduction

## Serial Number Legend

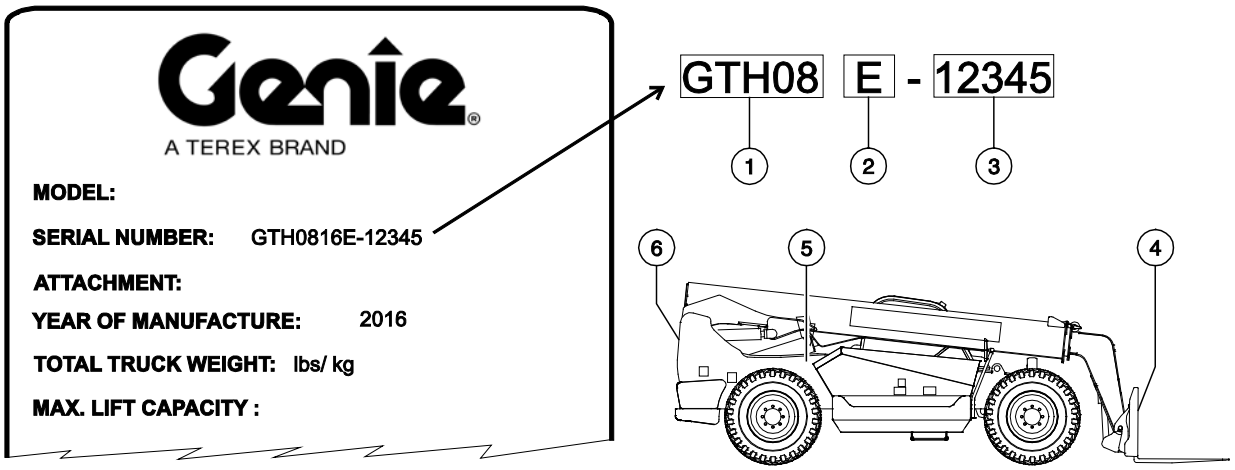
**To August 31, 2016**




1 Model
2 Model year
3 Facility code
4 Sequence number

1 Serial label (located inside fork frame)
2 Serial number (stamped on chassis)
3 Serial label (located inside riser, cab side)

**From September 1, 2016**




1 Model
2 Facility code
3 Sequence number

1 Serial label (located inside fork frame)
2 Serial number (stamped on chassis)
3 Serial label (located inside riser, cab side)

# Safety Rules



## Danger

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

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

## Do Not Perform Maintenance Unless:

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

☑ You read, understand and obey:

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

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

# Safety Rules

## Personal Safety

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



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



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

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

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

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

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



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



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

## Workplace Safety

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



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



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



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



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



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



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

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# Specifications

## Machine Specifications

| Tires and wheels | |
|---|---|
| Tire size | 13.00 x 24 |
| Tire ply rating | 12 |
| Weight, rough terrain tire (air filled) | 315 lbs<br>142.9 kg |
| Weight, rough terrain tire (foam filled) | 967 ±35 lbs<br>439 ±16 kg |
| Tire pressure (models with air-filled tires) | 62 psi<br>4.3 bar |
| Lug nut torque | 295 ft-lbs<br>400 Nm |
| Lug Pattern | 8 x 10.826 |
| Wheel diameter | 24 in<br>60.1 cm |
| Wheel width | 9 in<br>22.9 cm |

| Fluid capacities | (to SN GTH0816-21535) |
|---|---|
| Fuel tank | 35 gallons<br>132.5 liters |
| Hydraulic tank | 40 gallons<br>151.4 liters |
| Hydraulic system (including tank) | 55 gallons<br>208.2 liters |

| Fluid capacities | (from SN GTH0816-21536)<br>(from GTH0816E-10000) |
|---|---|
| Fuel tank | 32 gallons<br>121.1 liters |
| Hydraulic tank | 35 gallons<br>132.5 liters |
| Hydraulic system (including tank) | 50 gallons<br>189.3 liters |
| DEF tank | 2.6 gallons<br>10 liters |

# Specifications

## Performance Specifications

| | |
|---|---|
| **Drive speed, maximum** | |
| Deutz TCD3.6 T3/T4F Engines | 15 mph<br>24.1 km/h |
| Perkins 1104D Engine | 14 mph<br>22.5 km/h |
| Perkins 854E T4i Engine | 16 mph<br>25.7 mph |
| **Draw bar pull** | 21,000 lbs<br>9525 kg |
| **Lift capacity, maximum** | 8000 lbs<br>3629 kg |

| **Boom function speeds, maximum** | |
|---|---|
| Boom up | 12 to 14 seconds |
| Boom down | 9 to 11 seconds |
| Boom extend | 13 to 15 seconds |
| Boom retract | 8 to 10 seconds |
| Fork rotate | 3 to 6 seconds |
| Fork tilt up | 6 to 8 seconds |
| Fork tilt down | 5 to 7 seconds |

## Hydraulic Oil Specifications

| Hydraulic Fluid Specifications | |
|---|---|
| Genie specifications require hydraulic oils which are designed to give maximum protection to hydraulic systems, have the ability to perform over a wide temperature range, and the viscosity index should exceed 140. They should provide excellent antiwear, oxidation prevention, corrosion inhibition, seal conditioning, and foam and aeration suppression properties. | |
| Cleanliness level, minimum | ISO 15/13 |
| Water content, maximum | 250 ppm |
| **Recommended Hydraulic Fluid** | |
| Hydraulic oil type | Chevron Rando HD Premium |
| Viscosity grade | 32 |
| Viscosity index | 200 |
| **Optional Hydraulic Fluids** | |
| Mineral based | Shell Tellus S2 V 32<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.

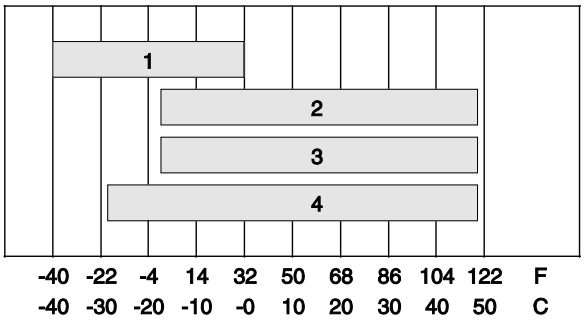
Note: Extended machine operation can cause the hydraulic fluid temperature to increase beyond it's maximum allowable range. If the hydraulic fluid temperature consistently exceeds 200°F / 90°C an optional oil cooler may be required.

**NOTICE**

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

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

## Hydraulic Fluid Temperature Range




Ambient air temperature

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

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

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

## Chevron 5606A Hydraulic Oil Fluid Properties

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

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

**NOTICE**

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

## Petro-Canada Environ MV 46 Fluid Properties

| | |
|---|---|
| ISO Grade | 46 |
| Viscosity index | 154 |
| Kinematic Viscosity<br>cSt @ 200°F / 100°C<br>cSt @ 104°F / 40°C | <br>8.0<br>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<br>cSt @ 200°F / 100°C<br>cSt @ 104°F / 40°C | <br>9<br>33.8 |
| Brookfield Viscosity<br>cSt @ -4°F / -20°C<br>cSt @ -13°F / -25°C<br>cSt @ -40°F / -40°C | <br>481<br>702.4<br>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<br>cSt @ 149°F / 65°C<br>cSt @ 104°F / 40°C<br>cSt @ 0°F / -18°C | <br>22<br>46<br>1300 |
| Flash point | None |
| Pour point | -81°F / -63°C |
| Maximum continuous operating temperature | 189°F / 87°C |

# Specifications

## Hydraulic Component Specifications

| **Function pump** | |
|---|---|
| Type: variable displacement piston pump | |
| Displacement | 0 to 3.1 cu in<br>0 to 51 cc |
| Flow rate @ 2500 rpm | 34 gpm<br>128 L/min |
| Pump pressure, maximum | 3190 psi<br>220 bar |
| Pressure compensator | 3190 psi<br>220 bar |
| Standby pressure | 450 psi<br>31 bar |

| **Primary Function Manifold** | |
|---|---|
| System relief valve pressure, maximum (measured at test port TP) | 3200 psi<br>221 bar |
| Fork tilt relief valve pressure, maximum | 3500 psi<br>241 bar |
| Flow regulator, Sway circuit | 2 gpm<br>7.5 L/min |
| **Secondary Function Manifold** | |
| Steer relief valve pressure, maximum (measured at test port TS) | 2650 psi<br>182.7 bar |
| Parking brake relief valve pressure, maximum (measured at test port TPB) | 350 psi<br>24.1 bar |
| Diff lock relief valve pressure, maximum (measured at test port TJ) | 400 psi<br>27.5 bar |
| Rear lock-up relief valve pressure, maximum (measured at test port TR) | 50 psi<br>3.4 bar |

# Specifications

## Manifold Component Specifications

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

## Air Conditioner Refrigerant Specifications

| System Full Charge | |
|---|---|
| R134a | 1 lb 14 oz |

# Specifications

## DEF Storage Specifications

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

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

# Specifications

## Deutz TCD3.6 L4 Engine

| | |
|---|---|
| **Displacement** | 221 cu in<br>3.62 liters |
| **Number of cylinders** | 4 |
| **Bore and Stroke** | 3.86 x 4.72 inches<br>98 x 120 mm |
| **Horsepower T4i** | 99 @ 2300 rpm<br>73.8 kw @ 2300 rpm |
| **Peak Torque T4i** | 288 lb-ft @ 1600 rpm<br>390 Nm @ 1600 rpm |
| **Horsepower T4F** | 74 @ 2300 rpm<br>55.2 kw @ 2300 rpm |
| **Peak Torque T4F** | 288 lb-ft @ 1300 rpm<br>390 Nm @ 1300 rpm |
| **Firing order** | 1 - 3 - 4 - 2 - |
| **Low idle**<br>**Frequency** | 1000 rpm<br>200 Hz |
| **High idle**<br>**Frequency** | 2400 rpm<br>500 Hz |
| **Compression ratio** | 17.2:1 |
| Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder | |
| **Governor** | electronic |
| **Lubrication system** | |
| Minimum oil pressure<br>(warm, at low idle) | 23.5 psi<br>1.6 bar |
| Oil capacity (including filter)<br>Low Emission Oil | 9.5 quarts<br>9 liters |
| **Oil viscosity requirements** | |
| Unit ships with 15W-40 API CJ4 low ash oil.<br>Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine. | |

| | |
|---|---|
| **Fuel injection system** | |
| Injection pump pressure, maximum | 23200 psi<br>1600 bar |
| **Fuel requirement** | |
| For fuel requirements, refer to the engine Operator Manual for your engine. | |
| **Engine coolant** | |
| Capacity | 4.5 gallons<br>17 liters |
| Type | Extended Life |
| **Starter motor** | |
| Normal load | 300-400A |
| Relay max | 60A |
| Relay continuous | 12A |
| Cranking speed | >100 rpm |
| **Glow Plugs** | |
| Initial load (0-6 sec) | 80 amps |
| Continuous load (>6 sec) | <40 amps |
| **Battery Specifications** | |
| Type | 12V DC |
| Group | C31 |
| Quantity | 1 |
| Battery capacity, maximum | 1000A |
| Reserve capacity @ 25A rate | 200 Minutes |
| **Alternator output** | 95A @ 12V DC |

# Specifications

## Deutz TCD3.6 L4 T4F Engine

| | |
|---|---|
| **Displacement** | 221 cu in<br>3.62 liters |
| **Number of cylinders** | 4 |
| **Bore and Stroke** | 3.86 x 4.72 inches<br>98 x 120 mm |
| **Horsepower** | 100 @ 2300 rpm<br>74.6 kw @ 2300 rpm |
| **Peak Torque** | 302 lb-ft @ 1600 rpm<br>409 Nm @ 1600 rpm |
| **Firing order** | 1 - 3 - 4 - 2 |
| **Induction System** | turbocharged<br>charge air cooled |
| **Aftertreatment** | DOC + SCR |
| **Combustion** | direct injection<br>252 cfm / 0.18 cmm |
| **Exhaust** | 703 cfm @ 2300 rpm<br>894°F / 470°C @ 2300 rpm |
| **Low idle**<br>**Frequency** | 1000 rpm<br>200 Hz |
| **High idle**<br>**Frequency** | 2400 rpm<br>500 Hz |
| **Compression ratio** | 17.2:1 |
| Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder | |
| **Governor** | electronic |
| **Lubrication system** | |
| Minimum oil pressure<br>(warm, at low idle) | 23.5 psi<br>1.6 bar |
| Oil capacity (including filter)<br>Low Emission Oil | 9.5 quarts<br>9 liters |
| **Oil viscosity requirements** | |
| Unit ships with 15W-40 API CJ4 low ash oil.<br>Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine. | |

| | |
|---|---|
| **Fuel injection system** | |
| Injection pump pressure, maximum | 23200 psi<br>1600 bar |
| Max fuel consumption | 6.5 gph / 24.6 lph |
| **Fuel requirement** | |
| For fuel requirements, refer to the engine Operator Manual for your engine. | |
| **Engine coolant** | |
| Capacity | 4.5 gallons<br>17 liters |
| Type | Extended Life |
| **Starter motor** | |
| Normal load | 300-400A |
| Relay max | 60A |
| Relay continuous | 12A |
| Cranking speed | >100 rpm |
| **Glow Plugs** | |
| Initial load (0-6 sec) | 80 amps |
| Continuous load (>6 sec) | <40 amps |
| **Battery Specifications** | |
| Type | 12V DC |
| Group | C31 |
| Quantity | 1 |
| Battery capacity, maximum | 1000A |
| Reserve capacity @ 25A rate | 200 Minutes |
| **Alternator output** | 120A @ 12V DC |

# Specifications

## Perkins 1104D-E44TA Engine

| | |
|---|---|
| **Displacement** | 269 cu. in<br>4.4 liters |
| **Number of cylinders** | 4 |
| **Bore and Stroke** | 4.13 x 5 inches<br>105 x 127 mm |
| **Horsepower** | 99 @ 2200 rpm<br>73.8 kW @ 2200 rpm |
| **Peak Torque** | 310 lb-ft @ 1400 rpm<br>420 Nm @ 1400 rpm |
| **Induction system** | turbocharged |
| **Firing order** | 1 - 3 - 4 - 2 |
| **Low idle**<br>**Frequency** | 1000 rpm<br>200 Hz |
| **High idle**<br>**Frequency** | 2500 rpm<br>500 Hz |
| **Compression ratio** | 16.2:1 |
| **Combustion** | E-TVCS |
| **Governor** | Electronic |
| **Lubrication system** | |
| Oil pressure, hot (@ 2300 rpm) | 43 to 58 psi<br>2.9 to 4 bar |
| Oil capacity (including filter) | 10 quarts<br>9.6 liters |
| **Oil viscosity requirements** | |
| Unit ships with 15W-40. Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operator Manual for your engine. | |
| **Fuel requirement** | |
| For fuel requirements, refer to the engine Operator Manual for your engine. | |
| **Fuel injection pressure** | 23700 psi<br>1635 bar |
| **Starter motor** | |
| Normal load | 68A |
| Relay max | 50A |
| Relay continuous | 20A |
| Cranking speed | 130 - 200 rpm |
| **Battery Specifications** | |
| Type | 12V DC, Group C31 |
| Quantity | 1 |
| Battery capacity, maximum | 1000A |
| Reserve capacity @ 25A rate | 200 Minutes |
| **Engine coolant** | |
| Capacity | 4.6 gallons<br>17.4 liters |
| Type | Extended Life |
| **Glow Plugs** | |
| Initial load (0-4 sec) | 20A (EA) |
| Continuous load (>4 sec) | 15A (EA) |
| **Alternator output** | 85A @ 12V DC |

# Specifications

## Perkins 854E-E34TA Engine

| | |
|---|---|
| **Displacement** | 207 cu. in<br>3.4 liters |
| **Number of cylinders** | 4 |
| **Bore and Stroke** | 3.9 x 4.3 inches<br>99 x 110 mm |
| **Horsepower** | 99 @ 2500 rpm<br>73.8 kW @ 2500 rpm |
| **Peak Torque** | 288 lb-ft @ 1400 rpm<br>390 Nm @ 1400 rpm |
| **Firing order** | 1 - 3 - 4 - 2 |
| **Low idle**<br>**Frequency** | 1000 rpm<br>100 Hz |
| **High idle**<br>**Frequency** | 2700 rpm<br>270 Hz |
| **Compression ratio** | 17.0:1 |
| **Compression pressure pressure (psi or bar) of the lowest cylinder must be at least 75% of the highest cylinder** | |
| **Governor** | Electronic |
| **Lubrication system** | |
| Minimum oil pressure | 12 psi<br>0.82 bar |
| Oil capacity (including filter) | 8.8 quarts<br>8.3 liters |
| **Oil viscosity requirements** | |
| Units ship with 15W-40 API CJ4 low ash oil.<br>Extreme operating temperatures may require the use of alternative engine oils. For oil requirements, refer to the Engine Operation and Maintenance Manual on your machine. | |

| | |
|---|---|
| **Fuel injection system** | |
| Injection pressure | 23000 psi /<br>(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** | |
| Normal load | 68A |
| Relay max | 50A |
| Relay continuous | 20A |
| Cranking speed | 130 - 200 rpm |
| **Battery Specifications** | |
| Type | 12V DC, Group C31 |
| Quantity | 1 |
| Battery capacity, maximum | 1000A |
| Reserve capacity @ 25A rate | 200 Minutes |
| **Engine coolant** | |
| Capacity | 4.9 gallons<br>18.5 liters |
| Type | Extended Life |
| **Alternator output** | 120A @ 12V DC |

## Dana VDT12000 Transmission Specifications

| | |
|---|---|
| **Transmission Type** | 3 speed powershift converter |
| Speeds, Forward | 3 |
| Speeds, Reverse | 3 |
| **Torque Converter** | |
| Maximum input | 3100 rpm |
| Size | 12 inches |
| **Lubrication** | |
| Oil capacity, transmission | 14.3 quarts<br>13.5 liters |
| Oil capacity, drop box | 1.1 quart<br>1 liter |
| **Oil viscosity requirements** | |
| Units ship with Chevron Ursa Hydraulic 10W. Extreme operating temperatures may require the use of alternative transmission oils. For oil requirements, refer to the Dana VDT12000 Service Manual. | |
| **Dana VDT12000 Service Manual** | |
| Genie part number | 218706 |

## Carraro 26.27M Drive Axle Specifications

| | |
|---|---|
| **Steering** | Integrated steer cylinder |
| **Joints** | Heavy duty double U-joints |
| **Steering angle, maximum** | 45° |
| **Front Axle Lubrication** | |
| Front differential | 7.4 quarts<br>7 liters |
| Axle planetary end (each) | 0.8 quarts<br>0.8 liters |
| **Rear Axle Lubrication** | |
| Rear differential | 7.9 quarts<br>7.5 liters |
| Axle planetary end (each) | 0.8 quarts<br>0.8 liters |
| **Oil viscosity requirements** | |
| Differential | Chevron Supreme 80W90 LS |
| Planetary ends | Chevron Supreme 80W90 LS |
| For additional axle information, refer to the Carraro 26.27M Axle Maintenance and Repair Manual | |
| **Carraro 26.27M Axle Maintenance and Repair Instructions** | |
| Genie part number | 218710 |

# 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

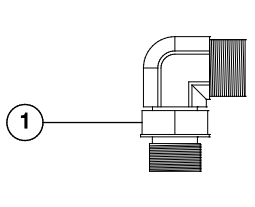
(swivel nut or hose connection)

| 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

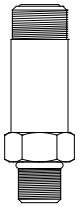
(tube fitting - installed into Aluminum)
(all types)

| 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

1 jam nut



Non-adjustable fitting

### SAE O-ring Boss Port

(tube fitting - installed into Steel)

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

## Torque Procedure

### Seal-Lok™ fittings

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

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

2 Lubricate the O-ring before installation.

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

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

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

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

### JIC 37° fittings

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

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

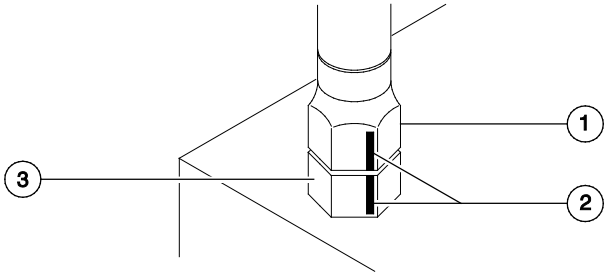



Illustration 1

1 hex nut
2 reference mark
3 body hex fitting

# Specifications

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

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

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

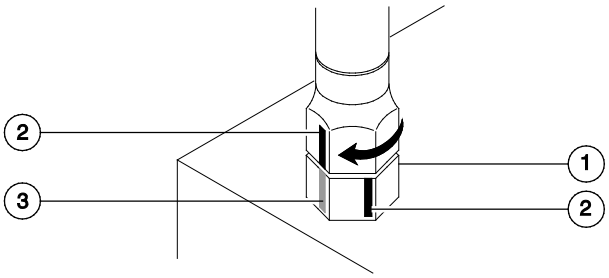



Illustration 2

1 body hex fitting
2 reference mark
3 second mark

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

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

# Repair Procedures



## Observe and Obey:

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

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

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

## Before Repairs Start:

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

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

☑ Use only Genie approved replacement parts.

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

## Machine Configuration:

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

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

# Repair Procedures

## About This Section

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

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

### Symbols Legend



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

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

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

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

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

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

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

## 1-1
## Boom Proximity Switch

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

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

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

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

## How to Test a Proximity Switch

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

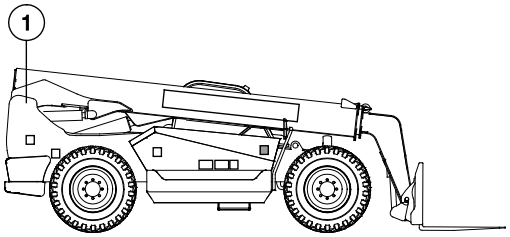
2 Start the engine.

3 Move the switch away from any ferrous or metallic object

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

4 Move the switch close to any ferrous or metallic object

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




1 boom angle proximity switch (located on engine side)

# Boom Components

## How to Adjust the Boom Angle Proximity Switch

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

1 Start the engine.

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

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

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

5 Securely tighten the fasteners. Do not over tighten.

6 Lower the machine to 55°.

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

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

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

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

# 1-2 Boom

## How to Replace the Boom Wear Pads

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

2 Remove the wear pad retainer plates and remove the wear pads from the boom.

3 Lubricate the wear surface of the new pads. Refer to Maintenance Procedure, *Lubricate the Boom*.

Note: Do not lubricate the side wear pads.

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

# Boom Components

## How to Remove the Lifting Fork Frame

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

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

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

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

## How to Replace the Retraction Chain

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

1 Start the engine and allow the engine to idle.

2 Raise the boom to a horizontal position.

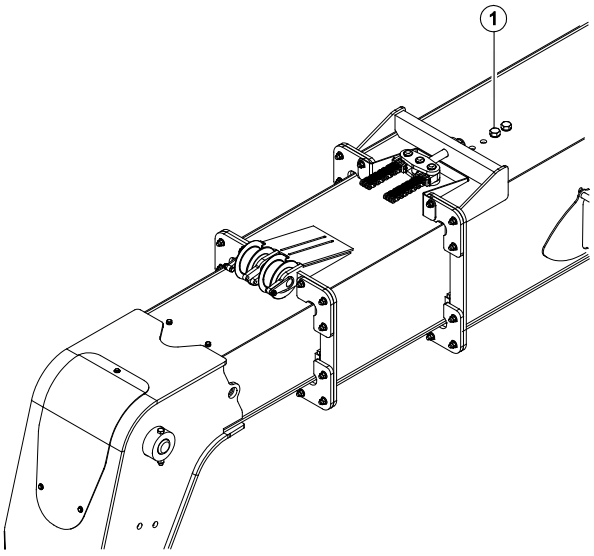
3 Fully retract the boom.

4 Extend the boom approximately 1 inch / 2.5 cm.

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

6 Working at the fork end of the boom, remove the fasteners securing the single-chain anchor to the top of boom tube number 1.

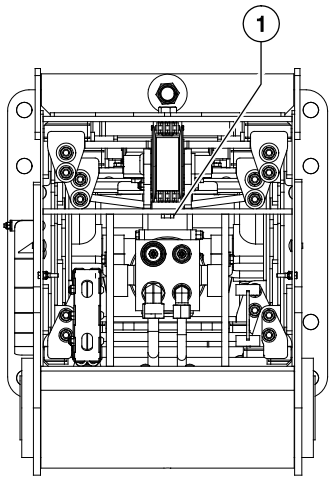
Note: When installing the new chain, the chain tensioner should be mounted in the two most rearward holes.




1 retract chain anchor

# Boom Components

7 Remove the inspection cover from the pivot end of the boom. Locate the chain anchor of the boom retraction chain where it attaches to the chain anchor mount at the lower side of boom tube 3.




1 retract chain anchor

8 Remove a cotter pin securing the chain anchor pivot pin to the anchor mount of the boom tube. Remove the pivot pin and pull the chain free of the mount.

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

10 Remove the chain anchor from the chain and install it on the new chain.

Note: Always use new cotter pins when installing a chain

11 Feed an electrical 'fish tape' through the boom from the front and attach it to the new chain. Also attach a short rope to the pivot end of the chain.

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

13 Now pull the chain carefully toward the pivot end until the mounting holes of the chain anchor line up with the holes on the boom tube. Install the fasteners securing the chain to the bottom of the boom tube.

14 Working at the pivot end of the boom, route the chain over the roller and install the chain onto the boom assembly using the pivot pin and retaining clip removed in step 8.

15 Check the tension on the extension chains. Refer to Maintenance Procedure, *Adjust the Boom Sequencing Chains*.

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

## How to Replace the Extension Chains

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

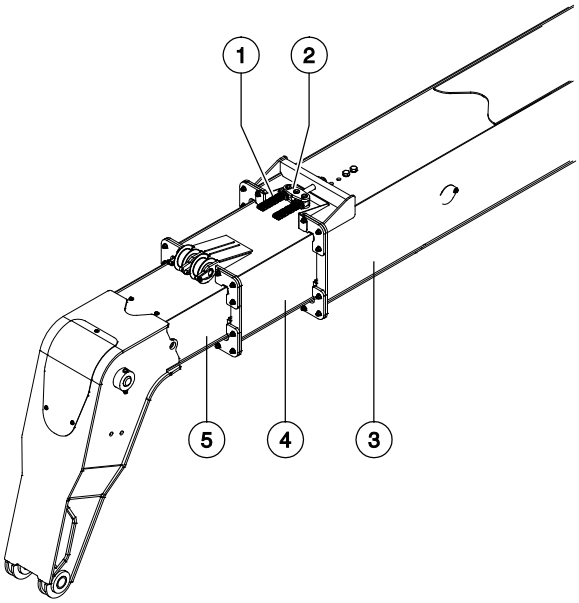
1 Start the engine and allow the engine to idle.

2 Raise the boom to a horizontal position.

3 Fully retract the boom.

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

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




1 extension chains
2 single-chain tensioner
3 boom tube number 1
4 boom tube number 2
5 boom tube number 3

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

7 Repeat this procedure, beginning with step 6, for the other chains.

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

9 Remove the inspection cover from the pivot end of the boom and locate the chain anchors of the extension chains at the top of boom tube 3.

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

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

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

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

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

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

# Boom Components

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

16 Working at the pivot end of the boom and using the fasteners removed in step 5, install the chain anchor onto the boom tube. Securely tighten the fasteners. Do not over tighten.

17 Remove the rope from the chain and install the chain into the chain anchor of the tensioner assembly. Secure the chain to the chain anchor using the pin and clip removed in step 6.

18 Repeat this procedure, beginning with step 5, for the other chains.

19 Install the inspection cover, removed in step 9, onto the boom. Install and securely tighten the fasteners. Do not over tighten.

20 Install the chain tensioners into the tensioner mount at the fork end of boom tube number 1. Install the mounting components, removed in step 6. Evenly tighten the chain tensioners to the top of the boom tube until they are securely tightened.

21 Adjust the chains. Refer to Maintenance, *Adjust the Boom Sequencing Chains.*

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

## How to Remove the Boom

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

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

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

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

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

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

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

# Boom Components

6 Lower the fork level cylinder onto the chassis.

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

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

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

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

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

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

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

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

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

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

15 Using a suitable tool, remove the boom pivot pin.

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

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

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

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

# Boom Components

## How to Disassemble the Boom

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

14 Remove the hose keepers from the hose roller assembly.

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

15 Working at the pivot end of the boom, remove the clamps securing the hoses to the inside of boom tube number 3.

16 Working at the fork end of the boom, remove the clamps securing the hoses to the inside of boom tube number 3.

17 Working at the pivot end of the boom, pull the fork level hydraulic hoses from the boom and lay them to the side.

18 Working at the pivot end of the boom, remove the fasteners securing the hose roller assembly to boom tube number 2. Remove the hose roller assembly from the boom.

19 Working at the fork end of the boom, loosen evenly, then remove, the fasteners securing the chain tensioners to the top of boom tube number 1.

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

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

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

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

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

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

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

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

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

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

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

# Boom Components

## 1-3
## Boom Lift Cylinder

### How to Remove the Lift Cylinder

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

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

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

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

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

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

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

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

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

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

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

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

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

## 1-4 Boom Extension Cylinder

### How to Remove the Extension Cylinder

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

1 Raise the boom to a horizontal position.

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

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

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

3 Remove the access covers on the number 1 boom and remove the bolts holding the extend cylinder support at the fork end of the machine.

4 At the pivot end of the machine, remove the retainer plates securing the extension cylinder to the number 2 and number 3 tubes and lift the extension cylinder out of the support sockets.

5 Support the extension cylinder with a suitable lifting device and remove from the boom assembly.

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

## 1-5 Fork Level Cylinder

### How to Remove the Fork Level Cylinder

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

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

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

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

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

# Boom Components

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

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

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

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

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

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

## 1-6 Hydraulic Hoses

### How to Adjust the Fork Level Cylinder and/or Auxiliary Hose

1 Fully retract the boom.

2 Fully lower the tips of the lifting forks.

3 Remove the cover from the fork end of the boom.

4 Loosen the hose clamp securing the fork level cylinder or auxiliary hoses.

5 Pull each hose until it is equally tensioned and not touching the boom tube.

6 Tighten the clamp bolt to secure the hoses in place.

## How to Replace the Fork Level Cylinder and/or Auxiliary Hoses

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 Fully retract the boom.

2 Fully lower the tips of the lifting forks.

3 Remove the cover from the fork end of the boom.

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

5 Disconnect and plug the fork level cylinder supply hoses at the cylinder manifold or the auxiliary supply hoses at the quick connect fittings. Cap the fittings.

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

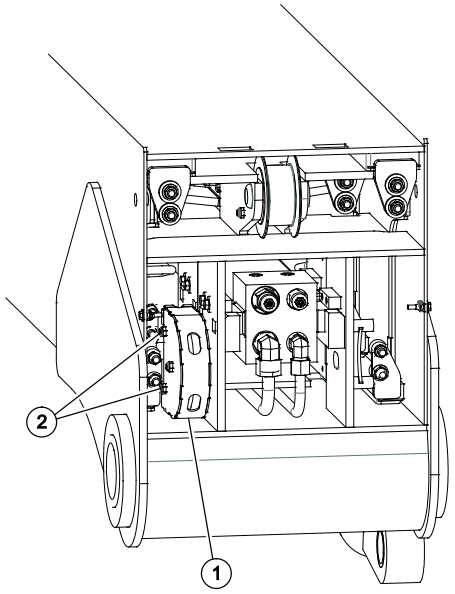
**NOTICE** Component damage hazard. Hoses can be damaged if they are kinked or pinched.

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

7 Securely connect a 30 feet / 10 m length of rope to each end of the hoses disconnected in steps 5 and 6. Securely tie off the other end of each section of rope to the boom structure.

8 Remove the hose clamp at the fork end of the boom by loosening the hose clamp bolt located on the top of the boom.

9 Remove the cover from the pivot end of the boom and remove the hose sheave cover.




1 hose sheave cover
2 cover retaining bolts

Note: Partial extension of the boom on some machines may be necessary to access the sheave cover fasteners.

# Boom Components

10 Select one of the hoses. Pull the hose out of the boom.

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

11 Remove the rope from each end of the hose. Discard the hose.

12 Securely install a section of rope onto each end of the new hose assembly.

Note: Tag each hose before assembly.

13 Install the new hose assembly into the boom in the same manner the hose was removed. Using the rope, carefully pull the hose through the boom until each end is accessible.

14 Install both ends of the hose assembly onto the correct connection points. Torque to specification. Refer to Section 2, Specifications.

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

16 Tension the hoses using the Repair procedure, "How to Adjust the Fork Level and Auxiliary Hydraulic Hoses".

17 Repeat this procedure for the auxiliary hydraulic hoses beginning with step 5.

18 Remove the lifting strap from the fork frame.

19 Install hose sheave covers removed in step 9.

20 Install the covers onto both ends of the boom. Install and securely tighten the retaining fasteners.

# 2-1 Operator's Compartment

## How to Remove the Operator's Compartment

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

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

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

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

1 Disconnect the battery from the machine.

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

2 Locate the secondary function manifold under the manifold inspection cover. Tag, disconnect and plug the hydraulic hoses at ports BP and BT of the secondary function manifold. Cap the fittings.

3 Locate the brake manifold under the manifold inspection cover. Tag, disconnect and plug the hydraulic hose at the underside of the brake manifold. Cap the fitting.

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

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

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

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

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

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

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

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

# Operator's Compartment

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

11 Tag, disconnect and plug the hydraulic hoses at ports JE1, JE3, JL2and JL4 of the primary function manifold. Cap the fittings.

12 Remove the fasteners securing the joystick mount to the operator's compartment. Disconnect the joystick harness and the remove the joystick assembly.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

| **Bolt torque specification** | |
|---|---|
| Operator's cab mounting bolts | 750 ft-lbs<br>1017 Nm |

# 2-2 Machine Controls

## How to Remove the Steering Column

1 Disconnect the battery from the machine.

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

2 Remove the fasteners securing the transmission control lever and turn signal shifter, if equipped, to the column. Carefully separate the lever from the column.

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

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

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

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

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

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

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

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

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

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

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

## How to Remove the Steering Wheel

1 Open the access door above the hydraulic tank.

2 Disconnect the battery from the machine.

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

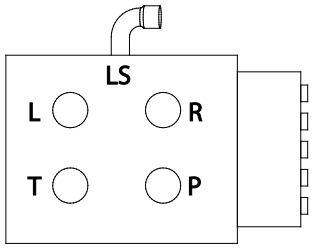
3 Remove the horn button from the steering wheel. Remove the nut securing the steering wheel to the column and remove the steering wheel.

# Operator's Compartment

## How to Remove the Steer Orbitral

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

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




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

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

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

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

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

## How to Remove the Joystick - Models with Single Joystick

1 Disconnect the battery from the machine.

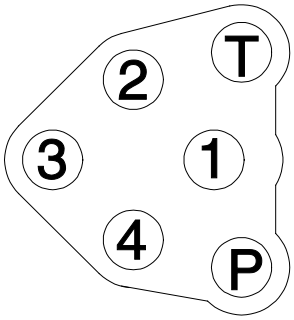
**⚠WARNING** Electrocution/burn hazard. Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

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

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

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

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




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

# Operator's Compartment

## How to Remove the Joystick - Models with Dual Joysticks

1 Disconnect the battery from the machine.

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

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

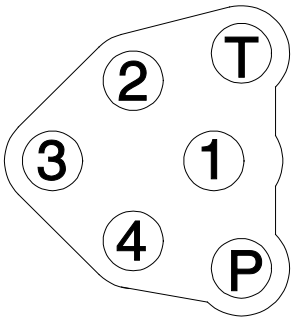
3 Tag and disconnect the joystick wire harness from the machine.

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

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

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

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




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

## How to Remove the Brake Pedal Assembly

1 Disconnect the battery from the machine.

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

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

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

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

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

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

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

# Operator's Compartment

## How to Remove the Gauge Cluster Assembly

1 Disconnect the battery from the machine.

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

2 Remove the fasteners securing the transmission control lever to the column. Carefully separate the lever from the column.

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

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

# 3-1
# Fuel and Hydraulic Tanks

## How to Remove the Fuel and Hydraulic Tank Assembly

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

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

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

1 Open the access door to the engine.

2 Disconnect the battery from the machine.

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

**HYDRAULIC TANK**

3 Remove the access cover to the hydraulic tank.

4 Remove the filler cap from the hydraulic tank.

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

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

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

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

8 Proceed to step 14.

# Fuel and Hydraulic Tanks

**FUEL TANK**

9 Remove the access cover above the fuel tank and the access door above the filler cap.

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

11 Remove the filler cap from the fuel tank.

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

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

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

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

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

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

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

# 4-1 Engines

## How to Repair the Perkins 1104D-E44TA Engine

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

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

## How to Repair the Perkins 854E-34TA Engine

Repair procedures and additional engine information is available in the Perkins 854 Systems Operation Testing & Adjusting or the Perkins 854 Disassembly & Assembly.

| **Perkins 854 Operation Manual** | |
|---|---|
| Genie part number | 218711 |
| **Perkins 854 Assembly Manual** | |
| Genie part number | 218712 |

## How to Repair the Deutz TCD3.6 Engine

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

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

# Engines

## 4-2 Engine Fault Codes

### How to Retrieve Engine Fault Codes

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

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

## 5-1 Transmission

### How to Repair the Transmission

Repair procedures and additional transmission information is available in the Dana VDT12000 Service Manual.

| **Dana VDT12000 Service Manual** | |
|---|---|
| Genie part number | 218706 |

# 6-1
# Hydraulic Pump

## How to Test the Function Pump

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

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

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

2 Start the engine and fully retract the boom. Continue to hold the joystick in the boom retract position and observe the pressure gauge.

⊙ Result: If the pressure gauge reads 3200 psi / 220 bar, immediately stop. The pump is good.

☒ Result: If the pressure fails to reach 3200 psi / 220 bar, the pump needs to be adjusted OR or the pump or pump coupling is faulty and will need to be serviced or replaced.

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

3 Remove the pressure gauge and install plug onto port TP. Torque to specification. Refer to Section Specifications, *Hydraulic Specifications*.

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

# Hydraulic Pump

## How to Remove the Function Pump

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

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

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

1 Open the engine cover.

2 Disconnect the battery from the machine.

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

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

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

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

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

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

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

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

# Hydraulic Pump

## How to Install the Function Pump

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

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

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

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

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

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

7 Securely install the wire harness onto the pump.

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

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

10 Start the engine and inspect for leaks.

11 Turn the machine off.

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

## How to Prime the Function Pump

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

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

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

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

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

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

# Hydraulic Pump

## How to Adjust the Function Pump Standby Pressure

1 Connect a 0 to 1000 psi / 0 to 100 bar pressure gauge to test port 'TP' on the primary function manifold. See 7-1 or 7-2, Primary Function Manifold Components.

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

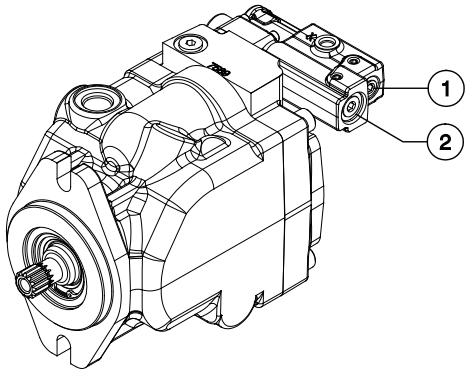
3 Observe the pressure reading on the pressure gauge.

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

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

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

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




1 Standby Pressure Adjustment
2 Pressure compensator adjustment

6 Turn the engine off and remove the pressure gauge.

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

## How to Adjust the Function Pump Standby Pressure

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

1 Connect a 0 to 5000 psi / 0 to 350 bar pressure gauge to port 'M1' on the function pump.

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

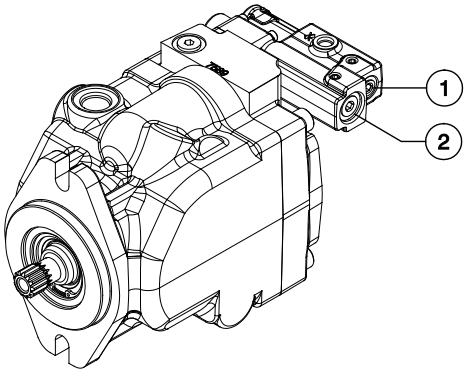
3 Fully retract the boom.

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

⊙ Result: The pressure gauge reads 3200±150 psi / 220±10.3 bar. The pump is functioning correctly. Proceed to step 7.

⊠ Result: The pressure gauge fails to read 3200±150 psi / 220±10.3 bar. The pressure setting needs to be adjusted. Proceed to step 5.

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




1 Standby pressure adjustment
2 Pressure compensator adjustment

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

**NOTICE**

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

7 Turn the engine off and remove the pressure gauge.

**⚠WARNING**

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

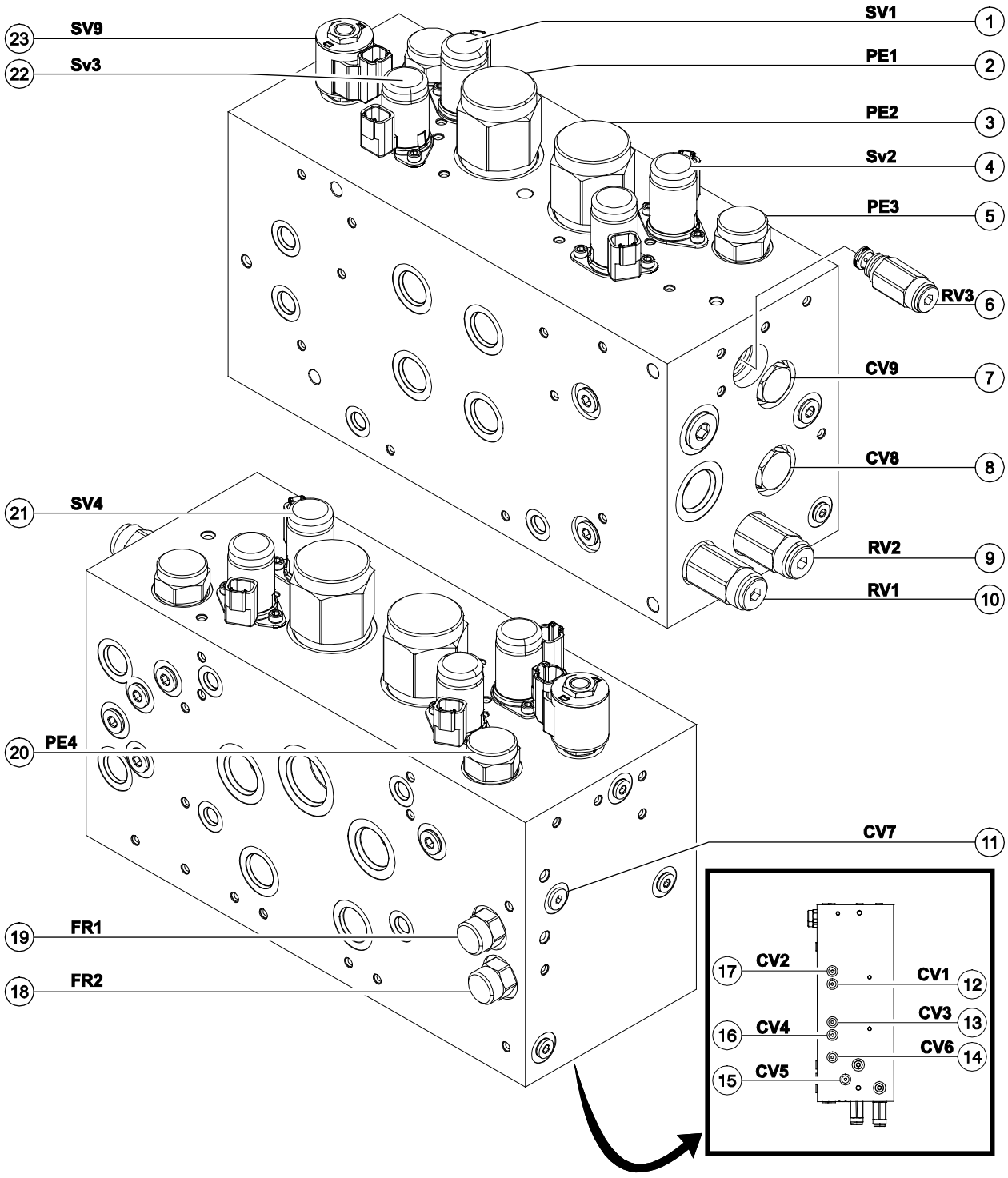
# Manifolds

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

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

| Index No. | Description | Schematic Item | Function | Torque |
|---|---|---|---|---|
| 1 | Solenoid valve, 2 position 4 way | SV1 | Function select -boom retract and sway right | 19-21 ft-lbs / 25.8-28.6 Nm |
| 2 | Directional valve,proportional | PE1 | Boom extend/retract | 140 ft-lbs / 190 Nm |
| 3 | Directional valve, proportional | PE2 | Boom up/down | 140 ft-lbs / 190 Nm |
| 4 | Solenoid valve, 2 position 4 way | SV3 | Function select -boom extend and sway left | 19-21 ft-lbs / 25.8-28.6 Nm |
| 5 | Directional valve, proportional | PE3 | Fork tilt up/down | 33-37 ft-lbs / 45-50 Nm |
| 6 | Relief valve, 3500 psi / 241 bar | RV3 | Fork tilt up relief | 25-30 ft-lbs / 34-37 Nm |
| 7 | Check valve, pilot operated 100 psi / 6.9 bar | CV9 | Fork tilt down circuit | 40-45 ft-lbs / 54-61 Nm |
| 8 | Check valve, pilot operated100 psi / 6.9 bar | CV8 | Fork tilt up circuit | 40-45 ft-lbs / 54-61 Nm |
| 9 | Relief valve, 3500 psi / 241 bar | RV2 | Fork tilt down relief | 25-30 ft-lbs / 34-47 Nm |
| 10 | Relief valve, 3500 psi / 241 bar | RV1 | System relief | 40-45 ft-lbs / 54-61 Nm |
| 11 | Check valve, 5 psi / 0.3 bar | CV7 | Sway right circuit | 20 ft-lbs / 27.1 Nm |
| 12 | Check valve, 5 psi / 0.3 bar | CV1 | Boom retract circuit | 20 ft-lbs / 27.1 Nm |
| 13 | Check valve, 5 psi / 0.3 bar | CV3 | Boom down circuit | 20 ft-lbs / 17.6 Nm |
| 14 | Check valve, 5 psi / 0.3 bar | CV6 | Tilt down circuit | 20 ft-lbs / 27.1 Nm |
| 15 | Check valve, 5 psi / 0.3 bar | CV5 | Tilt up circuit | 20 ft-lbs / 27.1 Nm |

# Manifolds


23 SV9
22 Sv3
SV1 1
PE1 2
PE2 3
Sv2 4
PE3 5
RV3 6
CV9 7
CV8 8
RV2 9
RV1 10
21 SV4
20 PE4
CV7 11
19 FR1
18 FR2
17 CV2
CV1 12
CV3 13
16 CV4
CV6 14
15 CV5

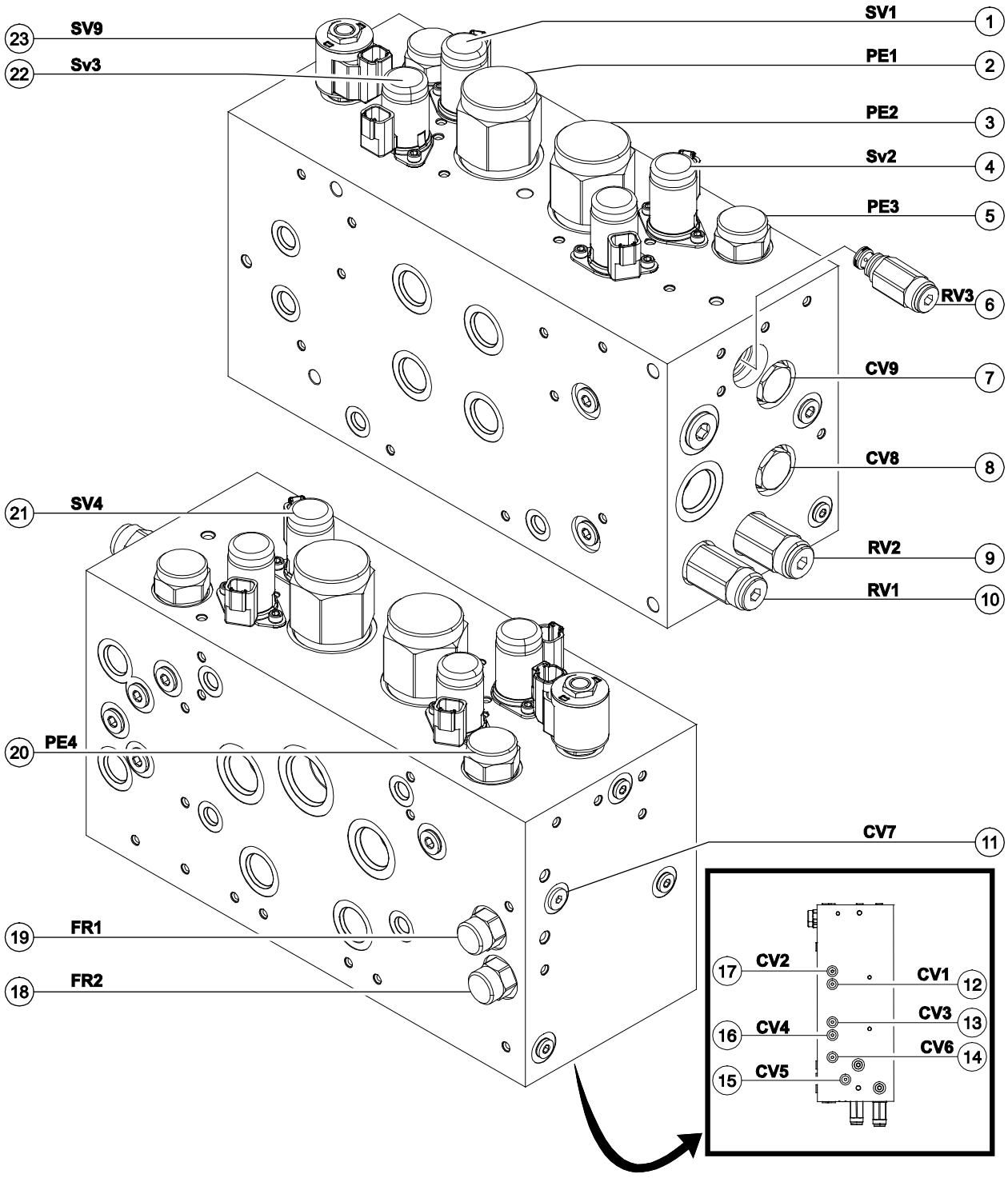
# Manifolds

## Primary Function Manifold Components - Models with Single Joystick

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

| Index No. | Description | Schematic Item | Function | Torque |
|---|---|---|---|---|
| 16 | Check valve, 5 psi / 0.3 bar | CV4 | Boom up circuit | 20 ft-lbs / 27.1 Nm |
| 17 | Check valve, 5 psi / 0.3 bar | CV2 | Boom extend circuit | 20 ft-lbs / 27.1 Nm |
| 18 | Flow regulator valve, 0.1 gpm / 0.4 L/min | FR2 | Sway left circuit / load sense bleed | 33-37 ft-lbs / 45-50 Nm |
| 19 | Flow control valve, adj., 2.0 gpm / 7.6 L/min | FR1 | Sway left circuit | 33-37 ft-lbs / 45-50 Nm |
| 20 | Directional valve, proportional 3 position 4 way, pilot operated | PE4 | Sway left/right | 33-37 ft-lbs / 45-50 Nm |
| 21 | Solenoid valve, 2 position 4 way | SV4 | Function select -boom up and fork tilt up | 19-21 ft-lbs / 25.8-28.6 Nm |
| 22 | Solenoid valve, 2 position 4 way | SV2 | Function select -boom down and fork tilt down | 19-21 ft-lbs / 25.8-28.6 Nm |
| 23 | Solenoid valve, 2 position 2 way | SV9 | Function select - sway circuit | 40 ft-lbs / 54 Nm |

# Manifolds


SV1
1
23
SV9
PE1
2
22
Sv3
PE2
3
Sv2
4
PE3
5
RV3
6
CV9
7
CV8
8
21
SV4
RV2
9
RV1
10
20
PE4
CV7
11
19
FR1
18
FR2
17
CV2
CV1
12
CV3
13
16
CV4
CV6
14
15
CV5

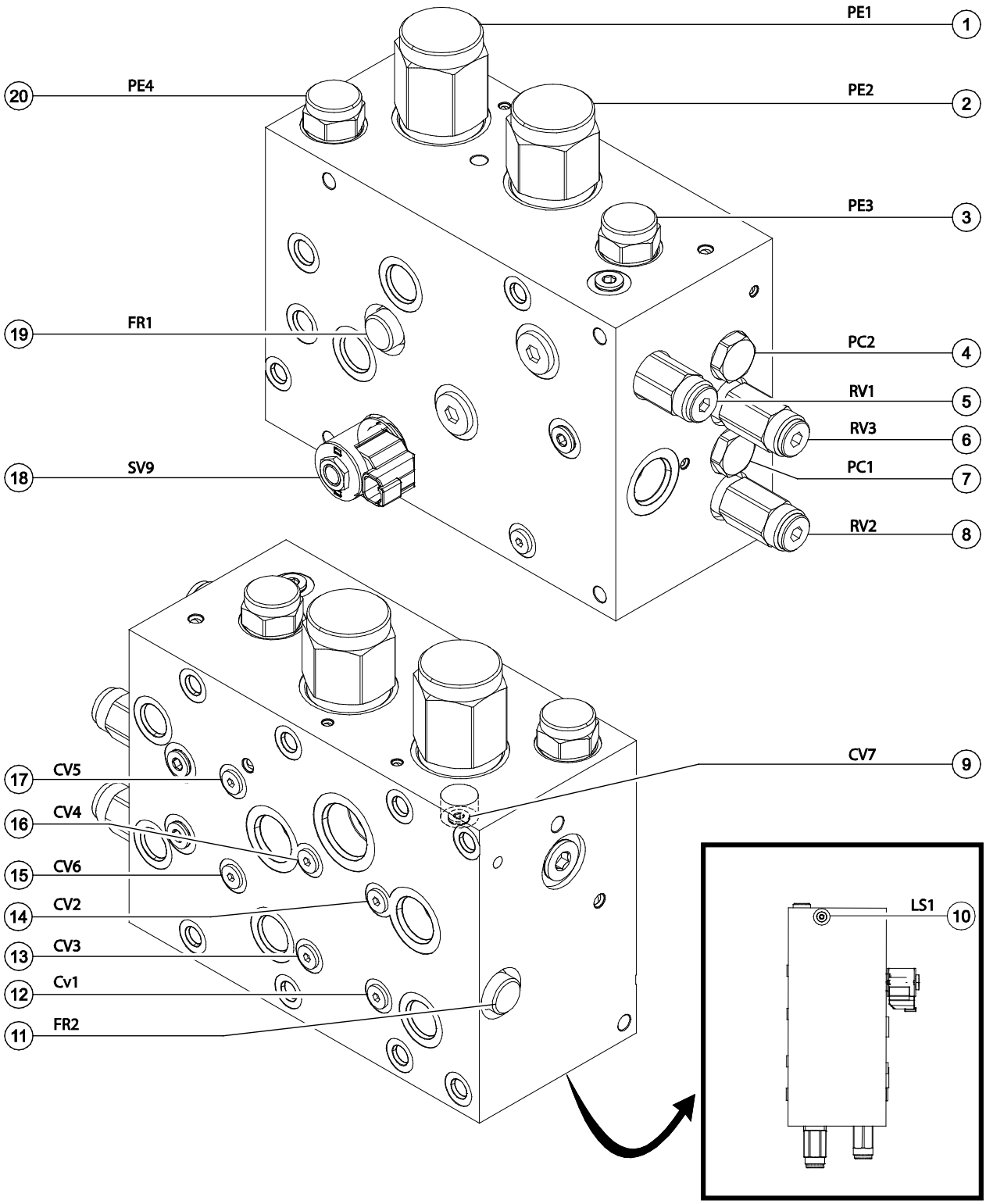
# Manifolds

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

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

| Index No. | Description | Schematic Item | Function | Torque |
|---|---|---|---|---|
| 1 | Directional valve, proportional | PE1 | Boom extend/retract | 140 ft-lbs / 190 Nm |
| 2 | Directional valve, proportional | PE2 | Boom up/down | 140 ft-lbs / 190 Nm |
| 3 | Directional valve, proportional | PE3 | Fork tilt up/down | 50 ft-lbs / 68 Nm |
| 4 | Check valve, pilot operated 100 psi / 6.9 bar | PC2 | Fork tilt down circuit | 40-45 ft-lbs / 54-61 Nm |
| 5 | Relief valve, 3500 psi / 241 bar | RV1 | System relief | 40-45 ft-lbs / 54-61 Nm |
| 6 | Relief valve, 3500 psi / 241 bar | RV3 | Fork tilt down circuit | 25-30 ft-lbs / 34-41 Nm |
| 7 | Check valve, pilot operated 100 psi / 6.9 bar | PC1 | Fork tilt up circuit | 40-45 ft-lbs / 54-61 Nm |
| 8 | Relief valve, 3500 psi / 241 bar | RV2 | Fork tilt up relief | 25-30 ft-lbs / 34-41 Nm |
| 9 | Relief valve, 3500 psi / 241 bar | CV7 | Sway right check valve | 20 ft-lbs / 27.1 Nm |
| 10 | Shuttle valve | LS1 | Function select - sway left/right | 12 ft-lbs / 16 Nm |
| 11 | Flow regulator valve, 0.1 gpm / .38 L/min | FR2 | Sway left circuit / load sense bleed | 33-37 ft-lbs / 45-50 Nm |
| 12 | Check valve, 5 psi / 0.3 bar | CV1 | Boom retract circuit | 20 ft-lbs / 27.1 Nm |
| 13 | Check valve, 5 psi / 0.3 bar | CV3 | Boom down circuit | 20 ft-lbs / 27.1 Nm |
| 14 | Check valve, 5 psi / 0.3 bar | CV2 | Boom extend circuit | 20 ft-lbs / 27.1 Nm |
| 15 | Check valve, 5 psi / 0.3 bar | CV6 | Tilt down circuit | 20 ft-lbs / 27.1 Nm |
| 16 | Check valve, 5 psi / 0.3 bar | CV4 | Boom up circuit | 20 ft-lbs / 27.1 Nm |
| 17 | Check valve, 5 psi / 0.3 bar | CV5 | Tilt up circuit | 20 ft-lbs / 27.1 Nm |
| 18 | Solenoid valve, 2 pos, 2 way | SV9 | Function select- sway circuit | 20 ft-lbs / 27.1 Nm |
| 19 | Flow control valve, 2.0 gpm | FR1 | Fork up/down circuit | 20 ft-lbs / 27.1 Nm |
| 20 | Directional valve, proportional | PE4 | Sway function select | 50 ft-lbs / 68 Nm |

# Manifolds


PE1
1
PE2
2
PE3
3
PC2
4
RV1
5
RV3
6
PC1
7
RV2
8
CV7
9
LS1
10
CV5
17
CV4
16
CV6
15
CV2
14
CV3
13
Cv1
12
FR2
11
PE4
20
FR1
19
SV9
18

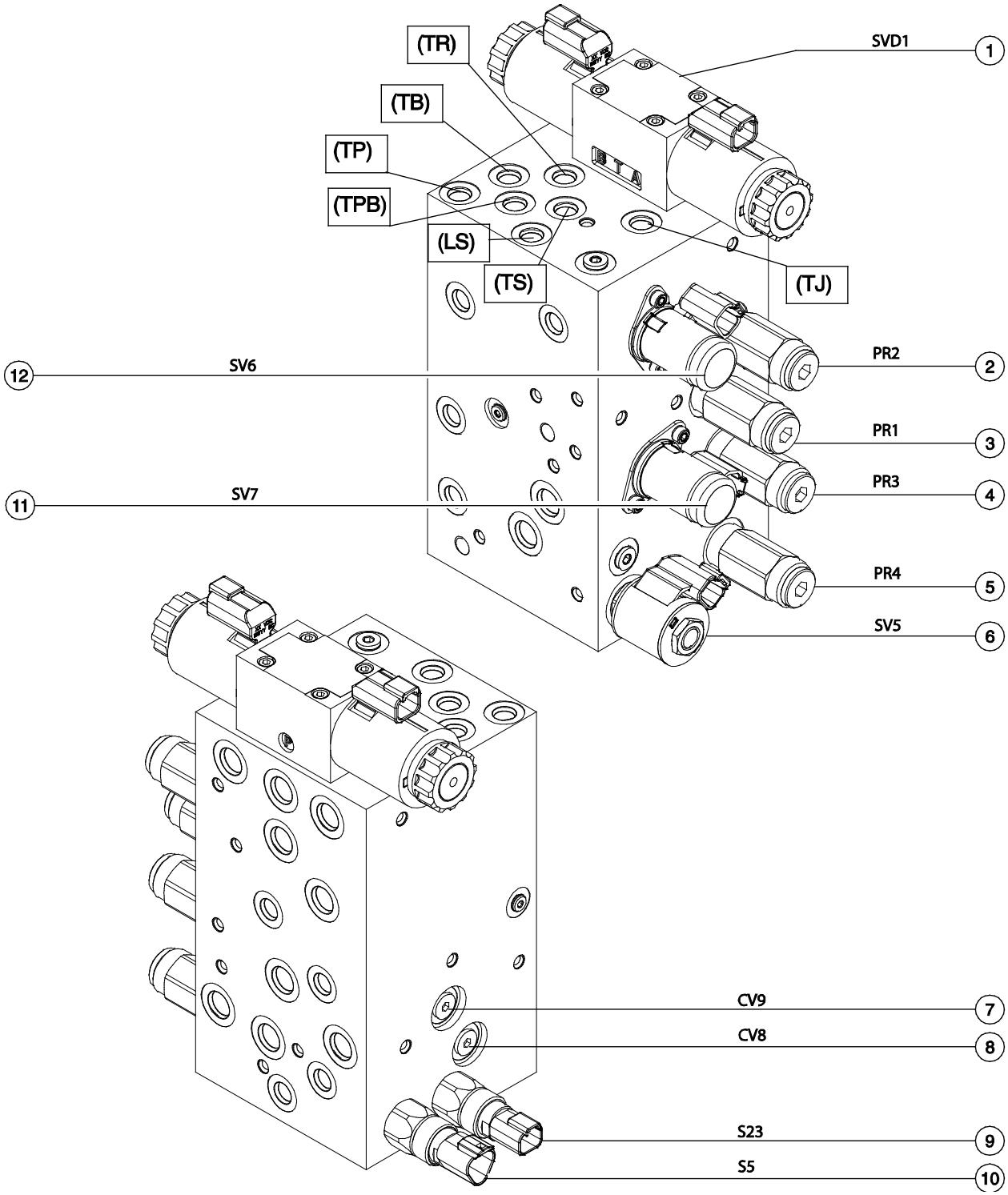
# Manifolds

## 7-3
## Secondary Function Manifold Components

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

| Index No. | Description | Schematic Item | Function | Torque |
|---|---|---|---|---|
| 1 | DO3 valve, 3 position 4 way | SVD1 | Steer left/right | 60 in-lbs / 6.8 Nm |
| 2 | Pressure reducing/relief valve, 50 psi / 3.4 bar | PR2 | Rear lock-up circuit | 50 ft-lbs / 68 Nm |
| 3 | Pressure reducing/relief valve,400 psi / 27.5 bar | PR1 | Differential lock-up circuit | 25-30 ft-lbs / 34-41 Nm |
| 4 | Pressure reducing/relief valve,2650 psi / 183 bar | PR3 | Steer circuit | 50 ft-lbs / 68 Nm |
| 5 | Pressure reducing/relief valve,350 psi / 24.8 bar | PR4 | Parking brake circuit | 25-30 ft-lbs / 34-41 Nm |
| 6 | Solenoid valve, 2 position 3 way | SV5 | Parking brake release | 20 ft-lbs / 27 Nm |
| 7 | Check valve, 5 psi / 0.35 bar | CV9 | Brake circuit | 20 ft-lbs / 27 Nm |
| 8 | Check valve, 5 psi / 0.35 bar | CV8 | Steering circuit | 20 ft-lbs / 27 Nm |
| 9 | Pressure switch | S23 | Brake warning switch | |
| 10 | Pressure switch | S5 | Parking brake switch | |
| 11 | Solenoid valve, 2 position 3 way | SV7 | Rear lock up select | 19-21 ft-lbs / 25.8-28.6 Nm |
| 12 | Solenoid valve, 2 position 3 way | SV6 | Differential lock up select | 19-21 ft-lbs / 25.8-28.6 Nm |

# Manifolds

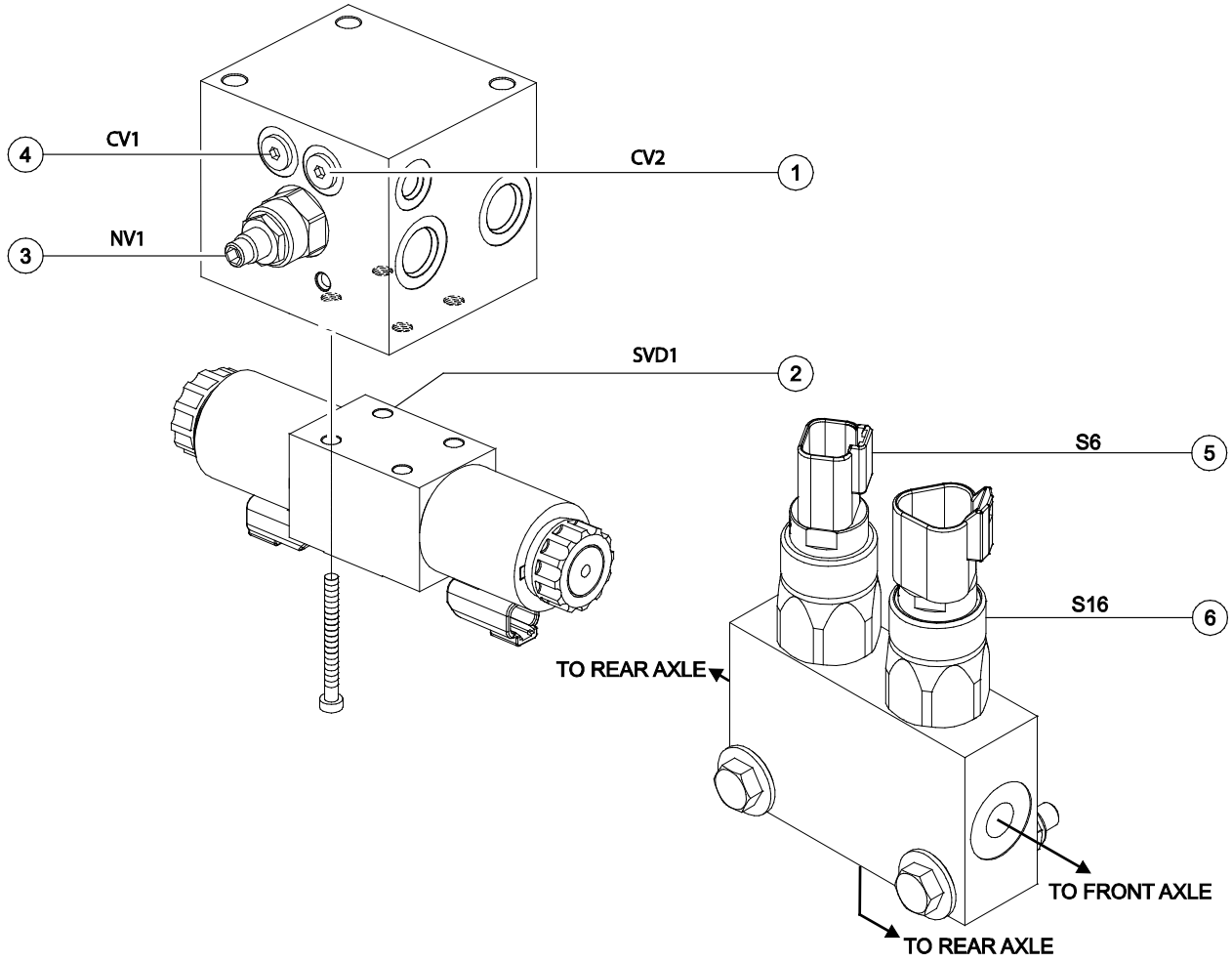

(TR)
(TB)
(TP)
(TPB)
(LS)
(TS)
(TJ)
SVD1
1
PR2
2
PR1
3
PR3
4
PR4
5
SV5
6
SV6
12
SV7
11
CV9
7
CV8
8
S23
9
S5
10

# Manifolds

## 7-4
## Auxiliary Manifold (option) and Brake Manifold Components

The auxiliary manifold is located under the transmission inspection cover.

| Index No. | Description | Schematic Item | Function | Torque |
|---|---|---|---|---|
| 1 | Check valve, 5 psi / 0.3 bar | CV2 | Auxiliary 'A1' circuit | 13 ft-lbs / 17.6 Nm |
| 2 | DO3 valve, 3 position 4 way | SVD1 | Auxiliary function enable | 60 in-lbs / 6.8 Nm |
| 3 | Flow regulator valve | NV1 | Function speed control | 50 ft-lbs / 68 Nm |
| 4 | Check valve, 5 psi / 0.3 bar | CV1 | Auxiliary 'A2' circuit | 13 ft-lbs / 17.6 Nm |
| 5 | Pressure switch, 450 psi / 31 bar | S6 | Clutch cut-off pressure | 11 ft-lbs / 14.9 Nm |
| 6 | Pressure switch, 50 psi / 3.4 bar | S16 | Brake light pressure (option) | 11 ft-lbs / 14.9 Nm |



# 7-5
# Valve Adjustments - Secondary Function Manifold

## How to Set the Steer System Pressure

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

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

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

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

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

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

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

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

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

6 Start the engine. Allow the engine to idle.

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

⊙ Result: The pressure gauge reads 2650 psi±50 psi / 183±3.4 bar. The pressure setting is correct. Proceed to step 12.

⊠ Result: The pressure gauge fails to read 2650 psi±50 psi / 183±3.4 bar. The pressure setting needs to be adjusted. Proceed to step 8.

8 Turn the machine off. Hold the steer pressure reducing/relief valve with a wrench and remove the cap (schematic item PR3).

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

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

10 Install the relief valve cap.

11 Repeat this procedure beginning with step 6.

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

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

# Manifolds

## How to Set the Parking Brake System Pressure

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

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

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

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

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

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

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

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

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

6 Start the engine. Allow the engine to idle.

⊙ Result: The pressure gauge reads 350 psi / 24.1. The pressure setting is correct. Proceed to step 11.

⊠ Result: The pressure gauge fails to read 350 psi / 24.1. The pressure setting needs to be adjusted. Proceed to step 7.

7 Turn the machine off. Hold the brake pressure reducing/relief valve with a wrench and remove the cap (schematic item PR4).

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

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

9 Install the relief valve cap.

10 Repeat this procedure beginning with step 6.

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

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

## How to Set the Differential Lock/Joystick System Pressure

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

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

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

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

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

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

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

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

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

6 Start the engine. Allow the engine to idle.

⊙ Result: The pressure gauge reads 400±20 psi / 27.5 ±1.4 bar. The pressure setting is correct. Proceed to step 11.

⊠ Result: The pressure gauge fails to read 400±20 psi / 27.5 ±1.4 bar. The pressure setting needs to be adjusted. Proceed to step 7.

7 Turn the machine off. Hold the differential lock/joystick pressure reducing/relief valve with a wrench and remove the cap (schematic item PR1).

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

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

9 Install the relief valve cap.

10 Repeat this procedure beginning with step 6.

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

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

# Manifolds

## How to Set the Rear Lock-up System Pressure

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

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

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

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

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

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

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

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

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

6 Start the engine. Allow the engine to idle.

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

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

7 Turn the machine off. Hold the rear lockup pressure reducing/relief valve with a wrench and remove the cap (schematic item PR2).

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

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

9 Install the relief valve cap.

10 Repeat this procedure beginning with step 6.

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

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

# 7-6 Valve Coils

## How to Test a Coil

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

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

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

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

1 Tag and disconnect the wiring from the coil to be tested.

2 Test the coil resistance.

⊙ Result: The resistance should be within specification, plus or minus 30%.

⊠ Result: If the resistance is not within specification, plus or minus 30%, replace the coil.

## Valve Coil Resistance Specification

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

**Valve Coil Resistance Specification**

| Description | Specification |
|---|---|
| DO3 valve, 3 position 4 way 12V DC with diode (schematic items SVD1) | 5.6Ω |
| Solenoid valve, 2 position 2 way 12V DC with diode (schematic items SV9) | 8.8Ω |
| Solenoid valve, 2 position 3 way 12V DC with diode (schematic items SV5, SV7, SV6) | 8.8Ω |
| Solenoid valve, 2 position 4 way 12V DC with diode (schematic items SV1, SV2, SV3, SV4) | 8.8Ω |

# Manifolds

## How to Test a Coil Diode

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

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

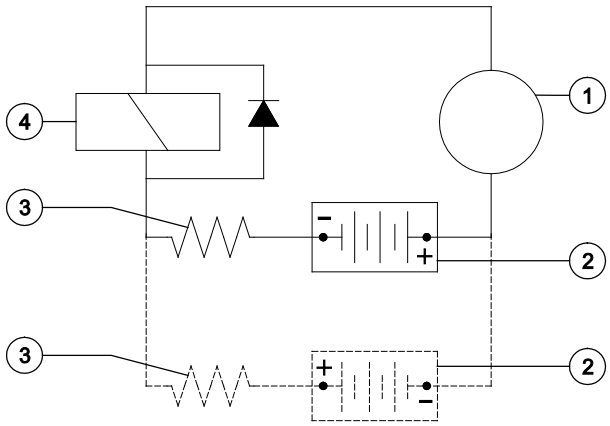
1 Test the coil for resistance. Refer to Repair Procedure, *How to Test a Coil*.

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

**Resistor 10Ω**

Genie part number 27287

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




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

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

3 Set a multimeter to read DC current.

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

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

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

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

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

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

# 8-1 Axles

## How to Remove the Axle

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

1 Chock the wheels.

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

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

4 Tag and remove the hydraulic hoses from the axle.

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

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

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

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

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

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

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

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

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

| **Bolt torque specification** | |
|---|---|
| Axle mounting bolts | 380 ft-lbs<br>515 Nm |

# Fault Codes



## Observe and Obey:

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

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

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

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

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

## 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.

# Diagnostic Display

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

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

The gauge cluster also includes two warning lights.

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

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

**Active Fault Codes**

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

**Active Codes vs Stored Codes**

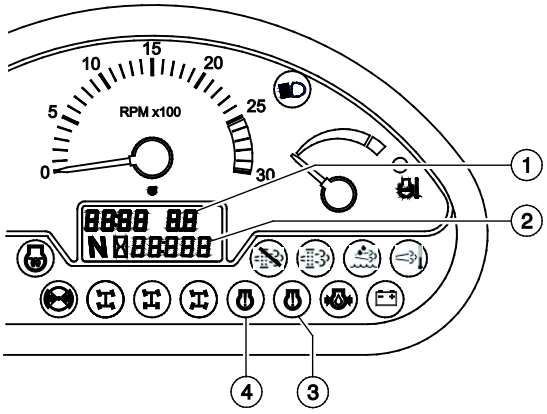
Active fault codes, indicating an engine condition or conditions which have not been corrected, are displayed at the moment the fault is detected.

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

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

**Decoding Fault Codes**

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




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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

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

# Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

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

# Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

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

# Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Deutz TCD3.6 Engine Fault Codes

SPN = Suspect Parameter Number
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FMI = Failure Mode Identifier

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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

# Deutz TCD3.6 Engine Fault Codes

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

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

# Perkins 1104 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

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

# Perkins 1104 Engine Fault Codes

SPN = Suspect Parameter Number
FMI = Failure Mode Identifier

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

| **Perkins 1100 Troubleshooting Manual** | |
|---|---|
| Genie part number | 123583 |

# Schematics



## Observe and Obey:

- ☑ 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.

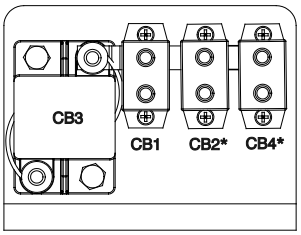
### Electrical Schematics

**⚠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.

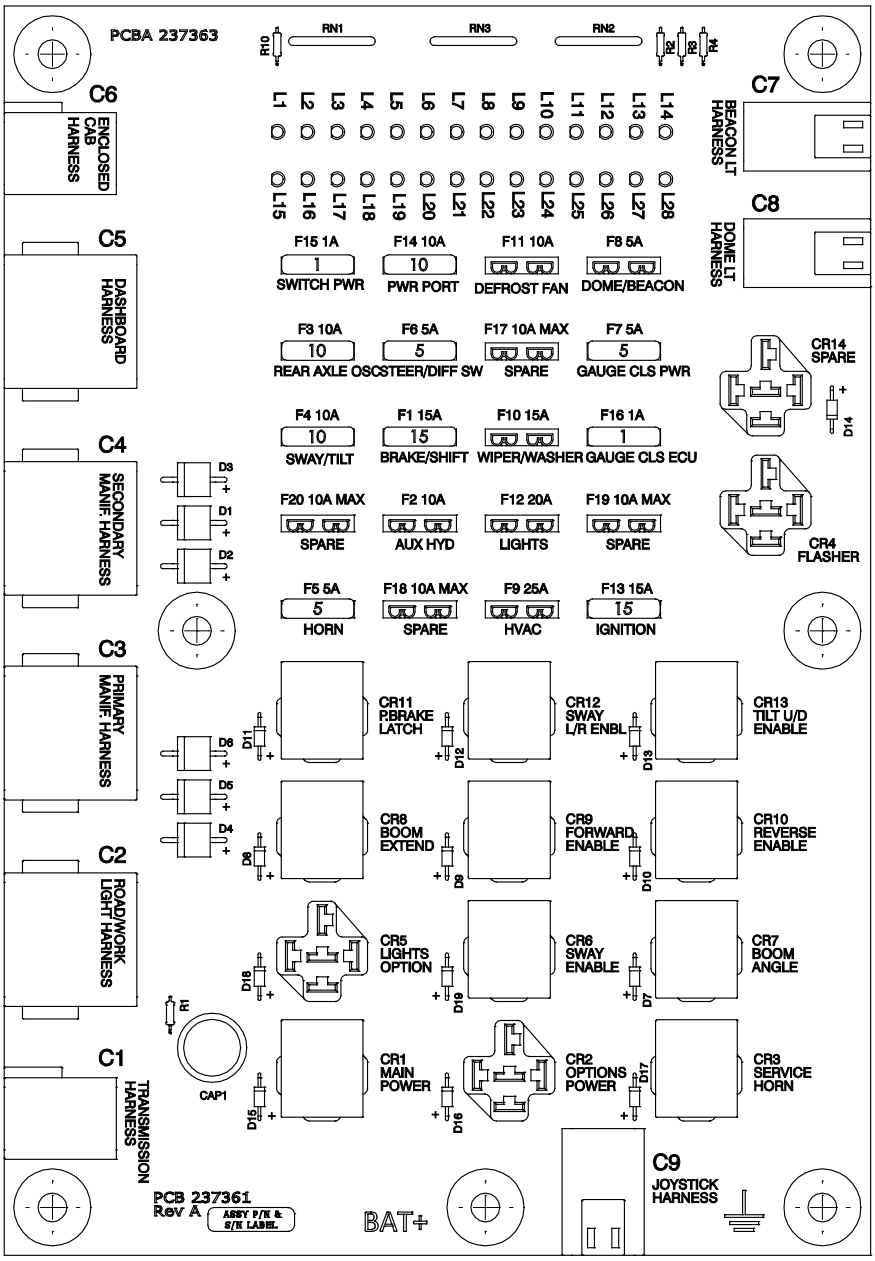
# Fuse Panel Layout (to 20629)




**Circuit Breakers located on the Battery Tray**

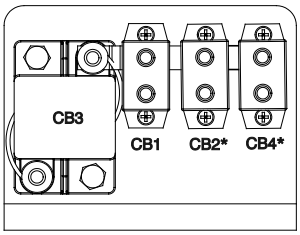
**CB1- Telehandler Control System Power**
**CB2- Engine Power / ECM**
**CB3- Glow Plugs**

CB1 and CB3 on all engines
CB2:
30A Deutz T3, T4i and Perkins T3
50A Perkins T4i



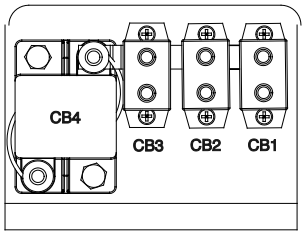

**Fuse Board located in the Cab**

# Fuse Panel Layout (from 20630 to 21535)




Deutz T3 - Perkins T3 - Perkins T4**i**

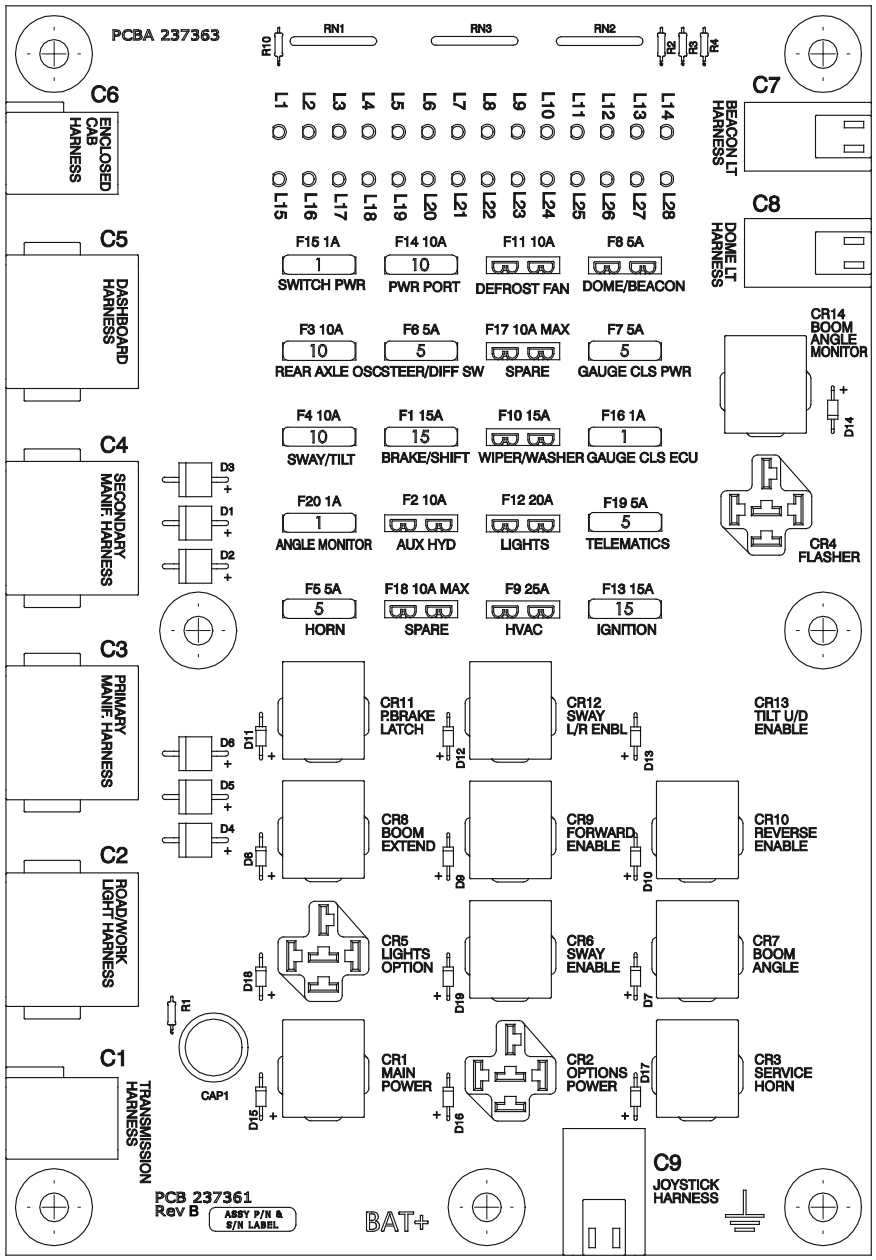
CB1- 50A- Control System Power
*CB2 30A- Engine Power / ECM
Deutz T3; Perkins T3
*CB2 50A
Perkins T4i
CB3 60A- Glow Plugs
*CB4 20A- Fuel Pump
Deutz T3 (from SN 21536)




Deutz T4F (from SN 21536)

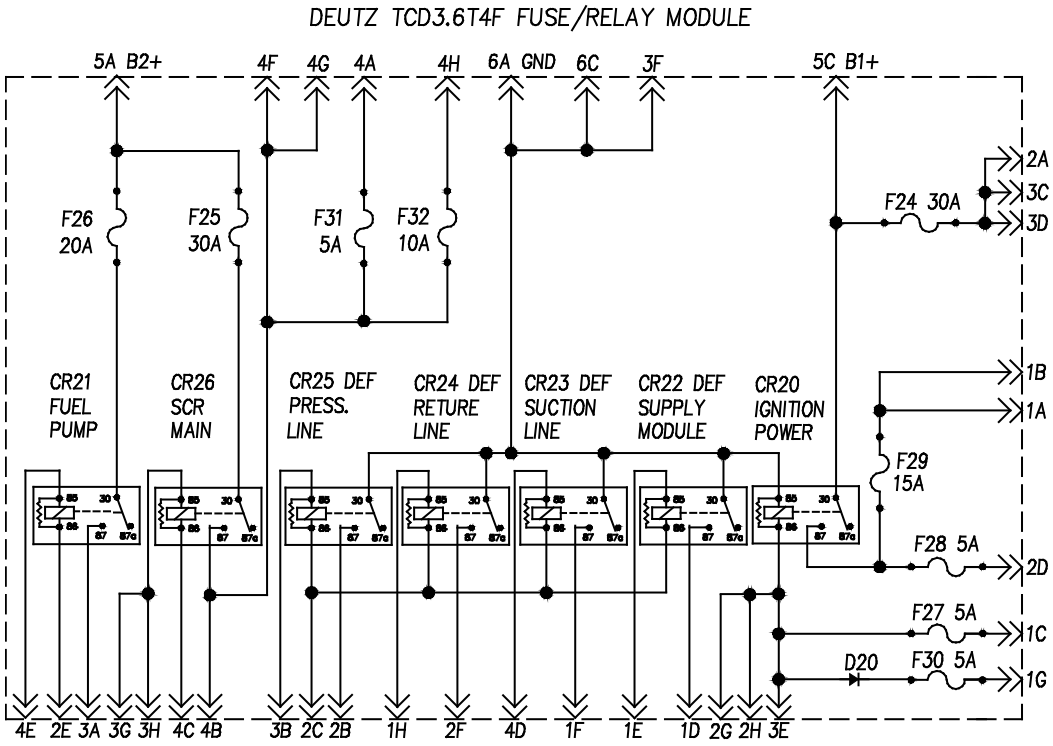
CB1 50A-EAT Power
CB2 50A- ECM Power
CB3 50A-Control System Power
CB4 60A-Glow Plugs

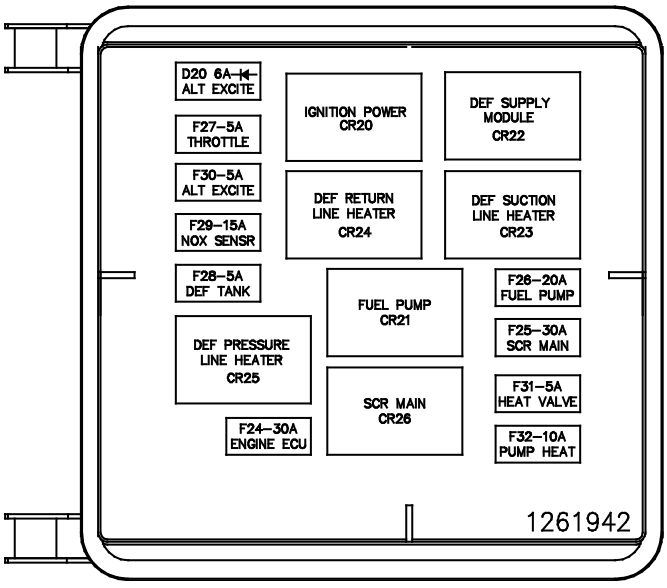
Circuit Breakers located on the Battery Tray




**Fuse Board located in the Cab**

# Deutz TCD3.6 T4F Module (from 21536, 16E-10000)




**Deutz TCD3.6 T4F Engine only**

# Electrical Component & Wire Color Abbreviation Legend

| Item | Description |
|---|---|
| **ALT** | **Alternator** |
| **B** | **Battery** |
| B1 | Main Battery |
| **CB** | **Circuit Breaker** |
| CB1 | 50 Amp Circuit Breaker |
| CB2 | 30 Amp or 50 Amp Circuit Breaker |
| CB3 | 50 Amp or 60 AMP Circuit Breaker |
| CB4 | 20 Amp or 60 Amp Circuit Breaker |
| **C** | **Capacitor** |
| C1 | 4700 uf |
| **CR** | **Control Relay** |
| CR1 | Main Power |
| CR2 | Options Power |
| CR3 | Service Horn |
| CR4 | Flasher |
| CR5 | Lights Option |
| CR6 | Sway Enable |
| CR7 | Boom Angle |
| CR8 | Boom Extend |
| CR9 | Forward Enable |
| CR10 | Reverse Enable |
| CR11 | Parking Brake Latch |
| CR12 | Sway Left/Right Enable |
| CR13 | Tilt Up/Down Enable |
| CR14 | Boom Angle Monitor |
| CR15 | HVAC Blower L |
| CR16 | HVAC Blower M |
| CR17 | HVAC Blower H |

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

# Electrical Component & Wire Color Abbreviation Legend

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

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

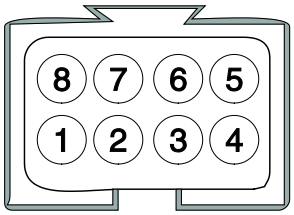
# Electrical Component & Wire Color Abbreviation Legend

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

| Wire Color Legend | |
|---|---|
| BL | Blue |
| BL/BK | Blue/Black |
| BL/RD | Blue/Red |
| BL/WH | Blue/White |
| BK | Black |
| BK/RD | Black/Red |
| BK/WH | Black/White |
| BK/YL | Black/Yellow |
| BR | Brown |
| GR | Green |
| GR/BK | Green/Black |
| GR/WH | Green/White |
| RD | Red |
| RD/BK | Red/Black |
| RD/WH | Red/White |
| OR | Orange |
| OR/BK | Orange/Black |
| OR/RD | Orange/Red |
| WH | White |
| WH/BK | White/Black |
| WH/RD | White/Red |

# Telematics Connector Pin Legend

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



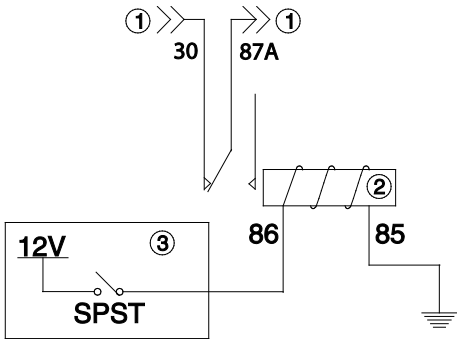

| Pin | Circuit Type | Circuit Properties | Genie Machine Function(s) | Telematics Use Case |
|---|---|---|---|---|
| 1 | System Power | 12 VDC<br>5 Amp Max. allowed draw | Battery Positive – constant power | Supply power to device |
| 2 | System Ground | 0 VDC | Battery Negative | Device Ground |
|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

* Not available on GTH-636

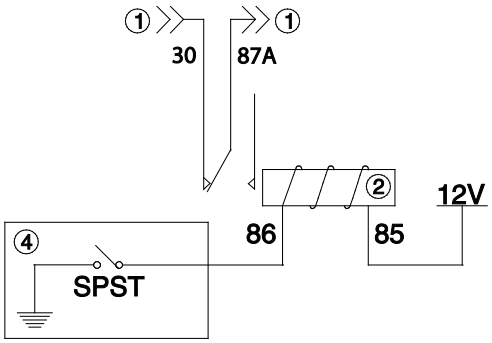
# Telematics Connector Pin Legend

## Remote Disable Engine Start Relay Configuration

Telematics Active High - Schematic
(standard wiring)




Telematics Active Low - Schematic
(optional wiring)




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

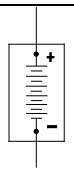
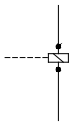
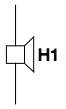
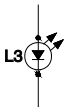
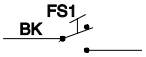
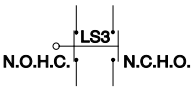
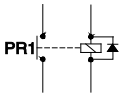
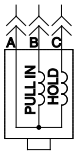
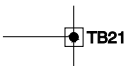
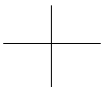
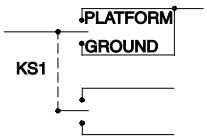
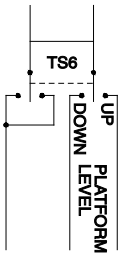
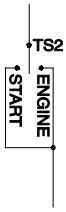
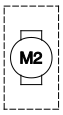
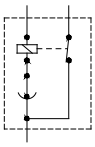
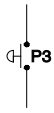
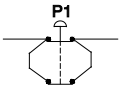
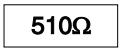
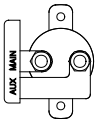
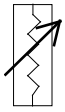
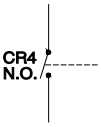
### Wireless Certifications

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

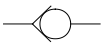
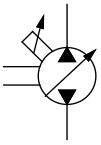
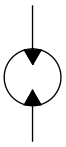
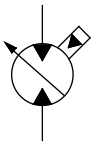
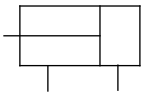
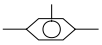
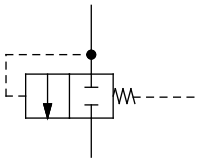
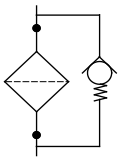
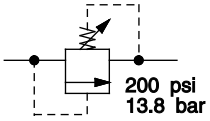
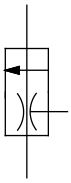
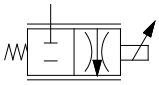
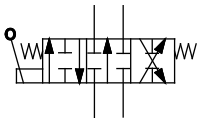
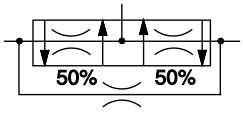
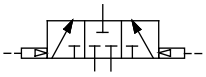
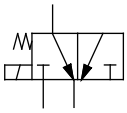
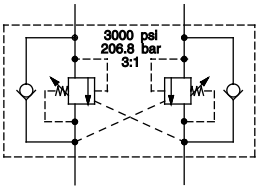
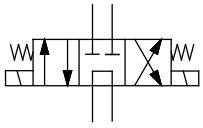
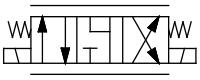
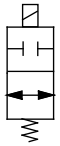
N. America – PTCRB, FCC/IC

Europe – CE, R&TTE

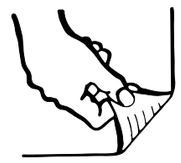
# Electrical Symbol Legend

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

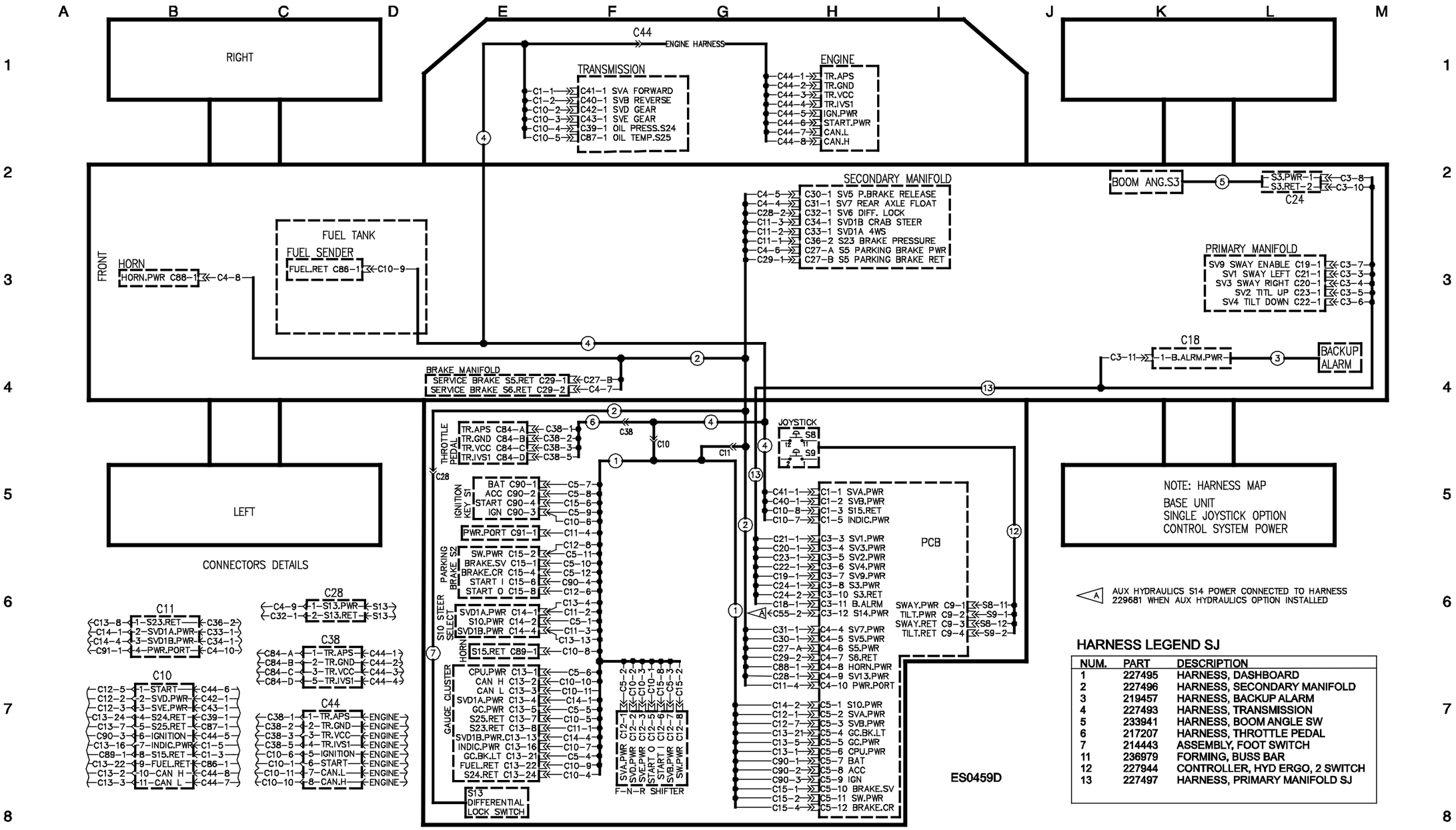
# Hydraulic Symbols Legend

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

# Harness Map - Control System Power Single Joystick (to 15-20661)



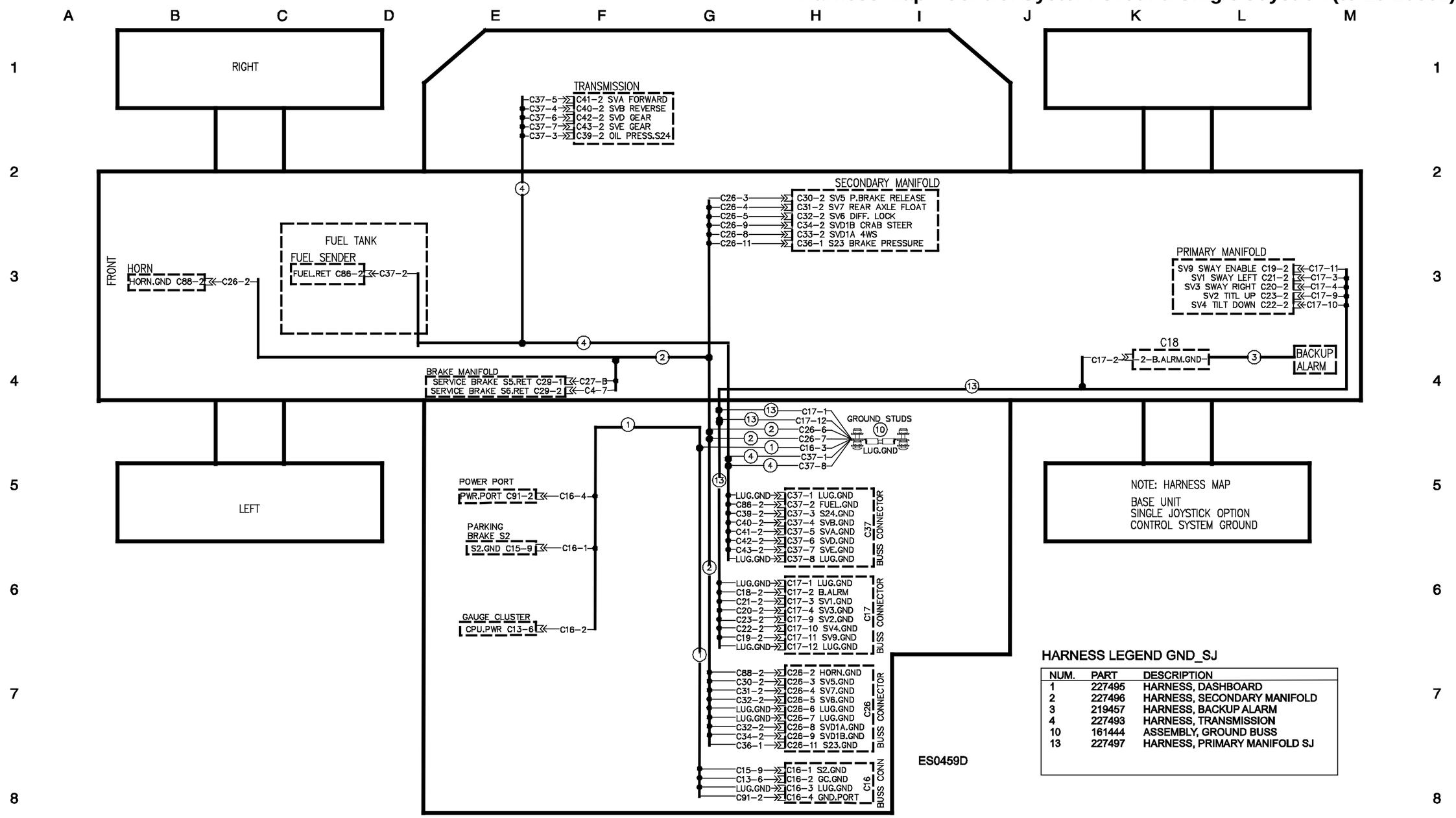
# Harness Map - Control System Power Single Joystick (to 15-20661)




## HARNESS LEGEND SJ

| NUM. | PART | DESCRIPTION |
|---|---|---|
| 1 | 227495 | HARNESS, DASHBOARD |
| 2 | 227496 | HARNESS, SECONDARY MANIFOLD |
| 3 | 219457 | HARNESS, BACKUP ALARM |
| 4 | 227493 | HARNESS, TRANSMISSION |
| 5 | 233941 | HARNESS, BOOM ANGLE SW |
| 6 | 217207 | HARNESS, THROTTLE PEDAL |
| 7 | 214443 | ASSEMBLY, FOOT SWITCH |
| 11 | 236979 | FORMING, BUSS BAR |
| 12 | 227944 | CONTROLLER, HYD ERGO, 2 SWITCH |
| 13 | 227497 | HARNESS, PRIMARY MANIFOLD SJ |

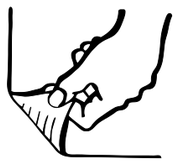
# Harness Map - Control System Ground Single Joystick (to 15-20661)



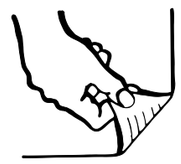

## HARNESS LEGEND GND_SJ

| NUM. | PART | DESCRIPTION |
|---|---|---|
| 1 | 227495 | HARNESS, DASHBOARD |
| 2 | 227496 | HARNESS, SECONDARY MANIFOLD |
| 3 | 219457 | HARNESS, BACKUP ALARM |
| 4 | 227493 | HARNESS, TRANSMISSION |
| 10 | 161444 | ASSEMBLY, GROUND BUSS |
| 13 | 227497 | HARNESS, PRIMARY MANIFOLD SJ |

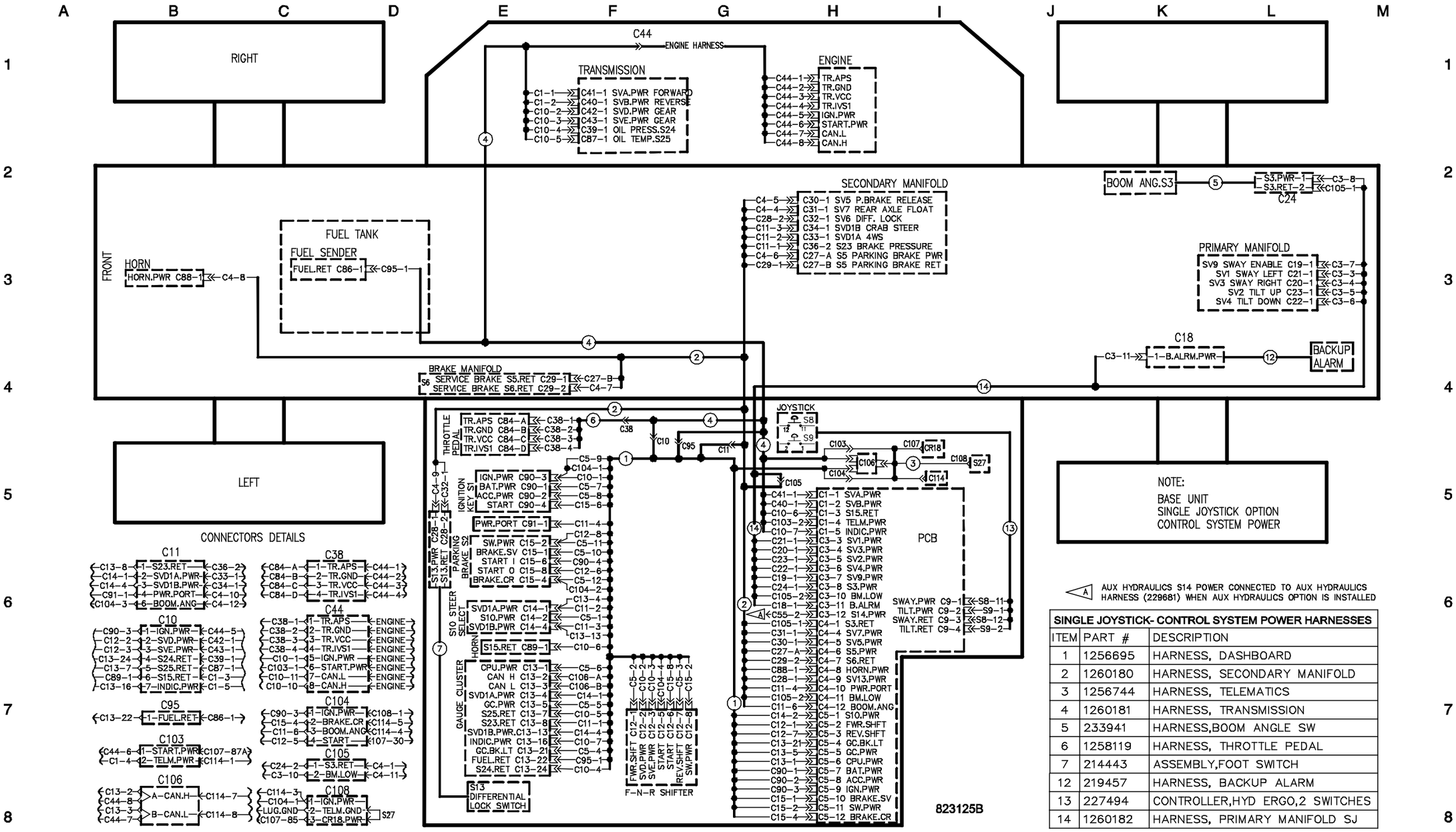
# Harness Map - Control System Ground
# Single Joystick (to 15-20661)



# Harness Map - Control System Power
# Single Joystick (from 15-20662 to 21535)

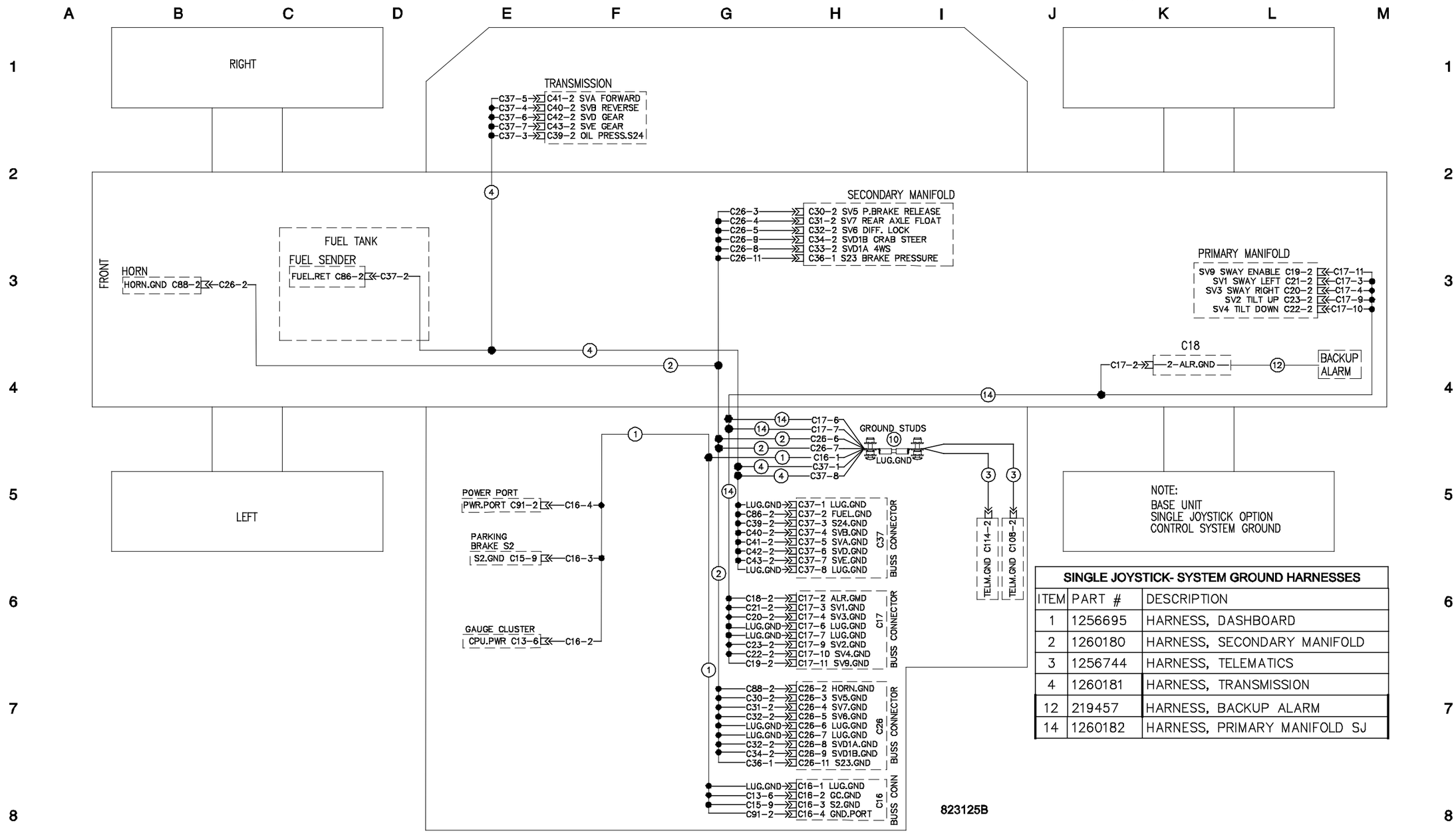


# Harness Map - Control System Power Single Joystick (from 15-20662 to 21535)



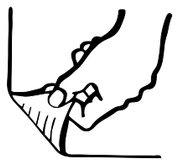

| SINGLE JOYSTICK- CONTROL SYSTEM POWER HARNESSES | | |
|---|---|---|
| ITEM | PART # | DESCRIPTION |
| 1 | 1256695 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1260181 | HARNESS, TRANSMISSION |
| 5 | 233941 | HARNESS,BOOM ANGLE SW |
| 6 | 1258119 | HARNESS, THROTTLE PEDAL |
| 7 | 214443 | ASSEMBLY,FOOT SWITCH |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 13 | 227494 | CONTROLLER,HYD ERGO,2 SWITCHES |
| 14 | 1260182 | HARNESS, PRIMARY MANIFOLD SJ |

# Harness Map - Control System Ground Single Joystick (from 15-20662 to 21535)

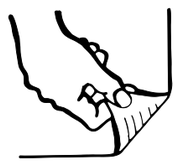



| SINGLE JOYSTICK- SYSTEM GROUND HARNESSES | | |
|---|---|---|
| ITEM | PART # | DESCRIPTION |
| 1 | 1256695 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1260181 | HARNESS, TRANSMISSION |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 14 | 1260182 | HARNESS, PRIMARY MANIFOLD SJ |

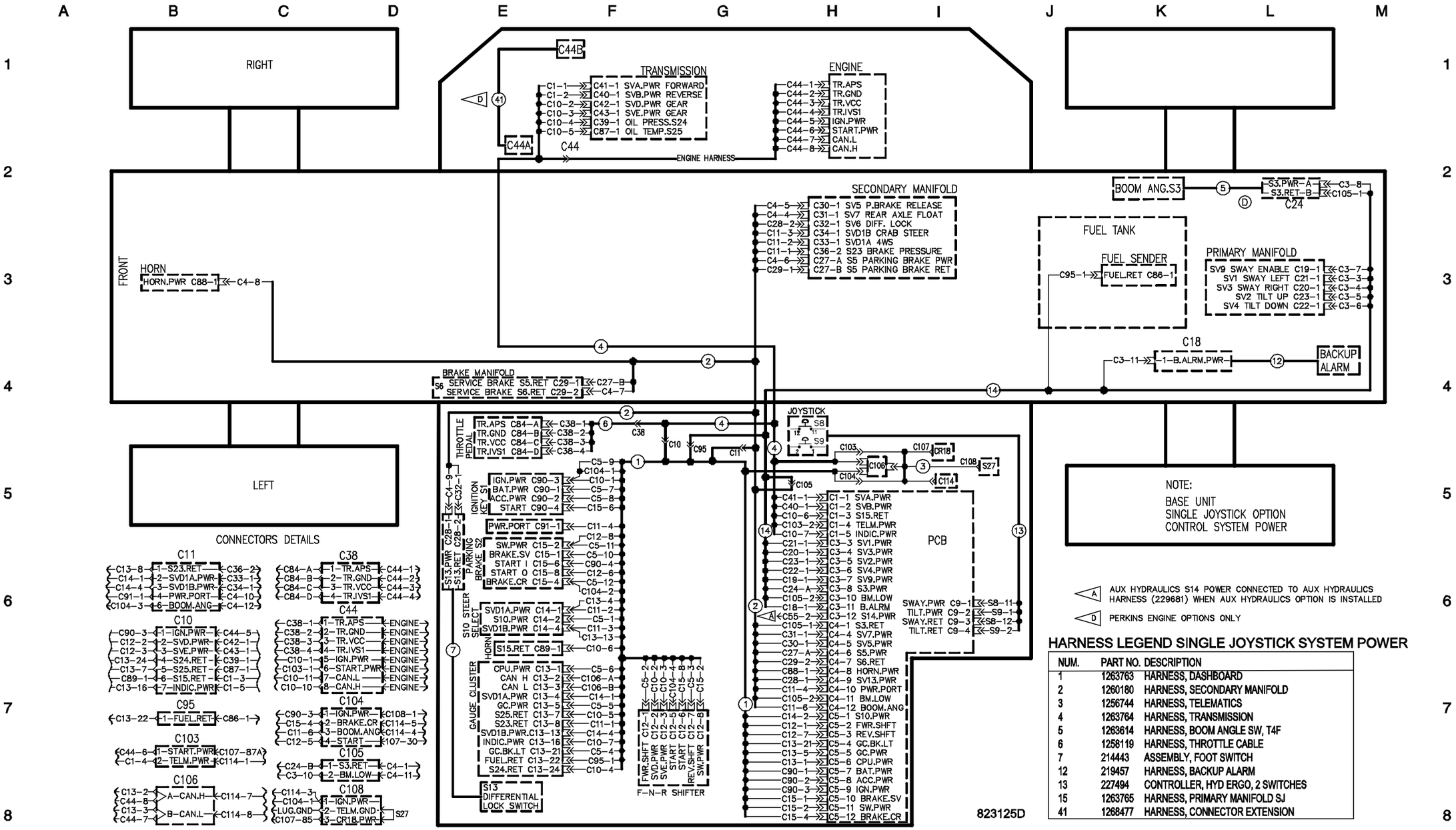
# Harness Map - Control System Ground
# Single Joystick (from 15-20662 to 21535)



# Harness Map - Control System Power
# Single Joystick (from 15-21536, 16E-10000)



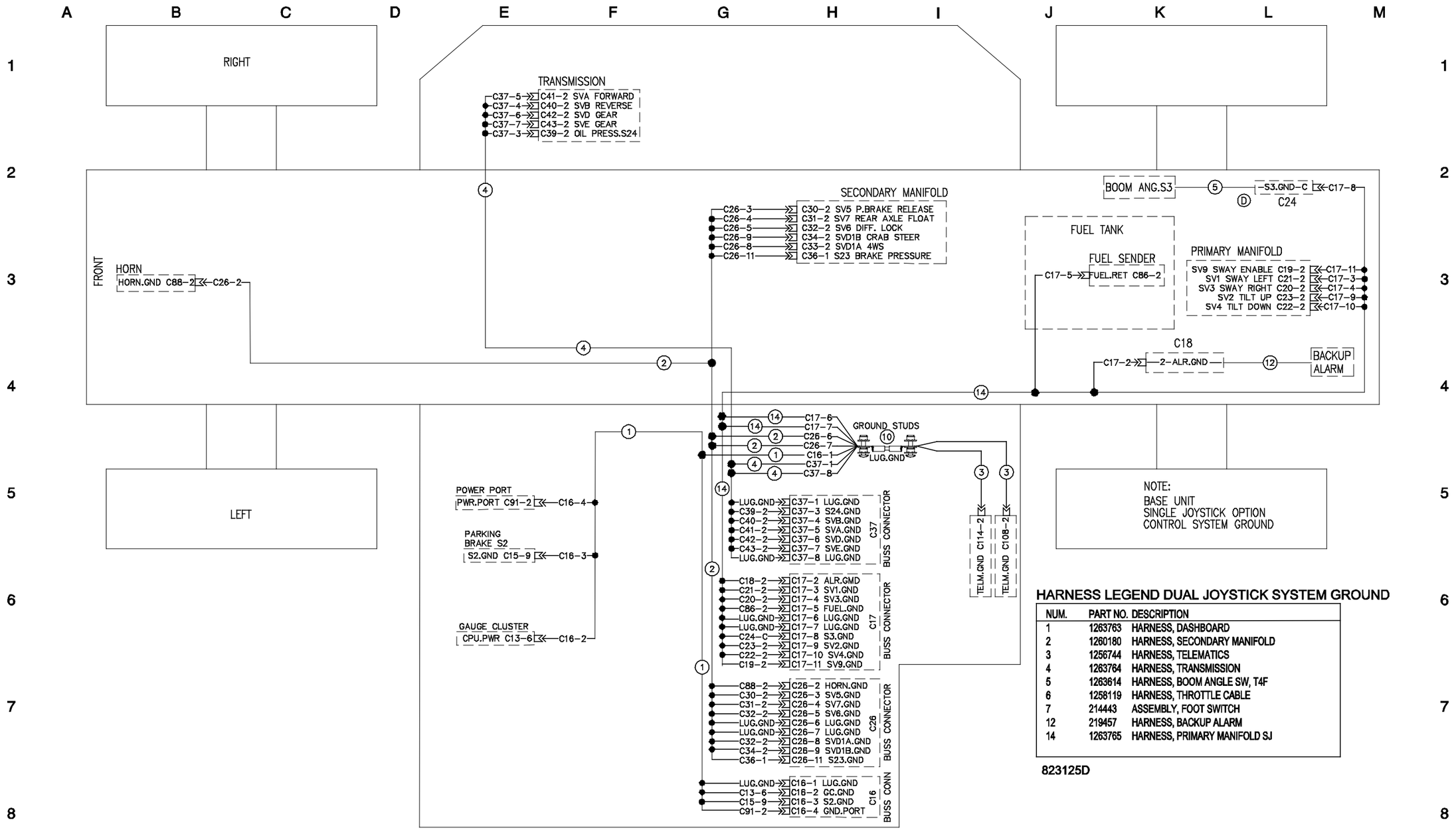
# Harness Map - Control System Power Single Joystick (from 15-21536, 16E-10000)




## HARNESS LEGEND SINGLE JOYSTICK SYSTEM POWER

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 1263763 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1263764 | HARNESS, TRANSMISSION |
| 5 | 1263614 | HARNESS, BOOM ANGLE SW, T4F |
| 6 | 1258119 | HARNESS, THROTTLE CABLE |
| 7 | 214443 | ASSEMBLY, FOOT SWITCH |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 13 | 227494 | CONTROLLER, HYD ERGO, 2 SWITCHES |
| 15 | 1263765 | HARNESS, PRIMARY MANIFOLD SJ |
| 41 | 1268477 | HARNESS, CONNECTOR EXTENSION |

# Harness Map - Control System Ground Single Joystick (from 15-21536, 16E-10000)

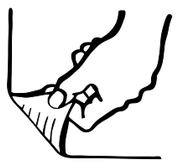



## HARNESS LEGEND DUAL JOYSTICK SYSTEM GROUND

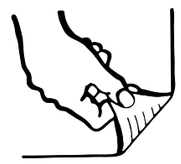
| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 1263763 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1263764 | HARNESS, TRANSMISSION |
| 5 | 1263614 | HARNESS, BOOM ANGLE SW, T4F |
| 6 | 1258119 | HARNESS, THROTTLE CABLE |
| 7 | 214443 | ASSEMBLY, FOOT SWITCH |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 14 | 1263765 | HARNESS, PRIMARY MANIFOLD SJ |

823125D

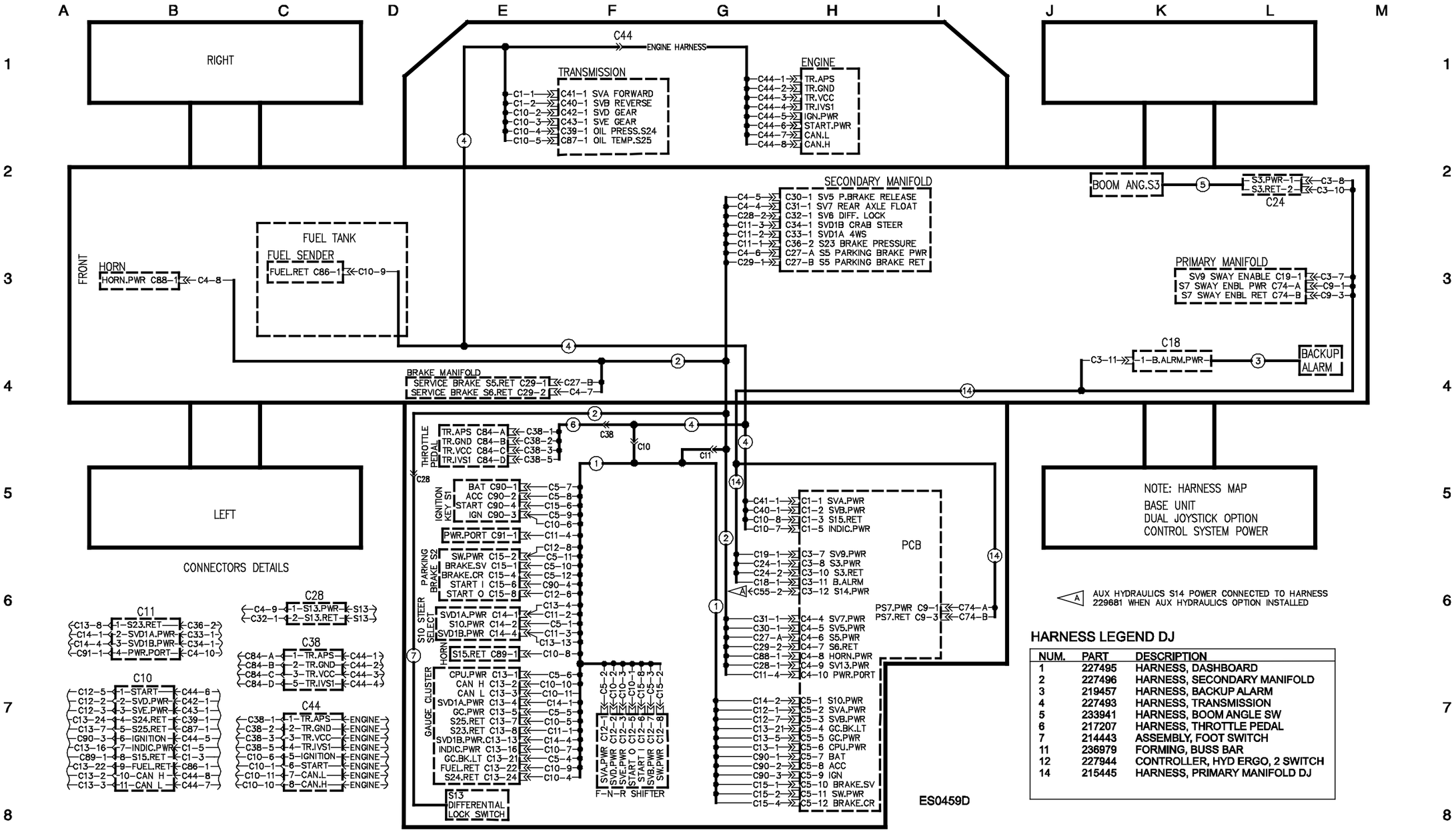
# Harness Map - Control System Ground
# Single Joystick (from 15-21536, 16E-10000)



# Harness Map - Control System Power
# Dual Joystick (to 15-20661)



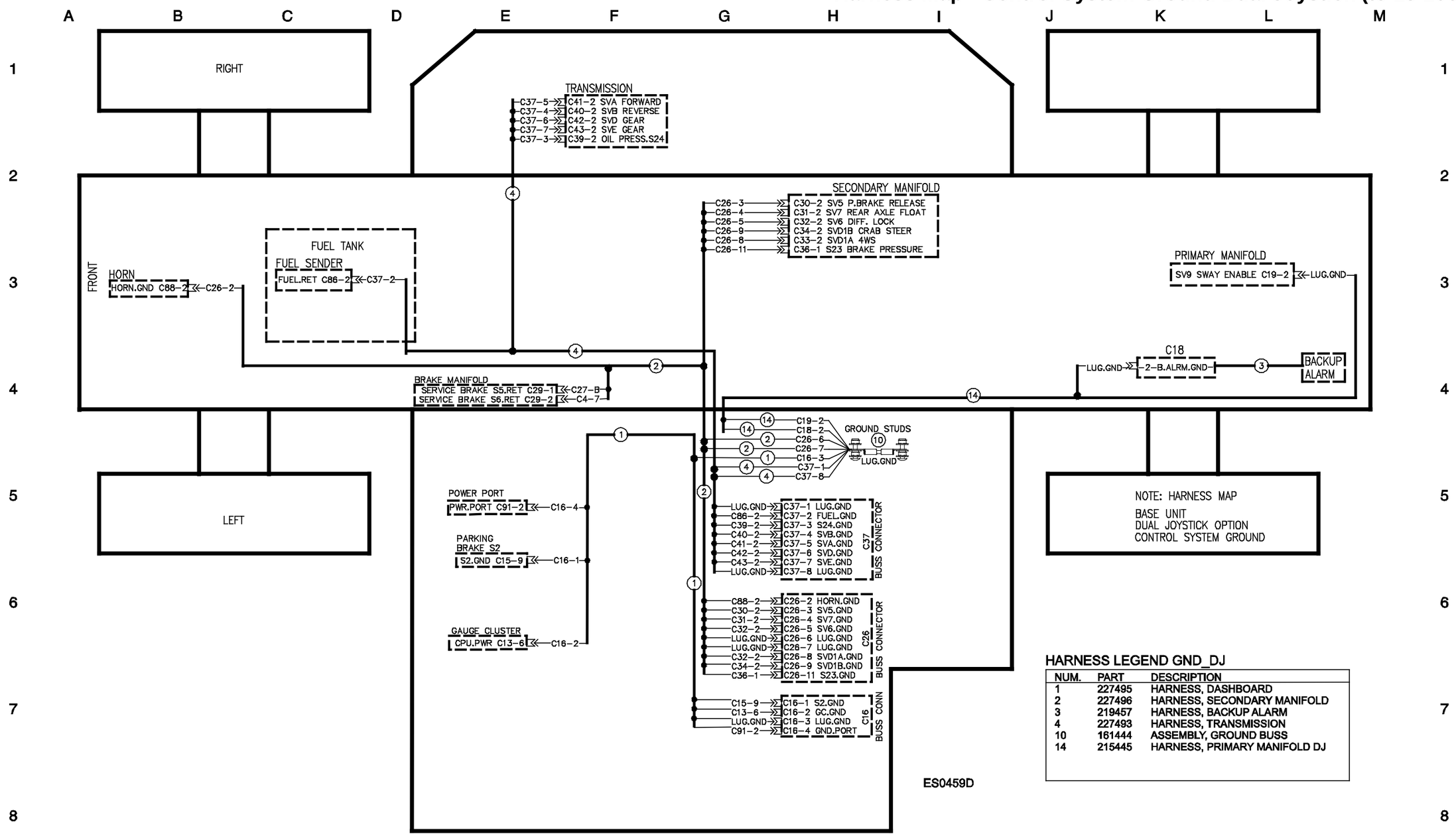
# Harness Map - Control System Power Dual Joystick (to 15-20661)




## HARNESS LEGEND DJ

| NUM. | PART | DESCRIPTION |
|---|---|---|
| 1 | 227495 | HARNESS, DASHBOARD |
| 2 | 227496 | HARNESS, SECONDARY MANIFOLD |
| 3 | 219457 | HARNESS, BACKUP ALARM |
| 4 | 227493 | HARNESS, TRANSMISSION |
| 5 | 233941 | HARNESS, BOOM ANGLE SW |
| 6 | 217207 | HARNESS, THROTTLE PEDAL |
| 7 | 214443 | ASSEMBLY, FOOT SWITCH |
| 11 | 236979 | FORMING, BUSS BAR |
| 12 | 227944 | CONTROLLER, HYD ERGO, 2 SWITCH |
| 14 | 215445 | HARNESS, PRIMARY MANIFOLD DJ |

# Harness Map - Control System Ground Dual Joystick (to 15-20661)



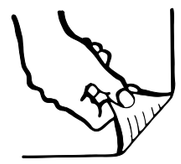

## HARNESS LEGEND GND_DJ

| NUM. | PART | DESCRIPTION |
|---|---|---|
| 1 | 227495 | HARNESS, DASHBOARD |
| 2 | 227496 | HARNESS, SECONDARY MANIFOLD |
| 3 | 219457 | HARNESS, BACKUP ALARM |
| 4 | 227493 | HARNESS, TRANSMISSION |
| 10 | 161444 | ASSEMBLY, GROUND BUSS |
| 14 | 215445 | HARNESS, PRIMARY MANIFOLD DJ |

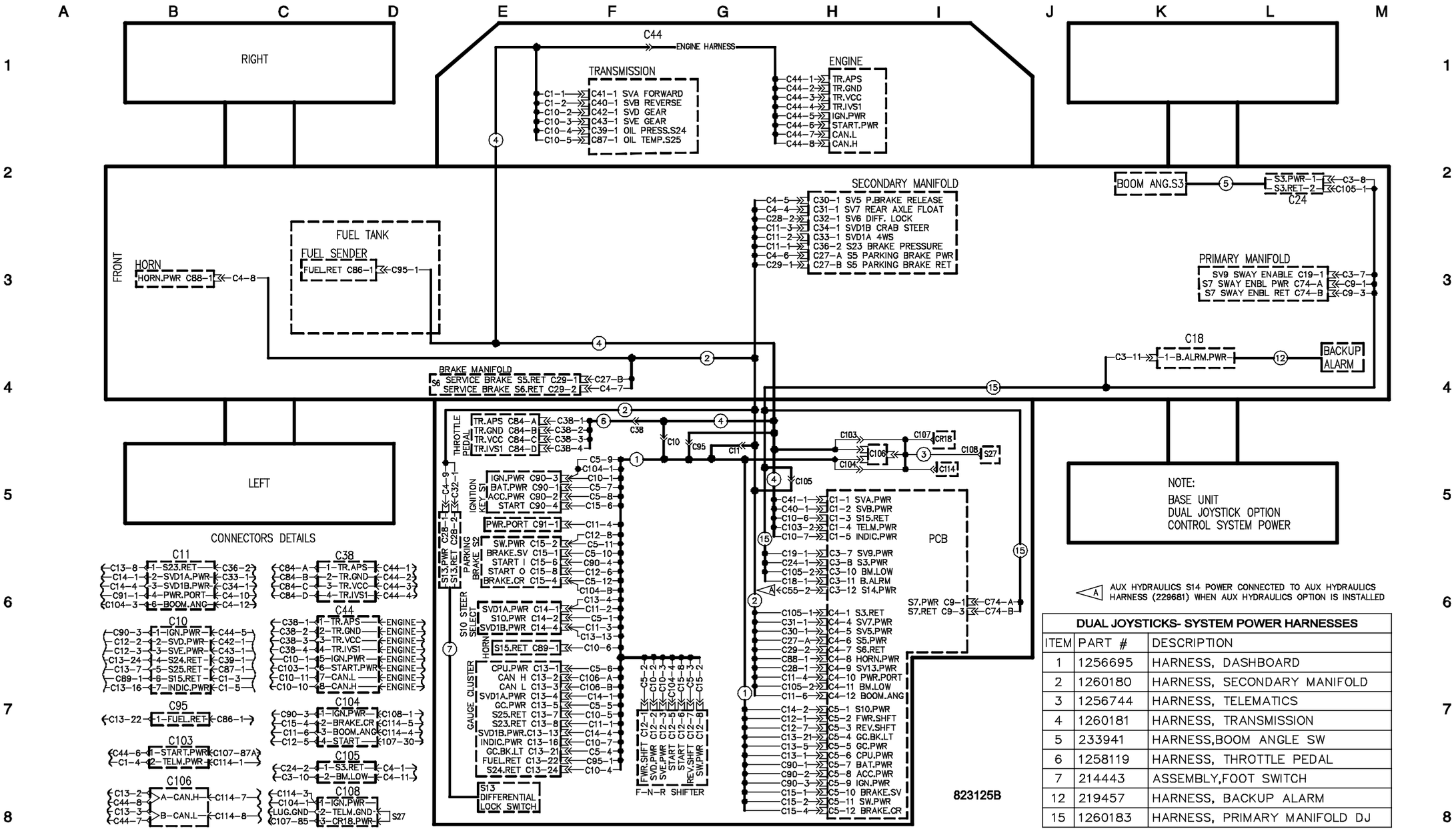
# Harness Map - Control System Ground Dual Joystick (to 15-20661)



# Harness Map - Control System Power Dual Joystick (from 15-20662 to 21535)

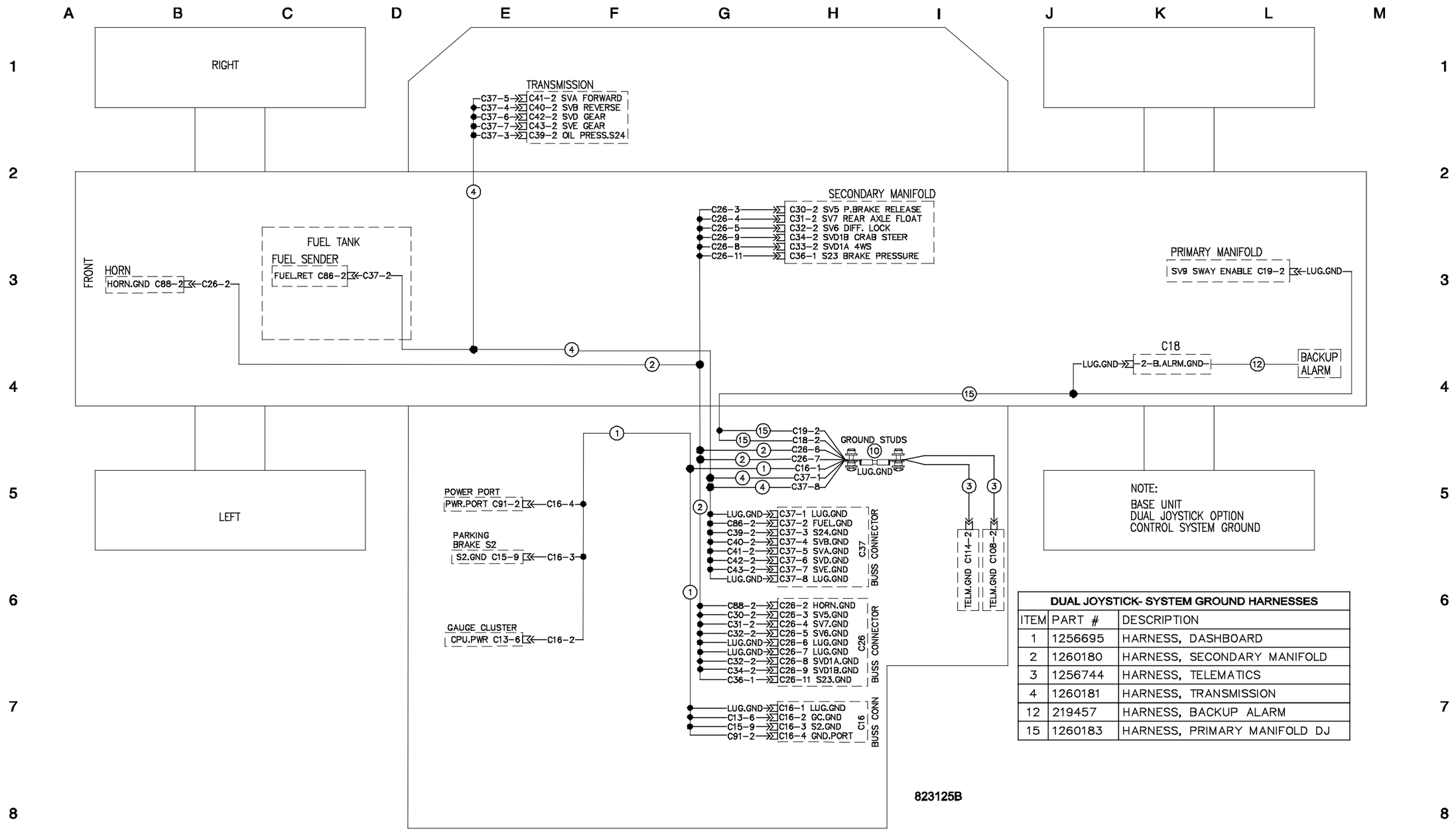


# Harness Map - Control System Power Dual Joystick (from 15-20662 to 21535)




| DUAL JOYSTICKS- SYSTEM POWER HARNESSES | | |
|---|---|---|
| ITEM | PART # | DESCRIPTION |
| 1 | 1256695 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1260181 | HARNESS, TRANSMISSION |
| 5 | 233941 | HARNESS,BOOM ANGLE SW |
| 6 | 1258119 | HARNESS, THROTTLE PEDAL |
| 7 | 214443 | ASSEMBLY,FOOT SWITCH |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 15 | 1260183 | HARNESS, PRIMARY MANIFOLD DJ |

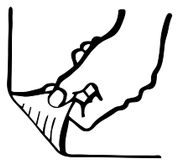
## Harness Map - Control System Ground Dual Joystick (from 15-20662 to 21535)



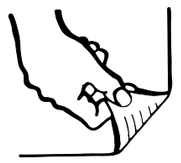

| DUAL JOYSTICK- SYSTEM GROUND HARNESSES | | |
|---|---|---|
| ITEM | PART # | DESCRIPTION |
| 1 | 1256695 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1260181 | HARNESS, TRANSMISSION |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 15 | 1260183 | HARNESS, PRIMARY MANIFOLD DJ |

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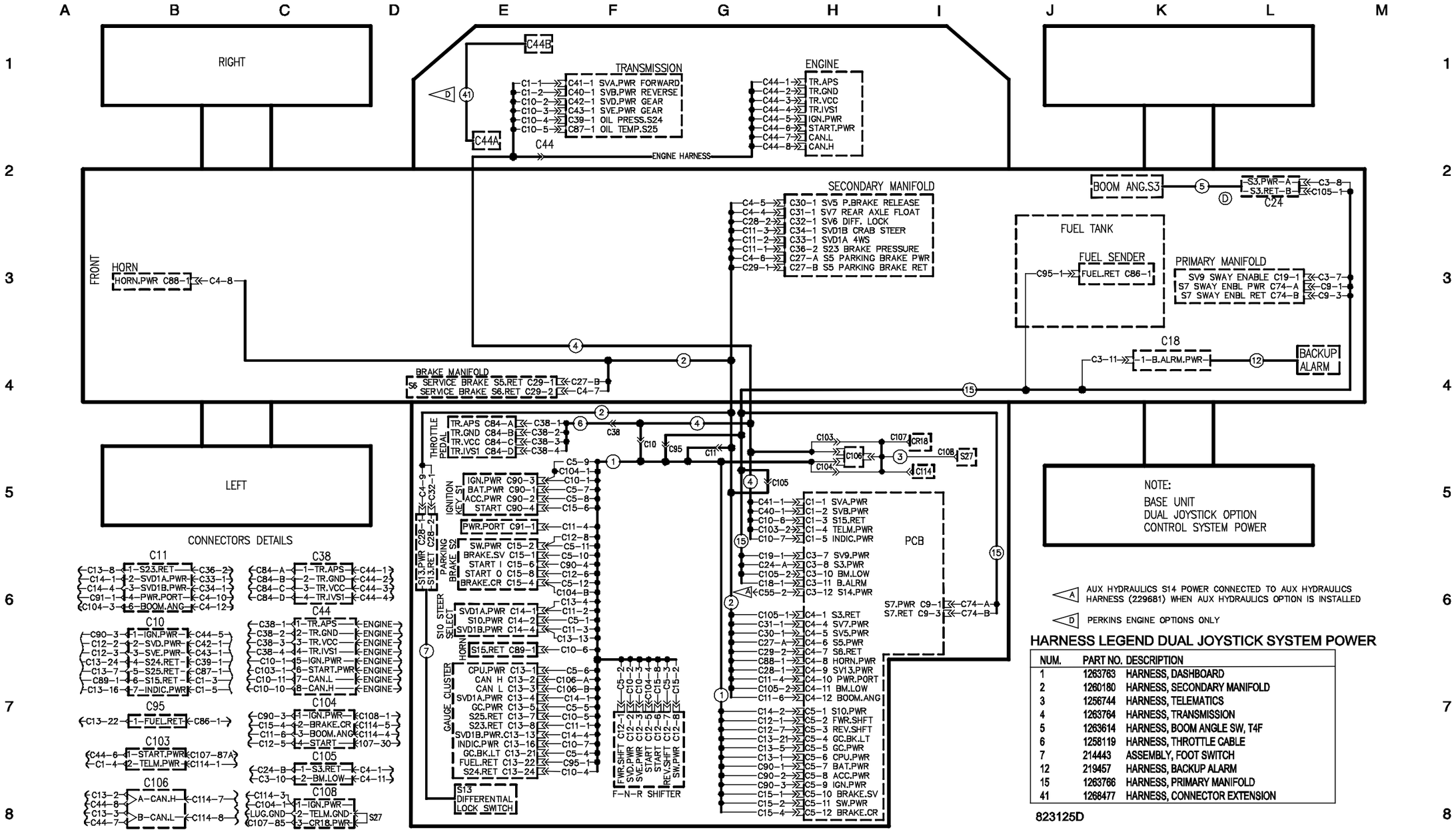
# Harness Map - Control System Ground Dual Joystick (from 15-20662 to 21535)



# Harness Map - Control System Power
# Dual Joystick (from 15-21536, 16E-10000)



## Harness Map - Control System Power Dual Joystick (from 15-21536, 16E-10000)




A AUX HYDRAULICS S14 POWER CONNECTED TO AUX HYDRAULICS HARNESS (229681) WHEN AUX HYDRAULICS OPTION IS INSTALLED

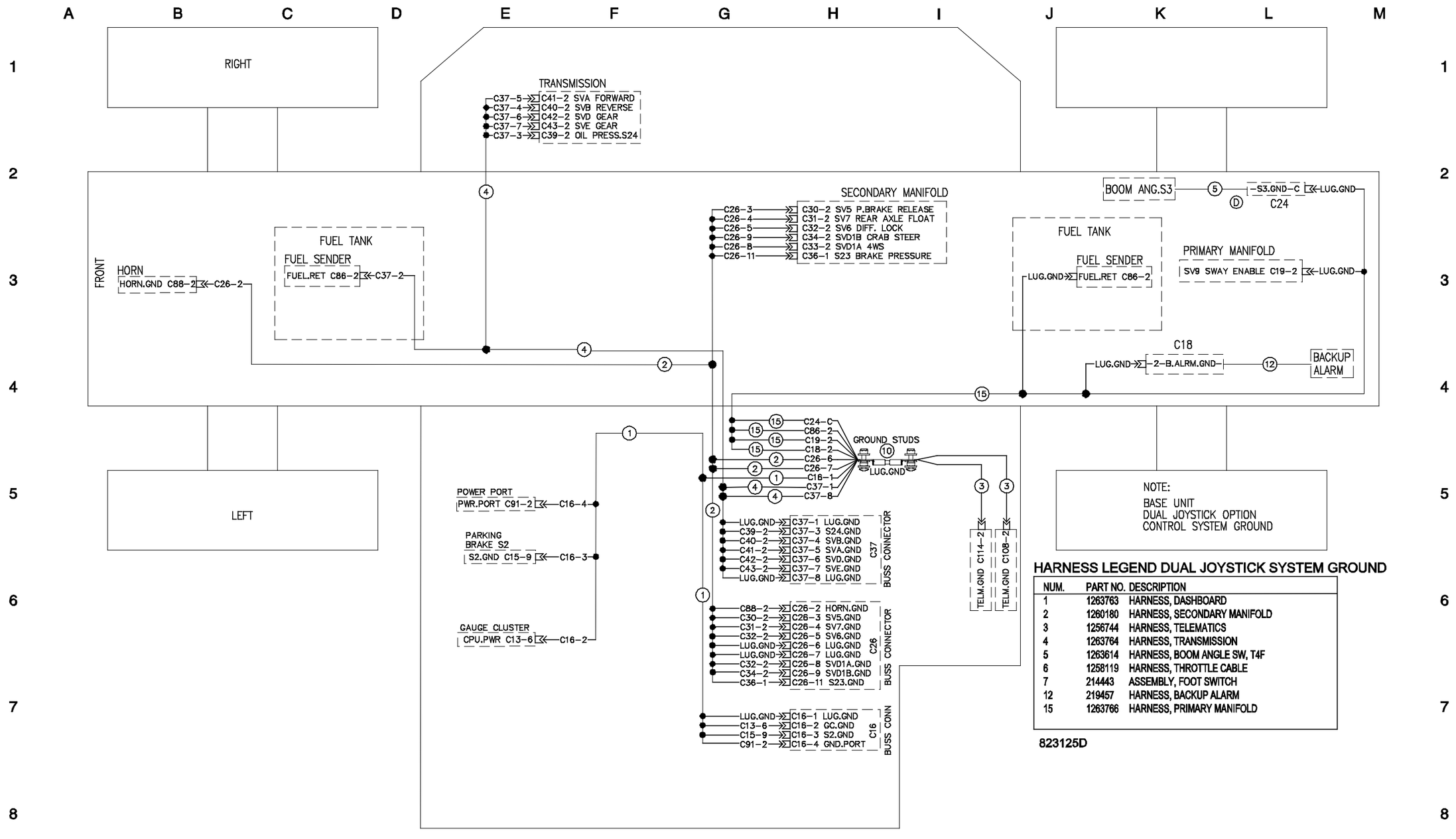
D PERKINS ENGINE OPTIONS ONLY

### HARNESS LEGEND DUAL JOYSTICK SYSTEM POWER

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 1263763 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1263764 | HARNESS, TRANSMISSION |
| 5 | 1263614 | HARNESS, BOOM ANGLE SW, T4F |
| 6 | 1258119 | HARNESS, THROTTLE CABLE |
| 7 | 214443 | ASSEMBLY, FOOT SWITCH |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 15 | 1263766 | HARNESS, PRIMARY MANIFOLD |
| 41 | 1268477 | HARNESS, CONNECTOR EXTENSION |

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# Harness Map - Control System Ground Dual Joystick (from 15-21536, 16E-10000)

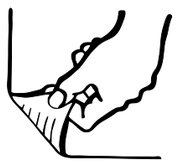



## HARNESS LEGEND DUAL JOYSTICK SYSTEM GROUND

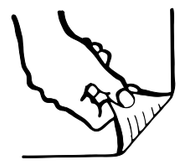
| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 1 | 1263763 | HARNESS, DASHBOARD |
| 2 | 1260180 | HARNESS, SECONDARY MANIFOLD |
| 3 | 1256744 | HARNESS, TELEMATICS |
| 4 | 1263764 | HARNESS, TRANSMISSION |
| 5 | 1263614 | HARNESS, BOOM ANGLE SW, T4F |
| 6 | 1258119 | HARNESS, THROTTLE CABLE |
| 7 | 214443 | ASSEMBLY, FOOT SWITCH |
| 12 | 219457 | HARNESS, BACKUP ALARM |
| 15 | 1263766 | HARNESS, PRIMARY MANIFOLD |

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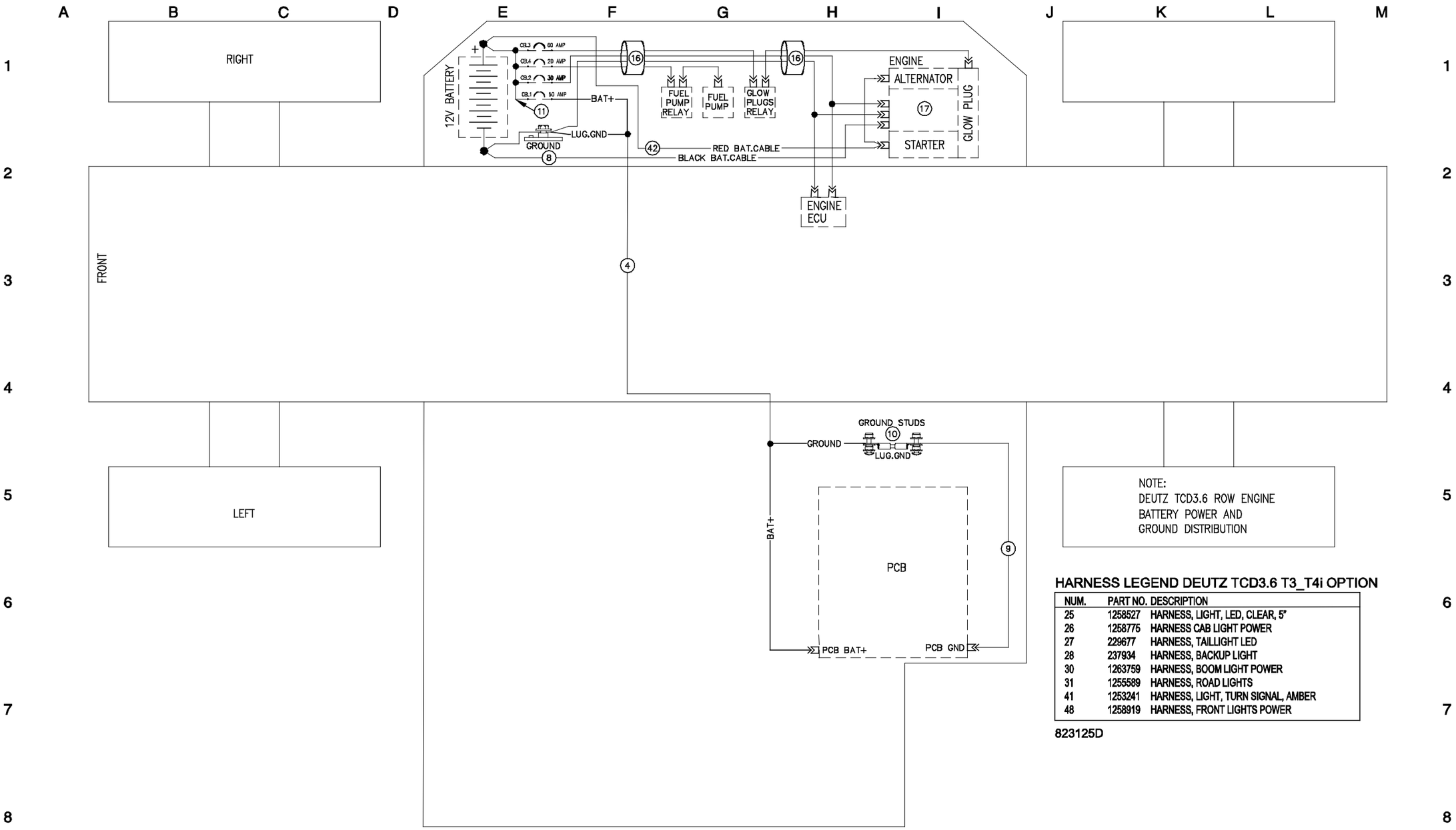
# Harness Map - Control System Ground
# Dual Joystick (from 15-21536, 16E-10000)



# Harness Map - Deutz TCD3.6 T3_T4i Engine
# Battery Power and Ground



# Harness Map - Deutz TCD3.6 T3_T4i Engine Battery Power and Ground

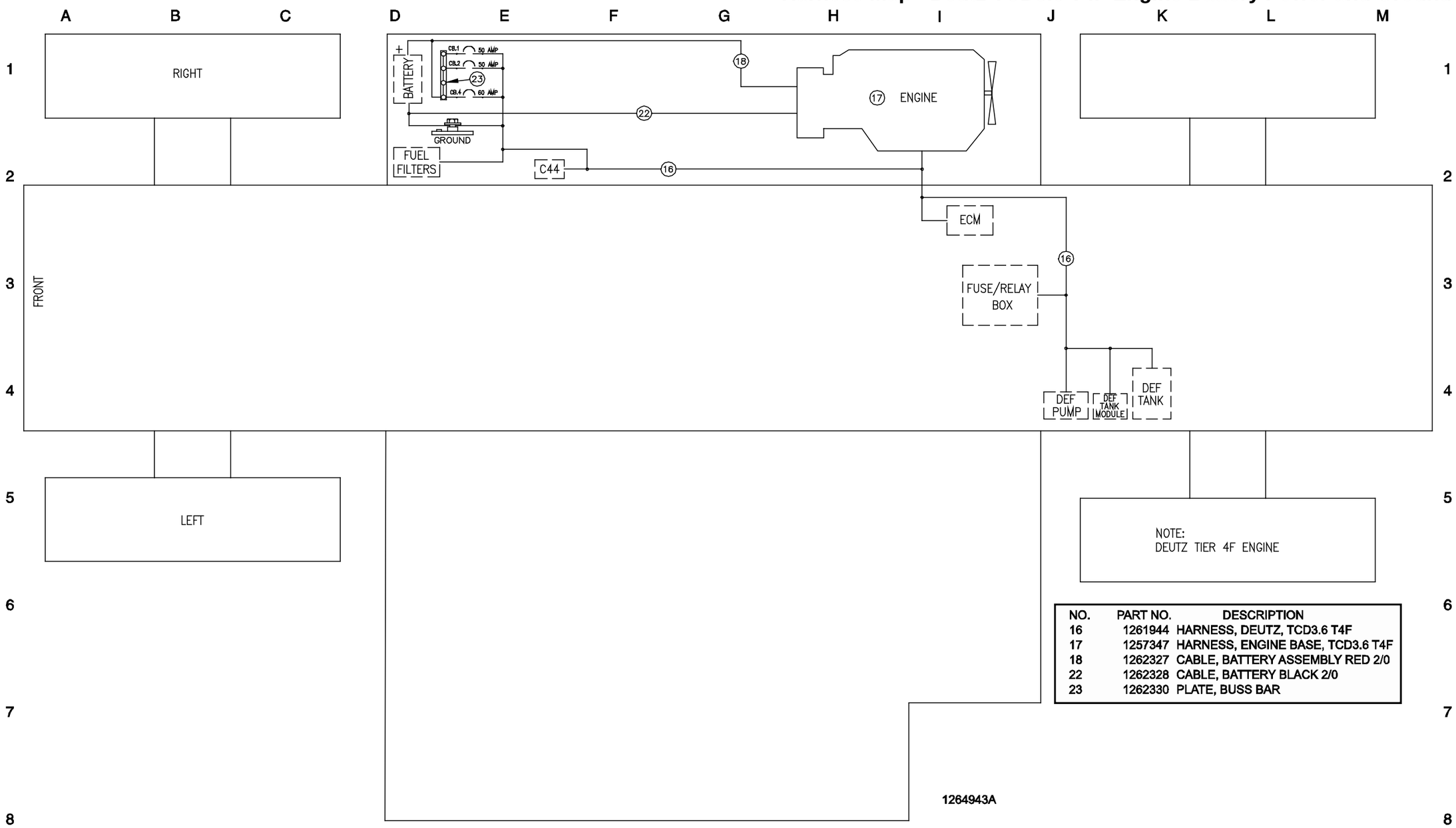



## HARNESS LEGEND DEUTZ TCD3.6 T3_T4i OPTION

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 25 | 1258527 | HARNESS, LIGHT, LED, CLEAR, 5" |
| 26 | 1258775 | HARNESS CAB LIGHT POWER |
| 27 | 229677 | HARNESS, TAILLIGHT LED |
| 28 | 237934 | HARNESS, BACKUP LIGHT |
| 30 | 1263759 | HARNESS, BOOM LIGHT POWER |
| 31 | 1255589 | HARNESS, ROAD LIGHTS |
| 41 | 1253241 | HARNESS, LIGHT, TURN SIGNAL, AMBER |
| 48 | 1258919 | HARNESS, FRONT LIGHTS POWER |

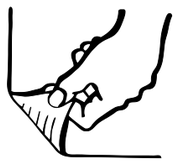
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# Harness Map - Deutz TCD3.6 T4F Engine Battery Power and Ground

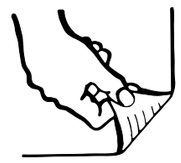



| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 16 | 1261944 | HARNESS, DEUTZ, TCD3.6 T4F |
| 17 | 1257347 | HARNESS, ENGINE BASE, TCD3.6 T4F |
| 18 | 1262327 | CABLE, BATTERY ASSEMBLY RED 2/0 |
| 22 | 1262328 | CABLE, BATTERY BLACK 2/0 |
| 23 | 1262330 | PLATE, BUSS BAR |

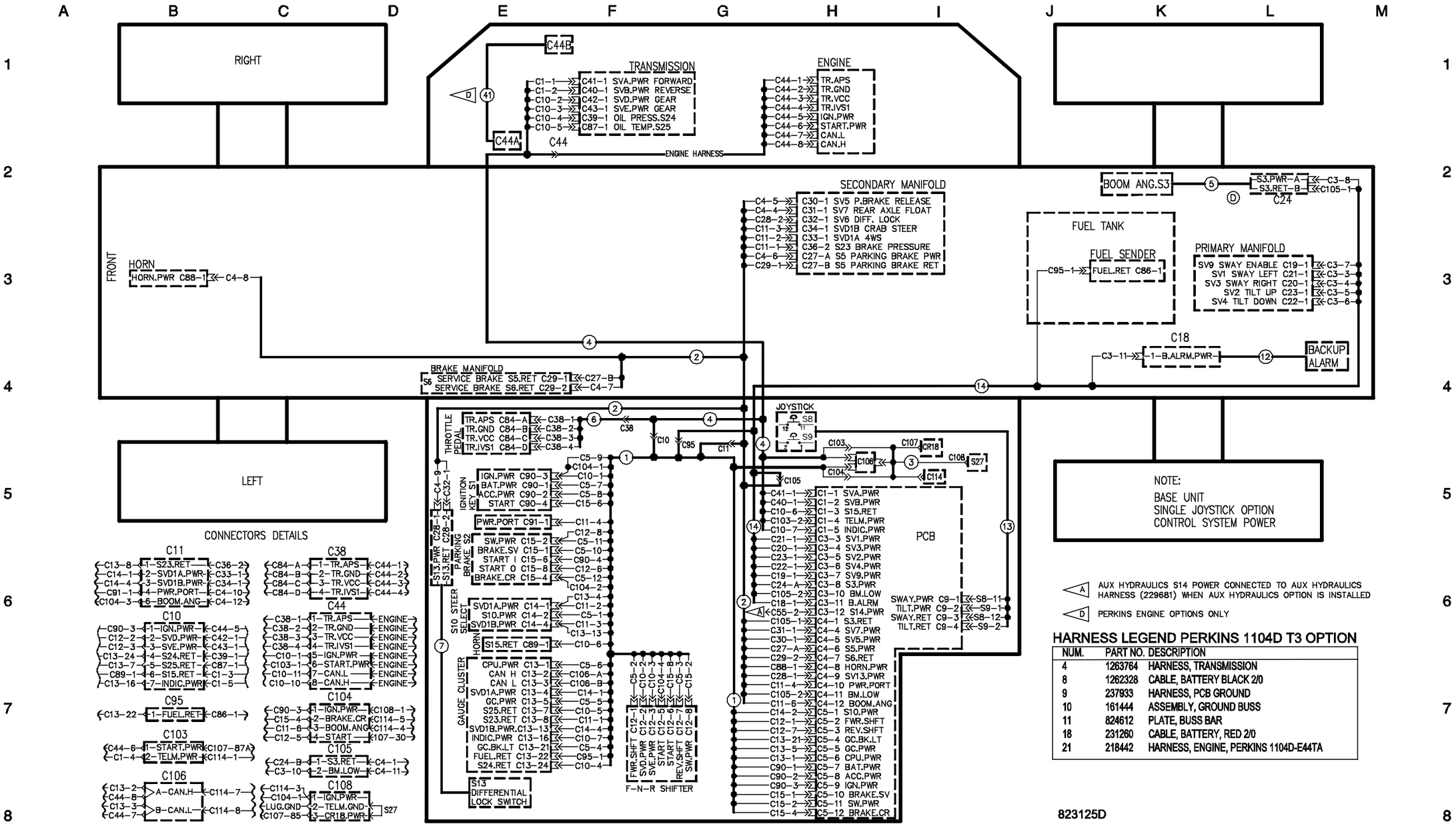
# Harness Map - Deutz TCD3.6 T4F Engine
# Battery Power and Ground



# Harness Map - Perkins 1104D Engine
# Battery Power and Ground



# Harness Map - Perkins 1104D Engine Battery Power and Ground

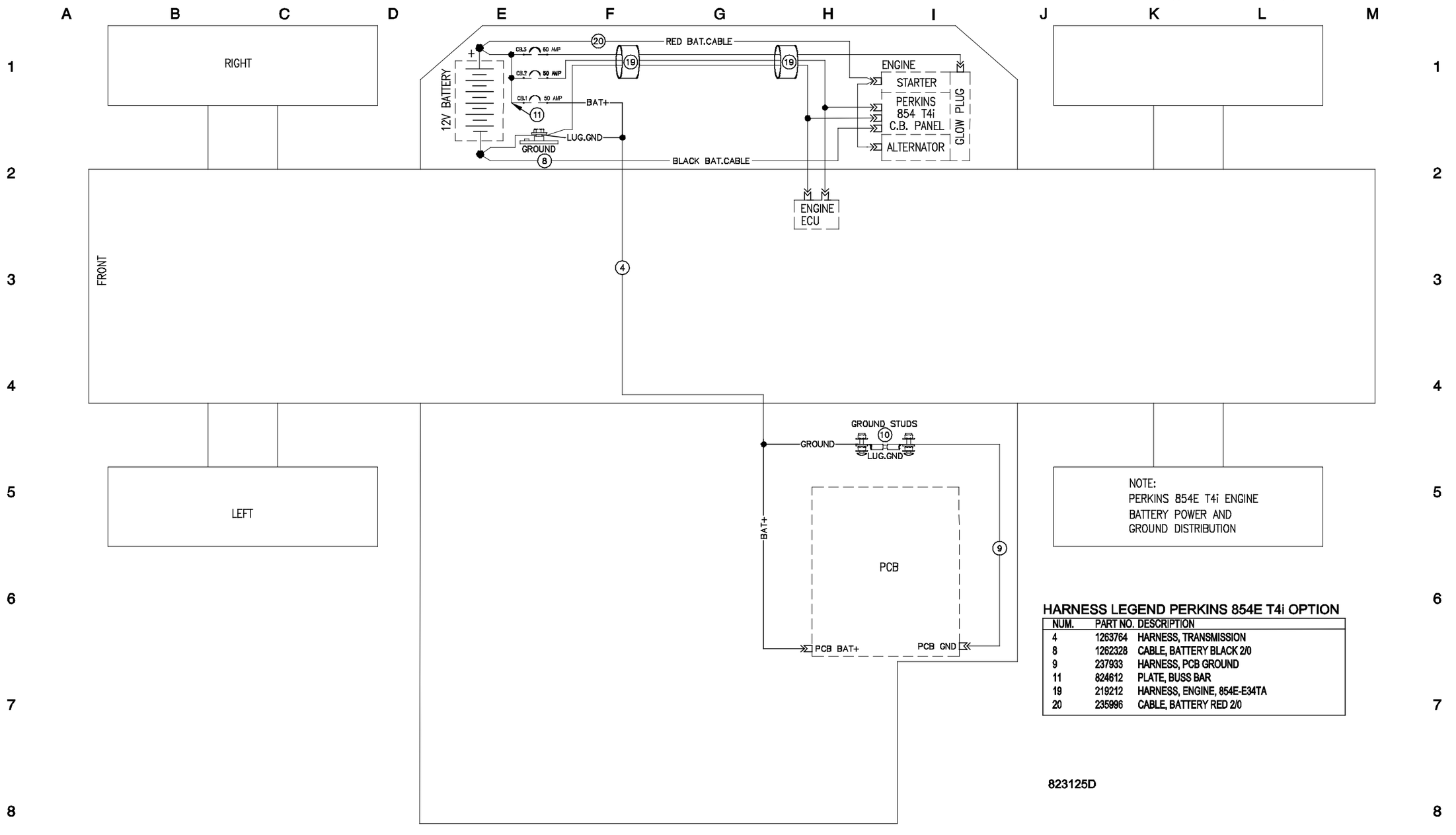



## HARNESS LEGEND PERKINS 1104D T3 OPTION

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 4 | 1263764 | HARNESS, TRANSMISSION |
| 8 | 1262328 | CABLE, BATTERY BLACK 2/0 |
| 9 | 237933 | HARNESS, PCB GROUND |
| 10 | 161444 | ASSEMBLY, GROUND BUSS |
| 11 | 824612 | PLATE, BUSS BAR |
| 18 | 231260 | CABLE, BATTERY, RED 2/0 |
| 21 | 218442 | HARNESS, ENGINE, PERKINS 1104D-E44TA |

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# Harness Map - Perkins 854E T4i Engine Battery Power and Ground

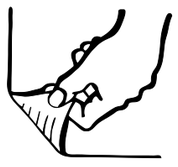



## HARNESS LEGEND PERKINS 854E T4i OPTION

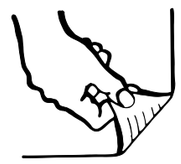
| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 4 | 1263764 | HARNESS, TRANSMISSION |
| 8 | 1262328 | CABLE, BATTERY BLACK 2/0 |
| 9 | 237933 | HARNESS, PCB GROUND |
| 11 | 824612 | PLATE, BUSS BAR |
| 19 | 219212 | HARNESS, ENGINE, 854E-E34TA |
| 20 | 235996 | CABLE, BATTERY RED 2/0 |

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# Harness Map - Perkins 854 T4i Engine
# Battery Power and Ground



# Harness Map - Perkins 854E T4F Engine
## Battery Power and Ground

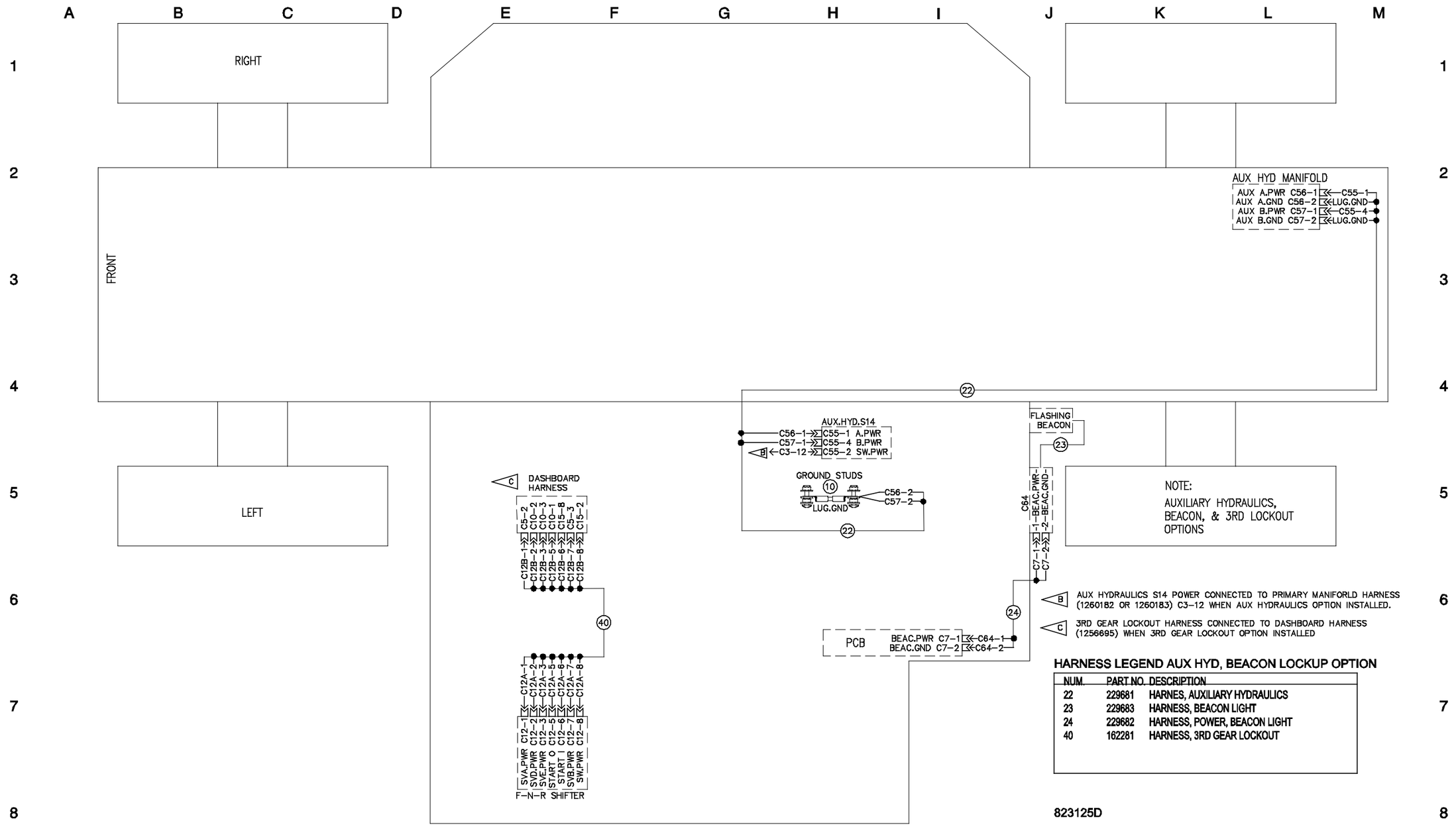


# Harness Map - Perkins 854E T4F Engine Battery Power and Ground




| NO. | PART NO. | DESCRIPTION |
|---|---|---|
| 19 | 1259590 | HARNESS, ENGINE, ECM 854 T4F |
| 20 | 1269545 | BATTERY CABLE ASSEMBLY,RED 2/0 |
| 21 | 1266123 | HARNESS, ENGINE BASE, 854F T4F |
| 22 | 1262328 | CABLE, BATTERY BLACK 2/0 |
| 24 | 1265773 | PLATE, BUSS BAR |

# Harness Map - Options Auxiliary Hydraulics, Beacon and 3rd Gear Lockout

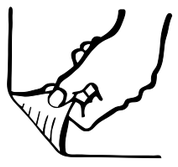



## HARNESS LEGEND AUX HYD, BEACON LOCKUP OPTION

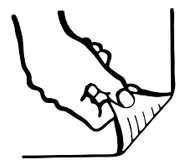
| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 22 | 229681 | HARNES, AUXILIARY HYDRAULICS |
| 23 | 229683 | HARNESS, BEACON LIGHT |
| 24 | 229682 | HARNESS, POWER, BEACON LIGHT |
| 40 | 162281 | HARNESS, 3RD GEAR LOCKOUT |

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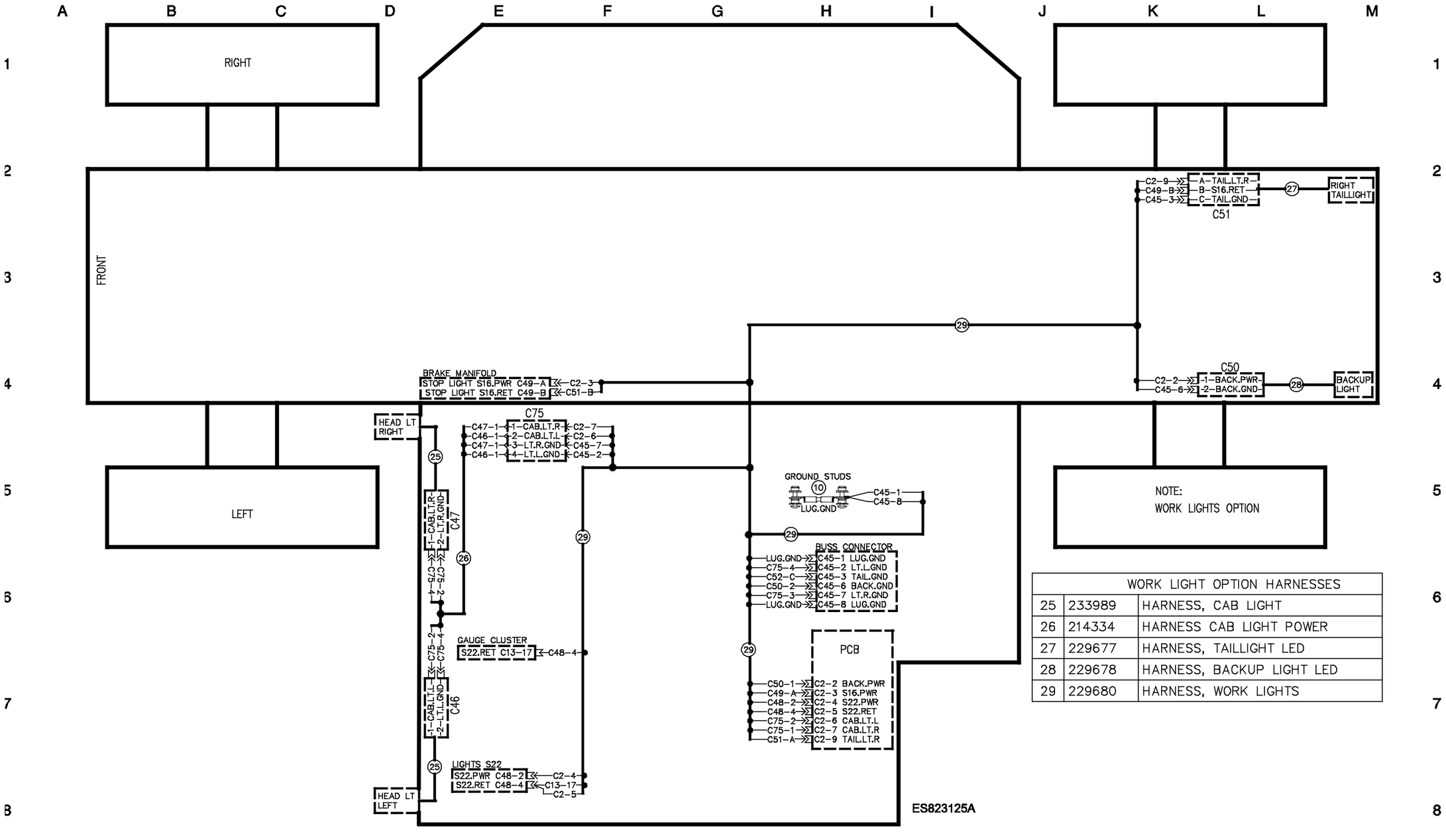
# Harness Map - Options Auxiliary Hydraulics, Beacon and 3rd Gear Lockout



# Harness Map - Options Work Lights (to 15-21456)

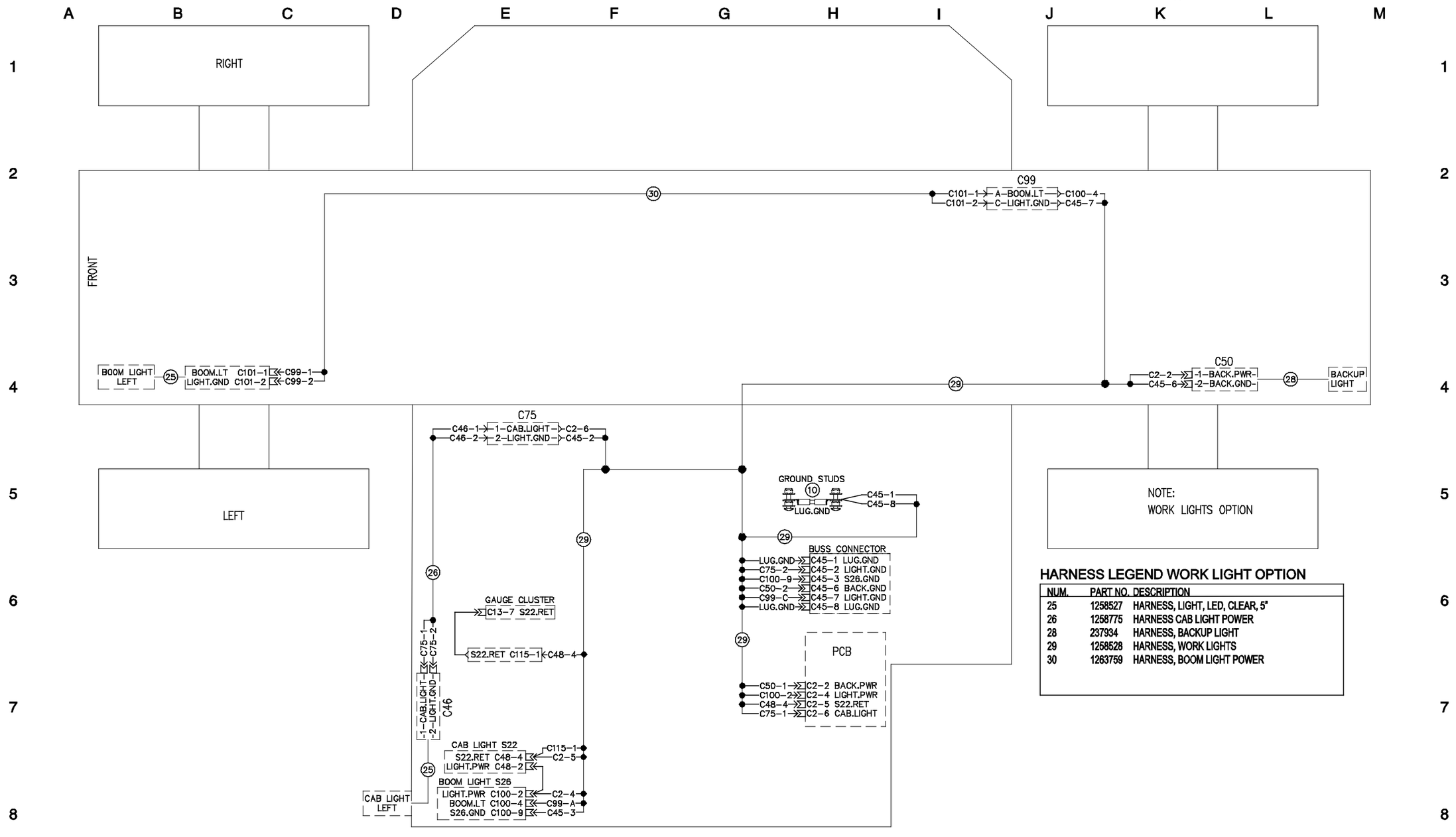


## Harness Map - Options Work Lights (to 15-21456)




| WORK LIGHT OPTION HARNESSES | | |
|---|---|---|
| 25 | 233989 | HARNESS, CAB LIGHT |
| 26 | 214334 | HARNESS CAB LIGHT POWER |
| 27 | 229677 | HARNESS, TAILLIGHT LED |
| 28 | 229678 | HARNESS, BACKUP LIGHT LED |
| 29 | 229680 | HARNESS, WORK LIGHTS |

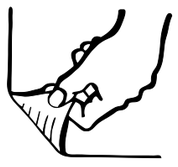
## Harness Map - Options Work Lights (from 15-21457, 16E-10000)



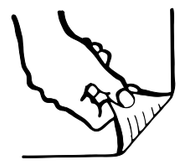

### HARNESS LEGEND WORK LIGHT OPTION

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 25 | 1258527 | HARNESS, LIGHT, LED, CLEAR, 5" |
| 26 | 1258775 | HARNESS CAB LIGHT POWER |
| 28 | 237934 | HARNESS, BACKUP LIGHT |
| 29 | 1258528 | HARNESS, WORK LIGHTS |
| 30 | 1263759 | HARNESS, BOOM LIGHT POWER |

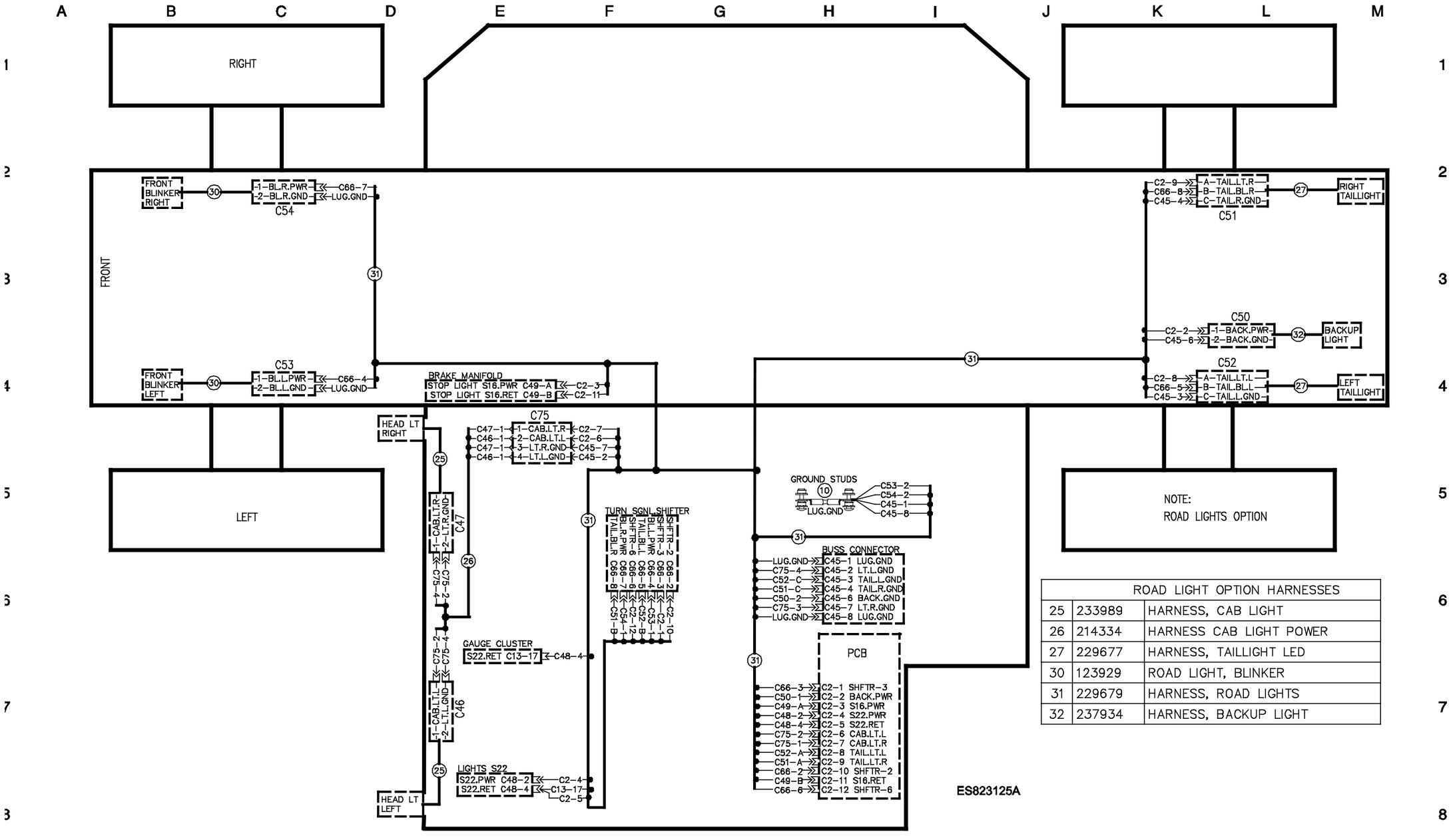
# Harness Map - Options Work Lights (from 15-21456, 16E-10000)



# Harness Map - Options Road Lights (to 15-21456)

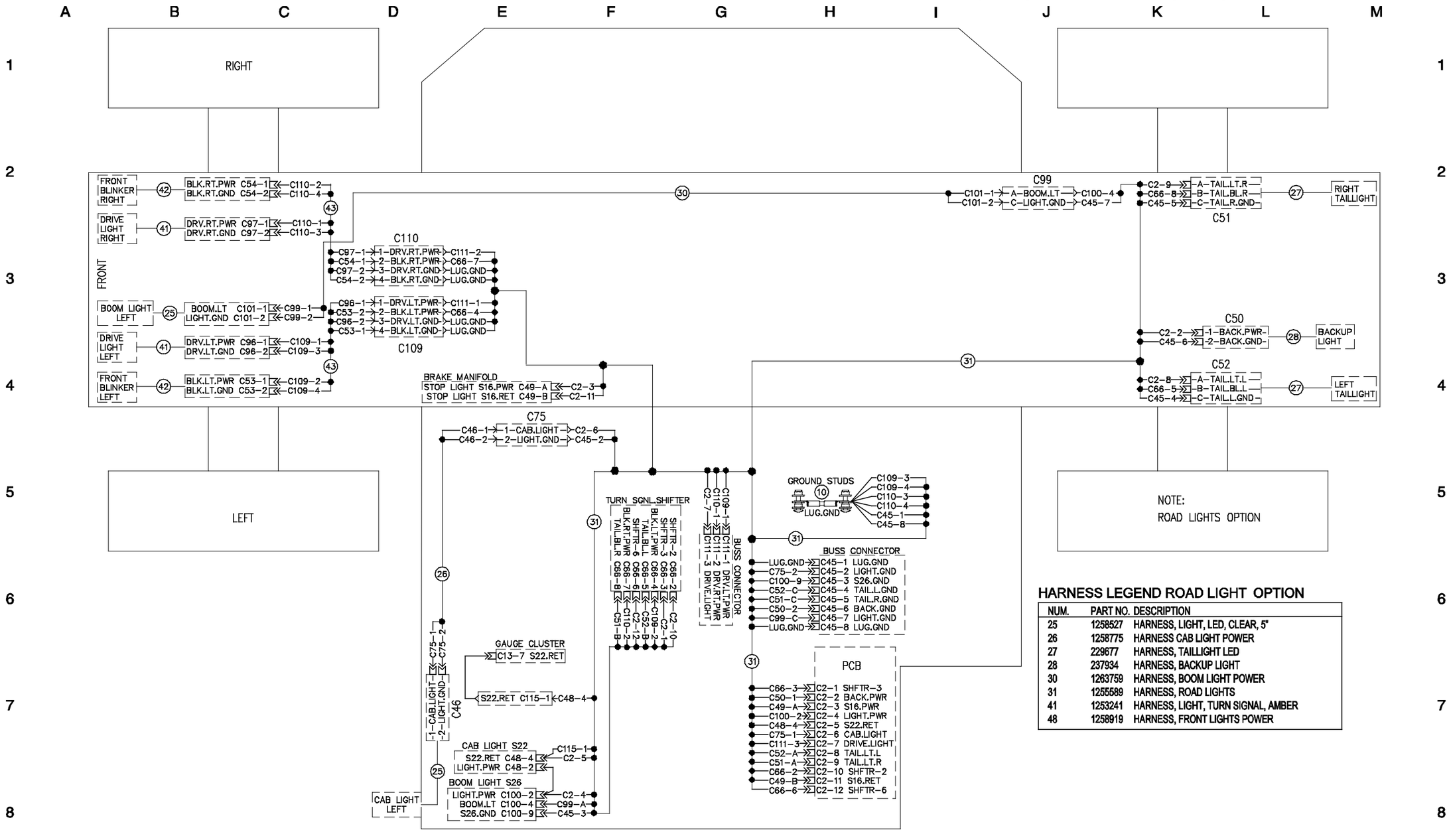


## Harness Map - Options Road Lights (to 15-21456)




| ROAD LIGHT OPTION HARNESSES | | |
|---|---|---|
| 25 | 233989 | HARNESS, CAB LIGHT |
| 26 | 214334 | HARNESS CAB LIGHT POWER |
| 27 | 229677 | HARNESS, TAILLIGHT LED |
| 30 | 123929 | ROAD LIGHT, BLINKER |
| 31 | 229679 | HARNESS, ROAD LIGHTS |
| 32 | 237934 | HARNESS, BACKUP LIGHT |

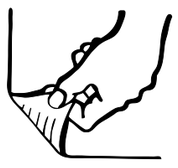
# Harness Map - Options Road Lights (from 15-21457, 16E-10000)



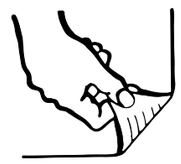

## HARNESS LEGEND ROAD LIGHT OPTION

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 25 | 1258527 | HARNESS, LIGHT, LED, CLEAR, 5" |
| 26 | 1258775 | HARNESS CAB LIGHT POWER |
| 27 | 229677 | HARNESS, TAILLIGHT LED |
| 28 | 237934 | HARNESS, BACKUP LIGHT |
| 30 | 1263759 | HARNESS, BOOM LIGHT POWER |
| 31 | 1255589 | HARNESS, ROAD LIGHTS |
| 41 | 1253241 | HARNESS, LIGHT, TURN SIGNAL, AMBER |
| 48 | 1258919 | HARNESS, FRONT LIGHTS POWER |

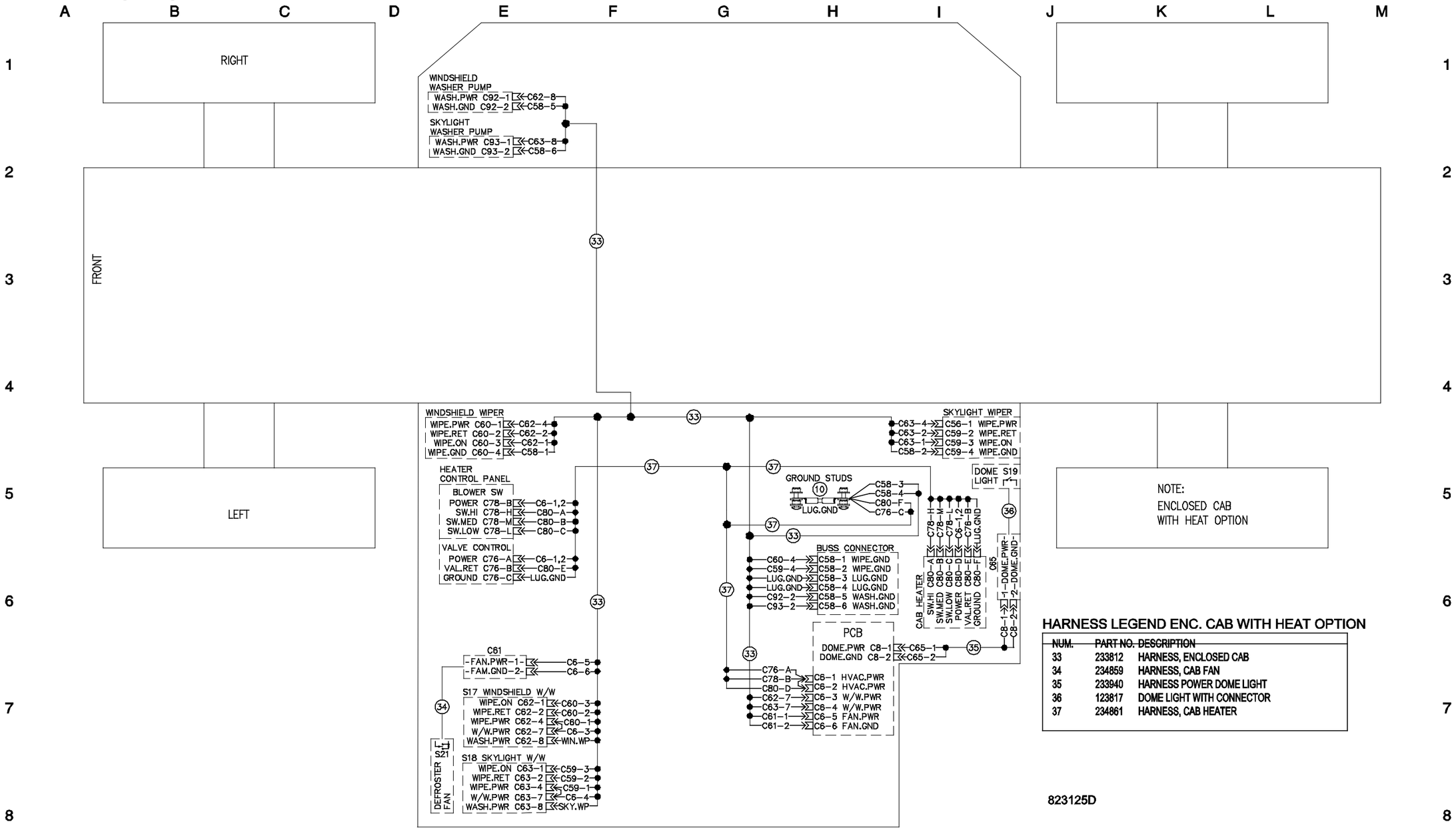
# Harness Map - Options Road Lights (from 15-21457, 16E-10000)



## Harness Map - Options Enclosed Cab with Heater



# Harness Map - Options Enclosed Cab with Heater

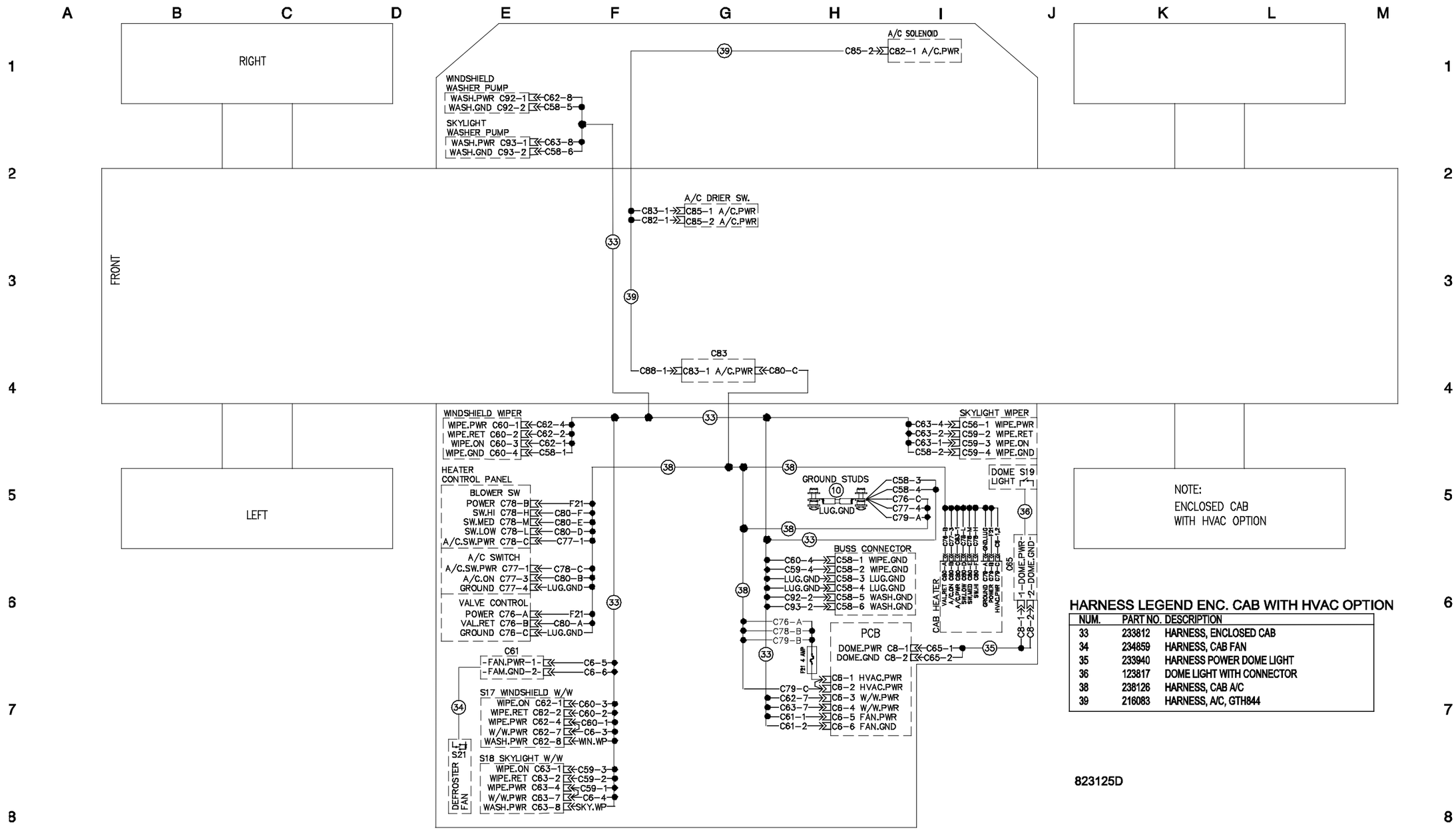



## HARNESS LEGEND ENC. CAB WITH HEAT OPTION

| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 33 | 233812 | HARNESS, ENCLOSED CAB |
| 34 | 234859 | HARNESS, CAB FAN |
| 35 | 233940 | HARNESS POWER DOME LIGHT |
| 36 | 123817 | DOME LIGHT WITH CONNECTOR |
| 37 | 234861 | HARNESS, CAB HEATER |

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# Harness Map - Options Enclosed Cab with HVAC

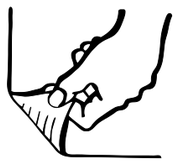



## HARNESS LEGEND ENC. CAB WITH HVAC OPTION

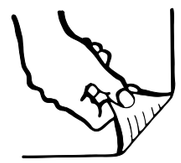
| NUM. | PART NO. | DESCRIPTION |
|---|---|---|
| 33 | 233812 | HARNESS, ENCLOSED CAB |
| 34 | 234859 | HARNESS, CAB FAN |
| 35 | 233940 | HARNESS POWER DOME LIGHT |
| 36 | 123817 | DOME LIGHT WITH CONNECTOR |
| 38 | 238126 | HARNESS, CAB A/C |
| 39 | 216083 | HARNESS, A/C, GTH844 |

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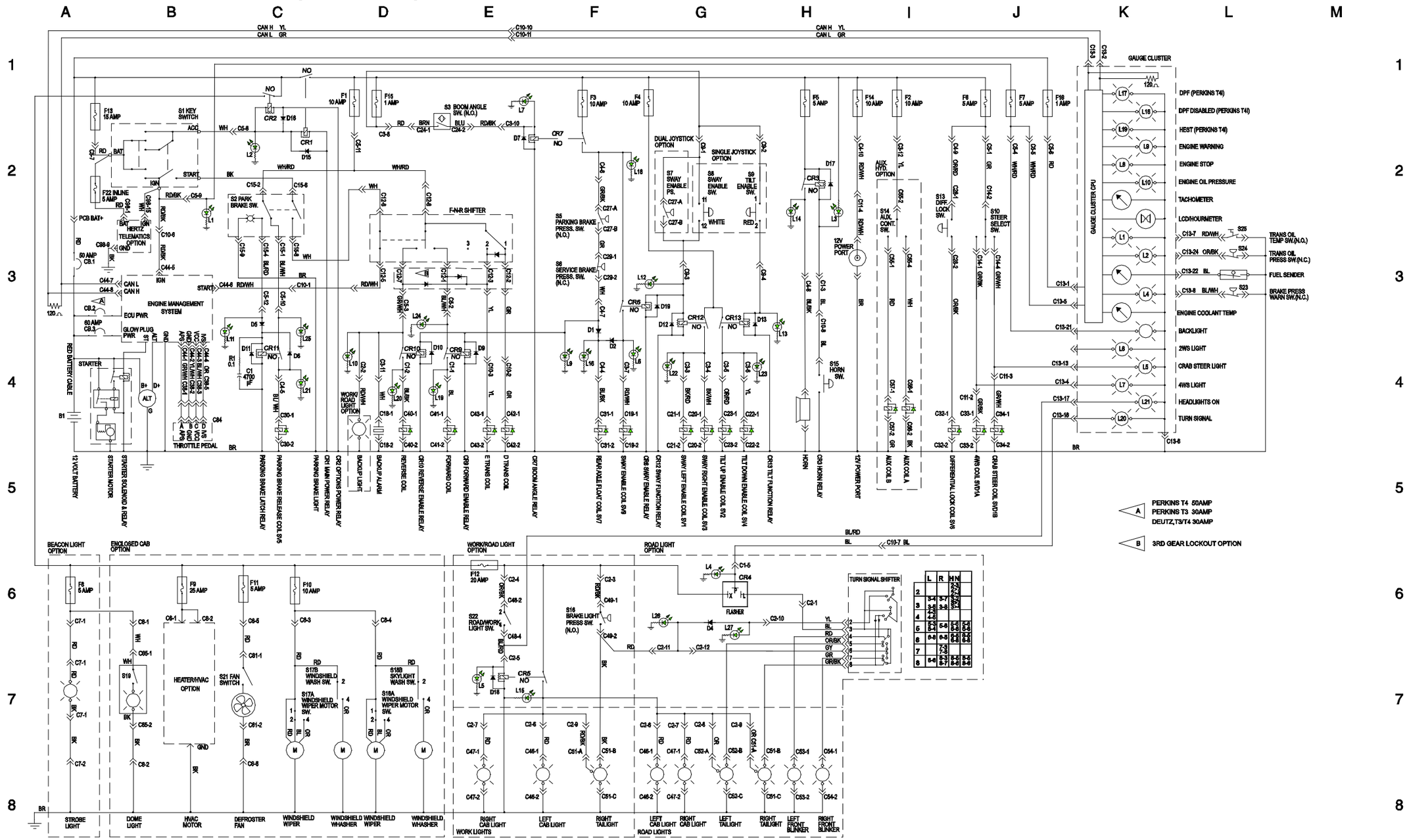
# Harness Map - Options Enclosed Cab with HVAC



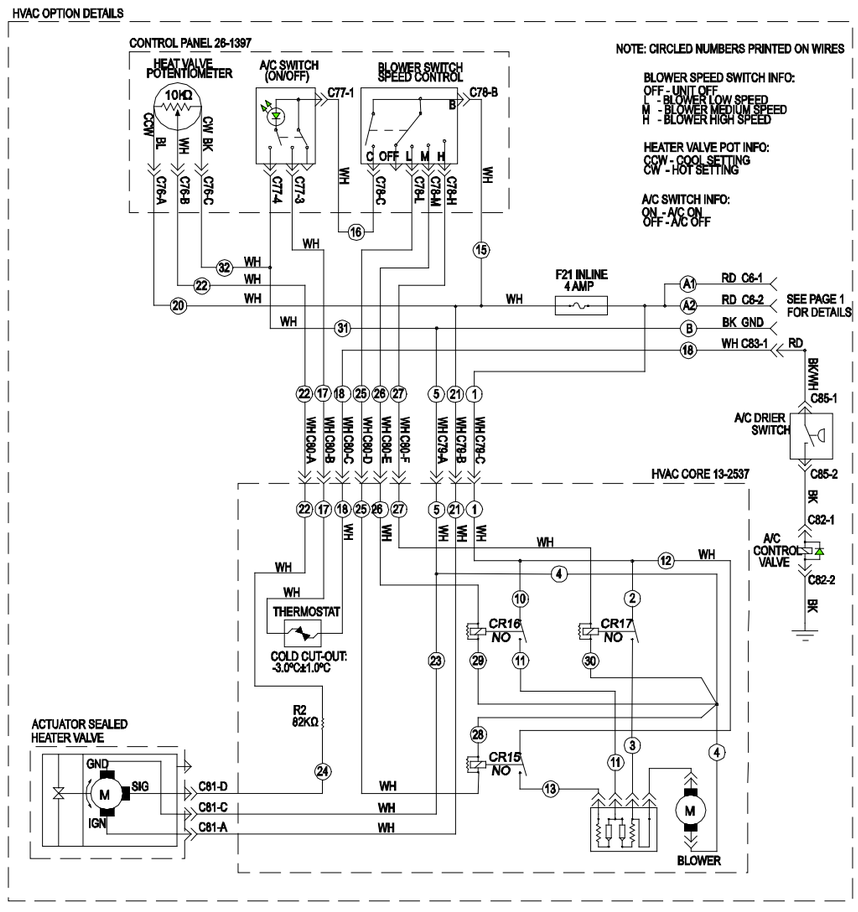
## Electrical Schematic - View 1 (to 15-20661)

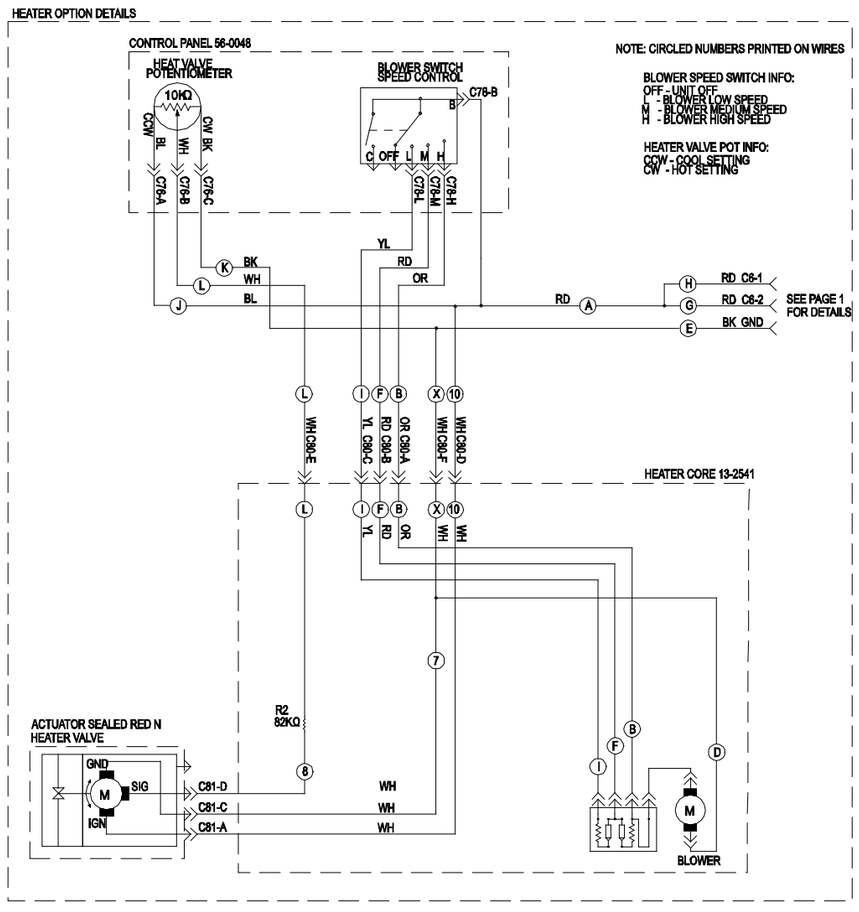


# Electrical Schematic - View 1 (to 15-20661)

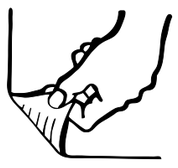


# Electrical Schematic - View 2 (to 15-20661)

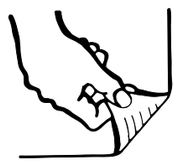


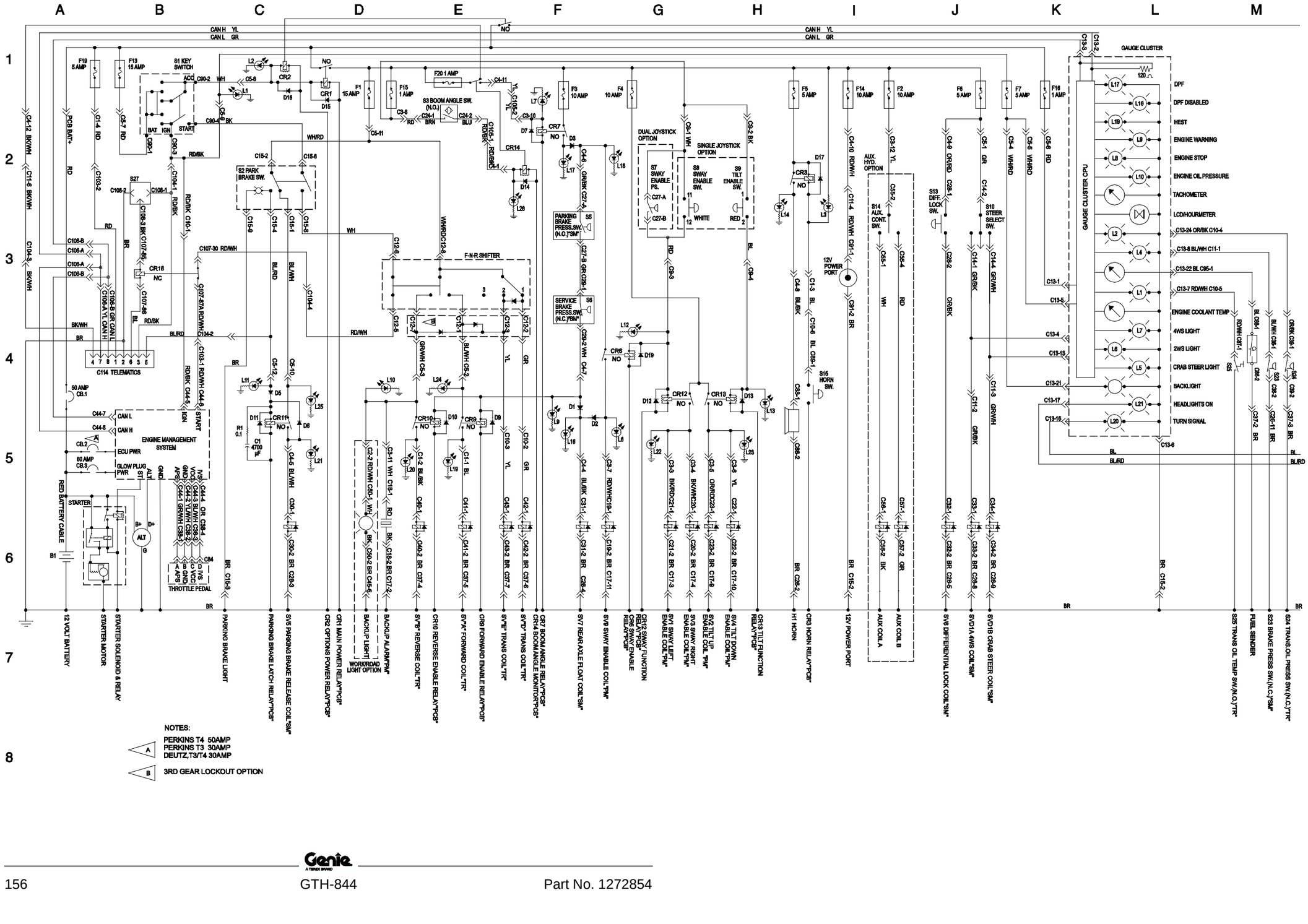
# Electrical Schematic - View 2 (to 15-20661)



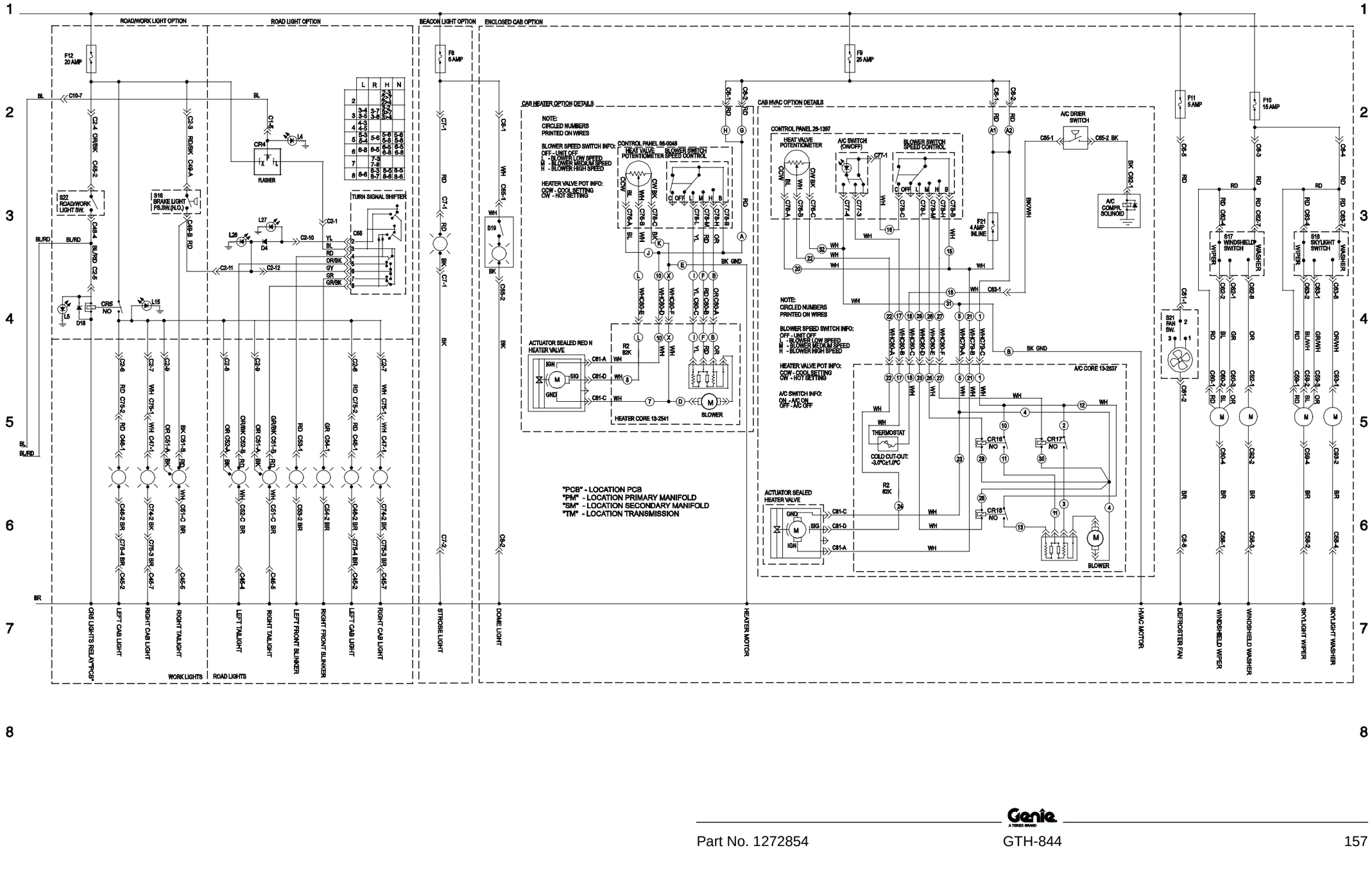
## Electrical Schematic - View 1 (from 15-20662 to 21456)



# Electrical Schematic - View 1 (from 15-20662 to 21456)



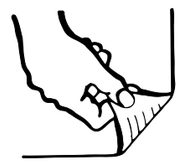
# Electrical Schematic - View 2 (from 15-20662 to 21456)



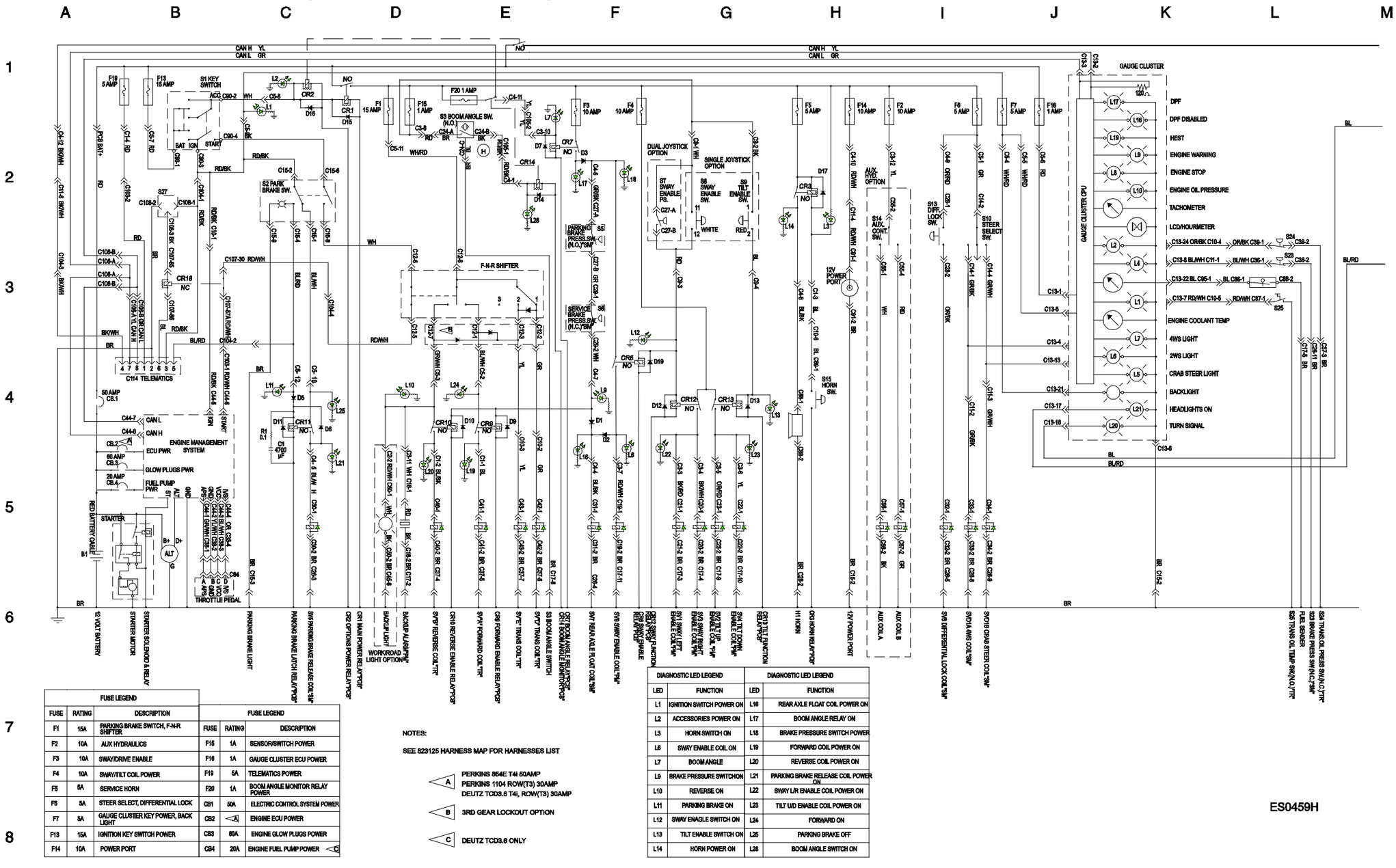
## Electrical Schematic - View 2 (from 15-20662 to 21456)



## Electrical Schematic - View 1 (from 15-21457 to 21535)



# Electrical Schematic - View 1 (from 15-21457 to 21535)




| FUSE LEGEND | | | FUSE LEGEND | | |
|---|---|---|---|---|---|
| FUSE | RATING | DESCRIPTION | FUSE | RATING | DESCRIPTION |
| F1 | 15A | PARKING BRAKE SWITCH, F-N-R SHIFTER | F15 | 1A | SENSOR/SWITCH POWER |
| F2 | 10A | AUX HYDRAULICS | F16 | 1A | GAUGE CLUSTER ECU POWER |
| F3 | 10A | SWAY/DRIVE ENABLE | F19 | 5A | TELEMATICS POWER |
| F4 | 10A | SWAY/TILT COIL POWER | F20 | 1A | BOOM ANGLE MONITOR RELAY POWER |
| F5 | 5A | SERVICE HORN | CB1 | 50A | ELECTRIC CONTROL SYSTEM POWER |
| F6 | 5A | STEER SELECT, DIFFERENTIAL LOCK | CB2 | <A | ENGINE ECU POWER |
| F7 | 5A | GAUGE CLUSTER KEY POWER, BACK LIGHT | CB3 | 60A | ENGINE GLOW PLUGS POWER |
| F13 | 15A | IGNITION KEY SWITCH POWER | CB4 | 20A | ENGINE FUEL PUMP POWER <C |
| F14 | 10A | POWER PORT | | | |

NOTES:

SEE 823125 HARNESS MAP FOR HARNESSES LIST

A — PERKINS 854E T4i 50AMP
PERKINS 1104 ROW(T3) 30AMP
DEUTZ TCD3.6 T4i, ROW(T3) 30AMP

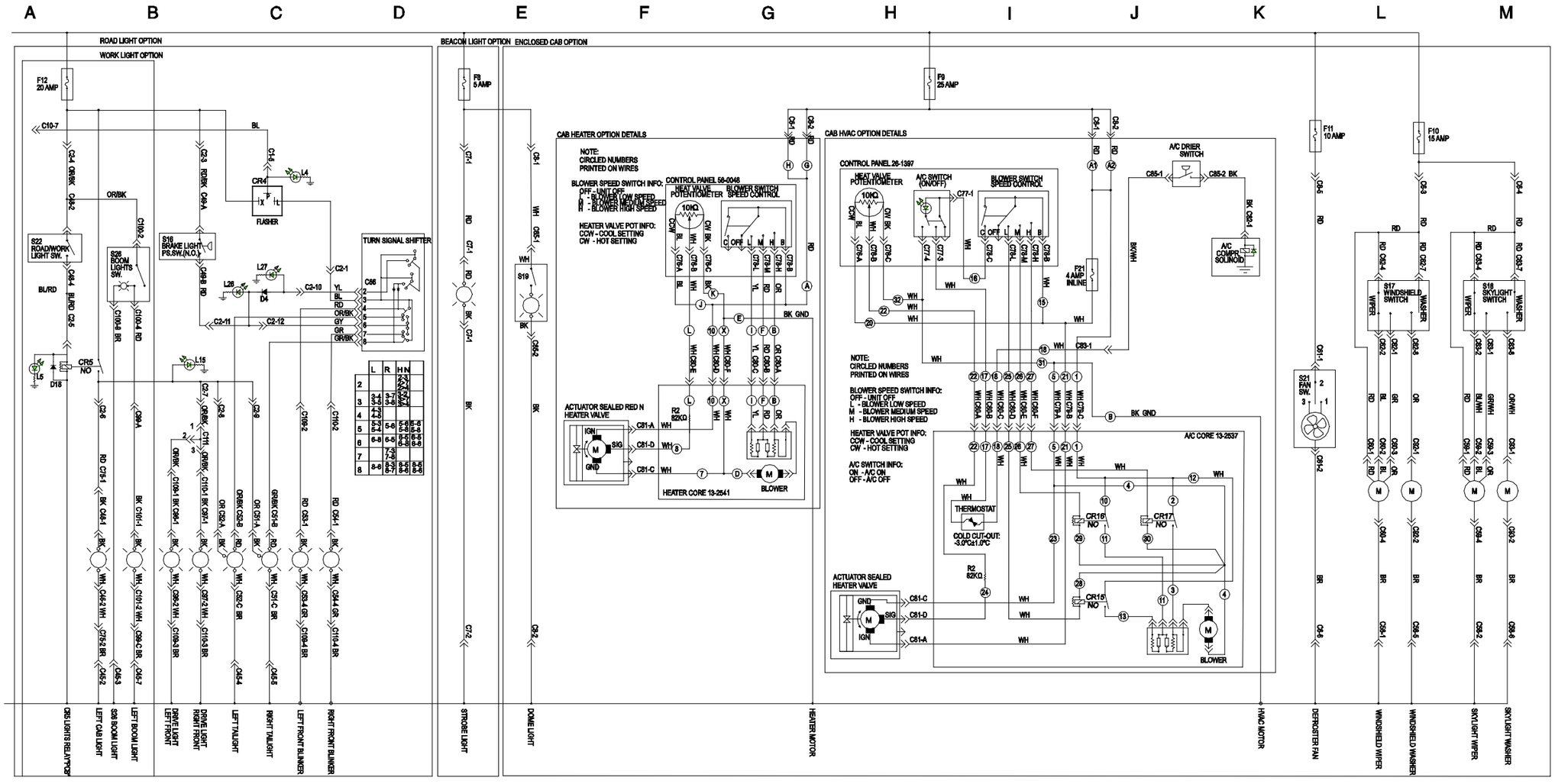
B — 3RD GEAR LOCKOUT OPTION

C — DEUTZ TCD3.6 ONLY

| DIAGNOSTIC LED LEGEND | | DIAGNOSTIC LED LEGEND | |
|---|---|---|---|
| LED | FUNCTION | LED | FUNCTION |
| L1 | IGNITION SWITCH POWER ON | L16 | REAR AXLE FLOAT COIL POWER ON |
| L2 | ACCESSORIES POWER ON | L17 | BOOM ANGLE RELAY ON |
| L3 | HORN SWITCH ON | L18 | BRAKE PRESSURE SWITCH POWER |
| L6 | SWAY ENABLE COIL ON | L19 | FORWARD COIL POWER ON |
| L7 | BOOM ANGLE | L20 | REVERSE COIL POWER ON |
| L9 | BRAKE PRESSURE SWITCHON | L21 | PARKING BRAKE RELEASE COIL POWER ON |
| L10 | REVERSE ON | L22 | SWAY L/R ENABLE COIL POWER ON |
| L11 | PARKING BRAKE ON | L23 | TILT U/D ENABLE COIL POWER ON |
| L12 | SWAY ENAGLE SWITCH ON | L24 | FORWARD ON |
| L13 | TILT ENABLE SWITCH ON | L25 | PARKING BRAKE OFF |
| L14 | HORN POWER ON | L26 | BOOM ANGLE SWITCH ON |

ES0459H

## Electrical Schematic - View 2 (from 15-21457 to 21535)




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

"PCB" - LOCATION PCB
"PM" - LOCATION PRIMARY MANIFOLD
"SM" - LOCATION SECONDARY MANIFOLD
"TM" - LOCATION TRANSMISSION

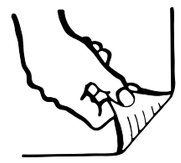
| DIAGNOSTIC LED LEGEND | |
|---|---|
| LED | FUNCTION |
| L4 | BLINKERS/PILOT LIGHT ON |
| L5 | LIGHT SWITCH ON |
| L15 | LIGHTS POWER ON |
| L26 | BRAKE LIGHTS PRESSURE SWITCH ON |
| L27 | HAZARD SWITCH ON |

ES0459H

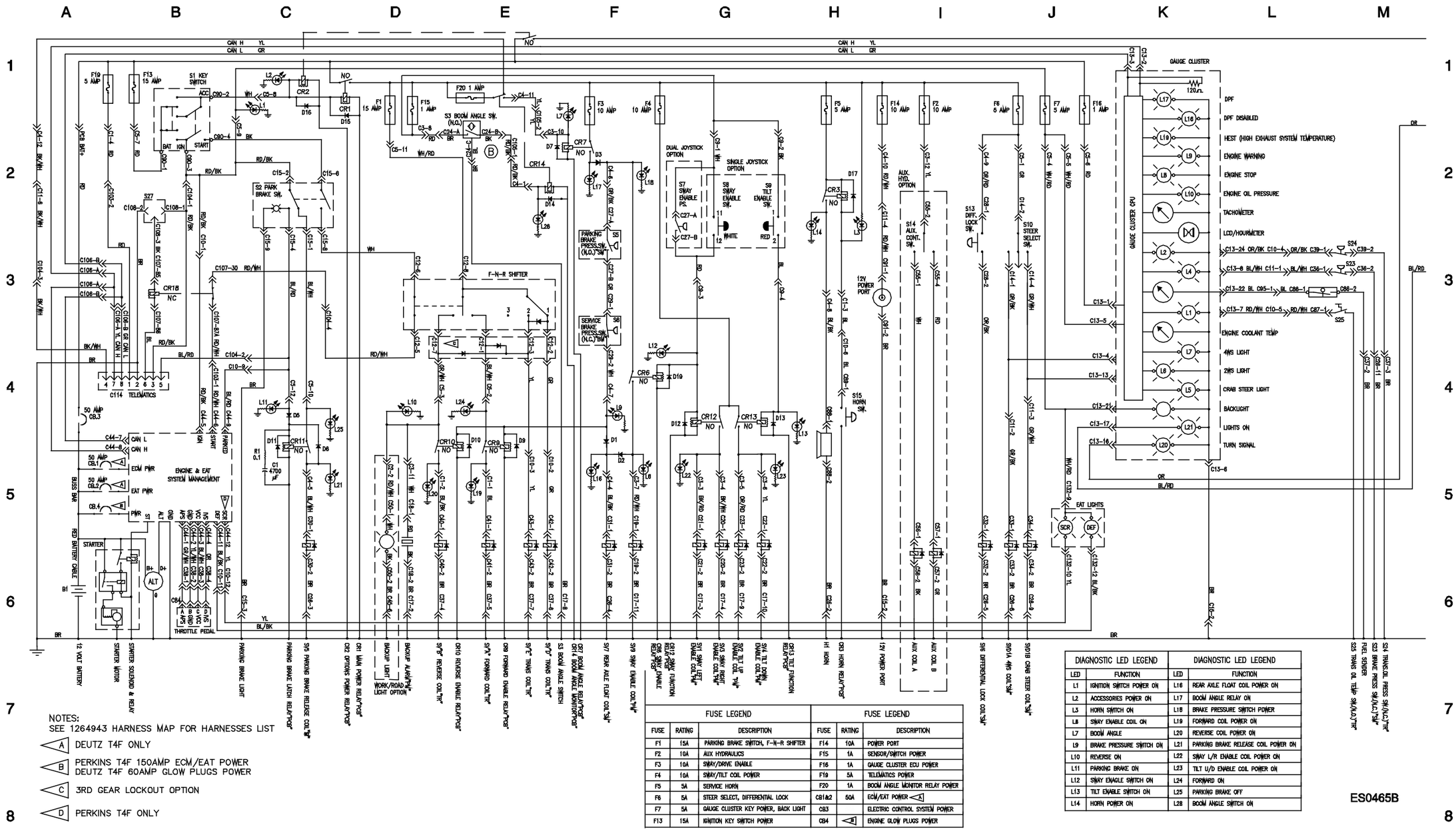
## Electrical Schematic - View 2 (from 15-21457 to 21535)



## Electrical Schematic - View 1 (from 15-21536, 16E-10000)



# Electrical Schematic - View 1 (from 15-21536, 16E-10000)

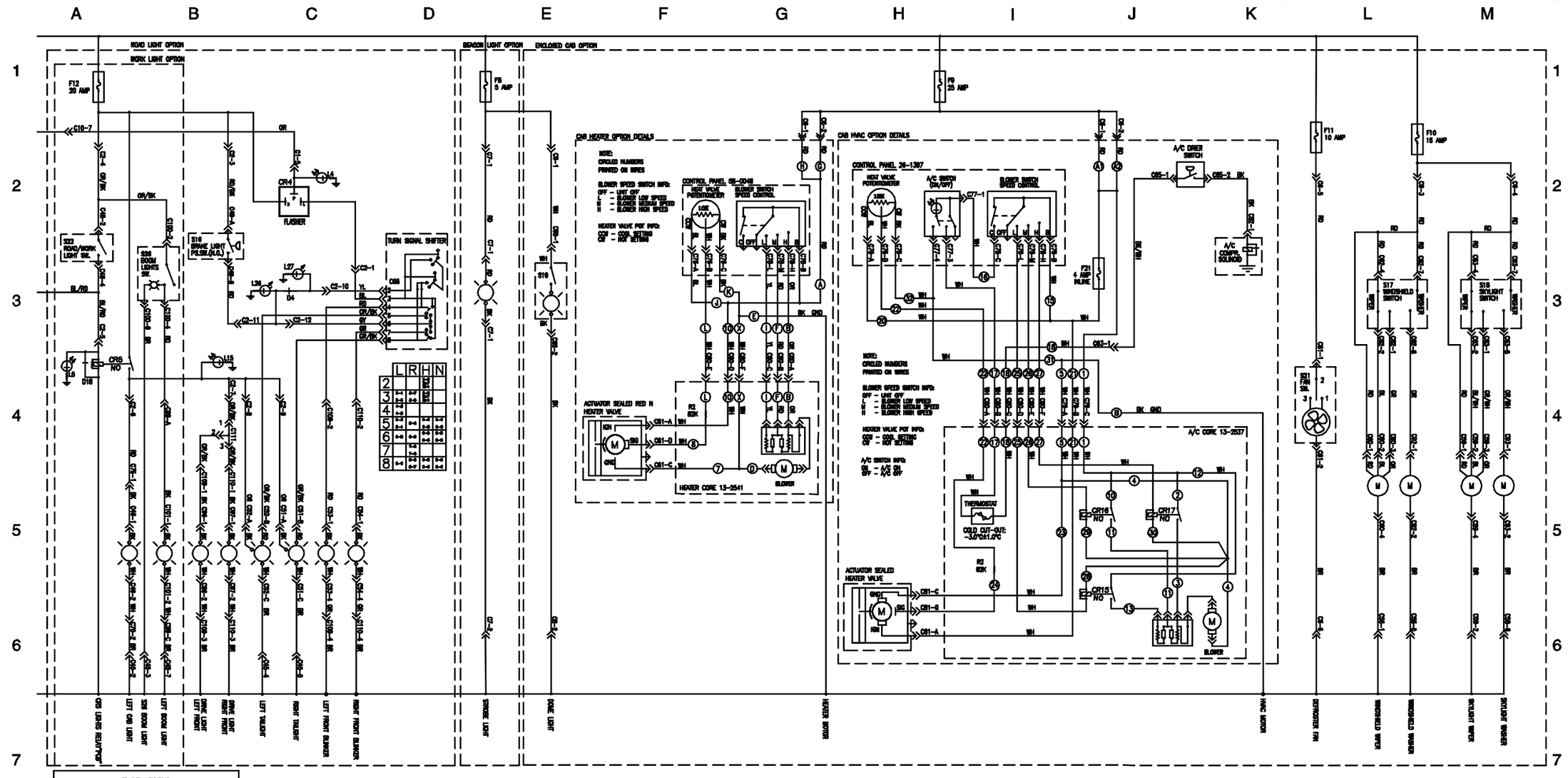



| FUSE LEGEND | | | FUSE LEGEND | | |
|---|---|---|---|---|---|
| FUSE | RATING | DESCRIPTION | FUSE | RATING | DESCRIPTION |
| F1 | 15A | PARKING BRAKE SWITCH, F-N-R SHIFTER | F14 | 10A | POWER PORT |
| F2 | 10A | AUX HYDRAULICS | F15 | 1A | SENSOR/SWITCH POWER |
| F3 | 10A | SWAY/DRIVE ENABLE | F16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

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

ES0465B

## Electrical Schematic - View 2 (from 15-21536, 16E-10000)




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

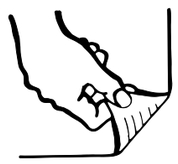
"PCB" – LOCATION PCB
"PM" – LOCATION PRIMARY MANIFOLD
"SM" – LOCATION SECONDARY MANIFOLD
"TM" – LOCATION TRANSMISSION

ES0465B

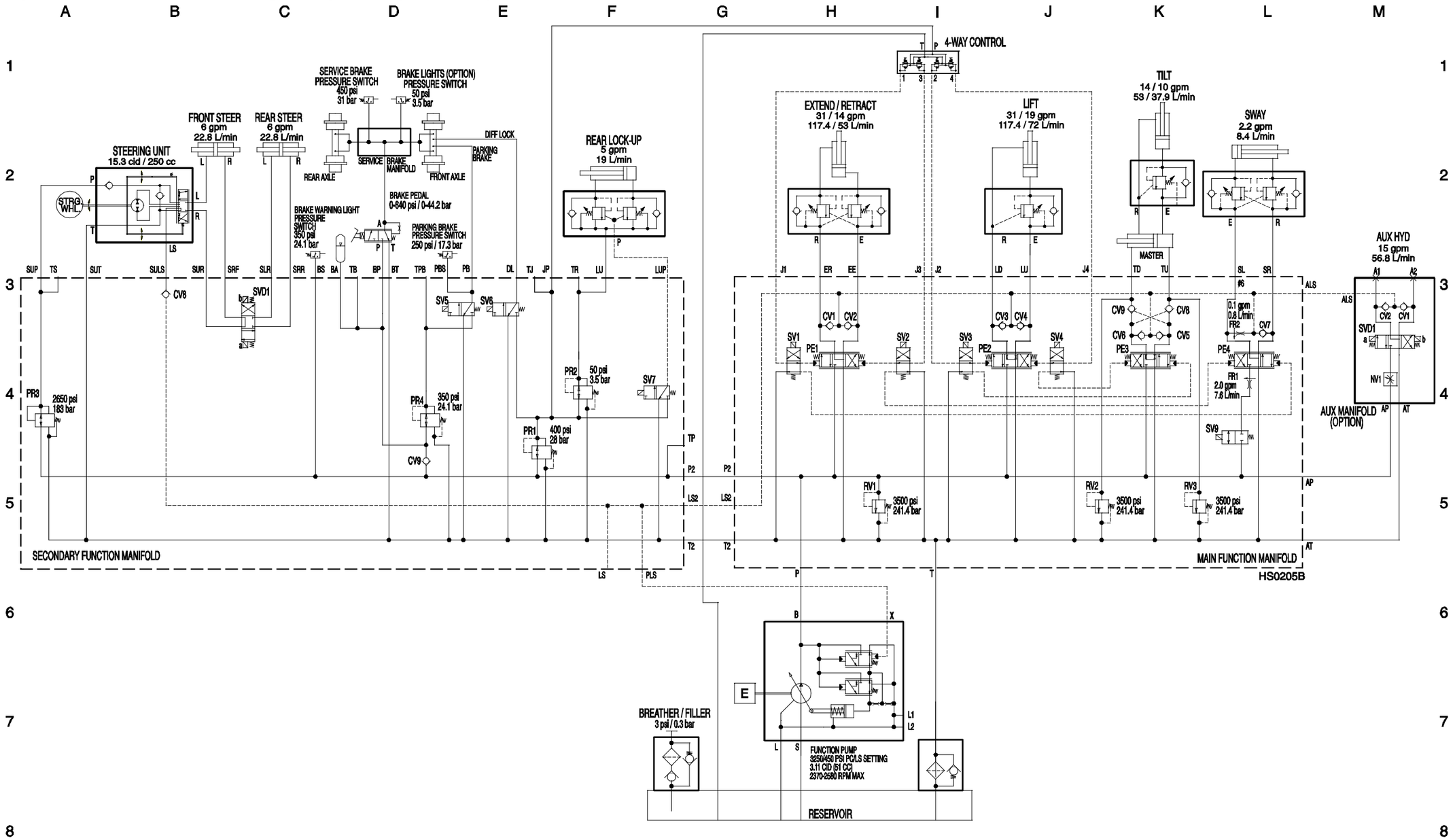
## Electrical Schematic - View 2 (from 15-21536, 16E-10000)



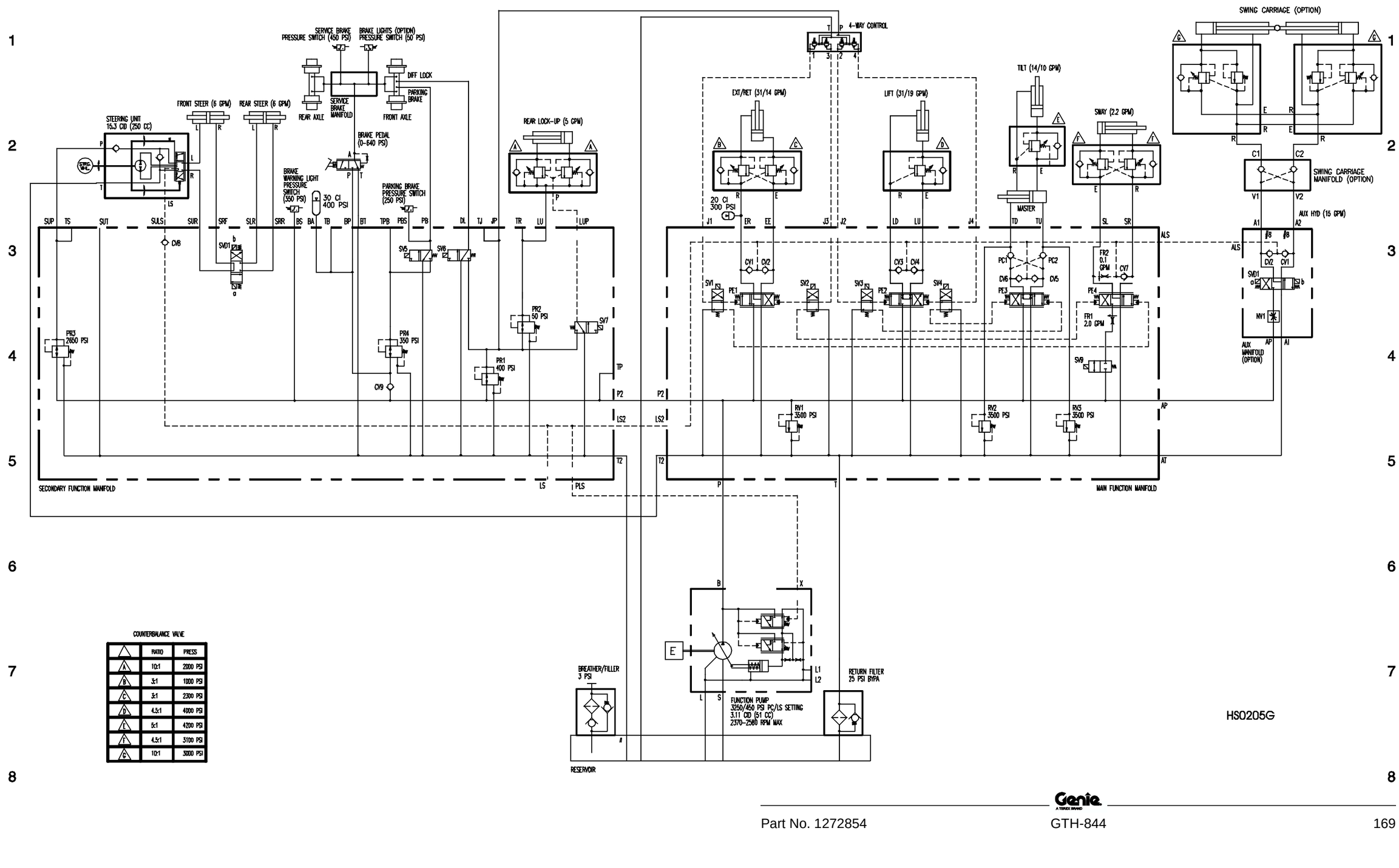
# Hydraulic Schematic - Single Joystick (to 19528)



## Hydraulic Schematic - Single Joystick (to 19528)



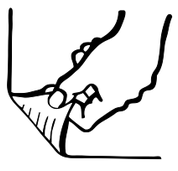
## Hydraulic Schematic - Single Joystick (from 19529, 16E-10000)



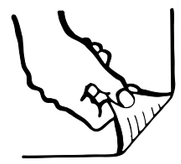

COUNTERBALANCE VALVE

| | RATIO | PRESS |
|---|---|---|
| A | 10:1 | 2000 PSI |
| B | 3:1 | 1000 PSI |
| C | 3:1 | 2300 PSI |
| D | 4.5:1 | 4000 PSI |
| E | 5:1 | 4200 PSI |
| F | 4.5:1 | 3100 PSI |
| G | 10:1 | 3000 PSI |

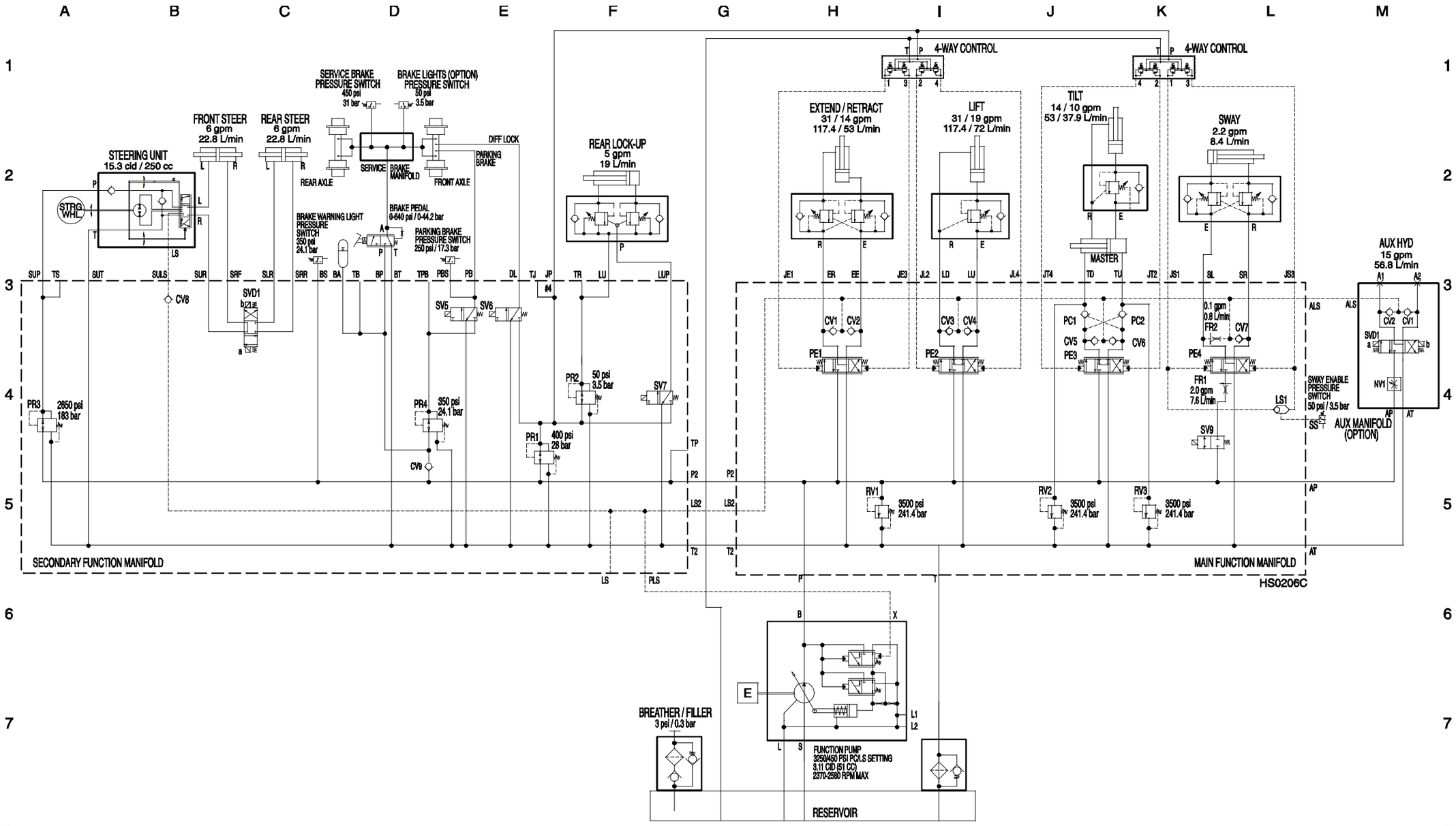
# Hydraulic Schematic - Single Joystick (from 19529, 16E-10000)



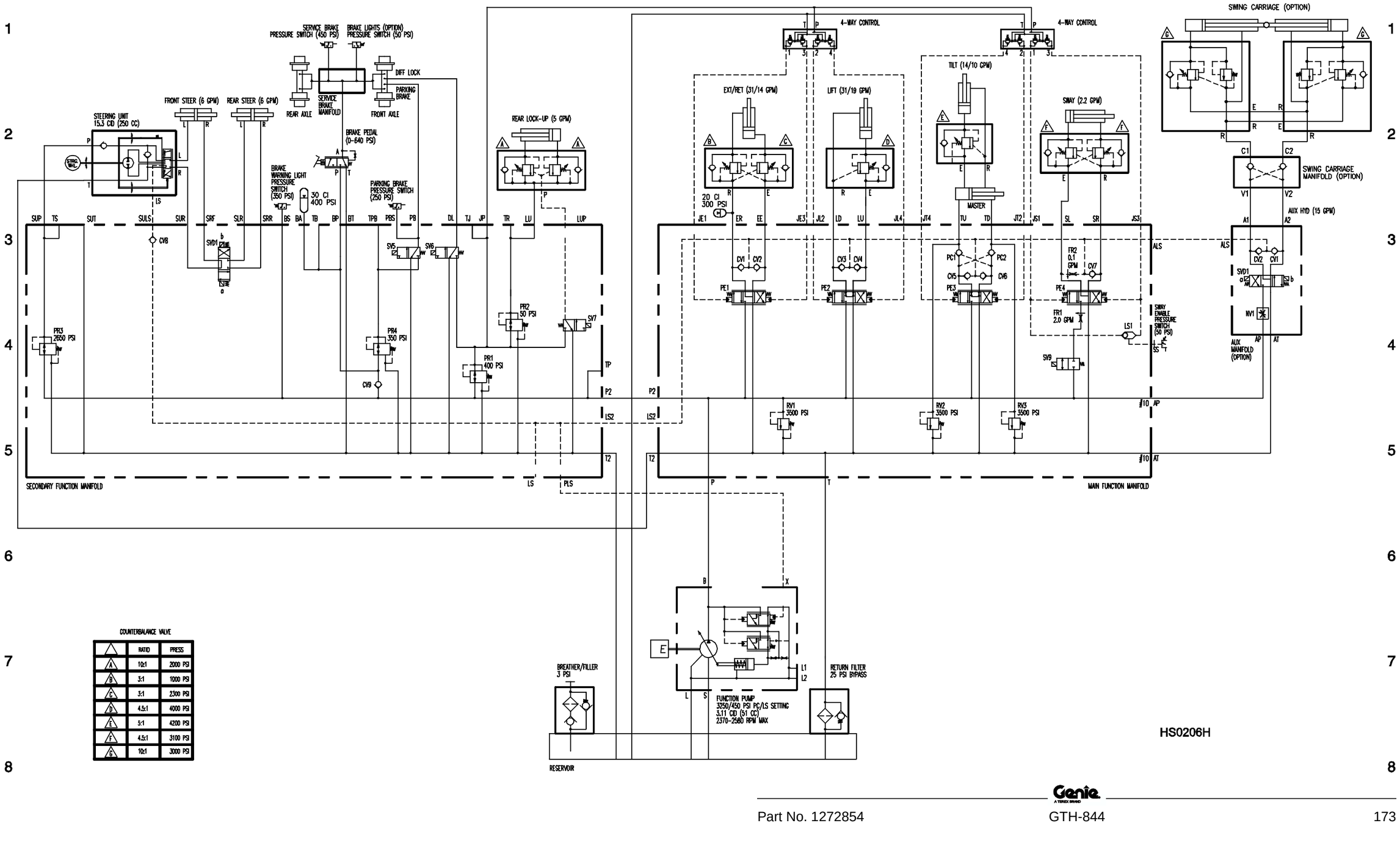
# Hydraulic Schematic - Dual Joystick (to 19528)



## Hydraulic Schematic - Dual Joystick (to 19528)



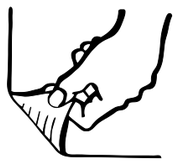
# Hydraulic Schematic - Dual Joystick (from 19529, 16E-10000)




COUNTERBALANCE VALVE

| | RATIO | PRESS |
|---|---|---|
| A | 10:1 | 2000 PSI |
| B | 3:1 | 1000 PSI |
| C | 3:1 | 2300 PSI |
| D | 4.5:1 | 4000 PSI |
| E | 5:1 | 4200 PSI |
| F | 4.5:1 | 3100 PSI |
| G | 10:1 | 3000 PSI |

# Hydraulic Schematic - Single Joystick (from 19529, 16E-10000)



California Proposition 65

**WARNING**

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

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

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

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



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