



TL-Family

Electrical Schematics & Troubleshooting

(Freightliner M2 Chassis)

PETERSEN INDUSTRIES, INC. | 4000 SR 60 WEST, LAKE WALES, FL 33859

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Technicians and operators must verify they are using the latest version of this manual before performing any service, installation, or maintenance. Petersen Industries Inc. assumes no liability for actions taken based on outdated documentation.

Feel free to [**CONTACT US**](#) or call our parts department at **(800) 930-5623, Ext. 229**, should you need any assistance. Please have your loader serial number available when contacting our parts department.

You can also learn how to [**IDENTIFY YOUR LOADER**](#) on our website.

Scan the QR code below or visit [**Petersenmanuals.com**](https://Petersenmanuals.com) to verify and download the latest manual prior to operating the loader or performing any service, installation, or maintenance.

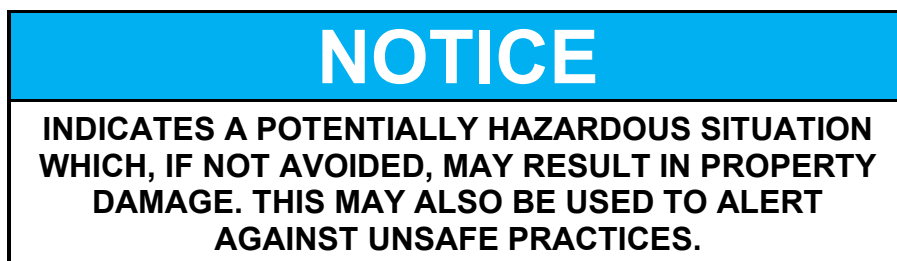
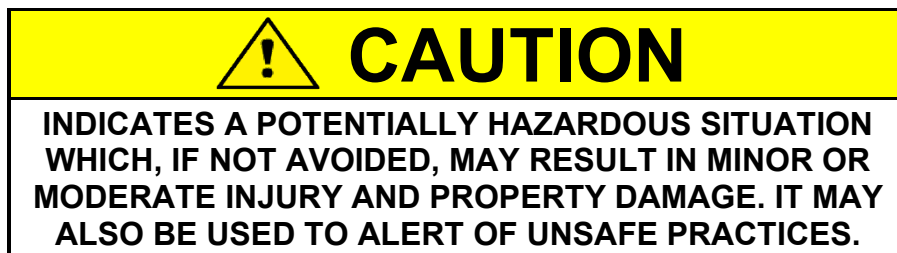
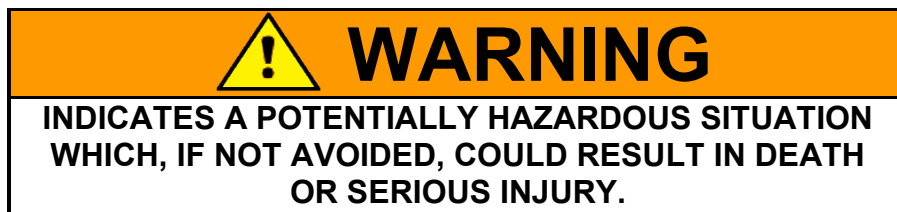


PART 1: SAFETY PRECAUTIONS

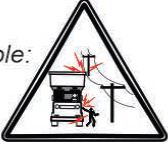
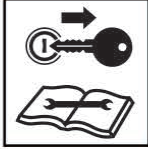
Read this manual before operating or working around the loader. The following service procedures and safety precautions should always be followed when performing any maintenance or repairs to this loader. The loader also has required safety decals that are designed to alert those operating, working around, or performing maintenance on the loader of certain safety hazards.

Safety decals are used to show the consequence of human interaction with a hazard in terms of:

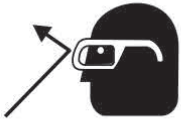
- **The degree of severity**
minor injury, severe injury, or death
- **The probability of severity**
WILL result in, COULD result in injury



Pictographs are also used throughout this manual to help draw visual attention to safety issues to avoid, or best practices to promote safety while operating the loader. Here are examples of pictographs you will find in this manual.

SAFETY HAZARD	SAFETY AVOIDANCE	SAFETY PREVENTION
Pictograph surrounded by a triangle indicates a Safety Hazard that must be avoided. Example:  Equipment contacting overhead electrical lines	Pictograph in a circle or inside a box indicates an avoidance procedure that should be followed to prevent injuries. Example:  Always shut off engine and remove key before working on equipment.	A circle with a slash through it indicates an action that is prohibited. Example:  No Smoking

Always wear protective clothing and personal safety devices issued to you or required by job conditions when operating or working on this loader. Requirements include but are not limited to wearing a hard hat, safety shoes, goggles, face shield, or safety glasses (with side shields that comply with ANSI Z87 standards), protective gloves, hearing protection, and reflective clothing.

					
Wear Safety Glasses to Comply with ANSI Z87	Wear Hard Hat	Wear Safety Shoes	Wear Hearing Protection	Wear Protective Gloves	Wear Safety Reflective Vest



WARNING

NEVER WEAR LOOSE CLOTHING OR JEWELRY WHEN WORKING ON OR AROUND EQUIPMENT. SUCH ITEMS CAN CATCH ON CONTROLS OR BE DRAWN INTO OTHER PARTS OF THE LOADER.

Do not perform any work to this loader unless you are qualified and authorized to do so. All service personnel must also read and understand the Operator's Manual for this loader before any work is to be performed. Anyone responsible for the care of the unit must be completely familiar with the type and frequency of inspections, maintenance, and service operations to be performed.

Ensure the vehicle is parked in an area with sufficient space to swing the boom and raise the dump body. This not only allows for any necessary maintenance procedures to be performed but also allows sufficient room if operation may be necessary for diagnosis and post-repair testing. Before any service, ensure the bucket is resting on the ground or floor of the dump body, the body is raised (if necessary) and supported on the supplied props, and the approved lockout-tagout procedure has been performed.


WARNING

FAILURE TO READ THIS MANUAL IS A MISUSE OF THIS EQUIPMENT. ANYONE WHO WILL OPERATE OR WORK AROUND THE LOADER MUST FIRST READ THIS MANUAL. DEATH OR SERIOUS INJURY MAY RESULT FROM IMPROPER USE OR MAINTENANCE OF THIS LOADER.

Safe Operating/Maintenance Practices

Safety is everyone's responsibility and becomes paramount during the operation, repair, and working around the loader. It is your responsibility to ensure your safety, as well as the safety of others. NEVER operate the loader's boom, outriggers, or dump body if another person is within 30 feet of the work area.


DANGER

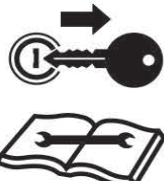
CRUSHING HAZARD AND PINCH POINTS



TO AVOID SERIOUS INJURY OR DEATH:

- KEEP AWAY from moving machinery parts that can pinch, crush or fall.

Here are some other **requirements that will ensure safety of the entire crew:**

				
Read and Understand Operator's Manual	DO NOT USE DRUGS or ALCOHOL before or while operating equipment	Always shut off engine and remove key before working on equipment	Always install Debris Body and tail gate props before working under equipment	Always wear your seatbelt

Always maintain three-point contact with the machine during entry and exit of the cab or operator's station. Use provided hand bars and never grab control levers or the steering wheel when mounting or dismounting the machine. Always face the machine when mounting or dismounting and do so only after the truck and all moving parts have stopped completely.

Do not crawl onto any part of the loader to access any component. Use only the supplied steps and standing platform to operate or perform maintenance on the loader. Always wear the necessary protective gear for the task being performed and observe all safety precautions and safety best practices when working on or around the loader.

Power Lines & Electrical Hazard Safety

Always survey the site for any potential power lines before performing any function or work on the loader. If power lines are present, follow all requirements for operating equipment around power lines. Extreme care must be used to prevent electrocution. Always ensure that the appropriate power or utility company has de-energized the lines before operating the loader.

If shutting down the line is not an option, ask the utility company to install insulation over the lines for the duration of time you will be operating in the area. A minimum safe distance of 10 feet from all power lines must be maintained by all personnel. Do not allow any team member to approach or carry any conductive object closer than 10 feet to any potentially energized power line.

		
Contacting power lines will result in death or serious injury. Do NOT allow any part of the machine within 10 feet of power lines or electrical shock can result.		

 WARNING
USE THREE POINTS OF CONTACT (<i>TWO HANDS AND ONE FOOT OR TWO FEET AND ONE HAND</i>) WHEN MOUNTING OR DISMOUNTING FROM THE CAB OR OPERATOR'S STATION OF THE LOADER.

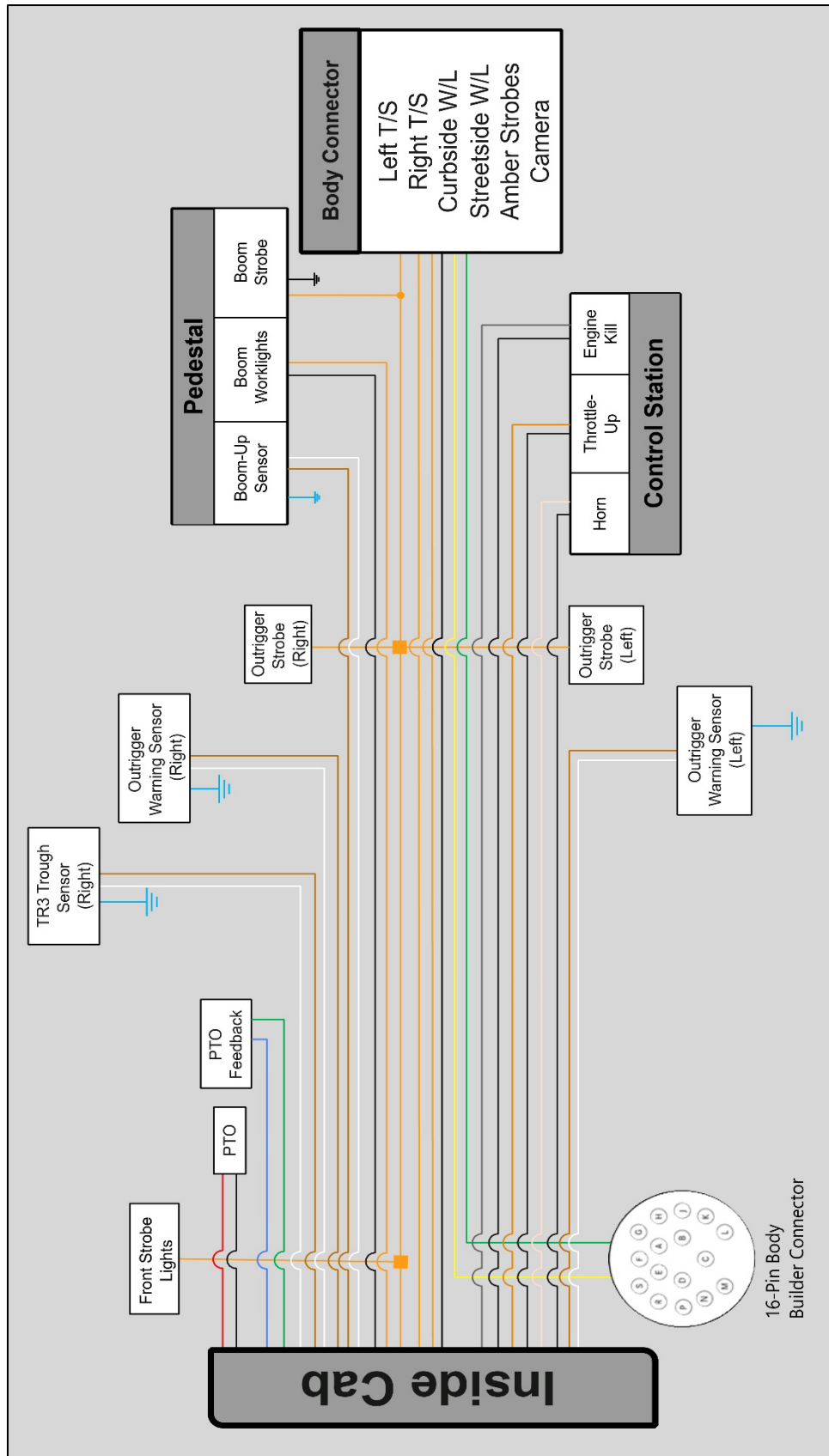
Training

The health and safety of each crew member is of primary importance. Consequently, each member has an obligation to himself and his fellow workers to make sure safe operating procedures are followed. All operating regulations recommended by the vehicle manufacturer, employer, as well as municipal, state and federal agencies must be observed. The operating procedures described in this manual are Petersen Industries' recommendations and do not necessarily cover all employer and government regulations. Each operator is responsible for understanding and observing **all** regulations pertaining to the operation of this loader.

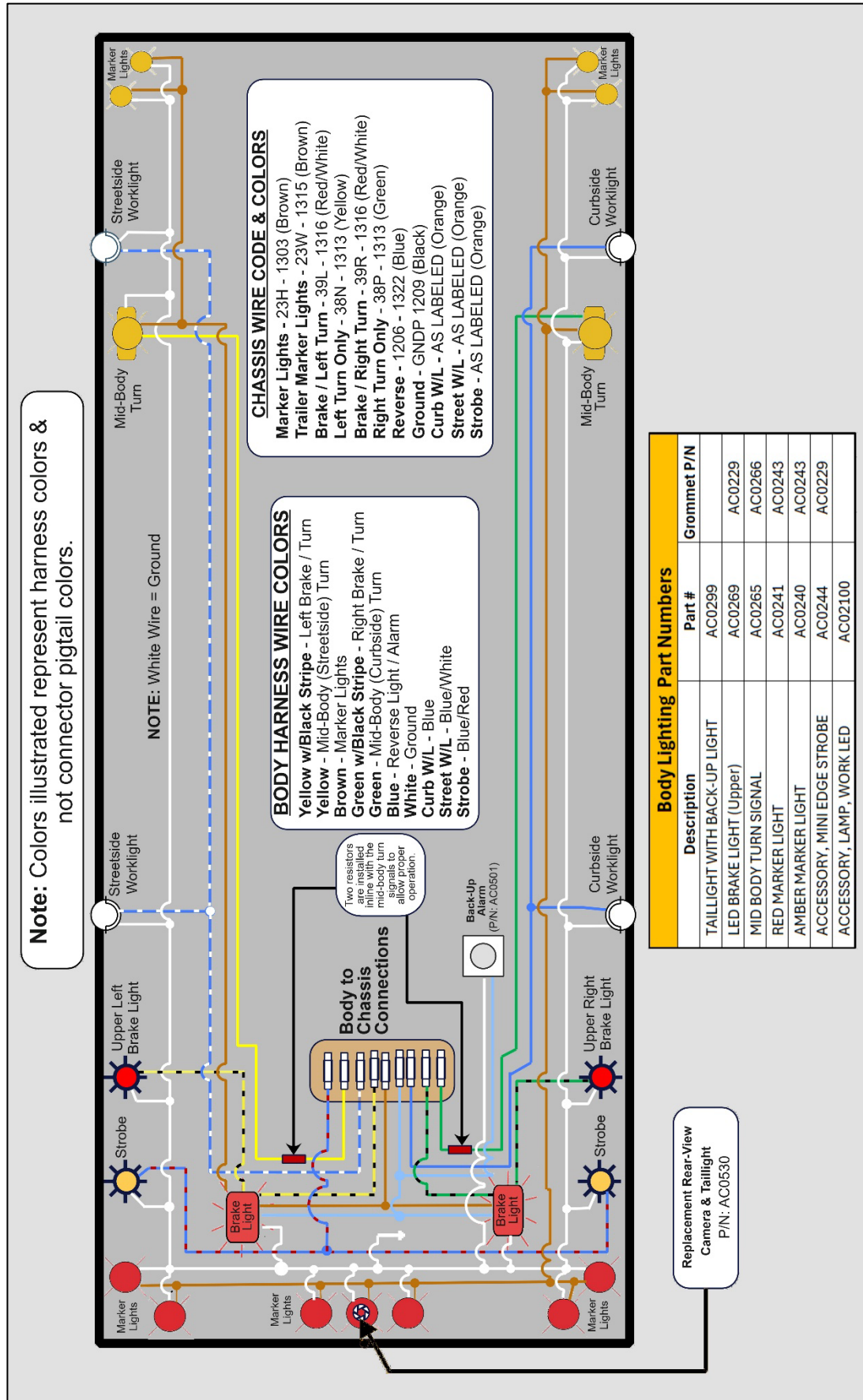
Become familiar with the proper function of this equipment and remain alert to spot any abnormalities or malfunctions. There is a high degree of reliability built into the equipment, but there is always a possibility of mechanical or power failure due to incomplete service or abnormal wear. Each crew member must receive instructions on the proper function of this machine. This will help prepare each crew member to recognize when it is not operating properly.

Key Safety Points When Servicing The Loader

- Use your company's prescribed Lock-Out/Tag-Out (LO/TO) procedure to prevent any accidental starting of the engine.
- Do not disconnect any pressurized hydraulic connections. Ensure that all hydraulic line pressures have been sufficiently evacuated before performing any service to the system.
- Stay clear of hydraulic fluid leaks as high-pressure and/or hot hydraulic fluid can cause serious injury.
- Always use body props before servicing or repairing the dump body or hoist and whenever the body will be kept in the raised position.
- Never leave the dump body raised, even partly raised, without support while the vehicle is unattended.
- Modification to any part of the loader can create a safety hazard and therefore shall not be made without the manufacturer's written approval.
- It is important that factory replacement parts are used to ensure the safety and load-carrying capacity of the loader is retained.
- Disconnecting, removing, or disabling any part or component which controls the speed of the loader is a misuse of the loader.

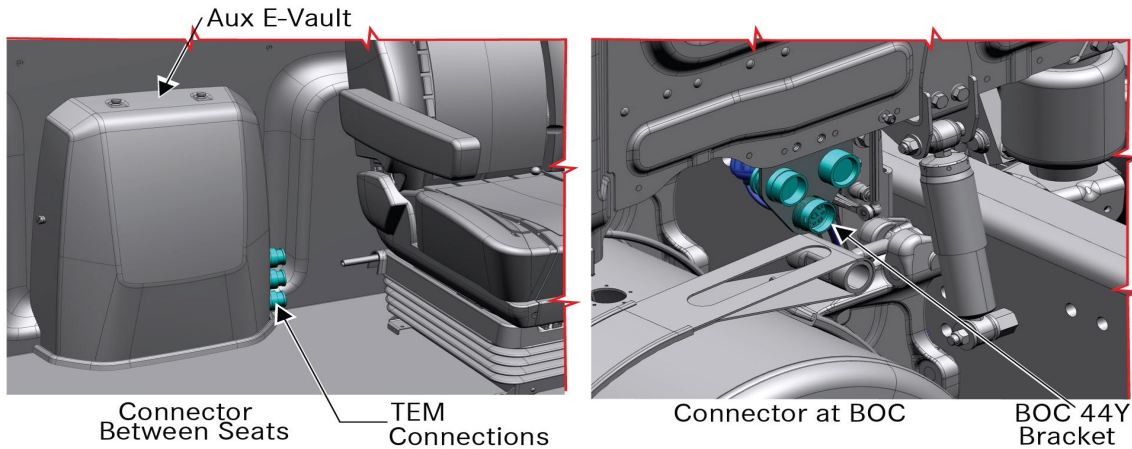
PART 2: WIRING

DWT Loader Wiring Diagram

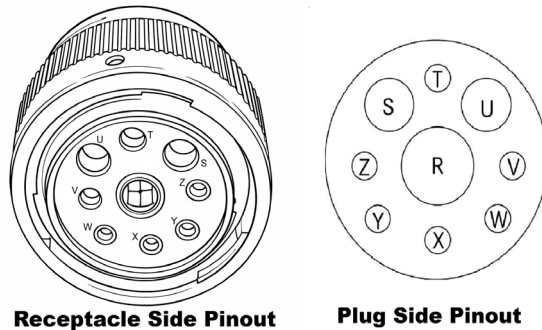


Cab Interface Connectors

Most Truck Equipment Manufacturer (TEM) / Body Builder Switch Interface Connectors (SWTIC) you will find either between the seats in the cab or outside, under the cab on the driver's side. TEM interface connectors provide a sealed and secure connection point for integrating TEM body and equipment to the controls inside the truck.



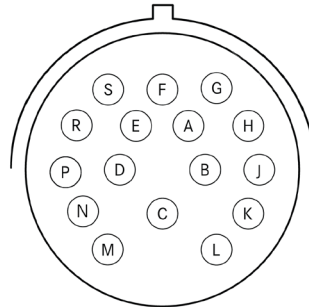
9-Pin TEM Interface Connector



FREIGHTLINER 9-PIN CONNECTOR PINOUT		
Pin	Wire Color	Function
S	N/A	N/A
T	N/A	N/A
U	N/A	N/A
V	N/A	N/A
W	Orange	Strobe Lights
X	Orange	Boom Work lights
Y	Orange	Streetside W/L
Z	Orange	Curbside W/L

Each dash switch outputs current to one or more circuits terminating at this nine-pin, Switch TEM Interface Connector (SWTIC). You may find this connector located at the back of the cab, between the seats (in the cab), or at the rear of the driver's side frame rail.

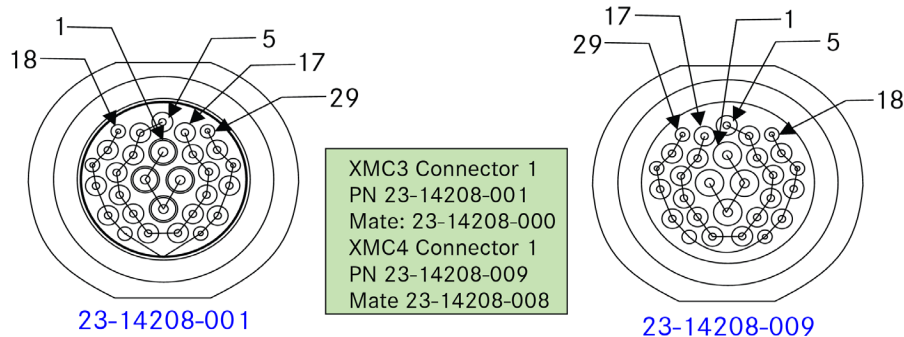
16-Pin Body Lighting Interface Connector (BTIC)



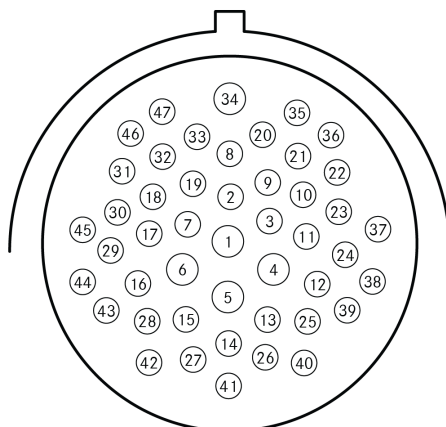
Plug Side Pinout

16-PIN BODY LIGHTING INTERFACE CONNECTOR PINOUT			
Pin	Function	Pin	Function
A	Dome lamp, Trailer Supply (Blue)	J	Right Turn Lamp Signal (Green)
B	CHMSL/Stop Supply (Red)	K	Ground (Black)
C	Clearance Lamp (Black)	L	Ground (Black)
D	Tail/Marker Supply (Brown)	M	Ground (Black)
E	Left Turn/Stop Supply (Yellow/Red)	N	IGN Supply, Body Builder (Pink)
F	Right Turn/Stop Supply (Green/Red)	P	
G	Backup Lamp Supply (Lt. Green)	R	
H	Left Turn Lamp Signal (Yellow)	S	

29-PIN XMC3 QPM Connector



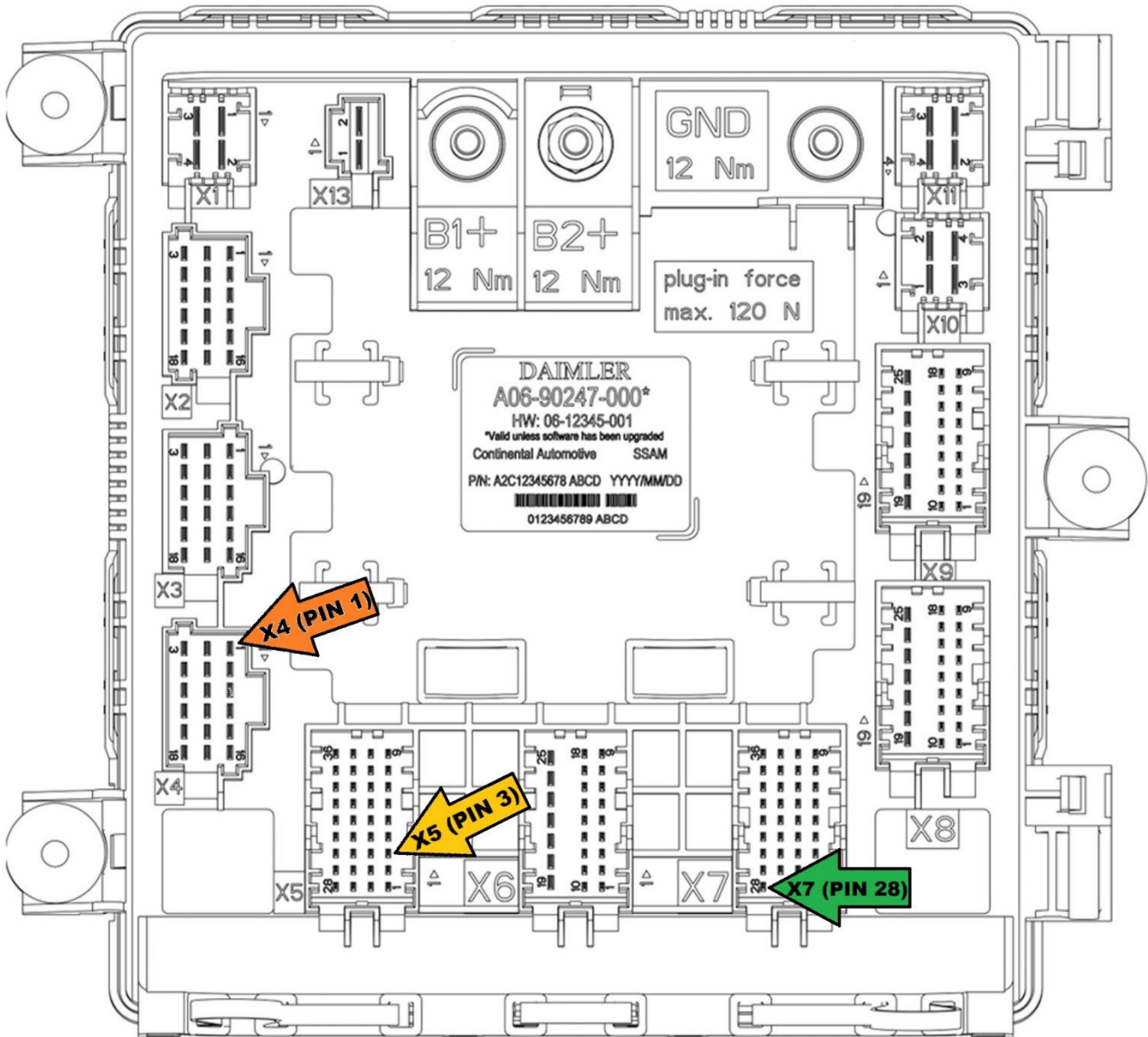
29-PIN (BODY BUILDER) CONNECTOR			
Pin	Function	Pin	Function
1*	Strobe	16	
2*	Boom Work Lights	17	
3*	Street Work Lights	18	
4*	Curb Work Lights	19	
5	Engine Kill Relay	20	
6	145 (Neutral Safety)	21	
7	Boom Alarm 12V	22	
8	Boom Alarm 12V	23	
9	To Pin-17 on 47-Pin PTIC Conn. (National Accounts)	24	Control Station Horn Switch (White)
10		25	
11	To pin 15 (47-Pin PTIC Conn.)	26	Throttle-Up Switch (Brown)
12	Engine Kill Relay (85)	27	Boom Proximity Sensor (White)
13		28	
14		29	
15		*	(1-4 Used if NO 9-Pin TEM plug is present)

47-Pin Body Link Connector

Connector Size 24, 47 Pins

Qty 5, size 16 & Qty 42, size 20

FREIGHTLINER 47-PIN PTIC CONNECTOR PINOUT (Cummins)			
Pin	Function	Pin	Function
1	Signal Ground Return, Electronics	25	OUT8: Secondary Mode/Range Ind.
2	Vehicle Speed Signal	26	IN1: Pump Mode
3	Digital Ground	27	IN4: Trans. Case Low/Secondary Shift
4	Ignition Signal	28	IN6: Aux Range Inhibit/Secondary Shift
5	Power Ground	29	IN10: Auto Neutral/Reverse Enable
6	Transmission Neutral, TEM 145 (Blue)	30	TRANS,VIGN Supply
7	Park Brake Status	31	OUT1: PTO 1 Enable (3K/4K)/Sec Ind.
8	NEG J1939-500K CAN - Backbone	32	OUT6: Sump/Retarder Temp
9	POS J1939-500K CAN - Backbone	33	IN3: PTO 1 Enable
10	Remote Accelerator Return Ground	34	IN5: Secondary Mode Input #142 Interlock
11	Remote Accelerator/Sensor Power +5V	35	PTO #1 Engage Request
12	Remote Accelerator Signal - Throttle Position	36	PTO Hour Meter
13	Remote Accelerator On/Off Switch	37	Not Used
14	Tachometer Drive Output	38	Engine Mount PTO #1 Request
15	Throttle Jump (Pin 11, 29-Pin Connector) (Black)	39	Not Used
16	Not Used	40	Emergency Engine Stop Request
17	Max Engine/Road Speed Interlock, #142	41	Not Used
18	Acc. Pedal Interlock/Engine Limit Switch	42	Not Used
19	PTO Set Switch	43	PTO Engaged Status (Any PTO)
20	Remote Station PTO On/Off Switch	44	PTO TEM Interlock
21	PTO Resume/Accelerator Switch	45	RSS Stop Start
22	OEM Switch / Sensor Return	46	RSS Engine On, Run State Indicator
23	OUT3: Neutral Indicator/Axle Ratio Enable	47	RSS Interlock
24	OUT4: Speed Indicator A / Secondary Shifter		

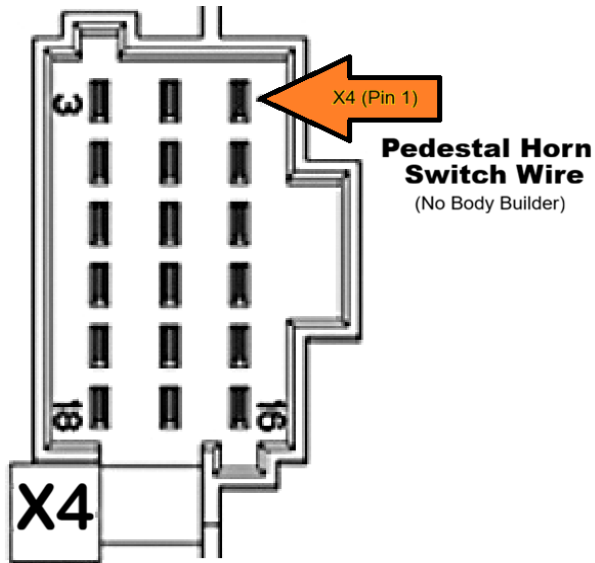


Freightliner sSAM Module

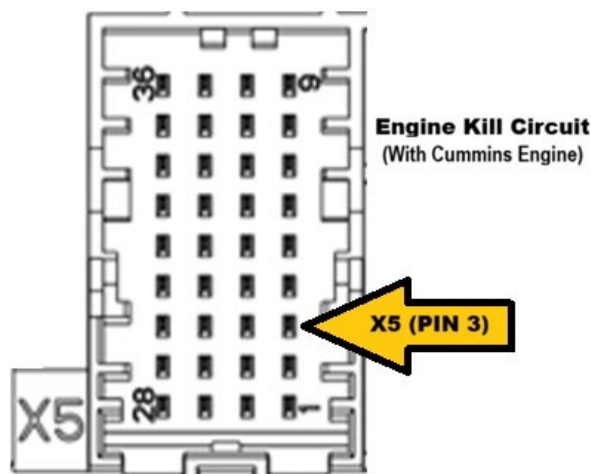
The Freightliner **Single Signal-Detect and Actuation Module** (sSAM) is a dash-mounted, primary module in the truck's electrical system. It features a newer, more streamlined electrical architecture than the previous Advanced Signal-Detect and Actuation Module (aSAM) and merges signals and combines multiple functions into one unit.

The sSAM provides power distribution for the chassis, cab, and all modular switch functions. As the hub of the electrical system, we use the sSAM for integrating various functions of the loader controls to the chassis of the truck. Here are connections that may be of use, should you ever need to troubleshoot these functions.

sSAM Connector Pinout



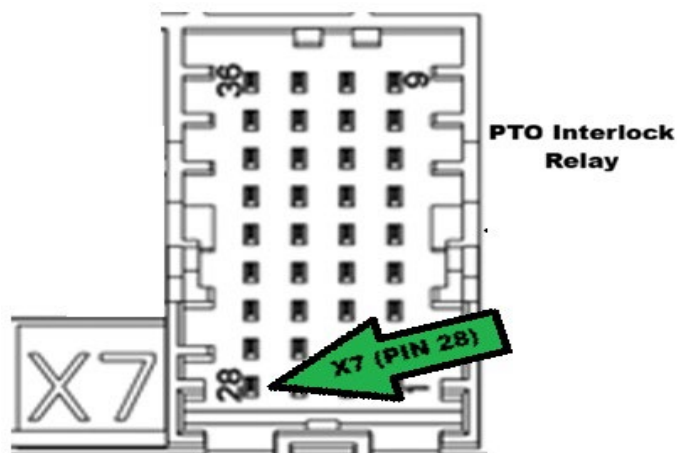
FREIGHTLINER sSAM X4 CONNECTOR		
Pin	Function	Input/Output
1	Horn Electric, (If no BB Conn.)	Output
2	Light Rotary Switch, BAT	Output
3	Int. Lighting, GND_P #1 (FWD Overhead)	Ground
4	Not Used	N/A
5	Light Rotary Switch, BC1	Input
6	Panel Lamps, GND	Ground
7	Utility Light #2	Output
8	Light Rotary Switch BC Redundant	Input
9	Light Rotary Switch GND	Ground
10	Footwell Lamp	Output
11	Light Rotary Switch Version	Input
12	Not Used	N/A
13	Light Rotary Switch Backlighting	Output
14	Light Rotary Switch NL/NSL	Input
15	Light Rotary Switch BC2	Input
16	High Beam, Right	Output
17	Turn Left Front Corner	Output
18	Turn Right Front Side	Output

sSAM Connector Pinout (Cont).

FREIGHTLINER sSAM X5 CONNECTOR		
Pin	Function	Input/Output
1	Ignition Switch - Accessory	Input
2	Ignition Switch - Off	Input
3	Ignition Switch, BAT	Output
4	MQ-Bus, Switch Bank #1, PWR	Output
5	LIN #3, PWR	Output
6	LIN #2, PWR	Output
7	LIN #1, Stalk/Steering, PWR	Output
8	Tail Lamp, Left	Output
9	Turn Signal Left, Indicator	Output
10		
11	Ignition Switch - Crank	Input
12	Ignition Switch - On (ignition)	Input
13	MQ-Bus, Switch Bank #1, Com	Comm.
14	LIN #3, Com	Comm.
15	LIN #2, Com	Comm.
16	LIN #1, Stalk/Steering, Com	Comm.
17	LVD Sense, BAT	Input
18	Turn Signal Right, Indicator	Output

FREIGHTLINER sSAM X5 CONNECTOR (Cont).		
Pin	Function	Input/Output
19		
20	Transmission Temperature, Feedback	Input
21	Transmission Temperature, GND_CR	-
22	MQ-Bus, Switch Bank #1, GND_DE	-
23	LIN #3, GND_DE	-
24	LIN #2, GND_DE	-
25	LIN #1, Stalk/Steering, GND_DE	-
26	LVD Sense, GND_DE	-
27	SAM_Cab_CAN_H_Cabin	Comm.
28	Backup Switch	Input
29	Transmission Neutral Switch	Input
30	Service Brake Pressure Switch #1 (NO)	Input
31	Park Brake Pressure Switch (NC)	Input
32	Park Brake Drag Pressure Switch (NO)	Input
33	Stop Lamps	Output
34	Top of Clutch, Cruise Control Disable	Input
35		
36	SAM_Cab_CAN_L_Cabin	Comm.

sSAM Connector Pinout (Cont).

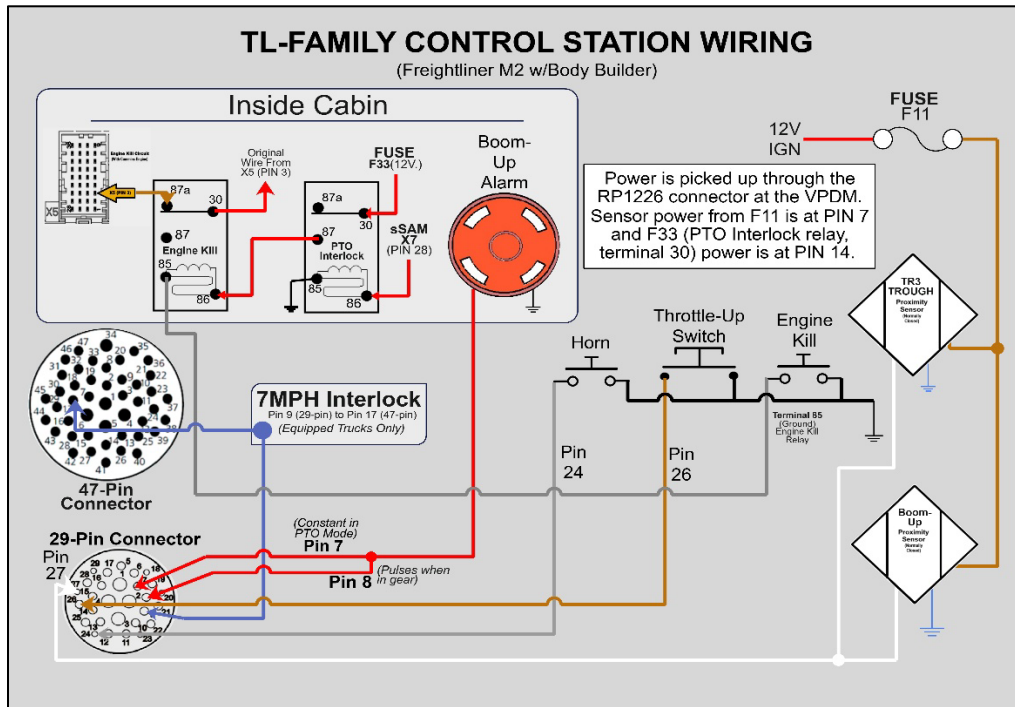


FREIGHTLINER sSAM X7 CONNECTOR		
Pin	Function	Input/Output
1	Configurable Low Side Output #1	Output
2	Configurable Low Side Output #2	Output
3	Configurable Low Side Output #3	Output
4	Configurable Low Side Output #4	Output
5	Configurable High Side Output #9	Output
6	Configurable High Side Output #10	Output
7	Configurable Analog Input #3	Input
8	Configurable Analog Input #2	Input
9	Configurable Analog Input #1	Input
10	Configurable Digital Input #8	Input
11	Configurable Digital Input #9	Input
12	Flex Pin Analog Pressure Sensor 1	Output
13	Configurable Digital Input #5	Input
14	Configurable Digital Input #4	Input
15	Configurable Digital Input #2	Input
16	Configurable Analog Input #4	Input
17	Private CAN High	Comm.
18	Configurable High Side Output #11	Output

FREIGHTLINER sSAM X7 CONNECTOR (Cont).		
Pin	Function	Input/Output
19	Configurable Digital Input #1	Input
20	Configurable Digital Input #3	Input
21	Configurable Digital Input #6	Input
22	Configurable Digital Input #7	Input
23	Configurable Digital Input #10	Input
24	Configurable Digital Input #11	Input
25	Configurable Digital Input #12	Input
26	Private CAN Low	Comm.
27	Configurable High Side Output #12	Output
28	Configurable High Side Output #2	Output
29	Configurable High Side Output #1	Output
30	Configurable High Side Output #4	Output
31	Configurable High Side Output #3	Output
32	Configurable High Side Output #6	Output
33	Configurable High Side Output #5	Output
34	Flex Pin Analog Pressure Sensor 2	Output
35	Configurable High Side Output #8	Output
36	Configurable High Side Output #7	Output

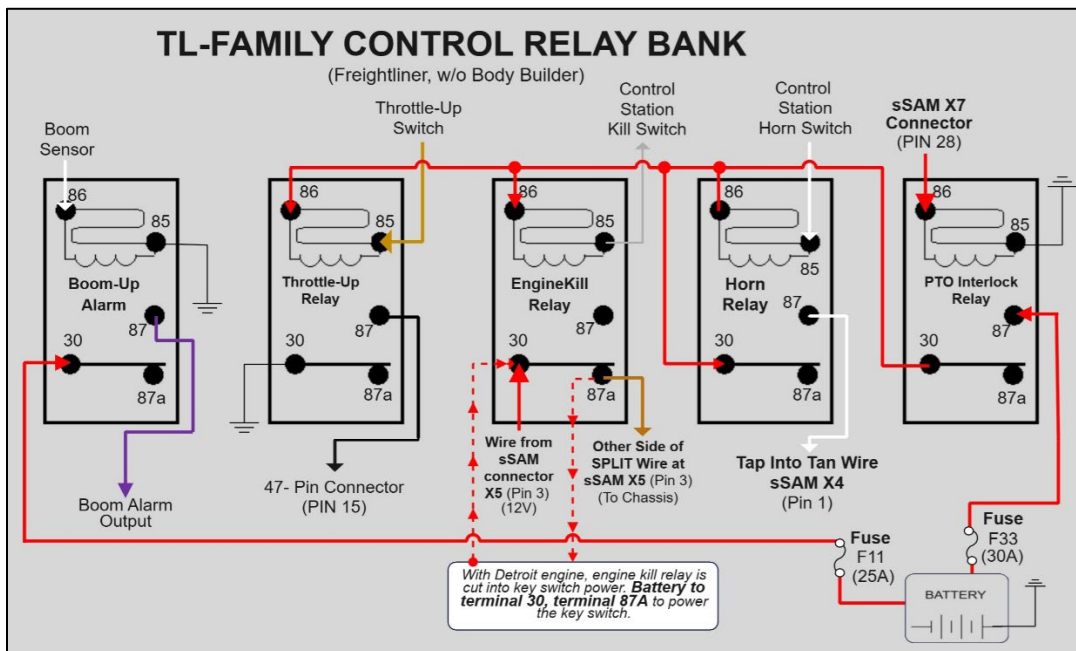
Control Circuits

There are electric switches on the control platform, as well as in the driver's cab to operate the loader. Depending on the number of options and whether the chassis was ordered with a body builder kit or not dictates how the loader interfaces with the chassis and how many relays or sensors are necessary to control all loader functions.



TL-Family Loader Control Wiring (w/BBK)

If the chassis does not include a body builder kit, a series of relays are installed in the cab, behind the driver-side kick panel to operate the loader and interlock control systems. The number of relays used is determined by the number of options manufactured into the loader.



Basic TL-Family Loader Control Relay Bank (w/o BBK)

Power-Take-Off (PTO) Switch

The PTO switch is either located on the dashboard in the cab of the truck or integrated into the transmission selector for Allison transmissions. In this case, pressing the “MODE” button will engage the PTO. The recommended procedure for engaging the PTO is to bring the vehicle to a full stop, place the vehicle’s transmission into Neutral (N), set the parking brake, and then engage the PTO switch. At the completion of loading operations, turn off the PTO switch, apply the service brakes, disengage the parking brake, and then select the desired gear.

If the PTO does not engage, a flashing PTO light indicates that the PTO function is requested but not permitted to engage for some reason. Check that the transmission selector is in Neutral (N). **Note:** the PTO may not engage if the truck is in stationary regeneration mode due to the increased engine RPM during the regen process. If the truck is in regeneration mode, depress the brake pedal (which should trigger a lower engine RPM) and try the PTO switch again once engine RPM drops. If the PTO indicator light does not illuminate at all, check the fuse for the PTO.

Throttle-Up Control

There is a push/pull-type throttle-up control switch to permit the operator to easily increase the loader’s engine speed for most efficient loading or decrease it whenever the loader is at rest. This permits slower, more precise control of the loader, and allows for better communication with a fellow crew member, for example. Pulling out the switch activates the throttle-up function, raising the engine’s speed. Pushing in the switch lowers engine speed.

Always use the throttle-up function to increase engine speed when using the loader. The throttle-up feature is dependent on the in-cab PTO switch being activated. If the loader does not respond to control input and the engine speed does not increase when the throttle-up switch is activated, check that the in-cab PTO switch has been engaged.

Horn & Emergency Engine Kill

On the same console as the throttle-up control, there are two momentary push buttons. One operates the horn and the other is for activating the emergency engine shutoff (Engine Kill). The engine shutoff button will kill the engine whenever depressed. The engine shutoff relay is connected to the truck’s sSAM controller at connector X5 (PIN 3). Grounding terminal 85 of the relay through the engine kill pushbutton opens this circuit to kill the engine.

Troubleshooting Engine Shutoff Circuit

The engine shutoff relay is spliced into the factory ignition relay wire at sSAM connector X5 (PIN 3) for Cummins-powered trucks. Detroit-powered trucks may have the engine shutoff relay spliced directly into the key switch power supply wire coming from the battery. If this is the case, the battery is connected to terminal 30 and the wire to the ignition switch is connected to terminal 87A. In both cases, the cab-mounted relay removes this 12V circuit whenever the engine shutoff switch (in the operator station) is pushed. The momentary engine shutoff switch supplies ground for the engine kill relay, disrupting the circuit between relay terminals 30 and 87A.

An easy way to verify the integrity of the engine kill harness is by combining the wires from the engine kill relay's pin 30 and pin 87A. This bypasses the relay and all switches. If the truck engine runs when these wires are combined, the issue is with the engine kill switch, relay, or the circuit which signals PTO operation. Also verify the engine responds by shutting down when the wires from these two pins are separated. If the engine responds accordingly, the wiring between the engine shutoff relay and ECU are operating properly and the issue is somewhere within the engine shutoff signaling circuit (engine shutoff push button).

Testing the Engine Shutoff Signaling Circuit

Use a test light or multimeter to check for 12 volts at the engine kill relay terminals number 86 and 30. Power at terminal 86 is supplied by either a fused power source or the PTO interlock relay. (The need for a PTO interlock relay is determined by the chassis, engine, and programming used for the loader.) If the engine kill relay has **no power at terminal 86**, check for proper operation of the ignition source or PTO interlock relay.

For trucks NOT equipped with a body builder connection, the PTO interlock relay should also supply 12V to the horn and throttle-up relays from terminal 30 whenever the PTO switch is on. With the PTO switch activated, test for 12V at terminal 30 of the PTO interlock relay and 86 of the throttle-up and horn relays. If they have power, the PTO interlock relay and power jumper wire are working properly. If the engine kill relay has **no power at terminal 30**, check that the chassis-specific power source is operating properly. Be sure to check all fuses as well.

If the engine kill circuit still fails to operate, check for proper grounding of the engine shutoff and PTO interlock relay. Test by grounding the engine kill relay terminal 85 to known good ground and check for 12V at terminal 87. Power should switch between terminals 87 and 87A of the engine kill relay whenever ground is added or removed from terminal 85 of the relay.

If the engine kill relay properly switches power between terminals 87 and 87A whenever ground is applied or removed, inspect the engine shutoff switch assembly. Check the switch for proper operation. It is a normally open switch that should provide a solid ground whenever depressed.

Troubleshooting The Rear-View Camera

If the rear-view camera ever fails to operate properly, a systematic approach to troubleshooting should quickly identify the reason. Begin by checking that the display is properly grounded and has 12-volt power. Confirm the fuse is not blown. Then, check the camera and wiring for damage or loose connections. Check that the camera (CAM1) wire behind the dash has good ground and operative keyed power supply.

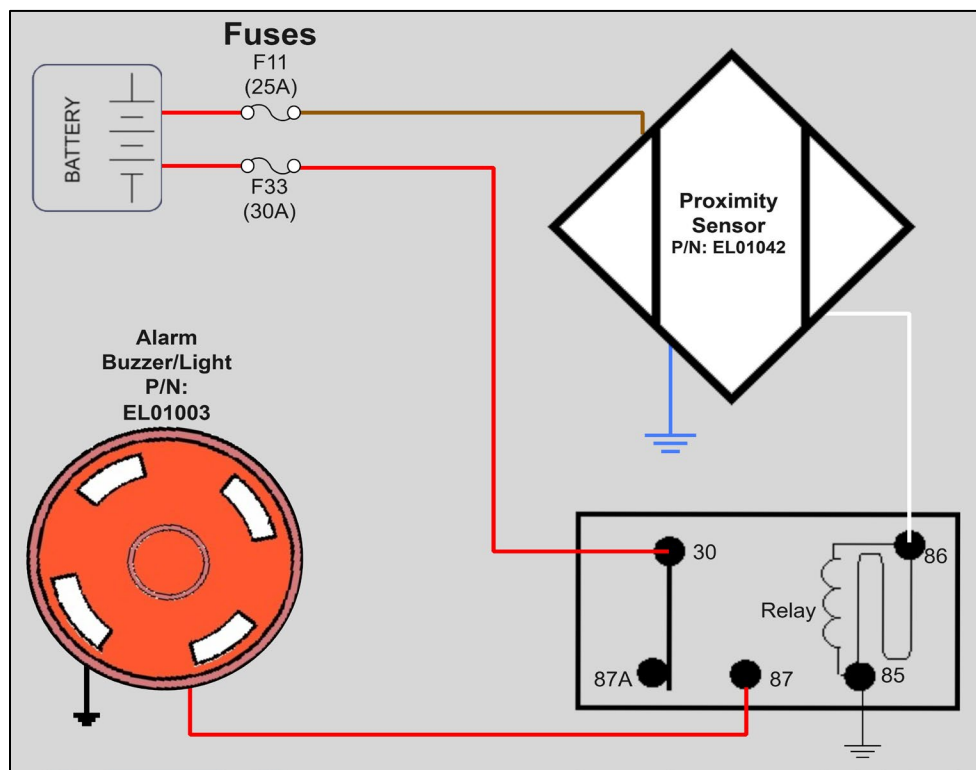
There is a connection at the camera, and another located under the pedestal where the camera's main harness and extension harness are joined. Check this connection for wear, damage, or oxidation; and that the connection is secure. If the integrity of all connections and wires look good and the system has sufficient power, the camera has most likely failed.

Alarm & Interlock Circuits

In-Cab Alarm

The alarm in the cab has the potential to alert the operator of potentially dangerous situations. The primary goal of the alarm is to warn the operator if the boom is at an unsafe height for transit. It can also alert the operator if the body, or outriggers are in an unfit position for travel, if the loader is equipped with the necessary sensors. Each operation requires a proximity sensor located on each protected component.

The proximity sensor is a normally closed switch that powers the alarm relay whenever the boom or protected system is not properly stowed. If all components are stowed properly and the alarm continues to sound, begin by checking for a blown fuse, evidence of damage, or that the sensor has been moved. The sensor must be within 1/8-inch of the actuating surface to function as designed. There is an orange indicator light on the sensor that should be lit whenever the protected system is not stowed properly. If the alarm is triggered and there is no orange indication at the sensor, the fuse is blown or the sensor has failed.



Proximity Sensor & Alarm Wiring

Interlock Circuits

There are interlocking circuits designed into the loader either as standard or offered as options based on how the loader was ordered. The number of sensors and circuits required is dependent on how many interlocking circuits are utilized. Some circuits use proximity sensors to operate a solenoid to limit hydraulic oil flow through a particular valve bank section. Other circuits send a signal to the chassis ECU or transmission control module to limit vehicle speed or transmission gear selection. Here are several circuits that may be found on the TL-family of loaders.

Speed- & Gear-Limiting Interlock

The alarm circuit can also be used to control speed-limiting, or gear-limiting interlock relays (if the truck's ECU/TCM is programmed to do so). The interlock restricts operation of the vehicle if a component of the loader is not safely stored for transit. A signal from the relay would either go to the engine control module (speed-limiting) or to the transmission control module (gear-limiting) when activated.

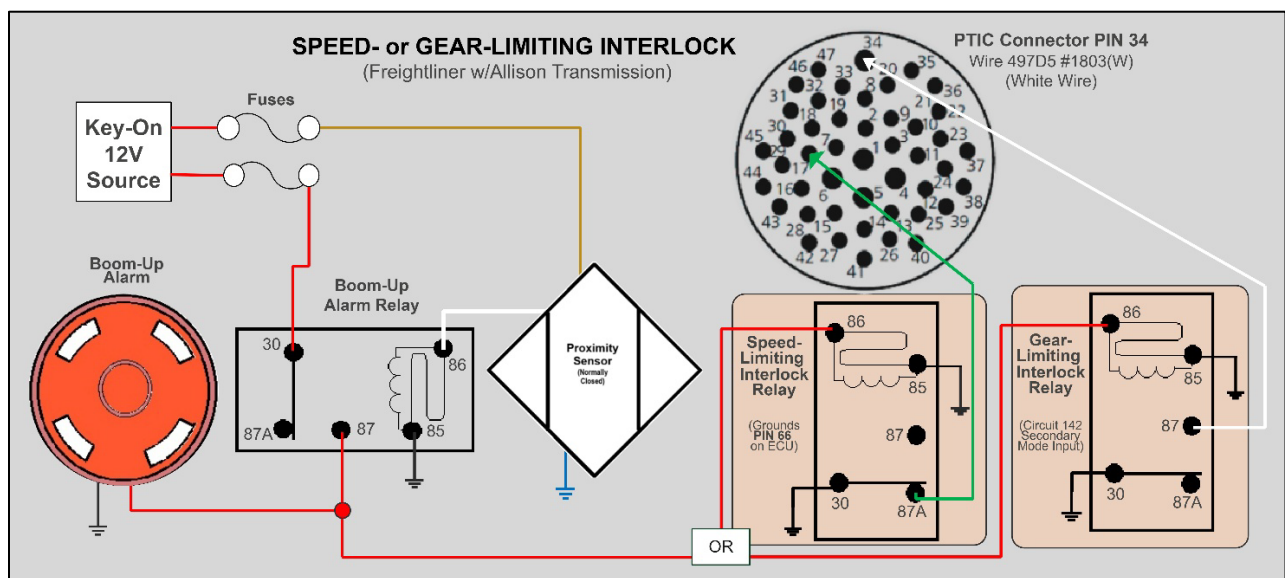

WARNING!

EACH SAFETY SYSTEM ENGINEERED INTO THE LOADER IS A VITAL PART OF MAINTAINING A SAFE WORKING ENVIRONMENT. BYPASSING ANY INTERLOCKING SYSTEM CAN CREATE HAZARDOUS CONDITIONS AND CAN RESULT IN SEVERE HARM OR DEATH.

The gear-limiting interlock provides ground to the transmission controller to initiate gear-limiting while the speed-limiting interlock removes ground to the controlling circuit to activate. The relay is spliced into the truck's boom-up alarm relay (terminal 87) to control either the speed- or gear-limiting interlock.

With the alarm (and interlock relay) activated, the vehicle would be limited to 7 MPH or whichever gear was selected when the interlock was engaged. Once activated, the gear-limiting interlock does allow for downshifting, but the transmission will not upshift beyond whatever gear the transmission was in when activated. If the truck is then ever put in Neutral (N) and then back into gear with the interlock relay activated, first gear will now be the highest gear permitted.

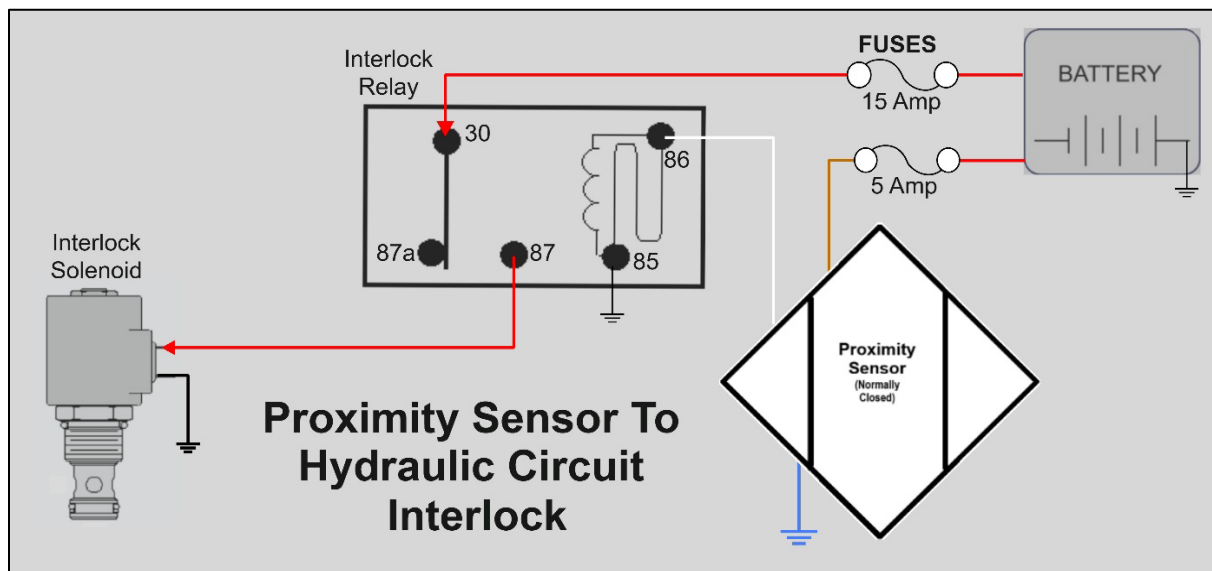
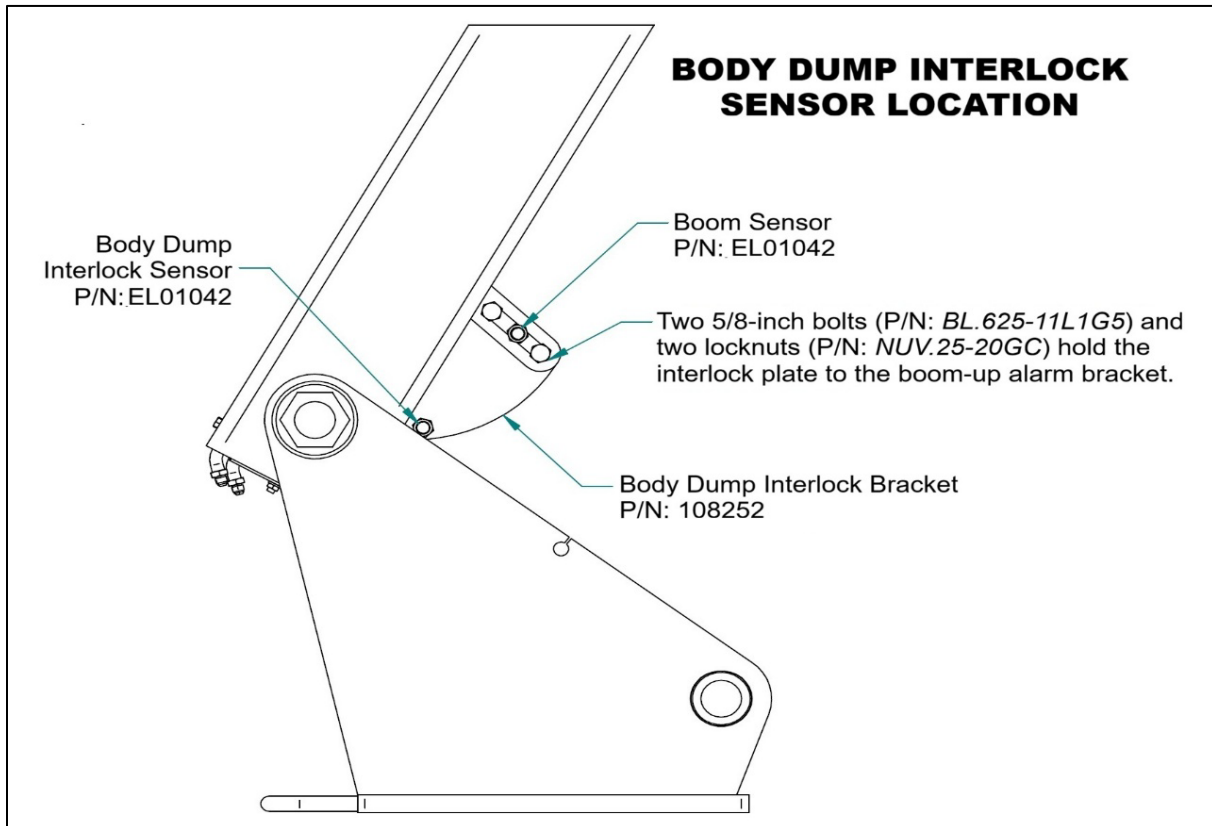
The pushbutton transmission control center in the cab will display digits "6-1" for normal operation. If maximum gear selection is limited, the gear digit display will show the highest gear allowed during the interlock. If "4-1" is shown in the display, the transmission will not go any higher than fourth gear.



Speed- or Gear-Limiting Interlock Wiring

Boom To Body Dump Interlock

If the loader is equipped with a body dump interlock, the body hoist will not operate unless the boom is raised sufficiently. If the loader is equipped with this optional interlock, there is a second proximity sensor mounted alongside the boom-up alarm sensor. This second sensor signals that the boom has been raised sufficiently and activates a solenoid on the valve body to allow hydraulic fluid flow for raising the body.



Boom Interlock Circuit Relay & Sensor Wiring

CP3 Crab Disable

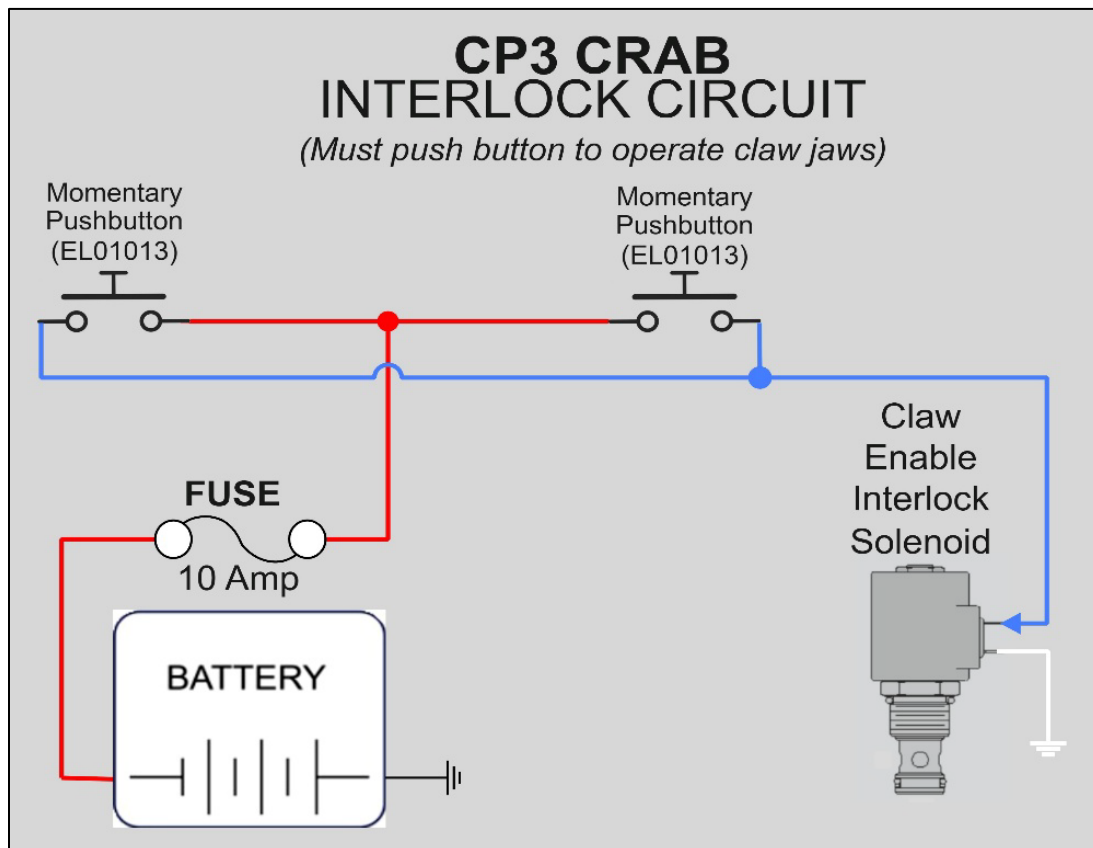
All CP3 loaders have an interlock to prevent the crab claws from opening and allowing a container to fall unintentionally. The crab jaw electric/hydraulic interlock circuit requires pushing the button at either control station to activate a solenoid on the valve bank. This solenoid enables fluid flow, permitting opening the crab jaws only when the button is depressed.



CP3 Crab Jaw Interlock Button



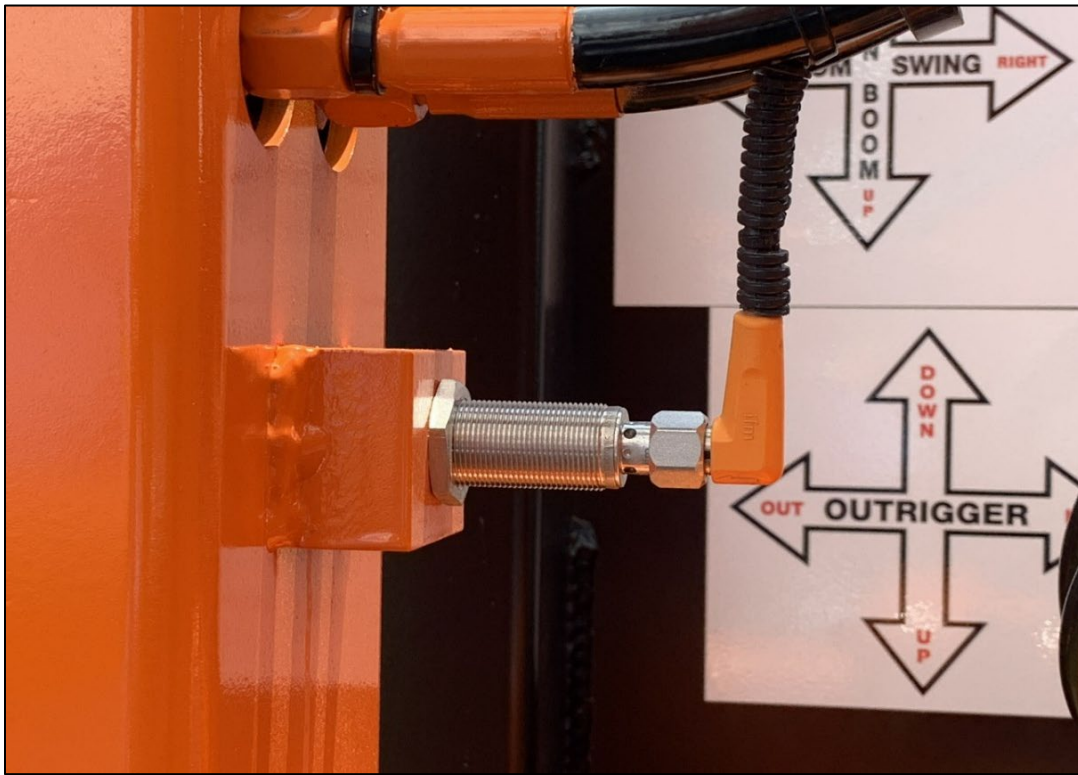
CP3 Electric/Hydraulic Solenoid



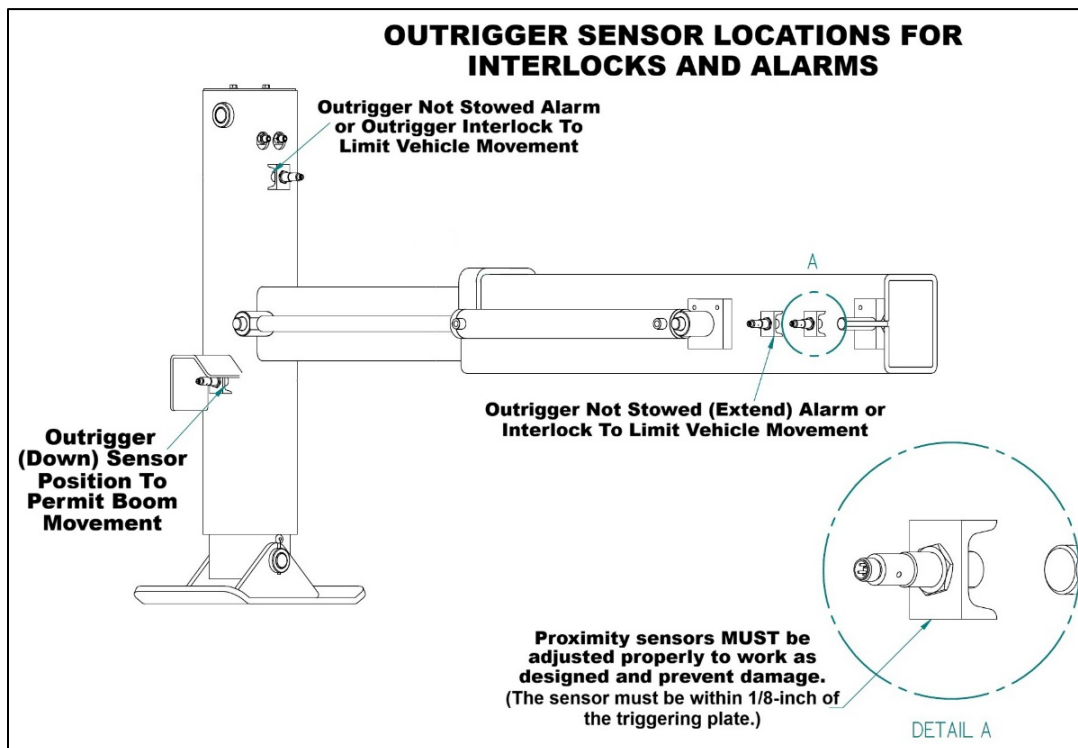
CP3 Crab Interlock Electrical Circuit

Outrigger Sensors

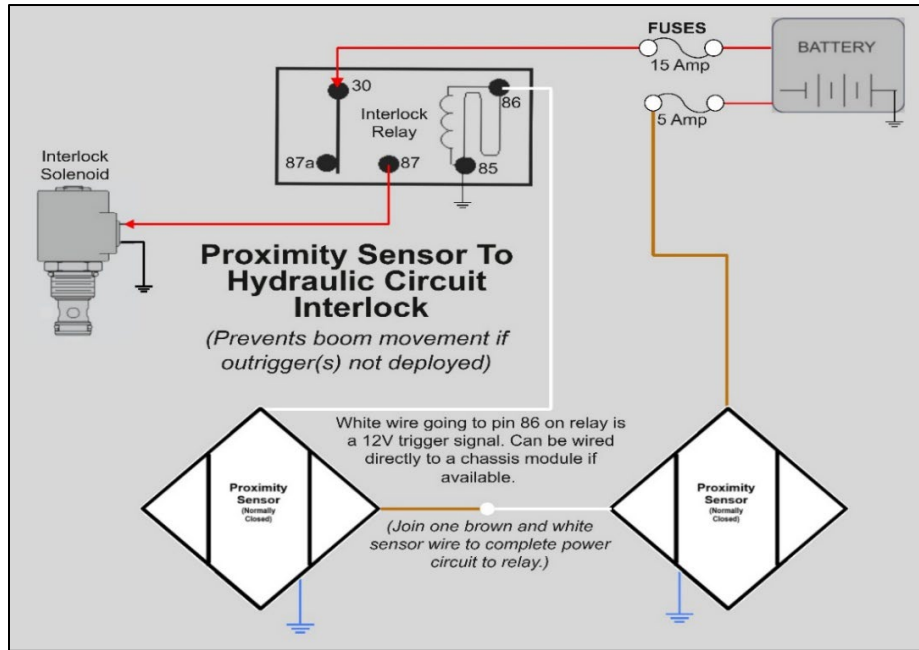
Loaders **MAY** also be manufactured to include sensors on the outriggers to limit the speed of the loader or prevent the transmission from shifting. The function of the interlock and exact wiring path used depends on the configuration of the loader and programming of the chassis.



Outrigger Leg (Vertical) Sensor



Optional Outrigger Interlock Locations

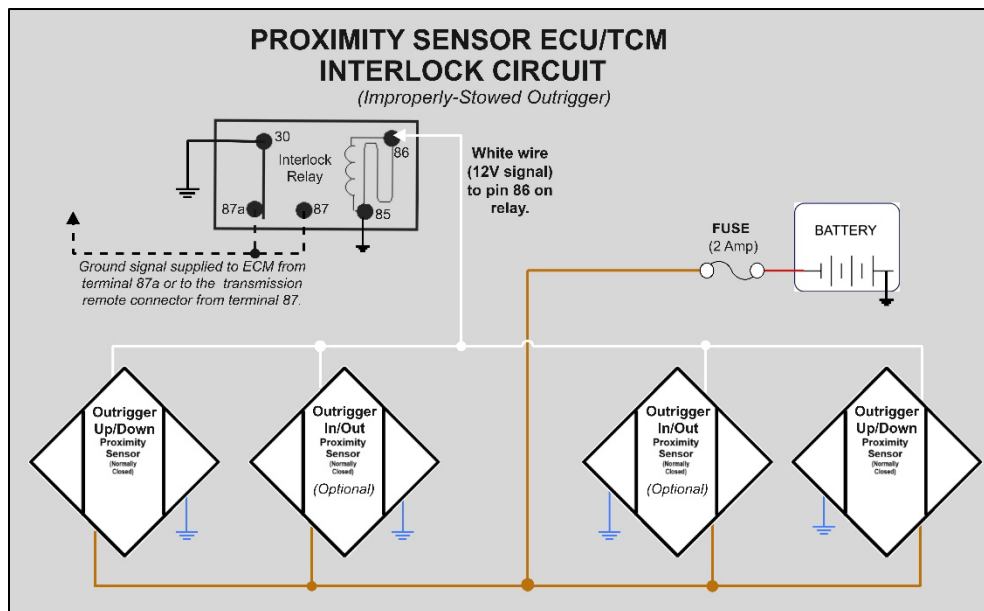


Outrigger-Boom-Limiting Interlock Circuit

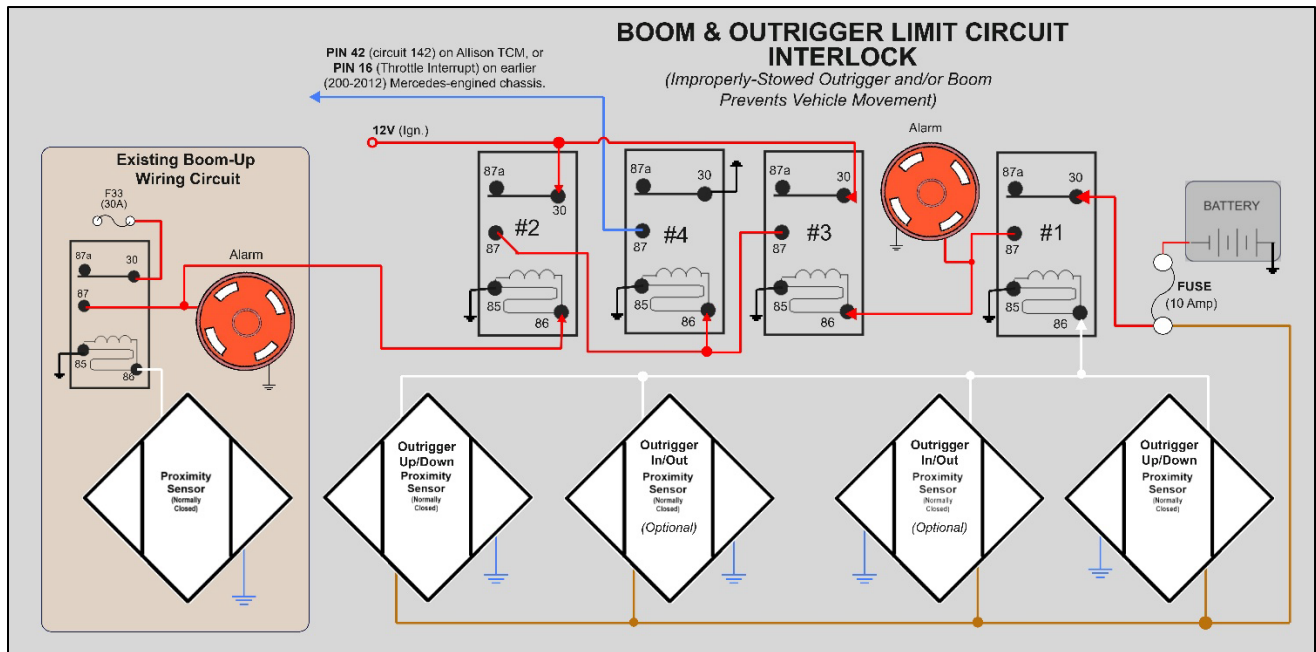
Outrigger proximity sensors are wired to supply a 12V signal whenever the outriggers are not stowed. This signal can be directed to a solenoid on the valve bank to prevent raising the boom unless the outriggers are lowered sufficiently, or to limit the speed of the vehicle.

Outrigger Chassis Interlock Circuit

Chassis using the 2023-earlier Freightliner Smartplex electrical controls system may require a ground signal to the chassis module. Later production models with the Freightliner QuickFit electrical system utilize a 12-volt signal to trigger the outrigger-limiting interlock circuit. If a ground signal is needed at the ECM or TCM, an additional switching relay, controlled by the sensors' 12V signal, is used to supply the necessary ground. How the chassis responds to input from the outrigger interlock circuit is determined by its programming.



Outrigger Vehicle Speed/Gear-Limiting Interlock



Powered Tarp

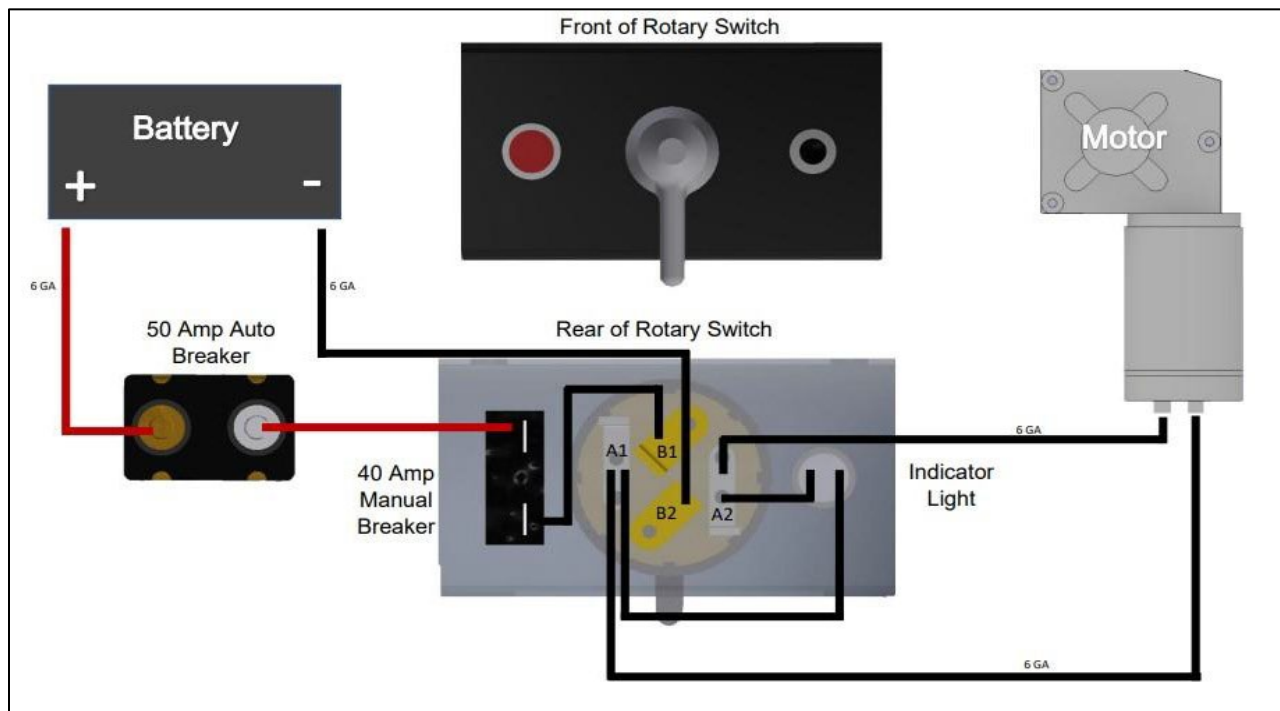
If the loader is equipped with a powered tarp system, make sure the tarp can be extended and retracted fully before inspection. Operating the powered tarp is done by rotating the rotary switch located on the street side of the body, in the desired direction.



If the tarp is inoperable, reset the breaker at the rotary control switch by pressing in on the button. If that doesn't fix the issue, check for power going into and from the switch assembly. If there is no power to the switch, check the 50-amp, self-resetting breaker and cables inside the battery box, between the battery and the rotary switch.



If the breaker continually trips, check the wiring for areas of damage, corrosion, or loose connections. If the powered-tarp assembly ever requires maintenance, you are welcome to call the Petersen parts and service department. You can also contact the tarp manufacturer or download the instruction manual on the [SHURCO WEBSITE](https://www.shurco.com) for more information.



Powered Tarp Wiring DWT Models