

Introduction

The Business Class[®] M2 is available in several vehicle configurations. When an M2 vehicle is used as a tractor to pull a trailer, or as a truck to tow a piece of equipment, electrical connections are required between the vehicle and the trailer or the equipment.

Semitrailers and full trailers that are equipped with pneumatic brakes and used in North America or South America are generally equipped with an electrical cable that terminates in a 7-way connector that is defined in SAE J560 standard, *Primary and Auxiliary Seven Conductor Electrical Connector for Truck-Trailer Jumper Cable*. In some cases, a trailer used in North America is equipped with two electrical cables; one will be an SAE J560 connector and the other will be an ISO 3731 connector.

The harnesses and components that are used to provide an SAE J560 connector on a tractor or truck are nearly identical, regardless of the country of domicile of the vehicle. Most of the **component** variation is contained in the single-piece J560 connector, and if equipped, in the ISO 3731 connector that is installed on the tractor—the J560 connector and the ISO 3731 connector may be a straight connector or a 90-degree connector, and the cable may contain a signal filter that is related to the TRAILER ABS warning light. **Operational** variation is contained in the reference parameters that are used to control the functionality of the center pin of the J560 connector.

Overview

Trailer wiring requires the use of a full-feature Chassis Module (CHM). The CHM provides the necessary digital outputs, such as lighting and trailer power condition, via a wiring harness to the trailer power distribution module (PDM). The trailer PDM is usually mounted on the left frame rail aft of the cab, or on a rear crossmember at the end of the frame rail. Direct battery power is supplied to the trailer PDM via an independent connection to a 150 amp Battery MEGA[®] Fuse. The trailer PDM contains fuses and relays to enable high current outputs via a wiring harness to the trailer connector. It is possible to adapt trailer connector placement and mounting methods to better suit vehicle configuration or the preference of the body builder. Trailer PDM outputs include:

- taillights

- marker lights
- stop lights
- turn lights
- trailer power

If electrical trailer provisions are to include a trailer antilock braking system (ABS), the harness between the trailer PDM and trailer connector is adapted with a power line carrier (PLC) filter to permit communication of the trailer ABS warning signal on the trailer power circuit. The PLC filter is usually mounted alongside the trailer PDM.

Components

If electrical trailer provisions need to be added, visit a local Freightliner dealer to request a bill of material. Be prepared to provide the dealer with the vehicle identification number (VIN) and a sales option code (if known) for the desired feature. The bill of material provides a complete parts list that is tailored to the configuration and dimension of the vehicle.

The following is a list of some necessary components for establishing proper trailer electrical provisions:

- reference parameter (programs the new feature)
- upgraded CHM (full-feature Chassis Module required)
- trailer PDM with mounting hardware and bracket
- trailer connector J560 with mounting hardware and bracket
- harness between the CHM and the trailer PDM
- harness between the trailer PDM and the trailer connector
- power cable between the battery and the trailer PDM
- 150 amp Battery MEGA Fuse

The J560 center pin functionality must be programmed into the Bulkhead Module (BHM) of the truck. Use ServiceLink[®] to add the reference parameter if this feature is added to a vehicle that is already in service.

General Information

Installation or Replacement Guidelines

When installing or replacing any part of the electrical trailering system, follow these guidelines:

- Make ground connections at factory-provided ground stud locations whenever possible. If there is not a ground stud available, it will be necessary to add a bolt or self-threading fastener to connect the ground lugs to the frame rail.
- Route all wiring so that it will not be exposed to harmful conditions such as, moving parts, excessive heat, chafing, or saturation with oil or grease.
- Secure and protect all electrical components. Use appropriate mounting and installation techniques such as, retaining clips, harness protection, and correct hardware.
- Be sure to clean all paint, dielectric enamel, and road grime from the ground stud or frame before connecting the new ground leads. After the connections are secured, use a dielectric enamel on the ground connections to protect against corrosion.
- Removal of electrical components for an extended period of operation requires proper weatherproofing to avoid system damage and electrical faults.

PDM Removal and Installation

Removal

1. Turn off the engine, apply the parking brakes, and chock the tires.
2. Disconnect the negative leads from the batteries or, if the vehicle is equipped with a battery disconnect switch, turn the switch to the off position.

NOTE: The trailer power distribution module (PDM) is mounted on the left frame rail aft of the cab, or on a crossmember at the end of the frame rail.

3. Remove the capscrews that attach the metal cover on the PDM to the mounting plate, then remove the cover.
4. Remove the nut and washer that attach the positive lead to the trailer PDM battery power stud. Then remove the positive lead. See **Fig. 1**.
5. Disconnect the electrical connectors from the trailer PDM. See **Fig. 1**.

6. Remove the nuts and washers that attach the trailer PDM to the mounting bracket, then remove the PDM. See **Fig. 2** and **Fig. 3**.

Installation

1. Using nuts and washers, attach the PDM to the mounting bracket.
2. Attach the electrical connectors to the trailer PDM.
3. Using a nut and washer, install the positive lead on the trailer PDM battery power stud. Torque the nut 11 to 13 lbf·ft (15 to 18 N·m).
4. Using capscrews, attach the metal cover (that protects the PDM) to the mounting plate.
5. Connect the batteries or turn the battery disconnect switch to on.
6. Verify the operation of the trailer electrical components.

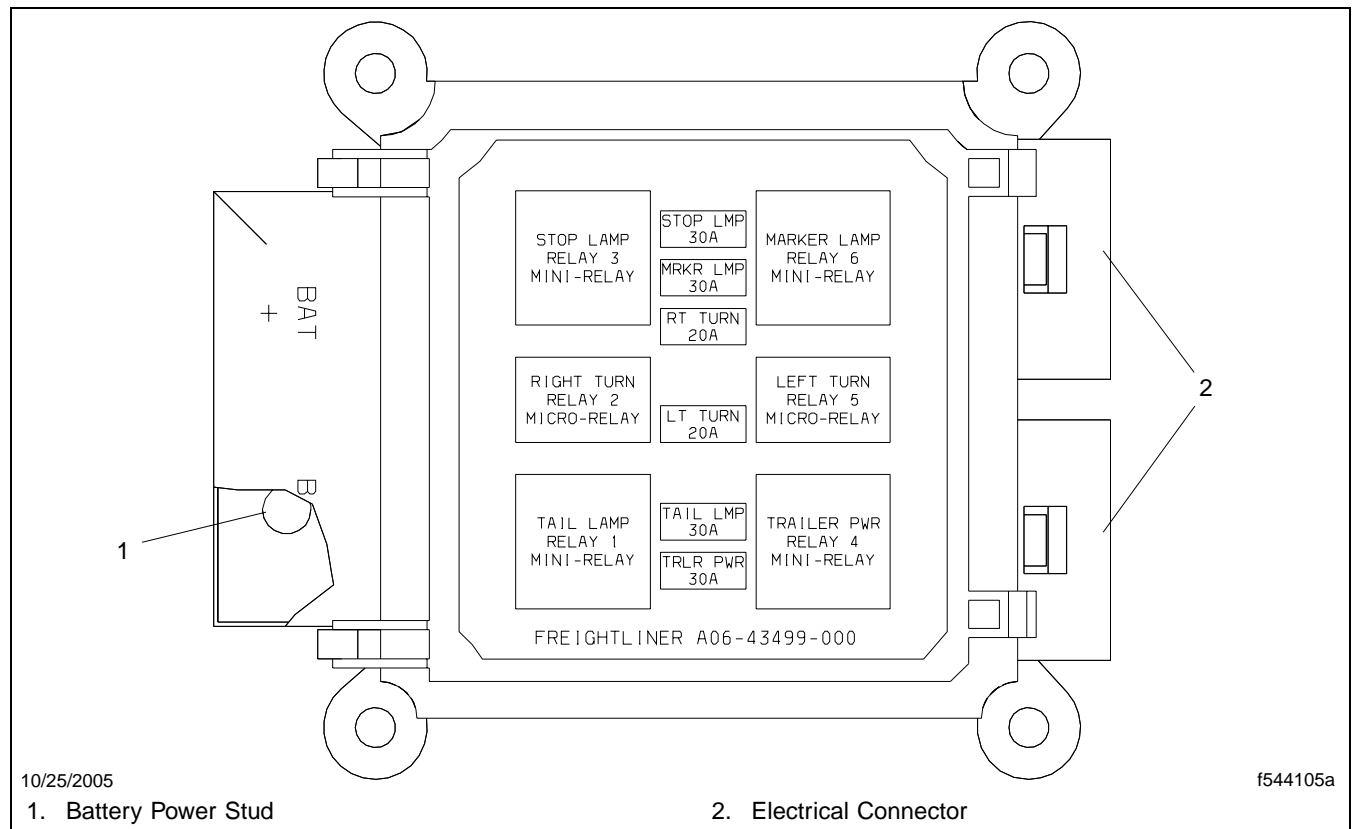


Fig. 1, Trailer PDM Fuse Panel Layout

PDM Removal and Installation

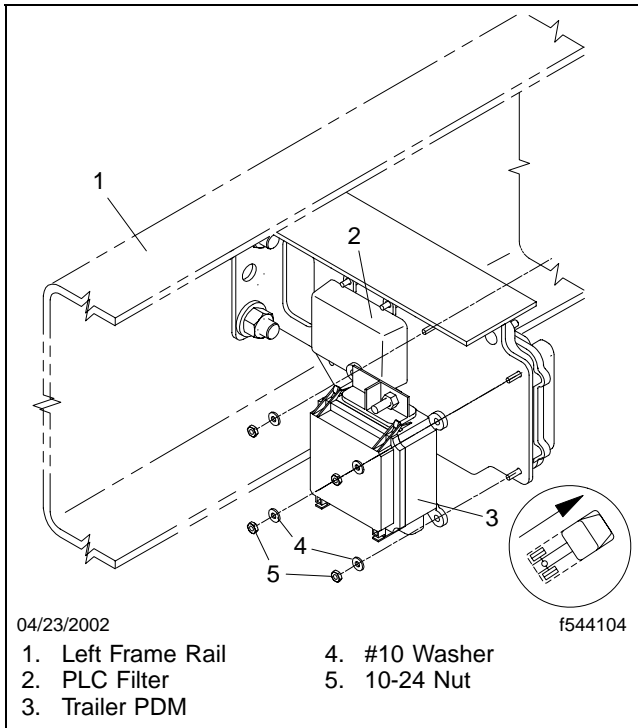


Fig. 2, Trailer PDM Aft-of-Cab Installation

7. Remove the chocks from the tires.

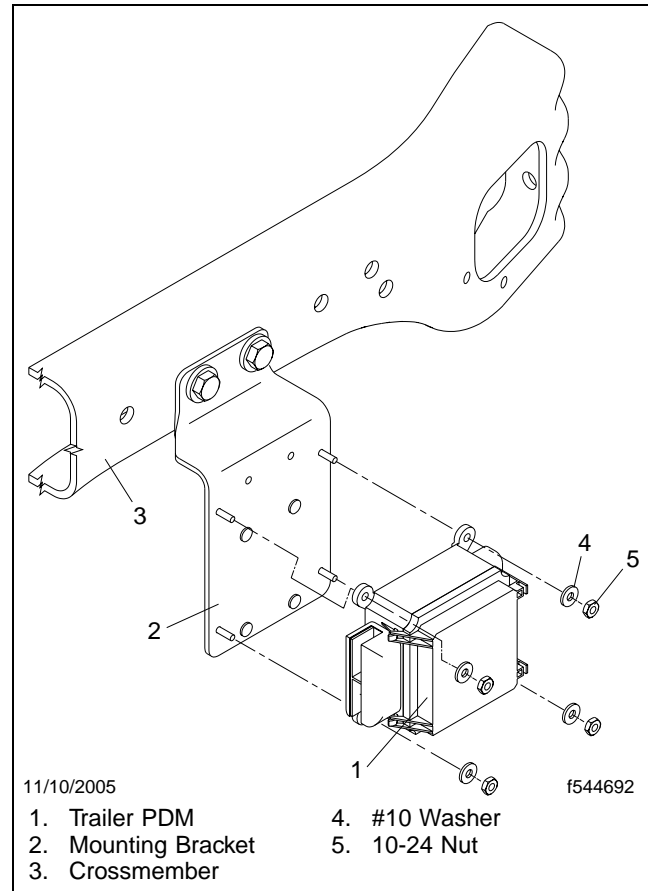


Fig. 3, Trailer PDM End-of-Frame Installation

Troubleshooting

For electrical troubleshooting, see **Table 1**.

Electrical Troubleshooting	
Description of Fault	Possible Cause
Stop lights on at all times.	Battery MEGA® Fuse that supplies the trailer power distribution module (PDM) is open or missing.
Trailer connector center pin (pin 7) is not providing desired power condition.	Incorrect Reference Parameter.
Intermittent or no electrical trailer operation at all outputs.	Loss of connection. Check trailer PDM electrical connections and ground.
No operation on single output.	Trailer PDM components are inoperable. Check PDM fuse (blown) and relay (stuck) for that output.
Intermittent or no operation on single output.	Loose terminal connection(s), damaged wire. Trace the suspect circuit.

Table 1, Electrical Troubleshooting

Trailer Connector Testing

Make sure that the center pin is operating according to the programmed reference parameter. See **Specifications 400**.

Verify that all trailer lighting signals are operating properly. Test the taillights, marker lights, stop lights, parking lights, and turn lights.

Trailer Electrical System Wiring Diagram

See Fig. 2 for a wiring diagram of the trailer electrical system with both J560 and ISO 3731 connectors.

See Fig. 1 for a wiring diagram of the trailer electrical system with only a J560 connector.

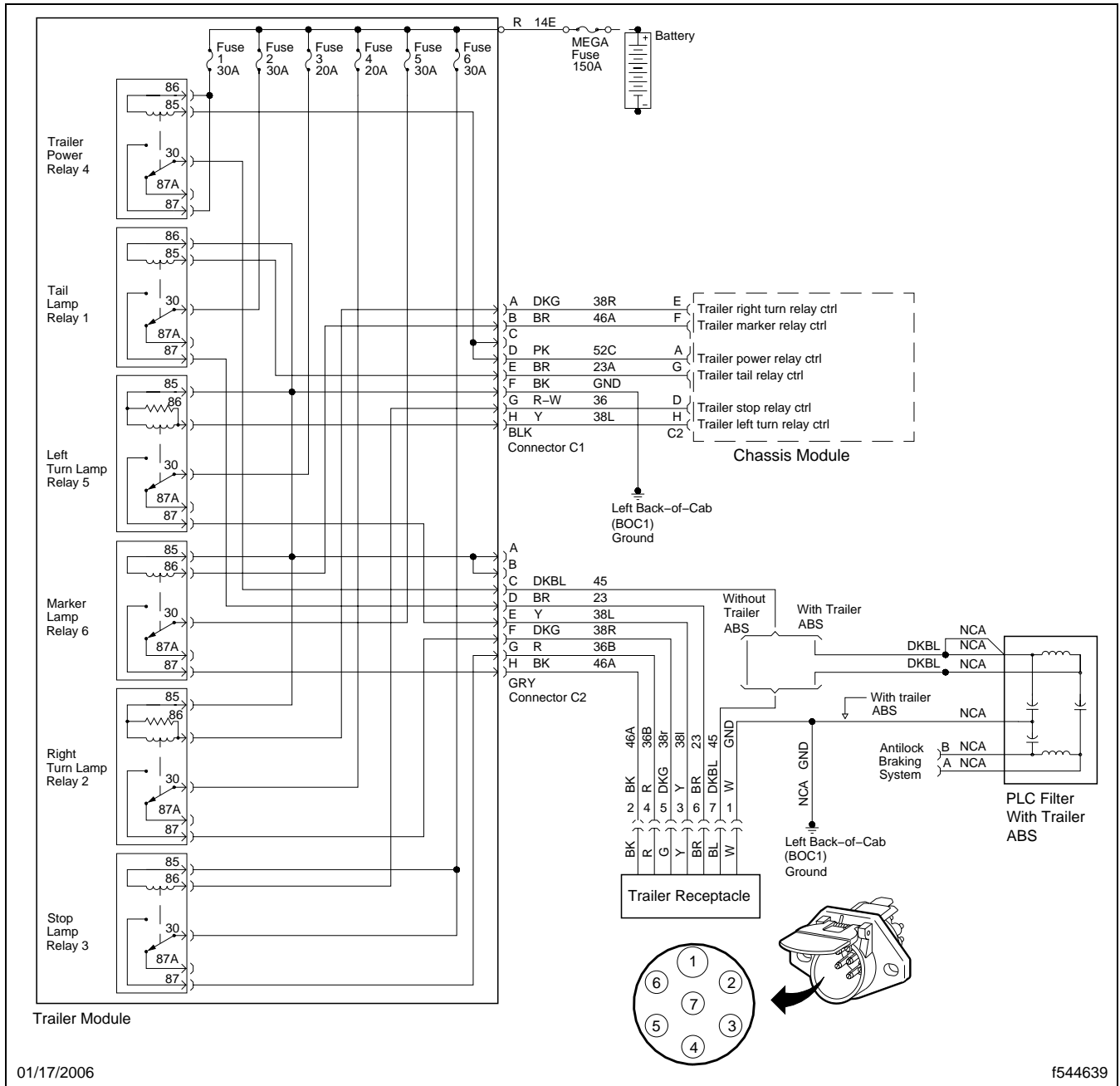
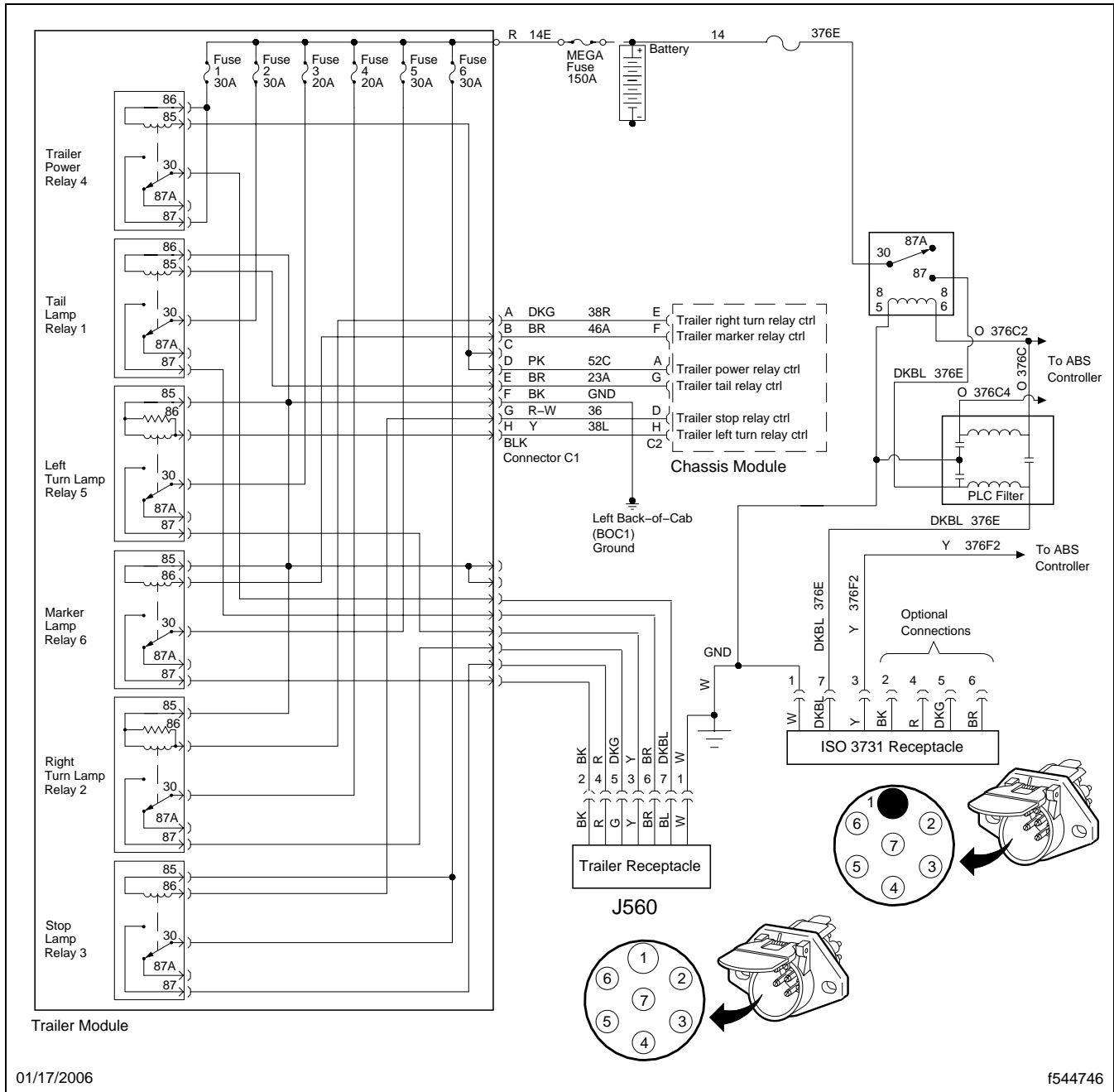


Fig. 1, Wiring Diagram of the Trailer Electrical System With Only a J560 Connector (primary receptacle)

Specifications



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Fig. 2, Wiring Diagram of the Trailer Electrical System With Both J560 and ISO 3731 Connectors (primary and secondary receptacles)

Trailer Electrical System I/O Diagram

For an overview of the input and output signals of the trailer electrical system, see **Fig. 3**.

Reference Parameters

Several configurations of trailer wiring are available and are mainly defined by the function and use of the trailer connector center pin. Each configuration is provided a unique ServiceLink® reference parameter for programming the proper trailer wiring usage and cen-

ter pin operation. For a list of possible trailer reference parameters and the corresponding descriptions, see **Table 1**.

Circuit Identification

Chassis Module

For Chassis Module (CHM) connector identification, see **Fig. 4**. For a connector face view and pinout chart of the CHM C2 connector, see **Table 2**.

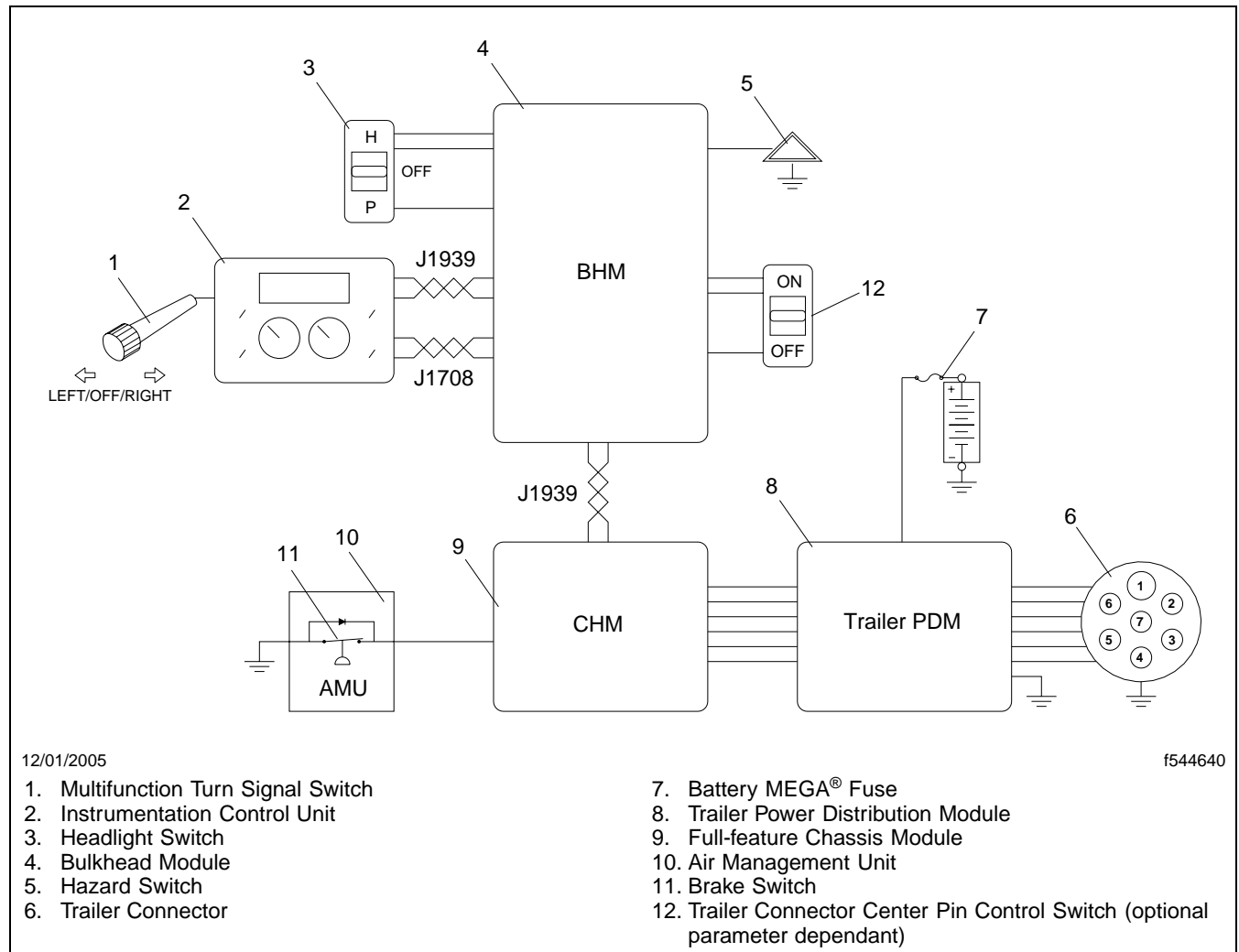


Fig. 3, Trailer Electrical System I/O Diagram

Specifications

Trailer PDM

For trailer power distribution module (PDM) layout and identification of electrical connections, see **Subject 100**. For a connector face view and pinout chart of the trailer module harness PDM connector, see **Table 3**. For a connector face view and pinout chart of the trailer connector harness PDM connector, see **Table 4**.

Trailer Connector

For a connector face view and pinout chart of the trailer connector harness at J560 connector, see **Table 5**. For a connector face view and pinout chart of the trailer connector harness at ISO 3731 connector, see **Table 6**.

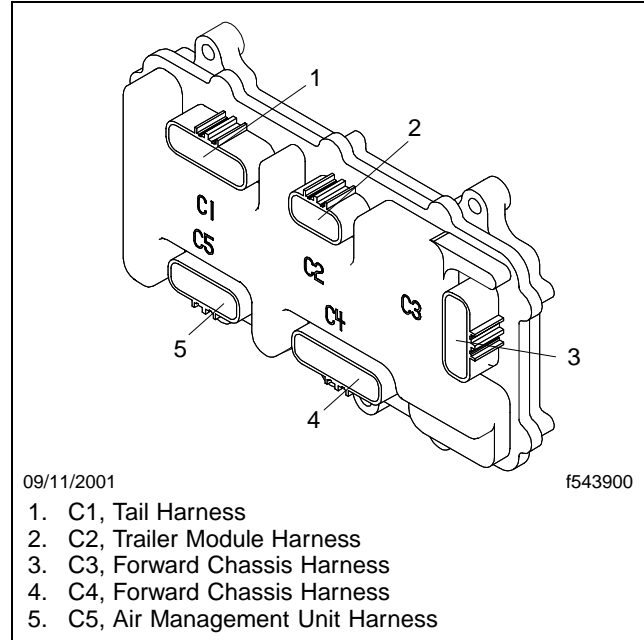


Fig. 4, Chassis Module Connector Identification

Trailer Reference Parameters		
Reference Parameter	Description	Additional Information
26-01017-000	Without 7-Way Center Pin Ignition Supply	No trailering
26-01017-001	With 7-Way Center Pin Ignition Supply	Provides +12 volts at the center pin (pin 7) of the trailer connector with ignition ON via PDM Fuse 1 (30A) with PDM relay 4 (trailer power) active.
26-01017-002	Switch-controlled 7-Way Center Pin (Smart Sw ID#44)	Provides for a dash switch that turns on/off the center pin power. +12 volts at the center pin (pin 7) of the trailer connector with dash switch ON via PDM Fuse 1 (30A) with PDM relay 4 (trailer power) active.
26-01017-004	Trailer Center Pin ON With Reverse Lights	Non-U.S. option, export feature. Provide reverse output at center pin.

Table 1, Trailer Reference Parameters

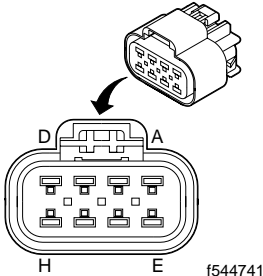
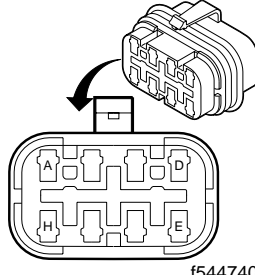
Trailer Module Harness Pinouts at CHM Connector C2				
Connector Pin	Signal Name	Signal Type	Circuit Color	Circuit Number
				
C2-A	Trailer Power Relay Control	Digital Output	PK	52C
C2-B	—	—	—	—
C2-C	—	—	—	—
C2-D	Trailer Stop Light Relay Control Pass-through	Pass-through	R-W	36
C2-E	Trailer Right Turn Light Relay Control	Digital Output	DKG	38RT
C2-F	Trailer Marker Light Relay Control	Digital Output	BR	46A
C2-G	Trailer Taillight Relay Control Pass-through	Pass-through	BR	23A
C2-H	Trailer Left Turn Light Relay Control	Digital Output	Y	38LT

Table 2, Trailer Module Harness Pinouts at CHM Connector C2

Trailer Module Harness Pinouts at PDM Connector C1				
Connector Pin	Signal Name	Signal Type	Circuit Color	Circuit Number
				
A	Trailer Right Turn Light Relay Control	Digital Input	DKG	38RT
B	Trailer Marker Light Relay Control	Digital Input	BR	46A
C	—	—	—	—
D	Trailer Power Relay Control	Digital Input	PK	52C
E	Trailer Taillight Relay Control	Digital Input	BR	23A
F	Ground	Ground	BK	GND

Specifications

Trailer Module Harness Pinouts at PDM Connector C1				
Connector Pin	Signal Name	Signal Type	Circuit Color	Circuit Number
G	Trailer Stop Light Relay Control	Digital Input	R-W	36
H	Trailer Left Turn Light Relay Control	Digital Input	Y	38LT

Table 3, Trailer Module Harness Pinouts at PDM Connector C1

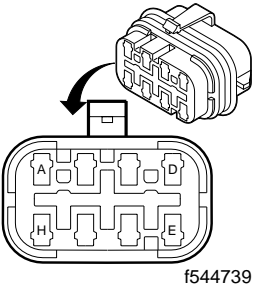
Trailer Connector Harness Pinouts at PDM Connector C2				
Connector Pin	Signal Name	Signal Type	Circuit Color	Circuit Number
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A	—	—	—	—
B	—	—	—	—
C	Trailer Power Output	+12V via PDM Fuse 1 (30A) with PDM relay 4 (trailer power) active.	DKBL	45
D	Trailer Taillight Output	+12V via PDM Fuse 2 (30A) with PDM relay 1 (taillight) active.	BR	23
E	Trailer Left Turn Light Output	+12V via PDM Fuse 3 (20A) with PDM relay 5 (left turn) active.	Y	38L
F	Trailer Right Turn Light Output	+12V via PDM Fuse 4 (20A) with PDM relay 2 (right turn) active.	DKG	38R
G	Trailer Stop Light Output	+12V via PDM Fuse 6 (30A) with PDM relay 3 (stop light) active.	R	36B
H	Trailer Marker Light Output	+12V via PDM Fuse 5 (30A) with PDM relay 6 (marker light) active.	BK	46A

Table 4, Trailer Connector Harness Pinouts at PDM Connector C2

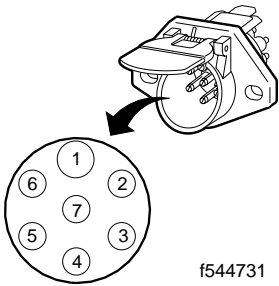
Trailer Connector Harness Pinouts at J560 Connector				
Connector Pin	Signal Name	Signal Type	Circuit Color	Current Capacity
				
1	Ground	Ground	W	20A
2	Trailer Marker Light	+12V via PDM Fuse 5 (30A) with PDM relay 6 (marker light) active.	BK	30A
3	Trailer Left Turn Light	+12V via PDM Fuse 3 (20A) with PDM relay 5 (left turn) active.	Y	20A
4	Trailer Stop Light	+12V via PDM Fuse 6 (30A) with PDM relay 3 (stop light) active.	R	30A
5	Trailer Right Turn Light	+12V via PDM Fuse 4 (20A) with PDM relay 2 (right turn) active.	G	20A
6	Trailer Taillight	+12V via PDM Fuse 2 (30A) with PDM relay 1 (taillight) active.	BR	30A
7	Trailer Power	+12V via PDM Fuse 1 (30A) with PDM relay 4 (trailer power) active.	BL	30A

Table 5, Trailer Connector Harness Pinouts at J560 Connector

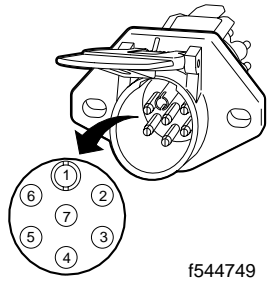
Trailer Connector Harness Pinouts at ISO 3731 Connector				
Connector Pin	Current	Signal Name	Signal Type	Color
				
1	30A	Ground	Ground	W
3	0.5A	Trailer ABS Lamp	+12V through relay controlled by tractor ABS	Y
7	20A	Trailer Power	+12V through relay controlled by tractor ABS	DKBL

Table 6, Trailer Connector Harness Pinouts at ISO 3731 Connector