International Electric Medium Duty Truck (eMV™) Electrical Systems Integration Guide

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# 1. Revision Summary Table

| REVISION | DATE | SECTION | CHANGE DESCRIPTION | REASON FOR CHANGE | REVISED BY |
|---|---|---|---|---|---|
| 01 | 9/10/2021 | ALL | INITIAL DRAFT | INITIATION OF DOCUMENT | A. SCHNELLENBERGER |
| 02 | 11/1/2022 | ALL | MINOR CORRECTIONS | | A. SCHNELLENBERGER |
| 03 | 11/1930/2025 | | Added ePTO, ePower, RPMs, more switch information and Steering wheel switch changes. | New features and information | A. SCHNELLENBERGER |
| | | | | | |

## 2. Foreword:

### Warnings and Cautions

**WARNING –** To prevent personal injury and / or death, or damage to property, NEVER service a high-voltage vehicle without completing High-Voltage Safety training. Before working on vehicle, read and obey High-Voltage Safety, and Lock-Out Tag-Out safety procedures and information.

This manual provides general and specific maintenance procedures essential for reliable vehicle operation and your safety. Since many variations in procedures, tools, and service parts are involved, advice for all possible safety conditions and hazards cannot be stated.

Read all safety instructions and High-Voltage Safety procedures and information before doing any service or diagnostic procedures for the vehicle. See related application manuals for more information.

There is more information on high voltage safety and components at the end of this manual.

Disregard for Safety Instructions, Warnings, Cautions, and Notes in this manual can lead to injury, death or damage to the vehicle. Safety Terminology

Three terms are used to stress your safety and safe operation of the vehicle: Warning, Caution, and Note

Warning: A Warning describes actions necessary to prevent or eliminate conditions, hazards, and unsafe practices that can cause personal injury and / or death.

Caution: A Caution describes actions necessary to prevent or eliminate conditions that can cause damage to the vehicle.

Note: A Note describes actions necessary for correct, efficient vehicle operation.

Refer to the following manuals for more information:

International® Electric MV™ Series Operation and Maintenance Manual 0001253563 and FIRST RESPONDER GUIDE - International ® eMV™ Series 4328810

Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:

Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

**Ensure that all required high voltage training has been completed and all safety procedures are being followed before working on this vehicle.**
**For training:**

1. Navigate to https://www.Internationaleducation.com
2. Login or create an account as needed and navigate to Courses 9371 and 9374.

**WARNING –** To prevent personal injury and / or death, turn OFF the high voltage disconnect switch first and then turn OFF the 12V disconnect switch before interacting with a damaged vehicle.

**WARNING –** To prevent personal injury and / or death, ALWAYS REMEMBER the 12V disconnect switch only disables the vehicle 12-volt system, NOT the high-voltage battery system.

**WARNING –** This document contains information on a diverse set of truck chassis system and subsystem integration features which contain the potential for both simple and complex operational situations and interactions,
when integrated in combination with a truck chassis and truck mounted equipment. It is the responsibility of persons performing truck chassis and, or truck mounted equipment system integration and testing to fully understand the plurality of operational outcomes and take the appropriate as well as necessary precautions to avoid property damage, personal injury, up to and including death, when performing system integration and, or testing in association with the content of this document.

Note: This manual provides information to assist with modifying the truck for individual applications. International does not recommend or approve any firm nor make any judgements on the quality of the work performed by a particular firm. Individuals who use the services of a Body Builder must satisfy themselves as to the quality of the work.

The party installing a body, any other equipment, or making any modifications to complete the vehicle for delivery and make it road-ready is responsible to see that the completed vehicle complies with all applicable certification procedures and safety standards, as may be set forth in Federal, State, and local statutes, rules and regulations.

Specifications, descriptions, and illustrative material in this literature are as accurate as known at time of publication but are subject to change without notice. Illustrations are not always to scale and may include optional equipment and accessories but may not include all standard equipment.

**IMPORTANT** - Read the following before starting the service procedure.

You must follow your company safety procedures when you service or repair equipment. Be sure to understand all procedures and instructions before you begin work on the unit. Some procedures require the use of special tools for safe and correct service. Failure to use these special tools when required can cause injury to service personnel or damage to vehicle components.

**DISCLAIMER:** INTERNATIONAL DOES NOT TAKE ANY RESPONSIBILITY FOR CUSTOMER OR BODY BUILDER WIRING.

**NOTE -** After-market installed wiring must comply with the following guidelines:

1. Sealed switches and connectors must be used for switches and connections that are exposed to the weather or to salt spray emanating from the vehicle's tires.

2. Route and clip wiring to minimize chafing and exposure to weather. Use conduit, loom, and/or tape to achieve this.

3. Fuse all power leads as close to the power source as possible. Remember fuses protect the wiring - size fuses accordingly.

4. All ground connections that will be made to the frame or body must be connected to clean bare metal. Remove all dirt, paint, grease and rust that would insulate the terminal from ground. After connecting the ground, seal the connection with a good quality grease or surface sealant to protect the connection from corrosion.

5. Spliced wires should be crimped and soldered. Use a heat shrink tube with a meltable inner wall to seal the connection. Do not expose splices to the weather.

**WARNING –** To avoid serious personal injury, possible death, or damage to the vehicle, make sure the drive selection is in neutral, parking brake is set, and the wheels are blocked before undertaking service procedures.

**WARNING –** To avoid personal injury, possible death, or damage to the vehicle when adding electrical features, disconnect batteries or use the battery disconnect switch. Reconnect batteries when installation is complete.

When disconnecting 12 Volt battery terminals, always disconnect the ground terminal first. When reconnecting, always connect the ground terminal last.
To prevent injury to the eyes, face, limbs and body, it is imperative that lighted materials, flames or sparks be kept away from the vent openings of the battery. The gas mixture in the battery

cells, which escapes through the vents, could ignite and/or cause an explosion. This is particularly true when jumper cables are being used.
In addition, inhaling of gas produced by the normal operation of the battery could result in partial or permanent damage to the respiratory system.
Always wear eye protection when working around batteries. Do not attempt to jump-start a vehicle having a frozen battery because the battery may explode. If a frozen battery is suspected, examine all fill vents on the battery. If ice can be seen, do not attempt to start with jumper cables as long as the battery remains frozen. Thaw out the battery and recharge.
Do not check battery condition by shorting (flashing) across terminals.
Failure to observe these instructions could result in personal injury and/or damage to the vehicle.

Battery cable terminals must be clean and tight. Use hot water and common baking soda for removing terminal corrosion and for cleaning the top of the battery. Brighten the contact surface with steel wool, apply a light coat of lubricant sealing grease such as Fleetrite® 472141-C1 or equivalent and reassemble. Be sure the terminals are clamped tightly, and that the battery is clamped securely in place.

When working around the terminals and battery, use extra care to avoid shorting. A good practice is to use insulated pliers and screwdrivers.

# 3. Vehicle Architectures:

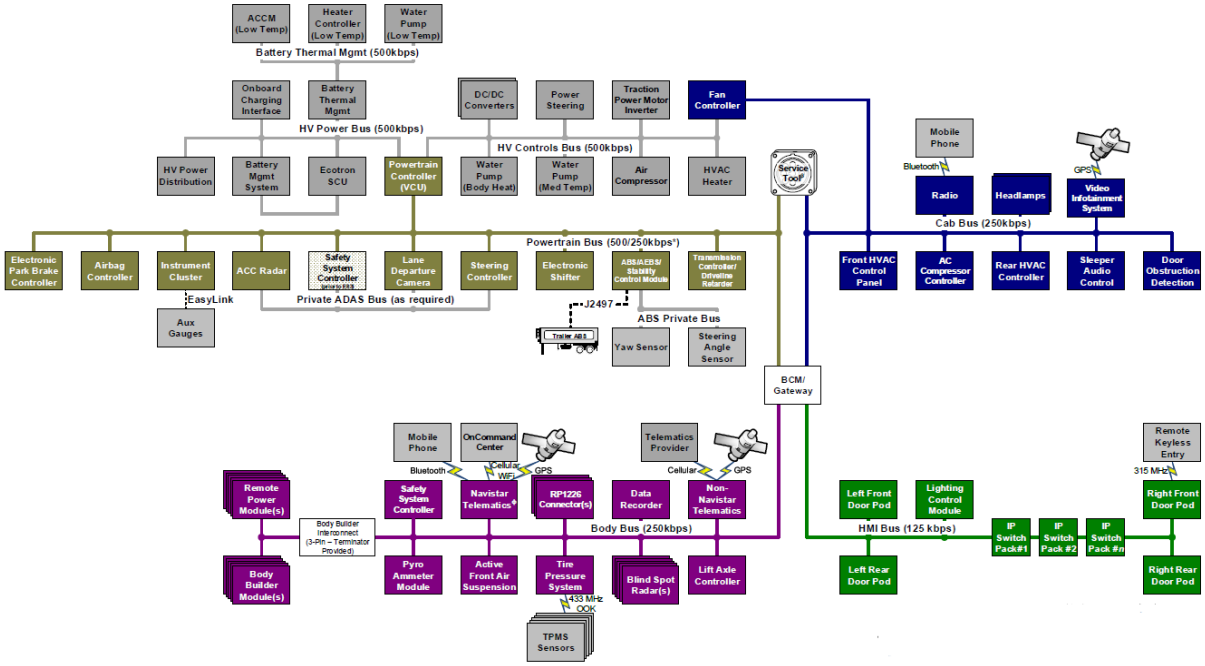
## 3.1. Multiplexing Architecture:

This system uses multiplex technology to provide control and communication between major functional areas of the vehicle. Multiplexing simply means, communicating multiple pieces of information via a single twisted pair of wires (called the data link) without requiring a wire for each piece of information. This information could be gauge information such as battery voltage, or switch information that controls vehicle functions such as headlamps.

The electrical system relies on a collection of electronic circuit modules and software to perform vehicle functions instead of implementing similar features using complex wire harness designs with electromechanical relays and switches. These electronic module components are connected by data links. The data links allow the electronic components on the vehicle to communicate with one another.

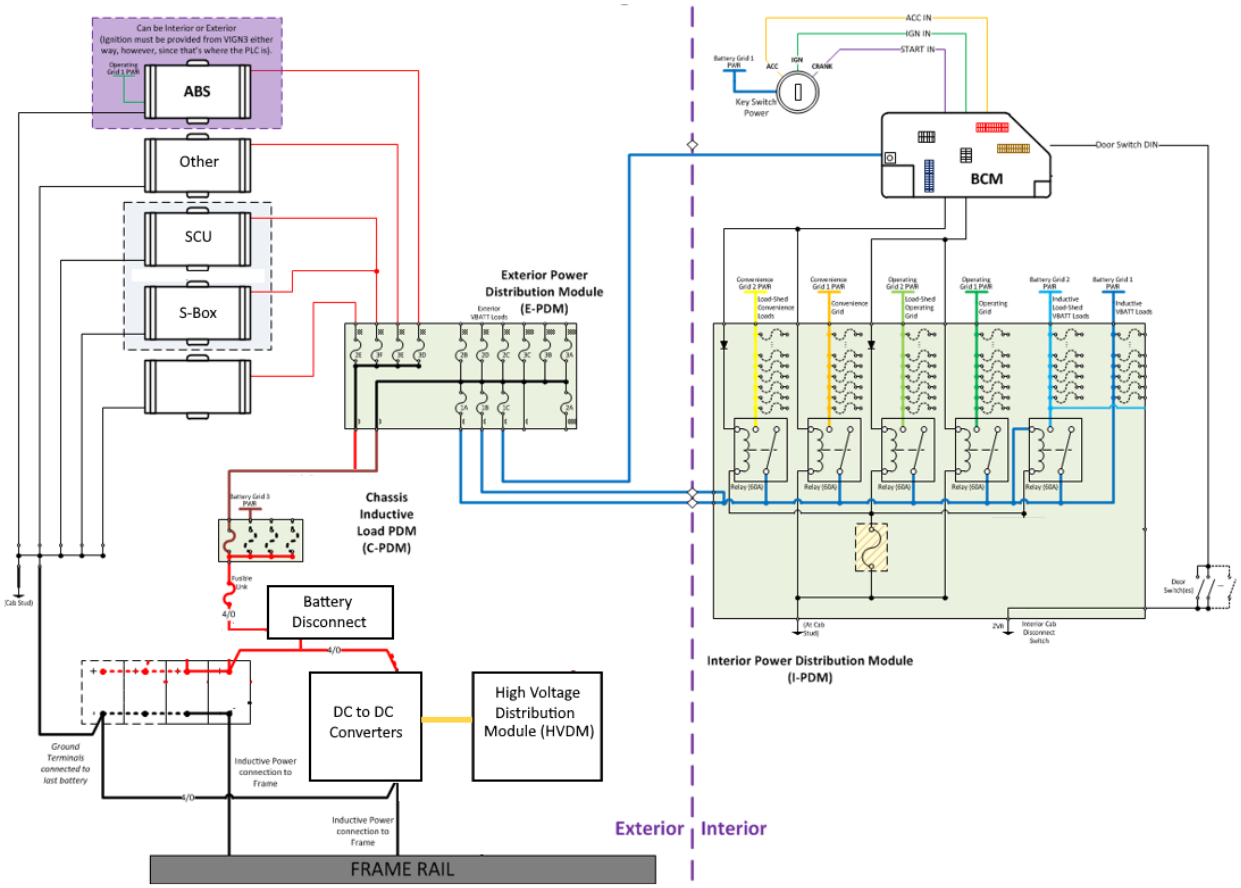
The goal of multiplexing is to reduce cab harness wiring and to simplify circuits. This is accomplished by using low current data links for communicating between cab switches, the Body Controller, the Instrument Cluster, and the high voltage system Vehicle Control Unit (VCU). Other data links in the vehicle allow other electrical controllers, the BCM and the Instrument Cluster to communicate with each other.

## 3.2. Vehicle Multiplex Architecture




**Vehicle Multiplex Architecture**

## 3.3. Vehicle Power Distribution Architecture:




**12 Volt Power Distribution Architecture**

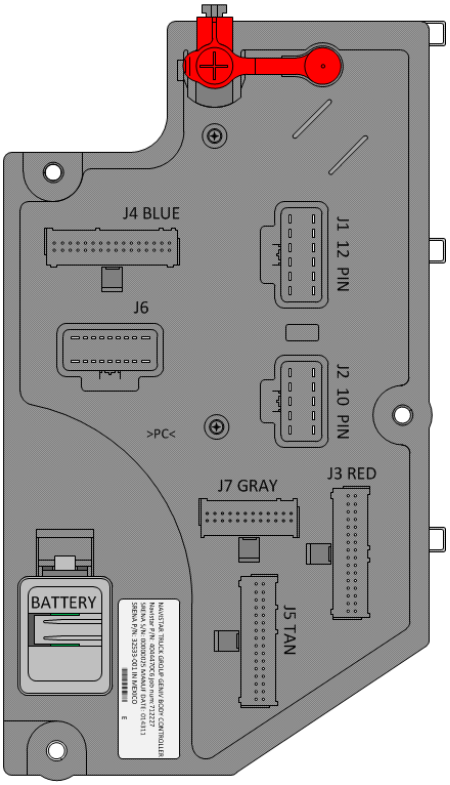
# 4. Body Control Module (BCM)

## 4.1. Body Control Module Gen IV:

At the center of the Diamond Logic® Electrical, 12-volt, System is the Body Controller (BCM). The BCM is an electronic module that provides multiple analog and switched input/output interfaces to monitor vehicle sensors and control vehicle functions through solid state switches, relay driver outputs, and serial data communications.

The BCM is located under the IP behind a kick plate to the left of the driver's left foot. All connections are located inside the cab except for the power connection that passes thru the dash panel to the under-hood compartment. The BCM receives battery power from the maxi-fuse block and Ignition (IGN) power from the IP harness.
The BCM communicates with plurality of modules over a series of differing baud rate data links in an exchange of tens of thousands of digital messages ever second. It also receives input from various sensors and hard wire inputs throughout the truck. The BCM converts these inputs, in accordance with the programmed "rules," into data to be transmitted on the datalinks. It is also the power source for circuits that feed the components, controlled by the multiplexed switches, inside and outside of the cab. The primary vehicle software programming resides in the BCM.

**Body Control Module Gen IV (Connector Header View):**



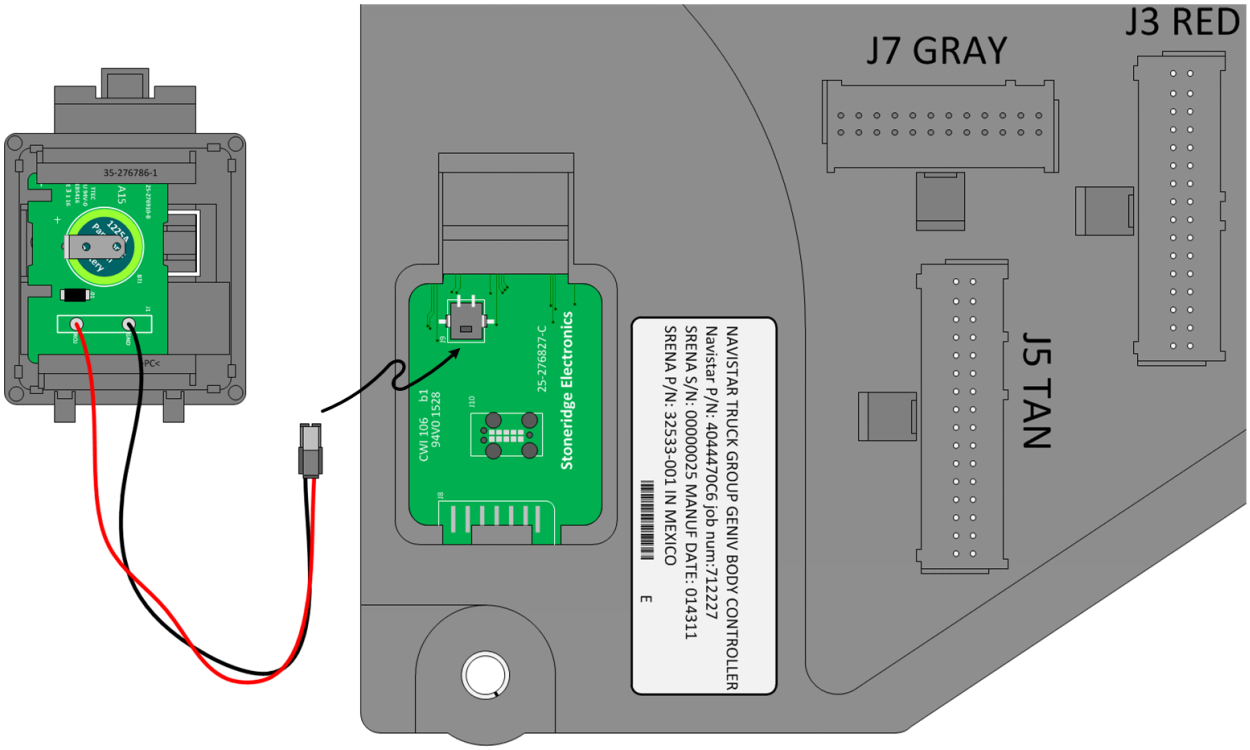
**Body Controller Gen IV Part Information:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 4044470C7 | BODY CONTROL MODULE GEN IV |

**Body Control Module Part Number**

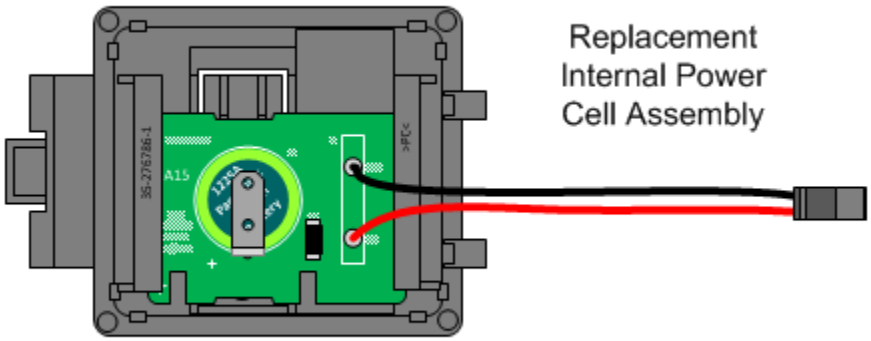
## 4.2. Body Control Module "Real-time Clock" Internal Power Source:

Note: There is an internal power cell, in the body control module, that powers the module's internal "real-time clock".
When there is insufficient electrical potential available, from the main chassis battery, the internal battery will maintain the internal clock. Over time this internal power cell will weaken and require replacement.
The body control module's original internal power cell is integral to the control module and is permanently mounted on the main printed circuit board and is not intended to be a serviceable component. However, positioned next to the original internal power cell is a 2-way electrical connector which is in parallel with, but diode blocked from, the original internal power cell. A new internal power cell module assembly can be added by pinning it into the 2-way printed circuit board mounted mating connector. The replacement internal power cell module is packaged in the form of a new body control module battery cover which includes a new power cell as well as a printed circuit board mounted to the underside/interior of the new body control module battery cover. Once the new internal power cell has been connected to the printed circuit board mounted mating connector, the module assembly will replace the body control module's original plastic battery cover.
When the body controller's internal power cell becomes discharge a fault code can be accessed through either the gauge cluster's diagnostic display or through International's Diamond Logic Builder® service tool. The fault code suspect parameter number will be displayed as SPN:516824 and have the diagnostic fault code name, "RTC Battery".




**Replacement Internal Power Cell**

**Body Controller Internal Power Cell – Uninstalled View:**

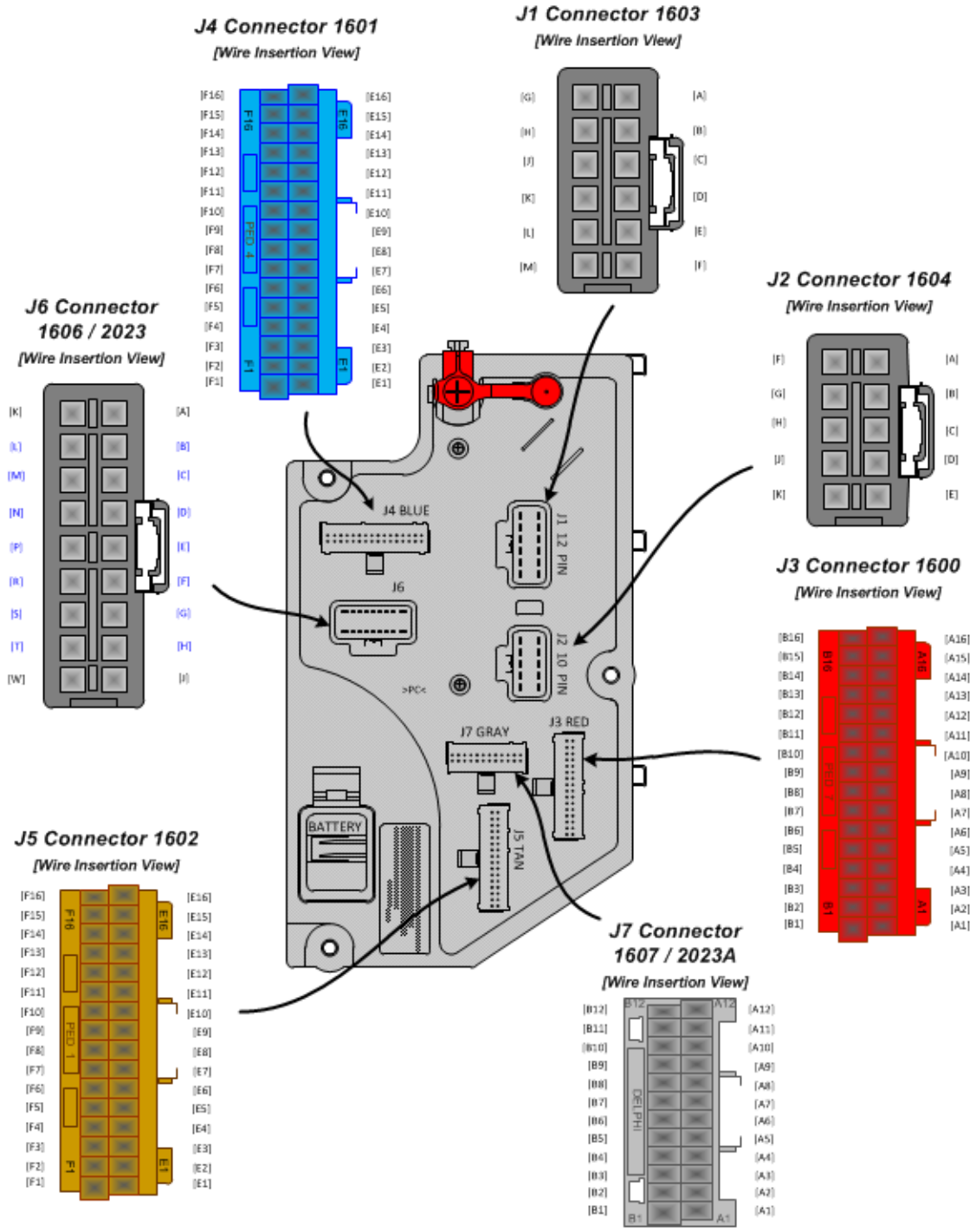



**Body Controller Gen IV Replacement Battery Part Information:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 2514328C91 | BODY CONTROL MODULE REPLACEMENT BATTERY (INTERNAL POWER CELL ASSEMBLY) |

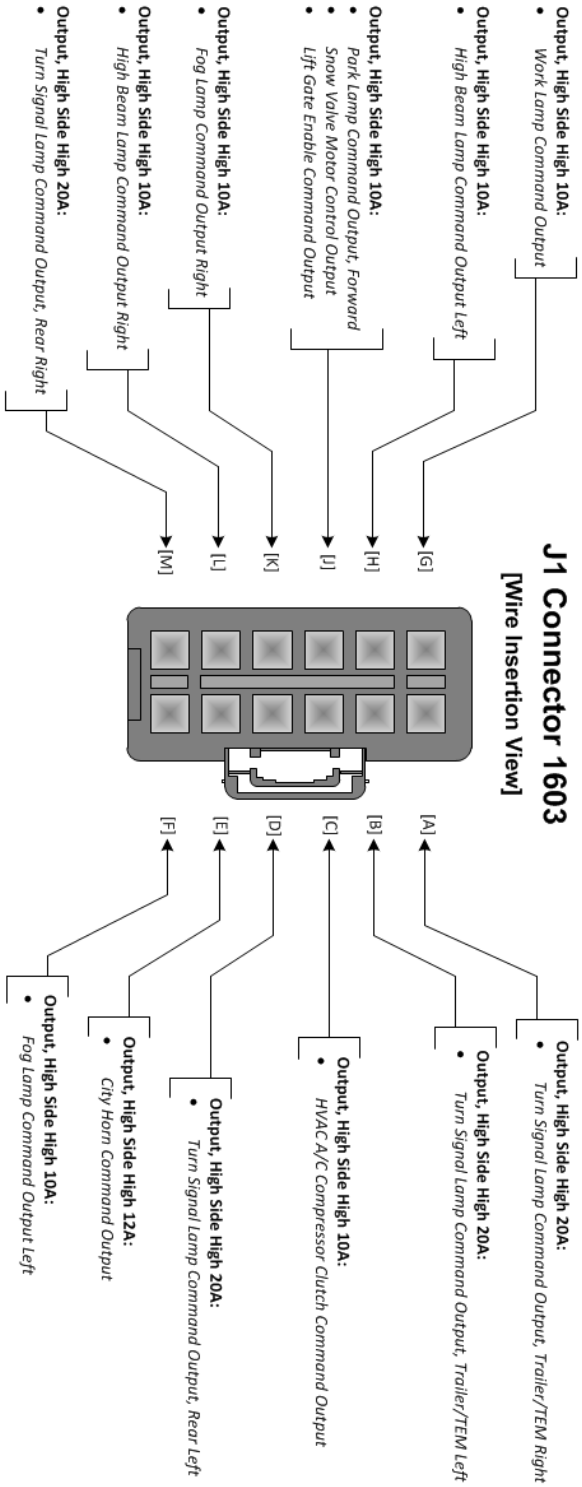
**Body Control Module Internal Battery Part Number**

## 4.3. Body Control Module Gen IV Connector Composite:




**Body Controller Gen IV Connector Composite**

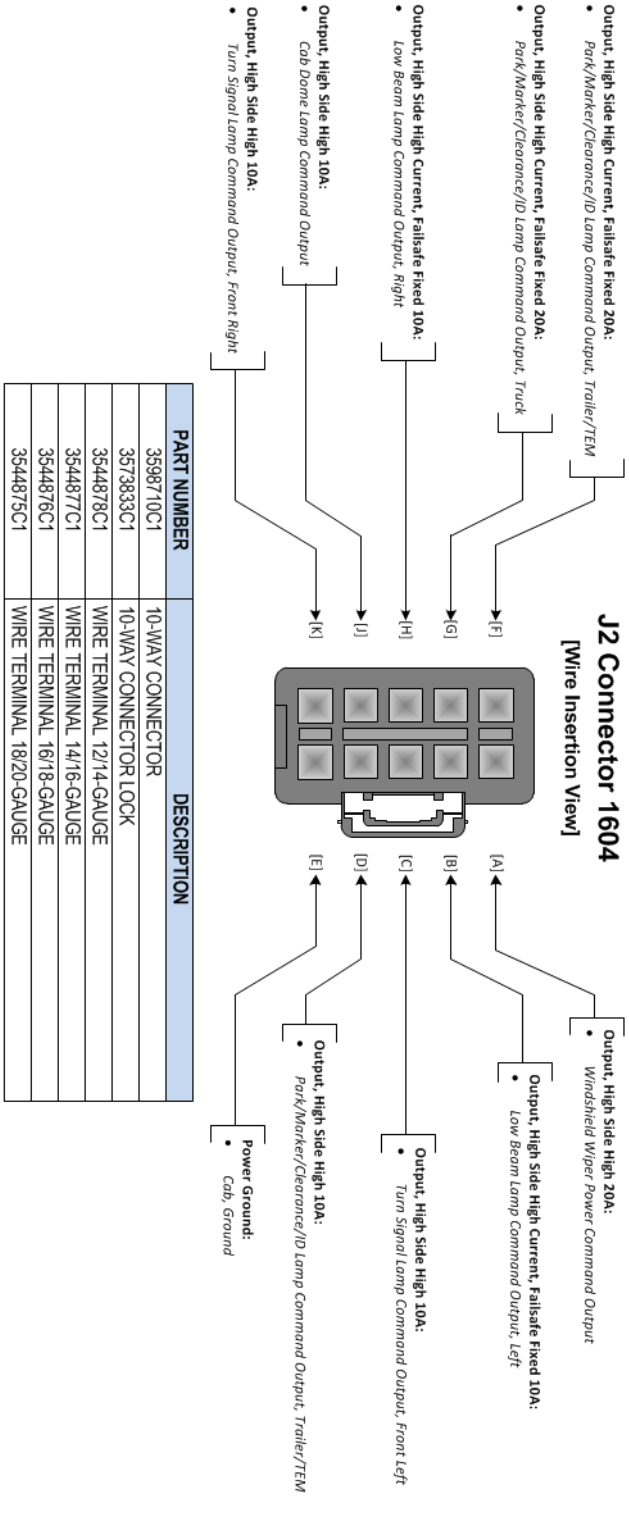
## 4.4. Body Controller J1 Connector 1603 I/O & Part Number Detail:




| PART NUMBER | DESCRIPTION |
|---|---|
| 3598711C1 | 12-WAY CONNECTOR |
| 3573833C1 | 12-WAY CONNECTOR LOCK |
| 3544878C1 | WIRE TERMINAL 12/14-GAUGE |
| 3544877C1 | WIRE TERMINAL 14/16-GAUGE |
| 3544876C1 | WIRE TERMINAL 16/18-GAUGE |
| 3544875C1 | WIRE TERMINAL 18/20-GAUGE |

**J1 Connector 1603**

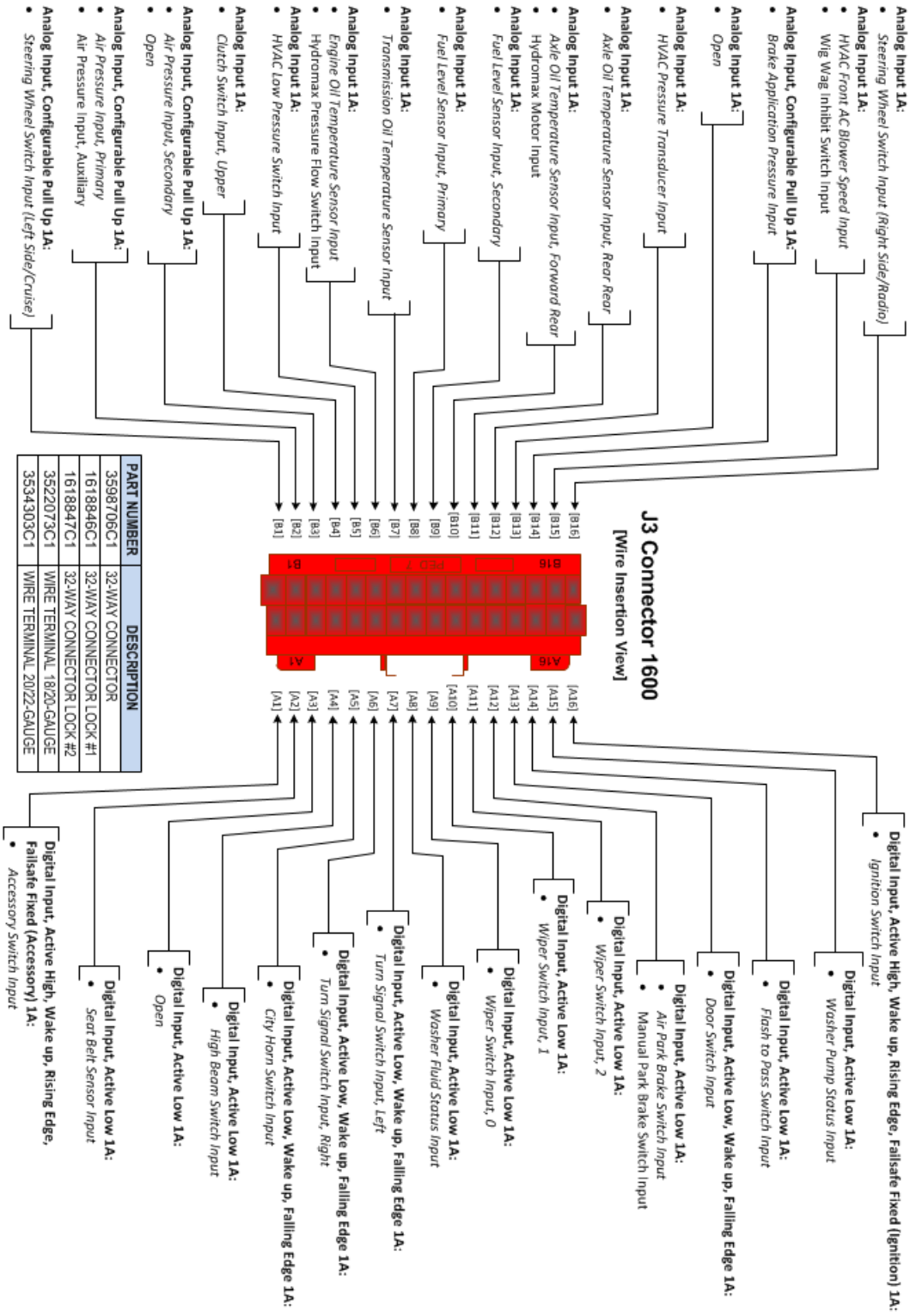
## 4.5. Body Controller J2 Connector 1604 I/O & Part Number Detail:




| PART NUMBER | DESCRIPTION |
|---|---|
| 3598710C1 | 10-WAY CONNECTOR |
| 3573833C1 | 10-WAY CONNECTOR LOCK |
| 3544878C1 | WIRE TERMINAL 12/14-GAUGE |
| 3544877C1 | WIRE TERMINAL 14/16-GAUGE |
| 3544876C1 | WIRE TERMINAL 16/18-GAUGE |
| 3544875C1 | WIRE TERMINAL 18/20-GAUGE |

**J2 Connector 1604**

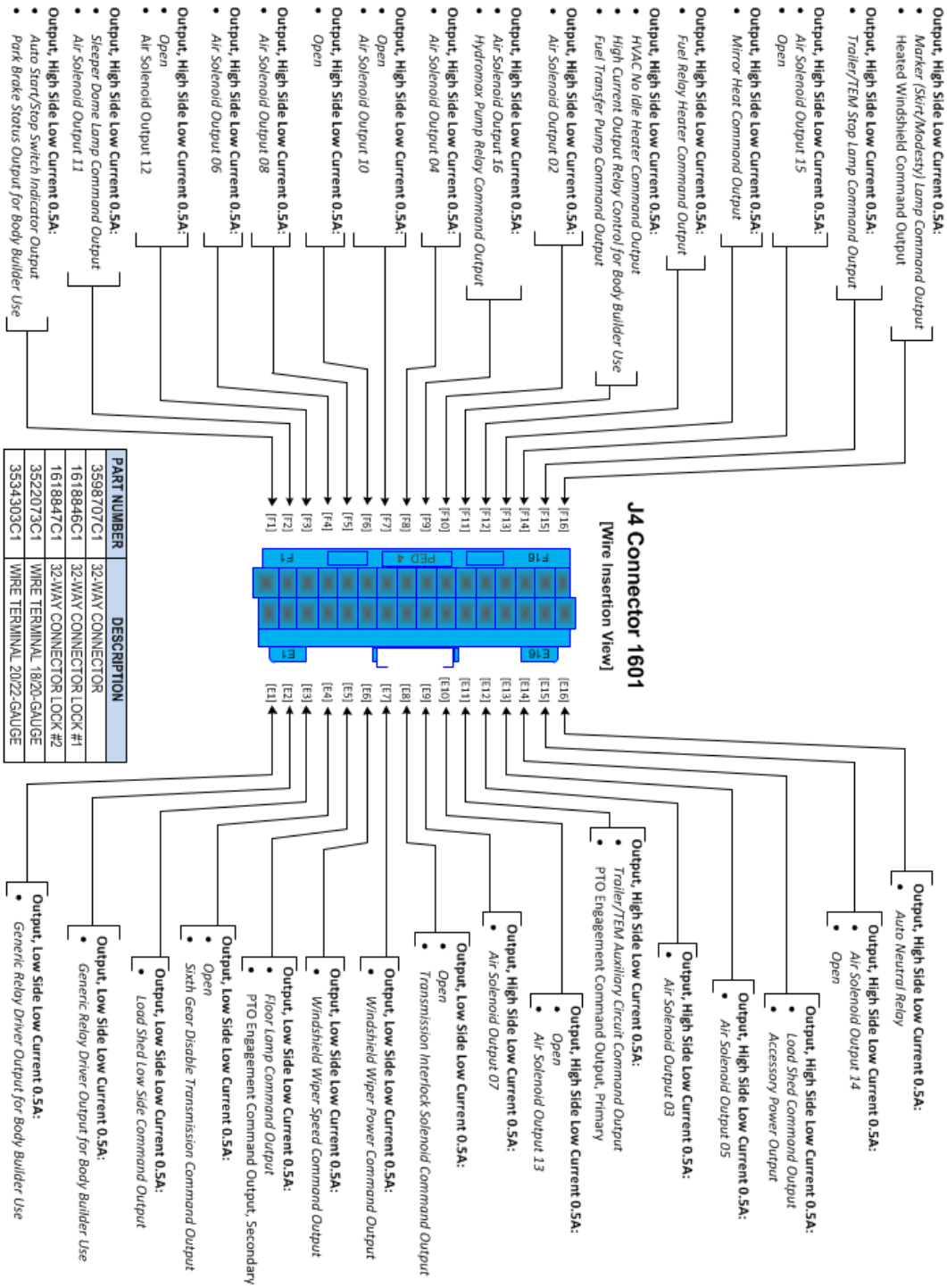
## 4.6. Body Controller J3 Connector 1600 I/O & Part Number Detail:




| PART NUMBER | DESCRIPTION |
|---|---|
| 3598706C1 | 32-WAY CONNECTOR |
| 1618846C1 | 32-WAY CONNECTOR LOCK #1 |
| 1618847C1 | 32-WAY CONNECTOR LOCK #2 |
| 3522073C1 | WIRE TERMINAL 18/20-GAUGE |
| 3534303C1 | WIRE TERMINAL 20/22-GAUGE |

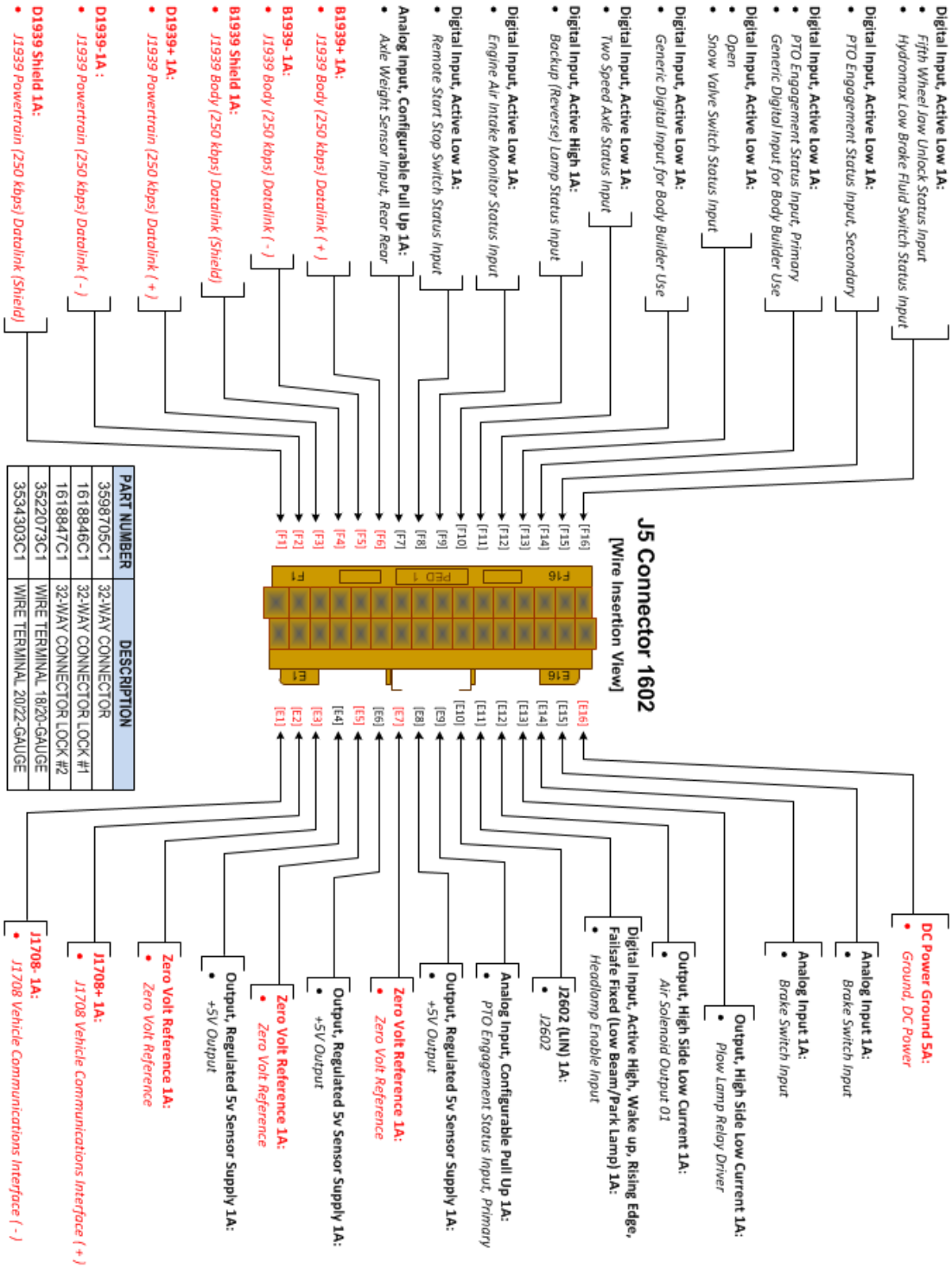
**J3 Connector 1600**

## 4.7. Body Controller J4 Connector 1601 I/O & Part Number Detail:



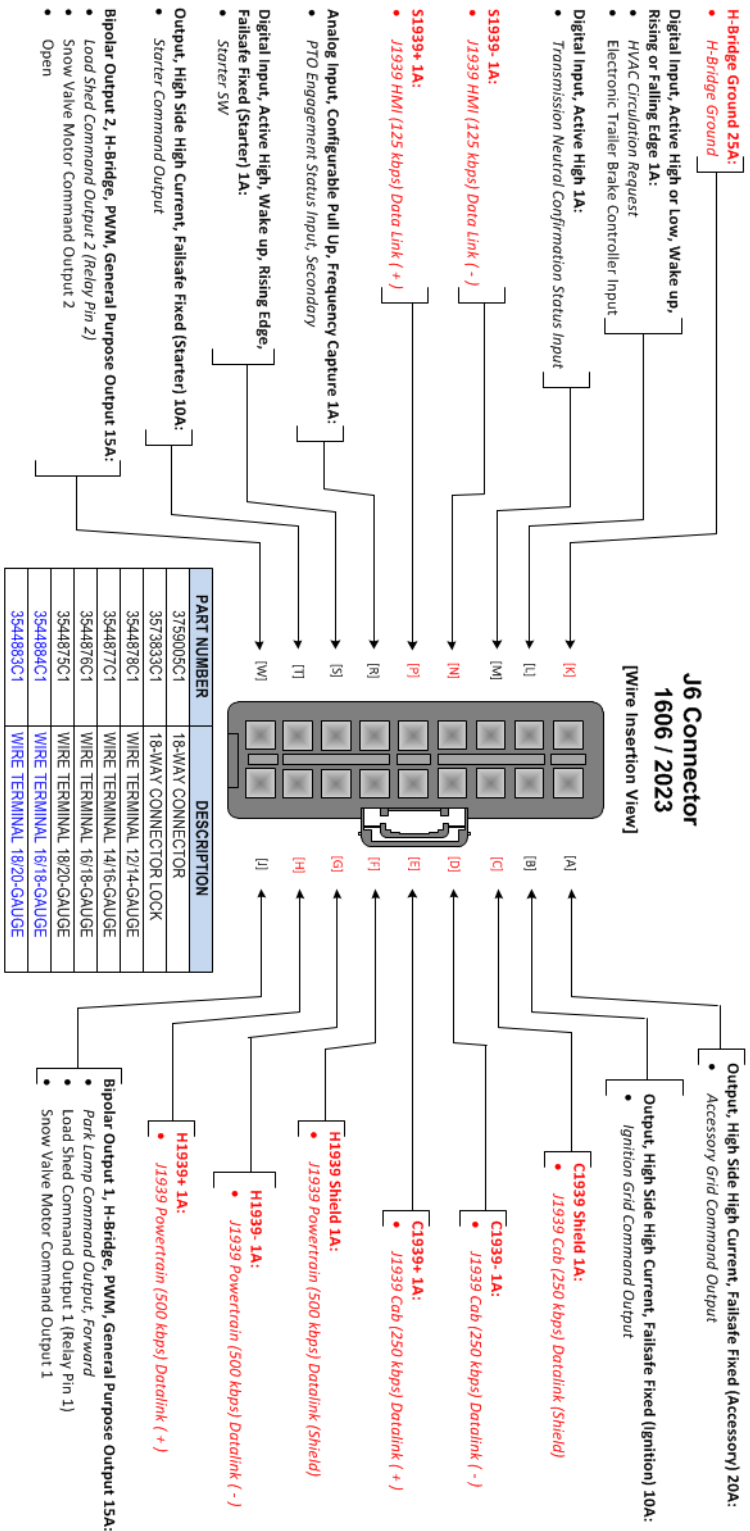

**J4 Connector 1601**

## 4.8. Body Controller J5 Connector 1602 I/O & Part Number Detail:




**J5 Connector 1602**

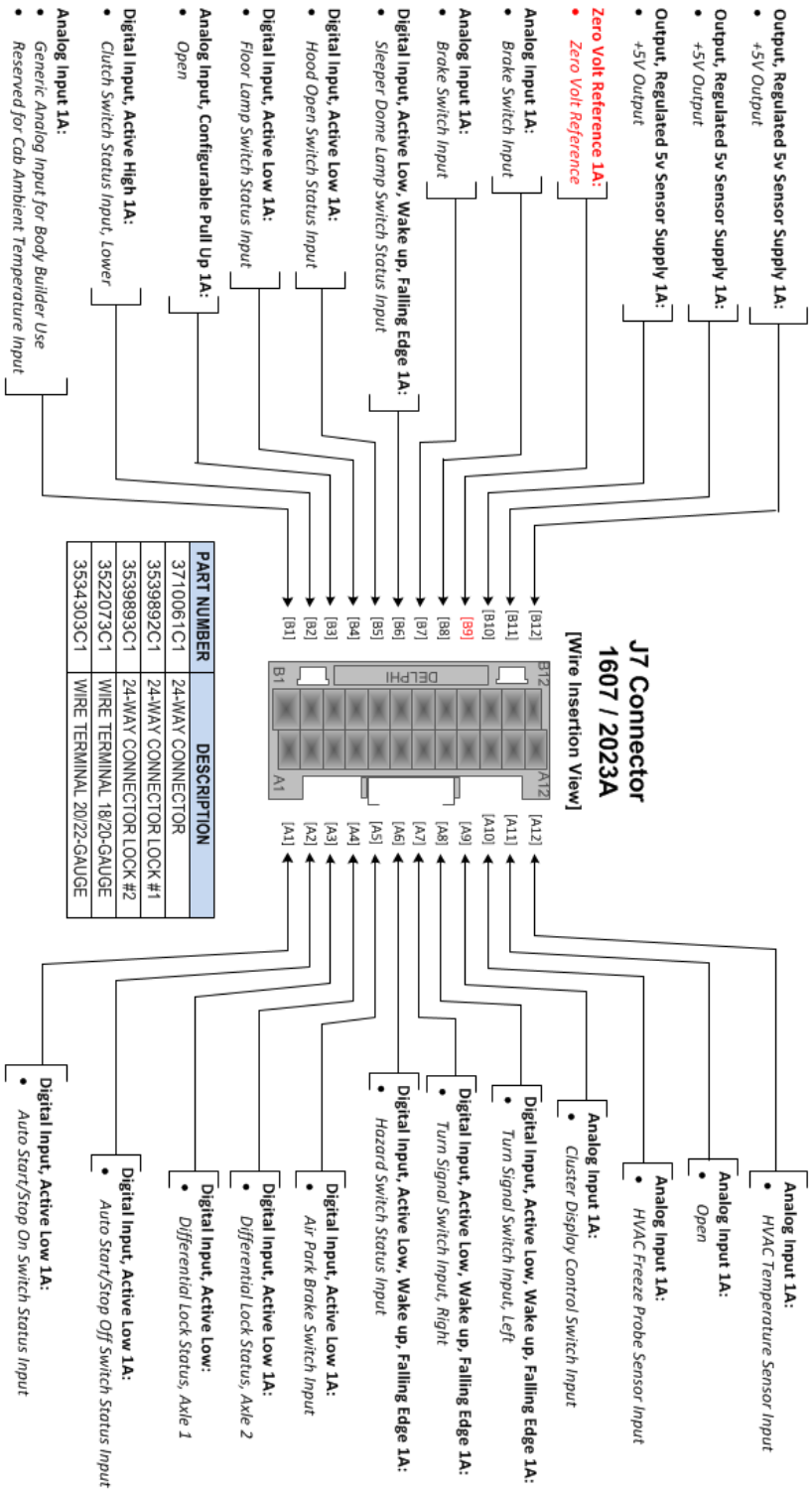
## 4.9. Body Controller J6 Connector 1605 I/O & Part Number Detail:




| PART NUMBER | DESCRIPTION |
|---|---|
| 3759005C1 | 18-WAY CONNECTOR |
| 3573833C1 | 18-WAY CONNECTOR LOCK |
| 3544878C1 | WIRE TERMINAL 12/14-GAUGE |
| 3544877C1 | WIRE TERMINAL 14/16-GAUGE |
| 3544876C1 | WIRE TERMINAL 16/18-GAUGE |
| 3544875C1 | WIRE TERMINAL 18/20-GAUGE |
| 3544884C1 | WIRE TERMINAL 16/18-GAUGE |
| 3544883C1 | WIRE TERMINAL 18/20-GAUGE |

**J6 Connector 1606 / 2023**

## 4.10. Body Controller J7 Connector 1606 I/O & Part Number Detail:




| PART NUMBER | DESCRIPTION |
|---|---|
| 3710061C1 | 24-WAY CONNECTOR |
| 3539892C1 | 24-WAY CONNECTOR LOCK #1 |
| 3539893C1 | 24-WAY CONNECTOR LOCK #2 |
| 3522073C1 | WIRE TERMINAL 18/20-GAUGE |
| 3534303C1 | WIRE TERMINAL 20/22-GAUGE |

**J7 Connector 1607 / 2023A**

# 5. Multiplex Switch-Packs (Center Panel Mounted)

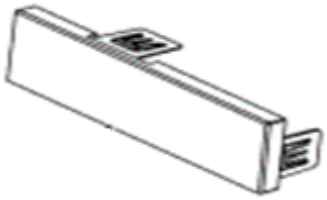
## 5.1. Multiplex Switch-Pack Housing:

**Parts Associated with This Device:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 4057689C2 | HOUSING, SWITCH, 6 PACK DIN MULTIPLEX |

**Multiplex Switch-Pack Housing Part Number**

## 5.2. Multiplex Switch-Pack Cover

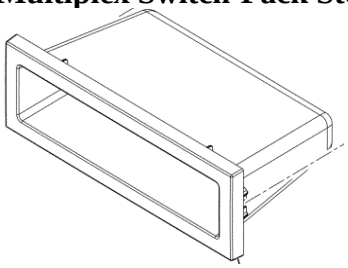


**Parts Associated with This Device:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 3765152C2 | PANEL, SINGLE DIN BLANK PLATE |

**Multiplex Switch-Pack Cover Part Number**

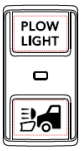
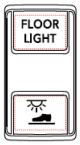
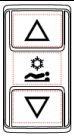
## 5.3. Multiplex Switch-Pack Storage Bin:



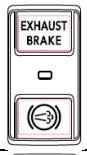
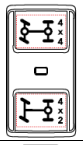
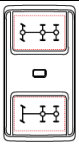
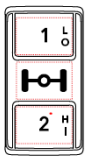
**Parts Associated with This Device:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 3765149C94 | BOX, ASSEMBLY, STORAGE BIN, SINGLE |

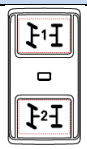
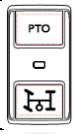
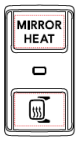
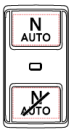
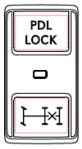
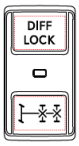
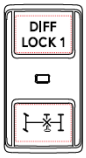
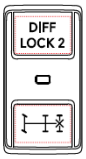
## 5.4. Multiplex Switch-Pack Actuators, Blanks (plugs) and Indicators:

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Graphic |
|---|---|---|---|---|---|---|
| Plug | 3766052C1 | N/A | N/A | N/A | N/A |  |
| Work Light | 4102405C1 | 3 | Mono | Center | Yes |  |
| Exterior Light Check | 4102406C1 | 3 | Mono | Center | Yes |  |
| Plow Light | 4102408C1 | 2 | Bi | Up/Down | Yes |  |
| Cab Dome & Door Lights | 3766057C1 | 3 | Tri | All | No |  |
| Sleeper Dome & Floor Lights | 3766058C1 | 3 | Mono | Center | No |  |
| Floor Light | 3766059C1 | 3 | Mono | Center | No |  |
| Sleeper Temperature Control | 3766061C1 | 3 | Mono | Center | No |  |

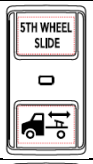
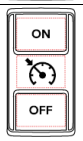
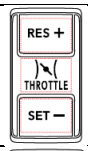
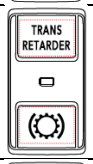
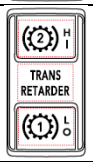
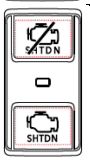
**Rocker Switch Table #1**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Sleeper Fan Speed | 3766062C2 | 3 | Mono | Center | No | Increase<br>N/A<br>Decrease |  |
| Exhaust Brake | 3766063C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Engine Brake On/Off | 4102411C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Engine Brake, Selector | 3766065C1 | 3 | Tri | All | No | Selects '3'<br>Selects '2'<br>Selects '1' |  |
| Fan Override | 4102413C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Front Axle 4x4 | 4102414C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Front Axle 6x6 | 4102461C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Traction Control Off Road | 4102416C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| 2 Speed Axle High/Low | 3766072C1 | 2 | Bi | Up/Down | No | High<br>Low |  |

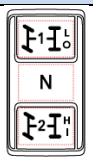
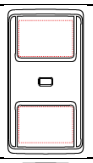
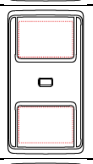
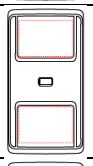
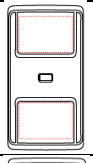
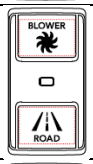
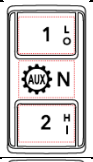
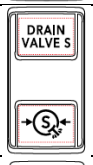
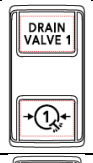
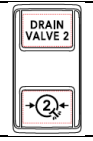
**Rocker Switch Table #2**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Transfer Case High/Low | 4102417C1 | 2 | Bi | Up/Down | Yes | High<br>Low |  |
| PTO | 4102418C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Mirror Heat (Monostable) | 4102419C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Mirror Heat (Bistable) | 3766142C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Auto Neutral | 4102420C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| PDL Lock | 4102421C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Differential Lock | 4102422C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Forward Rear Differential Lock | 3766079C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Rear Rear Differential Lock | 3766080C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Air Suspension Dump | 3766081C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |

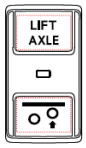
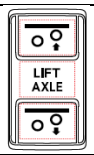
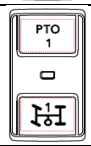
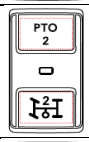
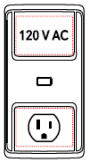
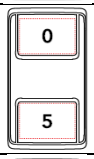
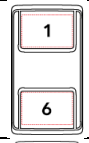
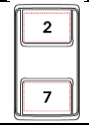
**Rocker Switch Table #3**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| 5th Wheel Unlock | 4102426C1 | 2 | Mono | Down | Yes | Unlock<br>Lock |  |
| 5th Wheel Slide | 4102456C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Cruise/Throttle On/Off | 3766084C1 | 3 | Mono | Center | No | On<br>N/A<br>Off |  |
| Cruise/Throttle Set/Resume | 3766085C1 | 3 | Mono | Center | No | Set<br>N/A<br>Resume |  |
| Throttle On/Off | 4102435C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Throttle Deceleration/Acceleration | 3766102C1 | 3 | Mono | Center | No | Decelerate<br>N/A<br>Accelerate |  |
| Retarder On/Off | 4102427C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Retarder High/Low | 3766087C1 | 2 | Bi | Up/Down | No | High<br>Low |  |
| Auxiliary Front Suspension | 4102428C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Engine Shutdown Override | 3766089C1 | 2 | Mono | Down | Yes | On/Off<br>N/A |  |

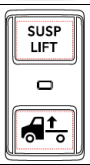
**Rocker Switch Table #4**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Transfer Case High/Neutral/Low | 3766090C1 | 3 | Tri | All | No | High<br>Neutral<br>Low |  |
| Blank Window Rocker | 4102430C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Blank Window Rocker | 4102431C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Blank Window Rocker | 4102432C1 | 3 | Tri | All | Yes | On<br>N/A<br>Off |  |
| Blank Window Rocker | 4102433C1 | 2 | Mono | Down | Yes | On<br>Off |  |
| Blower/Road | 4102434C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Auxiliary Transmission | 3766096C1 | 3 | Tri | All | No | Low<br>Neutral<br>High |  |
| Humphrey Drain Valve Wet Tank | 3766097C1 | 2 | Mono | Down | No | On/Off<br>N/A |  |
| Drain Valve - Prime Tank | 3766098C1 | 2 | Mono | Down | No | On/Off<br>N/A |  |
| Drain Valve - Secondary Tank | 3766099C1 | 2 | Mono | Down | No | On/Off<br>N/A |  |

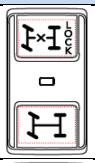
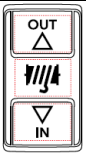
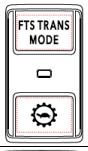
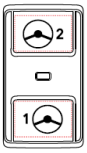
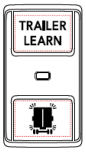
**Rocker Switch Table #5**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Lift Gate | 4102436C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Lift Axle Enable | 4102437C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Lift Axle Up/Down | 3766105C1 | 3 | Mono | Center | No | Up<br>N/A<br>Down |  |
| PTO 1 | 4102438C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| PTO 2 | 4102439C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| 120V AC | 4102440C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Engine Stop/Clear | 4102441C1 | 3 | Mono | Center | Yes | Stop<br>N/A<br>Clear |  |
| 0/5 | 3766111C1 | 3 | Mono | Center | No | Selects '0'<br>N/A<br>Selects '5' |  |
| 1/6 | 3766112C1 | 3 | Mono | Center | No | Selects '1'<br>N/A<br>Selects '6' |  |
| 2/7 | 3766113C1 | 3 | Mono | Center | No | Selects '2'<br>N/A<br>Selects '7' |  |

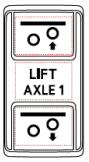
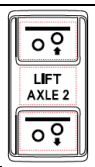
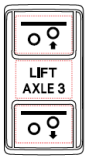
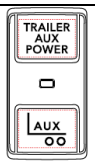
**Rocker Switch Table #6**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| 3/8 | 3766114C1 | 3 | Mono | Center | No | Selects '3'<br>N/A<br>Selects '8' |  |
| 4/9 | 3766115C1 | 3 | Mono | Center | No | Selects '4'<br>N/A<br>Selects '9' |  |
| Economy | 4102442C1 | 2 | Mono | Down | Yes | On<br>Off |  |
| Inhibit Regeneration (Monostable) | 4102443C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Inhibit Regeneration (Bistable) | 4102444C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Parked Regeneration | 4102445C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| 6th Gear Disable Switch | 4102446C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Wig-Wag Headlight Enable | 4102447C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Rear Axle Load Distribution | 4102448C1 | 2 | Mono | Down | Yes | On/Off<br>N/A |  |
| Suspension Raise | 4102449C1 | 2[1] | Bi | Up/Down | Yes | On<br>Off |  |

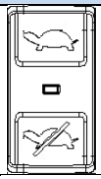
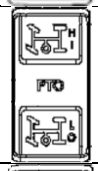
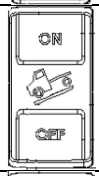
**Rocker Switch Table #7**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Transfer Case | 4102450C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Winch On/Off | 4102451C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| Winch In/Out | 3766130C1 | 3 | Mono | Center | No | Out<br>N/A<br>In |  |
| Hill Start Aid | 4102452C1 | 2 | Mono | Down | Yes | On/Off<br>N/A |  |
| FTS Transmission Bypass Enable | 4102453C1 | 2 | Mono | Down | Yes | On/Off<br>N/A |  |
| Heated Windshield | 4102454C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |
| Driver Position | 4102455C1 | 2 | Bi | Up/Down | Yes | Position 2<br>Position 1 |  |
| Trailer Learn | 4102457C1 | 2 | Mono | Down | Yes | On/Off<br>N/A |  |
| Auto Start/Stop | 4102459C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |

**Rocker Switch Table #8**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Engine Brake (ECE) | 4095306C1 | 3 | Tri | All | No | High |  |
| Sleeper Auto Climate | 4102463C1 | 2 | Bi | Up/Down | Yes | On |  |
| Lift Axle Up/Down 1 | 4072987C1 | 3 | Mono | Center | No | On<br>N/A<br>Off |  |
| Lift Axle Up/Down 2 | 4072989C1 | 3 | Mono | Center | No | On<br>N/A<br>Off |  |
| Lift Axle Up/Down 3 | 4072995C1 | 3 | Mono | Center | No | On<br>N/A<br>Off |  |
| Aux Trailer | 4102462C1 | 2 | Bi | Up/Down | Yes | On<br>Off |  |
| PTO | 4114975C1 | 3 | Mono | Center | Yes | On<br>N/A<br>Off |  |

**Rocker Switch Table #9**

| Rocker Switch Name | International P/N | Number of Positions | Switch Action | Stable Positions | Indicator | Function | Graphic |
|---|---|---|---|---|---|---|---|
| Low Speed Throttle Control (Maneuvering) | 4124041C1 | 2 | Bi | Up/Down | Yes | On |  |
| | | | | | | Off | |
| Drive Mode | 4124040C1 | 2 | Bi | Up/Down | Yes | On |  |
| | | | | | | Off | |
| Transmission PTO Split Hi/Lo | 4234487C1 | 2 | Bi | Up/Down | Yes | Hi |  |
| | | | | | | Lo | |
| Downhill Speed Control | 4124042C1 | 2 | Bi | Up/Down | Yes | On |  |
| | | | | | | Off | |
| Downhill Speed Control Res/Set | 4124043C1 | 3 | Mono | Center | No | RES + |  |
| | | | | | | N/A | |
| | | | | | | RES - | |

**Rocker Switch Table #10**

## 5.5. Multiplex Switch-Pack Warning Lights:

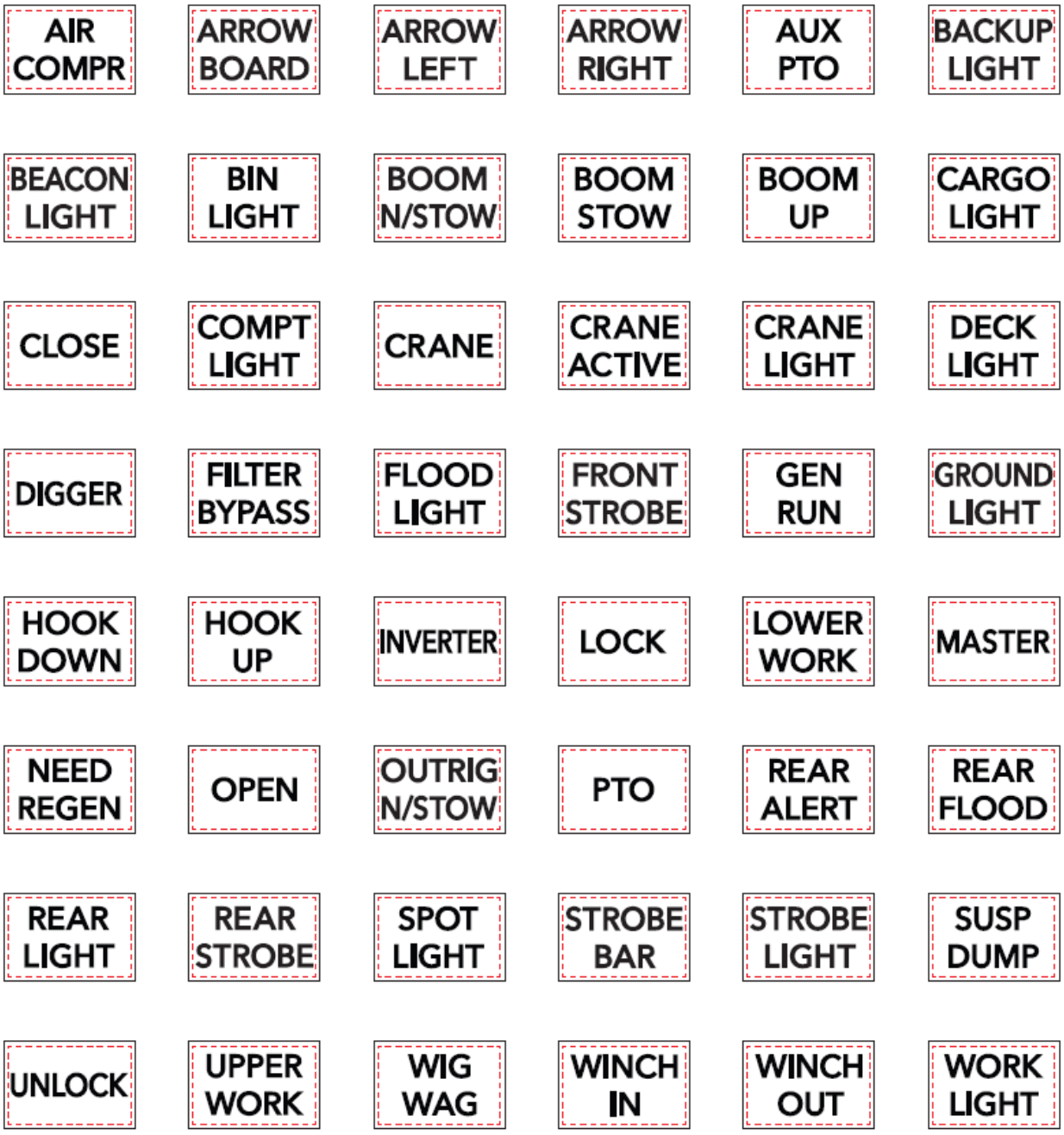
| Warning Light | International P/N | Graphic |
|---|---|---|
| Blank | 4108104C1 |  |
| Hill Start Assist | 4084814C1 |  |
| Auto Neutral | 4084815C1 |  |
| Boom Up | 4084816C1 |  |
| Outrig Out | 4084817C1 |  |
| Body Up | 4084818C1 |  |
| Gate Open | 4084819C1 |  |
| Rear Alert | 4084820C1 |  |

**Warning Light Table #1**

| Warning Light | International P/N | Graphic |
|---|---|---|
| 120V AC Power | 4084821C1 |   |
| Jaw Locked | 4084823C1 |   |
| Jaw Unlocked | 4084824C1 |   |
| Range Inhibit | 4084825C1 |   |

**Warning Light Table #2**

## 5.6. Switch Label Applique Sheet #1 (Utility/Wrecker):




**Switch Label Applique Sheets #1 - #5 are included under part number 4110384C1.**

## 5.7. Switch Label Applique Sheet #2 (Fire):


**Switch Label Applique Sheets #1 - #5 are included under part number 4110384C1.**

## 5.8. Switch Label Applique Sheet #3 (Limo/Bus/Propane):


**Switch Label Applique Sheets #1 - #5 are included under part number 4110384C1.**

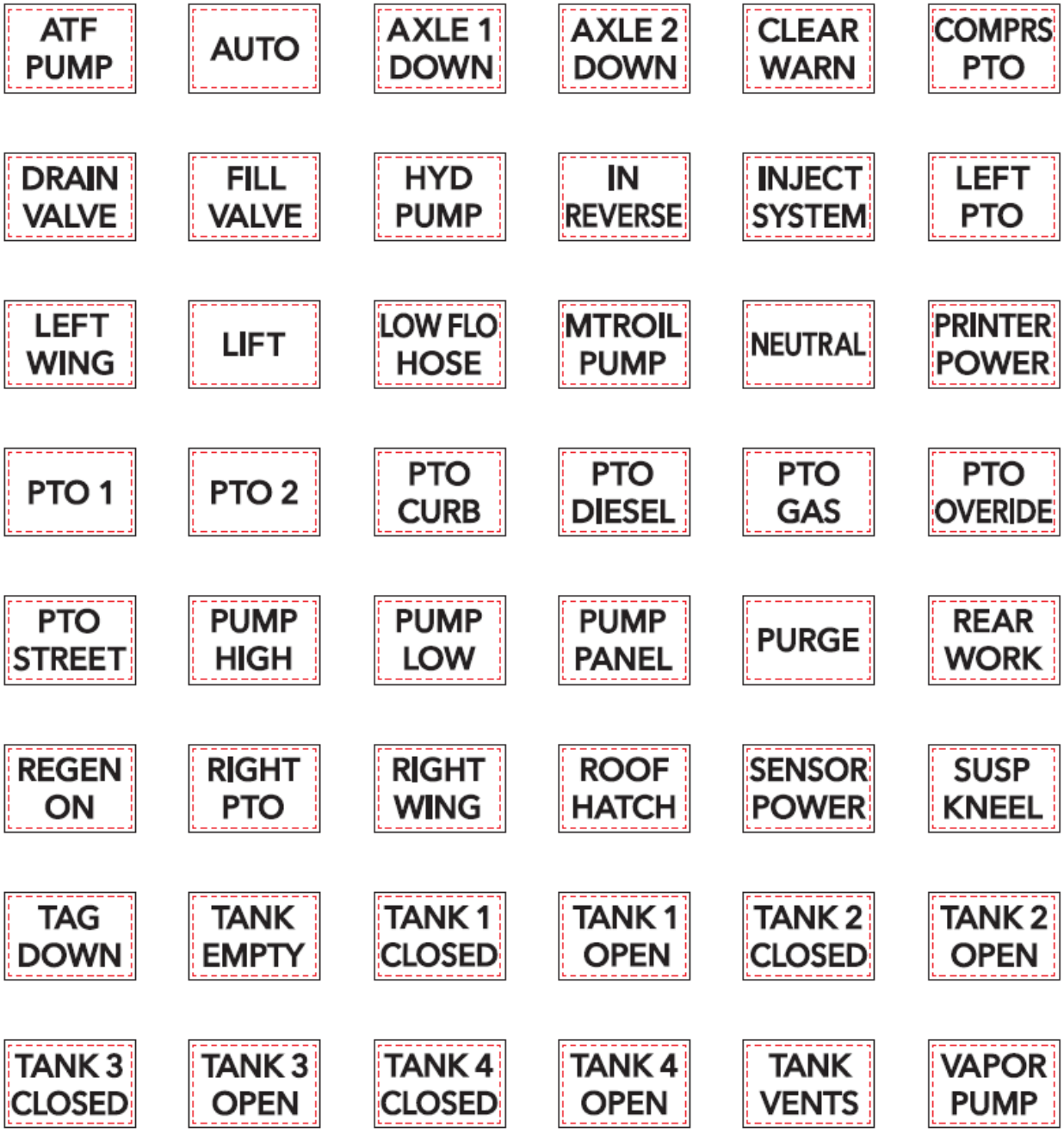
## 5.9. Switch Label Applique Sheet #4 (Airport Refueler/Concrete Mixer):


**Switch Label Applique Sheets #1 - #5 are included under part number 4110384C1.**

## 5.10. Switch Label Applique Sheet #5 (Plow/Dump):


**Switch Label Applique Sheets #1 - #5 are included under part number 4110384C1.**

## 5.11. Switch Label Applique Sheet #6 (Tanker)




**Switch Label Applique Sheet #6 Part Number 2518768C1**

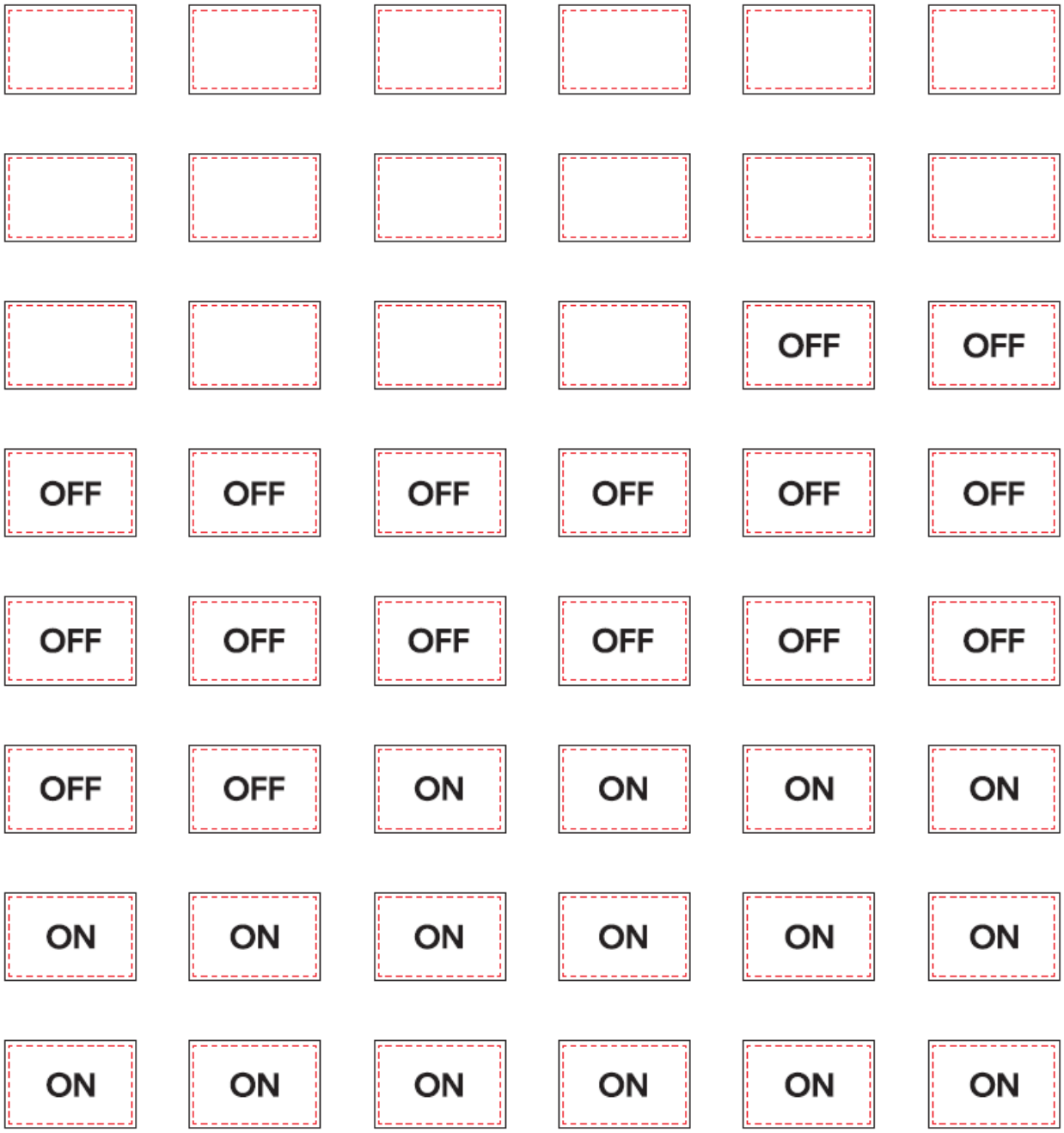
## 5.12. Switch Label Applique Sheet #7 (Ambulance/Fire):


**Switch Label Applique Sheet #7 Part Number 2518769C1**

## 5.13. Switch Label Applique Sheet #8 (Adv Fire/Ambulance):


**Switch Label Applique Sheet #8 Part Number 2518770C1**

## 5.14. Switch Label Applique Sheet #9 (On/Off/Blank):




**Switch Label Applique Sheet #9 Part Number 2518771C1**

## 5.15. Switch Label Applique Sheet #10 (Miscellaneous):

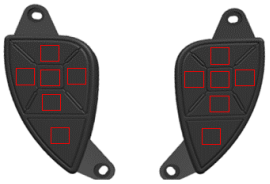

**Switch Label Applique Sheet #10 Part Number 2518772C1**

# 6. Customized Steering Wheel Switches

**0008XPG:** STEERING WHEEL CONTROLS (2) Customizable Switch Pods

**0008XPH:** STEERING WHEEL CONTROLS Customizable Switch Pod

Steering wheel switches include a right-side pod and a left-side pod. Steering wheel switches have several configurations and part numbers.

| | | |
|---|---|---|
| Body Builder Variant 1 - Blank | 4307659C91 |  |
| Body Builder Variant 2 - Cruise, Marker Interrupt, Blank | 4324016C91 |  |
| Body Builder Variant 3 - Cruise, Blank | 4330394C91 |  |

**Steering Wheel Switch Pod Configurations**

Customer applications can be customized by using the part number configurations from the table above.

Note: Clock spring part numbers and steering column harnesses may need to be changed, depending on the desired changes and what was built on the truck.

**Steering Wheel Switch Label Configurations**

Note: The switches can be labeled using the stickers provided with part number 4333919C1.

Note:  Refer to the appropriate integration guide for the most up to date information.

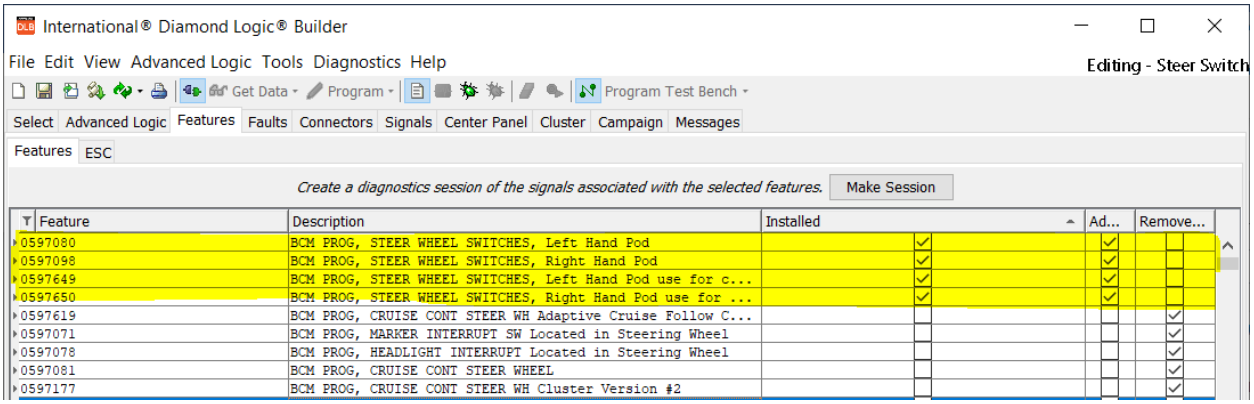
Steering wheel switches have labels to use on each steering wheel switch pod. Depending on the customer application, different labels will be used. Refer to the appropriate integration guide for detailed steering wheel switch label configurations.

**Stickers Provided with 4333919C1**


**Sample of Sheet Provided with 4333919C1**

**Body Controller Software Feature Codes:**

Custom switch configuration requires combinations of various feature codes. Feature codes 597080 is the left-side pod and 597098 is the right-side pod. They are required if the corresponding pod is required in the steering wheel. These feature codes set up the analog inputs to the BCM from the switches.




**Features as Shown in DLB**

Note: All features associated with the (R/L) switch pod intended to be used for custom application must be removed/ not included in the configuration these include, but may not be limited to:

- Feature code 597071– Marker Interrupt Switch
- Feature code 597078 – Headlight Interrupt Switch
- Feature code 597081 – Cruise Cont. Steer Wheel
- Feature code 597145 – Radio Controls
- Feature code 597177 – Cruise Control Switch
- Feature code 597619 – Adaptive cruise selectable following distance
- Feature code 597620 – Adaptive cruise selectable following distance for fusion 3.0

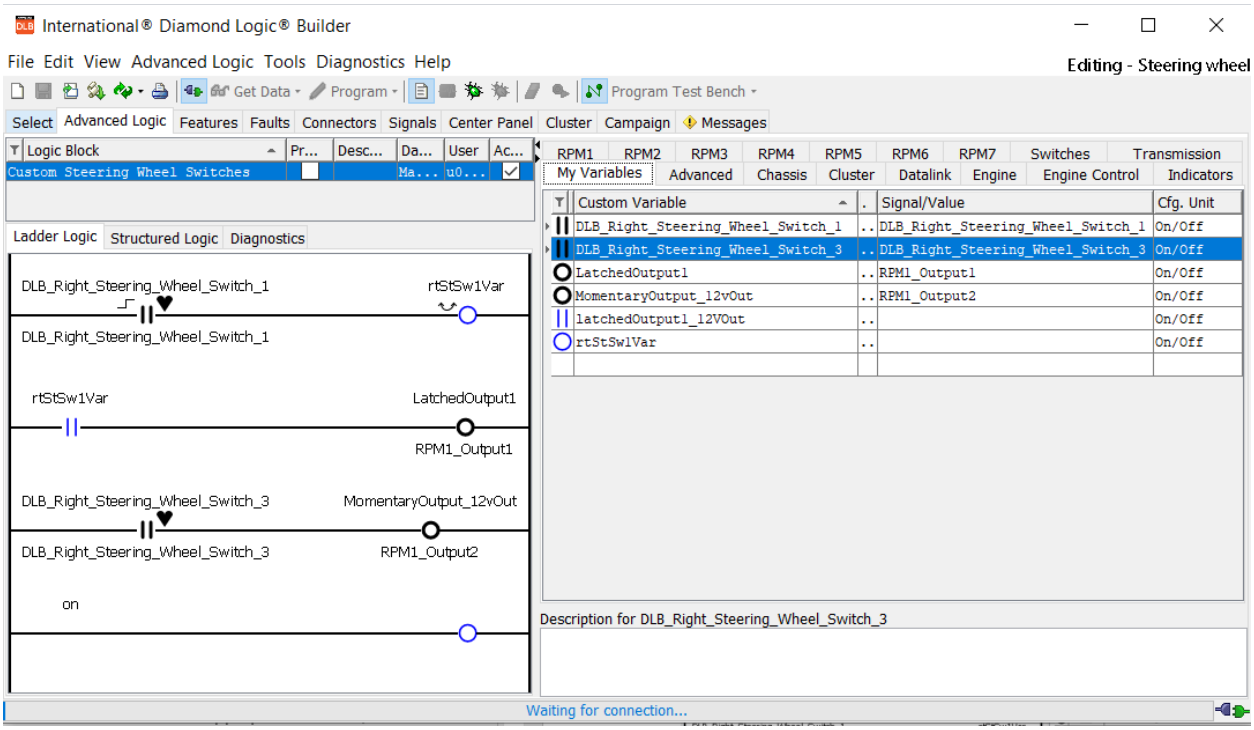
Note: Cruise control functionality can be relocated from the steering wheel pods to the Mux Switch pack in the IP using feature code **597528**

Note: Both the feature for the installed side pod and the use of that pod for custom application must be configured:

| Electrical feature code required | Left pod | Right pod |
|---|---|---|
| Add Pod to configuration | 597080 | 597098 |
| Enable Pod for custom application | 597649 | 597650 |

## Advanced Logic Programming

Note: Advanced logic programming, written with DLB, is required to enable the steering wheel switch customer Applications. The physical steering wheel pod switches are all discrete, normally open and momentary contact. The input signals used in DLB that read the switches are also normally open contacts like most input contacts in DLB are. If latching operation of the output is desired a software latch must be used, one efficient method is to use an intermediate variable with a toggle modifier this also requires an edge modifier on the input to ensure proper controlled operation.




**Advanced Logic Sample**

# 7. Lighting Control Module:

## 7.1. Lighting Control Module Housing:

**LCM** ***(Pictured example Configured with Auto Light Ctrl & Fog Lights)***

## 7.2. Lighting Control Module and Associated Parts:

| PART NUMBER | DESCRIPTION |
|---|---|
| **LIGHTING CONTROL MODULES** | |
| 4080940C3 | HOUSING SWITCH LIGHT CONTROL MODULE W/AUTO, FOG LIGHT |
| 4086867C3 | HOUSING SWITCH LIGHT CONTROL MODULE W/FOG |

**Lighting Control Module Variants**

# 8. Remote Power Modules:

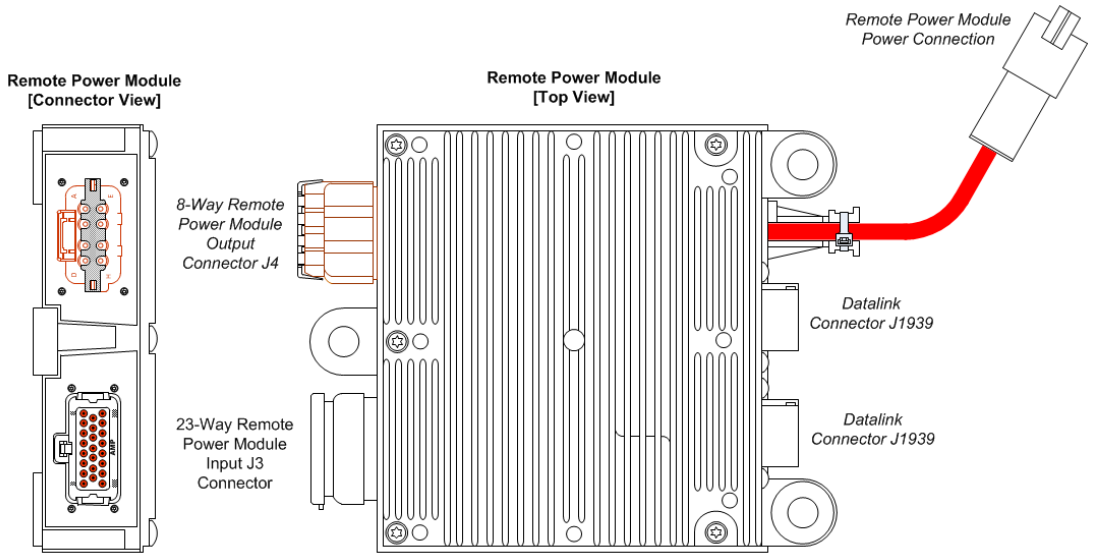
Note: Remote power modules are not currently available as an orderable feature on electric vehicles. Body builders can add them by obtaining and installing the required parts, adding the required programming, and adding the required wiring.

Remote power modules provide a method of distributing and controlling power to various device loads on the vehicle, outside the cab, without running high current wires from in-cab switches to the loads or splicing into existing wiring.

The RPM is connected to the BCM via the Body Builder J1939 datalink (the BCM is capable of controlling up to seven RPMs on the vehicle). The only factory-installed wires connected to the RPM are battery power for driving the loads and the datalink cable. Connectors for Body Builder-installed inputs and outputs are also provided. Power is fed to the RPM through a fusible link to the battery source. Each RPM has six independently controllable, 20 Ampere (AMP) outputs (80 maximum per RPM) with virtual (software programmable) fusing similar to the BCM. If higher current capacity is needed, two outputs can be paralleled, or the RPM can control a high current relay while still maintaining logic and diagnostic capability without having to wire to the inside of the cab.

Because the RPM is connected to the BCM via the datalink, it also serves as an “integration gateway” to the BCM and the vehicle electrical system. Six inputs on each RPM allow information from body accessories to be communicated to the BCM and processed for interlocks, operator information/warning, etc. These inputs also allow the Body Builder to add body-mounted switches to turn on or off the same electrical devices controlled by in-cab switches.

## 8.1. Remote Power Module Composite View

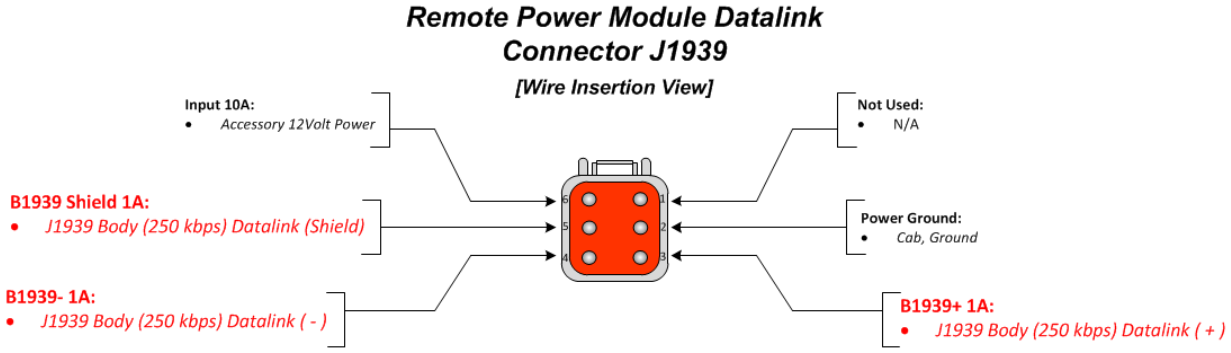



**Remote Power Modul End and Top Views**

| PART NUMBER | DESCRIPTION |
|---|---|
| 2588909C95 | REMOTE POWER MODULE |

**Remote Power Module**

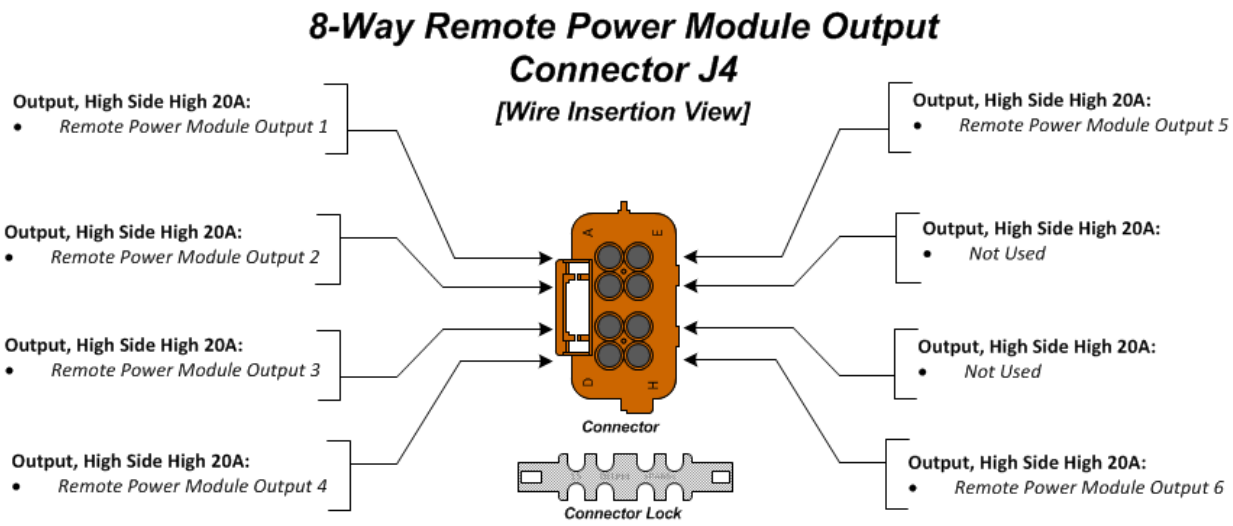
## 8.2. Remote Power Module CAN Pass-through Connector




| PART NUMBER | DESCRIPTION |
|---|---|
| 2005240C1 | 6-WAY CONNECTOR |
| 200242C1 | 6-WAY CONNECTOR LOCK |
| 453133C1 | CONNECTOR PLUG |
| 2034787C1 | WIRE TERMINAL 14-GAUGE |
| 1680205C1 | WIRE TERMINAL 16-GAUGE |
| 1651988C1 | WIRE TERMINAL 18-GAUGE |
| 1651969C1 | WIRE TERMINAL 20-GAUGE |

**Remote Power Module 6-Way J1939 Datalink Connector**

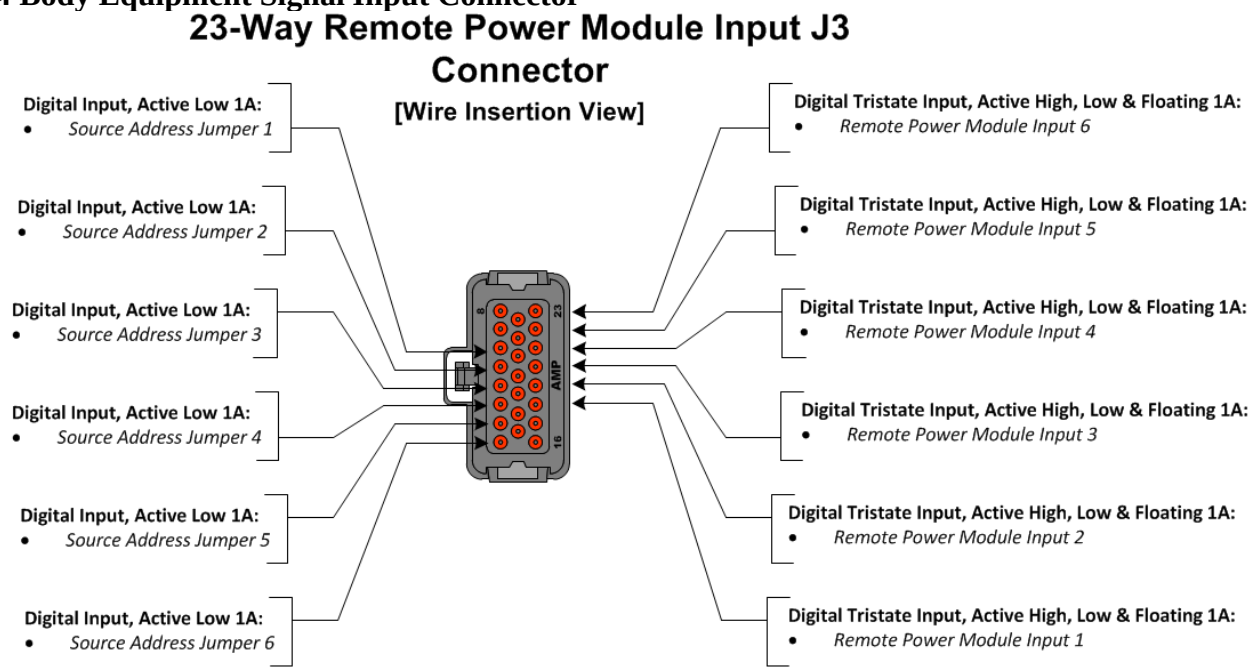
## 8.3. Body Equipment Power Output Connector




| PART NUMBER | DESCRIPTION |
|---|---|
| 3548934C1 | 8-WAY CONNECTOR |
| 3548943C1 | 8-WAY CONNECTOR LOCK |
| 2025431C1 | CONNECTOR PLUG |
| 3434163C1 | WIRE TERMINAL 12-GAUGE |
| 3935931C1 | WIRE TERMINAL 14-GAUGE |
| 3535930C1 | WIRE TERMINAL 16-GAUGE |
| 3548945C1 | WIRE TERMINAL SEAL 12-GAUGE |
| 3535937C1 | WIRE TERMINAL SEAL 14-GAUGE |
| 3535936C1 | WIRE TERMINAL SEAL 16-GAUGE |

**Remote Power Module 8-Way Output Connector**

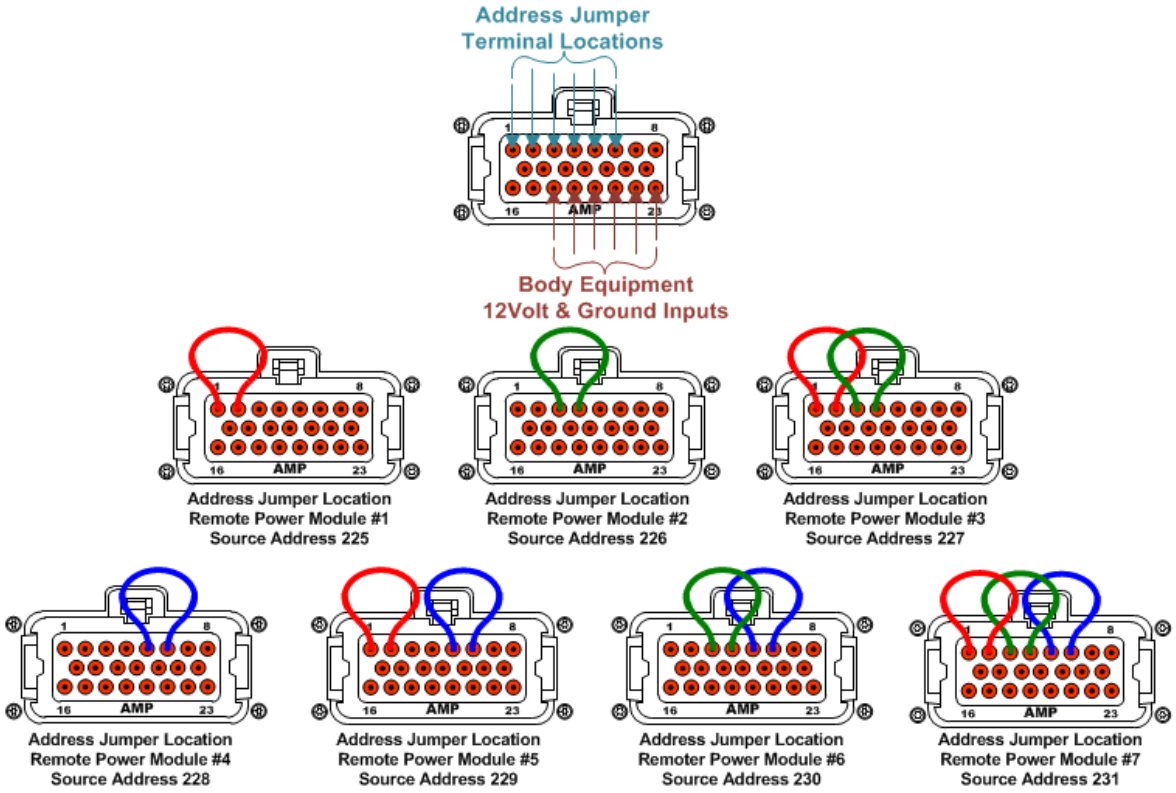
## 8.4. Body Equipment Signal Input Connector




| PART NUMBER | DESCRIPTION |
|---|---|
| *2588914C1* | 23-WAY CONNECTOR |
| *1688285C1* | CONNECTOR PLUG |
| *1698937C1* | WIRE TERMINAL 16/18/20-GAUGE |

**Remote Power Module 23-Way Input Connector**

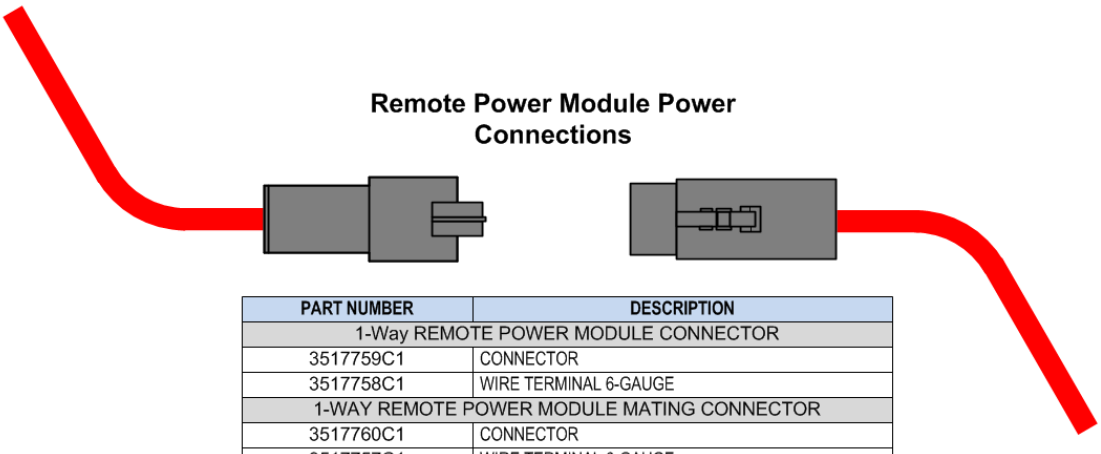
## 8.5. Remote Power Module Address Jumper Locations




| PART NUMBER | DESCRIPTION |
|---|---|
| 2588908C92 | ADDRESS JUMPER KIT |

**Remote Power Module Address Jumper Source Addressing Schemes**

## 8.6. Remote Power Module Power Connections




| PART NUMBER | DESCRIPTION |
|---|---|
| 1-Way REMOTE POWER MODULE CONNECTOR | |
| 3517759C1 | CONNECTOR |
| 3517758C1 | WIRE TERMINAL 6-GAUGE |
| 1-WAY REMOTE POWER MODULE MATING CONNECTOR | |
| 3517760C1 | CONNECTOR |
| 3517757C1 | WIRE TERMINAL 6-GAUGE |

**Remote Power Module High Current Battery Connectors**

# 9. Instrument Panel

**Instrument Panel**

Instrument Panel Overview:

- The base instrument panel configuration can accommodate one 6-pack module location.
- Currently, there are no options available to add additional switched output functions in the switch pack.
- Currently, there are no options to add additional switch packs.
- The drive mode selector determines the desired direction of travel.
- The In-cab fuse and relay panel is under a cover, on the dash, in front of the passenger seat.

# 10. Air Conditioning

**16BAM**: Air Conditioner with Integral Heater and Defroster

**Extended Description:** This feature provides HVAC controls for the cab environment. The system uses a high voltage electric compressor. There are no options for this system to be modified by Body Builders and there are no accommodations to add additional compressors.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 11. 12 Volt System

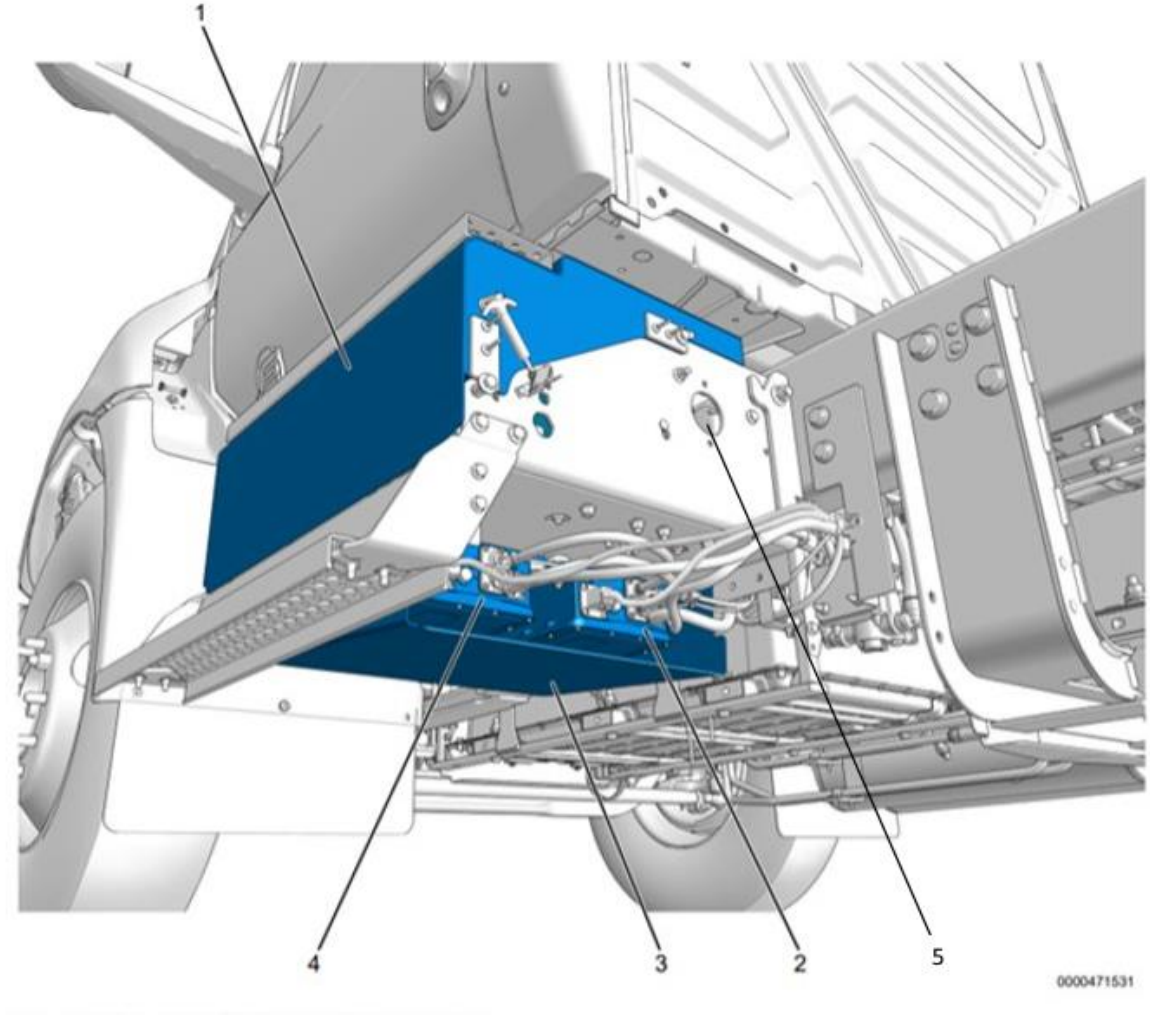
**Caution –** To prevent damage to components, refer to the information, on removing the "Red Gel Coat," provided in the Appendix.

## **11.1.** 12-VOLT BATTERY CHARGING

The 12-Volt batteries are charged by 2 DC to DC converters that convert high voltage to approximately 14 volts.
Each Converter has a power rating of 4000 Watts and a maximum current capacity of 278 Amps.

The converters are mounted underneath the 12 Volt battery box or in the compartment under the cab below the driver.
Newer models may have the battery located under the hood.
The converters and the batteries are all connected in parallel.
The converter positive outputs tie together and terminate at the battery disconnect switch.
The negative outputs tie together and terminate at a chassis ground.
The battery positive circuits tie to the same spot as the converter circuit, at the disconnect switch.
The circuits on the other side of the disconnect switch go to the 12-volt PDM, in the under-hood compartment.

**Caution –** To prevent damage to components, refer to the information, on removing the “Red Gel Coat,” provided in the Appendix.




Component Locations

| | | | |
|---|---|---|---|
| 1. | Battery Box | 2. | DC to DC Converter #2 |
| 3. | Skid Plate | 4. | DC to DC Converter #1 |
| 5. | Battery Disconnect Switch Location | | |

**References:**

Circuit Diagram Manual:

Publication Number: 0000018831 – International eMV Series Interactive Schematics

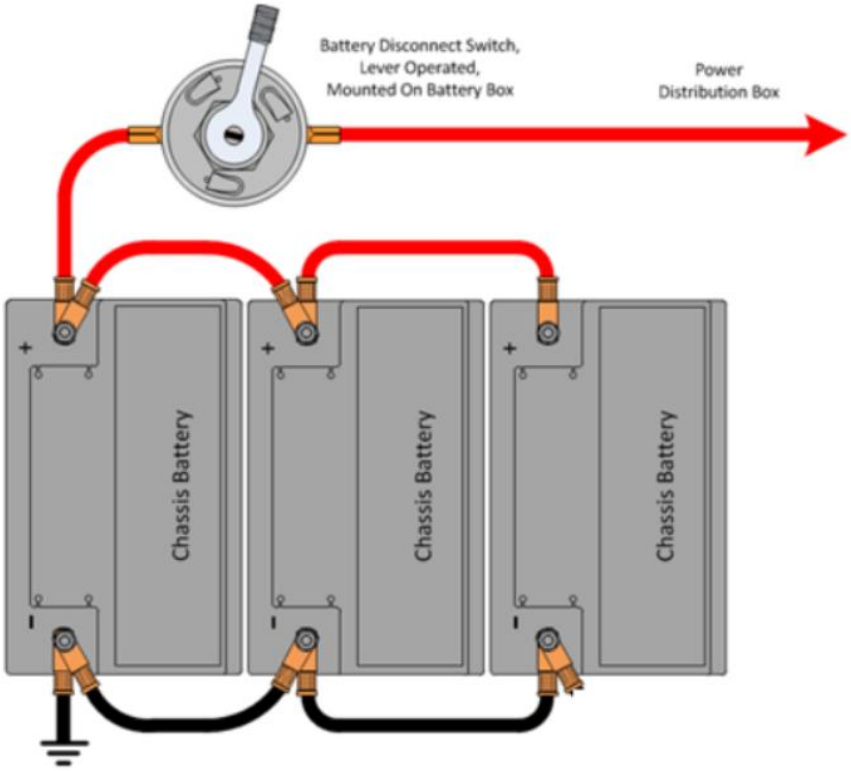
Service Manual:

Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

## 11.2. 08RMH: BATTERY DISCONNECT SWITCH **Cole-Hersee 75920-06} 300 Amp, Disconnects Charging Circuits, Locks with Padlock, Battery Box Mounted**.

**Extended Description:** The battery disconnect switch is used to shut down the entire 12 Volt battery-fed electrical system. This switch will shut off the system so that the electrical components on the vehicle, if left on, do not drain the batteries. This switch also disables the control to the High-Voltage system.
08RMH provides a lever operated battery disconnect switch, which can be "locked out".

**System Block Diagram:**




**How to Test This Feature:**
1. Close switch.
2. Verify that the vehicle is providing 12-14 Volts to the power distribution box.
3. Open disconnect switch.
4. Verify vehicle systems do not have any 12-volt electrical power.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

POWER DISTRIBUTION MODULE AND FUSES

Additional body builder loads can be added to the power distribution modules and/or the fuse and relay panel.

**Caution –** To prevent damage to components, refer to the information, on removing the "Red Gel Coat," provided in the Appendix.

Information on the power distribution modules and fuse locations can be found in the Operator's Manual, Circuit Diagrams and the Service Manual.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 12. Body Builder Wiring, for Stop/Turn/Tail Lights/ Through Power:

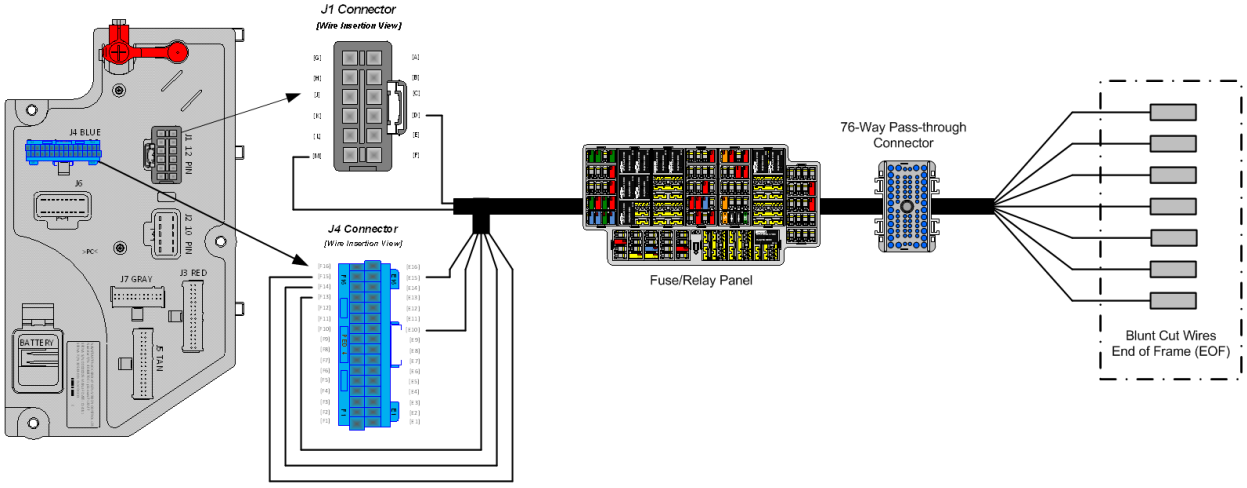
**12.1. 08HAA:** BODY BUILDER WIRING To EOF, With Stop, Tail, Turn, and Marker Lights Circuits, Ignition (IGN)-Controlled Auxiliary Feed and Ground (GND), Less Trailer Socket.

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature is for vehicles that have heavy-duty lighting requirements. This feature has a 30-AMP IGN Feed. Right and left turn signals can support up to seven turn lamps per side. Code 08HAA is designed for separate stop and turn lamps only. The 7-wire breakout is located at the EOF and there is no connector. The wires are blunt cut with heat shrink covering.

## System Block Diagram:




## Body Controller Software Feature Codes:

- 597054 – BCM PROG, TRAILER LIGHTING

## Body Controller Software Feature Code Parameters:

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Trailer_Left_Turn_Lamp_OC_Current | 3175 | Trailer Left Lamp Open Circuit Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Left_Turn_Lamp_Low_Current | 3177 | Trailer Left Lamp Low Current Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Left_Turn_Lamp_High_Current | 3178 | Trailer Left Lamp High Current Detection Level value range | 15 | A | 0 | 20 | 0.1 |
| Trailer_Right_Turn_Lamp_High_Current | 3179 | Trailer Right Lamp High Current Detection Level value range | 15 | A | 0 | 20 | 0.1 |
| Trailer_Right_Turn_Lamp_Low_Current | 3180 | Trailer Left Lamp Low Current Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Right_Turn_Lamp_OC_Current | 3181 | Trailer Left Lamp Open Circuit Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Marker_Lamp_High_Current | 3182 | Trailer Marker Lamp High Current Detection Level value range | 20 | A | 0 | 20 | 0.1 |
| Trailer_Marker_Lamp_Low_Current | 3183 | Trailer Marker Lamp Low Current Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Marker_Lamp_OC_Current | 3184 | Trailer Marker Lamp Open Circuit Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Tail_Lamp_High_Current | 3185 | Trailer Tail Lamp High Current Detection Level value range | 20 | A | 0 | 20 | 0.1 |
| Trailer_Tail_Lamp_Low_Current | 3186 | Trailer Tail Lamp Low Current Detection Level value range | 0 | A | 0 | 20 | 0.1 |
| Trailer_Tail_Lamp_OC_Current | 3187 | Trailer Tail Lamp Open Circuit Detection Level value range | 0 | A | 0 | 20 | 0.1 |

**Parameter Definitions:**

- **Trailer_Left_Turn_Lamp_OC_Current –** This parameter sets the minimum fuse level for the open circuit of the Trailer Left Turn Lamp. If the current draw is below this value, a fault will be set.
- **Trailer_Left_Turn_Lamp_Low_Current** – This parameter sets the minimum fuse level for normal operation of the Trailer Left Turn Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Left_Turn_Lamp_High_Current** – This parameter sets the maximum fuse level for normal operation of the Trailer Left Turn Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Right_Turn_Lamp_High_Current** – This parameter sets the maximum fuse level for normal operation of the Trailer Right Turn Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Right_Turn_Lamp_Low_Current** – This parameter sets the minimum fuse level for normal operation of the Trailer Right Turn Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Right_Turn_Lamp_OC_Current –** This parameter sets the minimum fuse level for the open circuit of the Trailer Right Turn Lamp. If the current draw is below this value, a fault will be set.
- **Trailer_Marker_Lamp_High_Current** – This parameter sets the maximum fuse level for normal operation of the Trailer Marker Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Marker_Lamp_Low_Current** – This parameter sets the minimum fuse level for normal operation of the Trailer Marker Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Marker_Lamp_OC_Current –** This parameter sets the minimum fuse level for the open circuit of the Trailer Marker Lamp. If the current draw is below this value, a fault will be set.
- **Trailer_Tail_Lamp_High_Current** – This parameter sets the maximum fuse level for normal operation of the Trailer Tail Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Tail_Lamp_Low_Current** – This parameter sets the minimum fuse level for normal operation of the Trailer Tail Lamp. If the current draw exceeds this value, the circuit will open.
- **Trailer_Tail_Lamp_OC_Current –** This parameter sets the minimum fuse level for the open circuit of the Trailer Tail Lamp. If the current draw is below this value, a fault will be set.

**Arrow Indicates Location of Lighting Circuits**

**How to Add This Feature:**

**NOTE** - This feature is not easy to install, and every effort should be made to order the vehicle with the desired code. Refer to the 7-way blunt cut wires at EOF for information covering circuit connections and use of the circuit diagram manual to aid in assembly.

**How to Test This Feature:**

1. Turn on vehicle headlights.
2. Verify that the taillight circuit has battery voltage levels present.
3. Verify that the marker light circuit has battery voltage levels present.
4. Turn off vehicle headlights.
5. Turn on left turn signal in vehicle.
6. Verify that left turn circuit is cycling between battery voltage and GND.
7. Turn off vehicle left turn signal.
8. Turn on right turn signal in vehicle.
9. Verify that right turn circuit is cycling between battery voltage and GND.
10. Turn off vehicle left turn signal.
11. Put the vehicle in reverse.

12. Turn the key to the accessory or IGN position.
13. Verify that the IGN circuit has battery voltage levels present.
14. Press the vehicle brake pedal.
15. Verify that the stop circuit has battery voltage levels present.
16. Release brake pedal.

**NOTE** - This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 13. CB and 2-Way Radio Accommodation Packages

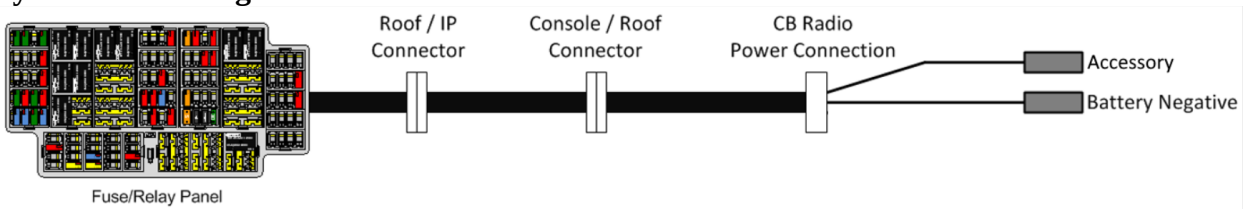
## 13.1. 08RNC: CB RADIO Accommodation Package, Header Mounted, Feeds from Accessory Side of Ignition Switch, Includes Power Source, Two Antennas and Antenna Bases with Wiring on Both Side Mirror

**Feature Applicability to Vehicle Platforms:**

- (eMV)

**Extended Description:** When installing a CB radio, this feature provides the power circuits required for hook-up. This accommodation package includes a two-way connector with a 10-Amp accessory power feed and cab ground, dual CB antenna cables routed from the mirrors to the cab overhead console panel opening and two CB antenna mounts located at the top of each mirror. A strap is also provided in the header to mount the customer-supplied CB radio. The antennas are not provided with this code. If the two antennas are desired, 08RBK must be ordered.

**System Block Diagram:**




**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 1661196C1 | 2-WAY CONNECTOR, BODY |
| 1661209C1 | WIRE TERMINAL 16-GAUGE |

**Parts Associated with CB Radio Mating Connector**

**How to Test This Feature:**

To test these circuits, verify that battery voltage is present in the correct key-state for each respective feature.

**References:**

Circuit Diagram Manual:

Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:

Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 14. Fog Light Package

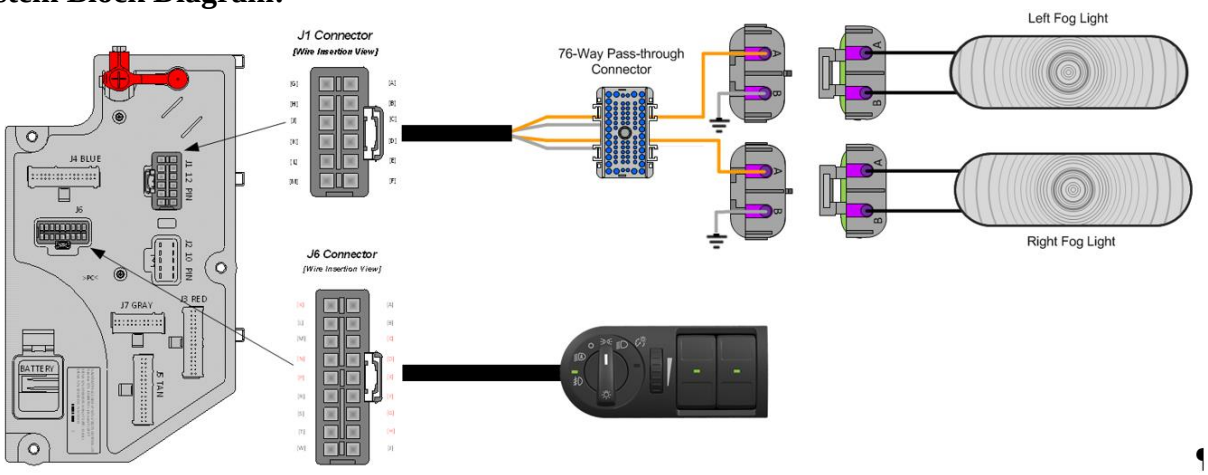
## 14.1. 08XJH: FOG LIGHTS (2) Clear Lens, LED, Rectangular, with White Light Source

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Feature code 08XJH comes with the fog light system (wiring and fog lamps) completely installed. 08XJH operates as follows: to turn on the fog lamps; the headlamps must be on and in the low beam position. The lamps will go off if the headlamps are switched to high beam. 08XJH is available on eMV models.

**System Block Diagram:**




**Body Controller Software Feature Codes:** (Feature code and description goes below)

- 597011 - BCM PROG, FOG LIGHT (LCM)

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Left_Fog_Light_Hi_Current | 2309 | Left Fog Light High Current Detection Level (Amps) | 10 | A | 0 | 10 | 0.1 |
| Left_Fog_Light_Lo_Current | 2310 | Left Fog Light Low Current Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Left_Fog_Light_OC_Current | 2311 | Left Fog Light Open Circuit Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Right_Fog_Light_Hi_Current | 2312 | Right Fog Light High Current Detection Level (Amps) | 10 | A | 0 | 10 | 0.1 |
| Right_Fog_Light_Lo_Current | 2313 | Right Fog Light Low Current Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Right_Fog_Light_OC_Current | 2314 | Right Fog Light Open Circuit Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |

**Parameter Definitions:**

- **Left_Fog_Light_Hi_Current** - If the current in the left fog light circuit exceeds the level set by this parameter, the Body Controller (BCM) will shut off the circuit and register a fault code.

- **Left_Fog_Light_Lo_Current** - If the current in the left fog light circuit falls below the level set by this parameter, the Body Controller (BCM) will register a fault code.

- **Left_Fog_Light_OC_Current** - This parameter detects open circuit in the left fog light, the Body Controller (BCM) will register a fault code.

- **Right_Fog_Light_Hi_Current** - If the current in the right fog light circuit exceeds the level set by this parameter, the Body Controller (BCM) will shut off the circuit and register a fault code.

- **Right_Fog_Light_Lo_Current** - If the current in the right fog light circuit falls below the level set by this parameter, the Body Controller (BCM) will register a fault code.

- **Right_Fog_Light_OC_Current** - This parameter detects open circuit in the right fog light, the Body Controller (BCM) will register a fault code.

**Note/s About Possible Software Feature Conflicts:** NONE

**Parts Associated with This Feature:**

| PART NUMBERS | DESCRIPTION |
|---|---|
| **FOG LIGHT CONNECTOR (FEMALE CONNECTOR BODY)** | |
| 587567C91 | 2-WAY CONNECTOR BODY |
| 1673748C1 | WIRE TERMINAL 12-GAUGE |
| 587577C1 | WIRE TERMINAL 14/16-GAUGE |
| 589391C1 | WIRE TERMINAL SEAL 12-GAUGE |
| 1667735C1 | WIRE TERMINAL SEAL 14/16-GAUGE |
| **FOG LIGHT CONNECTOR (MALE CONNECTOR BODY)** | |
| 587568C91 | 2-WAY CONNECTOR BODY (DELPHI WEATHERPACK SEALED 2.6MM FEM 2W 20 AMPS) |
| 1673747C1 | WIRE TERMINAL 16-GAUGE (DELPHI WEATHERPACK 2.6MM MALE 12 AWG) |
| 587575C1 | WIRE TERMINAL 16-GAUGE (DELPHI WEATHERPACK 2.6MM MALE 16-14 AWG) |
| 589391C1 | WIRE TERMINAL 12-GUAGE (DELPHI BLUE 1W CAVITY SEAL PN:15324996) |
| 1667735C1 | WIRE TERMINAL 16-GUAGE (DELPHI BLUE 1W CAVITY SEAL PN:15324996) |

**Parts Associated with Fog Light Feature**

**How to Test This Feature:**
1. Activate fog light switch with the IGN key on and the headlamp switch on the low-beam mode.
2. Verify that pin F (labeled Left_Front_Fog_Light) and pin K (labeled Right_Front_Fog_Light) in DLB located in connector
(#1603 J1) are providing battery voltage.
3. Verify that the fog lights are functioning correctly.
4. Turn the fog light switch OFF.
5. Verify that the fog light output goes OFF.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 15. Gauges and Fault Code Display

## 15.1. 16HKA IP CLUSTER DISPLAY Omit Display of Diagnostic Trouble Codes in Instrument Cluster and Disable Blink Codes, Requires Service Tool to Retrieve and View Fault Code

**Description:** The instrument cluster on the electric vehicle does not have the ability to display diagnostic trouble codes. Codes can be retrieved by connecting with a service tool**.**

# 16. In Cab Battery Feed and USB Power Source

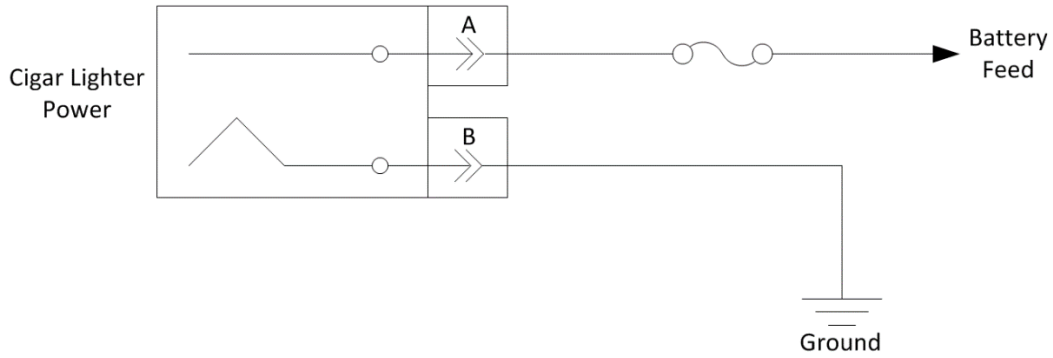
## 16.1. 08XPK: POWER SOURCE, ADDITIONAL Auxiliary Power Outlet (APO) with USB-A Port and USB-C Port, Located in the Instrument Panel.

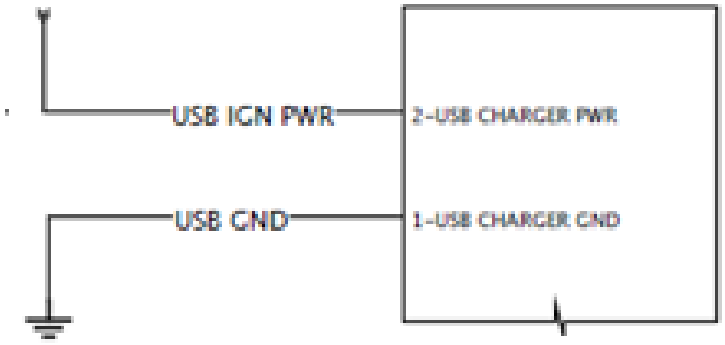
**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature provides a power source for customers who wish to use CB radios, handheld spotlights, trouble lights or other accessories that plug into the cigar type receptacle for 12-volt power. It also provides USB-A and USB-C ports for powering and charging compatible devices.

**System Block Diagram:**




**How to Test This Feature:**
To test these circuits, refer to the applicable circuit diagram for the feature and verify that battery voltage and USB voltage is present in the correct key-state.

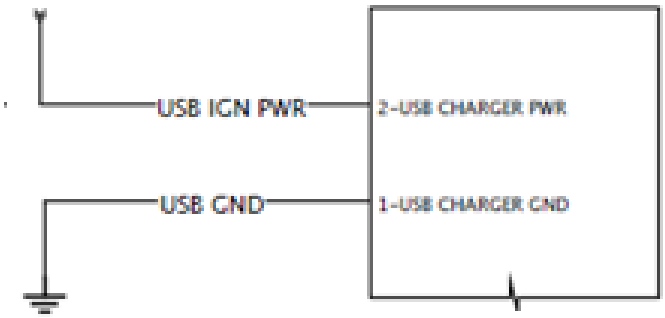
**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

**16.2. 08XPL:** POWER SOURCE, ADDITIONAL Auxiliary Power Outlet (APO) with Two USB-A Ports and Two USB-C Ports, Located in the Instrument Panel.

**Feature Applicability to Vehicle Platforms:**
- eMV

**Extended Description:** This feature provides additional USB-A and USB-C ports for powering and charging compatible devices.

**System Block Diagram:**




**How to Test This Feature:**
To test these circuits, refer to the applicable circuit diagram for the feature and verify that USB voltage is present in the correct key-state.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

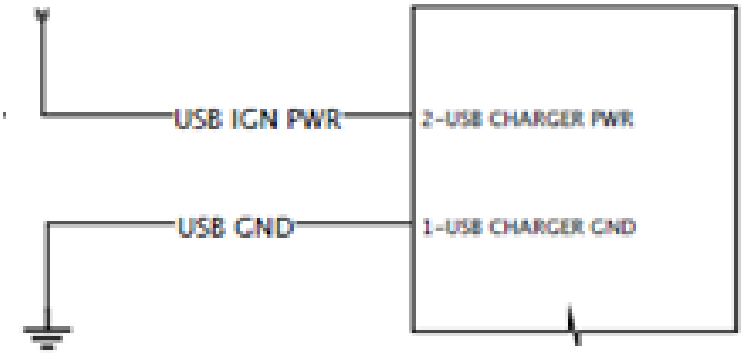
### 16.3. 08XPN: USB PORT One USB-A Port and one USB-C Port, Located in the Instrument Panel.

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature provides USB-A and USB-C ports for powering and charging compatible devices.

**System Block Diagram:**



**How to Test This Feature:**
To test these circuits, refer to the applicable circuit diagram for the feature and verify that USB voltage is present in the correct key-state.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

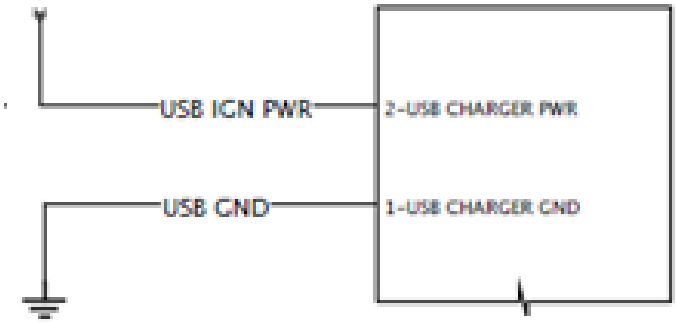
### 16.4. 08XPP: USB PORT Two USB-A Ports and Two USB-C Ports, Located in the Instrument Panel.

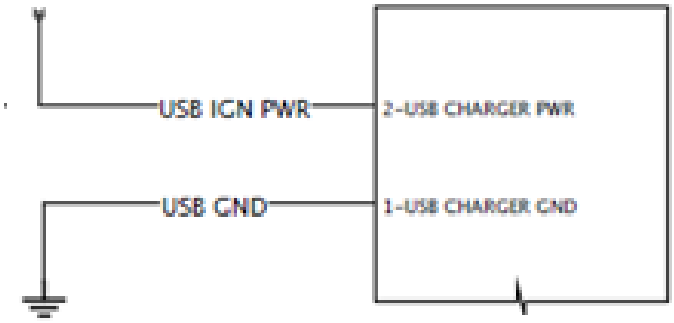
**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature provides USB-A and USB-C ports for powering and charging compatible devices.

**System Block Diagram:**



**How to Test This Feature:**
To test these circuits, refer to the applicable circuit diagram for the feature and verify that USB voltage is present in the correct key-state.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

# 17. Liftgate Accommodation Package

**17.1. 08VBA:** POWER SOURCE, SPECIAL for Customer Installed Lift Gate; 200 Amp Max, Includes 00ga. Power Cable to End of Frame, Optional Power (PDM) for Power Source, Latched Switch on Instrument Panel, with a Time Out Feature, Battery Discharge Protection, Controlling a Mag Switch Which Provides Power.

**Feature Applicability to Vehicle Platforms:**

- eMV

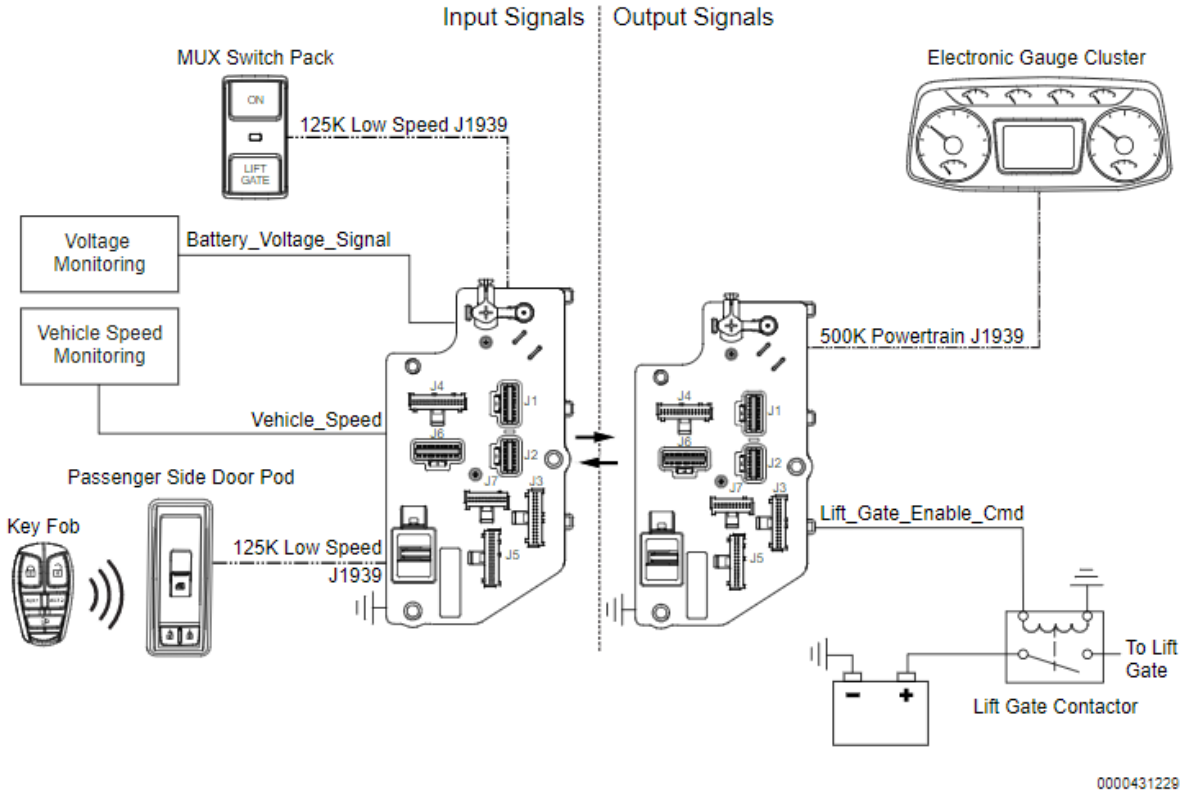
**Extended Description:** 08VBA includes a 15-foot power cable coiled at the end of the frame to provide power for operating a lift gate. This feature is battery fed through a chassis Power Distribution Module (PDM) The feature includes a 200-Amp circuit breaker located in the chassis PDM.

When the lift gate is requested via the dash switch or the Remote Keyless Entry, it sends a signal to the BCM over the 125K J1939 communication network. The BCM processes the lift gate enable request when interlocks such as battery voltage, vehicle speed, and lift gate enable timer are met. The BCM activates lift gate contactor solenoid, which then sends voltage to the lift gate. This feature provides battery protection with visual and audible indication to the operator that the BCM will deactivate the lift gate output to prevent excessive discharge of the batteries.

Lift gate contactor internal solenoid is energized by the Body Control Module (BCM) with input from the lift gate switch. After contactor solenoid is energized, an optional Chassis PDM supplies voltage to lift gate contactor which then outputs voltage for raising and lowering lift gate. If vehicle is not equipped with optional Chassis PDM, vehicle batteries supply voltage to lift gate contactor.

If the lift gate enable switch is on and the 12-volt battery voltage drops below the threshold limit for a programmable amount of time, the audible alarm will come on and the switch indicator will flash for a programmable amount of time.

**System Block Diagram:**




**Body Controller Software Feature Codes:** (Feature code and description goes below)

- 597309 - BCM PROG, LIFT GATE WIRING PAK Rocker Position with a Time Out Feature, Battery Discharge Protection

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Lift_Gate_Alarm_Time | 2249 | Lift Gate Alarm time value. | 60 | s | 1 | 120 | 1 |
| Lift_Gate_Enable_Timeout | 2235 | This signal is a parameter that can be adjusted to vary the amount of time, in 10-minute increments, that the lift gate will remain enabled. If this value is set to 6, the lift gate will remain enabled for 60 minutes from the time that it is enabled. | 60 | min | 10 | 24o | 10 |
| Lift_Gate_Diasable_Threshold | 2239 | Battery voltage at which the feature is disabled. | 12 | V | 11.5 | 13.8 | 0.1 |
| Lift_Gate_Enable_High_Current | 2234 | Lift Gate Enable High Current Detection Level (Amps). | 10 | A | 0 | 10 | 0.1 |
| Lift_Gate_Enable_Lo_Current | 2233 | Lift Gate Enable Low Current Detection Level (Amps). | 0 | A | 0 | 10 | 0.1 |
| Lift_Gate_Enable_OC_Current | 2232 | Lift Gate Enable Open Circuit Detection Level (Amps). | 0 | A | 0 | 10 | 0.1 |

**Parameter Definitions:**

- **Lift_Gate_Alarm_Time** - If battery voltage has dropped to or below programmable value (Lift_Gate_Voltage_Threshold) for 'Lift_Gate_Alarm_Time' the BCM will remove power from the Lift Gate Control output.
- **Lift_Gate_Enable_Timeout -** programmable period of time for which BCM will provide power to the Lift Gate Control output, after Lift Gate Control is activated by Lift Gate Enable switch.
- **Lift_Gate_Diasable_Threshold**- If the 12-volt battery falls below the level set by this parameter, the Body Controller (BCM) will disable the lift gate.
- **Lift_Gate_Enable_High_Current -** If the current in the lift gate contactor circuit exceeds the level set by this parameter, the Body Controller (BCM) will shut off the circuit and register a fault code.
- **Lift_Gate_Enable_Lo_Current -** If the current in the circuit falls below the level set by this parameter, the Body Controller (BCM) will register a fault code.
- **Lift_Gate_Enable_OC_Current-** If the current in the circuit falls below the level set by this parameter, the Body Controller (BCM) will register a fault code.


**Arrow Indicates Location of Lift Gate Power Circuit**

**Parts Associated with This Feature:**

| PART NUMBER | QTY | DESCRIPTION |
|---|---|---|
| 3601546C1 | 2 | NUT, STAINLESS NYLON M5 X 0.8 |
| 4041455C1 | 1 | RELAY, GIGAVAC GX-11 CONTACTOR |
| R2H32R1024 | 1 | CABLE, BATTERY, ASM, LIFT GATE, 12VDC CONTACTOR |
| 3601544C1 | 2 | BOLT, STAINLESS M5 X 0.8 X 35MM |
| 4121522C1 | 1 | COVER, TERMINAL |
| 120380 | 1 | LOCKWASHER, 1/4 REG STEEL/ZNC 1/4 |
| 4041531C94 | 1 | ASSEMBLY, LIFT GATE POWER |
| 25672R1 | 1 | BOLT, 1/4 X 2-1/4 PHC TYPE 8 |
| 4041529C97 | 1 | CABLE, ASSEMBLY, LIFT GATE POWER |
| 4041530C92 | 1 | CABLE, ASM, LIFTGATE SINGLE POLE COILED CABLE 15FT |

**Lift Power Wiring Part Numbers**

**How to Test This Feature:**

1. The body builder or lift gate installer must bring the batteries up to a full charge before trying to test the system for functionality.
2. With the batteries at a full charge, voltage in the 12.6 to 12.9 range and the lift gate power controlled by the Battery Protection System, the system will operate as described in the Extended Description section.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 18. Power Window, Locks, Remote Keyless Entry

## 18.1. 16VDZ: KEYLESS ENTRY SYSTEM REMOTE with Panic and Auxiliary Work Light Function, Includes Two Key Fobs (Transmitters).

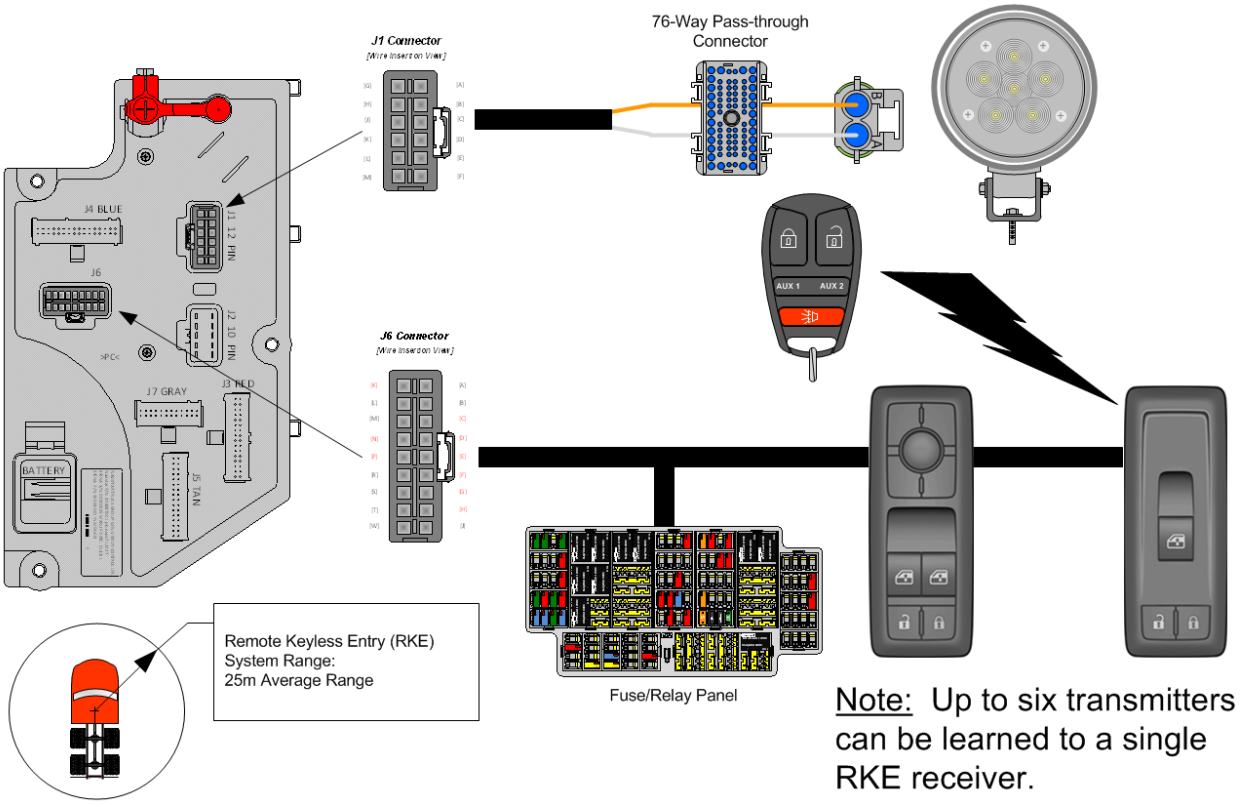
**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Driver and passenger power windows and door locks are available. The driver switches are located on the driver door trim and can control all door windows and locks. The passenger switches are located on the passenger door trim and can control the passenger door window and all locks. Window express down is available for all window switches by momentarily depressing the window down switch. The driver can "lockout" all non-driver controllable window switches by momentarily depressing the lower left switch on the driver door control.

Feature 16VDZ requires that feature 16WJU in addition to one of the available Work Light accommodation features be installed on the vehicle in order to operate correctly. This feature assigns the Aux button on the keyless entry remote to control the work light output from the Body Control Module. When this feature is installed on the vehicle, the work light can be turned "ON" and "OFF" using the AUX button on the key fob.

**System Block Diagram:**




**Body Controller Software Feature Codes:**

- 597103 - BCM PROG, KEYLESS ENTRY REMOTE
- 597107 - BCM PROG, REMOTE FOR WORKLIGHTS
    - Both features are required

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Panic_Enable | 644 | Enable/disable the Panic Mode for the Keyless Remote. A value of 1 enables and a value of 0 disables the feature. | ON | No_Units | N/A | N/A | N/A |
| Chirp_Enable | 647 | Enable/disable the remote lock "chirp" for Keyless Remote. A value of 1 enables and a value of 0 disables the feature. | ON | No_Units | N/A | N/A | N/A |

**Parameter Definitions:**

- **Panic_Enable** – When this parameter is set to ON. This enables the Panic Mode feature of the keyless remote. The panic function chirps the horn on/off in unison with the headlights and park lights for three minutes when the panic button on the key fob is pressed and the IGN switch is off. If the button is pressed prior to the time out period, the lights and horn will go off.

- **Chirp_Enable -** When this parameter is set to ON. This enables the Chirp feature for the keyless remote. The chirp feature results in a "chirping" sound when the truck is locked and unlocked.

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| **DOOR POD RELATED PARTS** | |
| 4057699C5 | CONTROL, ELECTRONIC, POD PASS DOOR W/RKE |
| 4060791C1 | CONTROL, ELECTRONIC, TRANSMITTER, RKE DOOR POD |
| **WORK LIGHT (CHASSIS HARNESS CONNECTOR PARTS)** | |
| 1661778C1 | 2-WAY CONNECTOR BODY |
| 1661875C1 | WIRE TERMINAL 16-GAUGE |
| 1661874C1 | CONNECTOR LOCK |
| 1661872C1 | WIRE TERMINAL SEAL 16-GAUGE |
| **WORK LIGHT (CHASSIS HARNESS MATING CONNECTOR PARTS)** | |
| 3543888C1 | 2-WAY CONNECTOR BODY |
| 1661874C1 | CONNECTOR LOCK |
| 1667742C1 | WIRE TERMINAL 16-GUAGE |
| 1661872C1 | WIRE TERMINAL SEAL 16-GAUGE |

**Parts Associated with Remote Keyless Entry System**

## Transmitter Learning Process:

This is the "learning" process for teaching a remote entry transmitter ("Key fob") to a passenger door pod mounted receiver.
The learning process begins by following the idiosyncratic steps delineate below:

- Step 1 – Simultaneously depress and hold both the lock and unlock buttons located in the passenger door pod.
- Step 2 – With both the lock and unlock buttons depressed, push down and release the passenger door pod's window control switch actuator at least five times within a time interval of two seconds or less.
- Step 3 – Both lock and unlock buttons (located in the passenger door pod) can be released after completion of step 3.

- Step 4 – Depress any of the five buttons located on the RKE transmitter (Key fob).

**Exiting the Transmitter "Learning" process:**
- The door pod will exit the "learning" process once it enters the sleep state.
- Once the "learning" state has been successfully entered [Step 2] and there is no activity after 30-seconds the passenger door pod will automatically exit the RKE (Key fob) "learn" mode.

**NOTE** - While the passenger door pod is in the "learning" process as many as six RKE (Key fobs) may be "learned" to that single passenger door pod device. Simply depress any of the five buttons on each RKE (Key fob) [Step 4] to "learn" it to the passenger door pod. It is also important to note that while "learning" multiple RKE (Key fobs) to a single passenger door pod device that care is taken to sequentially "learn" the RKE (Key fobs) one at a time so not to confuse the process with multiple RKE (Key fob) transmitters broadcasting differing and simultaneous IP messages to the passenger door pod device.

**How to Test This Feature:**
1. Refer to the applicable feature code using Diamond Logic® Builder programming and diagnostic software to test programmed parameter signal list.
**NOTE** - This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

## 18.2. 16WJU: WINDOW, POWER (2-Door) and Power Locks, Left and Right Doors.

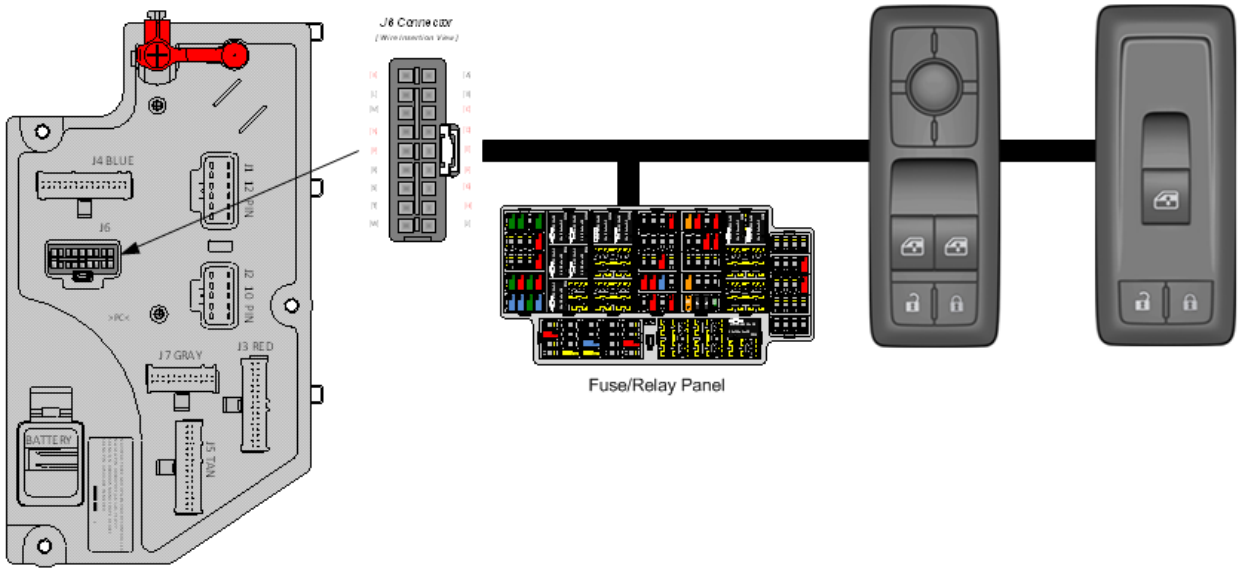
**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Driver and passenger power windows and door locks are available. The driver switches are located on the driver door trim and can control all door windows and locks. The passenger switches are located on the passenger door trim and can control the passenger door window and all locks. Window express down is available for all window switches by momentarily depressing the window down switch. The driver can "lockout" all non-driver controllable window switches by momentarily depressing the lower left switch on the driver door control.

Feature 16WJU provides driver and passenger door pods for the control of power windows and locks for standard and extended cabs with two doors.

**System Block Diagram:**




**Body Controller Software Feature Codes:**

- 597061 - BCM PROG, POWER WINDOW/DR LOCK 2 DOORS

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| AutoLock_Speed | 652 | Autolock speed. The speed at which the vehicle doors will lock automatically (requires power locks); Setting this parameter to zero will disable Auto Door Locks. | 15 | MPH | 0 | 155 | 1 |

**Parameter Definitions:**

- **AutoLock_Speed** – This parameter sets the vehicle speed at which the vehicle doors will lock automatically. A value of ZERO will disable the Auto Door Lock feature.

**How to Add This Feature:**
Remote Keyless Entry (RKE) feature can be added if power windows/power locks (16WJU / 16WJV) are already installed on the vehicle by replacing the standard front passenger side door pod with an RKE compatible door pod.

- Software feature code 597061 must be removed, and software feature code 597103 be enabled on the vehicle using the Diamond Logic® Builder software (see local dealer).
- Remove the existing passenger side door pod and replace it with the RKE compatible pod, part number in table [below]. The desired quantity of remote key fobs, part number in table [below], must also be ordered.
- Set the applicable programmable parameters, chirp enable, panic enable - see above, using the Diamond Logic® Builder software (see local dealer). The auto lock with default vehicle speed option should already be set since power locks are installed.
- As noted above, additional wiring may be required if one or both of the Aux buttons on the key fob is to be utilized for the operation of a work light or other function/s.
- Program the RKE receiver to recognize the desired key fobs as described above.

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 4057699C3 | CONTROL, ELECTRONIC, POD PASS DOOR W/RKE |
| 4060791C1 | ELECTRONIC, TRANSMITTER, RKE DOOR POD |

**Required Parts for Adding Remote Keyless Entry**

## Transmitter Learning Process:

This is the "learning" process for teaching a remote entry transmitter ("Key fob") to a passenger door pod mounted receiver.
The learning process begins by following the idiosyncratic steps delineate below:

- Step 1 – Simultaneously depress and hold both the lock and unlock buttons located in the passenger door pod.
- Step 2 – With both the lock and unlock buttons depressed, push down and release the passenger door pod's window control switch actuator at least five times within a time interval of two seconds or less.

- Step 3 – Both lock and unlock buttons (located in the passenger door pod) can be released after completion of step 3.
- Step 4 – Depress any of the five buttons located on the RKE transmitter (Key fob).

**Exiting the Transmitter "Learning" process:**
- The door pod will exit the "learning" process once it enters the sleep state.
- Once the "learning" state has been successfully entered [Step 2] and there is no activity after 30-seconds the passenger door pod will automatically exit the RKE (Key fob) "learn" mode.

**NOTE** - While the passenger door pod is in the "learning" process as many as six RKE (Key fobs) may be "learned" to that single passenger door pod device. Simply depress any of the five buttons on each RKE (Key fob) [Step 4] to "learn" it to the passenger door pod. It is also important to note that while "learning" multiple RKE (Key fobs) to a single passenger door pod device that care is taken to sequentially "learn" the RKE (Key fobs) one at a time so not to confuse the process with multiple RKE (Key fob) transmitters broadcasting differing and simultaneous IP messages to the passenger door pod device.

**How to Test This Feature:**
1. Refer to the applicable feature code using Diamond Logic® Builder programming and diagnostic software to test programmed parameter signal list.
**NOTE** - This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

**18.3. 16WKZ:** KEYLESS ENTRY SYSTEM REMOTE with Panic and Auxiliary Buttons, Includes One Key Fob (Transmitter).

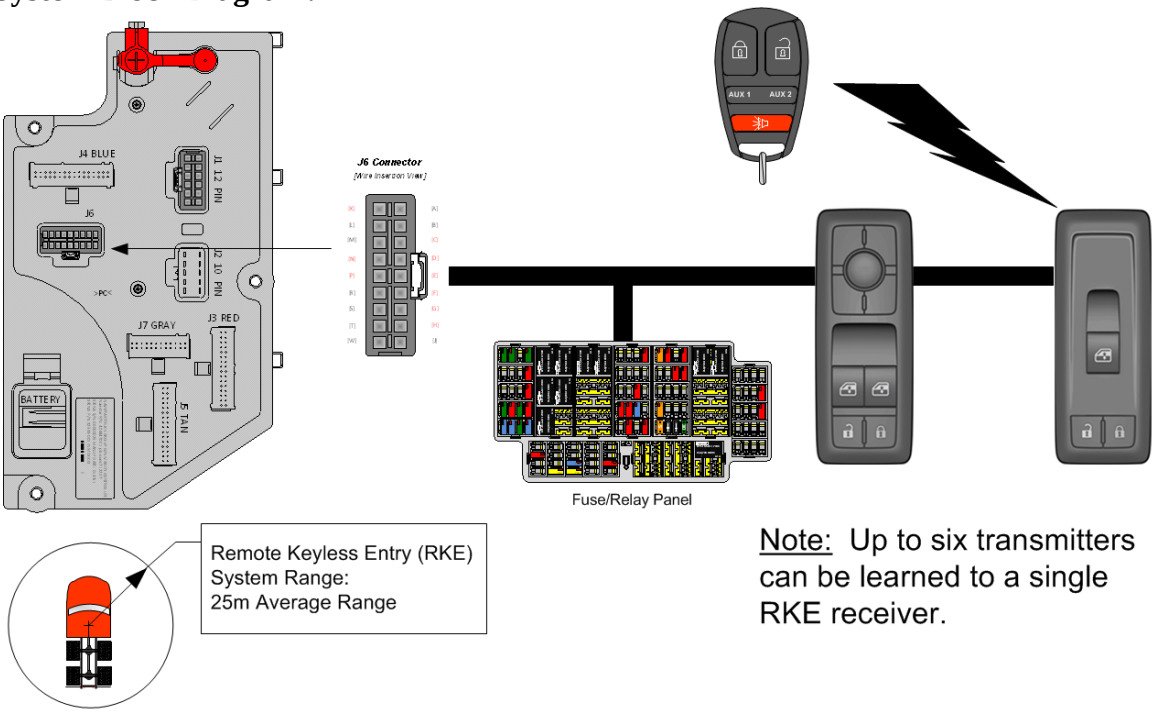
**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Driver and passenger power windows and door locks are available as well as power window control for rear cab doors on crew cabs. The driver switches are located on the driver door trim and can control all door windows and locks. The passenger switches are located on the passenger door trim and can control the passenger door window and all locks. Rear cab window controls are located on the left and right rear doors of the cab. Window express down is available for all window switches by momentarily depressing the window down switch. The driver can "lockout" all non-driver controllable window switches by momentarily depressing the lower left switch on the driver door control.

Feature 16WKZ provides a key fob for remote keyless entry into the cab of the vehicle. The key fob includes buttons to lock/unlock the cab doors, a Panic alarm button to sound the city horn and an Auxiliary button that can be utilized with advanced logic programming for customer desired functionality. This feature requires 16WJU or 16WJV is also installed on the vehicle.

**System Block Diagram:**




**Body Controller Software Feature Codes:**

- 597103 - BCM PROG, KEYLESS ENTRY REMOTE

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Panic_Enable | 644 | Enable/disable the Panic Mode for the Keyless Remote. A value of 1 enables and a value of 0 disables the feature. | ON | No_Units | N/A | N/A | N/A |
| Chirp_Enable | 647 | Enable/disable the remote lock "chirp" for Keyless Remote. A value of 1 enables and a value of 0 disables the feature. | ON | No_Units | N/A | N/A | N/A |

**Parameter Definitions:**

- **Panic_Enable** – When this parameter is set to ON. This enables the Panic Mode feature of the keyless remote. The panic function chirps the horn on/off in unison with the headlights and park lights for three minutes when the panic button on the key fob is pressed and the IGN switch is off. If the button is pressed prior to the time out period, the lights and horn will go off.

- **Chirp_Enable** - When this parameter is set to ON. This enables the Chirp feature for the keyless remote. The chirp feature results in a "chirping" sound when the truck is locked and unlocked.

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 4057699C5 | CONTROL, ELECTRONIC, POD PASS DOOR W/RKE |
| 4060791C1 | ELECTRONIC, TRANSMITTER, RKE DOOR POD |

**Parts Associated with Remote Keyless Entry System**

## Transmitter Learning Process:

This is the "learning" process for teaching a remote entry transmitter ("Key fob") to a passenger door pod mounted receiver.
The learning process begins by following the idiosyncratic steps delineate below:

- Step 1 – Simultaneously depress and hold both the lock and unlock buttons located in the passenger door pod.
- Step 2 – With both the lock and unlock buttons depressed, push down and release the passenger door pod's window control switch actuator at least five times within a time interval of two seconds or less.
- Step 3 – Both lock and unlock buttons (located in the passenger door pod) can be released after completion of step 3.
- Step 4 – Depress any of the five buttons located on the RKE transmitter (Key fob).

**Exiting the Transmitter "Learning" process:**

- The door pod will exit the "learning" process once it enters the sleep state.
- Once the "learning" state has been successfully entered [Step 2] and there is no activity after 30-seconds the passenger door pod will automatically exit the RKE (Key fob) "learn" mode.

**NOTE** - While the passenger door pod is in the "learning" process as many as six RKE (Key fobs) may be "learned" to that single passenger door pod device. Simply depress any of the five buttons on each RKE (Key fob) [Step 4] to "learn" it to the passenger door pod. It is also important to note that while "learning" multiple RKE (Key fobs) to a single passenger door pod device that care is taken to sequentially "learn" the RKE (Key fobs) one at a time so not to confuse the process with multiple RKE (Key fob) transmitters broadcasting differing and simultaneous IP messages to the passenger door pod device.

**How to Test This Feature:**

1. Refer to the applicable feature code using Diamond Logic® Builder programming and diagnostic software to test programmed parameter signal list.

**NOTE** - This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

# 19. Productivity Features

**19.1. 08WXB:** HEADLIGHT WARNING BUZZER Sounds When Head Light Switch is on, and Ignition Switch is in "Off" Position.

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** The purpose of the Headlight Warning Buzzer is to alert drivers if their headlights and/or park lights are still on when the vehicle is turned off. This feature can be enabled or disabled by using the Diamond Logic® Builder software.

**Body Controller Software Feature Codes:**

- 597089 – BCM PROG, HEADLIGHT REMINDER #2

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Exterior_Lamp_Warn | 2179 | Use this parameter to enable exterior lamp reminder. A value of 1 will result in an audible warning when the vehicle is off, and the lights are on. A value of 0 is used to deactivate the audible warning. | ON | On/Off | 0 | 1 | N/A |

**Parameter Definitions:**

- **Exterior_Lamp_Warn** - Use this parameter to enable exterior lamp reminder. A value of 1 will result in an audible warning when the vehicle is off, and the lights are on. A value of 0 is used to deactivate the audible warning.

**How to Add This Feature:**
Use the Diamond Logic® Builder software to install the appropriate software and determine correct settings for programmable parameters.

**How to Test This Feature:**
*Exterior_Lamp_Warn Disabled:*
1. Turn the key off.
2. Turn headlights on. There should be no warning.
*Exterior_Lamp_Warn Enabled:*
1. Turn the key off.
2. Turn headlights on. The warning will beep five times (with the door closed).
3. Open door. The warning will buzz continuously.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

### 19.2. 08WXD: ALARM, PARKING BRAKE Electric Horn Sounds in Repetitive Manner when Vehicle Park Brake is "NOT" Set, With Ignition (IGN) "OFF" and any Door Open.

**Feature Applicability to Vehicle Platforms:**
- eMV

**Extended Description:** The purpose of the parking brake alarm is to alert drivers if they fail to set the park brake before exiting the vehicle. For this feature to be activated, ALL the following conditions MUST occur:
• The IGN switch is in the off position.
• The parking brake is not set prior to the ignition key being turned to the "OFF" position.
• A cab door is open.
Once activated, the electric horn will sound for 60 seconds, which is the factory default setting for this.
programmable parameter. To deactivate the parking brake alarm, press on the brake pedal to immediately quiet.
the horn, and then make sure the IGN switch is in the run or accessory position and set the park brake.

**Body Controller Software Feature Codes:**
- 597057 – BCM PROG, PARK BRAKE ALARM

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Park_Brake_Alarm_Duration | 1951 | The amount of time the horn will sound when alarm activated | 60 | S | 0 | 180 | 1 |
| Park_Brake_Alarm_Suspend | 1952 | Amount of time the alarm will suspend before brake is depressed | 10 | S | 0 | 60 | 10 |
| Park_Brake_Alarm_KeyOff_Enable | 2457 | Park brake alarm depends on Key=Off, or not | 1 | On/Off | 0 | 1 | 1 |

**Parameter Definitions:**

- **Park_Brake_Alarm_Duration** – This parameter determines the maximum amount of time the horn will sound when the alarm is triggered. The default time is set at 60 seconds, but the range is from 0 to 180-seconds.
- **Park_Brake_Alarm_Suspend** – This parameter determines the amount of time the alarm will suspend after the brake pedal is depressed in order to allow the driver to complete the steps to deactivate the park brake alarm. The default time is set at 10 seconds, but the range is from 0 to 60-seconds.
- **Park_Brake_Alarm_KeyOff_Enable** – This parameter allows for the selection of the park brake alarm to work in either key off or key on/off.

**How to Test This Feature:**

The purpose of the parking brake alarm is to alert drivers if they fail to set the park brake before exiting the vehicle.

For this feature to be activated, ALL the following conditions MUST occur:

• The IGN switch is in the off position.
• The parking brake is not set.
• A cab door is open.

Once activated, the electric horn will sound for 60-seconds, which is the factory default setting for this.
programmable parameter. To deactivate the parking brake alarm, press on the brake pedal to immediately quiet the horn, and then make sure the IGN switch is in the run or accessory position and set the park brake.

**References:**

Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

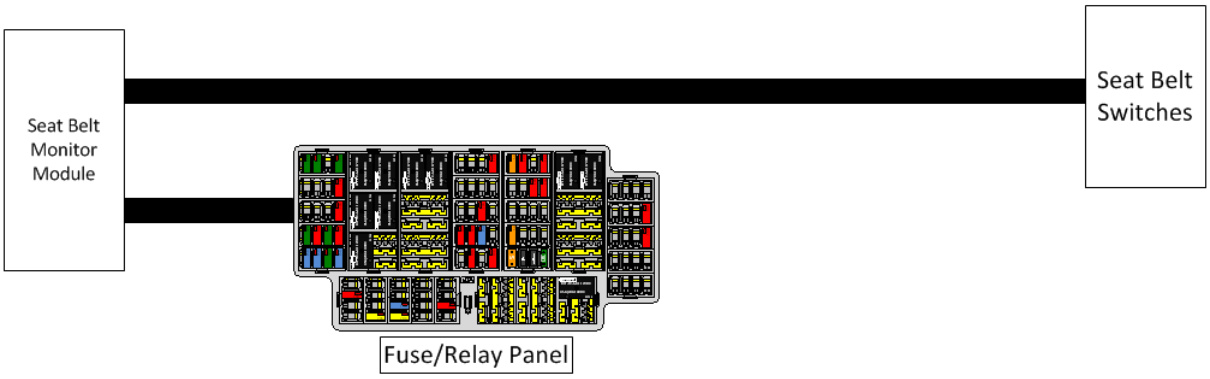
**19.3. 16HCH:** SEATBELT WARNING LIGHT IND. Mounted in Dash, Will Flash when Park Brake is Disengaged and Driver Seatbelt Unfastened, Audible Alarm to Remind Driver to Fasten Seatbelt

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature includes Seat Belt Switches and Seat Sensors for belted positions and a harness routed to the center of the dash for the aftermarket installation of a Data Recorder and Seat Belt Indicator System.

**System Block Diagram:**




**How to Test This Feature:**
Refer to the chassis model circuit diagram manual for diagnostic testing functionality.

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

## 20. Standard electrical Offerings

**20.1. 08WRB:** HEADLIGHTS ON W/WIPERS Headlights Will Automatically Turn on if Windshield Wipers are turned on. There are two functions, Lights on With Wipers (LOWW) and Day Time Running Lights (DTRL), available with this sales code.

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Function (LOWW): The Lights On with Wipers (LOWW) function turns on the low beam headlights (tail, marker & clearance lights are also turned on with low beam headlights) whenever the windshield wipers are ON steady or intermittent. The headlights will not be enabled in washer mode. When the wipers are turned OFF, headlights will remain ON until the key is turned OFF or the headlight switch is cycled from OFF to ON to OFF. This feature may be enabled or disabled by using Diamond Logic® Builder programming software.

**Body Controller Software Feature Codes:**

- 597079 – BCM PROG, HEADLIGHT ON W/WIPERS

**How to Test This Feature:**
1. Connect Diamond Logic Builder software to the vehicle to check the parameter box for Lights_on_with_Wipers and program the Body Controller.
2. Turn on the wipers (Steady or Intermittent) and verify that the low beam headlights, tail, marker and/or
clearance lights are turned on.
3. Turn off the wipers and verify that the above lights are OFF.

**NOTE** - This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

## 21. Work light Outside Cab Features

### 21.1. 08WMA: SWITCH, TOGGLE, FOR WORK LIGHT Lighted; on Instrument Panel and Wiring Effects for Customer Furnished Back of Cab Light.

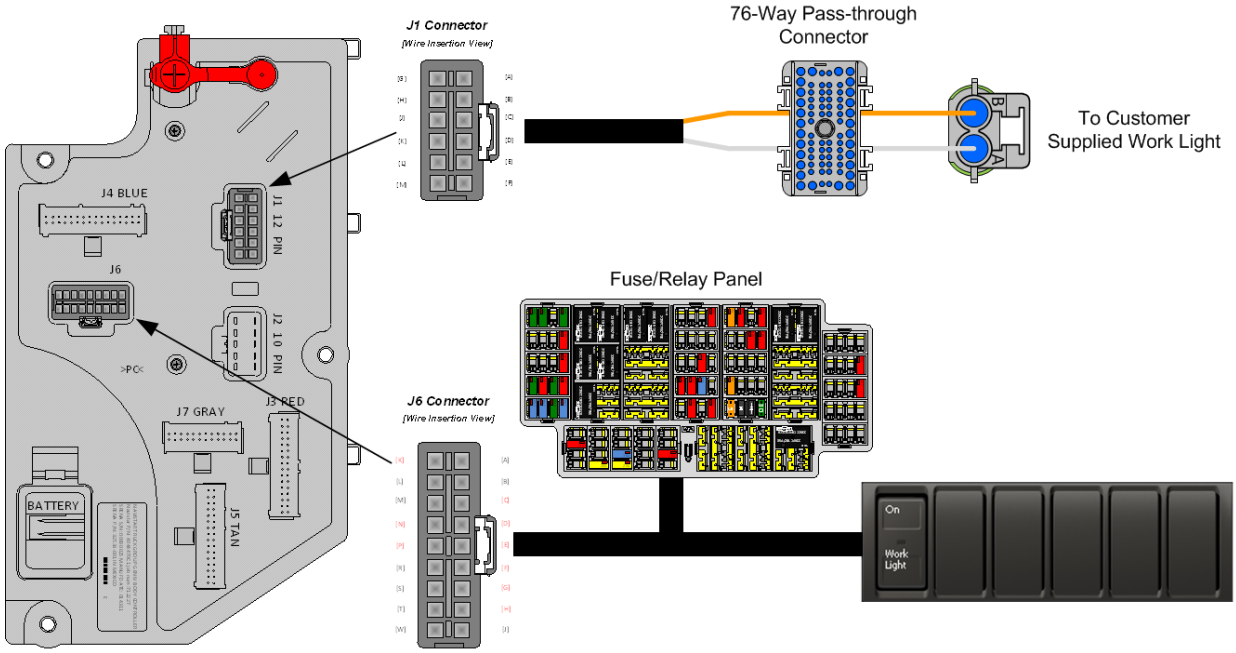
**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature includes a switch in the Instrument Panel (IP). The switch will illuminate when the switch is on. The feature provides an output from the Body Controller (BCM) and provides wiring to the back of cab which includes power and ground. This can be used to satisfy any number of electrical needs such as lights inside dry van boxes, small pumps and illumination to aid in various job functions.
If the key is off, there is a time out parameter, which is factory set at 120-minutes. If the vehicle is running, the work light will not time out. If the work light is left on when the vehicle is

moving, the work light will turn off when the vehicle speed exceeds the work light off speed parameter. This parameter is factory set at 2-MPH. Both parameters can be changed through the Diamond Logic® Builder software.

**System Block Diagram:**




**Body Controller Software Feature Codes:**

- 597008 - BCM PROG, WORK LIGHT Rocker Switch
  - (If there is the desire to turn off the work light feature's diagnostics each parameter setting will need to be set to zero).

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Work_Light_Hi_Current | 1899 | Work Light High Current Detection Level (Amps) | 10 | A | 0 | 10 | 0.1 |
| Work_Light_Lo_Current | 1898 | Wore Light Low Current Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Work_Light_OC_Current | 1900 | Work Light Open Circuit Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Work_Light_Off_Speed | 2568 | This parameter is required to turn off the work light if the vehicle's speed is | 2 | Mph | 1 | 90 | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | greater than the work light off speed parameter | | | | | |
| Work_Light_Timeout_Enable | 640 | This parameter sets the amount of time that the work light will remain on after the ignition is turned to off. | 2 | Hours | 0.16 | 24 | 0.16 |

**Parameter Definitions:**

- **Work_Light_Hi_Current** - If the current in the work light circuit exceeds the level set by this parameter, the Body Controller (BCM) will shut off the circuit and register a fault code.

- **Work_Light_Lo_Current** - If the current in the work light circuit falls below the level set by this parameter, the Body Controller (BCM) will register a fault code.

- **Work_Light_OC_Current** - This parameter should be left at its factory default of zero.

- **Work_Light_Off_Speed** – This is a programmable parameter for vehicle speed. Once this value is achieved the body controller will turn off the work light.

- **Work_Light_Timeout_Enable** – This parameter is used to set the amount of time that the customer desires the work light to remain on after the IGN key is turned off. This parameter is for customers who desire to have their work light. time out after a specified length of time so that the light does not drain the battery(s) in case the operator forgets to turn the work light off.

**Arrow Indicates Location of Work Light Connector**

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| **MULTIPLEX SWITCH-PACK PARTS** | |
| 4057689C1 | HOUSING, SWITCH 6-PACK DIN MULTIPLEX |
| 4102405C1 | POSITION 3-POSITION MONOSTABLE “MOMENTARY” WORK LIGHT SWITCH ACTUATOR |
| **WORK LIGHT CONNECTOR (CHASSIS HARNESS)** | |
| 1661778C1 | 2-WAY CONNECTOR BODY |
| 1661875C1 | WIRE TERMINAL 16-GAUGE |
| 1661874C1 | CONNECTOR LOCK |
| 1661872C1 | WIRE TERMINAL SEAL 16-GAUGE |
| **WORK LIGHT MATING CONNECTOR (CHASSIS HARNESS)** | |
| 3543888C1 | 2-WAY CONNECTOR BODY |
| 1661874C1 | CONNECTOR LOCK |
| 1667742C1 | WIRE TERMINAL 16-GUAGE |
| 1661872C1 | WIRE TERMINAL SEAL 16-GAUGE |
| **BODY CONTROL MODULE J1/J6 CONNECTOR PARTS** | |
| 3598711C1 | 12-WAY CONNECTOR BODY J1 (1603) |
| 3573833C1 | 12-WAY CONNECTOR LOCK J1 (1603) |
| 3544878C1 | WIRE TERMINAL 12/14-GAUGE J1 (1603) |
| 3544877C1 | WIRE TERMINAL 14/16-GAUGE J1 (1603) |
| 3544876C1 | WIRE TERMINAL 16/18-GAUGE J1 (1603) |
| 3544875C1 | WIRE TERMINAL 18/20-GAUGE J1 (1603) |
| 3544878C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 12-14-GAUGE [GT280] |
| 3544877C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 14/16-GAUGE [GT280] |
| 3544876C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 16/18-GAUGE [GT280] |
| 3544875C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 18/20-GAUGE [GT280] |
| 3544884C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 16/18-GAUGE [GT150] |
| 3544883C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 20/22-GAUGE [GT150] |

**Parts Required to Connect to Work Light Cable**

**How to Test This Feature:**

1. Activate work light switch.
2. Verify that pin G (labeled Work Light) on the Body Controller (BCM) connector (#1603) is providing battery voltage.
3. Verify that the work light (or alternate load) is functioning properly.
4. Turn work light switch OFF.
5. Verify that the work light output goes OFF.

**NOTE -** This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**

Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

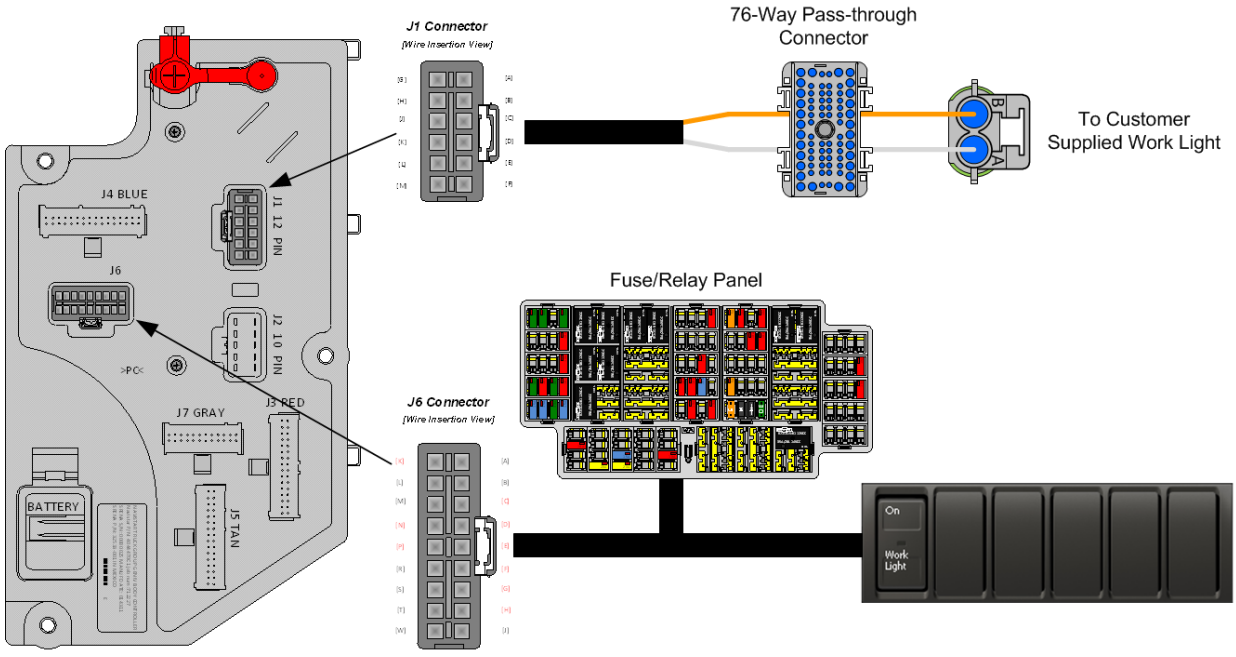
## 21.2. 08WTT: SWITCH, TOGGLE, FOR WORK LIGHT Lighted; on Instrument Panel and Wiring Effects for Customer Furnished End of Frame Light

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** This feature includes a switch in the Instrument Panel (IP) or Light Control Module (LPM). The switch will illuminate when the switch is on. The feature provides an output from the Body Controller (BCM) and provides wiring to the back of frame which includes power and ground. This can be used to satisfy any number of electrical needs such as lights inside dry van boxes, small pumps and illumination to aid in various job functions.
If the key is off, there is a time out parameter, which is factory set at 120-minutes. If the vehicle is running, the work light will not time out. If the work light is left on when the vehicle is moving, the work light will turn off when the vehicle speed exceeds the work light off speed parameter. This parameter is factory set at 2-MPH. Both parameters can be changed through the Diamond Logic® Builder software.

**System Block Diagram:**



**Body Controller Software Feature Codes:**

- 597008 - BCM PROG, WORK LIGHT Rocker Switch
    - (If there is the desire to turn off the work light feature's diagnostics each parameter setting will need to be set to zero).

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| Work_Light_Hi_Current | 1899 | Work Light High Current Detection Level (Amps) | 10 | A | 0 | 10 | 0.1 |
| Work_Light_Lo_Current | 1898 | Wore Light Low Current Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Work_Light_OC_Current | 1900 | Work Light Open Circuit Detection Level (Amps) | 0.5 | A | 0 | 10 | 0.1 |
| Work_Light_Off_Speed | 2568 | This parameter is required to turn off the work light if the vehicle's speed is greater than the work light off speed parameter | 2 | Mph | 1 | 90 | 2 |
| Work_Light_Timeout_Enable | 640 | This parameter sets the amount of time that the work light will remain on after the ignition is turned to off. | 2 | Hours | 0.16 | 24 | 0.16 |

**Parameter Definitions:**

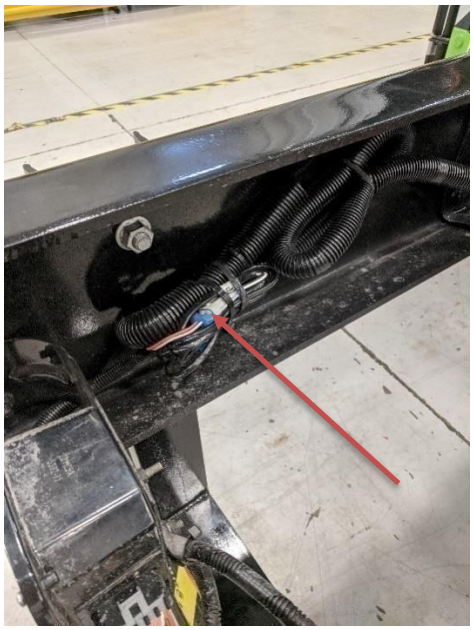
- **Work_Light_Hi_Current** - If the current in the work light circuit exceeds the level set by this parameter, the Body Controller (BCM) will shut off the circuit and register a fault code.

- **Work_Light_Lo_Current** - If the current in the work light circuit falls below the level set by this parameter, the Body Controller (BCM) will register a fault code.

- **Work_Light_OC_Current** - This parameter should be left at its factory default of zero.

- **Work_Light_Off_Speed** – This is a programmable parameter for vehicle speed. Once this value is achieved the body controller will turn off the work light.

- **Work_Light_Timeout_Enable** – This parameter is used to set the amount of time that the customer desires the work light to remain on after the IGN key is turned off. This parameter is for customers who desire to have their work light. time out after a specified length of time so that the light does not drain the battery(s) in case the operator forgets to turn the work light off.



**Arrow Indicates Location of Work Light Connector**

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| **MULTIPLEX SWITCH-PACK PARTS** | |
| 4057689C1 | HOUSING, SWITCH 6-PACK DIN MULTIPLEX |
| 4102405C1 | POSITION 3-POSITION MONOSTABLE “MOMENTARY” WORK LIGHT SWITCH ACTUATOR |
| **WORK LIGHT CONNECTOR (CHASSIS HARNESS)** | |
| 1661778C1 | 2-WAY CONNECTOR BODY |
| 1661875C1 | WIRE TERMINAL 16-GAUGE |
| 1661874C1 | CONNECTOR LOCK |
| 1661872C1 | WIRE TERMINAL SEAL 16-GAUGE |
| **WORK LIGHT MATING CONNECTOR (CHASSIS HARNESS)** | |
| 3543888C1 | 2-WAY CONNECTOR BODY |
| 1661874C1 | CONNECTOR LOCK |
| 1667742C1 | WIRE TERMINAL 16-GUAGE |
| 1661872C1 | WIRE TERMINAL SEAL 16-GAUGE |
| **BODY CONTROL MODULE J1/J6 CONNECTOR PARTS** | |
| 3598711C1 | 12-WAY CONNECTOR BODY J1 (1603) |
| 3573833C1 | 12-WAY CONNECTOR LOCK J1 (1603) |
| 3544878C1 | WIRE TERMINAL 12/14-GAUGE J1 (1603) |
| 3544877C1 | WIRE TERMINAL 14/16-GAUGE J1 (1603) |
| 3544876C1 | WIRE TERMINAL 16/18-GAUGE J1 (1603) |
| 3544875C1 | WIRE TERMINAL 18/20-GAUGE J1 (1603) |

| | |
|---|---|
| 3544878C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 12-14-GAUGE [GT280] |
| 3544877C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 14/16-GAUGE [GT280] |
| 3544876C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 16/18-GAUGE [GT280] |
| 3544875C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 18/20-GAUGE [GT280] |
| 3544884C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 16/18-GAUGE [GT150] |
| 3544883C1 | 18-WAY BODY CONTROLLER J6 (1606/2023) CONNECTOR WIRE TERMINAL 20/22-GAUGE [GT150] |

**Parts Required to Connect to Work Light Cable**

**How to Test This Feature:**
1. Activate work light switch.
2. Verify that pin G (labeled Work Light) on the Body Controller (BCM) connector (#1603) is providing battery voltage.
3. Verify that the work light (or alternate load) is functioning properly.
4. Turn work light switch OFF.
5. Verify that the work light output goes OFF.

**NOTE** - This feature uses body controller-based software controls which can be diagnosed with International's Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Circuit Diagram Manual:
Publication Number: 0000018831 – International eMV Series Interactive Schematics

Service Manual:
Publication Number: 0001253563 – 2021 International eMV Technician Manual (Service and Diagnostic)

## 22. Body Builder Integration Harnesses

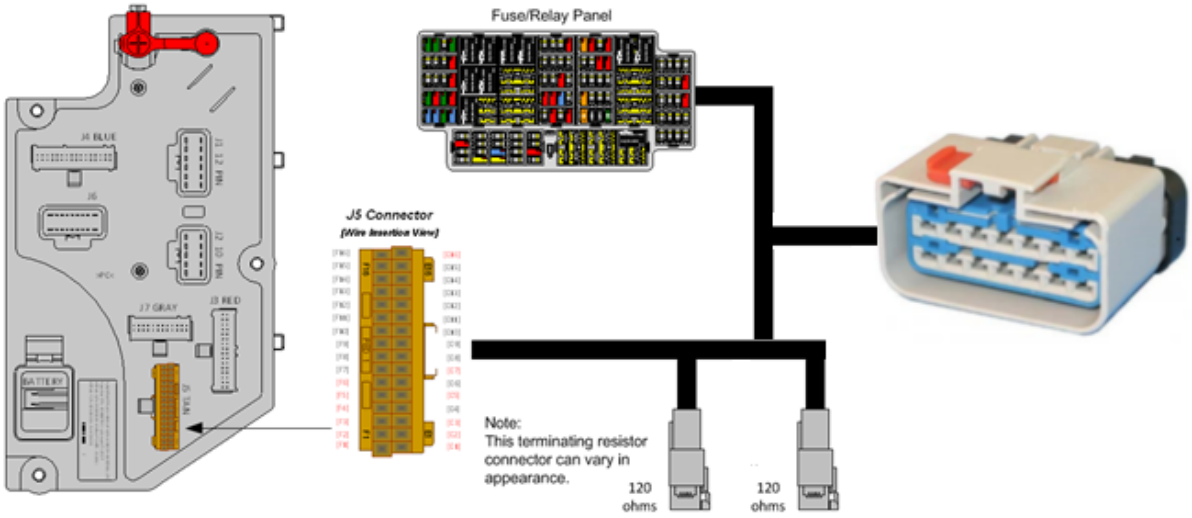
**22.1. 08XMB:** WIRING (1)TMC RP1226 BEHIND CTR CONSOLE CONNECTOR, DASH, CENTER PANEL Cab Wiring for TMC RP1226 Vehicle Accessory Connector; Includes 14-pin Connector with Switched Power, Battery Power, Ignition Power, Ground & Body 250K Datalink, Connector Located Behind Instrument Panel Center Console

**Feature Applicability to Vehicle Platforms:**
- eMV

**Extended Description:** This feature provides a connector that provides battery, ignition, ground and connections to the 250K Baud Body Builder data link.

RP1226 is a "recommended practice" from the 2015 TMC (the ATA's Technology and Maintenance Council). It is a new way for telematics providers to connect to the vehicle. It is a standardized connector for telematics devices to plug into heavy duty vehicles as an alternative to the 9-pin diagnostic connector.

**System Block Diagram:**

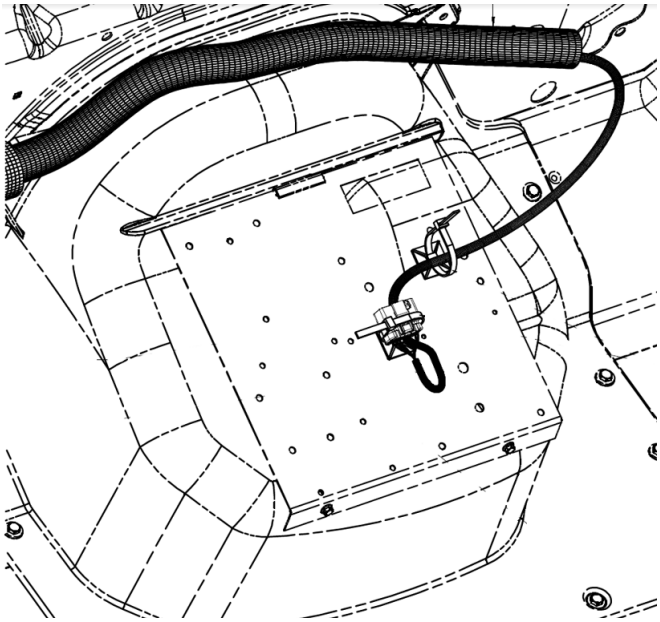



**Parts Associated with This Feature:**

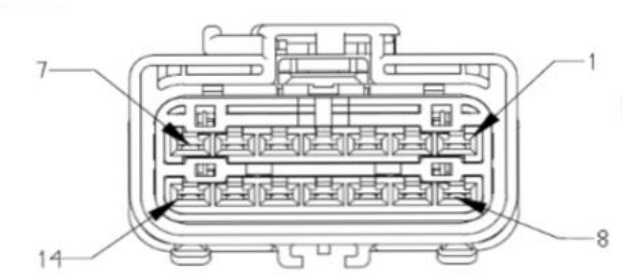
| PART NUMBERS | DESCRIPTION |
|---|---|
| **08XMB CONNECTOR (OEM CONNECTOR BODY)** | |
| 6114576C1 | 14-WAY CONNECTOR BODY |
| 3989901C1 | WIRE TERMINAL 14-GAUGE |
| 3753255C1 | WIRE TERMINAL 12-GAUGE |
| **08XMB CONNECTOR (MALE CONNECTOR BODY)** | |
| 6114577C1 | 14-WAY CONNECTOR BODY |
| 3626441C1 | WIRE TERMINAL 20-18 GAUGE |
| 3627568C1 | WIRE TERMINAL 16-14 GAUGE |

**Parts Associated with 08XMB Feature.**

**Connector Location:**



**Connector Pin Outs:**




| Pin | Value |
|---|---|
| 2 | J1939 250 K (+) Body Builder |
| 7 | Ignition Power |
| 8 | Ground |
| 9 | J1939 250K (-) Body Builder |
| 14 | Battery Power |

**References:**
Refer to the applicable International® Circuit Diagrams and Service Manuals.

**22.2. 08XMZ:** WIRING (2)TMC RP1226 BEHIND CTR CONSOLECONNECTOR, DASH, CENTER PANEL Cab Wiring for (2) TMC RP1226 Vehicle Accessory Connectors; Includes (2) 14-pin Connectors with Switched Power, Battery Power, Ignition Power, Ground & Body 250K Datalink, Connector Located Behind Instrument Panel Center Console

**Feature Applicability to Vehicle Platforms:**

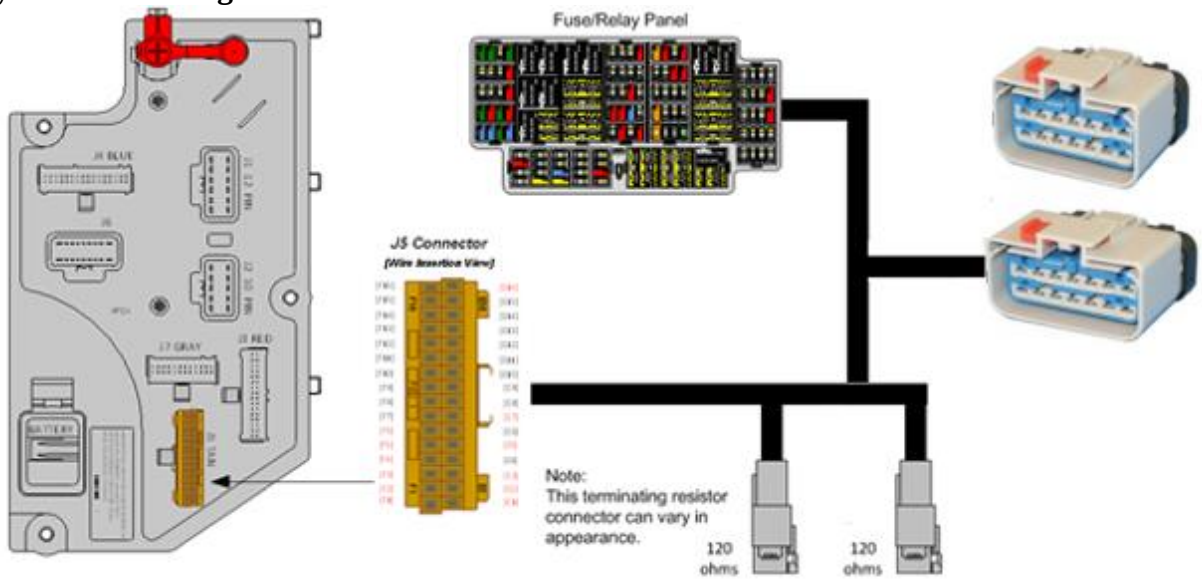
- eMV

**Extended Description:** This feature provides a connector that provides battery, ignition, ground and connections to the 250K Baud Body Builder data link.

RP1226 is a "recommended practice" from the 2015 TMC (the ATA's Technology and Maintenance Council). It is a new way for telematics providers to connect to the vehicle.

It is a standardized connector for telematics devices to plug into heavy duty vehicles as an alternative to the 9-pin diagnostic connector.

**System Block Diagram:**

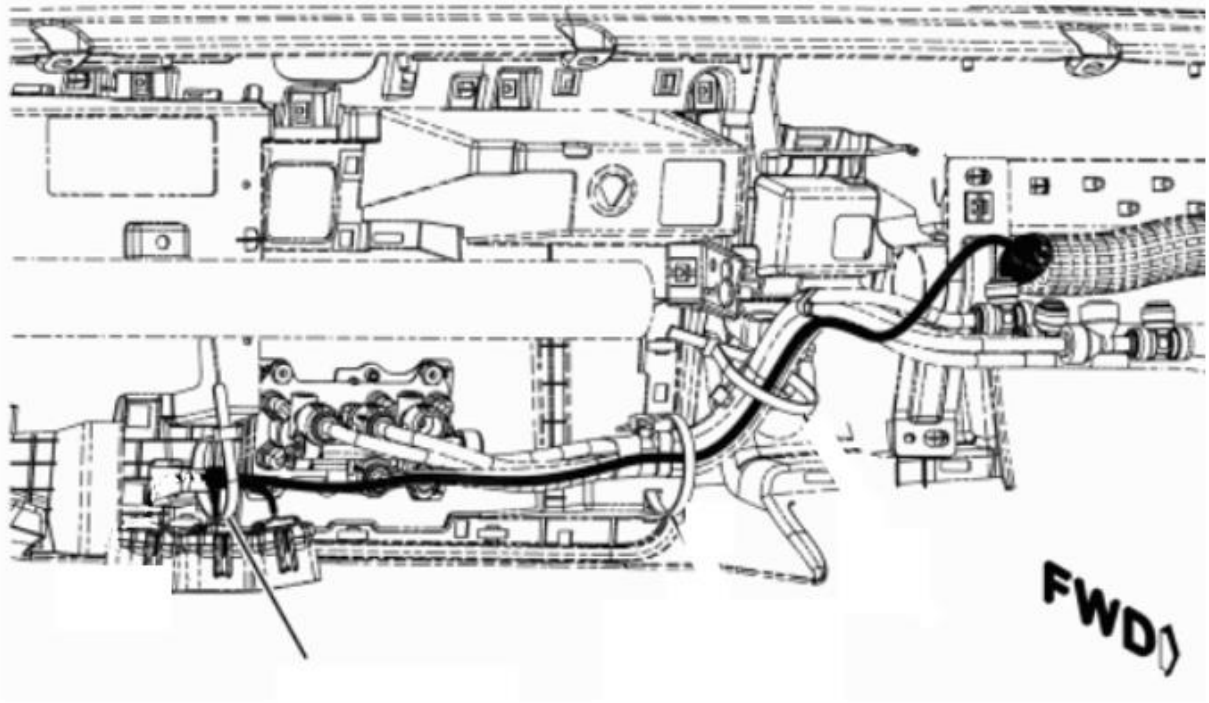



**Parts Associated with This Feature:**

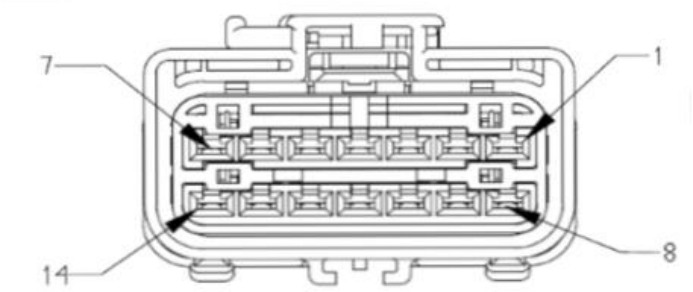
| PART NUMBERS | DESCRIPTION |
|---|---|
| **08XMZ CONNECTOR (OEM CONNECTOR BODY)** | |
| 6114576C1 | 14-WAY CONNECTOR BODY |
| 3989901C1 | WIRE TERMINAL 14-GAUGE |
| 3753255C1 | WIRE TERMINAL 12-GAUGE |
| **08XMZ CONNECTOR (MALE CONNECTOR BODY)** | |
| 6114577C1 | 14-WAY CONNECTOR BODY |
| 3626441C1 | WIRE TERMINAL 20-18 GAUGE |
| 3627568C1 | WIRE TERMINAL 16-14 GAUGE |

**Parts Associated with 08XMZ Feature**

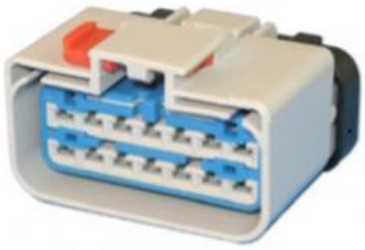
**Connector Location:**



**Connector Pin Outs:**




| Pin | Value |
|---|---|
| 2 | J1939 250 K (+) Body Builder |
| 7 | Ignition Power |
| 8 | Ground |
| 9 | J1939 250K (-) Body Builder |
| 14 | Battery Power |



**References:**

Refer to the applicable International® Circuit Diagrams and Service Manuals.

**22.3.** 08XNA, CENTER PANEL Cab Wiring for (3) TMC RP1226 Vehicle Accessory Connectors; Includes (3) 14-pin Connectors with Switched Power, Battery Power, Ignition Power, Ground & Body 250K Datalink, Connector Located Behind Instrument Panel Center Console

**Feature Applicability to Vehicle Platforms:**

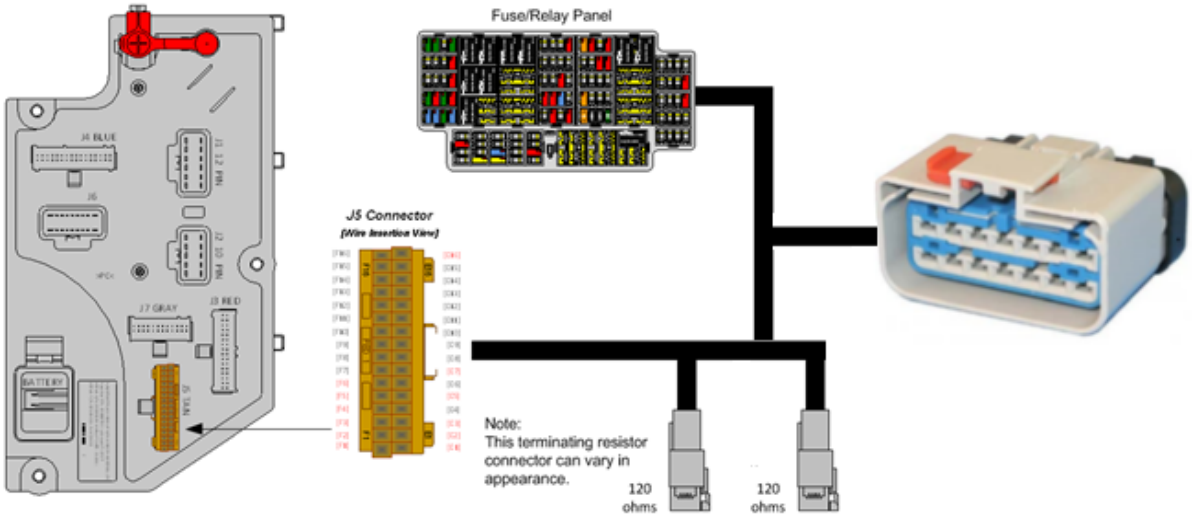
- eMV

**Extended Description:** This feature provides a connector that provides battery, ignition, ground and connections to the 250K Baud Body Builder data link.

RP1226 is a "recommended practice" from the 2015 TMC (the ATA's Technology and Maintenance Council). It is a new way for telematics providers to connect to the vehicle.

It is a standardized connector for telematics devices to plug into heavy duty vehicles as an alternative to the 9-pin diagnostic connector.

**System Block Diagram:**

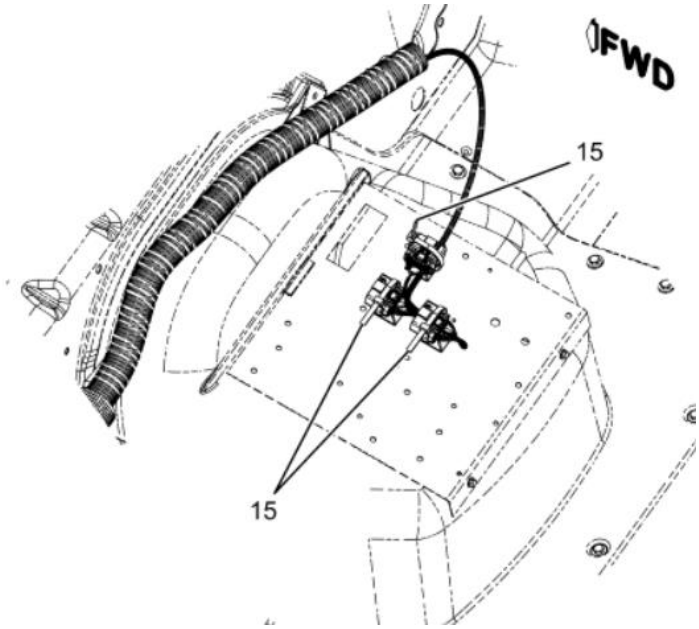


**Parts Associated with This Feature:**

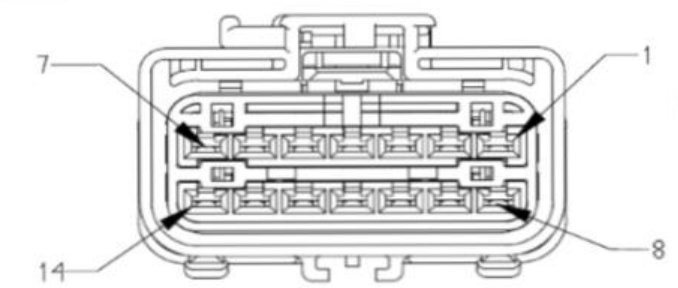
| PART NUMBERS | DESCRIPTION |
|---|---|
| **08XNA CONNECTOR (OEM CONNECTOR BODY)** | |
| 6114576C1 | 14-WAY CONNECTOR BODY |
| 3989901C1 | WIRE TERMINAL 14-GAUGE |
| 3753255C1 | WIRE TERMINAL 12-GAUGE |
| **08XNA CONNECTOR (MALE CONNECTOR BODY)** | |
| 6114577C1 | 14-WAY CONNECTOR BODY |
| 3626441C1 | WIRE TERMINAL 20-18 GAUGE |
| 3627568C1 | WIRE TERMINAL 16-14 GAUGE |

**Parts Associated with 08XNA Feature**

**Connector Location:**



**Connector Pin Outs:**




| Pin | Value |
|---|---|
| 2 | J1939 250 K (+) Body Builder |
| 7 | Ignition Power |
| 8 | Ground |
| 9 | J1939 250K (-) Body Builder |
| 14 | Battery Power |

**References:**

Refer to the applicable International® Circuit Diagrams and Service Manuals.

# 23. Power Features using Remote Power Modules

These features are not available for order from the plant but can be added after delivery.

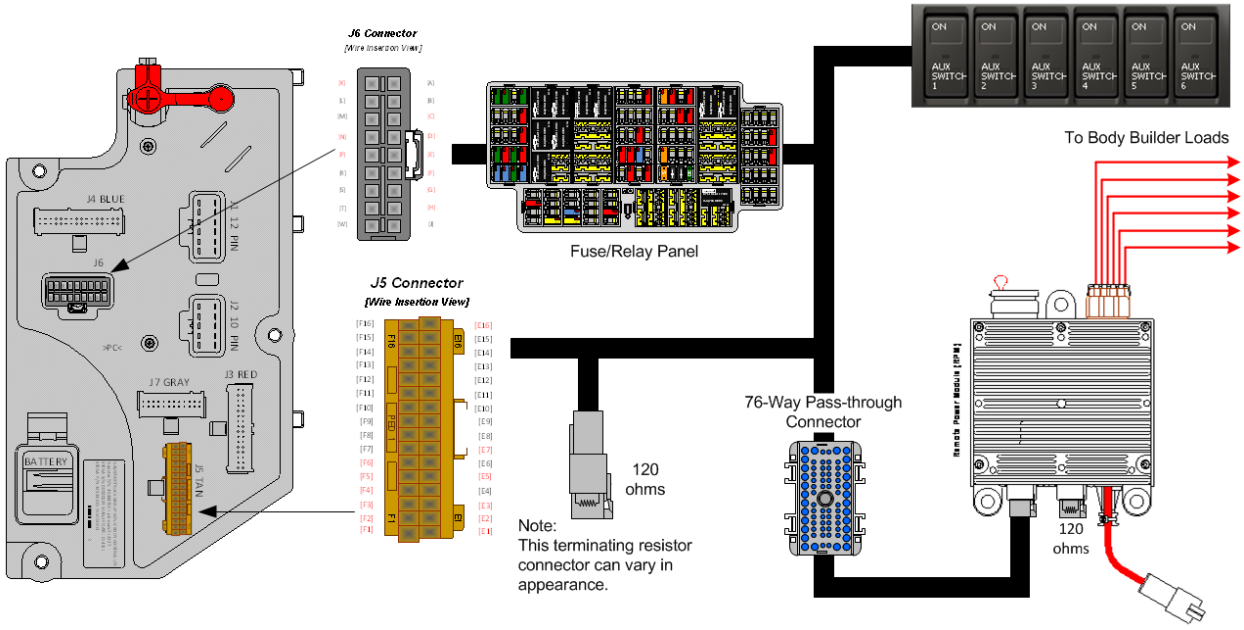
## 23.1. 60AAG: BDY INTG, REMOTE POWER MODULE Mounted Inside Cab Behind Driver Seat, Up to 6 Outputs & 6 Inputs, Max 20 amp per Channel, Max 80 amp Total; Includes 1 Switch Pack with Latched Switches

### Feature Applicability to Vehicle Platforms:

- eMV

**Extended Description:** Feature 60AAG includes one Remote Power Module (RPM) mounted behind the passenger seat on eMV models. Included with this feature are six two-position latched switches located in the Instrument Panel. Each RPM output can provide up to 20-Amps maximum with a total of 80-Amps maximum per module.

### System Block Diagram:




### Body Controller Software Feature Codes:

Note: Feature code 60AJL is configured by special unadvertised software feature codes. These codes are determined by the number of additional features that use the RPM resources. The following codes should be added after all other features are added to the vehicle.

60ACA = 597194 – This feature should be added if there are features already using five RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD #1)

60ACB = 597195 – This feature should be added if there are features already using four RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 2 ROCKER SW)
60ACC = 597196 – This feature should be added if there are features already using three RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 3 ROCKER SW)
60ACD = 597197 – This feature should be added if there are features already using two RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 4 ROCKER SW)
60ACJ = 597198 – This feature should be added if there are features already using one RPM input/output. (BCM PROG, AUXILIARY LOAD 5 ROCKER SW)
60ACK = 597199 – This feature should be added if there no other features using any RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 6 ROCKER SW)

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| 597194 - BCM PROG, AUXILIARY LOAD #1 For Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| 597195 - BCM PROG, AUXILIARY LOAD For (2) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| 597196 - BCM PROG, AUXILIARY LOAD For (3) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| 597197 - BCM PROG, AUXILIARY LOAD For (4) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| 597198 - BCM PROG, AUXILIARY LOAD For (5) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| 597199 - BCM PROG, AUXILIARY LOAD For (6) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux6_Output_Fuse_Param | 2000 | This is the maximum current Aux 6 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux6_Loadshed_Level | 3278 | Load shed level parameter for TEM Aux Switch 6 | 1 | No Units | 0 | 3 | 1 |

**Parameter Definitions:**

- **TEM_Aux1_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_1_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux2_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_2_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux3_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_3_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux4_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_4_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux5_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_5_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux6_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_6_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux1_LoadShed_Level** – This is the level at which the Aux1 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux2_LoadShed_Level** – This is the level at which the Aux2 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

- **TEM_Aux3_LoadShed_Level** – This is the level at which the Aux3 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux4_LoadShed_Level** – This is the level at which the Aux4 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux5_LoadShed_Level** – This is the level at which the Aux5 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux6_LoadShed_Level** – This is the level at which the Aux6 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 3766091C1 | SWITCH, ELECTRONIC, BLANK WINDOW ROCKER - 3 POS - MONOSTABLE |
| 4057689C2 | HOUSING, SWITCH*6-PACK DIN MULT |
| 2585423C91 | KIT, RPM TERMINAL/SEAL 14GA |
| 2585651C91 | KIT, RPM TERMINAL/SEAL 12GA |
| 2588909C92 | RPM BY ITSELF |
| 3519178C91 | RESISTOR, ELECT TERMINATING |

**Switches, RPM, Output Terminal Part Numbers**

**How to Test This Feature:**

1. Turn key to accessory or IGN key-state.
2. Activate first in-cab switch.
3. Verify that RPM output #1 is providing battery voltage.
4. Deactivate first in-cab switch.
5. Apply 12V to RPM input #1.
6. Verify that RPM output #1 is providing battery voltage.
7. Apply GND to RPM input #1.
8. Verify that RPM output #1 shuts off.

Continue the above testing procedure for each RPM switch location.
Note: This feature uses body controller-based software controls which can be diagnosed with The International® Diamond Logic® Builder software (see local dealer if not owned).

**References:**

Refer to the applicable International® Circuit Diagrams and Service Manuals.

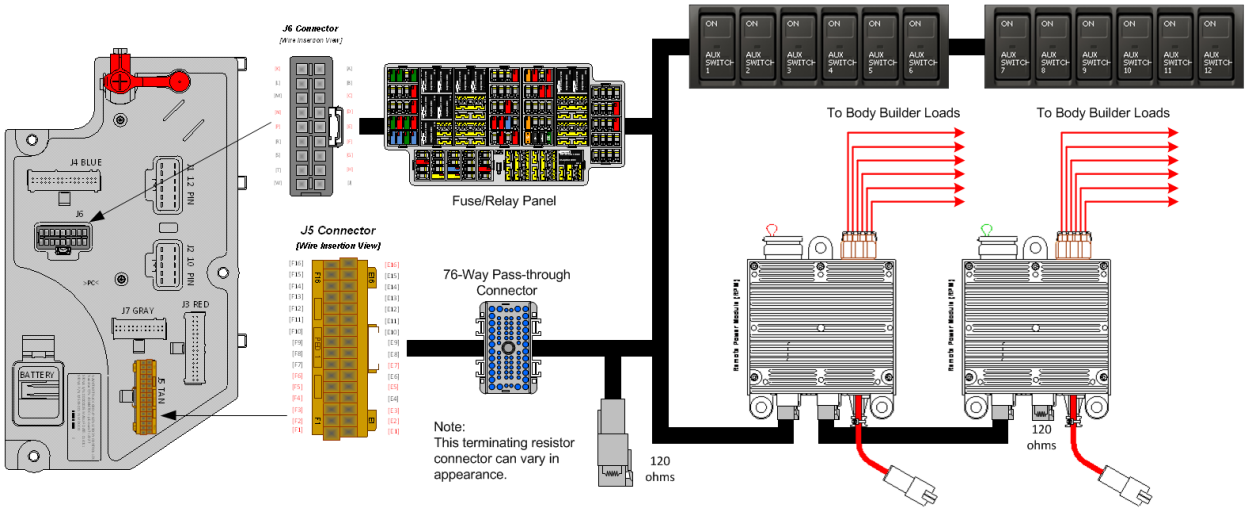
**23.2. 60AAH:** BDY INTG, REMOTE POWER MODULE (2) Mounted Inside Cab Behind Driver Seat, Up to 6 Outputs & 6 Inputs Each, Max 20 amp per Channel, Max 80 amp Total; Includes 2 Switch Packs with Latched Switches.

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Feature 60AAH includes two Remote Power Modules (RPMs) mounted behind the passenger seat on eMV models. Included with this feature are twelve two-position latched switches located in the Instrument Panel. Each RPM output is capable of providing up to 20-Amps maximum with a total of 80-Amps maximum per module.

**System Block Diagram:**




**Body Controller Software Feature Codes:**

Note: Feature code 60AJM is configured by special unadvertised software feature codes. These codes are determined by the number of additional features that use the RPM resources. The following codes should be added after all other features are added to the vehicle.

60ACA = 597194 – This feature should be added if there are features already using five RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD #1)

60ACB = 597195 – This feature should be added if there are features already using four RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 2 ROCKER SW)

60ACC = 597196 – This feature should be added if there are features already using three RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 3 ROCKER SW)

60ACD = 597197 – This feature should be added if there are features already using two RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 4 ROCKER SW)

60ACJ = 597198 – This feature should be added if there are features already using one RPM input/output. (BCM PROG, AUXILIARY LOAD 5 ROCKER SW)

60ACK = 597199 – This feature should be added if there no other features using any RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 6 ROCKER SW)

60ACV = 597202 – This feature should be added to add the second RPM (60AAB). (BCM PROG, ADDITIONAL 6 AUXILIARY SW)

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| 597194 - BCM PROG, AUXILIARY LOAD #1 For Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| 597195 - BCM PROG, AUXILIARY LOAD For (2) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| 597196 - BCM PROG, AUXILIARY LOAD For (3) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| 597197 - BCM PROG, AUXILIARY LOAD For (4) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| 597198 - BCM PROG, AUXILIARY LOAD For (5) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| 597199 - BCM PROG, AUXILIARY LOAD For (6) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux6_Output_Fuse_Param | 2000 | This is the maximum current Aux 6 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux6_Loadshed_Level | 3278 | Load shed level parameter for TEM Aux Switch 6 | 1 | No Units | 0 | 3 | 1 |
| 597202 – BCM PROG, ADDITIONAL 6 AUXILIARY SW | | | | | | | |
| TEM_Aux7_Output_Fuse_Param | 2100 | This is the maximum current Aux 7 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux8_Output_Fuse_Param | 2101 | This is the maximum current Aux 8 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux9_Output_Fuse_Param | 2102 | This is the maximum current Aux 9 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux10_Output_Fuse_Param | 2103 | This is the maximum current Aux 10 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux11_Output_Fuse_Param | 2104 | This is the maximum current Aux 11 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux12_Output_Fuse_Param | 2105 | This is the maximum current Aux 12 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux7_Loadshed_Level | 3339 | Load shed level parameter for TEM Aux Switch 7 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux8_Loadshed_Level | 3340 | Load shed level parameter for TEM Aux Switch 8 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux9_Loadshed_Level | 3341 | Load shed level parameter for TEM Aux Switch 9 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux10_Loadshed_Level | 3342 | Load shed level parameter for TEM Aux Switch 10 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux11_Loadshed_Level | 3343 | Load shed level parameter for TEM Aux Switch 11 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux12_Loadshed_Level | 3344 | Load shed level parameter for TEM Aux Switch 12 | 1 | No Units | 0 | 3 | 1 |

**Parameter Definitions:**

- **TEM_Aux1_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_1_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux2_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_2_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux3_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_3_Output of RPM #1. Default is set at 20 amps.

- **TEM_Aux4_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_4_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux5_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_5_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux6_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_6_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux7_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_7_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux8_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_8_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux9_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_9_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux10_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_10_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux11_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_11_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux12_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_12_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux1_LoadShed_Level** – This is the level at which the Aux1 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux2_LoadShed_Level** – This is the level at which the Aux2 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux3_LoadShed_Level** – This is the level at which the Aux3 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux4_LoadShed_Level** – This is the level at which the Aux4 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux5_LoadShed_Level** – This is the level at which the Aux5 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

- **TEM_Aux6_LoadShed_Level** – This is the level at which the Aux6 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux7_LoadShed_Level** – This is the level at which the Aux7 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux8_LoadShed_Level** – This is the level at which the Aux8 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux9_LoadShed_Level** – This is the level at which the Aux9 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux10_LoadShed_Level** – This is the level at which the Aux10 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux11_LoadShed_Level** – This is the level at which the Aux11 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux12_LoadShed_Level** – This is the level at which the Aux12 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 3766092C1 | SWITCH, ELECTRONIC, BLANK WINDOW ROCKER - 2 POS - BISTABLE |
| 4057689C2 | HOUSING, SWITCH*6-PACK DIN MULT |
| 2585423C91 | KIT, RPM TERMINAL/SEAL 14GA |
| 2585651C91 | KIT, RPM TERMINAL/SEAL 12GA |
| 2588909C92 | RPM BY ITSELF |
| 3519178C91 | RESISTOR, ELECT TERMINATING |

**Switches, RPM, Output Terminal Part Numbers**

**How to Test This Feature:**

1. Turn key to accessory or IGN key-state.
2. Activate first in-cab switch.
3. Verify that RPM output #1 is providing battery voltage.
4. Deactivate first in-cab switch.
5. Apply 12V to RPM input #1.
6. Verify that RPM output #1 is providing battery voltage.
7. Apply GND to RPM input #1.
8. Verify that RPM output #1 shuts off.

Continue the above testing procedure for each RPM switch location.

Note: This feature uses body controller-based software controls which can be diagnosed with The International® Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Refer to the applicable International® Circuit Diagrams and Service Manuals.

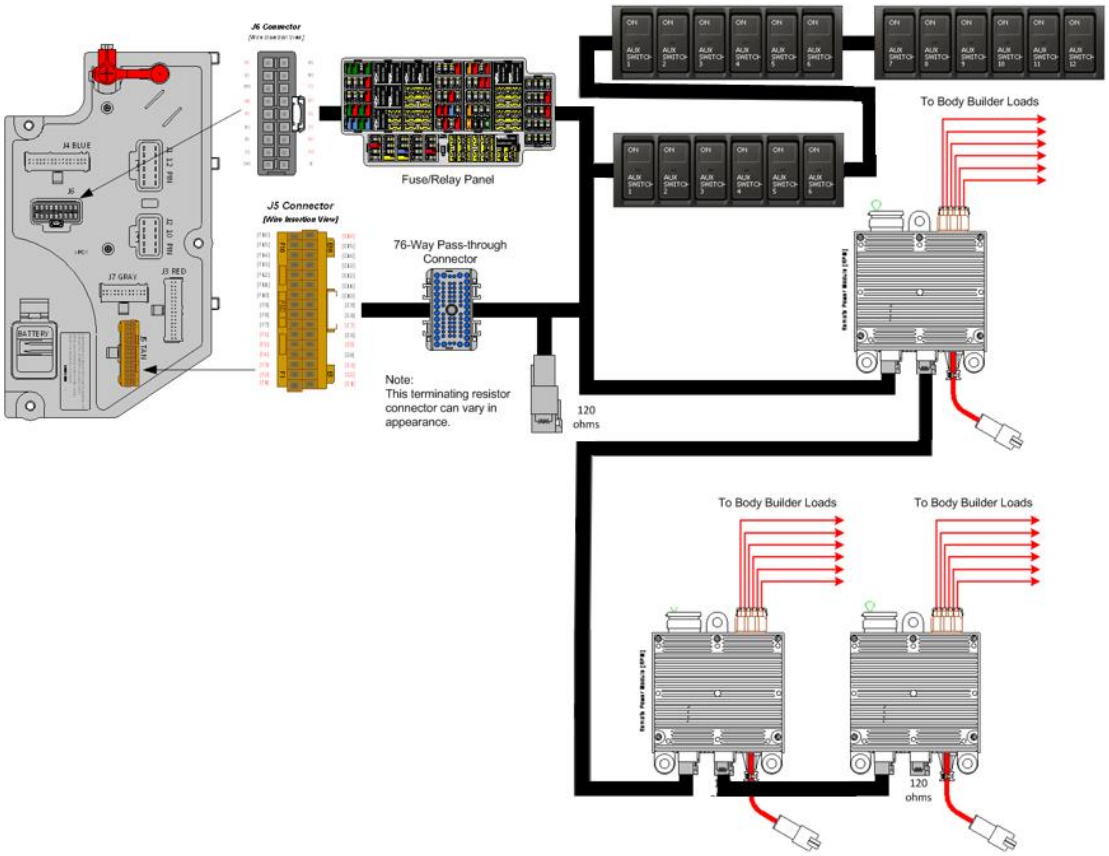
**23.3. 60AAJ:** DY INTG, REMOTE POWER MODULE (3) Mounted Inside Cab Behind Driver Seat, Up to 6 Outputs & 6 Inputs Each, Max 20 amp per Channel, Max 80 amp Total; Includes 3 switch Packs with Latched Switches.

**Feature Applicability to Vehicle Platforms:**

- eMV

**Extended Description:** Feature 60AAJ Includes  eighteen two-position latched switches located in the Instrument Panel. Each RPM output is capable of providing up to 20-Amps maximum with a total of 80-Amps maximum per module.

**System Block Diagram:**



**Body Controller Software Feature Codes:**

Note: Feature code 60AJM is configured by special unadvertised software feature codes. These codes are determined by the number of additional features that use the RPM resources. The following codes should be added after all other features are added to the vehicle.

60ACA = 597194 – This feature should be added if there are features already using five RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD #1)

60ACB = 597195 – This feature should be added if there are features already using four RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 2 ROCKER SW)

60ACC = 597196 – This feature should be added if there are features already using three RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 3 ROCKER SW)

60ACD = 597197 – This feature should be added if there are features already using two RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 4 ROCKER SW)

60ACJ = 597198 – This feature should be added if there are features already using one RPM input/output. (BCM PROG, AUXILIARY LOAD 5 ROCKER SW)

60ACK = 597199 – This feature should be added if there no other features using any RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 6 ROCKER SW)

60ACV = 597202 – This feature should be added to add the second RPM (60AAB). (BCM PROG, ADDITIONAL 6 AUXILIARY SW)

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| 597194 - BCM PROG, AUXILIARY LOAD #1 For Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| 597195 - BCM PROG, AUXILIARY LOAD For (2) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| 597196 - BCM PROG, AUXILIARY LOAD For (3) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| 597197 - BCM PROG, AUXILIARY LOAD For (4) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| 597198 - BCM PROG, AUXILIARY LOAD For (5) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| 597199 - BCM PROG, AUXILIARY LOAD For (6) Rocker Switch | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux6_Output_Fuse_Param | 2000 | This is the maximum current Aux 6 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux6_Loadshed_Level | 3278 | Load shed level parameter for TEM Aux Switch 6 | 1 | No Units | 0 | 3 | 1 |
| 597202 – BCM PROG, ADDITIONAL 6 AUXILIARY SW | | | | | | | |
| TEM_Aux7_Output_Fuse_Param | 2100 | This is the maximum current Aux 7 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux8_Output_Fuse_Param | 2101 | This is the maximum current Aux 8 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux9_Output_Fuse_Param | 2102 | This is the maximum current Aux 9 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux10_Output_Fuse_Param | 2103 | This is the maximum current Aux 10 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux11_Output_Fuse_Param | 2104 | This is the maximum current Aux 11 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux12_Output_Fuse_Param | 2105 | This is the maximum current Aux 12 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux7_Loadshed_Level | 3339 | Load shed level parameter for TEM Aux Switch 7 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux8_Loadshed_Level | 3340 | Load shed level parameter for TEM Aux Switch 8 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux9_Loadshed_Level | 3341 | Load shed level parameter for TEM Aux Switch 9 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux10_Loadshed_Level | 3342 | Load shed level parameter for TEM Aux Switch 10 | 1 | No Units | 0 | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux11_Loadshed_Level | 3343 | Load shed level parameter for TEM Aux Switch 11 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux12_Loadshed_Level | 3344 | Load shed level parameter for TEM Aux Switch 12 | 1 | No Units | 0 | 3 | 1 |

**Parameter Definitions:**

- **TEM_Aux1_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_1_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux2_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_2_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux3_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_3_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux4_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_4_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux5_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_5_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux6_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_6_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux7_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_7_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux8_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_8_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux9_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_9_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux10_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_10_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux11_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_11_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux12_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_12_Output of RPM #2. Default is set at 20 amps.

- **TEM_Aux1_LoadShed_Level** – This is the level at which the Aux1 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux2_LoadShed_Level** – This is the level at which the Aux2 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux3_LoadShed_Level** – This is the level at which the Aux3 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux4_LoadShed_Level** – This is the level at which the Aux4 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux5_LoadShed_Level** – This is the level at which the Aux5 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux6_LoadShed_Level** – This is the level at which the Aux6 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux7_LoadShed_Level** – This is the level at which the Aux7 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux8_LoadShed_Level** – This is the level at which the Aux8 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux9_LoadShed_Level** – This is the level at which the Aux9 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux10_LoadShed_Level** – This is the level at which the Aux10 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux11_LoadShed_Level** – This is the level at which the Aux11 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux12_LoadShed_Level** – This is the level at which the Aux12 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 3766092C1 | SWITCH, ELECTRONIC, BLANK WINDOW ROCKER - 2 POS - BISTABLE |
| 4057689C2 | HOUSING, SWITCH*6-PACK DIN MULT |
| 2585423C91 | KIT, RPM TERMINAL/SEAL 14GA |
| 2585651C91 | KIT, RPM TERMINAL/SEAL 12GA |
| 2588909C92 | RPM BY ITSELF |
| 3519178C91 | RESISTOR, ELECT TERMINATING |

**Switches, RPM, Output Terminal Part Numbers**

**How to Test This Feature:**

1. Turn key to accessory or IGN key-state.
2. Activate first in-cab switch.
3. Verify that RPM output #1 is providing battery voltage.
4. Deactivate first in-cab switch.
5. Apply 12V to RPM input #1.
6. Verify that RPM output #1 is providing battery voltage.
7. Apply GND to RPM input #1.
8. Verify that RPM output #1 shuts off.

Continue the above testing procedure for each RPM switch location.

Note: This feature uses body controller-based software controls which can be diagnosed with The International® Diamond Logic® Builder software (see local dealer if not owned).

**References:**

Refer to the applicable International® Circuit Diagrams and Service Manuals

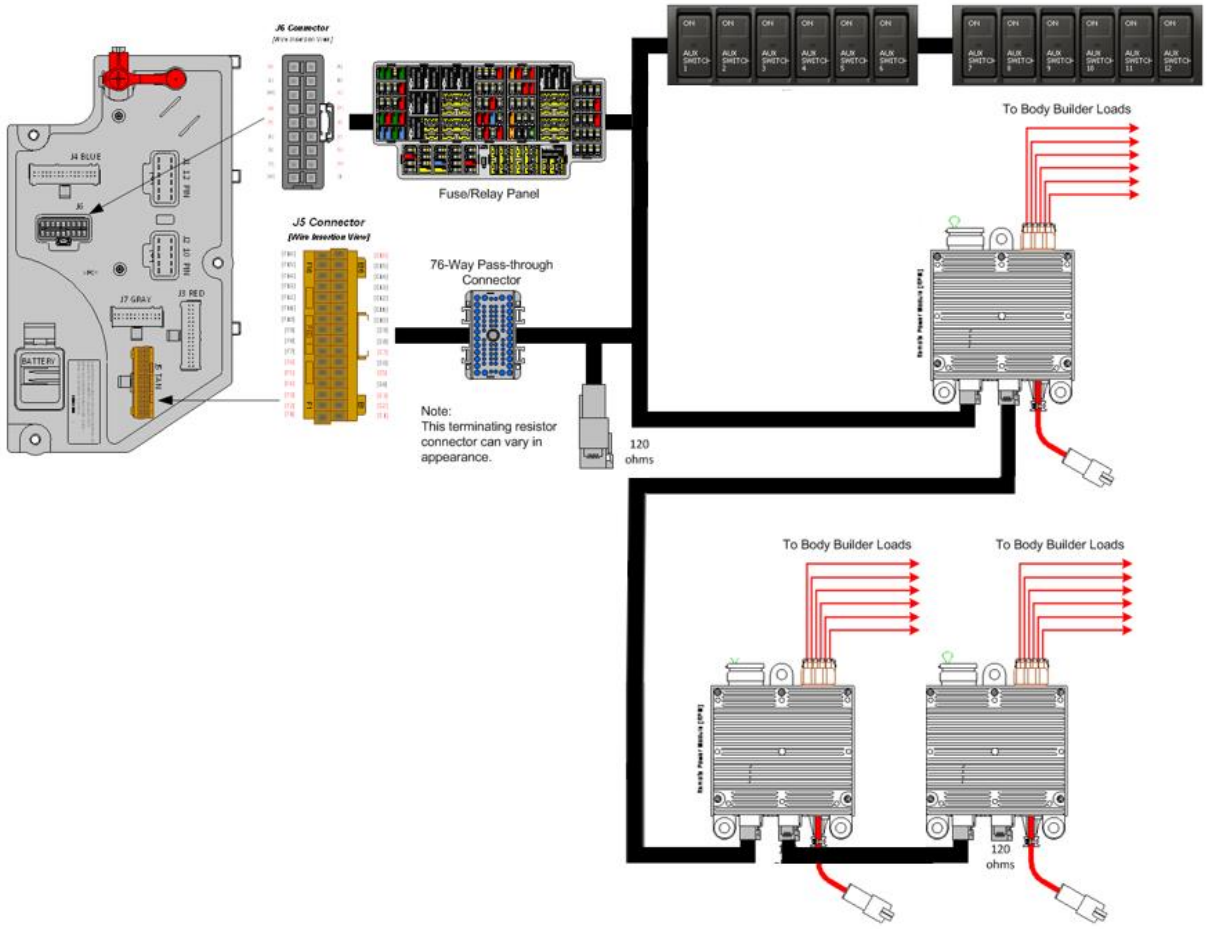
**23.4. 60AAP:** BDY INTG, REMOTE POWER MODULE (3) Mounted Inside Cab Behind Driver Seat, Up to 6 Outputs & 6 Inputs Each, Max 20 amp per Channel, Max 80 amp Total; Includes 2 Modules with Switch Packs Containing 6 Latched Switches, 1 Module with Hardware Only

**Feature Applicability to Vehicle Platforms:**

- eMV

Extended Description: Feature 60AAP Includes twelve two-position latched switches located in the Instrument Panel. Each RPM output is capable of providing up to 20-Amps maximum with a total of 80-Amps maximum per module. 1 Module with Hardware Only

**System Block Diagram:**




**Body Controller Software Feature Codes:**

Note: Feature code 60AJM is configured by special unadvertised software feature codes. These codes are determined by the number of additional features that use the RPM resources. The following codes should be added after all other features are added to the vehicle.

60ACA = 597194 – This feature should be added if there are features already using five RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD #1)
60ACB = 597195 – This feature should be added if there are features already using four RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 2 ROCKER SW)
60ACC = 597196 – This feature should be added if there are features already using three RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 3 ROCKER SW)
60ACD = 597197 – This feature should be added if there are features already using two RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 4 ROCKER SW)
60ACJ = 597198 – This feature should be added if there are features already using one RPM input/output. (BCM PROG, AUXILIARY LOAD 5 ROCKER SW)
60ACK = 597199 – This feature should be added if there no other features using any RPM inputs/outputs. (BCM PROG, AUXILIARY LOAD 6 ROCKER SW)
60ACV = 597202 – This feature should be added to add the second RPM (60AAB). (BCM PROG, ADDITIONAL 6 AUXILIARY SW)

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| 597194 - BCM PROG, AUXILIARY LOAD #1 For Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| 597195 - BCM PROG, AUXILIARY LOAD For (2) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| 597196 - BCM PROG, AUXILIARY LOAD For (3) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| 597197 - BCM PROG, AUXILIARY LOAD For (4) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| 597198 - BCM PROG, AUXILIARY LOAD For (5) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| 597199 - BCM PROG, AUXILIARY LOAD For (6) Rocker Switch | | | | | | | |
| TEM_Aux1_Output_Fuse_Param | 1990 | This is the maximum current Aux 1 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux2_Output_Fuse_Param | 1991 | This is the maximum current Aux 2 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TEM_Aux3_Output_Fuse_Param | 1992 | This is the maximum current Aux 3 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux4_Output_Fuse_Param | 1995 | This is the maximum current Aux 4 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux5_Output_Fuse_Param | 1999 | This is the maximum current Aux 5 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux6_Output_Fuse_Param | 2000 | This is the maximum current Aux 6 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux1_Loadshed_Level | 3273 | Load shed level parameter for TEM Aux Switch 1 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux2_Loadshed_Level | 3274 | Load shed level parameter for TEM Aux Switch 2 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux3_Loadshed_Level | 3275 | Load shed level parameter for TEM Aux Switch 3 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux4_Loadshed_Level | 3276 | Load shed level parameter for TEM Aux Switch 4 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux5_Loadshed_Level | 3277 | Load shed level parameter for TEM Aux Switch 5 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux6_Loadshed_Level | 3278 | Load shed level parameter for TEM Aux Switch 6 | 1 | No Units | 0 | 3 | 1 |
| 597202 – BCM PROG, ADDITIONAL 6 AUXILIARY SW | | | | | | | |
| TEM_Aux7_Output_Fuse_Param | 2100 | This is the maximum current Aux 7 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux8_Output_Fuse_Param | 2101 | This is the maximum current Aux 8 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux9_Output_Fuse_Param | 2102 | This is the maximum current Aux 9 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux10_Output_Fuse_Param | 2103 | This is the maximum current Aux 10 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux11_Output_Fuse_Param | 2104 | This is the maximum current Aux 11 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux12_Output_Fuse_Param | 2105 | This is the maximum current Aux 12 Output is allowed to source before the virtual fusing turns the output off. | 20 | A | 0 | 20 | 0.1 |
| TEM_Aux7_Loadshed_Level | 3339 | Load shed level parameter for TEM Aux Switch 7 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux8_Loadshed_Level | 3340 | Load shed level parameter for TEM Aux Switch 8 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux9_Loadshed_Level | 3341 | Load shed level parameter for TEM Aux Switch 9 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux10_Loadshed_Level | 3342 | Load shed level parameter for TEM Aux Switch 10 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux11_Loadshed_Level | 3343 | Load shed level parameter for TEM Aux Switch 11 | 1 | No Units | 0 | 3 | 1 |
| TEM_Aux12_Loadshed_Level | 3344 | Load shed level parameter for TEM Aux Switch 12 | 1 | No Units | 0 | 3 | 1 |

**Parameter Definitions:**

- **TEM_Aux1_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_1_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux2_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_2_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux3_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_3_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux4_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_4_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux5_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_5_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux6_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_6_Output of RPM #1. Default is set at 20 amps.
- **TEM_Aux7_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_7_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux8_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_8_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux9_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_9_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux10_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_10_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux11_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_11_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux12_Output_Fuse_Param** – This parameter sets the limit (in AMPS) of the current flowing from the output labeled Aux_Switch_12_Output of RPM #2. Default is set at 20 amps.
- **TEM_Aux1_LoadShed_Level** – This is the level at which the Aux1 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

- **TEM_Aux2_LoadShed_Level** – This is the level at which the Aux2 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux3_LoadShed_Level** – This is the level at which the Aux3 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux4_LoadShed_Level** – This is the level at which the Aux4 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux5_LoadShed_Level** – This is the level at which the Aux5 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux6_LoadShed_Level** – This is the level at which the Aux6 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux7_LoadShed_Level** – This is the level at which the Aux7 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux8_LoadShed_Level** – This is the level at which the Aux8 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux9_LoadShed_Level** – This is the level at which the Aux9 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux10_LoadShed_Level** – This is the level at which the Aux10 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux11_LoadShed_Level** – This is the level at which the Aux11 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).
- **TEM_Aux12_LoadShed_Level** – This is the level at which the Aux12 Output will load shed. A value of ZERO (0) disables load shed. A value of ONE (1) is least priority (sheds first), a value of 3 highest priority (sheds last).

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 3766092C1 | SWITCH, ELECTRONIC, BLANK WINDOW ROCKER - 2 POS - BISTABLE |
| 4057689C2 | HOUSING, SWITCH*6-PACK DIN MULT |
| 2585423C91 | KIT, RPM TERMINAL/SEAL 14GA |
| 2585651C91 | KIT, RPM TERMINAL/SEAL 12GA |
| 2588909C92 | RPM BY ITSELF |
| 3519178C91 | RESISTOR, ELECT TERMINATING |

**Switches, RPM, Output Terminal Part Numbers**

**How to Test This Feature:**
1. Turn key to accessory or IGN key-state.
2. Activate first in-cab switch.
3. Verify that RPM output #1 is providing battery voltage.
4. Deactivate first in-cab switch.
5. Apply 12V to RPM input #1.
6. Verify that RPM output #1 is providing battery voltage.
7. Apply GND to RPM input #1.
8. Verify that RPM output #1 shuts off.

Continue the above testing procedure for each RPM switch location.

Note: This feature uses body controller-based software controls which can be diagnosed with The International® Diamond Logic® Builder software (see local dealer if not owned).

**References:**
Refer to the applicable International® Circuit Diagrams and Service Manuals.

## 24. ePTO

**WARNING –** To avoid serious personal injury, possible death, or damage to the vehicle, when servicing the HVDM connection, Level 2 isolation is required. Ensure that only trained personnel using the appropriate procedures and safety equipment are working on these connections. Course information can be found at the International Motors - Learning website.

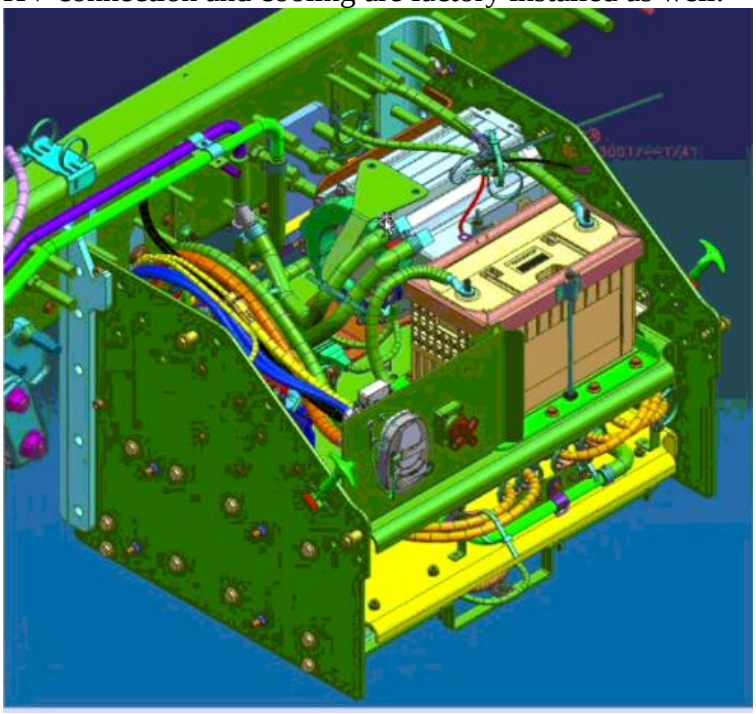
**08PAA**: HIGH VOLTAGE POWER ACCESSORY 40kW Electronic Power Take Off, with SAE B Pump Flange, Mounted Left Side Under Cab

Note: 08PAA only offered with a single 12 volt battery. If configuration requires additional capacity, consult Application Engineering. Always take actions to prevent draining the batteries with parasitic loads**.**

**Feature Applicability to Vehicle Platforms:**

- Electric Vehicle (eMV)

**Extended Description:** This feature provides a factory installed motor and inverter for TEM integration of hydraulic and other pump systems.
HV connection and cooling are factory installed as well.

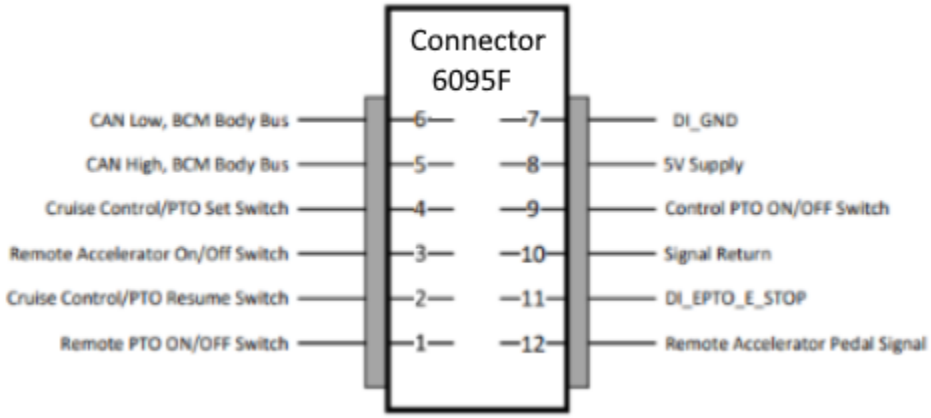


PTO Motor Location in Battery Box

**Caution –** At initial setup, the motor direction should be verified before installing the pump to avoid blowing out seals.

The PTO is enabled by a switch in the switch 6 pack. The PTO speed can be controlled by the cruise switches or by remote connections to the 12 pin body builder connector.
The 12 pin connector, located under the hood, has circuits for requesting preset speed control, variable speed control and remote pedal speed control. It also has circuits that provide data link connection to allow a 3rd Party controller device to be used.

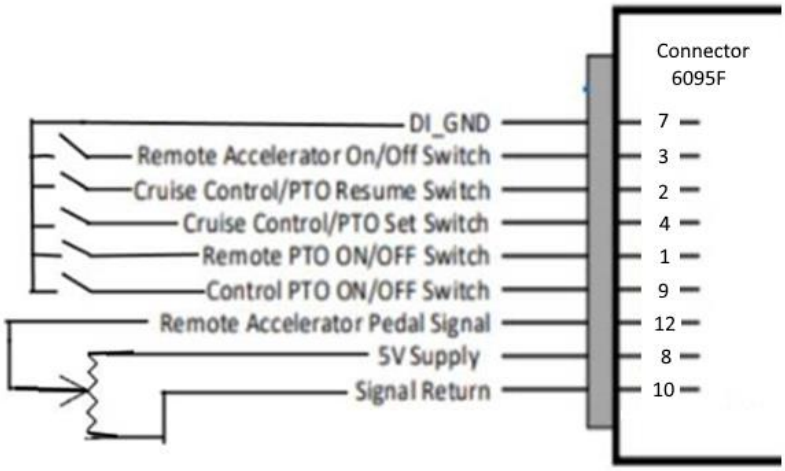
**Body Builder Low Voltage Connection:** The ePTO 12-pin Body Builder Connector is located under the hood approximately 18" from PDM2. This connection comes with a factory installed cap that includes a terminating resistor. Remove cap and connect TEM controller CAN wires to pin 5 (CANH) and pin 6 (CANL). Maintain/Re-install terminating resistor.




Connector Pinout

| 12 pin connector | Signal Name | VCU Pin |
|---|---|---|
| Pin 1 | Remote PTO ON/OFF Switch | Pin 33 |
| Pin 2 | Cruise Control/PTO Resume Switch | Pin 44 |
| Pin 3 | Remote Accelerator On/Off Switch | Pin 30 |
| Pin 4 | Cruise Control/PTO Set Switch | Pin 45 |
| Pin 5 | CAN High | N.C. |
| Pin 6 | CAN Low | N.C. |
| Pin 7 | DI_GND | Pin 79 |
| Pin 8 | 5V Supply | Pin 71 |
| Pin 9 | Control PTO ON/OFF Switch | Pin 32 |
| Pin 10 | Signal Return | Pin 47 |
| Pin 11 | DI_EPTO_E_STOP | Pin 58 |
| Pin 12 | Remote Accelerator Pedal Signal | Pin 41 |

6095 Connecter Pins to VCU Pins



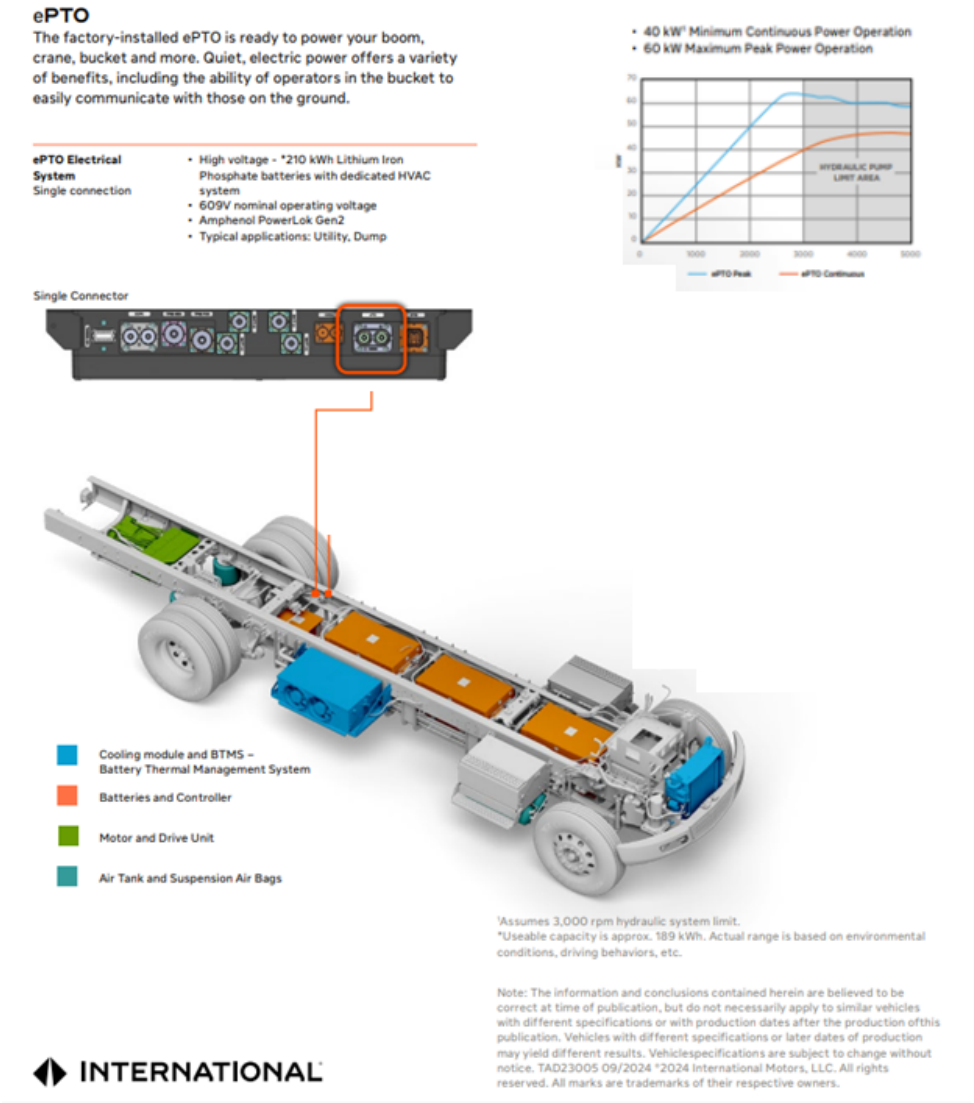

Wiring Suggestions

**Parts Associated with This Feature:**

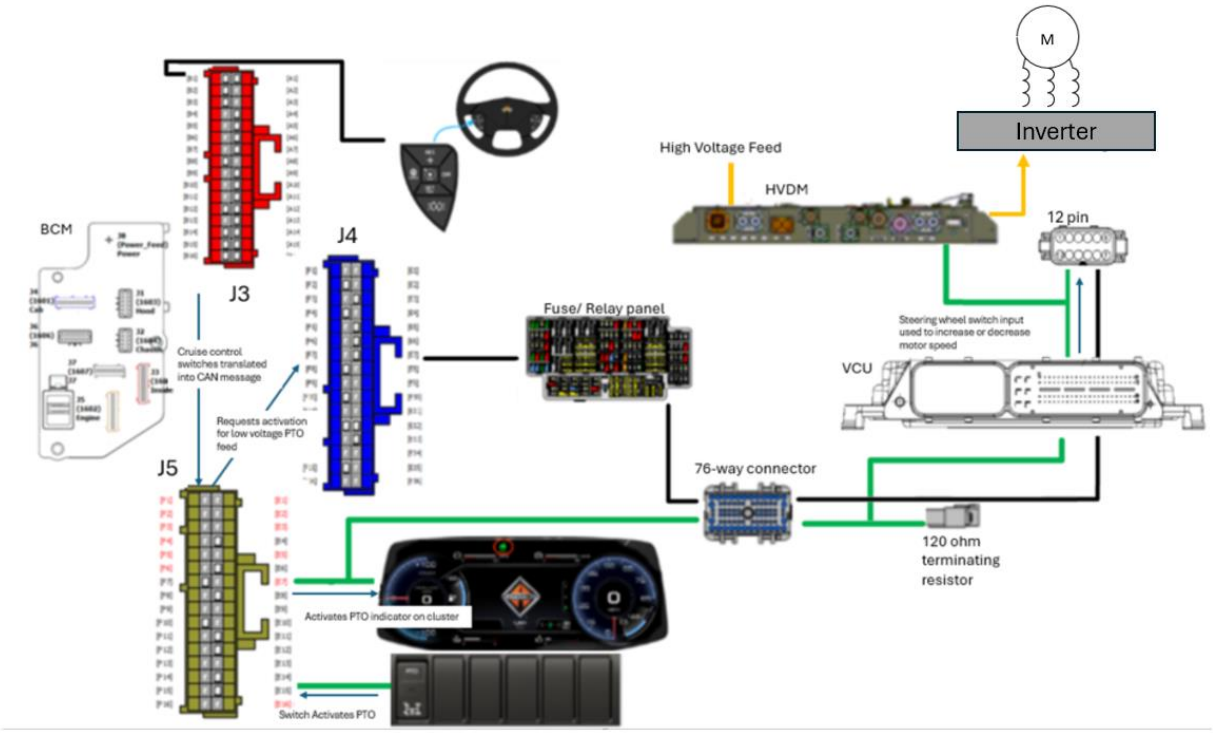
| PART NUMBER | DESCRIPTION |
|---|---|
| EPTO BODY BUILDER 6095F | |
| 3586750C1 | CONNECTOR |
| 3553460C1 | CONNECTOR LOCK |
| 3727971C1 | TERMINAL |
| EPTO BODY BUILDER CAP 6095M | |
| 3838727C1 | CONNECTOR |
| 3589992C1 | CONNECTOR LOCK |
| 3518961C1 | TERMINAL |
| CAN BODY BUS RESISTOR 6096 | |
| 4173578C1 | CAN BODY BUS RESISTOR |
| 3573833C1 | CONNECTOR LOCK |
| 3683466C1 | CONNECTOR LOCK |
| 3769112C91 | J1939 120 OHM 1 WATT RESISTOR |

**Parts Associated with Feature**

**ePTO High Voltage Connection:** The PTO high voltage connection is provided at a connector on the high Voltage distribution module (HVDM)



**System Block Diagram:**




**Programming Tools Required:**
Diamond Logic Builder (DLB)
Service Diagnostics Solutions (SDS)

**Body Controller Software Feature Codes:**

- 0597737 BCM PROG, ELECT POWER TAKE OFF Use with High Voltage Power Accessory for Electric Vehicles
- 0597755 BCM PROG, ePTO MONITOR INDICATOR & ALARM

**Body Controller Software Feature Code Parameters:**

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| PTO_Engagement_Status_Signal_Delay | 3633 | Parameter for the debounce of the PTO Engagement status message from TCM | 100 | ms | 100 | 500 | 100 |
| PTO_Veh_Spd_Threshold | 3659 | Parameter sets the vehicle speed at which the PTO will not be engaged if the threshold is exceeded. | 3 | mph | 1 | 100 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| HV_SOC_CityHorn_Warning_Duration | 3762 | Duration of State-of-Charge City Horn Warning Pattern | 3 | s | 0 | 10 | 1 |
| HV_SOC_Level_1_Timer_Threshold | 3767 | HV_SOC_Level_1_Timer_Threshold | 5 | s | 0 | 3600 | 1 |
| HV_SOC_Level_2_Timer_Threshold | 3765 | HV_SOC_Level_2_Timer_Threshold | 10 | s | 0 | 3600 | 1 |
| HV_SOC_Level_3_Timer_Threshold | 3763 | HV_SOC_Level_3_Timer_Threshold | 15 | s | 0 | 3600 | 1 |
| HV_SOC_Level_1_Min_Threshold | 3770 | Minimum State-Of-Charge percentage for operator Level 1 Warning | 0 | percent | 0 | 100 | 1 |
| HV_SOC_Level_2_Min_Threshold | 3769 | Minimum State-Of-Charge percentage for operator Level 2 Warning | 0 | percent | 0 | 100 | 1 |
| HV_SOC_Level_3_Min_Threshold | 3768 | Minimum State-Of-Charge percentage for operator Level 3 Warning | 0 | percent | 0 | 100 | 1 |

## VCU Software Feature Codes (Programmed with SDS):

Note: VCU programming, with SDS, requires using the Nexiq USB link 2 or 3 and a special interface harness that has the standard round 9 Pin connector and a rectangular 10 pin connector. PN 08-801-01  Electric Vehicle “Y” Adaptor Cable

| ID | Name | Values | Read | Write |
|---|---|---|---|---|
| 90 UDS D01D 000 | ePTO Programmed Speed Switch Input Selection | 0: Hardwired<br>1: CAN | Available | Fleet |
| 90 UDS D00E 000 | ePTO Motor Speed Throttle Down Ramp Rate | 0 - 7500 rpm/s (1 rpm/bit) | Available | Fleet |
| 90 UDS D006 000 | External Body Builder PTO Configuration | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D01A 000 | Master Switch for Setting Source | 0: Hardwired<br>1: CAN | Available | Fleet |

| | | | | |
|---|---|---|---|---|
| 90 UDS D013 000 | ePTO Preset Motor Speed 2 (Resume/Accel) | | Available | Fleet |
| 90 UDS D011 000 | ePTO Initial Preset Motor Speed Select | 0: Off<br>1: Preset 1<br>2: Preset 2<br>3: Preset 3<br>4: Preset 4<br>5: Preset 5<br>6: Preset 6 | Available | Fleet |
| 90 UDS D007 000 | Cruise Control Cancel Switch Feature Enable | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D021 000 | Remote Accelerator Pedal Position Input Selection | 0: Hardwired<br>1: CAN | Available | Fleet |
| 90 UDS D00A 000 | ePTO Maximum Motor Speed | 0 - 8000 rpm (1rpm/bit) | Available | Fleet |
| 90 UDS D009 000 | ePTO Minimum Motor Speed | 0 - 8000 rpm (1rpm/bit) | Available | Fleet |
| 90 UDS D00D 000 | ePTO Motor Speed Throttle Up Ramp Rate | 0 - 1500 rpm/s (1 rpm/bit) | Available | Fleet |
| 90 UDS D010 000 | ePTO Remote Preset On/Off Switch Enable | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D005 000 | ePTO In Cab Mode | 0: Disabled<br>1: Stationary Preset<br>2: Stationary Variable<br>3: Mobile Variable | Available | Fleet |
| 90 UDS D00F 000 | ePTO Bump Up/Down Step | 0 - 500 rpm (1 rpm/bit) | Available | Fleet |
| 90 UDS D019 000 | Remote Accelerator Enable Switch | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D017 000 | ePTO Preset Motor Speed 6 | 0 - 8000 rpm (1 rpm/bit) | Available | Fleet |
| 90 UDS D01B 000 | Remote ePTO Set/Coast Switch Input Selection | 0: Hardwired<br>1: CAN<br>2: Both | Available | Fleet |
| 90 UDS D012 000 | ePTO Preset Motor Speed 1 (Set/Coast) | 0 - 8000 rpm (1 rpm/bit) | Available | Fleet |
| 90 UDS D01C 000 | Remote ePTO Resume/Accelerate Switch Input Selection | 0: Hardwired<br>1: CAN<br>2: Both | Available | Fleet |
| 90 UDS D008 000 | ePTO Max Vehicle Speed | 0 - 150 kph (1 kph/bit) | Available | Fleet |
| 90 UDS D020 000 | Remote Accelerator Switch Input Selection | 0: Hardwired<br>1: CAN | Available | Fleet |

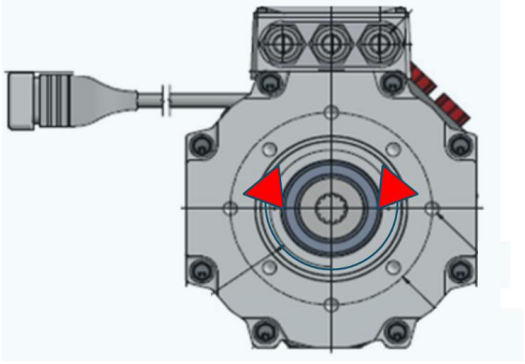
| | | | | |
|---|---|---|---|---|
| 90 UDS D015 000 | ePTO Preset Motor Speed 4 | 0 - 8000 rpm (1 rpm/bit) | Available | Fleet |
| 90 UDS D00B 000 | ePTO Disables with Brake | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D00C 000 | ePTO Disables with Parking Brake | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D01E 000 | ePTO In-Cab Operator Interface On/Off | 0: Disable<br>1: Enable | Available | Fleet |
| 90 UDS D014 000 | ePTO Preset Motor Speed 3 | 0 - 8000 rpm (1 rpm/bit) | Available | Fleet |
| 90 UDS D016 000 | ePTO Preset Motor Speed 5 | 0 - 8000 rpm (1 rpm/bit) | Available | Fleet |
| 90 UDS D024 000 | Motor Shaft Rotational Direction | 0: Clockwise<br>1: Counterclockwise | Available | Fleet |
| 90 UDS D01F 000 | Remote ePTO Variable Speed Switch Input Selection | 0: Hardwired<br>1: CAN | Available | Fleet |
| 90 UDS D004 000 | ePTO Speed Control Mode | 0: Disabled<br>1: Remote Operation Only<br>2: In Cab Operation Only<br>3: Remote and In Cab Operation | Available | Fleet |

**Configuring 3rd Party Controllers that connect to the data link:**

Please contact an application engineer for assistance with adding one of these devices.

**How to Test This Feature (Standard Feature Operation):**

**Caution** - Verify the shaft direction prior to pump installation to avoid pump damage.



**Motor Spin Direction is Programmable**

1. To determine if the PTO is working, depress the PTO switch in the cab to the on position.
2. Ensure the indicator light in the top section of the PTO switch illuminates indicating PTO engagement.
3. Ensure the PTO indicator light in the gauge cluster illuminates when engaging the PTO. A flashing indicator on the PTO Switch would indicate a problem with the system.
4. Visually check to see if the PTO motor shaft is spinning in the desired direction.

**References:**
Refer to the applicable International® Circuit Diagrams and Service Manuals.

## 25. ePower

**08PAB: HIGH VOLTAGE POWER ACCESSORY Connector Located Left Side Back of Cab, Provides Low Voltage and J1939 Signals to Enable High Voltage DC Body Builder Connection:**

NOTE – When this feature is ordered from the factory, the parameter programming required to enable it may have been turned off to prevent any DTCs from setting, at the plant. The parameter will need to be turned on, using the SDS programming software, to allow the system to work as desired. This parameter requires someone with Engineering permissions to change the parameter.

NOTE – Once the TEM ePower system has been installed and connected, create a case file for Vehicle Programming Group. Case File should state:
TEM equipment has been installed on VIN# XXXXXXXX. Please re-enable 08PAB at no charge.

Feature 08PAB provides a high voltage connection at the HVDM to provide power to be used with compatible Body Builder components.

**Feature Applicability to Vehicle Platforms:**

- Electric Vehicle (eMV)

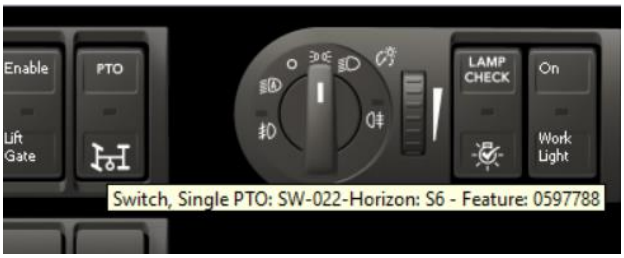
**Note: ZE Onboarding training will cover all eMV safety content. This training is needed prior to ePower integration activities. Onboarding training covers all safety content including isolation procedures and commissioning/de-commissioning.**

**Extended Description:**

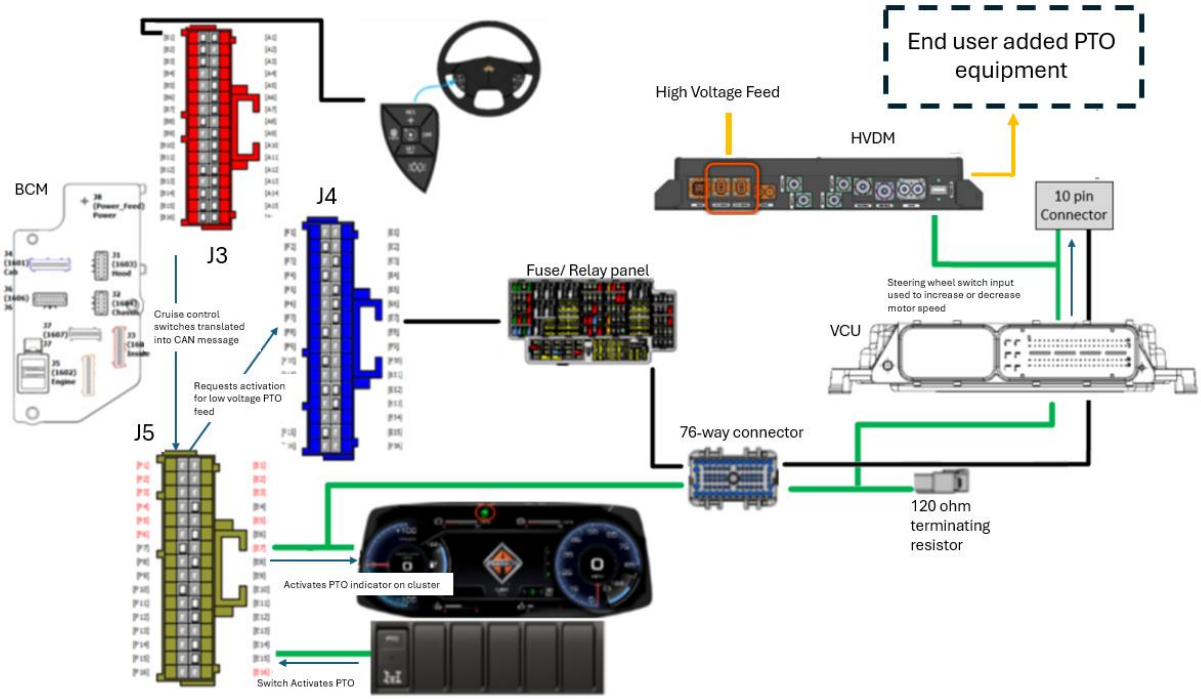
**WARNING –** To avoid serious personal injury, possible death, or damage to the vehicle, when servicing the HVDM connection, Level 2 isolation is required. Ensure that only trained personnel using the appropriate procedures and safety equipment are working on these connections. Course information can be found at the International Motors - Learning website.

**NOTE –** Connecting to the ePower system can be complex as each bodybuilder's requirements may be different**.** It is recommended that you contact an application engineer so the engineer can gather your requirements and provide details on how to best integrate the ePower system.

A switch, labeled PTO, in the cab is used to turn on the system.



## System Block Diagrams:




## Body Controller Software Feature Codes:

- 0597788 BCM PROG, ePower Cluster Display

## Body Controller Software Feature Code Parameters:

| Parameter | ID | Description | Default | Units | Min | Max | Step |
|---|---|---|---|---|---|---|---|
| PTO_Engagement_Status_Signal_Delay | 3633 | Parameter for the debounce of the PTO Engagement status message from TCM | 10 | ms | 100 | 500 | 1 |
| PTO_Veh_Spd_Threshold | 3659 | This Parameter sets the vehicle speed at which the PTO will not be engaged if the threshold is exceeded | 3 | mph | 3 | 100 | 1 |

## 25.4. ePower LV Hardware Interface Integration

### 25.4.1. LV Voltage Range

Customer supplied system shall operate from the following operating voltage range.

| | Unit | Min | Nom | Max |
|---|---|---|---|---|
| **LV supply: input current** | A | tbd | tbd | tbd |
| **LV supply: input voltage** | V | 9 | 12 | 18 |

Table 1: LV voltage range

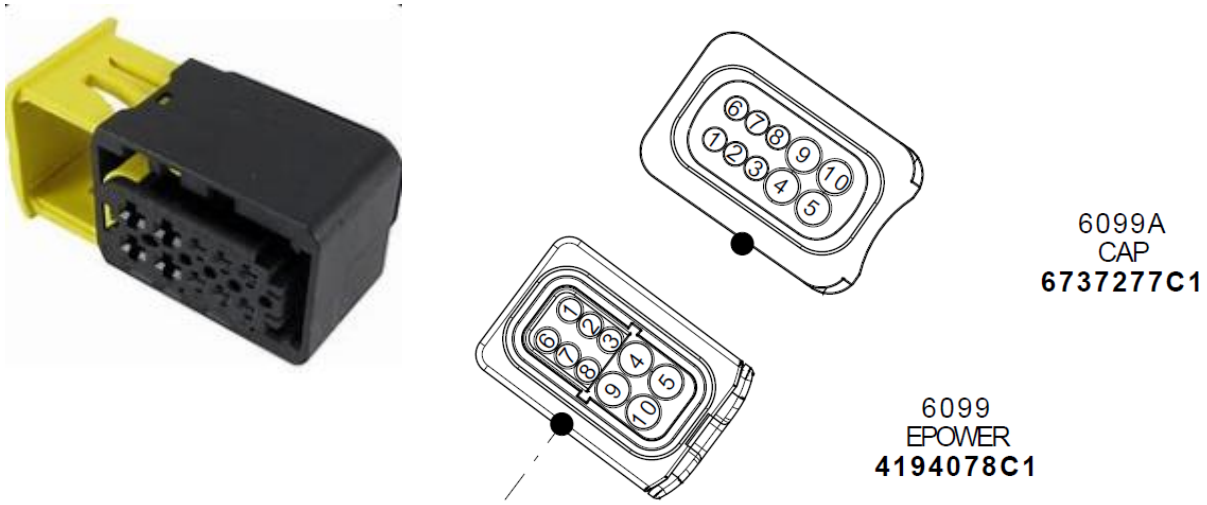
## 25.5. ePower Electrical Interface Integration

### 25.5.1. LV Connector

A 10 pin interface connector provides low voltage, J1939 signals and an enable circuit to enable the High Voltage DC .

A dedicated 10-pin connector is supplied for the customer LV connections.
The connector is taped to the main bundle of the VCU harness, BOC on Left Rail, in the same manner that 0008HAB is taped to the main bundle of the chassis harness.
The 10 pin connection is capped. Store the cap in a safe place after removing for future use.
120 Ohm terminating resistor is required for the data link pins.

10-pin connector for the LV connection has the following pinout:




ePower Low Voltage Connector and Pin Outs

| Pin Ref. | Signal | Level | Description |
|---|---|---|---|
| 1 | N.C. | | Not used in the current design, reserved for the future use. |
| 2 | N.C. | | Not used in the current design, reserved for the future use. |
| 3 | N.C. | | Not used in the current design, reserved for the future use. |
| 4 | N.C. | | Not used in the current design, reserved for the future use. |
| 5 | 12V | 0-12V | Low voltage battery connection, 12V positive. |
| 6 | CAN High ePower | 0-5V | This is a 500K line and that this is ONLY for the HV Handshake. |
| 7 | CAN Low ePower | 0-5V | This is a 500K line and that this is ONLY for the HV Handshake. |
| 8 | ePower Enable | 0-12V | Used to enable the customer supplied system. |
| 9 | N.C. | | |
| 10 | GND | 0-12V | Low voltage battery connection, ground. |

Table 2: LV connector pinout

**Parts Associated with This Feature:**

| PART NUMBER | DESCRIPTION |
|---|---|
| **ePOWER LOW VOLTAGE HARNESS CONNECTOR 6099** | |
| 4194078C1 | 10 WAY CONNECTOR |
| 3830792C1 | TERMINAL FOR PINS 5 & 10 |
| 3532128C1 | SEAL FOR PINS 5 & 10 |
| 4086472C1 | TERMINAL FOR PINS 6,7, & 8 |
| 3573653C1 | SEAL FOR PINS 6,7, & 8 |
| **ePOWER LOW VOLTAGE MATING CONNECTOR 6099A** | |
| 6737277C1 | 10 WAY CONNECTOR |
| 3830792C1 | TERMINAL FOR PINS 5 & 10 |
| 3532128C1 | SEAL FOR PINS 5 & 10 |
| 4086472C1 | TERMINAL FOR PINS 6,7, & 8 |
| 3573653C1 | SEAL FOR PINS 6,7, & 8 |
| 3766715C1 | BACK-SHELL |

### 25.5.2. LV Fuse for VBATT Connection

Vehicle has internal 15A fuse that protects 12V loading of the bus. Upfitter is responsible to determine if additional fuse protection is necessary.

### 25.5.3. LV Fusing
Customer supplied system shall have internal LV fuses to protect various internal loads.

### 25.5.4. ePower Enable
The Enable pin is rated for 12V output, 100mA and it is used to enable the customer supplied system.

### 25.5.5. CAN System Diagram
The customer supplied system shall be connected to the ePower per the following CAN network diagram.
Ensure the proper terminating resistor standards are followed.

### 25.5.6. High Voltage Range

Customer supplied system shall operate from the following operating voltage range.

| | Unit | Min | Nom | Max |
|---|---|---|---|---|
| **HV supply: input current** | A | | 20 | 20 |
| **HV supply: input voltage** | V | 473 | 608 | 690 |

HV Voltage Range Table

### 25.5.7. HVDM Connection

**WARNING –** To avoid serious personal injury, possible death, or damage to the vehicle, when servicing the HVDM connection, Level 2 isolation is required. Ensure that only trained personnel using the appropriate procedures and safety equipment are working on these connections. Course information can be found at the International Motors - Learning website.

Customer supplied system shall be connected to the HVDM. The HVDM has two 20kW outputs that are labeled as AC-R/Aux2 and AC-F/Aux1, as shown below. If only utilizing 1 output, the customer supplied system should be connected to AC-F/ Aux1.


HVDM Connection Interface

### 25.5.8. HV Connector Plugs

HVDM headers AC-F and AC-R (as per above image) are protected by plugs. These plugs complete the HVIL circuit. They should only be removed if Customer supplied system is connecting to that outlet. If only using 1 outlet, the AC-R/Aux2 plug must remain installed. Plugs should be retained after installation (recommend glovebox).

### 25.5.9. HV Connector

HVAC-R (HVDM Header: TE P/N 2103124-1 Key-A)
HVAC-F (HVDM Header: TE P/N 2103124-2 Key-B)

### 25.5.10. Mating Keyed Connectors F (Plug/Mating connector for HV Harness)

*Option-1: HV plug Connector with Pass Through HVIL W/Multicore cable.*

TE reference Drawing Number:C-2103436
TE Application Specification: 114-13310

Option-2: HV plug connector with Shunted HVIL W/Multicore cable.

TE reference Drawing Number: C-2103437
TE Application Specification: 114-13305

Option-3: HV Plug connector with Shunted HVIL W/Single or individual cable

TE reference Drawing Number: C-2103176 and C-2103177
TE Application Specification: 114-13259

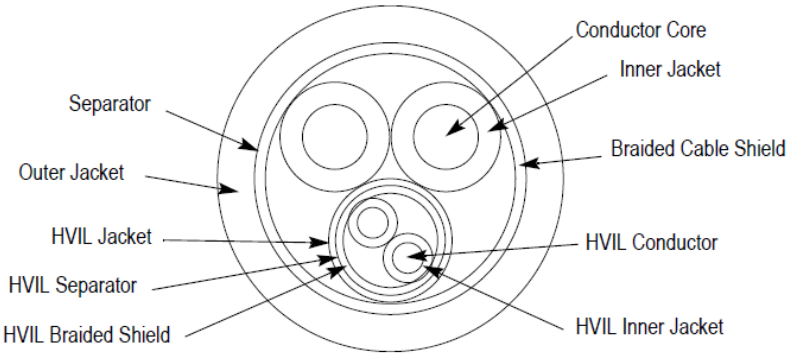
### 25.5.11. HV Cable

Customer supplied system shall be connected using HV Cable harnesses. These Harnesses must have:

(i) All high voltage cables and covers are required to be orange in color for safety recognition.
(ii) The proper labeling with Customer Part number and description of the part number.
(iii) Cables must be routed properly with their bending diameter requirement (as per wire supplier (like Leoni, H&S).
(iv) These HV wires must be protected by the proper sleeves.
(v) These Harnesses must be clipped/attached properly to secure the position of the harnesses.
(vi) Must use the strain relief back of the HV connector (as per Connectors supplier requirements). To avoid any damage in the harness.
(vii) These Wire Harnesses must build with the proper wires as per TE mating connectors (plugs) assembly requirements.

The wire selection based on the plugs as defined in section 25.5.8.

**For Option-1**

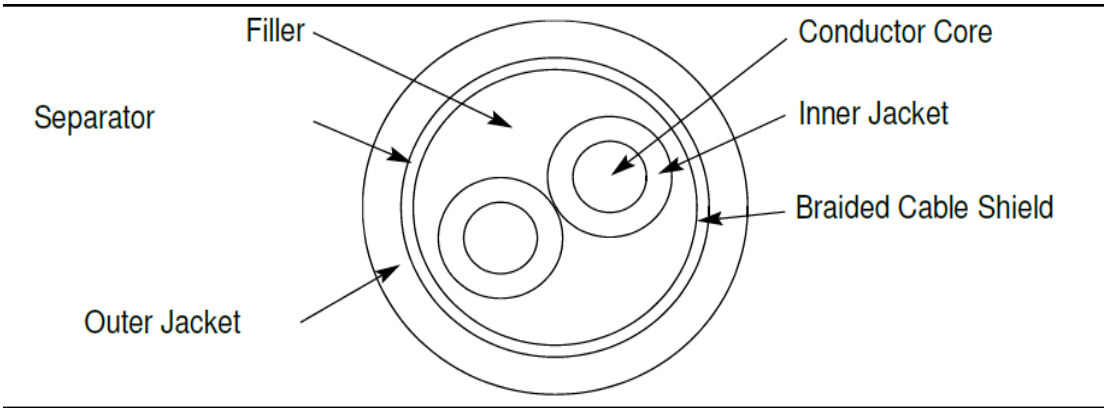



***Cable Option***

Cable supplier: KROMBERG & SCHUBERT
Cable Construction: 2X 4.0 mm² and 2X 0.5 mm²
Supplier cable part number: 64994093

KROMBERG & SCHUBERT is a trademark.

## For Option-2




***Cable Option***

Cable Supplier: COROPLAST
Cable Construction: 2 x 4.0 mm²
Supplier Cable Part Number: 9-2641

**Recommended Subcomponents:**

1-968853-3 MCP Receptacle Contact, 2.8 mm
2103157-1 or 1-2103157-1 Shield Plug
1587723-3 Inner Ferrule
1587724-3 Outer Ferrule
2103153-1 Spacer
2103154-1 Cable Seal
2103013-1 Cable Seal Retainer
2103155-1 Collet

***Cable Option***

Cable Supplier: DARKA
Cable Construction: 2 x 4.0 mm²
Supplier Cable Part Number: FLR91XBC33X

**Recommended Subcomponents:**

1-968853-3 MCP Receptacle Contact, 2.8 mm
1-2103157-2 Shield Plug
1587723-2 Inner Ferrule
1587724-2 Outer Ferrule
2103153-1 Spacer
2103154-3 Cable Seal
2103013-2 Cable Seal Retainer
2103155-3 Collet

***Cable Option***

Cable Supplier: Huber+Suhner
Cable Construction: 2 x 4.0 mm²
Supplier Cable Part Number: 12 582 308

**Recommended Subcomponents:**

1-968853-3 MCP Receptacle Contact, 2.8 mm
1-2103157-2 Shield Plug
1587723-2 Inner Ferrule
1587724-2 Outer Ferrule
2103153-1 Spacer
2103154-2 Cable Seal
2103013-2 Cable Seal Retainer
2103155-2 Collet

## For Option-3

| CABLE | | RECOMMENDED CABLE-SPECIFIC TERMINATION COMPONENTS | |
|---|---|---|---|
| | | PART NUMBER | DESCRIPTION |
| Supplier: | HUBER+SUHNER | 1-968853-3 | MCP 2.8-mm Receptacle Terminal |
| Construction: | 4 mm² | 1587828-3 | Inner Ferrule |
| Part Numbers: | 12582674 (Orange)<br>85002132 (Orange/Black) | 1587829-3 | Outer Ferrule |
| | | 1587826-3 | Cable Seal |
| | | 1587827-3 | Cable Seal Retainer |
| Supplier: | LEONI | 1-968853-3 | MCP 2.8-mm Receptacle Terminal |
| Construction: | 4 mm² | 1587828-3 | Inner Ferrule |
| Part Number: | 76231175A (Orange) | 1587829-3 | Outer Ferrule |
| | | 1587826-3 | Cable Seal |
| | | 1587827-3 | Cable Seal Retainer |
| Supplier: | Judd Wire Inc. | 1-968853-3 | MCP 2.8-mm Receptacle Terminal |
| Construction: | 3 mm² | 1587828-2 | Inner Ferrule |
| Part Number: | C09494 (Orange) | 1587829-2 | Outer Ferrule |
| | | 1587826-2 | Cable Seal |
| | | 1587827-2 | Cable Seal Retainer |

### 25.5.12. HVDM Fuse

The HVDM has internal fuses.

(i) 30A fuse to protect AC-F output, and
(ii) a separate 30A fuse to protect the AC-R output.
(iii)

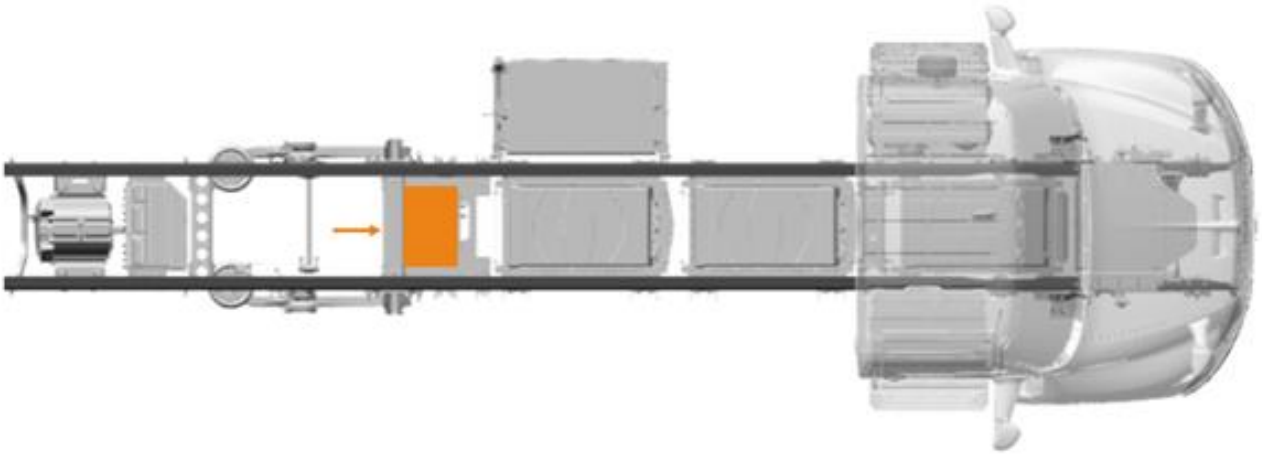
Note: Control logic will limit the current available, depending on the SOC. The max output will be closer to 22A.

This is a non-serviceable fuse and cannot be serviced in the field. Fuse failure will require contacting Tech Service so a case file can be opened. HVDM replacement instructions will be provided.

Note: Customer connected loads must be within this range to protect these main fuses in HVDM. In case of wire size reduction in customer load harasses, Customer must use their own distribution box with fuses to protect HV wiring.

### 25.5.13. HVDM Location

HVDM location within eMV is shown in a figure below.



HVDM location

### 25.5.14. HV Fuse

Customer supplied system shall have an internal fuse to protect their own high voltage components.

#### 25.5.15. HVIL

Customer supplied system shall internally monitor HVIL status and report status via CAN network.

HVIL stands for High-Voltage Interlock Loop. It is a crucial safety feature in hybrid and electric vehicles designed to protect people during the assembly, repair, maintenance, and operation of these vehicles. The HVIL system monitors high-voltage components and ensures that if any high-voltage connection becomes loose, disconnected, or damaged, the system will alert the driver and prevent potential hazards.

**Warning** For servicing the HVDM connection, Level 2 isolation is required. Ensure that only trained personnel using the appropriate procedures and safety equipment are working on these connections.

## 25.1 System Active Discharge

Customer supplied system is expected to stay connected to HVDM during the active discharge. Vehicle is responsible to actively discharge all HV components during the vehicle shut down sequence to the voltage below 60V within 5 seconds.
If the components are disconnected from the HVDM via the internal contactor, the system is then responsible to actively discharge the component within 5 seconds of the disconnection.

## 25.2 Internal Contactor

If the customer supplied system has internal contactor, they should stay connected to HVDM during the shutdown and the active discharge process. In this case vehicle will actively discharge the high voltage capacitors within vehicle and high voltage capacitors within the customer supplied system.
In case that the customer supplied system opens internal contactors before the vehicle active discharge sequence they are responsible for discharging the internal high voltage capacitors to below 60V within 5 seconds.
During this process, the customer supplied system shall broadcast internal high voltage values to confirm that they have discharged their system.

## 25.3 System After-Run Operation

The ePower system will remain operational, if the PTO switch is on, when vehicle is keyed off. The ePower system shall continue to operate as long as battery SOC remains above the predetermined threshold and software/hardware interlocks are met.

**How to Test This Feature:**
1. Contact your Application Engineer for test procedure

**References:**
Refer to the applicable International® Circuit Diagrams and Service Manuals

# 26. General Electrical Section:

**Description**: - International vehicle electrical systems are becoming increasingly complex with the addition of a BCM, electronically driven instrument gauges, and Antilock Brake Systems (ABS) to name a few. While most systems still operate on battery voltage (12 volts), some systems operate at as high as 700 volts (battery powered vehicles) and as low as five (5) volts (pressure sensors).

International publishes Electrical Circuit Diagrams and Service Manuals for all its models. Body builders and installers should refer to these manuals before connecting body lights and accessories to the vehicle electrical system to assure that circuits chosen are both appropriate and not overloaded. Modifications not defined in the circuit diagram book are not to be made to the vehicle electrical/electronic control systems without first contacting International's Technical Service Department at 1-800-336-4500.

## 26.1. "Red Gel Coat" Removal From Electrical Connections

The following will provide information on how to properly soften and remove the 'red gel coat' from, ground studs and any other electrical connections that are covered with this protective coating. This will greatly ease the disassembly of these connections, preventing stud/nut damage caused by using too much force to overcome the gel coat.

**SPECIAL TOOL(s) / SOFTWARE**

| Tool Description | Tool Number | Comments | Instructions |
|---|---|---|---|
| Standard Wire Brush | N/A | Source Locally | |
| Small Scraper | N/A | Source Locally | |
| Small Paint Brush | N/A | Source Locally | |
| Small, metal cup/bowl/container | N/A | Source Locally | |

## SERVICE PARTS INFORMATION

**NOTE** – After the container has been opened, it should be used within 6 months. Potency will decrease after 6 months.

| Description | Part Number | Quantity Required | Notes |
|---|---|---|---|
| Blue Bear 600GL Coating Softener/Remover | BBISG1GEANDT1 or BBISGQTEANDT1 | 1 (1 Quart) | Tools Catalog |
| Mineral Spirits | N/A | 1 container | Source Locally |
| Grafo Dielectric Grease or Tribo Tuff Blue Dielectric | Grafo - 472141C2<br>Tribo Tuff - 2519646C1 | 1 container | Parts Catalog |


## REPAIR STEP(s)

**Warning -** To prevent property damage, personal injury and/or death, park vehicle on a hard, flat surface, turn the engine off, set the parking brake, and install wheel chocks to prevent the vehicle from moving in either direction.

**Warning –** To prevent property damage, personal injury and/or death, if the vehicle must be raised, do not work under the vehicle supported only by jacks. Jacks can slip or fall over.

**Warning –** To prevent personal injury and/or death, always wear safe eye protection when performing vehicle maintenance.

**Warning –** To prevent property damage, personal injury and/or death, keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases,

**Warning -** To prevent property damage, personal injury, and / or death, remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last.

**Caution -** Wear chemical-resistant gloves and safety glasses while applying. Respiratory masks may be considered to avoid inhaling any vapors. Avoid contact with painted surfaces or any surface not coated with the Red gel. See MSDS sheet for more safety info.

## REMOVAL PROCEDURE:

1. Install Wheel Chocks
2. Obtain Service Information for proper procedure on batt. disconnect, starter and/or ground stud(s) removal.
3. Obtain Service Part(s)
4. Obtain Service Tool(s)

**Important** – Refer to the warnings and directions provided with the product.

5. Shake the Gel Softener container well to homogenize the contents and open the container slowly
6. Pour the required amount of chemical into a small metal container. Using a paint brush, apply liberally on to red coated threads, nuts and studs (metal surfaces). See **Figure #1**. Avoid dripping onto other surfaces. DO NOT apply to rubber, wire insulation etc. Only use this on metallic surfaces.
7. Let sit for 10-15 minutes to allow chemical to soften the Red coating.

Note**:** A longer set time will yield better results.

8. Use a scraper, wire brush and rag to remove as much coating as possible. See **Figure #2**. A second application of the softener chemical may be required - use discretion prior to loosening nuts/studs.
9. To remove remaining finish or residues, use abrasive pad or cloth dipped in odorless mineral spirits.

## REASSEMBLY PROCEDURE:

1. Remove any excess Red Gel Coat on mating surfaces of eyelet connectors, nuts, washers, threads or any contact surface that may disrupt continuity, BEFORE reassembly.

2. After referencing the manual and repairs are complete, reconnect batteries per the standard procedure called out in the manual and apply 'Grafo' or 'Tribo Tuff Blue' dielectric grease to any of the connections removed, that originally contained the red coating.

3. Work areas and tools can be cleaned w/ mild degreaser and/or detergent/soap and water. Wash hands with cold water and soap.

4. Disposal: Any unused Gel Softener remaining in the small metal container, should be placed outdoors to evaporate and dry. Once dry, the container can be cleaned with degreaser or mineral spirits.

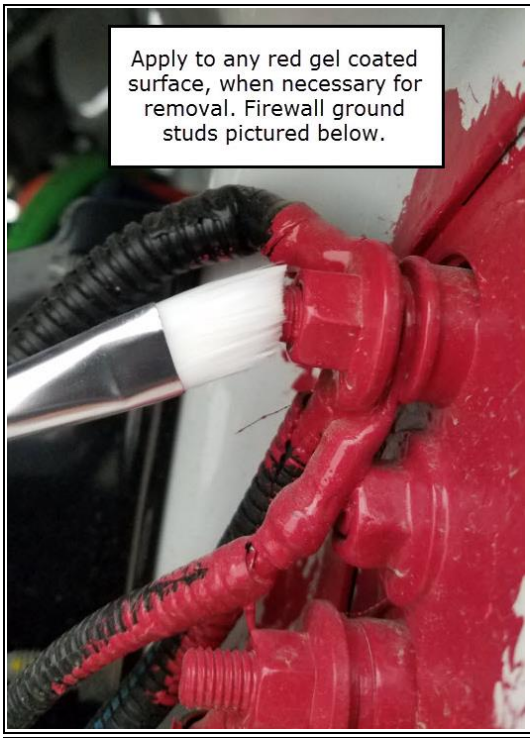



**Figure #1: Applying Softener Gel to Dash Panel Ground Studs**

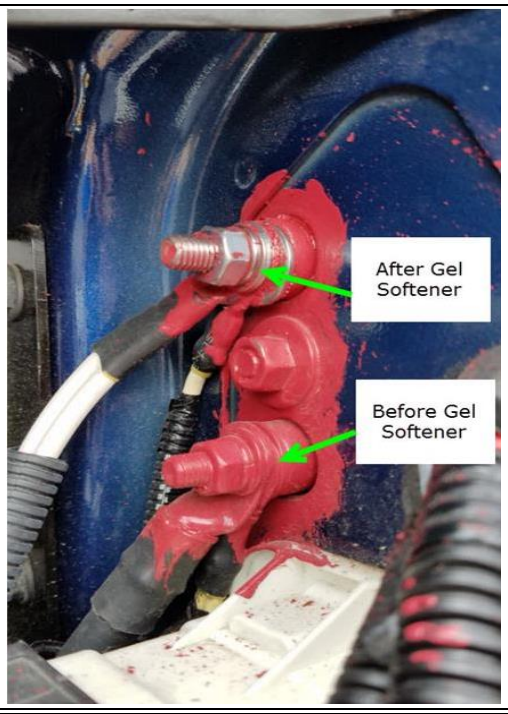



**Figure #2: Dash Panel Ground Studs - Before and After**

## 26.2. Connecting to 12 Volt Circuits

Connecting to 12-volt circuits can be a straightforward process if you follow some key steps. Here is a general guide to help you get started:

1. **Identify the Power Source**:
   Using the circuit diagrams, locate a desired battery fed, ignition fed or accessory fed 12-volt power source.
   Also ensure the power source can manage the additional load of the new circuit.
   Ensure that any added circuits will not induce parasitic loads that will unintentionally drain the batteries.
2. **Choose the Right Wiring**:
   Use appropriate gauge wire for the current draw of your devices.
3. **Install a Fuse**:
   Always install the fuse close to the power source to protect the circuit. The fuse rating should be slightly higher than the maximum current draw of your devices.
4. **Run the Wires**:
   Route the wires from the power source to the location of your accessory. Use wire loom or conduit to protect the wires from abrasion and heat.
5. **Ground the Circuit**:
   Connect the negative wire to a good chassis ground. Clean the grounding point to ensure a solid connection.
6. **Test the Circuit**:
   Before finalizing the installation, test the circuit to ensure everything is working correctly. Use a multimeter to check for proper voltage and continuity.

## 26.3. Recommended Circuit Protection

Adding fuses to 12-volt circuits is crucial for protecting your electrical system from overcurrent that can cause damage. Here are some standard practices to follow:

1. **Determine the Correct Fuse Size**:
   Calculate the maximum current draw of your circuit by adding up the current ratings of all devices connected to it. Use a fuse rated at approximately 125% of the normal operating current to allow for safe operation without unnecessary blowing of the fuse.
2. **Fuse Placement**:
   Place fuses as close to the power source as possible to protect the entire length of the circuit.
   Each individual circuit should have its own fuse to provide targeted protection and simplify fault troubleshooting.

3. **Types of Fuses**:
   Use the appropriate type of fuse for your application. Common types include blade fuses, glass tube fuses, ceramic fuses and circuit breakers.
   For high-current applications like starter motors, consider using fusible links or circuit breakers instead of standard fuses.
4. **Installation Tips**:
   Ensure the fuse is compatible with the fuse holder and that connections are secure.
   Regularly inspect fuses for signs of damage or corrosion and replace them with the exact type and rating if they blow.
5. **Safety Considerations**:
   Always disconnect the battery or power source before working on the circuit.
   Avoid using a fuse with a higher rating than recommended, as this can prevent the fuse from blowing during an overcurrent situation, potentially causing damage.

## Circuit Protection by Wire Gauge:

| WIRE GAUGE | PROTECTIVE DEVICE SIZE | MAXIMUM CURRENT (AMPS) |
|---|---|---|
| 18-GUAGE | 10 AMP FUSE/ CIRCUIT BREAKER | 8 A |
| 16-GUAGE | 15 AMP FUSE/ CIRCUIT BREAKER | 12 A |
| 14-GUAGE | 20 AMP FUSE/ CIRCUIT BREAKER | 16 A |
| 12-GUAGE | 25 AMP FUSE/ CIRCUIT BREAKER | 20 A |
| 10-GUAGE | 30 AMP FUSE/ CIRCUIT BREAKER | 24 A |
| 8-GUAGE | 12 GAUGE FUSIBLE LINK | 80 A |
| 6-GUAGE | 10 GAUGE FUSIBLE LINK | 108 A |
| 4-GUAGE | 2–12 GAUGE FUSIBLE LINK | 160 A |
| **CAUTION – Wire gauge is designed to match fuse / circuit breaker ratings. Do not increase the size of a circuit breaker or fuse. This might cause wiring to overheat.** | | |

**Circuit Protection by wire Gauge Table**

**Circuit Protection Devices - Fuses and Circuit Breakers:**

| PART NUMBER | DESCRIPTION | SIZE | COLOR |
|---|---|---|---|
| **CIRCUIT BREAKERS** | | | |
| 3536177C1 | TYPE III — MANUAL RESET | 7.5 A | BROWN |
| 3536178C1 | TYPE III — MANUAL RESET | 10 A | RED |
| 3536179C1 | TYPE III — MANUAL RESET | 15 A | BLUE |
| 3536180C1 | TYPE III — MANUAL RESET | 20 A | YELLOW |
| 3536181C1 | TYPE III — MANUAL RESET | 25 A | WHITE |
| 3536182C1 | TYPE III — MANUAL RESET | 30 A | GREEN |
| 3529688C1 | TYPE III - MINI | 20 A | YELLOW |
| 3529690C1 | TYPE III - MINI | 30 A | GREEN |
| **THERMAL FUSES** | | | |
| 3534208C1 | MINI — SAE J2077 | 5 A | TAN |

| | | | |
|---|---|---|---|
| 3546109C1 | MINI — SAE J2077 | 7.5 A | BROWN |
| 3534209C1 | MINI — SAE J2077 | 10 A | RED |
| 3534210C1 | MINI — SAE J2077 | 15 A | BLUE |
| 3534211C1 | MINI — SAE J2077 | 20 A | YELLOW |
| 3534212C1 | MINI — SAE J2077 | 25 A | NATURAL |
| 3534213C1 | MINI — SAE J2077 | 30 A | GREEN |
| 131224C1 | AUTOFUSE | 20 A | YELLOW |
| 571691C1 | AUTOFUSE | 30 A | GREEN |
| **INLINE SOCKET AND CABLE FOR CIRCUIT BREAKER/FUSE** | | | |
| 1676841C91 | INLINE SOCKET WITH CABLE | 20 A | BLACK |
| 1682115C91 | INLINE SOCKET WITH CABLE | 30 A | BLACK |

**Fuse and Circuit Breaker Protection Device Table**

**Circuit Protection Devices - Fuses and Circuit Breakers:**

| PART NUMBER | DESCRIPTION | SIZE | COLOR |
|---|---|---|---|
| **CIRCUIT BREAKERS** | | | |
| 3536177C1 | TYPE III — MANUAL RESET | 7.5 A | BROWN |
| 3536178C1 | TYPE III — MANUAL RESET | 10 A | RED |
| 3536179C1 | TYPE III — MANUAL RESET | 15 A | BLUE |
| 3536180C1 | TYPE III — MANUAL RESET | 20 A | YELLOW |
| 3536181C1 | TYPE III — MANUAL RESET | 25 A | WHITE |
| 3536182C1 | TYPE III — MANUAL RESET | 30 A | GREEN |
| 3529688C1 | TYPE III - MINI | 20 A | YELLOW |
| 3529690C1 | TYPE III - MINI | 30 A | GREEN |
| **THERMAL FUSES** | | | |
| 3534208C1 | MINI — SAE J2077 | 5 A | TAN |
| 3546109C1 | MINI — SAE J2077 | 7.5 A | BROWN |
| 3534209C1 | MINI — SAE J2077 | 10 A | RED |
| 3534210C1 | MINI — SAE J2077 | 15 A | BLUE |
| 3534211C1 | MINI — SAE J2077 | 20 A | YELLOW |
| 3534212C1 | MINI — SAE J2077 | 25 A | NATURAL |
| 3534213C1 | MINI — SAE J2077 | 30 A | GREEN |
| 131224C1 | AUTOFUSE | 20 A | YELLOW |
| 571691C1 | AUTOFUSE | 30 A | GREEN |
| **INLINE SOCKET AND CABLE FOR CIRCUIT BREAKER/FUSE** | | | |
| 1676841C91 | INLINE SOCKET WITH CABLE | 20 A | BLACK |
| 1682115C91 | INLINE SOCKET WITH CABLE | 30 A | BLACK |

**Fuse and Circuit Breaker Protection Device Table**

## 26.4. Color Code System for International® Truck Wiring:

### Wiring Color Code System:

| COLOR | DESCRITION |
|---|---|
| RED | BATTERY FEEDS |
| PINK | IGNITION FEEDS |
| LIGHT BLUE | ACCESSORY FEEDS |
| YELLOW | HEADLIGHT SYSTEM (DAYTIME RUNNING LIGHTS, FOG, HI-BEAM, ETC.); DATA LINK J1939 (+) |
| DARK BLUE | INTERIOR LIGHTS (DOME, PANEL, ETC.); DATA LINK J1708 (+) |
| BROWN | EXTERIOR LIGHTS (TAIL, MARKER, CLEARANCE, ETC.) |
| ORANGE | EXTERIOR LIGHTS (TURN, BACK-UP, ETC.) |
| GRAY | CHASSIS SYSTEMS (HORN, ETC.); |
| TAN | CHASSIS MONITORING SYSTEMS (GAUGES) |
| GREEN | DATA LINK J1939 (-) |
| LIGHT GREEN | DRIVER AID SYSTEMS (WINDSHIELD WASHER, HEATER, ETC.) |
| VIOLET | CONTROLS - ELECTRONIC |
| WHITE | GND |
| BLACK | BATTERY GND CABLES OR COMPUTER DATA LINK SYSTEMS |
| **NOTE** - The wiring in multiple conductor jacketed cable does not follow the above color code system. see the electrical circuit diagram manual for specific colors and circuit numbers used with each system. use only “GXL", “SXL" or “TXL" insulated wire. crimp and solder all connections. | |

**Wiring Color Code Table**

## 26.5. Electrical Components Commonly Used by Equipment Installers:

### Components Table:

| PART NUMBER | DESCRIPTION |
|---|---|
| **AT FUSE BLOCK** | |
| 3536294C1 | TERMINAL, FUSE BLOCK (18/20 GAUGE) |
| 3573312C1 | TERMINAL, FUSE BLOCK (14/16 GAUGE) |
| 3573311C1 | TERMINAL, FUSE BLOCK (10/12 GAUGE) |
| **AT TAIL LIGHTS** | |
| 589390C1 | SEAL, WIRE - (BLUE) .165-.138 O.D. CABLE (12-14 GAUGE) |
| 589391C1 | SEAL, WIRE - (GRAY) .137-.111 O.D. CABLE (14-16 GAUGE) |
| 1652325C1 | SEAL, WIRE - (LT GN) .110-.080 O.D. CABLE (16-20 GAUGE) |
| 1661375C2 | BODY CONNECTOR, 5-WAY MALE |
| 1661377C1 | TERMINAL, FEMALE - 14/16 GAUGE |
| 1661376C1 | LOCK, 5-WAY MALE CONNECTOR |

| | |
|---|---|
| 1677851C1 | BODY CONNECTOR, 5-WAY FEMALE |
| 1671609C1 | TERMINAL, MALE - 14/16 GAUGE |
| 1677914C1 | LOCK, 5-WAY FEMALE CONNECTOR |
| 587579C1 | SEALING PLUG (FOR EMPTY CONNECTOR CAVITIES) |
| **NOTE –** Any unused circuit cavities must be plugged with the sealing plugs provided with the chassis harness. | |

**Commonly Used Electrical Integration Small Components Table**

### 26.6. Suppression

International® strongly recommends electromagnetic devices be electrically suppressed, when adding devices such as relays, magnetic switches, and solenoids.

Unsuppressed electromagnetic devices can generate large voltage spikes which are conducted into the vehicle electrical system. These voltage spikes may adversely affect customer added electronic devices and in some instances may affect International installed electronic components.

When installing electromagnetic devices, specify suppressed units. If suppressed units are not available, diode suppression may be added as shown below:

The following suppressed relays and magnetic switches are available from International.

**Suppressed Relays and Magnetic Switches:**

| PART NUMBER | DESCRIPTION |
|---|---|
| 1691520C91 | MAGNETIC SWITCH - CONTINUOUS DUTY (SUPPRESSED) 100 AMP |
| 1693479C91 | MAGNETIC SWITCH - INTERMITTENT DUTY (SUPPRESSED) 100 AMP |
| 3519350C1 | MICRO RELAY – SPDT (SUPPRESSED), NO – 20 AMP, NC – 10 AMP |

### 26.7. Welding Information

Electric Welding on the electric vehicle is not recommend. The exception is welding performed at the rear end of the frame to accommodate lift gate installations.

Whenever electric welding is done on any part of the vehicle, it is not necessary to disconnect the International electronic modules in the cab such as the BCM, RPM, and the instrument cluster. The welder's GND must be connected as close to the weld as possible. Disconnect both the positive (+) and the negative (-) battery cables including the electronic power feeds prior to electric welding. If it is necessary to weld close to an electronic component, it is recommended that the component be temporarily removed.

Devices should also be covered with a protective blanket to prevent splatter from damaging any components.

Consult manufacturer's instructions for all other electronic modules such as Bendix ABS and WABCO ABS.

## 26.8. Routing Guidelines

Any hosing, tubing, battery cable, wiring or electrical harness must not rub on a sharp edge. However, due to the high abrasion resistance of synflex tubing, it is permissible for synflex tubing to make contact with the lower edge of the frame rail flange when the tubing is making the transition from the outside to down and under the rail. This does not mean that proper clearance or the need for protective wrap is not needed when synflex line contacts sharp edges or threaded fasteners.

Any hosing, tubing, battery cable, wiring or electrical harness must not rub or make contact with a hot surface.

Nothing should rub or make contact with the copper compressor discharge tubing other than the clamp(s) that support it.

All hosing, tubing, battery cables or electrical harnesses should be supported at least every 18" to 20".

Strap locks used to directly clamp, or support battery cables or main engine wiring harnesses must be no less than 7/16" in width.

Strap locks are not to be used on any bulk hose materials (heater hoses, make-up lines, etc.).

Strap locks are not to be used on any Orange high voltage circuits or conduit.

**Route and Clip Recommendations:**

**Electrical Harness:**

| PROBLEM | REQUIREMENT |
|---|---|
| SHARP OR ABRADING SURFACE | NO CONTACT |
| TENSION ALONG HARNESS/WIRES/HOSE | NONE |
| DISTANCE FROM MOVING PARTS | 1" |
| CONNECTOR CLIPPED TO AVOID DAMAGE | YES |
| CONNECTORS ARE SEALED | YES |
| MAX EYELETS PER STUD | 3 |
| HARNESS PROTECTED FROM DAMAGE | YES |
| DRIP POINT FOR HARNESS | YES |
| DISTANCE OF HARNESS TO FLAMMIBLE FLUIDS | 1/2" |
| HARNESS LOCATION TO FLAMMIBLE FLUIDS | NOT DIRECTLY UNDER |
| BATTERY CABLES TO FLAMMIBLE FLUIDS | 1" MINIMUM |

| | |
|---|---|
| BATTERY CABLE TO CONDUCTIVE SURFACE | 1/2” MINIMUM |
| BATTERY CABLE TIE STRAP | 1/2” (250 POUND) WIDE |
| HARNESS CONTACT WITH METAL SURFACE | NO RELATIVE MOTION |
| P-CLAMPS – ELECTRICAL | CUSHIONED ONLY |
| P-CLAMPS FASTENING SUPPORT | NO CANTILEVER |
| HIGH PRESSURE PIPE/HOSE (>200 PSI) | DON’T CLIP ANYTHING TO THEM |
| HARNESS THROUGH METAL HOLES | USE GROMMET |
| FULL ARTICULATED POSITION | OPERATES WITH OUT DAMAGE |
| CLIPPING FIXED MAX DISTANCE - HARNESS | 14” |
| SPLICES | USE SHRINK WRAP |

## 26.9. Wire Splicing and Termination - Standard Terminals and Splices:

### Standard Terminals

1. Cut the cable just before the insulation wings on the terminal.

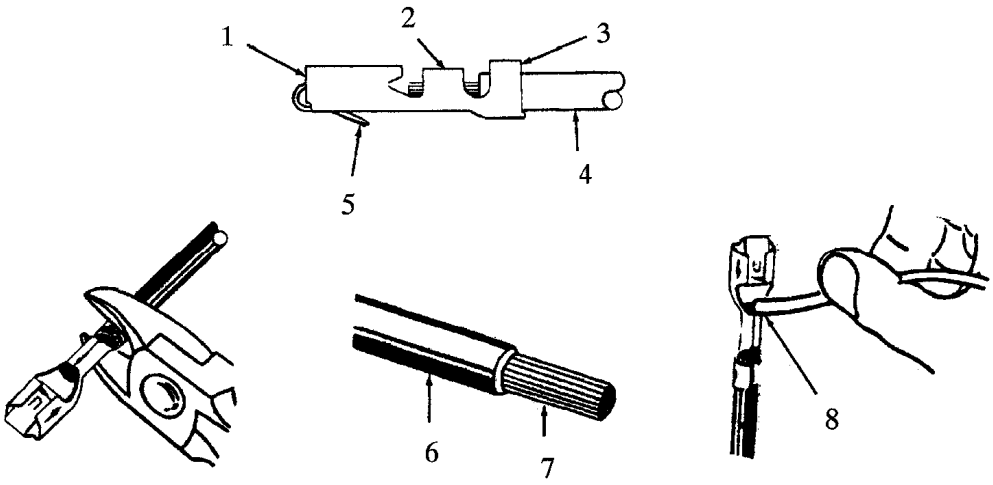
2. Remove the insulation being careful not to cut any of the wire strands.

3. Position cable in the new terminal.

4. Hand crimp the core wings first, then the insulation wings.

**NOTE -** Always use the recommended crimp tool for each terminal. A detailed crimp chart is included in the repair kit.

5. Solder all hand crimped terminals and electrically check for continuity.

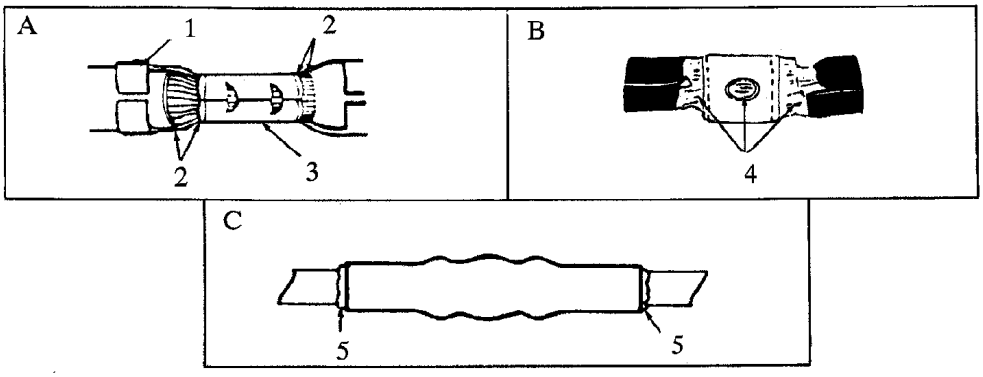



**Standard Terminal**

1. MATING END

2. CORE WINGS
3. INSULATION WINGS
4. CABLE
5. LOCK TANG
6. INSULATION
7. WIRE STRANDS
8. SOLDER

**Splice Inspection:**




**Splice Inspection**

A. TERMINAL APPLICATION
1. INSULATION CRIMP
2. WIRE STRANDS VISIBLE IN THIS AREA
3. CORE CRIMP
B. SOLDER APPLICATION
4. GOOD SOLDER APPLICATION
C. CRIMP AND SEAL HEAT APPLICATION
5. EVIDENCE OF GLUE

**Splice Clip Installation**
**NOTE -** A new clip must be located a minimum of 1.5 inches (40 mm) from a connector, sleeve or another clip.

1. Cut off the old clip or bad section of wire.

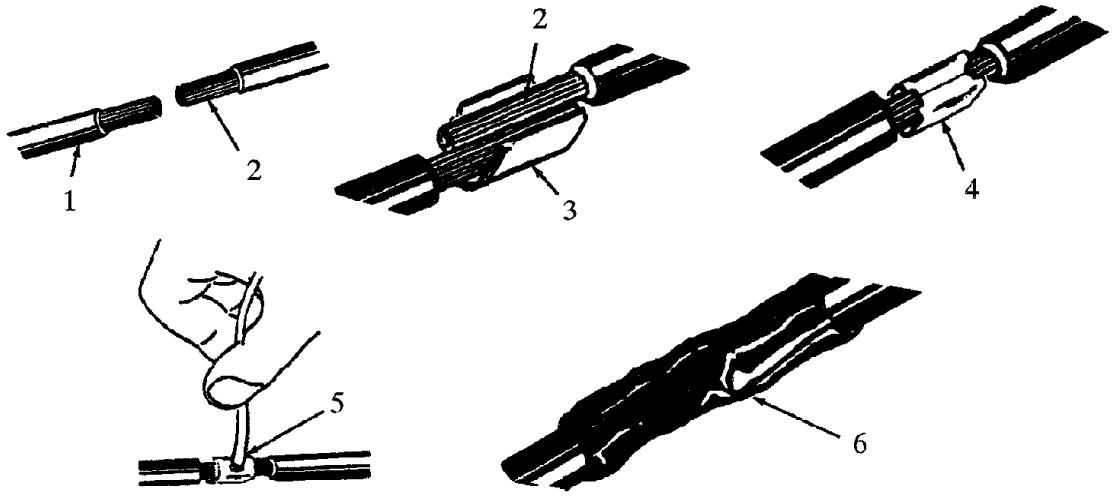
2. Remove the insulation being careful not to cut any of the wire strands.

3. Install the proper clip on the wire strands.

4. Hand crimp the clip until securely fastened.

5. Solder the clip and electrically check for continuity.

6. Cover the entire splice with splice tape. Extend the tape onto the insulation on both sides of the splice(s).




**Splice Clip Installation**

1. INSULATION
2. WIRE STRANDS
3. CLIP (POSITIONED CORRECTLY)
4. CRIMPED CORRECTLY
5. SOLDER
6. TAPE

**Crimp and Seal Splice Sleeve Installation:**

**Parts Information:**

| Part Number | Description | Quantity |
|---|---|---|
| 3517501C1 | 12-10 AWG Splice | 2 |
| 3517502C1 | 16-14 AWG Splice | 7 |
| 3517503C1 | 22-18 AWG Splice | 2 |
| 2644000R1 | Dual Wall Heat Shrink, 50mm | 50 |

**NOTE -** A new sleeve must be located a minimum of 1.5 inches (40 mm) from a connector, clip or another sleeve.

1. Cut off the old sleeve or bad section of the wire.

2. Remove insulation being careful not to cut any of the wire strands.

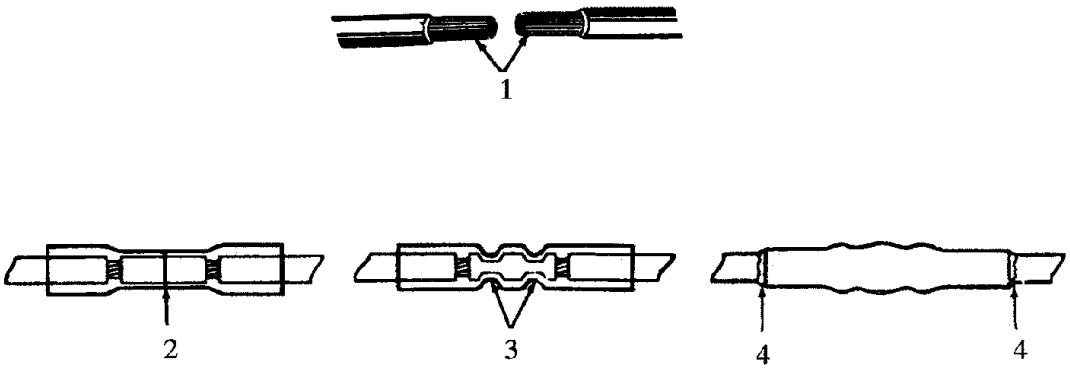
3. Install the proper sleeve on the wire strands, making sure the ends of the wire hit the stop.

4. Hand crimp to the sleeve. Gently tug on the wire to make sure that they are secure.

**NOTE -** Always use the recommended crimp tool for each sleeve. A detailed crimp chart is included in the Repair Kit.

**Caution - Use an appropriate heat gun. Do not use a match or open flame to heat the sleeve seal.**

5. Electrically check the sleeve and wire cable for continuity.

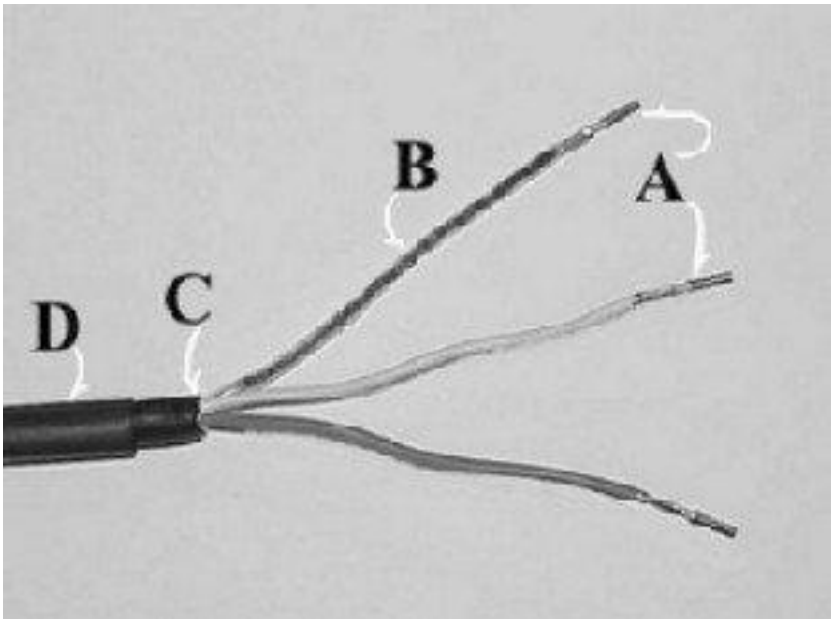



**Crimp and Seal Splice Sleeve Installation**

1. WIRE STRANDS
2. WIRE STOP
3. CRIMP CONNECTOR
4. EVIDENCE OF GLUE

**Data Link Repair:**
**J1939/11 Shielded Only**
Repairs to damaged J1939 circuits should be accomplished using identical types of wiring. Splices should be crimped, soldered and covered with heat shrink. Ensure the twist in the wire pair is maintained and that any wire bundles in the engine compartment are shielded and covered with heat shrink.

**Wire Repair**
This instruction addresses termination and splicing of J1939 wire.




**Preparation of J1939 Wire for Connection**

1. Strip back (view C) outer shield 3 1/8 in. (76 mm).

2. Strip (view A) green wire and yellow wire 1/4 in. (6.35 mm) being careful not to cut individual strands.

3. Re-twist all three wires if they have separated.

4. Sleeve drain wire (view B) may be soldered to aid in sleeving.

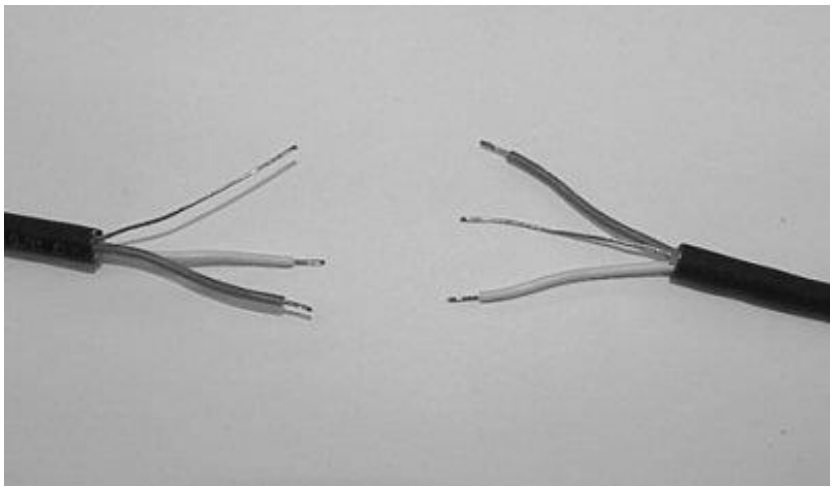
5. Install terminals on green and yellow wire ends, and crimp.

6. The 1/4" heat shrink tube (view D) will be shrunk later after the wires have been inserted into the crimp connector.

**Wire Splicing**

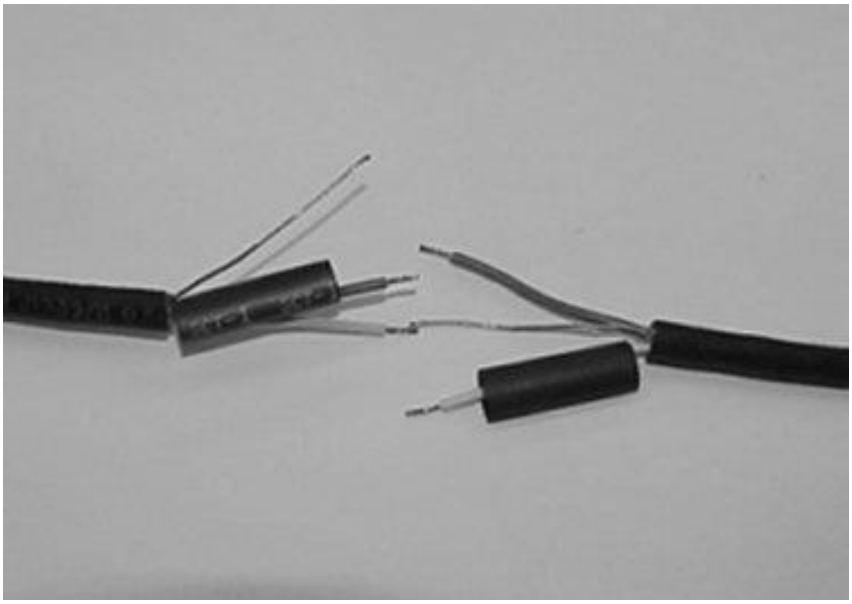
1. Strip wire ends 1/4 inch.

2. Re-twist any loose wires.



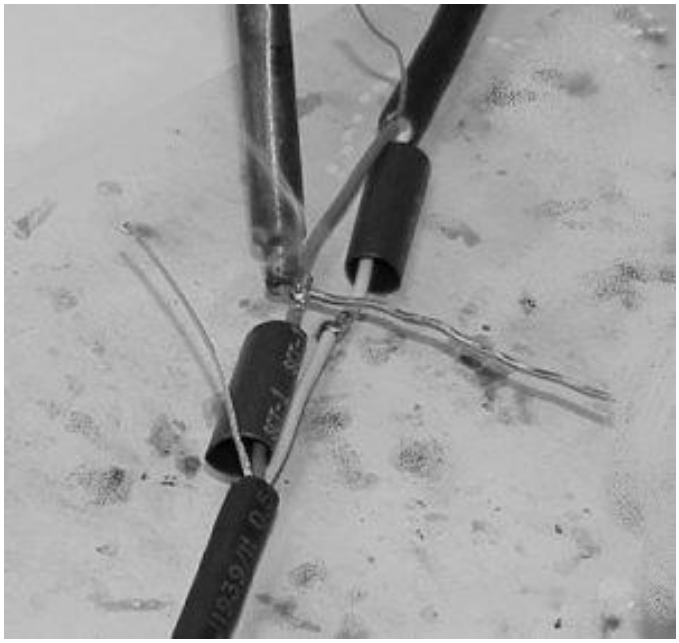
**Re-Twist Any Loose Wires**

3. Slide 2-inch pieces of heat shrink tube over wire for later use.



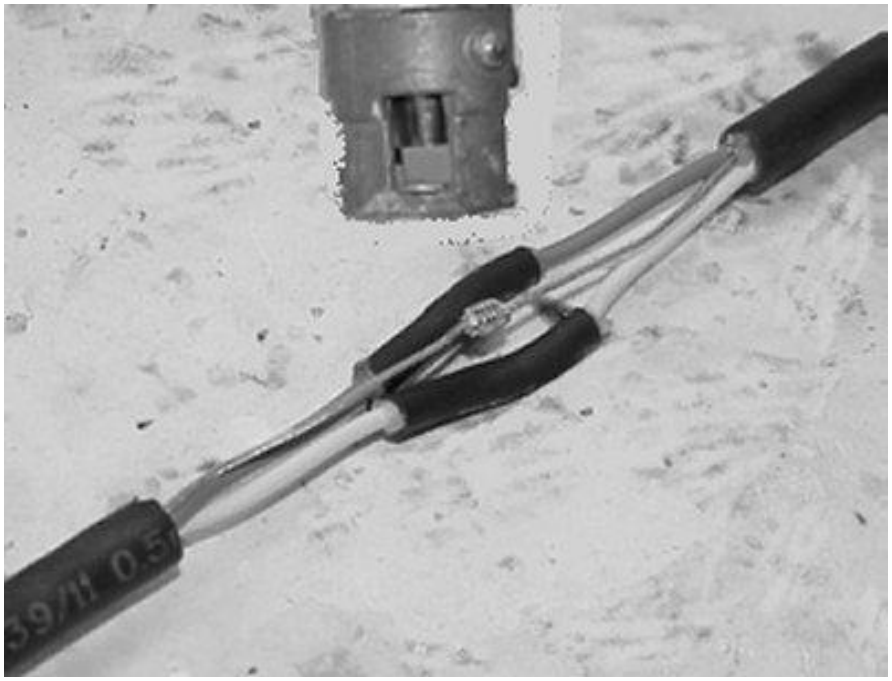
**Put Heat Shrink Tube Over Each Wire**

4. Put heat shrink tube over each wire.
5. Insert ends of wires into splice joint and crimp.
6. Solder the wires and crimp joint together.



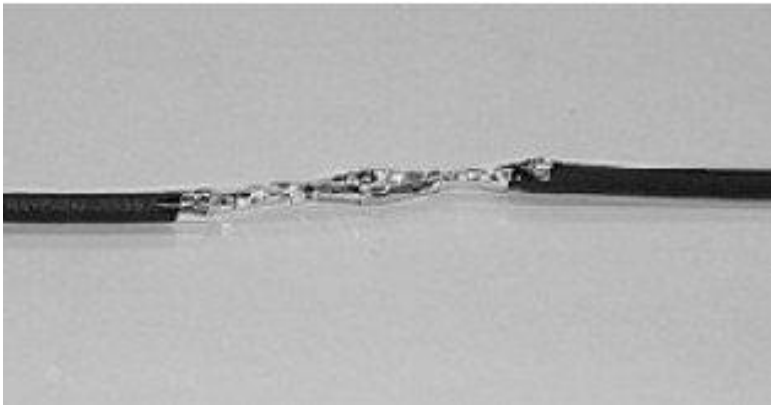
**Solder Wires Together**

7. Center heat shrink tube over splice and shrink.



**Center Heat Shrink Tube Over Splice**

8. Wrap wires with foil tape. Maintain at least 1/2 wrap overlap.



**Center Heat Shrink Tube Over Cable**

9. Center heat shrink tube over the splice and shrink.

**Center Heat Shrink Tube Over Cable**

**J1939 HIGH SPEED DATA LINK CABLE (SAE J1939/15):**
The information in this section applies to all severe and medium vocational series models.

Performing the proper repairs or modifications of the cable is critical to the integrity and performance of the vehicle systems. (For repair procedure see Electrical Troubleshooting Guide - S08250 or Data Link Repair in this manual.) This information based on SAE J1939/15 and TMC RP 142.

These instructions are intended for modifications that meet the SAE spec, i.e., no internal resistor. When extending the backbone, the proper materials must be used. The data link cable consists of a twisted pair of insulated wires and are covered by an insulating jacket. The data link cable must meet the SAE - specified characteristic impedance of 120-ohms. Never splice regular automotive type wire such as GXL, SXL,

TXL into the data link cable. Use data link cable furnished by Raychem, part number 2021D0309.

The backbone is the main part of the cable. This is terminated at each end with a 120-ohm resistor. When adding a device, the backbone must be extended. This is done by removing the resistor, inserting the backbone extension, then plugging the resistor and the device into the extension.

**J1939:**
J1939 is a high-speed serial communications data link. The system requires two terminating resistors. The wire between these two resistors is called the backbone. The backbone cannot be longer than 131.2 feet (40m). A module can tap into the backbone. This point is called the Node. The distance between two nodes cannot be less than 3.9 inches (0.1m). The cable length from the node to the module cannot be longer than 9.8 feet (3m).

## 26.10. HIGH VOLTAGE CIRCUITS (GREATER THAN 50 VOLTS) ON INTERNATIONAL TRUCKS AND BUSES:

**WARNING** – To avoid property damage, personal injury, or death, refer to the manufacturer's service information before working on any high voltage equipment. By definition, high voltage circuits and components contain voltage levels that may cause equipment damage, electrical shock, and/or electrocution if handled incorrectly.

Only a trained technician may perform service inside high voltage components. When working around or maintaining high voltage circuits, please seek high voltage training.

**NOTE** – The intent of this section is to provide some basic guidelines when working on or around International vehicles that are equipped with high voltage electrical equipment and circuits. For specific instructions, maintenance, or service information on specific equipment or options, refer to the service manuals for the specified truck models and component(s). It IS NOT the intent of this section to provide detailed service instructions for high voltage equipment and circuits.

**Only a trained technician may perform service inside high voltage components. If working around or maintaining high voltage circuits, please seek high voltage training.**

High voltage systems require the maintainer to be familiar with two types of electrical systems.

**DC (Direct Current)**

Most DC systems on today's trucks use 12volt negative GND. Some systems can store DC electricity in batteries with operating voltages as high as 600 DC volts.

## AC (Alternating Current)

The main difference between AC and DC systems is that the voltage levels in DC systems remain constant while the voltage levels in AC systems are constantly changing. When measuring an AC system, it is important to know that the average voltage is zero, and that is why ***A VOLTMETER SET TO DC WILL NOT INDICATE THE PRESENCE OF AN AC VOLTAGE WHEN CONNECTED TO AN AC CIRCUIT!***

High voltage can be lethal. Always refer to the manufacturer of the high voltage component when maintenance or repairs are needed. In most cases, diagnostics and repair are performed after the high voltage circuits are disabled. If working around or maintaining high voltage circuits, please seek high voltage training.

**WARNING** – To avoid property damage, personal injury, or death, circuits must be checked using a voltmeter for the presence of both DC and AC voltages. A voltmeter set to DC will not indicate the presence of an AC voltage when connected to an AC circuit! Contacting an unknown AC or DC voltage may cause equipment damage, electrical shock, and/or electrocution.

**Understanding High Voltage Equipment and Circuits on International Products:**
Some examples of high voltage equipment that can be encountered on products are as follows:

### — Auxiliary Power Units (APUs)

APUs are basically small diesel-powered generator units that are integrated into the vehicle electrical system. APUs are utilized in combination with inverters and battery chargers. APUs are often set up to automatically start when the electrical management system deems it necessary to maintain battery charge or electrical demand requires it.

**NOTE -** APU high voltage wiring might NOT be marked for easy identification as high voltage.

### — Shore Power

Shore power is a connection from a vehicle to an external 120Volt AC power source. The vehicle is equipped with an exterior receptacle that allows connection to an external “shore” power source.

**NOTE** – High voltage shore power wiring may NOT be marked for easy identification as high voltage.

**— Inverters**

Inverters are electronic devices used to change DC (Direct Current) into AC (Alternating Current). Some inverters contain converters that also convert AC to DC for battery charging or running 12V equipment.

**— Converters**

Converters are electronic devices used to change high voltage DC (Direct Current) to low voltage DC for battery charging.

**NOTE** – High voltage wiring for inverters may NOT be marked for easy identification as high voltage.

**—Electric Vehicles (EVs)**

EVs use high voltage batteries and an electric motor to propel the vehicle. High electrical voltages and currents are present.

**NOTE** – The industry standard for high voltage cables is for the cables to be covered in ORANGE CONDUIT.

If orange conduit is observed on a vehicle, please review the safety precautions for that system.

**How to Identify High Voltage Circuits:**
High voltage circuits are not always connected with large wires. The best way to identify high voltage equipment or circuits is to be familiar with the equipment and circuit diagrams as well as to look for high voltage warning labels and orange conduit. **Inspect the vehicle for any equipment or circuits added after the truck was built (owner/operators may add high voltage components such as inverters or APUs).**

All electrical circuits associated with APUs, shore power, inverters, and EVs should be considered high voltage. The standard for high voltage cabling on EVs is orange. APUs, inverters, shore power, and cabin 110/120V outlet wiring may not indicate high voltage by visual inspection (they may not be marked and are NOT orange in color).

**Servicing International Products:**
The following steps outline the appropriate method to follow to identify and address any maintenance or service on International products with factory-installed high voltage equipment.

1. Complete related training prior to attempting to identify and service any high voltage system.

2. Review the line-set ticket provided with the vehicle or from the Service Portal and identify all high voltage components. Inspect the vehicle for any equipment or circuits added after the truck was built (owner/operators may add high voltage components such as inverters or APUs that could be live and powering circuits in the vehicle EVEN WITH THE IGN OFF AND THE BATTERIES DISCONNECTED).

3. Refer to manufacturer's service publications for identified high voltage components.

4. Physically locate high voltage components on the vehicle and disable them according to manufacturer's instructions (some components may require a waiting period or special procedures to discharge the voltage completely).

5. Use Best Work Practices (see below) when performing work on electrical systems.

**Best Work Practices:**

**WARNING** – To avoid personal injury or death, permit only trained responsible and capable persons to operate or maintain the equipment. Carelessly operating or neglecting maintenance despite the safe design of any vehicle and its high voltage equipment may result in personal injury or death.

The danger of injury through electrical shock is possible whenever electrical power is present. Most fatal injuries result from high-voltage exposure; however, people can sustain severe injuries from low voltage power if it has a high current flow.

- Be aware of ALL high voltage equipment on the vehicle; review line-set/build ticket and the owner and service manuals of high voltage equipment **BEFORE** starting any work.
- When working on this equipment, remain alert at all times. Never work on the equipment when physically or mentally fatigued, and never work alone near high voltage equipment.
- Always stand on an insulated, dry surface when working on any electrical circuit. Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet.
- Always work in an adequately illuminated area.
- Always use appropriate protective equipment: insulated gloves, rubber gloves, goggles/face shield, safety shoes, protective clothing, and insulated tools when working on electrical components/circuits of the vehicle.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock or burns and may get caught in moving components causing injury.
- When working on vehicles that have high voltage devices or equipment, use appropriate alerting techniques in plain view to warn people that may be in the general area and to

prevent inadvertent activation of any disabled high voltage circuit(s) during service: safety signs, safety symbols, tags, barricades, cones, etc.

- Keep a fire extinguisher close by at all times. Extinguishers rated "ABCM" by the National Fire Protection Association are appropriate for use on the electrical system. Make sure the extinguisher is properly charged and be familiar with its use. Consult the local fire department with any question pertaining to fire extinguishers.
- Ensure that the high voltage power, high voltage power generating equipment, and high voltage storage devices are disconnected, locked out, or otherwise disabled BEFORE working on or around the vehicle, its electrical circuits, or components. Unless disabled, Auxiliary Power Units (APUs) may start at any time without warning; when this occurs, the circuits associated with the APU become energized with potentially lethal high voltage. Some components may require a waiting period or special procedures to discharge the voltage completely.
- Use an appropriate electrical tester and procedures to confirm that the power is disconnected **BEFORE performing any work on or near any high voltage components/circuits**.
- Exercise caution around output circuits even when the input power is off. Parallel power sources and energy storage devices can still be dangerous. Be familiar with the high voltage equipment installed on the vehicle. Some systems contain high voltage condensers that may require time to discharge after power is removed.
- After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulation tape.
- After completion of any electrical work, **BEFORE restoring the power, verify that parts and/ or tools are removed from the work area and that the fasteners are firmly tightened to the specified torque and the connectors are correctly connected.**
- **Voltage can be fatal at levels greater than 60 volts. High voltage can jump a larger air gap than low voltage. If contact is made with high voltage, it may not be possible to simply "let go."**
- **Towing an EV with its drive wheels on the ground may cause the motor to generate electricity. Consult the operator's/owner's manual for proper towing procedures.**
- **If a high voltage fuse or circuit protection device trips, do not re-energize the circuit until it has been determined that the circuit is safe. See manufacturer's troubleshooting procedures before servicing a high voltage system.**
- Reference OSHA Regulations as necessary and applicable.