

# **SERVICE MANUAL**

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## **SERVICE MANUAL SECTION**

**Body Builder Electrical Data Book for Models Built Starting March 1, 2007**

**S08323**

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## 1. FOREWORD

**Contents** — In this manual, International® Truck and Engine Corporation provides information about its different products to assist those who wish to modify these products 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, a fifth wheel, 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.

In addition to this Body Builder Electrical Data Book, publication CT-471, Body Builder Data, may be required. The CT-471 - Body Builder Data is a set of booklets which includes a General Information Body Builder Data booklet for information about the International® Truck and Engine product line; model series Body Builder Data booklets which contain information related to the features and specifications for each of their respective models; Component Body Builder Data booklet containing information for components which have common application in two or more truck series and any supplemental Body Builder Data booklets containing information for components which have common application in two or more truck series.

## 2. SAFETY INFORMATION

**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 of the procedures and instructions before you begin work on the unit.

International uses the following types of notations to give warning of possible safety problems and to give information that will prevent damage to the equipment being serviced or repaired.



**WARNING** – A warning indicates procedures that must be followed exactly. Personal injury or possible death, along with damage to the vehicle, can occur if the procedure is not followed.

**CAUTION** – A caution indicates procedures that must be followed exactly. If the procedure is not followed, damage to equipment or components can occur.

**NOTE** – A note indicates an operation, procedure or instruction that is important for correct service.

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.

### 3. INTRODUCTION

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

**NOTE – After-market installed wiring for engine speed control 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 twisted together 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 transmission is in neutral, parking brake is set, and the wheels are blocked before undertaking service procedures. In addition, turn off the engine when you leave the vehicle. Never leave the vehicle unattended with the engine running.**



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

- Whenever disconnecting 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 insulate pliers and screwdrivers.

## 4. INTERNATIONAL DIAMOND LOGIC® ELECTRICAL SYSTEM OVERVIEW

### 4.1. MULTIPLEXING ARCHITECTURE

Unlike the electrical systems on previous models, which utilized point-to-point wiring for all input signals and output loads, 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 engine oil pressure, 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 together by data links. The data links can be thought of as computer networks that allow the electronic components on the vehicle to communicate with one another.

The concept of multiplexing is not new since data links for communicating between engine controllers, the instrument cluster and the diagnostic connector have been used for several years.

The goal of multiplexing is to reduce cab harness wiring and to simplify circuits. This is accomplished by using a low current data link for communicating between cab switches, the Body Controller and the Instrument Cluster. Other data links in the vehicle allow other electrical controllers, the BC and the Instrument Cluster to communicate with each other.

### 4.2. DATA LINKS

International's multiplexing uses two types of data links, J1708 and J1939. The J1708 data link is often referred to as ATA and J1939 is often referred to as CAN. These two types are utilized in four separate data links on the vehicle.

- **Power Train data link – J1939**

This data link provides a path for communication between the engine controller, transmission controller, antilock brake system (ABS) controller, pyrometer ammeter module (PAM), Body Controller (BC), auxiliary gauge switch pack (AGSP) and the electronic gauge cluster (EGC). It also provides for programming and diagnostic functions.

- **Body Builder data link – J1939**

This data link provides a path for communication between the remote power module(s), remote PTO, air solenoid 7 pack(s) and the BC.

- **Switch data link – J1708**

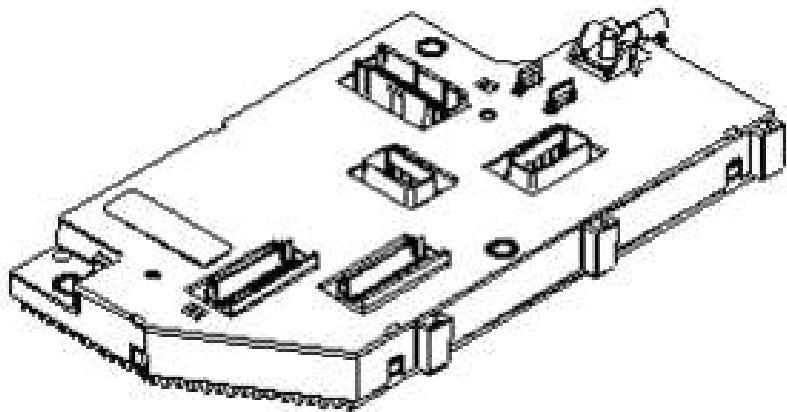
This J1708 data link provides a path for communication between the center panel switch packs, door pods and BC.

- **ATA data link – J1708**

This is the same J1708 data link (sometimes referred to as ATA) that has been used in the past. This data link is used almost exclusively for communicating with the engine diagnostic and programming tool to identify engine electrical system problems or program desired settings controlled by the engine ECM.

### **4.3. BODY CONTROLLER (BC)**

The heart of the multiplex system is the BC.



**Figure 1**

The BC communicates with the switch packs on the switch datalink, controllers from other features on the power train datalink, and RPMs on the Body Builder datalink. It also receives input from various sensors and hard wire inputs throughout the truck. The BC 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 BC.

### **4.4. REMOTE POWER MODULE (RPM)**

RPMs 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.



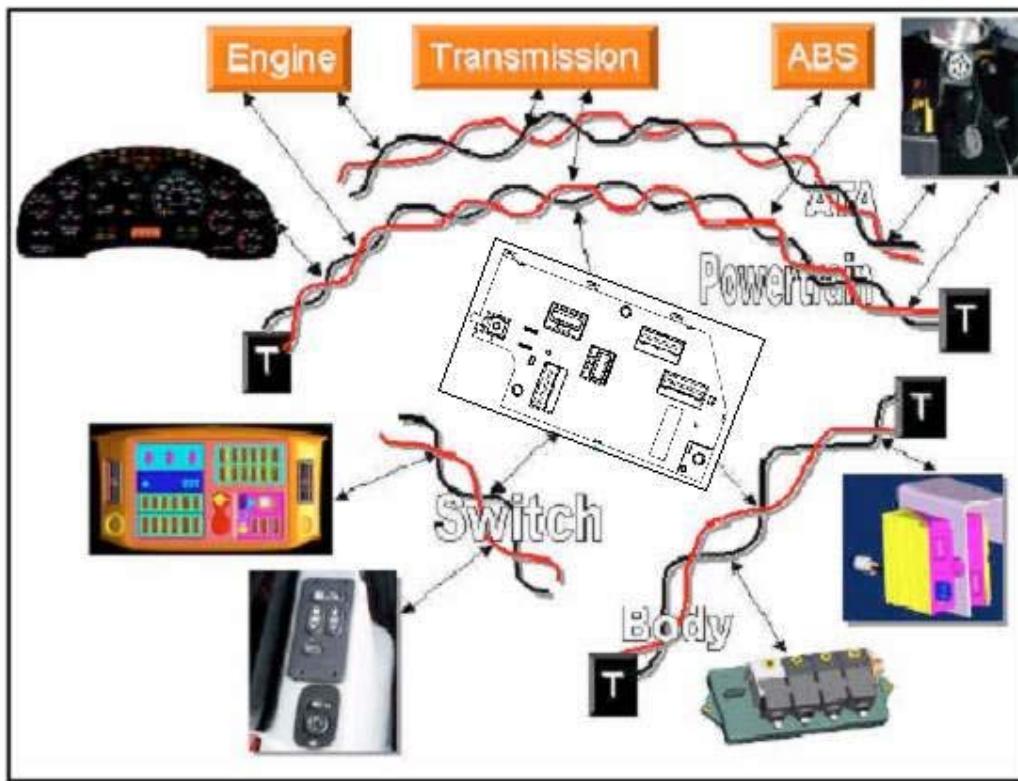
**Figure 2**

The RPM is connected to the BC via the Body Builder J1939 datalink (the BC 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 BC. 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 BC via the datalink, it also serves as an “integration gateway” to the BC and the vehicle electrical system. Six inputs on each RPM allow information from body accessories to be communicated to the BC 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.

Additional information concerning the use and installation of RPMs is contained in the applicable Feature sections that follow (see 60AAA/60AAB in particular for detailed data on RPM connectors/pin functions, wiring, and mounting).

The following is an example of how a vehicle electrical system might be configured.



**Figure 3**

The International Diamond Logic® electrical system, along with the Diamond Logic® Builder software, provide the Body Builder with an unprecedented flexibility in adding and customizing the electrical features on a vehicle.

## 5. GENERAL ELECTRICAL

### 5.1. DESCRIPTION

International vehicle electrical systems are becoming increasingly complex with the addition of a BC, electronic engine and transmission controls, electronically driven instrument gauges, and Antiroll Brake Systems (ABS) to name a few. While most systems still operate on battery voltage (12 volts), some systems operate at as high as 107 volts (electronic fuel injection) and as low as five (5) volts (electronic engine controls).

International publishes Electrical Circuit Diagram 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 for assistance at its Tech Central Department, telephone 1-800-336-4500.

### 5.2. COLOR CODE SYSTEM FOR INTERNATIONAL® TRUCK

**Table 1 Color Code System**

Color	Description
Red	Alternator/Battery Feeds

**Table 1 Color Code System (cont.)**

Color	Description
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	Engine / Chassis Systems (Fuel Solenoid, Horn, Etc.); Data Link J1708 (-)
Tan	Engine / Chassis Monitoring Systems (Gauges)
Green	Data Link J1939 (-)
Light Green	Driver Aid Systems (Windshield Washer, Heater, Etc.)
Violet	Engine 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.

### 5.3. RECOMMENDED CIRCUIT PROTECTION

**Table 2 Recommended Circuit Protection**

Wire Gauge	Protective Device Size	Maximum Current (Amps)
18 Ga	10 AMP Fuse/ Circuit Breaker	8 A
16 Ga	15 AMP Fuse/ Circuit Breaker	12 A
14 Ga	20 AMP Fuse/ Circuit Breaker	16 A
12 Ga	25 AMP Fuse/ Circuit Breaker	20 A
10 Ga	30 AMP Fuse/ Circuit Breaker	24 A
8 Ga	12 Gauge Fusible Link	80 A
6 Ga	10 Gauge Fusible Link	108 A
4 Ga	2–12 Gauge Fusible Link	160 A

**CAUTION –** Wire gauge is designed to match fuse / circuit breaker rating. Do not increase the size of a circuit breaker or fuse. To do so could cause wiring to overheat and burn.

## 5.4. CIRCUIT PROTECTION DEVICES

**Table 3 Circuit Protection Devices**

Size	Circuit Breakers	Part Number	Color
7.5 A	Type III — Manual Reset	3536177C1	Brown
10 A	Type III — Manual Reset	3536178C1	Red
15 A	Type III — Manual Reset	3536179C1	Blue
20 A	Type III — Manual Reset	3536180C1	Yellow
25 A	Type III — Manual Reset	3536181C1	White
30 A	Type III — Manual Reset	3536182C1	Green
Size	Fuses	Part Number	Color
5 A	MINI — SAE J2077	3534208C1	Tan
7.5 A	MINI — SAE J2077	3546109C1	Brown
10 A	MINI — SAE J2077	3534209C1	Red
15 A	MINI — SAE J2077	3534210C1	Blue
20 A	MINI — SAE J2077	3534211C1	Yellow
25 A	MINI — SAE J2077	3534212C1	Natural
30 A	MINI — SAE J2077	3534213C1	Green

Circuit breakers and fuses can be installed in the chassis wiring using the following in-line connectors:

- 1676841C91 - Inline socket and cable for circuit breaker/fuse (20 A Maximum)
- 1682115C91 - Inline socket and cable for circuit breaker/fuse (30 A Maximum)

**Table 4**

Size	Devices	Part Number	Color
20 A	Autofuse	131224C1	Yellow
20 A	Circuit Breaker — Type III	3529688C1	
30 A	Autofuse	571691C1	Green
30 A	Circuit Breaker — Type III	3529690C1	

## 5.5. ELECTRICAL COMPONENTS COMMONLY USED BY EQUIPMENT INSTALLERS

**Table 5**

3200, 4000, 7000	Type
<b>At Fuse Block</b>	
3536294C1	Terminal, Fuse Block (18/20 Gauge)
3573312C1	Terminal, Fuse Block (14/16 Gauge)
3573311C1	Terminal, Fuse Block (10/12 Gauge)

3200, 4000, 7000	Type
<b>At Tail Lights</b>	
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 sealing plugs provided with chassis harness.**

#### **Connectors 4450 and 4460**

Connectors 4450 and 4460 have their mating connectors attached filled with cavity plugs. To use connectors, remove cavity plugs and use the following:

**Table 6**

Terminals	Wire Gauge
2033912C1	12, 14
2033911C1	16, 18, 20
Cavity Seals	Wire Gauge
0589390C1	12
0589391C1	14
1652325C1	16, 18, 20
Mating Connector Part Nos.	
4450 Connector	2039312C91
4450 Lock	2039342C1
4460 Connector	3553961C1
4460 Lock	3554019C1

## **5.6. STANDARD TERMINALS AND SPLICES**

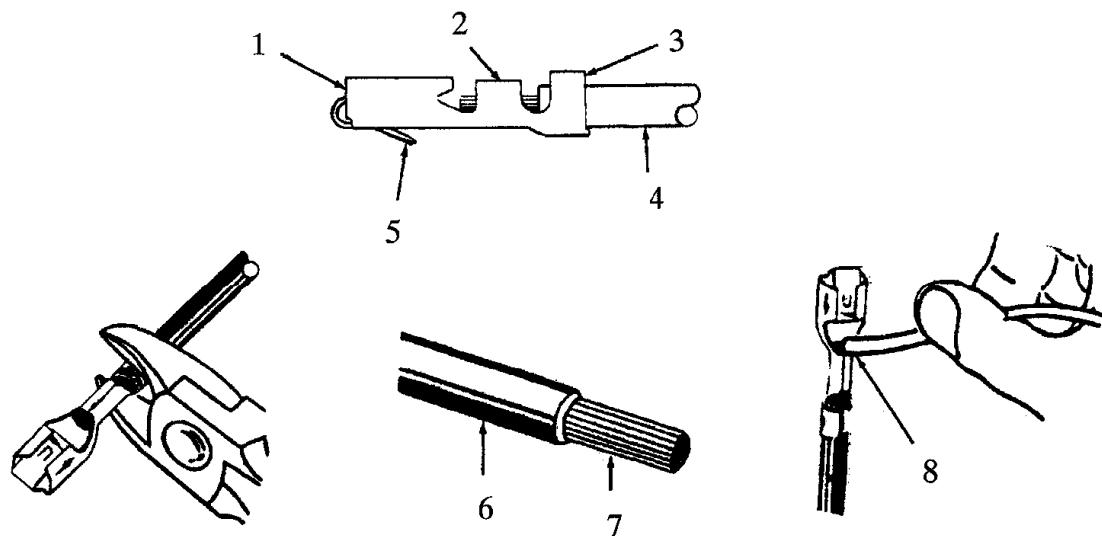
#### **Standard Terminals**

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.**

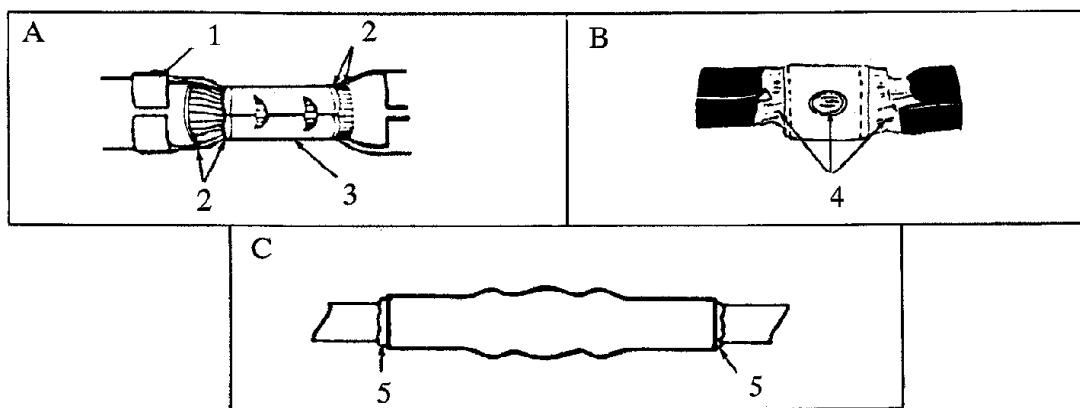
5. Solder all hand crimped terminals and electrically check for continuity.



**Figure 4 Standard Terminal**

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

## 5.7. SPLICE INSPECTION



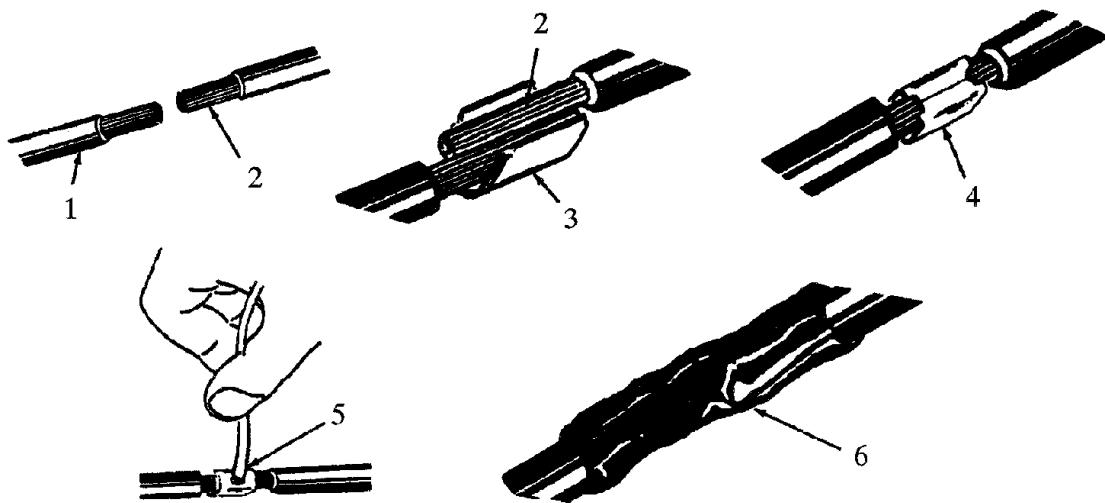
**Figure 5 Splice Inspection**

- 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

## 5.8. 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).



**Figure 6 Splice Clip Installation**

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

## 5.9. CRIMP AND SEAL SPLICE SLEEVE INSTALLATION

**Table 7 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

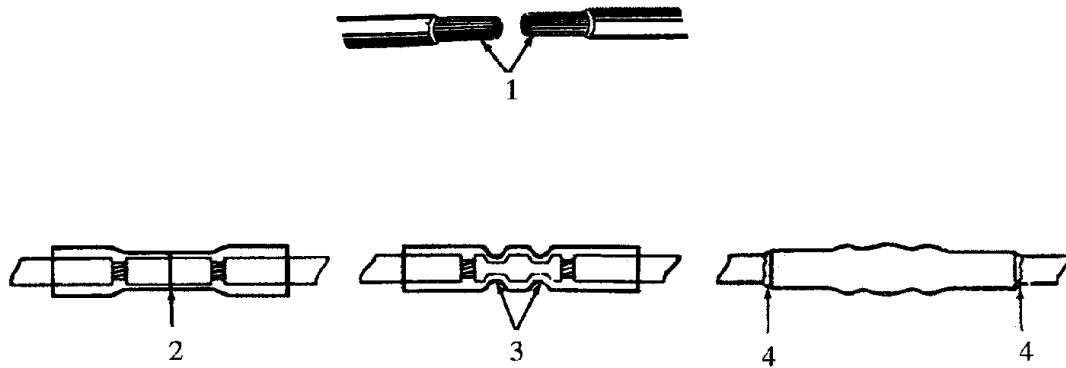
**NOTE – A new sleeve must be located a minimum of 1.5 inches (40 mm) from a connector, clip or another sleeve.**

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 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.



**Figure 7 Crimp and Seal Splice Sleeve Installation**

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

## 5.10. DATA LINK REPAIR

### J1708

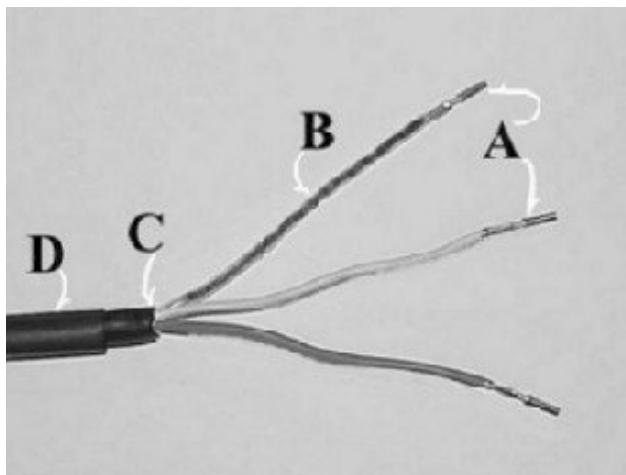
Repairs to damaged J1708 circuits should be accomplished using similar types of wiring. Splices should be crimped and soldered. Insure the twist in the wire pair is maintained and individual wires are covered with heat shrink.

### 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. Insure 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.

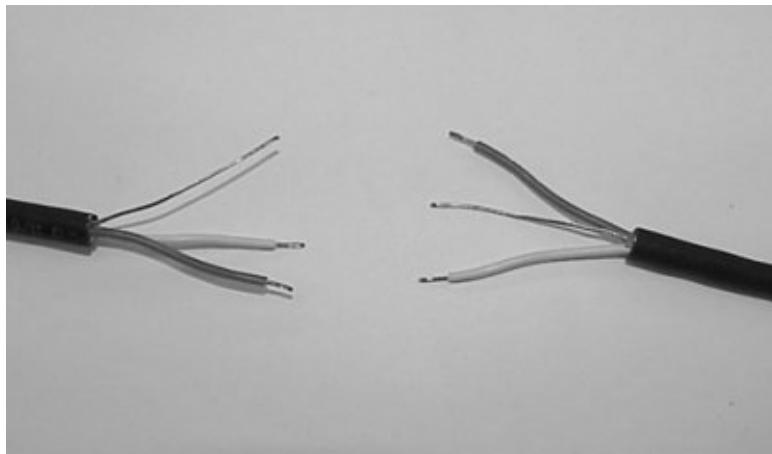


**Figure 8 Preparation of J1939 Wire for Connection**

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.

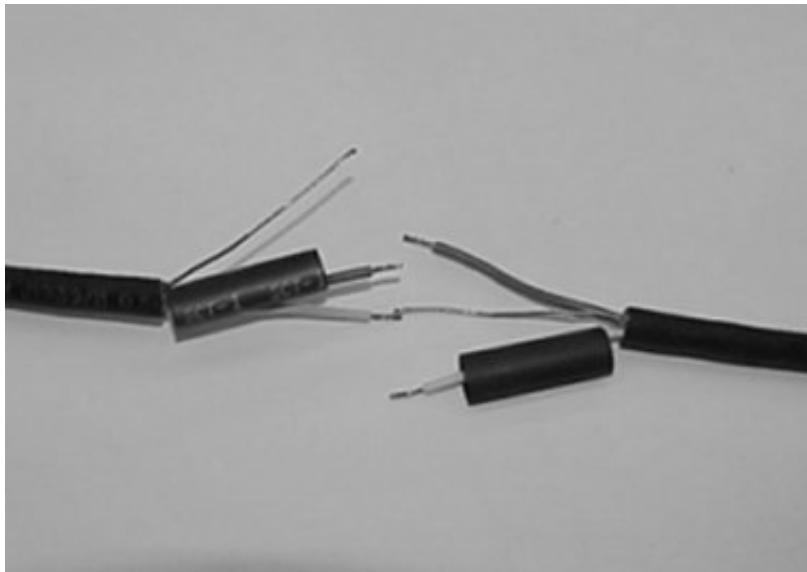
### 5.11. WIRE SPLICING

1. Strip wire ends 1/4 inch.
2. Re-twist any loose wires.



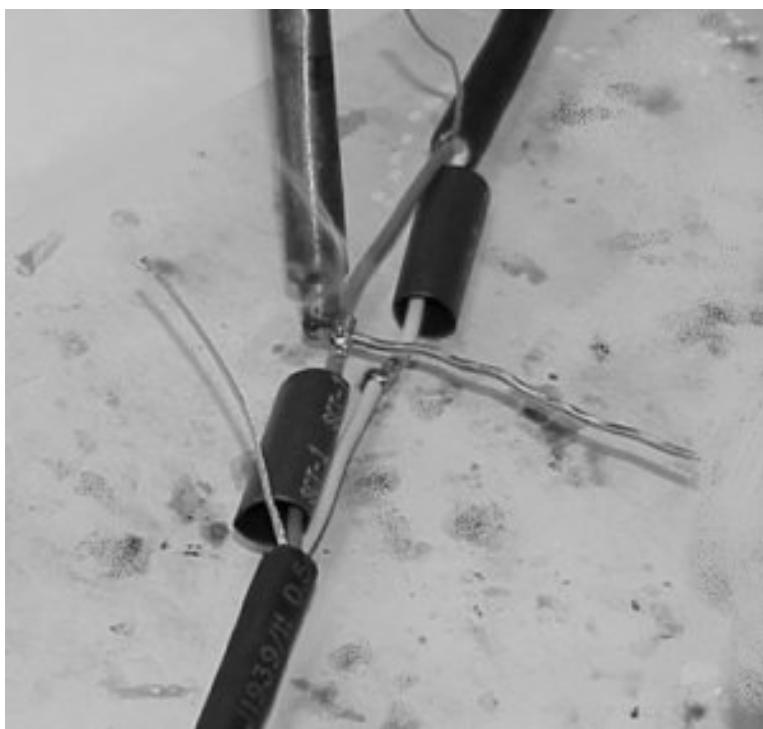
**Figure 9 Re-Twist Any Loose Wires**

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



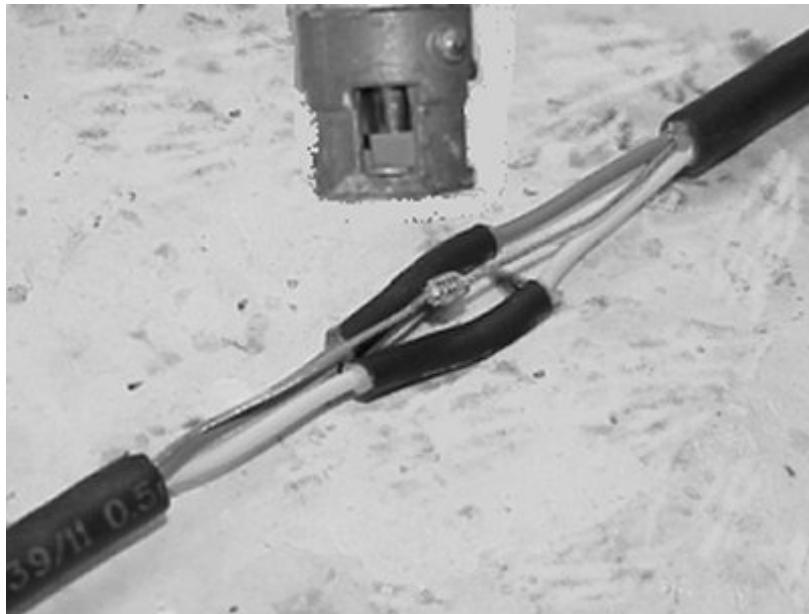
**Figure 10 Put Heat Shrink Tube Over Each Wire**

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.



**Figure 11 Solder Wires Together**

- 
- 7. Center heat shrink tube over splice and shrink.



**Figure 12 Center Heat Shrink Tube Over Splice**

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



**Figure 13 Center Heat Shrink Tube Over Cable**

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



**Figure 14 Center Heat Shrink Tube Over Cable**

## **5.12. J1939 HIGH SPEED DATA LINK CABLE (SAE J1939/15)**

The information in this section applies to all 3200, 4000, 7000, and 8000 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.

The International® high performance vehicle will always have a power train J1939 system. This is for key operations that come from the factory direct. A second J1939 system is put in place for body builders and will be referred to as body builder J1939. Circuit diagrams are shown in Chapter 9 of the Circuit Diagram Book (S08322) under Remote Power Units, Solenoid Packs, Remote Engine Speed Controller.

### **J1939**

J1939 is a high speed serial communications data link. The system requires two resistor caps. The first resistor cap for Body Builder J1939 currently starts in the engine compartment. The second resistor cap ends where the last module is placed. 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 can not 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).

With the research of the robustness of the J1939-15 lite (unshielded) International removed the shield from their high performance vehicle in January 2002. Mixing of the shielded (J1939-11) and unshielded (J1939-15) is not recommended.

## ADDING Body Builder J1939, Power and Grounds

Without any Body Builder J1939: Ask Service Parts for "the components needed to add the Body Builder J1939 datalink to the vehicle. Service part kits are available to add the datalink, RPMs and switch packs."

Most of the software information is processed in the BC. Therefore, the J1939 wires must be connected to the BC. Refer to Circuit Diagram Manual S08322, Chapter 10, Remote Power Units, Solenoid Packs, Remote Engine Speed Controller for proper circuit installation.

## 5.13. 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.**

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 12 volt 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.**

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

### **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 may NOT be marked for easy identification as high voltage.**

#### **— Shore Power**

Shore power is a connection from a vehicle to an external 120 volt 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.

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

#### **— Hybrid Electric Vehicles (HEVs)**

HEVs combine internal combustion engines with high voltage batteries, electric motors, and inverters to offer higher fuel efficiency and lower emissions without compromising power, range, and convenient fueling of conventional vehicles. Regardless of the HEV design, 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 HEVs should be considered high voltage. The standard for high voltage cabling on HEVs 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 ISIS, 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 "ABC" 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 a HEV 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.

## 5.14. SUPPRESSION

International® strongly recommends these electromagnetic devices be electrically suppressed, when adding electromagnetic 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.

**Table 8 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

## 5.15. WELDING INFORMATION

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 BC, RPM, and the instrument cluster. The welder's GND must be connected as close to the weld as possible. If the vehicle is equipped with an International engine, 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.

Consult manufacturer's instructions for all other electronic modules such as Allison Transmission, Eaton Auto Shift Transmission, Bendix ABS, Wabco ABS, Cummins Engine, Caterpillar Engine, and Detroit Diesel Engine.

## 5.16. 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. There should be 5" minimum clearance from the exhaust depending on the situation. The further back from the turbo, the less clearance required.

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".

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

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

### Route and Clip Recommendations

**Table 9 Heat Source**

Heat Source	Distance from
Exhaust Manifold to muffler inlet	6"
After treatment	8"

**Table 9 Heat Source (cont.)**

Heat Source	Distance from
Muffler inlet to tail pipe out	3"
Other (EGR discharge pipe/hose)	1/2"

**Table 10 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 flammable fluids	1/2"
Harness location to flammable fluids	Not directly under
Battery cables to flammable 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

## 5.17. ELECTRICAL DOS AND DON'TS

The information in this section applies to all 3200, 4200, 4300, 4400, and 7000 models.

**Table 11 Electrical Dos and Don'ts**

ITEM	DO	DON'T
Accessory (power taps with key in "Accessory" mode)	a) Connect to accessory relay output in the inside cab fuse block; circuit A12B	Connect to key switch accessory output.

**Table 11 Electrical Dos and Don'ts (cont.)**

ITEM	DO	DON'T
Battery - Clean (unfused) power and maxi-fused power feeds and GND connection points	a) Use inline Maxi-holder from Mega-fuse unfused side.	a) Exceed additional 45 AMPS  b) Exceed 3 ring terminals total on Maxi-fuse stud.
GND	GND additional electrical loads (customer supplied devices) to chassis or GND studs located on the dash panel.	GND to vehicle batteries for additional loads.
GND — with ammeter	GND to frame or dash GND stud to allow for ammeter to register current.	GND directly to batteries for meter signal.
IGN (power taps with key in "IGN")	a) Connect to the IGN relay output in the inside cab fuse block; circuit A13AH or  b) Connect to the IGN relay output outside the cab PDC; circuit J13CW.	Connect circuits directly to key switch IGN circuits.
Start (power taps with key in "Start")	Connect to the starter relay input circuit J17 at the outside fuse block.	Connect circuits directly to the key switch start circuits.
BC (access to pinouts of discrete circuits)	Connect to BC outputs only.	a) Exceed BC outputs amperage refer to BC section  b) Connect to signal inputs of the BC.
Electric City Horn	a) Connect to circuit A85E (Dash), M85E, M85N, or M85L (Forward chassis) and M85J (Horn jumper) or  b) Only use suppressed type horn assembly.	Connect to Electric City Horn circuit without a diode for protection.
Air Horn (or Air Horn Accommodation)	Connect air line to output side of the solenoid pack controlled through BC.	Connect to input side of air switch electrical circuit.
CB Radio (or CB Accommodation)	Use power connector 2303 and CB antenna connector 2306 at CB opening in overhead console with optional code 08RCB.	Exceed 10 AMPS.
Radio installation for customer aftermarket radio accommodation	a) Connect to pigtail (A13B) owner/operator IGN feed  b) Use a relay if load exceeds 5 AMPS.	Exceed 5 AMPS.
Cruise / Stationary Throttle via Remote Throttle module and via hardwire for remote hook-up	For I6 or V8 engines without optional code 12VZA - Add circuit to Pins 16, 49, 60, and 68 of Engine ECM connector 6020 depending on desired function, or add a Remote Engine Speed Control Module (RESCM). Refer to 12VZA Component Information Diamond Logic® Controller Engine Control Features and Programmable Parameters for vehicles equipped with these optional codes or the RESCM.	Connect to the BC Cruise Control Input circuits.

**Table 11 Electrical Dos and Don'ts (cont.)**

ITEM	DO	DON'T
Engine Oil Pressure warning for remote panel display	For I6 or V8 engines without optional code 12VZA - Add circuit to Pin 22 of Engine ECM connector 6020 depending on desired function; or add a RESCM. Refer to 12VZA Component Information Diamond Logic® Controller Engine Control Features and Programmable Parameters for vehicles equipped with these optional codes. Install discrete oil pressure sensor or tap signal off the ATA or public J1939 Datalink.	Connect directly to oil pressure sensor circuit.
Vehicle Speed output with Manual Transmission for optional feature control; i.e., sand spreader	For I6 or V8 engines without optional code 12VZA - Add circuit to Pin 72 of Engine ECM connector 6020 depending on desired function; or add a RESCM. This provides 30,000 pulse/mile output for speed. Use an isolated Dual wound sensor with manual transmission. Refer to Component Information Diamond Logic® Controller Engine Control Features and Programmable Parameters for vehicles equipped with 12VZA optional code.	a) Connect into the speedometer sensor circuit on the engine.  b) Wire into Speed sensor circuit on transmission. Use sensors in parallel with existing output speed sensor. It will cause VSS Diagnostic Trouble Code DTC to set.
Vehicle Speed output with Automatic Transmission for optional feature control; i.e., sand spreader	For I6 or V8 engines without optional code 12VZA - Add circuit to Pin 72 of Engine ECM connector 6020 depending on desired function; or add a RESCM. This provides 30,000 pulse/mile output for speed. Use an isolated Dual wound sensor with manual transmission. Refer to Component Information Diamond Logic® Controller Engine Control Features and Programmable Parameters for vehicles equipped with 12VZA optional code. This provides 30,000 pulse/mile output for speed. Refer to Component Information Diamond Logic® Controller Engine Control Features and Programmable Parameters for vehicles equipped with 12VZA optional code. Allison Transmission utilizes a variable frequency pulse generated by Transmission ECU. For vehicle speed information, refer to Allison service information, Connector 7205, cavity F (provides this signal connection point).	a) Connect into the speedometer sensor circuit on the engine.
Tachometer Signal Output for remote panel display	For I6 or V8 engines without optional code 12VZA - Add circuit to Pin 71 of Engine ECM connector 6020 depending on desired function; or add a RESCM. This provides a 12/pulse/eng RPM. Refer to Component Information Diamond Logic Controller Engine Control Features and Programmable Parameters for vehicles equipped with 12VZA optional code.	Connect into the tachometer sensor circuits on the engine.

**Table 11 Electrical Dos and Don'ts (cont.)**

ITEM	DO	DON'T
Engine Coolant Temperature Gauge Output Signal for remote panel display	Install discrete Engine Coolant Temperature sensor. Refer to Component Information Diamond Logic® Controller Engine Control Features and Programmable Parameters. Refer to ATA Datalink or public J1939 support information.	Connect into Engine Coolant Temperature sensor circuits.
Alternator warning light output circuit for remote panel display	Connect wire to alternator warning light output terminal and connect the other side of the warning light circuit to IGN feed.	Connect warning light circuit to GND circuit.
Low Air warning signal for remote panel display	a) Tap into air line with additional sensor or  b) Refer to public J1939 Data Link information to extract Air PSI signal.	Connect into electrical Low Air sensor circuits.
Park Brake Warning Output Signal for circuit interlock features installed	a) Tap into air line with additional switch for vehicles with air brakes or  b) Connect into BC circuit pin F1; Connector 1601 with a 12 volt active signal Air or Hydraulic brake vehicle.	a) Connect into existing air park brake switch electrical circuit b) Exceed 200 ma total.
Trans Warning Output signal for remote panel display	Connect wire to ECU circuit 115 for WTC III and circuit 125 for LCT 2000/24000 transmission models. Circuit goes open to GND to actuate a remote mounted light. An external relay is required if current is .05 AMPS or greater.	a) Splice into the transmission harness for signal uses  b) Utilize this signal for vehicle shutdown system.
Transmission Interface (Body Builder Connections)	See the Transmission section in this manual S08323 for Body Builder connection information.	Splice into the transmission harness for signal uses.
Back Up Lights	Connect into Body Builder connectors 4450; Cavity E circuit 71, or connect into tail light harness Connector 9303. Refer to Body Builder Connections and circuit diagrams.	Exceed 6 AMPS total circuit
Clearance / Marker Lights	Connect into Body Builder connector 4450; Cavity D circuit 58, or connect into tail light harness Connector 9303. Refer to Body Builder Connections and circuit diagrams.	Exceed 20 AMPS total circuit.
Dome Light	a) Connect into BC connector 1604; Pin J for output circuit.  b) Theater Dimming must be turned off in the BC.	Connect into any door switch circuit.  Exceed 10 AMPS total circuit.
Fog Light	a) Connect into BC connector 1603; Pin F for the left Fog Lamp and Pin K for the right Fog Lamp output circuit.  b) Fog Light accommodation must be added to the BC.	Connect into fog light switch circuit.  Exceed 10 AMPS.

**Table 11 Electrical Dos and Don'ts (cont.)**

ITEM	DO	DON'T
Headlights (including Plow Lights without Plow Light option)	Connect into Plow Light 7-way Harness connector provided with optional code 08THJ.	Connect into headlight switch circuit.  Exceed 20 AMPS total circuit.
Panel Lights	Connect into panel lamp Bus connector 1002 located behind the Instrument Panel (IP) left of the interior fuse panel.	Connect into panel dimmer switch circuit or Panel light adapter circuit A62N.  Exceed 5 AMPS.
Stop Lights	Connect into Body Builder connector (4450 cavity B and C; circuits 56 left/ 57 right combined) (4460 cavity A and B; circuits 56 left /57 right separate), or connect into tail light harness connector 9303. Refer to Body Builder Connections and circuit diagrams.	Connect into the stop light switch circuit at the brake pedal.  Exceed 8 AMPS total.
Tail Lights	Connect into Body Builder connector 4450; Cavity A circuits 68 or connect into tail light harness Connector 9303. Refer to Body Builder Connections and circuit diagrams.	Exceed 20 AMPS Total Circuit.
Turn Signals	Connect to Body Builder connector (4450 cavity B and C; circuits 56 left/57 right combined) (4460 cavity A and B; circuits 56 left/57 right separate).	Connect to the input side of the turn signal switch or the BC circuit inputs.  Exceed 8 AMPS total circuit.
Work Light	a) Connect into BC connector 1603 Pin G Work Light Output circuit.  b) Work lamp accommodation must be programmed into the BC.	Exceed 10 AMPS.
RPM Connection	Connect to Body Builder connectors at the RPM (J3-output circuits and J4- remote inputs). Refer to RPM Section.	Exceed 20 AMPS per channel output with a maximum 80 AMPS total draw per module.
Remote mounted Fuel Level (Low Fuel Warning)	Install additional fuel sender. Extract fuel gauge data from the Public J1939 data link.	Connect to fuel level gauge sender circuit or short existing fuel sending unit to chassis GND.
HVAC Interrupt (A/C compressor clutch and Blower fan interrupts)	Add a secondary A/C Evaporator to cool remote areas by tapping into the refrigerant lines with the authorized hoses. Use only the standard HVAC Control for controlling the A/C system.	Connect into HVAC A/C clutch circuit between the BC and the A/C compressor clutch for purposes of controlling the A/C system.  Connect to the high side of the pressure transducer or either of the A/C system thermistors.

**Table 11 Electrical Dos and Don'ts (cont.)**

ITEM	DO	DON'T
Clutch switch	Install additional switch.	Connect into the clutch switch or circuit.
Brake Switch	a) Connect to the BC connector 1605 Pin E5 active GND output circuit BC must be programmed with the Separate Stop Feature.  b) Install additional switch.	Connect into the brake switch or circuit.

## 5.18. HOW DO I - GENERAL INFORMATION

The International parts system is set up to give part information that is specific to a particular vehicle as built, including all optional features that were ordered. If a feature is to be added after the vehicle was built, provide the dealer with the vehicle VIN number and the feature code to be added. The dealer will contact "Parts Spec" to obtain a listing of parts required for that feature.

The circuits provided for the feature will be what are referred to as "overlay circuits" and are to be layered on and taped to existing harnesses. In some cases, a total harness may be provided. The harness may include standard wiring circuits.

The body builder will have to refer to the circuit diagram book for connector cavity information. If the decision is made to build the overlays locally, part numbers of the terminals can be found in the back of the circuit diagram manual S08322 (Connector Composites section).

All hardware associated with a specific feature code, switches, brackets, etc. will be provided. The body builder must decide which parts are to be ordered – it is not required that all parts for a code be ordered. Generally, except for a few features, there are no "kits" available, hence, detailed instructions are not provided, and this section will cover some basic direction.

If a feature is not available on a specific model, a parts list will not be provided.

Some features will require reprogramming of the BC. If reprogramming is required, the vehicle must be returned to the dealer.

If the body builder adds a feature, they must assume full responsibility for proper operation of that feature.

International parts purchased from a dealer carry a one-year, unlimited mileage warranty. Other than the one year parts warranty, International assumes no warranty for body builder installed components or the labor to repair the body builder added feature if it is determined that the failure is not OEM related.

## 6. GENERAL

The following section provides basic information of how to integrate TEM's electrical systems with the vehicle electrical system. This section includes feature descriptions, programming information and sales codes where applicable. Also included is a description of how the feature works and in some cases, how the feature can be used.

If the vehicle was not ordered with the desired feature, this section covers basic information on how to add a feature to the vehicle.

An index of feature codes covered in this section is included in the table below.

**Before proceeding, review the Introduction information.**

**Table 12 Feature Code Index**

Feature Code	Description	Section	Page
04SBL	Optional Aux. Air Pressure Gauge - Hydraulic Chassis	Gauges	04SBL(See 04SBL — Instrument Cluster – Adding Gauges, page 150)
08518	Cigar Lighter	In Cab Battery Feed Power Source	08518(See Fused Battery Connections Inside Cab — 08518, 08718, 08WCK, page 71)
08585	Auxiliary Toggle Switch for Fog or Driving Lights	Fog, Plow and Guide Post Accommodation Packages	08585(See 08585, 08WPL, 08WPM, 08WLM, and 08WLN, page 80)
08718	Power Source, Cigar Type Receptacle	In Cab Battery Feed Power Source	08718(See Fused Battery Connections Inside Cab — 08518, 08718, 08WCK, page 71)
08HAA	Body Builder Wiring, End of Frame Without Connector — Separate Stop/ Turn/ Tail Only	Bodybuilder Wiring for Stop/ Tail/ Turn Lights	08HAA(See 08HAA — Body Builder Wiring At End Of Frame, page 97)
08HAB	Body Builder Wiring, Back of Cab With Connector — Combined and Separate Stop/ Turn/ Tail	Bodybuilder Wiring for Stop/ Tail/ Turn Lights	08HAB(See 08HAB and 08HAE — Body Builder Wiring, page 101)
08HAE	Body Builder Wiring, End of Frame With Connector — Combined and Separate Stop/ Turn/ Tail	Bodybuilder Wiring for Stop/Tail/ Turn Lights	08HAE(See 08HAB and 08HAE — Body Builder Wiring, page 101)
08HAG	Electric Brake Accommodation Package for Separate Stop/Turn, End of Frame	Bodybuilder Wiring for Stop/Tail/ Turn Lights	08HAG(See 08HAG and 08HAH — Electric Trailer Brakes, page 110)
08HAH	Electric Brake Accommodation Package for Combined Stop/Turn, End of Frame	Bodybuilder Wiring for Stop/Tail/ Turn Lights	08HAH(See 08HAG and 08HAH — Electric Trailer Brakes, page 110)
08NAA	Extending Frame and Tail Light Harnesses — 8 ft.	Bodybuilder Wiring for Stop/Tail/ Turn Lights	08NAA(See 08NAA — Extending Tail Light Harnesses, page 106)
08RBK	Dual CB Radio Antennas	CB and 2-Way Radio Accommodation Packages	08RBK(See 08RCB and 08RBK — CB Radios, page 60)
08RCB	Header- Mounted CB Radio Accommodation Package	CB and 2-Way Radio Accommodation Packages	08RCB(See 08RCB and 08RBK — CB Radios, page 60)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
08REA	2-Way Radio Accommodation Wiring Package — 10 ft.	CB and 2-Way Radio Accommodation Packages	08REA(See 08REA and 08RGA – 2-Way Radio, page 62)
08RGA	2-Way Radio Accommodation Package — Routed to Header Console	CB and 2-Way Radio Accommodation Packages	08RGA(See 08REA and 08RGA – 2-Way Radio, page 62)
08RHC	Aware Telematics Base Features	Aware Telematics Accommodation Packages	08RHC(See 08RHC – AWARE TELEMATICS SYSTEM MODULE and ANTENNA, page 381)
08RHD	Aware Telematics Alert Switch	Aware Telematics Accommodation Packages	08RHC(See 08RHC – AWARE TELEMATICS SYSTEM MODULE and ANTENNA, page 381)
08RHE	Aware Accessory Equipment	Aware Telematics Accommodation Packages	08RHC(See 08RHC – AWARE TELEMATICS SYSTEM MODULE and ANTENNA, page 381)
08RHY	Aware Fuel Tax Reporting Service	Aware Telematics Accommodation Packages	08RHC(See 08RHC – AWARE TELEMATICS SYSTEM MODULE and ANTENNA, page 381)
08SAJ	In Cab Switch Controls for Body Accessories, 2 RPM's (BOC)/12 Momentary Switches	Remote Power Modules	08SAJ(See Remote Power Modules (RPMs), page 167)
08THG	Auxiliary 7-Way Trailer Socket	Bodybuilder Wiring for Stop/ Tail/ Turn Lights	08THG(See 08THG and 08THH – Auxiliary 7-Way Trailer Socket, page 106)
08THH	Auxiliary 7-Way Trailer Socket	Bodybuilder Wiring for Stop/ Tail/ Turn Lights	08THH(See 08THG and 08THH – Auxiliary 7-Way Trailer Socket, page 106)
08THJ	Auxiliary Harness for Front Plow Lights and Turn Signals — 3 ft.	Fog, Plow and Guide Post Accommodation Packages	08THJ(See 08THJ — Auxiliary Harness, page 90)
08THN	Hazard Lights Override Stop Lights	Productivity Features	08THN(See 08THN, page 78)
08THV	Front Harness for Guidepost Lights	Fog, Plow and Guide Post Accommodation Packages	08THV(See 08THV — Front Guide Post Lights, page 93)
08TME	7-Way Trailer Socket at End of Frame — Independent of Stop Lights	Bodybuilder Wiring for Stop/ Tail/ Turn Lights	08TME(See 08TME and 08TMG – 7-Way Trailer Socket At End Of Frame, page 115)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
08TMG	7-Way Trailer Socket at End of Frame — Combined with Stop Lights	Bodybuilder Wiring for Stop/ Tail/ Turn Lights	08TMG(See 08TME and 08TMG – 7-Way Trailer Socket At End Of Frame, page 115)
08TMH	Switched Power to Cab Roof	Worklight and Outside Cab Power Features	08TMH(See 08TMH — Switched Power to Cab Roof, page 128)
08WAD	Battery Disconnect Switch — Battery Box-Mounted	Battery Disconnect Switch Features	08WAD(See 08WAD, 08WCS, 08WHX and 08WHY — Battery Disconnect Switch, page 58)
08WCK	Power Source, 2-Post Terminal Type	In Cab Battery Feed Power Source	08WCK(See Fused Battery Connections Inside Cab — 08518, 08718, 08WCK, page 71)
08WCS	Battery Disconnect Switch — Cab Floor-Mounted Positive Disconnect	Battery Disconnect Switch Features	08WCS(See 08WAD, 08WCS, 08WHX and 08WHY — Battery Disconnect Switch, page 58)
08WEB	Extending Frame and Tail Light Harnesses — for Drop Frame Beverage Body	Bodybuilder Wiring for Stop/Turn/Tail Lights	08WEB(See 08WEB — Center Chassis Extension Harness, page 108)
08WEE	Passenger- Controlled Air Horn — Instrument Panel-Mounted Switch	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WEE(See 08WEE – SWITCH, AIR HORN, PASSENGER, FIRE TRUCK, page 367)
08WGA	One Universal Air Solenoid, N/C	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WGA(See 08WGA, 08WGB, 08WGC, 08WGD, 08WGP, and 08WGR — TEM Air Solenoids, page 362)
08WGB	Two Universal Air Solenoids, N/C	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WGB(See 08WGA, 08WGB, 08WGC, 08WGD, 08WGP, and 08WGR — TEM Air Solenoids, page 362)
08WGC	Three Universal Air Solenoids, N/C	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WGC(See 08WGA, 08WGB, 08WGC, 08WGD, 08WGP, and 08WGR — TEM Air Solenoids, page 362)
08WGD	Four Universal Air Solenoids, N/C	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WGD(See 08WGA, 08WGB, 08WGC, 08WGD, 08WGP, and 08WGR — TEM Air Solenoids, page 362)
08WGL	Windshield Wiper Speed Control Forced to Slowest Speed	Productivity Features	08WGL(See 08WGL — Windshield Wiper Speed Control, page 76)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
08WGP	Five Universal Air Solenoids, N/O	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WGP(See 08WGA, 08WGB, 08WGC, 08WGD, 08WGP, and 08WGR — TEM Air Solenoids, page 362)
08WGR	Six Universal Air Solenoids, N/O	Air Solenoid Features (Normally Open, Closed and Air Horn)	08WGR(See 08WGA, 08WGB, 08WGC, 08WGD, 08WGP, and 08WGR — TEM Air Solenoids, page 362)
08WHX	Battery Disconnect Switch — Battery Box-Mounted Positive Disconnect	Battery Disconnect Switch Features	08WHX(See 08WAD, 08WCS, 08WHX and 08WHY — Battery Disconnect Switch, page 58)
08WHY	Battery Disconnect Switch — Cab Floor-Mounted Positive Disconnect	Battery Disconnect Switch Features	08WHY(See 08WAD, 08WCS, 08WHX and 08WHY — Battery Disconnect Switch, page 58)
08WJA	Special 200 AMP Max. Lift Gate Power Source — 2 Gauge Power Cable	Liftgate Accommodation Package	08WJA(See 08WJA, 08WJB — Power Source For Lift Gate, page 376)
08WJB	Power Source For Customer Lift Gate — 0 Gauge Power Cable	Liftgate Accommodation Package	08WJB(See 08WJA, 08WJB — Power Source For Lift Gate, page 376)
08WLL	Pedestal-Mounted Work Light	Worklight and Outside Cab Power Features	08WLL(See 08WLL (Tractor) and 08WMA (Straight Truck), page 120)
08WLM	Fog Lights (Peterson) - Amber, Rectangular - 7000 Series	Fog, Plow and Guide Post Accommodation Packages	08WLM(See 08585, 08WPL, 08WPM, 08WLM, and 08WLN, page 80)
08WLN	Fog Lights (Peterson) - Clear, Rectangular - 7000 Series	Fog, Plow and Guide Post Accommodation Packages	08WLN(See 08585, 08WPL, 08WPM, 08WLM, and 08WLN, page 80)
08WMA	Work Light Accommodation Package - Customer-Supplied Light or Aux. Application	Worklight and Outside Cab Power Features	08WMA(See 08WLL (Tractor) and 08WMA (Straight Truck), page 120)
08WPL	Fog Lights - Amber, Oval - 4000 Series	Fog, Plow and Guide Post Accommodation Packages	08WPL(See 08585, 08WPL, 08WPM, 08WLM, and 08WLN, page 80)
08WPM	Fog Lights - Clear, Oval - 4000 Series	Fog, Plow and Guide Post Accommodation Packages	08WPM(See 08585, 08WPL, 08WPM, 08WLM, and 08WLN, page 80)
08WPZ	Test Exterior Lamps Except Back-Ups	Productivity Features	08WPZ(See 08WPZ — Test Exterior Lamps Except Back Ups, page 73)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
08WSK	In Cab Switch Controls for Body Accessories, 1 RPM (EOF)/6 Momentary Switches	Remote Power Modules	08WSK(See Remote Power Modules (RPMs), page 167)
08WSM	In-Cab Switch Controls for Body Accessories, 1 RPM (BOC)/6 Momentary Switches	Remote Power Modules	08WSM(See Remote Power Modules (RPMs), page 167)
08WTJ	In-Cab Switch Controls for Body Accessories, 1 RPM (EOF)/6 Latched Switches	Remote Power Modules	08WTJ(See 08WTJ — Switch Body Circuits Frame MTG Rear, page 198)
08XBK	Auxiliary 40 Amp Circuit, Switch-Controlled	Worklight and Outside Cab Power Features	08XBK(See 08XBK — Auxiliary 40 Amp Circuit, Switch Controlled, page 126)
08WXD	Park Brake Alarm	Productivity Features	08WXD(See 08WXD – ALARM, PARKING BRAKE, page 75)
12VXT	Remote Engine Speed Control: Stationary, Variable Speed Control	Engine Speed Control Features and Accommodation Packages	12VXT(See 12VXT – THROTTLE, HAND CONTROL, Stationary, Variable Speed, page 332)
12VXU	Remote Engine Speed Control: Stationary, Pre-Set Speed Control	Engine Speed Control Features and Accommodation Packages	12VXU(See 12VXU – THROTTLE, HAND CONTROL, Stationary Pre-Set, page 333)
12VXV	Remote Engine Speed Control: Mobile, Variable Speed Control	Engine Speed Control Features and Accommodation Packages	12VXV(See 12VXV – THROTTLE, HAND CONTROL, Mobile, Variable Speed, page 334)
12VXY	Remote-Mounted Engine Speed Control	Engine Speed Control Features and Accommodation Packages	12VXY(See 12VXY — Remote Mounted Engine Control, page 327)
12VZA	Remote-Mounted Engine Speed Control, Direct Wire — for Post 2007 International Engines	Engine Speed Control Features and Accommodation Packages	12VZA(See 12VZA — Remote Mounted Engine Control, page 335)
13WUB	Allison Spare Input/Output for Highway Series (HS); General Purpose Trucks	Transmission Spare Input/Outputs and Transmission Codes	13WUB(See Automatic Transmission Interfaces, page 137)
13WUC	Allison Spare Input/Output for Rugged Duty Series (RDS); General Purpose Trucks, Construction	Transmission Spare Input/Outputs and Transmission Codes	13WUC(See Automatic Transmission Interfaces, page 137)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
13WUD	Allison Spare Input/Output for Emergency Vehicle Series (EVS); Rescue, Ambulance	Transmission Spare Input/Outputs and Transmission Codes	13WUD(See Automatic Transmission Interfaces, page 137)
13WUE	Allison Spare Input/Output for Emergency Vehicle Series (EVS); Fire/Pumper, Tank, Aerial/Ladder	Transmission Spare Input/Outputs and Transmission Codes	13WUE(See Automatic Transmission Interfaces, page 137)
13WUG	Allison Spare Input/Output for Truck Recreational Vehicle (TRV)	Transmission Spare Input/Outputs and Transmission Codes	13WUG(See Automatic Transmission Interfaces, page 137)
13WUH	Allison Spare Input/Output for Rugged Duty Series (RDS); Airport Refueler, Sewer Evac	Transmission Spare Input/Outputs and Transmission Codes	13WUH(See Automatic Transmission Interfaces, page 137)
13WUJ	Allison Spare Input/Output for Rugged Duty Series (RDS); Front Loaders, Rear Loaders, Recycling/Packer Trucks	Transmission Spare Input/Outputs and Transmission Codes	13WUJ(See Automatic Transmission Interfaces, page 137)
13WUK	Allison Spare Input/Output for Rugged Duty Series (RDS); Side Loaders	Transmission Spare Input/Outputs and Transmission Codes	13WUK(See Automatic Transmission Interfaces, page 137)
13WUL	Allison Spare Input/Output for Rugged Duty Series (RDS); Street Sweeper	Transmission Spare Input/Outputs and Transmission Codes	13WUL(See Automatic Transmission Interfaces, page 137)
13WUM	Allison Spare Input/Output for Pupil Transportation Series (PTS)	Transmission Spare Input/Outputs and Transmission Codes	13WUM(See Automatic Transmission Interfaces, page 137)
13WUP	Allison Spare Input/Output for Bus Series (B)	Transmission Spare Input/Outputs and Transmission Codes	13WUP(See Automatic Transmission Interfaces, page 137)
13WUR	Allison Spare Input/Output for Dump/ Construction with Two-Speed Axle or Auxiliary Transmission (RDS)	Transmission Spare Input/Outputs and Transmission Codes	13WUR(See Automatic Transmission Interfaces, page 137)
13WUS	Allison Spare Input/Output for Rugged Duty Series (RDS); General Purpose Trucks Modified for Single Input Auto Neutral	Transmission Spare Input/Outputs and Transmission Codes	13WUS(See Automatic Transmission Interfaces, page 137)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
13WUT	Allison Spare Input/Output for Emergency Vehicle Series (EVS); without Split Shaft PTO	Transmission Spare Input/Outputs and Transmission Codes	13WUT(See Automatic Transmission Interfaces, page 137)
13WUU	Allison Spare Input/Output for Specialty Transmission Series (SP)	Transmission Spare Input/Outputs and Transmission Codes	13WUU(See Automatic Transmission Interfaces, page 137)
13WUV	Allison Spare Input/Output for Highway Series (HP); General Purpose Trucks Modified for Single Input Auto Neutral	Transmission Spare Input/Outputs and Transmission Codes	13WUV(See Automatic Transmission Interfaces, page 137)
13XAA	Dash-Mounted PTO Control for Customer-Provided Clutched, Air-Shifted PTO	PTO (Power Take OFF) and PTO Hourmeter	13XAA(See 13XAA — PTO Control, page 317)
16HGG	Optional Engine Oil Temperature Gauge	Gauges	16HGG(See 16HGG — Instrument Cluster – Adding Gauges, page 152)
16HGH	Optional Allison Transmission Oil Temperature Gauge	Gauges	16HGH(See 16HGH — Instrument Cluster – Adding Gauges, page 154)
16HGJ	Optional Manual Transmission Oil Temperature Gauge	Gauges	16HGJ(See 16HGJ — Instrument Cluster – Adding Gauges, page 156)
16HGL	Optional Rear Axle Oil Temperature Gauge	Gauges	16HGL(See 16HGL — Instrument Cluster – Adding Gauges, page 158)
16HGN	Optional Air Application Gauge	Gauges	16HGN(See 16HGN — Instrument Cluster – Adding Gauges, page 161)
16HHT	Optional Ammeter Gauge	Gauges	16HHT(See 16HHT — Instrument Cluster – Adding Gauges, page 163)
16HKA	Optional IP Cluster display — Omit fault codes	Gauges	16HKA(See 16HKA — Instrument Cluster – Omit Fault Codes, page 165)
16HKT	IP Cluster Display Diagnostics	Gauges	16HKT(See 16HKT — Instrument Cluster – Fault Codes, page 166)
16WJU	Power Windows/Locks (2)	Power Windows, Locks, Remote Keyless Entry	16WJU(See 16WJU, 16WJV and 16WKZ — Electric Windows, Remote Lock and Unlock, and Use of the Aux Feature, page 65)
16WJV	Power Windows/Locks (4)	Power Windows, Locks, Remote Keyless Entry	16WJV(See 16WJU, 16WJV and 16WKZ — Electric Windows, Remote Lock and Unlock, and Use of the Aux Feature, page 65)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
16WKB	Air Conditioning	Air Conditioning	16WKB(See 16WKB — Air Conditioning, page 134)
16WKZ	Remote Keyless Entry and Use of Aux Feature	Power Windows, Locks, Remote Keyless Entry	16WKZ(See 16WJU, 16WJV and 16WKZ — Electric Windows, Remote Lock and Unlock, and Use of the Aux Feature, page 65)
16WLM	PTO Hourmeter for Customer-Supplied PTO	PTO (Power Take OFF) and PTO Hourmeter	16WLM(See 16WLM — PTO Hourmeter, page 325)
60AAA	Remote Power Module (1) With 6 Latched Switches	Remote Power Modules	60AAA
60AAB	Remote Power Modules (2) With 12 Latched Switches	Remote Power Modules	60AAB
60AAC	International® Diamond Logic® PowerPack 3, Battery Box Mount	Power Pack 3 Primary and Temporary Mount Features	60AAC(See Power Pack 3 for Stationary Operation, page 393)
60AAD	Remote Power Modules (2) With 6 Latched Switches	Remote Power Modules	60AAD
60AAE	International® Diamond Logic® Power Pack 3, Temp Mount	Power Pack 3 Primary and Temporary Mount Features	60AAE(See Power Pack 3 for Stationary Operation, page 393)
60ABA	Cable Shift PTO Accommodation Package	PTO (Power Take OFF) and PTO Hourmeter	60ABA(See 60ABA — PTO Accommodation Cable Shift, page 255)
60ABB	Muncie Lectra-Shift PTO Accommodation Package	PTO (Power Take OFF) and PTO Hourmeter	60ABB(See 60ABB — PTO Accommodation Muncie® Powerflex™ Lectra-Shift, page 261)
60ABC	Remote Start/Stop	Remote Start/Stop Feature	60ABC(See 60ABC — Remote Start/Stop, page 370)
60ABD	Remote Start/Stop With Emergency Pump Accommodation	Remote Start/Stop Feature	60ABD(See 60ABD — Remote Start/Stop with Emergency Pump, page 373)
60ABE	Electric Over Hydraulic PTO Accommodation Package	PTO (Power Take OFF) and PTO Hourmeter	60ABE(See 60ABE — PTO Accommodation for Electric over Hydraulic PTO, page 277)
60ABK	Electric Over Air (Non-Clutched) PTO Accommodation Package	PTO (Power Take OFF) and PTO Hourmeter	60ABK(See 60ABK — PTO Accommodation Electric over Air Non-Clutched, page 290)
60ABL	Electric Over Air (Clutched) PTO Accommodation Package	PTO (Power Take OFF) and PTO Hourmeter	60ABL(See 60ABL — PTO Accommodation Electric Over Air Clutched, page 304)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
60ACA	Unadvertised Code for Remote Power Module with One Latched Switch	Remote Power Modules	60ACA(See Remote Power Modules (RPMs), page 167)
60ACB	Unadvertised Code for Remote Power Module with Two Latched Switches	Remote Power Modules	60ACB(See Remote Power Modules (RPMs), page 167)
60ACC	Unadvertised Code for Remote Power Module with Three Latched Switches	Remote Power Modules	60ACC(See Remote Power Modules (RPMs), page 167)
60ACD	Unadvertised Code for Remote Power Module with Four Latched Switches	Remote Power Modules	60ACD(See Remote Power Modules (RPMs), page 167)
60ACE	In Cab Switch Controls for High Current (40AMP) Body Accessories	Power Features Using Remote Power Modules	60ACE(See 60ACE — Dual Output Latched Switch 40 Amps, page 210)
60ACG	In Cab Switch Control (1) With Vehicle Speed Interlock for Body Accessories	Power Features Using Remote Power Modules	60ACG(See 60ACG — One Interlocked Latched Switch Disengage at 30 MPH, page 212)
60ACH	In Cab Switch Controls (2) With Vehicle Speed Interlock for Body Accessories	Power Features Using Remote Power Modules	60ACH(See 60ACH — Two Interlocked Latched Switch Disengage at 30 MPH, page 217)
60ACJ	Unadvertised Code for Remote Power Module with Five Latched Switches	Remote Power Modules	60ACJ(See Remote Power Modules (RPMs), page 167)
60ACK	Unadvertised Code for Remote Power Module with Six Latched Switches	Remote Power Modules	60ACK(See Remote Power Modules (RPMs), page 167)
60ACS	In Cab/External Switch for Body Accessories (3-Way Momentary), Two Switches	Power Features using Remote Power Modules	60ACS(See 60ACS — One Momentary Rocker Switch / Remote Switch Capability, page 226)
60ACT	In Cab/External Switch for Body Accessories (3-Way Momentary), Two Switches	Power Features using Remote Power Modules	60ACT(See 60ACT — Two Momentary Rocker Switches/ Remote Switch Capability, page 229)
60ACU	In Cab/External Switch for Body Accessories (3-Way Momentary), Three Switches	Power Features using Remote Power Modules	60ACU(See 60ACU — Three Momentary Rocker Switches/ Remote Switch Capability, page 233)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
60ACV	Unadvertised Code for Remote Power Module with an Additional Six Latched Switches	Remote Power Modules	60ACV(See Remote Power Modules (RPMs), page 167)
60ACW	Body Integration Input/Output Expansion Harness (DLB Controlled)	Input/Output Expansion Harness (Advanced Logic Use Only)	60ACW(See Input/Output Expansion Harness, page 253)
60ACX	Theft Deterrent Feature	Theft Deterrent	60ACX(See Theft Deterrent, page 424)
60AJA	Throttle Control Accommodation for Single Customer- Mounted External Engine Speed Control Switch - Recovery Applications	Engine Speed Control Features and Accommodation Packages	60AJA(See 60AJA — Remote Throttle Control Interlocked to Park Brake Applied — Recommended Application: Recovery, page 341)
60AJC	Special Gauge Cluster Indicators and Alarms (Gate Open and Rear Alert) for Refuse Applications	Indicator Lights and Alarms	60AJC(See 60AJC — Two Indicator Lights and Audible Alarms Programmable Mode for Various Switch Actions (Waste Solution), page 239)
60AJD	Special Gauge Cluster Indicators and Alarms (Boom Not Stowed and Outriggers Not Stowed) for Utility Applications	Indicator Lights and Alarms	60AJD(See 60AJD — Body Integrated, Indicator Lights (Utility Solutions), page 244)
60AJE	Throttle Control Accommodation for Single Customer- Mounted External Engine Speed Control Switch - General Purpose	Engine Speed Control Features and Accommodation Packages	60AJE(See 60AJE — Remote Throttle Control Interlocked to Park Brake Applied — Recommended Application: Various, page 345)
60AJG	Throttle Control Accommodation for Single Customer- Mounted External Engine Speed Control Switch - Utility Applications	Engine Speed Control Features and Accommodation Packages	60AJG(See 60AJG — Remote Throttle Control Interlocked to Park Brake Applied — Recommended Application: Utility, page 349)
60AJH	Remote Throttle Control for Dual Function Engine Running/ Emergency Power Engine Off	Engine Speed Control Features and Accommodation Packages	60AJH(See 60AJH — Remote Throttle Control Interlocked to Park Brake Applied — Recommended Application: Utility, page 353)
60AJJ	Remote Throttle Control for Customer- mounted Momentary Switch - Refuse Applications	Engine Speed Control Features and Accommodation Packages	60AJJ(See Remote Engine Speed Control – Caterpillar and Cummins Engines, page 361)

**Table 12 Feature Code Index (cont.)**

Feature Code	Description	Section	Page
60AJK	Body Integration, Indicator Lights (Body Up and Gate Open) Plow/ Dump Applications	Indicator Lights and Alarms	60AJK(See 60AJK — Dump Box Indicator Lights And Alarm, page 248)
None	Dome Light Features	Electrical Functionality without associated feature codes	Dome Light Feature(See Brake Applied BC Connections, page 453)
None	Park Brake Applied Connection	Electrical Functionality without associated feature codes	Park Brake Applied Connection(See Brake Applied BC Connections, page 453)
None	Brake Applied Connection	Electrical Functionality without associated feature codes	Brake Applied Connection(See Brake Applied BC Connections, page 453)

## **7. BODY CONTROLLER**

### **7.1. BODY CONTROLLER (3200, 4000, 7000 MODELS)**

At the center of the Diamond Logic® Electrical System is the Body Controller (BC). The BC 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. Serial datalinks connected to the BC include the following:

- A drivetrain J1939 datalink to communicate information between the engine, transmission, Antilock Brake System (ABS), the BC, and the Instrument Panel (IP)
- A switch datalink for communicating switch status between the rocker switch assemblies (in the IP and the switches in the door pods) and the BC
- A Body Builder datalink to interface optional input/output modules with the BC

The BC is located under the IP behind a kick plate to the left of the driver's left foot. All connections are now located inside the cab with the exception of the power connection that passes thru the dash panel to the engine compartment. The BC provides a standard interface signals for the park brake set signal. This interface signal is described at the end of this section. The BC receives battery power from the maxi-fuse block and Ignition (IGN) power from the IP harness.

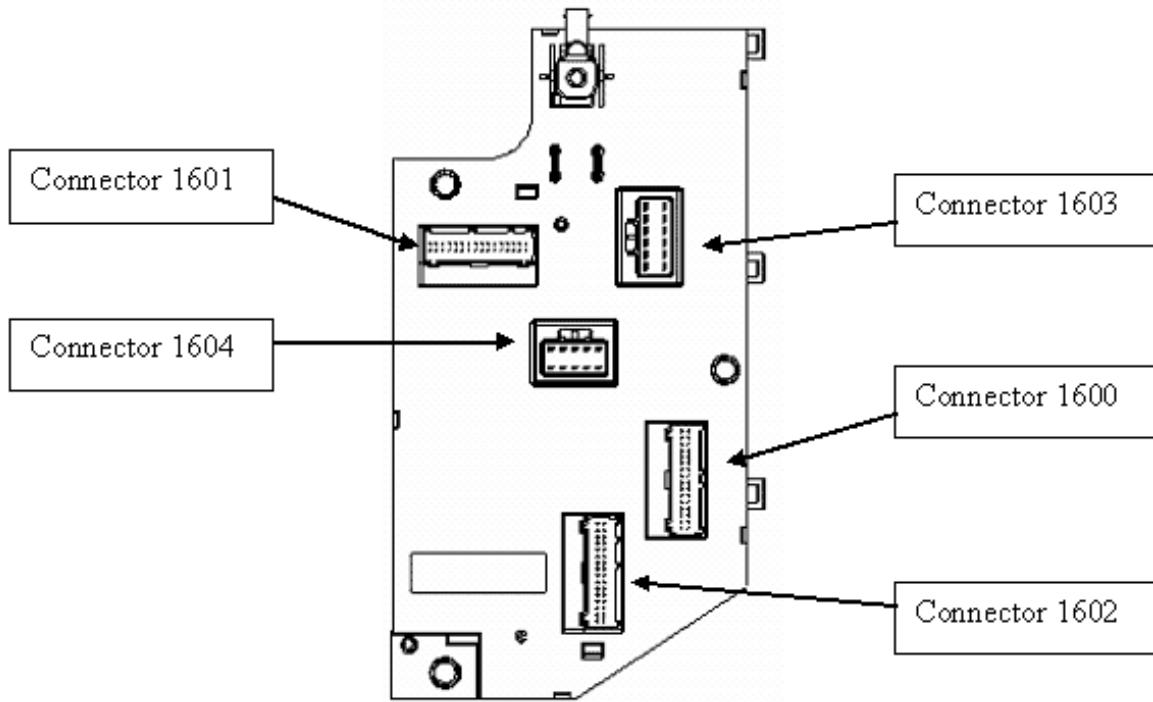


Figure 15 Body Controller (BC)

**NOTE – Pins E3, E5, and E7 of the BC 32-way connector (1602) are the Zero Volt References (ZVR) for various sensors on the vehicle and should NEVER have battery voltage applied to them. Doing so will permanently damage the BC. Do not connect other Ground (GND) signals to the ZVR.**

### BC Connector 1600

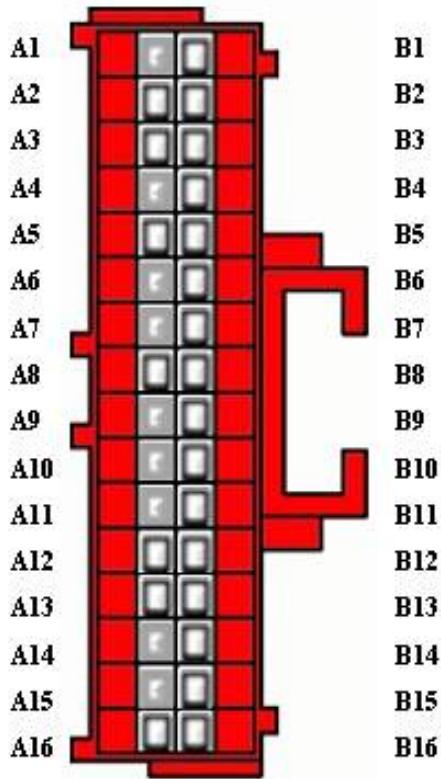


Figure 16 BC Connector 1600

Table 13

#1600 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
A1	<i>Input (Gnd Active)</i>	<b>Accessory Switch Input</b>	<b>Accessory Switch Input</b>	<b>Accessory Switch Input</b>	<b>Accessory Switch Input</b>
A2	<i>Input (Gnd Active)</i>	<b>AC Request</b>	<b>AC Request</b>	<b>AC Request</b>	<b>AC Request</b>
A3	<i>Input (Gnd Active)</i>	<b>AC Diagnostics</b>	<b>AC Diagnostics</b>	<b>AC Diagnostics</b>	<b>AC Diagnostics</b>
A4	<i>Input (Gnd Active)</i>	<b>Headlight Dimmer Switch (Highbeam Switch)</b>			
A5	<i>Input (Gnd Active)</i>	<b>Electric Horn Switch Input</b>			

#1600 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
A6	<i>Input (Gnd Active)</i>	<i>Right Turn Signal Switch Input</i>			
A7	<i>Input (Gnd Active)</i>	<i>Left Turn Signal Switch Input</i>			
A8	<i>Input (Gnd Active)</i>	<i>Washer Fluid Low Switch</i>			
A9	<i>Input (Gnd Active)</i>	<i>Wiper Switch 0</i>	<i>Wiper Switch 0</i>	<i>Wiper Switch 0</i>	<i>Wiper Switch 0</i>
A10	<i>Input (Gnd Active)</i>	<i>Wiper Switch 1</i>	<i>Wiper Switch 1</i>	<i>Wiper Switch 1</i>	<i>Wiper Switch 1</i>
A11	<i>Input (Gnd Active)</i>	<i>Wiper Switch 2</i>	<i>Wiper Switch 2</i>	<i>Wiper Switch 2</i>	<i>Wiper Switch 2</i>
A12	<i>Input (Gnd Active)</i>	<i>Air Park Brake Switch</i>			
A13	<i>Input (Gnd Active)</i>	<i>Door Switch Input</i>	<i>Door Switch Input</i>	<i>Door Switch Input</i>	<i>Door Switch Input</i>
A14	<i>Input (Gnd Active)</i>	<i>Flash-to- Pass Switch Input</i>			
A15	<i>Input (Gnd Active)</i>	<i>Washer Pump</i>	<i>Washer Pump</i>	<i>Washer Pump</i>	<i>Washer Pump</i>
A16	<i>Input (Gnd Active)</i>	<i>IGN Switch Input</i>	<i>IGN Switch Input</i>	<i>IGN Switch Input</i>	<i>IGN Switch Input</i>
B1	Input (Gnd Active)	Open	Open	Open	Open
B2	<i>Input (Gnd Active)</i>	<i>Primary Air Pressure</i>	<i>Primary Air Pressure</i>	<i>Primary Air Pressure</i>	<i>Primary Air Pressure</i>
B3*	<i>Input (Gnd Active)</i>	<i>Secondary Air Pressure</i>	<i>Secondary Air Pressure</i>	<i>Open</i>	<i>Open</i>
B4	<i>Input (Gnd Active)</i>	Open	<i>Clutch Switch</i>	Open	<i>Clutch Switch</i>
B5	<i>Input (Gnd Active)</i>	<i>AC Accumulator Inlet Sensor</i>			
B6	Input (Gnd Active)	Open	Open	Open	Open

#1600 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
B7	<i>Input (Gnd Active)</i>	<i>PTO State Input</i>	<i>Transmission Oil Temperature Sensor (Manual) OR PTO State Input</i>	<i>PTO State Input</i>	<i>Transmission Oil Temperature Sensor (Manual) OR PTO State Input</i>
B8	<i>Input (Gnd Active)</i>	<i>Fuel Level Sensor Input — Right Side</i>	<i>Fuel Level Sensor Input — Right Side</i>	<i>Fuel Level Sensor Input — Right Side</i>	<i>Fuel Level Sensor Input — Right Side</i>
B9	<i>Input (Gnd Active)</i>	<i>Fuel Level Sensor Input — Left Side</i>	<i>Fuel Level Sensor Input — Left Side</i>	<i>Fuel Level Sensor Input — Left Side</i>	<i>Fuel Level Sensor Input — Left Side</i>
B10	<i>Input (Gnd Active)</i>	<i>FR* Axle Oil Temp</i>	<i>FR Axle Oil Temp</i>	<i>FR Axle Oil Temp</i>	<i>FR Axle Oil Temp</i>
B11	<i>Input (Gnd Active)</i>	<i>RR** Axle Oil Temp</i>	<i>RR Axle Oil Temp</i>	<i>RR Axle Oil Temp</i>	<i>RR Axle Oil Temp</i>
B12	<i>Input (Gnd Active)</i>	<i>AC Pressure Transducer Signal</i>	<i>AC Pressure Transducer Signal</i>	<i>AC Pressure Transducer Signal</i>	<i>AC Pressure Transducer Signal</i>
B13	<i>Input (Gnd Active)</i>	<i>AC Accumulator Outlet Sensor</i>	<i>AC Accumulator Outlet Sensor</i>	<i>AC Accumulator Outlet Sensor</i>	<i>AC Accumulator Outlet Sensor</i>
B14	<i>Input (Gnd Active)</i>	<i>Brake Application Pressure</i>	<i>Brake Application Pressure</i>	<i>Open</i>	<i>Open</i>
B15	Input (Gnd Active)	Open	Open	Open	Open
B16	<i>Input (Gnd Active)</i>	<i>Steering Wheel Cruise Switches Input</i>	<i>Steering Wheel Cruise Switches Input</i>	<i>Steering Wheel Cruise Switches Input</i>	<i>Steering Wheel Cruise Switches Input</i>

\* The circuit attached to pin B3 should NOT have additional connections or splices added on an air chassis.

Note: All outputs will handle up to a 500 milliAmpere load unless stated otherwise.

Note: Circuits labeled "Gnd Active", "12v Active", or "5v Active" are open circuit until active.

***No connections or splices are allowable on any signals that are highlighted in bold italic.***

\*Front

\*\*Rear

### BC Connector 1601

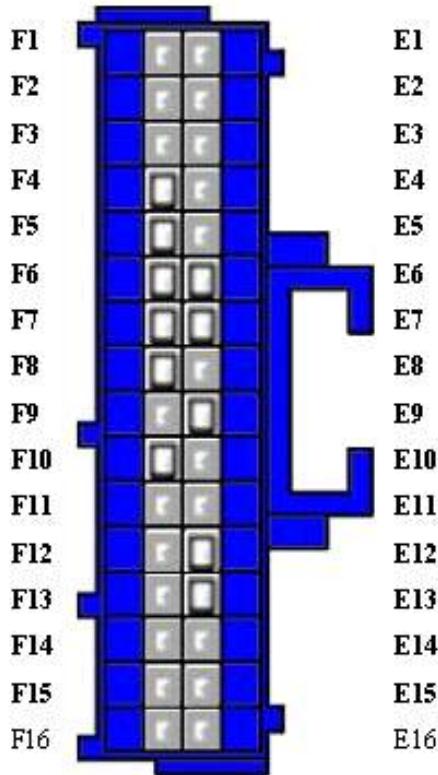


Figure 17 BC Connector 1601

Table 14

#1601 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
E1	Output (Low Side Driver)	TEM Pump Inhibit Relay OR TEM Aux Relay Driver 2	TEM Pump Inhibit Relay OR TEM Aux Relay Driver 2	TEM Pump Inhibit Relay OR TEM Aux Relay Driver 2	TEM Pump Inhibit Relay OR TEM Aux Relay Driver 2
E2	Output (Low Side Driver)	TEM Engine Stop Relay OR TEM Aux Relay Driver 1	TEM Engine Stop Relay OR TEM Aux Relay Driver 1	TEM Engine Stop Relay OR TEM Aux Relay Driver 1	TEM Engine Stop Relay OR TEM Aux Relay Driver 1
E3	Output (Low Side Driver)	Auto Neutral Relay OR LCT Column Shifter IGN Relay	Open	Auto Neutral Relay OR LCT Column Shifter IGN Relay	Open
E4	Output (Low Side Driver)	Theft Deterrent	Theft Deterrent	Theft Deterrent	Theft Deterrent

#1601 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
E5	Output (Low Side Driver)	TEM Engine Start Relay OR Stop Relay (Brake Pedal)	TEM Engine Start Relay OR Stop Relay (Brake Pedal)	TEM Engine Start Relay OR Stop Relay (Brake Pedal)	TEM Engine Start Relay OR Stop Relay (Brake Pedal)
<b>E6</b>	<b>Output (Low Side Driver)</b>	<b>Windshield Wiper High/ Low Speed</b>	<b>Windshield Wiper High/ Low Speed</b>	<b>Windshield Wiper High/ Low Speed</b>	<b>Windshield Wiper High/ Low Speed</b>
<b>E7</b>	<b>Output (Low Side Driver)</b>	<b>Windshield Wiper Power (On/Off)</b>	<b>Windshield Wiper Power (On/Off)</b>	<b>Windshield Wiper Power (On/Off)</b>	<b>Windshield Wiper Power (On/Off)</b>
E8	Output (Low Side Driver)	LCT Shifter — PB position unlock solenoid	Open	LCT Shifter — PB position unlock solenoid	Open
E9	Output (High Side Driver)	Air Solenoid #7	Air Solenoid #7	Air Solenoid #7	Air Solenoid #7
E10	Output (High Side Driver)	Trailer Tail Lights (Tractor or Body Builder Lighting)/ Air Solenoid #13	Trailer Tail Lights (Tractor or Body Builder Lighting)/ Air Solenoid #13	Body Builder Tail Lights/ Air Solenoid #13	Body Builder Tail Lights/ Air Solenoid #13
E11	Output (High Side Driver)	Trailer Auxiliary Circuit OR TEM PTO Engagement Relay (Lectra-Shift)	Trailer Auxiliary Circuit OR TEM PTO Engagement Relay (Lectra-Shift)	TEM PTO Engagement Relay (Lectra-Shift)	TEM PTO Engagement Relay (Lectra-Shift)
E12	Output (High Side Driver)	Air Solenoid #3	Air Solenoid #3	Air Solenoid #3	Air Solenoid #3
E13	Output (High Side Driver)	Air Solenoid #5	Air Solenoid #5	Air Solenoid #5	Air Solenoid #5
E14	Output (High Side Driver)	Right Plow Lights Relay	Right Plow Lights Relay	Right Plow Lights Relay	Right Plow Lights Relay
E15	Output (High Side Driver)	Trailer Right Turn Signal (Tractor or Body Builder Lighting)/ Air Solenoid #14 (Truck)	Trailer Right Turn Signal (Tractor or Body Builder Lighting)/ Air Solenoid #14 (Truck)	Body Builder Right Turn Signal/ Air Solenoid #14	Body Builder Right Turn Signal/ Air Solenoid #14
E16	Output (High Side Driver)	Customer Auxiliary 40 AMP* circuit	Customer Auxiliary 40 AMP circuit	Customer Auxiliary 40 AMP circuit	Customer Auxiliary 40 AMP circuit
F1	Output (High Side Driver)	Park Brake Relay	Park Brake Relay	Park Brake Relay	Park Brake Relay

#1601 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
F2	Output (High Side Driver)	Air Solenoid #11	Air Solenoid #11	Air Solenoid #11	Air Solenoid #11
F3	Output (High Side Driver)	Air Solenoid #12	Air Solenoid #12	Air Solenoid #12	Air Solenoid #12
F4	Output (High Side Driver)	Air Solenoid #6	Air Solenoid #6	Air Solenoid #6	Air Solenoid #6
F5	Output (High Side Driver)	Air Solenoid #8	Air Solenoid #8	Air Solenoid #8	Air Solenoid #8
F6	Output (High Side Driver)	Air Solenoid #9	Air Solenoid #9	Air Solenoid #9	Air Solenoid #9
F7	Output (High Side Driver)	Air Solenoid #10	Air Solenoid #10	Air Solenoid #10	Air Solenoid #10
F8	Output (High Side Driver)	Air Solenoid #4	Air Solenoid #4	Air Solenoid #4	Air Solenoid #4
F9	Output (High Side Driver)	Left Plow Lights Relay	Left Plow Lights Relay	Left Plow Lights Relay	Left Plow Lights Relay
F10	Output (High Side Driver)	Air Solenoid #2	Air Solenoid #2	Air Solenoid #2	Air Solenoid #2
F11	Output (High Side Driver)	Fuel Pump Transfer	Fuel Pump Transfer	Fuel Pump Transfer	Fuel Pump Transfer
F12	Output (High Side Driver)	Particulate Trap Indicator	Particulate Trap Indicator	Particulate Trap Indicator	Particulate Trap Indicator
F13	Output (High Side Driver)	Trailer Left Turn Signal (Tractor or Body Builder Lighting)/ Air Solenoid #16 (Truck)	Trailer Left Turn Signal (Tractor or Body Builder Lighting)/ Air Solenoid #16 (Truck)	Body Builder Left Turn Signal/ Air Solenoid #16	Body Builder Left Turn Signal/ Air Solenoid #16
F14	Output (High Side Driver)	Trailer Marker Lights (Tractor or Body Builder Lighting)/ Air Solenoid #15 (Truck)	Trailer Marker Lights (Tractor or Body Builder Lighting)/ Air Solenoid #15 (Truck)	Body Builder Marker Lights/ Air Solenoid #15	Body Builder Marker Lights/ Air Solenoid #15
F15	Output (High Side Driver)	Trailer or Body Builder Stop Lights	Trailer or Body Builder Stop Lights	Trailer or Body Builder Stop Lights	Trailer or Body Builder Stop Lights

#1601 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
F16	Output (High Side Driver)	Exhaust System High Temperature Indicator			

Note: All outputs will handle up to a 500 mAmp load unless stated otherwise.

Note: Circuits labeled "Gnd Active", "12v Active", or "5v Active" are open circuit until active.

***No connections or splices are allowable on any signals that are highlighted in bold italic.***

\*Ampere

### BC Connector 1602

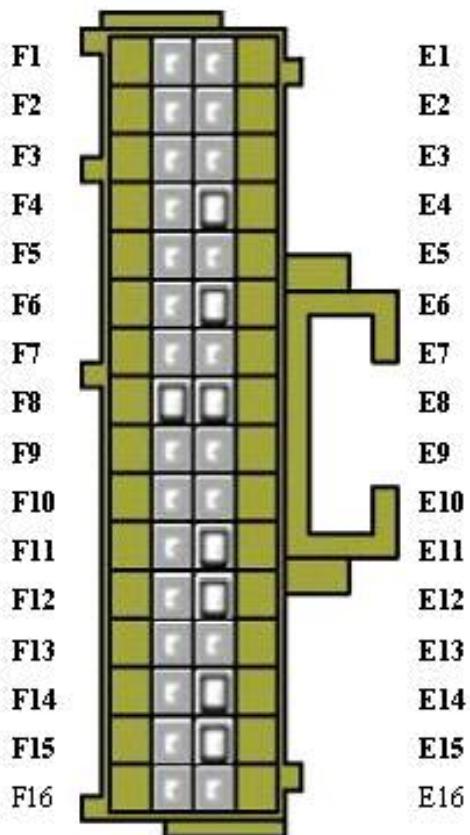


Figure 18 BC Connector 1602

**Table 15**

#1602 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
E1	Input/ Output	Switch Datalink –	Switch Datalink –	Switch Datalink –	Switch Datalink –
E2	Input/ Output	Switch Datalink +	Switch Datalink +	Switch Datalink +	Switch Datalink +
<b>E3</b>	<b>Reference</b>	<b>ZVR (1)</b>	<b>ZVR (1)</b>	<b>ZVR (1)</b>	<b>ZVR (1)</b>
<b>E4</b>	<b>Output</b>	<b>+5V Output (A)</b>	<b>+5V Output (A)</b>	<b>+5V Output (A)</b>	<b>+5V Output (A)</b>
<b>E5</b>	<b>Reference</b>	<b>ZVR (2)</b>	<b>ZVR (2)</b>	<b>ZVR (2)</b>	<b>ZVR (2)</b>
<b>E6</b>	<b>Output</b>	<b>+5V Output (B)</b>	<b>+5V Output (B)</b>	<b>+5V Output (B)</b>	<b>+5V Output (B)</b>
<b>E7</b>	<b>Reference</b>	<b>ZVR (3)</b>	<b>ZVR (3)</b>	<b>ZVR (3)</b>	<b>ZVR (3)</b>
<b>E8</b>	<b>Output</b>	<b>+5V Output (C)</b>	<b>+5V Output (C)</b>	<b>+5V Output (C)</b>	<b>+5V Output (C)</b>
E9	Input (Gnd Active)	N/A	N/A	N/A	N/A
E10	Input (Gnd Active)	Open	Open	Open	Open
<b>E11</b>	<b>Input (Gnd Active)</b>	<b>Headlight Enable</b>	<b>Headlight Enable</b>	<b>Headlight Enable</b>	<b>Headlight Enable</b>
E12	Input/ Output	Air Horn Solenoid/ Air Solenoid #1			
E13	Input/ Output	N/A	N/A	N/A	N/A
<b>E14</b>	<b>Input (Gnd Active)</b>	<b>Brake Switch Input</b>	<b>Brake Switch Input</b>	<b>Brake Switch Input</b>	<b>Brake Switch Input</b>
<b>E15</b>	<b>Input (Gnd Active)</b>	<b>Brake Switch Input</b>	<b>Brake Switch Input</b>	<b>Brake Switch Input</b>	<b>Brake Switch Input</b>
<b>E16*</b>	<b>GND</b>	<b>AC Coupled GND</b>	<b>AC Coupled GND</b>	<b>AC Coupled GND</b>	<b>AC Coupled GND</b>
F1	Input (Gnd Active)	J1939 Shield Datalink	J1939 Shield Datalink	J1939 Shield Datalink	J1939 Shield Datalink
F2	Input/ Output	J1939– Datalink	J1939– Datalink	J1939– Datalink	J1939– Datalink
F3	Input/ Output	J1939+ Datalink	J1939+ Datalink	J1939+ Datalink	J1939+ Datalink
F4	Input (Gnd Active)	J1939 Shield Datalink	J1939 Shield Datalink	J1939 Shield Datalink	J1939 Shield Datalink
F5	Input/ Output	J1939– Datalink	J1939– Datalink	J1939– Datalink	J1939– Datalink
F6	Input/ Output	J1939+ Datalink	J1939+ Datalink	J1939+ Datalink	J1939+ Datalink
F7		N/A	N/A	N/A	N/A
F8	Input (Gnd Active)	Air Horn Switch Input			

#1602 In-Cab		Air Chassis		Hydraulic Full Power Chassis	
32-Way Connector		Pin Description		Pin Description	
Pin	Type	Automatic Transmission	Manual Transmission	Automatic Transmission	Manual Transmission
F9	<i>Input (Gnd Active)</i>	<b>Reserved for Engine Air Intake Monitor</b>			
F10	Input (Gnd Active)	Backup Light State OR Electric Trailer Brake Controller Input	Backup Light State OR Electric Trailer Brake Controller Input	Backup Light State OR Electric Trailer Brake Controller Input	Backup Light State OR Electric Trailer Brake Controller Input
F11	Input (Gnd Active)	Open	Two Speed Axle Switch Input	Open	Two Speed Axle Switch Input
F12	Input (Gnd Active)	TEM Aux Input 2			
F13	<i>Input (Gnd Active)</i>	<b>Reserved for Fuel Filler Restriction/ WIF Input</b>			
F14	Input (Gnd Active)	TEM Aux Input 1			
F15	Input (Gnd Active)	TEM Remote Start/ Stop Switch Input			
F16	Input (Gnd Active)	Open	Open	Open	Open

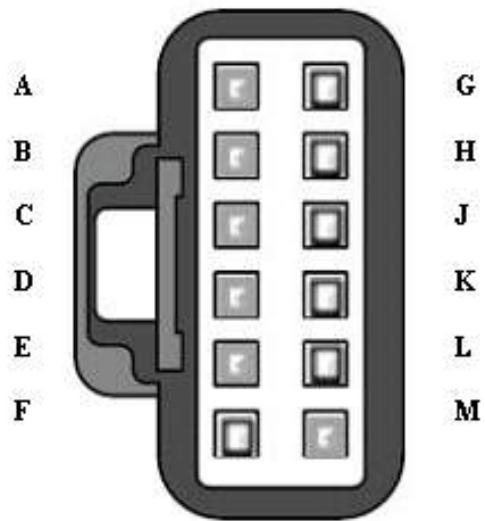
\* The circuit attached to pin E16 should NOT have additional connections or splices added on a hydraulic chassis.

Note: All outputs will handle up to a 500 mAmp load unless stated otherwise.

Note: Circuits labeled "Gnd Active", "12v Active", or "5v Active" are open circuit until active.

***No connections or splices are allowable on any signals that are highlighted in bold italic.***

### BC Connector 1603

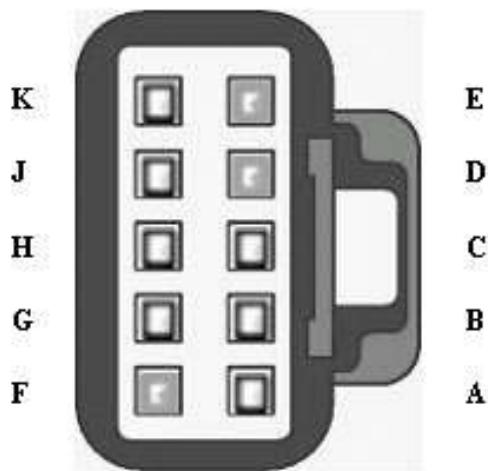


**Figure 19 BC Connector 1603**

**Table 16**

#1603 In-Cab		
12-Way Connector		
Pin	Type	Signal Description
A	10 AMP FET*	Right Front Turn Signal
B	10 AMP FET	Left Front Turn Signal
C	10 AMP FET	AC Compressor
D	10 AMP FET	Left Rear Turn Signal
E	12 AMP FET	Electric Horn
F	10 AMP FET	Left Fog Lamp
G	10 AMP FET	Work Light
H	10 AMP FET	Left Heated Mirror
J	10 AMP FET	Lift Gate
K	10 AMP FET	Right Fog Lamp
L	10 AMP FET	Right Heated Mirror
M	10 AMP FET	Right Rear Turn Signal

\*Field Effect Transistor

**BC Connector 1604****Figure 20 BC Connector 1604****Table 17**

#1604 In-Cab		
10-Way Connector		
Pin	Type	Signal Description
A	20 AMP FET	Windshield Wiper Power
B	10 AMP FET	Headlamp, Low Beam — Left
C	10 AMP FET	Headlamp, High Beam — Left
D		N/A
E	10 AMP FET	Cab GND
F	10 AMP FET	Air Shield Light
G	10 AMP FET	Park, Marker, Clearance, ID Lamp
H	10 AMP FET	Headlamp, Low Beam — Right
J	10 AMP FET	Cab Dome Lamp Circuit
K	10 AMP FET	Headlamp, High Beam — Right

\*Field Effect Transistor

## 7.2. 60ACW — BODY INTEGRATION, I/O EXPANSION HARNESS

### FEATURE CODE DESCRIPTION:

60ACW – BODY INTG, I/O EXPANSION HARNESS (for Diamond Logic® Builder only) includes a harness with five blunt-cut wires routed on lower left of IP. Two GND active inputs and two (0.5 AMP) relay driver outputs are provided.

### FEATURE / BODY FUNCTION:

This feature is an input/output expansion feature for Diamond Logic Builder to be utilized by Body Builders. This expansion feature provides the following: (2) digital inputs, (2) 0.5 AMP relay driver outputs, (1) ZVR on the BC as well as an expansion overlay harness that is part of the IP harness. The expansion overlay harness grants access to these inputs, outputs, and ZVR by providing blunt-cut wires that are strapped to the main IP harness trunk near the J1939 diagnostic connector on the interior of the cab. The overlay harness was designed to be long enough to allow the wires to be inserted into the 72-way pass thru connector if desired.

When this feature is added to the vehicle, the BC pins will not show up on the connector view of DLB until they are written to with Advanced Logic. 595AKH must be turned on and the inputs/outputs must be used in Advanced Logic to show up on the connector view of DLB. The following pins are NOT assigned with 595AKH Digital Logic must be used to assign these pins.

Description of each digital input:

- GND active inputs,

Digital input 1: pin F14 of BC connector #1602

Digital input 2: pin F12 of BC connector #1602

Refer to #1602 connector pinout for pinout description.

Description of each relay driver output:

- 0.5 AMP relay driver output,

Relay driver output 1: pin E1 of the BC connector #1601

Relay driver output 2: pin E2 of the BC connector #1601

Refer to Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Aux Inputs and Drivers.

Description of ZVR:

- Allows for the return of DC current from an external sensor or switch.

**CAUTION – Do not connect any additional electrical loads to ZVR. Adding non-approved electrical loads may adversely affect total electrical operation.**

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software feature codes that MUST be added: 595AKH

Software feature codes that MUST be removed: NONE

There are no customer or Body Builder programmable features associated with this feature.

**WIRING INFORMATION:**

For wiring information for this feature, see Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Aux Inputs and Drivers.

**TESTING:**

Use Diamond Logic® Builder software to program and test drivers and inputs.

**HOW TO ADD THIS FEATURE:**

Add the feature code 595AKH with Diamond Logic® Builder. Create advanced logic using the GND active inputs and/or the 0.5 AMP relay driver outputs. View the connectors tab in Diamond Logic® Builder to verify the pin assignments and connect to these circuits.

## 8. BATTERY, IGNITION, AND ACCESSORY TAPS

### 8.1. STANDARD BATTERY AND IGNITION TAPS

#### FEATURE CODE DESCRIPTION: NONE

See radio and power source connections and fused battery connection sections for additional information.

#### FEATURE / BODY FUNCTION:

Battery, Ignition (IGN) and accessory taps allow the customer to obtain battery IGN and accessory power from various locations on the vehicle to operate various Body Builder or after-market accessories such as lights, motors, heaters, cell phones, computers, etc.

**NOTE – When adding any circuit, be sure to protect the circuit being added. See the General Electric section for circuit protection information.**

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS: NONE

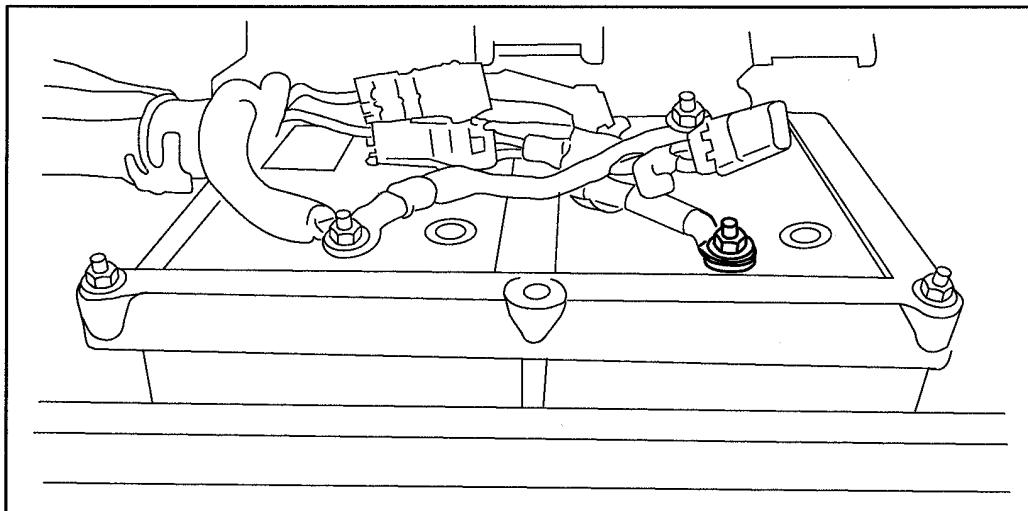
#### WIRING INFORMATION:

##### Battery Connections

**Location 1:** Exterior battery tap in battery box.

Attach to battery post using ring terminals. Circuits should not be connected to the battery if vehicle is equipped with sealed battery terminals.

**NOTE – Do not use starter stud for battery power, as extra terminals may cause nut to loosen.**



**Figure 21 Location 1: Exterior Battery Tap In Battery Box**

**Location 2 :** Exterior battery tap driver's side engine compartment mega-fuse assembly



**Figure 22 Location 2 : Exterior Battery Tap Driver's Side Engine Compartment**

**Table 18 Battery Feed Connection Points**

Circuit Number	Max. Current (Amperes)	Terminal Size	Nut Torque	Special Instructions	Description	Location
—	20	5/16	12 Nm / 9 lbf-ft	—	Mega-Fuse Stud, Fused Side*	Outside Dash Panel, Driver's Side
—	—	3/8	15 Nm / 11 lbf-ft	**	Positive Battery Terminal*	Battery Box

\* Additional "in-line" fuse of appropriate size must be added for circuit being added. Fuse should be located close to power source.

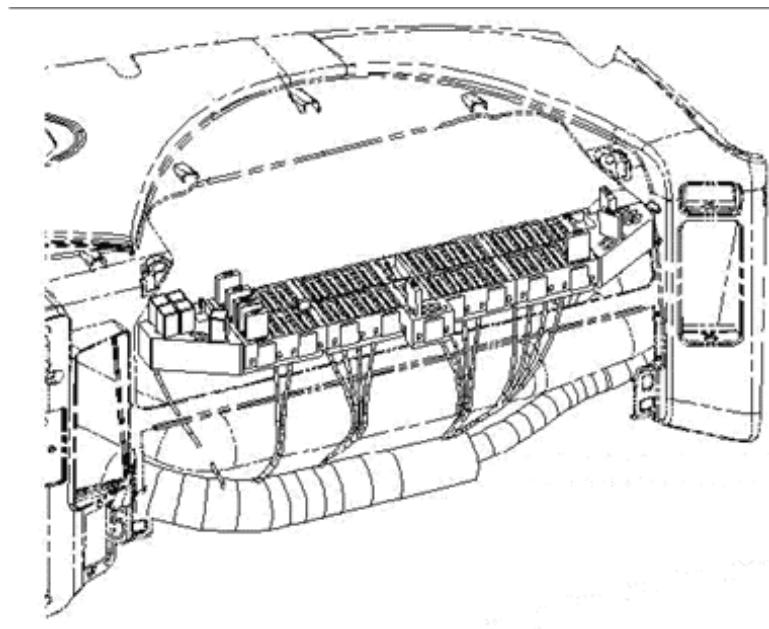
#### **Special Instructions**

\*\* Circuits should not be connected to the battery if vehicle is equipped with sealed battery terminals.

**NOTE: Do not use starter stud for battery power, as extra terminals may cause nut to loosen.**

### Connecting to IGN System

**Location 1:** Located by inside fuse panel



**Figure 23 Passenger Side PDC**

**Table 19**

Circuit Number	Color	Max. Current (Amps)	Special Instructions	Description	Location
A14G	15	—	—	Pigtail at fuse block	Inside Cab, Passenger Side
A13B	Pink	5	A	Pigtail protected by 5 AMP fuse	Inside Cab, Passenger Side

#### Special Instructions

- A. Circuit A14G circuit protected by a 15 AMP fuse in fuse block. A relay is required if the battery load exceeds 15 AMPS.
- B. Circuit A13B circuit protected by a 5 AMP fuse in fuse block. A relay is required if the battery load exceeds 5 AMPS.

On most vehicles, there are unused IGN bussed fuse locations in the PDC. These can be used for low current IGN loads provided that the total IGN load in the PDC does not exceed the 40A rating for the ISO cube IGN relay. For relay and fuse descriptions, see the product graphic located on the inside of the PDC cover.

Fuse terminal part numbers

18 gauge – 3515517C1

16 gauge – 3573312C1

14 gauge – 3573312C1

12 gauge – 3573311C1

**TESTING:**

- For Battery taps, test to see that battery voltage is present at all times.
- For Accessory taps, test to see that battery voltage is present when the IGN key is in “Accessory” or “IGN” key states
- For IGN taps, test to see that battery voltage is present when the IGN key is in “IGN” key state.

## 8.2. 08WAD, 08WCS, 08WHX AND 08WHY — BATTERY DISCONNECT SWITCH

### FEATURE CODE DESCRIPTION:

08WAD – BATTERY DISCONNECT SWITCH {Joseph Pollak} Lever Operated

08WCS – BATTERY DISCONNECT SWITCH {Joseph Pollak 51-315} Positive Type, Lever Operated, Mounted on Cab Floor

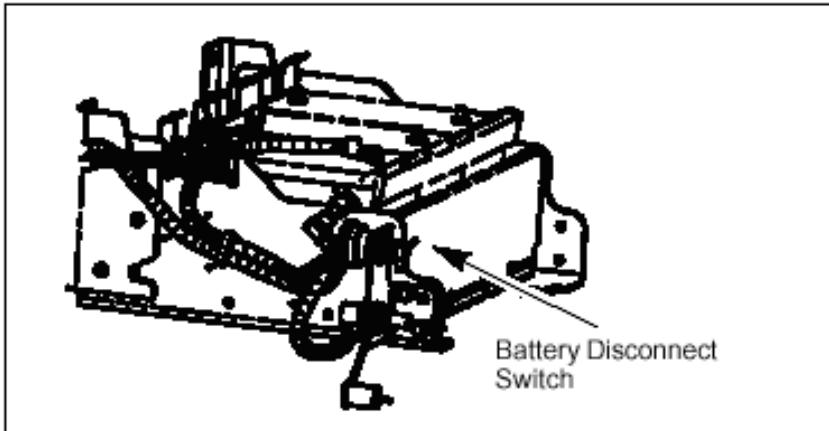
08WHX – BATTERY DISCONNECT SWITCH {Pollak 51-316} Locking, Key Operated, Positive Type, Mounted on Battery Box

08WHY – BATTERY DISCONNECT SWITCH {Joseph Pollak 51-316} Positive Type, Locking, Key Operated, Mounted on Cab Floor

### FEATURE / BODY FUNCTION:

The disconnect switch is used to shut down the entire battery-fed electrical system. When a vehicle is not going to be used for several days or longer, this switch will shut off the system so that the electrical components on the vehicle, if left on, do not drain the batteries of their charge. Customers have the choice between a key or lever operated battery disconnect switch.

**NOTE – The disconnect switch should never be used to shut off the engine as there is a possibility of the alternator generating a high positive voltage spike which may result in electrical damage.**



**BATTERY DISCONNECT SWITCH – CODE 08WAD**

Figure 24

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS: NONE

### WIRING INFORMATION:

No additional wiring is necessary if the vehicle is ordered from International with the sales feature codes listed above.

### TESTING:

1. Close switch.

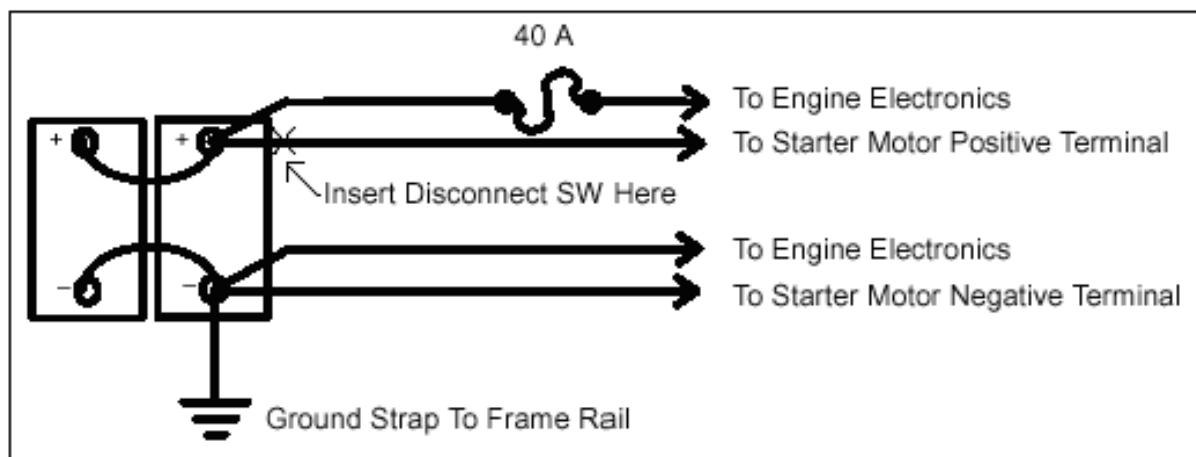
2. Verify that the vehicle is providing 12-14 Volts to the starter motor.
3. Verify vehicle will start.
4. Turn engine off.
5. Open disconnect switch.
6. Verify vehicle systems do not have any electrical power.

#### **HOW TO ADD THIS FEATURE:**

The disconnect switch cannot be put into the battery Ground (GND) cable as was previously done. The electronic modules will provide a GND path around the master disconnect switch if this is tried. The engine and transmission modules must always be connected to the batteries, even when the master disconnect switch is open. Separate power and GND circuits are provided on each vehicle to the engine and transmission electronics. To install a master disconnect switch, splice into the positive battery cable, or use OEM cables, going from the batteries to the cranking motor and insert disconnect switch into that circuit, as shown in Figure 1. Ensure that adequate electrical insulation is used between the positive battery cable, the switch mounting, and the surrounding area. Place boots or covers over the disconnect switch studs to protect the batteries and cables from accidental shorting. Do not disturb the direct connections from the battery to the engine or transmission electronics. To reduce corrosion, dielectric grease should cover eyelets and studs.

**CAUTION – Make sure that batteries are disconnected prior to performing any electrical work.**

If a non-OEM switch is to be used, make sure it is designed to handle at least 1,000 AMPS (intermittent duty)



**Figure 25 Installation Circuit For Battery Disconnect Switch**

**NOTE – If there is more than one positive cable, eyelet terminals will have to be stacked on the switch stud. Some installations may not have GND strap to rail – if none exists, there is no need to add one.**

## 9. CB AND 2-WAY RADIO ACCOMMODATION PACKAGES

### 9.1. 08RCB AND 08RBK — CB RADIOS

Refer to the Circuit Diagram Manual S08322, Chapter 4, Cab Accessories, CB Power Radio.

#### **FEATURE CODE DESCRIPTION:**

08RCB – CB RADIO Accommodation Package; Header Mounted; Feeds From Accessory Side of Ignition (IGN) Switch; Includes Power Source and Two Antenna Bases With Wiring

08RBK – CB ANTENNA (2) {Pana-Pacific} Full Wave; 4.0' Length Includes "International" Name on Top

#### **FEATURE / BODY FUNCTION:**

08RCB – When installing a CB radio, this feature provides the power circuits required for hook-up. This accommodation package includes a two-way connector with 10 Ampere (AMP) accessory power feed and cab Ground (GND), 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 CB antennas are not provided with this code. If the two antennas are desired, an additional feature code 08RBK must be ordered.

08RBK – Provides two 4' long CB antennas.

#### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

#### **WIRING INFORMATION:**

Locations for connecting to the vehicle IGN and cab GND have been provided. The table below lists the connection point along with information about that point. For a complete diagram of the IGN system and for connector and terminal part numbers, see vehicle circuit diagram manual.

**Table 20**

Feature Code	Max. Current (Amps)	Power Feed	Description
008RCB	10	Accessory	CB Radio Accommodation Package (Includes 2 Antenna Bases and Cable)

The mating connector for the CB connector is 1661196C1 and terminal 1661209C1 (16 gauge).

#### **TESTING:**

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

**HOW DO I ADD THESE FEATURES:**

If the vehicle was ordered without one of the desired features, they can be installed in the field. Refer to the section "How Do I" General Information section of this electrical guide for information on obtaining required parts. The same parts that are used in the OEM installation are available (cables, components, etc.). Also, refer to the circuit diagram that applies to the vehicle to aid in the installation.

## 9.2. 08REA AND 08RGA – 2-WAY RADIO

Refer to the Circuit Diagram Manual S08322, Chapter 4, Cab Accessories, 2-Way Radio.

### **FEATURE CODE DESCRIPTION:**

08REA – 2-WAY RADIO Wiring Effects; Wiring With 20 AMP Fuse Protection, Includes IGN Wire With 5 AMP Fuse, Wire Ends Heat Shrink and 10' Coil Taped to Base Harness

08RGA – 2-WAY RADIO Wiring Effects; Wiring With 20 AMP Fuse Protection, Includes IGN Wire With 5 AMP Fuse, Wire Ends Heat Shrink and Routed to Center of Header Console in Cab

### **FEATURE / BODY FUNCTION:**

08REA – Feature code 08REA provides a fused 20 AMP battery feed power wire, GND wire and fused 5 AMP IGN feed for applications requiring two-way radio communications such as local municipal government units or state DOT highway maintenance vehicles. The three wires are taped to the main cab harness.

08RGA – Feature code 08RGA provides a fused 20 AMP battery feed power wire, GND wire and fused 5 AMP IGN feed for applications requiring two-way radio communications such as local municipal government units or state DOT highway maintenance vehicles. The three wires are located in the center of the header console in the cab.

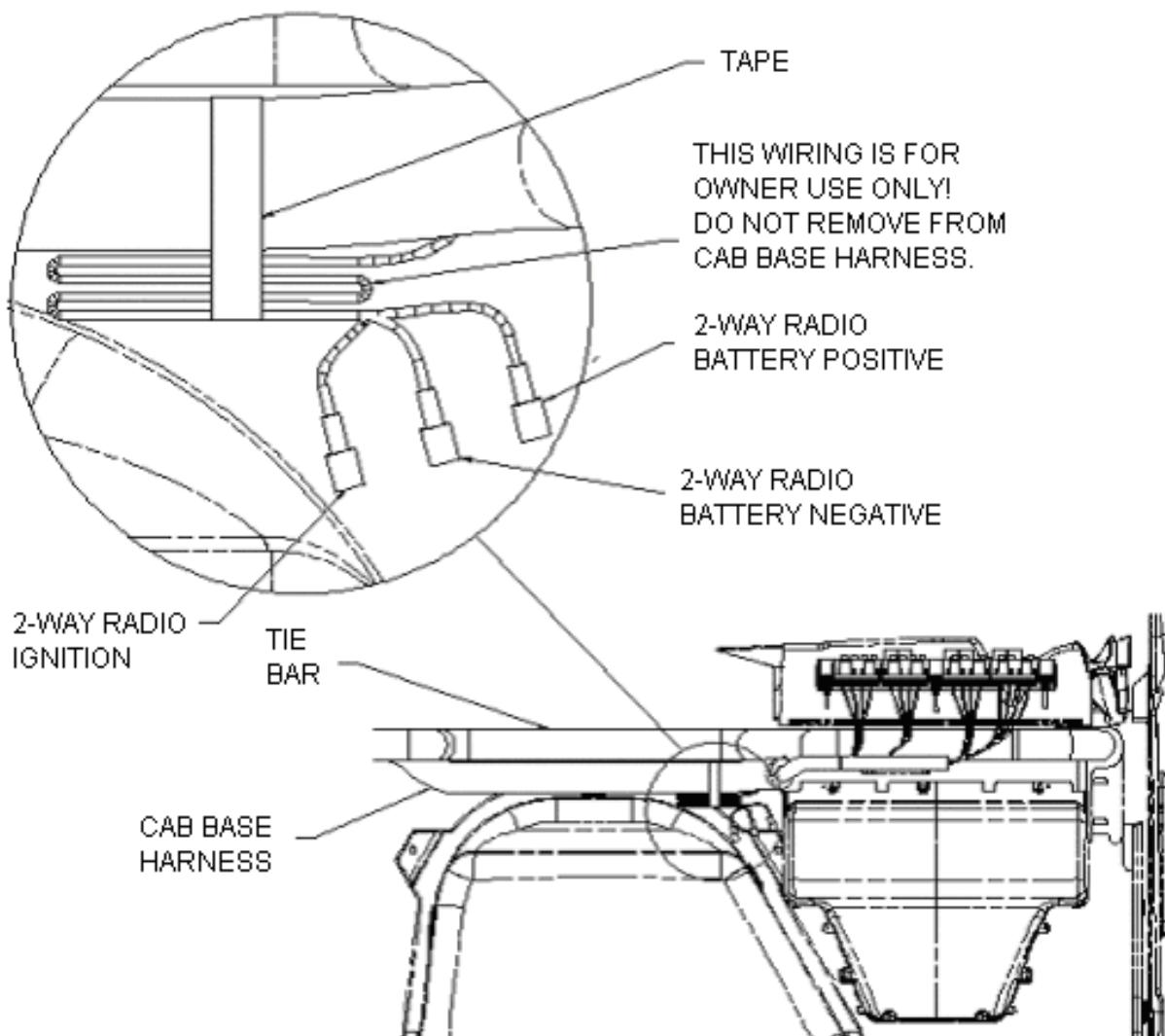
### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

### **WIRING INFORMATION:**

Locations for connecting to the vehicle IGN have been provided. The table below lists the connection point along with information about that point. For a complete diagram of the IGN system and for connector and terminal part numbers, see vehicle circuit diagram manual.

**Table 21**

Feature Code	Max. Current (AMPS)	Power Feed	Description
008REA	20	Battery	Power feed to two-way radio
	5	IGN	IGN feed to two-way radio
008RGA	20	Battery	Power feed to two-way radio
	5	IGN	Ignition feed to two-way radio



**Figure 26**

08REA and 08RGA provide radio power and GND directly from the battery to minimize electrical noise on the line.

The cable is coiled up under the Instrument Panel (IP) as shown above in 08REA, and is of sufficient length to route to the back of the Travelcrew cab.

The wiring is located in the center of the header console in the cab for 08RGA.

**TESTING:**

- To test these circuits, refer to the applicable circuit diagram for the feature and verify that battery voltage is present in the correct key-state for each respective feature.

**HOW TO ADD THESE FEATURES:**

If the vehicle was ordered without one of the desired features, it can be installed in the field. Refer to the "How Do I" General Information section of this electrical guide for information on obtaining required parts. The same parts that are used in the OEM installation are available (cables, components, etc.). Also, refer to the circuit diagram that applies to the vehicle to aid in the installation.

## 10. POWER WINDOWS, LOCKS, REMOTE KEYLESS ENTRY

### 10.1. 16WJU, 16WJV AND 16WKZ — ELECTRIC WINDOWS, REMOTE LOCK AND UNLOCK, AND USE OF THE AUX FEATURE

Refer to the Circuit Diagram Manual S08322, Chapter 4, Cab Accessories, Front Door Windows and Locks (Power), or For Crew for crew cab vehicles.

#### **FEATURE CODE DESCRIPTION:**

16WKZ – KEYLESS ENTRY SYSTEM REMOTE With Panic and Auxiliary Buttons, Includes One Key Fob (Transmitter)

16WJU – WINDOW, POWER (2) And Power Locks, Left and Right Doors

16WJV – WINDOW, POWER (4) And Power Door Locks, Front and Rear Doors, Left and Right

#### **FEATURE/BODY FUNCTION:**

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.



**Figure 27 Driver's Side Door Pod**



**Figure 28 Passenger's Side Door Pod**

The International Keyless Entry System uses electronic door pods in the driver and passenger side doors which also operate the power door locks and the power windows. If equipped with Remote Keyless Entry (optional code), the memory in the receiver (front passenger door pod) learns the transmitter codes from the key fobs (transmitters) and only recognizes those which it has learned in the programming process. Each vehicle's passenger side door pod has the ability to learn up to six transmitter codes allowing the vehicle to be accessed by six different key fobs. Each key fob has a unique code which can be learned by any number of RKE equipped vehicles.

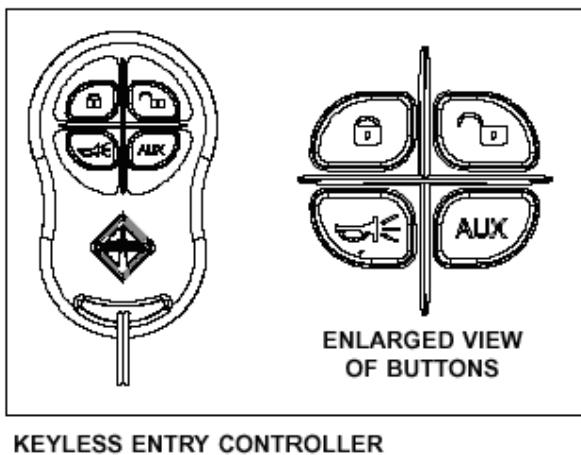
The key fob controls the following functions:

- Chirp of the horn and doors lock if the lock button is pressed on the key fob.
- Autolock function, which automatically locks the doors at a vehicle speed of 15 MPH see details below.
- Panic function, button with horn symbol, which 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 ignition (IGN) switch is off. If the button is pressed prior to the time out period, the lights, etc. will go off
- Pressing the "AUX" button will toggle the work light circuit on. Pressing the button will turn the work light off. Vehicle must be ordered with work light or work light accommodation package.

With the IGN on, if wheel-based vehicle speed is above the auto lock speed, the park brake was released below the auto lock speed and is still released, and the doors were closed below the auto lock speed and are still closed, all doors will lock.

The auto lock feature will only lock the doors once regardless of the number of times the truck stops and starts. Cycling the key and/or opening the door, while below the auto lock speed, will allow the auto lock feature to lock the doors again when the speed conditions are met.

**NOTE – Horn chirp, auto lock are programmable parameters.**



**Figure 29 Keyless Entry Controller**

#### Transmitter Learning And Erasing

Before the transmitter can be used for the first time, it has to be "learned" by the receiver. Up to 6 transmitters with different identification codes can be learned by a single RKE Pod.

These procedures are designed for manual learning/erasing operations on a complete vehicle. They can be used for learning replacement transmitters, for using up to six transmitters for accessing the same vehicle, or for accessing any number of vehicles using the same transmitter. If RKE is being added to the vehicle, additional programming of the Body Controller (BC) is required to operate the horn, panic, and dome light functions with RKE.

#### Procedure For Erasing All Learned Transmitters

1. Cycle the IGN from Off to On. Step 2. must be initiated (all four buttons pressed) within 10 seconds of this IGN event.
2. On the **driver** door pod, do the following:

While holding down the driver window-up, driver window-down, and unlock switches, depress and hold the lock switch. All four switches must be held for at least 5 seconds. Six or seven seconds is recommended. After the 5 seconds, the door pod RKE unit will erase all learned transmitters and the RKE will be disabled. At this point, the erase procedure is finished and a new IGN cycle must be initiated to perform any transmitter learning.

#### Procedure For Learning A Transmitter

**NOTE – This learning procedure cannot be performed during the same IGN cycle as the "erase all learned transmitters" procedure. If necessary, the erase procedure should be completed before this procedure is started.**

1. Cycle the IGN from Off to On (leaving the IGN on will not work, it must be cycled). Step 2. must be initiated (all four buttons pressed) within 10 seconds of this IGN event.
2. On the **passenger** door pod, do the following:

While holding down the window-up, window-down, and unlock switches, depress and hold the lock switch. All four switches must be held for at least 5 seconds. Six or seven seconds is recommended.

3. After the 5 seconds, the Door Pod RKE unit will enter "Learn Mode" and stay there for 10 seconds (or until a transmitter is learned). Once the RKE enters the "Learn Mode", the four buttons can be released. During the ten second "Learn Mode" any function on the new fob/transmitter must be keyed at least twice (See NOTE 1).

NOTE 1. After the transmitter is learned, the next keying of the new transmitter will perform the indicated function. It is recommended that the transmitter be successively keyed until the selected key's function is actually performed; i.e., pressing the lock button on the transmitter two times should learn its code; on the third push, it should lock the door and momentarily beep the city horn. This is a good way to quickly confirm the success of the learning.

NOTE 2. Steps 1. through 5. of the learning process must be repeated for each transmitter to be learned.

## PARTS INFORMATION

Replacement key fobs/transmitters can be obtained from Service Parts by ordering part number 3544938C2.

## SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required software feature code for sales code 16WKZ: 595ABZ

Turning the **Panic\_Enable** parameter ON 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.

Turning the **Chirp\_Enable** parameter ON enables the Chirp feature for the keyless remote. The chirp feature results in a "chirping" sound with the truck is locked and unlocked.

**Table 22**

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	NA	NA	NA
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	NA	NA	NA

Required software feature code for sales code:

- 16WJU: 595ABY
- 16WJV: 595AEJ

The **AutoLock\_Speed** parameter sets the vehicle speed at which the vehicle doors will lock automatically.

**Table 23**

Parameter	ID	Description	Default	Units	Min	Max	Step
AutoLock_Speed	652	Auto lock 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

**WIRING INFORMATION**

When using the "Aux" feature, the work light circuit can be used for other features other than a work light - see "Work Light Feature for additional information."

If truck was built with power locks but not the keyless entry, see "How Do I Add Work Light Feature."

With the Diamond Logic® Builder software, one other system can be activated. For example, the Aux button could turn on headlights or hazard lamps, not both.

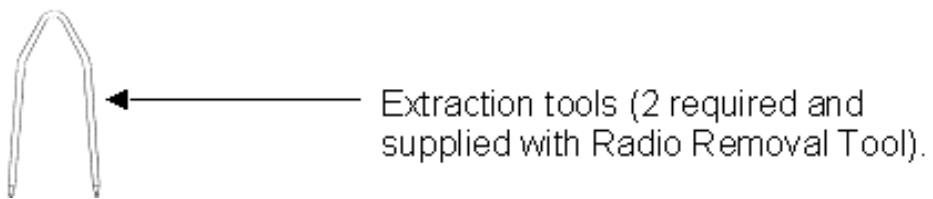
**HOW TO ADD THIS FEATURE:**

The 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 595ABZ must 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 3544937C5 as described below. The desired quantity of remote key fobs, part number 3544938C2, 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 vehicle speed option should already be set since power locks are installed.
- As noted above, additional wiring may be required if the Aux button on the key fob will be utilized for turning on a work light or other functions.
- Program the RKE receiver to recognize the desired key fobs as described above.

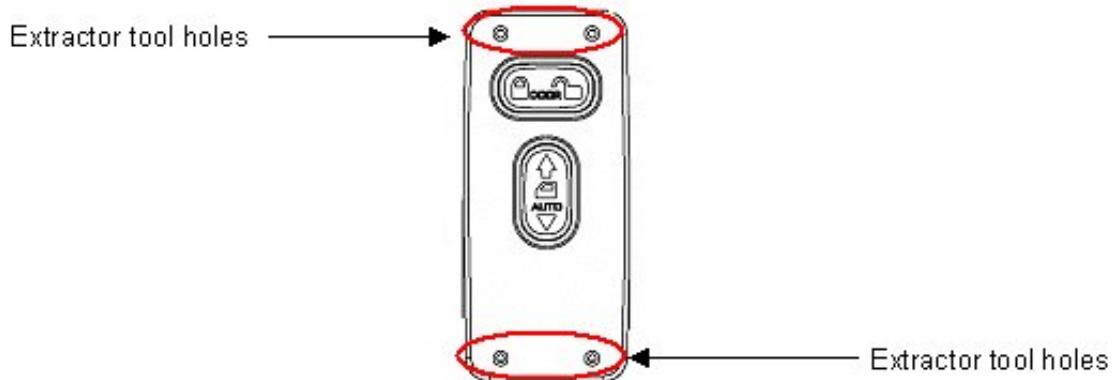
**REMOVAL/REPLACEMENT OF PASSENGER SIDE DOOR POD:**

To remove the door pod use the DIN Radio Removal Tool part number 2504954C1.



**Figure 30**

Insert the extraction tools (2 required and supplied with Radio Removal Tool). The extraction tools are shown in Figure 30.



**Figure 31**

To install the new replacement pod, connect the appropriate connectors and push the pod in until the locking tabs are fully engaged.

## 11. FUSED BATTERY CONNECTIONS INSIDE CAB — 08518, 08718, 08WCK

Refer to the Circuit Diagram Manual S08322, Chapter 4, Cab Accessories, Cigar Lighter and Power Feeds.

### **FEATURE CODE DESCRIPTION:**

08518 – CIGAR LIGHTER

08718 – POWER SOURCE Cigar Type Receptacle Without Plug and Cord

08WCK – POWER SOURCE, TERMINAL TYPE 2-Post

### **FEATURE / BODY FUNCTION:**

08518 – Provides cigar lighter.

08718 - This option provides a power source for customers who wish to use CB radios, hand held spotlights or trouble lights, or other accessories that plug into the power socket receptacle for 12-Volt power.

08WCK – Customers often desire the ability to power 12-volt accessories with the truck's electrical system. This option provides a power source for items equipped to receive power from post-type terminals.

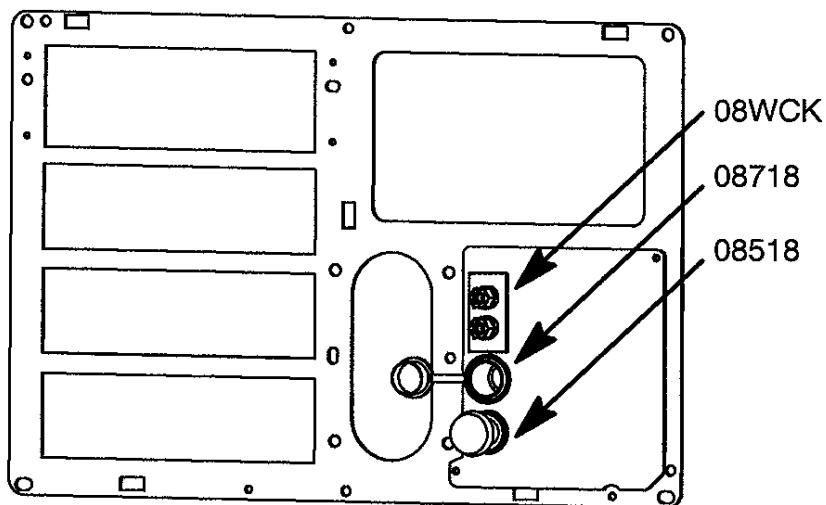
### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

Locations for connecting to the vehicle Ignition (IGN) have been provided. The table below lists the connection point along with information about that point. For a complete diagram of the IGN system and for connector and terminal part numbers, see vehicle circuit diagram manual.

**Table 24 Vehicle Ignition Connections**

Feature Code	Max. Current (Amperes)	Power Feed	Description
008WCK	20	Battery	Power Source, Two Post-Type
008718	20	Battery	Power Source (Cigar-Type Receptacle)
008518	15	Battery	Cigar Lighter (provides customer with a 15 AMP battery supply)

### Power Source Options in Dash Panel



**Figure 32 Power Source Connections**

**TESTING:** To test these circuits, refer to the applicable circuit diagram for the feature and verify that battery voltage is present in the correct key-state for each respective feature.

**HOW TO ADD THESE FEATURES:**

If the vehicle was ordered without one of the desired features, it can be installed in the field. Refer to the "How Do I" General Information section of this electrical guide for information on obtaining required parts. The same parts that are used in the OEM installation are available (cables, components, etc.). Also, refer to the circuit diagram that applies to the vehicle to aid in the installation.

## 12. PRODUCTIVITY FEATURES

### 12.1. 08WPZ — TEST EXTERIOR LAMPS EXCEPT BACK UPS

#### FEATURE CODE DESCRIPTION:

08WPZ — Test Exterior Lights Pre-Trip Inspection will cycle all exterior lamps except back-up lights.

#### FEATURE / BODY FUNCTION:

Exterior light test feature allows easier verification of light illumination during walk-around checks. Exterior lights shall illuminate in a fashion that allows the operator to verify the illumination of exterior lights.

To enable the external lamp check sequence:

- Turn the key to IGN or ACCESSORY
- All exterior lights are off
- All of the external lights inputs, park light switch, service brake switch, cruise switch and key state have a good status
- Set the park brake
- Simultaneously press the cruise on and cruise resume switches

THEN

- Press and release the brake pedal.

To disable the external lamp check sequence, the operator must:

- Press the service brake OR
- Manually turn on any of the external lights OR
- Any of the external lights inputs, park light switch, service brake switch, cruise switch and key state have a bad status OR
- Turn the key to the off or crank position OR
- Release the park brake.

The backup lamp cannot be included within this test since the BC does not control this lamp's functionality.

The lamp test repeatedly flashes all the lights on in the following sequence. This allows the operator to get outside the vehicle and verify that all the lights are working properly.

The following sequence is repeated with no delay between the steps; the programmable time parameter shall have a default value of two seconds, a minimum of one second, and a maximum of 10 seconds, with increments of one second. This parameter is set at FLEET access.

**Table 25**

Sequence Number	Lights Requested On	Time In This Sequence
0	High Beam on Plow (if plow is installed)	PP
1	High Beams and Park Lights on	PP
2	Fog Lamps (if installed) and Park Lights on	PP
	If fog lamps not installed, skip sequence one	
3	Low Beam on Plow (if plow installed)	PP
4	Low Beam and Park Lights on	PP
5	Right Front and Rear Turn Light and Park Lights on	PP
6	Left Front and Rear Turn Light and Park Brake Lights on	PP
7	All lights off	PP
8	Brake Lights	PP
9	All Lights off	PP

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Required software feature code: 595AZY

Software Feature Codes that must be removed: NONE

**Table 26**

Parameter Name	Parameter ID#	Parameter Description	Default Settings	Units	Minimum Value	Maximum Value	STEP
Ext_Lamp_Test_Seq_Time	2230	The time between each step of the exterior lamp check	2	S	1	10	1

**WIRING INFORMATION:**

None required.

**TESTING:**

Refer to the **FEATURE/BODY FUNCTION** section.

**HOW TO ADD THIS FEATURE:**

1. Enable the software feature code using the Diamond Logic® Builder software (see local dealer).
2. Set the desired programmable features from the table above.

## 12.2. 08WXD – ALARM, PARKING BRAKE

### FEATURE CODE DESCRIPTION:

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/BODY FUNCTION:

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 of 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, then make sure the IGN switch is in the run or accessory position and set the park brake.

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required software feature code: 595AZV

595AJD activates this feature; however, the parameters below can be found under 595AYC.

Software feature code that must be removed: None

Park\_Brake\_Alarm\_Duration 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 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 parameter allows for the selection of the park brake alarm to work in either key off or key on/off.

**Table 27**

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

## **WIRING INFORMATION**

No additional wiring is required for this feature.

## **HOW TO ADD THESE FEATURES:**

This feature is software only and can be added by activating software feature code 595AZV with Diamond Logic® Builder.

## **12.3. 08WGL — WINDSHIELD WIPER SPEED CONTROL**

### **FEATURE CODE DESCRIPTION:**

08WGL – Windshield Wiper Speed Control forces wipers to slowest Intermittent Speed when the park brake is set and left on for a predetermined time.

### **FEATURE/BODY FUNCTION:**

Feature 08WGL is a software feature that forces the windshield wipers to their slowest intermittent speed when the park brake is set and the wipers are left on for a programmable period of time (Wipers\_To\_Low\_Int\_Timeout).

The user may override this feature by manually moving the wiper switch to another position. The wipers will remain at this speed for the same programmable period of time and then return to their slowest intermittent speed after that time has passed.

If the IGN switch is turned off, this feature will be overridden.

There are two programmable parameters associated with this feature: Wipers\_To\_Low\_Int\_Enabled and Wipers\_To\_Low\_Int\_Timeout. These parameters can be modified by anyone with the appropriate interface tool and Fleet access or higher.

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software Feature Codes that must be installed: 08WGL — 595AJD

595AJD activates this feature; however, the parameters below can be found under 595AYC.

The **Wipers\_To\_Low\_Int\_Enabled** parameter shall enable or disable this feature. The default setting shall be ON when this feature is ordered.

The **Wipers\_To\_Low\_Int\_Timeout** parameter shall determine the amount of time the park brake has to be set before the wipers are forced to their slowest intermittent speed. The default value for this parameter is 60 seconds. The minimum time allowed is 10 seconds and the maximum time allowed is 300 seconds with 10 second intervals.

**Table 28**

Parameter	ID	Description	Default	Units	Min	Max	Step
Wipers_To_Low_Int_Enabled	2171	Enables or disables the wiper speed override, if it is present.	1	None	0	1	1
Wipers_To_Low_Int_Timeout	2228	Defines the amount of time the parking brake has to be set before the wiper speed is overridden.	60	s	10	300	10

**WIRING INFORMATION**

This feature is software driven.

**TESTING**

1. Start vehicle and make sure the parking brake is engaged.
2. Turn the windshield wipers on any setting except for the slowest intermittent speed.
3. Leave the wipers on this setting for 60 seconds without adjusting the wiper speed.
4. After 60 seconds, the wipers should slow to the lowest speed.
5. Adjust the wiper speed control.
6. The wiper setting should match the user set speed.

**HOW TO ADD THESE FEATURES:**

Use the Diamond Logic® Builder software to install the appropriate software and determine correct settings for programmable parameters.

## 12.4. HAZARD LIGHT OVERRIDE STOP LIGHTS

### 08THN

#### FEATURE CODE DESCRIPTION:

08THN - TURN SIGNAL SWITCH With Hazard Flasher Overrides Brake, to be done With Programming System Controller.

#### FEATURE / BODY FUNCTION:

This feature is for vehicles with combination stop and turn lamps. This feature allows hazard flashers to continue flashing when service brakes are applied. This feature is used on bulk fuel transport where some states require hazard lamps to remain flashing when stopped at R/R crossings. When the Stop Override Hazard programmable parameter below is turned on, this feature allows hazard flashers on the rear of the vehicle to stop flashing and stay illuminated as long as the brake pedal is depressed.

This feature can be enabled or disabled by using the Diamond Logic® Builder software.

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required Software Feature Codes: 0595AAL

Software Feature Codes that must be removed: NONE

Activating the **Stop\_Override\_Hazard\_Enabled** parameter means that the brake lights will override the hazard lights if both are activated at the same time.

**Table 29**

Parameter	ID	Description	Default	Units	Min	Max	Step
Stop_Override_Hazard_Enabled	562	Activate/ deactivate stop light override of flashing hazards on rear of vehicle. A value of 1 enables and a value of 0 disables this feature.	On	On/ Off	NA	NA	NA

#### WIRING INFORMATION:

None required.

#### TESTING:

##### **Stop Override Hazard Disabled:**

1. Turn on the Hazard lights and verify normal operation (flashing), front and rear.
2. Depress the brake pedal and verify that both front and rear hazard lights remain flashing.

**Stop Override Hazard Enabled:**

1. Turn on the Hazard lights and verify normal operation, front and rear.
2. Depress the brake pedal and verify that both rear stoplights are on (not flashing) and that the front hazard lights remain flashing.
3. Release the brake pedal and verify that normal operation of the flashing hazards resumes at the rear of the vehicle.

**HOW TO ADD THIS FEATURE:**

- If it is desired to have the HAZARD lights override the STOP lights, then the Stop\_Override\_Hazard\_Enabled parameter must be turned OFF.

## 13. FOG, PLOW AND GUIDE POST ACCOMMODATION PACKAGES

### 13.1. FOG/DRIVING LIGHTS

#### 08585, 08WPL, 08WPM, 08WLM, and 08WLN

Refer to the Circuit Diagram Manual S08322, Chapter 9, Lights, Fog Light and Work Light.

#### FEATURE CODE DESCRIPTION:

4000

- 08585 – TOGGLE SWITCH, AUXILIARY and Wiring; For Driving Lights or Fog Lights Mounted by Customer
- 08WPL – FOG LIGHTS (2) Amber, Oval, With H355W Halogen Bulb
- 08WPM – FOG LIGHTS (2) Clear, Oval, With H355W Halogen Bulb

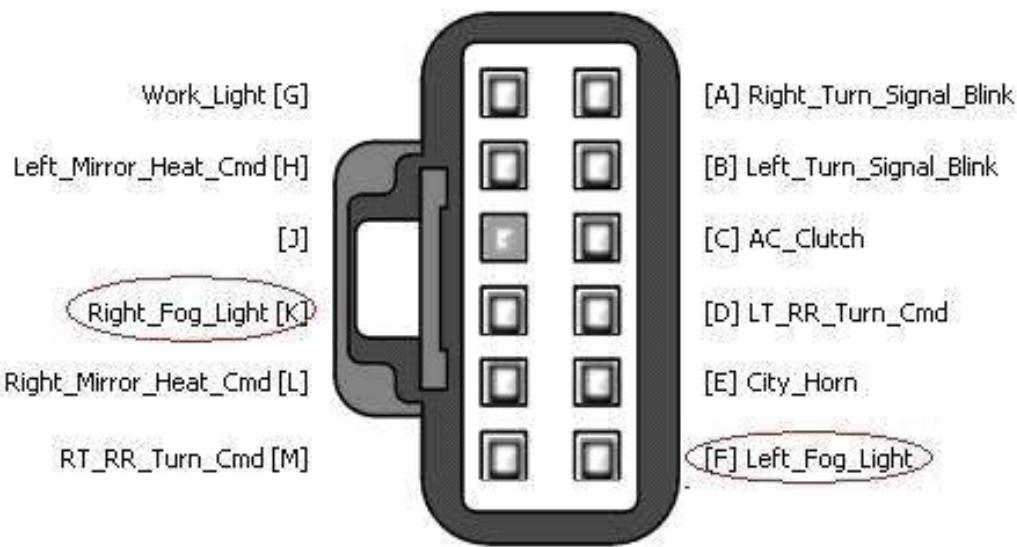
7000

- 08585 – TOGGLE SWITCH, AUXILIARY and Wiring; For Driving Lights or Fog Lights Mounted by Customer
- 08WLM – FOG LIGHTS {Peterson} Amber, Halogen, Rectangular
- 08WLN – FOG LIGHTS {Peterson} Clear, Halogen, Rectangular

#### FEATURE / BODY FUNCTION:

Feature codes 08WPL, 08WPM, 08WLM, and 08WLN come with the fog light system (wiring and fog lamps) completely installed. Feature code 08585 is an accommodation package that comes with wiring and a fog light connector. Customer must supply the mating connector, terminals, and seals, and must install the fog lamps.

All above features operate 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.



**Figure 33 1603 (BC J1)**



**Figure 34 Fog Light Switch in Switch Pack**

Depending on the other features ordered on the vehicle, the fog light button switch could also be located on the left of the steering column under the instrument cluster.



**Figure 35 Fog Light Switch Located Under the Instrument Cluster**

For the customers who prefer to mount their own lamps, installation integrity is improved with the factory toggle switch and wiring feature.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Required Software Feature Codes:

595ACE for Rocker Switch

595AMT for Push Button in Location B under the instrument cluster

595AMS for Push Button in Location A under the instrument cluster

595AHT for 08585

Software Feature Codes that must be removed: NONE

**Table 30**

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

Parameter	ID	Description	Default	Units	Min	Max	Step
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

#### WIRING INFORMATION:

With feature 08585 and if the vehicle is a 3200, 4200, 4300 or 4400, a "thin" fog lamp must be used if mounted in the bumper opening.

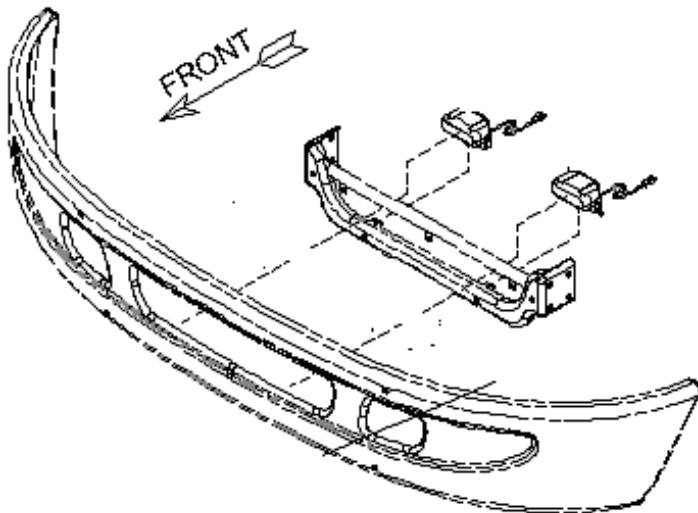
The fog lamp connections are located at the front of the frame on each side. See view below.

Care must be taken when adding fog lamps as lamps may have a GND wire and also have a grounded base. Be sure that the feed circuit, cavity A, the connector at front of frame, is not connected to GND.

Mating connector part number 587568C91

Terminal (16 gauge) part number 587575C1

Seal part number 1652325C1



**Figure 36**

Thin fog lamps must be used if mounted in the bumper opening of the 3200, 4200, 4300 and 4400 models.

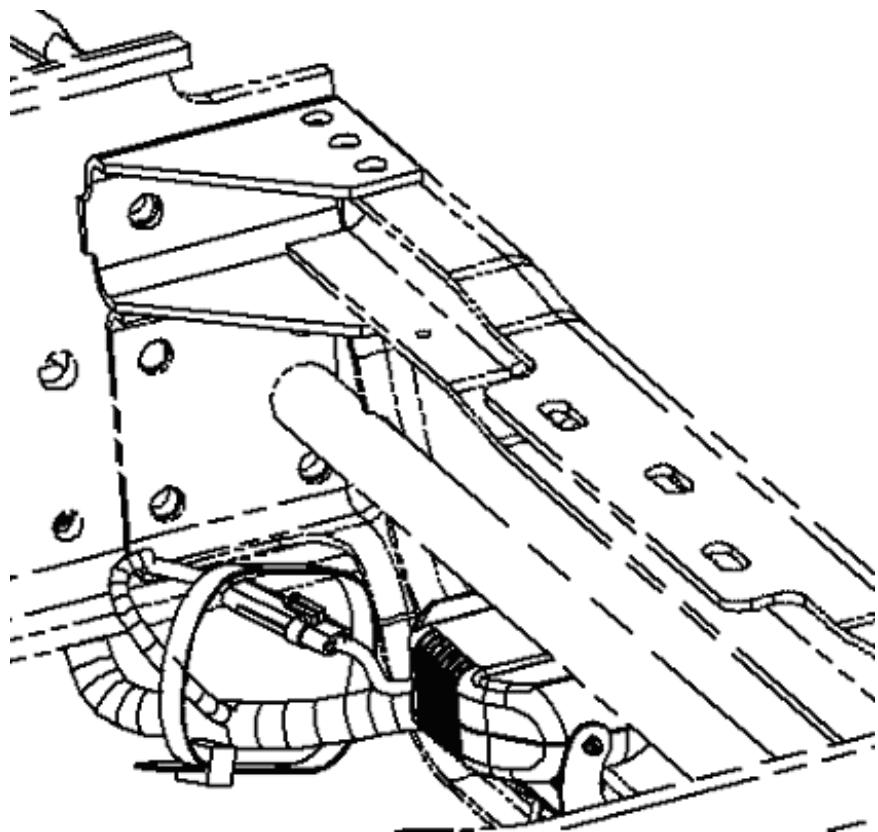
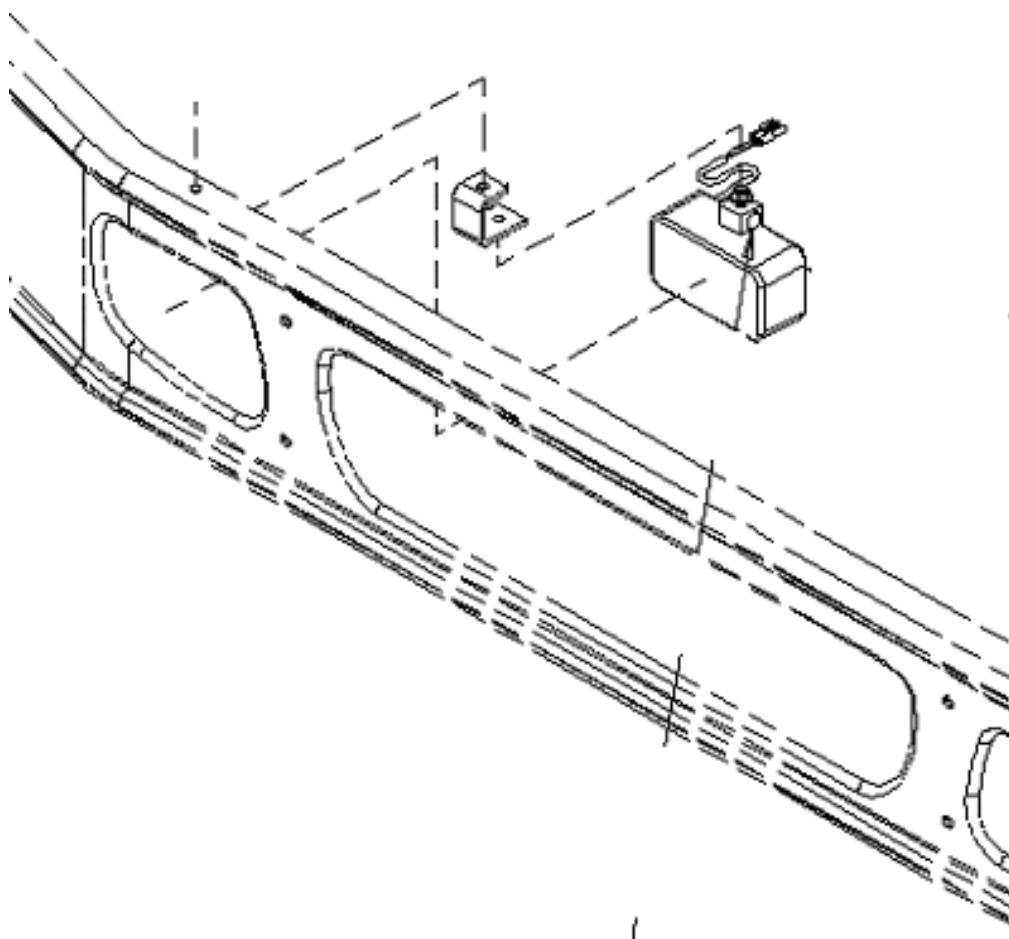


Figure 37 View of Fog Lamp Breakout



**Figure 38 View of Bumper Mounting — 7000 Models**

**TESTING:**

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\_Fog\_Light) and pin K (labeled Right\_Fog\_Light) in DLB located in connector (#1603 J1) are providing battery voltage.
3. Verify that the fog lights are functioning correctly.
4. Turn fog light switch OFF.
5. Verify that the fog light output goes OFF.

**HOW TO ADD THIS FEATURE:**

- Software feature code 595ACE, 595AMY, or 595AMS (depending on switch location) must be enabled on the vehicle using the Diamond Logic® Builder software (see local dealer if not owned).
- Install fog light switch part number 3563064C1 in the designated switch pack location or part number 3610765C1 for the pushbutton switch located below the instrument cluster. Use Diamond Logic® Builder software to determine the fog light switch assignment after the software has been programmed into the BC.

- Set the desired programmable parameters for each signal using the Diamond Logic® Builder software (see local dealer if not owned).
- Customer must wire the desired load into pin F (labeled Left\_Fog\_Light) and pin K (labeled Right\_Fog\_Light) on the BC hood connector (#1603 J1).

There are two fog light kits available from your International dealer, 2507255C91, Fog Lights Clear and 2507254C91 Fog Lights Amber. These kits provide the parts for the slim line fog lights for the 4000 models only. The installation instructions are shown below for reference.

### Fog Light Installation

**Models:** 4200, 4300, 4400, 8500



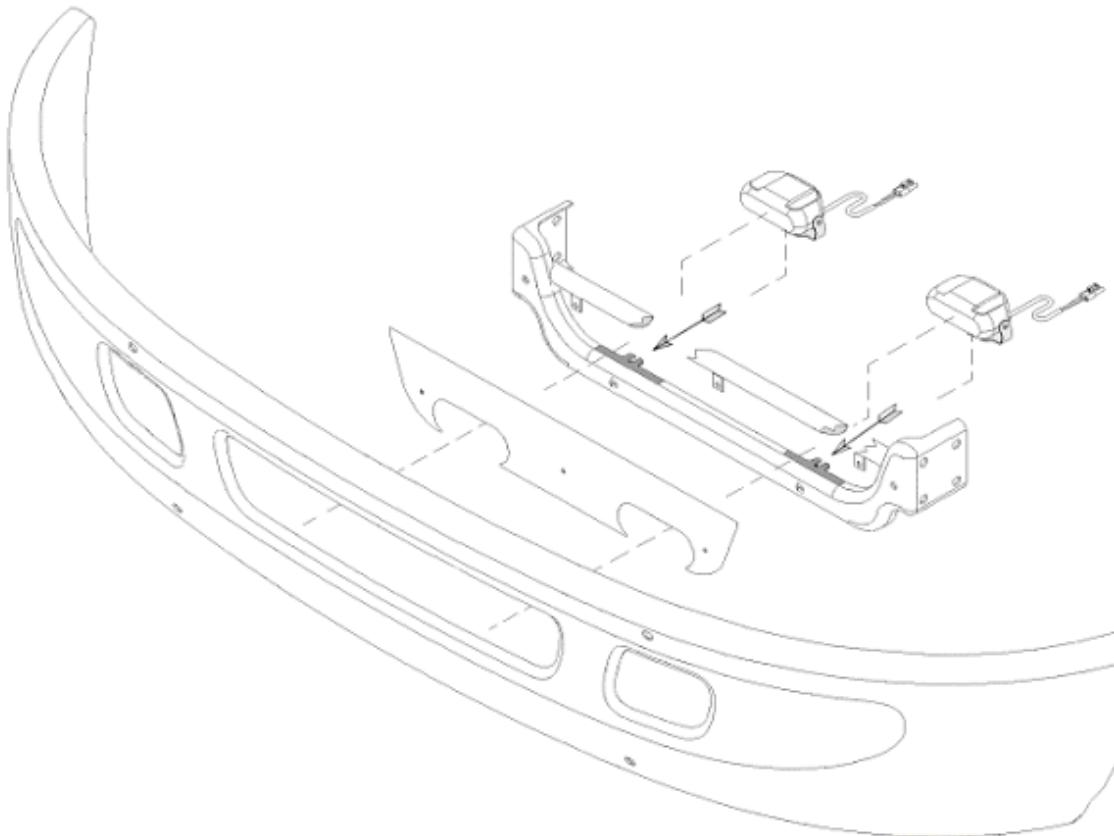
**WARNING – Turn off IGN switch before starting procedure to avoid injury.**

**Description:** This document addresses installation, switching, and programming of fog lights on International 4200, 4300, 4400, and 8500 trucks.

**Table 31 Parts Information**

Part Number	Description	Quantity
2507254C91	Amber Light Kit	1
2507255C91	Clear Light Kit	1

Install fog lights using hardware included in the kit. The Figure below shows installation.

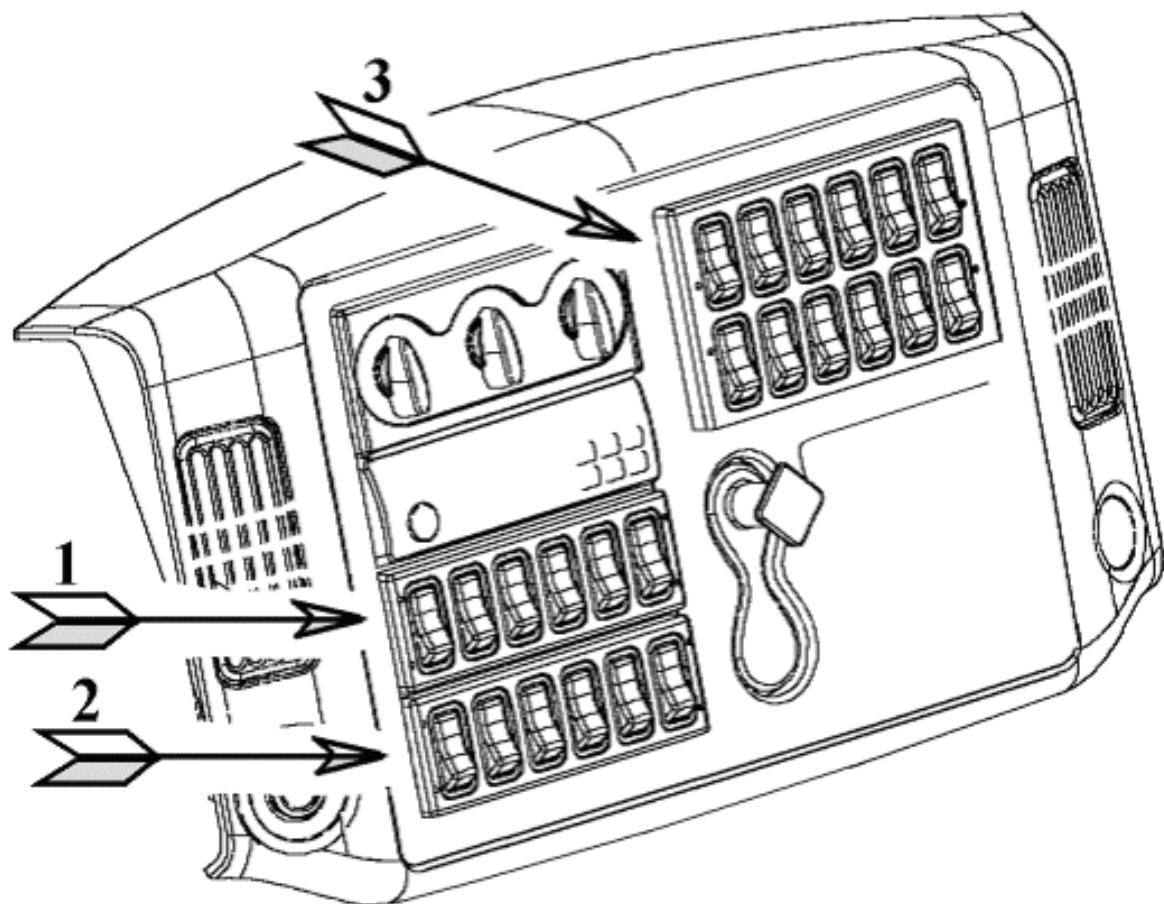


**Figure 39 Front View with Attachment Points**

#### **Switch Installation**

Refer to the Figure below.

If there is available switch capacity in location one, install the fog light control switch in location one. If the location one switch pack module is fully populated, install a six pack (part number 3549776C4) in location two. Additional switch blanks (part number 3533950C1) may be needed to cover unused switch locations.



**Figure 40 Control Panel**

- Location 1: Six pack
- Location 2: Six Pack
- Location 3: Twelve Pack

#### **Wiring Fog Lights**

Refer to the Circuit Diagram Manual S08322, Chapter 9, Lights, Fog Light and Work Light for circuit installations.

#### **Programming Fog Lights**

Adding fog lights will require reprogramming the system controller. See local dealer.

**Table 32 Fog Light Kit — Clear**

Part Number	Description
2507255C91	Fog Light Kit Clear
3555568C91	Light, Fog w/Brkt (Clear) Slim
3535162C1	Nut, Hex Metr Prev Torq*M8X1.25
306132C1	Strap, Cable Lock
3560279C91	Harness, *Fog Lights
3560225C91	Harness, Electrical, Chassis Wi
3549438C91	Switch, Light *Assy — Fog Light
3554890C1	Screen, Air Intake Radiator Gua
3552493C1	Bolt, Sems M6X1.0–25 SST Blk Ox
3526712C1	Nut, Special *M6
3535292C1	Bolt, Sems All 6mm X15 Torx
30592R1	Nut, Speed Standard Part M6 X1
2507524R1	Manual, Inst Fog Light Instl

**Table 33 Fog Light Kit — Amber**

Part Number	Description
2507254C91	Fog Light Kit Amber
3555569C91	Light, Fog w/Brkt (Amber) Slim
3535162C1	Nut, Hex Metr Prev Torq*M8X1.25
306132C1	Strap, Cable Lock
3560279C91	Harness, *Fog Lights
3560225C91	Harness, Electrical, Chassis Wi
3549438C91	Switch, Light *Assy — Fog Light
3554890C1	Screen, Air Intake Radiator Gua
3552493C1	Bolt, Sems M6X1.0–25 SST Blk Ox
3526712C1	Nut, Special *M6
3535292C1	Bolt, Sems All 6mm X15 Torx
30592R1	Nut, Speed Standard Part M6 X1
2507524R1	Manual, Inst Fog Light Instl

## 13.2. AUXILIARY FRONT LIGHTS

### 08THJ — Auxiliary Harness

Refer to the Circuit Diagram Manual S08322, Chapter 9, Lights, Aux Headlights, Snow Plow Lights.

#### FEATURE CODE DESCRIPTION:

08THJ – AUXILIARY HARNESS 3.0' for Auxiliary Front Headlights and Turn Signals for Front Plow Applications

#### FEATURE / BODY FUNCTION:

When front-mounted equipment blocks the vehicle headlamps and turn lamps, such as a snowplow, this feature code is available to connect additional lamps to be used in place of the normal headlamps.

This feature provides a 3-foot extension harness and comes with a sealed 7-way connector cap. The connector is located behind the driver's side headlight under the hood.

When the headlight switch is turned to the park or on position, both the vehicle park and auxiliary park lights will come on. If the turn signal switch is activated, both the vehicle turn and auxiliary turn signal lights will come on.

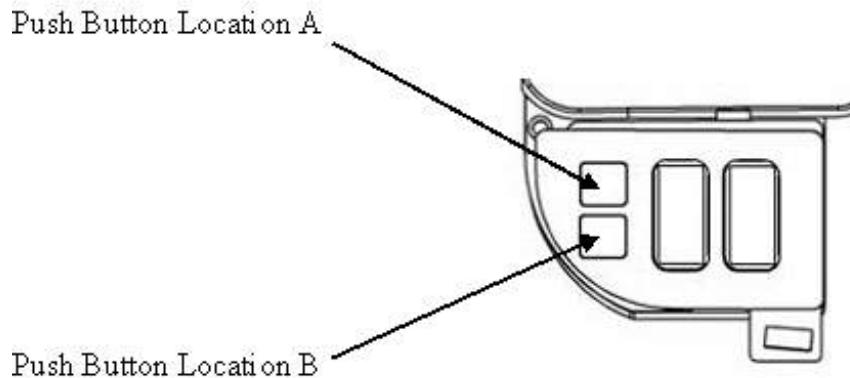
An auxiliary lighting switch labeled PLOW LIGHTS is mounted in the dash panel. The switch controls whether the auxiliary or vehicle headlights are on. The headlamp switch must be on for the auxiliary headlamps to operate. Note that both sets of headlamps cannot be turned on at the same time. The plow light switch will only function with the IGN key in the on or accessory position.

This option is not available with the fog light or customer-mounted fog light options and is not available factory-installed on 4000 models.

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required Software Feature Code:

- 595AMV – Push button located in position A below instrument cluster
- 595AMW – Push button located in position B below instrument cluster
- 595AYY – Rocker switch



**Figure 41 Plow Lights Push Button Locations**



**Figure 42 Plow Light Rocker Switch**

Software feature codes that must be removed: 595AMS, 595AMT, 595ACE

**WIRING INFORMATION:**

The circuit ratings are as follows: headlamp hi beam 20 AMP, headlamp low beam 20 AMP, left turn 10 AMP, right turn 10 AMP and park 15 AMP. Since the auxiliary park and turn current is shared with vehicle lighting current, make sure the added lighting does not exceed the stated current rating for each circuit. All circuit protection is internal to the BC.

**NOTE – If the plow lights are turned on without the lights being connected, the BC will log a headlamp fault code.**

**Table 34 Aux. Connector Circuit Identification**

Circuit Number	Cavity	Function
64HI	A	Hi Beam
11-G	B	GND
64LO	C	Low Beam
56D	D	T/S Left
58F	E	Park
57D	F	T/S Right
Plug	G	Plug



Connector on chassis harness viewed from mating end.  
This harness is located behind the driver's side headlight under the hood.

**CONNECTOR – 2039311C91**  
**PLUG – 0587579C1**  
**LOCK – 2039342C1**

**Figure 43**

To mate with the chassis harness use the following

**Table 35 Part Information**

Part	Quantity	Description
2039312C91	1	BODY, CONNECTOR 7 WAY METRI-PACK 280 SERIES, SEALED – FEM
587579C1	1	PLUG, FILLER, SEALING WEATHERPACK–GREEN
2033912C1	6	TERMINAL, CABLE, CABLE* METRI-PACK 280 SERIES MALE BLADE
589391C1	6	SEAL, CABLE TERMINAL WEATHERPACK–GRAY
2039342C1	1	LOCK, CONNECTOR BODY
The terminals and seals in the above table are for 14-gauge cable.		

**NOTE – It is suggested that an extra connector (Part # 2039312C91), completely filled with plugs, be saved and connected to the chassis harness connector when the plowing season is over – this procedure protects against corrosion.**

**TESTING:**

1. Activate the plow light switch in the dash using the Diamond Logic® Builder software for switch locations.
2. Turn on vehicle park lights.
3. Verify that auxiliary connector Cavity E has battery voltage levels present.
4. Turn ON vehicle headlights to the LOW BEAM position.
5. Verify that auxiliary connector Cavity C has battery voltage levels present.
6. Turn vehicle headlights to the HIGH BEAM position.
7. Verify that auxiliary connector Cavity A has battery voltage levels present.
8. Turn on vehicle left turn signal.
9. Verify that auxiliary connector Cavity D has intermittent voltage levels present.
10. Turn on vehicle right turn signal.
11. Verify that auxiliary connector Cavity F has intermittent voltage levels present.
12. Turn off the plow light switch.
13. Verify all vehicle lights are operating correctly.

**HOW TO ADD THIS FEATURE:**

There is a plow light kit available 2585355C91 to facilitate installation. The instructions that come with the kit are shown below.

**NOTE – If the vehicle has hydraulic brakes, the instructions for installing relay circuits do not apply as the cavities have factory-installed circuits in the cavities indicated DO NOT REMOVE THESE CIRCUITS, use alternate open cavities. Be sure to mark the function of the added relays on the decal located on the bottom of the PDC cover.**

**[2585355C91 KIT, AUXILIARY \(SNOWPLOW\) LIGHT Instructions](#)**

Refer to the Circuit Diagram Manual S08322, Chapter 9, Lights, Aux Headlights, Snow Plow Lights for circuit information on installing this feature.

**[08THV — Front Guide Post Lights](#)****FEATURE CODE DESCRIPTION:**

08THV — DISCONNECT, FRONT HARNESS for Guide Post Lights; Connectors Located at Headlight Connection, for Customer Installation

**FEATURE / BODY FUNCTION:**

This feature provides two additional connectors located in the front wiring harness for front parking or identification lights. This feature is commonly used for customer or Body Builder- added guidepost lights typically mounted at each end of the front bumper. These connectors come with mating connectors and sealing plugs pre-installed. The guide post light circuit is directly tied to the vehicle parking light system, so when the headlight switch is turned to the park or on position, these auxiliary lights will turn on with the standard vehicle lighting. This feature should be used in any application where operation in tight spaces requires constant identification of the vehicle's width.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software Feature Codes that must be added: NONE

Software Feature Codes that must be removed: NONE

**WIRING INFORMATION:**

Refer to the Circuit Diagram Manual S08322, Chapter 9, Lights, Light System – Marker, Park, Tail, Turn, and Stop Lights.

**Table 36 Connector Cavity Information and Parts Required**

Connector		Circuit #			Term	Seal
P/N	Cavity	Left Side	Right Side	Gauge	Part Number	Part Number
1661778C1	A	M58H	M58J	16	1661875C1	1661872C1
	B	M58-GA	M58-GB	16	1661875C1	1661872C1

Plug part number: 2025431C1

Lock part number: 1661874C1

**TESTING:**

1. Turn the Headlight switch to PARK position and verify that both right and left guide post lights are on.
2. Turn the Headlight switch to ON position and verify that both right and left guide post lights are on.

**HOW TO ADD THIS FEATURE:**

If the vehicle was not ordered with the feature, it may be added. Refer to the part numbers identified in the Wiring section above for information on parts and components. See also "How Do I" - General Information section of this electrical guide.

## 14. BODY BUILDER WIRING FOR STOP/TAI/L/TURN LIGHTS

### 14.1. STOP/TURN/TAI

International provides standard rear stop and turn signal lights on every vehicle. If the Body Builder or TEM needs to add different rear light configurations, such as separate stop and rear turn signals, various methods are offered to tap into the tail light circuits. The first and most common way is to use the standard sealed tail light 5-way Packard connector to provide lighting circuits for body-mounted lights that need combined stop and rear turn signals. It is recommended that a sealed mating connector and terminals be used to attach body wiring to the vehicle wiring. If the existing rear lighting is used and a marker or identification light feed is needed, International recommends using the 5-way connector on the driver side rear tail light. Other optional methods for adding various light configurations are available (feature codes 08HAA, 08HAB, and 08NAA).

A feed terminal for body marker lights is provided in "terminal D" position on the left tail lamp. To wire body lights, Body Builders are to attach a terminal (International part number 2033816C1 or Packard Electric part number 12129493) and seal (International part number 589391C1 or Packard Electric part number 12015193) to the body feed cable. The cable can then be snapped into the empty cavity of the existing 5-way connector (Note: if a splice is absolutely necessary, use heat shrink tubing with proper wire).

To connect to the tail light wiring harness, instead of using the OEM tail lights, use International connector 1677851C1 or Packard Electric P12186400. Be sure to use a terminal plug in any unused cavities in the connector body. Alternately, order feature code 08NAA which includes separate wiring for standard left and right tail lights with 8' of extra cable for extending tail light wiring and separate wiring for left and right body-mounted tail lights.

The standard tail light connectors are located at the lights mounted to both the driver and passenger sides of the frame rail at the rear.

#### **Standard Tail, Marker, and Clearance Lamp Connection**

#### **FEATURE CODE DESCRIPTION:**

Standard with standard tail lamps.

#### **FEATURE / BODY FUNCTION:**

International provides a connection point at the left rear standard tail lamp. The connection point is made available so that power can be provided to additional tail, marker and clearance lamps.

#### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

#### **WIRING INFORMATION:**

There is an unused cavity in the left rear tail lamp connector that can be used to provide tail, marker and clearance power. Remove the connector from the lamp and remove the cavity seal. Terminate added circuit with terminal and seal below, and insert into cavity D.

**Table 37**

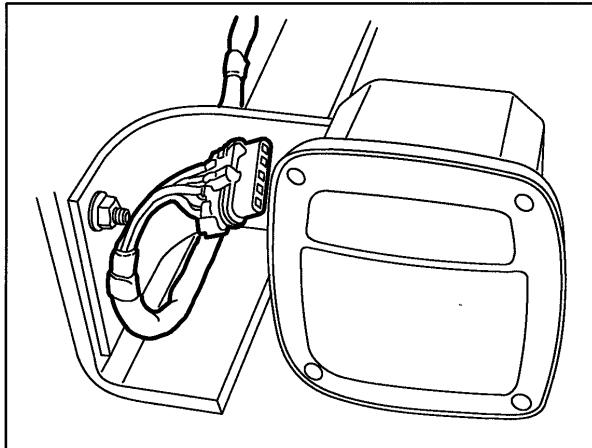
Parts	Part Numbers
Terminal (12 gauge)	2033816C1
Seal	589390C1

**NOTE – Circuit is protected internally by the Body Controller (BC) at 15 Amperes (AMPS). If current is close to or exceeds 15 AMPS, a relay must be added.**

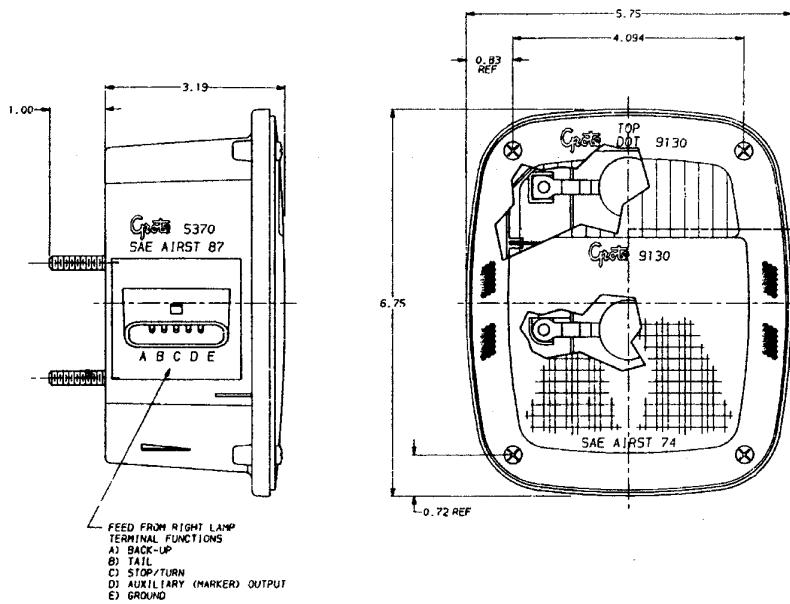
If the rear lighting is to be entirely body-mounted, and a connection to the rear harness tail lamp connector is needed, use connector, terminal and seal specified below.

**Table 38**

Parts	Part Numbers
Connector	1677851C1
Terminal	1687848C1 — 10 Gauge 2033912C1 — 12-14 Gauge
Lock	1677914C1
Seal	0589390C1 — 10-12 Gauge 0589391C1 — 14-16 Gauge



**Figure 44 Feed Terminal Location on Left Tail Lamp**



**Figure 45 Feed Terminal Location on Left Tail Lamp**

**TESTING:**

- When additional lights are added, test those lights for functionality and test the connection point for battery voltage.

**08HAA — Body Builder Wiring At End Of Frame**

Refer to the Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Body Builder and Trailer Socket – Back of Cab (BOC) and EOF.

**FEATURE CODE DESCRIPTION:**

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 / BODY FUNCTION:**

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.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software Feature Codes that must be added: 0595ABC

Software Feature Codes that must be removed: NONE

**These parameters should be left at their factory default values!**

**Table 39**

Parameter	ID	Description	Default	Units	Min	Max	Step
LT_FT_Turn_Lo_Current	1910	Park and ID Lights Low Current Detection Level (AMPS)	0.5	A	0	10	0.1
LT_FT_Turn_Hi_Current	1911	Park and ID Lights High Current Detection Level (AMPS)	10	A	0	10	0.1
LT_FT_Turn_OC_Current	1912	Park and ID Lights Open Circuit Detection Level (AMPS)	0.5	A	0	10	0.1
RT_FT_Turn_Lo_Current	1913	Park and ID Lights Low Current Detection Level (AMPS)	0.5	A	0	10	0.1
RT_FT_Turn_Hi_Current	1914	Park and ID Lights High Current Detection Level (AMPS)	10	A	0	10	0.1
RT_FT_Turn_OC_Current	1915	Park and ID Lights Open Circuit Detection Level (AMPS)	0.5	A	0	10	0.1

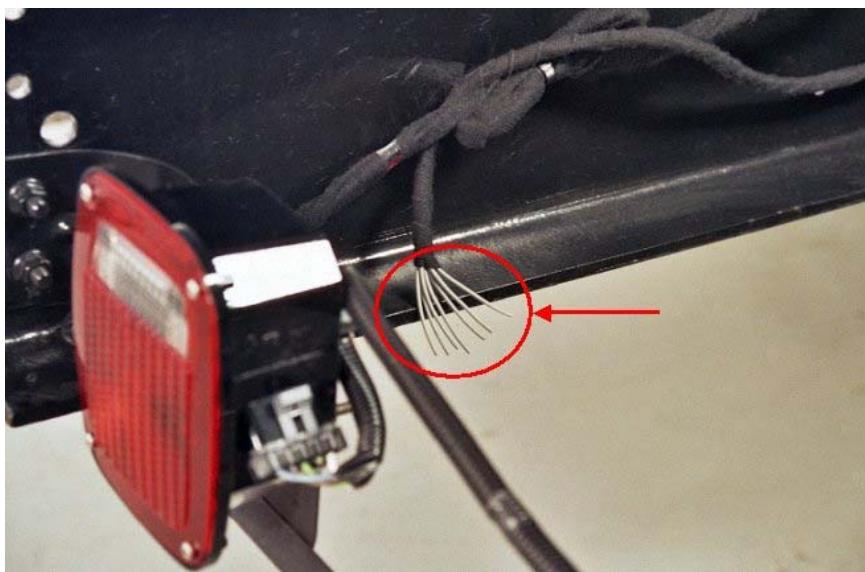
**WIRING INFORMATION:**

08HAA gives 7 wires located at EOF that are blunt-cut.

**Table 40 08HAA**

Cavity	Circuit Number	Maximum Current	Description	Fused by
N/A	R70	30 A	Stop Lights	F7-D F4-E4
N/A	R68	20 A	Park Lights	F3-B D2-C2
N/A	R94	30 A	IGN Feed	F8-D F4-E4
N/A	R58	20 A	Identification Lights	F3-D D4-C4
N/A	R56	15 A	Left Turn	F2-A F1-E1
N/A	R57	15 A	Right Turn	F2-C F3-E3
N/A	R10	N/A	GND	

Connector pinout is labeled as Trailer Socket (9734) connector in Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Body Builder and Trailer Socket – BOC and EOF. The connector itself is not supplied, and wires are blunt-cut.



**Figure 46 Location of 7-Wire Breakout at EOF**

**TESTING:**



**WARNING – To avoid property damage, personal injury or death, park the vehicle on a level surface, set the parking brake, chock the wheels and turn the engine off.**

1. Turn on vehicle headlights.
2. Verify that the taillight circuit (# R68) has battery voltage levels present.
3. Verify that the marker light circuit (# R58) has battery voltage levels present.
4. Turn off vehicle headlights.
5. Turn on left turn signal in vehicle.
6. Verify that left turn circuit (# R56) 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 (# R57) 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 (# R94) has battery voltage levels present.

14. Press the vehicle brake pedal.
15. Verify that the stop circuit (# R70) has battery voltage levels present.
16. Release brake pedal.

**CIRCUIT DIAGRAM:**

See Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Body Builder and Trailer Socket – BOC and EOF.

**HOW TO ADD THIS FEATURE:**

Feature 08HAA is not available with code 08HAG and 08HAH Electric Trailer Brake or codes 08TME and 08TMG Trailer Connection Socket and 08THH Aux Trailer Socket with Center Pin Circuit. If the vehicle has any of these codes, 08HAA cannot be installed in the vehicle.

This feature is not easy to install, and every effort should be made to order the vehicle with the desired code.

Refer to the "How Do I" General Information section of this electrical guide for obtaining information on obtaining required circuits.

Refer to the 7-way socket at EOF for information covering circuit connections and use of the circuit diagram manual to aid in assembly.

## **08HAB and 08HAE — Body Builder Wiring**

Refer to the Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Body Builder Connections.

### **FEATURE CODE DESCRIPTION:**

08HAB – BODY BUILDER WIRING, BOC AT LEFT OF FRAME, includes 7-way sealed connector for tail/amber/backup/accessory power/GND and sealed connectors for combination stop/turn and a 3-way for separate stop/turn lights.

08HAE – BODY BUILDER WIRING, BOC REAR OF FRAME, includes 7-way sealed connector for tail/amber/backup/accessory power/GND and sealed connectors for combination stop/turn and a 3-way for separate stop/turn lights.

### **FEATURE / BODY FUNCTION:**

These features provide power to operate various body loads or after-market accessories such as stop/tail/backup/marker/rear turn signal lights, motors, heaters, etc. There are two connectors that come with these options. A 7-way and a 3-way both have sealed mating connectors and sealing plugs pre-installed. The 7-way connector provides the combined stop and turn signal circuits while the 3-way provides the separate stop and turn signal circuits. It is always recommended that sealed mating connector terminals be used to attach body wiring to the vehicle wiring. Also, if this option is used in place of the standard rear lighting connector, it is recommended that a mating connector with sealing plugs be placed into the standard rear tail light connector.

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software Feature Codes that must be added: 595ABC

Software Feature Codes that must be removed: NONE

**These parameters should be left at their factory default values!**

**Table 41**

Parameter	ID	Description	Default	Units	Min	Max	Step
LT_FT_Turn_Lo_Current	1910	Park and ID Lights Low Current Detection Level (AMPS)	0.5	A	0	10	0.1
LT_FT_Turn_Hi_Current	1911	Park and ID Lights High Current Detection Level (AMPS)	10	A	0	10	0.1
LT_FT_Turn_OC_Current	1912	Park and ID Lights Open Circuit Detection Level (AMPS)	0.5	A	0	10	0.1
RT_FT_Turn_Lo_Current	1913	Park and ID Lights Low Current Detection Level (AMPS)	0.5	A	0	10	0.1

Parameter	ID	Description	Default	Units	Min	Max	Step
RT_FT_Turn_Hi_Current	1914	Park and ID Lights High Current Detection Level (AMPS)	10	A	0	10	0.1
RT_FT_Turn_OC_Current	1915	Park and ID Lights Open Circuit Detection Level (AMPS)	0.5	A	0	10	0.1

**WIRING INFORMATION:**

08HAB: Connectors are located inside the driver's side frame rail at the BOC.

08HAE: Connectors are located inside the driver's side frame rail at the EOF.

**Table 42 7-Way Connector Information**

Wire Number	Cavity	Gauge	Color	Description	Fuse Rating (Amps)	Available Current (Amps)
N68BB	A	14	Brown	Tail Light	20	20
N56BB	B	16	Yellow	Left Turn Light	10	8
N57BB	C	16	Light Green	Right Turn Light	10	8
N54BB	D	14	Brown	Marker Light	20	20
N71BB	E	16	Light Blue	Back-up Light	10	6
N12BB	F	14	Light Blue	Accessory Feed	20	20
N11-GD	G	12	White	GND	—	

**Table 43 More 7-Way Connector Information**

Description	Chassis Harness	Body Builder Harness
(4450) 7-Way Connector	2039311C91	2039312C91
Lock		2039342C1
12 Gauge Seals		589390C1
14 Gauge Seals		589391C1
16 Gauge Seals		1652325C1
12 Gauge Terminals	2039344C1	1687848C1
14 Gauge Terminals	3535486C1	2033912C1
16 Gauge Terminals	2039343C1	2033911C1

**Table 44 3-Way Connector Information**

Wire Number	Cavity	Gauge	Color	Description	Fuse Rating (Amps)	Available Current (Amps)
N56BC	A	16	Orange	Left Turn Light	10	6
N57BC	B	16	Orange	Right Turn Light	10	6
N70BB	C	14	Orange	Stop Light	15	15

**Table 45 More 3-Way Connector Information**

Description	Chassis Harness	Body Builder Harness
(4460) 3-Way Connector	1686834C1	3553961C1
Lock	1664408C1	3554019C1
14 Gauge Seals		589391C1
16 Gauge Seals		1652325C1
14 Gauge Terminals	2033816C1	2033912C1
16 Gauge Terminals	2033819C1	2033911C1

**Figure 47 7-Way and 3-Way Connectors for 08HAB (BOC)**

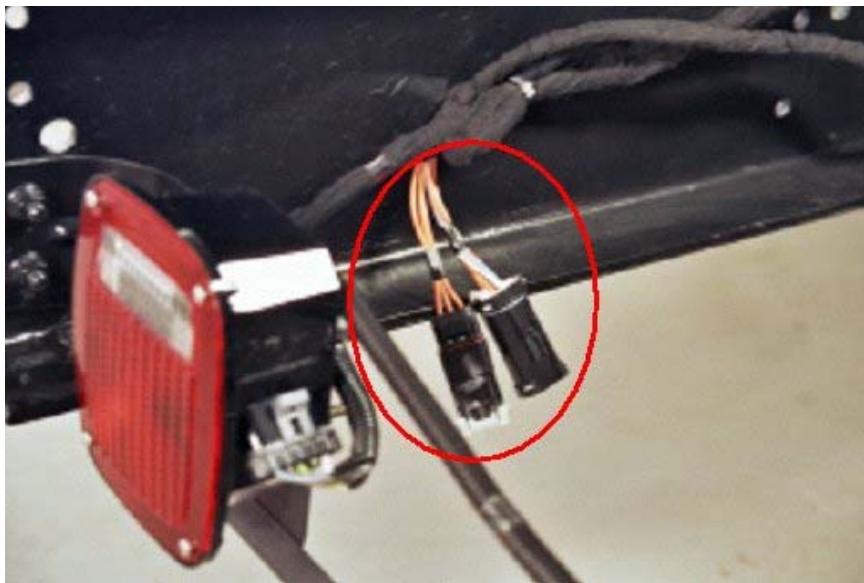


Figure 48 7-Way and 3-Way Connectors for 08HAE (EOF)

**TESTING:**



**WARNING – To avoid property damage, personal injury or death, park the vehicle on a level surface, set the parking brake, chock the wheels and turn the engine off.**

For Combined Stop and Turn:

1. Turn on vehicle headlights.
2. Verify that the tail light circuit, Cavity A of 7-way socket with brown 14 gauge wire, has battery voltage levels present.
3. Verify that the marker light circuit, Cavity D of 7-way socket with brown 14 gauge wire, has battery voltage levels present.
4. Turn OFF vehicle headlights.
5. Turn on left turn signal in vehicle.
6. Verify that left turn/stop circuit, Cavity B of 7-way socket with orange 16 gauge wire, 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/stop circuit, Cavity C of 7-way socket with orange 16 gauge wire, is cycling between battery voltage and GND.

10. Turn off vehicle left turn signal.
11. Put the vehicle in reverse.
12. Verify that the body backup lights are working correctly.
13. Verify that the backup light circuit, Cavity E of 7-way socket with orange 16 gauge wire, has battery voltage levels present.
14. Take the vehicle out of reverse.
15. Turn key to accessory or IGN position.
16. Verify that the accessory circuit, Cavity F of 7-way socket with light blue 14 gauge wire, has battery voltage levels present.
17. Press the vehicle brake pedal.
18. Verify that the brake lights are functioning correctly.
19. Verify that the left turn/stop circuit, Cavity B of 7-way socket with orange 16 gauge wire, AND the right turn/stop circuit, Cavity C of 7-way socket with orange 16 gauge wire have battery voltage levels present.
20. Release brake pedal.

For Separate Stop and Turn:

1. Turn ON vehicle headlights.
2. Verify that the tail light circuit, Cavity A of 7-way socket with brown 14 gauge wire, has battery voltage levels present.
3. Verify that the marker light circuit, Cavity D of 7-way socket with brown 14 gauge wire, has battery voltage levels present.
4. Turn off vehicle headlights.
5. Turn on left turn signal in vehicle.
6. Verify that left turn circuit, Cavity A of 3-way socket with orange 16 gauge wire, 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, Cavity B of 3-way socket with orange 16 gauge wire, is cycling between battery voltage and GND.
10. Turn off vehicle left turn signal.
11. Put the vehicle in reverse.
12. Verify that the backup light circuit, Cavity E of 7-way socket with orange 16 gauge wire, has battery voltage levels present.
13. Take the vehicle out of reverse.
14. Turn key to accessory or IGN position.

- 
15. Verify that the accessory circuit, Cavity F of 7-way socket with light blue 14 gauge wire, has battery voltage levels present.
  16. Press the vehicle brake pedal.
  17. Verify that the stop circuit, Cavity C of 3-way socket with orange 14 gauge wire, has battery voltage levels present.
  18. Release brake pedal.

**HOW TO ADD THIS FEATURE:**

This feature is not easy to install and every effort should be made to order the vehicle with the desired code.

Refer to the "How Do I" General Information section of this electrical guide for obtaining information on obtaining required circuits.

Refer to the 7-Way Socket at EOF for information covering circuit connections and use of the circuit diagram manual to aid in assembly.

**08THG and 08THH – Auxiliary 7-Way Trailer Socket**

Refer to Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Body Builder and Trailer Socket – BOC and EOF.

**FEATURE CODE DESCRIPTION:**

08THG – AUX. TRAILER SOCKET 7-Way; With Battery Fed Circuit to Center Pin, With 25 AMP Fuse and Relay Controlled by Switch With Indicator Light on Instrument Panel (IP) Fed From Hot Battery Feed (Not Wired Thru Key Switch)

08THH – AUX. TRAILER SOCKET 7-Way; With Battery Fed Circuit to Center Pin, With 25 AMP Fuse and Relay Controlled by Switch With Indicator Light Controlled by Accessory Side of Key Switch, Switch Mounted on IP

**FEATURE / BODY FUNCTION:**

These features allow a customer to connect two trailer lighting circuits to the vehicle. These options provide the same functionality as sales code 08HAB but provide a second 7-way socket next to the existing 7-way socket at the BOC.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software feature codes that must be added: NONE

Refer to feature code 08HAB for wiring and installation information. The circuits from the first 7-way trailer socket are directly spliced to the circuits of the second 7-way trailer socket. Part numbers for the connector and terminals remain the same.

**08NAA — Extending Tail Light Harnesses****FEATURE CODE DESCRIPTION:**

08NAA – TAIL LIGHT WIRING MODIFIED Includes: Separate Wiring for Standard Left and Right Tail Lights, With 8.0' of Extra Cable; Separate Wiring for Left and Right Body-Mounted Tail Lights, With 8.0' of Extra Cable

**FEATURE / BODY FUNCTION:**

Feature code 08NAA provides eight additional feet of stop, turn, and tail light wiring to relocate the stop/turn lights provided with the vehicle.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE**WIRING INFORMATION:**

The extra harness length for code 08NAA is coiled at the EOF on both the right and left frame rail per view below. The loose harness connector is covered with a sealed connector. If standard tail lights are being removed, use sealing cap to protect open connector.

If a harness is to be connected to the OEM connector, see below for parts requirements. The part number for the 08NAA extension harness is 3547275C91.

**Table 46 Left Side Connector**

Connector Cavity Information and Parts Required to connect to OEM Connector					
Connector P/N	Cavity	Circuit #	Description	Term P/N	Seal P/N
1677851C1	A	S71H	Back Up	2033911C1	589391C1
	B	S68F	Tail	2033911C1	589391C1
	C	S56E	Stop/ Turn	2033911C1	589391C1
	D	Plug	—	2033911C1	589391C1
	E	S10-GF	GND	2033911C1	589391C1

**Table 47 Right Side Connector**

Connector Cavity Information and Parts Required to connect to OEM Connector					
Connector P/N	Cavity	Circuit #	Description	Term P/N	Seal P/N
1677851C1	A	S71G	Back Up	2033911C1	589391C1
	B	S68G	Tail	2033911C1	589391C1
	C	S57E	Stop/ Turn	2033911C1	589391C1
	D	Plug	—	2033911C1	589391C1
	E	S10-GE	GND	2033911C1	589391C1

Plug P/N – 587579C1

Connector Lock P/N – 1677914C1

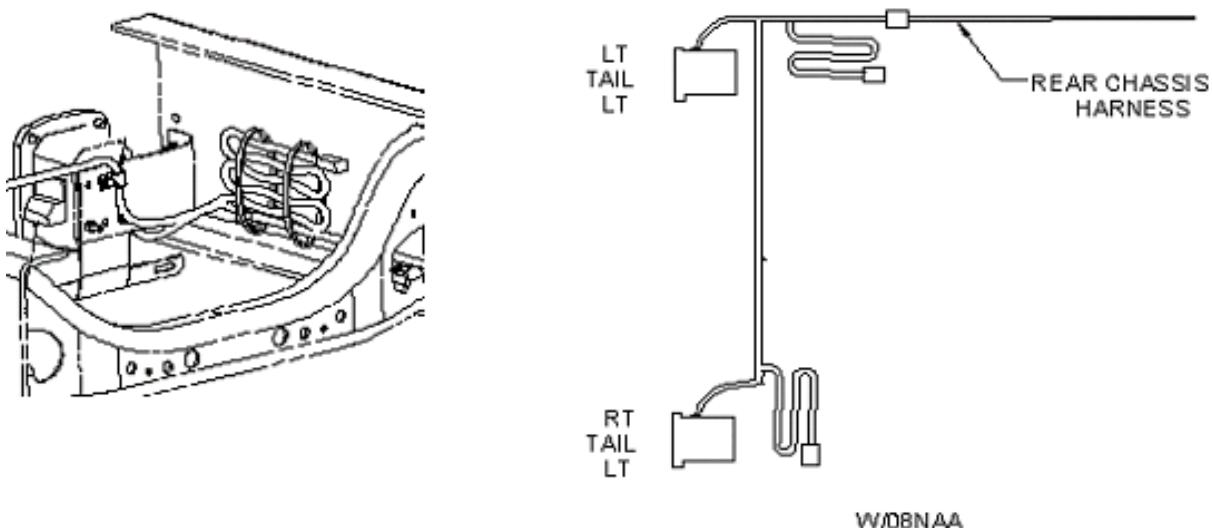


Figure 49

**HOW TO ADD THIS FEATURE:**

See the part numbers identified in the "Wiring Information" section of this document.

**08WEB — Center Chassis Extension Harness**

**FEATURE CODE DESCRIPTION:**

08WEB - SPECIAL WIRING HARNESS, BODY for Chassis, With 6' Additional Length to Accommodate Drop Frame Beverage Body Application

**FEATURE / BODY FUNCTION:**

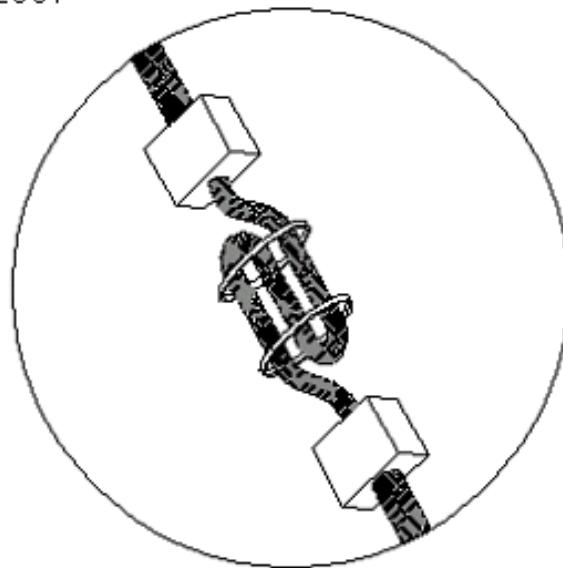
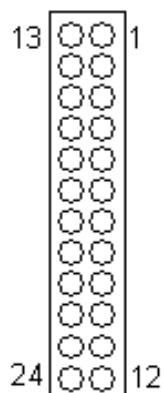
Feature code 08WEB provides an additional 6 feet to the center chassis harness. This feature is to accommodate drop frame applications but may be specified when additional chassis harness length is desired.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

**WIRING INFORMATION:**

A 6' extension of the center chassis harness, part number 3560971C91, is provided for Beverage Body Applications. A 24-pin connector is provided at the end of the extension.

24-Pin Connector Part Number is 3558026c1



ADDITIONAL JUMPER  
TO BE ADDED BETWEEN  
CENTER AND REAR  
CHASSIS HARNESS  
W/08WEB

**Figure 50**

**HOW TO ADD THIS FEATURE:**

See the part numbers identified in the "Wiring Information" section of this document.

## **14.2. 08HAG AND 08HAH — ELECTRIC TRAILER BRAKES**

Refer to the Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Electric Trailer Brake.

### **FEATURE CODE DESCRIPTION:**

08HAG – ELECTRIC TRAILER BRAKE/LIGHTS Accommodation Package to Rear of Frame (ROF); for Separate Trailer Stop, Tail, Turn, Marker Light Circuits; Includes Electric Trailer Brake Accommodation Package With Cab Connections for Mounting Customer- Installed Electric Brake Unit, Less Trailer Socket

08HAH – ELECTRIC TRAILER BRAKE/LIGHTS Accommodation Package to Rear of Frame; for Combined Trailer Stop, Tail, Turn, Marker Light Circuits; Includes Electric Trailer Brake Accommodation Package With Cab Connections for Mounting Customer-Installed Electric Brake Unit, Less Trailer Socket

### **FEATURE/BODY FUNCTION:**

These features provide a four-circuit breakout, blunt-cut with heat shrink covering located under the Instrument Panel (IP) on the left side of the steering column. The circuits include a Ground (GND) circuit, an electric brake feed to electric trailer brakes, a 30 Ampere (AMP) power circuit plus the stop lamp feed. The circuits are designed to work with all popular electric trailer brake controllers.

The two different features are designed to handle trailers with separate stop and turn and combination stop and turn circuits.

The seven circuits that connect to the trailer are located at the rear of frame and are blunt cut with heat shrink covering. The appropriate socket assembly needs to be added by the customer.

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Required software feature codes: 595AHU, 595ABC

Software feature codes that must be removed: NONE

**These parameters should be left at their factory default values!**

**Table 48**

Parameter	ID	Description	Default	Units	Min	Max	Step
LT_FT_Turn_Hi_Current	1911	Left front turn signal high current detection level (AMPS)	10	A	0	10	0.1
LT_FT_Turn_Lo_Current	1910	Left front turn signal low current detection level (AMPS)	0.5	A	0	10	0.1
LT_FT_Turn_OC_Current	1912	Left front turn signal open circuit detection level (AMPS)	0.5	A	0	10	0.1
RT_FT_Turn_Hi_Current	1914	Right front turn signal high current detection level (AMPS)	10	A	0	10	0.1

**Table 48 (cont.)**

Parameter	ID	Description	Default	Units	Min	Max	Step
RT_FT_Turn_Lo_Current	1913	Right front turn signal low current detection level (AMPS)	0.5	A	0	10	0.1
RT_FT_Turn_OC_Current	1915	Right front turn signal open circuit detection level (AMPS)	0.5	A	0	10	0.1

**WIRING INFORMATION**

For circuit installation, see Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Electric Trailer Brake.

The circuit colors/function to the electric brake controller are as follows:

**Table 49**

Circuit	Wire Color	Wire Gauge
Power feed to the controller	Black	12
Stop lamp feed	Red	16
Feed to electric trailer brakes	Grey	10
GND	White	16

08HAG and 08HAH provides seven blunt-cut wires located at end of frame and four blunt-cut wires located under cab IP.

The following are the wires for the circuits found in the blunt-cut wires located at the end of the frame.

**Table 50**

Circuit Number	Maximum Current	Description/ Labeled	Color
<b>08HAG and 08HAH Label Number (Connector 9724)</b>			
R70	30 A	Stop Lights	Red
R68	20 A	Park Lights	Brown
R94	30 A	Trailer Brake	Grey
R58	20 A	Identification Lights	Brown
R10	N/A	GND	White
<b>08HAG Connector (Connector 9724)</b>			
R56	15 A	Left Turn	Yellow
R57	15 A	Right Turn	Light Green
<b>08HAH Connector (Connector 9724)</b>			
R56	15 A	Left/ Stop Turn	Yellow
R57	15 A	Right/ Stop Turn	Light Green

Circuit Number	Maximum Current	Description/ Labeled	Color
<b>08HAG and 08HAH Label ETB CONTROLLER (Connector 1923)</b>			
AJ11-GNA	—	GND SIGNAL	White
A14NS	30 A	POWER SUPPLY SIGNAL	Black
A70NS	15 A	STOP LIGHTS	Red
A94T	20 A	ELEC BRAKE SIGNAL	Dark Blue

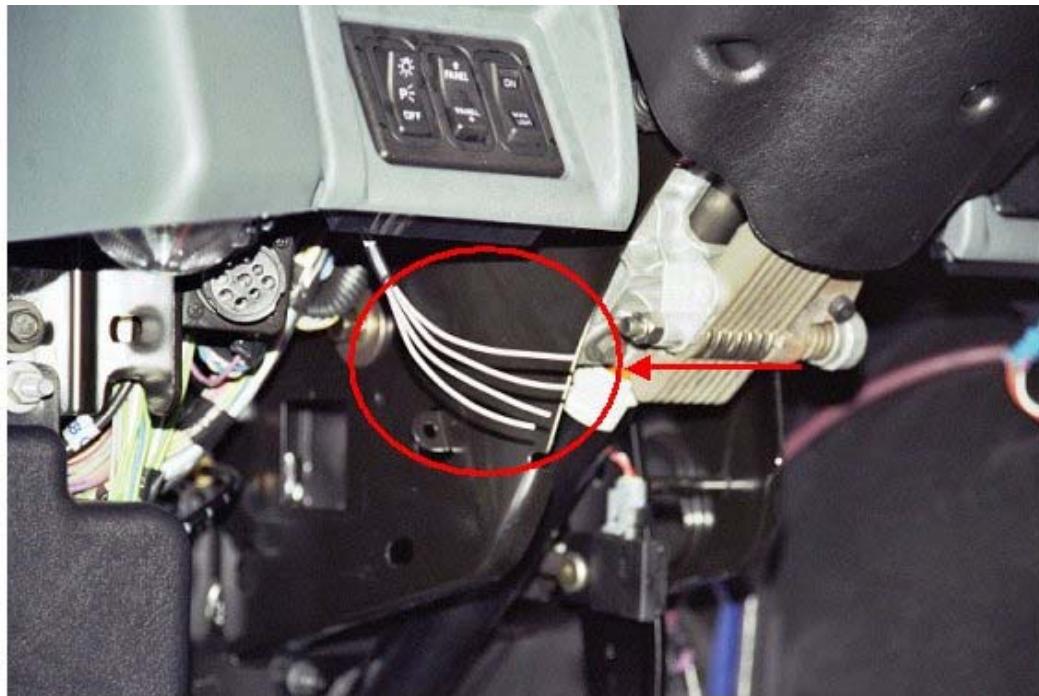
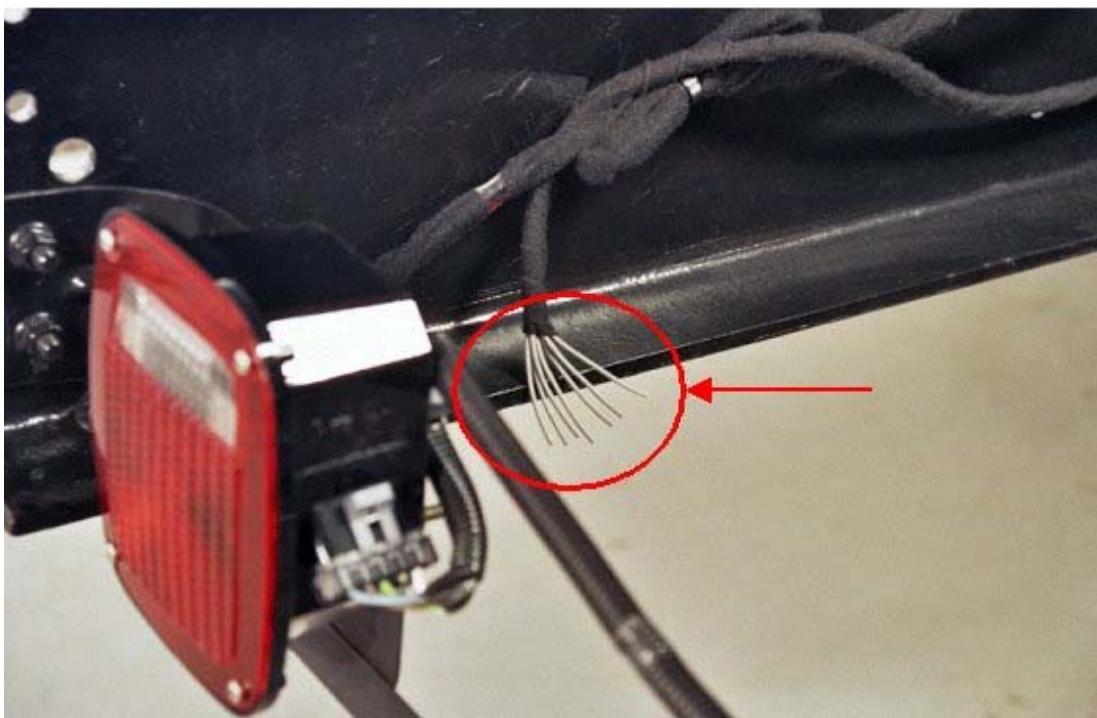


Figure 51 Location of 4-Wire Breakout Under Dash



**Figure 52 Location of 7-Wire Breakout at End of Frame**

**NOTE – Many trailers combine trailer marker lamps with the tail lamp. If this has been done, leave the black circuit covered with the heat shrink tube.**

**TESTING:**

1. Make proper trailer connections.
2. Turn on headlights.
3. Verify that the brown tail light wire and the black identification light wire have battery voltage levels present.
4. Turn off headlights.
5. Press the footbrake.
6. Verify that the red brake wire has battery voltage levels present.
7. Release the footbrake.
8. Turn on the left turn signal.
9. Verify that the yellow left turn signal wire is cycling between battery voltage and GND.
10. Turn off left turn signal.
11. Turn on the right turn signal.
12. Verify that the light green right turn signal wire is cycling between battery voltage and GND.

13. Turn off right turn signal.
14. Activate trailer brakes with the trailer brake controller.
15. Verify that the dark blue electric trailer brake wire has variable voltage levels present commensurate with the position of the brake controller lever.
16. Verify that trailer brakes are functioning correctly by calibrating the electric trailer brake controller according to the manufacturer's instructions.

### **14.3. TRAILER SOCKETS**

#### **08TME and 08TMG – 7-Way Trailer Socket At End Of Frame**

Refer to Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Body Builder and Trailer Socket – BOC and EOF.

#### **FEATURE CODE DESCRIPTION:**

08TME – TRAILER CONNECTION SOCKET 7-Way; Mounted at EOF, Wired for Turn Signals Independent of Stop, Compatible With Trailers That Have Amber or Side Lamps

08TMG – TRAILER CONNECTION SOCKET 7-Way; Mounted at EOF, Wired for Turn Signals Combines With Stop, Compatible With Trailers That Use Combined Stop, Tail, Turn Lamps

#### **FEATURE / BODY FUNCTION:**

These features are used to connect trailer lighting circuits to the vehicle. These options are for providing separate and combined stop and turn signals and are located at the EOF. These 7-way sockets provide IGN-controlled fused 30 AMP center pins for trailer Antilock Brake Systems (ABS). Feature 08TMG is designed for trailers with combined stop and turn lamps. With all trailer connection features, the socket is a standard SAE recommended socket used in the trucking industry. The circuit arrangement in the socket is also the same as SAE recommendation, except for 08TMG which has no separate stop circuit.

#### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software Feature Codes that must be added: 595ABW, 595AAD, and 595ABC.

Software Feature Codes that must be removed: NONE

**These parameters should be left at their factory default values!**

**Table 51**

Parameter	ID	Description	Default	Units	Min	Max	Step
LT_FT_Turn_Lo_Current	1910	Park and ID Lights Low Current Detection Level (Amps)	0.5	A	0	10	0.1
LT_FT_Turn_Hi_Current	1911	Park and ID Lights High Current Detection Level (Amps)	10	A	0	10	0.1
LT_FT_Turn_OC_Current	1912	Park and ID Lights Open Circuit Detection Level (Amps)	0.5	A	0	10	0.1
RT_FT_Turn_Lo_Current	1913	Park and ID Lights Low Current Detection Level (Amps)	0.5	A	0	10	0.1

Parameter	ID	Description	Default	Units	Min	Max	Step
RT_FT_Turn_Hi_Current	1914	Park and ID Lights High Current Detection Level (Amps)	10	A	0	10	0.1
RT_FT_Turn_OC_Current	1915	Park and ID Lights Open Circuit Detection Level (AMPS)	0.5	A	0	10	0.1

#### **WIRING INFORMATION:**

A 7-Way Trailer socket is provided at the end of the driver's side frame rail.

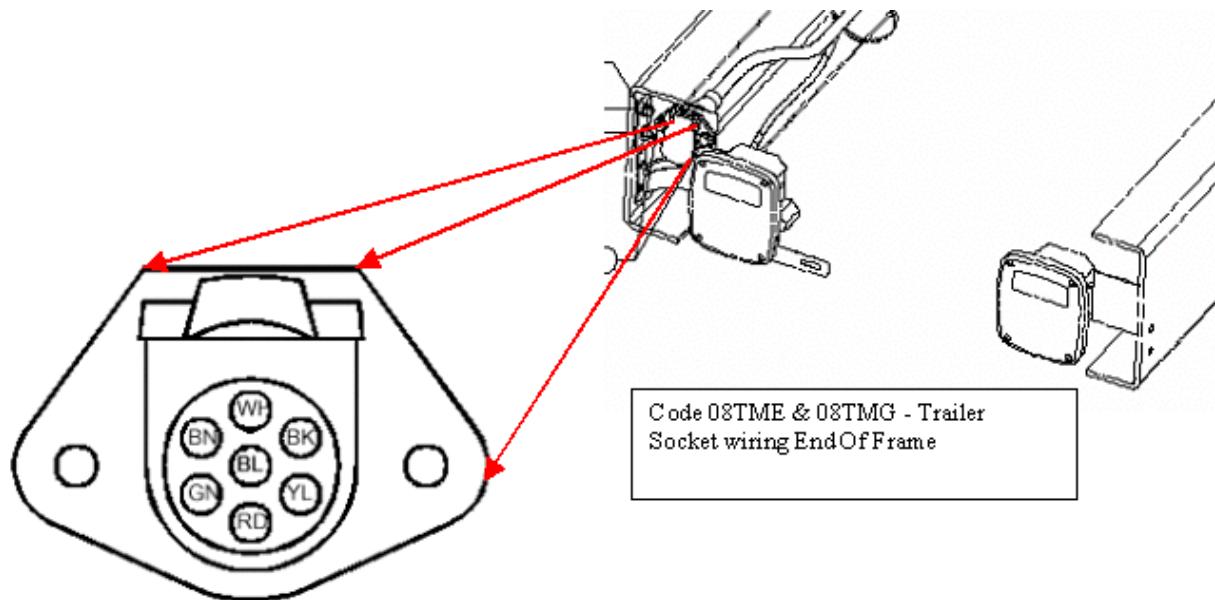


Figure 53 Trailer Socket (Mating End View)

Table 52 Electrical Description of 08TME

Circuit Description	Fused	Available Current	Color
GND	~	~	White
Tail Lamp	20	20	Brown
Right Turn	15	15	Green
Left Turn	15	15	Yellow
Marker	20	20	Black
Stop	30	30	Red
Center Pin	30	30	Blue

**Table 53 Electrical Description of 08TMG**

Circuit Description	Fused	Available Current	Color
GND	~	~	White
Tail Lamp	20	20	Brown
Right Turn/Stop	15	15	Green
Left Turn/Stop	15	15	Yellow
Marker	20	20	Black
Stop	~	Not provided	~
Center Pin	30	30	Blue

**TESTING:**

08TME

1. Turn on vehicle headlights.
2. Verify that the tail lights circuit (brown wire, top left cavity on trailer socket) has battery voltage levels present.
3. Verify that trailer marker circuit (black wire, top right cavity on trailer socket) has battery voltage levels present.
4. Turn off vehicle headlights.
5. Turn on vehicle right turn lamp.
6. Verify that the trailer right turn lamp circuit (green wire, bottom left cavity on trailer socket) is cycling between battery voltage and GND.
7. Turn off vehicle right turn lamp.
8. Turn on vehicle left turn lamp.
9. Verify that the trailer left turn lamp circuit (yellow wire, bottom right cavity on trailer socket) is cycling between battery voltage and GND.
10. Turn off vehicle left turn lamp.
11. Press the vehicle brake pedal.
12. Verify that the trailer brake light circuit (red wire, bottom center cavity on trailer socket) has battery voltage levels present when the IGN key is in the accessory position.
13. Verify that trailer brake circuit (Blue wire, center cavity on trailer socket) has battery voltage levels present.
14. Release brake pedal.

08TMG

1. Turn on vehicle headlights.
2. Verify that the tail lights circuit (brown wire, top left cavity on trailer socket) has battery voltage levels present.
3. Verify that trailer marker circuit (black wire, top right cavity on trailer socket) has battery voltage levels present.
4. Turn off vehicle headlights.
5. Turn on vehicle right turn lamp.
6. Verify that the trailer right turn/stop lamp circuit (green wire, bottom left cavity on trailer socket) is cycling between battery voltage and GND.
7. Turn off vehicle right turn lamp.

8. Turn on vehicle left turn lamp.
9. Verify that the trailer left turn/stop lamp circuit (yellow wire, bottom right cavity on trailer socket) is cycling between battery voltage and GND.
10. Turn off vehicle left turn lamp.
11. Press the vehicle brake pedal.
12. Verify that the right turn/stop circuit (green wire, bottom left cavity on trailer socket) and the left turn/stop circuit (yellow wire, bottom right cavity on trailer socket) have battery voltage levels present.
13. Verify that the trailer brake light circuit (red wire, bottom center cavity on trailer socket) has battery voltage levels present when the IGN key is in the accessory position.
14. Release brake pedal.

**HOW TO ADD THIS FEATURE:**

Adding these features after the vehicle is built is not an easy task. It is encouraged that the vehicle be ordered with the desired feature.

Refer to the "How Do I" General Information section of this electrical guide to obtain information on circuits and components. It is necessary to have the circuit diagram manual that applies to the vehicle to complete the installation.

The installation requires additional fuses and relays be added to the Power Distribution Center (PDC) in the cab. Be sure to label the function of the added relays and fuses to the decal on the underside of the PDC cover.

The loose circuits will be numbered and correspond to the circuits outlined in the circuit diagram manual.

## 15. WORK LIGHT AND OUTSIDE CAB POWER FEATURES

### 15.1. WORK LIGHT / AUX. REAR LIGHT

#### 08WLL (Tractor) and 08WMA (Straight Truck)

Refer to the Circuit Diagram Manual S08322, Chapter 9, Lights, Fog Light and Work Light.

#### FEATURE CODE DESCRIPTION:

08WLL – LIGHT Work; Pedestal Mounted With Switch on Instrument Panel

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

#### FEATURE / BODY FUNCTION:

With the International-installed work light (08WLL), nighttime trailer hook-ups are made easier with a work light mounted at the BOC on tractors. This light illuminates the fifth wheel area of the vehicle. Both features include a switch in the IP, or 08WMA can also come with a push button switch located below the instrument cluster. Either switch will illuminate when the switch is on. These features provide an out-of-cab load pin G of BC connector #1603. The feature without the light (08WMA) can be used to satisfy any number of electrical needs for vehicles with straight truck brakes (4091) such as lights inside dry van boxes, small pumps, and illumination to aid in various job functions.

If the engine is off, there is a time out feature, which is factory set at 120 minutes. The time out period can be changed through the Diamond Logic® Builder software (see local dealer if not owned). If the vehicle is running, the work light will not time out after 120 minutes. If the work light is left on when the vehicle is moving, the green indicator light in the work light switch will flash.

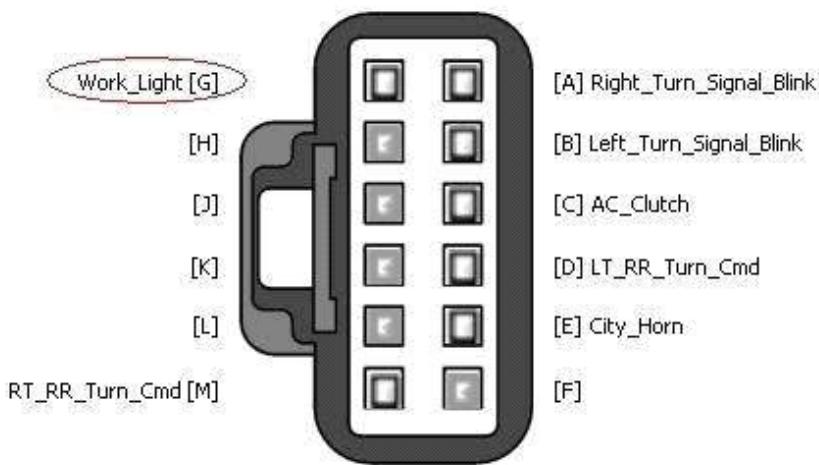


Figure 54 1603 (BC J1)



**Figure 55 Work Light Located in Switch Pack**



**Figure 56 Push Button Switch Located Below the Instrument Cluster**

#### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Required Software Feature Codes:

**08WLL:** 595ABR Switch located in the switch pack

**08WMA:**

- 595ABR or
- 595AMU Switch located below the instrument cluster in position B and
- 595AJE

The Work\_Light\_Timeout\_Enable 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 in case the operator forgets to turn the light off.

If the current in the work light circuit falls below the level set by the Work\_Light\_Lo\_Current parameter, the BC will register a fault code.

If the current in the work light circuit exceeds the level set by the Work\_Light\_Hi\_Current parameter, the BC will shut off the circuit and register a fault code.

The Work\_Light\_OC\_Current parameter should be left at its factory default of zero.

**Table 54**

Parameter	ID	Description	Default	Units	Min	Max	Step
Work_Light_Timeout_Enable	640	This signal is a parameter that can be adjusted to vary the amount of time that the work light will remain on after the IGN key is turned off. If this value is set to 6, the work light will remain on for 60 minutes after the IGN key is turned off.	120	Min	10	1440	10
Work_Light_Lo_Current	1898	Work Light Low Current Detection Level (Amps)	0	A	0	10	0.1
Work_Light_Hi_Current	1899	Work Light High Current Detection Level (Amps)	10	A	0	10	0.1
Work_Light_OC_Current	1900	Work Light Open Circuit Detection Level (Amps)	0	A	0	10	0.1
Load_Shed_Level_Work_Light	2327	Level at which GEN2 work light is shed	1	List	0	3	1

#### **WIRING INFORMATION:**

The maximum current load for the work light/aux light is 10 AMPS. The circuit protection is internal to the BC.

**Table 55 Parts Required to Connect to Work Light Cable**

Connector Part Number	Lock Part Number	Term Part Number	Seal Part Number
1661778C1	1661874C1	1661875C1	1661872C1

**Table 56 Terminals Designed for 16-Gauge Wire**

Connector Cavity	Circuit Number	Circuit Description
A	N65	Work Light Feed
B	N65-G	Work Light GND



Figure 57 Arrow Indicates Location of Work Light Connector (Straight Truck)



**Figure 58 Arrow Indicates Location of Work Light (Tractor)**

**TESTING:**

1. Activate work light switch.
2. Verify that pin G (labeled Work\_Light) on the BC 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.

**HOW TO ADD THIS FEATURE:**

- For 08WLL, the software feature code 595ABR must be enabled on the vehicle using ICAP or the Diamond Logic® Builder software (see local dealer).

- For 08WMA, the software feature codes 595ABR or 595AMU (dependent on switch location) and 595AJE must be enabled on the vehicle using the Diamond Logic® Builder software (see local dealer).
- Use the Diamond Logic® Builder software to make sure that software feature code 595025 is NOT enabled on the vehicle (see local dealer).
- Set the desired programmable parameters for each signal using the Diamond Logic® Builder software (see local dealer if software is not owned).
- Customer must wire the desired load into the pin labeled Work\_Light on the BC output connector (#1603 – Work Light).
- Customer must install a 3-position momentary rocker switch (part number 3549804C91) in the switch pack or appropriate part number for switch located below the gauge cluster. The switches are backlit with an amber light for better viewing during night operations. The switch has a green indicator light in the top half of the switch to indicate when the work light is on.

## 15.2. 08XBK — AUXILIARY 40 AMP CIRCUIT, SWITCH CONTROLLED

Refer to the Circuit Diagram Manual S08322, Chapter 10, Aux and Power Source.

### **FEATURE CODE DESCRIPTION:**

08XBK – SWITCH, AUXILIARY Switch 40 AMP Circuit for Customer Use; Includes Wiring Connection in the engine compartment near the megafuse

### **FEATURE/BODY FUNCTION:**

Feature code 08XBK provides a 40 AMP battery feed for customer use. An in-cab rocker switch controls the circuit. A blank window switch is provided with this feature along with a graphic overlay kit that allows custom labeling of the switch function.

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Software Feature Codes that must be added: 595AJH Body Controller (BC) Prog, SWITCH AUXILIARY In Center Panel, With 40 AMP Fuse Circuit, Accessory-Controlled

Software Feature Codes that must be removed: NONE

### **WIRING INFORMATION**

A blunt-cut wire (light green) taped back to the dash harness near the megafuse is provided for customer interface to this circuit. The battery feed to this wire is through a relay that is enabled by a 12V signal from the BC connector 1601 pin E16 when the switch is activated.

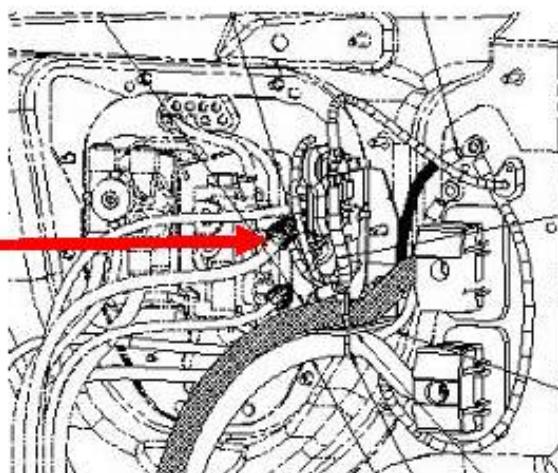
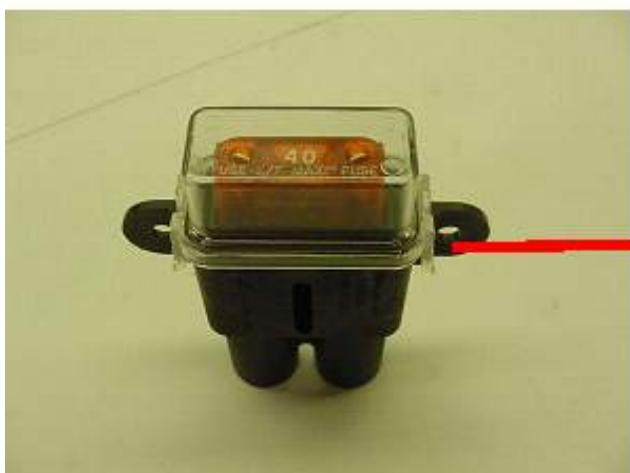


Figure 59

**TESTING**

To test this circuit, verify that battery voltage is present at the wire provided when the in-cab switch is activated with the IGN key in the on or accessory position. The green indicator in the rocker switch shall be illuminated when the output is on.

**HOW TO ADD THIS FEATURE:**

If the vehicle was not ordered with the feature, it may be added. For information on parts and components, see "How Do I" - General Information section of this electrical guide.

Use the Diamond Logic® Builder software to add the following software feature: 595AJH BC Prog, SWITCH AUXILIARY In Center Panel, With 40 AMP Fuse Circuit, Accessory-Controlled.

Also refer to the "Switches" section to determine the assigned location of the rocker switch for this feature.

### 15.3. OTHER EXTERNAL LIGHTING

#### 08TMH — Switched Power to Cab Roof

##### FEATURE CODE DESCRIPTION:

08TMH - SWITCH, AUXILIARY Accessory Control; for Wiring in Roof, With Maximum of 20 AMP Load With Switches In Instrument Panel

##### FEATURE / BODY FUNCTION:

This feature consists of a switch mounted in the center panel with wiring that is routed up the right "A" pillar. The circuit is protected with a 20 AMP fuse. This feature is only available on the 7000 models.

##### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS: NONE

##### WIRING INFORMATION:

The wiring in the roof includes both GND and feed circuits, and the circuits are blunt-cut covered with heat shrink sleeve. The GND circuit is white, and the feed is brown.

Switch Part Number: 3557932C1

Switch Label: "Roof Aux"

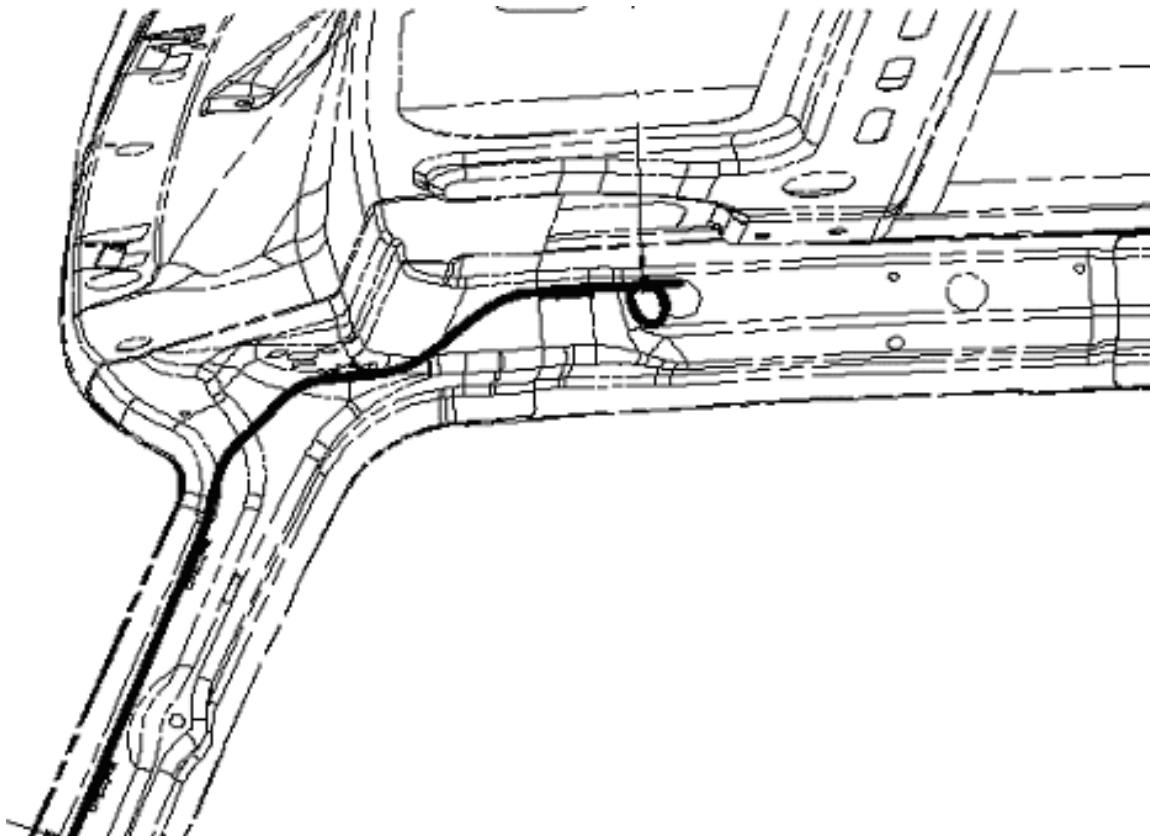
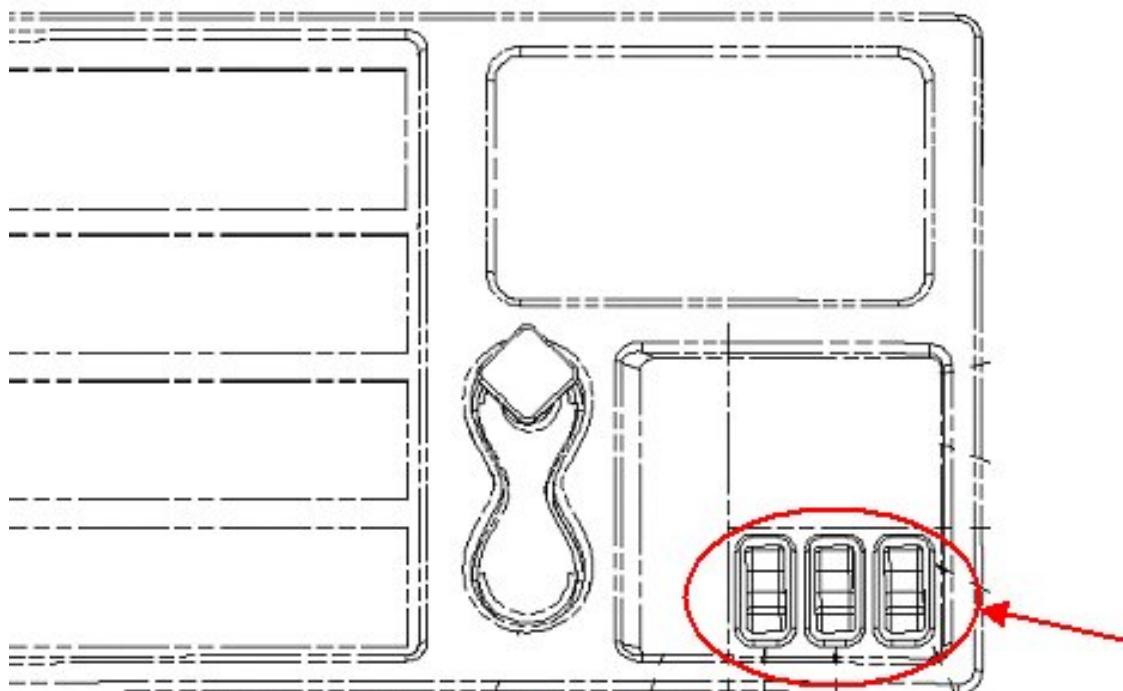


Figure 60 View Of Right Pillar And Roof Area, Viewed From Inside Vehicle



**Figure 61 Switch Controlling the Aux Roof Circuit Will Be In One Of Three Switch Positions Viewed Above**

This switch is "hard wired" and there are no multiplex circuits associated with this feature. The switch is lighted to give an "ON" indication.

**NOTE – This feature does not depend on any IGN key position, and can be turned on with the key off. Care must be taken as leaving the switch on may discharge batteries.**

Since the desired hole location for the harness to exit the cab and location may vary from customer to customer, circuits are left in roof for customer to drill hole.

Note that there are roof reinforcements that should not be drilled into. Lower headliner to locate harness and determine best hole location. Install grommet into the hole and seal around cables and grommet to prevent leakage of moisture into cab.

When connecting to load, be sure to use sealed connectors or a splice protected with heat shrink sleeve with an adhesive inner lining.

#### **TESTING:**

1. Turn on in-cab switch.
2. Verify that the added feature operates.
3. Verify that the feed wire is receiving battery voltage.

#### **HOW TO ADD THIS FEATURE:**

If the vehicle was not ordered with the feature, it may be added. For information on parts and components, see "How Do I" General Information section of this electrical guide.

## 15.4. IN-CAB LIGHTING

### Standard Panel Light Dimmer Connection

#### FEATURE CODE DESCRIPTION:

ELECTRICAL SYSTEM 12-Volt, Standard Equipment

#### FEATURE / BODY FUNCTION:

This standard connection provides a fused connection point (5 AMPS maximum for all circuits connected to this point) to allow auxiliary lights to be dimmed as the panel lights are dimmed.

**NOTE – This circuit utilizes a Pulse Width Modulated (PWM) signal. Do not connect a relay coil to it.**

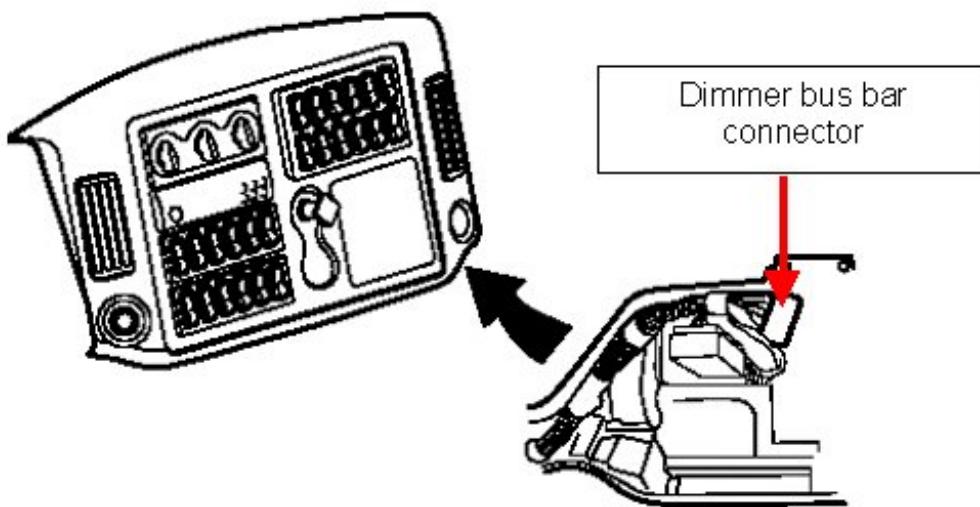
#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Software Feature Codes that must be added: NONE

Software Feature Codes that must be removed: NONE

#### WIRING INFORMATION:

The connection is located under the instrument panel left of the interior fuse panel.



**Figure 62**

To connect to this circuit, remove the lock from the wire side of the bus bar connector and insert the added wire with terminal (terminal part number 1661208C1) on an unused connection point.

**NOTE – The cover opposite the wires should also be removed to verify that the new connection is properly seated.**

Re-install the cover and lock.

**TESTING:**

1. Check that the added circuit properly dims when the panel dimmer switch is activated with the headlamp switch in the PARK or ON position.

## **15.5. LIGHTS ON WITH WIPERS (LOWW) / DAY TIME RUNNING LIGHTS (DTRL)**

### **FEATURE CODE DESCRIPTION:**

Lights On With Wipers (LOWW) - None

Day Time Running Lights (DTRL) - None

### **FEATURE / BODY FUNCTION:**

The Lights On With Wipers (LOWW) function turns on low beam headlights (tail, marker and 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.

The Day Time Running Lights (DTRL) function will turn on low beam headlights at 75% of normal brightness whenever the key is in the RUN position and the Park Brake is OFF.

Both features may be enabled or disabled by using the Diamond Logic® Builder software. Note: the DTRL is required by law for Canadian registered vehicles and the feature must not be turned off.

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

Required software feature code: 595ALB

Software Feature Codes that must be removed: NONE

**Table 57**

Parameter	ID	Description	Default	Units	Min	Max	Step
LOWW_ Enabled	317	Activate/ Deactivate headlights on with wipers. A value of 1 enables and a value of 0 disables this feature.	Off	On/ Off	NA	NA	NA
DTRL_ Enabled (See Note)	188	Activate/ Deactivate day time running lights. A value of 1 enables and a value of 0 disables this feature.	On	On/ Off	NA	NA	NA

**NOTE – The DTRL\_Enable parameter is accessible only to Dealers.**

### **WIRING INFORMATION:**

None required.

### **TESTING:**

#### **LOWW**

1. Turn on wipers (to the low speed) with IGN switch in run position.

2. Verify that the low beam headlights (and tail, marker and clearance lights) are on.
3. Turn on wipers (intermittent) with IGN in Run position.
4. Verify low beam headlights are on.
5. Turn off wipers and verify headlights remain on.
6. Cycle the Headlight switch and verify that headlights are off.

**DTRL**

1. Set the IGN switch to run with the park brake off.
2. Verify that low beam headlights are on.
3. Set the park brake to on and verify that the low beam headlights turn off.
4. Set the IGN switch to accessory with the park brake off and verify that the low beam headlights are off.

**HOW TO ADD THIS FEATURE:****LOWW**

(1) Activate the LOWW\_Enabled parameter using the Diamond Logic® Builder software, or see a dealer.

**DTRL**

(1) Go to your local dealer and have them enable the DTRL\_Enabled parameter with their version of the Diamond Logic® Builder software.

## 16. AIR CONDITIONING

### 16.1. 16WKB — AIR CONDITIONING

Refer to the circuit diagram in S08322, Chapter 12, Air Conditioning.

#### **FEATURE CODE DESCRIPTION:**

16WKB: Air Conditioner (International Blend Air) with integral heater, defroster and R134-A Refrigerant.

#### **FEATURE / BODY FUNCTION:**

This is an electrical connection point for detecting when the air conditioner clutch is on. No direct electrical connection point is provided for tapping into the A/C clutch wire. However, if an A/C clutch connection is necessary, the Body Builder may use proper splice techniques to tap into wire AC77A. The added load required by the Body Builder should not exceed two Amperes (AMPS). This control wire shall be at battery volts when the A/C clutch is on and 0 volts when off. The software in the Body Controller (BC) determines when the A/C clutch should be on or off based upon the mode of the HVAC controls in the cab and condenser temperatures and high side pressures of the A/C system.

#### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

#### **WIRING INFORMATION:**

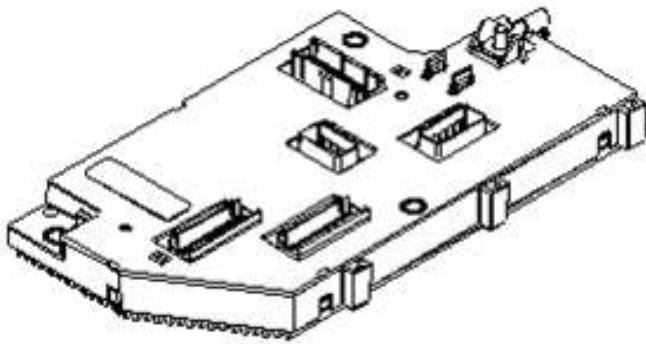


Figure 63 BC located in the cab behind the kickplate next to the driver's left foot

WIRE GAUGE: 16 Gauge

WIRE NUMBER/COLOR: AC77A-LTGN

BC connector (1603): Pin C

TERMINAL: 3534163C1

CIRCUIT DIAGRAM: See Electrical Circuit Diagram Manual S08322 Chapter 12, Air Conditioning.

#### **TESTING:**

1. Start the vehicle. Turn on air conditioner.
2. Verify that the wire feeding the body load is at battery volts when the A/C Clutch is ON and 0 volts when OFF.

3. Ensure that no faults codes are present when the truck is on.

**BODY BUILDER IMPORTANT INFORMATION:**

In some applications it may be advantageous to add an additional A/C evaporator to cool remote areas of the vehicle. The following procedures and part numbers will accommodate this addition.

**NOTE – Do not break into the A/C clutch circuit for the purpose of controlling the A/C system.**

**Do not connect to the high side of the pressure transducer.**

**Do not connect to either of the A/C system thermistors.**

**PARTS INFORMATION****2007 MaxxForce DT and MaxxForce 9 Engines, Low Cab Mount**

Hose, A/C assy accumulator to compressor – 3613035C92

Hose, A/C assy condenser to evaporator - 3613034C93

Hose, A/C assy compressor to condenser – 3613033C94

**2007 MaxxForce DT, MaxxForce 9 and MaxxForce 10 Engines, Mid High Cab**

Hose, A/C assy accumulator to compressor - 3613038C92

Hose, A/C assy condenser to evaporator - 3616067C93

Hose, A/C assy compressor to condenser – 3613036C92

**2007 MaxxForce 7**

Hose, A/C assy accumulator to compressor - 3612962C93

Hose, A/C assy condenser to evaporator - 3613034C93

Hose, A/C assy compressor to condenser – 3612960C94

**PROCEDURE**

**WARNING** – To avoid property damage, personal injury or death, park the vehicle on a level surface, set the parking brake, chock the wheels and turn the engine off.



**WARNING** – Wear a face shield, or other adequate eye protection, and nonporous gloves when working with refrigerant. The temperature of liquid refrigerant may cause injury or blindness if the refrigerant contacts the eyes. Should liquid refrigerant come in contact with skin, remove contaminated clothing, including shoes and treat the injury as though the skin had been frostbitten. See a doctor immediately.



**WARNING** – Refrigerant must be recovered from the air conditioning system before any components of the system are replaced. Removing components while pressure is in the system will cause personal injury or death.

1. Recover the refrigerant from the A/C system.
2. Remove the A/C hose from the condenser to the evaporator and install the new hose.
3. Remove the A/C hose from the accumulator to the compressor and install the new hose.
4. Install the A/C hose from the new evaporator to the aux. fitting on the newly installed hose from the condenser to the evaporator.
5. Install the A/C hose from the new evaporator to the aux. fitting on the newly installed hose from the accumulator to the compressor.
6. Evacuate the system.
7. Recharge the system using R-134A refrigerant. The original truck system holds 30 oz. and the new evaporator should require an additional 16 oz. The additional requirement will vary from system to system depending on the length of hoses and the capacity of the new evaporator. The additional capacity will also require an additional 40 cc (1.2 fl. Oz.) of PAG oil in the system.

**CAUTION** – Failure to add additional PAG oil to the increased capacity A/C system will result in improper lubrication and lead to premature component failure.

8. Operate the vehicle to make sure the A/C is performing properly and is not leaking.

## 17. TRANSMISSION SPARE INPUT/OUTPUTS AND TRANSMISSION CODES

### 17.1. AUTOMATIC TRANSMISSION INTERFACES

#### **FEATURE CODE DESCRIPTION:**

13AHE – TRANSMISSION, AUTOMATIC {ALLISON 1000\_HS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Less PTO Provision, Includes Park Pawl, Less Retarder, With 19,500-lb GVW & 26,000-lb GCW Max

13AHK – TRANSMISSION, AUTOMATIC {ALLISON 1000 PTS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Less PTO Provision, Includes Park Pawl, Less Retarder, With 19,500-lb GVW & 26,000-lb GCW Max

13AKX – TRANSMISSION, AUTOMATIC {ALLISON 1000\_RDS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, With PTO Provision, Less Retarder, With 19,500-lb GVW & 26,000-lb GCW Max.

13AKY – TRANSMISSION, AUTOMATIC {ALLISON 1000\_EVS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, With PTO Provision, Less Retarder, With 19,500-lb GVW & 26,000-lb GCW Max.

13AHG – TRANSMISSION, AUTOMATIC {ALLISON 2100\_HS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Less PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHJ – TRANSMISSION, AUTOMATIC {ALLISON 2500\_HS} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Less PTO Provision, Less Retarder, With 33,000-lb GVW & GCW Max.

13AHL – TRANSMISSION, AUTOMATIC {ALLISON 2100 PTS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Less PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHN – TRANSMISSION, AUTOMATIC {ALLISON 2500 PTS} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Less PTO Provision, Less Retarder, With 33,000-lb GVW & GCW Max.

13AHP – TRANSMISSION, AUTOMATIC {ALLISON 2100\_RDS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; With PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHS – TRANSMISSION, AUTOMATIC {ALLISON 2500\_RDS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; On/Off Hwy; 33,000 lb GVW & GCW Max., With PTO Provision, Less Retarder

13AHT – TRANSMISSION, AUTOMATIC {ALLISON 2500\_RDS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Refuse; With PTO Provision, Less Retarder, With 24,200-lb GVW Max.

13AHU – TRANSMISSION, AUTOMATIC {ALLISON 2100\_EVS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; With PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHW – TRANSMISSION, AUTOMATIC {ALLISON 2500\_EVS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; With PTO Provision, Less Retarder, With 33,000-lb GVW & GCW Max.

13AHY – TRANSMISSION, AUTOMATIC {ALLISON 2500\_MH} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive, Less PTO Provision, Less Retarder, With 33,000-lb GVW & GCW Max.

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13ALN – TRANSMISSION, AUTOMATIC {ALLISON 2500\_SP} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Less PTO Provision, Less Retarder, With 33,000-lb GVW & GCW Max.

13AHH – TRANSMISSION, AUTOMATIC {ALLISON 2200\_HS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, Less PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHM – TRANSMISSION, AUTOMATIC {ALLISON 2200 PTS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, Less PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHR – TRANSMISSION, AUTOMATIC {ALLISON 2200\_RDS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, With PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13AHV – TRANSMISSION, AUTOMATIC {ALLISON 2200\_EVS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, With PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max.

13ALG – TRANSMISSION, AUTOMATIC {ALLISON 2200\_SP} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Park Pawl, With PTO Provision, Less Retarder, With 26,000-lb GVW & GCW Max. Military use only.

13AHZ – TRANSMISSION, AUTOMATIC {ALLISON 3000\_HS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Oil Level Sensor, Less PTO Provision, Less Retarder, With 80,000-lb GVW & GCW Max.

13AJA – TRANSMISSION, AUTOMATIC {ALLISON 3000\_HS} 4th Generation Controls; Close Ratio, 6-Speed, With Double Overdrive; Includes Oil Level Sensor, Less PTO Provision, Less Retarder, With 80,000-lb GVW & GCW Max.

13AJB – TRANSMISSION, AUTOMATIC {ALLISON 3000 PTS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive, Includes Oil Level Sensor, Less PTO Provision, Less Retarder, School Max. Bus GVW N/A SCHOOL BUS

13AJC – TRANSMISSION, AUTOMATIC {ALLISON 3000 PTS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Oil Level Sensor, Less PTO Provision, Less Retarder, Shuttle Bus, With 33,000 lb GVW & GCW Max.

13AJE – TRANSMISSION, AUTOMATIC {ALLISON 3000\_RDS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; On/Off Hwy; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 80,000-lb GVW & GCW Max.

13AJG – TRANSMISSION, AUTOMATIC {ALLISON 3000\_RDS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Refuse/Mixer; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 62,000-lb GVW

13AJH – TRANSMISSION, AUTOMATIC {ALLISON 3000\_RDS\_P} 4th Generation Controls; Close Ratio, 6-Speed, With Double Overdrive; On/Off Hwy; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 80,000-lb GVW

13AJJ – TRANSMISSION, AUTOMATIC {ALLISON 3000\_RDS\_P} 4th Generation Controls; Close Ratio, 6-Speed, With Double Overdrive; Refuse/Mixer; Includes Oil Level Sensor With PTO Provision, Less Retarder, With 62,000-lb GVW Max.

13AJK – TRANSMISSION, AUTOMATIC {ALLISON 3500\_RDS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; On/Off Hwy; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 80,000-lb GVW & GCW Max.

13AJL – TRANSMISSION, AUTOMATIC {ALLISON 3500\_RDS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Refuse/Mixer; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 60,000-lb GVW

13AJM – TRANSMISSION, AUTOMATIC {ALLISON 3500\_RDS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Specialty PTO; Includes Oil Level Sensor, With PTO Provision, Less Retarder, MAX. GVW N/A

13AJN – TRANSMISSION, AUTOMATIC {ALLISON 3500\_RDS\_P} 4th Generation Controls; Wide Ratio, 6-Speed, With Double Overdrive; On/Off Hwy; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 80,000-lb GVW & GCW Max.

13AJP – TRANSMISSION, AUTOMATIC {ALLISON 3500\_RDS\_P} 4th Generation Control; Wide Ratio, 6-Speed, With Double Overdrive; Refuse/Mixer; Includes Oil Level Sensor, With PTO Provision, Less Retarder, With 60,000-lb GVW Max.

13AJR – TRANSMISSION, AUTOMATIC {ALLISON B-300} 4th Generation Controls; 5-Speed; With Overdrive, Includes Oil Level Sensor, With Deep Sump, Less PTO Provision and Less Retarder, With 38,000-lb GVW Max.

13AJU – TRANSMISSION, AUTOMATIC {ALLISON 3000EVS\_P} 4th Generation Controls; Close Ratio, 6-Speed; With Double Overdrive, Includes Oil Level Sensor, With Provision for PTO, Less Retarder, Max. GVW N/A

13AJV – TRANSMISSION, AUTOMATIC {ALLISON 3000EVS\_P} 4th Generation Controls; Close Ratio, 5-Speed; With Overdrive, Includes Oil Level Sensor, With Provision for PTO, Less Retarder, Max. GVW N/A

13AJW – TRANSMISSION, AUTOMATIC {ALLISON 3500EVS\_P} 4th Generation Controls; Wide Ratio, 6-Speed; With Double Overdrive, Includes Oil Level Sensor, With Provision for PTO, Less Retarder, Max. GVW N/A

13AJX – TRANSMISSION, AUTOMATIC {ALLISON 3500EVS\_P} 4th Generation Controls; Wide Ratio, 5-Speed; With Overdrive, Includes Oil Level Sensor, With Provision for PTO, Less Retarder, Max. GVW N/A

13AKA – TRANSMISSION, AUTOMATIC {ALLISON 3000TRV\_P} 4th Generation Controls; Close Ratio, 6-Speed; With Double Overdrive, Includes Oil Level Sensor, With Provision for PTO Gear, Less Retarder, Max. GVW N/A With 40,000-lb

13AKB – TRANSMISSION, AUTOMATIC {ALLISON 3000TRV\_P} 4th Generation Controls; Close Ratio, 5-Speed; With Overdrive, Includes Oil Level Sensor, With Provision for PTO Gear, Less Retarder, Max. GVW N/A With 40,000-lb GCW

13AKG – TRANSMISSION, AUTOMATIC {ALLISON 4000\_HS} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive, Includes Oil Level Sensor, Less PTO Provision, Less Retarder

13AKH – TRANSMISSION, AUTOMATIC {ALLISON 4000\_HS} 4th Generation Controls; Close Ratio, 6-Speed, With Double Overdrive, Includes Oil Level Sensor, Less PTO Provision, Less Retarder

13AKJ – TRANSMISSION, AUTOMATIC {ALLISON 4500\_HS} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Includes Oil Level Sensor, Less PTO Provision, Less Retarder

13AKK – TRANSMISSION, AUTOMATIC {ALLISON 4500\_HS} 4th Generation Controls; Wide Ratio, 6-Speed, With Double Overdrive; Includes Oil Level Sensor, Less PTO Provision, Less Retarder

13AKL – TRANSMISSION, AUTOMATIC {ALLISON 4000\_RDS\_P} 4th Generation Controls; Close Ratio, 5-Speed, With Overdrive; Includes Oil Level Sensor, With PTO Provision, Less Retarder

13AKM – TRANSMISSION, AUTOMATIC {ALLISON 4000\_RDS\_P} 4th Generation Controls; Close Ratio, 6-Speed, With Double Overdrive; Includes Oil Level Sensor, With PTO Provision, Less Retarder

13AKN – TRANSMISSION, AUTOMATIC {ALLISON 4500\_RDS\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Includes Oil Level Sensor, With PTO Provision, Less Retarder

13AKP – TRANSMISSION, AUTOMATIC {ALLISON 4500\_RDS\_P} 4th Generation Controls; Wide Ratio, 6-Speed, With Double Overdrive; Includes Oil Level Sensor, With PTO Provision, Less Retarder

13AKR – TRANSMISSION, AUTOMATIC {ALLISON 4000EVS\_P} 4th Generation Controls, Close Ratio, 5-Speed; With Overdrive, Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13AKS – TRANSMISSION, AUTOMATIC {ALLISON 4000EVS\_P} 4th Generation Controls; Close Ratio, 6-Speed; With Double Overdrive; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13AKT – TRANSMISSION, AUTOMATIC {ALLISON 4500EVS\_P} 4th Generation Controls; Wide Ratio, 5-Speed; With Overdrive; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13AKU – TRANSMISSION, AUTOMATIC {ALLISON 4500EVS\_P} 4th Generation Controls; Wide Ratio, 6-Speed; With Double Overdrive; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13ALH – TRANSMISSION, AUTOMATIC {ALLISON 3000\_SP\_P} 4th Generation Controls; Close Ratio, 5-Speed, Overdrive; Includes Oil Level Sensor, With PTO Provision, Less Retarder, Military Support/Tactical  
MILITARY ONLY

13ALJ – TRANSMISSION, AUTOMATIC {ALLISON 4500\_SP\_P} 4th Generation Controls; Wide Ratio, 5-Speed, With Overdrive; Includes Oil Level Sensor, With PTO Provision, Less Retarder, Military Support/Tactical

13WUB – ALLISON SPARE INPUT/OUTPUT for Highway Series (HS); General Purpose Trucks

13WUC – ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS); General Purpose Trucks, Construction

13WUD – ALLISON SPARE INPUT/OUTPUT for Emergency Vehicle Series (EVS); Rescue, Ambulance

13WUE – ALLISON SPARE INPUT/OUTPUT for Emergency Vehicle Series (EVS); Fire/Pumper, Tank, Aerial/Ladder

13WUG – ALLISON SPARE INPUT/OUTPUT for Truck Recreational Vehicle (TRV)

13WUH – ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS); Airport Refueler, Sewer Evac

13WUJ – ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS); Front Loaders, Rear Loaders, Recycling/Packer Trucks

13WUK – ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS); Side Loaders

13WUL – ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS); Street Sweeper

13WUM – ALLISON SPARE INPUT/OUTPUT for Pupil Transportation Series (PTS)

13WUP – ALLISON SPARE INPUT/OUTPUT for Bus Series (B)

13WUR – ALLISON SPARE INPUT/OUTPUT for Dump/Construction With Two-Speed Axle or Auxiliary Transmission (RDS)

13WUS – ALLISON SPARE INPUT/OUTPUT for Rugged Duty Series (RDS); General Purpose Trucks Modified for Single Input Auto Neutral

13WUT – ALLISON SPARE INPUT/OUTPUT for Emergency Vehicle Series (EVS); Without Split Shaft PTO

13WUU – ALLISON SPARE INPUT/OUTPUT for Specialty Transmission Series (SP)

13WUV – ALLISON SPARE INPUT/OUTPUT for Highway Series (HS); General Purpose Trucks Modified for Single Input Auto Neutral

#### **FEATURE/BODY FUNCTION:**

The features listed above describe both Allison transmission sales features as well as Allison vocational electrical interface sales features. Review each entry carefully, and choose the transmission and optional electrical interface feature that is right for the particular equipment application. Allison electrical interface connections are optional equipment on International vehicles. Choose one of the features described below to receive a cable harness interface connection on a vehicle factory-installed.

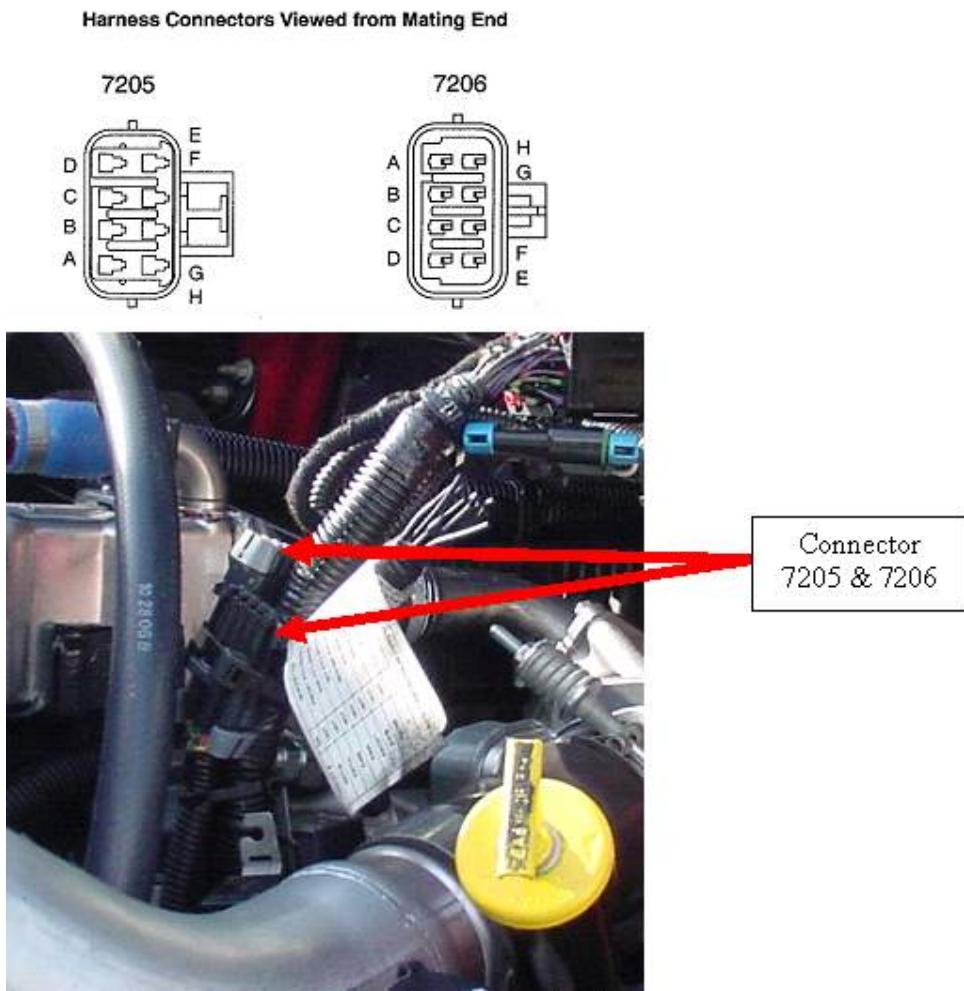
Allison provides electrical inputs and outputs for a variety of vehicle controls. The controls may be specific for fire truck, emergency vehicle, loader, etc. See Allison Controls and General Information for details.

#### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

#### **WIRING INFORMATION**

See Allison Controls and General Information for technical details and circuit design.

With the Allison 3000/4000 Series, there are two connectors – 7205 and 7206. Connectors 7205 and 7206 have their mating connectors attached filled with cavity plugs. The interface connections are located in between the radiator pipe and the engine on the driver side of the engine.

**Figure 64**

To use these connectors, remove cavity plugs and use the following:

**Table 58**

Mating Connector for 7205		
Connector	Connector Lock	Cavity Plug
3525874C1	3525875C1	2025431C1
Terminals	Wire Gauge	
1667742C1	16, 18, 20	
Cable Seals	Wire Gauge	
1661872C1	16, 18, 20	
Mating Connector for 7206		
Connector	Connector Lock	Cavity Plug
3525872C1	3525873C1	2025431C1

Terminals	Wire Gauge	
1661875C1	16, 18, 20	
Cable Seals	Wire Gauge	
1661872C1	16, 18, 20	

The circuit numbers on the harness correspond to the circuit numbers used by Allison. The table below gives the Allison 3000/4000 circuit number which corresponds to the circuit numbers in the International harness connectors. For a complete circuit diagram of the transmission wiring and for connector and terminal part numbers, see Circuit Diagram Manual S08322, Chapter 11, Transmission.

**Table 59**

Cavity	Circuit Number	I/O	Maximum Current
Connector Number 7205			
A	K92B103	—	—
B	K92#161	Input	—
C	K92#157	Input	—
D	K92#124	Output	500 mAMP*
E	K92#122	Input	—
F	K92#105	Output	—
G	K92#164	Output	500 mAMP
H	K92#162	Input	—
Connector Number 7206			
A	K92#101	Input	—
B	K92#117	Input	—
C	K92C103	—	—
D	K92#143	Input	—
E	K92#142	Input	—
F	K92#145	Output	500 mAMP
G	K92#130	Output	500 mAMP
H	K92#123	Input	—

\*milliAmpere

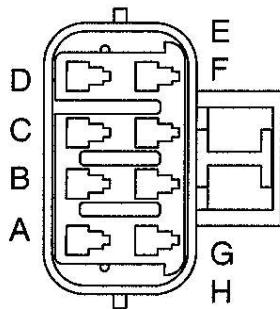
NOTE 1: See Allison technical manual for suggested circuit design.

NOTE 2: See special features table below for package content.

NOTE 3: MUST COMPLY WITH FMVSS STANDARD #102.

The Allison 1000/2000 series has a single connector – 7205. Connector 7205 has its mating connector attached and filled with cavity plugs. The interface connections are located in between the radiator pipe and the engine on the driver side of the engine.

**7205**



**Figure 65**

To use connector, remove cavity plugs and use the following:

**Table 60**

Connector	Connector Lock	Cavity Plug
3525874C1	3525875C1	2025431C1
Terminals	Wire Gauge	
1667742C1	16, 18, 20	
Cable Seals	Wire Gauge	
1661872C1	16, 18, 20	

The circuit numbers on the harness correspond to the circuit numbers used by Allison. The table below gives the Allison 1000/2000 circuit number which corresponds to the circuit numbers in the International harness connectors. For a complete circuit diagram of the transmission wiring and for connector and terminal part numbers, see Circuit Diagram Manual S08322, Chapter 11, Transmission.

**Table 61**

Cavity	Circuit Number	I/O	Maximum Current
Connector Number 7205			
A	L92C103	—	—
B	L92#143	Input	—
C	L92#150	Output	500 mAMP*
D	L47C125	Output	—
E	L92#101	Input	—
F	L92#123	Input	—
G	L92#145	Output	500 mAMP

Cavity	Circuit Number	I/O	Maximum Current
H	L92#105	Output	—

\*milliAmpere

NOTE 1: See Allison technical manual for suggested circuit design.

NOTE 2: See special features table below for package content.

NOTE 3: MUST COMPLY WITH FMVSS STANDARD #102.

Shown below are the various vocational feature codes that are available. Note the Group and Package number correspond to Allison Group and Package number.

NOTES for the tables below:

M = Mode Button Located on Shift Tower

# = Not Available with Code 13AAZ or 13WUA

@ = Requires Code 13AAZ, Automatic Neutral

% = Requires Code 13WUA, Automatic Neutral

\* = Not Activate

SPARE INPUT/OUTPUT		CODE	13WUB#	13WUC#	13WUD#	13WUE#	13WUG#	13WUH#
PACKAGE CONTENT		Group	98	99	108	107	110	102
		Package	200	113	174	120	113	150
	Other	Highway Series (HS);	Rugged Duty Series (RDS);	Emergency Vehicle Series (EVS); Rescue, Ambulance	Emergency Vehicle Series (EVS); Fire/Pumper, Tank, Aerial/Ladder	Truck Recreational Vehicle (TRV)	Rugged Duty Series (RDS); Airport Refueler Sewer Evac	
	Requirements	General Purpose Trucks	General Purpose Trucks, Construction					
Fun. No.	Function Name							

I-A	Secondary Shift Schedule	M	M	M	M	M	M
I-C	PTO Enable		143	143	142	143	
I-D	Shift Selection Transition			101*			
I-E	Auxiliary Function Range Inhibit (STD)		101*			101*	101*
I-F	Aux. Function Range Inhibit (Special)						
I-G	Auxiliary Hold		142			142	
I-H	Engine Brake & Preselect Request	102/157	102/157	102/157	102/157	102/157	102/157
I-J	Fire Truck Pump Mode				122/123*		
I-L	Auto Neutral for PTO (STD)						
I-Q	Two-Speed Axle Enable						
I-W	Direction Change Enable		122*			122*	117*
I-Y	ABS Input	121	121	121	121	121	121
I-Z	Retarder Enable	161	161	161	161	161	161
I-AA	Service Brake Status	162	162	162	162	162	162
I-AG	Auto Neutral for Refuse Packer & PTO Enable						
I-AJ	4th Gear Lockup for Pump Mode						122/123*

O-A	Engine Brake Enable	104	104	104	104	104	104
O-B	Sump/Retarder Temperature Indicator	164	164	164	164	164	164
O-C	Range Indicator	145	145	113	145 (4th)	145	145 (4th)
O-D	Output Speed Indicator A	105	105	105	105	105	105
O-G	PTO Enable		130	130	130	130	
O-J	Two-Speed Axle Enable						
O-I	Engine Overspeed Indicator						130
O-O	Service Indicator						
O-Q	Retarder Indicator	124	124	124	124	124	124
O-S	Neutral Indicator for PTO			145			

Figure 66

SPARE INPUT/OUTPUT		CODE Group	13WUJ@	13WUK@	13WUL#	13WUM#	13WUP#
PACKAGE CONTENT			105	106	103	111	112
		Other	Rugged Duty Series (RDS); Front	Rugged Duty Series (RDS); Side Loaders	Rugged Duty Series (RDS); Street Sweeper	Pupil Transportation Series (PTS); School/Shuttle	Bus Series (B); Transit and Intercity Bus
		Requirements	Loaders, Rear Loaders, Recycling/Packer Trucks				
Fun. No.	Function Name						
I-A	Secondary Shift Schedule	M		142	M	M	
I-C	PTO Enable	143		M		143	
I-D	Shift Selection Transition	101*					
I-E	Auxiliary Function Range Inhibit (STD)				101*	101*	
I-F	Aux. Function Range Inhibit (Special)						
I-G	Auxiliary Hold				142	142	
I-H	Engine Brake & Preselect Request	102/157		102/157	102/157	102/157	
I-J	Fire Truck Pump Mode						
I-L	Auto Neutral for PTO (STD)			117*	117*	117*	
I-Q	Two-Speed Axle Enable			101			
I-W	Direction Change Enable						
I-Y	ABS Input	121		121	121	121	
I-Z	Retarder Enable	161		161	161	161	
I-AA	Service Brake Status	162		162	162	162	
I-AG	Auto Neutral for Refuse Packer & PTO Enable	142/117					
I-AJ	4th Gear Lockup for Pump Mode						
O-A	Engine Brake Enable	104		104	104	104	
O-B	Sump/Retarder Temperature Indicator	164		164	164	164	
O-C	Range Indicator			113	145	145	
O-D	Output Speed Indicator A	105		105	105	105	
O-G	PTO Enable	130		130		130	
O-J	Two-Speed Axle Enable			145			
O-I	Engine Overspeed Indicator						
O-O	Service Indicator						
O-Q	Retarder Indicator	124		124	124	124	
O-S	Neutral Indicator for PTO	145					

Figure 67

SPARE INPUT/OUTPUT		CODE	13WUR#	13WUS%	13WUT#	13WUU#	13WUV%
PACKAGE CONTENT		Group	100	99	107	114	98
		Package	146	113 mod	119	163	200
		Other	Dump/Construction With Two-Speed Axle or Auxiliary Transmission (RDS)	Rugged Duty Series (RDS); General Purpose Trucks Modified for Single Input Auto Neutral	Emergency Vehicle Series (EVS); Fire (not for Split-Shaft PTO)	Specialty Series (SP); Specialty Vehicles	Highway Series (HS); General Purpose Trucks Modified for Single Input Auto Neutral
Fun. No.	Function Name						

I-A	Secondary Shift Schedule	M	M	M	M	M
I-C	PTO Enable	143	143	143	143	
I-D	Shift Selection Transition					
I-E	Auxiliary Function Range Inhibit (STD)	101*	101*			
I-F	Aux. Function Range Inhibit (Special)			101/142		
I-G	Auxiliary Hold		142		142	
I-H	Engine Brake & Preselect Request	102/157	102/157	102/157	102/157	102/157
I-J	Fire Truck Pump Mode					
I-L	Auto Neutral for PTO (STD)					117
I-Q	Two-Speed Axle Enable	142				
I-W	Direction Change Enable		122*			
I-Y	ABS Input	121	121	121	121	121
I-Z	Retarder Enable	161	161	161	161	161
I-AA	Service Brake Status	162	162	162	162	162
I-AG	Auto Neutral for Refuse Packer & PTO Enable					
I-AJ	4th Gear Lockup for Pump Mode					

O-A	Engine Brake Enable	104	104	104	104	104
O-B	Sump/Retarder Temperature Indicator	164	164		164	164
O-C	Range Indicator		145		145	145
O-D	Output Speed Indicator A	145	105	105	105	105
O-G	PTO Enable	130	130	130	130	
O-J	Two-Speed Axle Enable	145				
O-I	Engine Overspeed Indicator					
O-O	Service Indicator			164		
O-Q	Retarder Indicator	124	124	124	124	124
O-S	Neutral Indicator for PTO			145		

Figure 68

## 18. GAUGES

This chapter describes the optional gauges that are either installed or can be installed in the instrument cluster. If the vehicle was ordered without a desired gauge, one or more can be added in the field. Programming of the Body Controller (BC) and proper placement is critical. Certain gauges will only work in certain locations. Before adding the gauge to the vehicle, ensure that the vehicle can accept it. The outboard four gauges are the only ones that can be moved or added. They can be added by using the Diamond Logic® Builder software. Follow the steps below for adding a gauge to the cluster (those without Diamond Logic® Builder should see an International dealer). The following instructions can be followed for any of the four auxiliary gauge positions.

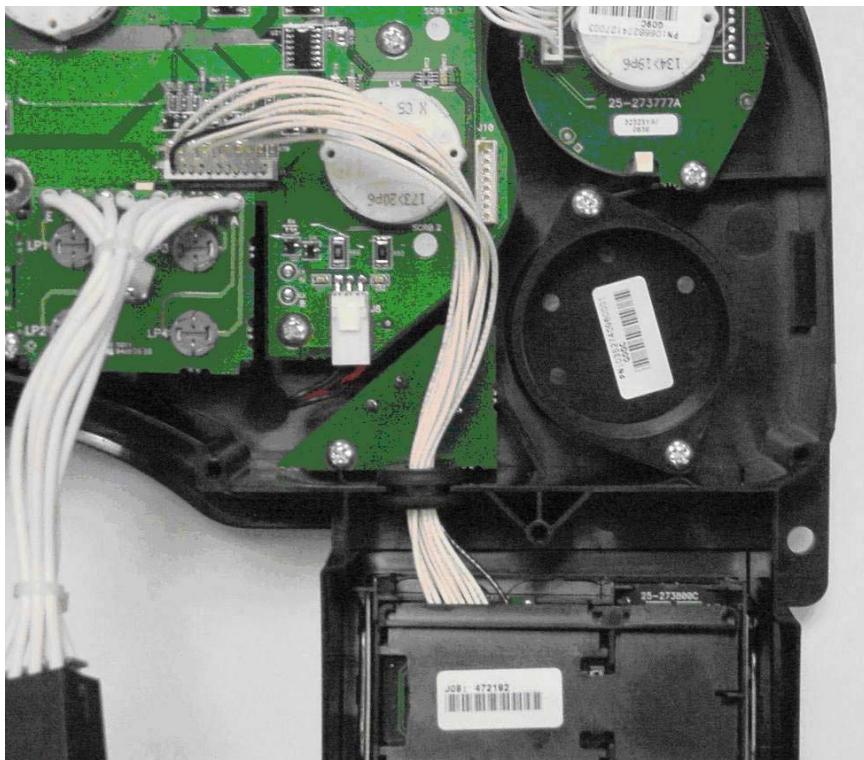
Adding and programming the vehicle:

- A. Using Diamond Logic® Builder, obtain a copy of the electronic vehicle file either by getting it from the vehicle or from history.
- B. Select the proper software feature code for the gauge to be added, and add this code to the configuration.
- C. Position the gauge in the desired location in the cluster by clicking and dragging it to an open location identified by a large blue circle. If the gauge will not move to a particular position, it is not designed to work in that location.
- D. Once the location of the gauge is determined, save the configuration and program the vehicle.

### INSTALLING THE GAUGE:

**NOTE – Refer to the “How Do I - General Information” section of this electrical guide for information on how to obtain gauge, circuits, and sensor part numbers.**

- A. Remove the cluster shroud from the Instrument Panel (IP).
- B. Remove the four screws which hold the cluster in place.
- C. Tilt the cluster forward to gain access to the back of the cluster (use caution not to scratch the face of the cluster).
- D. Remove all the connectors from the back of the cluster, and remove the cluster from the vehicle.
- E. Remove the ten screws from the metal panel on the back of the cluster.
- F. Remove the proper filler plug. See below.
- G. Install the gauge using caution not to move the needle, damage the face, or get the face of the gauge dirty.
- H. Connect the jumper wire in the socket directly next to the added gauge.
- I. Replace the metal panel, and install in the vehicle in the reverse order of removing it.



**Figure 69**

**WIRING INFORMATION:**

The standard cluster includes:

**ODOMETER DISPLAY:** Miles, Trip Miles, Engine Hours, Trip Hours, Fault Code Readout (Odometer, trip odometer, and fault code readout electronic-liquid crystal display)

**WARNING SYSTEM:** Low Fuel, Low Oil Pressure, High Engine Coolant Temp, and Low Battery Voltage (Visual and Audible)

**GAUGE CLUSTER GAUGES (6):** Engine Oil Pressure (Electronic), Water Temperature (Electronic), Fuel (Electronic), Tachometer (Electronic), Voltmeter, Speedometer

**GAUGE, AIR PRESSURE:** Air 1 and Air 2 Gauges; Located in Instrument Cluster (Air Chassis only)

**TESTING:**

Use the Diamond Logic® Builder software to steer each gauge to test values.

**18.1. 04SBL — INSTRUMENT CLUSTER – ADDING GAUGES**

**FEATURE CODE DESCRIPTION:**

04SBL - AIR COMPRESSOR {Bendix Tu-Flo 550} 13.2 CFM Capacity; and Tank for Air Source on Hydraulic Chassis

**FEATURE / BODY FUNCTION:**

04SBL – Provides system air pressure when an air compressor is ordered with a hydraulic brake vehicle.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

04SBL (Auxiliary Air gauge): 595AEP

The **Aux\_Air\_Press\_Alm\_Type\_Param** parameter defines the number of beeps associated with the auxiliary air pressure gauge alarm.

The **Aux\_Air\_Press\_Filter\_Param** parameter sets the auxiliary air gauge update rate. The higher the number is, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Aux\_Air\_Press\_Max\_WL\_Gen2** parameter sets the maximum point for auxiliary air in-gauge warning light. When the auxiliary air pressure rises above this set parameter, the warning light in the gauge will illuminate. A value of 76040 is the default gauge parameter and should normally not be changed.

The **Aux\_Air\_Press\_Min\_WL** parameter sets the minimum point for auxiliary air in-gauge warning light. When the auxiliary air pressure falls below this set parameter, the warning light in the gauge will illuminate.

**Table 62**

Parameter	ID	Description	Default	Units	Min	Max	Step
Aux_Air_Press_Alm_Type_Param	2380	Auxiliary air pressure alarm types available	4	List	0	7	1
Aux_Air_Press_Filter_Param	108	Auxiliary air gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1
Aux_Air_Press_Max_WL_Gen2	2392	Maximum threshold for auxiliary air in-gauge warning light. The default of 76040 means no minimum warning light.	76040	psig	0	150	1
Aux_Air_Press_Min_WL	1964	Minimum threshold for auxiliary air in-gauge warning light	72	psig	0	150	1

**Table 63 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Auxiliary Air Pressure Gauge	3615266C1	3615267C1

## 18.2. 16HGG — INSTRUMENT CLUSTER – ADDING GAUGES

### FEATURE CODE DESCRIPTION:

16HGG – GAUGE, OIL TEMP, ENGINE

### FEATURE / BODY FUNCTION:

16HGG – Provides engine oil temperature to the vehicle operator.

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HGG (Engine Oil Temperature): 595ADW **OR** 595ADX (Customer cannot use both)

\*\* Software Feature Code 595ADW is used to read engine oil temperature off the datalink.

\*\* Software Feature Code 595ADX is used to read engine oil temperature from a hard-wired analog sensor.

The **Eng\_Oil\_Temp\_Alrm\_Ty\_Param** parameter defines the number of beeps associated with the engine oil temperature alarm.

The **Eng\_Oil\_Temp\_Filter\_Param** parameter sets the engine oil temperature update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Eng\_Oil\_Temp\_Max\_WL** parameter sets the maximum point for engine oil temperature in-gauge warning light. When the oil temperature rises above this set parameter, the warning light in the gauge will illuminate.

The **Eng\_Oil\_Temp\_Min\_WL** parameter sets the minimum point for engine oil temperature in-gauge warning light. When the oil temperature falls below this set parameter, the warning light in the gauge will illuminate.

**Table 64**

Parameter	ID	Description	Default	Units	Min	Max	Step
Eng_Oil_Temp_Alrm_Ty_Param	2354	Engine oil temperature gauge alarm type.	4	List	0	7	1
Eng_Oil_Temp_Filter_Param	219	Engine oil temperature gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1
Eng_Oil_Temp_Max_WL	2274	Maximum set point for engine oil temperature in-gauge warning light	251	F	100	300	0.03125
Eng_Oil_Temp_Min_WL	2291	Minimum set point for engine oil temperature in-gauge warning light. The default of 3226 means no minimum warning light.	3226	F	100	300	0.03125

**Table 65 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Engine Oil Temperature Gauge	3615258C1	3615259C1

### **18.3. 16HGH — INSTRUMENT CLUSTER – ADDING GAUGES**

**FEATURE CODE DESCRIPTION:**

16HGH – GAUGE, OIL TEMP, AUTO TRANS

**FEATURE / BODY FUNCTION:**

16HGH – Provides Allison transmission fluid temperature information to the vehicle operator.

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

16HGH (Allison Transmission Oil Temperature gauge): 595ADZ

The **Trans\_Oil\_Temp\_Alrm\_Ty\_Param** parameter defines the number of beeps associated with the Transmission oil temperature alarm.

The **Trans\_Oil\_Temp\_Filter\_Param** parameter sets the transmission oil temperature update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Trans\_Oil\_Temp\_Max\_WL** parameter sets the maximum point for transmission oil temperature in-gauge warning light. When the oil temperature rises above this set parameter, the warning light in the gauge will illuminate.

The **Trans\_Oil\_Temp\_Min\_WL** parameter sets the minimum point for transmission oil temperature in-gauge warning light. When the oil temperature falls below this set parameter, the warning light in the gauge will illuminate.

**Table 66**

Parameter	ID	Description	Default	Units	Min	Max	Step
Trans_Oil_Temp_Alrm_Ty_Param	2356	Transmission oil temperature gauge alarm type.	0	No_ Units	0	7	1
Trans_Oil_Temp_Filter_Param	589	Transmission oil temperature gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1

Parameter	ID	Description	Default	Units	Min	Max	Step
Trans_Oil_Temp_Max_WL	2272	Maximum set point for transmission oil temperature in-gauge warning light. The default of 3226 means no maximum warning light.	3226	F	100	300	0.03125
Trans_Oil_Temp_Min_WL	2273	Minimum set point for transmission oil temperature in-gauge warning light. The default of 3226 means no minimum warning light.	3226	F	100	300	0.03125

**Table 67 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Transmission Oil Temperature Gauge	3615268C1	3615269C1

## 18.4. 16HGJ — INSTRUMENT CLUSTER – ADDING GAUGES

### FEATURE CODE DESCRIPTION:

16HGJ – GAUGE, OIL TEMP, MANUAL TRAN

### FEATURE / BODY FUNCTION:

16HGJ – Provides manual transmission oil temperature to the vehicle operator. Manual transmissions should not be operated at temperatures above 250 °F (120 °C).

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HGJ (Oil Temperature gauge on a manual transmission): 595AEW

The **Trans\_Oil\_Temp\_Alm\_Ty\_Param** parameter defines the number of beeps associated with the Transmission oil temperature alarm.

The **Trans\_Oil\_Temp\_Filter\_Param** parameter sets the transmission oil temperature update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Trans\_Oil\_Temp\_Max\_WL** parameter sets the maximum point for transmission oil temperature in-gauge warning light. When the oil temperature rises above this set parameter, the warning light in the gauge will illuminate.

The **Trans\_Oil\_Temp\_Min\_WL** parameter sets the minimum point for transmission oil temperature in-gauge warning light. When the oil temperature falls below this set parameter, the warning light in the gauge will illuminate.

**Table 68**

Parameter	ID	Description	Default	Units	Min	Max	Step
Trans_Oil_Temp_Alm_Ty_Param	2356	Transmission oil temperature gauge alarm type.	4	No_ Units	0	7	1
Trans_Oil_Temp_Filter_Param	589	Transmission oil temperature gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1

Parameter	ID	Description	Default	Units	Min	Max	Step
Trans_Oil_Temp_Max_WL	2272	Maximum set point for transmission oil temperature in-gauge warning light. 3226 means no maximum warning light.	250	F	100	300	0.03125
Trans_Oil_Temp_Min_WL	2273	Minimum set point for transmission oil temperature in-gauge warning light. The default of 3226 means no minimum warning light.	3226	F	100	300	0.03125

**Table 69 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Transmission Oil Temperature Gauge	3615268C1	3615269C1

## 18.5. 16HGL — INSTRUMENT CLUSTER – ADDING GAUGES

### FEATURE CODE DESCRIPTION:

16HGL – GAUGE, OIL TEMP, REAR AXLE

### FEATURE / BODY FUNCTION:

16HGL – Provides rear axle operating information to the vehicle operator. Rear axle temperature should not exceed 240 °F (115 °C).

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HGL (Rear Axle Temperature): 595AYA **OR** 595AYB (Customer cannot use both)

\*\* Software Feature Code 595AYA is used to read rear-rear axle temperature AND forward-rear axle temperature.

\*\* Software Feature Code 595AYB is used to read just rear-rear axle temperature.

#### → **595AYA (rear-rear and forward-rear axle temperature)**

The **Fwd\_RR\_Axle\_Temp\_Filter\_Param** parameter sets the forward rear axle temperature update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Rear\_Axle\_Temperature\_Alarm\_Gen2\_Param** parameter defines the number of beeps associated with the rear-rear axle temperature alarm.

The **Rear\_RR\_Axle\_Temp\_Filter\_Param** parameter sets the rear-rear axle temperature update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Rear\_Axle\_Temp\_Max\_Gen2\_WL** parameter sets the maximum point for rear-rear axle temperature in-gauge warning light. When the rear-rear axle temperature rises above this set parameter, the warning light in the gauge will illuminate.

The **Rear\_Axle\_Temp\_Min\_Gen2\_WL** parameter sets the minimum point for rear-rear axle temperature in-gauge warning light. When the rear-rear axle temperature falls below this set parameter, the warning light in the gauge will illuminate.

**Table 70**

Parameter	ID	Description	Default	Units	Min	Max	Step
Fwd_RR_Axle_Temp_Filter_Param	277	Forward-rear axle temperature gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1

Parameter	ID	Description	Default	Units	Min	Max	Step
Rear_Axle_Temperature_Alarm_Gen2	2415	Rear-rear axle temperature gauge alarm type.	4	No_Units	0	110	1
Rear_RR_Axle_Temp_Filter_Param	519	Rear-rear axle temperature gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_Units	1	255	1
Rear_Axle_Temp_Max_Gen2_WL	2417	Maximum set point for rear-rear axle temperature in-gauge warning light	240	F	100	300	1
Rear_RR_Axle_Temp_Min_Gen2_WL	2418	Minimum set point for rear-rear axle temperature in-gauge warning light. A value of 117923 means no minimum warning light.	100	F	100	300	1

→ 595AYB (just rear-rear axle temperature)

The **Rear\_Axle\_Temperature\_Alarm\_Gen2\_Param** parameter defines the number of beeps associated with the rear-rear axle temperature alarm.

The **Rear\_RR\_Axle\_Temp\_Filter\_Param** parameter sets the rear-rear axle temperature update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Rear\_Axle\_Temp\_Max\_Gen2\_WL** parameter sets the maximum point for rear-rear axle temperature in-gauge warning light. When the rear-rear axle temperature rises above this set parameter, the warning light in the gauge will illuminate.

The **Rear\_Axle\_Temp\_Min\_Gen2\_WL** parameter sets the minimum point for rear-rear axle temperature in-gauge warning light. When the rear-rear axle temperature falls below this set parameter, the warning light in the gauge will illuminate.

**Table 71**

Parameter	ID	Description	Default	Units	Min	Max	Step
Rear_Axle_Temperature_Alarm_Gen2	2415	Rear-rear axle temperature gauge alarm type.	4	No_Units	0	7	1

Parameter	ID	Description	Default	Units	Min	Max	Step
Rear_RR_Axle_Temp_Filter_Param	519	Rear-rear axle temperature gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1
Rear_Axle_Temp_Max_Gen2_WL	2417	Maximum set point for rear-rear axle temperature in-gauge warning light	240	F	100	300	1
Rear_RR_Axle_Temp_Min_Gen2_WL	2418	Minimum set point for rear-rear axle temperature in-gauge warning light. A value of 117920 means no minimum warning light.	100	F	100	300	1

**Table 72 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Rear-rear Axle Oil Temperature Gauge	3615272C1	3615273C1
Forward-rear Axle Oil Temperature Gauge	3615260C1	3615261C1

## 18.6. 16HGN — INSTRUMENT CLUSTER – ADDING GAUGES

### FEATURE CODE DESCRIPTION:

16HGN – GAUGE, AIR APPLICATION

### FEATURE / BODY FUNCTION:

16HGN – This feature gives a visual read-out of the amount of pressure being applied to the brake pedal.

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HGN (Air application gauge): 595ANP

The **LH\_Brake\_App\_Alrm\_Ty\_Param** parameter defines the number of beeps associated with the brake application gauge alarm.

The **Brake\_App\_Filter\_Param** parameter sets the brake application gauge update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Brake\_App\_Max\_WL** parameter sets the maximum point for the brake application in-gauge warning light. When the brake pressure rises above this set parameter, the warning light in the gauge will illuminate.

The **Brake\_App\_Min\_WL** parameter sets the minimum point for brake application in-gauge warning light. When brake pressure falls below this set parameter, the warning light in the gauge will illuminate.

**Table 73**

Parameter	ID	Description	Default	Units	Min	Max	Step
LH_Brake_App_Alrm_Ty_Param	2348	Brake application gauge alarm type.	0	No_ Units	0	1	7
Brake_App_Filter_Param	128	Brake application gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	No_ Units	1	255	1
Brake_App_Max_WL	2343	Maximum set point for brake application in-gauge warning light. A value of 38020 means no maximum warning light.	38020	psi	0	150	0.5
Brake_App_Min_WL	2337	Minimum set point for brake application in-gauge warning light. A value of 38020 means no minimum warning light.	38020	psi	0	150	0.5

**Table 74 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Air Application Gauge	3616155C1	361656C1

## 18.7. 16HHT — INSTRUMENT CLUSTER – ADDING GAUGES

### FEATURE CODE DESCRIPTION:

16HHT – GAUGE, Ammeter 150 Ampere (AMP)

### FEATURE / BODY FUNCTION:

16HHT – This feature gives a visual read-out of the amperage on the vehicle.

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HHT (Ammeter 150 AMP Gauge): 595AEZ

The **Ammeter\_Alrm\_Ty\_Param** parameter defines the number of beeps associated with the ammeter gauge alarm.

The **Ammeter\_Filter\_Param** parameter sets the ammeter gauge update rate. The higher the number, the faster the update rate. 255 is the fastest update rate available, and 1 is the slowest update rate available.

The **Ammeter\_Max\_WL** parameter sets the maximum point for the ammeter in-gauge warning light. When the amperage rises above this set parameter, the warning light in the gauge will illuminate.

The **Ammeter\_Min\_WL** parameter sets the minimum point for ammeter in-gauge warning light. When amperage falls below this set parameter, the warning light in the gauge will illuminate.

The **PAM\_Acc\_Pos\_Offset\_Param** parameter estimates the electrical loads measured by the PAM when the key is in the accessory position.

The **PAM\_Run\_Pos\_Offset\_Param** parameter estimates the electrical loads measured by the PAM when the key is in the run position.

The **PAM\_Xfer\_Function\_Slope\_Param** parameter sets the slope of the transfer function used to calculate the electrical load on the vehicle displayed by the ammeter.

**Table 75**

Parameter	ID	Description	Default	Units	Min	Max	Step
Ammeter_Alrm_Ty_Param	71	Ammeter gauge alarm type. The number of "beeps" is the value of this parameter divided by 5. 255 is a continuous tone.	0	Number	0	255	25
Ammeter_Filter_Param	72	Ammeter gauge update rate. A value of 1 is the slowest and 255 is the fastest update rate.	255	Number	1	255	1

Parameter	ID	Description	Default	Units	Min	Max	Step
Ammeter_Max_WL	2394	Maximum set point for ammeter in-gauge warning light. The default of 1676 means no maximum warning light.	1676	A	-300	300	1
Ammeter_Min_WL	2393	Minimum set point for ammeter in-gauge warning light. The default of 1676 means no minimum warning light.	1676	A	-300	300	1
PAM_Acc_Pos_Offset_Param	1941	Estimation of electrical load that is not measured by the PAM when the key is in the accessory position	0	A	0	250	1
PAM_Run_Pos_Offset_Param	1940	Estimation of electrical load that is not measured by the PAM when the key is in the run position	5	A	0	250	1
PAM_Xfer_Function_Slope_Param	1939	Slope of the transfer function used to calculate the electrical load on the vehicle to be displayed by the ammeter	475	micro Ohm	0	64255	1

**Table 76 Gauge Part Numbers**

Optional Gauges	ENGLISH Part Number	METRIC Part Number
Ammeter	3615264C1	—

## 18.8. 16HKA — INSTRUMENT CLUSTER – OMIT FAULT CODES

### FEATURE CODE DESCRIPTION:

16HKA – IP CLUSTER DISPLAY OMIT FAULT CODES — Omit display of fault codes in instrument cluster and disable blink codes (requires service tool to retrieve and view fault codes).

### FEATURE / BODY FUNCTION:

Optional feature that removes the ability to read fault codes inside the vehicle, using the cluster's LCD display. No hardware change is needed. This is a software configurable feature.

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HKA (IP Cluster Display Omit Fault Codes): 595ANV

### WIRING INFORMATION:

No additional wiring is needed.

### TESTING:

1. Set Park Brake
2. Press and hold “Cruise On” switch and “Cruise Resume” switch
3. Odometer should **NOT** display “NO FAULTS” or a number of FAULTS.

### HOW TO ADD THESE FEATURES:

Select software feature code 595ANV using the Diamond Logic® Builder software (See Local Dealer)

## 18.9. 16HKT — INSTRUMENT CLUSTER – FAULT CODES

### FEATURE CODE DESCRIPTION:

16HKT – IP CLUSTER DISPLAY DIAGNOSTICS — Display on board diagnostics of fault codes in gauge cluster

### FEATURE / BODY FUNCTION:

This feature allows the retrieval of fault codes from the LCD display in the cluster. No hardware change is needed. This is a software configurable feature.

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

16HKT (IP Cluster Display Diagnostics): 595ANW

### WIRING INFORMATION:

No additional wiring is needed.

### TESTING:

1. Set Park Brake
2. Press and hold “Cruise On” switch and “Cruise Resume” switch
3. Odometer should display the number of active and past fault codes.
4. Pressing the selection button on the face of the cluster will cycle through the fault codes, or they will change to the next fault code every ten seconds.

### HOW TO ADD THESE FEATURES:

Select software feature code 595ANW using the Diamond Logic® Builder software (See Local Dealer)

## 19. REMOTE POWER MODULES

### 19.1. REMOTE POWER MODULES (RPMS)

#### FEATURE CODE DESCRIPTION:

Refer to the Circuit Diagram Manual S08322, Chapter 10, Chassis Accessories, Remote Power Units, Solenoid Packs, Remote Engine Speed Controller.

#### Momentary Switch RPMS

**08WSK** – SWITCH, BODY CIRCUITS, REAR for Body Builder; With Six **Momentary** Switches in Instrument Panel (IP); One Power Module, With Six Channels, 20 Ampere (AMP) per Channel and 80 AMP Max. Output, Switches Control the Power Modules Through Multiplex Wiring, Mounted at Rear on Frame

**08WSM** – SWITCH, BODY CIRCUITS, MID for Body Builder, With Six **Momentary** Switches in IP; One Power Module With Six Channel, 20 AMP Max. per Channel and 80 AMP Max. Output, Switches Control the Power Module Through Multiplex Wiring, Mounted Battery Box, Back of Cab (BOC)

**08SAJ** – SWITCH, BODY CIRCUITS, MID for Body Builder; 12 **Momentary** Switches in IP, With Two Power Modules With Six Channels, 20 AMP Max. per Channel, 80 AMP Max. Output, Switch Control Power Modules Through Multiplex Wiring, Mounted on Battery Box, BOC

#### Latched Switch RPMS

**60AAA** — BDY INTG, RPM Mounted Under Cab; Up to Six Outputs and Six Inputs, Max. 20 AMP per Channel, Max. 80 AMP Total (Includes One Switch Pack With **Latched** Switches) Mounted on Battery Box, BOC

**60AAB** – BDY INTG, RPM (2) Mounted Under Cab; Up to Six Outputs and Six Inputs Each, Max. 20 AMP per Channel, Max. 80 AMP Total per Power Module (Includes Switch Packs With **Latched** Switches) Mounted on Battery Box, BOC

**08WTJ** – SWITCH, BODY CIRCUITS, REAR for Body Builder with Six Switches in IP (2-position **Latched** Switches), One Power Module With Six Channels, 20 AMP per Channel and 80 AMP Maximum Output, Switches Control the Power Modules Through Multiplex Wiring, Mounted at the Rear of the Frame (ROF)

**60AAD** – BDY INTG, RPM (2) {SPECIAL} Mounted Under Cab or on Battery Box; Max. 20 AMP per Channel, Max. 80 AMP Total per Power Module; Includes One Module With Switch Pack Containing Six **Latched** Switches and One Module With Hardware Only

#### FEATURE/BODY FUNCTION:

On the 4000 models, codes 08SAJ, 08WSM, 60AAA, and 60AAB have the RPMS mounted at the back of the battery box.

On the 7000 models, codes 08SAJ, 08WSM, 60AAA, and 60AAB have the RPMS mounted under the cab, left rear.

On either the 4000 or 7000 models, codes 08WSK or 08WTJ have the RPMS mounted on the driver's side frame rail at the ROF.

Feature codes 08WSK, 08WSM, 08SAJ, and 08WTJ each add a 6-pack switch pack in a one-to-one relationship to the RPM feature code.

60AAA and 60AAB add switches by filling in the first empty switch location. Once the first switch pack is full, a second will be added filling in from the left to right of the switch pack.

International has developed a method of controlling loads on the vehicle, outside the cab, without running individual wires from each switch to the load. This is accomplished by an electronic device called a Remote Power Module (RPM). This module is used to distribute and control power to various devices on the vehicle from switches inside the cab. The RPM is connected to the Body Controller (BC) via the Body Builder J1939 datalink (not the powertrain or ATA datalink). The only wires connected to the RPM are battery power (for driving the loads), datalink cable (which includes power and Ground (GND) to operate the module), and a wire for each vehicle device operated by the RPM.

#### **SOFTWARE FEATURE CODES AND PROGRAMMABLE PARAMETERS:**

**08WSK:** 595AHB

The **PwrMod4\_Fuse\_Level1\_Param** sets the limit (in AMPS) of the current flowing from Output #1 of RPM #4.

The **PwrMod4\_Fuse\_Level2\_Param** sets the limit (in AMPS) of the current flowing from Output #2 of RPM #4.

The **PwrMod4\_Fuse\_Level3\_Param** sets the limit (in AMPS) of the current flowing from Output #3 of RPM #4.

The **PwrMod4\_Fuse\_Level4\_Param** sets the limit (in AMPS) of the current flowing from Output #4 of RPM #4.

The **PwrMod4\_Fuse\_Level5\_Param** sets the limit (in AMPS) of the current flowing from Output #5 of RPM #4.

The **PwrMod4\_Fuse\_Level6\_Param** sets the limit (in AMPS) of the current flowing from Output #6 of RPM #4.

The **PwrMod4\_Init\_State1\_Param** parameter determines the initial state of RPM #4, output #1. If the parameter is set to 1, Output #1 of RPM #4 will be turned ON at ignition (IGN) key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod4\_Init\_State2\_Param** parameter determines the initial state of RPM #4, output #2. If the parameter is set to 1, Output #2 of RPM #4 will be turned ON at ignition (IGN) key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod4\_Init\_State3\_Param** parameter determines the initial state of RPM #4, output #3. If the parameter is set to 1, Output #3 of RPM #4 will be turned ON at ignition (IGN) key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod4\_Init\_State4\_Param** parameter determines the initial state of RPM #4, output #4. If the parameter is set to 1, Output #4 of RPM #4 will be turned ON at ignition (IGN) key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod4\_Init\_State5\_Param** parameter determines the initial state of RPM #4, output #5. If the parameter is set to 1, Output #5 of RPM #4 will be turned ON at ignition (IGN) key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod4\_Init\_State6\_Param** parameter determines the initial state of RPM #4, output #6. If the parameter is set to 1, Output #6 of RPM #4 will be turned ON at ignition (IGN) key-on. If the parameter value is set to 0, the output will be OFF at key-on.

**Table 77**

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod4_Fuse_Level1_Param	454	Current Limit in amps for Output #1 of RPM #4	20	A	0	20	0.1
PwrMod4_Fuse_Level2_Param	455	Current Limit in amps for Output #2 of RPM #4	20	A	0	20	0.1
PwrMod4_Fuse_Level3_Param	456	Current Limit in amps for Output #3 of RPM #4	20	A	0	20	0.1
PwrMod4_Fuse_Level4_Param	457	Current Limit in amps for Output #4 of RPM #4	20	A	0	20	0.1
PwrMod4_Fuse_Level5_Param	458	Current Limit in amps for Output #5 of RPM #4	20	A	0	20	0.1
PwrMod4_Fuse_Level6_Param	459	Current Limit in amps for Output #6 of RPM #4	20	A	0	20	0.1
PwrMod4_Init_State1_Param	460	If this parameter is set to 1, Output #1 of RPM #4 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod4_Init_State2_Param	461	If this parameter is set to 1, Output #2 of RPM #4 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod4_Init_State3_Param	462	If this parameter is set to 1, Output #3 of RPM #4 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod4_Init_State4_Param	463	If this parameter is set to 1, Output #4 of RPM #4 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod4_Init_State5_Param	464	If this parameter is set to 1, Output #5 of RPM #4 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod4_Init_State6_Param	465	If this parameter is set to 1, Output #6 of RPM #4 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

#### 08WSM: 595AHE

The **PwrMod1\_Fuse\_Level1\_Param** sets the limit (in AMPS) of the current flowing from Output #1 of RPM #1.

The **PwrMod1\_Fuse\_Level2\_Param** sets the limit (in AMPS) of the current flowing from Output #2 of RPM #1.

The **PwrMod1\_Fuse\_Level3\_Param** sets the limit (in AMPS) of the current flowing from Output #3 of RPM #1.

The **PwrMod1\_Fuse\_Level4\_Param** sets the limit (in AMPS) of the current flowing from Output #4 of RPM #1.

The **PwrMod1\_Fuse\_Level5\_Param** sets the limit (in AMPS) of the current flowing from Output #5 of RPM #1.

The **PwrMod1\_Fuse\_Level6\_Param** sets the limit (in AMPS) of the current flowing from Output #6 of RPM #1.

The **PwrMod1\_Init\_State1\_Param** parameter determines the initial state of RPM #1, output #1. If the parameter is set to 1, Output #1 of RPM #1 will be turned ON at ignition key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State2\_Param** parameter determines the initial state of RPM #1, output #2. If the parameter is set to 1, Output #2 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State3\_Param** parameter determines the initial state of RPM #1, output #3. If the parameter is set to 1, Output #3 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State4\_Param** parameter determines the initial state of RPM #1, output #4. If the parameter is set to 1, Output #4 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State5\_Param** parameter determines the initial state of RPM #1, output #5. If the parameter is set to 1, Output #5 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State6\_Param** parameter determines the initial state of RPM #1, output #6. If the parameter is set to 1, Output #6 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

**Table 78**

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod1_Fuse_Level1_Param	392	Current Limit in amps for Output #1 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level2_Param	393	Current Limit in amps for Output #2 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level3_Param	394	Current Limit in amps for Output #3 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level4_Param	395	Current Limit in amps for Output #4 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level5_Param	396	Current Limit in amps for Output #5 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level6_Param	397	Current Limit in amps for Output #6 of RPM #1	20	A	1	20	0.1
PwrMod1_Init_State1_Param	398	If this parameter is set to 1, Output #1 of RPM #1 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State2_Param	399	If this parameter is set to 1, Output #2 of RPM #1 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State3_Param	400	If this parameter is set to 1, Output #3 of RPM #1 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod1_Init_State4_Param	401	If this parameter is set to 1, Output #4 of RPM #1 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State5_Param	402	If this parameter is set to 1, Output #5 of RPM #1 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State6_Param	403	If this parameter is set to 1, Output #6 of RPM #1 will be turned on at ignition key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

#### 08SAJ: 595AHE and 595AHD

The **PwrMod2\_Fuse\_Level1\_Param** sets the limit (in AMPS) of the current flowing from Output #1 of RPM #2.

The **PwrMod2\_Fuse\_Level2\_Param** sets the limit (in AMPS) of the current flowing from Output #2 of RPM #2.

The **PwrMod2\_Fuse\_Level3\_Param** sets the limit (in AMPS) of the current flowing from Output #3 of RPM #2.

The **PwrMod2\_Fuse\_Level4\_Param** sets the limit (in AMPS) of the current flowing from Output #4 of RPM #2.

The **PwrMod2\_Fuse\_Level5\_Param** sets the limit (in AMPS) of the current flowing from Output #5 of RPM #2.

The **PwrMod2\_Fuse\_Level6\_Param** sets the limit (in AMPS) of the current flowing from Output #6 of RPM #2.

The **PwrMod2\_Init\_State1\_Param** parameter determines the initial state of RPM #2, output #1. If the parameter is set to 1, Output #1 of RPM #2 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod2\_Init\_State2\_Param** parameter determines the initial state of RPM #2, output #2. If the parameter is set to 1, Output #2 of RPM #2 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod2\_Init\_State3\_Param** parameter determines the initial state of RPM #2, output #3. If the parameter is set to 1, Output #3 of RPM #2 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod2\_Init\_State4\_Param** parameter determines the initial state of RPM #2, output #4. If the parameter is set to 1, Output #4 of RPM #2 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod2\_Init\_State5\_Param** parameter determines the initial state of RPM #2, output #5. If the parameter is set to 1, Output #5 of RPM #2 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod2\_Init\_State6\_Param** parameter determines the initial state of RPM #2, output #6. If the parameter is set to 1, Output #6 of RPM #2 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Fuse\_Level1\_Param** sets the limit (in AMPS) of the current flowing from Output #1 of RPM #1.

The **PwrMod1\_Fuse\_Level2\_Param** sets the limit (in AMPS) of the current flowing from Output #2 of RPM #1.

The **PwrMod1\_Fuse\_Level3\_Param** sets the limit (in AMPS) of the current flowing from Output #3 of RPM #1.

The **PwrMod1\_Fuse\_Level4\_Param** sets the limit (in AMPS) of the current flowing from Output #4 of RPM #1.

The **PwrMod1\_Fuse\_Level5\_Param** sets the limit (in AMPS) of the current flowing from Output #5 of RPM #1.

The **PwrMod1\_Fuse\_Level6\_Param** sets the limit (in AMPS) of the current flowing from Output #6 of RPM #1.

The **PwrMod1\_Init\_State1\_Param** parameter determines the initial state of RPM #1, output #1. If the parameter is set to 1, Output #1 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State2\_Param** parameter determines the initial state of RPM #1, output #2. If the parameter is set to 1, Output #2 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State3\_Param** parameter determines the initial state of RPM #1, output #3. If the parameter is set to 1, Output #3 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State4\_Param** parameter determines the initial state of RPM #1, output #4. If the parameter is set to 1, Output #4 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State5\_Param** parameter determines the initial state of RPM #1, output #5. If the parameter is set to 1, Output #5 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

The **PwrMod1\_Init\_State6\_Param** parameter determines the initial state of RPM #1, output #6. If the parameter is set to 1, Output #6 of RPM #1 will be turned ON at IGN key-on. If the parameter value is set to 0, the output will be OFF at key-on.

**Table 79**

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod2_Fuse_Level1_Param	35	Current Limit in amps for Output #1 of RPM #2	20	A	0	20	0.1
PwrMod2_Fuse_Level2_Param	36	Current Limit in amps for Output #2 of RPM #2	20	A	0	20	0.1
PwrMod2_Fuse_Level3_Param	37	Current Limit in amps for Output #3 of RPM #2	20	A	0	20	0.1
PwrMod2_Fuse_Level4_Param	38	Current Limit in amps for Output #4 of RPM #2	20	A	0	20	0.1
PwrMod2_Fuse_Level5_Param	39	Current Limit in amps for Output #5 of RPM #2	20	A	0	20	0.1
PwrMod2_Fuse_Level6_Param	40	Current Limit in amps for Output #6 of RPM #2	20	A	0	20	0.1
PwrMod2_Init_State1_Param	41	If this parameter is set to 1, Output #1 of RPM #2 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod2_Init_State2_Param	42	If this parameter is set to 1, Output #2 of RPM #2 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod2_Init_State3_Param	43	If this parameter is set to 1, Output #3 of RPM #2 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod2_Init_State4_Param	44	If this parameter is set to 1, Output #4 of RPM #2 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod2_Init_State5_Param	45	If this parameter is set to 1, Output #5 of RPM #2 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod2_Init_State6_Param	46	If this parameter is set to 1, Output #6 of RPM #2 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Fuse_Level1_Param	392	Current Limit in amps for Output #1 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level2_Param	393	Current Limit in amps for Output #2 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level3_Param	394	Current Limit in amps for Output #3 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level4_Param	395	Current Limit in amps for Output #4 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level5_Param	396	Current Limit in amps for Output #5 of RPM #1	20	A	1	20	0.1
PwrMod1_Fuse_Level6_Param	397	Current Limit in amps for Output #6 of RPM #1	20	A	1	20	0.1
PwrMod1_Init_State1_Param	398	If this parameter is set to 1, Output #1 of RPM #1 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State2_Param	399	If this parameter is set to 1, Output #2 of RPM #1 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

Parameter	ID	Description	Default	Units	Min	Max	Step
PwrMod1_Init_State3_Param	400	If this parameter is set to 1, Output #3 of RPM #1 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State4_Param	401	If this parameter is set to 1, Output #4 of RPM #1 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State5_Param	402	If this parameter is set to 1, Output #5 of RPM #1 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA
PwrMod1_Init_State6_Param	403	If this parameter is set to 1, Output #6 of RPM #1 will be turned on at IGN key-on. If set to 0 output will be off at key-on.	OFF	No_Units	NA	NA	NA

#### FEATURE/BODY FUNCTION: 60AAA, 60AAB and 60AAD

60AAA provides one RPM where 60AAB provides two RPMs. Each RPM provides six load outputs for a maximum of 20 AMPS per channel and a maximum of 80 total AMPS per module. Each RPM also provides six inputs that can be either a 12 volt input or a GND active input signal.

60AAD provides two RPMs with only one 6-pack switch pack. This feature is specifically for customers that wish to use advanced logic to control the outputs of these two RPMs through special customer-created software.

\* There are other software features that can be ordered such as PTO features that will also use RPM outputs and inputs. These features will take precedence over the RPM feature code switches and inputs/outputs. For example, an order for a PTO feature that uses switch location one and RPM input/output one comes with the PTO switch and five other switches that would control outputs two through six.

#### SOFTWARE FEATURE CODES AND PROGRAMMABLE PARAMETERS:

Feature code 60AAA, 60AAB, or 60AAD are 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 = 595AJK – This feature should be added if there are features already using five RPM inputs/outputs.

60ACB = 595AJL – This feature should be added if there are features already using four RPM inputs/outputs.

60ACC = 595AJM – This feature should be added if there are features already using three RPM inputs/outputs.

60ACD = 595AJN – This feature should be added if there are features already using two RPM inputs/outputs.

60ACJ = 595AJP – This feature should be added if there are features already using one RPM input/output.

60ACK = 595AJR – This feature should be added if there no other features using any RPM inputs/outputs.

60ACV = 595AJS – This feature should be added to add the second RPM (60AAB).

The following parameters may or may not show up in certain combinations based on which of the above software feature codes are installed on the vehicle.

The TEM\_Aux1\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_1\_Output of RPM #1.

The TEM\_Aux2\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_2\_Output of RPM #1.

The TEM\_Aux3\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_3\_Output of RPM #1.

The TEM\_Aux4\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_4\_Output of RPM #1.

The TEM\_Aux5\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_5\_Output of RPM #1.

The TEM\_Aux6\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_6\_Output of RPM #1.

The TEM\_Aux7\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_7\_Output of RPM #1.

The TEM\_Aux8\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_8\_Output of RPM #1.

The TEM\_Aux9\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_9\_Output of RPM #1.

The TEM\_Aux10\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_10\_Output of RPM #1.

The TEM\_Aux11\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_11\_Output of RPM #1.

The TEM\_Aux12\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled Aux\_Switch\_12\_Output of RPM #1.

**Table 80**

Parameter Name	ID	Description	Default Settings	Units	Min Value	Max Value	Step
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	Amps	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	Amps	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	Amps	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	Amps	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	Amps	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	Amps	0	20	0.1
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	Amps	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	Amps	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	Amps	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	Amps	0	20	0.1

Parameter Name	ID	Description	Default Settings	Units	Min Value	Max Value	Step
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	Amps	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	Amps	0	20	0.1

**FEATURE/BODY FUNCTION: 08WTJ: 595AJG**

Feature 08WTJ adds one RPM to the end of the frame to be used by itself or in combination with 60AAA (one RPM BOC) or 60AAB (two RPMs BOC). The RPM will have six channels, 20 AMPS per channel, and 80 AMPS maximum output. There will be six, 2-position, **latched** switches located in the IP that will control the RPM through multiplex wiring.

**SOFTWARE FEATURE CODES AND PROGRAMMABLE PARAMETERS:**

Required software feature code: 595AJG

Conflicts with Software features: 595AHB

The TEM\_Aux13\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled RPM4\_Output1 of RPM #1.

The TEM\_Aux14\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled RPM4\_Output2 of RPM #1.

The TEM\_Aux15\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled RPM4\_Output3 of RPM #1.

The TEM\_Aux16\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled RPM4\_Output4 of RPM #1.

The TEM\_Aux17\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled RPM4\_Output5 of RPM #1.

The TEM\_Aux18\_Output\_Fuse\_Param sets the limit (in AMPS) of the current flowing from the output labeled RPM4\_Output6 of RPM #1.

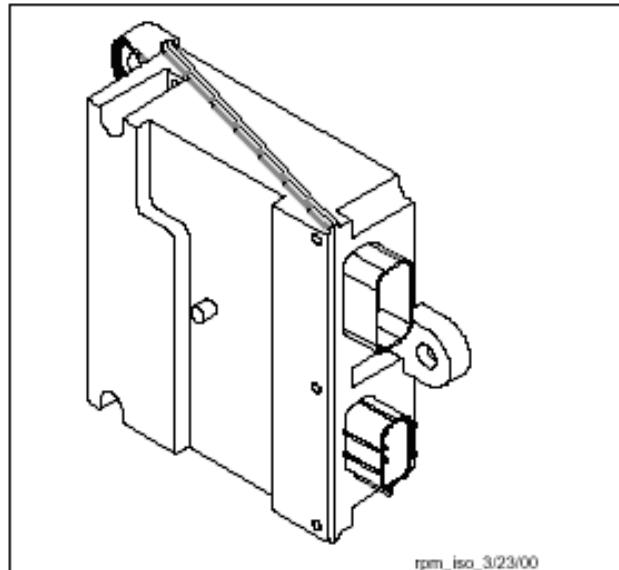
**Table 81**

Parameter Name	ID	Description	Default Settings	Units	Min Value	Max Value	Step
TEM_Aux13_Output_Fuse_Param	2215	This is the maximum current Aux 13 output is allowed to source before the virtual fusing turns the output off.	20	Amps	0	20	0.1

Parameter Name	ID	Description	Default Settings	Units	Min Value	Max Value	Step
TEM_Aux14_Output_Fuse_Param	2216	This is the maximum current Aux 14 output is allowed to source before the virtual fusing turns the output off.	20	Amps	0	20	0.1
TEM_Aux15_Output_Fuse_Param	2217	This is the maximum current Aux 15 output is allowed to source before the virtual fusing turns the output off.	20	Amps	0	20	0.1
TEM_Aux16_Output_Fuse_Param	2218	This is the maximum current Aux 16 output is allowed to source before the virtual fusing turns the output off.	20	Amps	0	20	0.1
TEM_Aux17_Output_Fuse_Param	2219	This is the maximum current Aux 17 output is allowed to source before the virtual fusing turns the output off.	20	Amps	0	20	0.1
TEM_Aux18_Output_Fuse_Param	2220	This is the maximum current Aux 18 output is allowed to source before the virtual fusing turns the output off.	20	Amps	0	20	0.1

### WIRING INFORMATION

Each module receives power from a 4-gauge cable, protected by a fusible link, connected to the battery stud of the starter motor or the battery depending on the location of the RPM.



**Figure 70** Remote Power Module

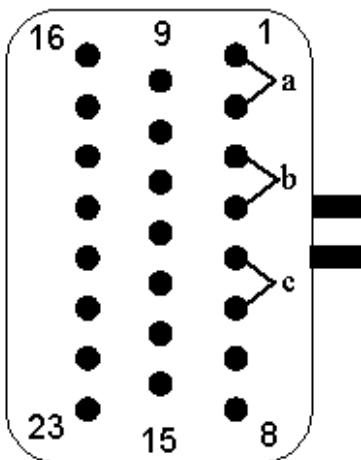
Each generic RPM has the ability to operate up to six devices of 20 AMPS or less not to exceed 80 AMPS for the entire module. Each RPM comes with a 6-pack of switches that is inserted into the center section of the IP. Each generic switch controls one output of the RPM. The switch mapping is one-to-one with the RPM, i.e. switch one controls output channel one on the RPM. The switch pack is connected to the switch data bus that communicates switch operation to the BC, which communicates that operation to the RPM. The RPM also has inputs on the module itself that can be programmed to control the outputs. This means that the RPM functions like a 3-way lamp switch in a home. Each in-cab switch is a momentary rocker switch that is stable in the center position. The upper section of each switch has an indicator light to provide the status of each power output channel. Pressing the upper section of the switch will latch the respective power output channel on and illuminate the indicator. Pressing the lower section of the switch will latch the power output channel off and turn the indicator off. Likewise, the output channels may be controlled remotely by using a three-position momentary single pole, double throw switch on each remote switch input. Applying battery volts to the remote switch input will turn the output channel on. Applying GND to the remote switch input will turn the output channel off. The lamp indicator on the IP switch will always display the current status of the output channel as long as the IGN key is in the IGN or accessory position. Each RPM In-cab switch operates with the key in the IGN or accessory position. The RPM remote input switches operate at any time. If a conflict exists between the switches, the off state always wins.

A maximum of three RPMs may be connected to the vehicle from the factory which allows a total of 18 devices to be controlled as long as the 80 AMPS per module is not exceeded. The modules can be relocated from their mounting position as long as the datalink cable will reach its new mounting location without the datalink cable being modified.

### **Addressing RPMs**

All RPMs require jumpers to tell the system controller what RPM it is controlling. Jumpers are to be installed in a 23-way connector in location J3, shown in the figure below. No two RPMs can have the same address on a vehicle.

J3 23-way Connector

**Addressing RPMs**

All RPMs require jumpers to tell the system controller what RPM it is controlling.

Jumpers are to be installed in a 23-way connector in location J3 shown at the left of this table.

RPM Identifier	RPM Location	Cavity Loc./Wire Color
RPM 1	1 <sup>st</sup> BOC	a Red
RPM 2	2 <sup>nd</sup> BOC	b Green
RPM 4	End of frame	c Blue
RPM 3	TEM aftermarket installation*	a, b Red, Green
RPM 5	TEM aftermarket installation*	a, c Red, Blue
RPM 6	TEM aftermarket installation*	b, c Green, Blue
RPM 7	TEM aftermarket installation	a, b, c Red, Green, Blue

\* Requires Advanced Logic writing capabilities

Figure 71 J3 23-Way Connector

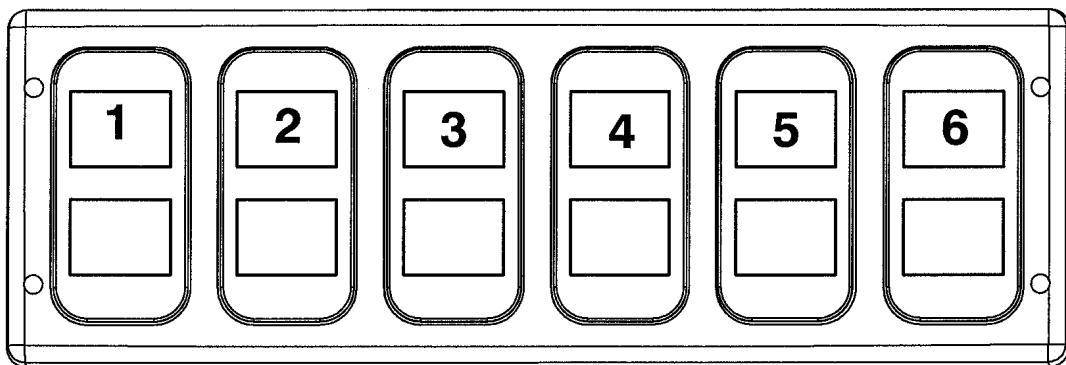


Figure 72 Instrument Panel Mounted Switch Pack

**Switch Labeling:** Switch packs provided with the RPM feature are general purpose “un-labeled” rocker switches. Since the functions of the rocker switches are unknown at the time of vehicle assembly, “un-labeled” rocker switches are provided so the Body Builder can customize the switches to any particular need. For switch graphic information, see the Switches chapter in this electrical guide.

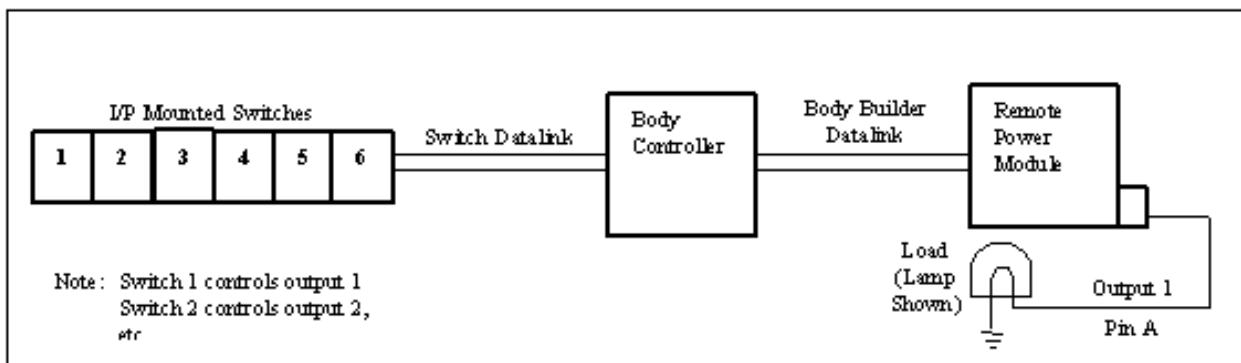


Figure 73 Example with RPM Output Controlled by Switch Inside Cab

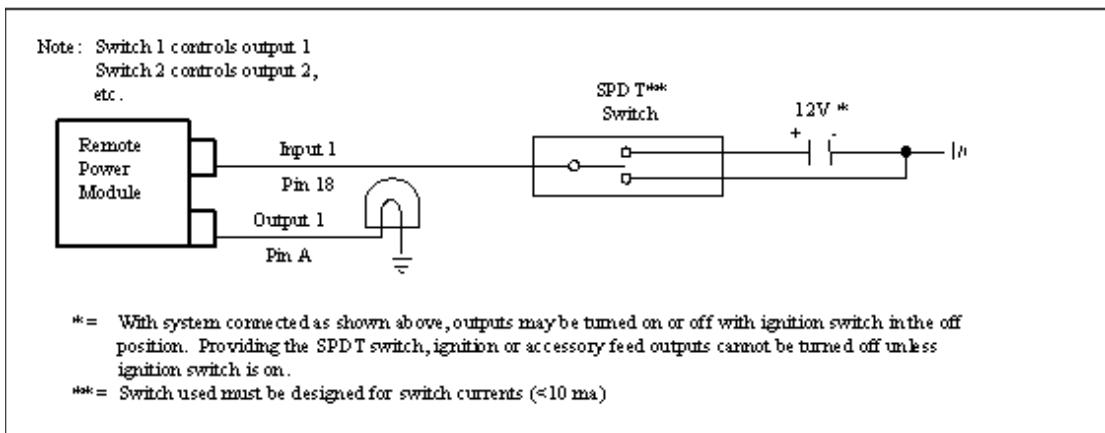
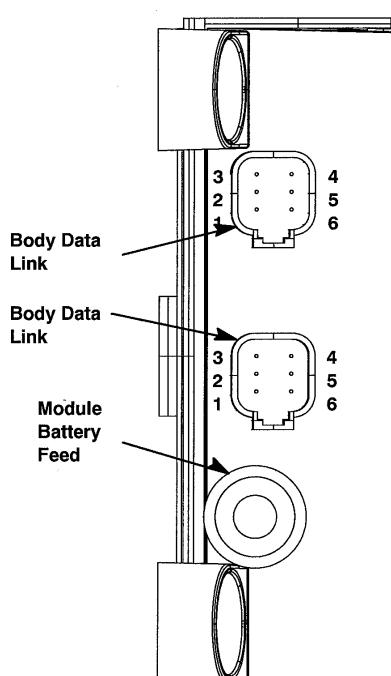


Figure 74 Example with RPM Output Controlled by Switch Located on Chassis

**Table 82**

	Pin	Signal Name	Signal Direction	Rating (Amps)
Body Data Link				
Body Data Link	2	GND	GND/ Pass-Thru	
	3	Body Builder J1939+	Datalink	
	4	Body Builder J1939-	Datalink	
Module Battery Feed	6	Battery	Input/ Pass-Thru	5
Body Datalink				
Body Data Link	2	GND	GND/ Pass-Thru	
	3	Body Builder J1939+	Datalink	
	4	Body Builder J1939-	Datalink	
	6	Battery	Input/ Pass-Thru	5
Module Battery Feed				
	1	Supply Voltage	Input	80
NOTE: Body datalink output is supplied with the mate to this connector which is sealed and includes a 120 ohm terminating resistor.				
NOTE: No additional circuits can be added.				


**Table 83**

Pin	Signal Name	Signal Direction	Rating (Amps)
Signal Connector			
1	Module Select Common	GND	
2	Module Select #1	Digital Input	0.010
3	Module Select Common	GND	
4	Module Select #2	Digital Input	0.010
5	Module Select Common	GND	
6	Module Select #3		0.010
7			
8			
9			
10			
11			
12			
13			

Pin	Signal Name	Signal Direction	Rating (Amps)
14			
15			
16			
17			
18	Input #1	Switch Input	0.010
19	Input #2	Switch Input	0.010
20	Input #3	Switch Input	0.010
21	Input #4	Switch Input	0.010
22	Input #5	Switch Input	0.010
23	Input #6	Switch Input	0.010
Power Connector			
A	Output #1	Output	20
B	Output #2	Output	20
C	Output #3	Output	20
D	Output #4	Output	20
E	Output #5	Output	20
F			
G			
H	Output #6	Output	20

**NOTE – Refer to the Recommended Circuit Protection in the General section when selecting wire gauge and fusing.**

**Table 84 Mating Connector Information**

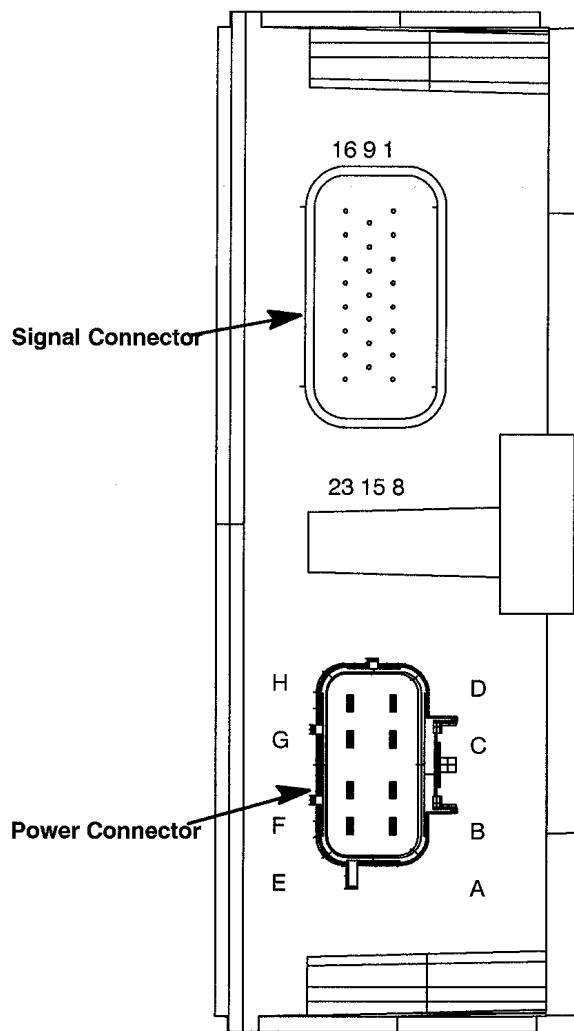
Signal Connector — 23 Way	
Connector	Plug
2005482C1	1688285C1
Terminal	Cable Gauge
1698937C1	16, 18, 20

**Table 85 Mating Connector Information**

Power Connector — 8 Way	
Connector	Lock
3548934C1	3548943C1
Terminal	Cable Gauge
3535930C1	16, 18
3534163C1	12

**Table 85 Mating Connector Information (cont.)**

3535931C1	14
Cable Seal	Cable Gauge
3535936C1	16, 18
3535937C1	14
3548945C1	12
Plug	2025431C1

**Figure 75**

For Switch Product Graphic Label Kit part numbers, see the Switch chapter in this electrical guide.

Here are some facts about the use of the RPM:

- Each RPM provides six outputs. The loads on each output are protected by virtual fuses and are programmable in 100mA (milliAmp) increments, 20 AMP max. per channel, 80 AMP max. per module.
- A maximum of three RPMs per vehicle may be factory-installed, and a total of seven can be added after the vehicle has been built.
- Power is fed to the RPM through a fused link from the battery or starter lug (depending on the vehicle model) that controls lights, mirrors, solenoids, fans, etc.
- If higher current capacity is needed, the RPM can control a high current relay and still maintain logic and diagnostic capability without having to wire to the inside of the cab.
- The RPM outputs may be programmed to be on or off with each key-on cycle (assumes a momentary switch is used in the cab).
- There is an input connector for the Body Builder switches.
  - A 3-way output control may be achieved by using a single pole double throw switch with the RPM inputs. The respective RPM output may be turned on by the in-cab switch and off by the remote switch, and vice versa. The in-cab switch indicator displays the status of the RPM output.
  - The switch input actually goes to the BC so that the program rules can be checked. If all of the rules checkout, the controller will activate the channel. If the preprogrammed logic rules for this circuit are not met, the switch will flash until the desired condition is activated.
  - A 12 volt input will turn a channel on, and a GND input will turn the channel off.
  - If a latching switch is used by the TEM or Body Builder with the remote switch inputs, the channel cannot be controlled by the in-cab switch.
- RPMs have diagnostic capability.
  - As mentioned, the fusing current can be programmed. If that current is exceeded, the circuit will be “fused” and the RPM will send that message to BC indicating which RPM and what output is over current.
  - The RPM has two 6-pin connectors.
- The last module must have a 120-ohm terminating resistor in the datalink connector.
  - All power, GND, and datalink signals are contained in these connectors.
  - The two identical connectors located on the power input side of the module are the datalink connectors. They are pass-thru connectors that allow for the “daisy chaining” of modules. Only one connector plugs into the chassis harness.

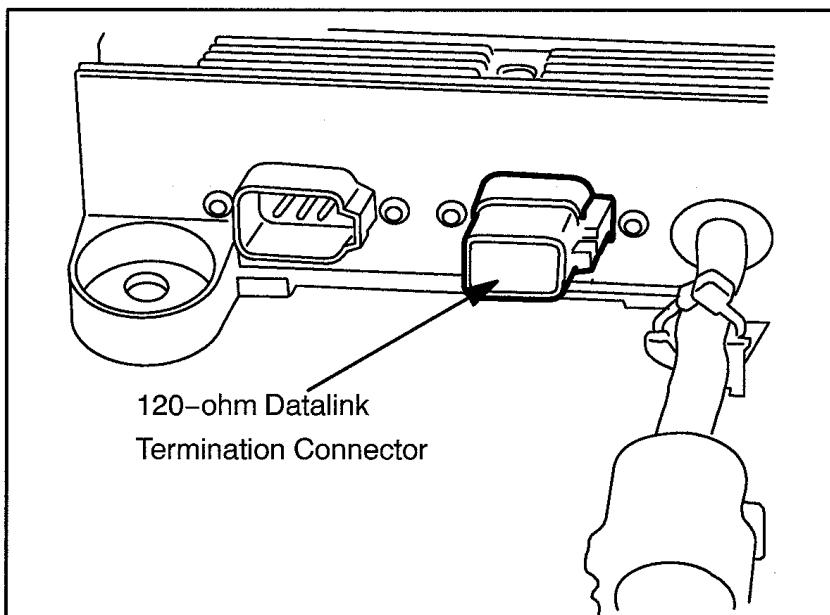


Figure 76 120-ohm Datalink Termination Connector on RPM

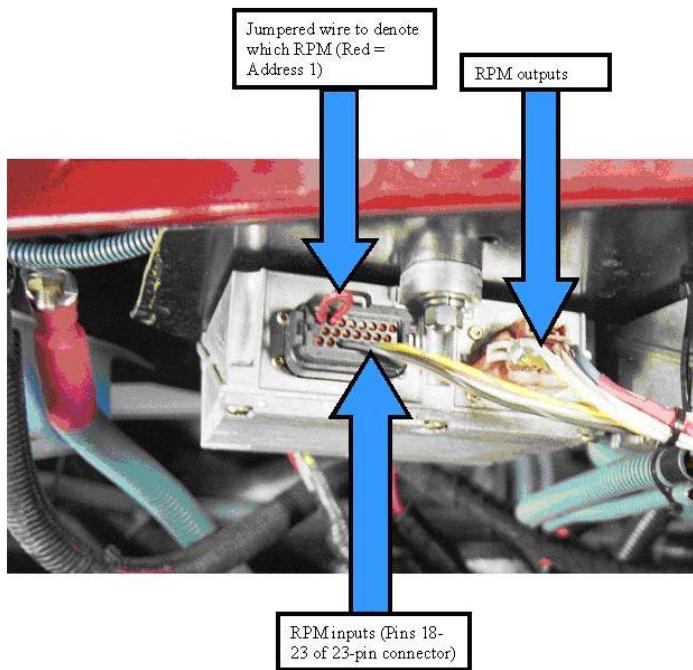


Figure 77 RPM Connectors

**HOW TO ADD THIS FEATURE:**

Three RPMs can be added to a vehicle. The RPM kit 2594132C91 contains the RPM, datalink cables, three foot power cable, 6-pack switch pack, LED indicators for the switches, and six latching switches. If momentary switches are needed, order part number 3564004C1 in the quantity needed.

**Table 86 RPM Kit Contents**

Part	Description	Quantity
2588909C92	KIT, REMOTE POWER MODULE W/JMPR	1
3804529P93	MM, IP, WRG, J1939 PRIVATE RPM	1
3558934C92	HARNESS, CHASSIS WIRING* SINGLE	1
3611349P93	HARN, CTR CHSS. RPU/RPTO BOC DAT	1
MIN10	FUSE 10A (3534209C1)	1
3519178C91	RESISTOR, ELECT TERMINATING	1
3549776C4	HOUSING, SWITCH*6-PACK DIN MULT	1
3578910C1	SWITCH, BLANK RCKR-2 POS BISTAB	6
3578733C1	LIGHT, IND, LED ON-GREEN, BRIGHT	6
3533928C1	LIGHT, IND, LED AMBER BKLGT	6
3552005C4	KIT, LIGHT* PRODUCT GRAPHIC FOR	1
2585423C91	KIT, RPM TERMINAL/SEAL 14GA	1
2585651C91	KIT, RPM TERMINAL/SEAL 12GA	1
2594135R1	MANUAL, INST RMT PWR MOD/BOC	1

This kit is for left-mounted battery box for 4000 models and under cab for 7000 models. If truck has right-mounted battery box, add 3558936C91. If adding two RPMs, use jumper harness 3558937C91 from first to second RPM and add 3558934C92 cable for the battery feed.

If RPM brackets are needed, the following part numbers will need to be ordered.

4000 models: RPM bracket for second BOC RPM – 3558794C1

7000 models (one or two RPMs): Day Cab – 3582976C2, Crew/Extended Cab – 3582983C2

Mounted under driver side of cab for 7000 models

3558794C1 - Mounting Bracket

Mounted under battery box for 4000 models

Attach the mounting bracket to the underside of the vehicle cab on 7000 models (driver's side) and the back of the battery box if a second RPM is mounted on a 4000 series. See figures below.

Attach the RPM to the vehicle-mounting bracket, and securely tighten the fasteners.

Install dash harness and center chassis harness as per the following instructions. The schematic diagram is provided for assistance in the installation.

Wrap the add-on harnesses to respective dash and center chassis harnesses with electrical tape or other harness wrap after the installation. Ensure harnesses are routed away from sharp edges and properly clipped for good wire harness support.

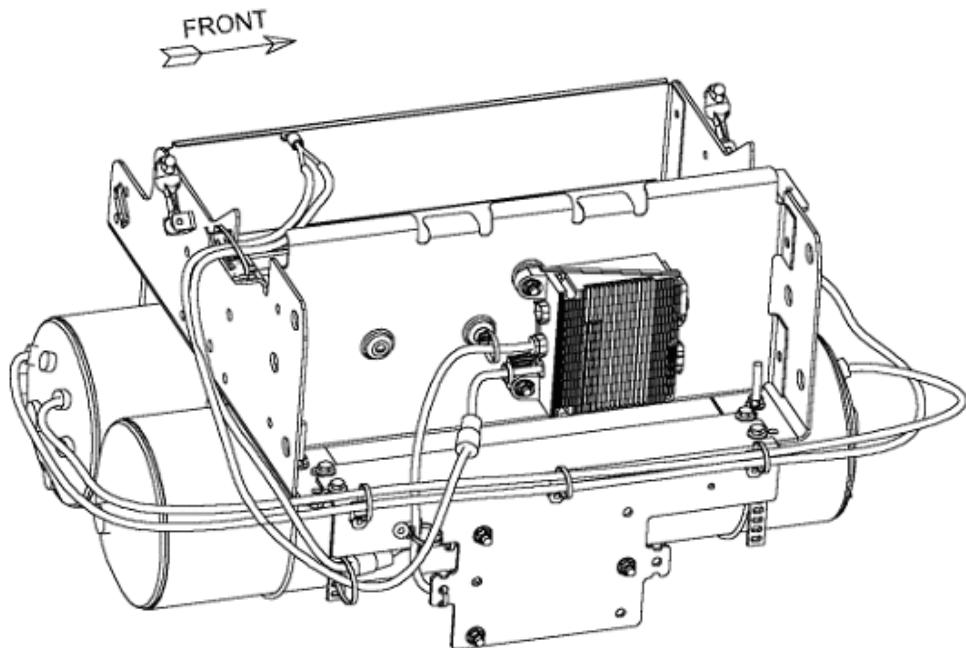
**INSTALLATION INSTRUCTIONS:****In-Cab**

1. Install A5EB (1939 +) {yellow} into the BC (1602) cavity F5
2. Install A5EB (1939 -) {green} into the BC (1602) cavity F6
3. Install A5E (1939 +) {yellow} into the IP center chassis (1701) cavity 52
4. Install A5E (1939 -) {green} into the IP center chassis (1701) cavity 53
5. Insert A20 {lt green} into the fuse panel (1017) cavity E3.
6. Insert a 10 AMP fuse in cavity F3-E3 in the fuse panel (1017).

**Engine Compartment**

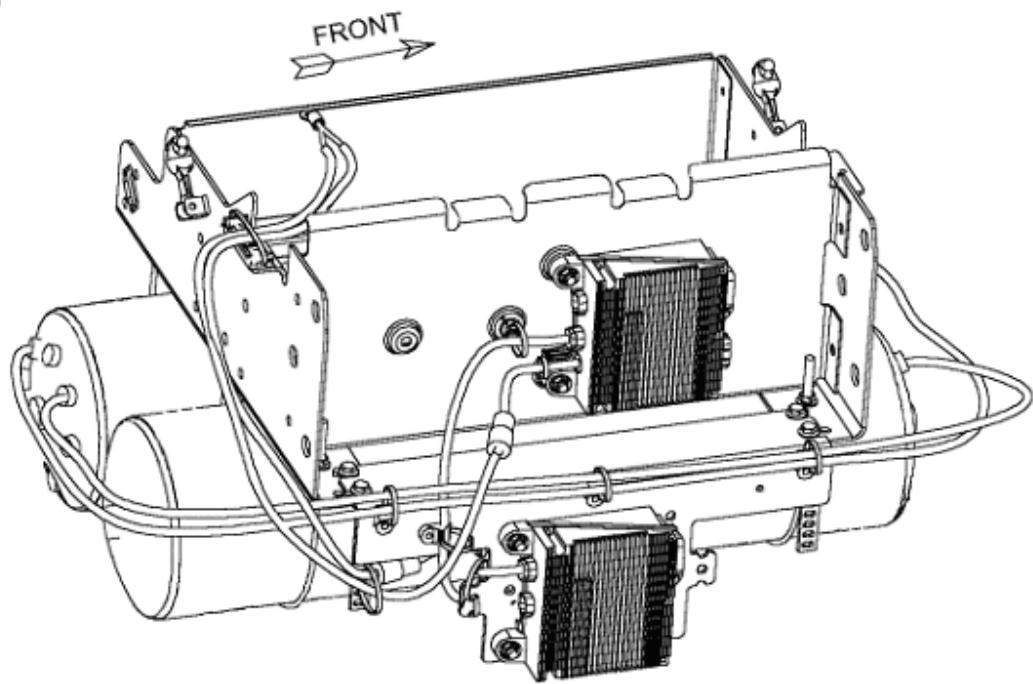
1. Install A5E (1939 +) {yellow} into the IP center chassis (1701) cavity 52
2. Install A5E (1939 -) {green} into the IP center chassis (1701) cavity 53
3. Insert A20 {lt green} into the IP center chassis (1701) cavity 51
4. Install N10-GR {white} into splice pack (8809) cavity C

Install a terminating resistor in the open connector in the cab, and install a terminating resistor in the last module in the datalink.

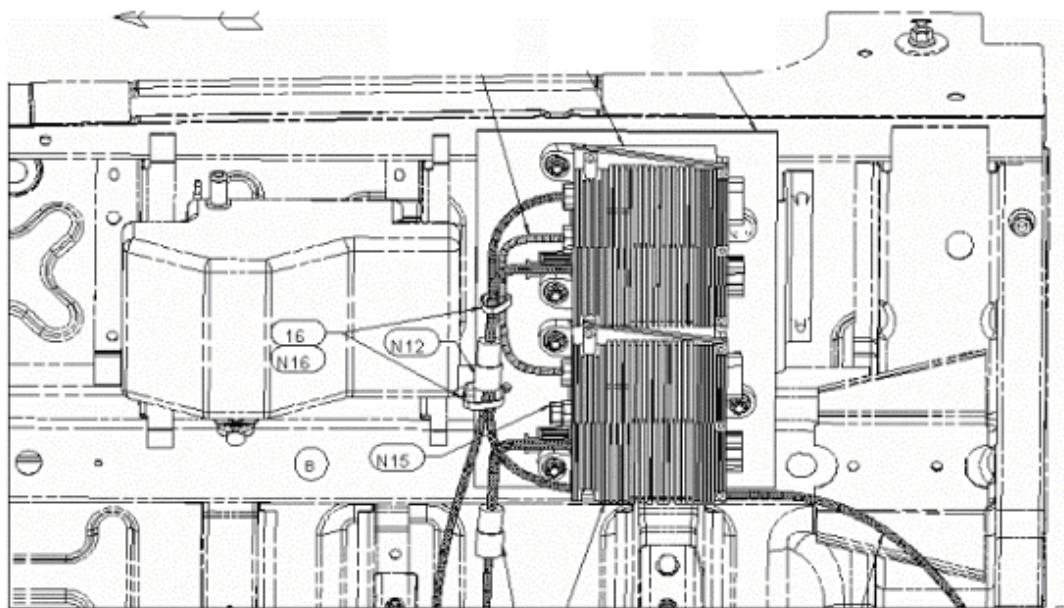


4000 Single RPM

**Figure 78 4000 Single RPM**



**Figure 79** 4000 with 2 RPMs



**Figure 80** 7000 Models Under Cab Mounting

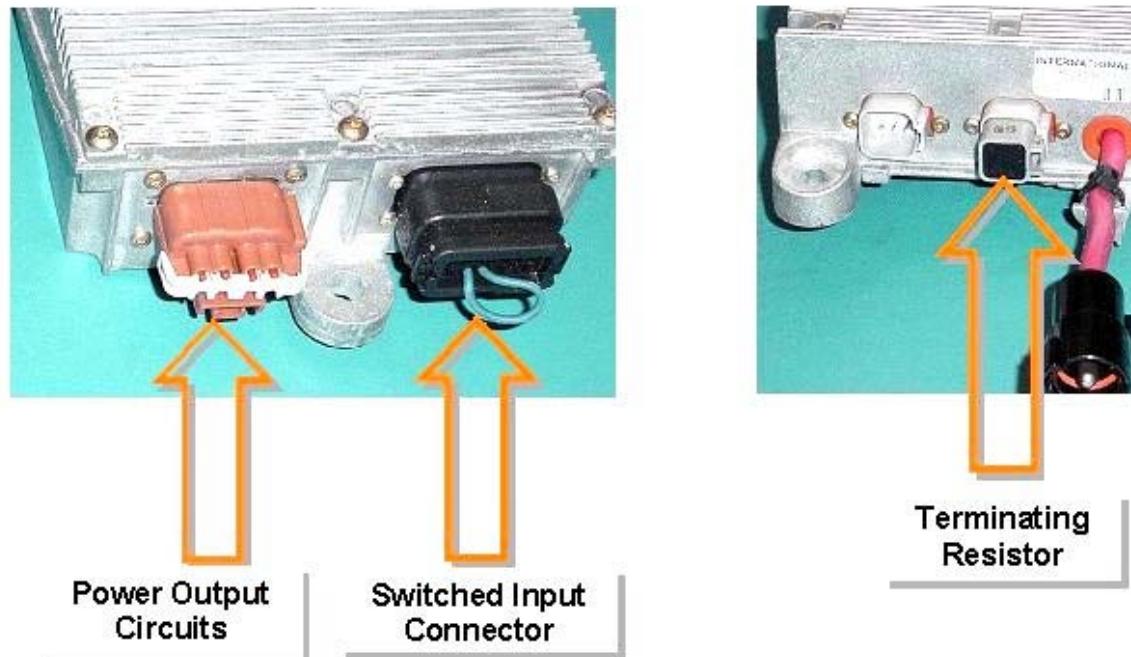


Figure 81

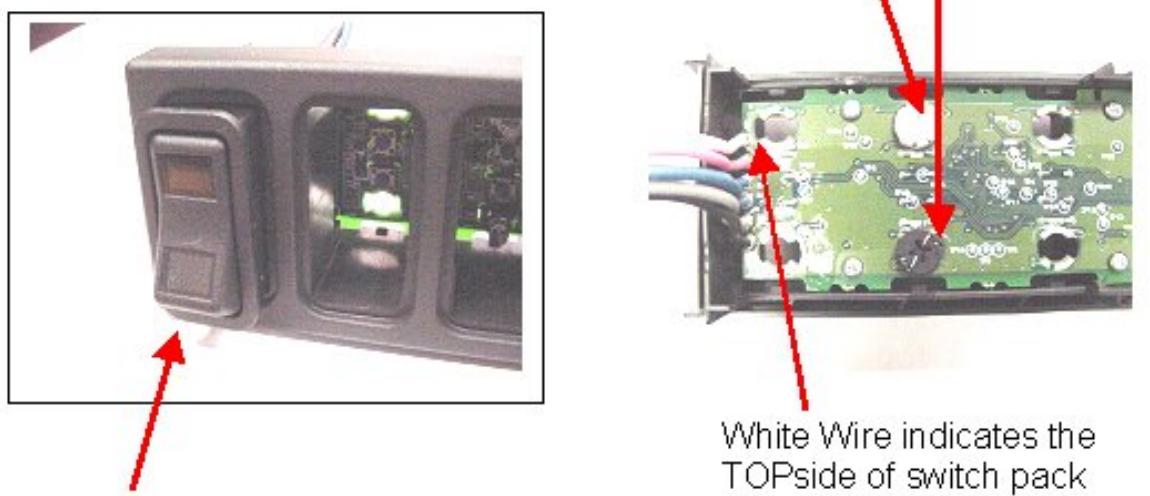
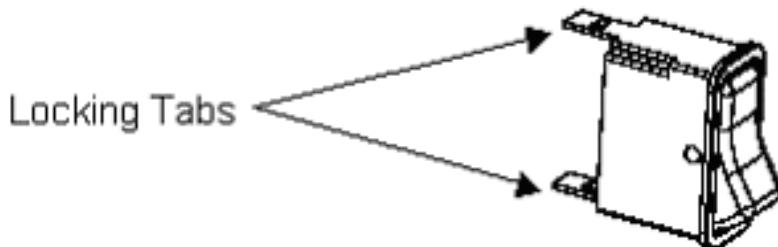
**Installation of Switch Packs and LEDs**

Figure 82

To install a switch in the switch pack housing, insert the switch in the proper slot and push in until the switch locking tabs are fully engaged (switches are keyed and cannot be installed upside down).



**Figure 83**

Remove the rear cover of the switch pack. It is attached with a snap fit. See the attached pictures to determine which end is up on the switch pack. Install the LED lamps with the white base (part number 3578733C1) in the upper section of each switch on the switch pack housing. These are the indication of on lamps and will glow green when activated. Note that the LED lamps have a keying feature as they are installed in the switch pack circuit board. If the lamps are forced in against the proper orientation, they will not illuminate.

Install the LED lamps with the black base (part number 3533928C1) in the lower section of each switch on the switch pack housing. These are the back light lamps and will glow amber when the panel lights are on. Reattach the rear cover and secure the wire harnesses under the cover hooks.

Locate a free switch pack opening in the central IP.

If no switch packs are present in the vehicle, remove the switch blank below the radio space and locate the 6-pin cab harness for the switch packs. Connect the cab switch harness to the left side switch pack harness (as viewed from the front). Connectors are keyed to ensure proper connection. Ensure that the switch pack is installed in the proper orientation. The green indication of on lamps must be on top when viewing the front of the switch pack.

If one 6-switch pack is already present, locate the new switch pack in the lower left switch pack area.

Connect the second harness of the first switch pack to the input cable harness of the second switch pack.

Install the second switch pack into center IP. It is secured with a snap action.

Determine the function of each of the newly added rocker switches. Locate the set of switch labels in the parts kit. Place the labels named "on" in the upper section of each windowed rocker switch. Place the switch name in the lower portion of the rocker switch.



Figure 84

If an additional switch pack is being installed, it is connected to the multiplex system by “daisy chaining” its connectors to the existing switch pack (or to the cab harness if no switch pack is currently installed). It is important to connect the switch packs in the correct order. Connecting the switch packs together and to the cab harness in the wrong order will cause switch pack addressing problems.

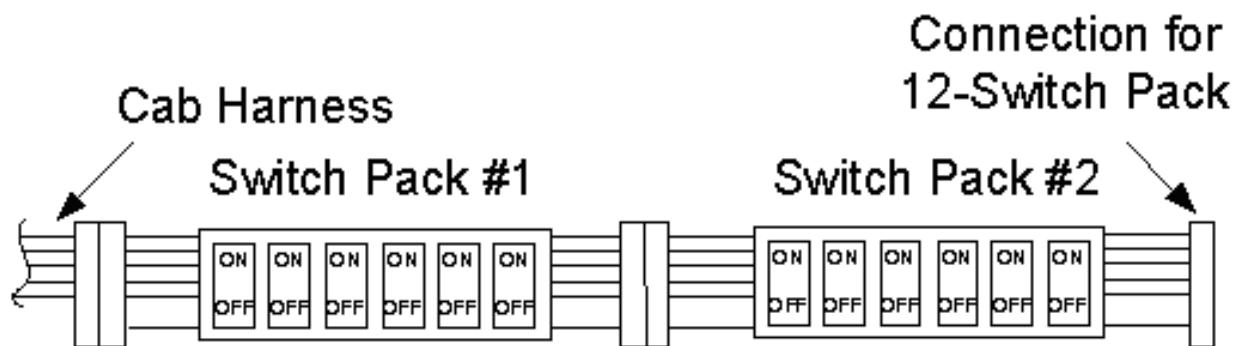
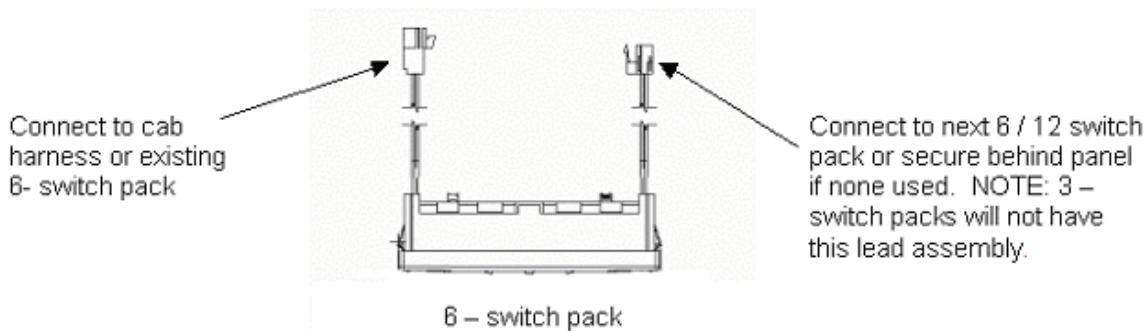


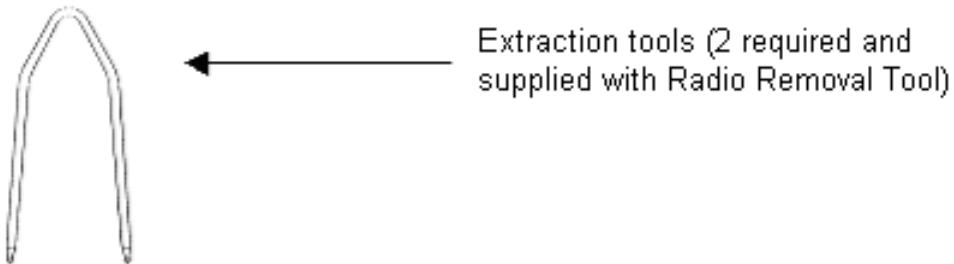
Figure 85



**Figure 86**

**Removal/Replacement of Switches and Switch Packs**

To remove a switch pack from the panel use the DIN radio removal tool part number 2504954C1.



**Figure 87**

Insert the extraction tools (2) into the two holes on either side of a switch pack housing until the locking tabs are fully depressed. The switch pack can then be removed from the panel and the extraction tools removed.



**Figure 88**

To remove individual switches or blanks from a switch pack, squeeze the locking tabs on the rear of the switch or blank (top and bottom) and push it from the housing.

To install a switch pack in the panel, make the necessary connections then simply push the assembly into place until the locking tabs are fully engaged.

**NOTE – The switch pack can be inadvertently installed upside down. To avoid this when no switches are present in the housing, make sure the white wire in the lead assemblies on the rear of the housing is towards the top.**

#### **Programming The System**

The RPM and switch pack system is now installed.

The electrical system must now be programmed to recognize these new components.

With the Diamond Logic® Builder software program, enable the appropriate 595xxx software feature codes from the beginning of this section.

The system may also be programmed at the nearest International dealer. Contact the dealer for details on purchasing either of these programs.

When other body integration features are used, please refer to the body integration feature section for further directions on installing these features.

#### **TESTING 08WSK, 08WSM, 08SAJ, or 08WTJ (one-to-one mapping):**

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.

If any RPM outputs have been programmed to turn on automatically when the key is turned on, (see programmable parameters) then turn the key to the on position and verify that those outputs are providing battery voltage.

**TESTING 60AAA or 60AAB:**

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.

Continue the above testing procedure for each RPM switch location.

## 19.2. 08WTJ — SWITCH BODY CIRCUITS FRAME MTG REAR

### FEATURE CODE DESCRIPTION:

**08WTJ** — SWITCH, BODY CIRCUITS, REAR for Bodybuilder with 6 switches in instrument panel (2-position switches), one power module with 6 channels, 20 amp per channel and 80 amp maximum output. Switches control the power modules through multiplex wiring, mounted at the rear of the frame.

### FEATURE/BODY FUNCTION:

Feature 08WTJ adds 1 RPM to the end of the frame to be used by itself or in combination with 60AAA (1 RPM BOC) or 60AAB (2 RPMs BOC). The Remote Power Module will have 6 channels, 20A per channel, and 80A maximum output. There will be 6, 2-position, switches located in the Instrument Panel, that will control the RPM through multiplex wiring.

### SOFTWARE FEATURE CODES AND PROGRAMMABLE PARAMETERS:

Required software feature code: 595282

Conflicts with Software features: NONE

**Table 87**

Parameter Name	ID	Description	Default Settings	Units	Min Value	Max Value	Step
TEM_Aux13_Output_Fuse_Param	PV-TEM-Aux-13	Default setting for TEM_Aux13_Output_Fuse Param	20	Amps	0	20	0.1
TEM_Aux14_Output_Fuse_Param	PV-TEM-Aux-14	Default setting for TEM_Aux14_Output_Fuse Param	20	Amps	0	20	0.1
TEM_Aux15_Output_Fuse_Param	PV-TEM-Aux-15	Default setting for TEM_Aux15_Output_Fuse Param	20	Amps	0	20	0.1
TEM_Aux16_Output_Fuse_Param	PV-TEM-Aux-16	Default setting for TEM_Aux16_Output_Fuse Param	20	Amps	0	20	0.1
TEM_Aux17_Output_Fuse_Param	PV-TEM-Aux-17	Default setting for TEM_Aux17_Output_Fuse Param	20	Amps	0	20	0.1
TEM_Aux18_Output_Fuse_Param	PV-TEM-Aux-18	Default setting for TEM_Aux18_Output_Fuse Param	20	Amps	0	20	0.1

### WIRING INFORMATION

Refer to current remote power module.

**TESTING**

Refer to current remote power module.

**HOW TO ADD THIS FEATURE:**

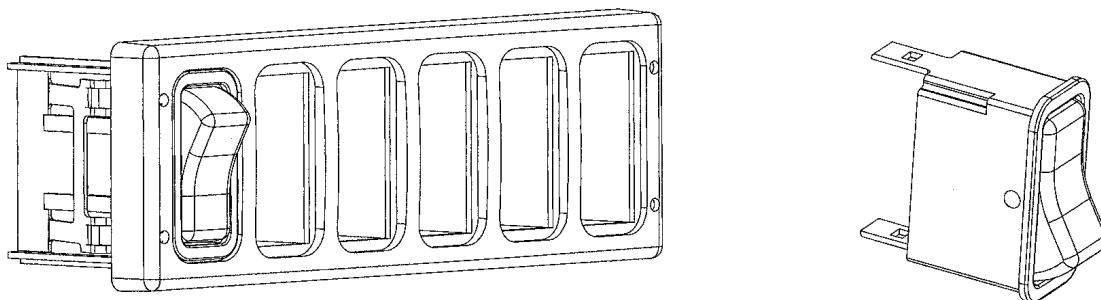
- Select software feature code 595282 using ICAP or the Diamond Logic™ Builder software (See Local Dealer)
- Programmable Parameters must be set using ICAP or the Diamond Logic™ Builder software (See Local Dealer)
- Refer to current remote power module for further installation instructions.

Listed below is a listing of parts that may be required depending on how the vehicle was equipped at the factory.

**Table 88**

Part Number	Description
3595804F91	Consists of the following:
6 of 3533928C1	Light, Indicator, LED backlight (Amber)
6 of 3578733C1	Light, Indicator, LED on (Green) 1.0 CAN
6 of 3578910C1	Switch, Electronic, Blank Rocker — 2 POS

## 20. SWITCHES AND SWITCH LABEL PART NUMBERS AND INFORMATION



**Figure 89**

Most switches are rocker actuators that do not require hard wiring. See the Switch Actuators for Multiplex Systems Table below. The switches are used in switch pack modules (6 or 12 switches) that connect to the multiplex system through the switch housing cable harnesses. Push button switches for the cluster are also available. See Push Buttons Table below.

If the original vehicle has a three switch pack with only one or two switch locations full, adding another switch is acceptable. Once three switch locations are full, adding more would require the purchase of a six switch pack. To identify a 3 or 6-pack, remove the switch pack from the center console using the radio removal tool. A 3-pack has wires on the left side only; a 6-pack has wires on the left and right side.

In the Switch Actuator Table below, the first column references the part numbers of the new replacement switch, and columns 2 and 3 are the replacement LED's part numbers. Column 4 is the switch description. Columns 5, 6, and 7 describe the switch functions. Position Number reflects the number of positions where the switch can physically be placed. Position On denotes the position of the switch for activation. Switch Action indicates whether the switch is momentary (spring-loaded, switch returns to a specific state) or if the switch is latching (switch stays in the selected state).

**NOTE – Switches are no longer packaged with LEDs (Light Emitting Diodes). LEDs must be ordered separately. Refer to the Table below to locate the proper LED part numbers. Each switch usually requires two LEDs that are installed from the rear side of the switch pack assembly (see the Switches section). If the switch has an on indicator, a green LED will be located in the upper portion. An amber LED is required in the lower portion providing for nighttime viewing. If a switch does not contain an on indicator, then an amber LED should be installed in the upper as well as the lower section.**

### 20.1. SWITCH ACTUATORS FOR MULTIPLEX SYSTEM

LED part numbers:

3578733C1 (green) = 1 3533928C1 (amber) = 2 \* = User may use any LED color they see fit.

**Table 89 Switch Actuators for Multiplex System**

1	2	3	4	5	6	7
New Part Number	Indicator LED	Back Light LED	Description	Position Number	Position On	Switch Action
3563061C1	2	2	Head Light Switch	3	Mid/ Up	Latching

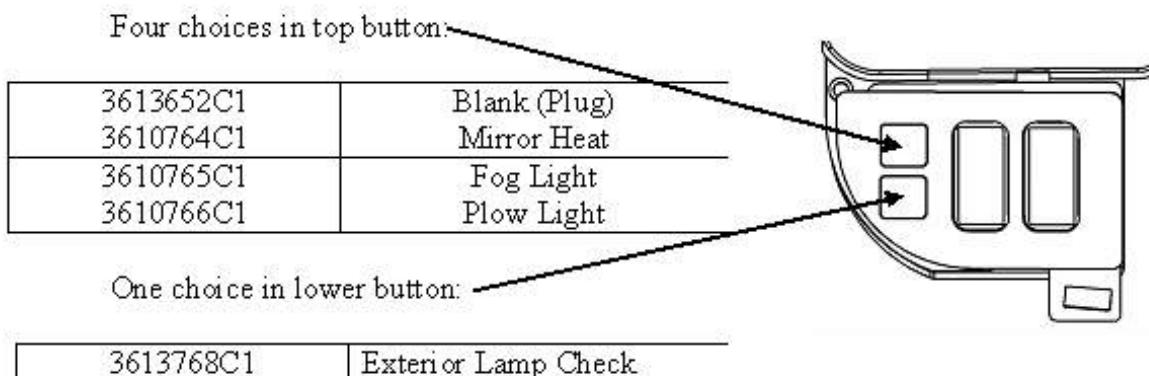
**Table 89 Switch Actuators for Multiplex System (cont.)**

1	2	3	4	5	6	7
New Part Number	Indicator LED	Back Light LED	Description	Position Number	Position On	Switch Action
3560046C1	1	2	Engine Compression Brake On/ Off	2	Up	Latching
3560047C1	2	2	Engine Compression Brake Selector	3	All	Latching
3560048C1	1	2	Fan Override	2	Up	Latching
3560659C1	1	2	Transfer Case Hi/Neut/Low	3	All	Latching
3560961C1	1	2	Blower Road Switch	2	Up/ Down	Latching
3561702C1	1	2	Auxiliary Transmission	3	All	Latching
3563062C1			Dimmer Switch	2	Up/ Down	Momentary
3563063C1	1	2	Work Light Switch	2	Up/ Down	Latching
3563064C1	1	2	Fog Light Switch	2	Up	Latching
3563065C1	1	2	Exhaust Brake Switch	2	Up	Latching
3563066C1	1	2	Plow Light Switch	2	Up	Latching
3563068C1		2	2 Speed Axle Hi/ Low	2	Up/ Hi	Latching
3563069C1	1	2	Front Axle Switch	2	Up	Latching
3563070C1		2	Marker Interrupt	2	Down	Momentary
3563072C1	1	2	Auto Neutral Switch	2	Up	Latching
3563073C1	1	2	Power Divider Lock	2	Up	Latching
3563074C1	1	2	Diff Lock	2	Up	Latching
3563075C1	1	2	Air Suspension Dump	2	Up	Latching
3563076C1	1	2	5th Wheel Slide	2	Up	Momentary
3563079C1	1	2	PTO On/ Off	2	Up	Latching
3563080C1	1	2	Air Assist	2	Up	Momentary
3563111C1		2	Transfer Case Hi/ Low	2	Up/ Hi	Latching
3563113C1		2	Wet Tank Drain	2	Up	Momentary
3563114C1		2	Primary Tank Drain	2	Up	Momentary
3582129C1	1	2	Mirror Heat	3	Up	Momentary
3587551C1	1	2	PTO, Xfer Case	2	Up	Latching
3593177C1	1	2	Lift Gate	3	Up	Momentary
3597367C1	1	2	Forward Rear Differential Lock	2	Up	Latching
3597368C1	1	2	Rear-Rear Differential Lock	2	Up	Latching

**Table 89 Switch Actuators for Multiplex System (cont.)**

1	2	3	4	5	6	7
New Part Number	Indicator LED	Back Light LED	Description	Position Number	Position On	Switch Action
3598282C1	1	2	Eng Spd	2	Up	Latching
3606678C1	1	2	120VAC	3	Up	Momentary
3621122C1	1	2	Traction Control Mud/Snow	2	Up	Latching
3622543C1	1	2	Traction Control Off Road	2	Up	Latching
3809914C1	1	2	Parked Regen	3	Up	Momentary
3813770C1	1	2	Engine Brake On/ Variable/ Off	3	Up/Mid	Latching
3564004C1	1	2	*Window Rocker Blank (3 Position)	3	Up	Momentary
3578910C1	1	2	*Window Rocker Blank (2 Position)	2	Up	Latching
3579027C1	1	2	*Window Rocker Blank (2 Position)	2	Up	Momentary
2589880C91	*	2	Blue Rocker Blank (2-Position)	2	Up	Latching
2589590C91	*	2	Red Rocker Blank (2-Position)	2	Up	Latching
2589883C91	*	2	Yellow Rocker Blank (2-Position)	2	Up	Latching
2589881C91	*	2	Orange Rocker Blank (2-Position)	2	Up	Latching
2589882C91	*	2	White Rocker Blank (2-Position)	2	Up	Latching
3533950C1			Plug, Filler Switch Blank for 6/12 packs			
2585638C1	1	2	Switch, Rocker Blank	3	ALL	Latching
NOTE - Blank switches have two clear square windows on them and require a stick-on graphic to identify function and allow for custom switches. The graphic labels can be purchased under part numbers in the Switch Graphic Label Kits Table below.						
*These blank switches are normally to be used with Remote Power Modules (RPMs) or advanced logic functions.						

### Push Buttons — Left Side of Cluster Table



**Table 90 Warning Lights**

Part Number	Description
3587032C1	Green Indicator Housing Less LED
3596344C1	Green 3 Candle Power LED
3587033C1	Amber Indicator Housing Less LED
3587034C1	Amber 3 Candle Power LED
3587024C1	Red Indicator Housing Less LED
3587031C1	Red 3 Candle Power LED



Green Housing



Amber Housing

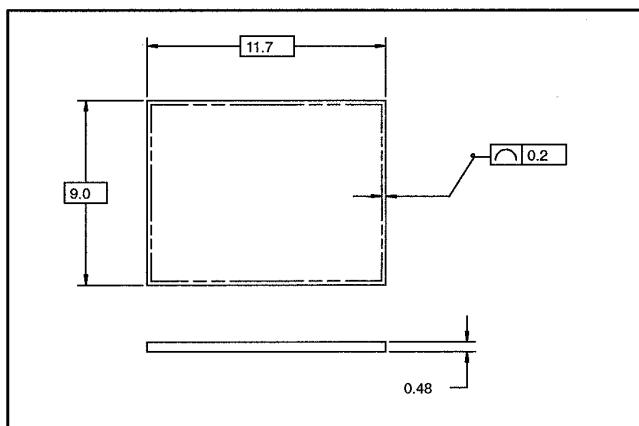


Red Housing

### **SWITCH PACK AND RPM SWITCH LABEL GRAPHICS:**

A package of the first five switch label sheets is provided for usage by the Body Builder to finish the labeling of the switches. There are also seven additional sheets at this time with more labels available from International (see the Switch section of this manual for a list of all labels offered from International). If the Body Builder requires a label name not already provided by International, a custom label may be designed by following the specification of the switch label appliqué drawing below. Supply of custom labels is the responsibility of the Body Builder.

**Switch Labeling:** Switch packs provided with the RPM feature are general purpose "un-labeled" rocker switches. Since the functions of the rocker switches are unknown at the time of vehicle assembly, "un-labeled" rocker switches are provided so the Body Builder can customize the switches to any particular need.



**Figure 92 Switch Label Dimensions in Millimeters**

The supplier for the windowed rocker labels is:

Dura-Tech  
3216 Commerce  
St. LaCrosse, Wisconsin 54603  
Telephone: 608-781-2570  
Web site: duratech.com

When contacting Dura-Tech, instruct them to create the labels in the same format and style as the International sheets to ensure product consistency and the factory fit and finish that is achieved by using the International graphics.

**Table 91 Legend:**

Sheet	Kit Part No.	First label in the upper left column (to help identify each sheet)
Sheet 1-5	3552005C4	1 – LEFT ALLEY 2 – MANGR CANCEL 3 – AUX 1 4 – ON 5 – RAISE BED
Sheet 6	2588422C1	SELF TEST

**Table 91 Legend: (cont.)**

Sheet	Kit Part No.	First label in the upper left column (to help identify each sheet)
Sheet 7	2589327C1	LEFT COT
Sheet 8	2590999C1	NIGHT STROBE
Sheet 9	2591000C1	HYD FILTER
Sheet 10	2593674C1	TANK 1 OPEN
Sheet 11	2593676C1	DOOR
Sheet 12	2593677C1	ESTOP

3552005C4 Sheet 1						3552005C4 Sheet 2					
LEFT ALLEY	PASS ALLEY	LEFT SCENE	LEFT WARN	LEFT FLOOD	OPTI COM	MANGR CANCEL	WIG WAG	PTO	OXYGEN	CODE AMBER	SIREN
RIGHT ALLEY	DRIVER ALLEY	RIGHT SCENE	RIGHT WARN	RIGHT FLOOD	COMPT LIGHT	LOAD MANGR	ROTO LIGHT	PTO GEN	OXYGEN LIGHT	CODE GREEN	SIREN HORN
REAR ALLEY	ROOF LIGHT	REAR SCENE	SIDE WARN	REAR FLOOD	BIN LIGHT	TRUCK	BEACON LIGHT	PTO PUMP	EXHST FAN	CODE RED	ELECT HORN
STROBE BAR	LIGHT BAR	STEP LIGHT	UPPER WARN	UPPER WORK	REAR LIGHT	MACHINE	LIGHT BOARD	GEN RUN	FAN LOW	CODE BLUE	SIREN BRAKE
PRIMARY WARN	STROBE LIGHT	DECK LIGHT	LOWER WARN	LOWER WORK	FLORES LIGHT	AIR COMPR	REAR FLASHR	AUX PTO	FAN HIGH	PUMP & ROLL	PUMP ENG'D
SECND WARN	REAR STROBE	FRONT FLASH	FRONT WARN	WORK LIGHT	DOME LIGHT	BRAKE LOCK	PUMP PANEL	MASTER THROTL	DO NOT MOVE	110 V INVT	OK TO HI IDLE
INT SEC LIGHTS	FRONT STROBE	STEP LT CANCEL	REAR WARN	FRONT LIGHT	MAP LIGHT	FLOOD LIGHT	DRIVE LIGHT	EMERG MASTER	AUX WARN	BACKUP LIGHT	OK TO PUMP
CAB ROTO	CAB STROBE	GROUND LIGHT	CLEAR WARN	PERM LIGHT	CARGO LIGHT	SPREDR LIGHT	LOW VOLTS	MASTER	DOOR OPEN	AIR HORN	CITY HORN
3552005C4 Sheet 3						3552005C4 Sheet 4					
AUX 1	PLOW LIGHT	OPEN GATE	CAMERA LIGHT	TRAP LIGHT	ELECT SUCTN	ON	ON	ON	LOCK DOOR	HIGH	
AUX 2	AXLE 1 UP	LIFT GATE	PUMP	HIGH IDLE	CHECK ELEC	ON	ON	ON	UNLOCK DOOR	LOW	
AUX 3	AXLE 1 DOWN	RAISE BOX	BOX UP	BACK ALARM	XFER CASE	ON	ON	ON	12 VOLT OUTLET	METEOR LIGHT	
PLOW DOWN	AXLE 2 UP	LOWER BOX	SHAKER	LEFT WMNG	WINCH	ON	ON	ON	HOPPER LIGHT	ALLEY	
PLOW UP	AXLE 2 DOWN	TARP MIND	BLOWER	RIGHT WMNG	OUTRIG DOWN	ON	ON	ON	FAN	OIL LEVEL	
SANDER ROTO	TAG UP	TARP UNMIND	DRAIN VALVE	SPARE	OUTRIG UP	ON	ON	ON	ESPAR HEAT	CRANE	
SANDER	TAG DOWN	EMERG PANIC	FILL VALVE	SPARE	CONVEYOR	ON	ON	ON	A/C	SPOT LIGHT	
BOOM	BOOM UP	BOOM DOWN	BOOM LEFT	BOOM RIGHT	BOOM STOW	ON	ON	ON	A/C HEAT	HIGH RAIL	

Figure 93 Label Sheets 1, 2, 3, 4

3552005C4 Sheet 5						2588422C1 Sheet 6					
RAISE BED	UP	RIGHT FRONT	COLOR LIGHTS	FLOOR HEATER	BATT SAVE	SELF TEST	SIDE GATE	LF DUMP OPEN	MIXER	FT LF ARM UP	FLOW1 OPEN
LOWER BED	DOWN	LEFT FRONT	NEON LIGHTS	FLOOR LIGHTS	TV MONITOR	CAB BACKUP	REAR GATE	LF DUMP CLOSE	LF WEED SEEKER	FT LF ARM DN	FLOW1 CLOSE
BED UP	OPEN DOOR	RIGHT REAR	BAR LIGHTS	FRONT A/C	TANK EMPTY	CRANE LIGHT	REEL GATE	RT DUMP OPEN	RT WEED SEEKER	FT RT ARM UP	FLOW2 OPEN
REAR ALERT	CLOSE DOOR	LEFT REAR	LASER LIGHTS	REAR A/C	HIGH	LEFT COMPT	WHEEL CHOCK	RT DUMP CLOSE	GPM FLOW	FT RT ARM DN	FLOW2 CLOSE
GATE OPEN	WATER PUMP	LEFT CENTER	DIVIDER UP	LIFT	LOW	RIGHT COMPT	EMERG STOP	RR DUMP OPEN	AUTO CHAINS	RR LF ARM UP	STOP
BOOM NSTOW	CABIN LIGHTS	RIGHT CENTER	DIVIDER DOWN	LOWER	VAN UP	HYD OIL LOW	AUX ENGINE	RR DUMP CLOSE	PTO OVRIDE	RR LF ARM DN	START
OUTRIG NSTOW	POWER	FRONT CENTER	REAR CAMERA	WHEEL CHAIR	VAN DOWN	HYD OIL HI TEMP	PA POWER	LEFT EVAC	OK TO THROTL	RR RT ARM UP	PLOW LEFT
ALT FLASH	LIFT GATE	REAR CENTER	COOL	HEAT	SPREDR	FILTER BYPASS	PUMP ONE	PUMP TWO	ROAD MODE	RR RT ARM DN	PLOW RIGHT
2589327C1 Sheet 7											
LEFT COT	SUSP RAISE	START GEN	STOP GEN	DEAD MN SWITCH	HI THROTL	NIGHT STROBE	CRANE UP	CHUTES UP	HOPPER UP	DRUM DISCHRG	T-GATE DOWN
RIGHT COT	SUSP DUMP	B LOAD GATE	HOSE LIGHTS	HIGH WATER	LOW THROTL	LEFT DOOR	CRANE DOWN	CHUTES DOWN	HOPPER DOWN	DRUM START	WINTER SUMMER
NOT LEVEL	REAR COMPT	PTO 2	RAISE IDLE	U WING NOZZLE	WING LIGHTS	RIGHT DOOR	CRANE LEFT	LADDER	PUSHER UP	DRUM STOP	WINTER
STEP HEATER	DEFROST FAN	AMB POWER	LOWER IDLE	FRT OW NOZZLE	LADDER NSTOW	RADIO REMOTE	CRANE RIGHT	CHUTES	PUSHER DOWN	MID START	WINTER
BELLY VALVE	VAPOR VALVE	SIDE EVAC	SPRAY FILL	RR OW NOZZLE	DUMP POWER	NO DATA LOGGED	CRANE EXTEND	HOPPER	TRAILER ACTIVE	EXTEND	SUMMER
WINCH IN	WINCH OUT	LADDER RACK	LADDER PTO	BOTTOM LOAD	FRONT SCENE	HYD ENABLE	CRANE RETRACT	REMOTE OVRIDE	MID STOP	RETRACT	VACUUM
CLOSE GATE	CLEAR LIGHTS	TOWER POWER	LIGHT TOWER	DEFUEL VALVE	120VAC POWER	MESSG WAIT	HOOK UP	CHUTES LOCK	MID START	TAIL GATE	HYD SHUTDN
REAR CHUTE	LEFT CHUTE	RIGHT CHUTE	BRAKE INTLCK	BRK INT OVRIDE	BATTERY ON	WATER	HOOK DOWN	CHUTES UNLOCK	DRUM CHRG	T-GATE UP	HYD OVRIDE

Figure 94 Label Sheets 5, 6, 7, 8

2591000C1 Sheet 9						2593674C1 Sheet 10					
HYD FILTER	BOOST OPERATE	SHRED POWER	IN REVERSE	ARROW RIGHT	ARROW LEFT	TANK 1 OPEN	TANK 5 OPEN	PTO GAS	REAR DELVRY	TOWER UP	LEFT SPRAY
BODY OVRHT	CRUISE	CHARGE PSI LOW	OPEN	ARROW BOARD	CHASER FLASH	TANK 1 CLOSED	TANK 5 CLOSED	PTO DIESEL	SENSOR POWER	TOWER DOWN	RIGHT SPRAY
BOOST UP	POWER WINDOW	BODY N/STOW	CLOSE	ALLEY LIGHTS	SLOW FLASH	TANK 2 OPEN	TANK 6 OPEN	PTO STREET	PUMP HI	LADDER UP	PRES-SURE
BOOST DOWN	LOCK WINDOW	TANK HEAT	CHECK HYBRID	WIGWAG FLASH	TIRE PRES	TANK 2 CLOSED	TANK 6 CLOSED	PTO CURB	PUMP LO	LADDER DOWN	VOLUME
GATE UP	UNLOCK WINDOW	FLOOR UNLOAD	STOP HYBRID	REFER TEMP	LOCK	TANK 3 OPEN	TANK 7 OPEN	TANK VENTS	METER POWER	LADDER LIGHTS	TRAFFC CNTRL
GATE DOWN	OPEN WINDOW	HIGH PRES	REAR CNTRL	REFER FUEL	UNLOCK	TANK 3 CLOSED	TANK 7 CLOSED	DOCK LIGHTS	LCR II POWER	DUMP OPEN	SLOW IDLE
SWIVEL UP	CLOSE WINDOW	LOW PRES	OVER RIDE	OVER LOAD	OVER TEMP	TANK 4 OPEN	TANK 8 OPEN	TRANS HEAT	RF POWER	DUMP CLOSE	MEDIUM IDLE
SWIVEL DOWN	LAMP OUT	HOOD OPEN	HEV OFF	SHUT DOWN	DUMP VALVE	TANK 4 CLOSED	TANK 8 CLOSED	SIDE DELVRY	PURGE	ARROW SPLIT	FAST IDLE
2593676C1 Sheet 11						2593677C1 Sheet 12					
DOOR	HAZARD LIGHT	EXT SPEAKR	EMERG SHTOFF	PACKER ON	MANUAL	ESTOP	COMPT 1 OPEN	DOOR UP	MASTER POWER	FRONT SWEEP	TAG UP
AUX HEAT	FOG LIGHTS	PRINTR POWER	INTRNL VALVE	PACKER LEFT	AUTO	LAMP TEST	COMPT 1 CLOSE	DOOR DOWN	PLC POWER	LEFT SWEEP	TAG DOWN
HEAT 1	HEATED MIRROR	DIESEL PUMP	INJECT SYSTEM	PACKER RIGHT	COORD INATOR	LEFT PTO	COMPT 2 OPEN	DOOR LIGHT	CHARGR POWER	RIGHT SWEEP	CHECK FAULTS
HEAT 2	RESET	GAS PUMP	GAS REEL	CRANE ACTIVE	UNLOAD	RIGHT PTO	COMPT 2 CLOSE	RIGHT HOSE	RAISE LIFT	REAR SWEEP	WARN 1
FAN1	AUX LIGHT	MTROIL PUMP	DIESEL REEL	LIFT EXTEND	LOAD	PTO1	COMPT 3 OPEN	LEFT HOSE	LOWER LIFT	TTP OPEN	WARN 2
FAN2	NEUTRAL	ATF PUMP	HIFLO HOSE	BODY RAISE	CENTER DOME	PTO2	COMPT 3 CLOSE	DO NOT MOVE	VAC OFF	TTP CLOSED	WARN 3
LEFT READ	WINDOW AJAR	HYD PUMP	LO FLO HOSE	BODY LOWER	LEFT DOME	PTO3	PTO DRIVER	PTO PASNGR	VAC ON	PANEL LIGHT	ELECT MAGNET
RIGHT READ	REAR MOOD	VAPOR PUMP	HOSE REEL	BODY UP	RIGHT DOME	START REGEN	STOP REGEN	REGEN ON	LEFT PTO ON	RIGHT PTO ON	NEED REGEN

Figure 95 Label Sheets 9, 10, 11, 12

2597868C1 Sheet 13					
FRONT	HEATER 1	BATH ASSIST	BATH LIGHT	UPPER PLW LTS	FRONT UNITY
MIDDLE	HEATER 2	BATH CONFIRM	DRIVER DOME	LOWER PLW LTS	REAR UNITY
REAR	HEATER 3	THROTL	SUSP KNEEL	EMERG OVRIDE	TOOL CIRCUIT
WATER CANNON	HEATER 4	STOP REQST	SUSP RAISE	AUTO-MATIC	POLE LIGHT
WATER J-STICK	MASTER HEATER	STOP CONFIRM	QUICK RAISE	FRONT ALARM	CRA NE PTO
LEFT CEILING	NO DATA LOGGING	LIFT ENABLE	DIESEL GEN	COMPRESS PTO	FRONT WORK
RIGHT CEILING	ROOF AC	RAMP ENABLE	DIESEL HEATER	DIGGER	REAR WORK
CEILING LIGHT	PA POWER	DFROST FAN 1	DFROST FAN 2	WELDER LIGHT	NOZZLE NSTOW

Figure 96 Label Sheet 13

## 21. POWER FEATURES USING REMOTE POWER MODULES

### 21.1. 60ACE — DUAL OUTPUT LATCHED SWITCH 40 AMPS

#### FEATURE CODE DESCRIPTION:

60ACE – BDY INTG, SWITCH DUAL OUTPUT 2 Position Latched Rocker, Backlit, with "ON" Indicator Mounted on Dash, for 1; Auxiliary Load 40 AMP Maximum; Power Available Only in "Ignition (IGN)" or "Accessory" Position; Controls Two Remote Power Modules (RPMs) (requires two RPM outputs)

#### FEATURE/BODY FUNCTION:

This feature provides one two-positioned latched rocker switch that controls one auxiliary load with a 40 AMP maximum. This feature was designed for owners who have a load that requires a RPM output of greater than 20 AMPS. Two RPM outputs are required, and power would only be available in IGN or accessory key-state.

Through programmable parameters, the owner can send the amount of current desired to the two outputs. This allows the owner to customize the amperage supplied to the RPM output based on their specific needs.

→ Please use the Diamond Logic® Builder software to determine pin and switch locations for RPM inputs and outputs and to set programmable parameters (refer to pin and switch location section)

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

\*Software feature codes can be added through the Diamond Logic® Builder software. Programmable Parameters are also programmable through the Diamond Logic® Builder software.

Required software feature code: 595AKA

Software features that must be removed: NONE

The **TEM\_Dual1\_Output1\_Fuse\_Param** is programmed to allowed a specified amount of current to go to the RPM output 1. If the current exceeds this specified amount, the virtual fusing shuts the output off.

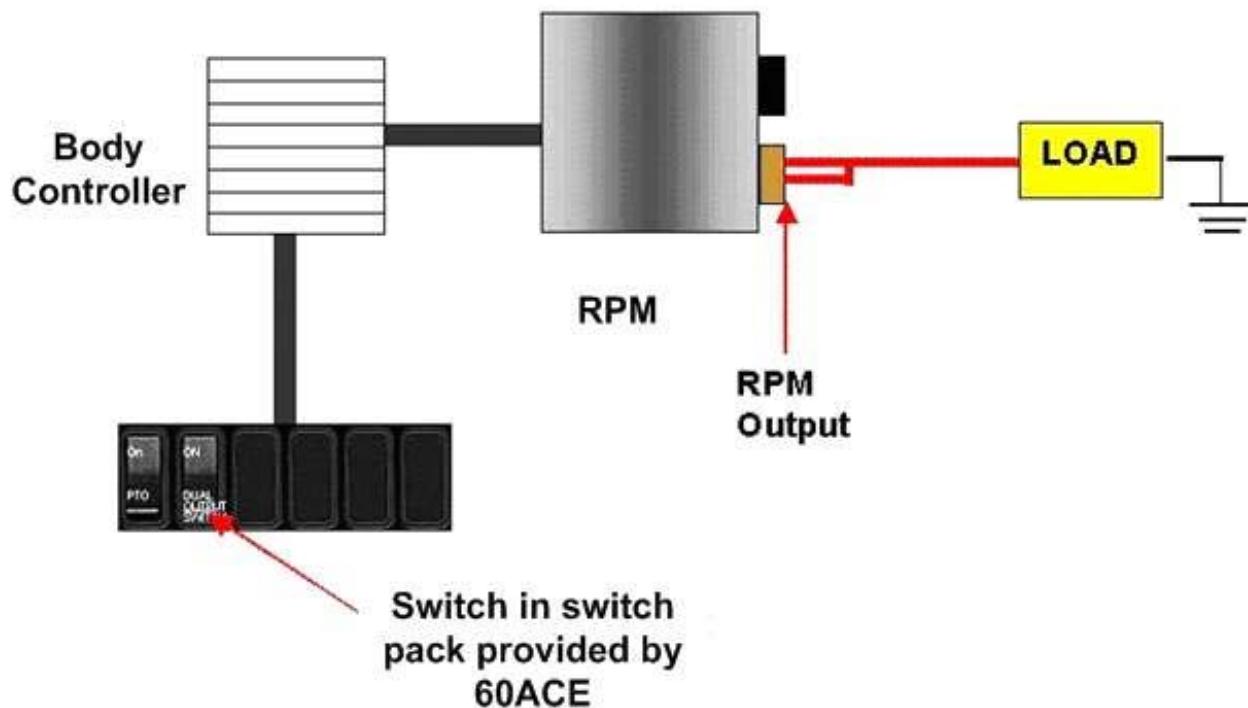
The **TEM\_Dual1\_Output2\_Fuse\_Param** is programmed to allowed a specified amount of current to go to the RPM output 2. If the current exceeds this specified amount, the virtual fusing shuts the output off.

**Table 92**

Parameter	ID	Description	Default	Units	Min	Max	Set
TEM_Dual1_Output1_Fuse_Param	1988	This is the maximum current Dual 1 Output 1 is allowed to source before the virtual fusing turns the output off.	20	A	0	20	0.1
TEM_Dual1_Output2_Fuse_Param	1989	This is the maximum current Dual 1 Output 2 is allowed to source before the virtual fusing turns the output off.	20	A	0	20	0.1

**WIRING INFORMATION**

- This feature requires the customer to supply the wiring that runs from the pins labeled DUAL\_OUTPUT\_SWITCH\_Output1 and DUAL\_OUTPUT\_SWITCH\_Output2, on the brown 8-pin RPM output connector, to the customer-installed feature that requires the load.



**Figure 97**

**TESTING**

- Depress the switch.
- Verify that the desired voltage is being pulled from the RPM outputs labeled DUAL\_OUTPUT\_SWITCH\_Output1 and DUAL\_OUTPUT\_SWITCH\_Output2 (as programmed by the Diamond Logic® Builder software).

**HOW TO ADD THIS FEATURE:**

- Software feature code 595AKA MUST be enabled using the Diamond Logic® Builder software (see local dealer).
- Programmable parameters must be set using the Diamond Logic® Builder software (see local dealer).
- Install the switch in the in-cab switch pack
- Customer must supply wiring from the RPM output

## **21.2. 60ACG — ONE INTERLOCKED LATCHED SWITCH DISENGAGE AT 30 MPH**

### **FEATURE CODE DESCRIPTION:**

60ACG – BDY INTG, SWITCH, INTERLOCKED 2 Position Latched Rocker, Backlit, with "ON" Indicator Mounted on Dash for 1; Auxiliary Load 20 Ampere (AMP) Maximum; Output will disengage when Vehicle Exceeds 30 MPH, Programmable; Power Available Only in "Ignition (IGN)" or "Accessory" Position (requires one Remote Power Module (RPM) output)

### **FEATURE/BODY FUNCTION:**

This feature provides a 2-position latched rocker switch that controls one auxiliary load of 20 AMPS maximum and requires one RPM output. Output will be defaulted to turn off when vehicle speed reaches 30 MPH. The output will only be available in IGN or accessory key-state. This feature is used for applications such as a rear shining light. If the operator forgets to turn the light off before he drives away, the light will shut off when the driver hits 30 MPH.

The owner can interlock the switch with certain programmable conditions. These conditions can be set as programmable parameters using the Diamond Logic® Builder software. These parameters are listed and explained below.

→ Please use the Diamond Logic® Builder software to determine pin and switch locations for RPM inputs and outputs and to set programmable parameters (refer to pin and switch location section).

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

\*Software feature codes can be added through the Diamond Logic® Builder software. Programmable Parameters are also programmable through the Diamond Logic® Builder software.

Required software feature code: 595AKB

Conflicts with Software features: NONE

- **TEM\_Aux1\_Misc\_Interlock\_Param**

This parameter (TEM\_Aux1\_Misc\_Interlock\_Param) is the master parameter for this feature. The setting for this parameter selects the interlocking condition for the output. The following table indicates which interlocking condition corresponds to which setting for the parameter. To select the interlocking condition simply set the value of this parameter to the corresponding setting on the table.

**Table 93**

Setting	Interlocking Condition
0	Apply no interlocks to this output
1	Activate this output when the park brake is set AND the switch is on
2	Activate this output when the park brake is not set AND the switch is on
3	Activate this output when a door is open AND the switch is on
4	Activate this output when all doors are closed AND the switch is on
5	Activate this output when the PTO is engaged AND the switch is on (Requires a PTO feature)

Setting	Interlocking Condition
6	Activate this output when the PTO is not engaged AND the switch is on (Requires a PTO feature)
7	Activate this output when the engine is running AND the switch is on
8	Activate this output when the engine is not running AND the switch is on
9	Activate this output when the vehicle speed exceeds the value set in TEM_Aux_1_Speed_Interlock_Param AND the switch is on
10	Activate this output when the vehicle speed is less than the value set in TEM_Aux_1_Speed_Interlock_Param AND the switch is on
11	Activate this output when the vehicle is stopped AND the switch is on
12	Activate this output when the vehicle is moving AND the switch is on
13	Activate this output when the transmission gear is higher than TEM_Aux1_Gear_Interlock_Param AND the switch is on (Requires Automatic Transmission)
14	Activate this output when the transmission gear is lower than TEM_Aux1_Gear_Interlock_Param AND the switch is on (Requires Automatic Transmission)
15	Activate this output when the transmission is in neutral AND the switch is on (Requires Automatic Transmission)
16	Activate this output when the transmission is not in neutral AND the switch is on (Requires Automatic Transmission)

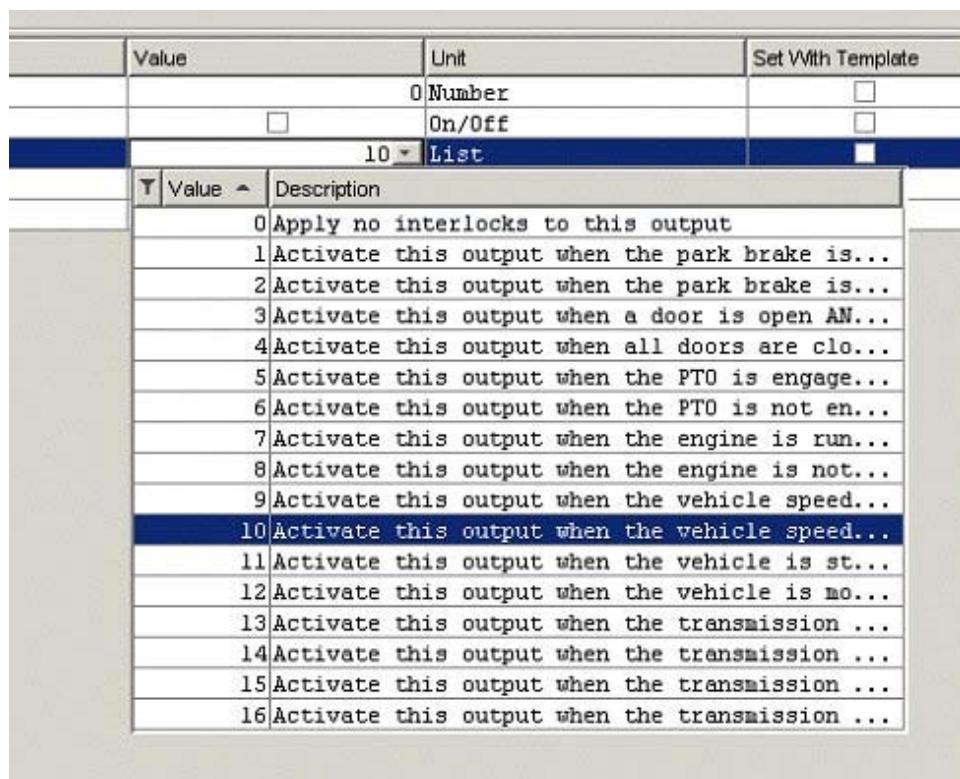


Figure 98 Drop Down List of Possible Parameters for TEM\_Aux1\_Misc\_Interlock\_Param

- **TEM\_Aux1\_Interlock\_Latches\_Off**

Normally, if the output is deactivated because the interlocking condition is not met, the output will re-activate as soon as the interlocking condition is re-established as long as the switch is still on. If this behavior is not desirable, the parameter TEM\_Aux1\_Interlock\_Latches\_Off parameter can be set. When it is set and the output is deactivated because the interlocking condition is not met, the output will not reactivate when the interlocking condition is re-established even if the switch is still on. To re-activate the output in this case, the switch must be re-cycled (flipped off and then on again).

- **TEM\_Aux1\_Speed\_Interlock\_Param**

If TEM\_Aux1\_Misc\_Interlock\_Param is set to 9 or 10, the speed-interlock parameter (TEM\_Aux1\_Speed\_Interlock\_Param) must also be set. This parameter must be set to the actual speed to use in the condition selected by TEM\_Aux1\_Misc\_Interlock\_Param (default unit for this parameter is MPH). The speed parameter is only used if TEM\_Aux1\_Misc\_Interlock\_Param is set to 9 or 10.

**Example:** If you want the output to only come on when the vehicle is traveling over 15 MPH, you would set TEM\_Aux1\_Misc\_Interlock\_Param to 9 and set TEM\_Aux1\_Speed\_Interlock\_Param to 15 MPH.

- **TEM\_Aux1\_Gear\_Interlock\_Param**

If TEM\_Aux1\_Misc\_Interlock\_Param is set to 13 or 14 and the vehicle has an automatic transmission, the gear-interlock parameter (TEM\_Aux1\_Gear\_Interlock\_Param) must also be set. This parameter must be set to the transmission gear to use in the condition selected by TEM\_Aux1\_Misc\_Interlock\_Param. The transmission gear is set as follows:

**Table 94**

Setting	Transmission Gear
125	Transmission in Neutral
126	Transmission is in the 1st forward gear
127	Transmission is in the 2nd forward gear
128	Transmission is in the 3rd forward gear
125 + x	Transmission is in the xth forward gear
124	Transmission is in the 1st reverse gear
123	Transmission is in the 2nd reverse gear
125 - y	Transmission is in the yth reverse gear
The transmission gear parameter is only used if TEM_Aux1_Misc_Interlock_Param is set to 13 or 14.	

**Example:** For the output to only come on when the vehicle transmission is in a reverse gear, set TEM\_Aux1\_Misc\_Interlock\_Param to 10 and TEM\_Aux1\_Gear\_Interlock\_Param to 125.

- **TEM\_Aux1\_w\_llocks\_Output\_Fuse**

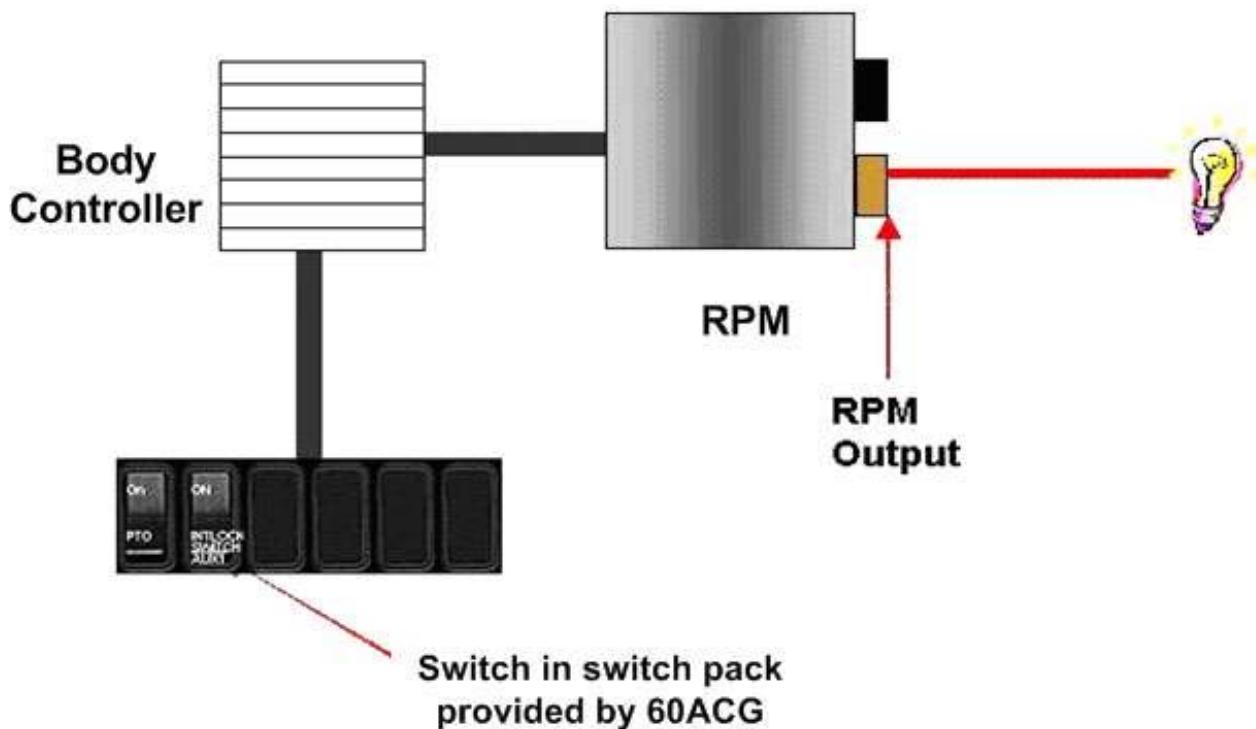
This parameter is the value at which the output will fuse (shut off). The allowable values are from 1 to 20 Amperes.

**Table 95**

Parameter	ID	Description	Default	Units	Min	Max	Set
TEM_Aux1_Interlock_Latches_Off	2006	If this is set, when the output is turned off due to an interlock, it will remain off until the switch is recycled.	Off	On/ Off			
TEM_Aux1_Speed_Interlock_Param	2007	The speed parameter for the TEM Aux #1 with Interlocks feature.	30	Mph	0	100	1
TEM_Aux1_Gear_Interlock_Param	2008	The transmission gear parameter for the TEM Aux #1 with Interlocks feature (124 is reverse, 125 is neutral, 126 is 1st gear, 127 is second gear etc.).	0	Number	0	250	1
TEM_Aux1_w_llocks_Output_Fuse	2009	Fuse parameter for the TEM Single output with interlocks feature.	20	A	0	20	0.1
TEM_Aux1_Misc_Interlock_Param	2033	Miscellaneous or control parameter used for setting the interlock for the auxiliary 1 with interlocks.	10	List			

### **WIRING INFORMATION**

- The wiring out of the pin labeled INTERLOCKED\_SWITCH\_AUX1\_Output on the Brown 8-pin RPM output connector is customer supplied.



**Figure 99**

**TESTING**

1. Depress switch.
2. Verify that the RPM output labeled INTERLOCKED\_SWITCH\_AUX1\_Output is obtaining the desired voltage (as programmed by the Diamond Logic® Builder software).
3. Verify the functionality of the 30 Mph interlock by violating the parameter and determine that the output shuts off.
4. Test all other interlocks by violating the programmable parameters to see if the output shuts off.

**HOW TO ADD THIS FEATURE:**

- Software feature code 595AKB MUST be enabled using the Diamond Logic® Builder software (see local dealer).
- Programmable Parameters must be set using the Diamond Logic® Builder software (see local dealer)
- The 2-position latched rocker switch must be installed in the in-cab switch pack
- Customer must install the wiring from the RPM output.

## **21.3. 60ACH — TWO INTERLOCKED LATCHED SWITCH DISENGAGE AT 30 MPH**

### **FEATURE CODE DESCRIPTION:**

60ACH – BDY INTG, SWITCH, INTERLOCKED (2) 2 Position Latched Rockers, Backlit, with "ON" Indicator Mtd on Dash, for 2; Auxiliary Load each 20 AMP Maximum; Outputs will Disengage when Vehicle Exceeds 30 MPH, Programmable; Power Available Only in "IGN" or "Accessory" Position (requires two RPM outputs)

### **FEATURE/BODY FUNCTION:**

This feature provides TWO 2-position Latched Rocker switches that control two auxiliary loads, each having a 20 AMP maximum and requiring a total of two RPM outputs. Outputs are defaulted to disengage when vehicle speed reaches 30 MPH. The outputs will only be available in IGN or accessory key-state. This feature is used for applications such as a rear shining light. If the operator forgets to turn the light off before he drives away, the light will shut off when the driver hits 30 MPH.

The owner can interlock the switch with certain programmable conditions. These conditions can be set as programmable parameters using the Diamond Logic® Builder software. These parameters are listed and explained below.

\*\* This feature includes two copies of the functionality provided by 60ACG; e.g., two outputs with two switches. Each one of these outputs is exactly the same as that provided by 60ACG. The two outputs in this feature are completely autonomous (independent of each other). Each of the two outputs has its own set of five parameters as is mentioned in the description for 60ACG.

→ Please use the Diamond Logic® Builder software to determine pin and switch locations for RPM inputs and outputs and to set programmable parameters (refer to pin and switch location section)

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

\*Software feature codes can be added through the Diamond Logic® Builder software. Programmable parameters are also programmable through the Diamond Logic® Builder software.

Required software feature codes: 595AKB, 595AKC

Conflicts with Software features: NONE

- **TEM\_Aux1\_Misc\_Interlock\_Param**

This parameter (TEM\_Aux1\_Misc\_Interlock\_Param) is the master parameter for this feature. The setting for this parameter selects the interlocking condition for the output. The following table indicates which interlocking condition corresponds to which setting for the parameter. To select the interlocking condition simply set the value of this parameter to the corresponding setting on the table.

**Table 96**

Setting	Interlocking Condition
0	Apply no interlocks to this output
1	Activate this output when the park brake is set AND the switch is on
2	Activate this output when the park brake is not set AND the switch is on
3	Activate this output when a door is open AND the switch is on

Setting	Interlocking Condition
4	Activate this output when all doors are closed AND the switch is on
5	Activate this output when the PTO is engaged AND the switch is on (Requires a PTO feature)
6	Activate this output when the PTO is not engaged AND the switch is on (Requires a PTO feature)
7	Activate this output when the engine is running AND the switch is on
8	Activate this output when the engine is not running AND the switch is on
9	Activate this output when the vehicle speed exceeds the value set in TEM_Aux_1_Speed_Interlock_Param AND the switch is on
10	Activate this output when the vehicle speed is less than the value set in TEM_Aux_1_Speed_Interlock_Param AND the switch is on
11	Activate this output when the vehicle is stopped AND the switch is on
12	Activate this output when the vehicle is moving AND the switch is on
13	Activate this output when the transmission gear is higher than TEM_Aux1_Gear_Interlock_Param AND the switch is on (Requires Automatic Transmission)
14	Activate this output when the transmission gear is lower than TEM_Aux1_Gear_Interlock_Param AND the switch is on (Requires Automatic Transmission)
15	Activate this output when the transmission is in neutral AND the switch is on (Requires Automatic Transmission)
16	Activate this output when the transmission is not in neutral AND the switch is on (Requires Automatic Transmission)

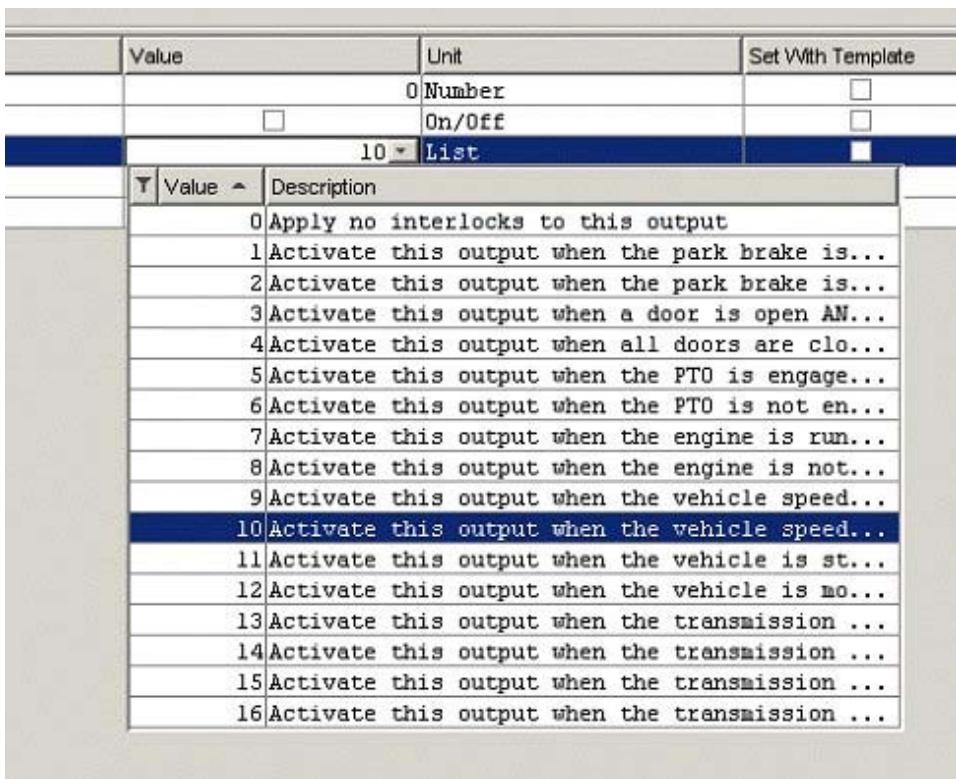


Figure 100 Drop Down List of Possible Parameters for TEM\_Aux1\_Misc\_Interlock\_Param

- **TEM\_Aux1\_Interlock\_Latches\_Off**

Normally, if the output is deactivated because the interlocking condition is not met, the output will re-activate as soon as the interlocking condition is re-established as long as the switch is still on. If this behavior is not desirable, the parameter TEM\_Aux1\_Interlock\_Latches\_Off parameter can be set. When it is set and the output is deactivated because the interlocking condition is not met, the output will not reactivate when the interlocking condition is re-established even if the switch is still on. To re-activate the output in this case, the switch must be re-cycled (flipped off and then on again).

- **TEM\_Aux1\_Speed\_Interlock\_Param**

If TEM\_Aux1\_Misc\_Interlock\_Param is set to 9 or 10, the speed-interlock parameter (TEM\_Aux1\_Speed\_Interlock\_Param) must also be set. This parameter must be set to the actual speed to use in the condition selected by TEM\_Aux1\_Misc\_Interlock\_Param (default unit for this parameter is MPH). The speed parameter is only used if TEM\_Aux1\_Misc\_Interlock\_Param is set to 9 or 10.

**Example:** For the output to only come on when the vehicle is traveling over 15 MPH, set TEM\_Aux1\_Misc\_Interlock\_Param to 9 and set TEM\_Aux1\_Speed\_Interlock\_Param to 15 MPH.

- **TEM\_Aux1\_Gear\_Interlock\_Param**

If TEM\_Aux1\_Misc\_Interlock\_Param is set to 13 or 14 and the vehicle has an automatic transmission, the gear-interlock parameter (TEM\_Aux1\_Gear\_Interlock\_Param) must also be set. This parameter must be set to the transmission gear to use in the condition selected by TEM\_Aux1\_Misc\_Interlock\_Param. The transmission gear is set as follows:

**Table 97**

Setting	Transmission Gear
125	Transmission in Neutral
126	Transmission is in the 1st forward gear
127	Transmission is in the 2nd forward gear
128	Transmission is in the 3rd forward gear
125 + x	Transmission is in the xth forward gear
124	Transmission is in the 1st reverse gear
123	Transmission is in the 2nd reverse gear
125 – y	Transmission is in the yth reverse gear
The transmission gear parameter is only used if TEM_Aux1_Misc_Interlock_Param is set to 13 or 14.	

**Example:** For the output to only come on when the vehicle transmission is in a reverse gear, set TEM\_Aux1\_Misc\_Interlock\_Param to 10 and TEM\_Aux1\_Gear\_Interlock\_Param to 125.

- **TEM\_Aux1\_w\_llocks\_Output\_Fuse**

This parameter is the value at which the output will fuse (shut off). The allowable values are from 1 to 20 Amperes.

- **TEM\_Aux2\_Misc\_Interlock\_Param**

This parameter (TEM\_Aux2\_Misc\_Interlock\_Param) is the master parameter for this feature. The setting for this parameter selects the interlocking condition for the output. The following table indicates which interlocking condition corresponds to which setting for the parameter. To select the interlocking condition simply set the value of this parameter to the corresponding setting on the table.

**Table 98**

Setting	Interlocking Condition
0	Apply no interlocks to this output
1	Activate this output when the park brake is set AND the switch is on
2	Activate this output when the park brake is not set AND the switch is on
3	Activate this output when a door is open AND the switch is on
4	Activate this output when all doors are closed AND the switch is on
5	Activate this output when the PTO is engaged AND the switch is on (Requires a PTO feature)
6	Activate this output when the PTO is not engaged AND the switch is on (Requires a PTO feature)
7	Activate this output when the engine is running AND the switch is on
8	Activate this output when the engine is not running AND the switch is on

Setting	Interlocking Condition
9	Activate this output when the vehicle speed exceeds the value set in TEM_Aux_1_Speed_Interlock_Param AND the switch is on
10	Activate this output when the vehicle speed is less than the value set in TEM_Aux_1_Speed_Interlock_Param AND the switch is on
11	Activate this output when the vehicle is stopped AND the switch is on
12	Activate this output when the vehicle is moving AND the switch is on
13	Activate this output when the transmission gear is higher than TEM_Aux1_Gear_Interlock_Param AND the switch is on (Requires Automatic Transmission)
14	Activate this output when the transmission gear is lower than TEM_Aux1_Gear_Interlock_Param AND the switch is on (Requires Automatic Transmission)
15	Activate this output when the transmission is in neutral AND the switch is on (Requires Automatic Transmission)
16	Activate this output when the transmission is not in neutral AND the switch is on (Requires Automatic Transmission)

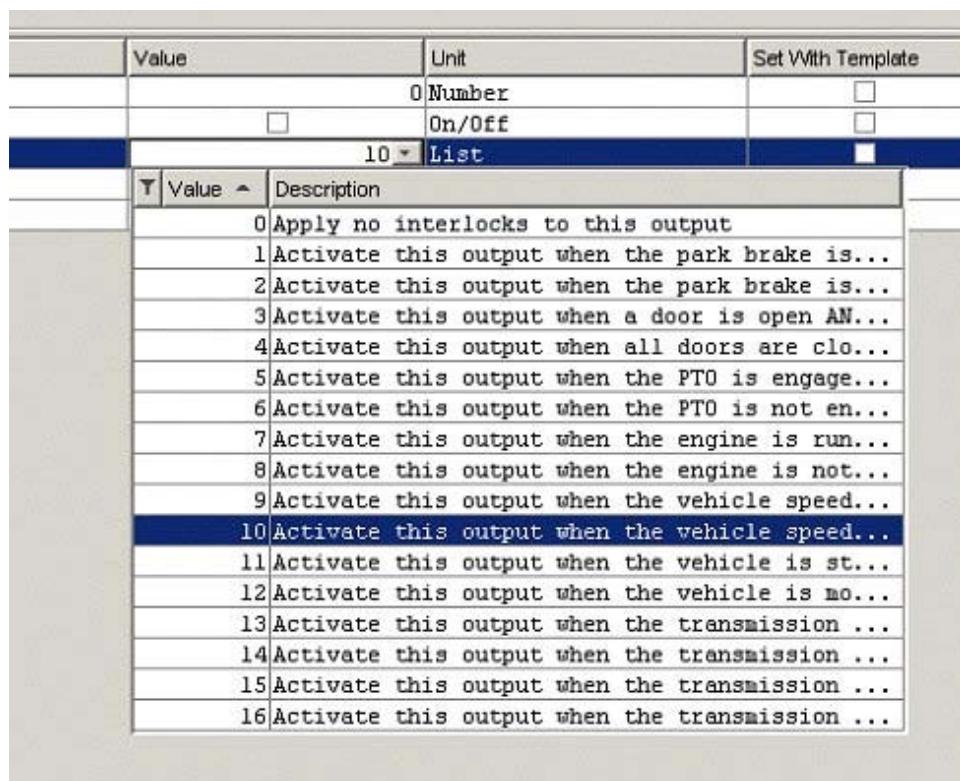


Figure 101 Drop Down List of Possible Parameters for TEM\_Aux2\_Misc\_Interlock\_Param

- **TEM\_Aux2\_Interlock\_Latches\_Off**

Normally, if the output is deactivated because the interlocking condition is not met, the output will re-activate as soon as the interlocking condition is re-established as long as the switch is still on. If this behavior is not

desirable, the parameter TEM\_Aux2\_Interlock\_Latches\_Off parameter can be set. When it is set and the output is deactivated because the interlocking condition is not met, the output will not reactivate when the interlocking condition is re-established even if the switch is still on. To re-activate the output in this case, the switch must be re-cycled (flipped off and then on again).

- **TEM\_Aux2\_Speed\_Interlock\_Param**

If TEM\_Aux2\_Misc\_Interlock\_Param is set to 9 or 10, the speed-interlock parameter (TEM\_Aux2\_Speed\_Interlock\_Param) must also be set. This parameter must be set to the actual speed to use in the condition selected by TEM\_Aux2\_Misc\_Interlock\_Param (default unit for this parameter is MPH). The speed parameter is only used if TEM\_Aux2\_Misc\_Interlock\_Param is set to 9 or 10.

**Example:** For the output to only come on when the vehicle is traveling over 15 MPH, set TEM\_Aux2\_Misc\_Interlock\_Param to 9 and set TEM\_Aux2\_Speed\_Interlock\_Param to 15 MPH.

- **TEM\_Aux2\_Gear\_Interlock\_Param**

If TEM\_Aux2\_Misc\_Interlock\_Param is set to 13 or 14 and the vehicle has an automatic transmission, the gear-interlock parameter (TEM\_Aux2\_Gear\_Interlock\_Param) must also be set. This parameter must be set to the transmission gear to use in the condition selected by TEM\_Aux2\_Misc\_Interlock\_Param. The transmission gear is set as follows:

**Table 99**

Setting	Transmission Gear
125	Transmission in Neutral
126	Transmission is in the 1st forward gear
127	Transmission is in the 2nd forward gear
128	Transmission is in the 3rd forward gear
125 + x	Transmission is in the xth forward gear
124	Transmission is in the 1st reverse gear
123	Transmission is in the 2nd reverse gear
125 – y	Transmission is in the yth reverse gear
The transmission gear parameter is only used if TEM_Aux2_Misc_Interlock_Param is set to 13 or 14.	

**Example:** For the output to only come on when the vehicle transmission is in a reverse gear, you would set TEM\_Aux2\_Misc\_Interlock\_Param to 10 and TEM\_Aux2\_Gear\_Interlock\_Param to 125.

- **TEM\_Aux2\_w\_llocks\_Output\_Fuse**

This parameter is the value at which the output will fuse (shut off). The allowable values are from 1 to 20 Amperes.

**Table 100**

Parameter	ID	Description	Default	Units	Min	Max	Set
TEM_Aux1_Interlock_Latches_Off	2006	If this is set, when the output is turned off due to an interlock, it will remain off until the switch is recycled.	Off	On/ Off			
TEM_Aux1_Speed_Interlock_Param	2007	The speed parameter for the TEM Aux #1 with Interlocks feature.	30	Mph	0	100	1
TEM_Aux1_Gear_Interlock_Param	2008	The transmission gear parameter for the TEM Aux #1 with Interlocks feature (124 is reverse, 125 is neutral, 126 is 1st gear, 127 is second gear etc.).	0	Number	0	250	1
TEM_Aux1_w_llocks_Output_Fuse	2009	Fuse parameter for the TEM Single output with interlocks feature.	20	A	0	20	0.1
TEM_Aux1_Misc_Interlock_Param	2033	Miscellaneous or control parameter used for setting the interlock for the auxiliary 1 with interlocks.	10	List			
TEM_Aux2_Interlock_Latches_Off	2010	If this is set, when the output is turned off due to an interlock, it will remain off until the switch is recycled.	Off	On/ Off			
TEM_Aux2_Speed_Interlock_Param	2011	The speed parameter for the TEM Aux #2 with Interlocks feature.	30	Mph	0	100	1
TEM_Aux2_Gear_Interlock_Param	2012	The transmission gear parameter for the TEM Aux #2 with Interlocks feature (124 is reverse, 125 is neutral, 126 is 1st gear, 127 is second gear etc.).	0	Number	0	250	1

Parameter	ID	Description	Default	Units	Min	Max	Set
TEM_Aux2_w_Illocks_Output_Fuse	2013	Fuse parameter for the TEM Single output with interlocks feature.	20	A	0	20	0.1
TEM_Aux2_Misc_Interlock_Param	2034	Miscellaneous or control parameter used for setting the interlock for the auxiliary 2 with interlocks.	10	List			

### WIRING INFORMATION

- The wiring out of the pin labeled INTERLOCKED\_SWITCH\_AUX1\_Output on the Brown 8-pin RPM output connector is customer supplied.
- The wiring out of the pin labeled INTERLOCKED\_SWITCH\_AUX2\_Output on the Brown 8-pin RPM output connector is customer supplied.

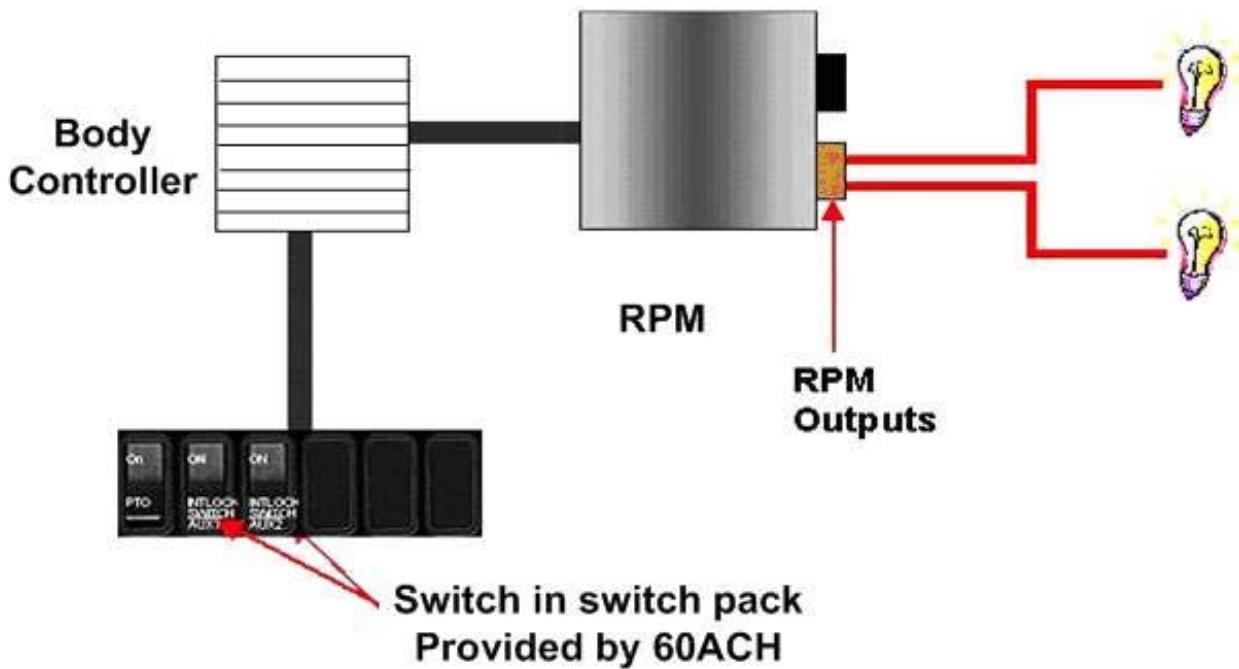


Figure 102

**TESTING**

1. Depress switch.
2. Verify that the RPM output labeled INTERLOCKED\_SWITCH\_AUX1\_Output is obtaining the desired voltage (as programmed by the Diamond Logic® Builder software).
3. Verify the functionality of the 30 Mph interlock by violating the parameter and determine that the output shuts off.
4. Test all other interlocks can by violating the programmable parameters to see if the output shuts off
5. Depress the second switch.
6. Verify that the RPM output labeled INTERLOCKED\_SWITCH\_AUX2\_Output is obtaining the desired voltage (as programmed by the Diamond Logic® Builder software).
7. Verify the functionality of the 30 MPH interlock by violating the parameter and determine that the output shuts off.
8. Test all other interlocks can by violating the programmable parameters to see if the output shuts off

**HOW TO ADD THIS FEATURE:**

- Software feature code 595AKB and 595AKC MUST be enabled using the Diamond Logic® Builder software (see local dealer).
- Programmable parameters must be set using the Diamond Logic® Builder software (see local dealer).
- The 2-position latched rocker switch must be installed in the in-cab switch pack
- Customer must install the wiring from the RPM outputs.

## 21.4. 60ACS — ONE MOMENTARY ROCKER SWITCH / REMOTE SWITCH CAPABILITY

### FEATURE CODE DESCRIPTION:

BDY INTG, SWITCH MOMNTRY 3POS Rocker, Backlit, with "ON" Indicator Mounted on Dash, Latching Software, for 1 Auxiliary Load 20 amp. Maximum; Power Available Only in "Ignition" or "Accessory" Position, Output Also Controlled by a Customer Remote Mounted Switch (requires 1 Remote Power Module input and 1 output)

### FEATURE/BODY FUNCTION:

This feature provides a three-way switch control function for a RPM output. An in-cab, 3-position momentary switch is connected to a RPM output. In addition, a customer-supplied, remote-mounted momentary switch may be used to control the same RPM output. This switch must be active at 12 volts and must use Ground (GND) to deactivate the output. Thus, a three-way switch control action may be performed with these two switch inputs. The RPM output may be turned off or on from either switch; however, an off command from either switch takes precedence and will turn the RPM output off. This feature is useful when a lamp or other load requires control from both in the cab and from a remote location on the body.

The in-cab switch provides a green lamp in the top section of the switch to indicate when the RPM output is on. The RPM provides an active high output that will source up to 20 AMPS at battery voltage levels. The output current level may be limited through programmable parameters between .1 and 20 AMPS in .1 AMP increments. This virtual fusing level is controlled in software and mimics the performance of an SAE fuse.

The RPM output may be activated with the in-cab switch provided that the IGN key is in the accessory or IGN position. The RPM output may also be activated with the remote switch input with IGN key off or on. It is important to turn off RPM outputs that have been enabled remotely before leaving a parked vehicle with the IGN key off. Otherwise, the system will remain active and drain the batteries.

60AAA or 60AAB is a prerequisite feature that must be ordered along with 60ACS. 60ACS uses a single momentary switch in place of one of the latching switches that is provided with 60AAA and 60AAB. For example, instead of the six latching switches that are provided with 60AAA, a vehicle with 60ACS will have a switch pack of five latching switches and one momentary switch.

→ Please use the Diamond Logic® Builder software to determine pin and switch locations for RPM inputs and outputs and to set programmable parameters (refer to pin and switch location section)

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

\*Software feature codes can be added through the Diamond Logic® Builder. Programmable parameters are also programmable through the Diamond Logic® Builder.

Required software feature code: 595AKD

Conflicts with software features: NONE

The **TEM\_Aux1\_w\_Ext\_Sw\_Fuse\_Level** parameter sets the amount of current that flows through auxiliary output 1. If current rises above this level, fusing takes place and the RPM output is shut down.

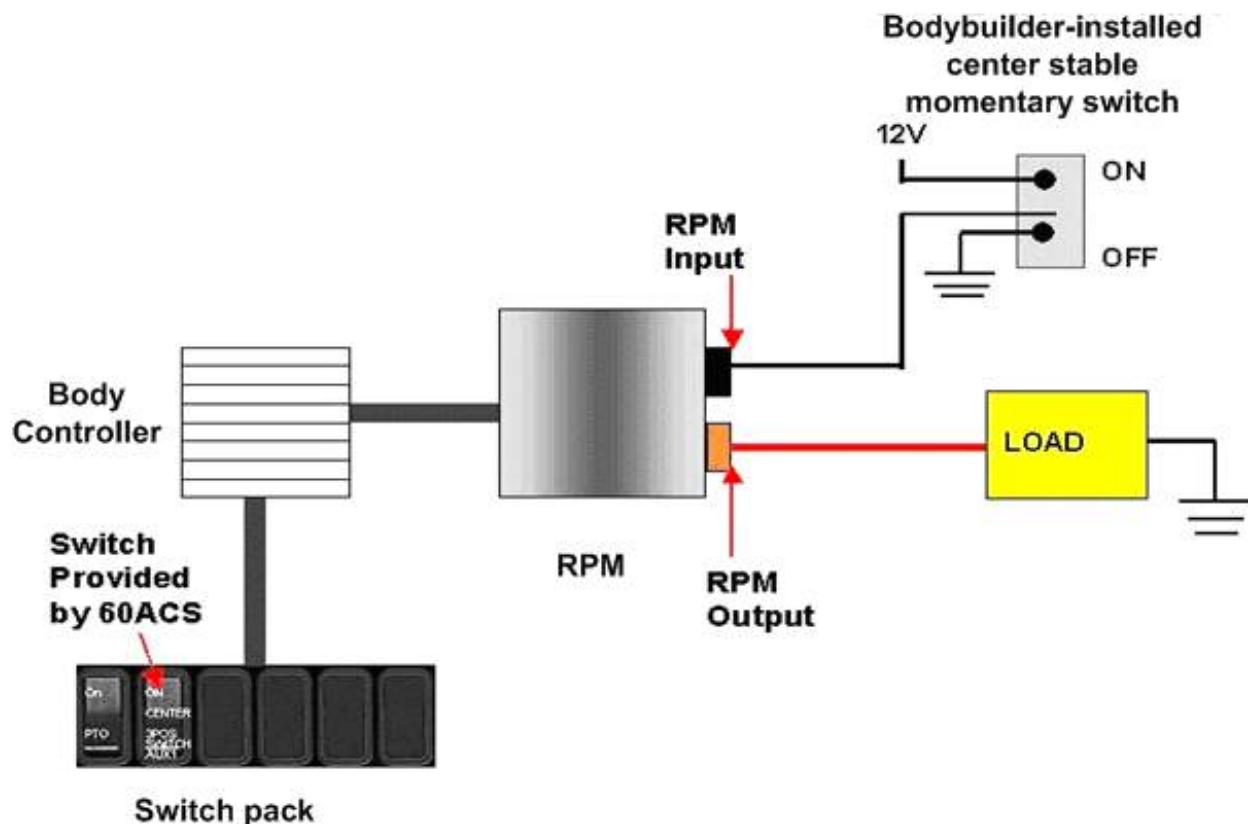
By turning the **TEM\_Aux1\_w\_Ext\_Switch\_Init\_State** parameter on, the Body Controller (BC) forces the RPM output to be on whenever the truck's key-state is turned from off to accessory or IGN.

**Table 101**

Parameter	ID	Description	Default	Units	Min	Max	Step
TEM_Aux1_w_Ext_Sw_Fuse_Level	1998	This is the level above which the RPM will fuse the TEM Auxiliary output with external switch.	20	A	0	20	0.1
TEM_Aux1_w_Ext_Switch_Init_State	2032	This programmable parameter sets the init. state of RPM channel used with TEM Auxiliary with external switch #1.	Off	On/ Off	NA	NA	NA

**WIRING INFORMATION**

- Customer may mount a switch and install the wiring into the pin labeled 3POS\_SWITCH\_AUX1\_Input in the black 23-pin RPM input connector. Installation of the remote switch is optional with this feature (see Diamond Logic® Builder for input pin location).
- Customer must install wiring from the pin labeled 3POS\_SWITCH\_AUX1\_Output brown 8-pin RPM output connector to the electrical load that is to be controlled (see Diamond Logic® Builder for output pin location).

**Figure 103**

**TESTING**

1. This feature allows the customer the ability to activate the output when the IGN key is turned from OFF to ACCESSORY or IGN. This functionality is obtained by turning programmable parameters (TEM\_Aux1\_w\_Ext\_Switch\_Init\_State ON).
2. Activate the first remote Body Builder installed switch to 12 volts by using a momentary switch action.
3. Verify that the RPM output labeled 3POS\_SWITCH\_AUX1\_Output is providing the battery volts at rated current levels (as programmed in Diamond Logic® Builder).
4. Verify that the green switch indicator light comes on.
5. Verify that the RPM input labeled 3POS\_SWITCH\_AUX1\_Input is receiving battery volts from the customer-mounted switch (as programmed in Diamond Logic® Builder).
6. Deactivate the first remote Body Builder installed switch by providing a momentary switch action to GND.
7. Verify that the RPM output goes OFF.
8. Activate the in-cab switch.
9. Verify that the RPM output labeled 3POS\_SWITCH\_AUX1\_Output is providing the battery volts (as programmed in Diamond Logic® Builder).
10. Verify that the green switch indicator light comes on.
11. Deactivate the in-cab switch.

**HOW TO ADD THIS FEATURE:**

- Select software feature code 595AKD using Diamond Logic® Builder (see local dealer).
- Programmable Parameters must be set using the Diamond Logic® Builder (see local dealer)
- The 3-position momentary switch with latching software must be installed in the in-cab switch pack.
- The customer must install wiring from the RPM output to the load they wish to control.
- The customer may mount a remote switch and install the wiring into the RPM input.

## 21.5. 60ACT — TWO MOMENTARY ROCKER SWITCHES/ REMOTE SWITCH CAPABILITY

### **FEATURE CODE DESCRIPTION:**

60ACT – BDY INTG, SWITCH MOMNTRY 3POS Rocker, Backlit, with "ON" Indicator Mounted on Dash, Latching Software, for 2; Auxiliary Load 20 AMP Maximum; Power Available Only in "IGN" or "Accessory" Position, Output Also Controlled by a Customer Remote-Mounted Switch (requires two RPM inputs and two outputs)

### **FEATURE/BODY FUNCTION:**

This feature provides three-way switch control function for two RPM outputs. Each RPM output is controlled by an in-cab, 3-position momentary switch and a 3-position momentary Body Builder-installed, remote-mounted switch. These customer-installed, remote-mounted switches must be active at 12 volts and must use GND to deactivate the output. Each in-cab, 3-position momentary switch is connected to a RPM output. In addition, each customer-supplied, remote-mounted momentary switch may be used to control the respective RPM outputs. Thus, three-way switch control action may be performed. The RPM outputs may be turned off or on from either the respective in-cab switch or the respective Body Builder switch; however, an off command from either switch takes precedence and will turn the RPM output off. This feature is useful when a lamp or other load requires control from both in the cab and from a remote location on the body.

The in-cab switches provide green lamps in the top section of the switches to indicate when the RPM outputs are on. The RPM provides active high outputs that will source up to 20 AMPS at battery voltage levels. The output current level may be limited through programmable parameters between .1 and 20 AMPS in .1 AMP increments. This virtual fusing level is controlled in software and mimics the performance of an SAE fuse.

The RPM outputs may be activated with the respective in-cab switches provided that the IGN key is in the accessory or IGN position. The RPM outputs may also be activated with the remote switch inputs with IGN key off or on. It is important to turn off RPM outputs that have been enabled remotely before leaving a parked vehicle with the IGN key off. Otherwise, the system will remain active and drain the batteries.

60AAA or 60AAB is a prerequisite feature that must be ordered along with 60ACT. 60ACT uses two momentary switches in place of two latching switches that are provided with 60AAA and 60AAB. For example, instead of the six latching switches that are provided with 60AAA, a vehicle with 60ACT will have a switch pack of four latching switches and two momentary switches.

→ Please use the Diamond Logic® Builder to determine pin and switch locations for RPM inputs and outputs and to set programmable parameters (refer to pin and switch location section)

### **SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:**

\*Software feature codes can be added through Diamond Logic® Builder. Programmable parameters are also programmable through Diamond Logic® Builder.

Required software feature code: 595AKE

Software features that must be removed: NONE

The **TEM\_Aux1\_w\_Ext\_Sw\_Fuse\_Level** parameter sets the amount of current that flows through Auxiliary output 1. If current rises above this level, fusing takes place and the RPM output is shut down.

By turning the **TEM\_Aux1\_w\_Ext\_Switch\_Init\_State** parameter on, the BC forces the RPM auxiliary output 1 to be on whenever the truck's key-state is turned from off to accessory or IGN.

The **TEM\_Aux2\_w\_Ext\_Sw\_Fuse\_Level** parameter sets the amount of current that flows through auxiliary output 2. If current rises above this level, fusing takes place and the RPM output is shut down.

By turning the **TEM\_Aux2\_w\_Ext\_Switch\_Init\_State** parameter on, the BC forces the RPM auxiliary output 2 to be on whenever the truck's key-state is turned from off to accessory or IGN.

**Table 102**

Parameter	ID	Description	Default	Units	Min	Max	Step
TEM_Aux1_w_Ext_Sw_Fuse_Level	1998	This is the level above which the RPM will fuse the TEM Auxiliary output with external switch.	20	A	0	20	0.1
TEM_Aux1_w_Ext_Switch_Init_State	2032	This programmable parameter sets the init. state of RPM channel used with TEM Auxiliary with external switch #1.	Off	On/ Off	NA	NA	NA
TEM_Aux2_w_Ext_Sw_Fuse_Level	2106	This is the level above which the RPM will fuse the TEM Auxiliary output #2 with external switch.	20	A	0	20	0.1
TEM_Aux2_w_Ext_Switch_Init_State	2142	This programmable parameter sets the init. state of RPM channel used with TEM Auxiliary with external switch #2.	Off	On/ Off	NA	NA	NA

#### **WIRING INFORMATION**

- Customer may mount a switch and install the wiring into the pin labeled 3POS\_SWITCH\_AUX1\_Input in the black 23-pin RPM input connector. Installation of the remote switch is optional with this feature (see Diamond Logic® Builder for input pin location).
- Customer may mount a switch and install the wiring into the pin labeled 3POS\_SWITCH\_AUX2\_Input in the black 23-pin RPM input connector. Installation of the remote switch is optional with this feature (see Diamond Logic® Builder for input pin location).
- Customer must install wiring from the pin labeled 3POS\_SWITCH\_AUX1\_Output brown 8-pin RPM output connector to the electrical load that is to be controlled (see Diamond Logic® Builder for output pin location).
- Customer must install wiring from the pin labeled 3POS\_SWITCH\_AUX2\_Output brown 8-pin RPM output connector to the electrical load that is to be controlled (see Diamond Logic® Builder for output pin location).

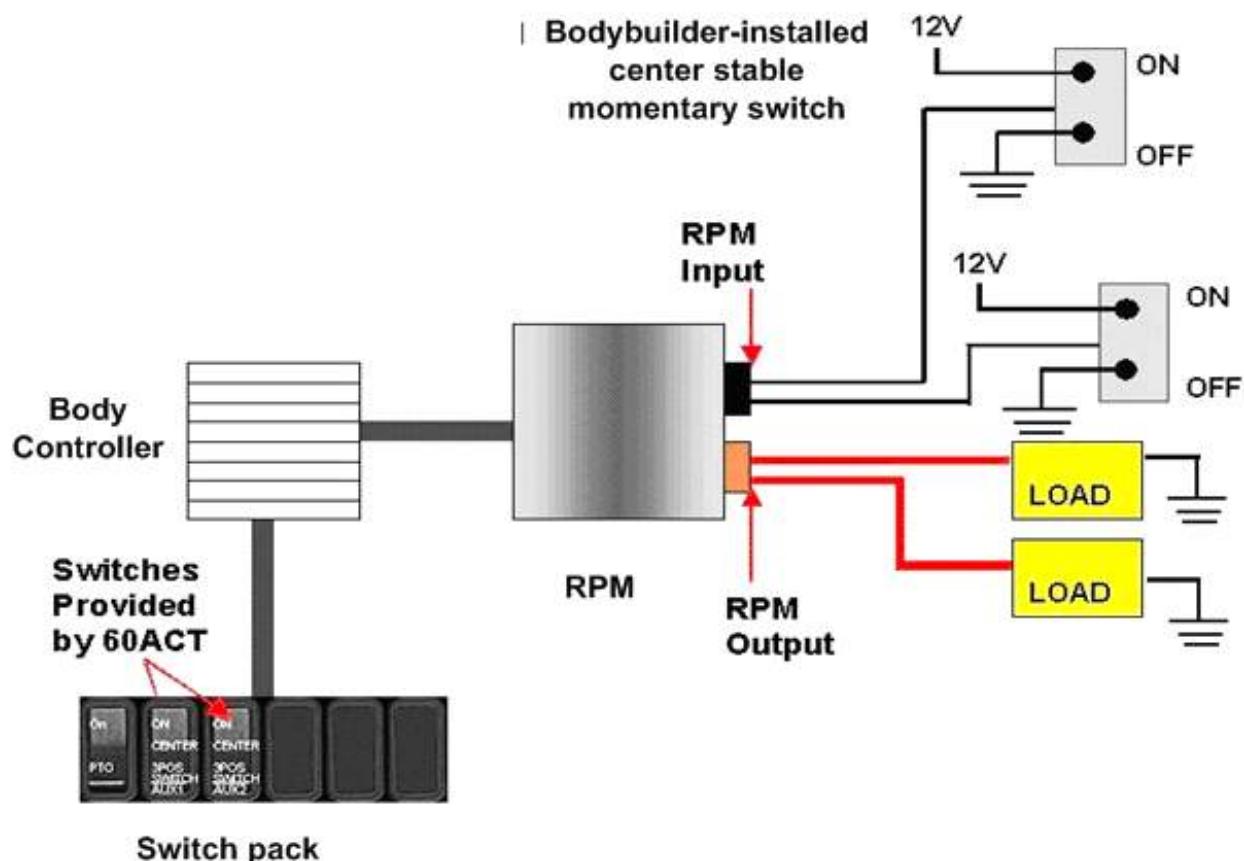


Figure 104

**TESTING**

1. This feature allows the customer the ability to activate the output when the IGN key is turned from off to accessory or IGN. This functionality is obtained by turning the programmable parameters (TEM\_Aux1\_w\_Ext\_Switch\_Init\_State and TEM\_Aux2\_w\_Ext\_Switch\_Init\_State) on.
2. Activate the first remote Body Builder installed switch to 12 volts by using a momentary switch action.
3. Verify that the RPM output labeled 3POS\_SWITCH\_AUX1\_Output is providing the battery volts at rated current levels (as programmed in Diamond Logic® Builder).
4. Verify that the green switch indicator light comes on.
5. Verify that the RPM input labeled 3POS\_SWITCH\_AUX1\_Input is receiving battery volts from the customer-mounted switch (as programmed in Diamond Logic® Builder).
6. Deactivate the first remote Body Builder-installed switch by providing a momentary switch action to GND.
7. Verify that the RPM output goes OFF.
8. Activate the first in-cab switch.

9. Verify that the RPM output labeled 3POS\_SWITCH\_AUX1\_Output is providing the battery volts (as programmed in Diamond Logic® Builder).
10. Verify that the green switch indicator light comes on.
11. Deactivate the first in-cab switch.
12. Activate the second remote Body Builder installed switch to 12 volts by using a momentary switch action.
13. Verify that the RPM output labeled 3POS\_SWITCH\_AUX2\_Output is providing the battery volts at rated current levels (as programmed in Diamond Logic® Builder).
14. Verify that the green switch indicator light comes on.
15. Verify that the RPM input labeled 3POS\_SWITCH\_AUX2\_Input is receiving battery volts from the customer-mounted switch (as programmed in Diamond Logic® Builder).
16. Deactivate the second remote Body Builder installed switch by providing a momentary switch action to GND.
17. Verify that the RPM output goes OFF.
18. Activate the second in-cab switch.
19. Verify that the RPM output labeled 3POS\_SWITCH\_AUX2\_Output is providing the battery volts (as programmed in Diamond Logic® Builder).
20. Verify that the green switch indicator light comes on.
21. Deactivate the second in-cab switch.

**HOW TO ADD THIS FEATURE:**

- Select software feature code 595AKE using Diamond Logic® Builder (see local dealer).
- Programmable parameters must be set using Diamond Logic® Builder (see local dealer).
- The 3-position momentary switch with latching software must be installed in the in-cab switch pack.
- The customer must install wiring from the RPM outputs to the loads that are to be controlled
- The customer may mount a switch (12 volts active and GND de-active) and install the wiring into the RPM inputs (Use the Diamond Logic® Builder software to determine switch and pin location assignments).

## 21.6. 60ACU — THREE MOMENTARY ROCKER SWITCHES/ REMOTE SWITCH CAPABILITY

### FEATURE CODE DESCRIPTION:

60ACU – BDY INTG, SWITCH MOMNTRY 3POS (3) Rocker, Backlit, with "ON" Indicator Mounted on Dash, Latching Software, for 3; Auxiliary Load 20 AMP Maximum; Power Available Only in "IGN" or "Accessory" Position, Output Also Controlled by a Customer Remote-Mounted Switch (requires three RPM inputs and three outputs)

### FEATURE/BODY FUNCTION:

This feature provides three-way switch control function for three RPM outputs. Each RPM output is controlled by an in-cab, 3-position momentary switch and a 3-position momentary Body Builder-installed, remote-mounted switch. These customer-installed, remote-mounted switches must be active at 12 volts and must use GND to deactivate the output. Each in-cab, 3-position momentary switch is connected to a RPM output. In addition, each customer-supplied, remote-mounted momentary switch may be used to control the respective RPM outputs. Thus, three-way switch control action may be performed. The RPM outputs may be turned off or on from either the respective in-cab switch or the respective Body Builder switch; however, an off command from either switch takes precedence and will turn the RPM output off. This feature is useful when a lamp or other load requires control from both in the cab and from a remote location on the body.

The in-cab switches provide green lamps in the top section of the switches to indicate when the RPM outputs are on. The RPM provides active high outputs that will source up to 20 AMPS at battery voltage levels. The output current level may be limited through programmable parameters between .1 and 20 AMPS in .1 AMP increments. This virtual fusing level is controlled in software and mimics the performance of an SAE fuse.

The RPM outputs may be activated with the respective in-cab switches provided that the IGN key is in the accessory or IGN position. The RPM outputs may also be activated with the remote switch inputs with IGN key off or on. It is important to turn off RPM outputs that have been enabled remotely before leaving a parked vehicle with the IGN key off. Otherwise, the system will remain active and drain the batteries.

60AAA or 60AAB is a prerequisite feature that must be ordered along with 60ACU. 60ACU uses three momentary switches in place of three latching switches that are provided with 60AAA and 60AAB. For example, instead of the six latching switches that are provided with 60AAA, a vehicle with 60ACU will have a switch pack of three latching switches and three momentary switches.

→ Please use the Diamond Logic® Builder software to determine pin and switch locations for RPM inputs and outputs and to set programmable parameters (refer to pin and switch location section)

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

\*Software feature codes can be added through the Diamond Logic® Builder. Programmable Parameters are also programmable through the Diamond Logic® Builder.

Required software feature code: 595AKG

Software features that must be removed: NONE

The **TEM\_Aux1\_w\_Ext\_Sw\_Fuse\_Level** parameter sets the amount of current that flows through Auxiliary output 1. If current rises above this level, fusing takes place and the RPM output is shut down.

By turning the **TEM\_Aux1\_w\_Ext\_Switch\_Init\_State** parameter on, the BC forces the RPM auxiliary output 1 to be on whenever the truck's key-state is turned from off to accessory or IGN.

The **TEM\_Aux2\_w\_Ext\_Sw\_Fuse\_Level** parameter sets the amount of current that flows through Auxiliary output 2. If current rises above this level, fusing takes place and the RPM output is shut down.

By turning the **TEM\_Aux2\_w\_Ext\_Switch\_Init\_State** parameter on, the BC forces the RPM auxiliary output 2 to be on whenever the truck's key-state is turned from off to accessory or IGN.

The **TEM\_Aux3\_w\_Ext\_Sw\_Fuse\_Level** parameter sets the amount of current that flows through Auxiliary output 3. If current rises above this level, fusing takes place and the RPM output is shut down.

By turning the **TEM\_Aux3\_w\_Ext\_Switch\_Init\_State** parameter on, the BC forces the RPM auxiliary output 3 to be on whenever the truck's key-state is turned from off to accessory or IGN.

**Table 103**

Parameter	ID	Description	Default	Units	Min	Max	Step
TEM_Aux1_w_Ext_Sw_Fuse_Level	1998	This is the level above which the RPM will fuse the TEM Auxiliary output #1 with external switch.	20	A	0	20	0.1
TEM_Aux1_w_Ext_Switch_Init_State	2032	This programmable parameter sets the init. state of RPM channel used with TEM Auxiliary with external switch #1.	Off	On/ Off	NA	NA	NA
TEM_Aux2_w_Ext_Sw_Fuse_Level	2106	This is the level above which the RPM will fuse the TEM Auxiliary output #2 with external switch.	20	A	0	20	0.1
TEM_Aux2_w_Ext_Switch_Init_State	2142	This programmable parameter sets the init. state of RPM channel used with TEM Auxiliary with external switch #2.	Off	On/ Off	NA	NA	NA

Parameter	ID	Description	Default	Units	Min	Max	Step
TEM_Aux3_w_Ext_Sw_Fuse_Level	2107	This is the level above which the RPM will fuse the TEM Auxiliary output #3 with external switch.	20	A	0	20	0.1
TEM_Aux3_w_Ext_Switch_Init_State	2143	This programmable parameter sets the init. state of RPM channel used with TEM Auxiliary with external switch #3.	Off	On/ Off	NA	NA	NA

### **WIRING INFORMATION**

- Customer may mount a switch and install the wiring into the pin labeled 3POS\_SWITCH\_AUX1\_Input in the black 23-pin RPM input connector. Installation of the remote switch is optional with this feature (see Diamond Logic® Builder for input pin location).
- Customer may mount a switch and install the wiring into the pin labeled 3POS\_SWITCH\_AUX2\_Input in the black 23-pin RPM input connector. Installation of the remote switch is optional with this feature (see Diamond Logic® Builder for input pin location).
- Customer may mount a switch and install the wiring into the pin labeled 3POS\_SWITCH\_AUX3\_Input in the black 23-pin RPM input connector. Installation of the remote switch is optional with this feature (see Diamond Logic® Builder for input pin location).
- Customer must install wiring from the pin labeled 3POS\_SWITCH\_AUX1\_Output brown 8-pin RPM output connector to the electrical load that is to be controlled (see Diamond Logic® Builder for output pin location).
- Customer must install wiring from the pin labeled 3POS\_SWITCH\_AUX2\_Output brown 8-pin RPM output connector to the electrical load that is to be controlled (see Diamond Logic® Builder for output pin location).
- Customer must install wiring from the pin labeled 3POS\_SWITCH\_AUX3\_Output brown 8-pin RPM output connector to the electrical load that is to be controlled (see Diamond Logic® Builder for output pin location).

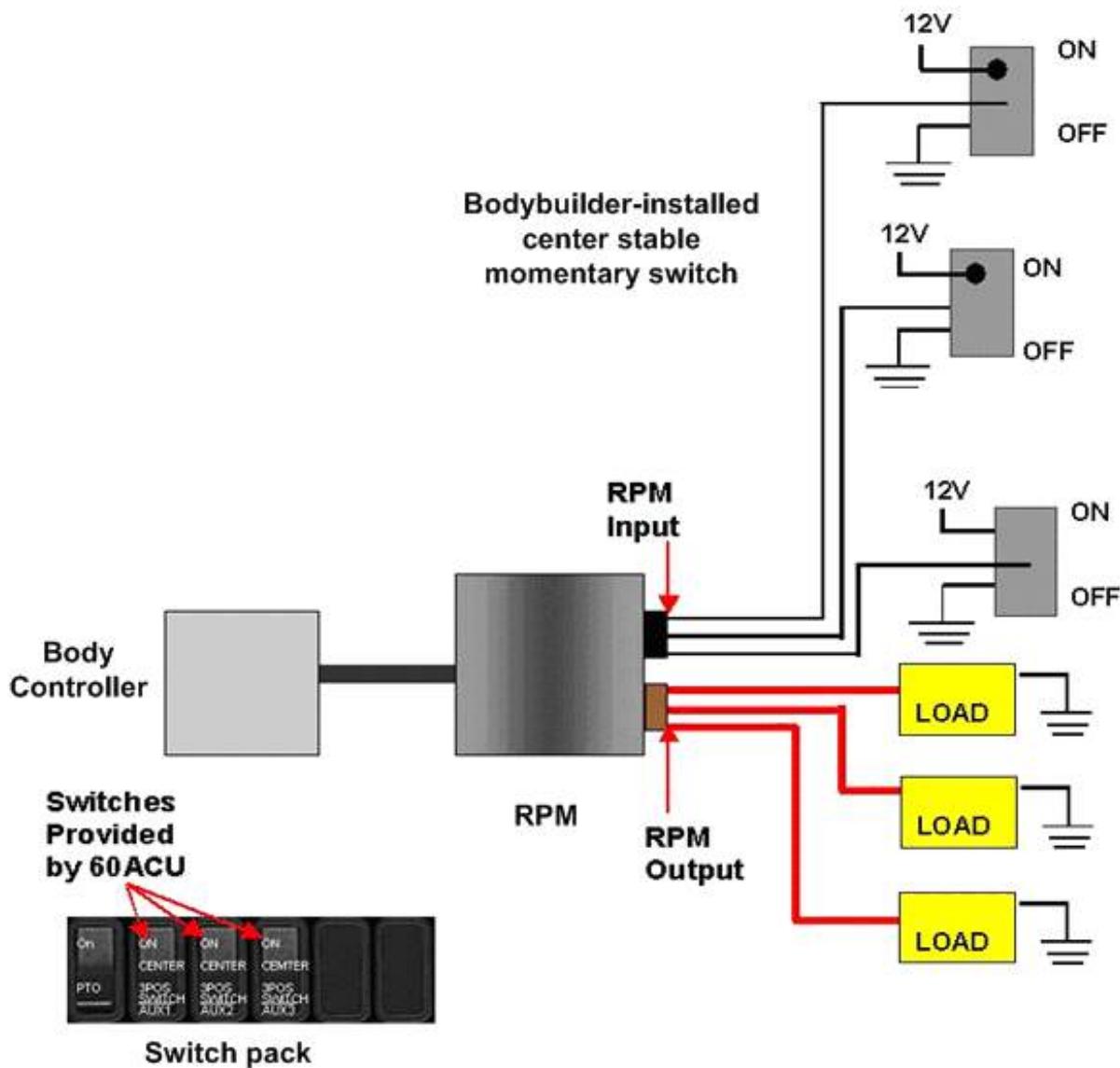


Figure 105

**TESTING**

1. This feature allows the customer the ability to activate the output when the IGN key is turned from off to accessory or IGN. This functionality is obtained by turning programmable parameters (TEM\_Aux1\_w\_Ext\_Switch\_Init\_State, TEM\_Aux2\_w\_Ext\_Switch\_Init\_State or TEM\_Aux3\_w\_Ext\_Switch\_Init\_State) on.
2. Activate the first remote Body Builder installed switch to 12 volts by using a momentary switch action.
3. Verify that the RPM output labeled 3POS\_SWITCH\_AUX1\_Output is providing the battery volts at rated current levels (as programmed in Diamond Logic® Builder).
4. Verify that the green switch indicator light comes on.

5. Verify that the RPM input labeled 3POS\_SWITCH\_AUX1\_Input is receiving battery volts from the customer-mounted switch (as programmed in Diamond Logic® Builder).
6. Deactivate the first remote Body Builder installed switch by providing a momentary switch action to GND.
7. Verify that the RPM output goes OFF.
8. Activate the first in-cab switch.
9. Verify that the RPM output labeled 3POS\_SWITCH\_AUX1\_Output is providing the battery volts (as programmed in Diamond Logic® Builder).
10. Verify that the green switch indicator light comes on.
11. Deactivate the first in-cab switch.
12. Activate the second remote Body Builder installed switch to 12 volts by using a momentary switch action.
13. Verify that the RPM output labeled 3POS\_SWITCH\_AUX2\_Output is providing the battery volts at rated current levels (as programmed in Diamond Logic® Builder).
14. Verify that the green switch indicator light comes on.
15. Verify that the RPM input labeled 3POS\_SWITCH\_AUX2\_Input is receiving battery volts from the customer-mounted switch (as programmed in Diamond Logic® Builder).
16. Deactivate the second remote Body Builder installed switch by providing a momentary switch action to GND.
17. Verify that the RPM output goes OFF.
18. Activate the second in-cab switch.
19. Verify that the RPM output labeled 3POS\_SWITCH\_AUX2\_Output is providing the battery volts (as programmed in Diamond Logic® Builder).
20. Verify that the green switch indicator light comes on.
21. Deactivate the second in-cab switch.
22. Activate the third remote Body Builder installed switch to 12 volts by using a momentary switch action.
23. Verify that the RPM output labeled 3POS\_SWITCH\_AUX3\_Output is providing the battery volts at rated current levels (as programmed in Diamond Logic® Builder).
24. Verify that the green switch indicator light comes on.
25. Verify that the RPM input labeled 3POS\_SWITCH\_AUX3\_Input is receiving battery volts from the customer-mounted switch (as programmed in Diamond Logic® Builder).
26. Deactivate the third remote Body Builder installed switch by providing a momentary switch action to GND.
27. Verify that the RPM output goes OFF.

28. Activate the third in-cab switch.
29. Verify that the RPM output labeled 3POS\_SWITCH\_AUX3\_Output is providing the battery volts (as programmed in Diamond Logic® Builder).
30. Verify that the green switch indicator light comes on.
31. Deactivate the third in-cab switch.

**HOW TO ADD THIS FEATURE:**

- Select software feature code 595AKG using Diamond Logic® Builder (see local dealer).
- Programmable parameters must be set using Diamond Logic® Builder (see local dealer).
- The 3-position momentary switch with latching software must be installed in the in-cab switch pack.
- The customer must install wiring from the RPM outputs to the loads that are to be controlled
- The customer may mount a switch (12 volts active and GND de-active) and install the wiring into the RPM inputs (use Diamond Logic® Builder to determine switch and pin location assignments).