

## 9. LIGHTS

### 9.1. STOP/TURN/TAIL

International provides standard rear stop and turn signal lights on every vehicle. If the bodybuilder 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 1661209C1 or Packard Electric part number 12015857) and seal (International part number 589390C1 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 12085036. 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 with 8' of extra cable.

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:**

None, 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 41

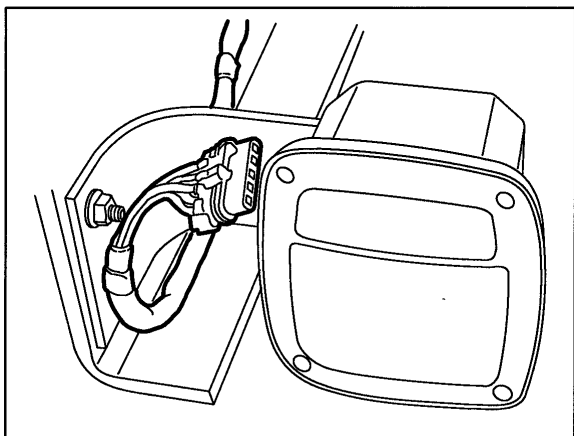
Parts	Part Numbers
Terminal (12 gauge)	2033816C1
Seal	589390C1

**NOTE – Circuit is protected internally by the ESC at 15 amp. If current is close to or exceeds 15 amp, a relay must be added.**

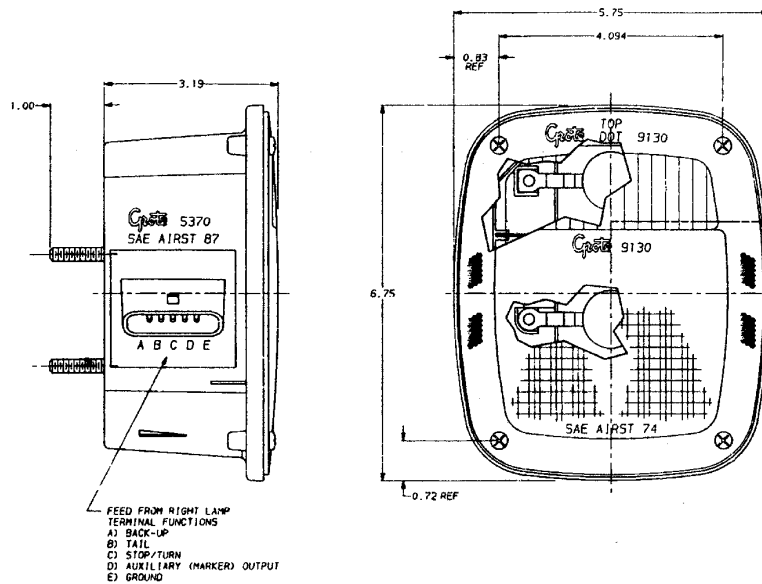
If the rear lighting is to be entirely body mounted, and a connection to the rear harness tail lamp connector is needed, use connector, terminal and seal specified below.

Table 42

Parts	Part Numbers
Connector	1677851C1
Terminal	1687848C1 — 12 Ga.
	2033912C1 — 14 Ga.
Lock	1677914C1
Seal	0589390C1 — 12 Ga.
	0589391C1 — 14 Ga.



**Figure 61 Feed Terminal Location on Left Tail Lamp**



**Figure 62 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 in S08285, Chapter 9, page 13.

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

008HAA – BODY BUILDER WIRING To Rear of Frame, With Stop, Tail, Turn, and Marker Lights Circuits, Ignition Controlled Auxiliary Feed and Ground, Less Trailer Socket

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

This feature is for vehicles that have heavy-duty lighting requirements. This feature has a 30 Amp Ignition Feed. Right and left turn signals can support up to 7 turn lamps per side. Code 08HAA is designed for separate stop and turn lamps only. The 7-wire breakout is located at the back of frame 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: 0595030

Software Feature Codes that must be removed: NONE

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

**Table 43**

Parameter	ID	Description	Default	Units	Min	Max	Step
Park_Light_ Lo_Current	1880	Park and ID Lights Low Current Detection Level (Amps)	0.5	A	0	15	0.1
Park_Light_ Hi_Current	1881	Park and ID Lights High Current Detection Level (Amps)	20	A	0	15	0.1
Park_Light_ OC_Current	1882	Park and ID Lights Open Circuit Detection Level (Amps)	0.5	A	0	15	0.1

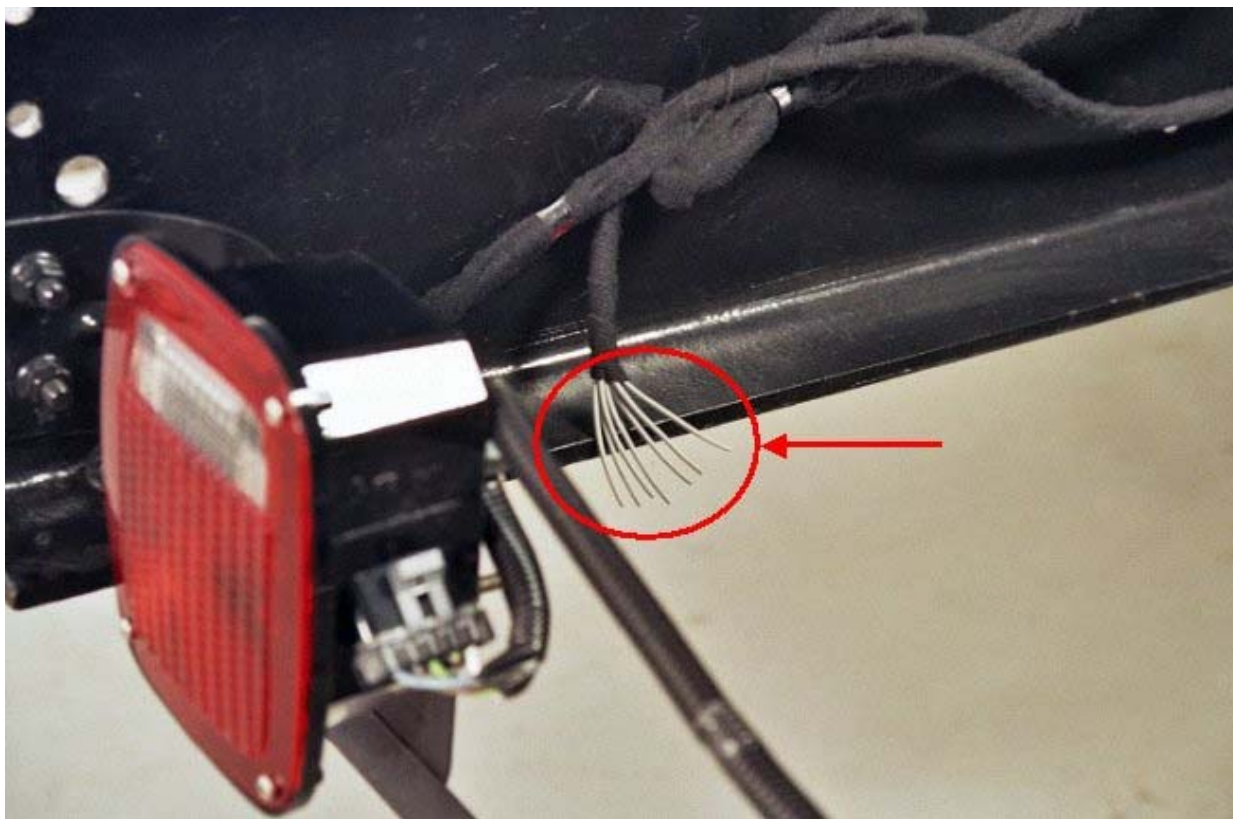
**WIRING INFORMATION:**

08HAA gives 7 wires located at end of frame that are blunt cut.

**Table 44 08HAA**

Cavity	Circuit Number	Maximum Current	Description	Fused by
N/A	R70	30 A	Stop Lights	F2-B1
N/A	R68	20 A	Park Lights	F2-F1
N/A	R94	30 A	Ignition Feed	F2-B2
N/A	R58	20 A	Identification Lights	F2-H1
N/A	R56	15 A	Left Turn	F2-H2
N/A	R57	15 A	Right Turn	F2-F2
N/A	R10	N/A	Ground	

Connector pinout is labeled as Trailer Socket (9734) connector in Chapter 9 page 13 of the circuit diagram book. The connector itself is not supplied and wires are blunt cut.



**Figure 63 Location of 7-Wire Breakout at the End of Frame**

**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 ground.
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 ground.

10. Turn off vehicle left turn signal.
11. Put the vehicle in reverse.
12. Turn key to "ignition" position.
13. Verify that the Ignition 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 Electrical Circuit Diagram Manual S08285 Chapter 9.

**HOW DO I ADD THIS FEATURE:**

Feature 08HAA is not available with code 08HAG and 08HAH Electric Trailer Brake or code 08TME and 08TMG Trailer Connection Socket. 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 the body builder book for obtaining information on obtaining required circuits.

Refer to the 7-Way Socket at End of frame 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 in S08285, Chapter 9, page 10.

#### FEATURE CODE DESCRIPTION:

008HAB – Body Builder wiring, **back of cab** at left frame, includes 7-way sealed connector for tail/amber/backup/accessory power/ground and sealed connectors for combination stop/turn. And a 3-way for separate stop/turn lights.

008HAE – Body Builder wiring, at **end of left frame**, includes 7-way sealed connector for tail/ amber/ backup/ accessory power/ground 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 connectors 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: 0595030

Software Feature Codes that must be removed: NONE

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

**Table 45**

Parameter	ID	Description	Default	Units	Min	Max	Step
Park_Light_Lo_Current	1880	Park and ID Lights Low Current Detection Level (Amps)	0.5	A	0	15	0.1
Park_Light_Hi_Current	1881	Park and ID Lights High Current Detection Level (Amps)	20	A	0	15	0.1
Park_Light_OC_Current	1882	Park and ID Lights Open Circuit Detection Level (Amps)	0.5	A	0	15	0.1

#### WIRING INFORMATION:

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

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

**Table 46 7-Way Connector Information**

Wire Number	Cavity	Gauge	Color	Description	Fuse Rating (Amps)	Available Current (Amps)
68BB	A	14	Brown	Tail Light	20	20
56BB	B	16	Orange	Left Turn Light	10	8
57BB	C	16	Orange	Right Turn Light	10	8
58BB	D	14	Brown	Marker Light	20	20
71BB	E	16	Orange	Back-up Light	10	6
12BB	F	14	Light Blue	Accessory Feed	20	20
11-GBB	G	12	White	Ground	—	

**Table 47 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 48 3-Way Connector Information**

Wire Number	Cavity	Gauge	Color	Description	Fuse Rating (Amps)	Available Current (Amps)
56BC	A	16	Orange	Left Turn Light	10	6
57BC	B	16	Orange	Right Turn Light	10	6
70BB	C	14	Orange	Stop Light	15	15

**Table 49 More 3-Way Connector Information**

Description	Chassis Harness	Body Builder Harness
(4460) 3-Way Connector	1686834C1	3553961C1
Lock	1664408C1	355 4019C1
14 Gauge Seals	589391C1	
16 Gauge Seals	1652325C1	



Table 49 More 3-Way Connector Information (cont.)

Description	Chassis Harness	Body Builder Harness
14 Gauge Terminals	2033816C1	2033912C1
16 Gauge Terminals	2033819C1	2033911C1



Figure 64 7-Way and 3-Way Connectors for 08HAB (Back of Cab)



Figure 65 7-Way and 3-Way Connectors for 08HAE (End of Frame)

**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 taillight 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 ground.

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 ground.
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 “ignition” 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 taillight 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 ground.
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 ground.
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 “ignition” 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 DO I 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 the body builder book for obtaining information on obtaining required circuits.

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

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

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

**FEATURE / BODY FUNCTION:**

Feature code 08NAA provides 8 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 rear of frame on both the right and left frame rail per view below. The loose harness connector is covered with a sealed connector, if standard taillights 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 P/N for the 08NAA extension harness is 3547275C91.

**Table 50 Left Side Connector**

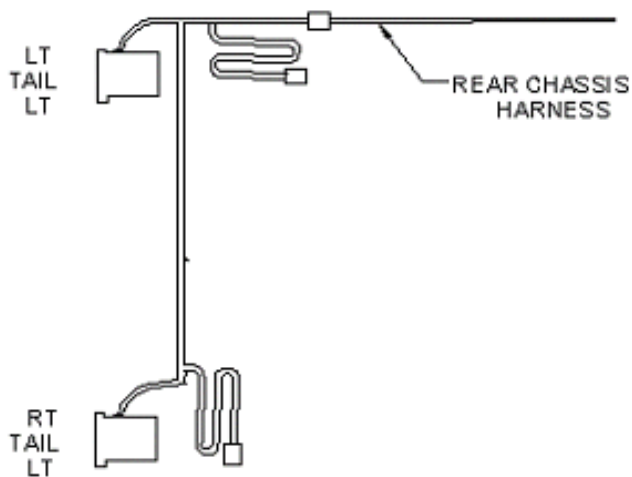
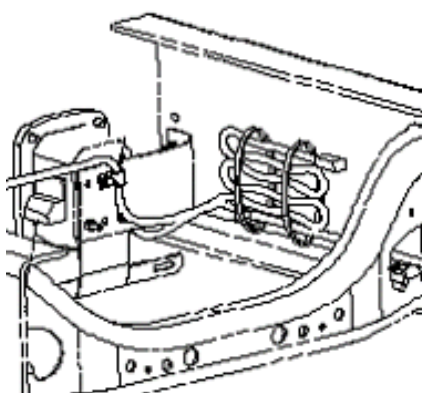
Connector Cavity Information and Parts Required to connect to OEM Connector					
Connector P/N	Cavity	Circuit #	Description	Term P/N	Seal P/N
1677851C1	A	S71H	Back Up	2033911C1	589391C1
	B	S68F	Tail	2033911C1	589391C1
	C	S56E	Stop/ Turn	2033911C1	589391C1
	D	Plug	—	2033911C1	589391C1
	E	S10—GF	Ground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

**Table 51 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	Ground	2033911C1	589391C1

Plug P/N – 587579C1

Connector Lock P/N – 1677914C1



W/08NAA

**Figure 66**

#### **HOW DO I 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

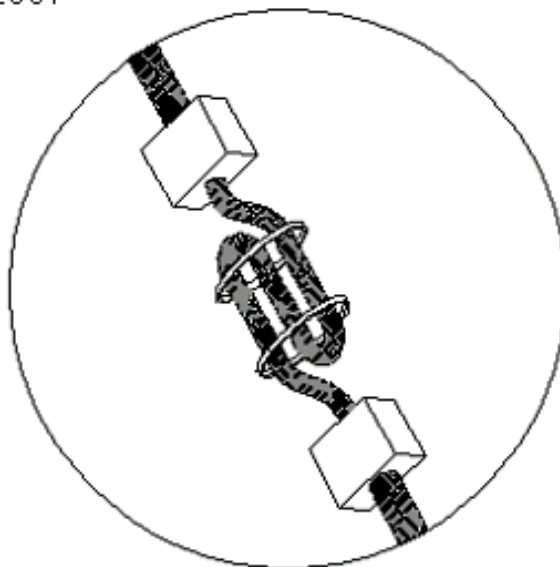
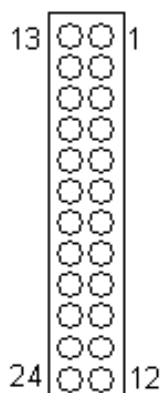
**FEATURE / BODY FUNCTION:**

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 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 67**

**HOW DO I ADD THIS FEATURE:**

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

## 9.2. TRAILER SOCKETS

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

Refer to the Circuit Diagram in S08285, Chapter 9, page 13.

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

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

08TMG-TRAILER CONNECTION SOCKET 7-Way; Mounted at Rear of Frame, 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 "End Of The Frame". These 7-way sockets provide ignition controlled fused 30 Amp center pins for trailer antilock brake systems. 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: 595012, 595015 and 595030.

Software Feature Codes that must be removed: NONE

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

**Table 52**

Parameter	ID	Description	Default	Units	Min	Max	Step
Park_Light_ Lo_Current	1880	Park and ID Lights Low Current Detection Level (Amps)	0.5	A	0	15	0.1
Park_Light_ Hi_Current	1881	Park and ID Lights High Current Detection Level (Amps)	20	A	0	15	0.1
Park_Light_ OC_Current	1882	Park and ID Lights Open Circuit Detection Level (Amps)	0.5	A	0	15	0.1

#### **WIRING INFORMATION:**

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



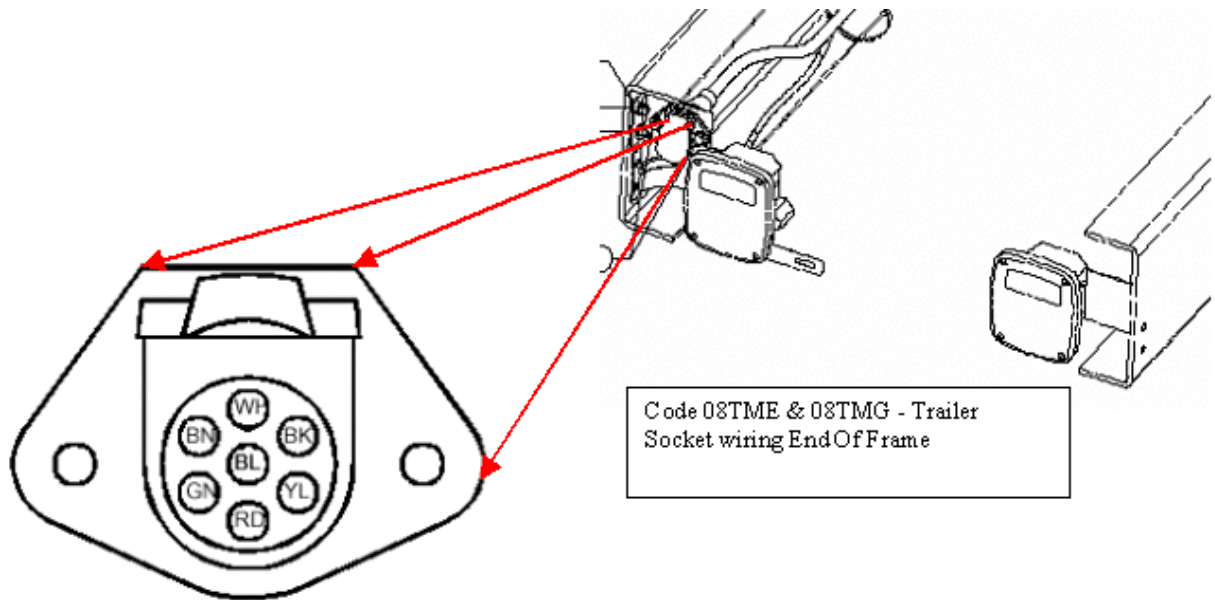


Figure 68 Trailer Socket (Mating End View)

Table 53 Electrical Description of 08TME

Circuit Description	Fused	Available Current	Color
Ground	~	~	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 54 Electrical Description of 08TMG

Circuit Description	Fused	Available Current	Color
Ground	~	~	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 taillights 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 ground.
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 ground.
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 ignition 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 taillights 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 ground.
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 ground.
  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 ignition key is in the accessory position.
  14. Release brake pedal.

**HOW DO I 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 the body builder's book to obtain information on circuits and components. You MUST have the circuit diagram manual that applies to your vehicle to complete the installation.

The installation requires additional fuses and relays be added to the PDC in the Engine Compartment. 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 that you get will be numbered and correspond to the circuits outlined in the circuit diagram book.

### 9.3. FOG/DRIVING LIGHTS

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

Refer to the Circuit Diagram in S08285, Chapter 7, page 7.

#### **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 69 4007 (ESC J1)



Figure 70 Fog Light Switch in Switchpack

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: 595019 (and 595161 for 08585)

Software Feature Codes that must be removed: NONE

If the current in the fog light circuit falls below the level set by the **Fog\_Light\_Lo\_Current** parameter, the ESC will illuminate the "Check Electrical System" warning light in the gauge cluster and will register a fault code.

If the current in the fog light circuit exceeds the level set by the **Fog\_Light\_Hi\_Current** parameter, the ESC will shut off the circuit, illuminate the "Check Electrical System" warning light in the gauge cluster, and register a fault code.

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

**Table 55**

Parameter	ID	Description	Default	Units	Min	Max	Step
Fog_Light_ Lo_Current	1877	Fog Lights Low Current Detection Level (Amps)	0	A	0	20	0.1
Fog_Light_ Hi_Current	1878	Fog Lights High Current Detection Level (Amps)	20	A	0	20	0.1
Fog_Light_ OC_Current	1879	Fog Lights Open Circuit Detection Level (Amps)	0	A	0	20	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.

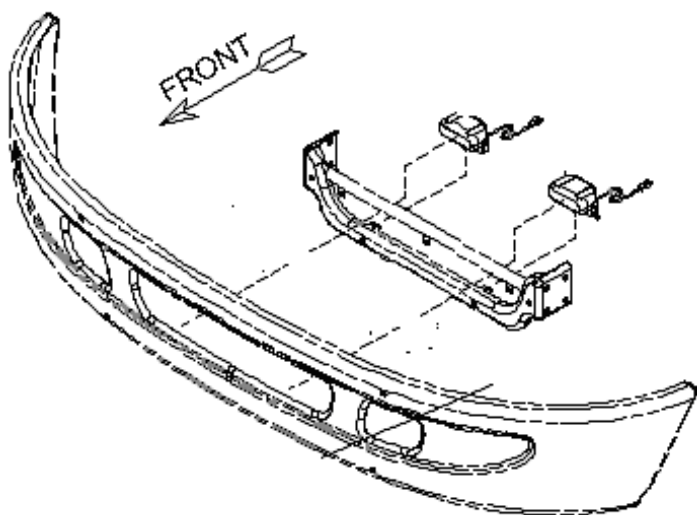
Care must be taken when adding fog lamps as lamps may have a ground wire and also have a grounded base. Be sure that the feed circuit, cavity A, the connector at front of frame, is not connected to ground.

The circuit is rated at 20 amp and is protected internally by the ESC.

Mating connector P/N 587568C91

Terminal (16 gauge) P/N 587575C1

Seal P/N 1652325C1

**Figure 71**

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

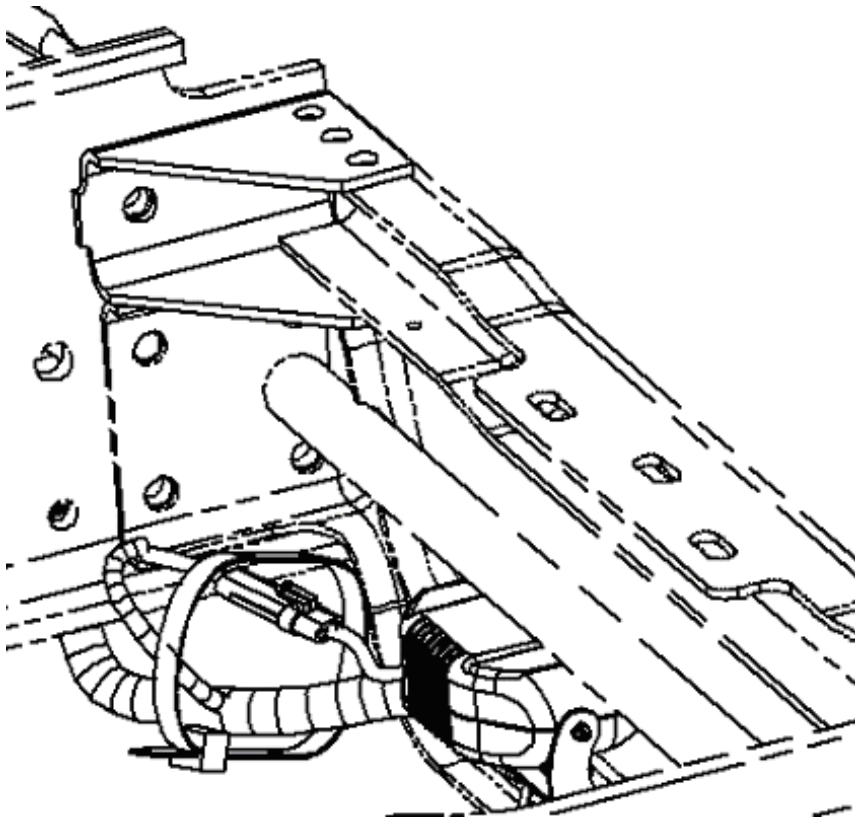
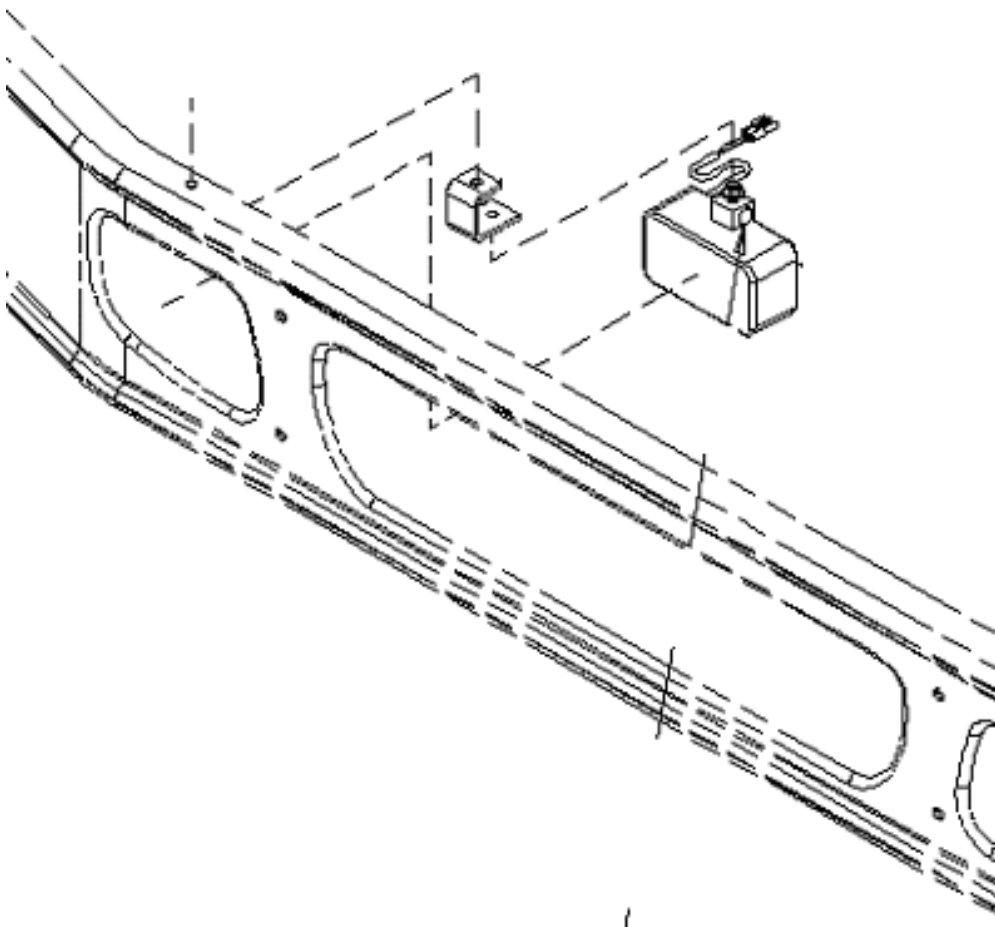


Figure 72 View of Fog Lamp Breakout



**Figure 73 View of Bumper Mounting — 7000 Models**

**TESTING:**

1. Activate Fog Light Switch with the ignition key on and the headlamp switch on the low-beam mode.
2. Verify that pin A (labeled Fog\_Light) on the Brown ESC output connector (#4007) is 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 DO I ADD THIS FEATURE:**

- Software feature code 595019 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Install fog light switch (part number 3563064C1) in the designated switch pack location. Use ICAP or the Diamond Logic™ Builder software to determine the fog light switch assignment after the software has been programmed into the ESC.

- Set the desired programmable parameters for each signal using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Customer must wire the desired load into the pin A in the Brown ESC output connector (#4007 – Hood)

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 ignition switch before starting Procedure to avoid injury.**

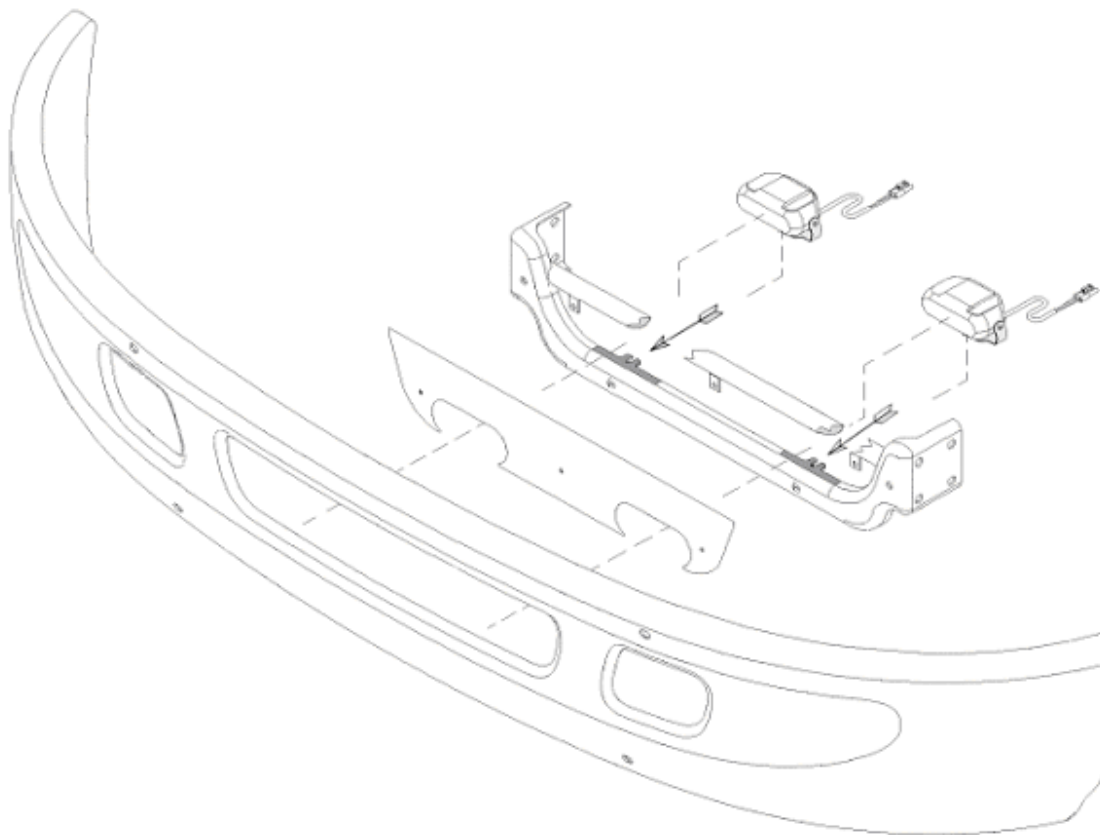
**Description:** This document addresses installation, Switching, and Programming of fog lights on International 4200, 4300, 4400, and 8500 trucks.

**Table 56** 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.



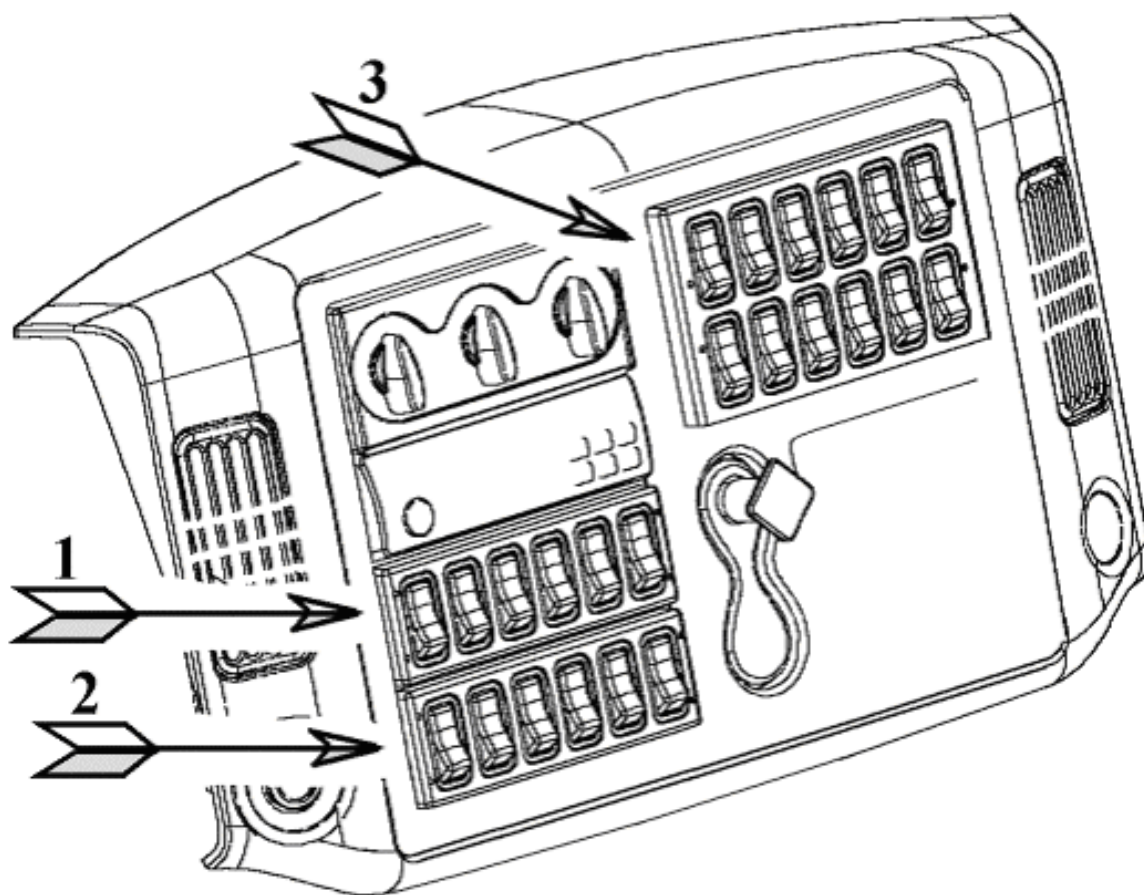


**Figure 74 Front View with Attachment Points**

#### **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 (p/n 3549776C4) in Location Two. Additional switch blanks (p/n 3533950C1) may be needed to cover unused switch locations.



**Figure 75 Control Panel**

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

### **Wiring Fog Lights**

Wire fog lights according to wiring diagram Figure below.

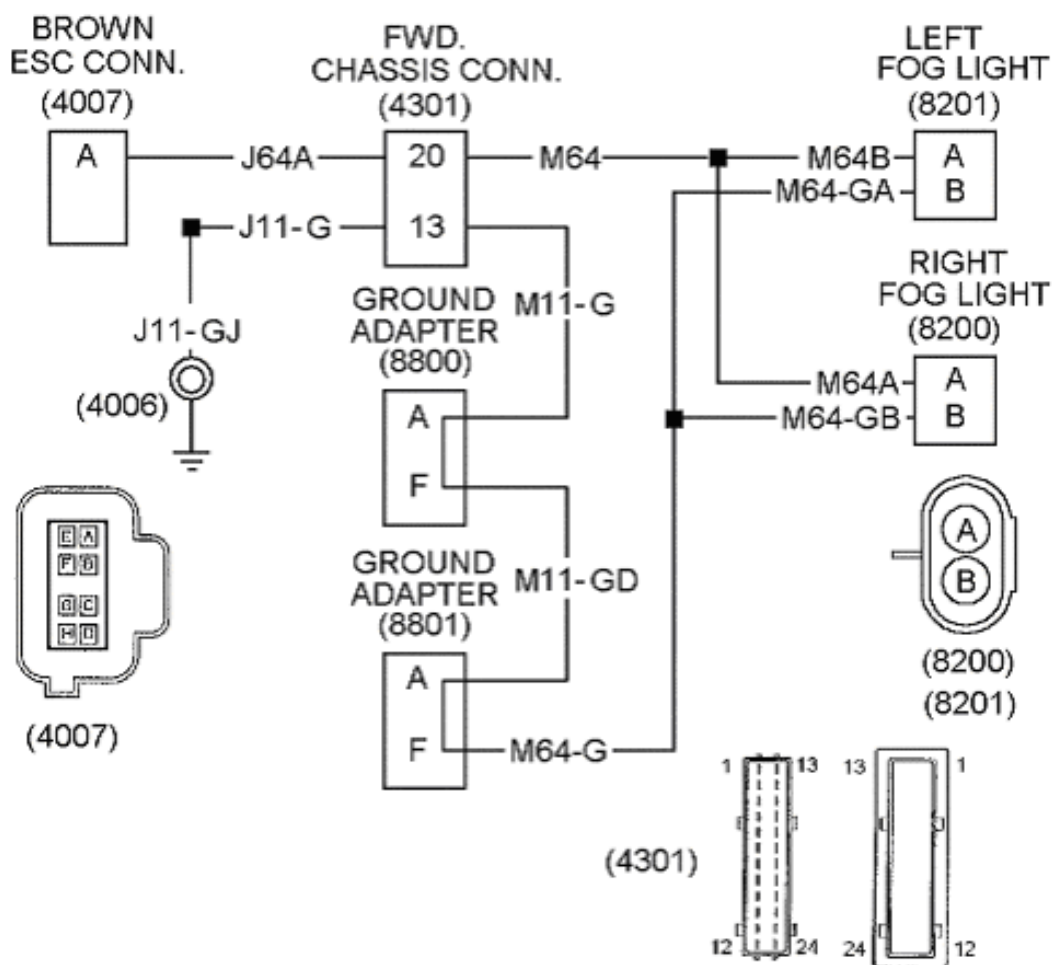


Figure 76 Wiring Diagram

### Programming Fog Lights

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

Table 57 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

**Table 57 Fog Light Kit — Clear (cont.)**

Part Number	Description
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 58 Fog Light Kit — Clear**

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

## 9.4. WORK LIGHT / AUX. REAR LIGHT

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

Refer to the Circuit Diagram in S08285, Chapter 7, page 7.

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

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

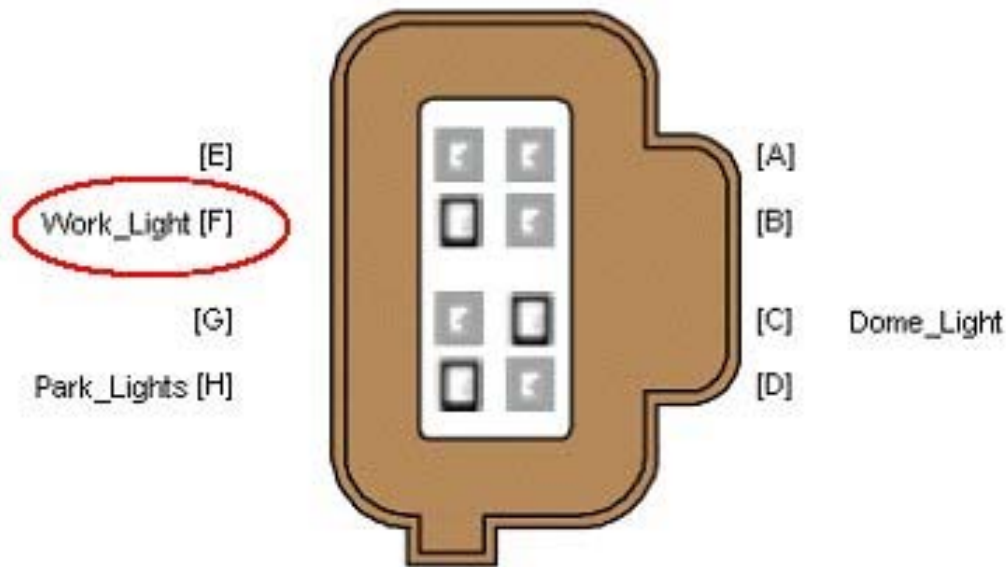
08WMA – SWITCH, TOGGLE, FOR WORK LIGHT Lighted; on Instrument Panel and Wiring Effects for Customer Furnished Back of Cab Light

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

With the International installed work light (08WLL), nighttime trailer hook-ups are made easier with a work light mounted at the back of the cab on tractors. This light illuminates the fifth wheel area of the vehicle. Both features include a switch in the instrument panel, which illuminates when the switch is on. These feature provide the ability to activate either an in-cab load (Pin F of ESC connector #1601), an out-of-cab load (Pin F of ESC connector #4007), or both depending on the pin selected and as long as the total load does not exceed 10 amps.

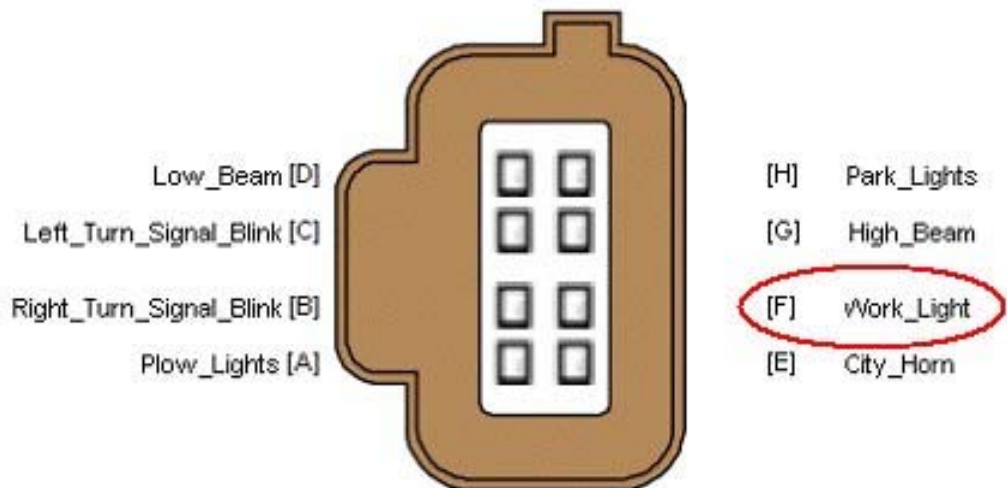
The feature without the light (08WMA) can be used to satisfy any number of electrical needs for vehicles with straight truck brakes (4091) such as lights inside dry van boxes, small pumps, and illumination to aid in various job functions.

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 by an International dealer. 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.



Connect to this pin for an In-cab load

Figure 77 1601 (ESC J3)



Connect to this pin for an Out-of-cab load

Figure 78 4007 (ESC J1)



**Figure 79 Work Light Switch in 3-Switchpack Below and Left of Gauge Cluster**

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

Required Software Feature Codes:

**08WLL:** 595250

**08WMA:** 595250, 595168

Software Feature Code that must be removed: 595025

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 ignition 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 ESC 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 ESC 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 59**

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 ignition key is turned off. If this value is set to 6, the work light will remain on for 60 minutes after the ignition 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

Parameter	ID	Description	Default	Units	Min	Max	Step
Work_Light_Hi_Current	1899	Work Light High Current Detection Level (Amps)	10	A	0	10	0.1
Work_Light_OC_Current	1900	Work Light Open Circuit Detection Level (Amps)	0	A	0	10	0.1

**WIRING INFORMATION:**

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

**Table 60 Parts Required to Connect to Work Light Cable**

Connector P/N	Lock P/N	Term P/N	Seal P/N
1661778C1	1661874C1	1661872C1	1661872C1

**Table 61 Terminals Designed for 16-Gauge Wire**

Connector Cavity	Circuit Number	Circuit Description
A	J65*	Work Light Feed
B	J65-G**	Work Light Ground
* "16BK" for 7000 Models		
** "J11-GK for 7000 models		





**Figure 80** Arrow Indicates Location of Work Light Connector (Straight Truck)



**Figure 81 Arrow Indicates Location of Work Light (Tractor)**

**TESTING:**

1. Activate Work Light Switch.
2. Verify that Pin F (labeled Work\_Light) on the Brown ESC output connector (#4007) and/or Pin F (labeled Work\_Light) on the Brown ESC output connector (#1601) 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 DO I ADD THIS FEATURE:**

- For 08WLL, the Software feature code 595250 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer)

- For 08WMA, the Software feature codes 595250 and 595168 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Use ICAP or 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 ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Customer must wire the desired load into the pin labeled Work\_Light on either the Brown ESC output connector (#4007 – Hood) or the Brown ESC output connector (#1601 – Inside Cab)
- Customer must install a 3-position momentary rocker switch (Part Number 3549804C91) in the far right position of the 3-switch switchpack below and to the left of the gauge cluster. The switch is backlit with an amber light (Part Number 3533928C1) for better viewing during night operations. The switch has a green indicator light (Part Number 3578733C1) in the top half of the switch to indicate when the work light is on.

## 9.5. AUXILIARY FRONT LIGHTS

### 08THJ — Auxiliary Harness

Refer to the Circuit Diagram in S08285, Chapter 8, page 9.

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

08THJ – AUXILIARY HARNESS 3.0' for Auxiliary Front Head Lights 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, a feature code is available to connect to added lamps.

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 ignition 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: 595099

Software Feature Code that must be removed: 595019

If the current in the plow lights circuit falls below the level set by the **Plow\_Lights\_Lo\_Current** parameter, the ESC will register a fault code.

If the current in the plow lights circuit exceeds the level set by the **Plow\_Lights\_Hi\_Current** parameter, the ESC will shut off the circuit and register a fault code.

The **Plow\_Lights\_OC\_Current** parameter should be left at its factory default of zero.

**Table 62**

Parameter	ID	Description	Default	Units	Min	Max	Step
Plow_Lights_OC_Current	1916	Plow Lights Open Circuit Detection Level (Amps)	0	A	0	20	0.1

Parameter	ID	Description	Default	Units	Min	Max	Step
Plow_Lights_Hi_Current	1917	Plow Lights High Current Detection Level (Amps)	20	A	0	20	0.1
Plow_Lights_Lo_Current	1918	Plow Lights Low Current Detection Level (Amps)	0	A	0	20	0.1

### **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 ESC.

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

**Table 63 Aux. Connector Circuit Identification**

Circuit Number	Cavity	Function
64HI	A	Hi Beam
11–G	B	Ground
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 82**

To mate with the chassis harness use the following

**Table 64 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 (See ICAP or 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 DO I 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 is equipped with Fog lights, that feature will have to be removed and circuit J64A removed from connector 4007 at the ESC.

**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**

This instruction sheet covers installation of Auxiliary light wiring, switch and programming.

**Dash Harness (3588838C91)**

- 1. Disconnect Battery Power.
- 2. Disconnect System Controller Connector (4007 Brown). Insert terminals from service harness (3588838C91) as shown below:

System Controller	
BROWN	4007
CIR	CAV
64AB	A
53LO	D
52HI	G



Figure 83

Remove and tape or shrink-wrap any already existing terminals. Reconnect Connector.

- 3. Remove cover from power distribution center (PDC). Insert into mini fuse block M-2 (4002) the following relay terminals:

Relay Block 4002	M-2
CIR	CAV
64G	D1
53LO	D2
53B	E1
64LO	F1
64AB	F2
64GA	G1
52HI	G2
52B	H1
64HI	J1
64C	J2

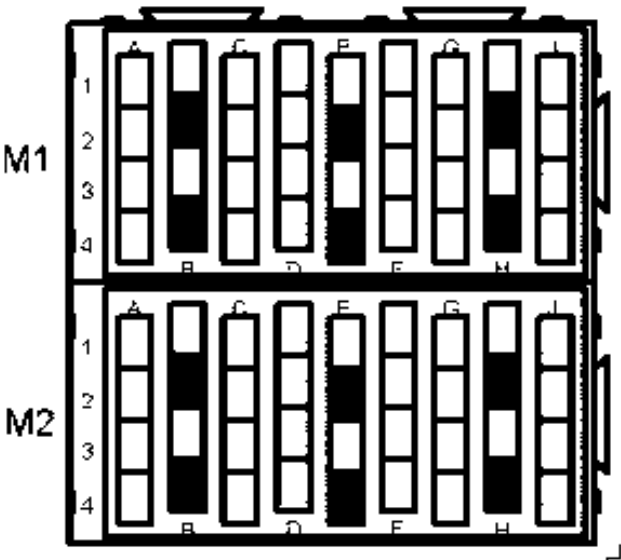


Figure 84

Insert (2) relays (3519350C1) into fuse block and lock with 3536085C1(2) and 3555642C1.

4. Insert terminals into the Dash to Forward Chassis Harness connector on the dash side (4301) as shown below:

Dash Fwd Chassis	
CIR	CAV
52B	4
53B	5
64LO	20

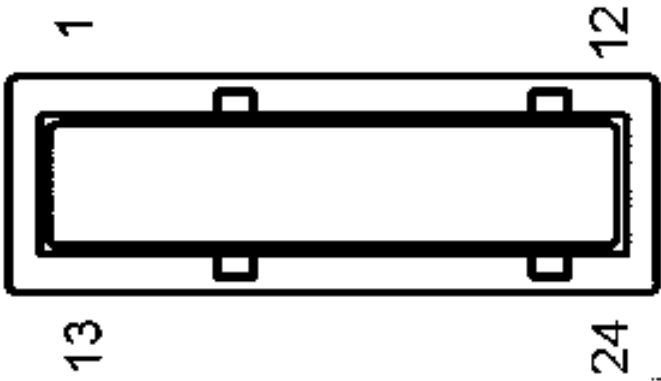


Figure 85

Remove and tape or shrink-wrap any already existing terminals.

5. Insert circuit 64HI into auxiliary connector (4305M) part number 2039311C91 in cavity "A" as shown:



AUX Conn	4305M
CIR	CAV
64HI	A



Figure 86

Plug remaining cavities with plug (587579C1) and insert lock (2039342C1).

6. Tie – Wrap service harness as necessary

Forward Chassis Harness (3560224C92)

1. Insert terminals into the Forward Chassis to Dash harness connector on the forward chassis harness side as shown below: Remove and tape or shrink-wrap any already existing terminals. Route harness along existing harness and tie wrap as needed. Note on some 4000 series models, service harness may need to be routed on engine side of washer bottle, to allow enough length for horn and radiator ground to connect. Re-connect Dash to forward chassis connectors. **NOTE: If this connector exists on service harness, remove terminals, lock, seal and discard connector, lock and seal.**
2. Connect Dash 7-Way connector (2039312C91) to Forward chassis 7-Way connector (2039311C91).
3. Connect horn connector, radiator ground to service harness connectors, taping away existing connectors.
4. Connect left and right headlight/turn signal connectors using service harness connectors, taping away existing connectors.
5. Tie – Wrap service harness as necessary.

Fwd Chassis Dash	4300
CIR	CAV
52B	4
53B	5
56B	9
85E	10
57B	11
58B	12
M11G	13
64LO	20

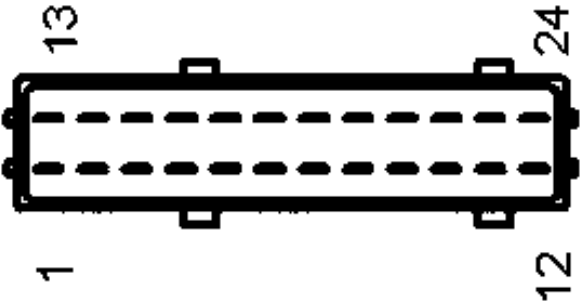


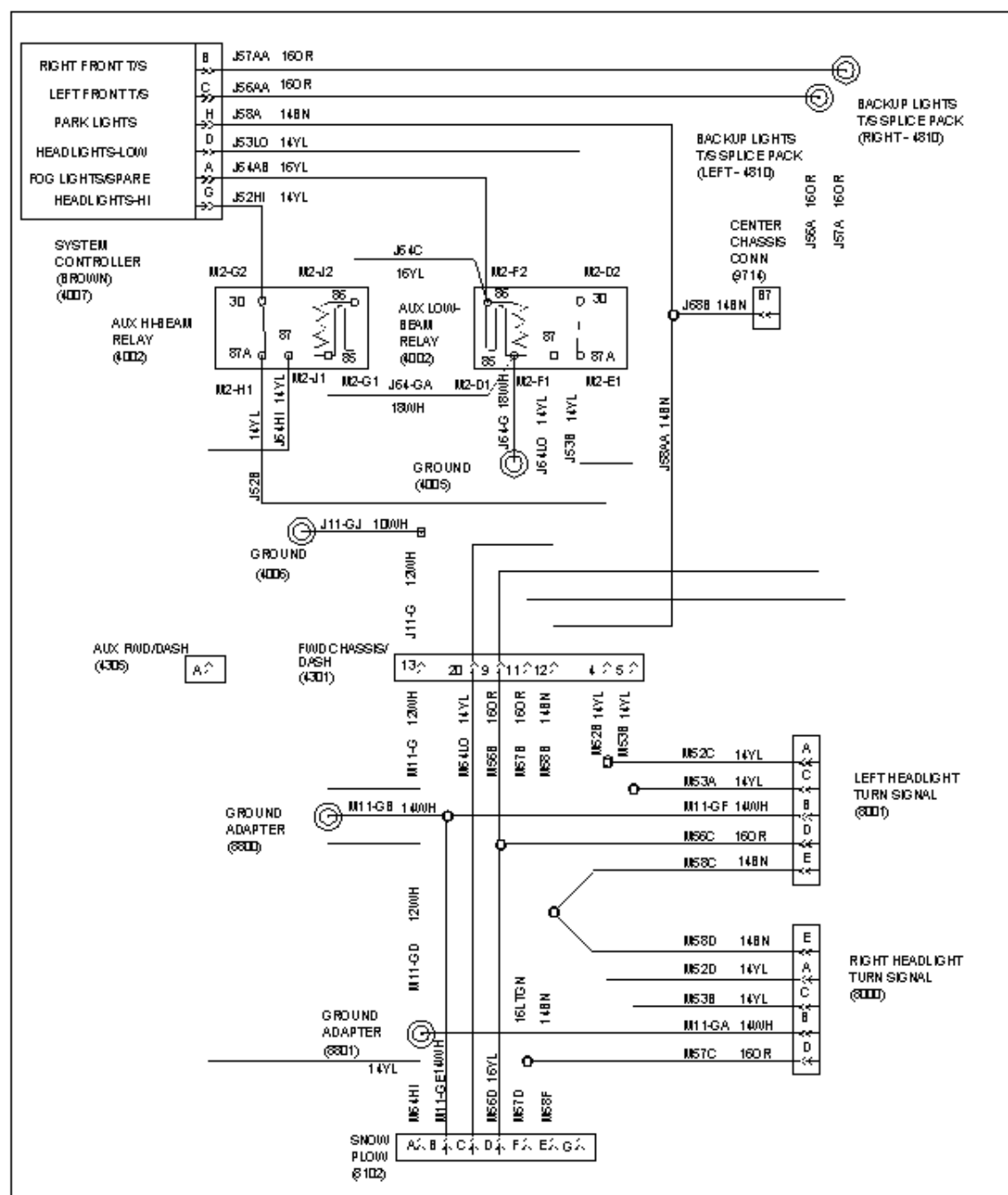
Figure 87

### Programming and Switch

Reprogram ESC using ICAP or the Diamond Logic™ Builder software (See authorized International Dealer). If vehicle is equipped with fog lights (595019), this feature must be removed prior to adding Snow Plow lights (595099). ICAP or the Diamond Logic™ Builder software will determine the location of the plow light switch.

**Table 65 2585355C91 KIT, AUXILIARY (SNOWPLOW) LIGHT**

Part	Quantity	Description
3560224C92	1	HARNESS, CHASSIS WIRING*, BASE W/SNOW PLOW LIGHTS
2039312C91	1	BODY, CONNECTOR*, 7 WAY METRI-PACK 280 SERIES, SEALED - FEM
2039342C1	2	LOCK, CONNECTOR BODY*, NULL
3588838C91	1	HARNESS, AUXILIARY HEAD LIGHT WIRING, AUX HEADLIGHTS (SNOWPLOW)
3519350C1	2	RELAY, ELECT-HORN ETC, MICRO SPDT
3555642C1	2	PLUG, FILLER*, CAVITY BLOCK FOR MICRO RELAY BLOCK
3536085C1	2	LOCK, CONNECTOR BODY, LOCK – 280 ALPHABLOCK SECONDARY, MULTI
2039311C91	1	BODY, CONNECTOR*, 7 WAY METRI-PACK 280 SERIES, SEALED - MAL
3563066C1	1	SWITCH, ELECTRONIC*, PLOW LIGHT
3578733C1	1	LIGHT, INDICATOR*, LED ON (GREEN) 1.0 CANDLEPOWER
3533928C1	1	LIGHT, INDICATOR*, LED BACKLIGHT (AMBER)
587579C1	13	PLUG, FILLER*, SEALING WEATHERPACK-GREEN
289862C1	20	STRAP, CABLE LOCK, CABLE LOCK
2585356R1	1	MANUAL, INST SHT AUX LT KIT



**Figure 88** Extra Connector (2039312C91), Plugs (587579C1) and Lock (20393342C1) are provided for weather protection when Aux lights are not connected

**08THV — Front Guide Post Lights****FEATURE CODE DESCRIPTION:**

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 bodybuilder 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

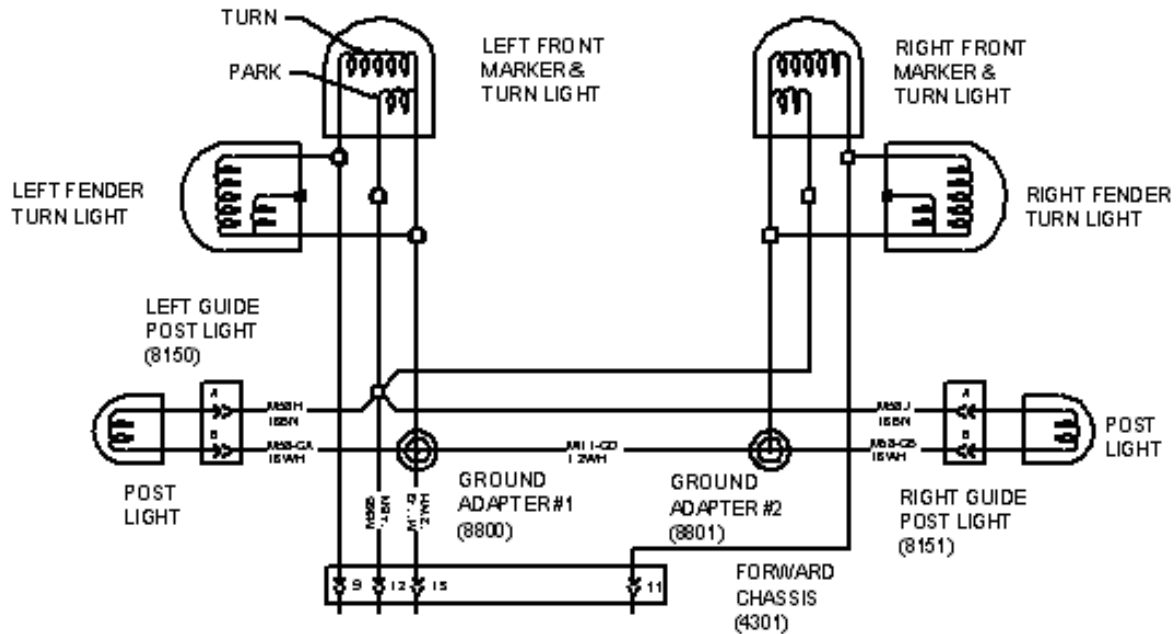
**WIRING INFORMATION:**

Figure 89

**Table 66 Connector Cavity Information and Parts Required**

Connector		Circuit #			Term	Seal
P/N	Cavity	Left Side	Right Side	Gauge	P/N	P/N
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 DO I 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 the body builder book.

## 9.6. 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.

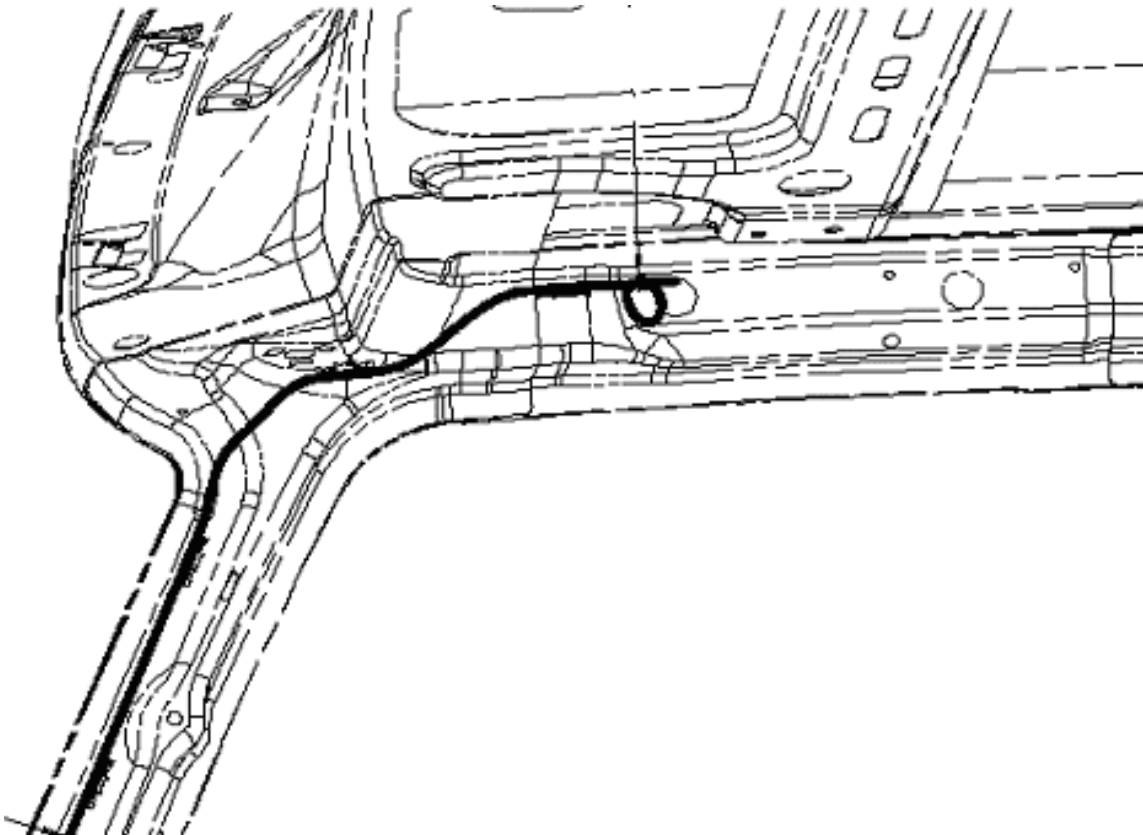
#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS: NONE

#### WIRING INFORMATION:

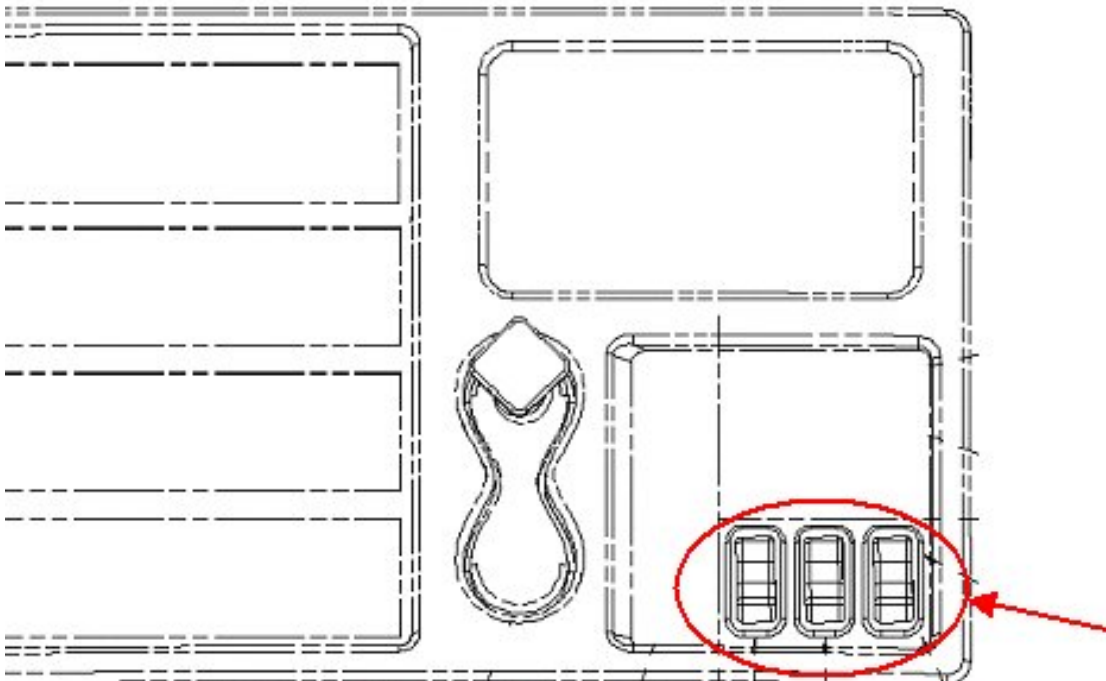
The wiring in the roof includes both ground and feed circuits and the circuits are blunt cut covered with heat shrink sleeve. The ground is circuit is WHITE and the feed is BROWN.

Switch Part Number: **3557932C1**

Switch Label: **"Roof Aux"**



**Figure 90 View Of Right Pillar And Roof Area, Viewed From Inside Vehicle**



**Figure 91 The Switch Controlling the Aux Roof Circuit Will Be In One Of The 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 ignition 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 meltable 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 DO I 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 the body builders book.

## 9.7. 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.**

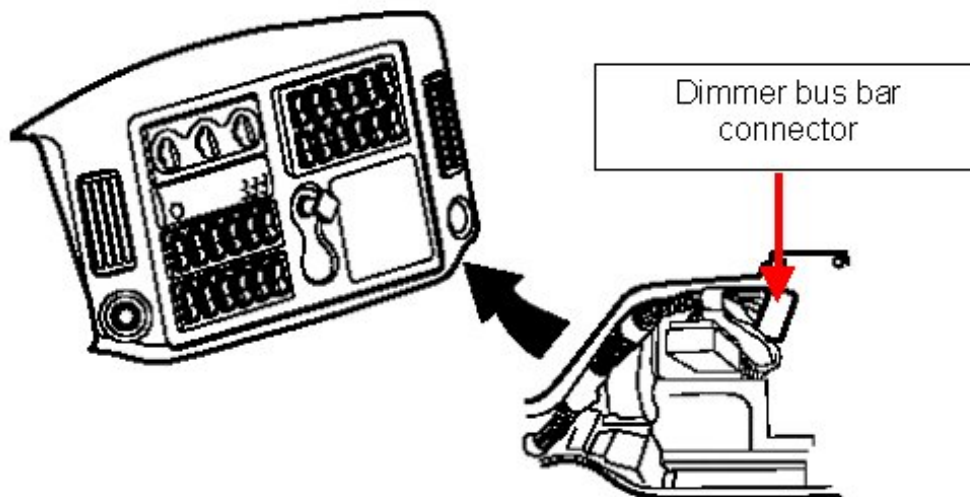
#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

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 92**

To connect to this circuit, remove the lock from the wire side of the buss 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.**

Reinstall 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.

## 9.8. 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 ICAP or the Diamond Logic™ Builder software.

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required Software Feature Codes: 0595021 or 0595229 (BUS)

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 67**

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 DO I 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.

## 9.9. 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 & 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 ICAP or 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: 595018

Software Feature Codes that must be removed: NONE

**Table 68**

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 ignition 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 ignition 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 ignition 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 ignition switch to Accessory with the Park Brake off and verify that the low beam headlights are off.

**HOW DO I ADD THIS FEATURE:****LOWW**

(1) Activate the LOWW\_Enabled parameter using ICAP or the Diamond Logic™ Builder software.

**DTRL**

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

---

## 9.10. 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

AND 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 ESC does not control this lamps 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 PP 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 PP is set at FLEET access.

**Table 69**

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: 595296

Software Feature Codes that must be removed: NONE

**Table 70**

Parameter Name	Parameter ID#	Parameter Description	Default Settings	Units	Minimum Value	Maximum Value	STEP
Ext_Lamp_Test_Seq_Time	PV-262	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 DO I ADD THIS FEATURE:**

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

## 9.11. 08WRB — HEADLIGHTS ON WITH WIPERS

### **FEATURE CODE DESCRIPTION:**

08WRB: Headlights will automatically turn on if windshield wipers are turned on.

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

This feature is a software only feature, no hardware is needed. It will automatically turn the headlights on while the windshield wipers are activated. It will also shut the headlights off once the windshield wipers are deactivated.

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

Required software feature code: 595134

Software Feature Codes that must be removed: NONE

### **WIRING INFORMATION:**

None required.

### **TESTING:**

Turn headlights off if they are on.

Turn on windshield wipers.

Check and see if lights are on.

**CAUTION – Continuous use of wipers without fluid can damage wipers and/or windshield.**

### **HOW DO I ADD THIS FEATURE:**

Enable the Software feature code using ICAP or the Diamond Logic™ Builder software (see local dealer).



## 10. HVAC

### 10.1. 16WKB — AIR CONDITIONING

Refer to the Circuit Diagram in S08285, Chapter 11, pages 1 and 2.

#### **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 weather sealed splice techniques to tap into wire J77B at the ESC. The added load required by the body builder should not exceed 2 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 ESC determines when this wire shall 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. This control wire shall be OFF as necessary to protect the A/C compressor.

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

#### **WIRING INFORMATION:**



**Figure 93 Location: ESC on Engine Compartment Side**

LOCATION: ESC on the engine compartment side

WIRE GAUGE: 16GA

WIRE NUMBER/COLOR: J77B-LTGN

ESC CONNECTOR (4008): 3548933C1 (BLUE) Pin G

LOCK: 3548943C1

TERMINAL: 3535930C1

SEAL: 3535936C1

CIRCUIT DIAGRAM: See Electrical Circuit Diagram Manual S08285 Chapter 11

### **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 AC 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 (J77B, K77A) 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**

#### **Pre 2004 Emission DT 466 and 530 Engines**

Hose, A/C assy accumulator to compressor (for I6) - 2585758C91

Hose, A/C assy condenser to evaporator (for I6) - 2585759C91

#### **Post 2004 Emission DT 466 and 570 Engines, Low Cab Mount**

Hose, A/C assy accumulator to compressor (for I6) - 2588940C91

Hose, A/C assy condenser to evaporator (for I6) - 2585759C91

#### **Post 2004 Emission DT 466 and 570 Engines, Mid High Cab**

Hose, A/C assy accumulator to compressor (for I6) - 2588941C91

Hose, A/C assy condenser to evaporator (for I6) - 2585759C91

#### **For VT 365 Engines**

Hose, A/C assy accumulator to compressor (for V8) - 2585760C91

Hose, A/C assy condenser to evaporator (for V8) - 2585761C91

#### 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 AC system.
2. Remove the AC hose from the condenser to the evaporator and install the new hose.
3. Remove the AC hose from the accumulator to the compressor and install the new hose.
4. Install the AC hose from the new evaporator to the aux. fitting on the newly installed hose from the condenser to the evaporator.
5. Install the AC 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 AC system will result in improper lubrication and lead to premature component failure.

8. Operate the vehicle to make sure the AC is performing properly and is not leaking.

---

## 11. AUTOMATIC TRANSMISSION INTERFACES

### 11.1. AUTOMATIC TRANSMISSION INTERFACES

#### **FEATURE CODE DESCRIPTIONS:**

13ACS – TRANSMISSION, AUTOMATIC {Allison 2000P SERIES} 5-Speed, With Overdrive, With PTO Gear, Less Retarder

13ACE – TRANSMISSION, AUTOMATIC {Allison HD-4560P} Wide Ratio, 5-Speed; With PTO Gear, With Oil Level Sensor and Less Retarder

13ACG – TRANSMISSION, AUTOMATIC {Allison HD-4560P} Wide Ratio, 6-Speed; With PTO Gear, With Oil Level Sensor and Less Retarder

13ABB – TRANSMISSION, AUTOMATIC {Allison MD-3060P} Close Ratio, 5-Speed; With PTO Gear and Less Retarder

13ABW – TRANSMISSION, AUTOMATIC {Allison MD-3066P} Close Ratio, 5-Speed; With PTO Gear and Less Retarder

13ABA – TRANSMISSION, AUTOMATIC {Allison MD-3060P} Close Ratio, 6-Speed; With PTO Gear and Less Retarder

13ABH – TRANSMISSION, AUTOMATIC {Allison MD-3560P} Wide Ratio, 6-Speed; With PTO Gear and Less Retarder

13ABV – TRANSMISSION, AUTOMATIC {Allison MD-3066P} Close Ratio, 6-Speed; With PTO Gear and Less Retarder Oil Level Sensor and Less Retarder

13ABJ – TRANSMISSION, AUTOMATIC {Allison MD-3560P} Wide Ratio, 5-Speed; With PTO Gear and Less Retarder

13ADM – TRANSMISSION, AUTOMATIC {Allison 3000EVS\_P} Close Ratio, 6-Speed; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13ADN – TRANSMISSION, AUTOMATIC {Allison 3000EVS\_P} Close Ratio, 5-Speed; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13ADP – TRANSMISSION, AUTOMATIC {Allison 3500EVS\_P} Wide Ratio, 6-Speed; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13ADR – TRANSMISSION, AUTOMATIC {Allison 3500EVS\_P} Wide Ratio, 5-Speed; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13ADS – TRANSMISSION, AUTOMATIC {Allison 4000EVS\_P} Close Ratio, 5-Speed; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13ADU – TRANSMISSION, AUTOMATIC {Allison 4500EVS\_P} Wide Ratio, 5-Speed; Includes Oil Level Sensor, With Provision for PTO, Less Retarder

13WTA – ALLISON WT SPARE INPUT/OUTPUT for General Truck, Utility, Refuse, Dump, Bus and Pickup and Delivery

13WTB – ALLISON WT SPARE INPUT/OUTPUT For Dump/Construction With Two-Speed Axle or Auxiliary Transmission

13WTE – ALLISON WT SPARE INPUT/OUTPUT for Fire Truck/Emergency Vehicles

13WTK – ALLISON WT SPARE INPUT/OUTPUT for Sewer Evacuator

13WTL – ALLISON WT SPARE INPUT/OUTPUT for Refuse With Automatic Neutral for PTO

**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 chose the transmission and optional electrical interface feature that is right for your equipment application. Allison electrical interface connections are optional equipment on International vehicles. You must choose one of the features described below to receive a cable harness interface connection on your 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.

13WTA – This feature provides a spare input/output on an Allison WT transmission for customers with a General Truck, Utility, Refuse, Dump, Bus or Pickup and Delivery application.

13WTB – This feature provides a spare input/output on an Allison WT transmission for customers with a Dump/Construction application with a Two-Speed axle or auxiliary transmission.

13WTE – This feature provides a spare input/output on an Allison WT transmission for customers with Fire Truck or Emergency application.

13WTK – This feature provides a spare input/output on an Allison WT transmission for customers with Sewer Vacuum application.

13WTL – This feature provides a spare input/output on an Allison WT transmission for customers with a refuse application that requires Automatic Neutral for a PTO.

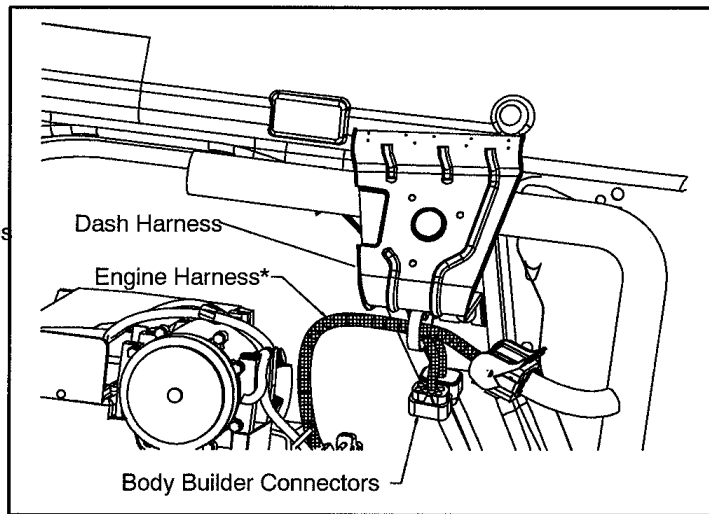
**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** NONE

**WIRING INFORMATION:**

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

With the Allison MD, HD and 2000/2400, the interface connection is located under the windshield wiper motor bracket.

Connectors Located on Front of Dash Panel, Driver's Side for the MD Series Transmissions



Connectors 7506 and 7206 have their mating connectors attached filled with cavity plugs. To use connectors, remove cavity plugs and use the following:

**Figure 94**

With the MD and HD, there are two connectors – 7205 and 7206. Connectors 7506 and 7206 have their mating connectors attached filled with cavity plugs. To use connectors, remove cavity plugs and use the following:

**Table 71**

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	

Harness Connectors Viewed from Mating End

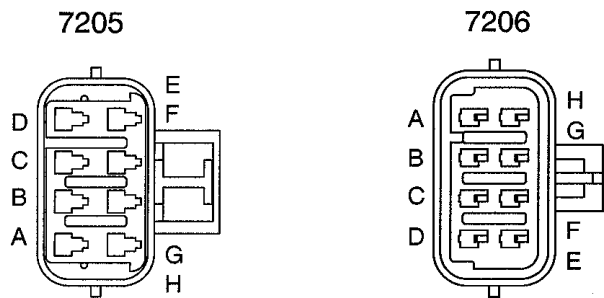
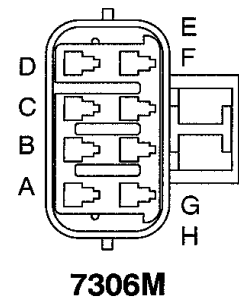


Figure 95

The Allison 2000/2400 has one connector – 7306M. Connector 7306M has its mating connector attached and filled with cavity plugs. To use connector, remove cavity plugs and use the following:

Table 72 Mating Connector for 7306M

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



Harness Connectors  
Viewed from Mating End

Figure 96 7306M

The circuit numbers on the harness correspond to the circuit numbers used by Allison. The table below gives the MD circuit and connector cavity information. For a complete circuit diagram of the Transmission wiring, and for connector and terminal part numbers, see vehicle circuit diagram book.

**Table 73**

Cavity	Circuit Number	I/O	Maximum Current	Description
Connector Number 7205				
A	L92B161	—	—	Signal Ground
B	Plug	—	—	—
C	Plug	—	—	—
D	L92#125	Output	500 mAmp	Retarder Indicator
E	Plug	—	—	—
F	L92#167	Output	—	Output Speed Indicator
G	L92#105	Output	500 mAmp	Sump/ Retarder Temp. Overheat Indicator
H	L92#137	Input	—	Service Brake Status
Connector Number 7206				
A	L92#155	Input	—	Auxiliary Function Range Inhibit
B	L92#117	Input	—	Auto Neutral for PTO
C	L92C161	—	—	Signal Ground
D	L92#118	Input	—	Fire Truck Pump Mode
E	L92#153	Input	—	Auxiliary Hold
F	L92#114	Output	500 mAmp	Range Indicator
G	L92#112	Output	500 mAmp	PTO Enable 2
H	Plug	—	—	—
NOTE 1: See Allison technical manual for suggested circuit design.				
NOTE 2: See special features table below for package content.				
<b>NOTE 3: MUST COMPLY WITH FMVSS STANDARD #102.</b>				

The table below gives the 2000/2400 circuit and connector cavity information. For a complete circuit diagram of the Transmission wiring, and for connector and terminal part numbers, see vehicle circuit diagram book.

**Table 74 Circuit and Connector Cavity Information**

Cavity	Circuit Number	I/O	Maximum Current	Description
Connector 7306M				
A	L92C128	—	—	Signal Ground
B	L92#106	Input	—	PTO Enable
C	L92#119	Output	500 mAmp	PTO Enable 2
D	L47C126	Output	—	Non- Zero Crossing Speedo (16 Pulses/ Rev)



**Table 74 Circuit and Connector Cavity Information (cont.)**

Cavity	Circuit Number	I/O	Maximum Current	Description
E	L92#111	Input	—	Auxiliary Function Range Inhibit
F	L92#108	Input	—	Auto Neutral for PTO
G	L92#121	Output	500 mAmp	Range Indicator
H	L92#122	Output	—	Output Speed Indicator

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.

**Table 75 Spare Input/ Output Package Content**

CODE		13WTA#	13WTB#	13WTE#	13WTK#	13WTL@
Group		70	73	71	75	73
Package		113	146	117	150	142
Other requirements		None (Max Feature Pkg.)	Two Speed Axle	Fire Truck or Crash Truck (Max Feature Pkg.)	Sewer Evacuator (Max Feature Pkg.)	Refuse with Automatic Neutral for PTO (Max Feature Pkg.)
Fun No.	Function Name	Wire Number (For Body Builder Use)				
Features That Are Enabled When Vehicle is Shipped:						
I-A	Secondary Shift Schedule	M	M	M	M	M
I-C	PTO Enable	118	118			118
I-H	Engine Brake and Preselect Request	119/ 169	119/ 169	119/ 169	119/ 169	119/ 169
I-Q	Two- Speed Axle Enable		153			
I-Y	ABS Input	154	154	154	154	154
I-Z	Retarder Enable	163	163	163	163	163
I-AA	Service Brake Status	137	137	137	137	137
I-AG	Auto Neutral for Refuse Packer and PTO Enable					153/ 117
O-A	Engine Brake Enable	132	132	132	132	132

**Table 75 Spare Input/ Output Package Content (cont.)**

CODE		13WTA#	13WTB#	13WTE#	13WTK#	13WTL@
Group		70	73	71	75	73
Package		113	146	117	150	142
Other requirements		None (Max Feature Pkg.)	Two Speed Axle	Fire Truck or Crash Truck (Max Feature Pkg.)	Sewer Evacuator (Max Feature Pkg.)	Refuse with Automatic Neutral for PTO (Max Feature Pkg.)
Fun No.	Function Name	Wire Number (For Body Builder Use)				
O-B	Sump/ Retarder Temperature Indicator	105	105	105	105	105
O-C	Range Indicator	114		114 (4th)	114 (4th)	
O-D	Output Speed Indicator A	167	167	167	167	167
O-G	PTO Enable	112	112			112
O-J	Two- Speed Axle Enable		114			
O-Q	Retarder Indicator	125	125	125	125	125
O-S	Neutral Indicator for PTO					114
<b>Feature Input Functions Available for Aftermarket Use:</b>						
I-D	Shift Selection Transition					155*
I-E	Auxiliary Function Range Inhibit (STD)	155*	155*		155*	
I-G	Auxiliary Hold	153				
I-J	Fire Truck Pump Mode			117/ 118*		
I-L	Auto Neutral for PTO (STD)	117*				
I-W	Direction Change Enable	177*			177*	
I-AJ	4th Gear Lockup for Pump Mode				117/ 118*	

**Table 75 Spare Input/ Output Package Content (cont.)**

CODE		13WTA#	13WTB#	13WTE#	13WTK#	13WTL@
Group		70	73	71	75	73
Package		113	146	117	150	142
Other requirements		None (Max Feature Pkg.)	Two Speed Axle	Fire Truck or Crash Truck (Max Feature Pkg.)	Sewer Evacuator (Max Feature Pkg.)	Refuse with Automatic Neutral for PTO (Max Feature Pkg.)
Fun No.	Function Name	Wire Number (For Body Builder Use)				
Feature Output Functions Available for Aftermarket Use:						
O-I	Engine Overspeed Indicator				112	

**NOTES:**

M = Mode Button Located on Shift Tower

# = Not Available with Code 13AAZ

@ = Requires Code 13AAZ, Automatic Neutral

\* = Not Activated

**NOTE – Add 13WTW – ALLISON WT SPARE INPUT/OUTPUT Automatic Neutral for Refuse Packer With Service Brake Status**

**Group 77, Package 152**

**CIRCUIT NUMBERS SAME AS 13WTL. IN FUNCTION NAME SECTION, ADD (WITH SERVICE BRAKE STATUS) IN ROW I-AG**

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## 12. POWER WINDOWS / LOCKS, REMOTE KEYLESS ENTRY

### 12.1. 16WJU, 16WJV AND 16WKZ — ELECTRIC WINDOWS, REMOTE LOCK AND UNLOCK, AND USE OF THE AUX FEATURE

Refer to the Circuit Diagram in S08285, Chapter 3, page 4.

**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 97** Driver's Side Door Pod



**Figure 98 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.

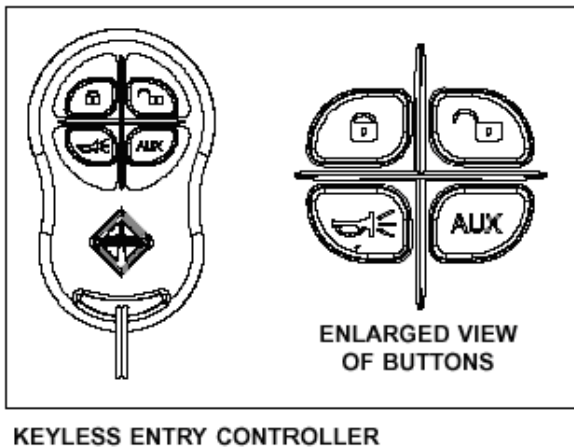
The Key FOB controls the following functions:

- 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 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 ignition on, if Wheel Based Vehicle Speed is above the AutoLock speed, the park brake was release 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 autolock 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 autolock feature to lock the doors again when the speed conditions are met.

**NOTE – Horn chirp, autolock are programmable parameters.**



**Figure 99 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 Electrical System Controller is required to operate the horn, panic, and dome light functions with RKE.

### Procedure For Erasing All Learned Transmitters

1. Cycle the Ignition from Off to On. Step 2. must be initiated (all four buttons pressed) within 10 seconds of this Ignition 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. 6 or 7 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 Ignition cycle must be initiated to perform any transmitter learning.

### Procedure For Learning A Transmitter

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

1. Cycle the Ignition from Off to On (leaving the Ignition on will not work, it must be cycled). Step 2. must be initiated (all four buttons pressed) within 10 seconds of this Ignition 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. 6 or 7 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: 595129

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 ignition 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 76**

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: 595107
- 16WJV: 595108

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



**Table 77**

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

**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, some other systems can be activated but, only one. For example, the Aux button could turn on headlights or hazard lamps, not both.

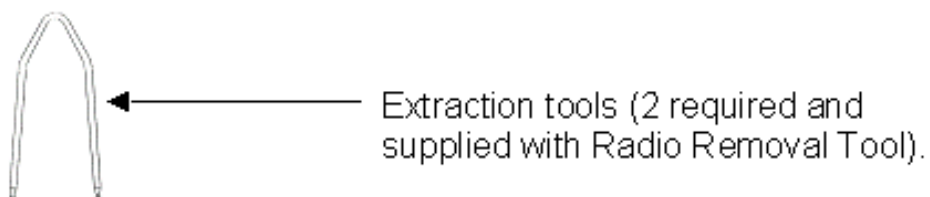
**HOW TO ADD THIS FEATURE:**

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 595129 must be enabled on the vehicle using ICAP or 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 ICAP or 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:**

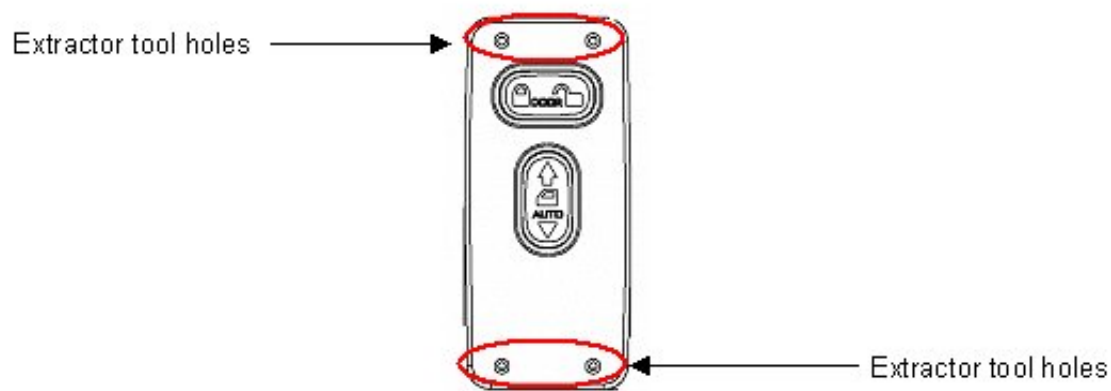
To remove the door pod use the DIN Radio Removal Tool part number 2504954C1.



Extraction tools (2 required and supplied with Radio Removal Tool).

**Figure 100**

Insert the extraction tools (2) into the two holes on either side of the pod housing until the locking tabs are fully depressed. The pod can then be removed from the door panel and the extraction tools removed.



**Figure 101**

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

## 13. ELECTRIC TRAILER BRAKES / LIGHTS

### 13.1. 08HAG AND 08HAH — ELECTRIC TRAILER BRAKES

Refer to the Circuit Diagram in S08285, Chapter 9, page 27.

#### FEATURE CODE DESCRIPTION:

08HAG – ELECTRIC TRAILER BRAKE/LIGHTS Accommodation Package to Rear of Frame; 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 on the left side of the steering column. The circuits include a ground circuit, an electric brake feed to electric trailer brakes, a 30 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 customer.

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required software feature codes: 595030, 595203

Software feature codes that must be removed: NONE

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

**Table 78**

Parameter	ID	Description	Default	Units	Min	Max	Step
Park_Light_Lo_Current	1880	Park and ID Lights Low Current Detection Level (Amps)	.5	A	0	15	0.1
Park_Light_Hi_Current	1881	Park and ID Lights High Current Detection Level (Amps)	20	A	0	15	0.1
Park_Light_OC_Current	1882	Park and ID Lights Open Circuit Detection Level (Amps)	.5	A	0	15	0.1

#### WIRING INFORMATION

Inside the cab, locate the breakout (under the instrument panel on the left side of the steering column) and connect leads to the electric brake controller.

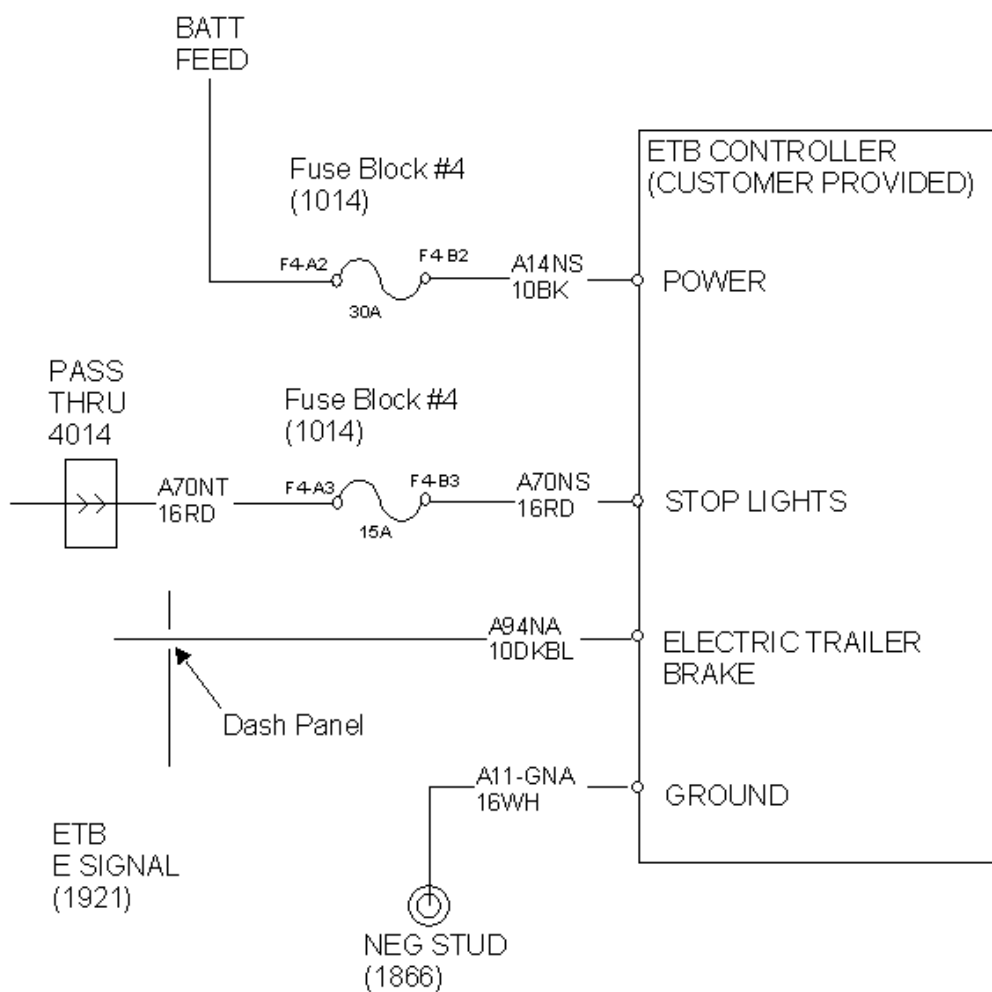


Figure 102

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

**Table 79**

Circuit	Wire Color	Wire Gauge
Power feed to the controller	Black	10
Stop lamp feed	Red	16
Feed to electric trailer brakes	Dark Blue	10
Ground	White	16

08HAG and 08HAH give 7 wires located at end of frame that are blunt cut. Also give 4 wires located under cab Instrument Panel.

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

**Table 80**

Circuit Number	Maximum Current	Description/ Labeled	Color
<b>08HAG and 08HAH Label Number 9724 CH09_13 of circuit diagram book</b>			
R70	30 A	Stop Lights	Red
R68	20 A	Park Lights	Brown
R94	30 A	Trailer Brake	Dark Blue
R58	20 A	Identification Lights	Black
R10	N/A	Ground	White
<b>08HAG Label Number 9724 CH09_13</b>			
R56	15 A	Left Turn	Yellow
R57	15 A	Right Turn	Light Green
<b>08HAH Label Number 9724 CH09_13</b>			
R56	15 A	Left/ Stop Turn	Yellow
R57	15 A	Right/ Stop Turn	Light Green
<b>08HAG and 08HAH Label ETB CONTROLLER CH09_27</b>			
ADJ11-GNA	—	GROUND SIGNAL	White
A14NS	30 A	POWER SUPPLY SIGNAL	Black
A70NS	15 A	STOP LIGHTS	Red
A94NA	20 A	ELEC BRAKE SIGNAL	Dark Blue

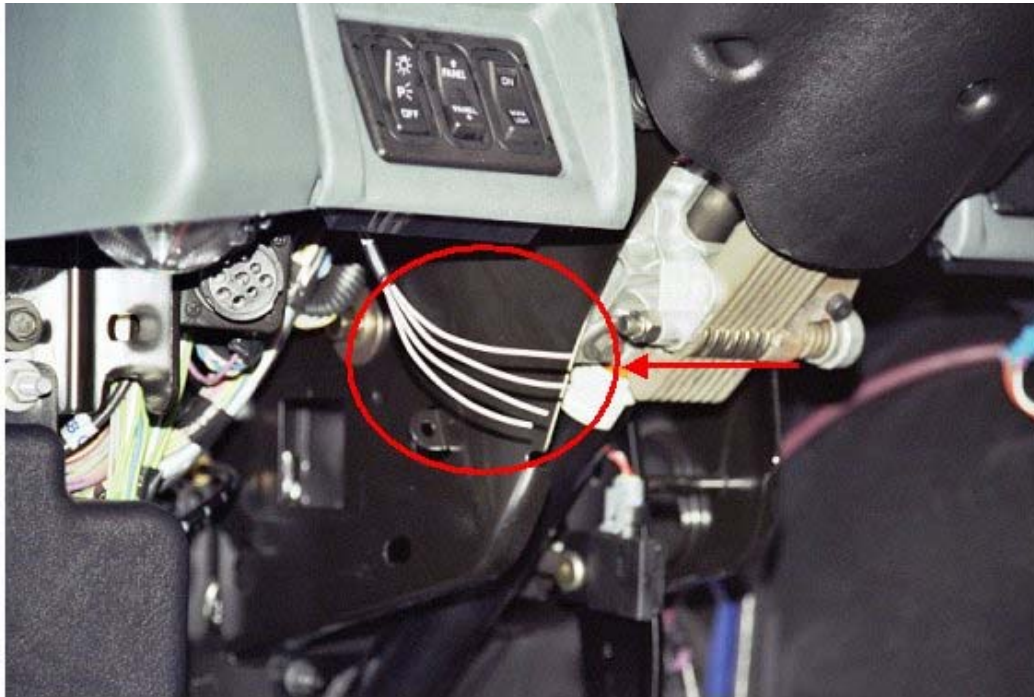


Figure 103 Location of 4-Wire Breakout Under Dash

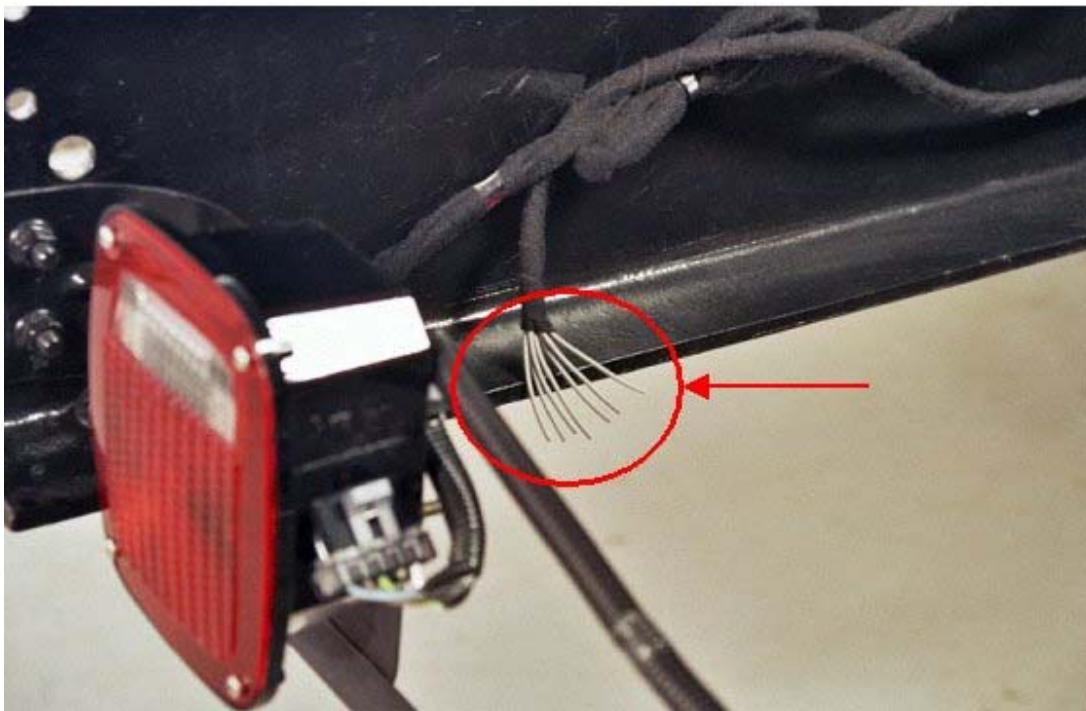


Figure 104 Location of 7-Wire Breakout at End of Frame

**NOTE** – Many trailers combine trailer marker lamps with the tail lamp, if so, 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 taillight 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 ground.
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 ground.
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. ENGINE CONTROL

### 14.1. 12VXY — REMOTE MOUNTED ENGINE CONTROL

#### FEATURE CODE DESCRIPTION:

08HAG – ENGINE CONTROL, REMOTE MOUNTED Provisions for: Includes module and connector for body builder installation of remote engine speed control with SAE J1939 communication with NGD electronic engines.

#### FEATURE/BODY FUNCTION:

This feature is an accommodation for a remote engine speed control module (RESCM). This feature also provides a public J1939 data link to the ESC from the RESCM. The feature also has associated software (595034) that is programmed into the ESC, which allows it to control the engine remotely through the RESCM.

There are programmable parameters that are used by this function. The programmable parameters are located in the ECM of the engine. They consist of preset engine speeds which the engine will maintain, if speed control is activated and the speeds are selected.

#### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Required software feature codes: 595034

Software feature codes that must be removed: NONE

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

**Table 81**

Parameter	ID	Description	Default	Units	Min	Max	Step
Remote_Accelerator_Enable	1870	Enables the remote accelerator.	1	NONE	0	1	
RESCM_Require_Park_Brake	2240	Enables the park brake interlock for RESCM.	1	NONE	0	1	

#### WIRING INFORMATION



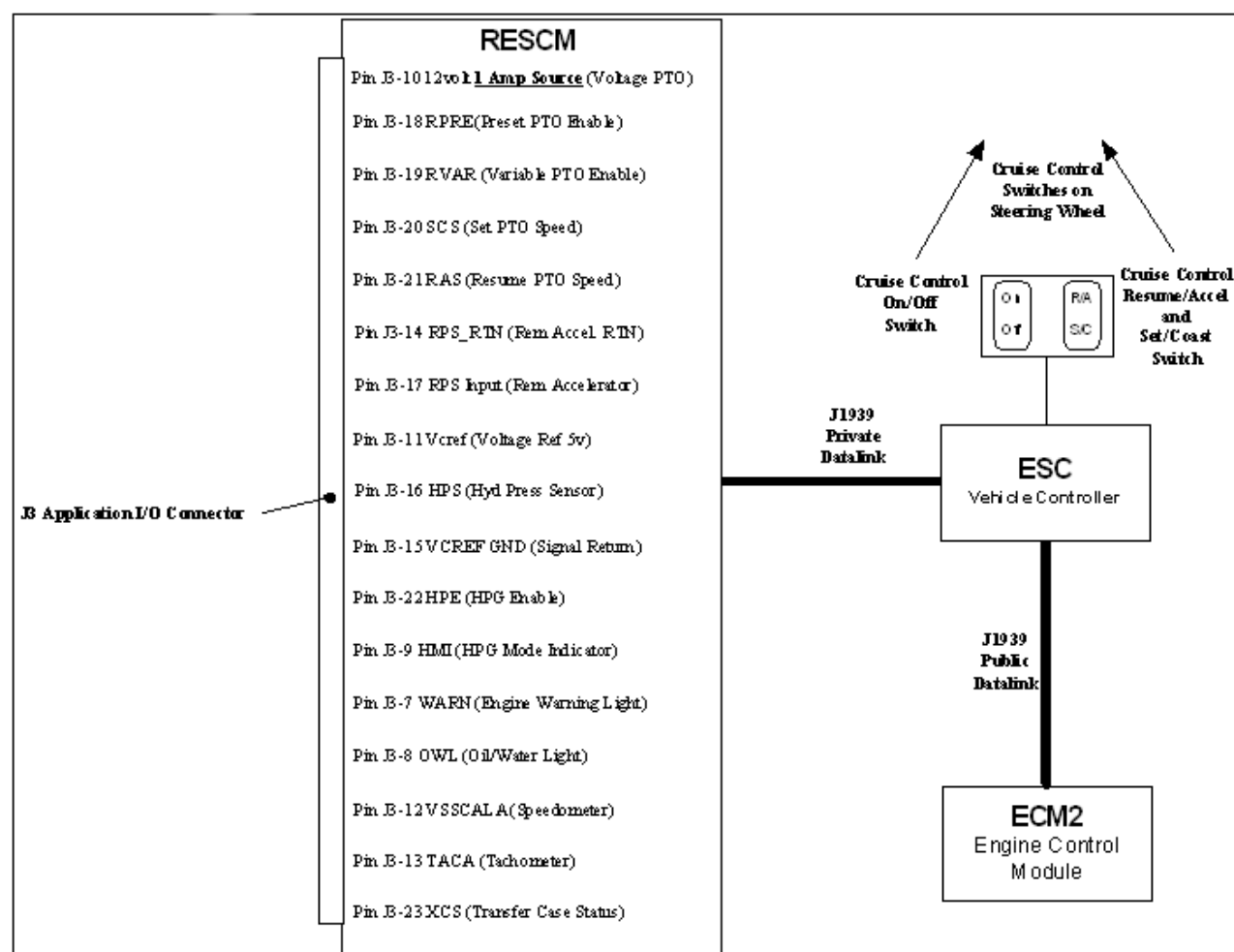


Figure 105 Remote Engine Speed Control Module Overview Diagram

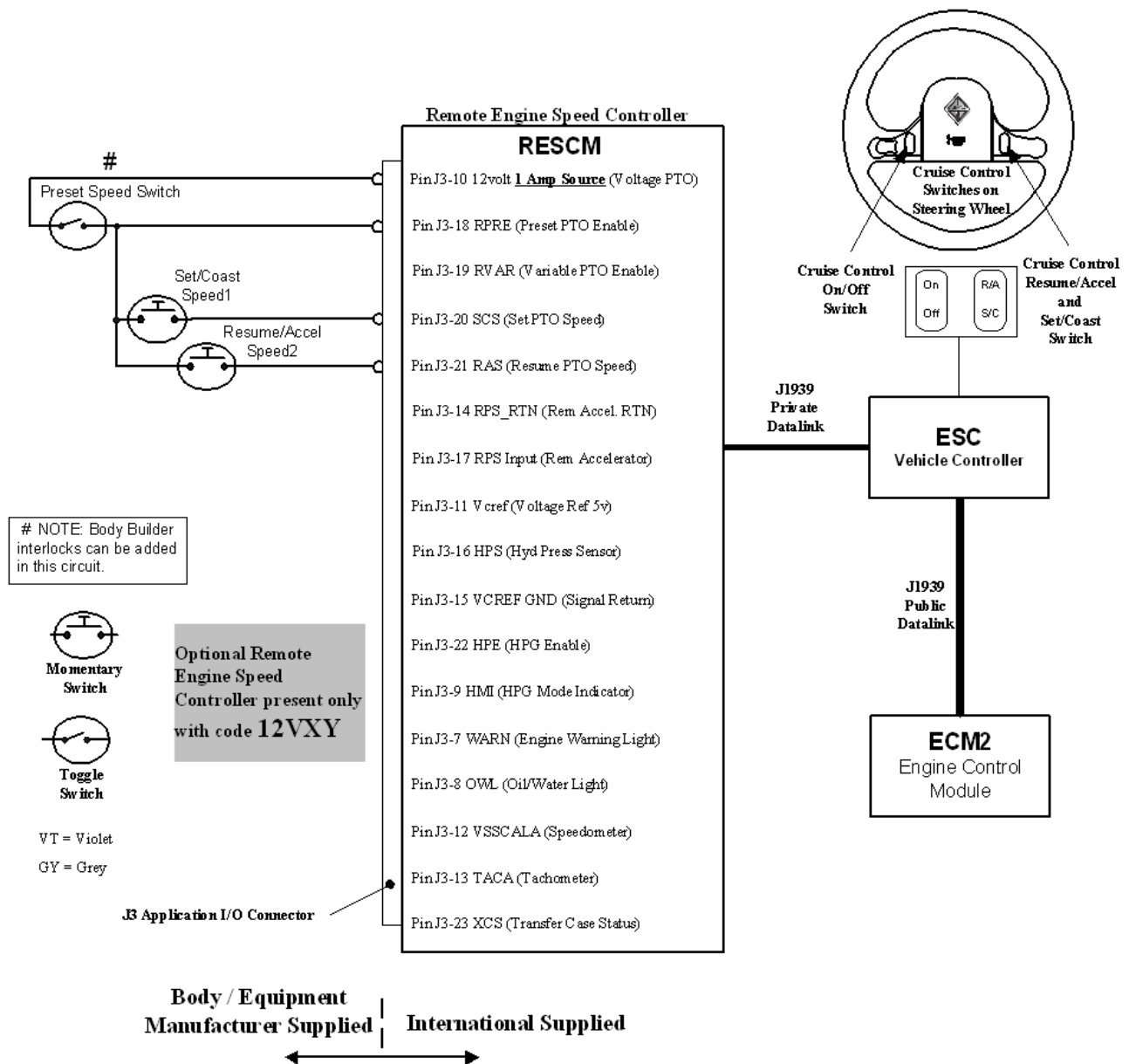


Figure 106 Remote Installation For Preset Engine Control Using the Remote Engine Speed Controller

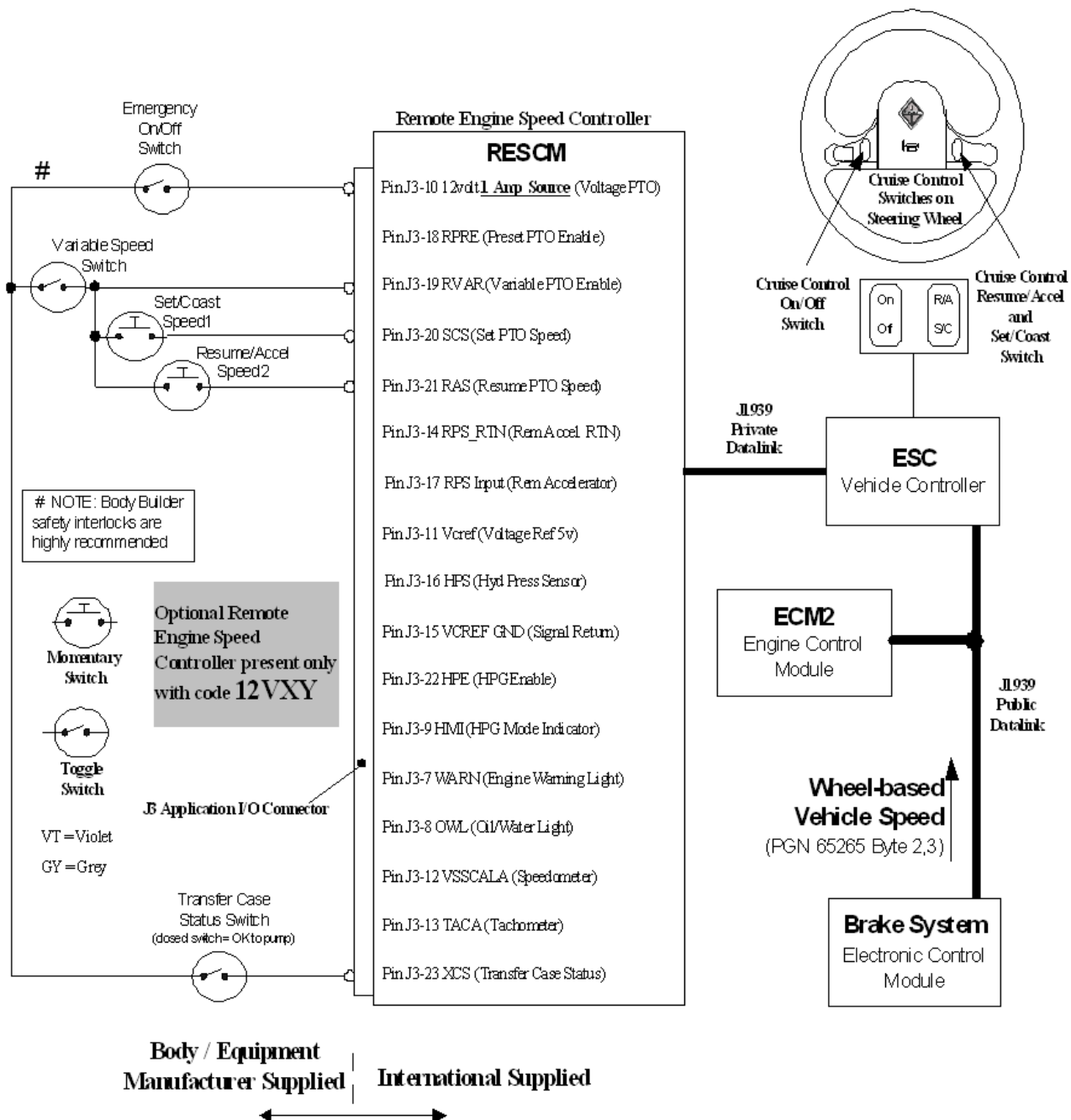
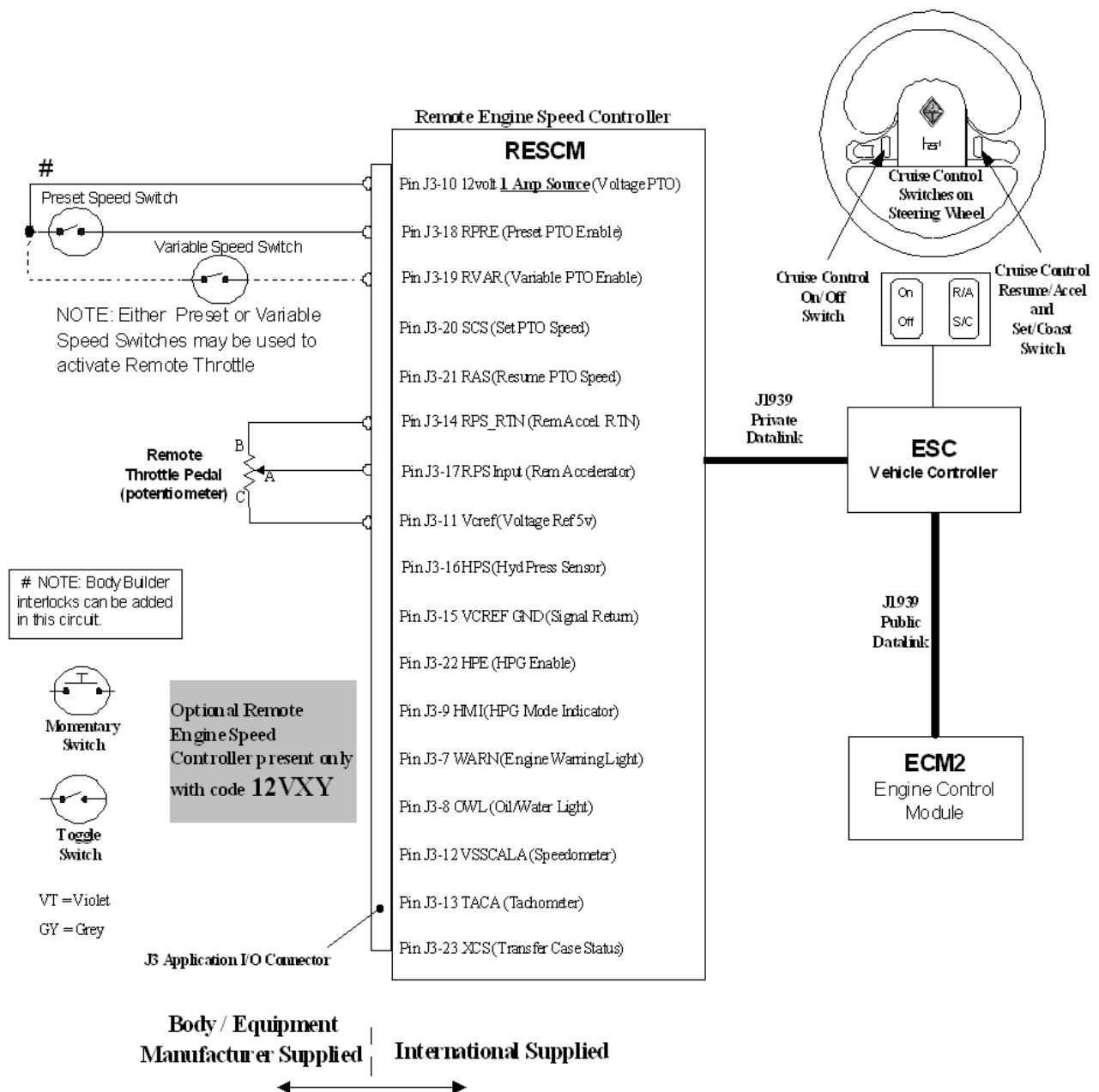


Figure 107 Split Shaft Engine Speed Control



### Figure 108 Remote Throttle Interface

**NOTE – Close the circuit from J3-10 to either circuit J3-18 or circuit J3-19 to enable the remote potentiometer. When either of these circuits are closed, the engine speed requested by the remote potentiometer is demanded as long as the Remote Throttle p**

**TESTING:**

12VXY is tested via the Master Diagnostics Software (MDS) package of the MPSI Pro-Link 9000 Electronic Service Tool (EST).

## 15. PTO

### 15.1. 60ABA – PTO ACCOMMODATION CABLE SHIFT

**FEATURE CODE DESCRIPTION:** BDY INTG, PTO ACCOMMODATION for Monitoring Cable Shift Engaged PTO, With Indicator Light and Audible Alarm in Gauge Cluster (requires 1 Remote Power Module input)

**FEATURE/BODY FUNCTION:** This feature utilizes a customer-mounted PTO feedback switch (ground active) wired to a Remote Power Module (RPM) input to drive an indicator light in the gauge cluster that allows the operator to discern that their PTO is engaged. An audible alarm is used to warn the operator when certain programmable parameters are violated. The RPM input also drives a PTO hourmeter to allow the operator to measure stationary PTO hours for maintenance records and fuel tax purposes. To view the hourmeter, you press the gauge cluster selection button momentarily until the text portion of the display indicates “PTO Hour”.

This PTO feature is a rule-based option. The operation of the PTO is monitored by an audible alarm. The functionality of these alarms is controlled by programmable parameters. Factory default settings for these programmable parameters are listed in the tables below.

→ *Please use ICAP or the Diamond Logic™ Builder software to determine pin locations for RPM inputs and set programmable parameters (refer to pin and switch location section).*

**SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:** \*Software feature codes can be added through ICAP or the Diamond Logic™ Builder software. Programmable Parameters are also programmable through ICAP or the Diamond Logic™ Builder software. Body Builders must set programmable parameters that are appropriate for their PTO application.

Required software feature codes: 595170, 595248

Conflicts with Software features: 595171, 595193, 595252, 595244, 595267

#### ALARMS

If **TEM\_PTO\_Eng\_Run\_Alarms** is turned on, then an alarm will sound if the PTO is engaged while the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Alarms** is turned on, then an alarm will sound if the PTO is engaged and the engine speed is over the value set by **TEM\_PTO\_Eng\_Spd\_Alarm\_Limit**

If **TEM\_PTO\_Non\_Neut\_Alarms** is turned on, then an audible alarm will sound if the PTO is engaged and the transmission is taken out of neutral

If **TEM\_PTO\_Pk\_Brake\_Alarms** is turned on, then an audible alarm will sound if the PTO is engaged and the park brake is released

If **TEM\_PTO\_Veh\_Spd\_Alarms** is turned on, then an audible alarm will sound if the PTO is engaged and the vehicle speed is about the value set by **TEM\_PTO\_Veh\_Spd\_Alarm\_Limit**

**Table 82 PTO Alarms**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Default	Description	Min	Max	Step

**Table 82 PTO Alarms (cont.)**

TEM_PTO_ Eng_Run_ Alarms	2137	Off	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine is turned off	NA	NA	NA
TEM_PTO_ Eng_Spd_ Alarm_Limit	2136	1600 RPM	See TEM_PTO_Eng_ Spd_Alarms	0	5000	1
TEM_PTO_ Eng_Spd_ Alarms	2135	On	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine speed is over TEM_PTO_Eng_Spd_Alarm_Limit	NA	NA	NA
TEM_PTO_ Non_Neut_ Alarms	2132	Off	If this Parameter is 1, an alarm will sound if the PTO is engaged and transmission is taken out of neutral	NA	NA	NA
TEM_PTO_ Pk_Brake_ Alarms	2131	On	If this Parameter is 1, an alarm will sound if the PTO is engaged and the park brake is released	NA	NA	NA
TEM_PTO_ Veh_Spd_ Alarms	2133	On	If this Parameter is 1, an alarm will sound if the PTO is engaged and the vehicle speed is over TEM_PTO_Veh_Spd_Alarm_Limit	NA	NA	NA
TEM_PTO_ Veh_Spd_ Alarm_Limit	2134	3 MPH	See TEM_PTO_Veh_ Spd_Alarms	3	100	1

**Other Parameters**

The **TEM\_RPM\_PTO\_Engaged\_Param** parameter indicates the active state that the ESC will read as active for the TEM PTO feedback switch (As it goes into the RPM input). This active state will be used to indicate when the PTO is engaged.

0 = Input active when open circuit

1 = Input active when grounded

3 = Input active when at 12V

Table 83

Parameter	ID	Default	Description	Min	Max	Step
TEM_RPM_PTO_Engaged_Param	2147	1	Active State for the TEM PTO engagement feedback switch.	List	List	List

### WIRING INFORMATION

→ *Please use ICAP or the Diamond Logic™ Builder software to determine pin locations for RPM inputs and set programmable parameters (refer to pin and switch location section).*

- The wiring to the RPM input is customer supplied.
- A wire must be connected from the Bodybuilder installed PTO feedback switch (ground active), to the pin labeled **PTO\_Feedback\_Switch** in the Black 23-pin RPM input connector (J3).

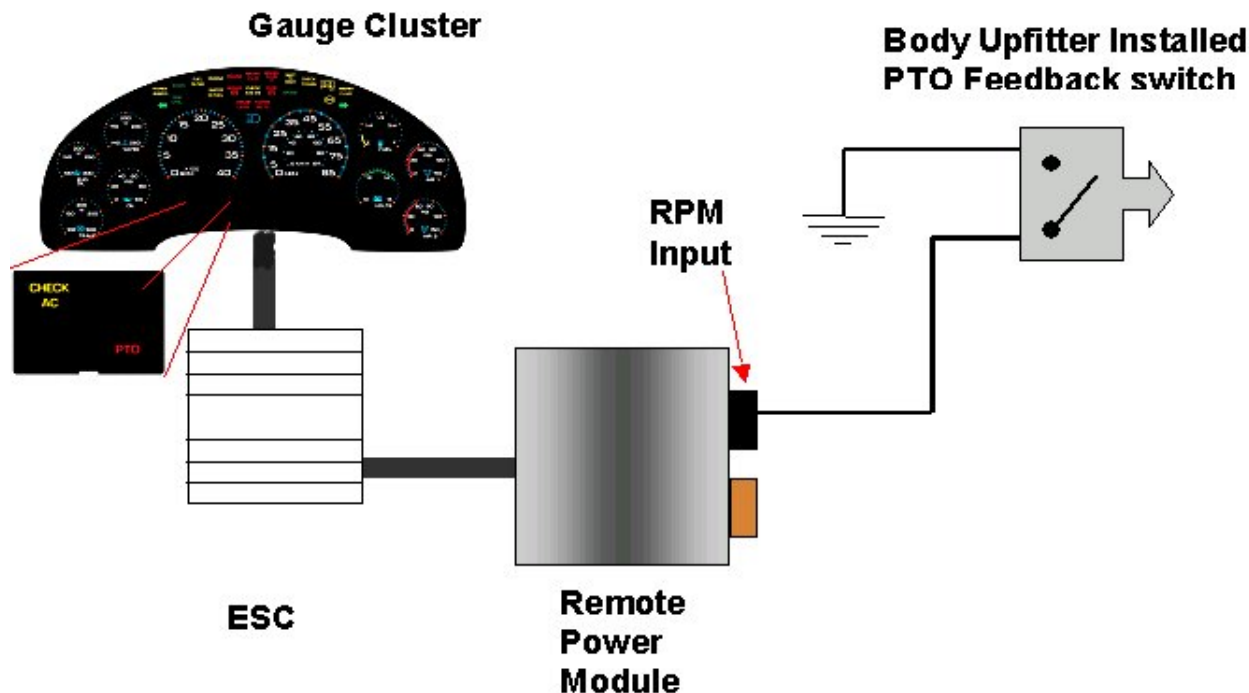


Figure 109 Overview of Cable Shift PTO System

### RPM CONNECTOR INFORMATION

**\*\* HPV kits are REQUIRED to allow Body Builders to wire in and out of the Remote Power Module connectors.**

HPV kits are pre-made kits that include 6 terminals and 6 seals for BOTH RPM connectors.

**Table 84**

HPV Kits	Part Number
RPM Terminal Kit 12 Gauge	2585651C91
RPM Terminal Kit 14 Gauge	2585423C91

**NOTE – The following connectors are optional because they are already provided with the Remote Power Modules.**

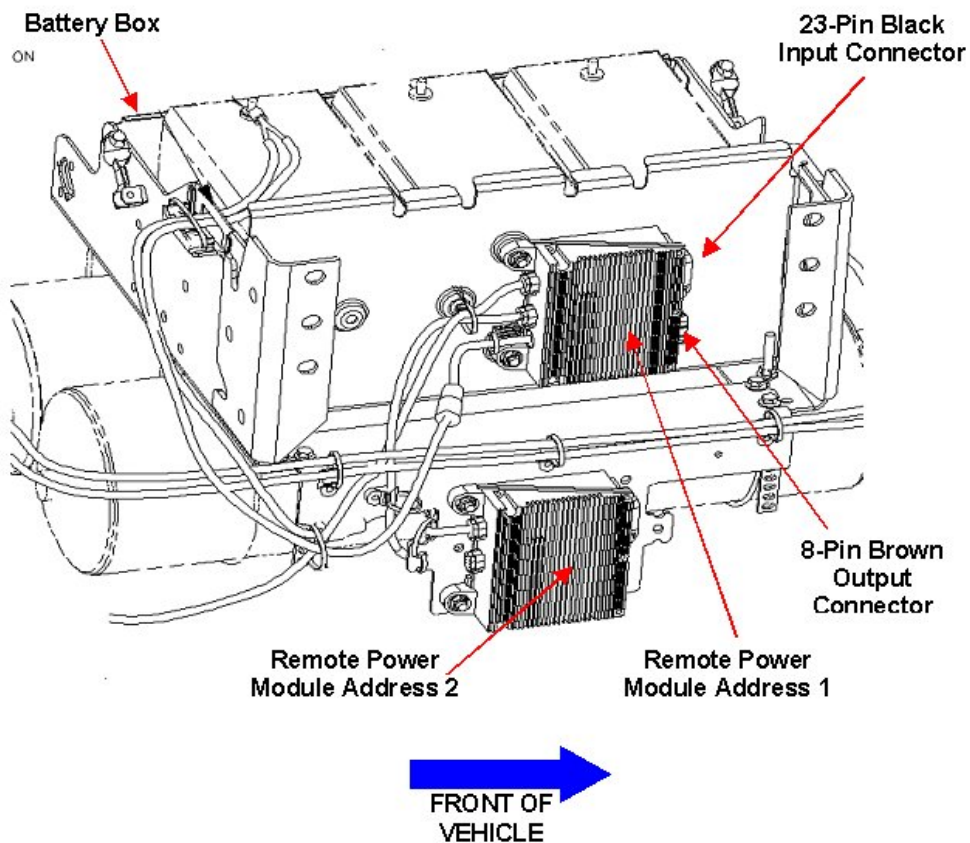
This information is given so that the Body Builder could purchase connectors in the event that the original connectors were damaged or lost, or so that the Body Builder can pre-fabricate a harness.



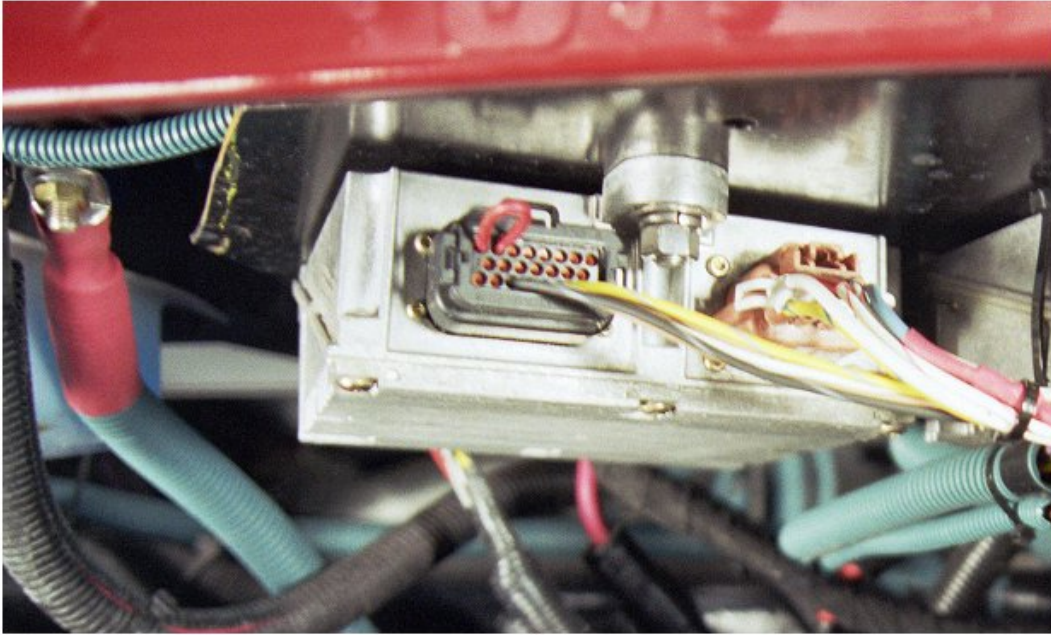
**Table 85 8-Way RPM Output Connector (Brown) and 23-Way RPM Input Connector (Black)**

Connector Part No.	3548934C1	2585981c91
Description	Connector, Body, Brown 8-Way RPM Output	Connector, Body, Black 23-Way RPM Input Kit
Terminal Part	3534163C1 - 12 Ga. 3535931C1 - 14 Ga. 3535930C1 - 16 & 18 Ga.	Included
Cable Seal Part	3548945C1 - 12 & 14 Ga. 3535937C1 - 16 & 18 Ga.	N/A
Connector Lock Part	3548943c1	N/A
CPA Lock	3573833c1	N/A
Cavity Plug	3535938c1	Included

→ RPM address 1 is located Back of Battery Box on 4000 model trucks

**Figure 110 RPM Mounting Location on a 4000 Model Truck**

→ RPM address 1 is located Under Cab, driver's side on 7000 model truck.



**Figure 111 RPM Mounting Location on a 7000 Model Truck**

### **TESTING**

1. Verify that the Remote Power Module Input labeled PTO\_Feedback\_Switch (Pin position specified by ICAP or the Diamond Logic™ Builder software) is receiving the correct voltage (12V or Ground) as specified by the customer in ICAP or the Diamond Logic™ Builder software.
2. Make certain that the PTO indicator light in the gauge cluster illuminates by engaging the PTO.
3. The Audible Alarm can be tested by violating the set programmable parameters and determining if the Alarm sounds. For example: If the park brake interlock is programmed ON, release the park brake and engage the PTO. The audible alarms should sound with continuous beeps.

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

- Software feature codes 595170 and 595248 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Use ICAP or the Diamond Logic™ Builder software to make sure that software feature codes 595171, 595193, 595252, 595244, and 595267 are NOT enabled on the vehicle (see Local Dealer)
- Set the desired programmable parameters for each signal using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Connect a wire from a Bodybuilder-installed PTO feedback switch to the pin labeled PTO\_Feedback\_Switch in the Black 23-Pin Connector on the RPM
- Perform the PTO testing procedure that is listed above.

## 15.2. 60ABB – PTO ACCOMMODATION MUNCIE® POWERFLEX™ LECTRA-SHIFT

Refer to the Circuit Diagram in S08285, Chapter 9, page 28.

**FEATURE CODE DESCRIPTION:** BDY INTG, PTO ACCOMMODATION for Muncie Lectra-Shift PTO Engagement and Disengagement, With Switch Mounted on Dash; Includes Indicator Light and Audible Alarm in Gauge Cluster (requires 1 Remote Power Module input and 1 output)

**FEATURE/BODY FUNCTION:** This feature provides a momentary switch in the in-cab switchpack that drives a Remote Power Module (RPM) output and a relay that are used to engage and disengage the Muncie® Lectra-Shift PTO. A Remote Power Module input is used to drive an indicator light in the gauge cluster, allowing the operator to discern whether or not the PTO is actually engaged. An audible alarm sounds when certain programmable parameters are violated. The RPM input also drives a PTO hourmeter, which allows the operator to measure stationary PTO hours for maintenance records and fuel tax purposes. To view the hourmeter, press the gauge cluster selection button momentarily until the text portion of the display indicates "PTO Hour".

This PTO feature is a rule-based option. The operation of the PTO is governed by rules of engagement, disengagement, reengagement, and alarms. These rules are defined through programmable parameters. Through these programmable parameters, the vehicle owner can customize the functionality of the PTO. Factory default settings for these programmable parameters are listed in the tables below.

Through programmable parameters the truck can be programmed to customize the number of times that an operator can request PTO engagement per key cycle. The customer can also customize the maximum time allowed to engage the solenoid per attempt, and the length of time between a failed engagement attempt and the next time the operator can attempt to engage the PTO.

→ ***Please use ICAP or 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:**

Required software feature codes: 595170, 595171, 595179, 595248

Software feature codes that must be removed: 595193, 595252, 595244, 595267

### **ENGAGEMENT**

\*These parameters set rules that must be met in order for the PTO to be engaged.

If **TEM\_PTO\_Brake\_Engmnt\_Inhib** parameter is turned on, then the brake pedal must be depressed in order for the PTO to engage.

If **TEM\_PTO\_Cltch\_Engmnt\_Inhib** parameter turned on, then the clutch pedal must be depressed for the PTO to engage.

If **TEM\_PTO\_Eng\_Run\_Engmnt\_Inhib** parameter is turned on, then the engine has to be running in order for the PTO to be engaged.

If **TEM\_PTO\_Eng\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the engine speed is over a certain threshold, which is defined as a programmable parameter in **TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit**

If **TEM\_PTO\_Neut\_Engmnt\_Inhib** parameter is turned on, then the PTO can only be engaged if the Transmission is NOT in Neutral or Park

If **TEM\_PTO\_Non\_Neut\_Engmnt\_Inhib** parameter is turned on, then the Transmission must be in Neutral or Park for the PTO to be engaged.

If **TEM\_PTO\_Pk\_Brake\_Engmnt\_Inhib** parameter is turned on, then the Park Brake must be set in order for the PTO to be engaged.

If **TEM\_PTO\_Veh\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the Vehicle Speed is over the value prescribed by **TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit**.

Table 86

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Brake_Engmnt_Inhib	2095	If this Parameter is 1, the PTO will not be engaged if the brake pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Clutch_Engmnt_Inhib	2094	If this Parameter is 1, the PTO will not be engaged if the clutch pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Eng_Run_Engmnt_Inhib	2096	If this Parameter is 1, the PTO will not be engaged if the engine is not running	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Inhib	2092	If this Parameter is 1, the PTO will not be engaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Limit	2093	See TEM_PTO_Eng_Spd_Engmnt_Inhib	1000 RPM	100	5000	1
TEM_PTO_Neut_Engmnt_Inhib	2089	If this Parameter is 1, the PTO will only be engaged if the Transmission is not in Neutral or Park	On	NA	NA	NA
TEM_PTO_Non_Neut_Engmnt_Inhib	2088	If this Parameter is 1, the PTO will not be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Engmnt_Inhib	2087	If this Parameter is 1, the PTO will not be engaged if the Park Brake is not set.	Off	NA	NA	NA

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Veh_Spd_Engmnt_Inhib	2090	If this Parameter is 1, the PTO will not be engaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_Engmnt_Limit	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Engmnt_Limit	2091	See TEM_PTO_Veh_Spd_Engmnt_Inhib	0	1	100	1

### DISENGAGEMENT

\* These parameters set the conditions under which the PTO will be disengaged.

If **TEM\_PTO\_Eng\_Run\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine speed rises above the value set by **TEM\_PTO\_Eng\_Spd\_DisEng\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Disengages** parameter is turned on, then the PTO will be disengaged if the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Disengages** parameter is turned on, then the PTO will be disengaged if the Park Brake is released.

If **TEM\_PTO\_Veh\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the vehicle speed is over the valued specified by **TEM\_PTO\_Veh\_Spd\_DisEng\_Limit**.

**Table 87**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Eng_Run_Disengages	2114	If this Parameter is 1, the PTO will be disengaged if the engine is turned off.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_DisEng_Limit	2113	See TEM_PTO_Eng_Spd_Disengages	1400 RPM	0	5000	1

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Eng_Spd_Disengages	2112	If this Parameter is 1, the PTO will be disengaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_DisEng_Limit	On	NA	NA	NA
TEM_PTO_Non_Neut_Disengages	2109	If this Parameter is 1, the PTO will be disengaged if the transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Disengages	2108	If this Parameter is 1, the PTO will be disengaged if the Park Brake is released.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Disengages	2089	If this Parameter is 1, the PTO will only be engaged if the Transmission is not in Neutral or Park	On	NA	NA	NA
TEM_PTO_Veh_Spd_Disengages	2110	If this Parameter is 1, the PTO will be disengaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_DisEng_Limit.	On	NA	NA	NA
TEM_PTO_Veh_Spd_DisEng_Limit	2111	See TEM_PTO_Veh_Spd_Disengages	5 MPH	3	100	1

### **REENGAGEMENT**

\* These parameters set the conditions under which the PTO can be reengaged.

**NOTE – All reengagement parameters should be left off with Lectra shift PTO's to prevent gear grind and damage to the transmission.**

If **TEM\_PTO\_Eng\_Run\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine stopping) when the engine is restarted.

If **TEM\_PTO\_Eng\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine overspeed) when the engine speed falls below TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit.

If **TEM\_PTO\_Key\_State\_Allow\_ReEng** parameter is turned on, then the PTO will be allowed to reengage when the key state is returned to run.

If **TEM\_PTO\_Non\_Neut\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to transmission out of neutral) when the transmission is placed back into neutral.

If **TEM\_PTO\_Pk\_Brake\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to park brake released) when the park brake is reapplied.

If **TEM\_PTO\_Veh\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to the vehicle being over the vehicle speed value) when the vehicle speed is falls TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit.

Table 88

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Eng_Run_Allow_ReEng	2122	If this Parameter is 1, the PTO will be reengaged after a disengage due to the engine stopping when the engine is restarted.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Allow_ReEng	2120	If this Parameter is 1, the PTO will be reengaged after a disengage due to engine overspeed when the engine speed is below TEM_PTO_Eng_Spd_Engmnt_Limit.	Off	NA	NA	NA
TEM_PTO_Key_State_Allow_ReEng	2069	If this parameter is set, the PTO will be allowed to reengage when the key state is returned to run.	Off	NA	NA	NA
TEM_PTO_Non_Neut_Allow_ReEng	2148	If this Parameter is 1, the PTO will be reengaged after a disengage due to transmission out of neutral when the transmission is placed back into neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Allow_ReEng	2149	If this Parameter is 1, the PTO will be reengaged after a disengage due to park brake released when the park brake is reapplied.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Allow_ReEng	2119	If this Parameter is 1, the PTO will be reengaged after a disengage due to vehicle overspeed when the vehicle speed is below TEM_PTO_Veh_Spd_Engmnt_Limit.	Off	NA	NA	NA

**ALARMS**

\*These parameters utilize the gauge cluster to sound an alarm to the driver when certain programmable parameters are violated.

If **TEM\_PTO\_Eng\_Run\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Alarms** parameter is turned on, then an alarm will sound if the PTO is engaged and the engine speed is over the value set by **TEM\_PTO\_Eng\_Spd\_Alarm\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the park brake is released.

If **TEM\_PTO\_Veh\_Spd\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the vehicle speed is about the value set by **TEM\_PTO\_Veh\_Spd\_Alarm\_Limit**.

**Table 89 PTO Alarms**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Eng_Run_Alarms	2137	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine is turned off	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarm_Limit	2136	See TEM_PTO_Eng_Spd_Alarms	1400 RPM	0	5000	1
TEM_PTO_Eng_Spd_Alarms	2135	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine speed is over TEM_PTO_Eng_Spd_Alarm_Limit.	On	NA	NA	NA
TEM_PTO_Non_Neut_Alarms	2132	If this Parameter is 1, an alarm will sound if the PTO is engaged and transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Alarms	2131	If this Parameter is 1, an alarm will sound if the PTO is engaged and the park brake is released	Off	NA	NA	NA



**Table 89 PTO Alarms (cont.)**

TEM_PTO_Veh_Spd_Alarms	2133	If this Parameter is 1, an alarm will sound if the PTO is engaged and the vehicle speed is over TEM_PTO_Veh_Spd_Alarm_Limit.	On	NA	NA	NA
TEM_PTO_Veh_Spd_Alarm_Limit	2134	See TEM_PTO_Veh_Spd_Alarms	5 MPH	3	100	1

**Other Parameters**

The **TEM\_PTO\_Retaining\_Solenoid\_Fuse** parameter is the fusing value for the Remote Power Module output that feeds the retaining coil that holds the electric solenoid in the engaged position. If current exceeds this value, the ESC will turn off the output.

The **TEM\_PTO\_Lectra\_Shift\_Max\_Retries** parameter allows the customer to establish the maximum number of times that the operator can request a PTO engagement per key cycle.

The **TEM\_PTO\_Lectra\_Shift\_Retry\_Time** parameter sets the time between a failed engagement attempt and the time that you can attempt to engage the PTO again.

The **TEM\_PTO\_Allowed\_Engagement\_Time** parameter sets the maximum time allowed for the solenoid to engage in one engagement attempt.

The **TEM\_RPM\_PTO\_Engaged\_Param** parameter indicates the state that the ESC will read as active for the TEM PTO feedback switch (As it goes into the RPM input). This active state will be used to tell the ESC when the PTO is engaged.

0 = Input active when open circuit

1 = Input active when grounded

3 = Input active when at 12V

**Table 90**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Retaining_Solenoid_Fuse	2022	Fuse value for the TEM PTO Single Polarity engagement retaining solenoid power.	20 Amps	0	20	0.1
TEM_PTO_Lectra_Shift_Max_Retries	2058	The maximum number of times a PTO engagement request is allowed to be issued in a key cycle.	0 Retries	0	65535	1

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Lectra_Shift_Retry_Time	2059	Time frame for retry counting in lectra shift engagement algorithm.	600 Seconds	0	600	1
TEM_PTO_Allowed_Engagement_Time	2057	Time allowed for engagement of the lectra shift PTO.	3 Seconds	0	10	0.1
TEM_RPM_PTO_Engaged_Param	2147	Active State for the TEM PTO engagement feedback switch.	1	List	List	List

### WIRING INFORMATION

→ ***Please use ICAP or 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).***

- When a truck is ordered from International with this feature, a 3-pin connector is provided which mates with the connector from the Muncie Lectra-Shift Solenoid. This connector is located in the transmission/engine harness located above the transmission. The customer is responsible for connecting two wires from this connector to the Remote Power Module connectors.
  - The WHITE wire is pre-wired from a relay to the Lectra-shift connector. This wire is for the engagement coil.
  - The RED wire is for the holding coil in the solenoid. The RED wire must be connected to the Brown 8-pin Remote Power Module output connector Pin labeled **PTO\_Lectra-Shift\_Retaining\_Solenoid\_Output**.
  - The BLACK wire is for the PTO feedback switch. The customer must wire from this pin into the Black 23-pin Remote Power Module input connector Pin labeled **PTO\_Feedback\_Switch**.
- When the customer has completed the wiring from the connector, they can then plug the 3-pin connector into the connector provided by the Muncie Solenoid (See the Figure below).
- The customer is responsible for providing ground to the solenoid.

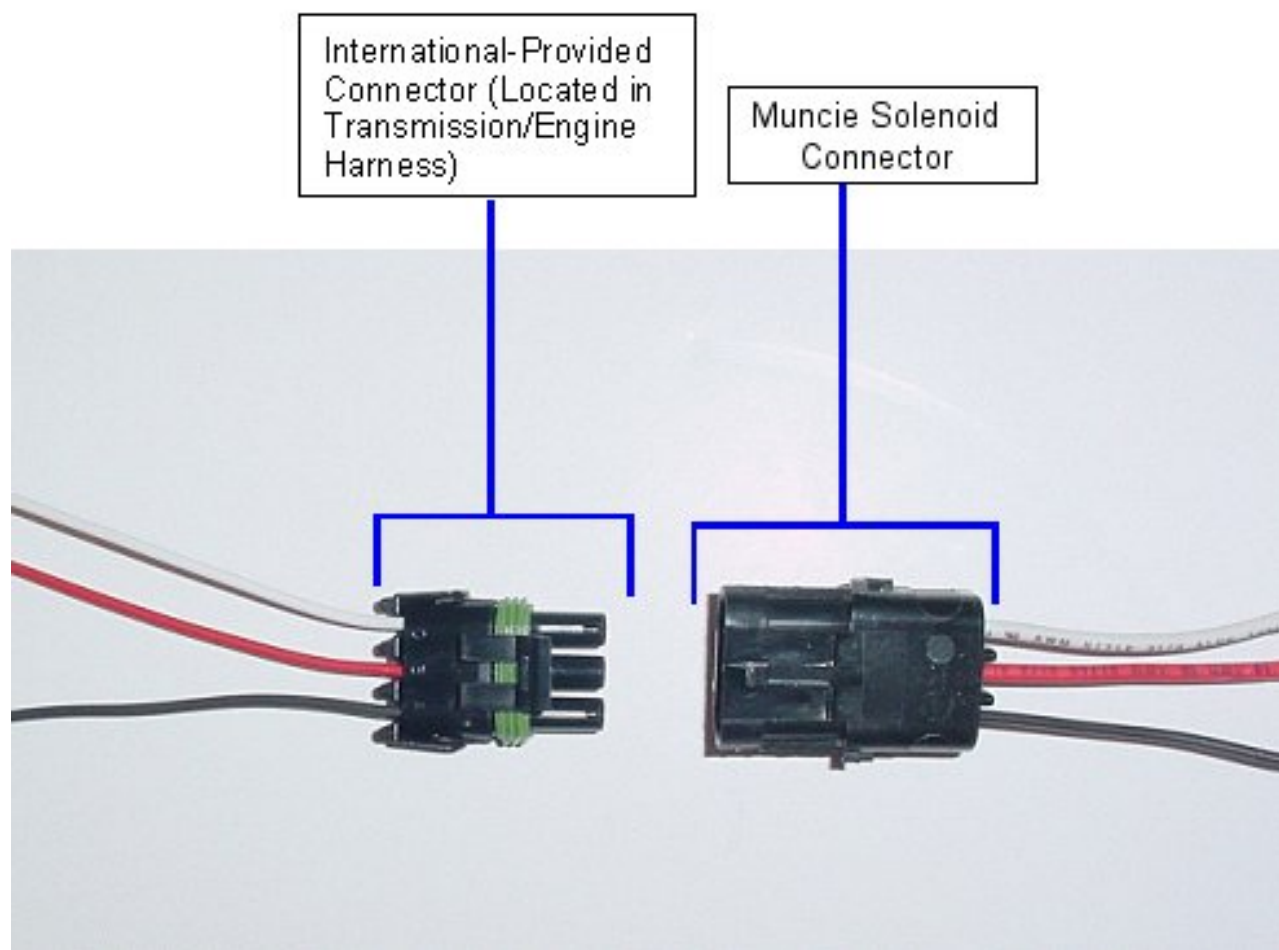
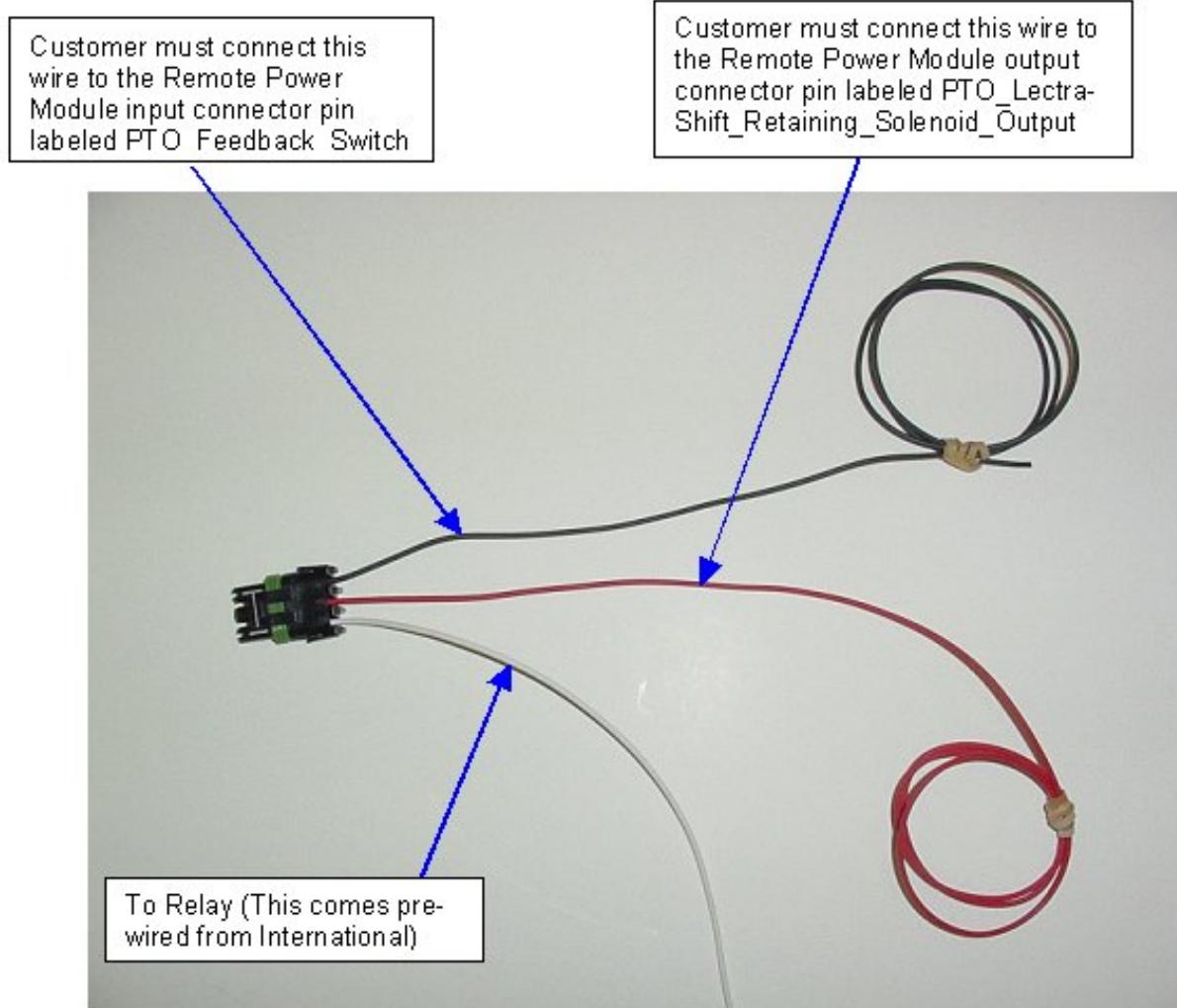
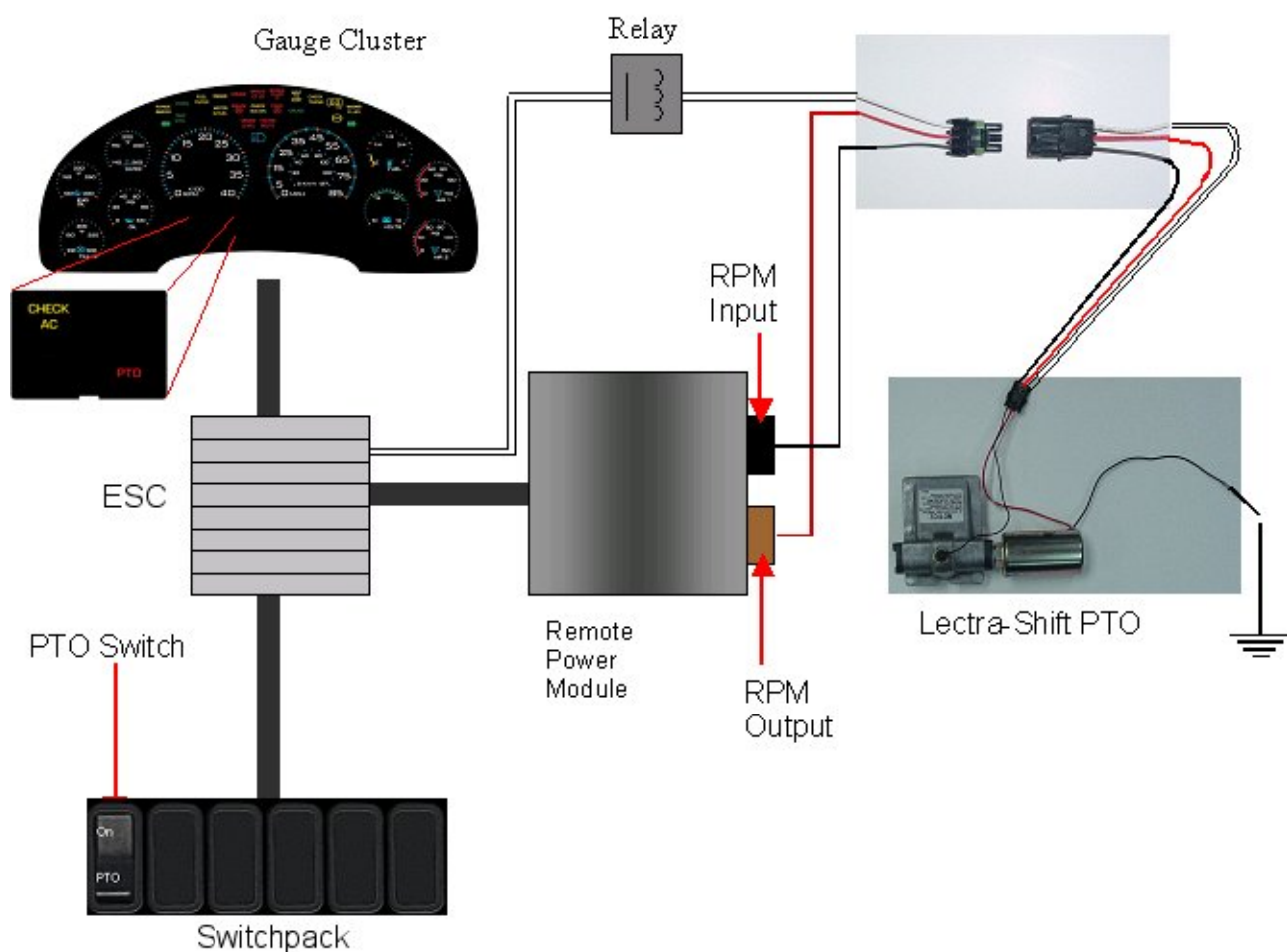


Figure 112 Lectra-Shift PTO Solenoid Connectors



**Figure 113** International Supplied Harness for Lectra-Shift PTO



**Figure 114** Diagram of Lectra-Shift PTO System

#### RPM CONNECTOR INFORMATION

**\*\* HPV kits are REQUIRED to allow Body Builders to wire in and out of the Remote Power Module connectors.**

HPV kits are pre-made kits that include terminals and seals for BOTH RPM connectors.

**Table 91**

HPV Kits	Part Number
RPM Terminal Kit 12 Gauge	2585651C91
RPM Terminal Kit 14 Gauge	2585423C91

**NOTE – The following connectors are optional because they are already provided with the Remote Power Modules.**

This information is given so that the Body Builder could purchase connectors in the event that the original connectors were damaged or lost, or so that the Body Builder can pre-fabricate a harness.

**Table 92 8–Way RPM Output Connector (Brown) and 23-Way RPM Input Connector (Black)**

Connector Part No.	3548934C1	2585981c91
Description	Connector, Body, Brown 8–Way RPM Output	Connector, Body, Black 23–Way RPM Input Kit
Terminal Part	3534163C1 - 12 Ga. 3535931C1 - 14 Ga. 3535930C1 - 16 & 18 Ga.	Included
Cable Seal Part	3548945C1 - 12 & 14 Ga. 3535937C1 - 16 & 18 Ga.	N/A
Connector Lock Part	3548943c1	N/A
CPA Lock	3573833c1	N/A
Cavity Plug	3535938c1	Included

→ RPM address 1 is located Back of Battery Box on 4000 model trucks

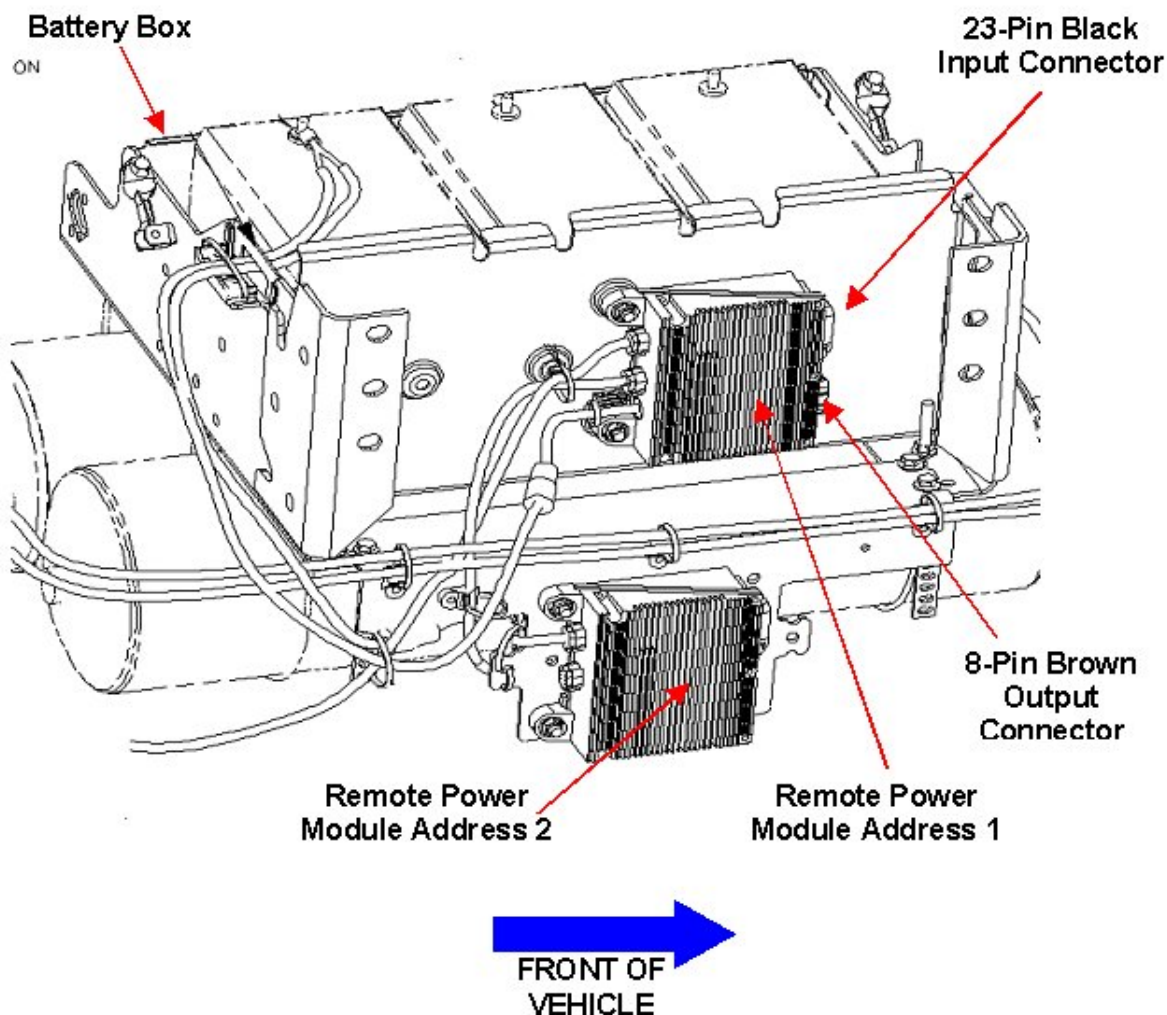
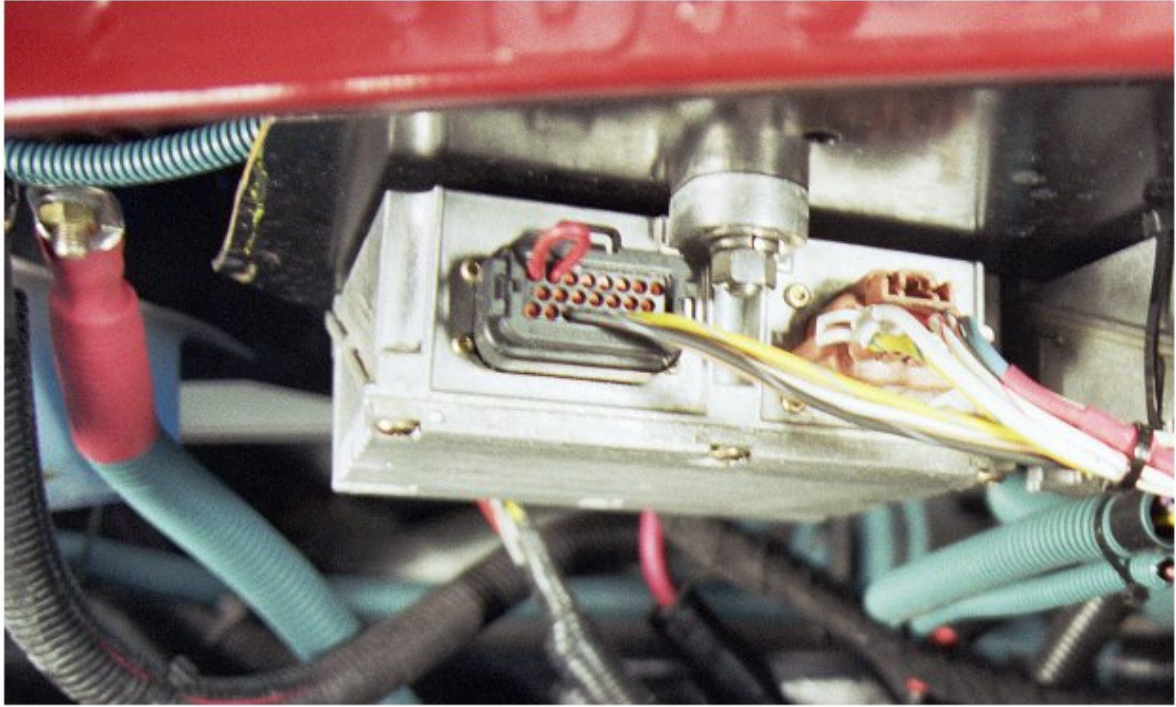


Figure 115 RPM Mounting Location on a 4000 Model Truck



→ RPM address 1 is located Under Cab, driver's side on 7000 model truck.



**Figure 116 RPM Mounting Location on a 7000 Model Truck**

### **TESTING**

1. Depress the PTO switch in the cab to the ON position. Ensure that all PTO interlock conditions are enabled.
2. Verify that the pin labeled PTO\_Lectra-Shift\_Retaining\_Solenoid\_Output of the Brown 8-way Remote Power Module output connector has battery voltage levels present.
3. Verify that the Remote Power Module Input labeled PTO\_Feedback\_Switch (Pin position specified by ICAP or the Diamond Logic™ Builder software) is receiving the correct voltage (12V or Ground) as specified by the customer in ICAP or the Diamond Logic™ Builder software.
4. Make certain that the switch indicator lights are functioning by engaging the PTO and verifying that the green light in the top section of the switch illuminates.
5. Make certain that the PTO indicator light in the gauge cluster is functioning by engaging the PTO.
6. Test the Audible Alarm by violating an alarm programmable parameter and verifying that the Alarm sounds. For example: If the park brake interlock is programmed ON, release the park brake and engage the PTO. The audible alarms should sound with continuous beeps.

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

- A. If vehicle does not have a Remote Power Module installed, follow the Remote Power Module Installment procedure listed in this document.



- B. If the vehicle already has a Remote Power Module, follow the procedure listed below to add specific wiring for Lectra-shift.

→ **Please use ICAP or the Diamond Logic™ Builder software to add the correct software codes (See above section) and 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 595170, 595171, 595179, and 595248 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Use ICAP or the Diamond Logic™ Builder software to make sure that software feature codes 595193, 595252, 595244, and 595267 are NOT enabled on the vehicle (see Local Dealer)
- Set the desired programmable parameters for each signal using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Connect a wire from the pin labeled **PTO\_Lectra-Shift\_Retaining\_Solenoid\_Output** pin the Brown 8-pin RPM output connector, to the coil on the solenoid.
- Connect a wire from a Bodybuilder-installed PTO feedback switch to the pin labeled **PTO\_Feedback\_Switch** in the Black 23-Pin RPM input connector

Perform the PTO testing procedure that is listed above.



**WARNING – Batteries expel explosive gases. Keep sparks, flames, burning cigarettes or other ignition sources away at all times. Always wear safety glasses and a face shield when working near batteries to prevent personal injury and/or property damage.**

Open hood and disconnect batteries on the vehicle.

In Cab Interior installation:

Remove ESC kick panel to access the 36-way ESC connector number 1600

1. Using Harness wire part number 3510323R1
  - a. Disconnect the 48 way Pass Thru connector outside the cab
  - b. Install gray circuit wire CY12LC to cavity 48 of the Pass Thru connector number 1700. (Not necessary to remove the connector)
  - c. Install gray circuit wire CY12LC to cavity 11 of the 36-way ESC connector number 1600.
  - d. Tape circuit CY12LC to the Cab harness and secure.
2. Install dash switches
  - a. Ensure the switch assigned to the Lectra Shift is a momentary switch.
  - b. If the switch is not a momentary switch, use a din removal tool and remove the affected switchpack from the instrument panel. Install a momentary switch in the position assigned to PTO. Reinstall the switchpack in the instrument panel.

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### PDC Under-hood Exterior Installation Steps

1. Remove the PDC panel cover to access interior circuits
2. Disassemble the PDC fuse panel block to gain access to the relay location and wire up the 40 Amp Relay located next to the Body Accessory Relay.
3. Using Harness wire part 3582955C91
  - a. Remove two screws holding the strain relief and twist the connector body, disassemble the pass thru connector (#4014). (do not remove the white terminal disk lock).
  - b. Connect the pink circuit wire J12LC to cavity 48 of the Pass thru connector 4014
  - c. Route harness to the PDC following the existing harness assembly.
  - d. Connect the white circuit wire J11-GC to ground stud (4005 Or 4006)
  - e. Connect the white/violet circuit wire J14LS to the PDC block location #4003 cavity R4-4 (Terminal 87 on the Relay) Install red terminal lock.
  - f. Connect the dual red splice terminal end circuit wires J14PL & J14LC to the PDC block location #4003 cavity R4-1 (Terminal 30 on the Relay) Install red terminal lock.
  - g. Connect small terminal end red circuit wire J14PL to the PDC block location #4003 cavity R4-5 (Terminal 86 on the Relay) Install red terminal lock.
  - h. Connect the pink circuit wire J12LC to PDC block location #4003 cavity R4-2 (Terminal 85 on the Relay) Install red terminal lock.
  - i. The large terminal end of the red circuit wire J14PL will connect to the maxi fuse block.
  - j. Install Relay assembly into Relay Location R4.
4. Using Harness 3581924C91 red wires with Maxi Fuse Block
  - a. Remove the harness from the Maxi Fuse Block
  - b. Reusing mounting hardware install the unfused side of the unmarked spare red power circuit to the Maxi Fuse block. (Not the teal end or fusible link side of the wire)
  - c. Remove the secondary lock from the Maxi Fuse Block and install J14PL into cavity A1 of the Maxi Fuse Block. Re-install the white secondary lock assembly and secure.
  - d. Install 40 Amp Maxi-fuse.
  - e. Install the fusible side of the unmarked power wire to the unfused side of the Mega fuse. (Towards the front of the truck) Remove and reinstall mounting hardware. Also tape wrap the dash harness wires to the dash harness.
  - f. Install the Maxi fuse block assembly into the PDC housing
  - g. Using the Coroplast tape warp install the protective tape onto the white circuit wire J14LS back up into the harness enough to sufficiently protect the wire outside the PDC fuse panel.
  - h. Re-assembly the PDC fuse panel box and stuff the wires back into place making sure that wires are correctly routed back to their original locations.
  - i. Reinstall PDC cover and secure
  - j. Strap lock dash harness effects and secure diode assembly.

5. Using wire harness 3582957C91
  - Route the harness down along the engine harness next to the ECM above the clutch linkage; follow the portion of the transmission/engine harness coming out of the engine ECM. Tape or tie-wrap the single WHITE Lectra shift pull-in coil wire to the transmission/engine harness.
6. Connect the RED wire to the Brown 8-pin Remote Power Module output connector Pin labeled **PTO\_Lectra-Shift\_Retaining\_Solenoid\_Output**.
7. Connect BLACK wire to the Black 23-pin Remote Power Module input connector Pin labeled **PTO\_Feedback\_Switch**.
8. Reconnect vehicle batteries.
9. Test the PTO operation.

**Table 93 8-Way RPM Output Connector (Brown) and 23-Way RPM Input Connector (Black)**

Connector Part No.	3548934C1	2585981c91
Description	Connector, Body, Brown 8-Way RPM Output	Connector, Body, Black 23-Way RPM Input Kit
Terminal Part	3534163C1 - 12 Ga. 3535931C1 - 14 Ga. 3535930C1 - 16 & 18 Ga.	Included
Cable Seal Part	3548945C1 - 12 & 14 Ga. 3535937C1 - 16 & 18 Ga.	N/A
Connector Lock Part	3548943c1	N/A
CPA Lock	3573833c1	N/A
Cavity Plug	3535938c1	Included

### 15.3. 60ABE — PTO ACCOMMODATION FOR ELECTRIC OVER HYDRAULIC PTO

**FEATURE CODE DESCRIPTION:** BDY INTG, PTO ACCOMMODATION for Electric over Hydraulic PTO, Does Not Include Solenoids, With Switch Mounted on Dash, Includes Audible Alarm and Indicator Light in Gauge Cluster (Requires 1 Remote Power Module input and 1 output)

**FEATURE/BODY FUNCTION:** This feature provides a latched switch in the in-cab switch-pack to drive a Remote Power Module output that provides current to engage the Electric over Hydraulic PTO. A Remote Power Module input is used to drive an indicator light in the gauge cluster, allowing the operator to discern whether or not the PTO is engaged. An audible alarm sounds when certain programmable parameters are violated. The RPM input also drives a PTO hourmeter to allow the operator to measure stationary PTO hours for maintenance records and fuel tax purposes. To view the hourmeter, you press the gauge cluster selection button momentarily until the text portion of the display indicates "PTO Hour".

This PTO feature is a rule-based option. The operation of the PTO is governed by rules of engagement, disengagement, reengagement, and alarms. These rules are defined through programmable parameters. Through these programmable parameters, the vehicle owner can customize the functionality of the PTO. Factory default settings for these programmable parameters are listed in the tables below.

→ ***Please use ICAP or 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 ICAP or the Diamond Logic™ Builder software. Programmable Parameters are also programmable through ICAP or the Diamond Logic™ Builder software. Body Builders must set programmable parameters that are appropriate for their PTO application.

Required software feature codes: 595170, 595179, 595193, 595248

Software feature codes that must be removed: 595171, 595252, 595244, 595267

#### **ENGAGEMENT**

\*These parameters set rules that must be met in order for the PTO to be engaged.

If **TEM\_PTO\_Brake\_Engmnt\_Inhib** parameter is turned on, then the brake pedal must be depressed in order for the PTO to engage.

If **TEM\_PTO\_Cltch\_Engmnt\_Inhib** parameter is turned on, then the clutch pedal must be depressed for the PTO to engage.

If **TEM\_PTO\_Eng\_Run\_Engmnt\_Inhib** parameter is turned on, then the engine has to be running in order for the PTO to be engaged.

If **TEM\_PTO\_Eng\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the engine speed is over a certain threshold, which is defined as a programmable parameter in **TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit**

If **TEM\_PTO\_Neut\_Engmnt\_Inhib** parameter is turned on, then the PTO can only be engaged if the Transmission is NOT in Neutral or Park

If **TEM\_PTO\_Non\_Neut\_Engmnt\_Inhib** parameter is turned on, then the Transmission must be in Neutral or Park for the PTO to be engaged.

If **TEM\_PTO\_Pk\_Brake\_Engmnt\_Inhib** parameter is turned on, then the Park Brake must be set in order for the PTO to be engaged.

If **TEM\_PTO\_Veh\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the Vehicle Speed is over the value prescribed by **TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit**.

**Table 94**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Brake_Engmnt_Inhib	2095	If this Parameter is 1, the PTO will not be engaged if the brake pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Clutch_Engmnt_Inhib	2094	If this Parameter is 1, the PTO will not be engaged if the clutch pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Eng_Run_Engmnt_Inhib	2096	If this Parameter is 1, the PTO will not be engaged if the engine is not running	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Inhib	2092	If this Parameter is 1, the PTO will not be engaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Limit	2093	See TEM_PTO_Eng_Spd_Engmnt_Inhib	1000 RPM	100	5000	1
TEM_PTO_Neut_Engmnt_Inhib	2089	If this Parameter is 1, the PTO will only be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_Non_Neut_Engmnt_Inhib	2088	If this Parameter is 1, the PTO will not be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Engmnt_Inhib	2087	If this Parameter is 1, the PTO will not be engaged if the Park Brake is not set.	Off	NA	NA	NA

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Veh_Spd_Engmnt_Inhib	2090	If this Parameter is 1, the PTO will not be engaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Veh_Spd_Engmnt_Limit	2091	See TEM_PTO_Veh_Spd_Engmnt_Inhib	3 MPH	1	100	1

**DISENGAGEMENT**

\* These parameters set the conditions under which the PTO will be disengaged.

If **TEM\_PTO\_Eng\_Run\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine speed rises above the value set by **TEM\_PTO\_Eng\_Spd\_DisEng\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Disengages** parameter is turned on, then the PTO will be disengaged if the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Disengages** parameter is turned on, then the PTO will be disengaged if the Park Brake is released.

If **TEM\_PTO\_Veh\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the vehicle speed is over the valued specified by **TEM\_PTO\_Veh\_Spd\_DisEng\_Limit**.

**Table 95**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Eng_Run_Disengages	2114	If this Parameter is 1, the PTO will be disengaged if the engine is turned off.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_DisEng_Limit	2113	See TEM_PTO_Eng_Spd_Disengages	1800 RPM	0	5000	1
TEM_PTO_Eng_Spd_Disengages	2112	If this Parameter is 1, the PTO will be disengaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_DisEng_Limit	On	NA	NA	NA
TEM_PTO_Non_Neut_Disengages	2109	If this Parameter is 1, the PTO will be disengaged if the transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Disengages	2108	If this Parameter is 1, the PTO will be disengaged if the Park Brake is released.	Off	NA	NA	NA

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Veh_Spd_Disengages	2110	If this Parameter is 1, the PTO will be disengaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_DisEng_Limit.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_DisEng_Limit	2111	See TEM_PTO_Veh_Spd_Disengages	0 MPH	3	100	1

### **REENGAGEMENT**

\* These parameters set the conditions under which the PTO can be reengaged.

If **TEM\_PTO\_Eng\_Run\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine stopping) when the engine is restarted.

If **TEM\_PTO\_Eng\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine overspeed) when the engine speed falls below TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit.

If **TEM\_PTO\_Ext\_Input\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to the designated external input being in active state) when the external input is no longer in active state.

If **TEM\_PTO\_Key\_State\_Allow\_ReEng** parameter is turned on, then the PTO will be allowed to reengage when the key state is returned to run.

If **TEM\_PTO\_Non\_Neut\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to transmission out of neutral) when the transmission is placed back into neutral.

If **TEM\_PTO\_Pk\_Brake\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to park brake released) when the park brake is reapplied.

If **TEM\_PTO\_Veh\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to the vehicle being over the vehicle speed value) when the vehicle speed falls below TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit.



Table 96

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_ Eng_Run_ Allow_ReEng	2122	If this Parameter is 1, the PTO will be reengaged after a disengage due to the engine stopping when the engine is restarted.	Off	NA	NA	NA
TEM_PTO_ Eng_Spd_ Allow_ReEng	2120	If this Parameter is 1, the PTO will be reengaged after a disengage due to engine overspeed when the engine speed is below TEM_PTO_Eng_Spd_Engmnt_Limit.	On	NA	NA	NA
TEM_PTO_ Ext_Input_ Allow_ReEng	2121	If this Parameter is 1, the PTO will be reengaged after a disengage due to the designated external input when the external input is no longer active.	Off	NA	NA	NA
TEM_PTO_ Key_State_ Allow_ReEng	2069	If this parameter is set, the PTO will be allowed to reengage when the key state is returned to run.	Off	NA	NA	NA
TEM_PTO_ Non_Neut_ Allow_ReEng	2148	If this Parameter is 1, the PTO will be reengaged after a disengage due to transmission out of neutral when the transmission is placed back into neutral.	Off	NA	NA	NA
TEM_PTO_ Pk_Brake_ Allow_ReEng	2149	If this Parameter is 1, the PTO will be reengaged after a disengage due to park brake released when the park brake is reapplied.	Off	NA	NA	NA
TEM_PTO_ Veh_Spd_ Allow_ReEng	2119	If this Parameter is 1, the PTO will be reengaged after a disengage due to vehicle overspeed when the vehicle speed is below TEM_PTO_Veh_Spd_Engmnt_Limit.	Off	NA	NA	NA

**ALARMS**

\* These parameters set the conditions in which an audible alarm in the gauge cluster will sound.

If **TEM\_PTO\_Eng\_Run\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Alarms** parameter is turned on, then an alarm will sound if the PTO is engaged and the engine speed is over the value set by **TEM\_PTO\_Eng\_Spd\_Alarm\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the transmission is taken out of neutral

If **TEM\_PTO\_Pk\_Brake\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the park brake is released

If **TEM\_PTO\_Veh\_Spd\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the vehicle speed is about the value set by **TEM\_PTO\_Veh\_Spd\_Alarm\_Limit**.

**Table 97 PTO Alarms**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Eng_Run_Alarms	2137	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine is turned off	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarm_Limit	2136	See TEM_PTO_Eng_Spd_Alarms	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarms	2135	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine speed is over TEM_PTO_Eng_Spd_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_Non_Neut_Alarms	2132	If this Parameter is 1, an alarm will sound if the PTO is engaged and transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Alarms	2131	If this Parameter is 1, an alarm will sound if the PTO is engaged and the park brake is released	Off	NA	NA	NA

**Table 97 PTO Alarms (cont.)**

TEM_PTO_Veh_Spd_Alarms	2133	If this Parameter is 1, an alarm will sound if the PTO is engaged and the vehicle speed is over TEM_PTO_Veh_Spd_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Alarm_Limit	2134	See TEM_PTO_Veh_Spd_Alarms	Off	NA	NA	NA

**Other Parameters**

\* These parameters allow the customer to program the active state of the Remote Power Module Input and set the maximum current of the Remote Power Module Output.

The **TEM\_RPM\_PTO\_Engaged\_Param** parameter indicates the state that the ESC will read as active for the TEM PTO feedback switch (As it goes into the RPM input). This active state will be used to indicate when the PTO is engaged.

0 = Input active when open circuit

1 = Input active when grounded

3 = Input active when at 12V

The **TEM\_Hyd\_PTO\_Engagement\_Out\_Param** parameter sets the current at which the ESC will fuse the Remote Power Module output that drives the engagement of the PTO. This is used to define the maximum amount of current that can flow through the Remote Power Module output.

**Table 98**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_RPM_PTO_Engaged_Param	2147	Active State for the TEM PTO engagement feedback switch.	1	List	List	List
TEM_Hyd_PTO_Engagement_Out_Param	1993	This is the fuse level of the Hydraulic PTO FET.	20 Amps	0	20	0.1

**WIRING INFORMATION**

→ **Please use ICAP or 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).**

- All wiring to RPM inputs and outputs is customer supplied.

- One wire must be connected from the pin labeled PTO\_Output in the Brown 8-pin RPM output connector, to the coil on the hydraulic solenoid. This wire drives the engagement and disengagement of the solenoid. The customer supplies a ground wire for the hydraulic solenoid.
- A second wire must be connected from the Bodybuilder installed PTO feedback switch (ground active), to the pin labeled PTO\_Feedback\_Switch in the Black 23-pin RPM input connector. This switch used to determine whether or not the PTO is engaged by determining if the switch is in the active state. If the switch is indeed in the active state and the PTO is running, then an indicator light in the gauge cluster will be on. When the switch is not in the active state, the indicator light will not be on.
- The switch provided is labeled PTO.

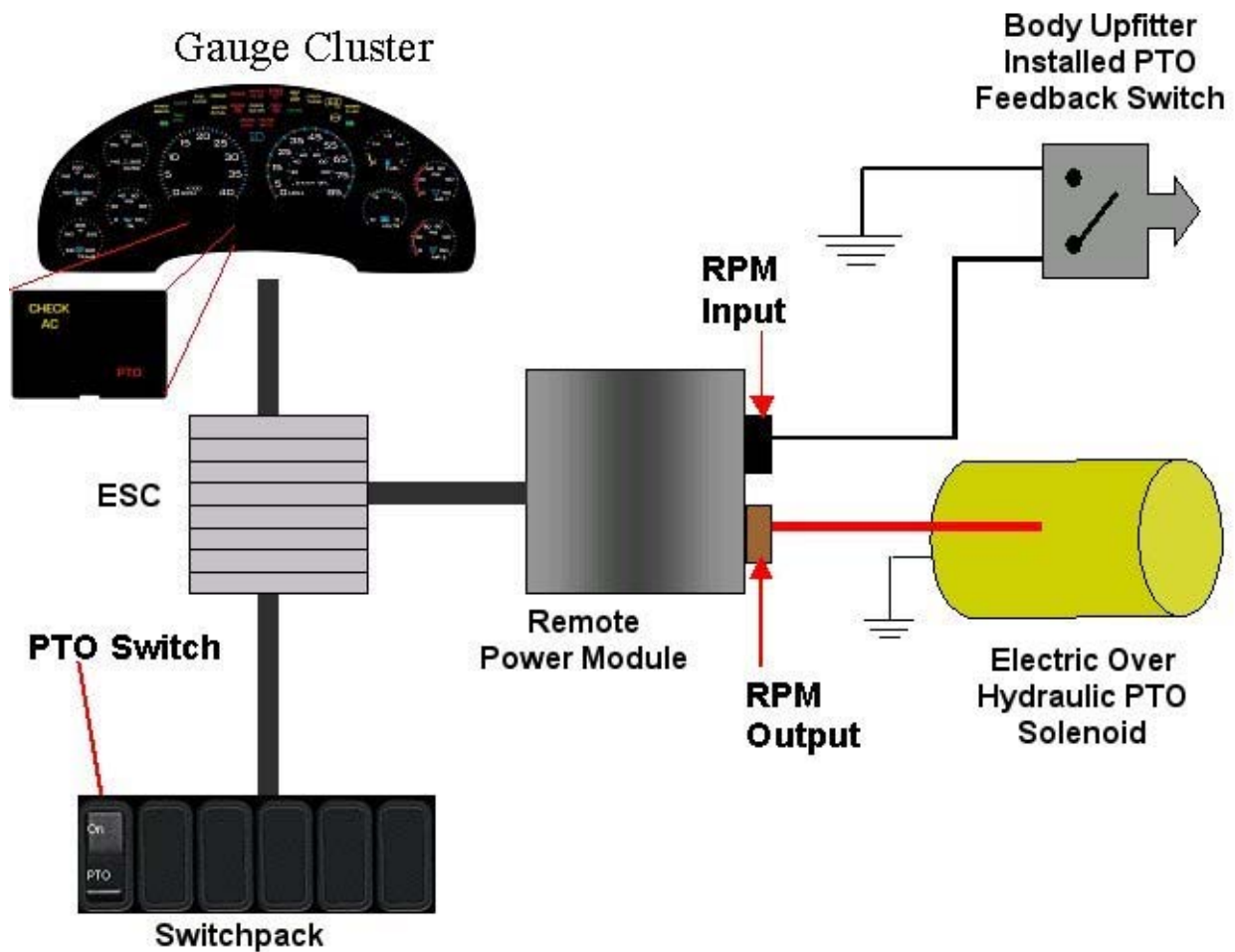


Figure 117 Overview of Electric Over Hydraulic PTO System

#### RPM CONNECTOR INFORMATION

**\*\* HPV kits are REQUIRED to allow Body Builders to wire in and out of the Remote Power Module connectors.**

HPV kits are pre-made kits that include terminals and seals for BOTH RPM connectors.

**Table 99**

HPV Kits	Part Number
RPM Terminal Kit 12 Gauge	2585651C91
RPM Terminal Kit 14 Gauge	2585423C91

**NOTE – The following connectors are optional because they are already provided with the Remote Power Modules.**

This information is given so that the Body Builder could purchase connectors in the event that the original connectors were damaged or lost, or so that the Body Builder can pre-fabricate a harness.

**Table 100 8–Way RPM Output Connector (Brown) and 23-Way RPM Input Connector (Black)**

Connector Part No.	3548934C1	2585981c91
Description	Connector, Body, Brown 8–Way RPM Output	Connector, Body, Black 23–Way RPM Input Kit
Terminal Part	3534163C1 - 12 Ga. 3535931C1 - 14 Ga. 3535930C1 - 16 & 18 Ga.	Included
Cable Seal Part	3548945C1 - 12 & 14 Ga. 3535937C1 - 16 & 18 Ga.	N/A
Connector Lock Part	3548943c1	N/A
CPA Lock	3573833c1	N/A
Cavity Plug	3535938c1	Included

→ RPM address 1 is located **Back of Battery Box** on 4000 model trucks

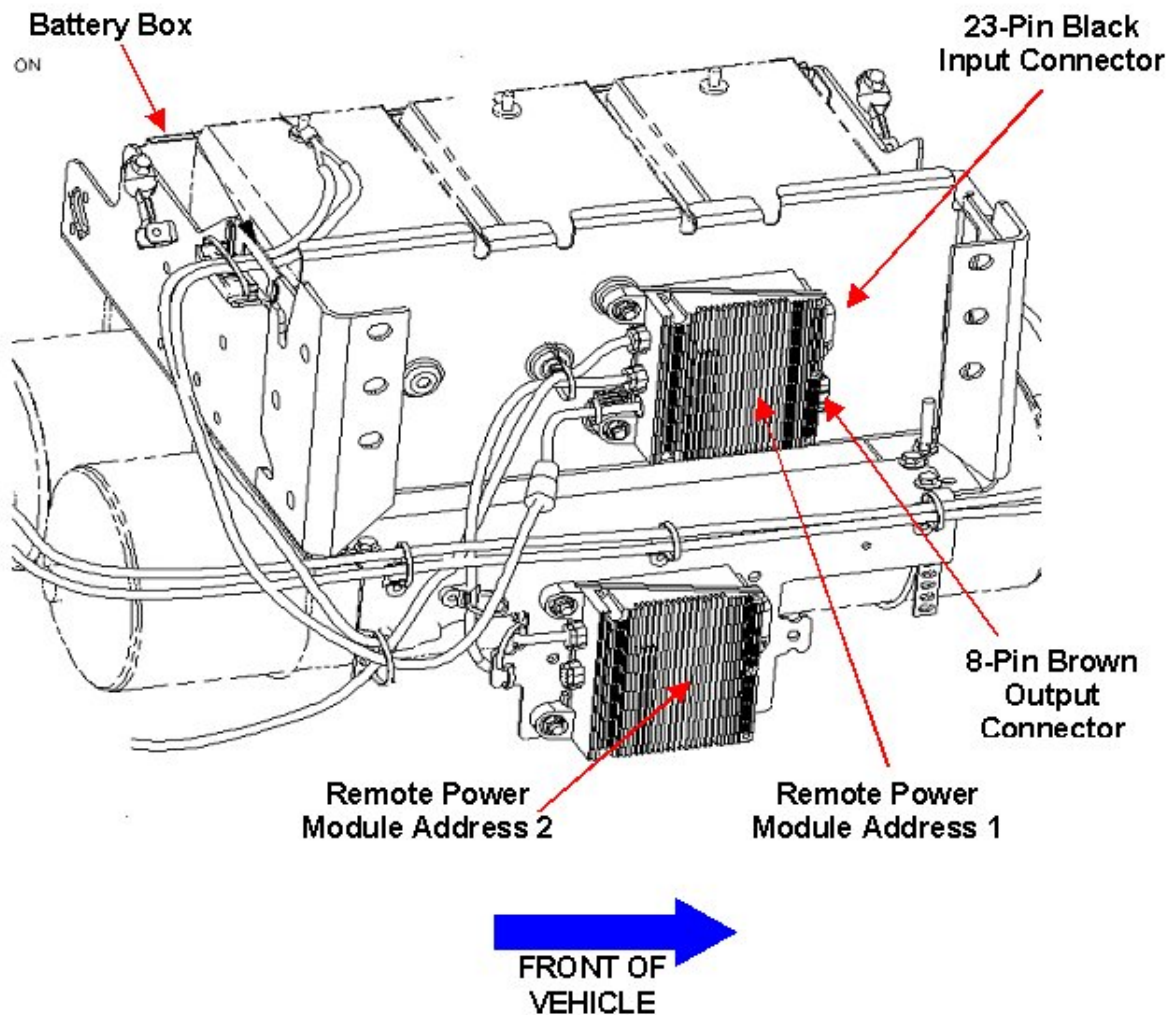
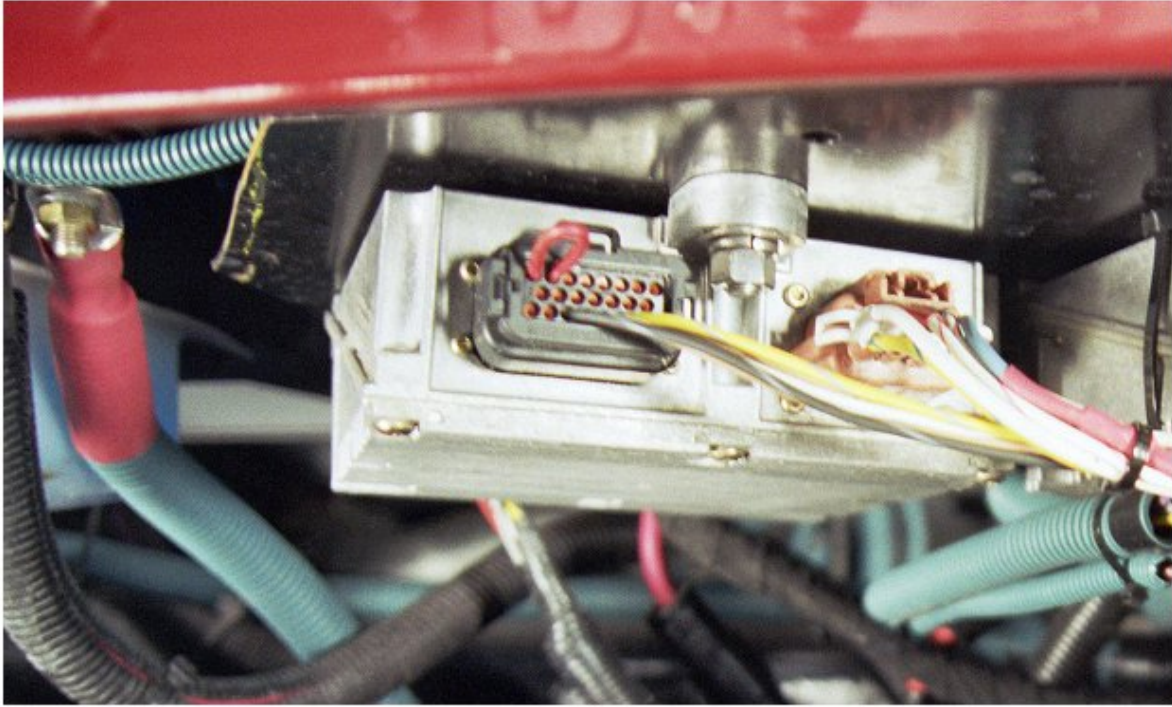


Figure 118 RPM Mounting Location on a 4000 Model Truck

→ **RPM address 1 is located Under Cab, driver's side on 7000 model truck.**



**Figure 119 RPM Mounting Location on a 7000 Model Truck**

### **TESTING**

1. To determine if the PTO is working, depress the PTO switch in the cab to the on position. Ensure that all interlock conditions are enabled.
2. Verify that the pin labeled **PTO\_Output** of the Brown 8-way Remote Power Module output connector has the battery voltage levels present.
3. Verify that the Remote Power Module Input labeled PTO\_Feedback\_Switch (Pin position specified by ICAP or the Diamond Logic™ Builder software) is receiving the correct voltage (12V or Ground) as specified by the customer in ICAP or the Diamond Logic™ Builder software.
4. Make certain that the indicator light in the top section of the PTO switch illuminates by engaging the PTO.
5. Make certain that the PTO indicator light in the gauge cluster illuminates by engaging the PTO.
6. The Audible Alarm can be tested by violating the set programmable parameters and determining if the Alarm sounds. For example: If the park brake interlock is programmed ON, release the park brake and engage the PTO. The audible alarm should sound with continuous beeps.

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

- Software feature codes 595170, 595179, 595193, and 595248 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer)

- 
- Use ICAP or the Diamond Logic™ Builder software to make sure that software feature codes 595171, 595252, 595244, and 595267 are NOT enabled on the vehicle (see Local Dealer)
  - Set the desired programmable parameters for each signal using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
  - Connect a wire from the pin labeled **PTO\_Output** in the Brown 8-pin RPM output connector, to the coil on the solenoid.
  - Connect a wire from a Bodybuilder-installed PTO feedback switch to the pin labeled **PTO\_Feedback\_Switch** in the Black 23-Pin RPM input connector
  - Perform the PTO testing procedure that is listed above.

**\* Constant Engage Hydraulic Pump**

- Another use of 60ABE is to control a dump valve on a constantly engaged hydraulic pump. In this case you would use the RPM (address 1) output A to activate and deactivate the dump valve. This dump valve is used to control hydraulic pressure in the system, reducing wear on the system and increasing fuel economy.



## 15.4. 60ABK — PTO ACCOMMODATION ELECTRIC OVER AIR NON-CLUTCHED

**FEATURE CODE DESCRIPTION:** BDY INTG, PTO ACCOMMODATION Accommodation for Electric over Air, Non Clutched PTO Engagement and Disengagement, Does not Include Air Solenoid, With Switch Mounted on Dash, Includes Audible Alarm and Indicator Light in Gauge Cluster (requires 1 Remote Input Power Module Input and 1 Output)

**FEATURE/BODY FUNCTION:** This feature provides a momentary switch in the in-cab switch-pack to drive a Remote Power Module (RPM) output that provides current to engage the Electric over Air, Non-Clutched PTO. A Remote Power Module input is used to drive an indicator light in the gauge cluster, allowing the operator to discern whether or not the PTO is actually engaged. An audible alarm sounds when certain programmable parameters are violated. The RPM input also drives a PTO hourmeter to allow the operator to measure stationary PTO hours for maintenance records and fuel tax purposes. To view the hourmeter, you press the gauge cluster selection button momentarily until the text portion of the display indicates "PTO Hour".

This PTO feature is a rule-based option. The operation of the PTO is governed by rules of engagement, disengagement, reengagement, and alarms. These rules are defined through programmable parameters. Through these programmable parameters, the vehicle owner can customize the functionality of the PTO. Factory default settings for these programmable parameters are listed in the tables below.

→ ***Please use ICAP or 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).***

→ All reengagement parameters for Non-Clutched PTO's are defaulted OFF. These parameters are defaulted to OFF because reengaging a Non-Clutched PTO automatically (after it has disengaged) could cause the gears to grind and damage the PTO.

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

\*Software feature codes can be added through ICAP or the Diamond Logic™ Builder software. Programmable Parameters are also programmable through ICAP or the Diamond Logic™ Builder software. Body Builders must set programmable parameters that are appropriate for their PTO application.

Required software feature codes: 595170, 595179, 595252, 595248

Software feature codes that must be removed: 595171, 595193, 595244, 595267

### **ENGAGEMENT**

\*These parameters set rules that must be met in order for the PTO to be engaged.

If **TEM\_PTO\_Air\_Pres\_Engmnt\_Inhib** parameter is turned on, the PTO cannot be engaged if the primary vehicle air pressure is below the programmable parameter set by **TEM\_PTO\_Air\_Pres\_Engmnt\_Limit**.

If **TEM\_PTO\_Brake\_Engmnt\_Inhib** parameter is turned on, then the brake pedal must be depressed in order for the PTO to engage.

If **TEM\_PTO\_Cltch\_Engmnt\_Inhib** parameter is turned on, then the clutch pedal must be depressed for the PTO to engage.

If **TEM\_PTO\_Eng\_Run\_Engmnt\_Inhib** parameter is turned on, then the engine has to be running in order for the PTO to be engaged.

If **TEM\_PTO\_Eng\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the engine speed is over a certain threshold, which is defined as a programmable parameter in **TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit**

If **TEM\_PTO\_Neut\_Engmnt\_Inhib** parameter is turned on, then the PTO can only be engaged if the Transmission is NOT in Neutral or Park

If **TEM\_PTO\_Non\_Neut\_Engmnt\_Inhib** parameter is turned on, then the Transmission must be in Neutral or Park for the PTO to be engaged.

If **TEM\_PTO\_Pk\_Brake\_Engmnt\_Inhib** parameter is turned on, then the Park Brake must be set in order for the PTO to be engaged.

If **TEM\_PTO\_Veh\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the Vehicle Speed is over the value prescribed by **TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit**.

Table 101

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Engmnt_Inhib	2097	If this Parameter is 1, the PTO will not be engaged if the primary vehicle air pressure is below TEM_PTO_Air_Pres_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Air_Pres_Engmnt_Limit	2098	See TEM_PTO_Air_Pres_Engmnt_Inhib	90 psi	1	500	1
TEM_PTO_Brake_Engmnt_Inhib	2095	If this Parameter is 1, the PTO will not be engaged if the brake pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Cltch_Engmnt_Inhib	2094	If this Parameter is 1, the PTO will not be engaged if the clutch pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Eng_Run_Engmnt_Inhib	2096	If this Parameter is 1, the PTO will not be engaged if the engine is not running	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Inhib	2092	If this Parameter is 1, the PTO will not be engaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_Engmnt_Limit	On	NA	NA	NA

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_ Eng_Spd_ Engmnt_Limit	2093	See TEM_PTO_Eng_ Spd_Engmnt_Inhib	1000 RPM	100	5000	1
TEM_PTO_ Neut_Engmnt_Inhib	2089	If this Parameter is 1, the PTO will only be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_ Non_Neut_ Engmnt_Inhib	2088	If this Parameter is 1, the PTO will not be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_Pk_ Brake_Engmnt_ Inhib	2087	If this Parameter is 1, the PTO will not be engaged if the Park Brake is not set.	Off	NA	NA	NA
TEM_PTO_ Veh_Spd_ Engmnt_Inhib	2090	If this Parameter is 1, the PTO will not be engaged if the vehicle speed is over the value set in TEM_PTO_Veh_ Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_ Veh_Spd_ Engmnt_Limit	2091	See TEM_PTO_Veh_ Spd_Engmnt_Inhib	3 MPH	1	100	1

**DISENGAGEMENT**

\* These parameters set the conditions under which the PTO will be disengaged.

If **TEM\_PTO\_Air\_Pres\_Disengages** parameter is turned on, then the PTO will be disengaged if the primary air pressure is below the value set in **TEM\_PTO\_Air\_Pres\_DisEng\_Limit**.

If **TEM\_PTO\_Eng\_Run\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine speed rises above the value set by **TEM\_PTO\_Eng\_Spd\_DisEng\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Disengages** parameter is turned on, then the PTO will be disengaged if the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Disengages** parameter is turned on, then the PTO will be disengaged if the Park Brake is released.

If **TEM\_PTO\_Veh\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the vehicle speed is over the valued specified by **TEM\_PTO\_Veh\_Spd\_DisEng\_Limit**.

**Table 102**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_DisEng_Limit	2116	See TEM_PTO_Air_Pres_Disengages	80 psi	0	500	1
TEM_PTO_Air_Pres_Disengages	2115	If this Parameter is 1, the PTO will be disengaged if the primary air pressure is below the value set in TEM_PTO_Air_Pres_DisEng_Limit.	On	NA	NA	NA
TEM_PTO_Eng_Run_Disengages	2114	If this Parameter is 1, the PTO will be disengaged if the engine is turned off.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_DisEng_Limit	2113	See TEM_PTO_Eng_Spd_Disengages	1800 RPM	0	5000	1
TEM_PTO_Eng_Spd_Disengages	2112	If this Parameter is 1, the PTO will be disengaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_DisEng_Limit	On	NA	NA	NA

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Non_Neut_Disengages	2109	If this Parameter is 1, the PTO will be disengaged if the transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Disengages	2108	If this Parameter is 1, the PTO will be disengaged if the Park Brake is released.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Disengages	2110	If this Parameter is 1, the PTO will be disengaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_DisEng_Limit.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_DisEng_Limit	2111	See TEM_PTO_Veh_Spd_Disengages	0 MPH	3	100	1

### **REENGAGEMENT**

\* These parameters set the conditions under which the PTO can be reengaged.

**NOTE – \*These parameters are not recommended to be set if you have a non-clutched type PTO.**

If **TEM\_PTO\_Air\_Pres\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to low air pressure) when the primary air pressure rises about the value specified by TEM\_PTO\_Air\_Pres\_Engmnt\_Limit.

If **TEM\_PTO\_Eng\_Run\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine stopping) when the engine is restarted.

If **TEM\_PTO\_Eng\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine overspeed) when the engine speed falls below TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit.

If **TEM\_PTO\_Key\_State\_Allow\_ReEng** parameter is turned on, then the PTO will be allowed to reengage when the key state is returned to run.

If **TEM\_PTO\_Non\_Neut\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to transmission out of neutral) when the transmission is placed back into neutral.

If **TEM\_PTO\_Pk\_Brake\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to park brake released) when the park brake is reapplied.

If **TEM\_PTO\_Veh\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to the vehicle being over the vehicle speed value) when the vehicle speed falls below TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit.

Table 103

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Allow_ReEng	2124	If this Parameter is 1, the PTO will be reengaged after a disengage due to low vehicle air pressure when the primary air pressure is over TEM_PTO_Air_Pres_Engmnt_Limit.	Off	NA	NA	NA
TEM_PTO_Eng_Run_Allow_ReEng	2122	If this Parameter is 1, the PTO will be reengaged after a disengage due to the engine stopping when the engine is restarted.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Allow_ReEng	2120	If this Parameter is 1, the PTO will be reengaged after a disengage due to engine overspeed when the engine speed is below TEM_PTO_Eng_Spd_Engmnt_Limit.	Off	NA	NA	NA
TEM_PTO_Key_State_Allow_ReEng	2069	If this parameter is set, the PTO will be allowed to reengage when the key state is returned to run.	Off	NA	NA	NA
TEM_PTO_Non_Neut_Allow_ReEng	2148	If this Parameter is 1, the PTO will be reengaged after a disengage due to transmission out of neutral when the transmission is placed back into neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Allow_ReEng	2149	If this Parameter is 1, the PTO will be reengaged after a disengage due to park brake released when the park brake is reapplied.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Allow_ReEng	2119	If this Parameter is 1, the PTO will be reengaged after a disengage due to vehicle overspeed when the vehicle speed is below TEM_PTO_Veh_Spd_Engmnt_Limit.	Off	NA	NA	NA

**ALARMS**

\*These parameters utilize the gauge cluster to sound an alarm to the driver when certain programmable parameters are violated.

If **TEM\_PTO\_Air\_Pres\_Alarms** parameter is turned on, then an audible alarm will sound in the cab if the primary air pressure drops below the value specified by **TEM\_PTO\_Air\_Pres\_Alarm\_Limit**.

If **TEM\_PTO\_Eng\_Run\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Alarms** parameter is turned on, then an alarm will sound if the PTO is engaged and the engine speed is over the value set by **TEM\_PTO\_Eng\_Spd\_Alarm\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the park brake is released

If **TEM\_PTO\_Veh\_Spd\_Alarms** parameter is turned on, then an audible alarm will sound if the PTO is engaged and the vehicle speed is about the value set by **TEM\_PTO\_Veh\_Spd\_Alarm\_Limit**.

**Table 104 PTO Alarms**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Alarm_Limit	2139	See TEM_PTO_Air_Pres_Alarms.	Off	NA	NA	NA
TEM_PTO_Air_Pres_Alarms	2138	If this Parameter is 1, an alarm will sound if the primary air pressure is below TEM_PTO_Air_Pres_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_Eng_Run_Alarms	2137	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine is turned off	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarm_Limit	2136	See TEM_PTO_Eng_Spd_Alarms	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarms	2135	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine speed is over TEM_PTO_Eng_Spd_Alarm_Limit.	Off	NA	NA	NA

**Table 104 PTO Alarms (cont.)**

TEM_PTO_ Non_Neut_ Alarms	2132	If this Parameter is 1, an alarm will sound if the PTO is engaged and transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_ Pk_Brake_ Alarms	2131	If this Parameter is 1, an alarm will sound if the PTO is engaged and the park brake is released	Off	NA	NA	NA
TEM_PTO_ Veh_Spd_ Alarms	2133	If this Parameter is 1, an alarm will sound if the PTO is engaged and the vehicle speed is over TEM_PTO_Veh_Spd_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_ Veh_Spd_ Alarm_Limit	2134	See TEM_PTO_Veh_Spd_Alarms	Off	NA	NA	NA

**Other Parameters**

\* These parameters allow the customer to program the active state of the Remote Power Module Input and set the maximum current of the Remote Power Module Output.

The **TEM\_RPM\_PTO\_Engaged\_Param** parameter indicates the state that the ESC will read as active for the TEM PTO feedback switch (As it goes into the RPM input). This active state will be used to indicate when the PTO is engaged.

0 = Input active when open circuit

1 = Input active when grounded

3 = Input active when at 12V

The **TEM\_Hyd\_PTO\_Engagement\_Out\_Param** parameter sets the current at which the ESC will fuse the Remote Power Module output that drives the engagement of the PTO. This is used to define the maximum amount of current that can flow through the Remote Power Module output.



Table 105

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_RPM_PTO_Engaged_Param	2147	Active State for the TEM PTO engagement feedback switch.	1	List	List	List
TEM_Hyd_PTO_Engagement_Out_Param	1993	This is the fuse level of the Hydraulic PTO FET.	20 Amps	0	20	0.1

**WIRING INFORMATION**

→ ***Please use ICAP or 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).***

- All wiring to RPM inputs and outputs is customer supplied.
- One wire must be connected from the pin labeled PTO\_Output in the Brown 8-pin RPM output connector, to the coil on the air solenoid. This wire drives the engagement and disengagement of the solenoid. The customer supplies a ground wire for the air solenoid.
- A second wire must be connected from the Bodybuilder installed PTO feedback switch (ground active), to the pin labeled PTO\_Feedback\_Switch in the Black 23-pin RPM input connector. This switch used to determine whether or not the PTO is engaged by determining if the switch is in the active state. If the switch is indeed in the active state and the PTO is running, then an indicator light in the gauge cluster will be on. When the switch is not in the active state, the indicator light will not be on.
- The switch provided is not labeled; therefore the customer will have to install a PTO label for the switch, from the bag of switch labels provided with the vehicle. The customer should use ICAP or the Diamond Logic™ Builder software to determine the location of the in-cab switch.

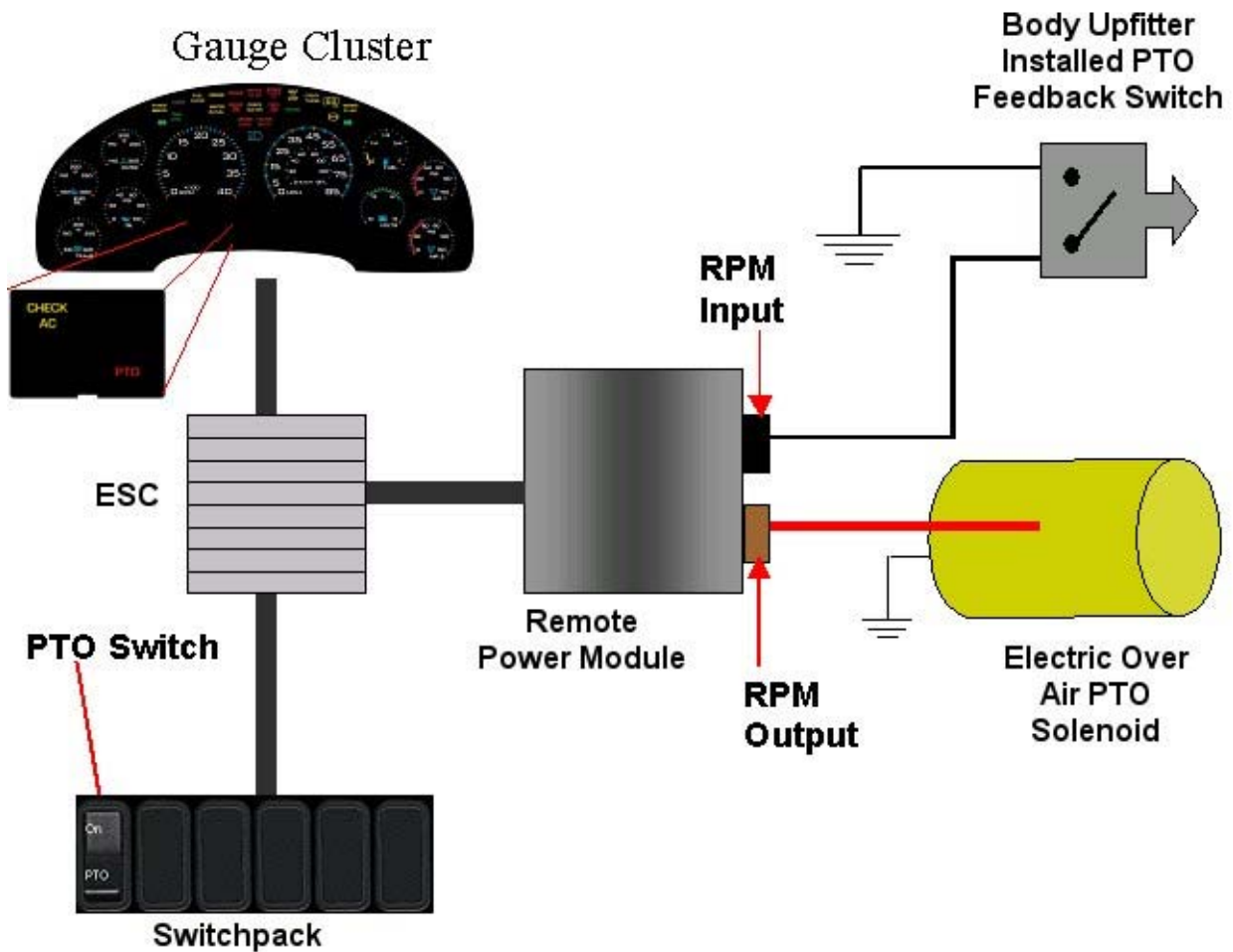


Figure 120 Overview of Electric Over Air (Non-Clutched) PTO System

#### RPM CONNECTOR INFORMATION

**\*\* HPV kits are REQUIRED to allow Body Builders to wire in and out of the Remote Power Module connectors.**

HPV kits are pre-made kits that include terminals and seals for BOTH RPM connectors.

Table 106

HPV Kits	Part Number
RPM Terminal Kit 12 Gauge	2585651C91
RPM Terminal Kit 14 Gauge	2585423C91

**NOTE – The following connectors are optional because they are already provided with the Remote Power Modules.**

This information is given so that the Body Builder could purchase connectors in the event that the original connectors were damaged or lost, or so that the Body Builder can pre-fabricate a harness.

**Table 107 8–Way RPM Output Connector (Brown) and 23-Way RPM Input Connector (Black)**

Connector Part No.	3548934C1	2585981c91
Description	Connector, Body, Brown 8–Way RPM Output	Connector, Body, Black 23–Way RPM Input Kit
Terminal Part	3534163C1 - 12 Ga. 3535931C1 - 14 Ga. 3535930C1 - 16 & 18 Ga.	Included
Cable Seal Part	3548945C1 - 12 & 14 Ga. 3535937C1 - 16 & 18 Ga.	N/A
Connector Lock Part	3548943c1	N/A
CPA Lock	3573833c1	N/A
Cavity Plug	3535938c1	Included

→ RPM address 1 is located **Back of Battery Box** on 4000 model trucks

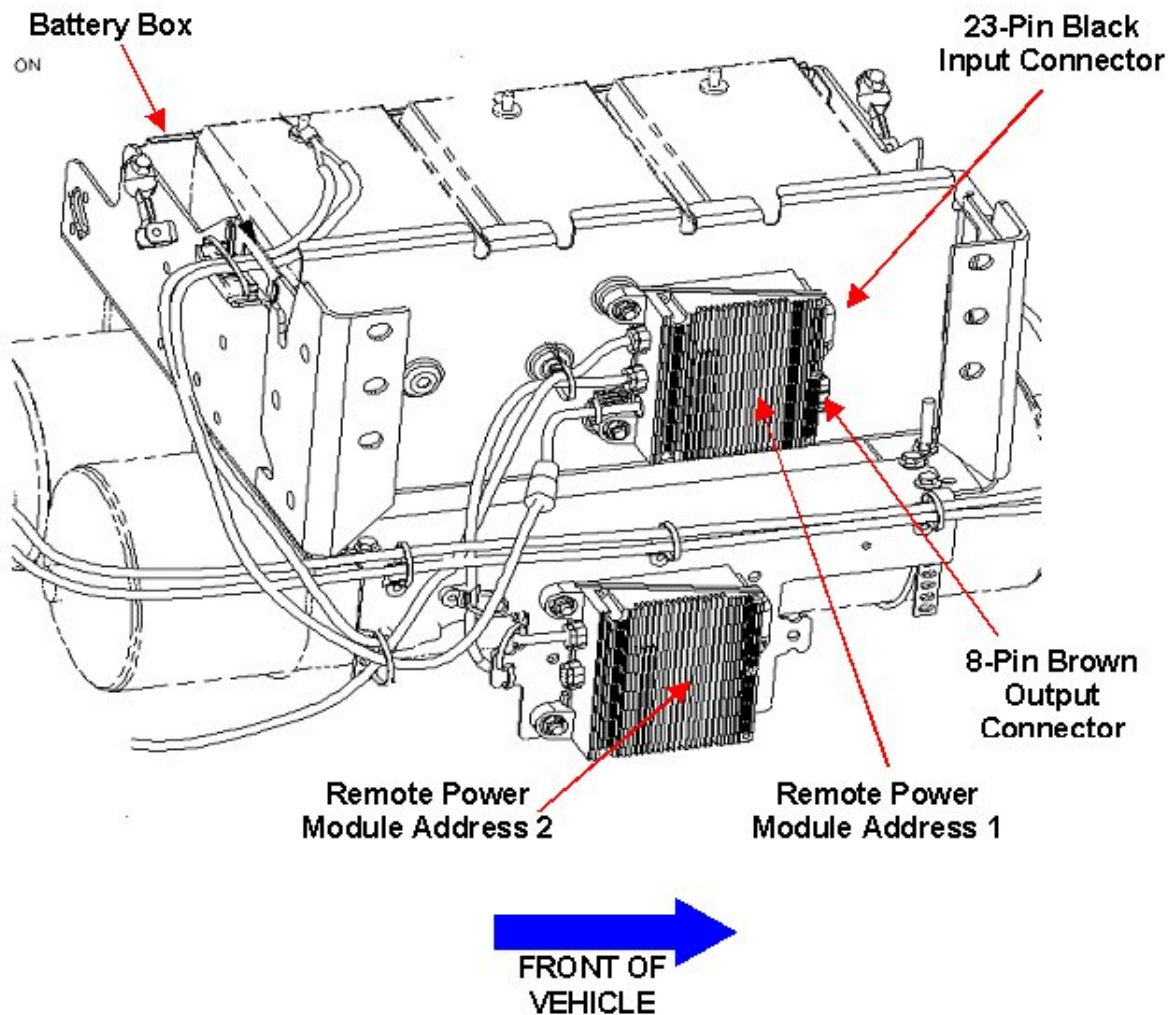
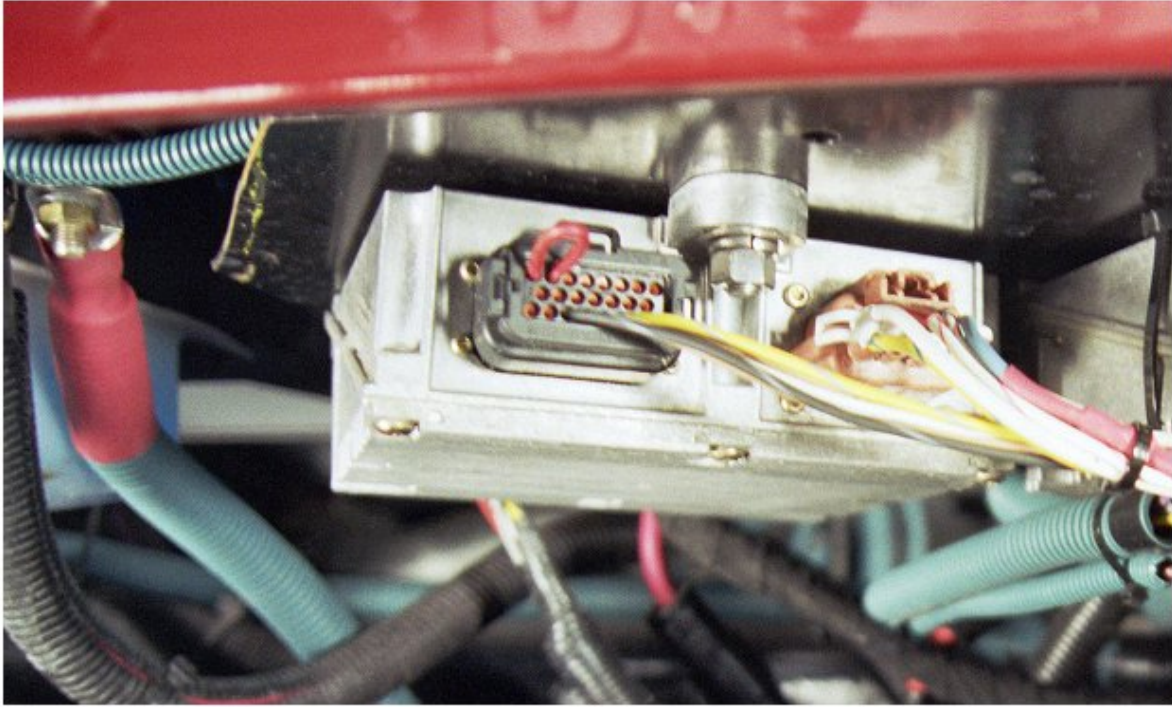


Figure 121 RPM Mounting Location on a 4000 Model Truck

→ **RPM address 1 is located Under Cab, driver's side on 7000 model truck.**



**Figure 122 RPM Mounting Location on a 7000 Model Truck**

### **TESTING**

1. To determine if the PTO is working, depress the PTO switch in the cab to the on position. Ensure that all interlock conditions are enabled.
2. Verify that the pin labeled **PTO\_Output** of the Brown 8-way Remote Power Module output connector has the battery voltage levels present.
3. Verify that the Remote Power Module Input labeled PTO\_Feedback\_Switch (Pin position specified by ICAP or the Diamond Logic™ Builder software) is receiving the correct voltage (12V or Ground) as specified by the customer in ICAP or the Diamond Logic™ Builder software.
4. Make certain that the indicator light in the top section of the PTO switch illuminates by engaging the PTO.
5. Make certain that the PTO indicator light in the gauge cluster illuminates by engaging the PTO.
6. The Audible Alarm can be tested by violating the set programmable parameters and determining if the Alarm sounds. For example: If the park brake interlock is programmed ON, release the park brake and engage the PTO. The audible alarm should sound with continuous beeps.

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

- Software feature codes 595170, 595179, 595252, and 595248 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer).

- 
- Use ICAP or the Diamond Logic™ Builder software to make sure that software feature codes 595171, 595193, 595244, and 595267 are NOT enabled on the vehicle (see Local Dealer)
  - Set the desired programmable parameters for each signal using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
  - Connect a wire from the pin labeled **PTO\_Output** in the Brown 8-pin RPM output connector, to the coil on the solenoid.
  - Connect a wire from a Bodybuilder-installed PTO feedback switch to the pin labeled **PTO\_Feedback\_Switch** in the Black 23-Pin RPM input connector
  - Perform the PTO testing procedure that is listed above.

## 15.5. 60ABL — PTO ACCOMMODATION ELECTRIC OVER AIR CLUTCHED

**FEATURE CODE DESCRIPTION:** BDY INTG, PTO ACCOMMODATION Accommodation for Electric over Air, Clutched PTO Engagement and Disengagement, Does not Include Air Solenoid, With Switch Mounted on Dash, Includes Audible Alarm and Indicator Light in Gauge Cluster (requires 1 Remote Power Module Input and 1 Output)

**FEATURE/BODY FUNCTION:** This feature provides a latched switch in the in-cab switch-pack to drive a Remote Power Module output that provides power to engage and disengage the Electric over Air, Clutched PTO. A Remote Power Module input is used to drive an indicator light in the gauge cluster, allowing the operator to discern whether or not the PTO is engaged. An audible alarm sounds when certain programmable parameters are violated. The RPM input also drives a PTO hourmeter to allow the operator to measure stationary PTO hours for maintenance records and fuel tax purposes. To view the hourmeter, you press the gauge cluster selection button momentarily until the text portion of the display indicates "PTO Hour".

This PTO feature is a rule-based option. The operation of the PTO is governed by rules of engagement, disengagement, reengagement, and alarms. These rules are defined through programmable parameters. Through these programmable parameters, the vehicle owner can customize the functionality of the PTO. Factory default settings for these programmable parameters are listed in the tables below.

→ ***Please use ICAP or 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 ICAP or the Diamond Logic™ Builder software. Programmable Parameters are also programmable through ICAP or the Diamond Logic™ Builder software. Body Builders must set programmable parameters that are appropriate for their PTO application.

Required software feature codes: 595170, 595179, 595248, 595244

Software feature codes that must be removed: 595171, 595193, 595252, 595267

### **ENGAGEMENT**

\*These parameters set rules that must be met in order for the PTO to be engaged.

If **TEM\_PTO\_Air\_Pres\_Engmnt\_Inhib** parameter is turned on, the PTO cannot be engaged if the primary vehicle air pressure is below the programmable parameter set by **TEM\_PTO\_Air\_Pres\_Engmnt\_Limit**.

If **TEM\_PTO\_Brake\_Engmnt\_Inhib** parameter is turned on, then the brake pedal must be depressed in order for the PTO to engage.

If **TEM\_PTO\_Cltch\_Engmnt\_Inhib** parameter is turned on, then the clutch pedal must be depressed for the PTO to engage.

If **TEM\_PTO\_Eng\_Run\_Engmnt\_Inhib** parameter is turned on, then the engine has to be running in order for the PTO to be engaged.

If **TEM\_PTO\_Eng\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the engine speed is over a certain threshold, which is defined as a programmable parameter in **TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit**

If **TEM\_PTO\_Neut\_Engmnt\_Inhib** parameter is turned on, then the PTO can only be engaged if the Transmission is NOT in Neutral or Park

If **TEM\_PTO\_Non\_Neut\_Engmnt\_Inhib** parameter is turned on, then the Transmission must be in Neutral or Park for the PTO to be engaged.

If **TEM\_PTO\_Pk\_Brake\_Engmnt\_Inhib** parameter is turned on, then the Park Brake must be set in order for the PTO to be engaged.

If **TEM\_PTO\_Veh\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the Vehicle Speed is over the value prescribed by **TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit**.

Table 108

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Engmnt_Inhib	2097	If this Parameter is 1, the PTO will not be engaged if the primary vehicle air pressure is below TEM_PTO_Air_Pres_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Air_Pres_Engmnt_Limit	2098	See TEM_PTO_Air_Pres_Engmnt_Inhib	90 psi	1	500	1
TEM_PTO_Brake_Engmnt_Inhib	2095	If this Parameter is 1, the PTO will not be engaged if the brake pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Cltch_Engmnt_Inhib	2094	If this Parameter is 1, the PTO will not be engaged if the clutch pedal is not depressed	Off	NA	NA	NA
TEM_PTO_Eng_Run_Engmnt_Inhib	2096	If this Parameter is 1, the PTO will not be engaged if the engine is not running	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Inhib	2092	If this Parameter is 1, the PTO will not be engaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Eng_Spd_Engmnt_Limit	2093	See TEM_PTO_Eng_Spd_Engmnt_Inhib	1000 RPM	100	5000	1



<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_ Neut_Engmnt_Inhib	2089	If this Parameter is 1, the PTO will only be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_ Non_Neut_ Engmnt_Inhib	2088	If this Parameter is 1, the PTO will not be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_Pk_ Brake_Engmnt_ Inhib	2087	If this Parameter is 1, the PTO will not be engaged if the Park Brake is not set.	Off	NA	NA	NA
TEM_PTO_ Veh_Spd_ Engmnt_Inhib	2090	If this Parameter is 1, the PTO will not be engaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_ Veh_Spd_ Engmnt_Limit	2091	See TEM_PTO_Veh_Spd_Engmnt_Inhib	3 MPH	1	100	1

### **DISENGAGEMENT**

\* These parameters set the conditions under which the PTO will be disengaged.

If **TEM\_PTO\_Air\_Pres\_Disengages** parameter is turned on, then the PTO will be disengaged if the primary air pressure is below the value set in **TEM\_PTO\_Air\_Pres\_DisEng\_Limit**.

If **TEM\_PTO\_Eng\_Run\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine speed rises above the value set by **TEM\_PTO\_Eng\_Spd\_DisEng\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Disengages** parameter is turned on, then the PTO will be disengaged if the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Disengages** parameter is turned on, then the PTO will be disengaged if the Park Brake is released.

If **TEM\_PTO\_Veh\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the vehicle speed is over the valued specified by **TEM\_PTO\_Veh\_Spd\_DisEng\_Limit**.

Table 109

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_DisEng_Limit	2116	See TEM_PTO_Air_Pres_Disengages	80 psi	0	500	1
TEM_PTO_Air_Pres_Disengages	2115	If this Parameter is 1, the PTO will be disengaged if the primary air pressure is below the value set in TEM_PTO_Air_Pres_DisEng_Limit.	On	NA	NA	NA
TEM_PTO_Eng_Run_Disengages	2114	If this Parameter is 1, the PTO will be disengaged if the engine is turned off.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_DisEng_Limit	2113	See TEM_PTO_Eng_Spd_Disengages	1800 RPM	0	5000	1
TEM_PTO_Eng_Spd_Disengages	2112	If this Parameter is 1, the PTO will be disengaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_DisEng_Limit	On	NA	NA	NA
TEM_PTO_Non_Neut_Disengages	2109	If this Parameter is 1, the PTO will be disengaged if the transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Disengages	2108	If this Parameter is 1, the PTO will be disengaged if the Park Brake is released.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Disengages	2110	If this Parameter is 1, the PTO will be disengaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_DisEng_Limit.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_DisEng_Limit	2111	See TEM_PTO_Veh_Spd_Disengages	0 MPH	3	100	1

**REENGAGEMENT**

\* These parameters set the conditions under which the PTO can be reengaged.

If **TEM\_PTO\_Air\_Pres\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to low air pressure) when the primary air pressure rises about the value specified by TEM\_PTO\_Air\_Pres\_Engmnt\_Limit.

If **TEM\_PTO\_Eng\_Run\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine stopping) when the engine is restarted.

If **TEM\_PTO\_Eng\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine overspeed) when the engine speed falls below TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit.

If **TEM\_PTO\_Key\_State\_Allow\_ReEng** parameter is turned on, then the PTO will be allowed to reengage when the key state is returned to run.

If **TEM\_PTO\_Non\_Neut\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to transmission out of neutral) when the transmission is placed back into neutral.

If **TEM\_PTO\_Pk\_Brake\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to park brake released) when the park brake is reapplied.

If **TEM\_PTO\_Veh\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to the vehicle being over the vehicle speed value) when the vehicle speed falls below TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit.

**Table 110**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Allow_ReEng	2124	If this Parameter is 1, the PTO will be reengaged after a disengage due to low vehicle air pressure when the primary air pressure is over TEM_PTO_Air_Pres_Engmnt_Limit.	Off	NA	NA	NA
TEM_PTO_Eng_Run_Allow_ReEng	2122	If this Parameter is 1, the PTO will be reengaged after a disengage due to the engine stopping when the engine is restarted.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Allow_ReEng	2120	If this Parameter is 1, the PTO will be reengaged after a disengage due to engine overspeed when the engine speed is below TEM_PTO_Eng_Spd_Engmnt_Limit.	On	NA	NA	NA

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Key_State_Allow_ReEng	2069	If this parameter is set, the PTO will be allowed to reengage when the key state is returned to run.	Off	NA	NA	NA
TEM_PTO_Non_Neut_Allow_ReEng	2148	If this Parameter is 1, the PTO will be reengaged after a disengage due to transmission out of neutral when the transmission is placed back into neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Allow_ReEng	2149	If this Parameter is 1, the PTO will be reengaged after a disengage due to park brake released when the park brake is reapplied.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Allow_ReEng	2119	If this Parameter is 1, the PTO will be reengaged after a disengage due to vehicle overspeed when the vehicle speed is below TEM_PTO_Veh_Spd_Engmnt_Limit.	Off	NA	NA	NA

## **ALARMS**

\*These parameters utilize the gauge cluster to sound an alarm to the driver when certain programmable parameters are violated.

If **TEM\_PTO\_Air\_Pres\_Alarms** parameter is turned on, then an audible alarm will sound in the cab if the primary air pressure drops below the value specified by **TEM\_PTO\_Air\_Pres\_Alarm\_Limit**.

If **TEM\_PTO\_Eng\_Run\_Alarms** parameter is turned on, then an audible alarm will sound in the cab if the PTO is engaged and the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Alarms** parameter is turned on, then an alarm will sound in the cab if the PTO is engaged and the engine speed is over the value set by **TEM\_PTO\_Eng\_Spd\_Alarm\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Alarms** parameter is turned on, then an audible alarm will sound in the cab if the PTO is engaged and the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Alarms** parameter is turned on, then an audible alarm will sound in the cab if the PTO is engaged and the park brake is released

If **TEM\_PTO\_Veh\_Spd\_Alarms** parameter is turned on, then an audible alarm will sound in the cab if the PTO is engaged and the vehicle speed is about the value set by **TEM\_PTO\_Veh\_Spd\_Alarm\_Limit**.

Table 111 PTO Alarms

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Alarm_Limit	2139	See TEM_PTO_Air_Pres_Alarms.	Off	NA	NA	NA
TEM_PTO_Air_Pres_Alarms	2138	If this Parameter is 1, an alarm will sound if the primary air pressure is below TEM_PTO_Air_Pres_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_Eng_Run_Alarms	2137	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine is turned off.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarm_Limit	2136	See TEM_PTO_Eng_Spd_Alarms	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Alarms	2135	If this Parameter is 1, an alarm will sound if the PTO is engaged and the engine speed is over TEM_PTO_Eng_Spd_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_Non_Neut_Alarms	2132	If this Parameter is 1, an alarm will sound if the PTO is engaged and transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Alarms	2131	If this Parameter is 1, an alarm will sound if the PTO is engaged and the park brake is released	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Alarms	2133	If this Parameter is 1, an alarm will sound if the PTO is engaged and the vehicle speed is over TEM_PTO_Veh_Spd_Alarm_Limit.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Alarm_Limit	2134	See TEM_PTO_Veh_Spd_Alarms	Off	NA	NA	NA

### Other Parameters

\* These parameters allow the customer to program the active state of the Remote Power Module Input and set the maximum current of the Remote Power Module Output.

The **TEM\_RPM\_PTO\_Engaged\_Param** parameter indicates the state that the ESC will read as active for the TEM PTO feedback switch (As it goes into the RPM input). This active state will be used to indicate when the PTO is engaged.

0 = Input active when open circuit

1 = Input active when grounded

3 = Input active when at 12V

The **TEM\_Hyd\_PTO\_Engagement\_Out\_Param** parameter sets the current at which the ESC will fuse the Remote Power Module output that drives the engagement of the PTO. This is used to define the maximum amount of current that can flow through the Remote Power Module output.

**Table 112**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_RPM_PTO_Engaged_Param	2147	Active State for the TEM PTO engagement feedback switch.	1	List	List	List
TEM_Hyd_PTO_Engagement_Out_Param	1993	This is the fuse level of the Hydraulic PTO FET.	20 Amps	0	20	0.1

### WIRING INFORMATION

→ ***Please use ICAP or 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).***

- All wiring to RPM inputs and outputs is customer supplied.
- One wire must be connected from the pin labeled PTO\_Output in the Brown 8-pin RPM output connector, to the coil on the air solenoid. This wire drives the engagement and disengagement of the solenoid. The customer supplies a ground wire for the air solenoid.
- A second wire must be connected from the Bodybuilder installed PTO feedback switch (ground active), to the pin labeled PTO\_Feedback\_Switch in the Black 23-pin RPM input connector. This switch used to determine whether or not the PTO is engaged by determining if the switch is in the active state. If the switch is indeed in the active state and the PTO is running, then an indicator light in the gauge cluster will be on. When the switch is not in the active state, the indicator light will not be on.
- The switch provided is labeled PTO.

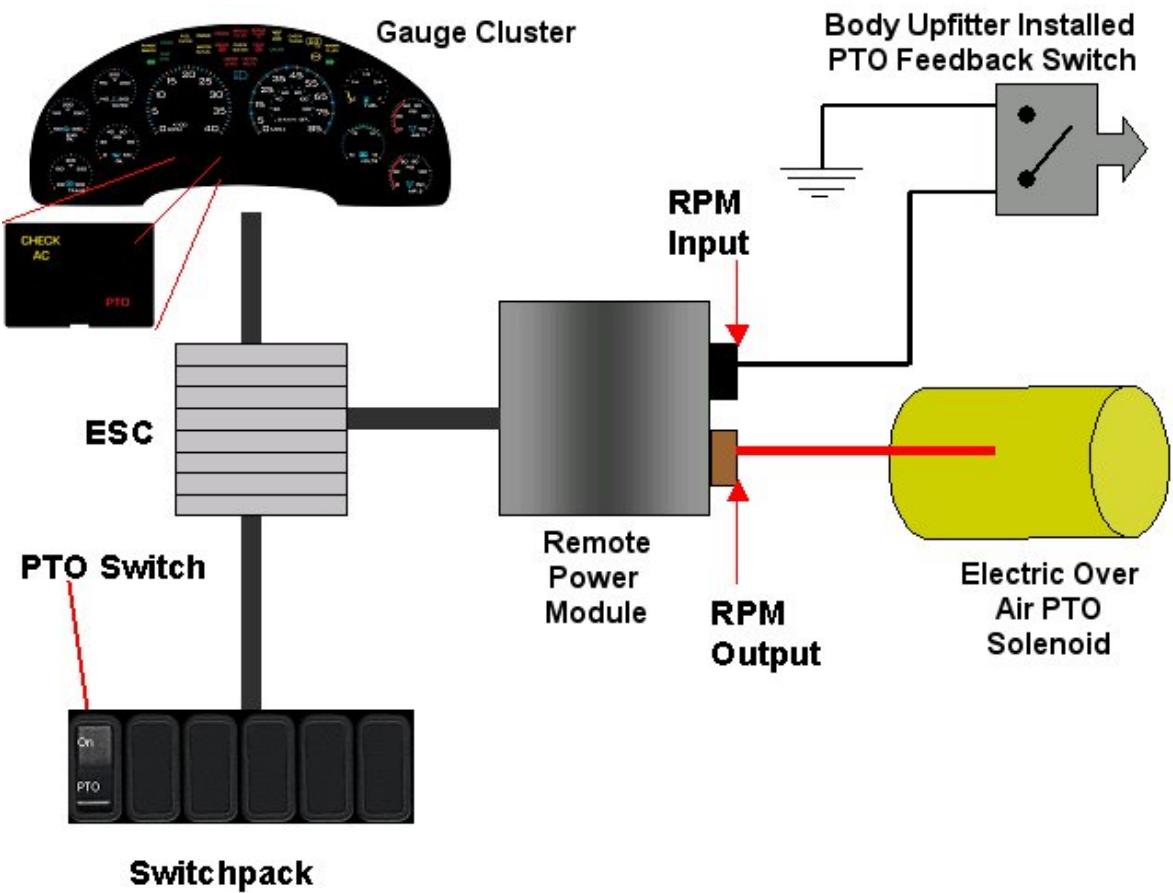


Figure 123 Overview of Electric Over Air (Clutched) PTO System

**RPM CONNECTOR INFORMATION**

**\*\* HPV kits are REQUIRED to allow Body Builders to wire in and out of the Remote Power Module connectors.**

HPV kits are pre-made kits that include terminals and seals for BOTH RPM connectors.

**Table 113**

HPV Kits	Part Number
RPM Terminal Kit 12 Gauge	2585651C91
RPM Terminal Kit 14 Gauge	2585423C91

**NOTE – The following connectors are optional because they are already provided with the Remote Power Modules.**

This information is given so that the Body Builder could purchase connectors in the event that the original connectors were damaged or lost, or so that the Body Builder can pre-fabricate a harness.

**Table 114 8–Way RPM Output Connector (Brown) and 23-Way RPM Input Connector (Black)**

Connector Part No.	3548934C1	2585981c91
Description	Connector, Body, Brown 8–Way RPM Output	Connector, Body, Black 23–Way RPM Input Kit
Terminal Part	3534163C1 - 12 Ga. 3535931C1 - 14 Ga. 3535930C1 - 16 & 18 Ga.	Included
Cable Seal Part	3548945C1 - 12 & 14 Ga. 3535937C1 - 16 & 18 Ga.	N/A
Connector Lock Part	3548943c1	N/A
CPA Lock	3573833c1	N/A
Cavity Plug	3535938c1	Included



→ RPM address 1 is located Back of Battery Box on 4000 model trucks

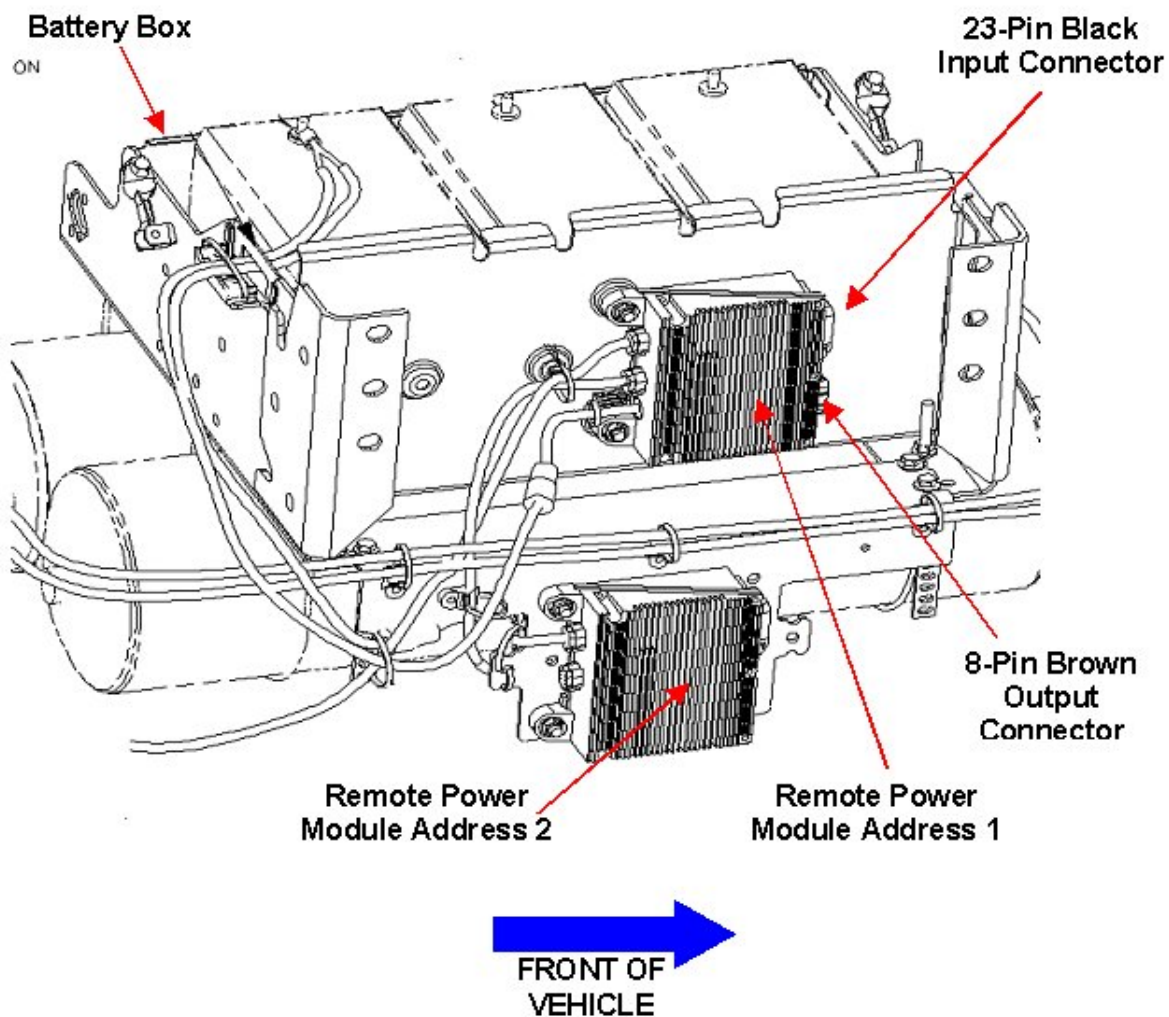
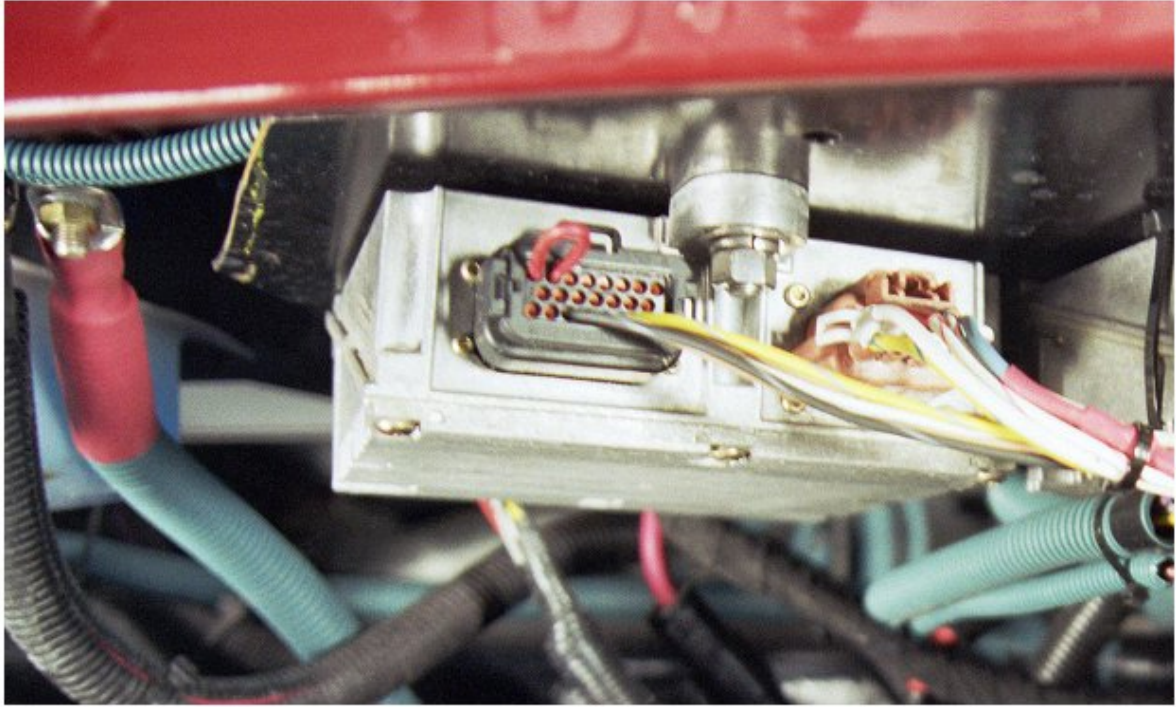


Figure 124 RPM Mounting Location on a 4000 Model Truck

→ **RPM address 1 is located Under Cab, driver's side on 7000 model truck.**



**Figure 125 RPM Mounting Location on a 7000 Model Truck**

### **TESTING**

1. To determine if the PTO is working, depress the PTO switch in the cab to the on position. Ensure that all interlock conditions are enabled.
2. Verify that the pin labeled **PTO\_Output** of the Brown 8-way Remote Power Module output connector has the battery voltage levels present.
3. Verify that the Remote Power Module Input labeled PTO\_Feedback\_Switch (Pin position specified by ICAP or the Diamond Logic™ Builder software) is receiving the correct voltage (12V or Ground) as specified by the customer in ICAP or the Diamond Logic™ Builder software.
4. Make certain that the indicator light in the top section of the PTO switch illuminates by engaging the PTO.
5. Make certain that the PTO indicator light in the gauge cluster illuminates by engaging the PTO.
6. The Audible Alarm can be tested by violating the set programmable parameters and determining if the Alarm sounds. For example: If the park brake interlock is programmed ON, release the park brake and engage the PTO. The audible alarm should sound with continuous beeps.

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

- Software feature codes 595170, 595179, 595244, and 595248 must be enabled on the vehicle using ICAP or the Diamond Logic™ Builder software (see Local Dealer).

- Use ICAP or the Diamond Logic™ Builder software to make sure that software feature codes 595171, 595193, 595252, and 595267 are NOT enabled on the vehicle (see Local Dealer)
- Set the desired programmable parameters for each signal using ICAP or the Diamond Logic™ Builder software (see Local Dealer)
- Connect a wire from the pin labeled **PTO\_Output** in the Brown 8-pin RPM output connector, to the coil on the solenoid.
- Connect a wire from a Bodybuilder-installed PTO feedback switch to the pin labeled **PTO\_Feedback\_Switch** in the Black 23-Pin RPM input connector
- Perform the PTO testing procedure that is listed above.

## 15.6. 13XAA — PTO CONTROL

**FEATURE CODE DESCRIPTION:** PTO CONTROL, DASH MOUNTED For Customer Provided PTO; Includes Switch, Electric/Air Solenoid, Piping and Wiring

**FEATURE/BODY FUNCTION:** This feature provides the customer with the ability to control a customer-supplied PTO with an in-dash switch and an air solenoid. This feature provides all the software and wiring to the air solenoid located inside the driver's side frame rail next to the Transmission. Customer must supply and route air plumbing to the PTO. Programmable parameters allow customers to customize the functionality of their PTO.

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

Required Software Feature Codes: 595080, 595179, and 595267

Software feature codes that must be removed: 595171, 595193, 595252, 595244, and 595248

### **ENGAGEMENT**

\*These parameters set rules that must be met in order for the PTO to be engaged.

If **TEM\_PTO\_Air\_Pres\_Engmnt\_Inhib** parameter is turned on, the PTO cannot be engaged if the primary vehicle air pressure is below the programmable parameter set by **TEM\_PTO\_Air\_Pres\_Engmnt\_Limit**.

If **TEM\_PTO\_Brake\_Engmnt\_Inhib** parameter is turned on, then the brake pedal must be depressed in order for the PTO to engage.

If **TEM\_PTO\_Cltch\_Engmnt\_Inhib** parameter is turned on, then the clutch pedal must be depressed for the PTO to engage.

If **TEM\_PTO\_Eng\_Run\_Engmnt\_Inhib** parameter is turned on, then the engine has to be running in order for the PTO to be engaged.

If **TEM\_PTO\_Eng\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the engine speed is over a certain threshold, which is defined as a programmable parameter in **TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit**

If **TEM\_PTO\_Neut\_Engmnt\_Inhib** parameter is turned on, then the PTO can only be engaged if the Transmission is NOT in Neutral or Park

If **TEM\_PTO\_Non\_Neut\_Engmnt\_Inhib** parameter is turned on, then the Transmission must be in Neutral or Park for the PTO to be engaged.

If **TEM\_PTO\_Pk\_Brake\_Engmnt\_Inhib** parameter is turned on, then the Park Brake must be set in order for the PTO to be engaged.

If **TEM\_PTO\_Veh\_Spd\_Engmnt\_Inhib** parameter is turned on, then the PTO cannot be engaged if the Vehicle Speed is over the value prescribed by **TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit**.

Table 115

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_ Air_Pres_ Engmnt_Inhib	2097	If this Parameter is 1, the PTO will not be engaged if the primary vehicle air pressure is below TEM_PTO_Air_Pres_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_ Air_Pres_ Engmnt_Limit	2098	See TEM_PTO_Air_Pres_Engmnt_Inhib	90 psi	1	500	1
TEM_PTO_ Brake_Engmnt_ Inhib	2095	If this Parameter is 1, the PTO will not be engaged if the brake pedal is not depressed	Off	NA	NA	NA
TEM_PTO_ Cltch_Engmnt_ Inhib	2094	If this Parameter is 1, the PTO will not be engaged if the clutch pedal is not depressed	Off	NA	NA	NA
TEM_PTO_ Eng_Run_ Engmnt_Inhib	2096	If this Parameter is 1, the PTO will not be engaged if the engine is not running	Off	NA	NA	NA
TEM_PTO_ Eng_Spd_ Engmnt_Inhib	2092	If this Parameter is 1, the PTO will not be engaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_ Eng_Spd_ Engmnt_Limit	2093	See TEM_PTO_Eng_Spd_Engmnt_Inhib	1000 RPM	100	5000	1
TEM_PTO_ Neut_Engmnt_ Inhib	2089	If this Parameter is 1, the PTO will only be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_ Non_Neut_ Engmnt_Inhib	2088	If this Parameter is 1, the PTO will not be engaged if the Transmission is not in Neutral or Park	Off	NA	NA	NA
TEM_PTO_Pk_ Brake_Engmnt_ Inhib	2087	If this Parameter is 1, the PTO will not be engaged if the Park Brake is not set.	Off	NA	NA	NA

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Veh_Spd_Engmnt_Inhib	2090	If this Parameter is 1, the PTO will not be engaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_Engmnt_Limit	On	NA	NA	NA
TEM_PTO_Veh_Spd_Engmnt_Limit	2091	See TEM_PTO_Veh_Spd_Engmnt_Inhib	3 MPH	1	100	1

### DISENGAGEMENT

\* These parameters set the conditions under which the PTO will be disengaged.

If **TEM\_PTO\_Air\_Pres\_Disengages** parameter is turned on, then the PTO will be disengaged if the primary air pressure is below the value set in **TEM\_PTO\_Air\_Pres\_DisEng\_Limit**.

If **TEM\_PTO\_Eng\_Run\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine is turned off.

If **TEM\_PTO\_Eng\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the engine speed rises above the value set by **TEM\_PTO\_Eng\_Spd\_DisEng\_Limit**.

If **TEM\_PTO\_Non\_Neut\_Disengages** parameter is turned on, then the PTO will be disengaged if the transmission is taken out of neutral.

If **TEM\_PTO\_Pk\_Brake\_Disengages** parameter is turned on, then the PTO will be disengaged if the Park Brake is released.

If **TEM\_PTO\_Veh\_Spd\_Disengages** parameter is turned on, then the PTO will be disengaged if the vehicle speed is over the valued specified by **TEM\_PTO\_Veh\_Spd\_DisEng\_Limit**.

**Table 116**

Off - Indicates a 0 is set in for this parameter						
On - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_DisEng_Limit	2116	See TEM_PTO_Air_Pres_Disengages	80 psi	0	500	1

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Disengages	2115	If this Parameter is 1, the PTO will be disengaged if the primary air pressure is below the value set in TEM_PTO_Air_Pres_DisEng_Limit.	On	NA	NA	NA
TEM_PTO_Eng_Run_Disengages	2114	If this Parameter is 1, the PTO will be disengaged if the engine is turned off.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_DisEng_Limit	2113	See TEM_PTO_Eng_Spd_Disengages	1800 RPM	0	5000	1
TEM_PTO_Eng_Spd_Disengages	2112	If this Parameter is 1, the PTO will be disengaged if the engine speed is over the value set in TEM_PTO_Eng_Spd_DisEng_Limit	On	NA	NA	NA
TEM_PTO_Non_Neut_Disengages	2109	If this Parameter is 1, the PTO will be disengaged if the transmission is taken out of neutral.	Off	NA	NA	NA
TEM_PTO_Pk_Brake_Disengages	2108	If this Parameter is 1, the PTO will be disengaged if the Park Brake is released.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_Disengages	2110	If this Parameter is 1, the PTO will be disengaged if the vehicle speed is over the value set in TEM_PTO_Veh_Spd_DisEng_Limit.	Off	NA	NA	NA
TEM_PTO_Veh_Spd_DisEng_Limit	2111	See TEM_PTO_Veh_Spd_Disengages	0 MPH	3	100	1

### **REENGAGEMENT**

\* These parameters set the conditions under which the PTO can be reengaged.

If **TEM\_PTO\_Air\_Pres\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to low air pressure) when the primary air pressure rises about the value specified by TEM\_PTO\_Air\_Pres\_Engmnt\_Limit.

If **TEM\_PTO\_Eng\_Run\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine stopping) when the engine is restarted.

If **TEM\_PTO\_Eng\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to engine overspeed) when the engine speed falls below TEM\_PTO\_Eng\_Spd\_Engmnt\_Limit.

If **TEM\_PTO\_Key\_State\_Allow\_ReEng** parameter is turned on, then the PTO will be allowed to reengage when the key state is returned to run.

If **TEM\_PTO\_Non\_Neut\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to transmission out of neutral) when the transmission is placed back into neutral.

If **TEM\_PTO\_Pk\_Brake\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to park brake released) when the park brake is reapplied.

If **TEM\_PTO\_Veh\_Spd\_Allow\_ReEng** parameter is turned on, then the PTO will be reengaged (after a disengage due to the vehicle being over the vehicle speed value) when the vehicle speed falls below TEM\_PTO\_Veh\_Spd\_Engmnt\_Limit.

**Table 117**

<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_Air_Pres_Allow_ReEng	2124	If this Parameter is 1, the PTO will be reengaged after a disengage due to low vehicle air pressure when the primary air pressure is over TEM_PTO_Air_Pres_Engmnt_Limit.	Off	NA	NA	NA
TEM_PTO_Eng_Run_Allow_ReEng	2122	If this Parameter is 1, the PTO will be reengaged after a disengage due to the engine stopping when the engine is restarted.	Off	NA	NA	NA
TEM_PTO_Eng_Spd_Allow_ReEng	2120	If this Parameter is 1, the PTO will be reengaged after a disengage due to engine overspeed when the engine speed is below TEM_PTO_Eng_Spd_Engmnt_Limit.	On	NA	NA	NA
TEM_PTO_Key_State_Allow_ReEng	2069	If this parameter is set, the PTO will be allowed to reengage when the key state is returned to run.	Off	NA	NA	NA



<b>Off</b> - Indicates a 0 is set in for this parameter						
<b>On</b> - Indicates a 1 is set for the parameter						
Parameter	ID	Description	Default	Min	Max	Step
TEM_PTO_ Non_Neut_ Allow_ReEng	2148	If this Parameter is 1, the PTO will be reengaged after a disengage due to transmission out of neutral when the transmission is placed back into neutral.	Off	NA	NA	NA
TEM_PTO_ Pk_Brake_ Allow_ReEng	2149	If this Parameter is 1, the PTO will be reengaged after a disengage due to park brake released when the park brake is reapplied.	Off	NA	NA	NA
TEM_PTO_ Veh_Spd_ Allow_ReEng	2119	If this Parameter is 1, the PTO will be reengaged after a disengage due to vehicle overspeed when the vehicle speed is below TEM_PTO_Veh_Spd_Engmnt_Limit.	Off	NA	NA	NA

**ALARMS**

**\*\*Alarm parameters should not be set for this feature!!!!**

**WIRING INFORMATION**

- Customer must supply and route air plumbing from the International-provided air solenoid (Located inside the driver's side frame rail, adjacent to the Transmission) to the PTO.

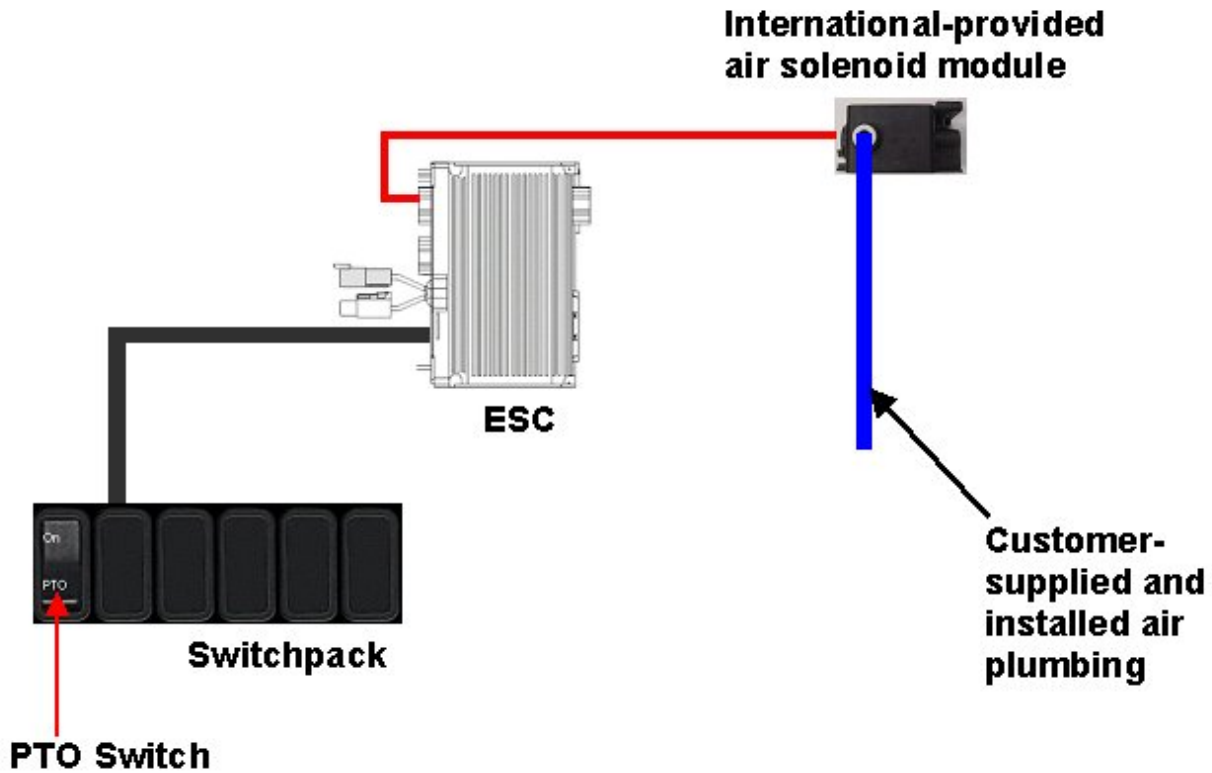


Figure 126

**TESTING**

1. Depress the In-cab PTO switch to the ON position.
2. Verify that all enabled interlock conditions are met.
3. Verify that the ESC pin labeled Air\_Solenoid\_Power (Pin A of the Blue ESC “Chassis” connector # 4008) is providing battery voltage.
4. Verify that the International-provided air solenoid is supplying air pressure at the solenoid output.

**HOW TO ADD THIS FEATURE:**

- Software Feature Codes 595080, 595179, and 595267 must be added to the truck using ICAP or the Diamond Logic™ Builder software.
- Software feature codes 595171, 595193, 595252, 595244, and 595248 must NOT be enabled on the truck.
- Set desired “Engagement”, “Disengagement”, and “Reengagement” programmable parameters.
- Add a latched switch (P/N 3578910C1) in the In-Cab switch pack in the position specified by ICAP or the Diamond Logic™ Builder software.
- If the truck already has a 4-pack or a 7-pack of solenoids, the customer should order another air solenoid (P/N 2506711C91) and install it in the next location on the solenoid pack.

- If the truck does not already have a 4-pack or 7-pack, the customer should order a 4-pack bracket (P/N 2505594C1) and an air solenoid (P/N 2506711C91).

## 15.7. 16WLM — PTO HOURMETER

**FEATURE CODE DESCRIPTION:** HOURMETER, PTO for Customer Provided PTO; Indicator Light and Hourmeter in Gauge Cluster Includes Return Wire for PTO Feedback Switch

**FEATURE/BODY FUNCTION:** This feature provides the customer with a wire (Circuit K88B 14 Ga. Lt Gn - cut blunt - located in the transmission harness ) to be wired into a PTO body builder installed feedback switch. Also included in this feature is a PTO indicator light in the gauge cluster and a PTO hourmeter, which allows the operator to measure stationary PTO hours for maintenance records and fuel tax purposes. To view the hourmeter, press the gauge cluster selection button momentarily until the text portion of the display indicates "PTO Hour".

**NOTE – This feature cannot be used if 16HGJ (Optional Transmission Oil Temperature Gauge for a MANUAL Transmission) is utilized.**

### SOFTWARE FEATURE CODES / PROGRAMMABLE PARAMETERS:

Software Feature Codes that must be added: 595266 and 595248

Software Feature Codes that must NOT be enabled: 595145

The **ESC\_PTO\_Engaged\_Param** parameter defines the voltage that will be read as the active state for the PTO engagement feedback switch.

0 = Input active when open circuit

1 = Input active when grounded

3 = Input active when at 12V

**Table 118**

Parameter	ID	Description	Default	Units	Min	Max	Step
ESC_PTO_Engaged_Param	2199	Active State for the PTO engagement feedback switch.	1	No_Units	NA	NA	NA

### WIRING INFORMATION

- The customer must wire the International-provided PTO engagement feedback return wire (14 gauge, Light Green) into the PTO feedback switch.

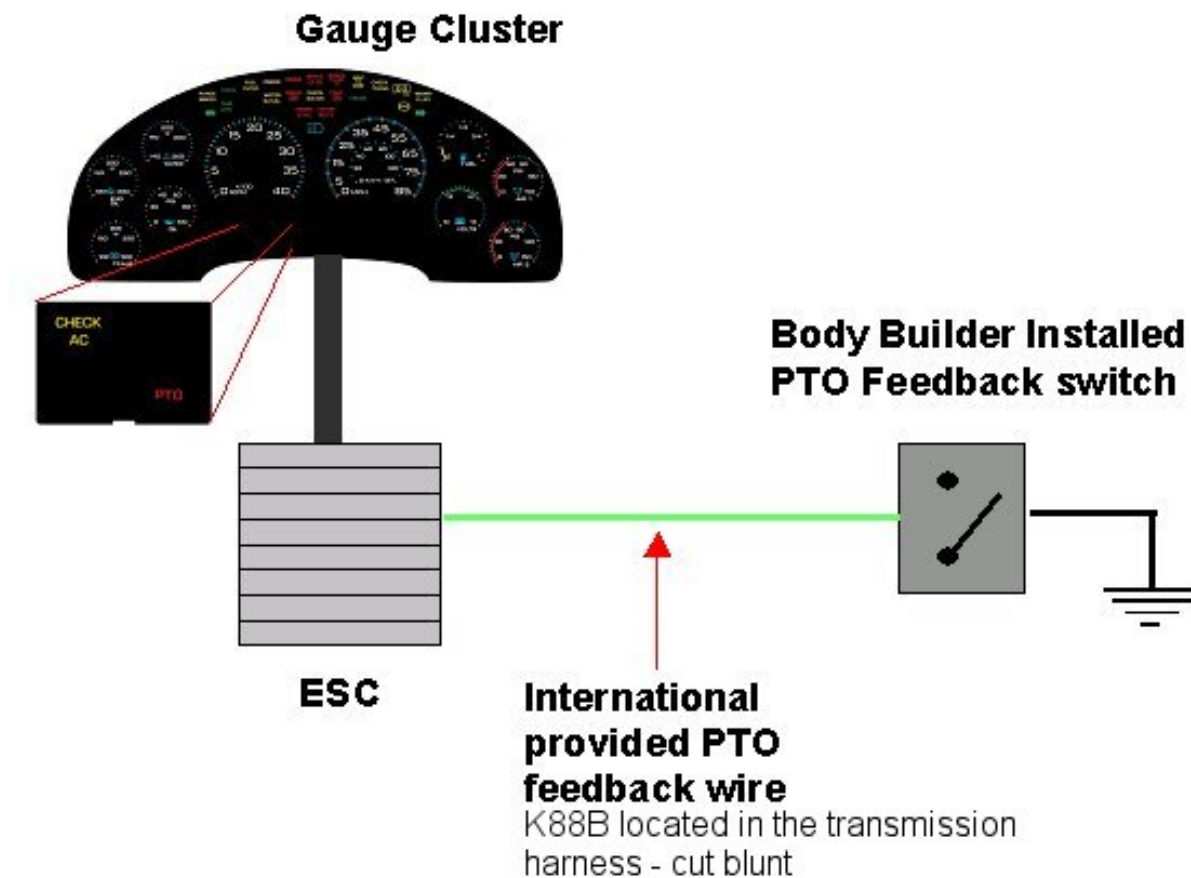


Figure 127

**TESTING**

1. Customer should apply the correct active state voltage (As programmed in ICAP or the Diamond Logic™ Builder software) to the International-provided PTO engagement feedback wire.
2. Verify that the PTO indicator light in the gauge cluster comes on and stays on as long as the active state voltage is applied.

**HOW TO ADD THIS FEATURE:**

- The customer must enable software feature code 595266 using ICAP or the Diamond Logic™ Builder software.
- The customer must make sure that software feature code 595145 is NOT enabled using ICAP or the Diamond Logic™ Builder software.
- The customer must set the ESC\_PTO\_Engaged\_Param to the desired active state for the PTO feedback switch.
- Customer must install a wire from the ESC pin labeled **ESC\_PTO\_Engaged\_Switch\_Raw** (Pin 3 on the 36-pin ESC connector #4004) to the PTO feedback switch.