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1. BACK-UP LIGHTS

1.1. CIRCUIT FUNCTIONS

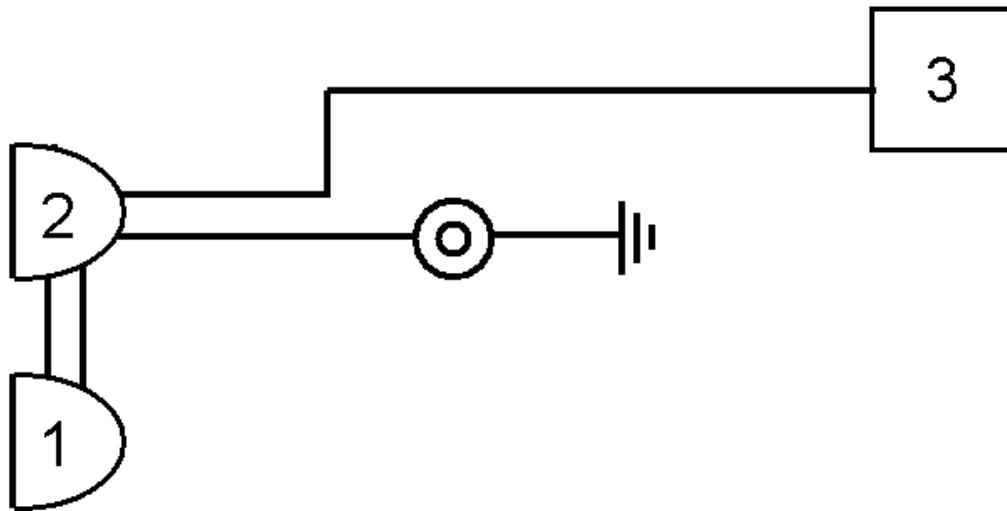


Figure 379 Back-Up Lights Function Diagram

1. RIGHT BACK-UP LIGHT
2. LEFT BACK-UP LIGHT
3. BACK-UP LIGHT SIGNAL FROM TRANSMISSION CIRCUITS (SEE TRANSMISSION SECTION)

The vehicle back-up lights come on when the vehicle transmission is shifted into reverse. Depending on the transmission installed on the vehicle, the lights are controlled by a switch on the transmission or a signal from the transmission electronic control unit (ECU). Refer to the Back-Up Lights Function Diagram.

This section only covers circuits from the back-up light turn signal splice (4810) to the tail lights. Refer to the transmission section for information on the circuits from the transmission to the back-up light turn signal splice.

1.2. DIAGNOSTICS

To display diagnostic trouble codes (DTC's), set the parking brake and turn the Ignition key "ON". Then press the Cruise "ON" switch and the Cruise "Resume" switch simultaneously. If no faults are present, the cluster odometer will display "NO FAULTS". If faults are present, the gauge cluster display will show the number of faults and each diagnostic trouble code for 10 seconds and then automatically scroll to the next entry and continue to cycle through the faults. To manually cycle through the fault list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in "A" for active faults or "P" for previously active faults. Releasing the parking brake or turning the ignition key off will take the ESC and the gauge cluster out of the diagnostic mode.

After all repairs have been made, the diagnostic trouble codes may be cleared by putting the key switch in the accessory position, turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 227 Back Up Lights

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
NO DIAGNOSTIC TROUBLE CODE	Diagnostic trouble codes are not logged for every possible fault in the back up light circuits.
2033 14 2 0	Lamp test reverse lamps, there is a load on this pin that has been configured unused, 1601 pin E.
2033 14 2 1	Lamp test reverse lamps output overloaded, 1601 pin E.
2033 14 2 2	Lamp test reverse lamps output open circuit, 1601 pin E.
2033 14 2 3	Lamp test reverse lamps output shorted to ground, 1601 pin E.

1.3. TYPICAL BACK-UP LAMPS FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to the Back-Up Lights Circuits with LCT Transmission or Back-Up Lights Circuits with MD Transmission.

Problems in the back-up light circuits can be caused by burned out lamps, a blown fuse, a short, an open, a faulty relay, a faulty switch on the transmission, or a failed transmission ECU.

Back-Up Lights for LCT Transmission

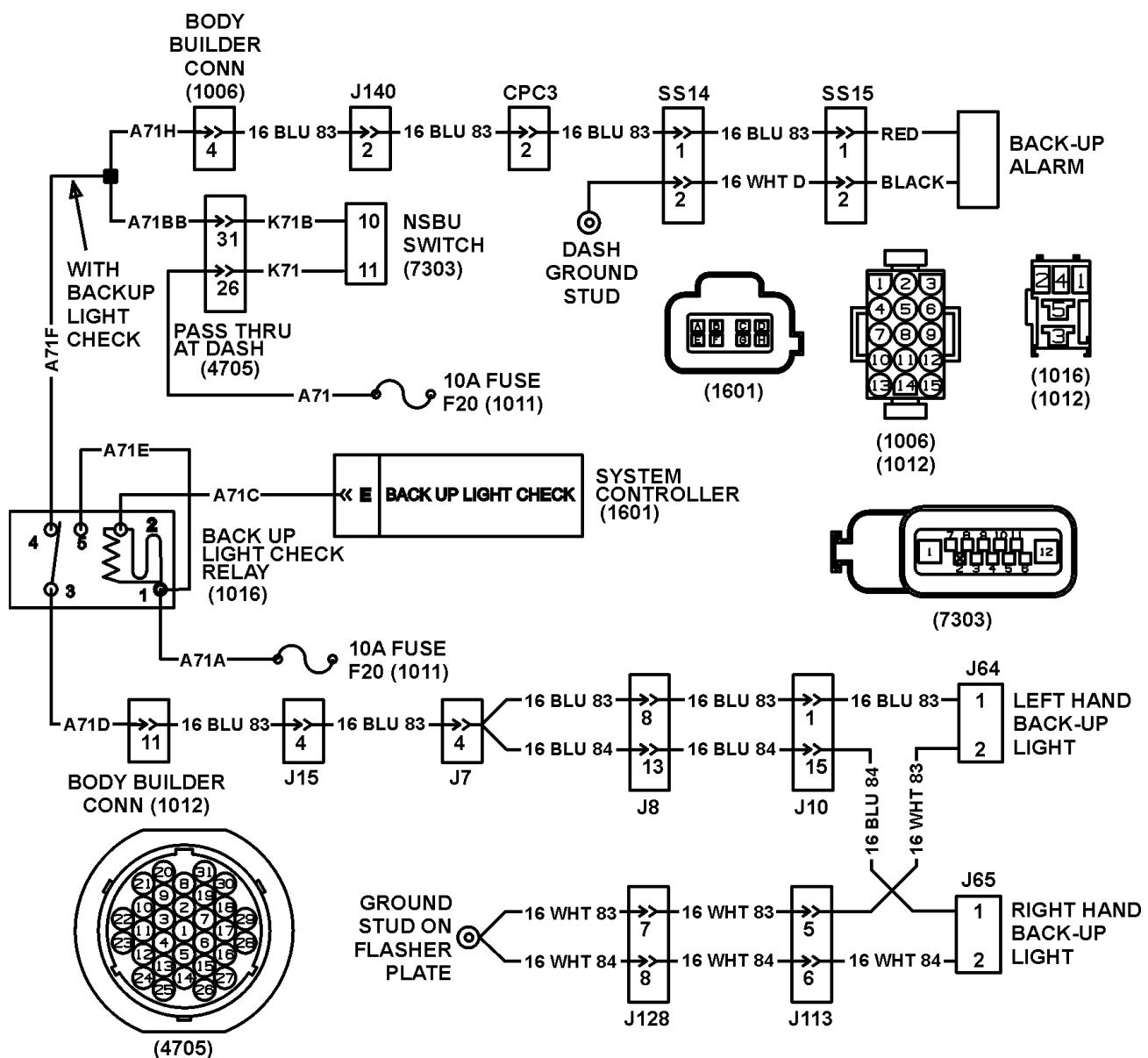


Figure 380 Back-Up Lights Circuit (w/LCT Transmission) Diagram — Always Refer to the Circuit Diagram Book for Latest Circuit Information.

- (1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1016) BACK UP LIGHT CHECK RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1601) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- (4705) PASS THRU AT DASH
LOCATED AT INSIDE DASH PANEL LEFT SIDE
- (7303) NSBU SWITCH
LOCATED AT ENGINE COMPARTMENT TRANSMISSION
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J7 J8 LEFT HAND BODY TO FRONT CAP
J10 J113 LEFT HAND BODY TO REAR CAP
J15 J128 FLASHER PLATE TO LEFT HAND BODY
J64 LEFT REAR BACK-UP LIGHT TO REAR CAP
J65 RIGHT REAR BACK-UP LIGHT TO REAR CAP
J140 FLASHER PLATE TO DASH AND TOE
SS14 SEALED ENGINE HARNESS TO BACK-UP HORN TRANS HARNESS
SS15 BACK-UP HORN TRANS HARNESS TO BACK-UP HORN

NOTE – If Back Up Lamp Check is not installed on vehicle, then back up lamps will be connected at Body Builder Connector (1006) pin 4 with the back up alarm.

Table 228 Back-Up Lights Circuit Tests for LCT Transmission

NSBU Switch (7303) Voltage Test		
Check with ignition on, transmission in reverse and backup lamp check relay (1016) removed.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
With transmission in reverse, NSBU switch (7303) cavity 11 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F20, open or short to ground in circuits A71 and K71.
With transmission in reverse, NSBU switch (7303) cavity 11 to cavity 10.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits K71B, A71BB and A71F.

Table 228 Back-Up Lights Circuit Tests for LCT Transmission (cont.)

Back Up Lamp Check Relay (1016) Voltage Test		
Check with ignition on, transmission in reverse and backup lamp check relay (1016) removed.		
Bench test relay. If relay fails bench test, replace and check for faults.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
With transmission in reverse, back up light check relay (1016) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F20, open or short to ground in circuit A71A. Also check for open or short in circuits A71E and A71C.
With transmission in reverse, back up light check relay (1016) cavity 4 to cavity 3.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits A71F, A71BB, and K71B.
Left Hand Back-Up Light (with or without Back-Up Lamp Check) Voltage Test		
Check with ignition on, transmission in reverse, back up lamp check relay installed (if applicable) and the left hand back-up light disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
With transmission in reverse, connector J64 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for short or open in circuit 16 BLU 83.
With transmission in neutral, connector J64 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 0 volts	If voltage is present, check for faulty transmission backup circuits. (See transmission section)

Table 228 Back-Up Lights Circuit Tests for LCT Transmission (cont.)

With transmission in reverse, connector J64 cavity 1 to cavity 2.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 83 to ground stud on flasher plate.
Right Hand Back-Up Light (with or without Back-Up Lamp Check) Voltage Test		
Check with ignition on, transmission in reverse, back up lamp check relay installed (if applicable) and the right hand back-up light disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
With transmission in reverse, connector J65 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuit 16 BLU 84.
With transmission in neutral, connector J65 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 0 volts	If voltage is present, check for faulty transmission backup circuits. (See transmission section)
With transmission in reverse, connector J65 cavity 1 to cavity 2.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 83 to ground stud on flasher plate.

Table 228 Back-Up Lights Circuit Tests for LCT Transmission (cont.)

Back Up Alarm Voltage Test		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
With transmission in reverse, back-up alarm red wire to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuit 16 BLU 83.
With transmission in reverse, back-up alarm red wire to black wire.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.

Back-Up Lights for MD Transmission

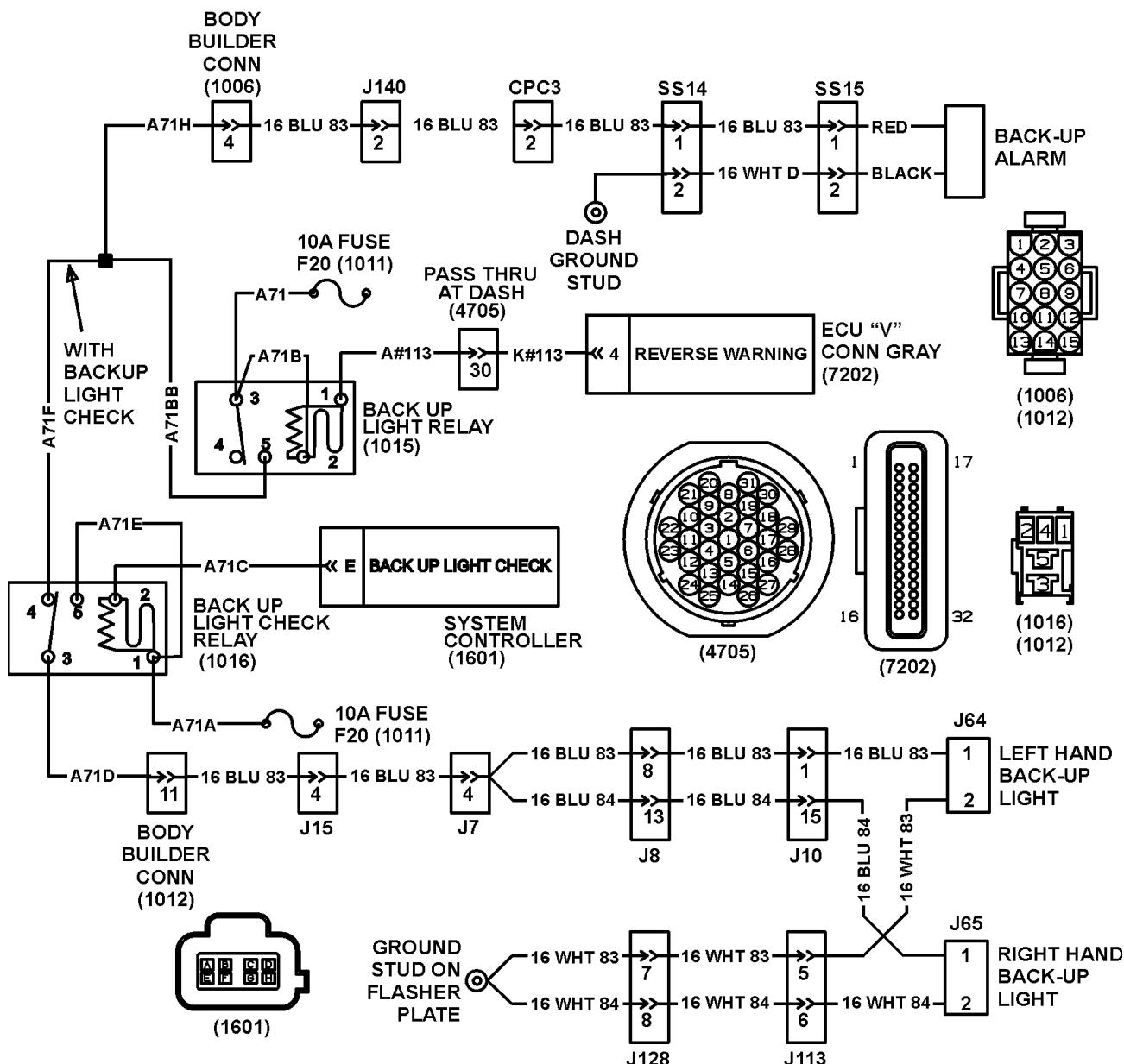


Figure 381 Back-Up Lights Circuit (w/WTEC MD Transmission) Diagram — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1015) BACK UP LIGHT RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1016) BACK UP LIGHT CHECK RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1601) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

(4705) PASS THRU AT DASH
LOCATED AT INSIDE DASH PANEL LEFT SIDE

(7202) MD ECU "V" CONNECTOR GRAY
LOCATED AT ENGINE COMPARTMENT TRANSMISSION
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J7 J8 LEFT HAND BODY TO FRONT CAP
J10 J113 LEFT HAND BODY TO REAR CAP
J15 J128 FLASHER PLATE TO LEFT HAND BODY
J64 LEFT REAR BACK-UP LIGHT TO REAR CAP
J65 RIGHT REAR BACK-UP LIGHT TO REAR CAP
J140 FLASHER PLATE TO DASH AND TOE
SS14 SEALED ENGINE HARNESS TO BACK-UP HORN TRANS HARNESS
SS15 BACK-UP HORN TRANS HARNESS TO BACK-UP HORN

NOTE – If Back Up Lamp Check is not installed on vehicle, then back up lamps will be connected at Body Builder Connector (1006) pin 4 with the back up alarm.

Table 229 Back-Up Lights Circuit Tests for WTEC MD Transmission

Back Up Light Relay (1015) Voltage Test

Check with ignition on, transmission in reverse, back up lamp check relay (1016) installed
(if applicable) and backup lamp check relay (1016) removed.

Bench test relay. If relay fails bench test, replace and check for faults.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
With transmission in reverse, back up light relay (1015) cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F20 and check for open or short to ground in circuit A71.

Table 229 Back-Up Lights Circuit Tests for WTEC MD Transmission (cont.)

With transmission in reverse, back up light relay (1015) cavity 3 to cavity 1.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits A#113 and K#113. Also check for open or short in circuit A71B. Also ensure proper ground signal form ECU "V" Connector Gray (7202) pin 4.
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Back Up Lamp Check Relay (1016) Voltage Test

Check with ignition on, transmission in reverse, back up light relay (1015) installed and backup lamp check relay (1016) removed.

Bench test relay. If relay fails bench test, replace and check for faults.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
With transmission in reverse, back up light check relay (1016) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F20, open or short to ground in circuit A71A. Also check for open or short in circuits A71E and A71C.
With transmission in reverse, back up light check relay (1016) cavity 4 to cavity 3.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits A71F, and A71BB.

Left Hand Back-Up Light (with or without Back-Up Lamp Check) Voltage Test

Check with ignition on, transmission in reverse, back up light relay installed, back up lamp check relay installed (if applicable) and the left hand back-up light disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
With transmission in reverse, connector J64 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for short or open in circuit 16 BLU 83.

Table 229 Back-Up Lights Circuit Tests for WTEC MD Transmission (cont.)

With transmission in neutral, connector J64 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 0 volts	If voltage is present, check for faulty transmission backup circuits. (See transmission section)
With transmission in reverse, connector J64 cavity 1 to cavity 2.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 83 to ground stud on flasher plate.

Right Hand Back-Up Light (with or without Back-Up Lamp Check) Voltage Test

Check with ignition on, transmission in reverse, back up light relay installed, back up lamp check relay installed (if applicable) and the right hand back-up light disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
With transmission in reverse, connector J65 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuit 16 BLU 84.
With transmission in neutral, connector J65 cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 0 volts	If voltage is present, check for faulty transmission backup circuits. (See transmission section)

Table 229 Back-Up Lights Circuit Tests for WTEC MD Transmission (cont.)

With transmission in reverse, connector J65 cavity 1 to cavity 2.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 83 to ground stud on flasher plate.
Back Up Alarm Voltage Test		
Check with ignition on, transmission in reverse, back up lamp check relay installed (if applicable) and the back up alarm disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
With transmission in reverse, back-up alarm red wire to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuit 16 BLU 83.
With transmission in reverse, back-up alarm red wire to black wire.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.

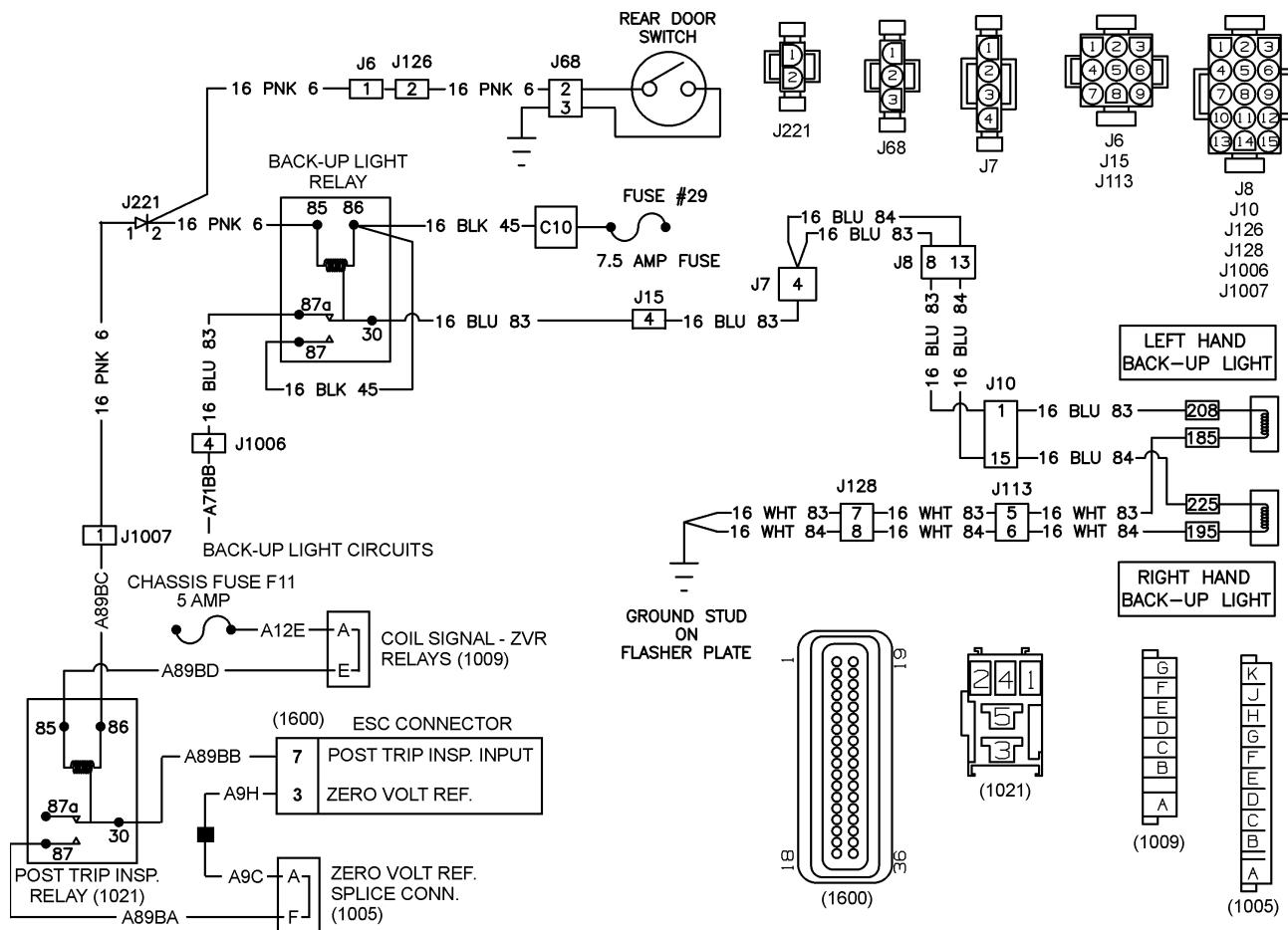
Back-Up Lights Activated By Rear Door Switch On Vehicles Built Before May, 2004


Figure 382 Back—Up Lights Activated By Rear Emergency Door Switch Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
- (1009) COIL SIGNAL ZERO VOLT REFERENCE (ZVR) CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1011) FUSE BLOCK
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
- (1021) POST TRIP INSPECTION RELAY
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- J6 FLASHER PLATE TO LEFT HAND BODY
- J7 J8 LEFT HAND BODY TO FRONT CAP
- J10 LEFT HAND BODY TO REAR CAP
- J15 FLASHER PLATE TO LEFT HAND BODY
- J68 REAR CAP
- J113 LEFT HAND TO REAR CAP
- J126 REAR CAP TO LEFT HAND BODY
- J128 FLASHER PLATE TO LEFT HAND BODY

Table 230 Emergency Exit Lights and Buzzers Circuit Tests

Post Trip Inspection Relay (1021) Voltage Checks			
Check with key in ignition position on, all emergency exits closed and post trip inspection relay (1021) removed.			
NOTE – Always check connectors for damage and pushed-out terminals.			
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.			
Test Points	Spec.	Comments	
Post trip inspection relay cavity 85 to ground	12 ± 1.5 volts	If voltage is missing check for blown chassis fuse F11 and for open or short on circuits A89BD and A12E.	
Post trip inspection relay cavity 85 to cavity 86	0 volts	If voltage is present check for short to ground in circuits A89BC and 16 PNK 6. Also ensure proper alignment and function of diode J221.	
While meter is still connected to post trip inspection relay (1021) from cavity 85 to cavity 86, open rear emergency exit.			
Post trip inspection relay cavity 85 to cavity 86	12 ± 1.5 volts	If voltage is missing check for open or short in circuits A89BC and 16 PNK 6. Also ensure proper alignment and function of diode J221. Also check for proper grounding on connector J68 pin 3.	
Leave rear emergency exit open.			
Post trip inspection relay (1021) cavity 87 to cavity 30.	0 volts	If voltage is present check for open or short on circuits A89BB, A89BA, A9C and A9H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Also ensure proper zero volt signal from zero volt reference signal from ESC connector (1600) pin 3 on circuits. Also ensure proper input signal on ESC connector (1600) pin 7. Refer to the ESC Replacement section of this manual.	

Table 230 Emergency Exit Lights and Buzzers Circuit Tests (cont.)

Back Up Light Relay Voltage Checks		
Check with key in ignition position on, all emergency exits closed and back up light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Back up light relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing check for blown body fuse #29 and for open or short on circuit 16 BLK 45.
Back up light relay cavity 86 to cavity 85	0 volts	If voltage is present check for open or short to high on circuit 16 PNK 6. Also ensure proper alignment and functionality of diode J221.
With meter still connected to back up light relay cavity 86 to cavity 85, open rear emergency exit.		
Back up light relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 PNK 6. Also ensure proper alignment and functionality of diode J221. Also check for proper grounding on connector J68 pin 3.
Close rear emergency exit door.		
Back up light relay cavity 87 to ground	12 ± 1.5 volts	If voltage is missing check for blown body fuse #29 and for open or short on circuit 16 BLK 45.
Back up light relay cavity 87 to cavity 30	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLU 83, 16 BLU 84, 16 WHT 83 and 16 WHT 84.
Rear Door Switch (J68) Voltage Checks		
Check with key in ignition position on and rear door switch connector (J68) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		

Table 230 Emergency Exit Lights and Buzzers Circuit Tests (cont.)

Rear door switch connector (J68) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 PNK 6. Also ensure proper alignment and functionality of diode J221.
Rear door switch connector (J68) cavity 2 to 3	12 ± 1.5 volts	If voltage is missing check for open or short to high on ground circuits. If circuits check good and fault still exists, replace rear door switch.

Back-Up Lights Activated By Rear Door Switch On Vehicles Built After April, 2004

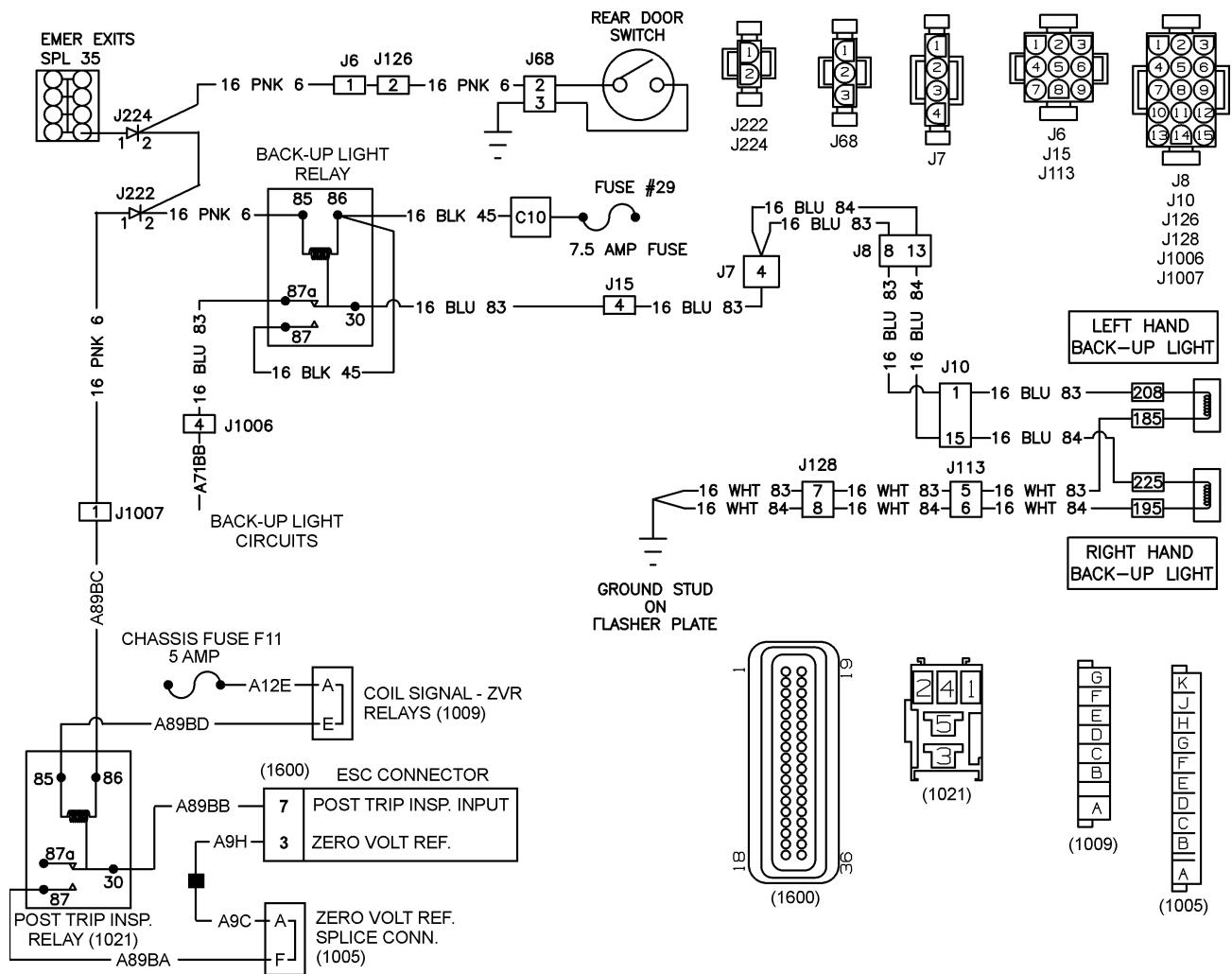


Figure 383 Back-Up Lights Activated By Rear Emergency Door Switch Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1006) (1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1009) COIL SIGNAL ZERO VOLT REFERENCE (ZVR) CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1011) FUSE BLOCK
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1021) POST TRIP INSPECTION RELAY
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J6 FLASHER PLATE TO LEFT HAND BODY
J7 J8 LEFT HAND BODY TO FRONT CAP
J10 LEFT HAND BODY TO REAR CAP
J15 FLASHER PLATE TO LEFT HAND BODY
J68 REAR CAP
J113 LEFT HAND TO REAR CAP
J126 REAR CAP TO LEFT HAND BODY
J128 FLASHER PLATE TO LEFT HAND BODY
J222 POST TRIP RELAY DIODE ASSEMBLY ON FLASHER PLATE
J224 REAR DOOR SWITCH DIODE ASSEMBLY ON FLASHER PLATE
SPL-35 EMERGENCY EXIT FEED SPLICE

Table 231 Emergency Exit Lights and Buzzers Circuit Tests

Post Trip Inspection Relay (1021) Voltage Checks		
Check with key in ignition position on, all emergency exits closed and post trip inspection relay (1021) removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Post trip inspection relay cavity 85 to ground	12 ± 1.5 volts	If voltage is missing check for blown chassis fuse F11 and for open or short on circuits A89BD and A12E.
Post trip inspection relay cavity 85 to cavity 86	0 volts	If voltage is present check for short to ground in circuits A89BC and 16 PNK 6. Also ensure proper alignment and function of diodes J222 and J224.
While meter is still connected to post trip inspection relay (1021) from cavity 85 to cavity 86, open rear emergency exit.		

Table 231 Emergency Exit Lights and Buzzers Circuit Tests (cont.)

Post trip inspection relay cavity 85 to cavity 86	12 ± 1.5 volts	If voltage is missing check for open or short in circuits A89BC and 16 PNK 6. Also ensure proper alignment and function of diodes J222 and J224. Also check for proper grounding on connector J68 pin 3.
Leave rear emergency exit open.		
Post trip inspection relay (1021) cavity 87 to cavity 30.	0 volts	If voltage is present check for open or short on circuits A89BB, A89BA, A9C and A9H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Also ensure proper zero volt signal from zero volt reference signal from ESC connector (1600) pin 3 on circuits. Also ensure proper input signal on ESC connector (1600) pin 7. Refer to the ESC Replacement section of this manual.
Back Up Light Relay Voltage Checks		
<p>Check with key in ignition position on, all emergency exits closed and back up light relay removed.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Bench test relay. If relay fails bench test, replace and check for faults.</p>		
Test Points	Spec.	Comments
Back up light relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing check for blown body fuse #29 and for open or short on circuit 16 BLK 45.
Back up light relay cavity 86 to cavity 85	0 volts	If voltage is present check for open or short to high on circuit 16 PNK 6. Also ensure proper alignment and function of diodes J222 and J224.
With meter is still connected to back up light relay cavity 86 to cavity 85, open rear emergency exit.		

Table 231 Emergency Exit Lights and Buzzers Circuit Tests (cont.)

Back up light relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 PNK 6. Also ensure proper alignment and function of diodes J222 and J224. Also check for proper grounding on connector J68 pin 3.
Close rear emergency exit door.		
Back up light relay cavity 87 to ground	12 ± 1.5 volts	If voltage is missing check for blown body fuse #29 and for open or short on circuit 16 BLK 45.
Back up light relay cavity 87 to cavity 30	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLU 83, 16 BLU 84, 16 WHT 83 and 16 WHT 84.
Rear Door Switch (J68) Voltage Checks		
Check with key in ignition position on and rear door switch connector (J68) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Rear door switch connector (J68) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 PNK 6. Also ensure proper alignment and function of diodes J222 and J224.
Rear door switch connector (J68) cavity 2 to 3	12 ± 1.5 volts	If voltage is missing check for open or short to high on ground circuits. If circuits check good and fault still exists, replace rear door switch.

1.4. SIDE MOUNTED BACK-UP LAMPS FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to the Side Mounted Back-Up Lights Circuits.

Problems in the back-up light circuits can be caused by burned out lamps, a blown fuse, a short, an open, a faulty relay, a faulty switch on the transmission, or a failed transmission ECU.

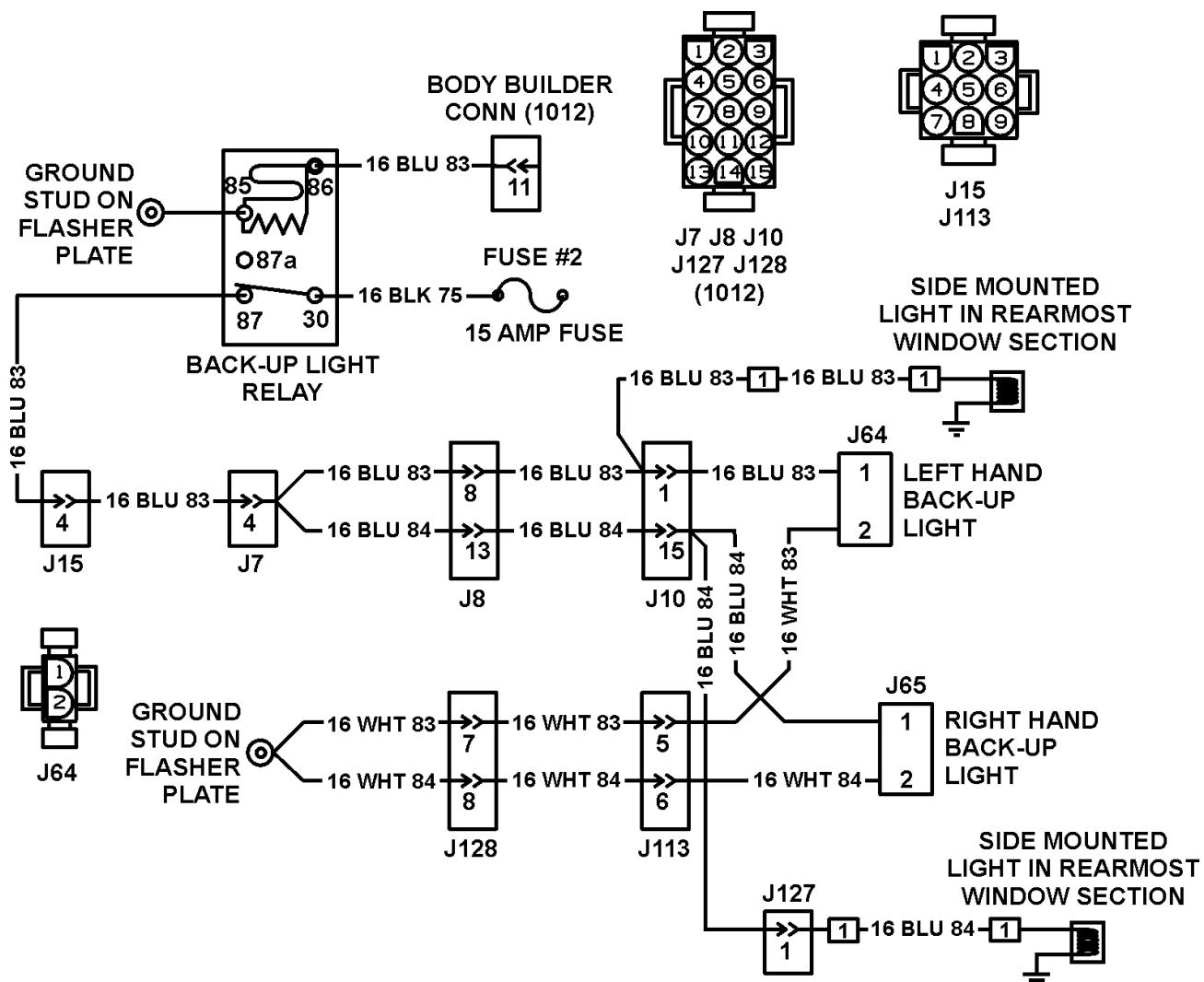


Figure 384 Side Mounted Back-Up Lights Circuit — Always Refer to the Circuit Diagram Book for Latest Circuit Information.

NOTE – If Back Up Lamp Check is not installed on vehicle, then back up lamps will be connected at Body Builder Connector (1006) pin 4 with the back up alarm.

Table 232 Side Mounted Back-Up Lights Circuit Tests

Side Mounted Back-Up Lamp Voltage Test		
Test Points	Spec.	Comments
		Check with ignition on, transmission in reverse and side mounted back-up lights disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Table 232 Side Mounted Back-Up Lights Circuit Tests (cont.)

Right side mounted back-up lamp cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for blown fuse #2. Also check for open or short to ground in circuits 16 BLU 84 and 16 BLU 83. To further troubleshoot this circuit, refer to the Typical Back-Up Lamps Fault Detection Management section of this manual. (See Typical Back-Up Lamps Fault Detection Management, page 748)
Left side mounted back-up lamp cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for blown fuse #2. Also check for open or short to ground in circuit 16 BLU 83. To further troubleshoot this circuit, refer to the Typical Back-Up Lamps Fault Detection Management section of this manual. (See Typical Back-Up Lamps Fault Detection Management, page 748)

1.5. EXTENDED DESCRIPTION

For LCT transmission:

Refer to the Back-Up Lights Circuits with LCT Transmission.

When the transmission is shifted into reverse, the NSBU switch (7303) will provide a voltage on pin 10. This will then provide a voltage to the backup light assemblies and the back up alarm.

Ground for the back up lights is supplied from the ground stud on flasher plate.

Ground for the back up alarm is supplied from the dash ground stud.

For WTEC MD transmission:

Refer to the Back-Up Lights Circuits with MD Transmission.

When the transmission is shifted into reverse, the ECU "V" Connector Gray (7202) will supply a ground on pin 4. This will then provide a voltage to energize the back up light relay (1015). Voltage from fuse F20 will then be supplied to the back up lights and back up alarm.

Ground for the back up lights is supplied from the ground stud on flasher plate.

Ground for the back up alarm is supplied from the dash ground stud.

Back Up Lamp Check:

The back up lamp check occurs at key on. A ground is supplied on the System Controller connector (1601) pin E. This will charge the back up light check relay (1016). Electrical current will then be divided between the System Controller connector (1601) pin E and the back up lights. The System Controller will signal

and error (burnt out or missing back up light bulb) depending on the amount of current that is measured at connector (1601) pin E.

1.6. COMPONENT LOCATIONS

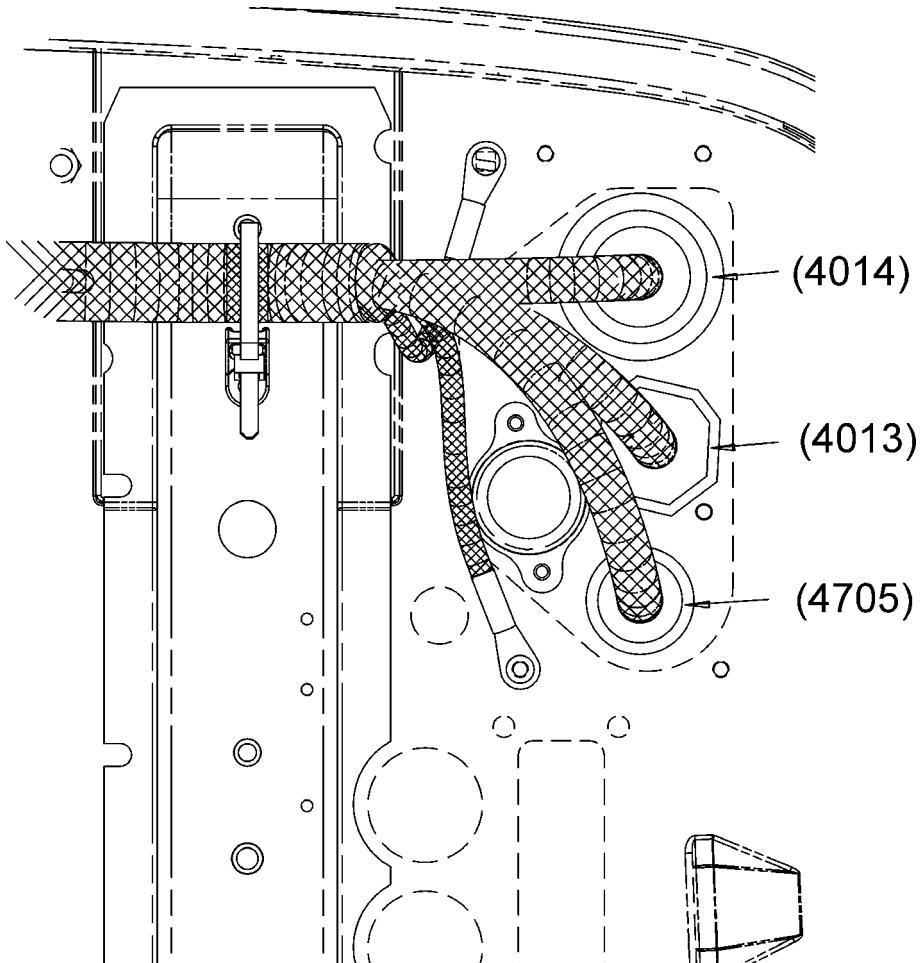


Figure 385 Pass Thru Wiring Connector Locations

- (4013) PASS THRU AT DASH CONNECTOR
- (4014) DASH/ENGINE PASS THRU CONNECTOR
- (4705) PASS THRU AT DASH CONNECTOR

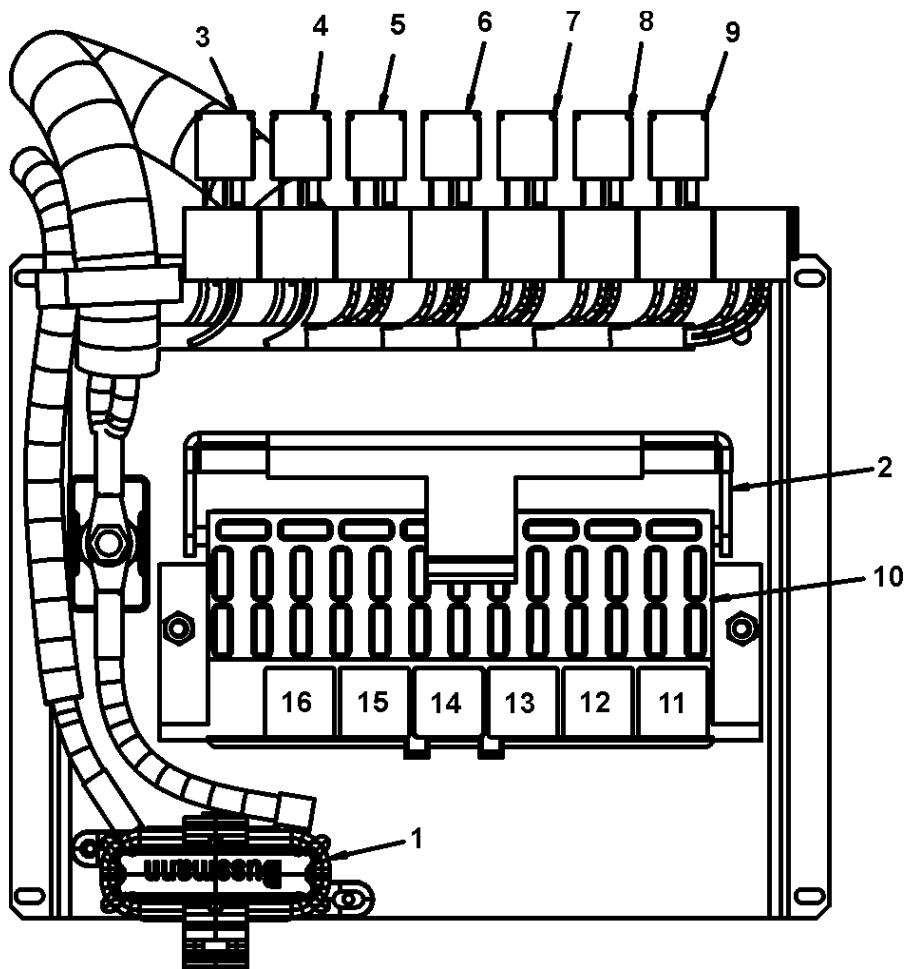


Figure 386 Chassis Flasher Plate

1. 175 AMP MEGA FUSE
2. FUSE BLOCK COVER
3. (1015) BACK-UP LIGHT RELAY
4. (1017) FOG LIGHT RELAY
5. (1018) AUTO DRAIN VALVE RELAY
6. (1016) BACK-UP LIGHT CHECK RELAY
7. (1020) EMERGENCY EXIT RELAY
8. (1021) POST TRIP INSPECTION RELAY
9. (1019) WHEELCHAIR LIFT RELAY
10. (1011) FUSE BLOCK
11. R1 WIPER POWER RELAY
12. R2 WIPER HI-LOW RELAY
13. R3 STOP LIGHT RELAY
14. R4 AIR SOLENOID POWER RELAY
15. R5 #1 IGNITION POWER RELAY
16. R6 #2 IGNITION POWER RELAY

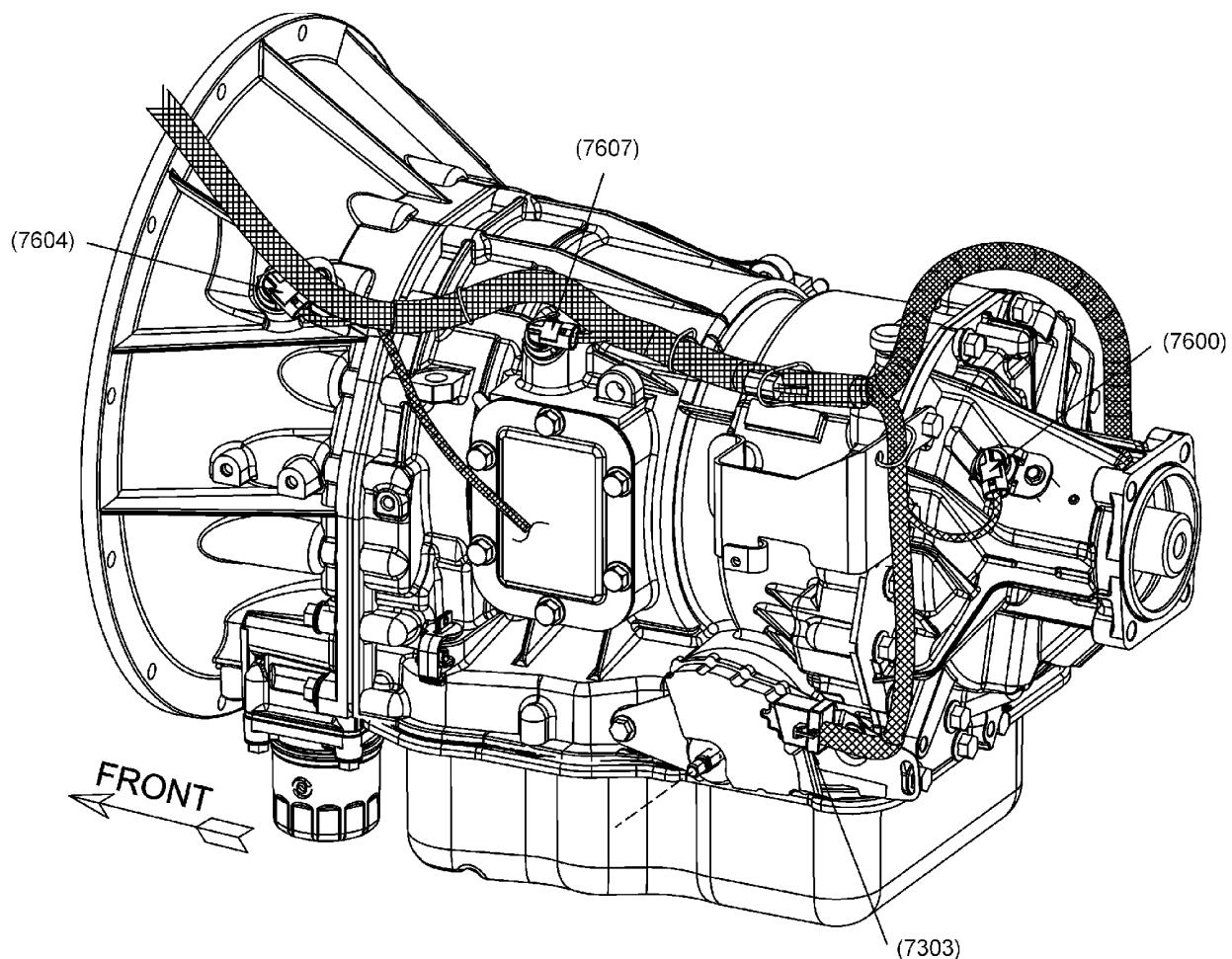


Figure 387 LCT Transmission Connector Location

- (7303) NSBU SWITCH CONNECTOR
- (7600) OUTPUT SPEED SENSOR CONNECTOR
- (7604) ENGINE SPEED SENSOR CONNECTOR
- (7607) TURBINE SPEED SENSOR CONNECTOR

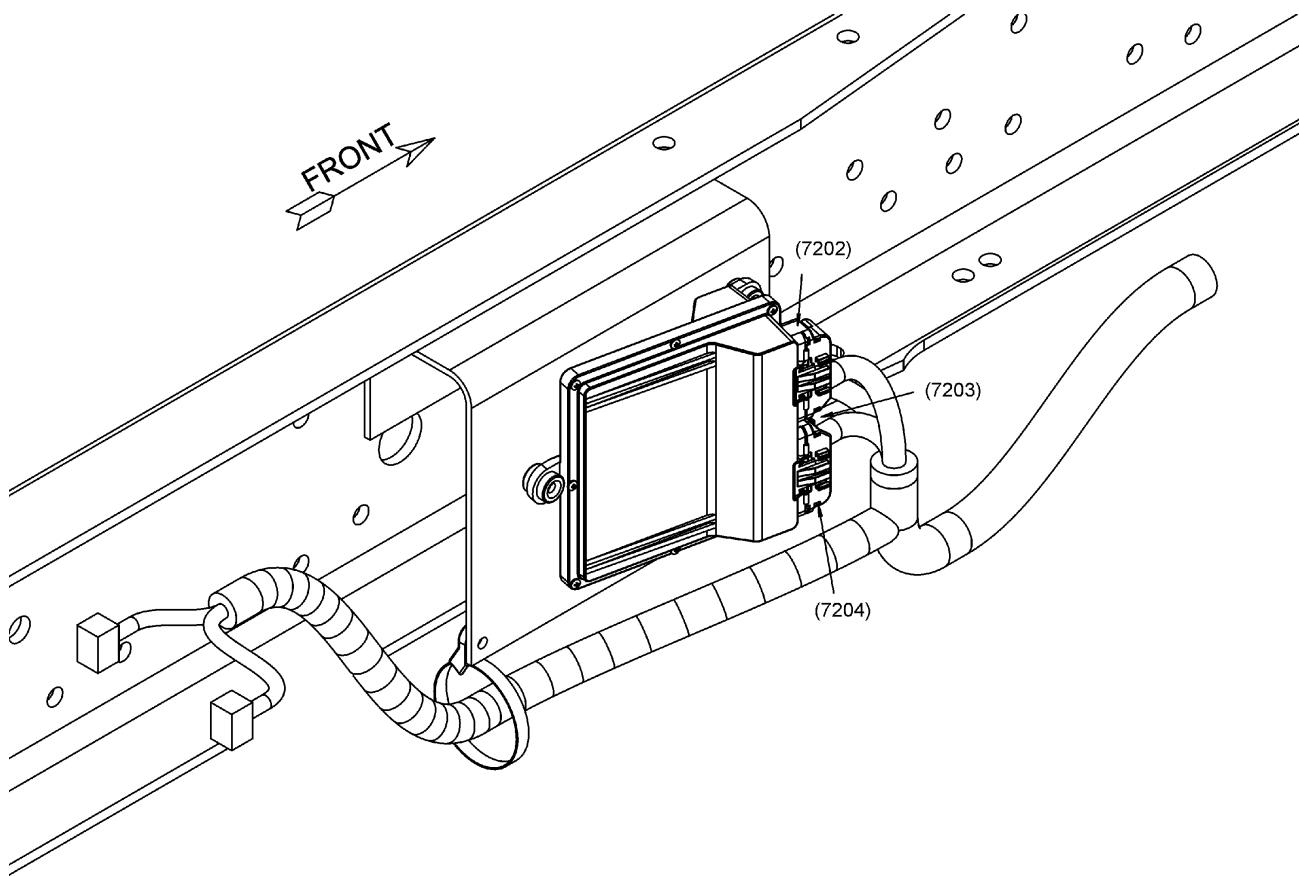


Figure 388 WTEC MD Transmission Controller Connector Locations

- (7202) MD ECU "V" CONNECTOR GRAY
- (7203) MD ECU "T" CONNECTOR BLUE
- (7204) MD ECU "S" CONNECTOR BLACK

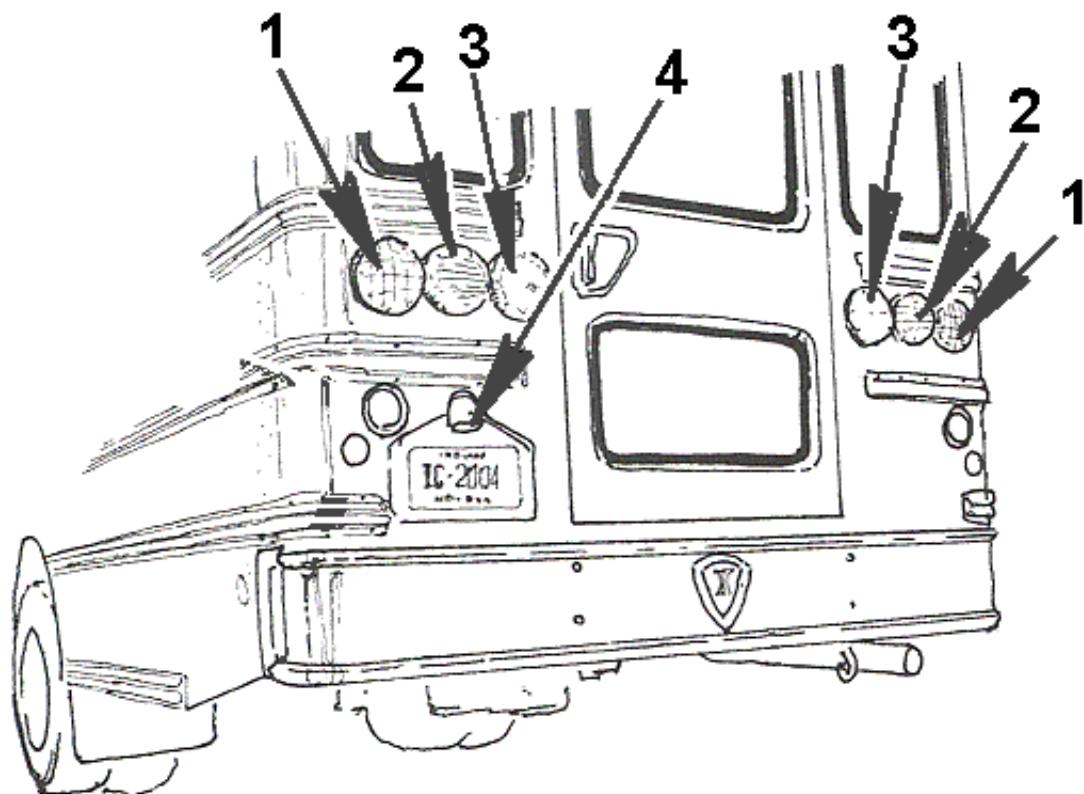


Figure 389 Rear Light Locations

1. REAR TURN SIGNAL LIGHT
2. REAR STOP/TAIL LIGHT
3. REAR BACK-UP LIGHT
4. LICENSE PLATE LIGHT

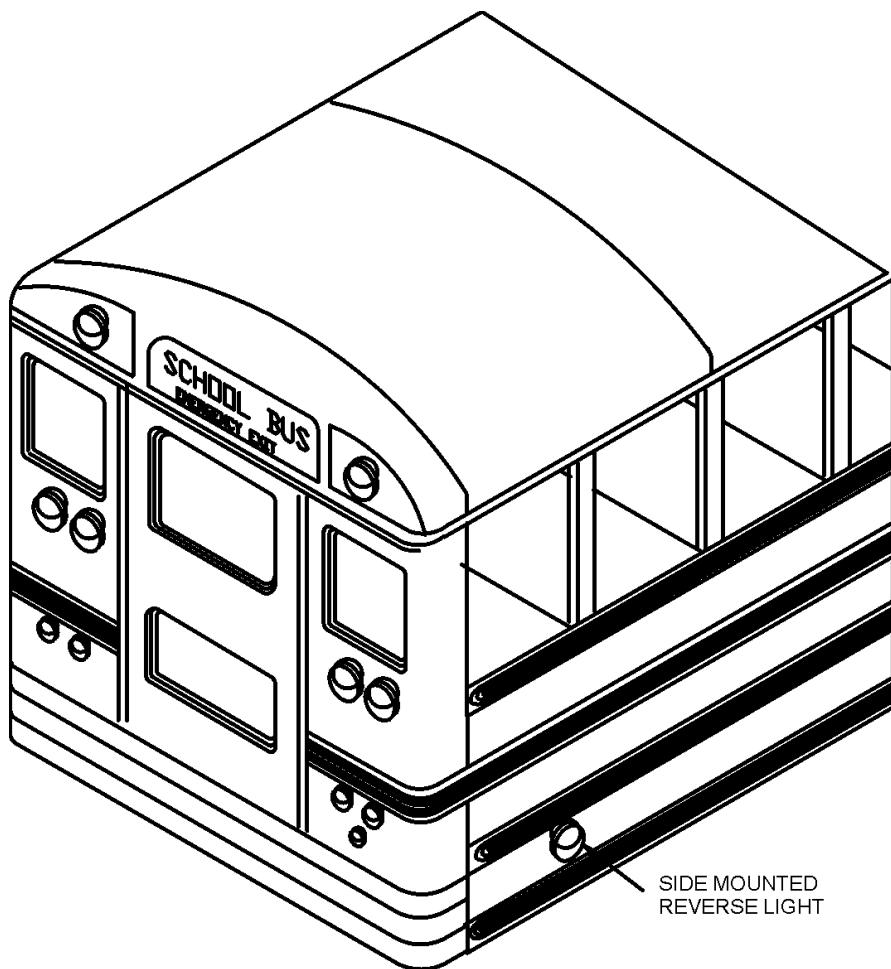


Figure 390 Side Mounted Back-Up Light Locations

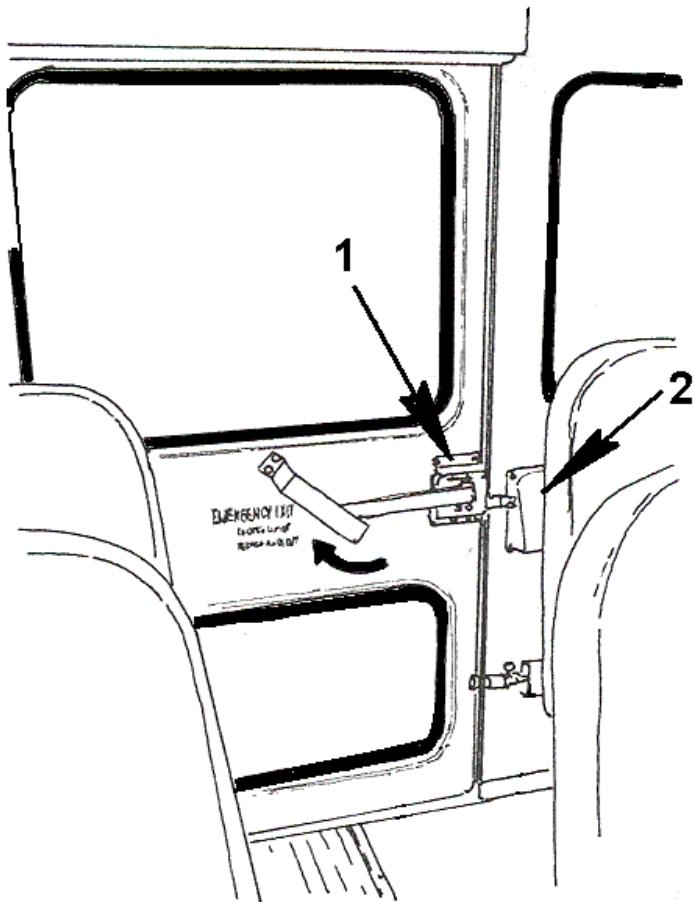


Figure 391 Rear Emergency Exit

1. REAR EMERGENCY EXIT DOOR LATCH
2. REAR EMERGENCY EXIT DOOR SWITCH

2. CLEARANCE LIGHTS

2.1. CIRCUIT FUNCTIONS

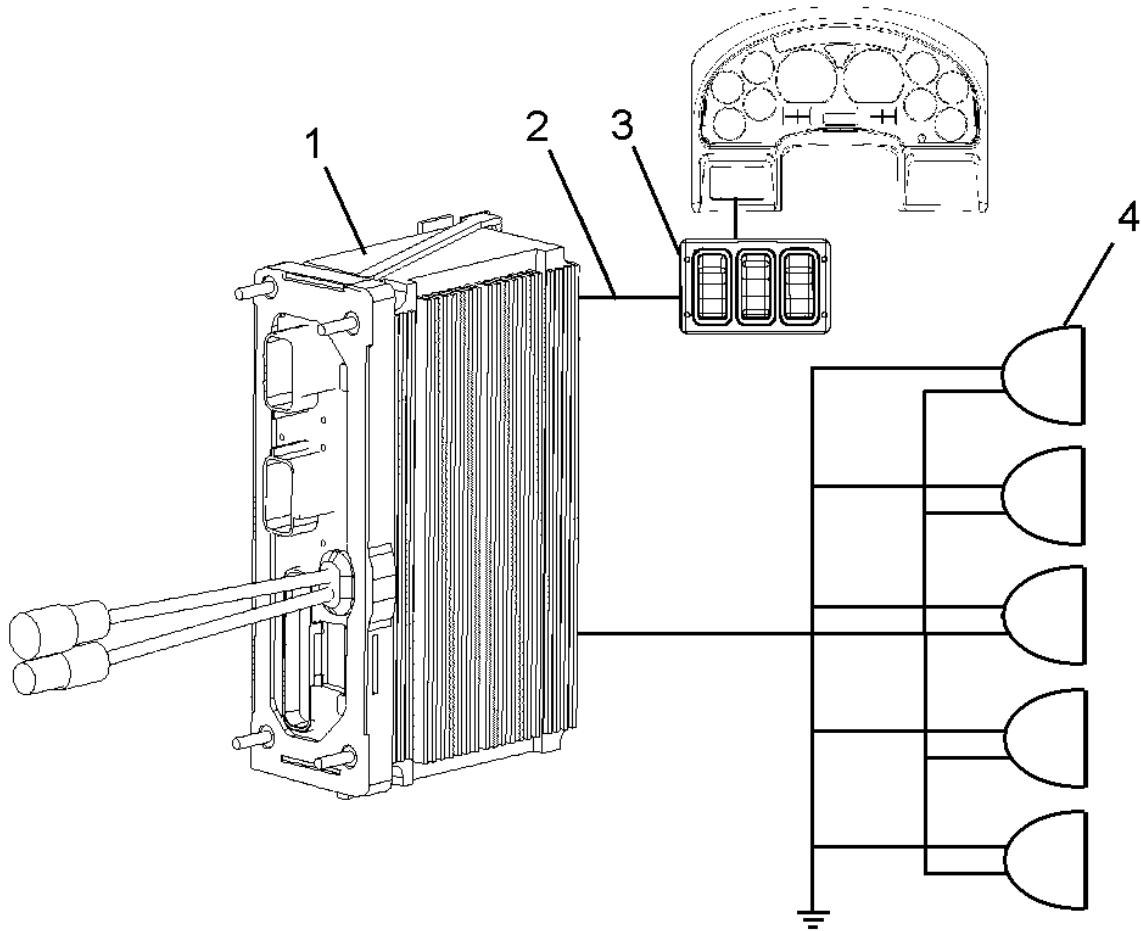


Figure 392 Clearance Lights Function Diagram

1. ELECTRICAL SYSTEM CONTROLLER
2. DRIVETRAIN J1939 DATA LINK
3. HEADLIGHT PARK LIGHT SWITCH (MOUNTED ON ELECTRONIC GAUGE CLUSTER)
4. CLEARANCE LIGHTS

Refer to the Clearance Lights Function Diagram.

NOTE – The clearance lights are connected to the park lamp circuits in the ESC. If clearance lights and park lamps are inoperative refer to the Marker, Park and Tail lamps section. If the clearance lights are inoperative but the park lights are working, proceed with this section.

The standard cab roof clearance and marker lights are part of the basic cab design.

The lights are activated when the headlight switch is in the headlight or park position. The electronic gauge cluster will send a message to the ESC to command the lights on.

The ESC supplies battery voltage to the clearance lights.

2.2. DIAGNOSTICS

If any of the other park lights are working (only the roof marker lights are inoperative) there will be no diagnostic trouble codes logged.

A short or open in the clearance light circuits will be apparent when the park or headlights are turned on and the clearance lights do not come on.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the park lights and monitor activation of the park light switch. See the diagnostic software manual for details on using the software.

2.3. FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Clearance Lights.

Problems which affect only the clearance light circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

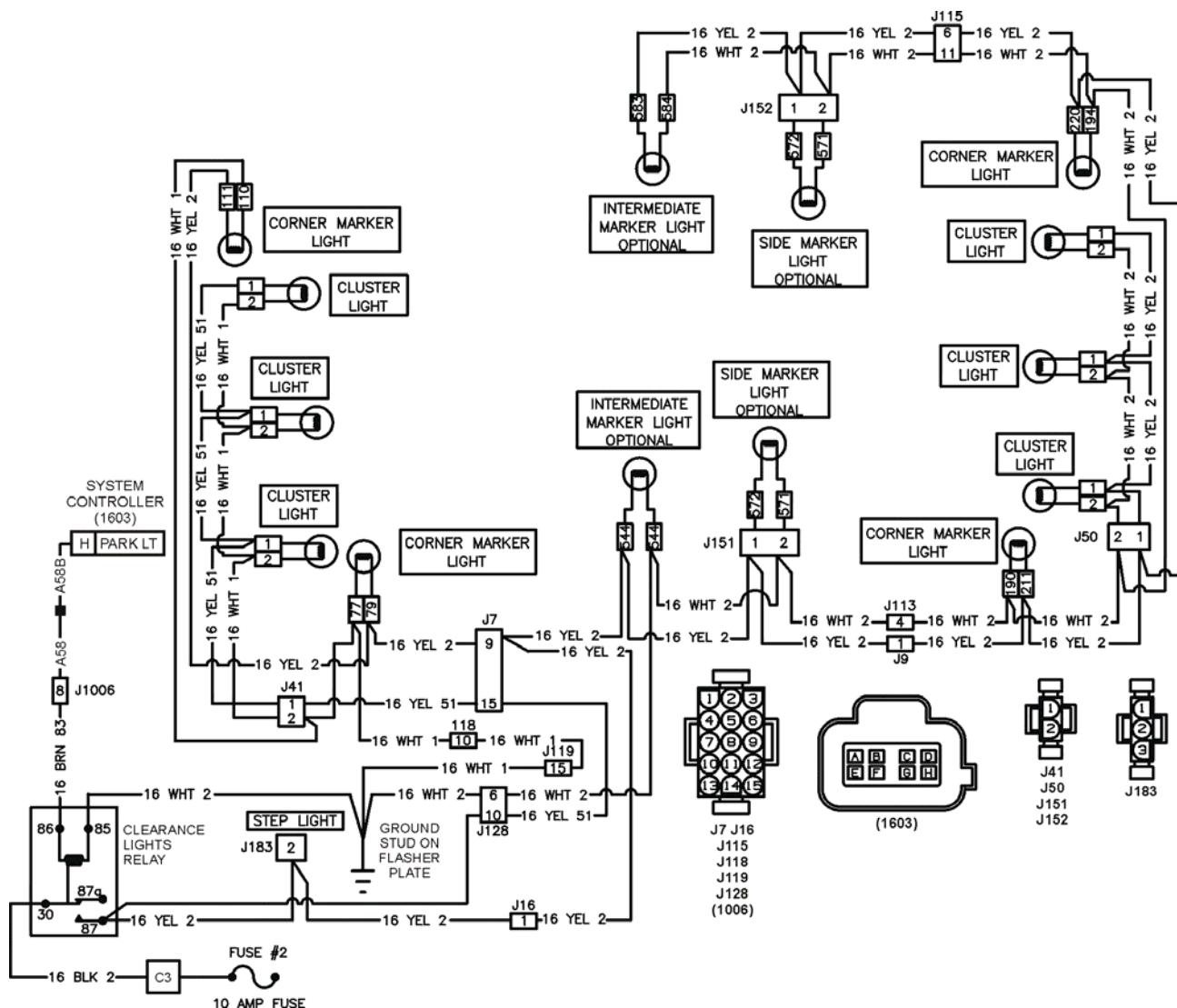


Figure 393 Clearance Lights Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1006) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
- (1603) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- J7 J118 LEFT HAND BODY TO FRONT CAP
- J9 J113 LEFT HAND BODY TO REAR CAP
- J16 J119 J128 FLASHER PLATE TO LEFT HAND BODY
- J41 CLUSTER LIGHT FRONT CAP
- J50 REAR CAP TO CLUSTER LIGHTS
- J115 RIGHT HAND BODY TO REAR CAP
- J151 LEFT HAND BODY TO SIDE MARKER CONNECTION
- J152 RIGHT HAND BODY TO SIDE MARKER CONNECTION
- J183 STEP LIGHT OPTIONS

Table 233 Clearance Lights Circuit Tests

Clearance Lights Relay Voltage Checks		
With clearance lights relay disconnected, key switch on and park lights on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Clearance light relay cavity 86 to ground	12 ± 1.5 volts	<p>If voltage is missing check for open or short in circuits 16 BRN 83, A58 and A58B.</p> <p>Also ensure proper voltage from system controller (1603) pin H.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>
Clearance light relay cavity 86 to 85	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuit 16 WHT 2.
Clearance light relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #2 and check for open or short in circuit 16 BLK 2.
Clearance light relay cavity 30 to 87	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>12 ± 1.5 volts</p>	<p>If voltage is missing check for open or short in voltage circuits 16 YEL 2 and 16 YEL 51.</p> <p>Also check for open or short to high in ground circuits 16 WHT 1 and 16 WHT 2.</p> <p>If voltages check good and clearance lights are still not functioning properly, then check voltage at each individual light.</p>

2.4. EXTENDED DESCRIPTION

Refer to Clearance Lights.

Roof Clearance and Marker Lights

When the ESC is commanded to turn the clearance lights on, the ESC will provide 12 volts to the clearance lights relay from ESC connector (1603) terminal H. When the relay is charged voltage from fuse #2 will then power the clearance lights through circuits 16YEL 2 and 16 YEL 51.

The ground circuit path is from the ground stud on the flasher plate through circuit 16 WHT 1 and 16 WHT 2 to individual ground circuits splitting out to the lights.

2.5. COMPONENT LOCATIONS

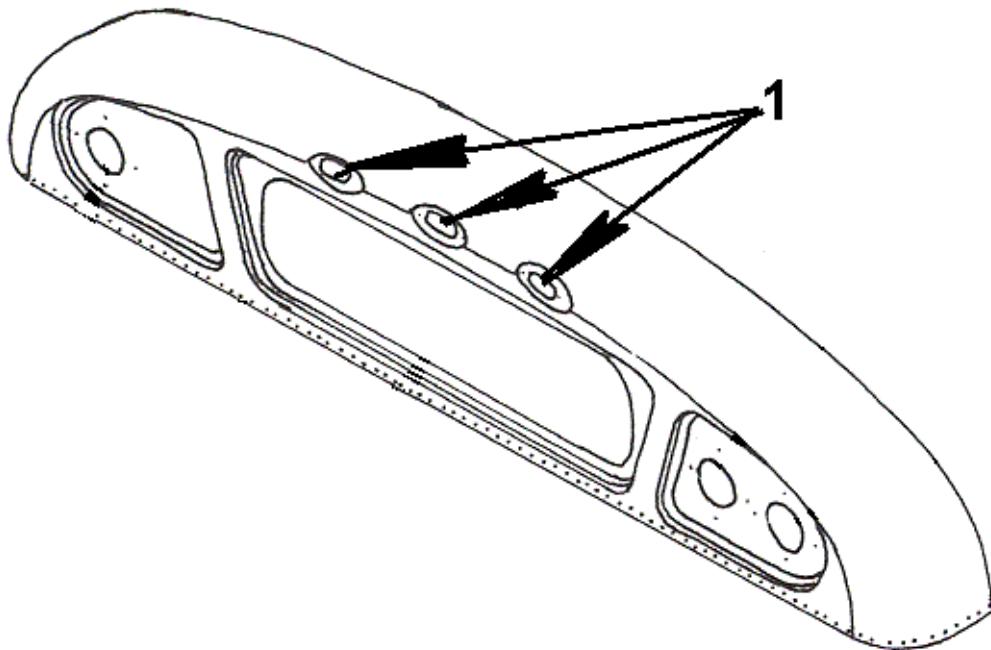


Figure 394 Clearance Light Locations

1. FRONT OR REAR CLEARANCE LIGHTS

3. MARKER, PARK AND TAIL LAMPS

3.1. CIRCUIT FUNCTIONS

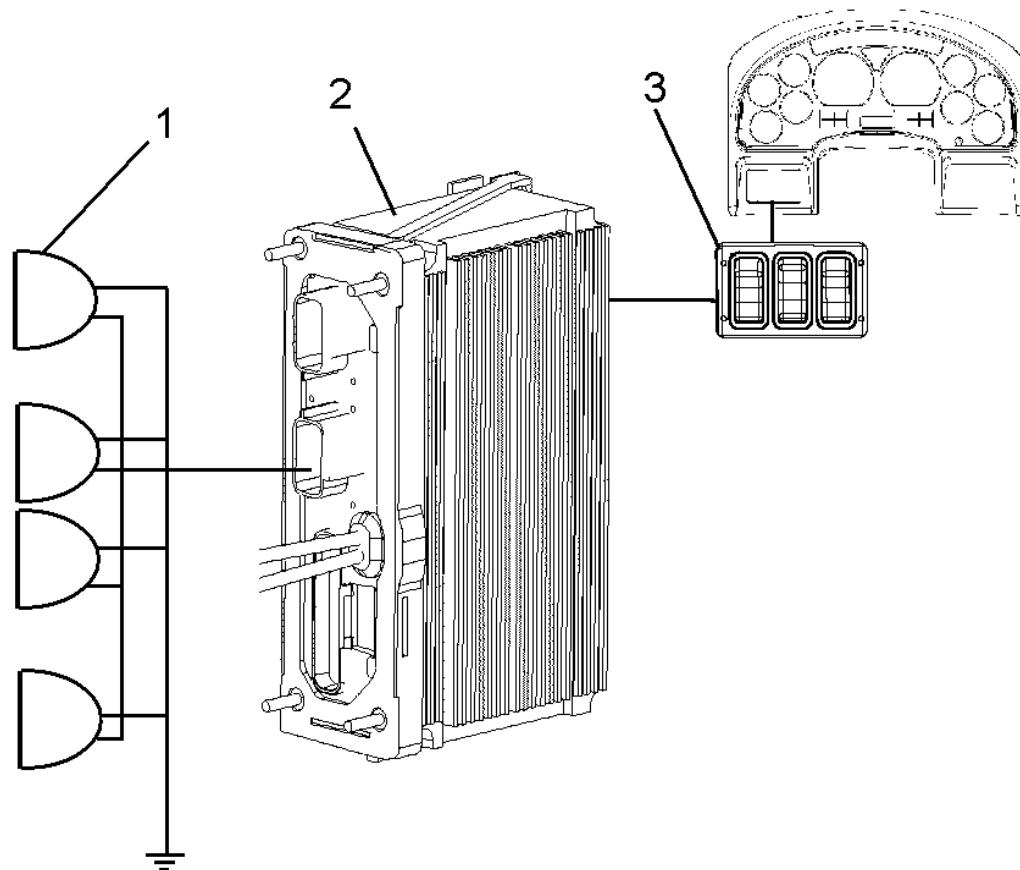


Figure 395 Marker, Park and Tail Lights

1. MARKER, PARK AND TAIL LIGHTS
2. ELECTRICAL SYSTEM CONTROLLER
3. DRIVETRAIN J1939 DATA LINK
4. HEADLIGHT PARK LIGHT SWITCH (PART OF ELECTRONIC GAUGE CLUSTER)

The marker, park and tail lamps are activated when the headlight switch is in the headlight or park position. The electronic gauge cluster will send a message to the ESC to command the lights on. The ESC supplies battery voltage for the marker, park and tail lamps.

The marker interrupt switch will also affect operation of the marker lights and park lights. The lights will turn on while the switch is held on, if the lights were previously off. The lights will turn off while the switch is held on, if the lights were previously on.

The clearance and marker lights are directly connected to the park circuits inside the ESC. Refer to the Clearance Lights Section (See CLEARANCE LIGHTS, page 776).

3.2. DIAGNOSTICS

Refer to Marker, Park and Tail Lights.

If the lights stay on when the headlight switch is in the off position, the problem is most likely a faulty headlight switch, switch pack, wiring between the switch pack and the EGC, or a problem in the EGC (the system is designed to turn the park lights on when there is no input to the EGC from the switch).

Should the lights fail to come on when the headlights are on, the problem could be attributed to open or shorted output wiring between the ESC and the tail lights, side marker lights and front marker lights lamps. The ESC has an internal virtual fuse software algorithm to protect output circuits in an over current situation.

A diagnostic trouble code will be logged if there is an over current caused by a short to ground or excessive load (too many accessories) or an open in the circuits between the ESC and the tail lights, side marker lights and front marker lights.

If individual lights are inoperative the problem must be attributed to faulty lamps or open wiring to the individual lamps.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to command the ESC to turn on the lights and monitor activation of the park light switch. See the diagnostic software manual for details on using the software.

Marker, Park and Tail Lights Preliminary Check

Table 234 Marker, Park and Tail Lights Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify marker, park and tail lights are inoperative.	Visually check marker, park and tail lights.	Marker, park and tail lights are inoperative.	Go to next step.	Marker, park and tail lights are operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.

Table 234 Marker, Park and Tail Lights Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
3.	On	Are all marker, park and tail lights inoperative?	Visually check if all lights are inoperative.	All lights are inoperative.	Go to next step.	Check specific circuits of the inoperative light(s) for open circuits.
4.	On	Check for marker, park and tail lights diagnostic trouble codes.	Read display on odometer.	No light diagnostic trouble codes are active.	Go to marker, park and tail lights circuit inputs to ESC. (See MARKER, PARK AND TAIL LIGHT INPUTS TO ESC, page 784)	Go to marker, park and tail lights circuit outputs from ESC. (See MARKER, PARK AND TAIL LIGHT OUTPUTS FROM ESC, page 786)

Diagnostic Trouble Codes

To display diagnostic trouble codes (DTC's), set the parking brake and turn the Ignition key "ON". Then press the Cruise "ON" switch and the Cruise "Resume" switch simultaneously. If no faults are present, the cluster odometer will display "NO FAULTS". If faults are present, the gauge cluster display will show the number of faults and each diagnostic trouble code for 10 seconds and then automatically scroll to the next entry and continue to cycle through the faults. To manually cycle through the fault list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in "A" for active faults or "P" for previously active faults. Releasing the parking brake or turning the ignition key off will take the ESC and the gauge cluster out of the diagnostic mode.

After all repairs have been made, the diagnostic trouble codes may be cleared by putting the key switch in the accessory position, turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 235 Marker, Park and Tail Lights

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
NO DIAGNOSTIC TROUBLE CODE	Diagnostic trouble codes are not logged for every possible fault in the park light circuits. If the lights stay on when the headlight switch is in the off position, the problem is most likely a faulty headlight switch, switch pack, wiring between the switch pack and the EGC, or a problem in the EGC (The system is designed to turn the park lights on when there is no input to the EGC from the switch).
	Go to marker, park and tail lights circuit inputs to ESC. (See MARKER, PARK AND TAIL LIGHT INPUTS TO ESC, page 784)
	When the park light switch is on and an individual light or several lights, but not all lights, are inoperative there is probably a failed bulb or an open circuit to those lights.

Table 235 Marker, Park and Tail Lights (cont.)

The roof clearance and marker lights or sunshade lights have a separate fuse between their circuits and the ESC. Refer to the Roof Clearance and Marker or Sunshade section (See CLEARANCE LIGHTS, page 776)	
611 14 4 1	Marker, park and tail lamps open circuit, 1603 pin H.
This fault is the result of an open in the circuits between the marker, park and tail lamps circuits and the ESC. Inspect marker park and tail lights (See MARKER, PARK AND TAIL LIGHT OUTPUTS FROM ESC, page 786) for proper operation	
611 14 4 2	Marker, park and tail lamps over current, 1603 pin H.
This fault is the result of a short or overload in the circuits between the marker, park and tail lamps circuits and the ESC. Inspect Marker Park And Tail Lights (See MARKER, PARK AND TAIL LIGHT OUTPUTS FROM ESC, page 786) for proper operation	
611 14 4 3	Marker, park and tail lamps, less than normal low current but more than open circuit
611 14 4 4	Marker, park and tail lamps, greater than normal high current and less than fusing current
611 14 4 6	Marker, park and tail lamps has current flow when output commanded off

3.3. MARKER, PARK AND TAIL LIGHT INPUTS TO ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Park Light EGC and ESC Input Circuits.

A fault in the input circuits will be apparent when the park lights are always on and no active faults are present. The ESC will not log any faults for park light circuits in the EGC. The park light request from the EGC is communicated on the 1939 data link. Loss of the drivetrain 1939 data link between the EGC and ESC will cause several problems to occur simultaneously and the check electrical system lamp will illuminate. **Go to the drivetrain 1939 data link section to troubleshoot this condition.** Problems in the work light input circuits can be caused by a short circuit between the 3 switch pack and the EGC, an open circuit between the 3 switch pack and the EGC, a faulty switch, or a problem in the EGC.

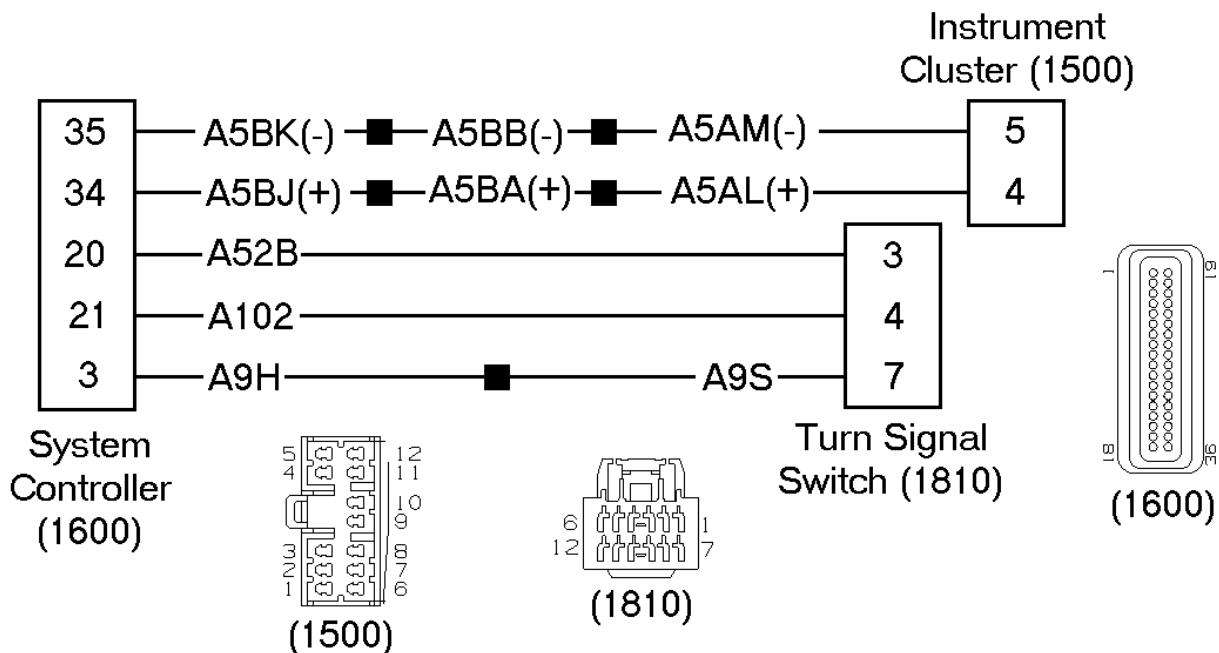


Figure 396 Park Light EGC and ESC Input Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1500) INSTRUMENT CLUSTER
LOCATED AT BACK SIDE INSTRUMENT CLUSTER

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

(1810) TURN SIGNAL SWITCH
LOCATED AT STEERING COLUMN

Table 236 EGC, 3 Switch Pack Circuit Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the 3 switch pack in the EGC.		
A mechanically faulty park light switch could also prevent the park light from operating. Remove the mechanical portion of the switch and attempt to turn the switch on by pressing the top microswitch. If the park lights go out, the mechanical switch assembly should be replaced.		
3 Switch Pack Harness Connector Park Light Voltage Checks		
Check with ignition key on and 3 switch pack disconnected.		
NOTE – If the EGC and switch are working correctly, disconnecting the 3 switch pack connector should cause the park lights to come on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments

Table 236 EGC, 3 Switch Pack Circuit Tests (cont.)

3 switch pack harness connector, cavity 8 to ground	$5 \pm .5$ volts	If voltage is missing, check for open or shorts in circuits between EGC connector and switch connector. Also insure proper voltage out of EGC.
3 switch pack harness connector, cavity 10 to ground	0 volts	Ground circuit from EGC If voltage is incorrect, check for shorts in circuits between EGC and switch. Also insure proper voltage out of EGC.
3 switch pack harness connector, cavity 8 to cavity 10.	$5 \pm .5$ volts	If voltage is incorrect, check for shorts in circuits between EGC and switch.
3 Switch Pack Work Light Resistance Check		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Check resistance between pins 10 (negative probe on pin 10) and 8 of the switch pack, when the switch is off.	Approximately 1.5M ohms.	If there is no continuity, the switch pack needs replaced.

Extended Description

The park light switch is wired directly to the EGC circuit board. When the park light switch is turned off, 5 volts on pin 8 from the EGC will drop to ground. This will cause the EGC to send a message to the ESC requesting the light to be turned on.

3.4. MARKER, PARK AND TAIL LIGHT OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Refer to Marker, Park and Tail Lamps.

A fault in the marker, park and tail lights will be apparent when the headlights are turned on and the marker, park and tail lamps do not come on. The ESC will also log a diagnostic trouble code (DTC) when there is a short in any of the marker, park and tail lamp circuits. Problems in the marker, park and tail lamp circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

Marker, Park and Tail Lamp Outputs on Busses Built Prior to Feb. 1, 2004

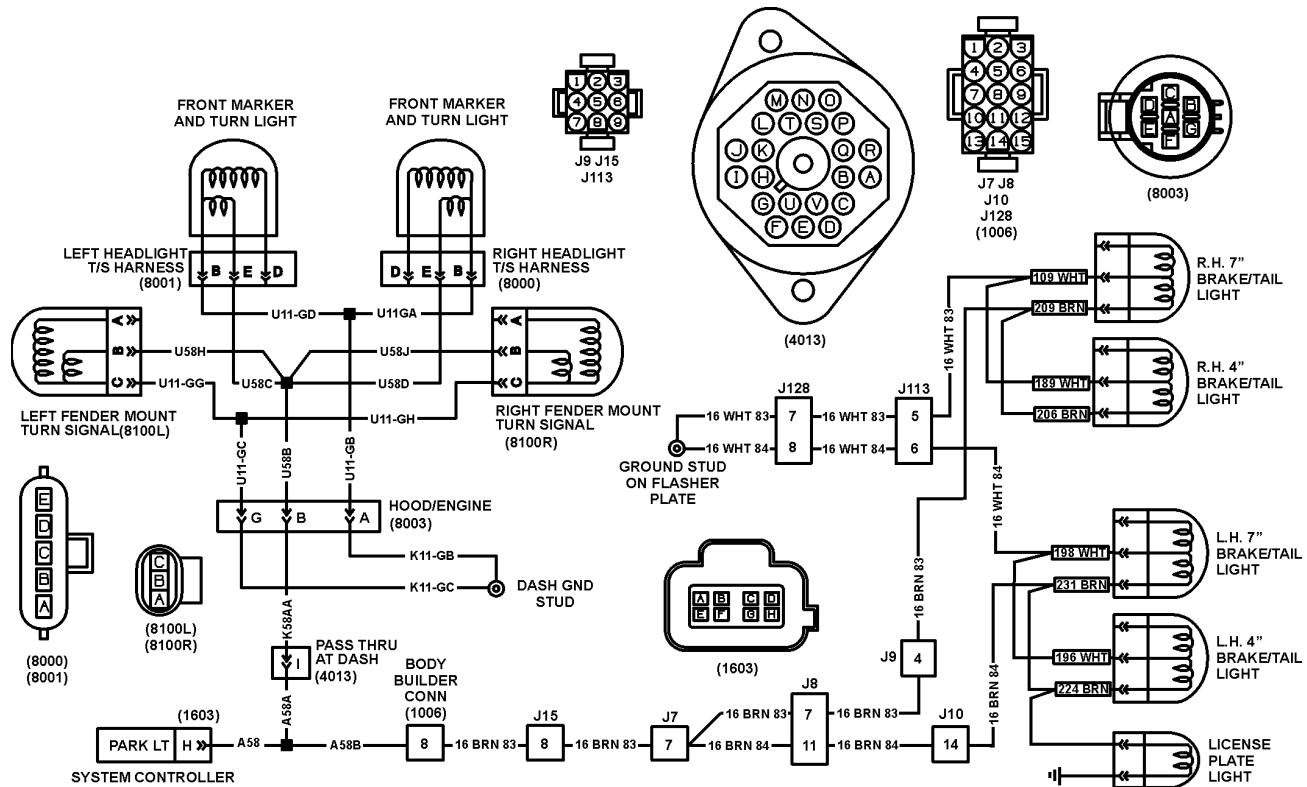


Figure 397 Marker, Park and Tail Lamps — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1603) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- (4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
- (8000) RIGHT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR RIGHT HEADLIGHT
- (8001) LEFT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR LEFT HEADLIGHT
- (8003) HOOD/ENGINE
LOCATED AT INSIDE LEFT FRAME RAIL NEAR BUMPER
- (8100L) RIGHT FENDER MOUNT TURN SIGNAL
LOCATED AT HOOD ABOVE RIGHT WHEEL
- (8100R) LEFT FENDER MOUNT TURN SIGNAL
LOCATED AT HOOD ABOVE LEFT WHEEL
- J7 J8 LEFT HAND BODY TO FRONT CAP J8
- J9 J10 LEFT HAND BODY TO REAR CAP
- J15 J128 FLASHER PLATE TO LEFT HAND BODY
- J113 LEFT HAND BODY TO REAR CAP

Table 237 Marker, Park And Tail Lights Circuit Tests

611 14 4 3	Marker, park and tail lamps, less than normal low current but more than open circuit	
611 14 4 4	Marker, park and tail lamps, greater than normal high current and less than fusing current	
611 14 4 6	Marker, park and tail lamps has current flow when output commanded off	
611 14 4 1	Marker, park and tail lamps open circuit	
	This fault is the result of an open in the circuits between the marker, park and tail lamps circuits and the ESC.	
611 14 4 2	Marker, park and tail lamps over current This fault may be the result of a short in the circuits between the marker, park and tail lamps and the ESC. It could also be caused by an excessive load on the circuits.	
	NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored. Clear DTC's. Disconnect stop tail and turn connector (9301), then turn on the park light switch and check for fault. If the fault has not reoccurred, there is a short or an overload in the tail lights. If the fault reoccurs, there is a short in one of the other circuits or in the ESC. Clear DTC's. Disconnect left headlight harness connector (8001), then turn on the park light switch and check for fault. If the fault has not reoccurred, there is a short or an overload in the left front marker lights. If the fault reoccurs, there is a short in one of the other circuits or in the ESC. Clear DTC's. Disconnect right headlight harness connector (8000), then turn on the park light switch and check for fault. If the fault has not reoccurred, there is a short or an overload in the right front marker lights. If the fault reoccurs, there is a short in one of the other circuits or in the ESC. Clear DTC's. Disconnect blue ESC connector (4007), then turn on park lights and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and the marker, park and tail lamps. If the fault reoccurs, there is a short inside the ESC.	
	Right Hand 7" and 4" Brake/Tail Light Voltage Checks With right hand 7" and 4" brake/tail light disconnected and park lights on.	
	NOTE – Always check connectors for damage and pushed-out terminals. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.	
Test Points	Spec.	Comments

Table 237 Marker, Park And Tail Lights Circuit Tests (cont.)

R.H. 7" brake/tail light cavity 209 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 38, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
R.H. 7" brake/tail light cavity 209 to cavity 109 R.H. 4" brake/tail light cavity 206 to cavity 189	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.

Left Hand 7" and 4" Brake/Tail Light Voltage Checks

With left hand 7" and 4" brake/tail light disconnected and park lights on.

NOTE – Always check connectors for damage and pushed-out terminals.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
L.H. 7" brake/tail light cavity 231 to ground L.H. 4" brake/tail light cavity 224 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 84, 16 BRN 83, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 237 Marker, Park And Tail Lights Circuit Tests (cont.)

R.H. 7" brake/tail light cavity 231 to cavity 198	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.	If voltage is missing, check for open or short to high in circuit 16 WHT 84.
R.H. 4" brake/tail light cavity 224 to cavity 196	12 ± 1.5 volts	

Front Marker and Turn Light Voltage Checks

With front marker and turn light harnesses (8000) and (8001) disconnected and park lights on.

NOTE – Always check connectors for damage and pushed-out terminals.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Right headlight harness (8000) cavity E to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58D, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right headlight harness (8000) cavity E to cavity B	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11GA, U11–GB and K11–GB.

Table 237 Marker, Park And Tail Lights Circuit Tests (cont.)

Left headlight harness (8001) cavity E to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58C, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left headlight harness (8001) cavity E to cavity B	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11–GD, U11–GB, and K11–GB.

Front Fender Mount Turn Light Voltage Checks (if available)

With front fender turn lights (8100R) and (8100L) disconnected and park lights on.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Right fender mount harness (8100R) cavity B to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58J, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 237 Marker, Park And Tail Lights Circuit Tests (cont.)

Right fender mount harness (8100R) cavity B to cavity C	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11–GH, U11–GC and K11–GC.
Left fender mount harness (8100L) cavity B to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58H, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left fender mount harness (8100L) cavity B to cavity C	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11–GG, U11–GC and K11–GC.

Marker, Park and Tail Lamp Outputs on Busses Built After Jan. 31, 2004

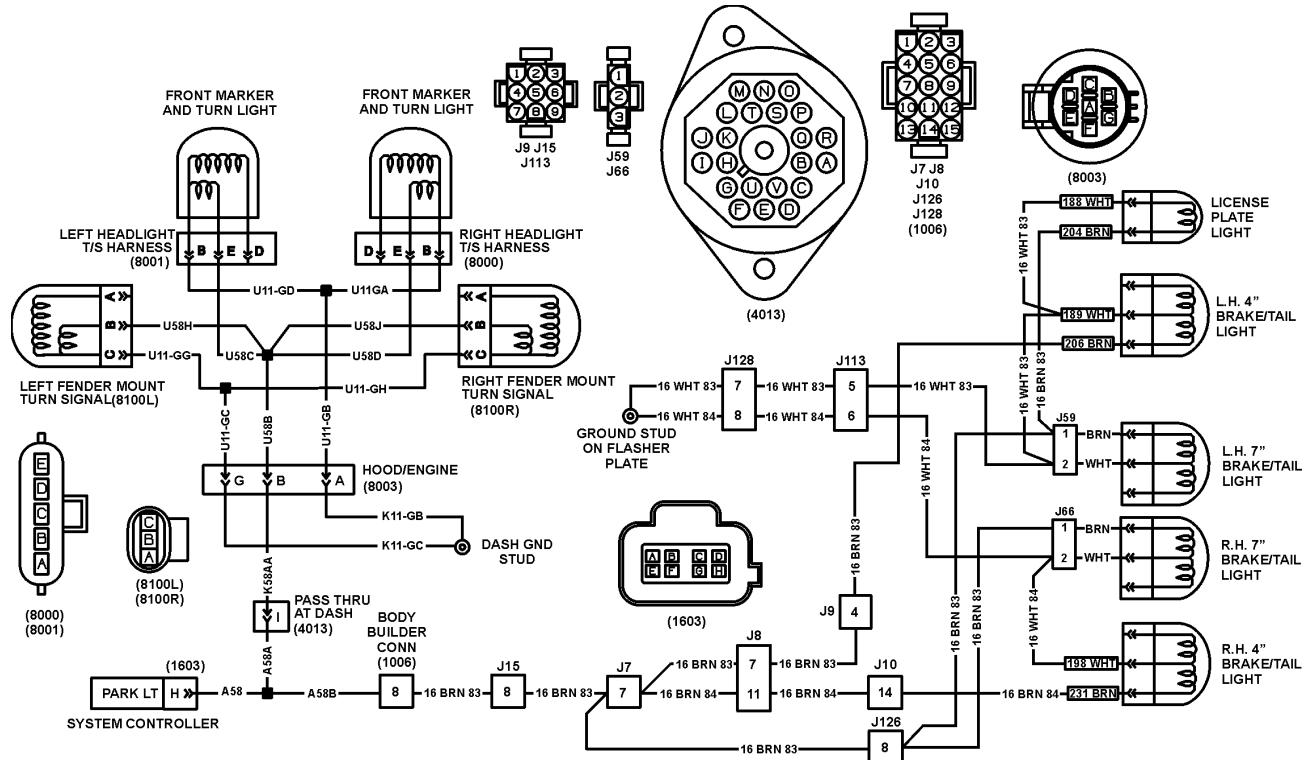


Figure 398 Marker, Park and Tail Lamps — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1603) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- (4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
- (8000) RIGHT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR RIGHT HEADLIGHT
- (8001) LEFT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR LEFT HEADLIGHT
- (8003) HOOD/ENGINE
LOCATED AT INSIDE LEFT FRAME RAIL NEAR BUMPER
- (8100L) RIGHT FENDER MOUNT TURN SIGNAL
LOCATED AT HOOD ABOVE RIGHT WHEEL
- (8100R) LEFT FENDER MOUNT TURN SIGNAL
LOCATED AT HOOD ABOVE LEFT WHEEL

J7 J8 LEFT HAND BODY TO FRONT CAP J8
J9 J10 LEFT HAND BODY TO REAR CAP
J15 J128 FLASHER PLATE TO LEFT HAND BODY
J59 LEFT REAR STOP/TAIL LIGHT TO REAR CAP
J66 RIGHT REAR STOP/TAIL LIGHT TO REAR CAP
J113 LEFT HAND BODY TO REAR CAP
J126 REAR CAP TO LEFT HAND BODY

Table 238 Marker, Park And Tail Lights Circuit Tests

611 14 4 3	Marker, park and tail lamps, less than normal low current but more than open circuit	
611 14 4 4	Marker, park and tail lamps, greater than normal high current and less than fusing current	
611 14 4 6	Marker, park and tail lamps has current flow when output commanded off	
611 14 4 1	Marker, park and tail lamps open circuit	
	This fault is the result of an open in the circuits between the marker, park and tail lamps circuits and the ESC.	
611 14 4 2	Marker, park and tail lamps over current This fault may be the result of a short in the circuits between the marker, park and tail lamps and the ESC. It could also be caused by an excessive load on the circuits.	
	NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored. Clear DTC's. Disconnect stop tail and turn connector (9301), then turn on the park light switch and check for fault. If the fault has not reoccurred, there is a short or an overload in the tail lights. If the fault reoccurs, there is a short in one of the other circuits or in the ESC. Clear DTC's. Disconnect left headlight harness connector (8001), then turn on the park light switch and check for fault. If the fault has not reoccurred, there is a short or an overload in the left front marker lights. If the fault reoccurs, there is a short in one of the other circuits or in the ESC. Clear DTC's. Disconnect right headlight harness connector (8000), then turn on the park light switch and check for fault. If the fault has not reoccurred, there is a short or an overload in the right front marker lights. If the fault reoccurs, there is a short in one of the other circuits or in the ESC. Clear DTC's. Disconnect blue ESC connector (4007), then turn on park lights and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and the marker, park and tail lamps. If the fault reoccurs, there is a short inside the ESC.	
	Right Hand 7" and 4" Brake/Tail Light Voltage Checks With right hand 7" and 4" brake/tail light disconnected and park lights on. NOTE – Always check connectors for damage and pushed-out terminals. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.	
Test Points	Spec.	Comments

Table 238 Marker, Park And Tail Lights Circuit Tests (cont.)

R.H. 7" brake/tail light (J66) cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 38, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
R.H. 7" brake/tail light (J66) cavity 1 to 2.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.
R.H. 4" brake/tail light cavity 231 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 34, 16 BRN 83, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
R.H. 4" brake/tail light cavity 231 to 198.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.
Left Hand 7" and 4" Brake/Tail Light Voltage Checks		
With left hand 7" and 4" brake/tail light disconnected and park lights on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments

Table 238 Marker, Park And Tail Lights Circuit Tests (cont.)

L.H. 7" brake/tail light (J59) cavity 1 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 83, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
L.H. 7" brake/tail light (J59) cavity 1 to 2.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.
L.H. 4" brake/tail light cavity 206 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 83, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
L.H. 4" brake/tail light cavity 206 to 189.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.
License Plate Light Voltage Checks		
With license plate light disconnected and park lights on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments

Table 238 Marker, Park And Tail Lights Circuit Tests (cont.)

License plate light cavity 204 to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 83, A58B and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
License plate light cavity 204 to 188.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.

Front Marker and Turn Light Voltage Checks

With front marker and turn light harnesses (8000) and (8001) disconnected and park lights on.

NOTE – Always check connectors for damage and pushed-out terminals.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Right headlight harness (8000) cavity E to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58D, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 238 Marker, Park And Tail Lights Circuit Tests (cont.)

Right headlight harness (8000) cavity E to cavity B	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11GA, U11–GB and K11–GB.
Left headlight harness (8001) cavity E to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58C, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left headlight harness (8001) cavity E to cavity B	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11–GD, U11–GB, and K11–GB.

Front Fender Mount Turn Light Voltage Checks (if available)

With front fender turn lights (8100R) and (8100L) disconnected and park lights on.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Right fender mount harness (8100R) cavity B to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58J, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Table 238 Marker, Park And Tail Lights Circuit Tests (cont.)

		Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right fender mount harness (8100R) cavity B to cavity C	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11–GH, U11–GC and K11–GC.
Left fender mount harness (8100L) cavity B to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits U58H, U58B, K58AA, A58A and A58. Also insure proper voltage out of System Controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left fender mount harness (8100L) cavity B to cavity C	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits U11–GG, U11–GC and K11–GC.

Extended Description

Refer to Marker, Park and Tail Lamps.

When the ESC is commanded to turn the tail lights on, the ESC will provide 12 volts to the lights from ESC connector (1603) terminal H to body builder connector terminal 8.

3.5. COMPONENT LOCATIONS

N09-53097.01

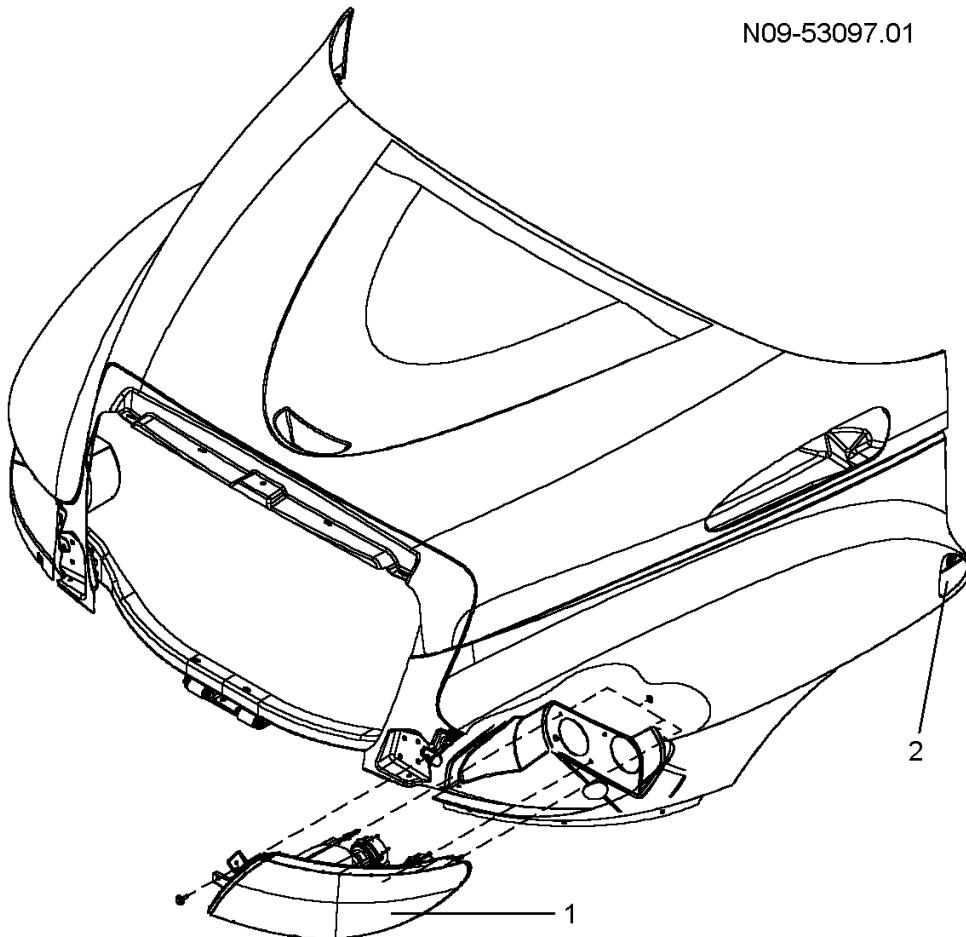


Figure 399 Headlights, Front and Side Marker Lights

1. FRONT PARK LIGHT
2. SIDE MARKER LIGHT

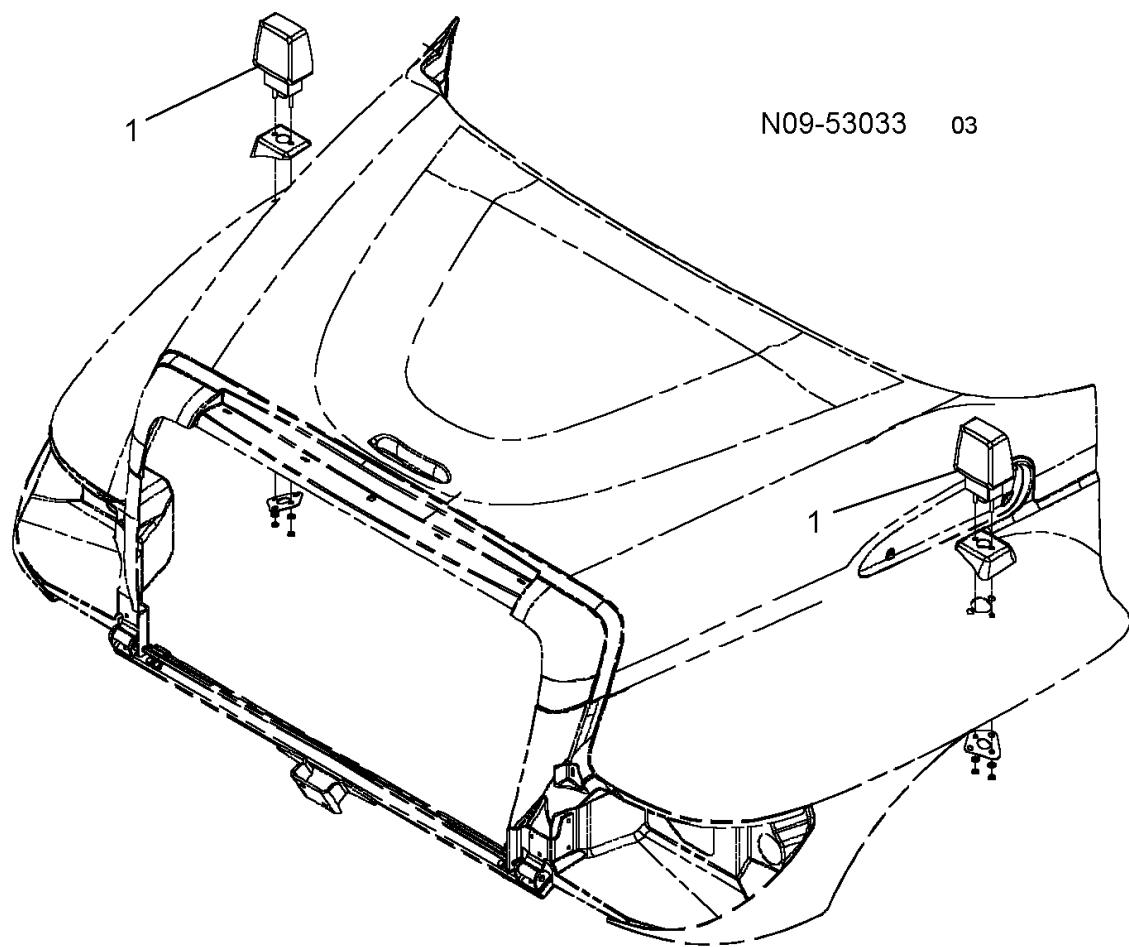


Figure 400 Optional Side Marker/Turn Signal Lights (Severe Service)

1. OPTIONAL SIDE MARKER/TURN SIGNAL LIGHT

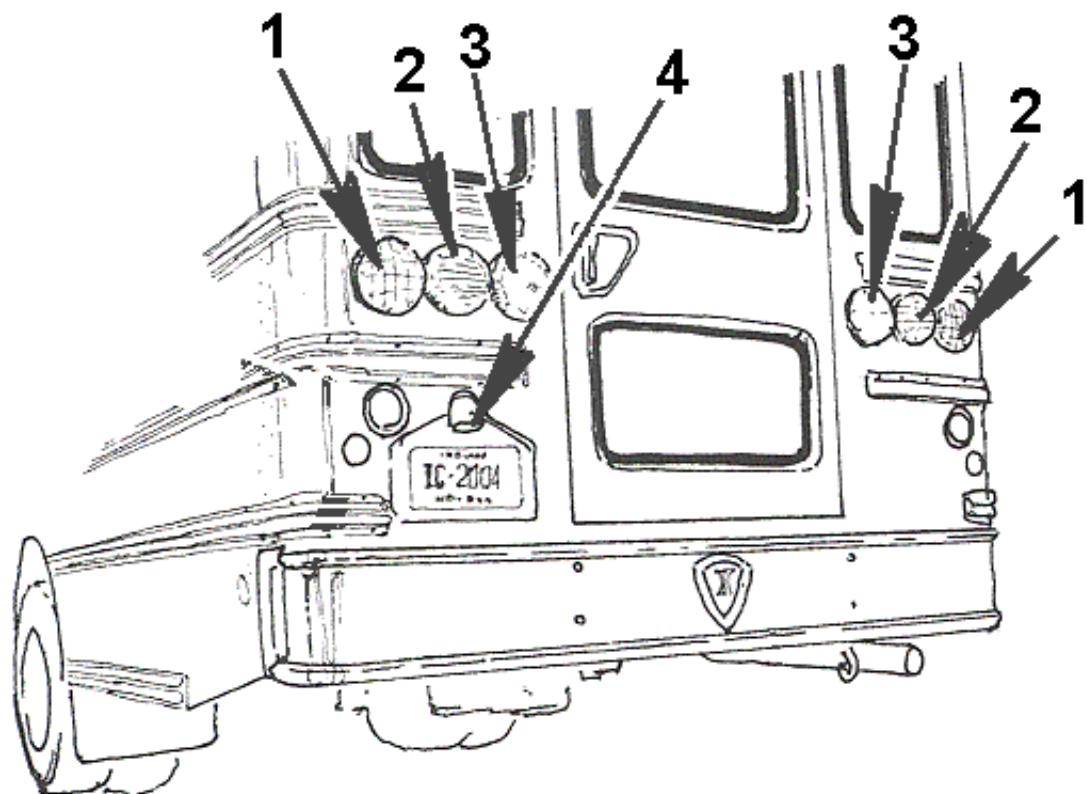


Figure 401 Rear Light Locations

1. REAR TURN SIGNAL LIGHT
2. REAR STOP/TAIL LIGHT
3. REAR BACK-UP LIGHT
4. LICENSE PLATE LIGHT

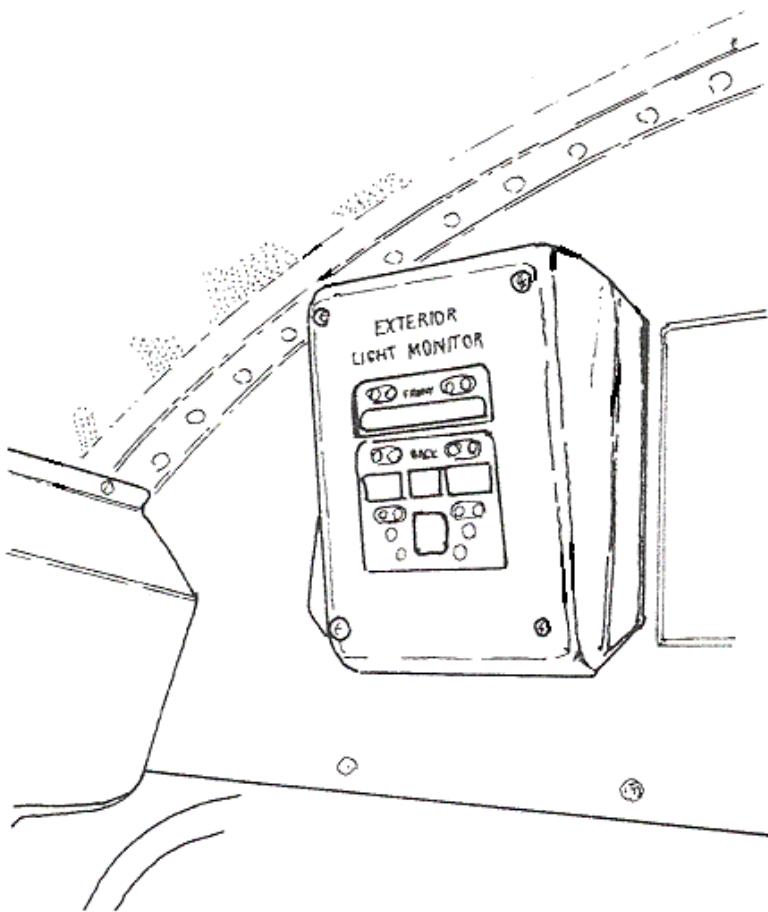


Figure 402 Exterior Light Monitor

4. FOG LIGHT SYSTEM

4.1. CIRCUIT FUNCTIONS

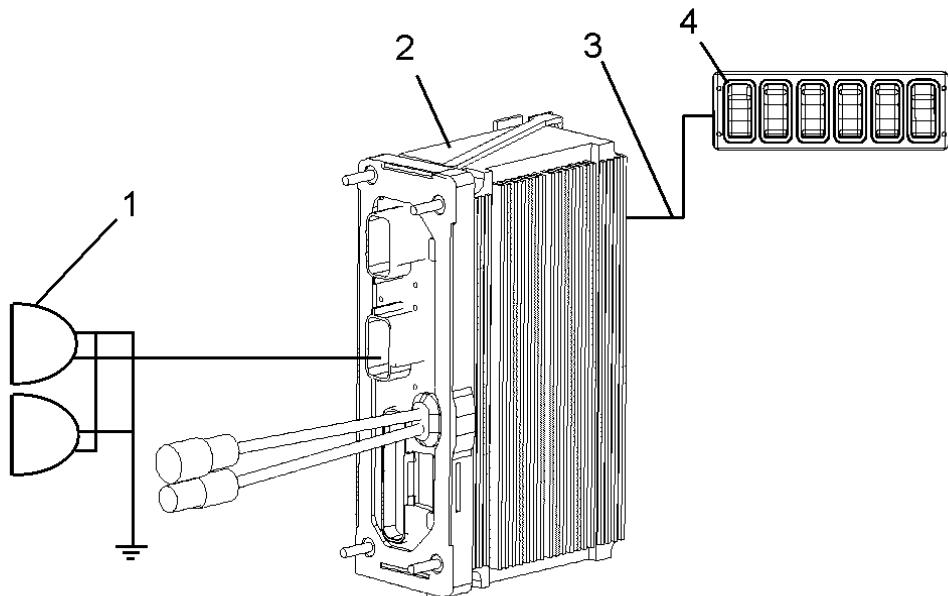


Figure 403 Fog Lights Function Diagram

1. FOG LIGHTS
2. ELECTRICAL SYSTEM CONTROLLER
3. SWITCH DATA LINK
4. FOG LIGHT SWITCH (IN SWITCH PACK)

Refer to Fog Lights Function Diagram.

Fog lights are rectangular halogen lights mounted in the bumper opening and are available with either amber or clear lenses.

When the fog light switch is turned on the switch pack will send a message, on the switch data link, to the ESC requesting the fog lights to be turned on. If the key is in the ignition position, the headlights are on and in the low beam position the ESC will provide voltage to power the fog lights. If the high beams are selected the voltage to the fog lights will be interrupted by the ESC until the low beams are turned on.

The ESC will also send a message back to the switch pack to illuminate the fog light switch "on" light.

4.2. DIAGNOSTICS

Should the fog lights fail to operate, the problem could be attributed to a faulty switch in the switch pack, a faulty switch pack or open or shorted output wiring between the ESC and the fog lights.

A problem with the mechanical portion of the switch or the switch contacts may cause the ESC to command the switch on lamp to blink.

The ESC will also log faults for switch errors or switch pack errors, identified by location. Switch locations will vary depending on vehicle configuration. The ESC is programmed to recognize the location and function of the switch.

The ESC has an internal virtual fuse software algorithm to protect output circuits in an over current situation.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A diagnostic trouble code will be logged if there is an over current (short to ground or excessive load) or an open in the circuits between the ESC and the fog lights.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the fog lights and monitor activation of the fog light switch. See the diagnostic software manual for details on using the software.

Fog Light Preliminary Check

Table 239 Fog Light Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify fog lights are inoperative. (Ignition on, headlights on, low beam selected and fog light switch on.)	Visually check fog lights.	Fog lights are inoperative.	Go to next step.	Fog lights are operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Are both fog lights inoperative?	Visually check if both fog lights are inoperative.	Both fog lights are inoperative.	Go to next step.	Check specific circuits of the inoperative light for open circuits.

Table 239 Fog Light Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
4.	On	Check for fog light diagnostic trouble codes. (See Diagnostic Trouble Codes, page 806)	Read display on odometer.	No fog light diagnostic trouble codes are active.	Go to next step.	Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 807)
5.		Check for switch pack faults. Problem may be in multiplexed switches. Check for switch diagnostic trouble codes. (See Diagnostic Trouble Codes, page 806)		No multiplexed switch diagnostic trouble codes are active.	Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 807)	

Diagnostic Trouble Codes

To display diagnostic trouble codes (DTC's), set the parking brake and turn the Ignition key "ON". Then press the Cruise "ON" switch and the Cruise "Resume" switch simultaneously. If no faults are present, the cluster odometer will display "NO FAULTS". If faults are present, the gauge cluster display will show the number of faults and each diagnostic trouble code for 10 seconds and then automatically scroll to the next entry and continue to cycle through the faults. To manually cycle through the fault list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in "A" for active faults or "P" for previously active faults. Releasing the parking brake or turning the ignition key off will take the ESC and the gauge cluster out of the diagnostic mode.

After all repairs have been made, the diagnostic trouble codes may be cleared by putting the key switch in the accessory position, turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 240 Fog Light Circuits

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
Diagnostic trouble codes starting with 625	625 series diagnostic trouble codes relate to switch pack faults. Refer to the switch pack module section.
2033 14 4 1	Fog light lamps, too much load attached. This fault may be the result of a short in the circuits between the fog lights and the ESC. It could also be caused by an excessive load on the circuit.
2033 14 4 2	Fog light lamps, open circuit This fault is the result of an open in circuits between the fog lights and the ESC. Check for burned out bulb.
2033 14 4 0	Fog light lamps, an unexpected load is attached to this pin.
2033 14 4 3	Fog light lamps, shorted to ground.

4.3. FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Refer to Fog Light Circuits From ESC.

A fault in the fog light circuits will be apparent when the lights do not come on. The ESC will also log a diagnostic trouble code (DTC) when there is a short in any of the circuits to the fog light. Problems in the fog light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a problem in the ESC.

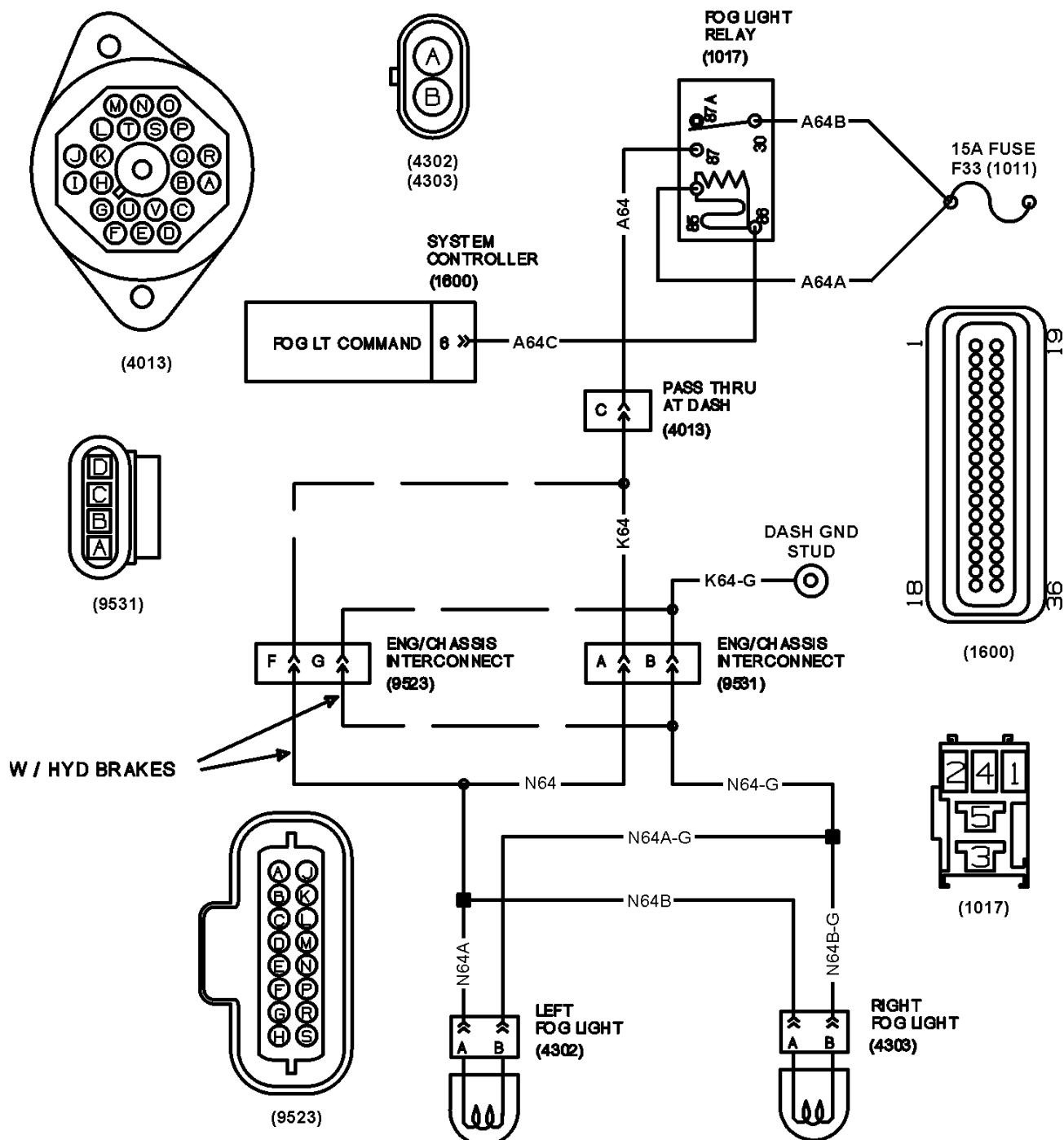


Figure 404 Fog Light Circuits From ESC — Always Refer To Circuit Diagram Book For Latest Circuit Information

- (1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1017) FOG LIGHT RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- (4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
- (4302) LEFT FOG LIGHT
LOCATED AT LEFT SIDE NEAR FRONT BUMPER
- (4303) RIGHT FOG LIGHT
LOCATED AT RIGHT SIDE NEAR FRONT BUMPER
- (9523) (9531) ENGINE/CHASSIS INTERCONNECT
LOCATED AT INSIDE LEFT FRAME RAIL BEHIND ENGINE

Table 241 Fog Lights Circuit Tests

FAULTS	
2033 14 4 0	Fog light lamps, an unexpected load is attached to this pin.
2033 14 4 1	Fog light lamps, too much load attached.
2033 14 4 2	Fog light lamps, open circuit.
2033 14 4 3	Fog light lamps, shorted to ground.

Fog Light Relay (1017) Voltage Checks

Check with ignition on, headlights on, low beams selected, fog light switch on, and fog light relay (1017) removed.

NOTE – Always check connectors for damage and pushed-out terminals.

The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Cavity 86 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse F33 and check for short or open in circuit A64A.
Cavity 86 to 85	12 ± 1.5 volts	If voltage is missing check for short or open in circuit A64C. Also check system controller connector (1600) pin 6 for ground signal. If ground signal missing, system controller may need reprogrammed or replaced. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 241 Fog Lights Circuit Tests (cont.)

Cavity 30 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse F33 and check for short or open in circuit A64B.
Fog Light Connector (4302) Voltage Checks		
<p>Check with ignition on, headlights on, low beams selected, fog light relay (1017) installed and fog light switch on.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals.</p> <p>The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		
Test Points	Spec.	Comments
Left fog light connector (4302) cavity A to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits N64A, N64, K64, and A64.
Left fog light connector (4302) Pin A to cavity B	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits N64A-G, N64-G, and K64-G.
Fog Light Connector (4303) Voltage Checks		
<p>Check with ignition on, headlights on, low beams selected, fog light relay (1017) installed and fog light switch on.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals.</p>		
Test Points	Spec.	Comments
Right fog light connector (4303) cavity A to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage missing, check for open or short to ground in circuits N64B, N64, K64, and A64.
Right fog light connector (4303) cavity A to cavity B	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.	If voltage is missing, check for short to high in circuits N64B-G, N64-G, and K64-G.

Table 241 Fog Lights Circuit Tests (cont.)

	12 ± 1.5 volts	
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4.4. EXTENDED DESCRIPTION

Refer to Fog Light Circuits From ESC.

The fog light switch communicates with the ESC. When it is in the on position and the headlights are in low beam the ESC will turn on the fog lights.

The ESC will supply a ground to the fog light relay (1017) cavity 85. Current will then flow from fuse F33 charging the relay. With the relay activated current will flow to the foglights through the pass thru at dash (4013), engine/chassis interconnect (9531) or (9523), to the foglight connectors (4302) and (4303).

Ground for the fog lights is supplied from the dash ground stud on circuits K64-G, engine/chassis interconnect (9531) or (9523) , and N64-G. From N64-G the circuits are split on N64A-G to left fog light connector (4302) terminal B and N64B-G to right fog light connector (4303) terminal B.

4.5. COMPONENT LOCATIONS

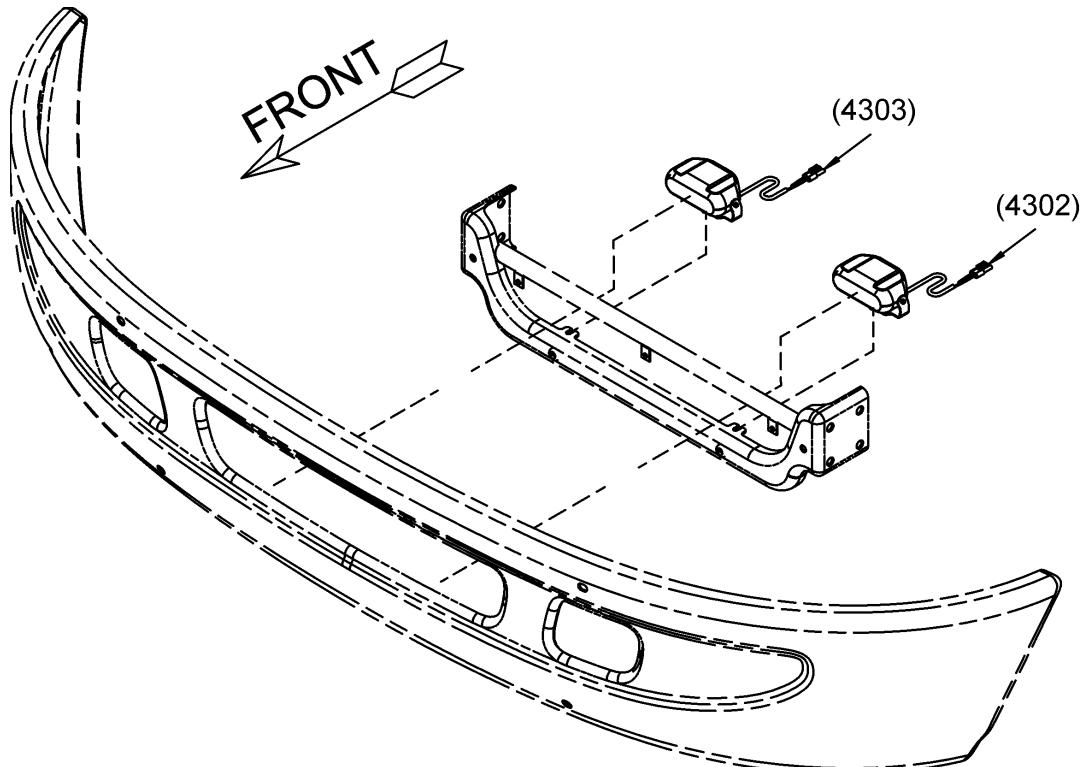


Figure 405 Fog Light Wiring

- (4302) LEFT FOG LIGHT CONNECTOR
- (4303) RIGHT FOG LIGHT CONNECTOR

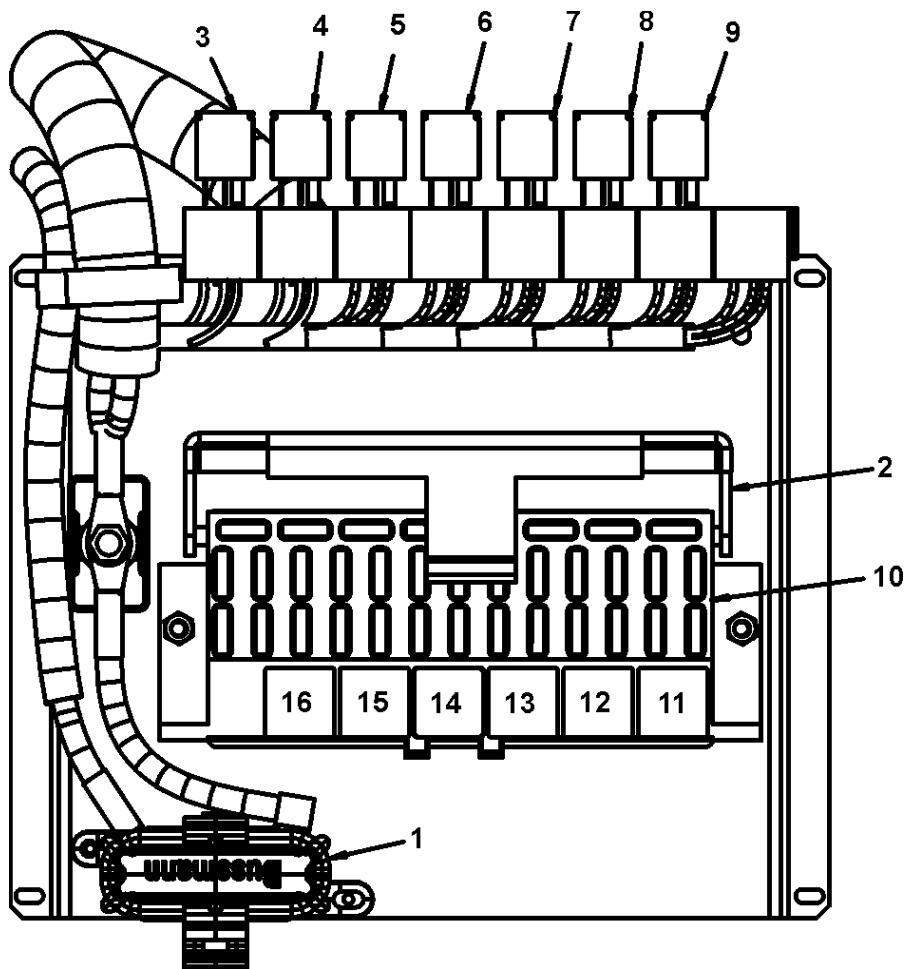


Figure 406 Chassis Flasher Plate

1. 175 AMP MEGA FUSE
2. FUSE BLOCK COVER
3. (1015) BACK-UP LIGHT RELAY
4. (1017) FOG LIGHT RELAY
5. (1018) AUTO DRAIN VALVE RELAY
6. (1016) BACK-UP LIGHT CHECK RELAY
7. (1020) EMERGENCY EXIT RELAY
8. (1021) POST TRIP INSPECTION RELAY
9. (1019) WHEELCHAIR LIFT RELAY
10. (1011) FUSE BLOCK
11. R1 WIPER POWER RELAY
12. R2 WIPER HI-LOW RELAY
13. R3 STOP LIGHT RELAY
14. R4 AIR SOLENOID POWER RELAY
15. R5 #1 IGNITION POWER RELAY
16. R6 #2 IGNITION POWER RELAY

5. HEADLIGHT SYSTEM

5.1. CIRCUIT FUNCTIONS

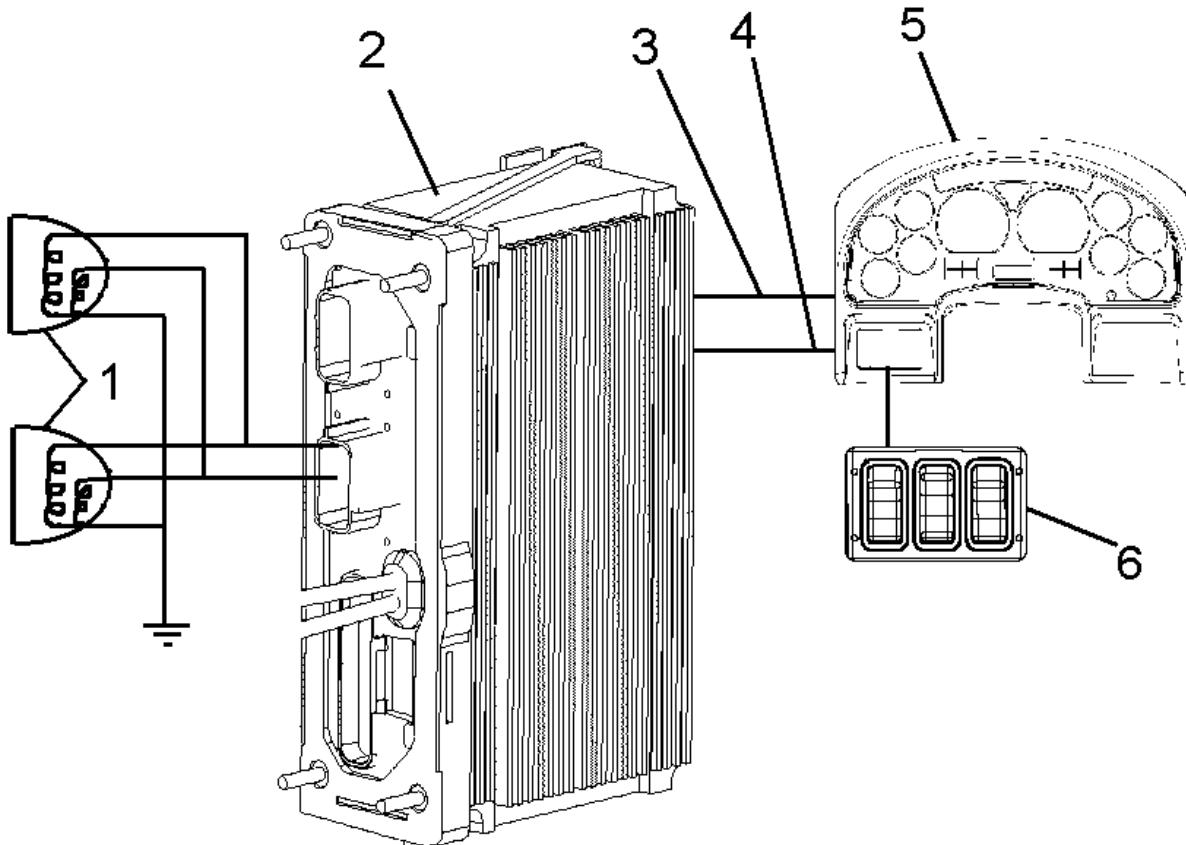


Figure 407 Headlights Function Diagram

1. HEADLIGHTS
2. ELECTRICAL SYSTEM CONTROLLER
3. DRIVETRAIN 1939 DATA LINK (FROM ELECTRONIC GAUGE CLUSTER)
4. DIRECT HEADLIGHT ENABLE CIRCUIT FROM EGC
5. ELECTRONIC GAUGE CLUSTER
6. HEADLIGHT SWITCH (IN ELECTRONIC GAUGE CLUSTER)

Refer to Headlights Function Diagram.

The headlight system consists of the headlights, headlight switch, dimmer switch, flash to pass, day time running lights (mandatory for Canada, optional for USA) and the optional "lights on with wipers feature".

The fender mounted headlights are a one lamp system and share a molded cavity with the turn signals. The headlight switch is a 3-position (off/parking lights/headlights) rocker type located below the EGC. When the key is in the ignition position and the headlight switch is on the EGC will communicate with the ESC on the drivetrain 1939 data link. The ESC supplies voltage to the headlights as requested.

While the key is not in the ignition position, the headlights will only operate in the low beam mode. This is enabled by a direct circuit from the EGC to the ESC, which is not dependant on the data link. This also acts as a fail-safe to activate the low beam headlights when communication on the drivetrain 1939 data link is interrupted.

The dimmer and flash to pass switches are located in the turn signal assembly. Pulling the turn signal lever toward the driver as far as it will go, while the headlights are on, will switch the headlights between hi-beam and low-beam operation.

When the key is on and the headlights are off, pulling the turn signal slightly toward the driver and releasing the turn signal lever will flash the headlights.

When the key is on and the headlights are on, pulling the turn signal slightly toward the driver and releasing the turn signal lever will momentarily switch the headlights between hi-beam and low-beam operation.

The programmable day time running light feature allows the vehicle to operate in a "lights on" condition at all times without driver input. This system operates the headlights at partial illumination, but still helps to increase visibility even in bright sunshine. The daytime running lights will go off when the park brake is set or the ignition is turned off.

When the programmable "lights on with wipers feature" is enabled the low beam headlights and park lights will be turned on by the ESC anytime the windshield wipers are activated, except during momentary wash/wipe. The lights will remain on after the wipers are turned off until the headlight switch is turned on and off or the key is turned off.

5.2. DIAGNOSTICS

Should the lights fail to operate, the problem could be attributed to a faulty switch in the EGC, a faulty switch pack in the EGC a faulty EGC, open circuits or shorted circuits. The ESC has an internal virtual fuse software algorithm to protect output circuits in an over current situation.

Should the lights fail to switch between high and low beams or the flash to pass fail to operate, the problem could be attributed to a faulty switch in the turn signal assembly, open circuits, shorted circuits or a problem in the ESC.

A diagnostic trouble code will be logged if there is an over current (short to ground or excessive load) or an open in the circuits between the ESC and the headlights.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the lights and monitor activation of the turn/hazard signal switches and stop light switch(es). See the diagnostic software manual for details on using the software.

The diagnostic software will also identify if the daytime running light or lights on with wipers features are activated.

Headlight Preliminary Check

Table 242 Headlight Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify headlights are malfunctioning.	Visually check headlights.	Headlights are malfunctioning.	Go to next step.	Headlights are operating correctly. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Are both high beam or both low beam lights malfunctioning?	Visually check if both high beam or both low beam lights are malfunctioning?	Both high beam or both low beam lights are malfunctioning.	Go to next step.	Check specific circuits of the inoperative light for open circuits.
4.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes, page 815)	Read display on odometer.	Headlight diagnostic codes are present.	Go to headlight outputs from ESC (See HEADLIGHT OUTPUTS FROM ESC, page 820)	Go to Headlight circuit inputs to ESC (See HEADLIGHT CIRCUIT INPUTS TO ESC, page 816)

Diagnostic Trouble Codes

To display diagnostic trouble codes (DTC's), set the parking brake and turn the Ignition key "ON". Then press the Cruise "ON" switch and the Cruise "Resume" switch simultaneously. If no faults are present, the cluster odometer will display "NO FAULTS". If faults are present, the gauge cluster display will show the number of faults and each diagnostic trouble code for 10 seconds and then automatically scroll to the next entry and continue to cycle through the faults. To manually cycle through the fault list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in "A" for active faults or "P" for previously active faults. Releasing the parking brake or turning the ignition key off will take the ESC and the gauge cluster out of the diagnostic mode.

After all repairs have been made, the diagnostic trouble codes may be cleared by putting the key switch in the accessory position, turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 243 Headlight Circuits

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
NO DIAGNOSTIC TROUBLE CODE	Diagnostic trouble codes are not logged for every possible fault in the headlight circuits.
	There are no diagnostic trouble codes associated with the dimmer switch, flash to pass switch or 3 switch pack in the EGC. Open circuits to an individual headlight will not generate a fault.
	An open in the zero volt reference signal to the turn signal switch will cause the wipers to operate at high speed which will turn on the low beams if the "lights on with wipers" feature is enabled.
611 14 5 1	Headlight low beam open circuit
611 14 5 2	Headlight low beam over current
611 14 5 3	Headlight low beam lamps, less than normal low current but more than open circuit
611 14 5 4	Headlight low beam lamps, greater than normal high current and less than fusing current
611 14 5 6	Headlight low beam lamps has current flow when output commanded off
611 14 7 1	Headlight high beam open circuit
611 14 7 2	Headlight high beam over current
611 14 7 3	Headlight high beam lamps, less than normal low current but more than open circuit
611 14 7 4	Headlight high beam lamps, greater than normal high current and less than fusing current
611 14 7 6	Headlight high beam lamps has current flow when output commanded off

5.3. HEADLIGHT CIRCUIT INPUTS TO ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Headlight Circuit Inputs to ESC.

A fault in the headlight circuit inputs to the ESC will be apparent when the lights do not operate correctly. There are no diagnostic trouble codes associated with headlight input circuits to the ESC. Problems in the headlight input circuits can be caused by faulty switches, a short, an open, or a problem in the ESC or EGC.

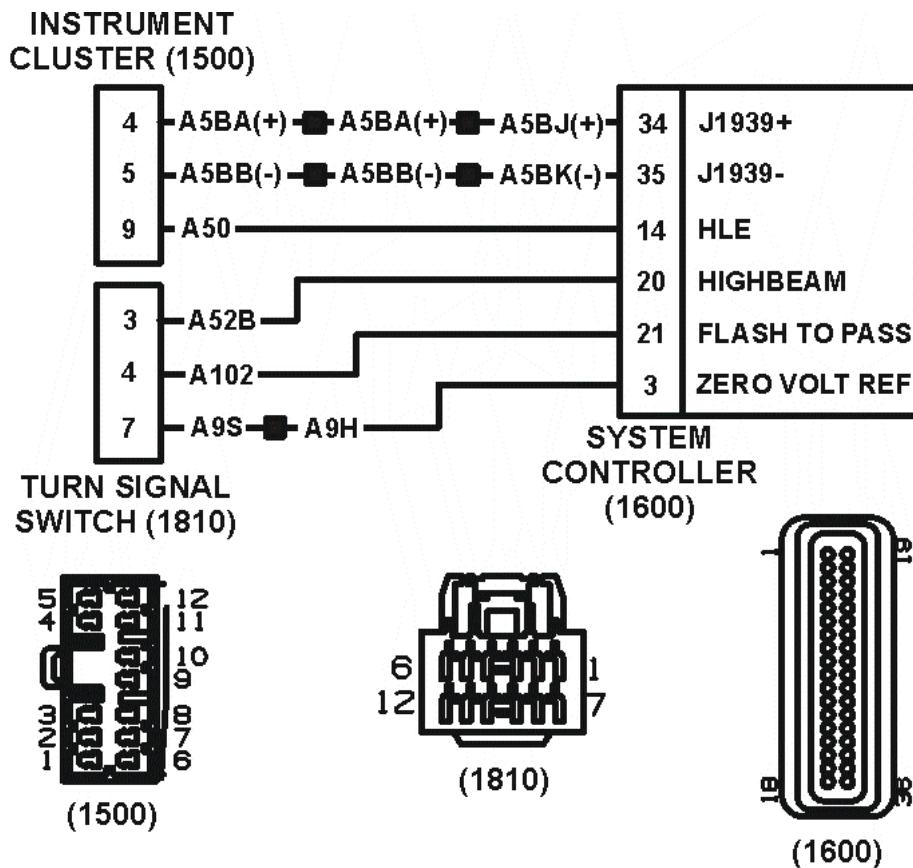


Figure 408 Headlight Circuit Inputs to ESC — Always Refer To Circuit Diagram Book For Latest Circuit Information

- (1500) INSTRUMENT CLUSTER
LOCATED AT BACK SIDE INSTRUMENT PANEL
- (1600) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- (1810) TURN SIGNAL SWITCH
LOCATED AT STEERING COLUMN

Table 244 Headlight Switch Inputs to ESC Circuit Tests

THERE ARE NO DIAGNOSTIC TROUBLE CODES ASSOCIATED WITH THESE CIRCUITS		
A mechanically faulty headlight switch could also prevent the headlight from operating. Remove the mechanical portion of the switch and attempt to turn the switch on by pressing the bottom switch contact. If the headlights illuminate, the mechanical switch assembly should be replaced.		
ESC Harness Connector (1600) Voltage Checks		
Checks headlight fail-safe circuit input to ESC.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Connect breakout box to harness connector (1600).		
Test Points	Spec.	Comments

Table 244 Headlight Switch Inputs to ESC Circuit Tests (cont.)

Headlight switch "on", ESC connector (1600) terminal 14 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts with headlight switch "on"	If voltage is missing, check for open or short in circuit A50. If no open or shorts are found check for voltage out of EGC.
Headlight switch "off", Terminal 14 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 0 volts with headlight switch "off"	Identify source of incorrect voltage and repair

EGC 3 Switch Pack Harness Connector Headlight Voltage Checks

Check with ignition key on and 3 switch pack disconnected.

NOTE – If the EGC is working correctly, disconnecting the 3 switch pack connector should cause the park lights to come on.

NOTE – Always check connectors for damage and pushed-out terminals.

Test Points	Spec.	Comments
3 switch pack harness connector, pin 3 to ground	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuits between EGC connector and switch connector. Also insure proper voltage out of EGC.
3 switch pack harness connector, pin 9 to ground	0 – .3 volts	Low circuit from EGC If voltage is incorrect, check for open or shorts in circuits between EGC and switch. Also insure proper voltage out of EGC.

3 Switch Pack Headlight Resistance Check

NOTE – Always check connectors for damage and pushed-out terminals.

Test Points	Spec.	Comments
Checking for continuity between pins 3 and 9 of the switch pack, when the switch is on.	<2 ohms.	If there is no continuity, the switch pack needs replaced.

Table 244 Headlight Switch Inputs to ESC Circuit Tests (cont.)

Turn Signal Switch Harness Connector (1810) Voltage Checks		
Check with key in ignition position.		
Checks high/low beam select input circuits.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
(1810) Cavity 3 to ground Headlight/highbeam switch input	12 ± 1.5 volts.	If voltage is missing, check for open or short in circuit A52B. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
(1810) Cavity 4 to ground Flash to pass switch input	12 ± 1.5 volts.	If voltage is missing, check for open or short in circuit A102. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
(1810) Cavity 7 to ground Zero volt reference.	<1 volt.	If voltage is seen, check circuits A9S and A9H for shorts to high. Also insure proper zero volt reference signal out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Turn Signal Switch (1810) Resistance Checks		
Check with (1810) removed		
Checks dimmer and flash to pass switches in turn signal assembly.		
(1810) pin 3 to 7	Switching between >50K ohms and < 2 ohms as lever is pulled and released.	If resistance is incorrect replace turn signal switch assembly.
(1810) pin 4 to 7	Switching between >50K ohms and < 2 ohms as lever is pulled and released.	If resistance is incorrect replace turn signal switch assembly.

Extended Description

Refer to Input Circuits to ESC.

When the key is in the ignition position and the headlight switch is turned on, the EGC will communicate with the ESC through the drivetrain 1939 data link to command the lights on.

The ESC applies 12 volts to terminal 3 (headlight dimmer switch contacts) of turn signal switch (1810) through circuit A52B. When the headlight dimmer switch is activated the ESC will sense this voltage drop to ground through turn signal switch connector (1810) terminal 7, circuit A9S and circuit A9H to the zero volt reference signal.

The ESC applies 12 volts to terminal 4 (flash to pass switch contacts) of turn signal switch (1810) through circuit A102. When the flash to pass switch is activated the ESC will sense this voltage drop to ground through turn signal switch connector (1810) terminal 7, circuits A9S and A9H to the zero volt reference signal.

When the headlight switch is in the on position, 12 volts is applied from EGC connector (1500) terminal 9 to circuit A50 and ESC connector (1600) terminal 14. This signals the ESC to turn on the low beams even when the key is not in the ignition position.

5.4. HEADLIGHT OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Circuits From ESC to Headlights.

A fault in the circuits between the ESC and the headlights will be apparent when the lights do not operate correctly. The ESC will also log a diagnostic trouble code (DTC) when there is a short in any of the headlight circuits or an open circuit between the ESC and the headlights. Problems in the circuits between the ESC and the headlights can be caused by burned out lamps, a short, an open, or a problem in the ESC.

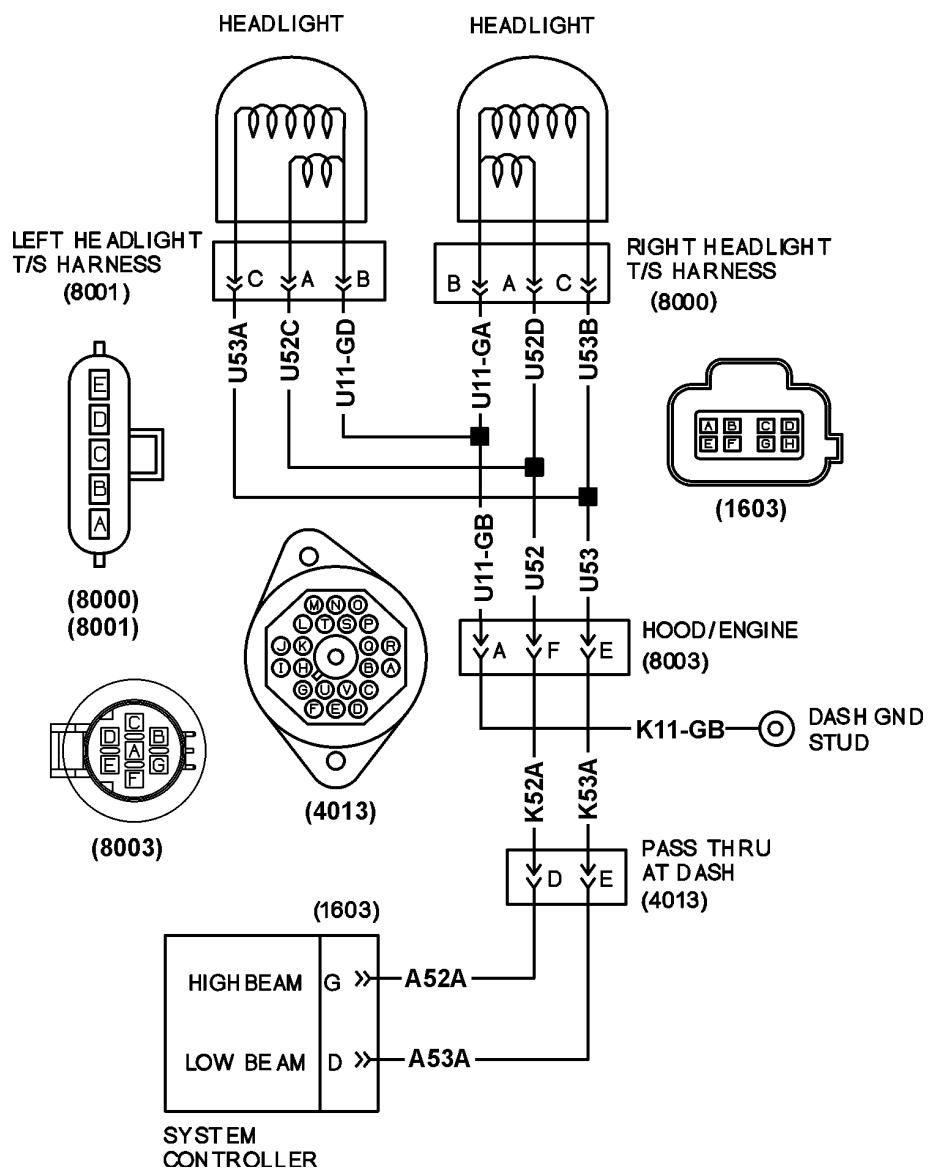


Figure 409 Circuits From ESC to Headlights — Always Refer To Circuit Diagram Book For Latest Circuit Information

- (1603) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- (4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
- (8000) RIGHT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR RIGHT HEADLIGHT
- (8001) LEFT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR LEFT HEADLIGHT
- (8003) HOOD/ENGINE
LOCATED AT INSIDE LEFT FRAME RAIL NEAR BUMPER

Table 245 ESC Low Beam Outputs to Headlight Circuit Tests

FAULTS		
611 14 5 3	Headlight low beam lamps, less than normal low current but more than open circuit	
611 14 5 4	Headlight low beam lamps, greater than normal high current and less than fusing current	
611 14 5 6	Headlight low beam lamps has current flow when output commanded off	
611 14 5 2	Low beam over current	
This fault may be the result of a short in the circuits between the low beam headlight circuits and the ESC. It could also be caused by an excessive load on the circuit.		
611 14 5 1	Low beam under current	
This fault is the result of an open in circuits between the low beam headlight circuits and the ESC. Check for burned out bulbs.		
Left Headlight Connector (8001) Low Beam Voltage Checks		
Check with key in ignition position, headlight switch on, low beams selected and connector (8001) disconnected.		
NOTE – With sealed beam headlamps the terminals at the headlamps are not sealed - in this application the terminals of the headlamps and the terminals in the headlamp connector must be totally coated with Grafo grease 2643099R1		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Headlights in low beam. Left headlight (8001) terminal C to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts with headlight switch "on"	If voltage is missing, check for open or short in circuits U53A, U53, K53A or A53A. If no open or shorts are found check for voltage out of EGC.
Headlights in low beam. Left headlight (8001) terminal C to terminal B.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts with headlight switch "on"	If voltage is missing, check for open or short to high in circuits U11-GD, U11-GB, and K11-GB.

Table 246 ESC High Beam Outputs to Headlight Circuit Tests

FAULTS		
611 14 7 3	Headlight high beam lamps, less than normal low current but more than open circuit	
611 14 7 4	Headlight high beam lamps, greater than normal high current and less than fusing current	
611 14 7 6	Headlight high beam lamps has current flow when output commanded off	
611 14 7 2	High beam over current This fault may be the result of a short in the circuits between the high beam headlight circuits and the ESC. It could also be caused by an excessive load on the circuit.	
611 14 7 1	High beam under current This fault is the result of an open in circuits between the high beam headlight circuits and the ESC. Check for burned out bulbs.	
Right Headlight Connector (8000) Voltage Checks		
Check with key in ignition position, headlight switch on, high beams selected and connector (8000) disconnected.		
NOTE – With sealed beam headlamps the terminals at the headlamps are not sealed - in this application the terminals of the headlamps and the terminals in the headlamp connector must be totally coated with Grafo grease 2643099R1.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Headlights in low beam. Right headlight (8000) terminal C to ground.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts with headlight switch "on"	If voltage is missing, check for open or short in circuits U53B, U53, K53A and A53A. If no open or shorts are found check for voltage out of EGC.
Headlights in low beam. (8000) terminal C to terminal B.	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts with headlight switch "on"	If voltage is missing, check for open or short to high in circuits U11GA, U11-GB and K11-GB.

Extended Description

Refer to Circuits From ESC to Headlights.

When low beams are requested, the EGC will send a signal on the 1939 data link and the headlight enable circuit to the ESC. The ESC will supply 12 volts to system controller connector (1603) terminal D, circuit A53A, pass thru at dash (4013) terminal E, circuit K53A, hood/engine (8003) terminal E, and circuit U53. From

there the circuit is split on U53A to left headlight connector (8001) terminal C and U53B to right headlight connector (8000) terminal C.

When high beams are requested, the EGC will send a signal on the 1939 data link. The ESC will supply 12 volts to system controller front connector (1603) terminal G, circuit A52A, pass thru at dash (4013) terminal D, circuit K52A, hood/engine connector terminal F, and circuit U52. From there the circuit is split on U52C to left headlight connector (8001) terminal A and U52D to right headlight connector (8000) terminal A.

Ground for the headlights is supplied from the dash ground stud (4037) on circuits K11-GB, hood/engine connector (8003) terminal A and circuit U11-GB. From there the circuit is split on U11-GD to left headlight connector (8001) terminal B and U11-GA to right headlight connector (8000) terminal B.

5.5. COMPONENT LOCATIONS

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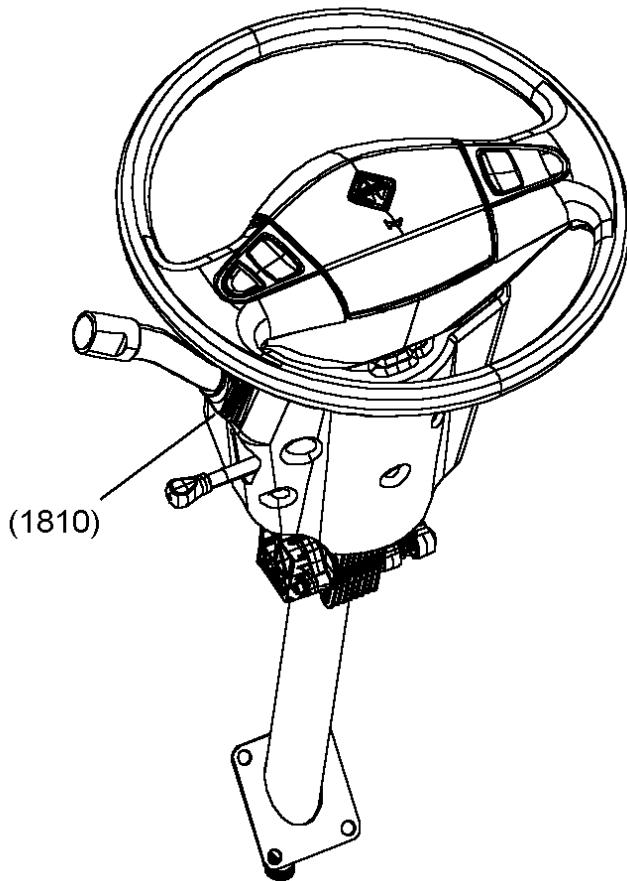


Figure 410 Turn Signal Assembly

(1810) TURN SIGNAL ASSEMBLY CONNECTOR (BEHIND STEERING COLUMN SHROUD)

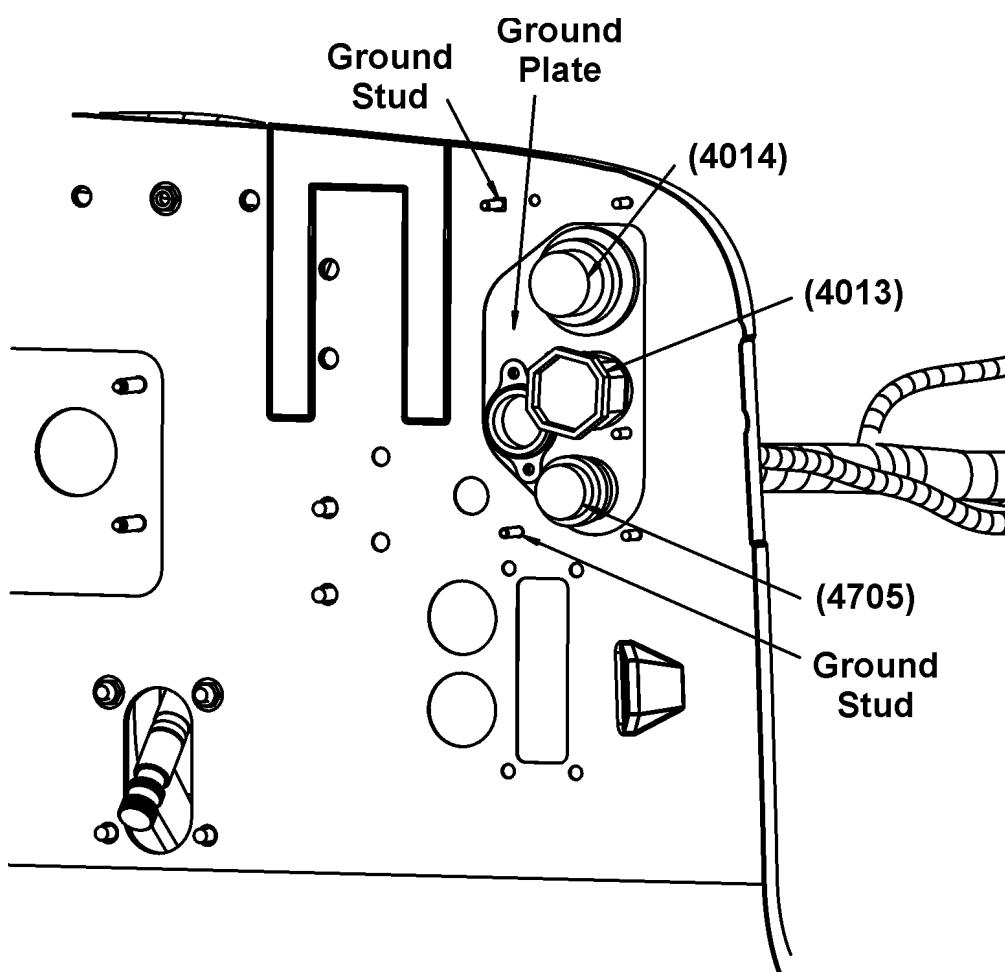


Figure 411 Pass Thru Connector Locations

(4013) PASS THRU AT DASH

(4014) DASH/ENGINE PASS THRU

(4705) PASS THRU AT DASH

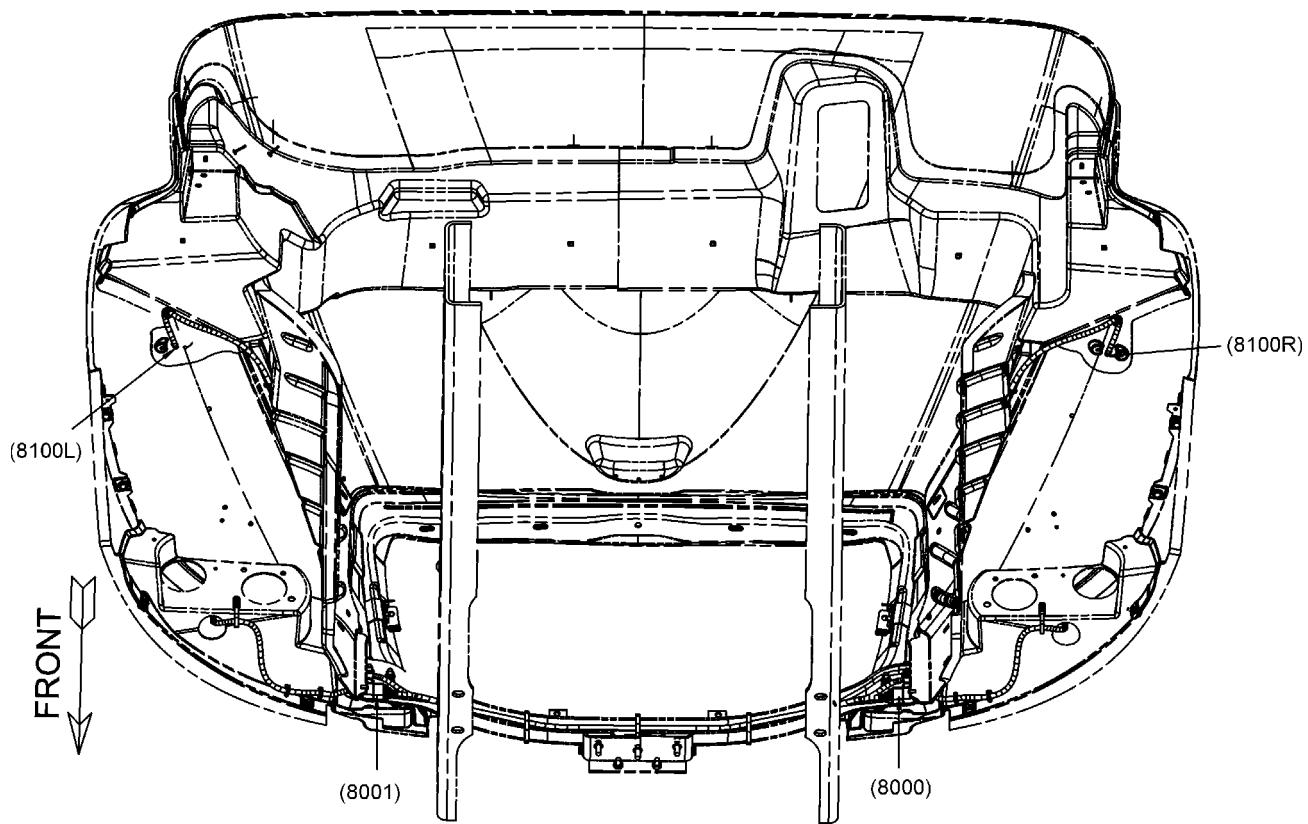


Figure 412 Headlight Wiring

- (8000) RIGHT HEADLIGHT CONNECTOR
- (8001) LEFT HEADLIGHT CONNECTOR
- (8100L) LEFT FENDER MOUNT TURN SIGNAL
- (8100R) RIGHT FENDER MOUNT TURN SIGNAL

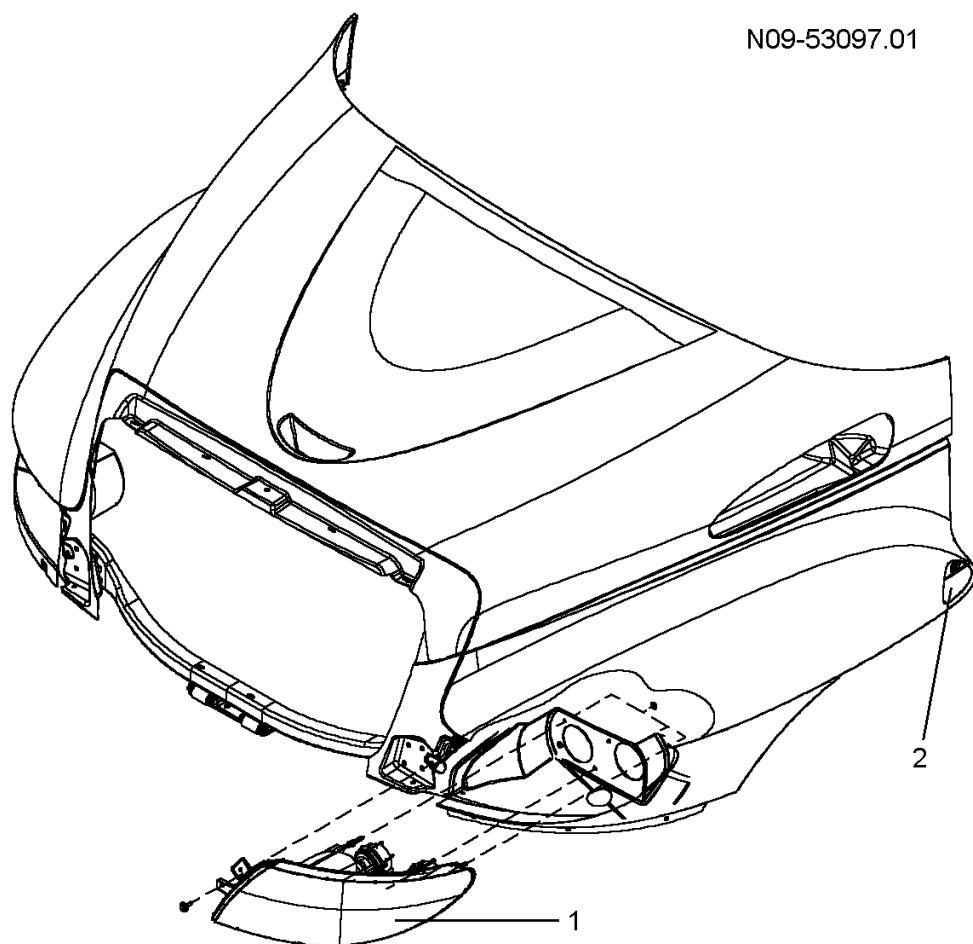


Figure 413 Headlights, Front and Side Marker Lights

1. HEADLIGHT ASSEMBLY
2. SIDE MARKER LIGHT

6. PANEL LIGHTS

6.1. CIRCUIT FUNCTIONS

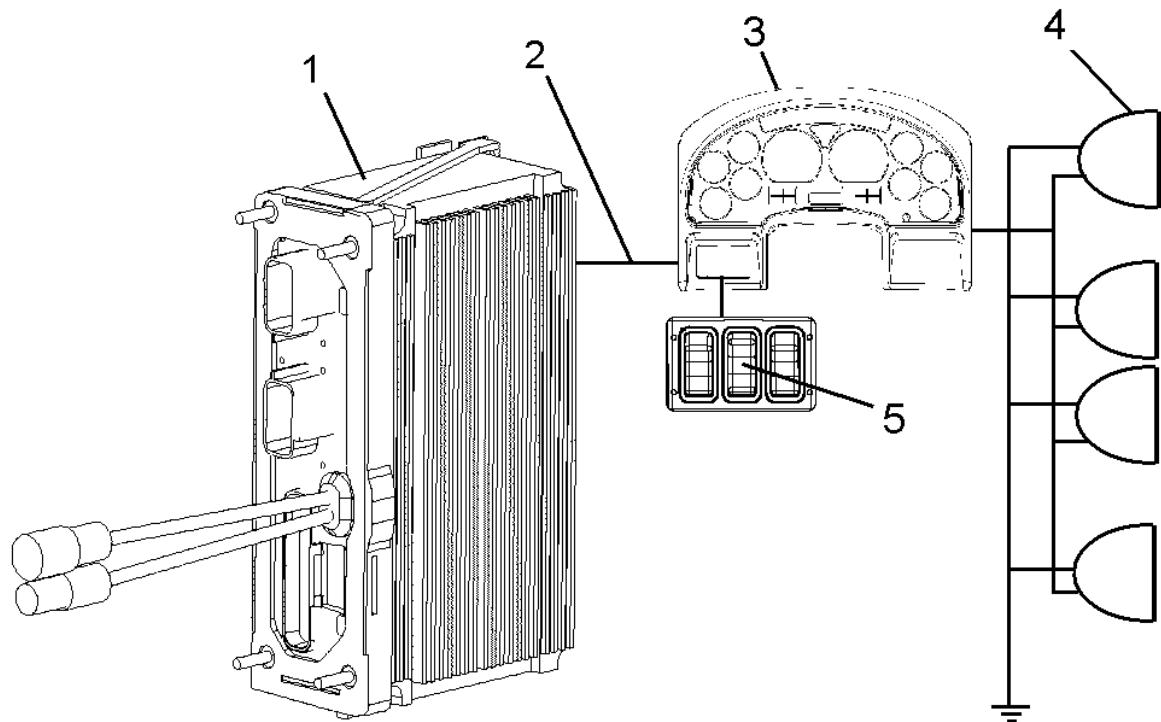


Figure 414 Panel Lights Function Diagram

1. ELECTRICAL SYSTEM CONTROLLER (ESC)
2. DRIVETRAIN 1939 DATA LINK BETWEEN ELECTRONIC GAUGE CLUSTER (EGC)
AND ESC
3. EGC
4. DIMMER CIRCUITS CONTROLLED BY PANEL LIGHT SWITCH
5. DIMMER SWITCH MOUNTED IN 3 SWITCH PACK MOUNTED IN EGC

Refer to Panel Lights Function Diagram

Panel lights are low wattage bulbs that illuminate gauges and other miscellaneous items. The panel light switch provides input to the EGC which generates the voltage to dim/brighten the panel lights for the gauge clusters, speedometer/tachometer module, heater control, etc.

6.2. DIAGNOSTICS

If the panel lights do not respond to the dimmer switch the problem could be attributed to a faulty panel light dimmer switch, a problem in the EGC, open circuits or shorted circuits.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the lights and monitor activation of the turn/hazard signal switches and stop light switch(es). See the diagnostic software manual for details on using the software.

Panel Light Preliminary Check

Table 247 Panel Light Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify panel lights are operating incorrectly.	Visually check panel lights.	Panel light is inoperative.	Go to next step.	Panel lights are operating correctly. Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to operate incorrectly.
3.	On	Are all panel lights operating incorrectly?	Visually check if all panel lights are operating incorrectly.	All panel lights are operating incorrectly.	Go to next step.	Check specific circuits of the inoperative lights for open circuits.
4.	On	Are panel lights illuminating when park lights are turned on?	Visually check if panel lights illuminate.	Panel lights illuminate.	Go to next step.	Go to panel light circuit outputs from EGC. (See PANEL LIGHT OUTPUT FROM EGC, page 833)
5.	On	Do panel lights respond correctly to activation of the panel dimmer switch?	Visually check if panel lights respond to panel dimmer switch.	Panel lights respond correctly.	Panel lights are working correctly.	Go to panel light circuit outputs from EGC. (See PANEL LIGHT SWITCH INPUTS TO EGC, page 829).

Diagnostic Trouble Codes

Table 248 Panel Light Circuits

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
There are no faults for panel light circuits	

6.3. PANEL LIGHT SWITCH INPUTS TO EGC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Panel Light EGC and ESC Input Circuits.

A problem in the panel light switch circuits will be apparent when the panel lights are always on and the switch has no effect on the intensity of the panel lights. There are no diagnostic trouble codes associated with the switch circuits in the EGC. Loss of the drivetrain 1939 data link between the EGC and ESC will cause several problems to occur simultaneously and the check electrical system lamp will illuminate. **Go to the section on the drivetrain 1939 data link to troubleshoot this condition.** Problems in the Panel light circuits in the EGC can be caused by a short circuit between the 3 switch pack and the EGC, an open circuit between the 3 switch pack and the EGC, a faulty switch, or a problem in the EGC.

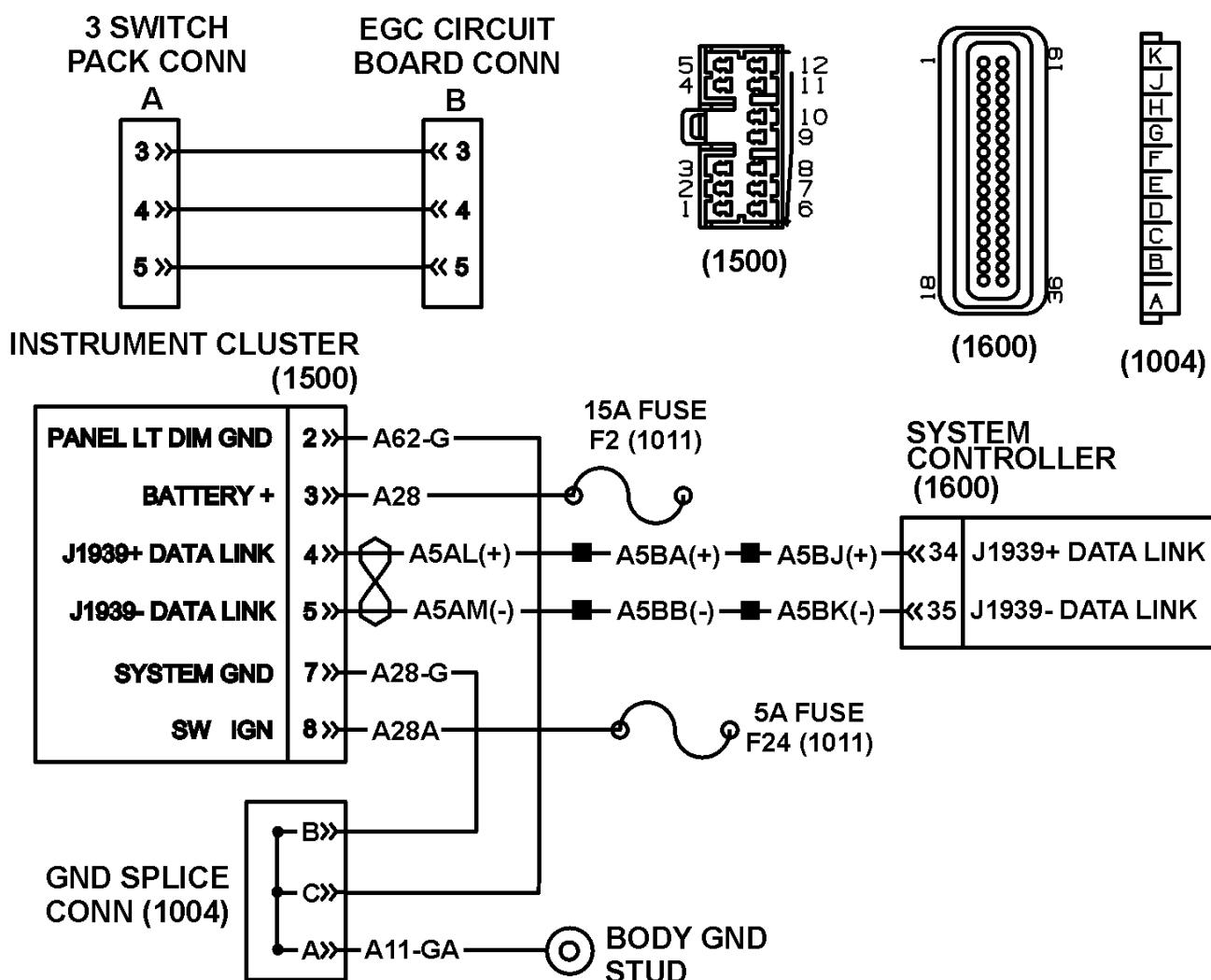


Figure 415 Panel Light EGC Input Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

- 3 SWITCH PACK CONNECTOR
- EGC CIRCUIT BOARD CONNECTOR
(1004) GROUND SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1500) EGC CONNECTOR
LOCATED BEHIND CLUSTER
- (1600) ELECTRICAL SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

Table 249 EGC, 3 Switch Pack Circuit Tests

Diagnostic Trouble Codes
There are no diagnostic trouble codes associated with the 3 switch pack in the EGC.

Table 249 EGC, 3 Switch Pack Circuit Tests (cont.)

<p>A mechanically faulty panel light switch could also prevent the panel light from operating. Remove the mechanical portion of the switch and attempt to turn the switch on by pressing the microswitches. If the panel lights respond, the mechanical switch assembly should be replaced.</p>		
3 Switch Pack Harness Connector Panel Light Voltage Checks		
<p>Check with ignition key on and 3 switch pack disconnected.</p>		
<p>NOTE – If the EGC and switch are working correctly, disconnecting the 3 switch pack connector should cause the panel lights to come on.</p>		
<p>NOTE – Always check connectors for damage and pushed-out terminals.</p>		
Test Points	Spec.	Comments
3 switch pack harness connector, cavity 3 to ground	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuits between EGC connector and switch connector. Also insure proper voltage out of EGC.
3 switch pack harness connector, cavity 4 to ground.	<1 volt	Dimmer down circuit between switch and EGC. If voltage is incorrect, check for shorts in circuits between EGC and switch. Also insure proper voltage out of EGC.
3 switch pack harness connector, cavity 5 to ground	<1 volt	Dimmer up circuit between switch and EGC. If voltage is incorrect, check for shorts in circuits between EGC and switch. Also insure proper voltage out of EGC.
3 Switch Pack Panel Light Resistance Check		
<p>NOTE – Always check connectors for damage and pushed-out terminals.</p>		
Test Points	Spec.	Comments
Check resistance between pins 3 and 4 of the switch pack, when the dimmer down switch is pressed.	<1 ohm.	If there is no continuity, the switch pack needs replaced.
Check resistance between pins 3 and 5 of the switch pack, when the dimmer up switch is pressed.	<1 ohm.	If there is no continuity, the switch pack needs replaced.

Table 249 EGC, 3 Switch Pack Circuit Tests (cont.)

Instrument Cluster (1500) Voltage Checks		
Check with ignition key on, 3 switch pack connected and instrument cluster (1500) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Instrument cluster connector (1500) cavity 8 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F24. Also check for open or short in circuit A28A.
Instrument cluster connector (1500) cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F2. Also check for open or short in circuit A28.
Instrument cluster connector (1500) cavity 3 to cavity 2.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits A62-G and A11-GA.
Instrument cluster connector (1500) cavity 3 to cavity 7.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits A28-G and A11-GA. If voltages check good and panel lights still fail, replace instrument cluster.

Extended Description

Refer to Panel Light EGC and ESC Input Circuits.

The panel light switch is wired directly to the EGC circuit board. When the panel light dimmer switch is pressed down, 12 volts from pin 3 from the EGC will be connected to pin 4. This will cause the EGC to lower the panel light voltage. When the panel light dimmer switch is pressed up, 12 volts from pin 3 from the EGC will be connected to pin 5. This will cause the EGC to raise the panel light voltage.

6.4. PANEL LIGHT OUTPUT FROM EGC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Typical Panel Light Outputs

Refer to Panel Light Outputs from EGC.

A fault in the circuits between the EGC and the panel lights will be apparent when the lights do not operate correctly. There are no diagnostic trouble codes associated with the panel lights. Problems in the circuits between the EGC and the panel lights throughout the vehicle may be caused by burned out lamps, a short, an open, a blown fuse or a problem in the EGC.

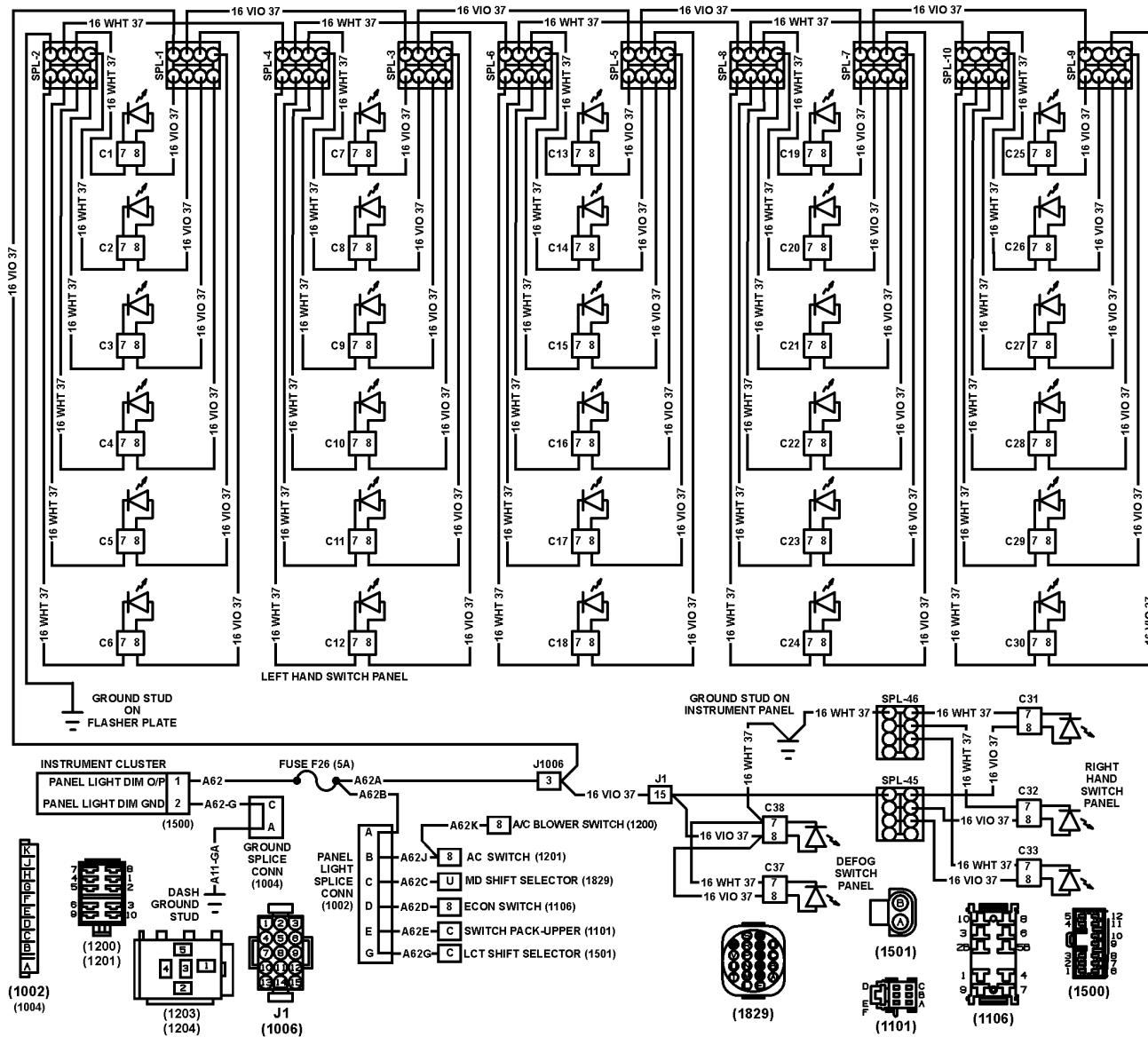


Figure 416 Panel Light Outputs from EGC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1002) PANEL LIGHT SPLICE CONNECTOR
LOCATED LEFT SIDE INSTRUMENT PANEL
(1004) GROUND SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1006) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1011) CAB FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1101) SWITCH PACK, UPPER ADDRESS
LOCATED AT INSTRUMENT WING PANEL
(1106) ECON SWITCH
LOCATED AT INSTRUMENT CLUSTER
(1200) A/C SWITCH
LOCATED AT INSTRUMENT PANEL
(1201) A/C BLOWER SWITCH
LOCATED AT INSTRUMENT PANEL
(1500) INSTRUMENT CLUSTER
LOCATED AT BACK SIDE INSTRUMENT CLUSTER
(1501) SHIFT CONTROL CONNECTION
LOCATED AT INSTRUMENT WING PANEL
(1829) MD TRANSMISSION PRIMARY SHIFT SELECTOR
LOCATED AT INSTRUMENT WING PANEL
J1 FLASHER PLATE TO DASH
SPL-1 SPL-3 SPL-5 SPL-7 SPL-9 SWITCH ILLUMINATION GROUND SPLICE
SPL-2 SPL-4 SPL-6 SPL-8 SPL-10 SWITCH ILLUMINATION FEED SPLICE
SPL-45 SWITCH ILLUMINATION FEED (RIGHT HAND SWITCH PANEL) SPLICE
SPL-46 SWITCH ILLUMINATION GROUND (RIGHT HAND SWITCH PANEL) SPLICE

Table 250 Panel Light Circuit Tests

Diagnostic Trouble Codes				
No Diagnostic Trouble Codes	There are no diagnostic trouble codes for panel light circuits.			
Panel Light Buss Bar (1002) Voltage Checks				
Check with ignition key on, park lights on and buss bar cover removed.				
NOTE – If the fuse is blown check for shorts on circuit A62 and other circuits connected to the buss bar. Repair the short and replace the fuse.				
Press and hold the dimmer up button for 15 seconds to insure panel lights are at full intensity.				
NOTE – Always check connectors for damage and pushed-out terminals.				
Test Points	Spec.	Comments		
Panel Light Buss Bar (1002) cavity A to ground.	12 ± 1.5 volts	If voltage is missing, check for open in circuits A62 and A62B. Insure fuse F26 is not blown.		

Panel Light Outputs w/Separate Dimmer Switch

Refer to Panel Light Outputs from EGC w/Separate Dimmer Switch.

A fault in the circuits between the EGC and the panel lights will be apparent when the lights do not operate correctly. There are no diagnostic trouble codes associated with the panel lights. Problems in the circuits between the EGC and the panel lights throughout the vehicle may be caused by burned out lamps, a short, an open, a blown fuse or a problem in the EGC.

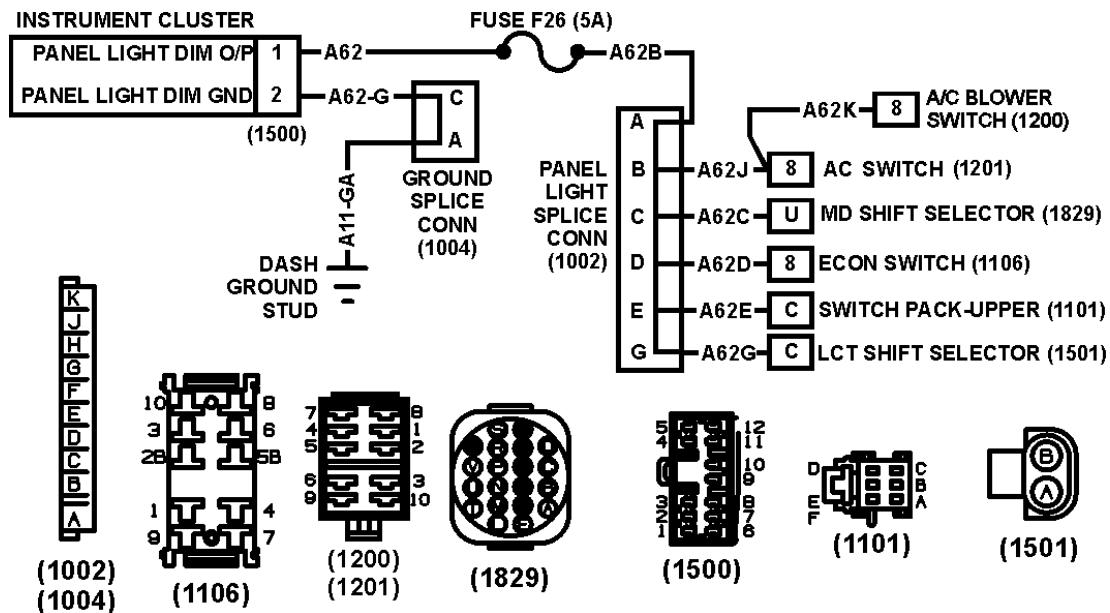


Figure 417 Panel Light Outputs from EGC for Dash Board Lights— Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1002) PANEL LIGHT SPLICE CONNECTOR
LOCATED LEFT SIDE INSTRUMENT PANEL
- (1004) GROUND SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1101) SWITCH PACK, UPPER ADDRESS
LOCATED AT INSTRUMENT WING PANEL
- (1106) ECON SWITCH
LOCATED AT INSTRUMENT CLUSTER
- (1200) A/C SWITCH
LOCATED AT INSTRUMENT PANEL
- (1201) A/C BLOWER SWITCH
LOCATED AT INSTRUMENT PANEL
- (1500) INSTRUMENT CLUSTER
LOCATED AT BACK SIDE INSTRUMENT CLUSTER
- (1501) SHIFT CONTROL CONNECTION
LOCATED AT INSTRUMENT WING PANEL
- (1829) MD TRANSMISSION PRIMARY SHIFT SELECTOR
LOCATED AT INSTRUMENT WING PANEL

Table 251 Panel Light Circuit Tests

Diagnostic Trouble Codes		
No Diagnostic Trouble Codes	There are no diagnostic trouble codes for panel light circuits.	
Panel Light Buss Bar (1002) Voltage Checks		
Check with ignition key on, park lights on and buss bar cover removed.		
NOTE – If the fuse is blown check for shorts on circuit A62 and other circuits connected to the buss bar. Repair the short and replace the fuse.		
Press and hold the dimmer up button for 15 seconds to insure panel lights are at full intensity.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Panel Light Buss Bar (1002) cavity A to ground.	12 ± 1.5 volts	If voltage is missing, check for open in circuits A62 and A62B. Insure fuse F26 is not blown.

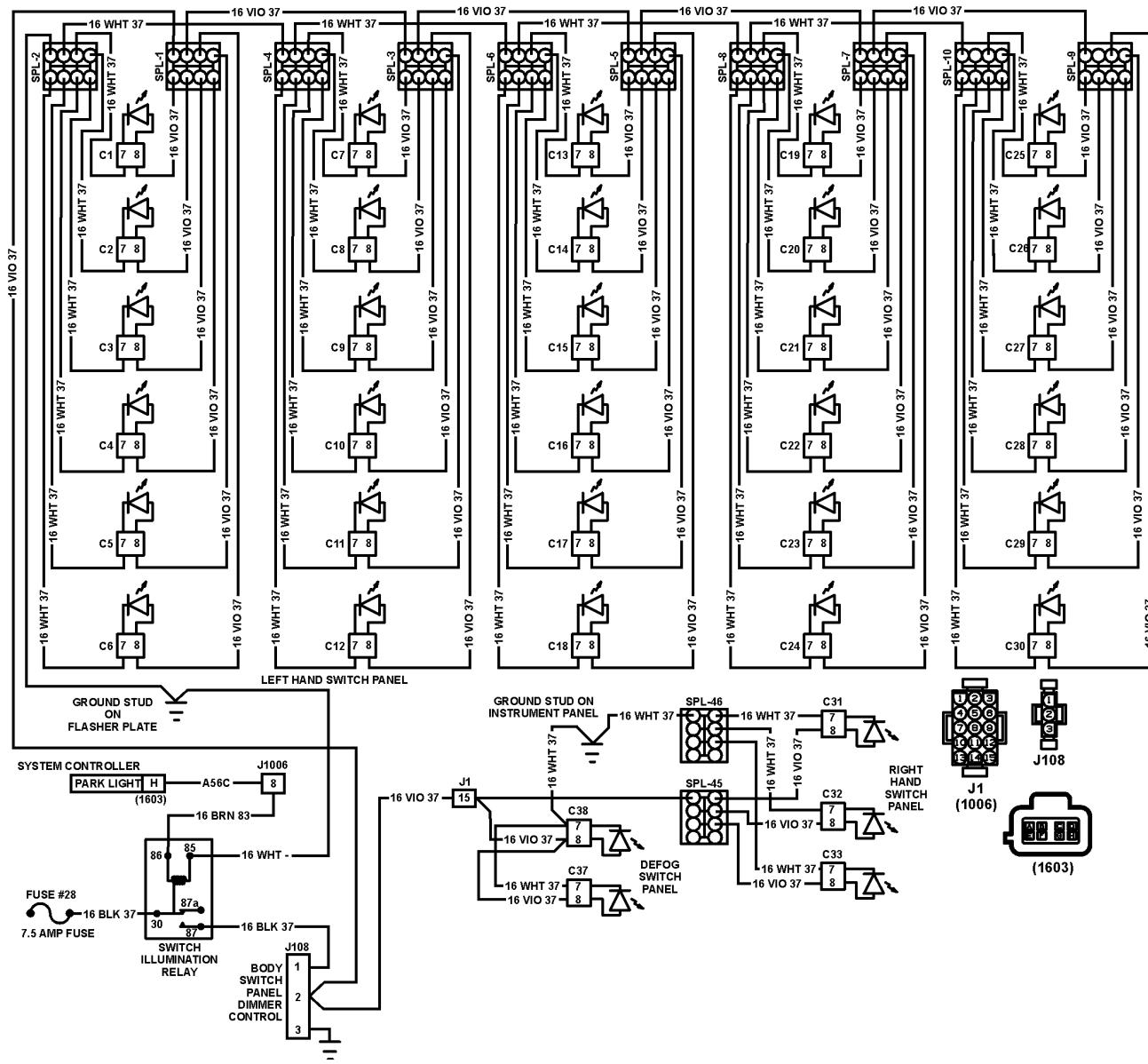


Figure 418 Panel Light Outputs from Left Hand and Right Hand Switch Panels — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1603) SYSTEM CONTROLLER

LOCATED AT INSIDE RIGHT SIDE DASH PANEL

J1 FLASHER PLATE TO DASH

J108 FLASHER PLATE TO ELECTRONIC DIMMER SWITCH

SPL-1 SPL-3 SPL-5 SPL-7 SPL-9 SWITCH ILLUMINATION GROUND SPLICER

SPL-2 SPL-4 SPL-6 SPL-8 SPL-10 SWITCH ILLUMINATION FEED SPLICE

SPL-45 SWITCH ILLUMINATION FEED (RIGHT HAND SWITCH PANEL) SPLICE

SPL-46 SWITCH ILLUMINATION GROUND (RIGHT HAND SWITCH PANEL) SPLICE

Table 252 Panel Light Circuit Tests

Switch Illumination Relay Voltage Checks		
<p>Check with ignition key on, park lights on and switch illumination relay removed.</p> <p>Press and hold the dimmer up button for 15 seconds to insure panel lights are at full intensity.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Bench test relay. If relay fails bench test, replace and check for faults.</p>		
Test Points	Spec.	Comments
Switch illumination relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #28. Also check for open or short in circuit 16 BLK 37.
Switch illumination relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLK 37.
Switch illumination relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 83 and A56C. Also ensure proper voltage from system controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
Switch illumination relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT —.
Switch Panel Dimmer Control (J108) Voltage Checks		
Check with ignition key on, park lights on and switch panel dimmer control connector disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Switch panel dimmer control connector (J108) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLK 37.
Switch panel dimmer control connector (J108) cavity 1 to 3.	12 ± 1.5 volts	If voltage is missing, check for open or short in switch panel dimmer control switch ground circuit.
Switch panel dimmer control connector (J108) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short circuit 16 VIO 37 to panel light feed splices.

Extended Description

Refer to Panel Light Outputs from EGC.

A variable voltage, controlled by the panel dimmer switch but generated in the EGC, is supplied at gauge cluster connector (1500) terminal 1 and circuit A62 through fuse F26. Voltage from the fuse is applied to circuit A62N to panel light adapter (1002). The panel light adapter is the source of panel light voltage for any other features with panel lights.

6.5. COMPONENT LOCATIONS

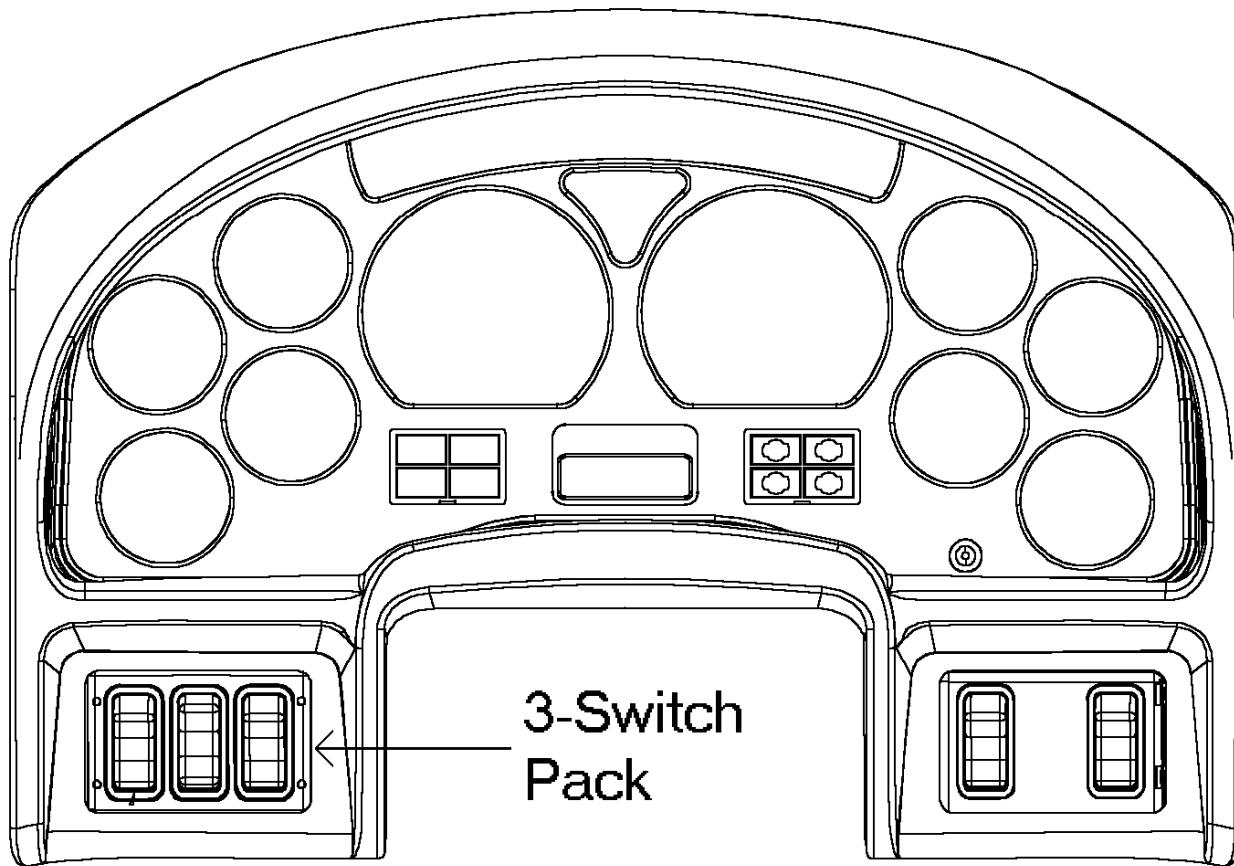


Figure 419 Instrument Cluster

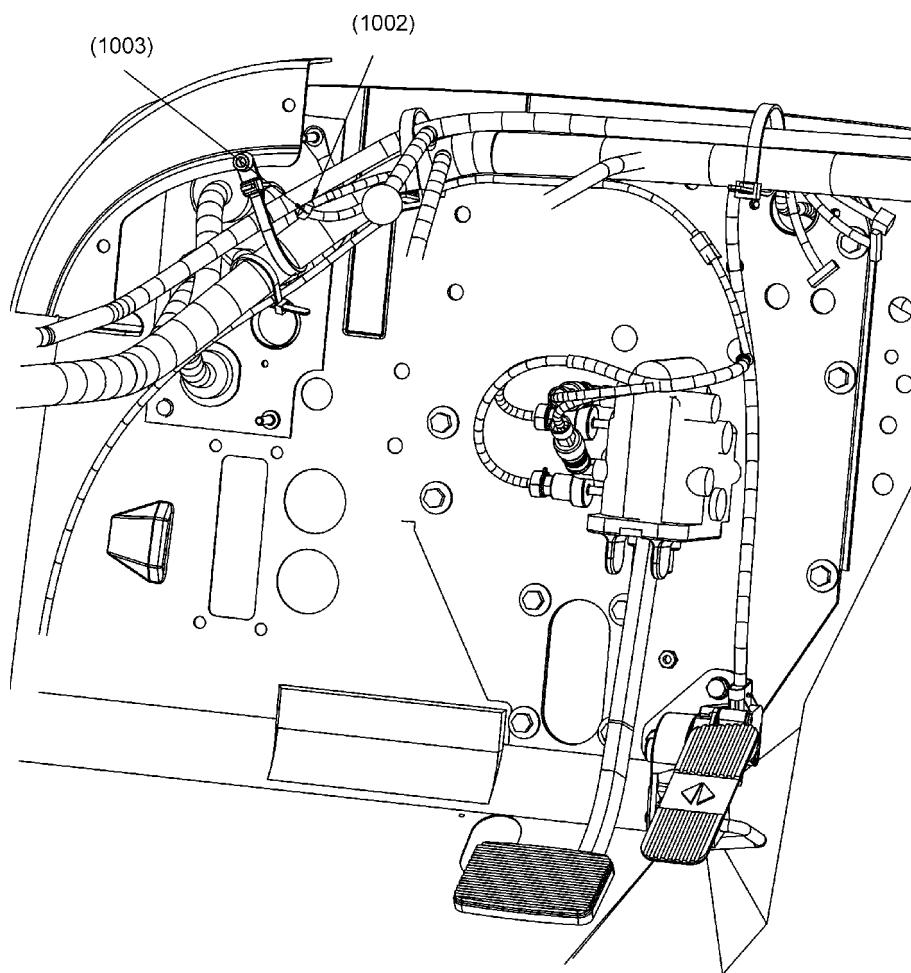


Figure 420 Panel Dimmer Wiring

(1002) PANEL LIGHT SPLICE CONNECTION
(1003) GROUND SPLICE CONNECTION

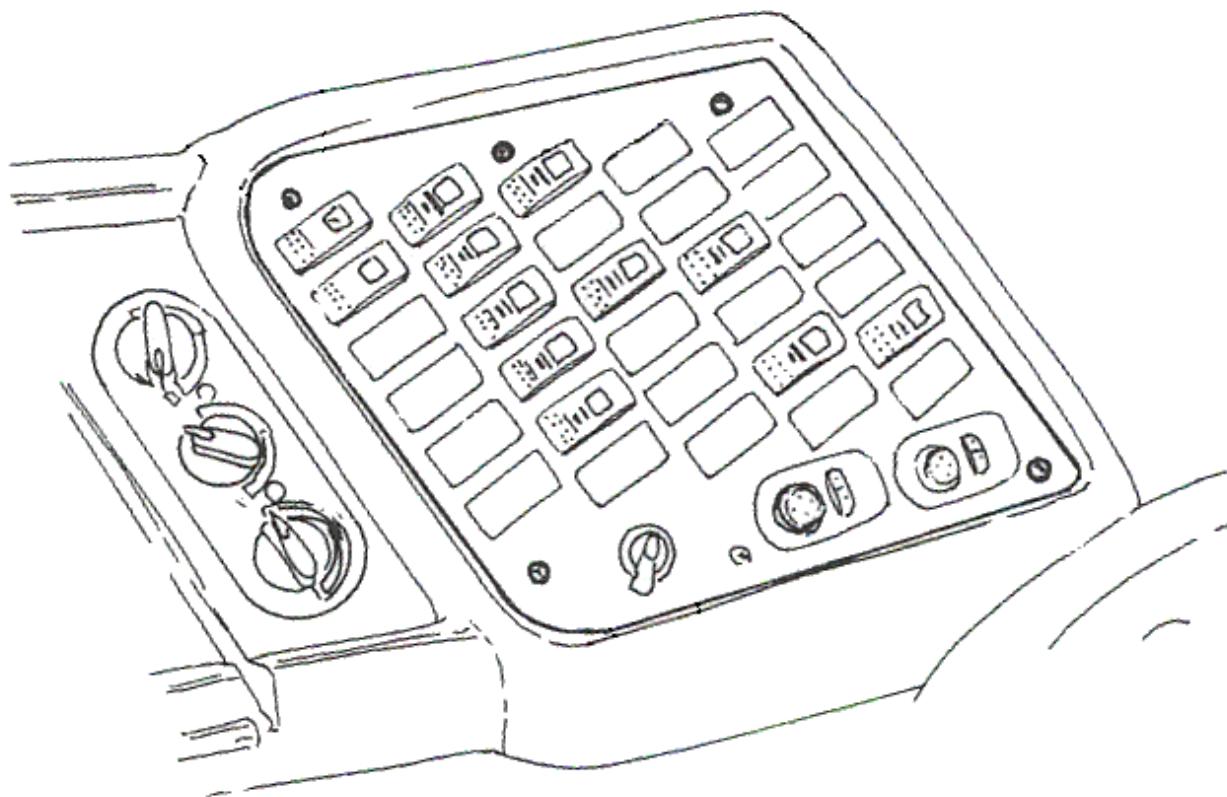


Figure 421 Left Hand Switch Panel

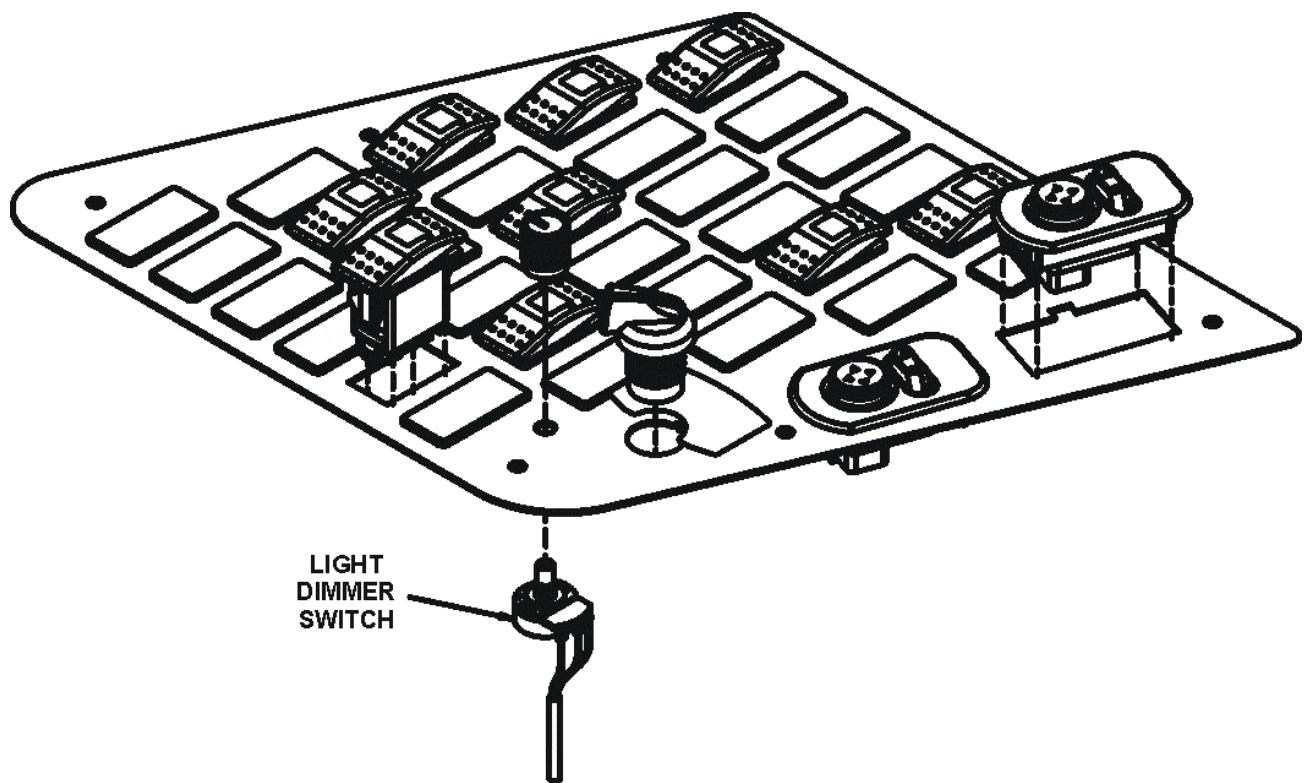


Figure 422 Left Hand Switch Panel Cutaway View

7. STOP/TURN SIGNAL/HAZARD LIGHT

7.1. CIRCUIT FUNCTIONS

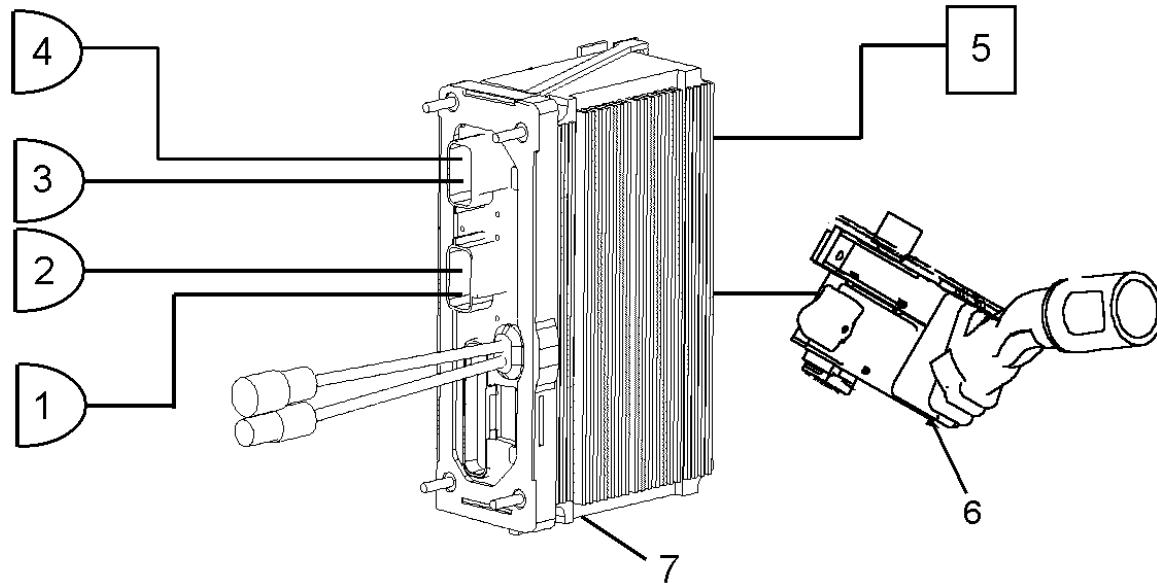


Figure 423 Stop/Turn Signal/Hazard Light Function Diagram

1. RIGHT FRONT TURN SIGNAL LIGHT
2. LEFT FRONT TURN SIGNAL LIGHT
3. LEFT REAR TURN SIGNAL LIGHT
4. RIGHT REAR TURN SIGNAL LIGHT
5. STOP LIGHT SWITCH, HYDRAULIC BRAKES OR BRAKE SWITCH, AIR BRAKES
6. TURN SIGNAL SWITCH
7. ELECTRICAL SYSTEM CONTROLLER

Refer to the Stop/Turn Signal/Hazard Light Function Diagram.

The ESC controls the turn and stop lights based on inputs from the turn signal switches and brake switch.

A combination turn/stop lamp system is standard on this vehicle. The turn signal overrides the stop lights on the rear.

The turn signal and hazard lights are selected with the turn signal lever and hazard switch on the steering column.

On vehicles with hydraulic brakes the stop light signal to the ESC comes from a switch activated by the brake pedal.

On vehicles with air brakes the stop light signal to the ESC comes from switches, connected to the air brake lines, activated by brake air pressure. The switches are located near the steering column.

The ESC has separate outputs supplying current for each front turn lamp and each rear turn/brake lamp. Additional turn lamps, which only illuminate when turn signals are selected, should be connected to the

front turn signal circuits. Additional lamps required to illuminate with turn signals and brake lights should be connected to the rear turn signal circuits. The flashing of the turn signals and hazard lights is controlled by the ESC.

When the hazard lights are activated the turn signal will not affect operation of the lights. Normally, the brake switches will override the hazards. The ESC can be programmed to allow the hazard lights to override the rear brake lights.

7.2. DIAGNOSTICS

Should the lights fail to operate correctly the problem could be attributed to faulty input wiring between the ESC and turn signal/stop light switches, faulty switches or faulty output wiring between the ESC and the turn signal lamps. The ESC has an internal virtual fuse software algorithm to protect output circuits in an over current situation.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A diagnostic trouble code will be logged when there is an over current (short to ground or excessive load) or open circuit on any of the four light output circuits.

A diagnostic trouble code will be logged if there is an open or short in the brake switch or brake switch circuits.

The lower current limits, which determine when a DTC is set, are programmable. LED stop/turn lamps use far less current than incandescent lamps. If the truck configuration is changed it may be necessary to reprogram the lower current limit in the ESC before LED lamps will operate.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the lights and monitor activation of the turn/hazard signal switches and stop light switch(es). See the diagnostic software manual for details on using the software.

Turn/Hazard Signal And Stop Light Preliminary Check

Table 253 Turn/Hazard Signal And Stop Light

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify turn/hazard signal and stop lights are inoperative.	Visually check turn/hazard signal and stop light.	Turn/hazard signal and stop lights operate incorrectly.	Go to next step.	Turn/hazard signal and stop lights are operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.

Table 253 Turn/Hazard Signal And Stop Light (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
3.	On	If more than one turn/hazard signal and stop light is connected to a circuit, are all lights inoperative?	Visually check if all turn/hazard signal and stop lights are inoperative.	All turn/hazard signal and stop lights are inoperative.	Go to next step.	Check specific circuits of the inoperative light for open circuits.
4.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes, page 846)	Read display on odometer.	No turn/hazard signal and stop light diagnostic trouble codes are active. (See TURN SIGNAL/HAZARD SWITCH INPUTS TO ESC, page 849)	Go to next step.	Follow directions in the turn/hazard signal and stop light diagnostic trouble code table. (See Table 254, page 846)

Diagnostic Trouble Codes

To display diagnostic trouble codes (DTC's), set the parking brake and turn the Ignition key "ON". Then press the Cruise "ON" switch and the Cruise "Resume" switch simultaneously. If no faults are present, the cluster odometer will display "NO FAULTS". If faults are present, the gauge cluster display will show the number of faults and each diagnostic trouble code for 10 seconds and then automatically scroll to the next entry and continue to cycle through the faults. To manually cycle through the fault list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in "A" for active faults or "P" for previously active faults. Releasing the parking brake or turning the ignition key off will take the ESC and the gauge cluster out of the diagnostic mode.

After all repairs have been made, the diagnostic trouble codes may be cleared by putting the key switch in the accessory position, turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 254 Turn/Hazard Signal And Stop Light

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
NO DIAGNOSTIC TROUBLE CODE	Diagnostic trouble codes are not logged for every possible fault in the turn signal/hazard circuits.
When all left or all right signals are inoperative, and no faults are present, the turn/hazard signal switches, their circuits to the ESC, or the ESC are most likely at fault.	
If hazard flashers do not work, but the turn signals do, the turn signal/hazard switch is faulty.	
If hazard flashers do work, but the turn signals do not, the turn signal/hazard switch is faulty.	

Table 254 Turn/Hazard Signal And Stop Light (cont.)

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
	If hazard flashers and turn signals do not work, the problem is most likely in the circuits between the switch and the ESC.
	Inspect turn/hazard signal switches (See TURN SIGNAL/HAZARD SWITCH INPUTS TO ESC, page 849) for proper operation
	When more than one bulb is connected to an ESC output circuit, the ESC will not sense that an individual bulb or the circuits to that specific bulb are open. Example: There are two bulbs on the forward turn circuit. One burned out bulb will not set a fault. If the two bulbs are the only ones on the circuit and they both burn out, an open circuit fault will be set.
	When an individual light will not illuminate, check for an open circuit to the specific light.
597 14 1 0	Brake switch stuck in the open or closed position
597 14 2 0	Brake switch inputs do not match
	Sets when the vehicle has decelerated to a stop, without brake switch activation.
	The brake switch is stuck closed, is not making contact with brake pedal or being activated by air pressure, or the switch contacts are faulty.
	Inspect hydraulic brake switch (See HYDRAULIC BRAKE SWITCH INPUTS TO ESC, page 853) or air brake switch(See AIR BRAKE SWITCH INPUTS TO ESC, page 855) for proper operation
611 14 16 1	Right front turn lamp open circuit
	This fault is the result of an open in the circuits between the right front lamps and the ESC.
	Check for burned out bulbs.
	Inspect right front circuits(See FRONT TURN SIGNAL/HAZARD AND SEPARATE TURN SIGNAL LIGHT OUTPUTS FROM ESC, page 859) for proper operation
611 14 16 2	Right front turn lamp over current
	This fault may be the result of a short in the circuits between the left front lamps and the ESC. It could also be caused by an excessive load (too many accessories) on the circuit.
	Inspect right front circuits (See FRONT TURN SIGNAL/HAZARD AND SEPARATE TURN SIGNAL LIGHT OUTPUTS FROM ESC, page 859) for proper operation
611 14 16 3	Right front turn lamps, less than normal low current but more than open circuit
611 14 16 4	Right front turn lamps, greater than normal high current and less than fusing current
611 14 16 6	Right front turn lamps has current flow when output commanded off
611 14 15 1	Left front turn lamp open circuit

Table 254 Turn/Hazard Signal And Stop Light (cont.)

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
	<p>This fault is the result of an open in circuits between the left front lamps and the ESC.</p> <p>Check for burned out bulbs.</p> <p>Inspect left front circuits (See FRONT TURN SIGNAL/HAZARD AND SEPARATE TURN SIGNAL LIGHT OUTPUTS FROM ESC, page 859) for proper operation</p>
611 14 15 2	Left front turn lamp over current
	<p>This fault may be the result of a short in the circuits between the left front lamps and the ESC. It could also be caused by an excessive load (too many accessories) on the circuit.</p> <p>Inspect left front circuits (See FRONT TURN SIGNAL/HAZARD AND SEPARATE TURN SIGNAL LIGHT OUTPUTS FROM ESC, page 859) for proper operation</p>
611 14 15 3	Left front turn lamps, less than normal low current but more than open circuit
611 14 15 4	Left front turn lamps, greater than normal high current and less than fusing current
611 14 15 6	Left front turn lamps has current flow when output commanded off
611 14 14 1	Right rear turn lamp open circuit
	<p>This fault is the result of an open in the circuits between the right rear lamps and the ESC.</p> <p>Check for burned out bulbs.</p> <p>Inspect right rear circuits (See REAR STOP LIGHT OUTPUTS FROM ESC, page 864) for proper operation</p>
611 14 14 2	Right rear turn lamp over current
	<p>This fault may be the result of a short in the circuits between the right rear lamps and the ESC. It could also be caused by an excessive load (too many accessories) on the circuit.</p> <p>Inspect right rear circuits (See REAR STOP LIGHT OUTPUTS FROM ESC, page 864) for proper operation</p>
611 14 14 3	Right rear turn lamps, less than normal low current but more than open circuit
611 14 14 4	Right rear turn lamps, greater than normal high current and less than fusing current
611 14 14 6	Right rear turn lamps has current flow when output commanded off
611 14 13 1	Left rear turn lamp open circuit
	<p>This fault is the result of an open in the circuits between the left rear lamps and the ESC.</p> <p>Check for burned out bulbs.</p> <p>Inspect left rear circuits (See REAR STOP LIGHT OUTPUTS FROM ESC, page 864) for proper operation</p>
611 14 13 2	Left rear turn lamp over current

Table 254 Turn/Hazard Signal And Stop Light (cont.)

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
	This fault may be the result of a short in the circuits between the left rear lamps and the ESC. It could also be caused by an excessive load (too many accessories) on the circuit. Inspect left rear circuits (See REAR STOP LIGHT OUTPUTS FROM ESC, page 864) for proper operation
611 14 13 3	Left rear turn lamps, less than normal low current but more than open circuit
611 14 13 4	Left rear turn lamps, greater than normal high current and less than fusing current
611 14 13 6	Left rear turn lamps has current flow when output commanded off
612 14 1 1	Brake switch out of range low (Open Circuit) Brake switch not connected or open circuit in wiring between ESC and switch.
	Inspect hydraulic brake switch (See HYDRAULIC BRAKE SWITCH INPUTS TO ESC, page 853) or air brake switch (See AIR BRAKE SWITCH INPUTS TO ESC, page 855) for proper operation. Also check wiring harness
612 14 1 2	Brake switch out of range high (Short Circuit) Circuit between ESC and Brake switch has been shorted to positive voltage.
	Inspect hydraulic brake switch (See HYDRAULIC BRAKE SWITCH INPUTS TO ESC, page 853) or air brake switch (See AIR BRAKE SWITCH INPUTS TO ESC, page 855) for proper operation Also check wiring harness

7.3. TURN SIGNAL/HAZARD SWITCH INPUTS TO ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

There are no detectable faults associated with the turn signal/hazard switches or switch input circuits to the ESC.

Refer to Turn Signal/Hazard Light Inputs to ESC.

Problems in the switches or circuits will be apparent when all left, all right or all signals cannot be selected.

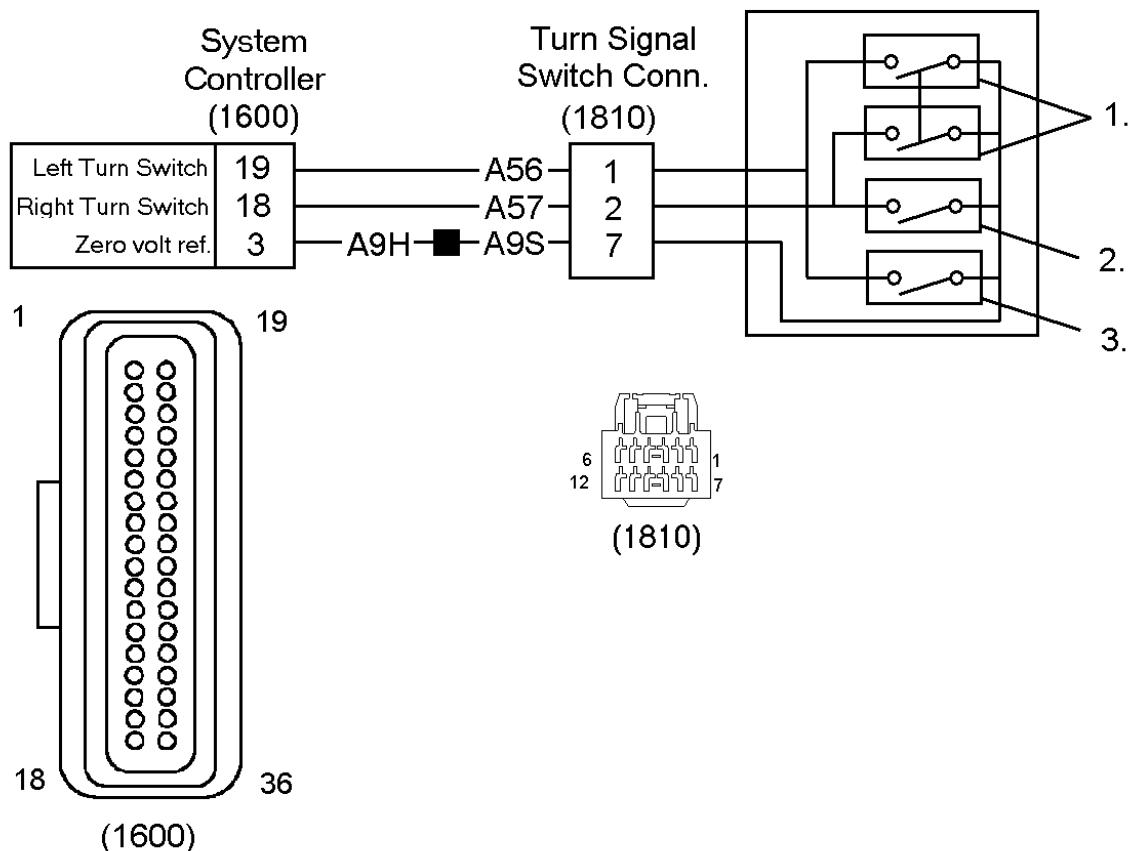


Figure 424 Turn Signal/Hazard Light Inputs to ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

1. TURN SIGNAL SWITCH – HAZARD CONTACTS
 2. RIGHT TURN SIGNAL CONTACTS
 3. LEFT TURN SIGNAL CONTACTS
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- (1810) TURN SIGNAL SWITCH
LOCATED AT STEERING COLUMN

Table 255 Turn Signal/Hazard Light Connector Check Chart

Diagnostic Trouble Codes		
No faults will be logged for problems with turn/hazard signal switch inputs to the ESC		
Turn/Hazard Signal Switch Harness Connector (1810) Voltage Checks		
Check with ignition key on and turn signal switch disconnected.		
NOTE – With the key off voltage to the switches will be approximately 5 volts.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Harness connector (1810), cavity 1 to ground	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A56. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Harness connector (1810), cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit A57. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Harness connector (1810), cavity 7 to ground	0 volts	Zero volt reference to switches. If voltage is incorrect check for shorts to other circuits or incorrect signal out of the ESC. NOTE – If this signal is not present at the switch connector, the wipers will also be inoperative. If this signal is incorrect from the ESC, several features will be inoperative.
Harness connector (1810), cavity 1 to cavity 7.	12 ± 1.5 volts	If voltage is incorrect, check for open in zero volt reference signal circuits A9S, or A9H or incorrect zero volt reference signal from the ESC.
Turn Signal Switch Resistance Checks		
(Check with switch disconnected)		
Turn signal switch, pin 2 to pin 7	With hazard switch and turn signal off, resistance should read >50K ohms.	Continuity through switch when hazard and turn lever is off, is the result of a failed switch.
Turn signal switch, pin 1 to pin 7	With hazard switch and turn signal off, resistance should read >50K ohms.	Continuity through switch when hazard and turn lever is off, is the result of a bad switch.

Table 255 Turn Signal/Hazard Light Connector Check Chart (cont.)

Turn signal switch, pin 2 to pin 7	With Hazard switch or turn signal on, resistance should read <2 ohms.	No continuity through switch when hazard or right turn lever is on, is the result of a failed switch.
Turn signal switch, pin 1 to pin 7	With Hazard switch or turn signal on, resistance should read < 2 ohms.	No continuity through switch when hazard or left turn lever is on, is the result of a bad switch.

Extended Description

Refer to Turn Signal/Hazard Light Inputs to ESC.

The zero volt reference signal is supplied to the turn signal switches on connector (1810) terminal 7 from the ESC connector (1600) terminal 3.

When the left turn signal is selected the zero volt reference signal is fed from turn signal switch (1810) terminal 1, to ESC connector (1600) terminal 19.

When the right turn signal is selected the zero volt reference signal is fed to ESC connector (1600) terminal 18 from turn signal switch (1810) terminal 2. This signals the ESC that the right turn signal has been requested.

When the hazard switch is selected, two additional contacts close to complete both turn signal inputs to the ESC. The zero volt reference signal will be sent to pins 18 and 19 of the ESC at the same time. This signals the ESC that the hazard lights have been requested.

7.4. HYDRAULIC BRAKE SWITCH INPUTS TO ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Hydraulic Brake Switch Inputs to ESC.

While the ignition is on, the ESC will continuously monitor the brake switch(es) and circuits for an open condition or a short to ground. The ESC will also log a diagnostic trouble code (DTC) if it determines the vehicle has decelerated to 0 mph (0 kmh) without brake activation or has accelerated to 35 mph (56 kph) while the switch is closed.

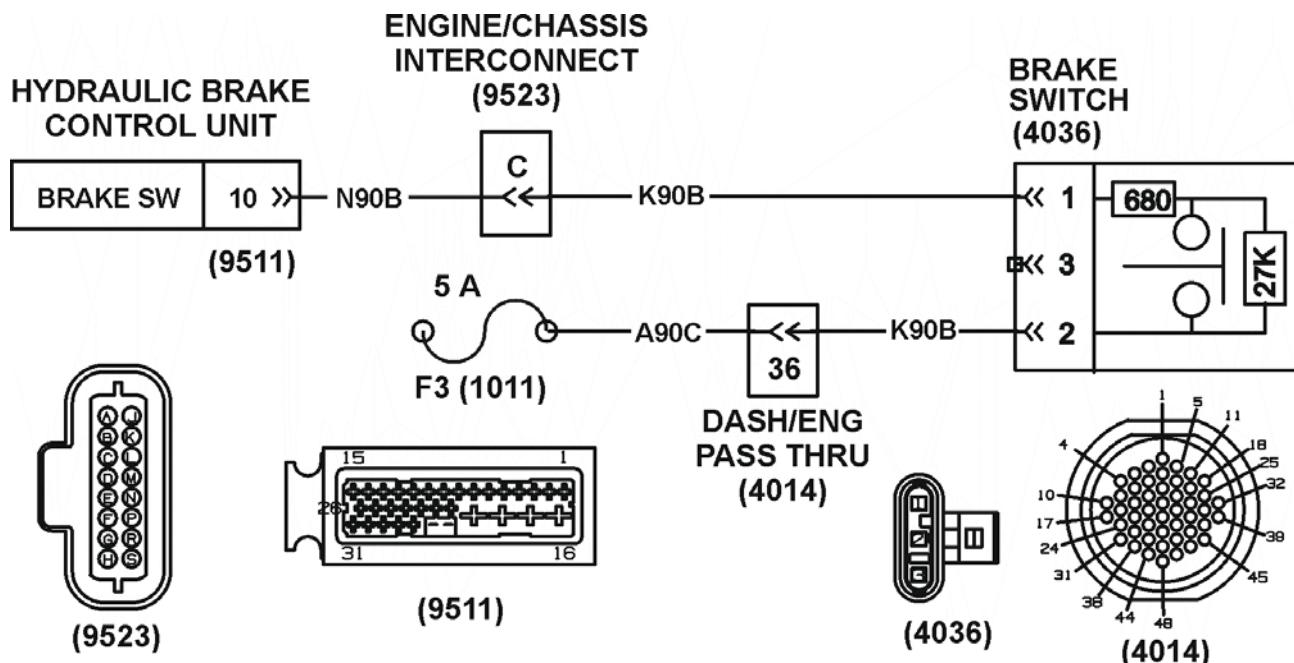


Figure 425 Hydraulic Brake Switch Inputs to ESC — Always Refer to the Circuit Diagram Book for Latest Circuit Information

- (1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (4014) DASH/ENGINE PASS THRU
LOCATED AT INSIDE LEFT SIDE DASH PANEL
- (4036) HYDRAULIC BRAKE SWITCH
LOCATED AT HYDRAULIC MASTER CYLINDER
- (9511) HYDRAULIC BRAKE CONTROL UNIT — HCU
LOCATED AT INSIDE LEFT FRAME RAIL AT HCU
- (9523) ENGINE/CHASSIS INTERCONNECT
LOCATED AT INSIDE LEFT FRAME RAIL BEHIND ENGINE

Table 256 Hydraulic Brake Stop/Turn Signal/Hazard Light Input Check Chart

Diagnostic Trouble Codes	
597 14 1 0	Brake Switch Stuck

Table 256 Hydraulic Brake Stop/Turn Signal/Hazard Light Input Check Chart (cont.)

597 14 2 0	Brake switch inputs do not match			
612 14 1 1	Brake switch out of range low			
612 14 1 2	Brake switch out of range high			
Brake Switch Harness Connector (4036) Voltage Checks				
Check with ignition key on and brake switch disconnected.				
NOTE – With the key off voltage to the switches will be approximately 5 volts.				
NOTE – Always check connectors for damage and pushed-out terminals.				
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.				
Test Points	Spec.	Comments		
Harness connector (4036), cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits K90C or A90C. Also insure 5 amp fuse F3 is not blown.		
Harness connector (4036), cavity 2 to 1	12 ± 1.5 volts	If voltage is incorrect check for open or short on circuits K90B and N90B.		
Brake Switch Resistance Checks				
Check with switch disconnected, negative probe of meter connected to pin B and positive probe connected to pin A.				
NOTE – Always check connectors for damage and pushed-out terminals.				
Brake switch (4036), pin B to pin A	With stop light switch closed resistance should be approximately 680 ohms.	Switch has a small resistor in series with contacts. If resistance is incorrect, replace the switch.		
Brake switch (4036), pin B to pin A	With stop light switch open resistance should be approximately 27K ohms.	Switch has a large resistor in parallel with the switch contacts.		

Extended Description

Refer to Hydraulic Brake Switch Inputs to ESC.

When the key is in the ignition position 12 volts from battery fuse F3 will be applied to the brake switch (4036) at pin 2. When the brake switch is closed (brake pedal pressed), the 12 volt signal is applied to the hydraulic brake control unit (9511) at pin 10 through the engine/chassis interconnect (9523) pin C.

A 6.8 volt Zener diode, inside the switch body is wired in parallel with the switch contacts. The diode allows current to pass through it when the key is in the ignition position and 12 volts is applied to the switch. The diode prevents current from passing through it when the key is off and 5 volts is applied to the switch. When the key is on and the brake is not applied, the ESC monitors the voltage drop across the diode and resistor in the switch. If there is an open in the brake switch circuits there will be no voltage drop and the ESC will set a fault.

A 150 ohm resistor, inside the switch body, is wired in series with the switch. The ESC senses the voltage drop across this resistor to check for a short to ground in the brake switch circuits between the brake switch and the ESC. If there is a short, 12 volts from the ESC will be pulled to ground and the ESC will set a fault.

When the brake switch is closed, the voltage drop will change and the hydraulic brake control unit will sense that the brake is applied. The hydraulic brake control unit and the ESC communicate over the J1939 data link.

7.5. AIR BRAKE SWITCH INPUTS TO ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Brake Switch Inputs to ESC With Air Brakes.

While the ignition is on, the ESC will continuously monitor the brake switch(es) and circuits for an open condition or a short to ground. The ESC will also log a diagnostic trouble code (DTC) if it determines the vehicle has decelerated to 0 mph (0 kmh) without brake activation or has accelerated to 35 mph (56 kph) while the switch is closed.

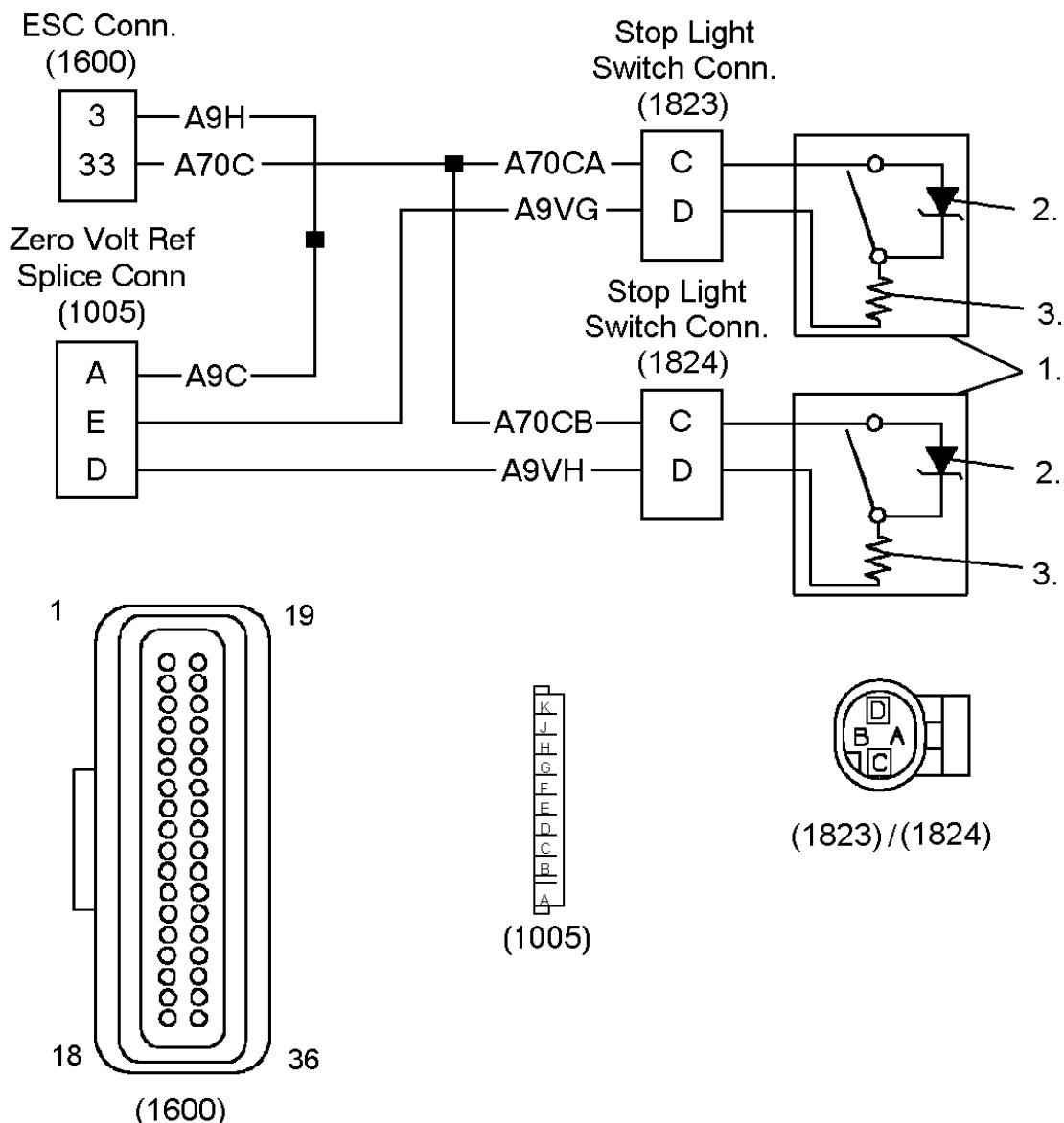


Figure 426 Brake Switch Inputs to ESC With Air Brakes — Always Refer to the Circuit Diagram Book for Latest Circuit Information

1. AIR BRAKE SWITCH(ES) (1823)/(1824)
LOCATED TO LEFT OF LOWER STEERING COLUMN
2. ZENER DIODE
3. 150 OHM RESISTOR
- (1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- (1823) AIR BRAKE STOP LIGHT #1 SWITCH
LOCATED NEAR BRAKE PEDAL
- (1824) AIR BRAKE STOP LIGHT #2 SWITCH
LOCATED NEAR BRAKE PEDAL

Table 257 Air Brake Switch Input Check Chart

Diagnostic Trouble Codes	
597 14 1 0	Brake Switch Stuck
597 14 2 0	Brake switch inputs do not match
612 14 1 1	Brake switch out of range low
612 14 1 2	Brake switch out of range high

Air Brake Switch Harness Connector (1823) Voltage Checks

(Check with ignition key on and brake switch disconnected.)

NOTE – With the key off voltage to the switches will be approximately 5 volts.**NOTE – Always check connectors for damage or pushed-out terminals.****Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**

Test Points	Spec.	Comments
Harness connector (1823) cavity C to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits A70CA, or A70A. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Harness connector (1823) cavity D to ground	0 volts	Zero volt reference signal to switch. If voltage is incorrect check for shorts to other circuits or incorrect signal out of the ESC. NOTE – If this signal is missing, the wipers will be on at the high speed setting.
Harness connector (1823) cavity C to cavity D	12 ± 1.5 volts	If voltage is incorrect, check for open in zero volt reference signal circuits A9VG, A9C or A9H or missing signal from ESC.

Air Brake Switch Harness Connector (1824) Voltage Checks

Check with ignition key on and brake switch disconnected.

NOTE – With the key off voltage to the switches will be approximately 5 volts.**NOTE – Always check connectors for damage or pushed-out terminals.****Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**

Test Points	Spec.	Comments
Harness connector (1824) cavity C to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits A70CB, or A70C. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 257 Air Brake Switch Input Check Chart (cont.)

Harness connector (1824) cavity D to ground	0 volts	Zero volt reference signal to switch. If voltage is incorrect check for shorts to other circuits or incorrect signal out of the ESC. NOTE – If this signal is incorrect out of the ESC, several other features will also be inoperative.
Harness connector (1824) cavity C to cavity D	12 ± 1.5 volts	If voltage is incorrect, check for open in zero volt reference signal circuits A9VH, A9C or A9H or missing signal from ESC.
Brake Switch Resistance Checks		
Check with switch disconnected, negative probe of meter connected to pin B and positive probe connected to pin A.		
NOTE – Always check connectors for damage or pushed-out terminals.		
Pin D to pin C	With stop light switch closed resistance should be approximately 150 ohms.	Switch has a resistor in series with contacts. If resistance is incorrect, replace the switch.
Pin D to pin C	With stop light switch open resistance should be approximately 50K ohms.	Switch has a Zener diode in parallel with the switch contacts.

Extended Description

Refer to Brake Switch Inputs to ESC With Air Brakes.

On vehicles with air brakes, the zero volt reference signal is supplied to brake switch 1 (1823) terminal D and brake switch 2 (1824) terminal D, from ESC connector (1600) terminal 3, through the zero volt reference splice connector (1005).

When the key is in the ignition position, 12 volts will be applied to stop light switch 1 (1823) terminal C and stop light switch 2 (1824) terminal C. When the key is in the off position 5 volts is supplied to terminal C of the switch instead of 12 volts.

A 6.8 volt Zener diode, inside the switch body is wired in parallel with the switch contacts. The diode allows current to pass through it when the key is in the ignition position and 12 volts is applied to the switch. The diode prevents current from passing through it when the key is off and 5 volts is applied to the switch. When the key is on and the brake is not applied, the ESC monitors the voltage drop across the diode and resistor in the switch. If there is an open in the brake switch circuits there will be no voltage drop and the ESC will set a fault. The diode is required to block current flow when the key is off, preventing the circuits from putting a drain on the battery.

A 150 ohm resistor, inside the switch body, is wired in series with the switch. The ESC senses the voltage drop across this resistor to check for a short to ground in the brake switch circuits between the brake switch and the ESC. If there is a short, 12 volts from the ESC will be pulled to ground and the ESC will set a fault.

When the brake switch is closed the voltage drop will change and the ESC will sense that the brake is applied.

7.6. FRONT TURN SIGNAL/HAZARD AND SEPARATE TURN SIGNAL LIGHT OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Refer to Front Turn Signal/Hazard Light outputs from ESC.

When the left or right turn signal is selected, the ESC will sense if the left or right signal circuits experience an over current (short to ground or excessive load) or open circuit (fault will only be logged when there is no current path through any bulb to ground). The ESC will log an active fault for either of these conditions. The fault will remain active until the condition causing the fault has been corrected and the affected turn signal is activated.

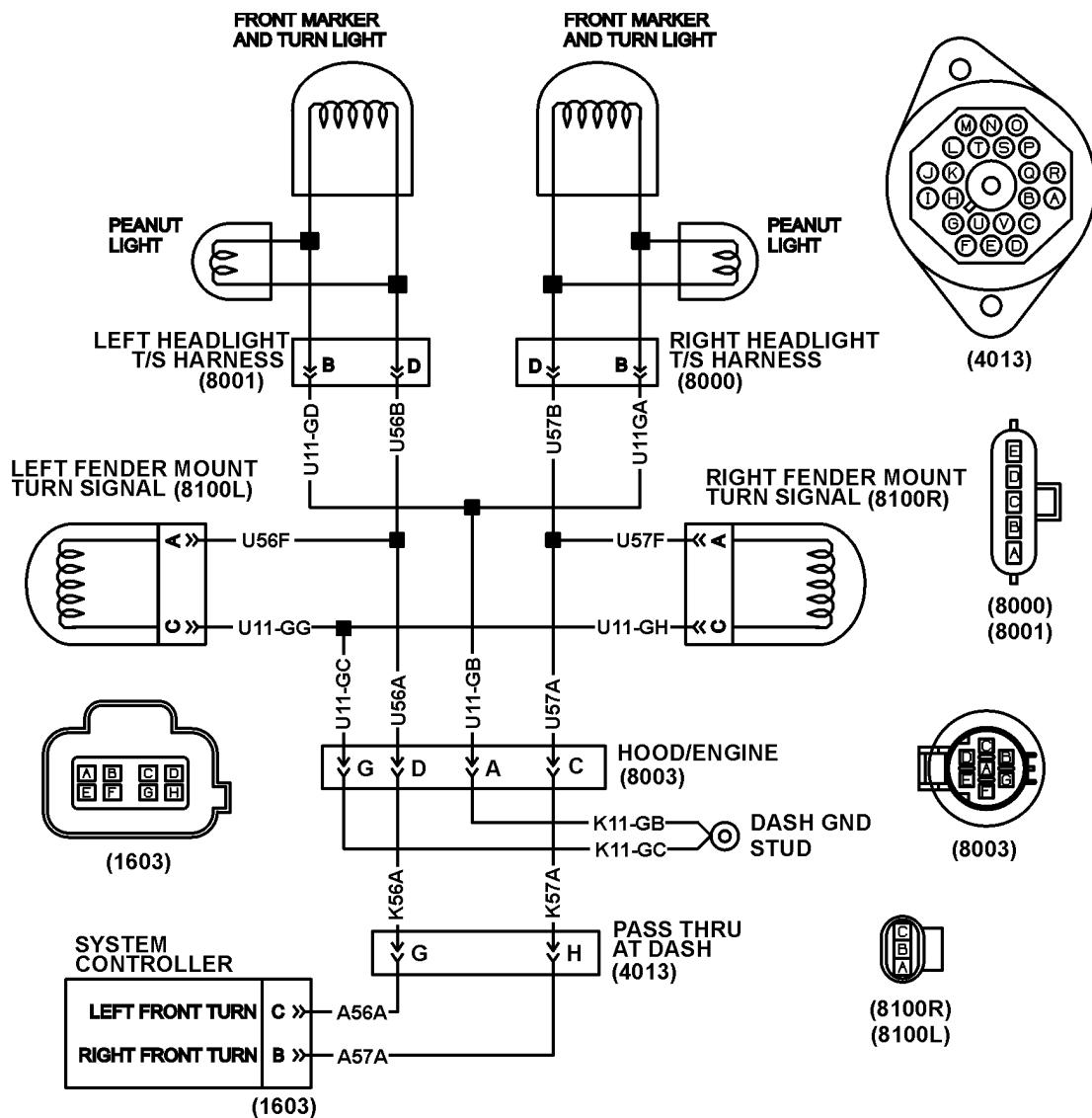


Figure 427 Front Turn Signal/Hazard Light outputs from ESC — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1603) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

(4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL

(8000) RIGHT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR RIGHT HEADLIGHT

(8001) LEFT HEADLIGHT AND TURN SIGNAL
LOCATED AT HOOD NEAR LEFT HEADLIGHT

(8003) HOOD/ENGINE
LOCATED AT INSIDE LEFT FRAME RAIL NEAR BUMPER

(8100L) LEFT FENDER MOUNT TURN SIGNAL
LOCATED AT HOOD ABOVE LEFT WHEEL

(8100R) RIGHT FENDER MOUNT TURN SIGNAL
LOCATED AT HOOD ABOVE RIGHT WHEEL

Table 258 Front Turn Signal/Hazard Light Connector Check Chart

Diagnostic Trouble Codes	
611 14 16 3	Right front turn lamps, less than normal low current but more than open circuit
611 14 16 4	Right front turn lamps, greater than normal high current and less than fusing current
611 14 16 6	Right front turn lamps has current flow when output commanded off
611 14 16 2	Right front turn lamp over current (Short Circuit)

NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.

Disconnect right headlight/turn signal harness connector (8000). Cycle key switch and clear DTC's. Turn on right front turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.

Disconnect any other connectors to components that are connected to the right front turn signal circuits. Cycle key switch and clear DTC's. Turn on right front turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.

Disconnect brown ESC connector (4007). Cycle key switch and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and turn signal light. If the fault reoccurs, there is a short inside the ESC.

611 14 16 1	Right front turn lamp circuit open
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Right Front Turn Signal/Hazard Light Voltage Checks

Check with hazard flashers on and right front headlight turn signal disconnected.

NOTE – Always check connectors for damage or pushed-out terminals.

NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.

Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Right turn signal connector (8000), pin D to ground	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short in circuits U57B, U57A, K57A, and A57A. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 258 Front Turn Signal/Hazard Light Connector Check Chart (cont.)

Right turn signal connector (8000), pin D to B	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuits U11-GA, U11-GB, and K11-GB. If circuit check is good and the light is still failing, replace headlight assembly.
Diagnostic Trouble Codes		
611 14 15 3		Left front turn lamps, less than normal low current but more than open circuit
611 14 15 4		Left front turn lamps, greater than normal high current and less than fusing current
611 14 15 6		Left front turn lamps has current flow when output commanded off
611 14 15 2		Left front turn lamp over current
<p>NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.</p> <p>Disconnect left headlight/turn signal harness connector (8001). Cycle key switch and clear DTC's. Turn on right front turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Disconnect any other connectors to components that are connected to the right front turn signal circuits. Cycle key switch and clear DTC's. Turn on right front turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Disconnect brown ESC connector (1603). Cycle key switch and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and turn signal light. If the fault reoccurs, there is a short inside the ESC.</p>		
611 14 15 1		Left front turn lamp circuit open
Left Front Turn Signal/Hazard Light Voltage Checks		
<p>Check with hazard flashers on and left front headlight turn signal disconnected.</p> <p>NOTE – Always check connectors for damage or pushed-out terminals.</p> <p>NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		
Test Points	Spec.	Comments

Table 258 Front Turn Signal/Hazard Light Connector Check Chart (cont.)

Left turn signal connector (8001), pin D to ground	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short in circuits U56B, U56A, K56A and A56A. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left turn signal connector (8001), pin D to B	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuits U11-GD, U11-GB, and K11-GB. If circuits test good and light is still failing, replace headlight assembly.

Right Fender Mount Turn Signal/Hazard Light (8100R) Voltage Checks

Check with hazard flashers on and right front headlight turn signal disconnected.

NOTE – Always check connectors for damage or pushed-out terminals.

NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Right turn signal connector (8100R), pin A to ground	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short in circuits U57F, U57A, K57A and A57A. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right turn signal connector (8100R), pin A to C	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuits U11-GH, U11-GC, and K11-GC. If circuits test good and light is still failing, replace fender mount light assembly.

Left Fender Mount Turn Signal/Hazard Light (8100L) Voltage Checks

Check with hazard flashers on and left front headlight turn signal disconnected.

NOTE – Always check connectors for damage or pushed-out terminals.

NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
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Table 258 Front Turn Signal/Hazard Light Connector Check Chart (cont.)

Left turn signal connector (8100L), pin A to ground	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short in circuits U56F, U56A, K56A and A56A. Also insure proper voltage out of ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left turn signal connector (8100L), pin A to C	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuits U11-GG, U11-GC, and K11-GC. If circuits test good and light is still failing, replace fender mount light assembly.

Extended Description

Refer to Front Turn Signal/Hazard Light outputs from ESC.

The ESC supplies battery voltage to the front turn signal lights.

Voltage for the right front turn signal light is supplied directly from ESC connector (1603) terminal B.

Ground for the light is supplied from ground stud (4037) to right headlight turn signal harness connector (8000) terminal B.

Voltage for the left front turn signal light is supplied directly from the ESC connector (1603) terminal C to left headlight turn signal harness connector (8001) terminal D.

Ground for the light is supplied from the ground stud to left headlight turn signal harness connector (8001) terminal B.

7.7. REAR STOP LIGHT OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Refer to Rear Stop Light Outputs From ESC.

When the brake light is selected, the ESC will sense if the left or right signal circuits experience an over current (short to ground or excessive load) or open circuit (fault will only be logged when there is no current path through any bulb to ground). The ESC will log an active fault for either of these conditions. The fault will remain active until the condition causing the fault has been corrected and the affected brake or turn signal is activated.

Buses built prior to Feb. 1, 2004

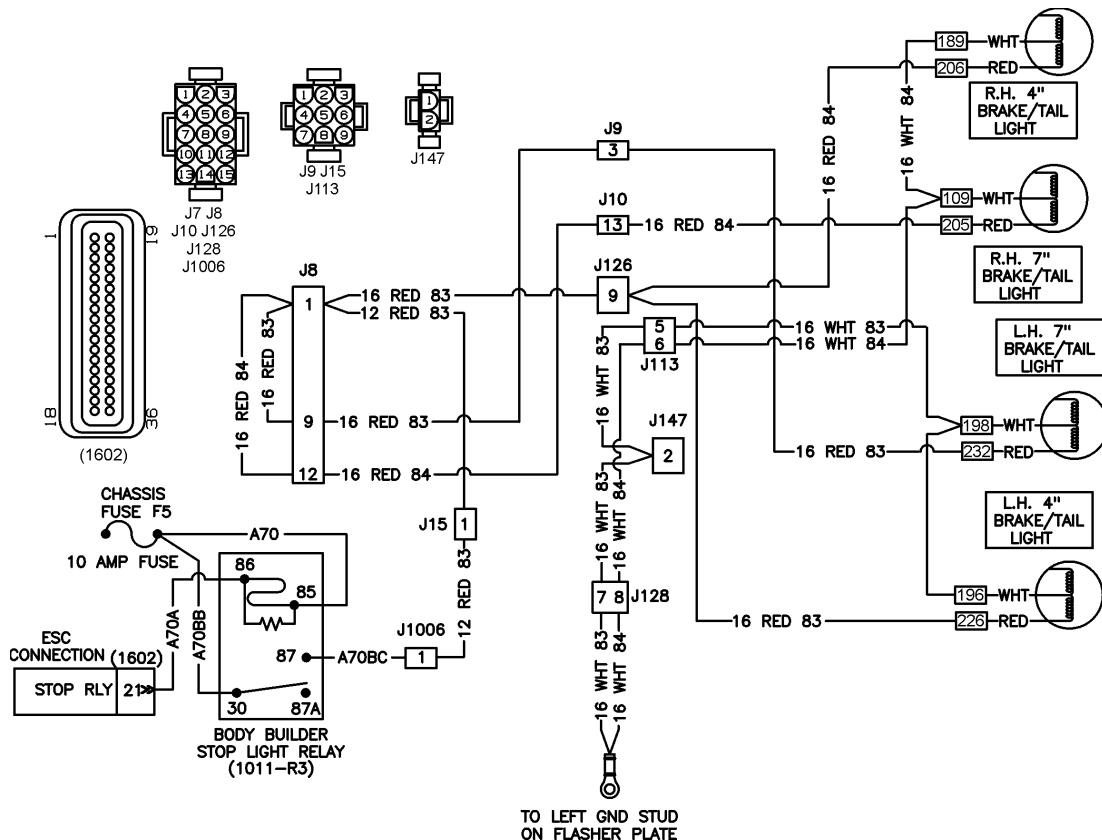


Figure 428 Rear Stop Light Outputs From ESC — Always Refer to the Circuit Diagram Book for Latest Circuit Information

- (1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- J8 LEFT HAND BODY TO FRONT CAP
- J9 J10 J113 LEFT HAND BODY TO REAR CAP
- J15 J128 FLASHER PLATE TO LEFT HAND BODY
- J126 REAR CAP TO LEFT HAND BODY
- J147 LEFT HAND BODY TO SIDE DIRECTIONAL

Table 259 Rear Stop Light Connector Check Chart

Diagnostic Trouble Codes	
2033 14 9 1	Connector #1602 Pin #21 Stop Relay output overloaded
2033 14 9 2	Connector #1602 Pin #21 Stop Relay output open circuit
2033 14 9 3	Connector #1602 Pin #21 Stop Relay output shorted to ground

Table 259 Rear Stop Light Connector Check Chart (cont.)

Body Builder Stop Light Relay (1011-R3) Voltage Checks		
Check with brake pedal depressed and body builder stop light relay (1011-R3) removed.		
Bench test relay. If relay fails bench test, replace and check for faults.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
(1011-R3) cavity 85 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse F5. Also check for open or short to ground in circuit A70
(1011-R3) cavity 85 to cavity 86	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuit A70A Also ensure proper ground signal from ESC connector #1602 pin 21 Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
(1011-R3) cavity 30 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse F5 and check for open or short to ground in circuit A70BB
Right Rear Stop Light Voltage Checks		
Check with brake pedal depressed, body builder stop light relay (1011-R3) installed and right rear tail light disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.		
R.H. 7" brake/tail light connector cavity 205 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 84, 12 RED 83, and A70BC.
R.H. 7" brake/tail light connector cavity 205 to 109.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.

Table 259 Rear Stop Light Connector Check Chart (cont.)

R.H. 4" brake/tail light cavity 206 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 84, 16 RED 83, 12 RED 83, and A70BC.
R.H. 4" brake/tail light cavity 206 to cavity 189.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 84.
Left Rear Stop Light Voltage Checks		
Check with brake pedal depressed, body builder stop light relay (1011-R3) installed and left rear tail light disconnected.		
<p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.</p>		
L.H. 7" brake/tail light connector cavity 232 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 83, 12 RED 83 and A70BC.
L.H. 7" brake/tail light connector cavity 232 to 198.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.
L.H. 4" brake/tail light cavity 226 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 83, 12 RED 83 and A70BC.
L.H. 4" brake/tail light cavity 226 to cavity 196.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 WHT 83.

Buses built after Jan. 31, 2004

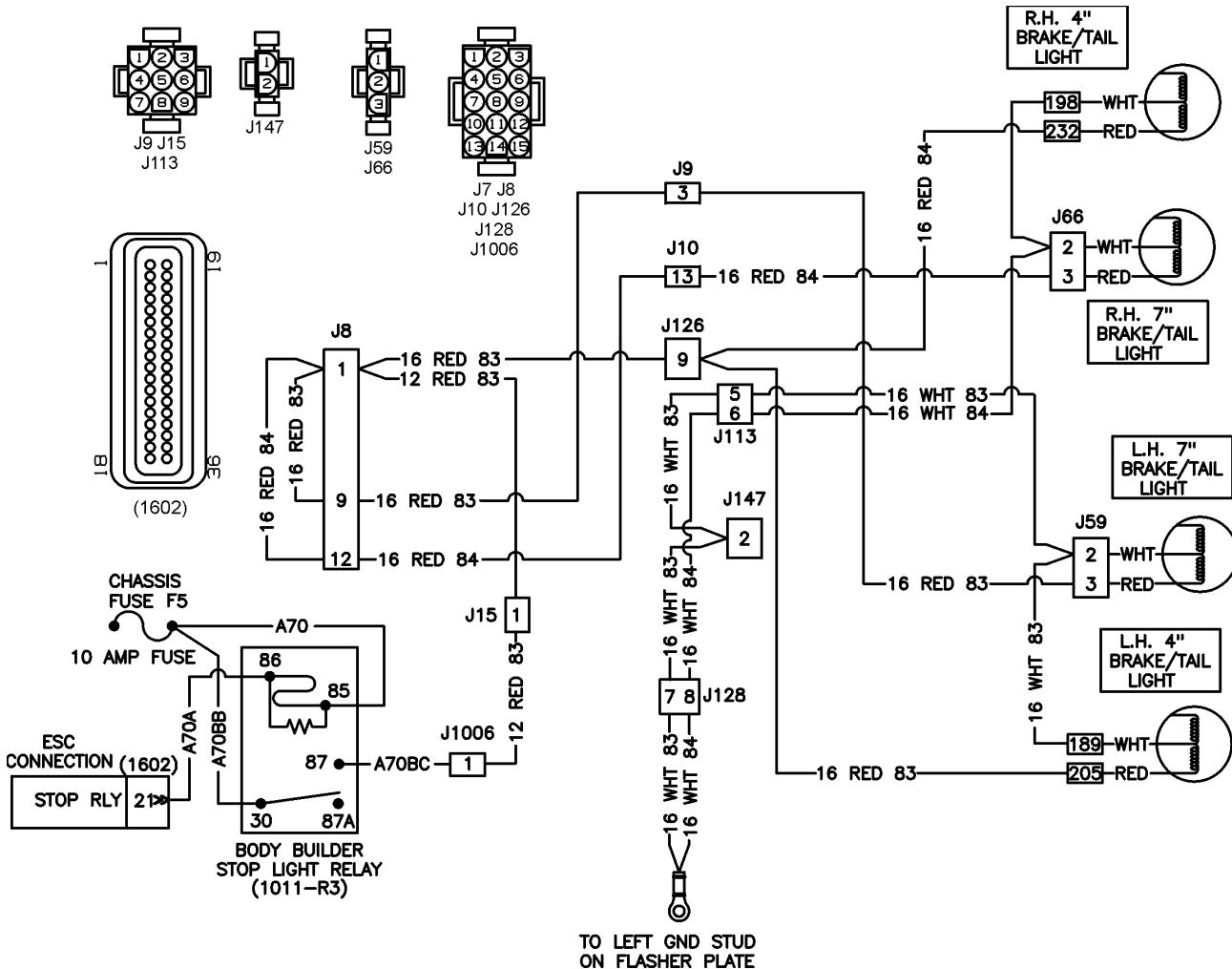


Figure 429 Rear Stop Light Outputs From ESC — Always Refer to the Circuit Diagram Book for Latest Circuit Information

- (1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- J8 LEFT HAND BODY TO FRONT CAP
- J9 J10 J113 LEFT HAND BODY TO REAR CAP
- J15 J128 FLASHER PLATE TO LEFT HAND BODY
- J59 LEFT REAR STOP/TAIL LIGHT TO REAR CAP
- J66 RIGHT REAR STOP/TAIL LIGHT TO REAR CAP
- J126 REAR CAP TO LEFT HAND BODY
- J147 LEFT HAND BODY TO SIDE DIRECTIONAL

Table 260 Rear Stop Light Connector Check Chart

Diagnostic Trouble Codes				
2033 14 9 1	Connector #1602 Pin #21 Stop Relay output overloaded			
2033 14 9 2	Connector #1602 Pin #21 Stop Relay output open circuit			
2033 14 9 3	Connector #1602 Pin #21 Stop Relay output shorted to ground			
Body Builder Stop Light Relay (1011-R3) Voltage Checks				
Check with brake pedal depressed and body builder stop light relay (1011-R3) removed.				
Bench test relay. If relay fails bench test, replace and check for faults.				
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.				
NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.				
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.				
Test Points	Spec.	Comments		
(1011-R3) cavity 85 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse F5. Also check for open or short to ground in circuit A70.		
(1011-R3) cavity 85 to cavity 86	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuit A70A. Also ensure proper ground signal from ESC connector #1602 pin 21. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.				
(1011-R3) cavity 30 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse F5 and check for open or short to ground in circuit A70BB.		
Right Rear Stop Light Voltage Checks				
Check with brake pedal depressed, body builder stop light relay (1011-R3) installed and right rear tail light disconnected.				
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.				
NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.				

Table 260 Rear Stop Light Connector Check Chart (cont.)

Test Points	Spec.	Comments
R.H. 7" brake/tail light connector (J66) cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 84, 12 RED 83, and A70BC.
R.H. 7" brake/tail light connector (J66) cavity 3 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.
R.H. 4" brake/tail light cavity 232 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 84, 16 RED 83, 12 RED 83, and A70BC.
R.H. 4" brake/tail light cavity 232 to cavity 198.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 84.

Left Rear Stop Light Voltage Checks

Check with brake pedal depressed, body builder stop light relay (1011-R3) installed and left rear tail light disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.

Test Points	Spec.	Comments
L.H. 7" brake/tail light connector (J59) cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 83, 12 RED 83 and A70BC.
L.H. 7" brake/tail light connector (J59) cavity 3 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.
L.H. 4" brake/tail light cavity 205 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 RED 83, 12 RED 83 and A70BC.
L.H. 4" brake/tail light cavity 205 to cavity 189.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 WHT 83.

Extended Description

Refer to Rear Stop Light Outputs From ESC.

Voltage for the right rear stop light is supplied from fuse F5 through the body builder stop light relay (1001-R3) pin 87 to the right hand 7" brake light connector J66 cavity 3 and the right hand 4" brake light cavity 232.

Ground for the right rear stop light is supplied from ground stud on the flasher plate.

Voltage for the left rear stop light is supplied from fuse F5 through the body builder stop light relay (1001-R3) pin 87 to the left hand 7" brake light connector J59 cavity 3 and the left hand 4" brake light cavity 205.

Ground for the left rear stop light is supplied from ground stud on the flasher plate.

7.8. REAR TURN SIGNAL/HAZARD LIGHT OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Refer to Rear Turn Signal/Hazard Light Outputs From ESC.

When the left or right rear turn signal lights are selected, the ESC will sense if the left or right signal circuits experience an over current (short to ground or excessive load) or open circuit (fault will only be logged when there is no current path through any bulb to ground). The ESC will log an active fault for either of these conditions. The fault will remain active until the condition causing the fault has been corrected and the affected brake or turn signal is activated.

Buses Built Prior to Feb. 1, 2004

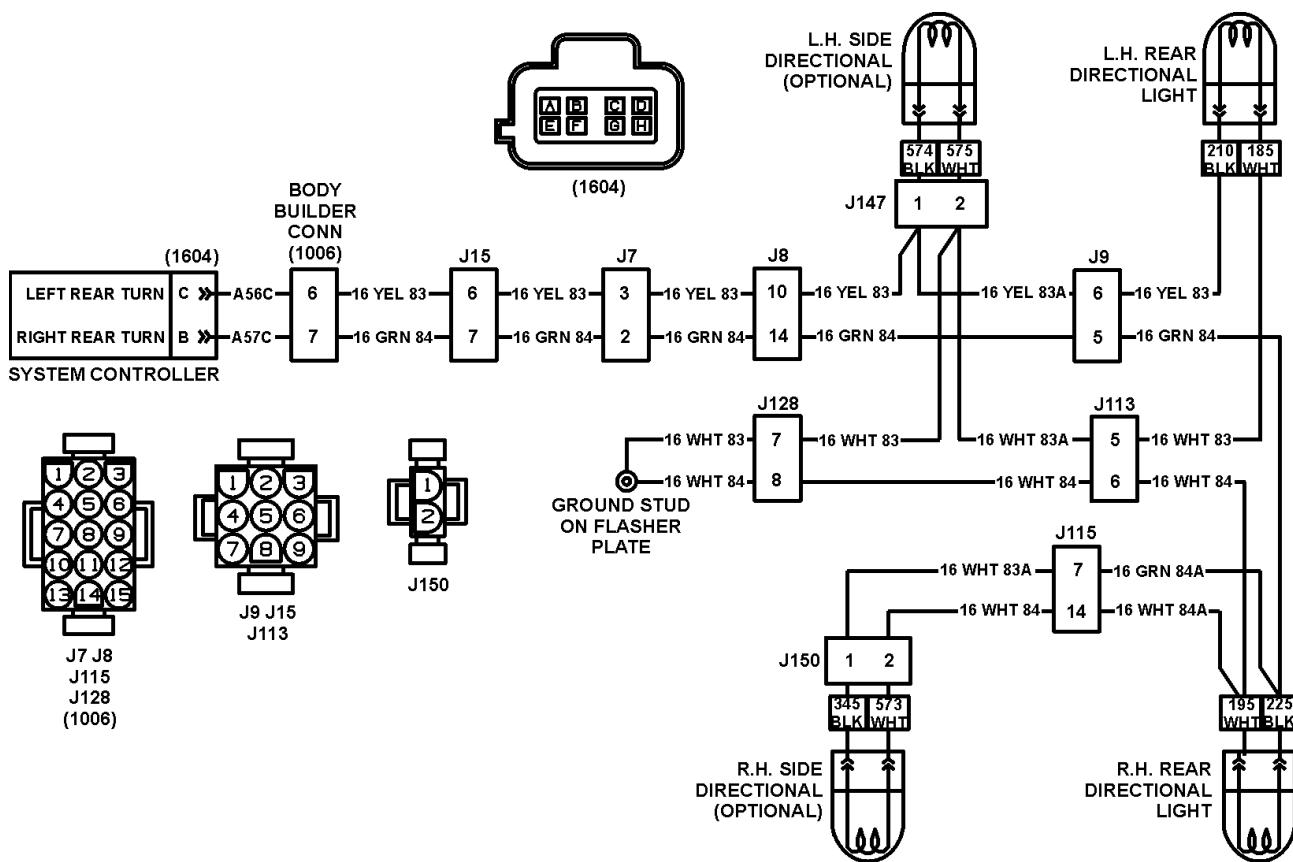


Figure 430 Rear Turn Signal/Hazard Light Outputs From ESC — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1604) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

J7 J8 LEFT HAND BODY TO FRONT CAP

J9 J113 LEFT HAND BODY TO REAR CAP

J15 J128 FLASHER PLATE TO LEFT HAND BODY

J115 RIGHT HAND BODY TO REAR CAP

J147 LEFT HAND BODY TO SIDE DIRECTIONAL

J150 RIGHT HAND BODY TO SIDE DIRECTIONAL

Table 261 Rear Turn Signal/Hazard Light Connector Check Chart

Diagnostic Trouble Codes	
611 14 13 3	Left rear turn lamps, less than normal low current but more than open circuit
611 14 13 4	Left rear turn lamps, greater than normal high current and less than fusing current
611 14 13 6	Left rear turn lamps has current flow when output commanded off

Table 261 Rear Turn Signal/Hazard Light Connector Check Chart (cont.)

611 14 13 2	Left rear turn lamp over current (Short Circuit)	
NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.		
NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.		
<p>Turn key "OFF". Disconnect rear turn connector. Turn on ignition and clear DTC's, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Turn key "OFF". Disconnect any other connectors to components that are connected to the left rear turn signal circuits. Turn on ignition and clear DTC's, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Turn key "OFF". Disconnect blue ESC connector (1604). Turn on ignition, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and left rear turn signal light. If the fault reoccurs, there is a short inside the ESC.</p>		
611 14 13 1	Left rear turn lamp circuit open	
Left Turn Signal/Hazard Light Voltage Checks		
<p>Check with hazard flashers on and left rear turn lamp disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		
Test Points	Spec.	Comments
Left hand rear directional light cavity 210 to ground.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to ground in circuits 16 YEL 83 and A56C.
Left hand side directional light (J147) cavity 1 to ground.		Also insure proper voltage out of ESC connector #1604 pin C. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
		NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Table 261 Rear Turn Signal/Hazard Light Connector Check Chart (cont.)

Left hand rear directional light cavity 210 to cavity 185.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.		
Left hand side directional light (J147) cavity 1 to 2.				
Diagnostic Trouble Codes				
611 14 14 3		Right rear turn lamps, less than normal low current but more than open circuit		
611 14 14 4		Right rear turn lamps, greater than normal high current and less than fusing current		
611 14 14 6		Right rear turn lamps has current flow when output commanded off		
611 14 14 2		Right rear turn lamp over current (Short Circuit)		
<p>NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.</p> <p>The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.</p> <p>Disconnect right rear light connector. Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Disconnect any other connectors to components that are connected to the right rear turn signal circuits. Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Disconnect blue ESC connector (1604). Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and right rear turn signal light. If the fault reoccurs, there is a short inside the ESC.</p>				
611 14 14 1	Right rear turn lamp Under Current (Circuit Open)			
Right Turn Signal/Hazard Light Voltage Checks				
<p>Check with hazard flashers on and right rear tail light disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>				

Table 261 Rear Turn Signal/Hazard Light Connector Check Chart (cont.)

Test Points	Spec.	Comments
Right hand rear directional light cavity 225 to ground. Right hand side directional light (J150) cavity 1 to ground.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to ground in circuits 16 GRN 84 and A57C. Also insure proper voltage out of ESC connector #1604 pin B. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right hand rear directional light cavity 225 to cavity 195. Right hand side directional light (J150) cavity 1 to 2.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.

Buses Built After Jan. 31, 2004

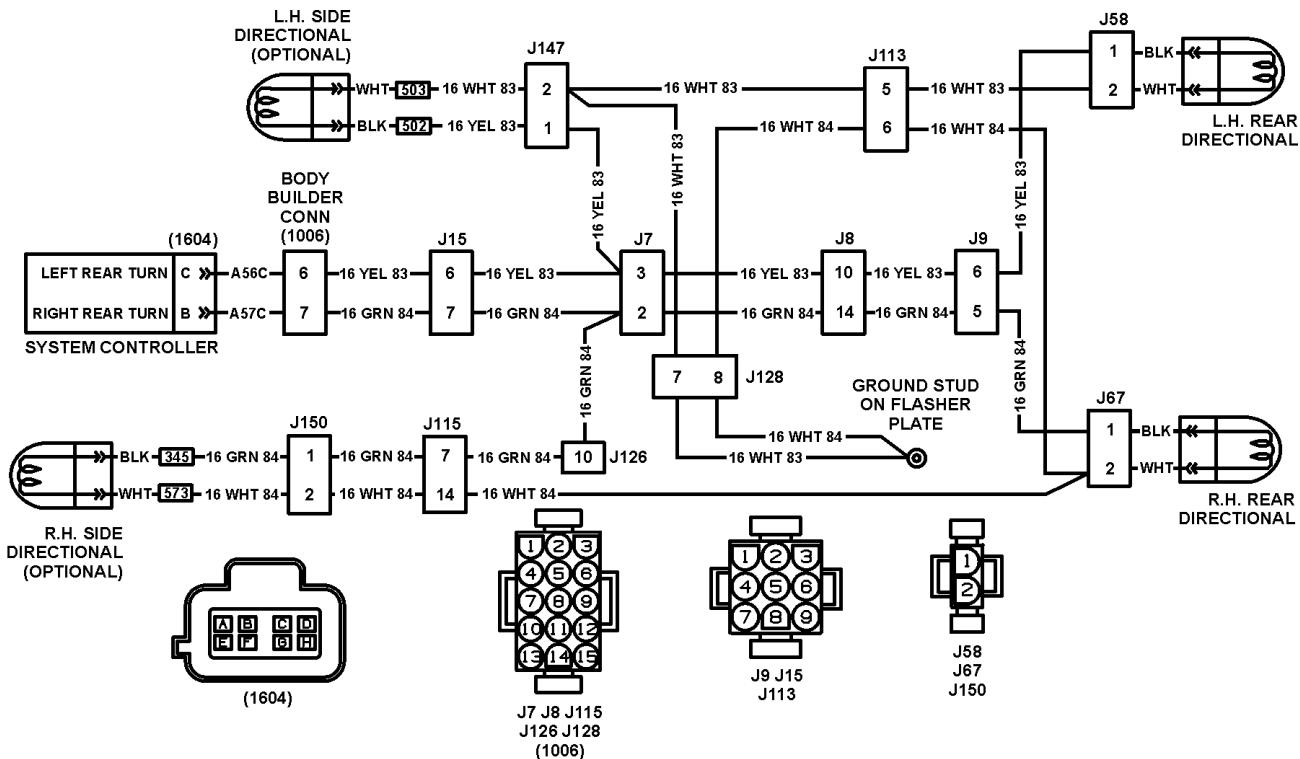


Figure 431 Rear Turn Signal/Hazard Light Outputs From ESC — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1604) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

J7 J8 LEFT HAND BODY TO FRONT CAP

J9 J113 LEFT HAND BODY TO REAR CAP

J15 J128 FLASHER PLATE TO LEFT HAND BODY

J58 LEFT REAR DIRECTIONAL LIGHT TO REAR CAP

J67 RIGHT REAR DIRECTIONAL LIGHT TO REAR CAP

J115 RIGHT HAND BODY TO REAR CAP

J126 REAR CAP TO LEFT HAND BODY

J147 LEFT HAND BODY TO SIDE DIRECTIONAL

J150 RIGHT HAND BODY TO SIDE DIRECTIONAL

Table 262 Rear Turn Signal/Hazard Light Connector Check Chart

Diagnostic Trouble Codes	
611 14 13 3	Left rear turn lamps, less than normal low current but more than open circuit
611 14 13 4	Left rear turn lamps, greater than normal high current and less than fusing current
611 14 13 6	Left rear turn lamps has current flow when output commanded off

Table 262 Rear Turn Signal/Hazard Light Connector Check Chart (cont.)

611 14 13 2	Left rear turn lamp over current (Short Circuit)	
NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.		
NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.		
<p>Turn key "OFF". Disconnect rear turn connector. Turn on ignition and clear DTC's, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Turn key "OFF". Disconnect any other connectors to components that are connected to the left rear turn signal circuits. Turn on ignition and clear DTC's, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Turn key "OFF". Disconnect blue ESC connector (1604). Turn on ignition, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and left rear turn signal light. If the fault reoccurs, there is a short inside the ESC.</p>		
611 14 13 1	Left rear turn lamp circuit open	
Left Turn Signal/Hazard Light Voltage Checks		
<p>Check with hazard flashers on and left rear turn lamp disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		
Test Points	Spec.	Comments
Left hand rear directional light (J58) cavity 1 to ground.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to ground in circuits 16 YEL 83 and A56C.
Left hand side directional light (J147) cavity 1 to ground.		Also insure proper voltage out of ESC connector #1604 pin C. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
		NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Table 262 Rear Turn Signal/Hazard Light Connector Check Chart (cont.)

Left hand rear directional light (J58) cavity 1 to 2.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.
Diagnostic Trouble Codes		
611 14 14 3		Right rear turn lamps, less than normal low current but more than open circuit
611 14 14 4		Right rear turn lamps, greater than normal high current and less than fusing current
611 14 14 6		Right rear turn lamps has current flow when output commanded off
611 14 14 2		Right rear turn lamp over current (Short Circuit)
<p>NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.</p> <p>The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.</p> <p>Disconnect right rear light connector. Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Disconnect any other connectors to components that are connected to the right rear turn signal circuits. Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.</p> <p>Disconnect blue ESC connector (1604). Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and right rear turn signal light. If the fault reoccurs, there is a short inside the ESC.</p>		
611 14 14 1		Right rear turn lamp Under Current (Circuit Open)
Right Turn Signal/Hazard Light Voltage Checks		
<p>Check with hazard flashers on and right rear tail light disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		
Test Points	Spec.	Comments

Table 262 Rear Turn Signal/Hazard Light Connector Check Chart (cont.)

Right hand rear directional light (J67) cavity 1 to ground.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to ground in circuits 16 GRN 84 and A57C. Also insure proper voltage out of ESC connector #1604 pin B. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right hand side directional light (J150) cavity 1 to ground.		NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
Right hand rear directional light (J67) cavity 1 to 2.	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.
Right hand side directional light (J150) cavity 1 to 2.		

Extended Description

Refer to Rear Turn Signal/Hazard Light Outputs From ESC.

Voltage for the right rear turn light is supplied from ESC connector (1604) terminal B to the right turn light connector cavity 225 and the right side directional cavity 345.

Ground for the right rear turn light is supplied from the ground stud on the flasher plate to the right turn light connector cavity 195 and the right side directional cavity 573.

Voltage for the left rear turn light is supplied from ESC connector (1604) terminal C to the right turn light connector cavity 210 and the left side directional cavity 574.

Ground for the left rear turn light is supplied from the ground stud on the flasher plate to the left turn light connector cavity 185 and the left side directional cavity 575.

7.9. COWL TURN SIGNAL/HAZARD LIGHT OUTPUTS FROM ESC (OPTIONAL)

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Refer to Cowl Turn Signal/Hazard Light Outputs From ESC.

When the left or right rear turn signal lights are selected, the ESC will sense if the left or right signal circuits experience an over current (short to ground or excessive load) or open circuit (fault will only be logged when there is no current path through any bulb to ground). The ESC will log an active fault for either of these

conditions. The fault will remain active until the condition causing the fault has been corrected and the affected brake or turn signal is activated.

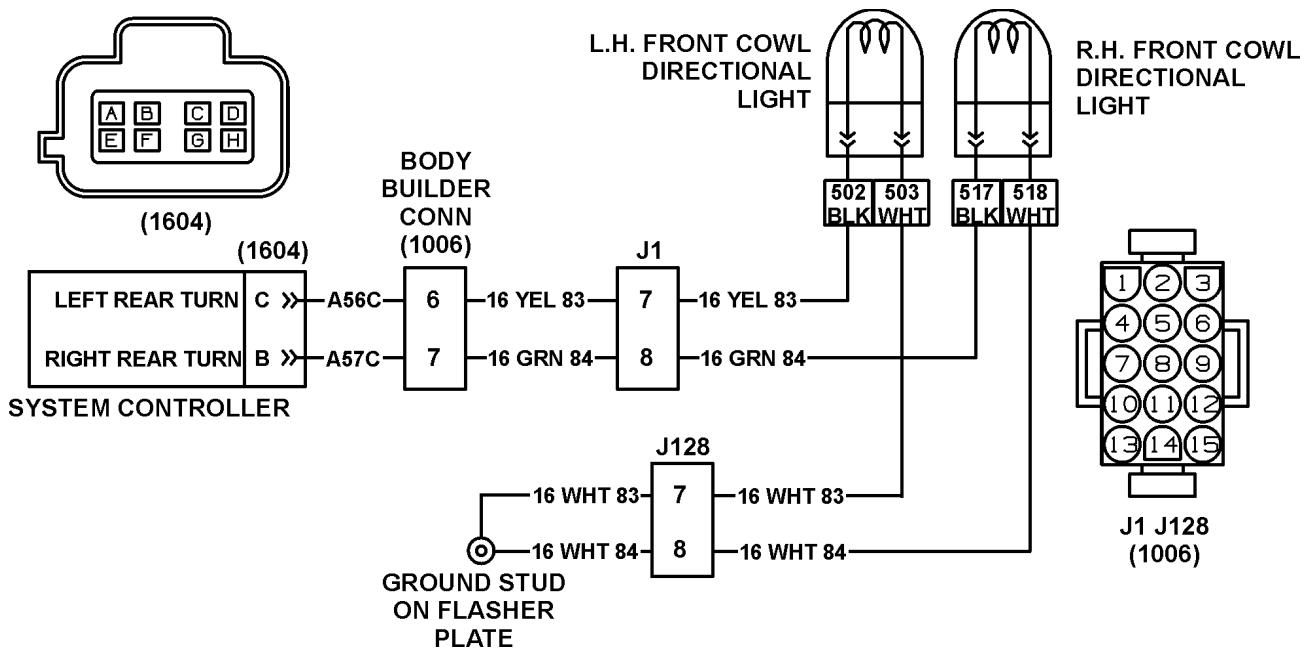


Figure 432 Front Cowl Turn Signal/Hazard Light Outputs From ESC On Buses Built Prior to Feb. 1, 2004 — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1604) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

J1 FLASHER PLATE TO DASH
J128 FLASHER PLATE TO LEFT HAND BODY

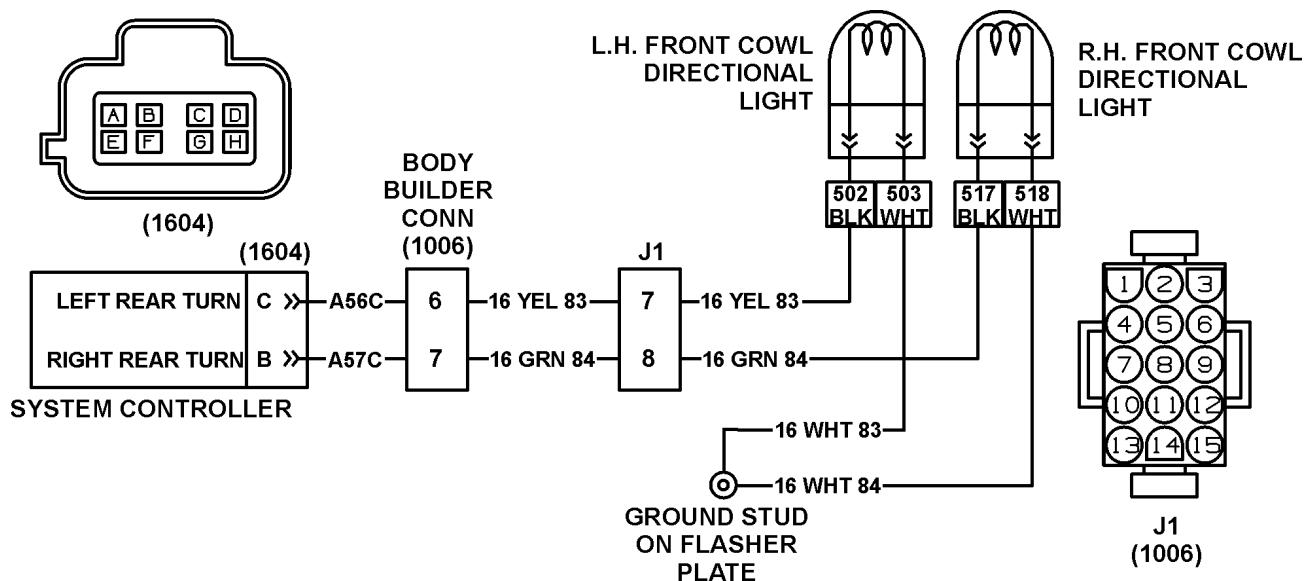


Figure 433 Front Cowl Turn Signal/Hazard Light Outputs From ESC On Buses Built After Jan. 31, 2004 — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1604) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J1 FLASHER PLATE TO DASH

Table 263 Front Cowl Turn Signal/Hazard Light Connector Check Chart

Diagnostic Trouble Codes	
611 14 13 3	Left rear turn lamps, less than normal low current but more than open circuit
611 14 13 4	Left rear turn lamps, greater than normal high current and less than fusing current
611 14 13 6	Left rear turn lamps has current flow when output commanded off
611 14 13 2	Left rear turn lamp over current (Short Circuit)

NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

Turn key "OFF". Disconnect front left cowl directional light. Turn on ignition and clear DTC's, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.

Turn key "OFF". Disconnect any other connectors to components that are connected to the left front cowl directional circuits. Turn on ignition and clear DTC's, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and turn signal light or in the ESC.

Table 263 Front Cowl Turn Signal/Hazard Light Connector Check Chart (cont.)

Turn key "OFF". Disconnect blue ESC connector (1604). Turn on ignition, then turn on left turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and left front cowl directional light. If the fault reoccurs, there is a short inside the ESC.		
611 14 13 1	Left rear turn lamp circuit open	
Left Front Cowl Directional Light Voltage Checks		
Check with hazard flashers on and left front cowl lamp disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left hand front cowl directional light cavity 502 to ground	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to ground in circuits 16 YEL 83 and A56C. Also insure proper voltage out of ESC connector #1604 pin C. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
Left hand front cowl directional light cavity 502 to cavity 503	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 83.

Table 263 Front Cowl Turn Signal/Hazard Light Connector Check Chart (cont.)

Diagnostic Trouble Codes	
611 14 14 3	Right rear turn lamps, less than normal low current but more than open circuit
611 14 14 4	Right rear turn lamps, greater than normal high current and less than fusing current
611 14 14 6	Right rear turn lamps has current flow when output commanded off
611 14 14 2	Right rear turn lamp over current (Short Circuit)
NOTE – Disconnecting connectors will cause new open circuit faults to be logged. Clear all faults after connections have been restored.	
The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.	
Disconnect right front cowl directional light. Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in the turn signal light. If the fault reoccurs, there is a short in the circuits between the ESC and front cowl directional light or in the ESC.	
Disconnect any other connectors to components that are connected to the right front cowl directional circuits. Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short or an overload in that component. If the fault reoccurs, there is a short in the circuits between the ESC and front cowl directional light or in the ESC.	
Disconnect blue ESC connector (1604). Cycle ignition and clear DTC's. Turn on right turn signal and check for fault. If the fault has not reoccurred, there is a short in the circuits between the ESC and right front cowl directional light. If the fault reoccurs, there is a short inside the ESC.	
611 14 14 1	Right rear turn lamp Under Current (Circuit Open)
Right Front Cowl Directional Light Voltage Checks	
Check with hazard flashers on and right front cowl directional light disconnected.	
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.	
NOTE – In an over current situation, the ESC will not supply voltage until the short or excessive load has been removed and the key switch has been cycled.	
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.	

Table 263 Front Cowl Turn Signal/Hazard Light Connector Check Chart (cont.)

Test Points	Spec.	Comments
Right hand front cowl directional light cavity 517 to ground	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to ground in circuits 16 GRN 84 and A57C. Also insure proper voltage out of ESC connector #1604 pin B. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
Right hand front cowl directional light cavity 517 to cavity 518	Voltage switching from 12 ± 1.5 volts to 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 84.

Extended Description

Refer to Rear Turn Signal/Hazard Light Outputs From ESC.

Voltage for the right front cowl directional light is supplied from ESC connector (1604) terminal B to the right front cowl light connector cavity 517.

Ground for the right front cowl directional light is supplied from the ground stud on the flasher plate to the right front cowl light connector cavity 518.

Voltage for the left front cowl directional light is supplied from ESC connector (1604) terminal C to the left front cowl light connector cavity 502.

Ground for the left front cowl directional light is supplied from the ground stud on the flasher plate to the left front cowl light connector cavity 503.

7.10. COMPONENT LOCATIONS

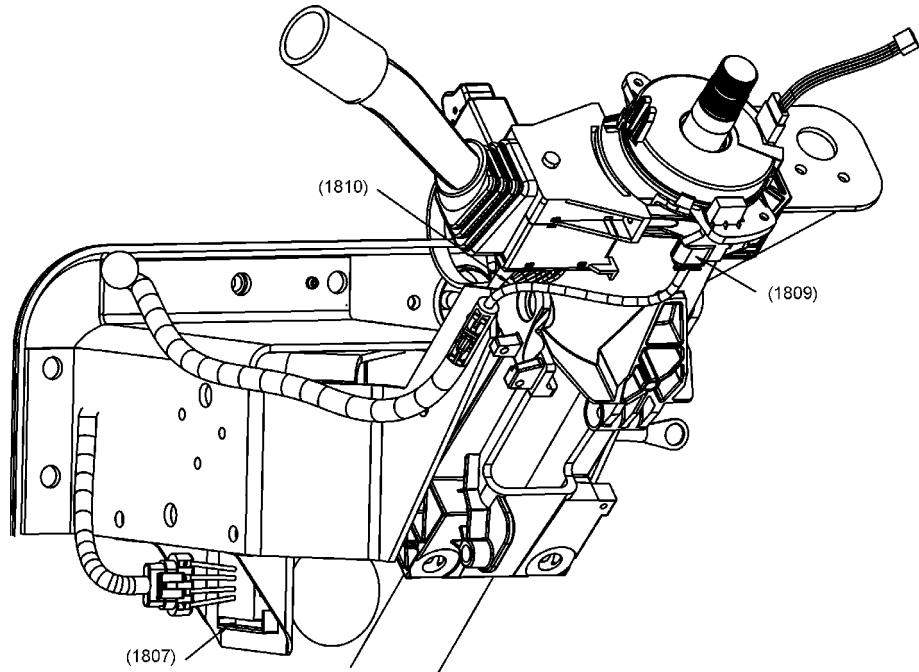


Figure 434 Stop/Turn Signal/Hazard Light Connector Locations (Steering Column Support View)

- (1807) CLUTCH SWITCH CONNECTOR
- (1809) CLOCK SPRING CONNECTOR
- (1810) TURN SIGNAL SWITCH CONNECTOR

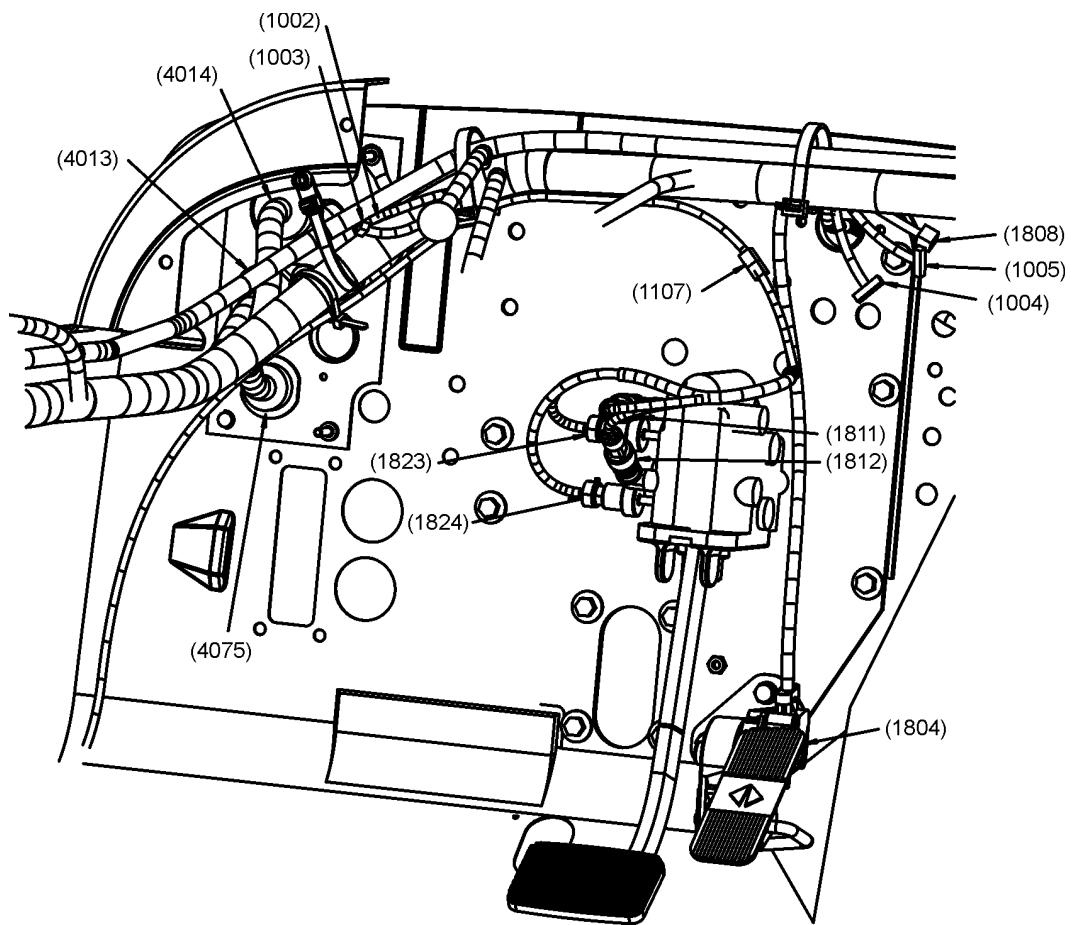


Figure 435 Inside Dash Panel Showing Pass-Thrus

- (1002) PANEL LIGHT SPLICE CONNECTOR
- (1003) (1004) GROUND SPLICE CONNECTOR
- (1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
- (1107) CABLE PARK BRAKE INTERCONNECT
- (1804) APS/IVS CONNECTOR
- (1808) BAP SENSOR CONNECTOR
- (1811) PRIMARY AIR PRESSURE SENSOR CONNECTOR
- (1812) SECONDARY AIR PRESSURE SENSOR CONNECTOR
- (1823) AIR BRAKE STOP LIGHT #1 SWITCH CONNECTOR
- (1824) AIR BRAKE STOP LIGHT #2 SWITCH CONNECTOR
- (4013) PASS THRU AT DASH CONNECTOR
- (4014) DASH/ENGINE PASS THRU CONNECTOR

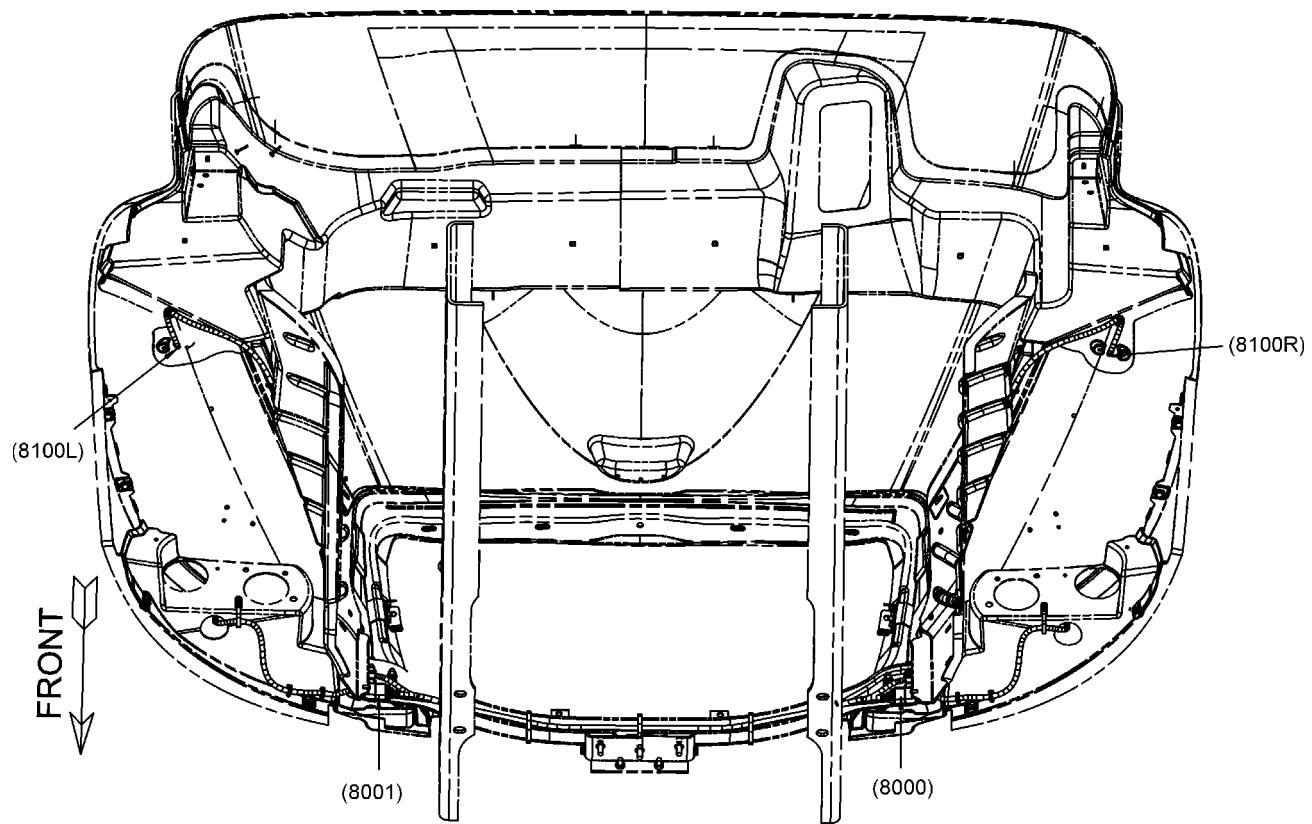


Figure 436 Stop/Turn Signal/Hazard Light Connector Locations

- (8000) RIGHT HEADLIGHT AND TURN SIGNAL CONNECTOR
- (8001) LEFT HEADLIGHT AND TURN SIGNAL CONNECTOR
- (8100L) LEFT FENDER MOUNT TURN SIGNAL CONNECTOR
- (8100R) RIGHT FENDER MOUNT TURN SIGNAL CONNECTOR

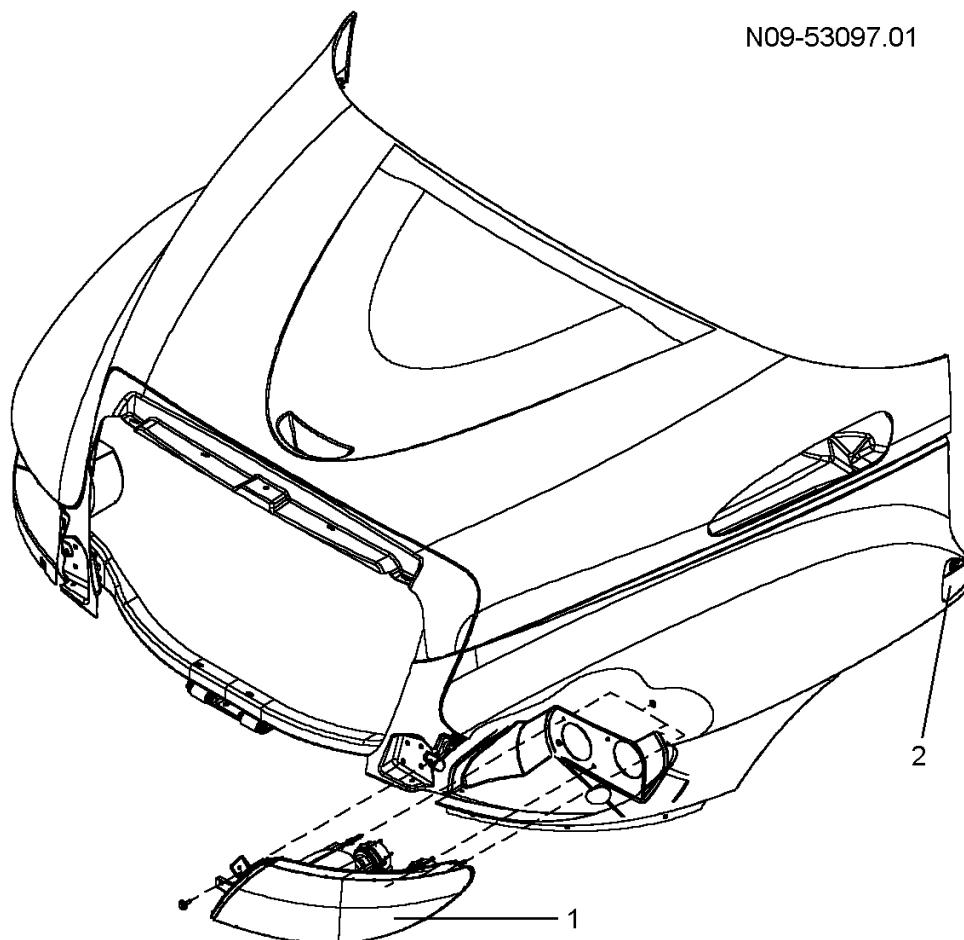


Figure 437 Headlights, Front and Side Marker Lights

1. FRONT PARK LIGHT
2. SIDE MARKER LIGHT

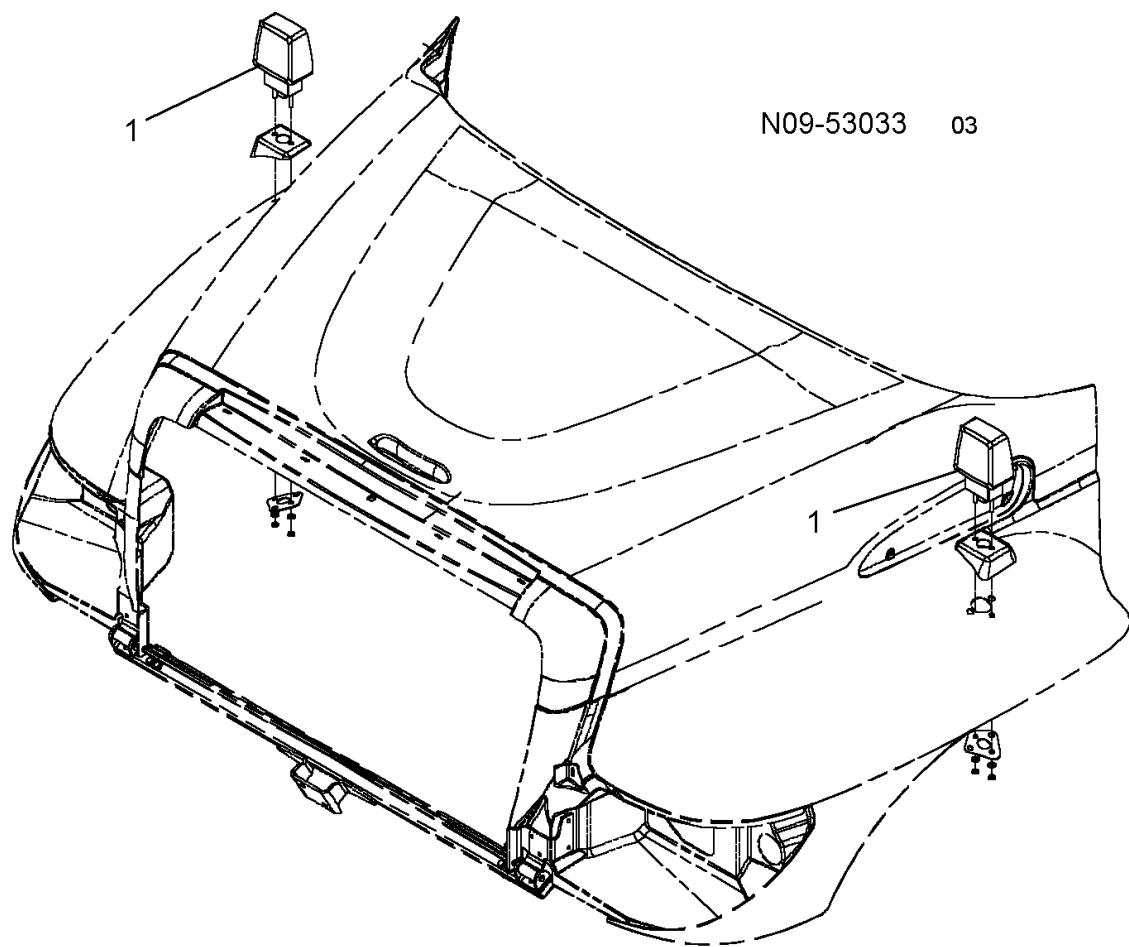


Figure 438 Optional Side Marker/Turn Signal Lights

1. OPTIONAL SIDE MARKER/TURN SIGNAL LIGHT

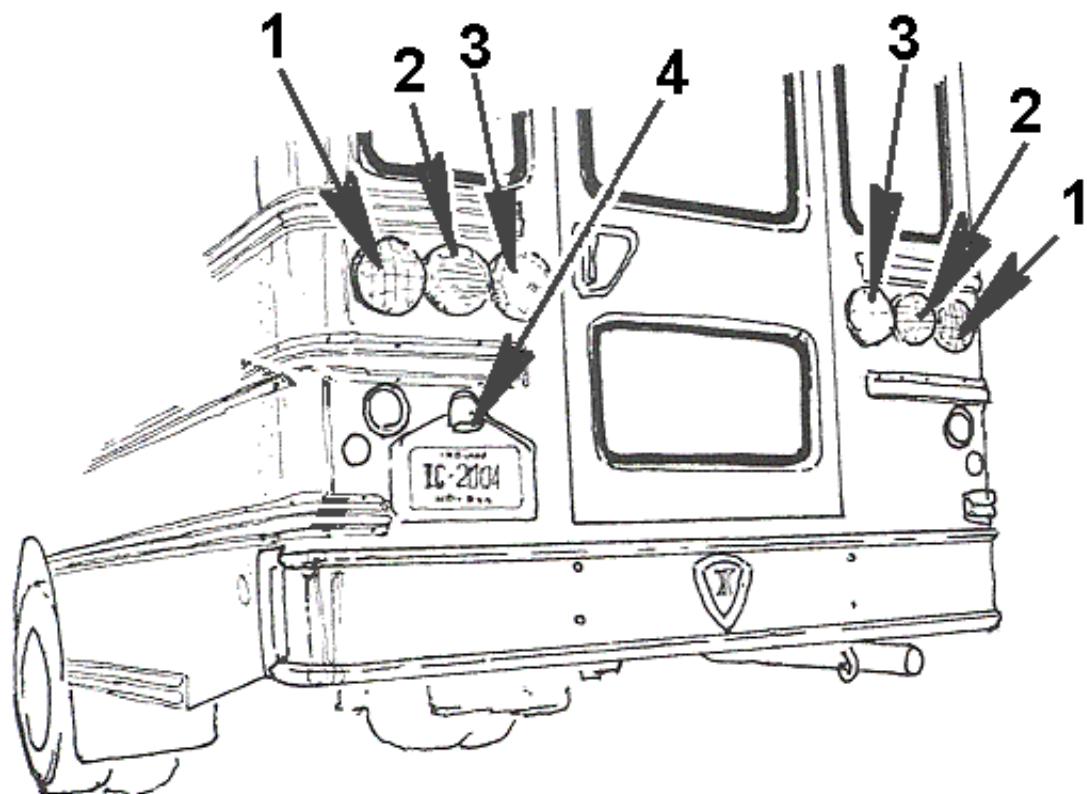


Figure 439 Rear Light Locations

1. REAR TURN SIGNAL LIGHT
2. REAR STOP/TAIL LIGHT
3. REAR BACK-UP LIGHT
4. LICENSE PLATE LIGHT

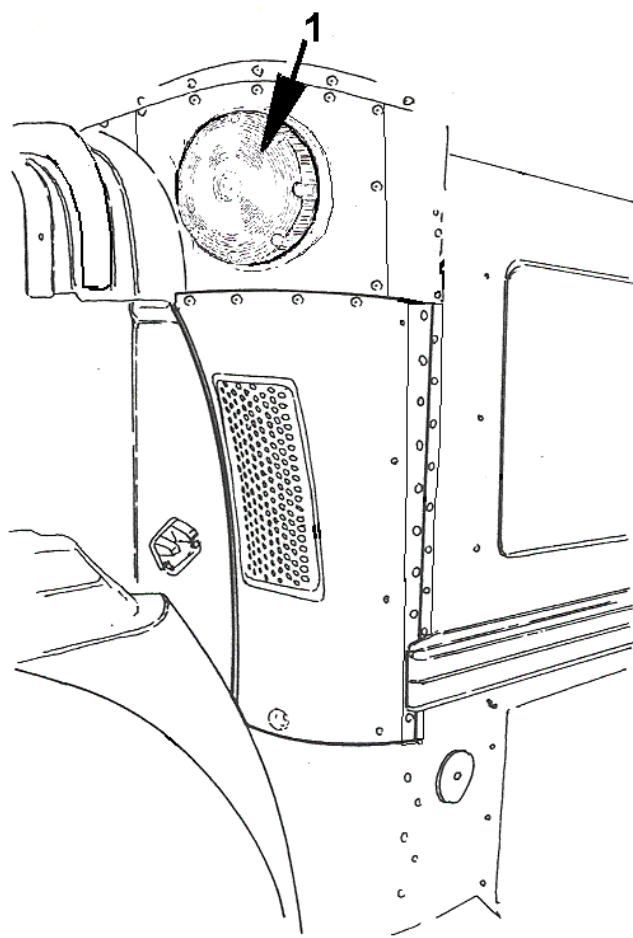


Figure 440 Cowl Light Location

1. COWL TURN SIGNAL LAMP

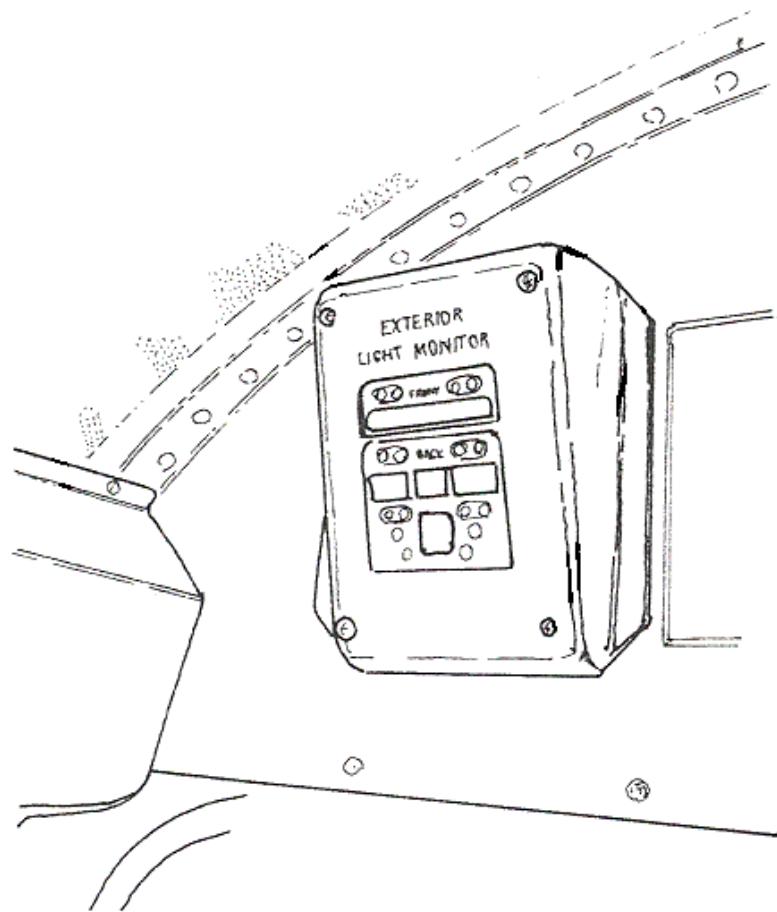


Figure 441 Exterior Light Monitor

8. RED AND AMBER PUPIL WARNING LIGHTS

8.1. CIRCUIT FUNCTIONS

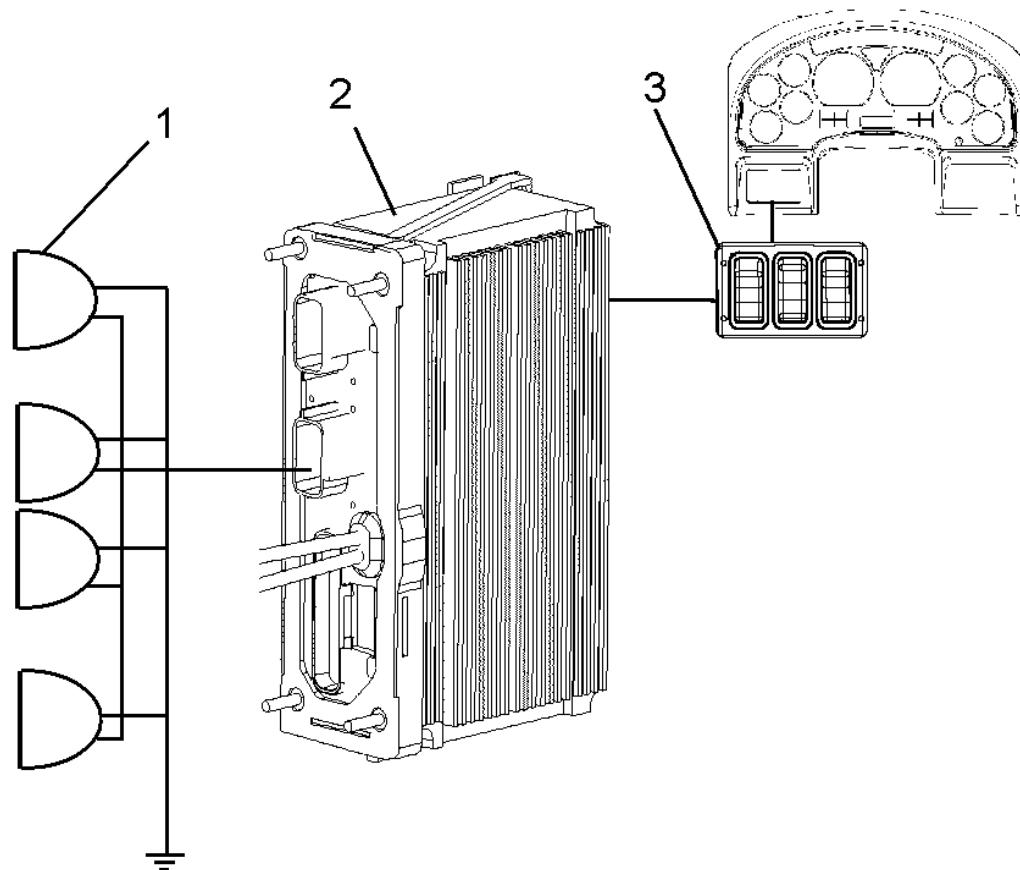


Figure 442 Red And Amber Pupil Warning Lights Function Diagram

1. RED AND AMBER PUPIL WARNING LIGHTS
2. ELECTRICAL SYSTEM CONTROLLER
3. RED/AMBER LIGHT FLASHER SWITCH

The stop arm and Red & Amber Pupil Warning Lights are activated when the red/amber flasher switch is activated. The steering wheel switches will send a message to the ESC to command the lights on. The ESC supplies battery voltage for the red/amber lights. The ESC supplies a ground for the stop arm relay to activate.

8.2. DIAGNOSTICS

NOTE – If vehicle is equipped with Ohio Override System, then go to the Ohio Override section of this manual to diagnose the switch inputs. (See Pupil Warning Lights — Ohio Override, page 941)

NOTE – If vehicle is equipped with Virginia Warning Lights, then go to the Virginia Warning Lights section of this manual to diagnose the switch inputs. (See Pupil Warning Lights — Virginia Warning Lights, page 957)

NOTE – If vehicle is equipped with Florida Warning Lights, then go to the Florida Warning Lights section of this manual to diagnose the switch inputs. (See Pupil Warning Lights — Florida Warning Lights, page 969)

NOTE – If vehicle is equipped with Maryland Warning Lights, then go to the Maryland Warning Lights section of this manual to diagnose the switch inputs. (See Pupil Warning Lights — Maryland Warning Lights, page 978)

If the lights stay on when the red/amber flasher switch is in the off position, the problem is most likely a faulty red/amber flasher switch, wiring between the switch and the ESC, a problem in the ESC, or a problem with the wiring between the ESC and the red/amber flashers.

Should the lights fail to come on when the red/amber flasher switch is in the “on” position, the problem is most likely a faulty red/amber flasher switch, wiring between the switch and the ESC, a problem in the ESC, or a problem with the wiring between the ESC and the red/amber flashers.

Should the stop arm fail to operate when the red/amber flasher switch is in the “on” position, the problem is most likely a faulty red/amber flasher switch, wiring between the switch and the ESC, a problem in the ESC, or a problem with the wiring between the ESC and the stop arm motor.

A diagnostic trouble code will be logged if there is an over current caused by a short to ground or excessive load (too many accessories) or an open in the circuits between the ESC and the red/amber flasher lights.

If individual lights are inoperative the problem must be attributed to faulty lamps or open wiring to the individual lamps.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to command the ESC to turn on the lights and monitor activation of the red/amber flasher light switch. See the diagnostic software manual for details on using the software.

Red And Amber Pupil Warning Lights Preliminary Check

Table 264 Red And Amber Pupil Warning Lights Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify stop arm and red/amber flasher lights are inoperative.	Visually check stop arm and red/amber flasher lights.	Stop arm and red/amber flasher lights are inoperative.	Go to next step.	Stop arm and red/amber flasher lights are operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.

Table 264 Red And Amber Pupil Warning Lights Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
3.	On	Are all red/amber flasher lights inoperative?	Visually check if all lights are inoperative.	All lights are inoperative.	Go to next step.	Check specific circuits of the inoperative light(s) for open circuits.
4.	On	Check for red/amber flasher light diagnostic trouble codes.	Read display on odometer.	No red/amber flasher light diagnostic trouble codes are active.	Go to stop arm and red/amber flasher light circuit inputs to ESC.	Go to stop arm and red/amber flasher light circuit inputs to ESC.

Diagnostic Trouble Codes

To display diagnostic trouble codes (DTC's), set the parking brake and turn the Ignition key "ON". Then press the Cruise "ON" switch and the Cruise "Resume" switch simultaneously. If no faults are present, the cluster odometer will display "NO FAULTS". If faults are present, the gauge cluster display will show the number of faults and each diagnostic trouble code for 10 seconds and then automatically scroll to the next entry and continue to cycle through the faults. To manually cycle through the fault list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in "A" for active faults or "P" for previously active faults. Releasing the parking brake or turning the ignition key off will take the ESC and the gauge cluster out of the diagnostic mode.

After all repairs have been made, the diagnostic trouble codes may be cleared by putting the key switch in the accessory position, turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 265 Stop Arm and Red/Amber Lights Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
NO DIAGNOSTIC TROUBLE CODE	Diagnostic trouble codes are not logged for every possible fault in the flasher light circuits.
611 14 11 1	Connector #1603 Pin #F (Right Front Amber PWL's) under current.
611 14 11 2	Connector #1603 Pin #F (Right Front Amber PWL's) over current.
611 14 11 3	Connector #1603 Pin #F (Right Front Amber PWL's) less than normal current but more than open circuit.
611 14 11 4	Connector #1603 Pin #F (Right Front Amber PWL's) greater than normal high current and less than fusing current.
611 14 11 6	Connector #1603 Pin #F (Right Rear Amber PWLs) has current flow when output commanded off.
611 14 10 1	Connector #1601 Pin #C (Right Rear Amber PWLs) under current.

Table 265 Stop Arm and Red/Amber Lights Diagnostic Trouble Codes (cont.)

611 14 10 2	Connector #1601 Pin #C (Right Rear Amber PWL) over current.
611 14 10 3	Connector #1601 Pin #C (Right Rear Amber PWL) less than normal current but more than open circuit.
611 14 10 4	Connector #1601 Pin #C (Right Rear Amber PWL) greater than normal high current and less than fusing current.
611 14 10 6	Connector #1601 Pin #C (Right Rear Amber PWL) has current flow when output commanded off.
611 14 9 1	Connector #1604 Pin #G (Left Rear Amber Flashers) under current.
611 14 9 2	Connector #1604 Pin #G (Left Rear Amber Flashers) over current.
611 14 9 3	Connector #1604 Pin #G (Left Rear Amber Flashers) less than normal current but more than open circuit.
611 14 9 4	Connector #1604 Pin #G (Left Rear Amber Flashers) greater than normal high current and less than fusing current.
611 14 9 6	Connector #1604 Pin #G (Left Rear Amber Flashers) has current flow when output commanded off.
611 14 2 1	Connector #1604 Pin #A (Left Front Amber PWL) under current.
611 14 2 2	Connector #1604 Pin #A (Left Front Amber PWL) over current.
611 14 2 3	Connector #1604 Pin #A (Left Front Amber PWL) less than normal current but more than open circuit.
611 14 2 4	Connector #1604 Pin #A (Left Front Amber PWL) greater than normal high current and less than fusing current.
611 14 2 6	Connector #1604 Pin #A (Left Front Amber PWL) has current flow when output commanded off.
2033 14 1 1	Connector #1601 Pin #A (Stop Arm Command) Too Much Load Attached.
2033 14 1 2	Connector #1601 Pin #A (Stop Arm Command) Open Circuit.
2033 14 1 3	Connector #1601 Pin #A (Stop Arm Command) Shorted To Ground.

8.3. RED AND AMBER PUPIL WARNING LIGHTS INPUTS TO ESC FROM STEERING WHEEL SWITCHES

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to the Red And Amber Pupil Warning Lights ESC Input Circuits.

A fault in the input circuits will be apparent when the flashers and/or stop arm fail to operate.

Typical Steering Wheel Switch Inputs

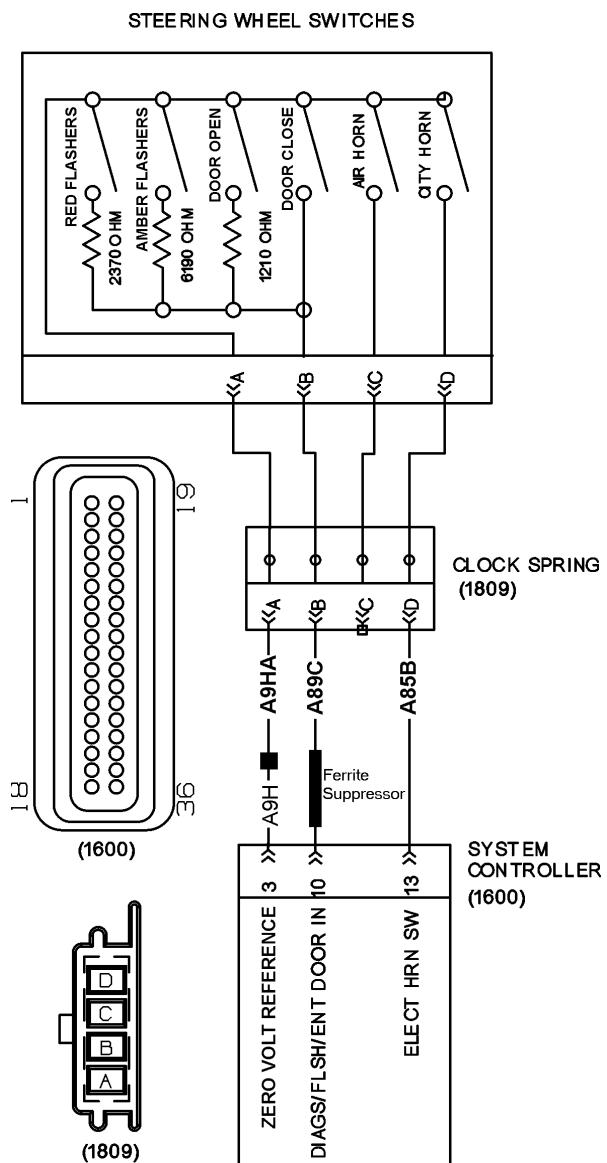


Figure 443 Red And Amber Pupil Warning Lights ESC Input Circuits From Steering Wheel Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER

LOCATED AT INSIDE RIGHT SIDE DASH PANEL

(1809) CLOCK SPRING

LOCATED IN STEERING COLUMN

Table 266 Steering Wheel Switch Circuit Tests

Diagnostic Trouble Codes
There are no diagnostic trouble codes associated with the steering wheel switches.

Table 266 Steering Wheel Switch Circuit Tests (cont.)

Steering Wheel Switches Resistance Checks		
Check with clock spring (1809) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Clock spring (1809) cavity A to cavity B.	Open circuit	If Ohmmeter reads a resistance value, there is a short circuit in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Flashers On/Off" button.	Approximately 6.2 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Red Override" button.	Approximately 2.4 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Door Open" button.	Approximately 1.2 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Door Close" button.	Short Circuit	If Ohmmeter reads a resistance there is a short in the steering wheel switches. Replace steering wheel switches.
System Controller Zero Volt Reference Check		
Check with key in ignition position on and system controller connector 1600 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
System controller (1600) pin 3 to ground.	0 volts	If there is a voltage or an open circuit, then system controller may need to be reprogrammed.

Steering Wheel Switch Inputs w/Master Flasher Switch

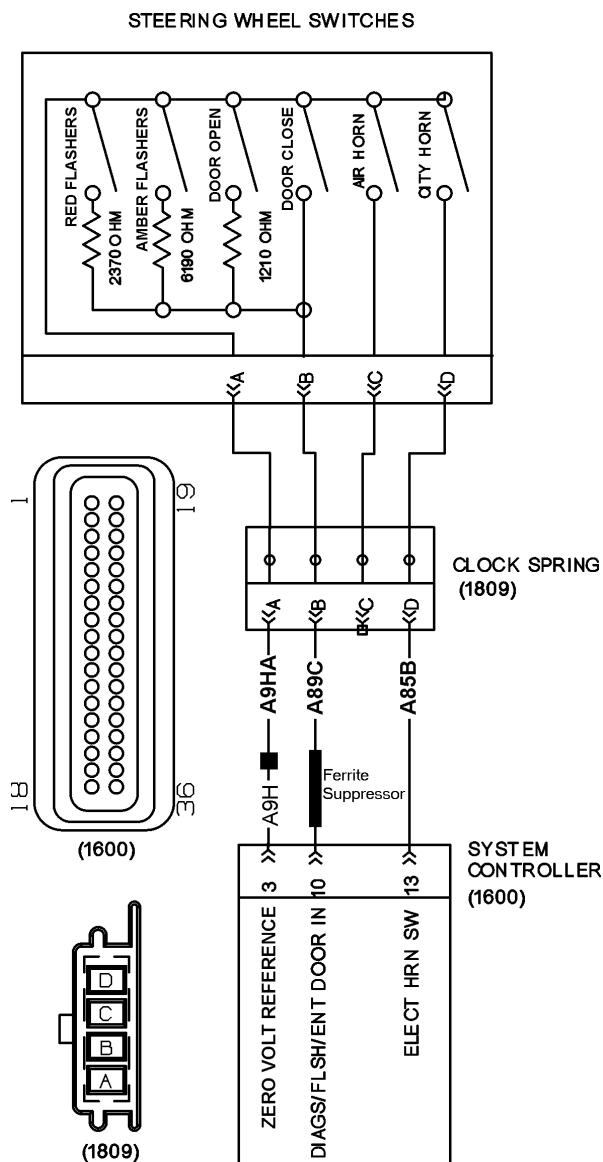


Figure 444 Red And Amber Pupil Warning Lights ESC Input Circuits From Steering Wheel Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

(1809) CLOCK SPRING
LOCATED IN STEERING COLUMN

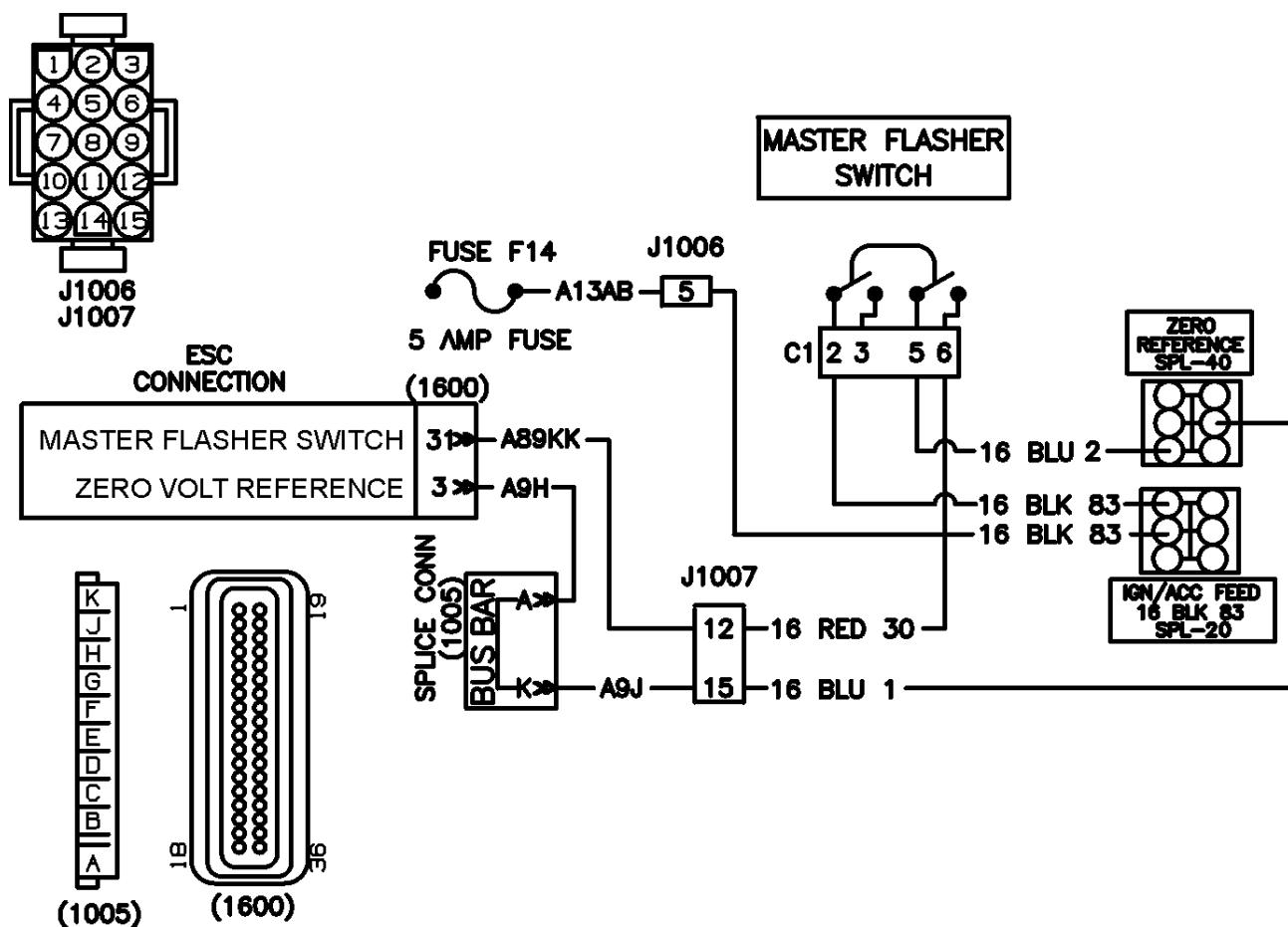


Figure 445 Master Flasher Switch in Left Hand Switch Panel Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE SPLICING CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- SPL-20 IGNITION ACCESSORY FEED SPLICE
- SPL-40 ZERO VOLT REFERENCE SPLICE CONNECTION

Table 267 Steering Wheel Switch Circuit Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the steering wheel switches.		
Steering Wheel Switches Resistance Checks		
Check with clock spring (1809) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Clock spring (1809) cavity A to cavity B.	Open circuit	If Ohmmeter reads a resistance value, there is a short circuit in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Flashers On/Off" button.	Approximately 6.2 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Red Override" button.	Approximately 2.4 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Door Open" button.	Approximately 1.2 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Door Close" button.	Short Circuit	If Ohmmeter reads a resistance there is a short in the steering wheel switches. Replace steering wheel switches.
Master Flasher Switch Voltage Checks		
Check with key in ignition position on and master flasher switch (C1) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Master flasher switch connector (C1) cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB

Table 267 Steering Wheel Switch Circuit Tests (cont.)

Master flasher switch connector (C1) cavity 5 to ground.	0 volts	If voltage is different, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Master flasher switch connector (C1) cavity 5 to 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 RED 30 and A89KK. If circuits check good, then the ESC may need reprogrammed.

Steering Wheel Switch Inputs Omit Master Flasher Switch

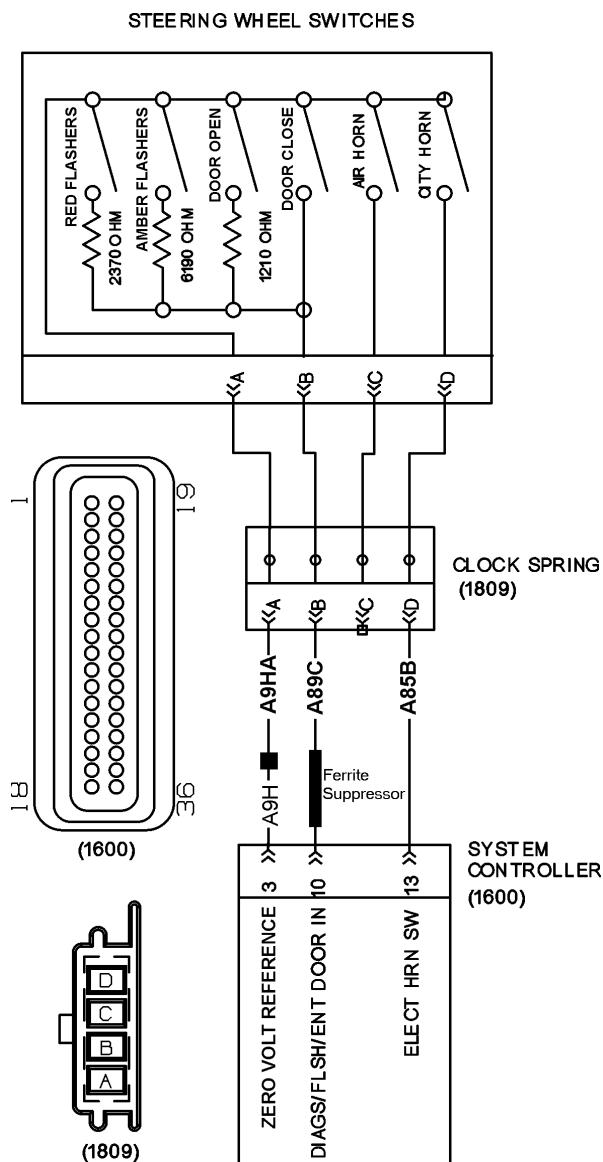


Figure 446 Red And Amber Pupil Warning Lights ESC Input Circuits From Steering Wheel Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

(1809) CLOCK SPRING
LOCATED IN STEERING COLUMN

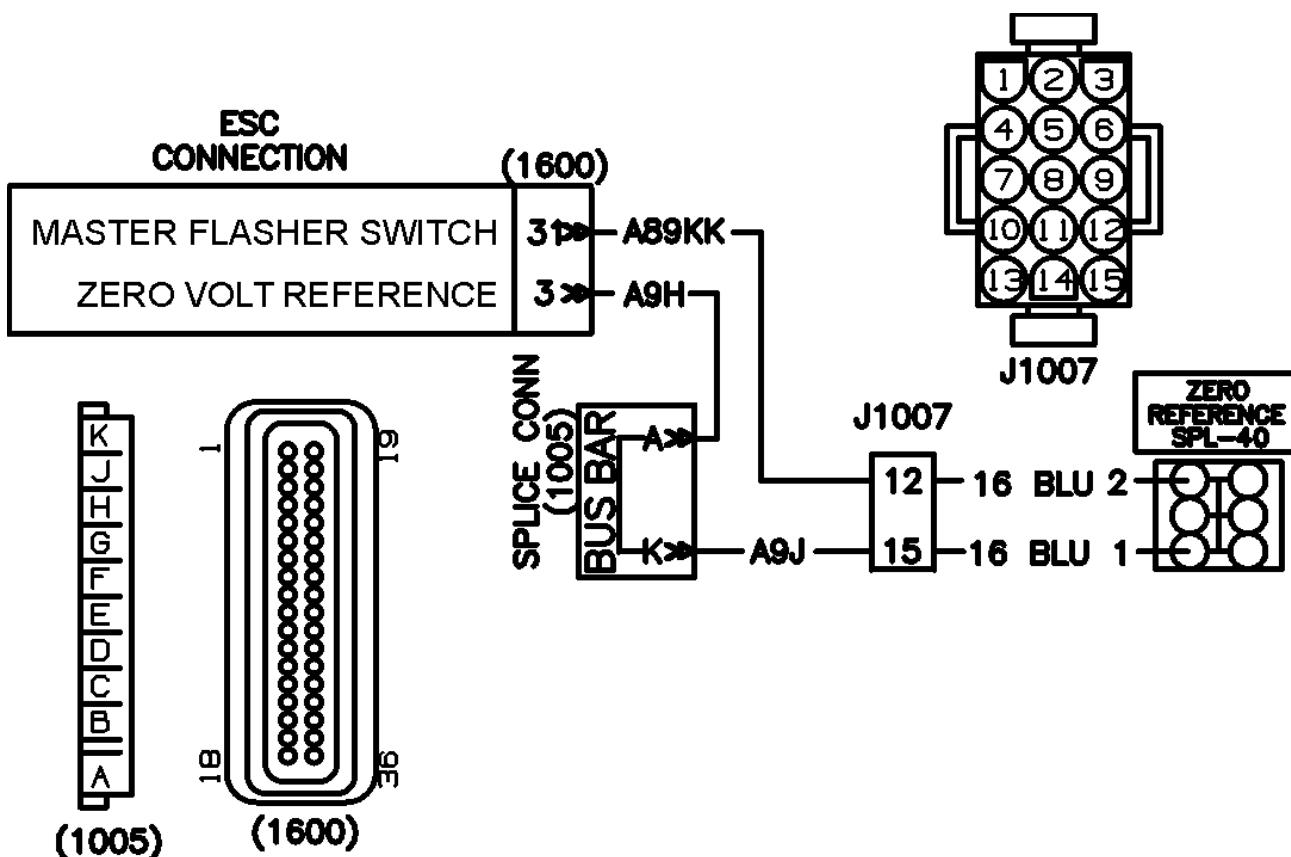


Figure 447 Master Flasher Switch Signal Input — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
SPL-40 ZERO VOLT REFERENCE SPLICE CONNECTION

Table 268 **Steering Wheel Switch Circuit Tests**

Diagnostic Trouble Codes	
There are no diagnostic trouble codes associated with the steering wheel switches.	
Steering Wheel Switches Resistance Checks	
Check with clock spring (1809) disconnected.	
NOTE – Always check connectors for damage and pushed-out terminals.	

Table 268 Steering Wheel Switch Circuit Tests (cont.)

Test Points	Spec.	Comments
Clock spring (1809) cavity A to cavity B.	Open circuit	If Ohmmeter reads a resistance value, there is a short circuit in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Flashers On/Off" button.	Approximately 6.2 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Red Override" button.	Approximately 2.4 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Door Open" button.	Approximately 1.2 Kohms	If Ohmmeter reads a different resistance there is an open or short in the steering wheel switches. Replace steering wheel switches.
Clock spring (1809) cavity A to cavity B while holding "Door Close" button.	Short Circuit	If Ohmmeter reads a resistance there is a short in the steering wheel switches. Replace steering wheel switches.

System Controller Zero Volt Reference Check

Check with key in ignition position on and system controller connector 1600 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
System controller (1600) pin 3 to ground.	0 volts	If there is a voltage then system controller may need to be reprogrammed. Also check for open or short on circuits A9H, A9J, 16 BLU 1, 16 BLU 2 and A89KK.

Extended Description

The steering wheel switches are wired to the ESC at pins 3 and 10. Pin 3 is the zero volt signal. This signal is received at pin 10 through one of four resistive possibilities. The resistance value detected at pin 10 tells the ESC what function to do.

8.4. RED AND AMBER PUPIL WARNING LIGHTS INPUTS TO ESC FROM ROCKER SWITCHES

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Red & Amber PWL input circuits will be apparent when the flashers and/or stop arm fail to operate. The ESC will also log a diagnostic trouble code (DTC) when there is a short in any of the red or amber pupil warning lamp circuits. Problems in the red or amber pupil warning lamp circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

Typical Left Hand Switch Panel Rocker Switch Inputs

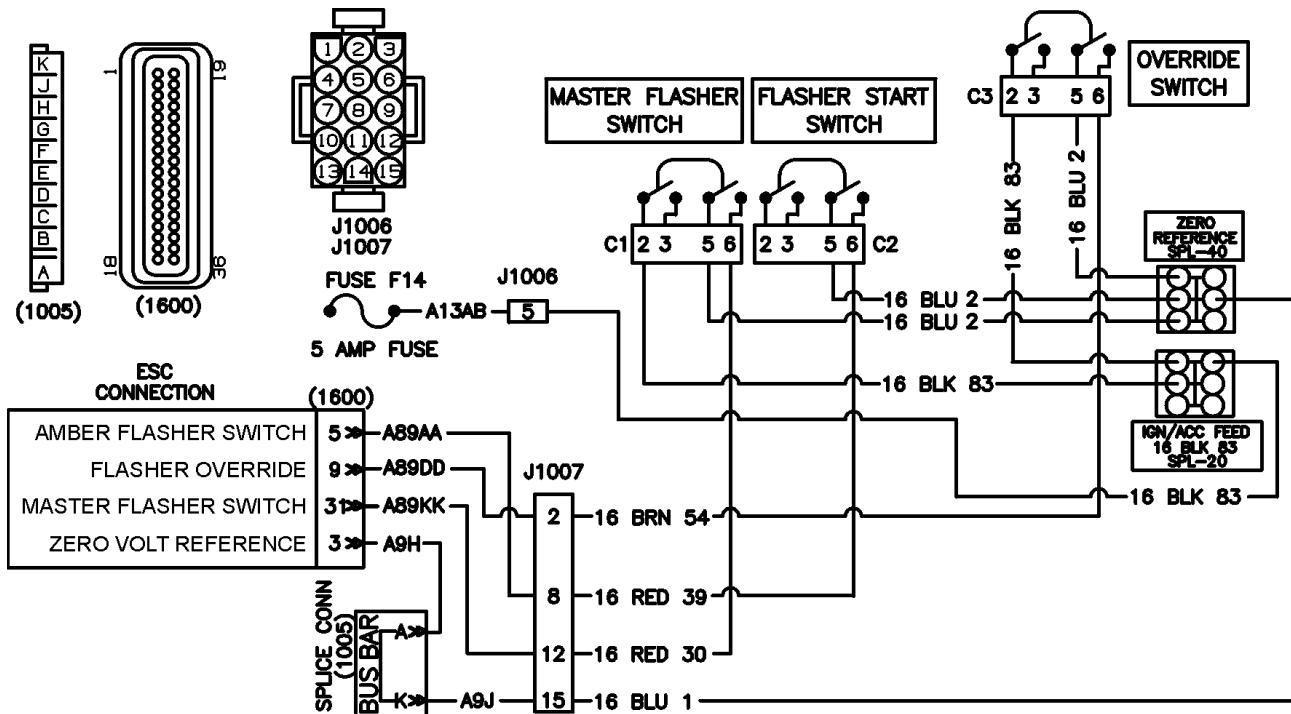


Figure 448 Red And Amber Pupil Warning Lights ESC Input Circuits From Left Hand Switch Panel — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- SPL-20 IGNITION ACCESSORY FEED SPLICE
- SPL-40 ZERO VOLT REFERENCE FEED SPLICE

Table 269 Left Hand Switch Panel Rocker Switch Circuit Tests

Flasher Switches Voltage Checks		
Check with ignition on and flasher switch connectors disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Master Flasher Switch connector C1 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLK 83 and A13AB. Also check for blown fuse F14. If wiring is good, replace switch.
Override Switch connector C3 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLK 83 and A13AB. Also check for blown fuse F14. If wiring is good, replace switch.
Master Flasher Switch connector C1 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Master Flasher Switch connector C1 pin 5 to pin 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 RED 30 and A89KK. If circuits check good, then the ESC may need reprogrammed.

Table 269 Left Hand Switch Panel Rocker Switch Circuit Tests (cont.)

Flasher Start Switch connector C2 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Flasher Start Switch connector C2 pin 5 to pin 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 RED 39 and A89AA. If circuits check good, then the ESC may need reprogrammed.
Override Switch connector C3 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 WHT 30, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Override Switch connector C3 pin 5 to pin 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 BRN 54and A89DD. If circuits check good, then the ESC may need reprogrammed.

Typical Right Hand Switch Panel Rocker Switch Inputs

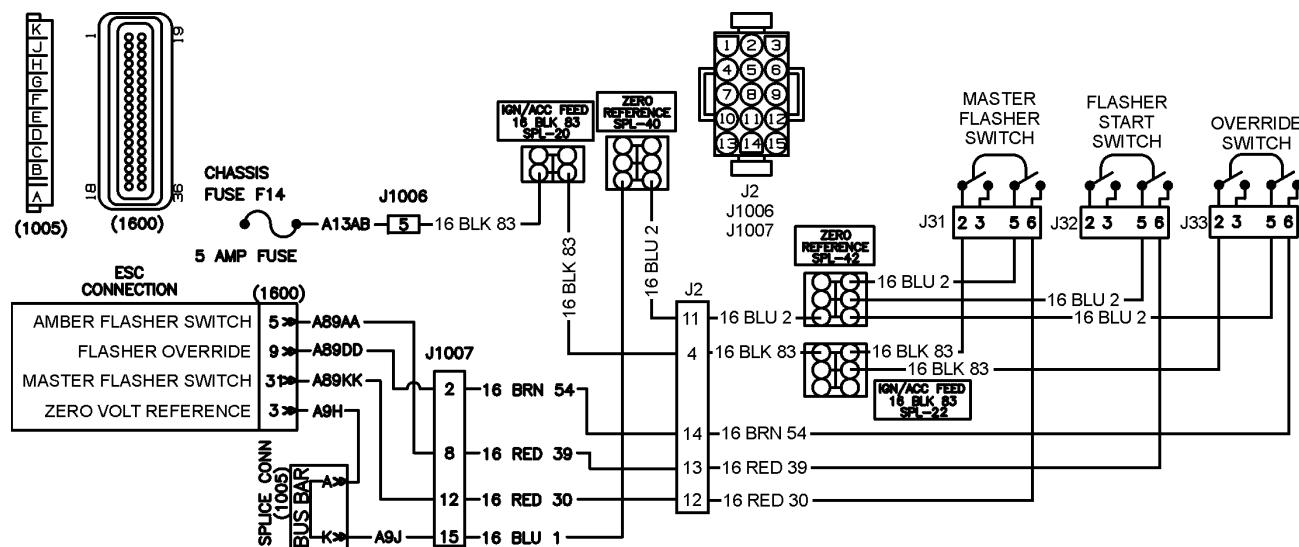


Figure 449 Red And Amber Pupil Warning Lights ESC Input Circuits From Right Hand Switch Panel — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- SPL-20 SPL-22 IGNITION ACCESSORY FEED SPLICE
- SPL-40 SPL-42 ZERO VOLT REFERENCE FEED SPLICE

Table 270 Left Hand Switch Panel Rocker Switch Circuit Tests

Flasher Switches Voltage Checks		
Check with ignition on and flasher switch connectors disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Master Flasher Switch connector C31 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLK 83 and A13AB. Also check for blown fuse F14. If wiring is good, replace switch.

Table 270 Left Hand Switch Panel Rocker Switch Circuit Tests (cont.)

Override Switch connector C33 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLK 83 and A13AB. Also check for blown fuse F14. If wiring is good, replace switch.
Master Flasher Switch connector C31 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Master Flasher Switch connector C31 pin 5 to pin 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 RED 30 and A89KK. If circuits check good, then the ESC may need reprogrammed.
Flasher Start Switch connector C32 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Flasher Start Switch connector C32 pin 5 to pin 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 RED 39 and A89AA. If circuits check good, then the ESC may need reprogrammed.

Table 270 Left Hand Switch Panel Rocker Switch Circuit Tests (cont.)

Override Switch connector C33 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 WHT 30, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Override Switch connector C3 pin 5 to pin 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 BRN 54and A89DD. If circuits check good, then the ESC may need reprogrammed.

Always Hot Override Switch Input

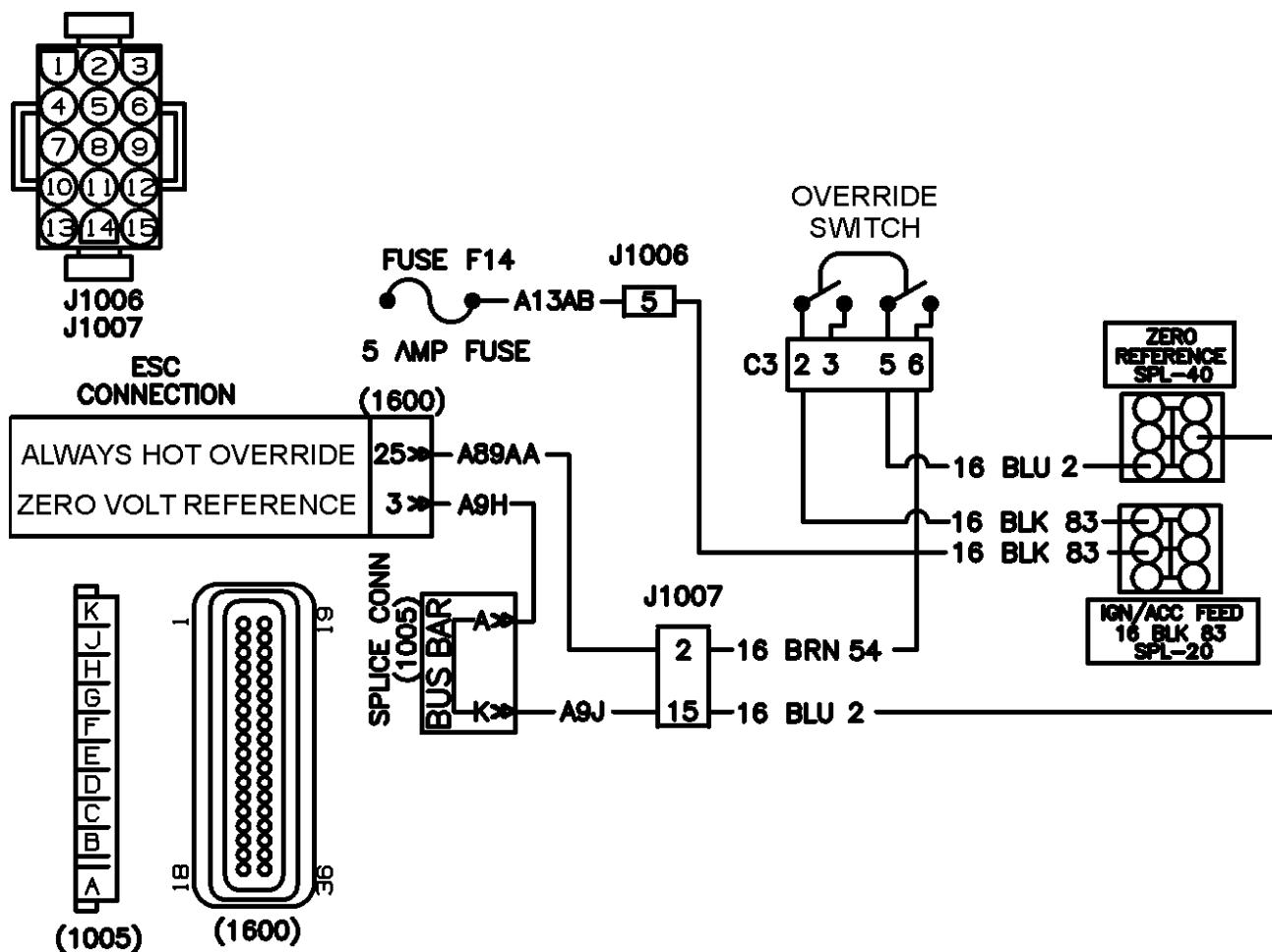


Figure 450 Red And Amber Pupil Warning Lights Hot All Time Override Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
- SPL-20 IGNITION ACCESSORY FEED SPLICE
- SPL-40 ZERO VOLT REFERENCE FEED SPLICE

Table 271 Left Hand Switch Panel Rocker Switch Circuit Tests

Override Switch Voltage Checks		
Check with ignition on and override switch connector disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Override switch connector C3 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BLK 83 and A13AB. Also check for blown fuse F14. If wiring is good, replace switch.
Override switch connector C3 pin 5 to ground.	0 volts	If voltage is not zero, check for open or short on circuits 16 BLU 2, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If zero volt reference signal is missing, then the ESC may need reprogrammed.
Override switch connector C3 pin 5 to 6.	0 volts	If voltage is not zero, check for open or short on circuits 16 BRN 54 and A89AA. If circuits check good, then the ESC may need reprogrammed.

Extended Description

Right Hand Switch Panel:

Power to the Master Flasher Switch and Override Switch is provided from the chassis fuse F14 through the Ign/Acc Feed SPL-20 through Ign/Acc Feed SPL-21 through connector J2 through Ign/Acc Feed SPL-22.

When the Master Flasher Switch is closed, the zero volt reference signal from the ESC connector (1600) pin 3 will pass through the zero volt reference splice connector to the zero volt reference SPL-40 through the zero volt reference SPL-41 through connector J2 through the zero volt reference SPL-42 back to the ESC connector (1600) pin 31.

When the Flasher Start Switch is closed, the zero volt reference signal from the ESC connector (1600) pin 3 will pass through the zero volt reference splice connector to the zero volt reference SPL-40 through the zero volt reference SPL-41 through connector J2 through the zero volt reference SPL-42 back to the ESC connector (1600) pin 5.

When the Override Switch is closed, the zero volt reference signal from the ESC connector (1600) pin 3 will pass through the zero volt reference splice connector to the zero volt reference SPL-40 through the zero volt reference SPL-41 through connector J2 through the zero volt reference SPL-42 back to the ESC connector (1600) pin 9.

Left Hand Switch Panel:

Power to the Master Flasher Switch and Override Switch is provided from the chassis fuse F14 through the Ign/Acc Feed SPL-20 through Ign/Acc Feed SPL-21.

When the Master Flasher Switch is closed, the zero volt reference signal from the ESC connector (1600) pin 3 will pass through the zero volt reference splice connector to the zero volt reference SPL-40 through the zero volt reference SPL-41 back to the ESC connector (1600) pin 31.

When the Flasher Start Switch is closed, the zero volt reference signal from the ESC connector (1600) pin 3 will pass through the zero volt reference splice connector to the zero volt reference SPL-40 through the zero volt reference SPL-41 back to the ESC connector (1600) pin 5.

When the Override Switch is closed, the zero volt reference signal from the ESC connector (1600) pin 3 will pass through the zero volt reference splice connector to the zero volt reference SPL-40 through the zero volt reference SPL-41 back to the ESC connector (1600) pin 9.

8.5. RED AND AMBER PUPIL WARNING LIGHTS OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Red or Amber Pupil Warning Lights Output Circuits will be apparent when the red or amber pupil warning lights are turned on and the red or amber pupil warning lights do not come on. The ESC will also log a diagnostic trouble code (DTC) when there is a short in any of the red or amber pupil warning lamp circuits. Problems in the red or amber pupil warning lamp circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

Buses Built Prior to Jan. 12, 2004

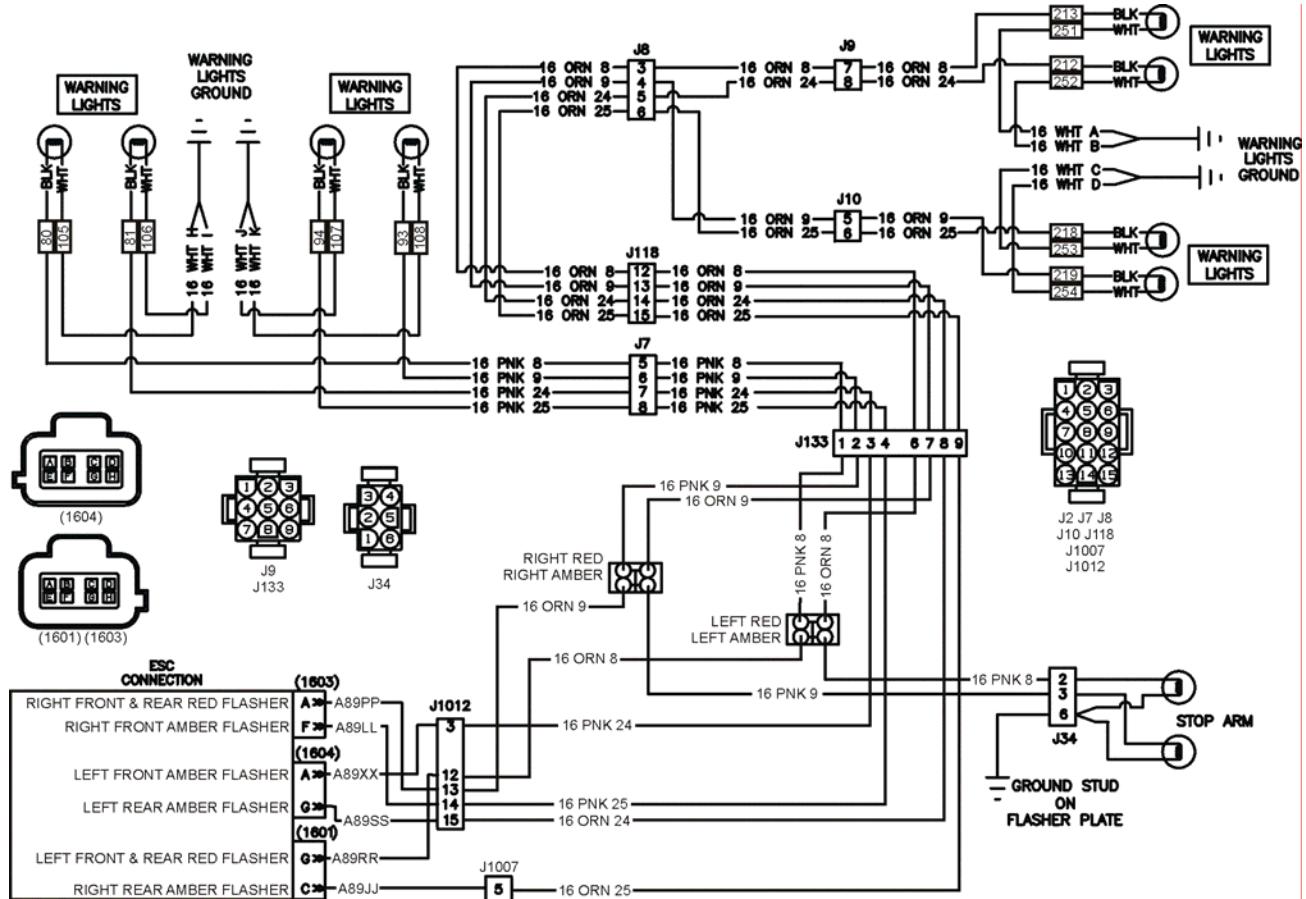


Figure 451 Red and Amber Pupil Warning Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1007) (1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1601) (1603) (1604) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J7 J8 J118 LEFT HAND BODY TO FRONT CAP
J9 J10 LEFT HAND BODY TO REAR CAP
J34 FLASHER PLATE TO STOP ARM
J133 FLASHER PLATE TO LEFT HAND BODY

NOTE – Before testing any red or amber pupil warning light circuits, check individual bulbs to ensure that they are not burnt out.

Table 272 Amber Pupil Warning Lights Circuit Tests

Amber Pupil Warning Lights Voltage Checks		
Check with ignition on, amber pupil warning lights connectors disconnected and amber pupil warning lights activated.		
Test Points	Spec.	Comments
Left front amber PWL connector cavity 81 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 24 and A89XX.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Left front amber PWL connector cavity 81 to 106	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	If voltage is missing, check for open or short to high in circuit 16 WHT I.
Right front amber PWL connector cavity 94 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 25 and A89LL.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>

Table 272 Amber Pupil Warning Lights Circuit Tests (cont.)

Right front amber PWL connector cavity 94 to 107	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT J.
Left rear amber PWL connector cavity 212 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 24 and A89SS. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear amber PWL connector cavity 212 to 252	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT B.
Right rear amber PWL connector cavity 218 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 25 and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear amber PWL connector cavity 218 to 253	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT C.

Table 273 Red Pupil Warning Lights Circuit Tests

Red Pupil Warning Lights Voltage Checks		
<p>With red pupil warning light disconnected and red pupil warning light activated.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		
Test Points	Spec.	Comments
Left front red PWL connector cavity 80 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Left front red PWL connector cavity 80 to 105	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	If voltage is missing, check for open or short to high in circuit 16 WHT H.
Right front red PWL connector cavity 93 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Right front red PWL connector cavity 93 to 108	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	If voltage is missing, check for open or short to high in circuit 16 WHT K.

Table 273 Red Pupil Warning Lights Circuit Tests (cont.)

Left rear red PWL connector cavity 213 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear red PWL connector cavity 213 to 251	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT A.
Right rear red PWL connector cavity 219 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear red PWL connector cavity 219 to 254	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.
Stop arm red PWL connector J34 cavity 2 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 273 Red Pupil Warning Lights Circuit Tests (cont.)

Stop arm red PWL connector J34 cavity 2 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.
Stop arm red PWL connector J34 cavity 3 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 3 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.

Buses Built After Jan. 12, 2004

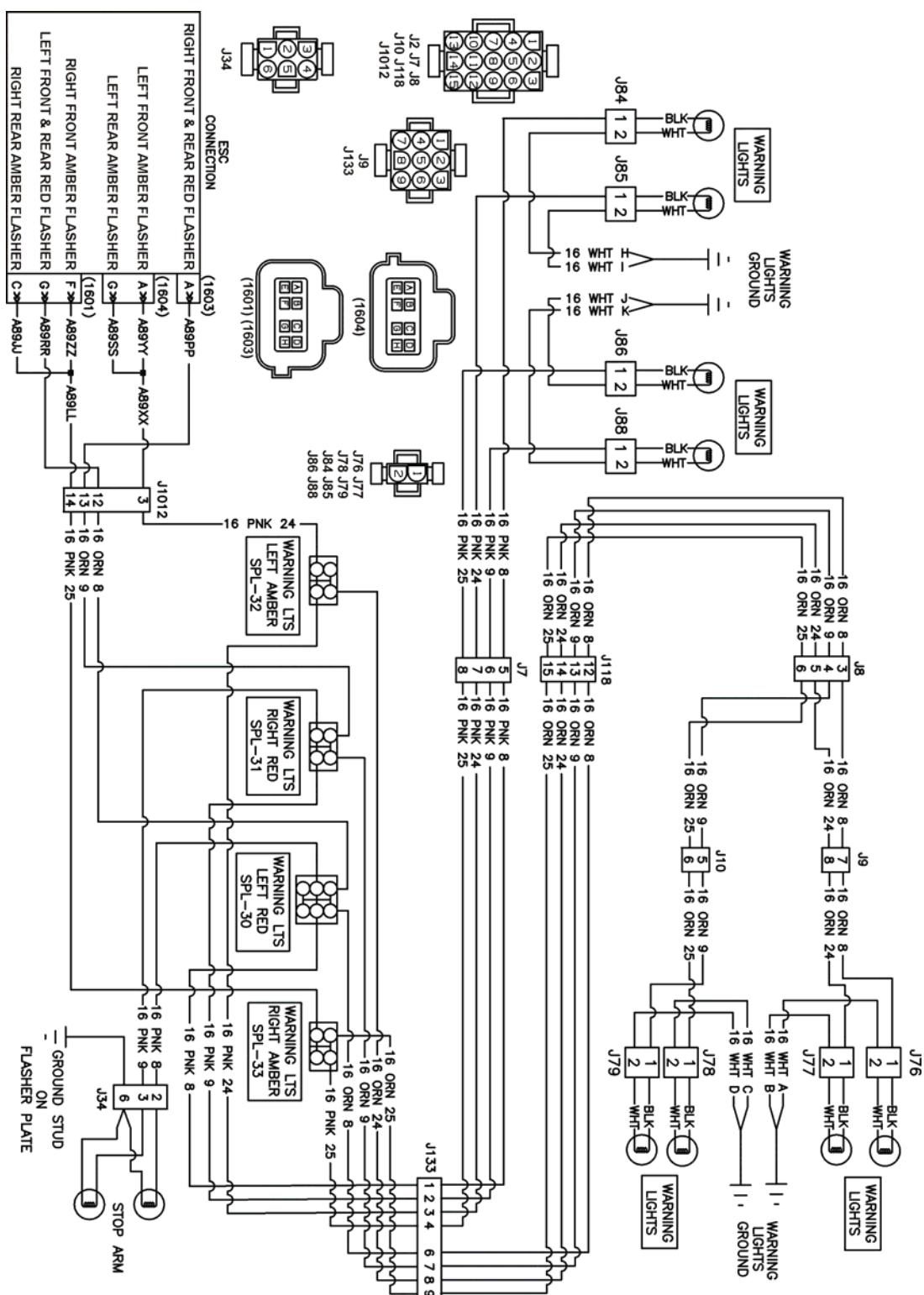


Figure 452 Red and Amber Pupil Warning Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1012) BODY BUILDER CONNECTOR
 LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
 (1601) (1603) (1604) SYSTEM CONTROLLER
 LOCATED INSIDE RIGHT SIDE DASH PANEL
 J7 J8 J118 LEFT HAND BODY TO FRONT CAP
 J9 J10 LEFT HAND BODY TO REAR CAP
 J34 FLASHER PLATE TO STOP ARM
 J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
 J77 LEFT RED AMBER WARNING LIGHT TO REAR CAP
 J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
 J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
 J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
 J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J88 RIGHT FRONT RED WARNING LIGHT TO FRONT CAP
 J133 FLASHER PLATE TO LEFT HAND BODY
 SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
 SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE
 SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR SPLICE
 SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR SPLICE

NOTE – Before testing any red or amber pupil warning light circuits, check individual bulbs to ensure that they are not burnt out.

Table 274 Amber Pupil Warning Lights Circuit Tests

Amber Pupil Warning Lights Voltage Checks		
Check with ignition on, amber pupil warning lights connectors disconnected and amber pupil warning lights activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front amber PWL connector (J85) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 24, A89XX, A89YY and A89SS. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 274 Amber Pupil Warning Lights Circuit Tests (cont.)

Left front amber PWL connector (J85) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT I.
Right front amber PWL connector (J86) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 25, A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front amber PWL connector (J86) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT J.
Left rear amber PWL connector (J77) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 24, 16 PNK 24, A89XX, A89YY and A89SS. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear amber PWL connector (J77) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT B.

Table 274 Amber Pupil Warning Lights Circuit Tests (cont.)

Right rear amber PWL connector (J78) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 25, 16 PNK 25 A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear amber PWL connector (J78) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT C.

Table 275 Red Pupil Warning Lights Circuit Tests

Red Pupil Warning Lights Voltage Checks		
With red pupil warning light disconnected and red pupil warning light activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front red PWL connector (J84) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left front red PWL connector (J84) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT H.

Table 275 Red Pupil Warning Lights Circuit Tests (cont.)

Right front red PWL connector (J88) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front red PWL connector (J88) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT K.
Left rear red PWL connector (J76) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear red PWL connector (J76) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT A.
Right rear red PWL connector (J79) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 275 Red Pupil Warning Lights Circuit Tests (cont.)

Right rear red PWL connector (J79) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.
Stop arm red PWL connector J34 cavity 2 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 2 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.
Stop arm red PWL connector J34 cavity 3 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 3 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.

Extended Description

When the ESC is commanded to turn the amber pupil warning lights on, the ESC will alternate 12 volts and zero volts to the lights from ESC connector (1604) terminals A and G and connector (1601) terminals C and F through body builder connector (1012) to the amber pupil warning lights splices SPL-32 and SPL-33. The right side amber pupil warning lights will be on when the left side amber pupil warning lights are off and vice versa.

Ground is provided to the amber pupil warning lights from the warning lights ground located at the lights.

When the ESC is commanded to turn the red pupil warning lights on, the ESC will alternate 12 volts and zero volts to the lights from ESC connector (1603) terminal A and connector (1601) terminal G through body builder connector (1012) to the red pupil warning lights splices SPL-30 and SPL-31. The right side red pupil warning lights will be on when the left side red pupil warning lights are off and vice versa. The stop arm lights will also alternate.

8.6. STOP ARM OUTPUTS FROM ESC

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the stop arm will be apparent when the red pupil warning lights are activated and the stop arm does not extend. The ESC will also log a diagnostic trouble code (DTC) when there is a short in stop arm. Problems in the stop arm circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

Electric Stop Arm

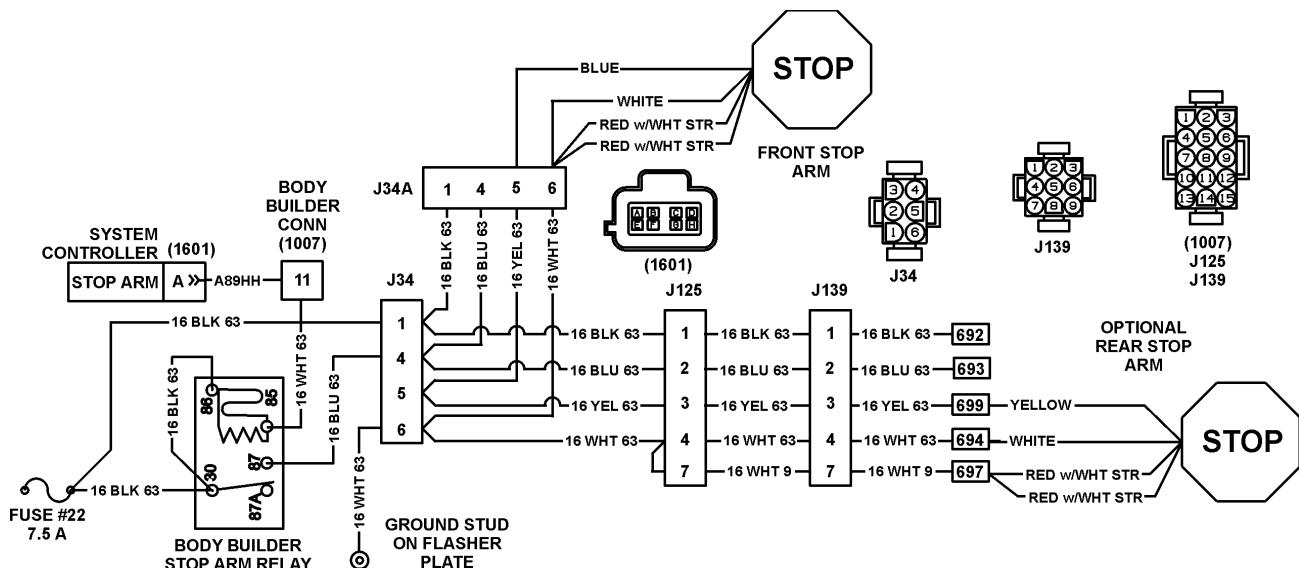


Figure 453 Electric Stop Arm Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1601) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- J34 FLASHER PLATE TO STOP ARM
- J125 LEFT HAND BODY TO FLASHER PLATE

Table 276 Electric Stop Arm Circuit Tests

Stop Arm Relay Voltage Checks		
With key in ignition position on, red pupil warning lights activated and stop arm relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Stop arm relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 BLU 63.
Stop arm relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 86 to 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
With meter still connected to stop arm relay cavity 86 to 85, deactivate red pupil warning lights.		
Stop arm relay cavity 86 to 85	0 volts	If voltage is present, check for short in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Front Stop Arm Connector (J34A) Voltage Checks		
With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J34A disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		

Table 276 Electric Stop Arm Circuit Tests (cont.)

Test Points	Spec.	Comments
Stop arm connector (J34A) cavity 4 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J34A) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J34A) cavity 1 to 6	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.

Optional Rear Stop Arm Connector (J139) Voltage Checks

With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J139 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Stop arm connector (J139) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J139) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J139) cavity 1 to 7	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 9 and 16 WHT 63.
Stop arm connector (J139) cavity 1 to 4	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.

Electric Stop Arm w/Strobe Lights

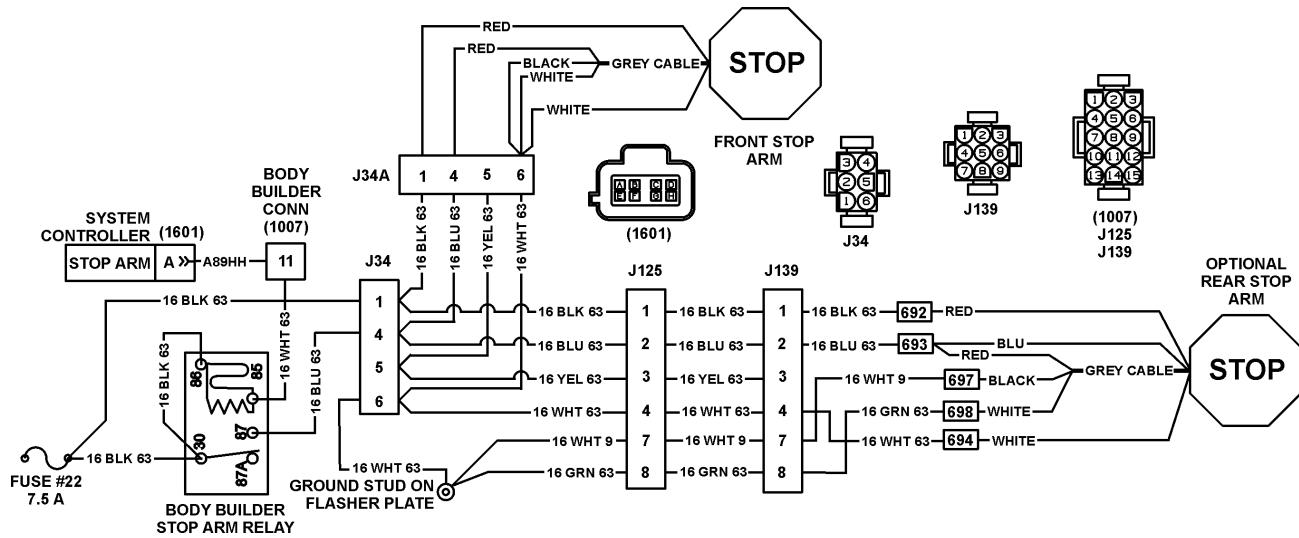


Figure 454 Electric Stop Arm w/Strobe Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1601) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J34 FLASHER PLATE TO STOP ARM
J125 LEFT HAND BODY TO FLASHER PLATE

Table 277 Electric Stop Arm w/Strobe Lights Circuit Tests

Stop Arm Relay Voltage Checks		
With key in ignition position on, red pupil warning lights activated and stop arm relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Stop arm relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 BLU 63.
Stop arm relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.

Table 277 Electric Stop Arm w/Strobe Lights Circuit Tests (cont.)

Stop arm relay cavity 86 to 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
With meter still connected to stop arm relay cavity 86 to 85, deactivate red pupil warning lights.		
Stop arm relay cavity 86 to 85	0 volts	If voltage is present, check for short in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Front Stop Arm Connector (J34A) Voltage Checks

With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J34A disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Stop arm connector (J34A) cavity 4 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J34A) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J34A) cavity 1 to 6	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.

Optional Rear Stop Arm Connector (J139) Voltage Checks

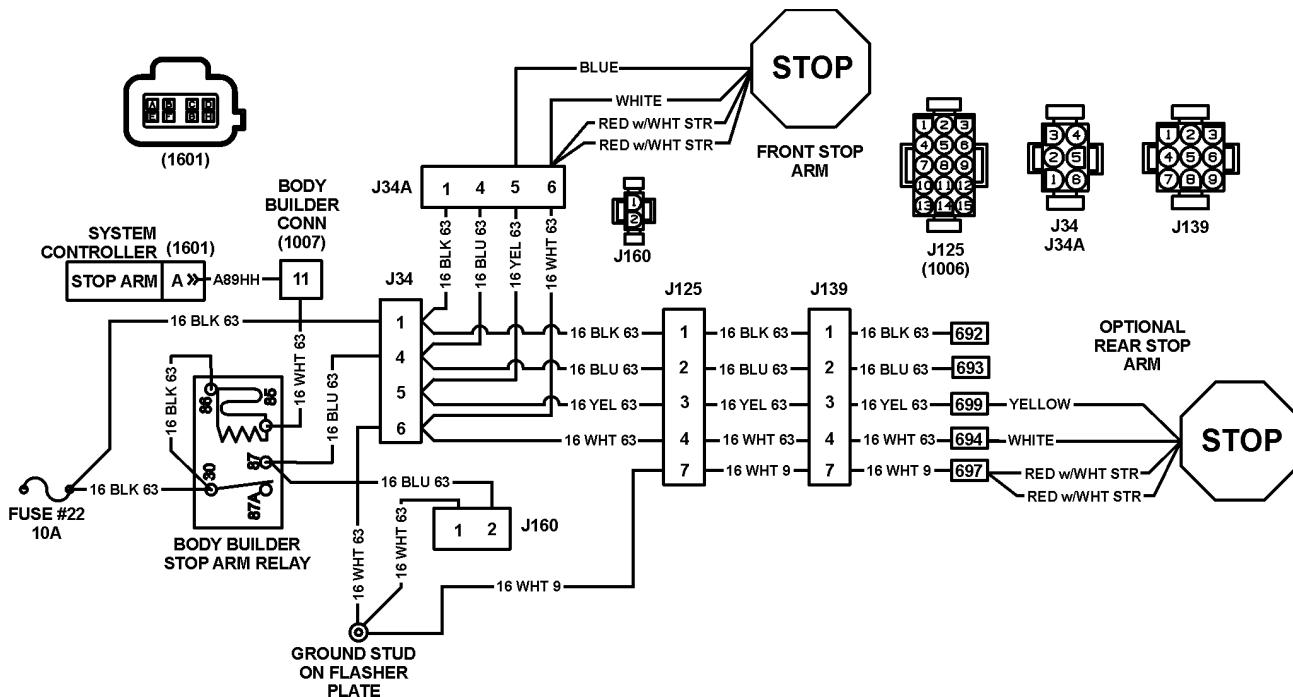
With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J139 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Stop arm connector (J139) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.

Table 277 Electric Stop Arm w/Strobe Lights Circuit Tests (cont.)

Stop arm connector (J139) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J139) cavity 1 to 7	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 9.
Stop arm connector (J139) cavity 1 to 4	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.

Air Controlled Stop Arm**Figure 455 Air Controlled Stop Arm Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information**

(1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1601) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J34 FLASHER PLATE TO STOP ARM
J125 LEFT HAND BODY TO FLASHER PLATE
J160 AIR STOP ARM — AIR VALVE REGULATOR

Table 278 Air Controlled Stop Arm Circuit Tests

Stop Arm Relay Voltage Checks		
With key in ignition position on, red pupil warning lights activated and stop arm relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
		Bench test relay. If relay fails bench test, replace and check for faults.
Test Points	Spec.	Comments
Stop arm relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 BLU 63.
Stop arm relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 86 to 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
With meter still connected to stop arm relay cavity 86 to 85, deactivate red pupil warning lights.		
Stop arm relay cavity 86 to 85	0 volts	If voltage is present, check for short in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Front Stop Arm Connector (J34A) Voltage Checks		
With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J34A disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		

Table 278 Air Controlled Stop Arm Circuit Tests (cont.)

Test Points	Spec.	Comments
Stop arm connector (J34A) cavity 4 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J34A) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J34A) cavity 1 to 6	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.

Optional Rear Stop Arm Connector (J139) Voltage Checks

With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J139 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Stop arm connector (J139) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J139) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J139) cavity 1 to 7	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 9.
Stop arm connector (J139) cavity 1 to 4	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.

Air Valve Regulator (J160) Voltage Checks

With key in ignition position on, red pupil warning lights activated, stop arm relay installed and air valve regulator connector J160 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Air valve regulator connector (J160) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLU 63.
Air valve regulator connector (J160) cavity 2 to 1	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 63. If all circuits check good and air controlled stop arm is still faulty, replace air valve regulator.

Air Controlled Stop Arm w/Strobe Lights

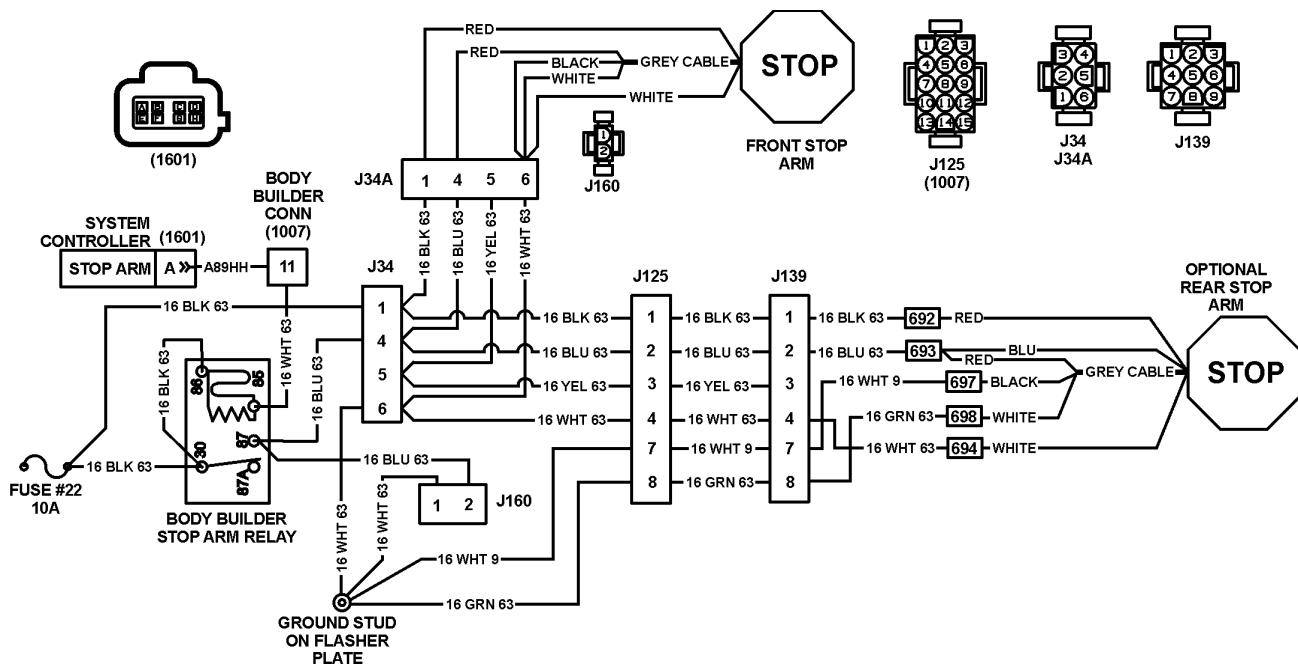


Figure 456 Air Controlled Stop Arm w/Strobe Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1601) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J34 FLASHER PLATE TO STOP ARM
J125 LEFT HAND BODY TO FLASHER PLATE
J160 AIR STOP ARM — AIR VALVE REGULATOR

Table 279 Air Controlled Stop Arm w/Strobe Lights Circuit Tests

Stop Arm Relay Voltage Checks

With key in ignition position on, red pupil warning lights activated and stop arm relay removed.

NOTE — Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE — Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Stop arm relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 BLU 63.

Table 279 Air Controlled Stop Arm w/Strobe Lights Circuit Tests (cont.)

Stop arm relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 86 to 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
With meter still connected to stop arm relay cavity 86 to 85, deactivate red pupil warning lights.		
Stop arm relay cavity 86 to 85	0 volts	If voltage is present, check for short in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Front Stop Arm Connector (J34A) Voltage Checks		
With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J34A disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Stop arm connector (J34A) cavity 4 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J34A) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J34A) cavity 1 to 6	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.
Optional Rear Stop Arm Connector (J139) Voltage Checks		
With key in ignition position on, red pupil warning lights activated, stop arm relay installed and stop arm connector J139 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		

Table 279 Air Controlled Stop Arm w/Strobe Lights Circuit Tests (cont.)

Test Points	Spec.	Comments
Stop arm connector (J139) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm connector (J139) cavity 1 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector (J139) cavity 1 to 7	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 9.
Stop arm connector (J139) cavity 1 to 4	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 63.
Stop arm connector (J139) cavity 1 to 8	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 GRN 63.

Air Valve Regulator (J160) Voltage Checks

With key in ignition position on, red pupil warning lights activated, stop arm relay installed and air valve regulator connector J160 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Air valve regulator connector (J160) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLU 63.
Air valve regulator connector (J160) cavity 2 to 1	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 63. If all circuits check good and air controlled stop arm is still faulty, replace air valve regulator.

Stop Arm Cancel

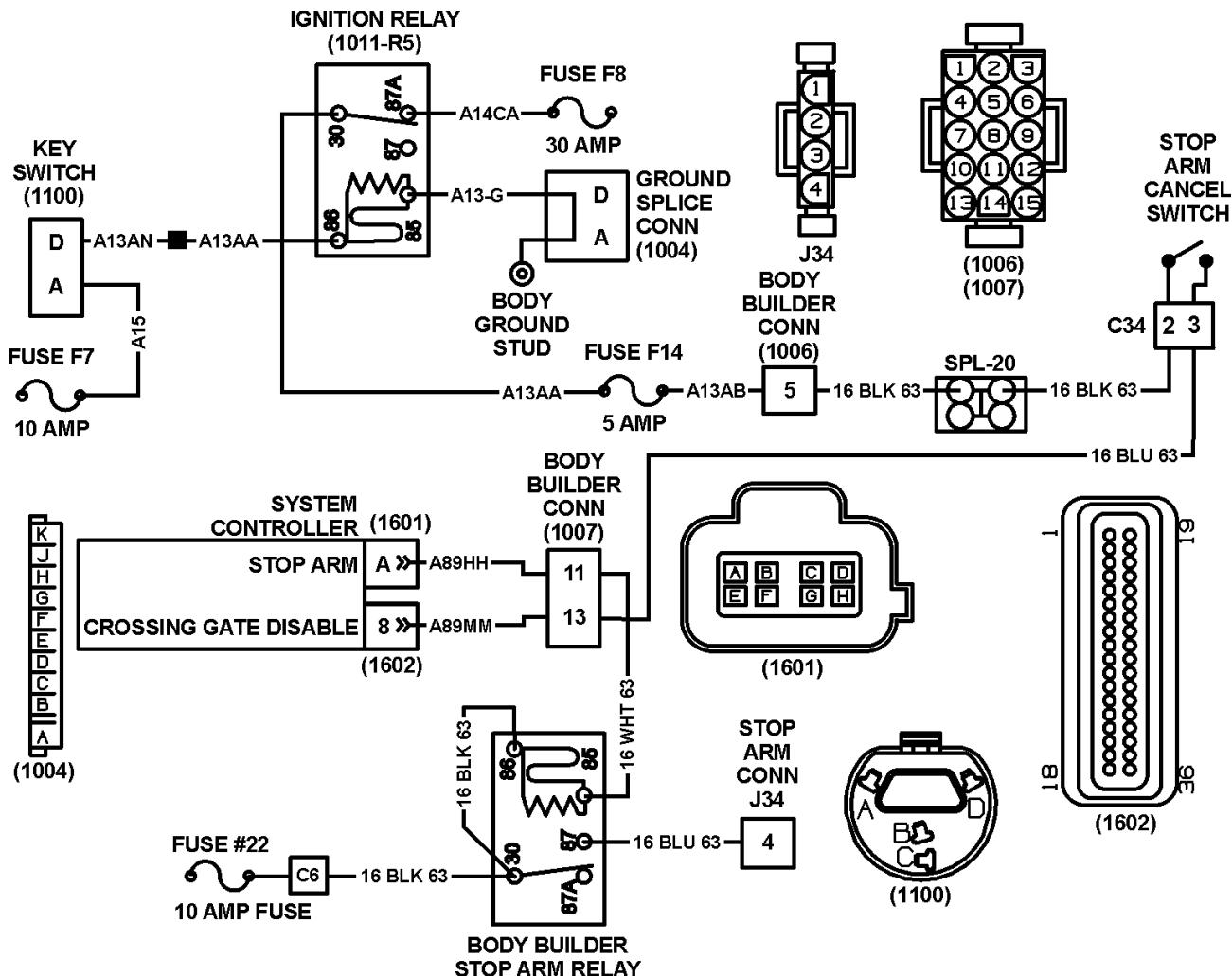


Figure 457 Stop Arm Cancel Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1004) GROUND SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
 - (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
 - (1100) KEY SWITCH
LOCATED AT INSTRUMENT WING PANEL
 - (1601) (1602) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL

J34 FLASHER PLATE TO STOP ARM
SPL-20 IGNITION ACCESSORY FEED SPLICE

Table 280 Stop Arm Cancel Circuit Tests

Stop Arm Relay Voltage Checks		
With key in ignition position on, red pupil warning lights activated and stop arm relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Stop arm relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 BLU 63.
Stop arm relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm relay cavity 86 to 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
With meter still connected to stop arm relay cavity 86 to 85, close stop arm cancel switch.		
Stop arm relay cavity 86 to 85	0 volts	If voltage is present, check for short in circuits 16 WHT 63 and A89HH. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Ignition Relay (1011-R5) Voltage Checks		
With key in ignition position on, red pupil warning lights activated and ignition relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Bench test relay. If relay fails bench test, replace and check for faults.		

Table 280 Stop Arm Cancel Circuit Tests (cont.)

Test Points	Spec.	Comments
Ignition relay (1011-R5) cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F7. Also check for open or short in circuits A13AA, A13AN and A15.
Ignition relay (1011-R5) cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit A13-G.
Ignition relay (1011-R5) cavity 87A to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F8. Also check for open or short in circuit A14CA.
Ignition relay (1011-R5) cavity 87A to 30.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit A13AA.

Stop Arm Cancel Switch (C34) Voltage Checks

With key in ignition position on, red pupil warning lights activated and stop arm cancel switch (C34) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Stop arm cancel switch (C34) cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F14. Also check for open or short in circuits 16 BLK 63 and A13AB.
Stop arm cancel switch (C34) cavity 2 to 3.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BLU 63 and A89MM. Also insure proper ground signal out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) If circuits check good and switch is still faulty, replace stop arm cancel switch.

Extended Description

When the ESC is commanded to turn the red pupil warning lights on, the ESC will provide a ground signal on connector 1601 pin A. This will allow the stop arm relay to energize with voltage from fuse #22. Voltage from fuse #22 will also be applied to the front stop arm connector (J34A) pins 1 and 4 and to the rear stop arm connector (J139) pins 1 and 2. This will power the stop arm motors extending the stop arms.

Ground is supplied to the stop arm motors from the ground stud on the flasher plate.

8.7. PUPIL WARNING LIGHTS — OHIO OVERRIDE

Fault Detection Management

This section is for those busses that are wired with the Ohio Override wiring configuration. If the bus is **NOT** wired with this configuration, then go to Red & Amber Pupil Warning Lights Inputs from Steering Wheel Switches to begin diagnostics.

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Ohio Override pupil warning lights will be apparent when the pupil warning lights are activated and the red or amber pupil warning lights do not flash. The ESC will also log a diagnostic trouble code (DTC) when there is a short in pupil warning lights. Problems in the pupil warning lights circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

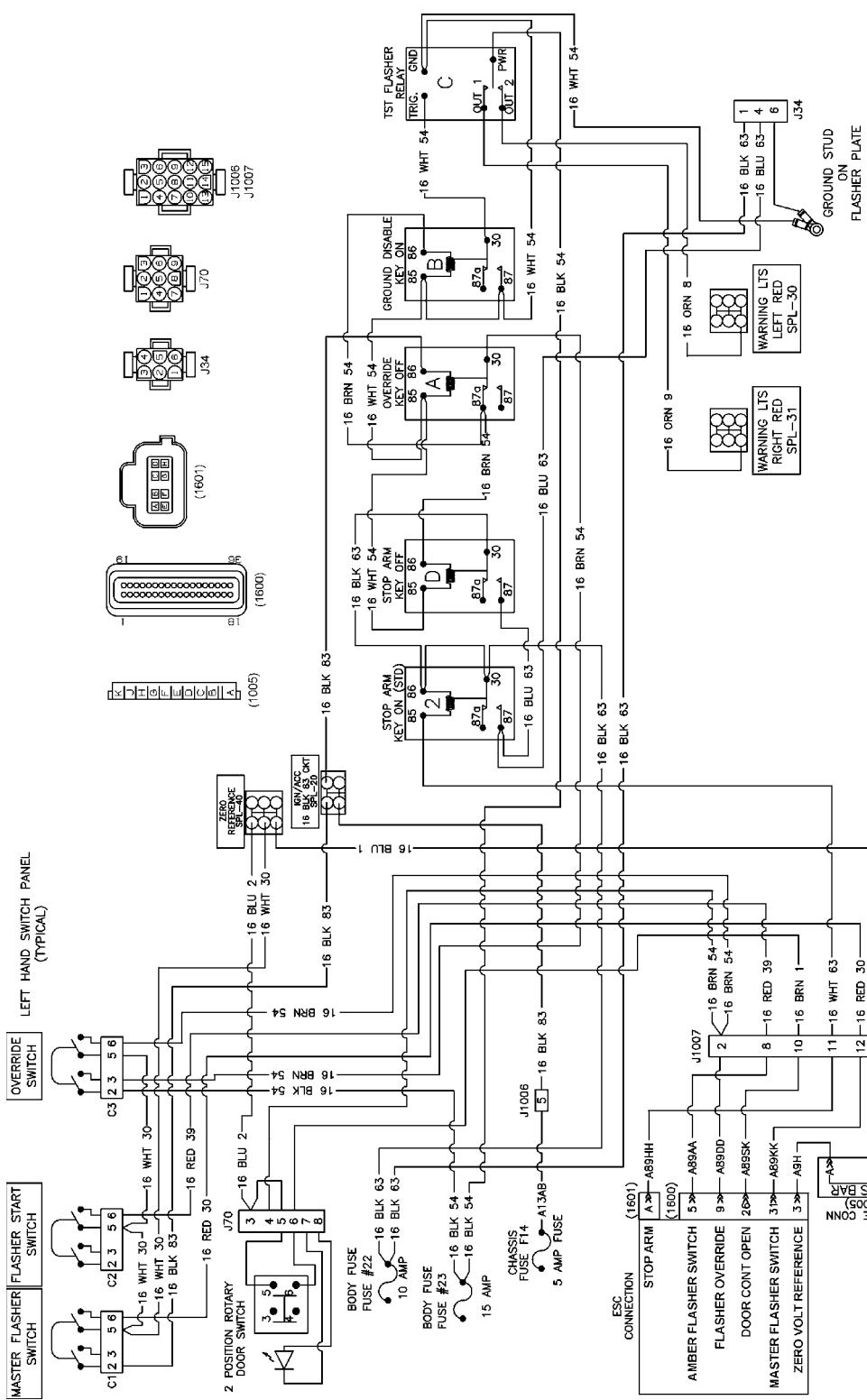


Figure 458 Ohio Override Pupil Warning Lights Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1601) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J34 FLASHER PLATE TO STOP ARM
J70 FLASHER PLATE TO DASH HARNESS FOR RIGHT HAND ROTARY DOOR SWITCH
SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE

Table 281 Pupil Warning Lights Relay Circuit Tests

Override Key Off Relay Voltage Checks		
With ignition position on, override key off relay removed and all other relays installed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Override key off relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.
Override key off relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 54.
Override key off relay cavity 30 to ground	0 volts	If voltage is present, check for short to high in circuit 16 BRN 54.
With leads still connected to Override key off relay cavity 30 to ground, close Override Switch in the left hand switch panel.		
Override key off relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #23. Also check for open or short in circuits 16 BRN 54 and 16 BLK 54. Also check override switch cavities 2 and 3 for continuity.
Leave Override switch closed.		
Override key off relay cavity 30 to cavity 87a	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 BRN 54 and 16 WHT 54.

Table 281 Pupil Warning Lights Relay Circuit Tests (cont.)

Stop Arm Key On Relay Voltage Checks			
With key in ignition position on, stop arm key on relay removed and all other relays installed.			
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.			
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.			
Test Points	Spec.	Comments	
Stop arm key on relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.	
Stop arm key on relay cavity 30 to cavity 87	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.	
Stop arm key on relay cavity 85 to ground	0 volts	If voltage is present, check for open or short in circuits 16 WHT 63 and A89HH.	
With test leads still connected to stop arm key on relay cavity 85 to ground, activate red pupil warning lights.			
Stop arm key on relay cavity 85 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 WHT 63 and A89HH. Also ensure proper 12 volt signal from ESC connector (1601) pin A. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)	
Leave red pupil warning lights activated.			
Stop arm key on relay cavity 85 to cavity 86	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BLK 63 and 16 BLU 63.	
Stop Arm Key Off Relay Voltage Checks			
With ignition off, stop arm key off relay removed and all other relays installed.			
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.			
Bench test relay. If relay fails bench test, replace and check for faults.			
Test Points	Spec.	Comments	
Stop arm key off relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.	

Table 281 Pupil Warning Lights Relay Circuit Tests (cont.)

Stop arm key off relay cavity 30 to cavity 87	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm key off relay cavity 86 to ground	0 volts	If voltage is present, check for open or short to high in circuit 16 BRN 54.
Stop arm key off relay cavity 86 to cavity 85	0 volts	If voltage is present, check for open or short to high in circuit 16 WHT 54.
With test leads still connected to the stop arm key off relay, close Override Switch on the left hand switch panel.		
Stop arm key off relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 54, 16 BLK 54 and 16 WHT 54.

Ground Disable Key On Relay Voltage Checks

With ignition off, ground disable key on relay removed and all other relays installed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Ground disable key on relay cavity 86 to ground	0 volts	If voltage is present, check for open or short to high in circuit 16 BRN 54.
Ground disable key on relay cavity 86 to cavity 85	0 volts	If voltage is present, check for open or short to high in circuit 16 WHT 54.
With test leads still connected to the ground disable key on relay, close Override Switch in the left hand switch panel.		
Ground disable key on relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #23. Also check for open or short in circuits 16 BRN 54 and 16 BLK 54.

Leave Override Switch closed.

Ground disable key on relay cavity 87 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BRN 54.
Ground disable key on relay cavity 87 to cavity 30	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 54.

TST Flasher Relay Voltage Checks

With ignition off, Override Switch closed, TST flasher relay removed and all other relays installed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Bench test relay. If relay fails bench test, replace and check for faults.

Table 281 Pupil Warning Lights Relay Circuit Tests (cont.)

Test Points	Spec.	Comments
TST flasher relay cavity TRIG. to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 54.
TST flasher relay cavity TRIG. to GND	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 54.
TST flasher relay cavity PWR to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #23. Also check for open or short in circuit 16 BLK 54.
TST flasher relay cavity PWR to OUT 1	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 ORN 9.
TST flasher relay cavity PWR to OUT 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 ORN 8.

Table 282 Left Hand Switch Panel Switch Circuit Tests

Override Switch Connector C3 Voltage Checks		
With key in ignition position on, all relays installed and connector C3 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Override Switch connector C3 cavity 5 to ground.	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 WHT 30, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 282 Left Hand Switch Panel Switch Circuit Tests (cont.)

Override Switch connector C3 cavity 5 to cavity 6.	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 BRN 54 and A89DD. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
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Master Flasher Switch Connector C1 Voltage Checks

With key in ignition position on, all relays installed and connector C1 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Master flasher switch connector C1 cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short on circuits 16 BLK 83 and A13AB.
Master flasher switch connector C1 cavity 5 to ground	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 WHT 30, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Master flasher switch connector C1 cavity 5 to cavity 6	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 RED 30 and A89KK. Also ensure proper input signal on ESC connector (1600) pin 31. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) If circuits check good and fault continues, replace switch and test for faults.

Table 282 Left Hand Switch Panel Switch Circuit Tests (cont.)

Flasher Start Switch Connector C2 Voltage Checks		
With key in ignition position on, all relays installed and connector C2 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Flasher start switch connector C2 cavity 5 to ground	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 WHT 30, 16 BLU 1, A9J and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Flasher start switch connector C2 cavity 5 to cavity 6	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 RED 39 and A89AA.</p> <p>Also ensure proper input signal on ESC connector (1600) pin 5.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p> <p>If circuits check good and fault continues, replace switch and test for faults.</p>

Table 283 2 Position Rotary Door Switch Circuit Tests

2 Position Rotary Door Switch J70 Voltage Checks		
With key in ignition position on, all relays installed and connector J70 disconnected.		
Test Points	Spec.	Comments
Rotary door switch connector J70 cavity 3 to ground.	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Rotary door switch connector J70 cavity 5 to ground.	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Rotary door switch connector J70 cavity 5 to cavity 6.	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 BRN 1 and A89SK.</p> <p>Also ensure proper input signal on ESC connector (1600) pin 26.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p> <p>If circuits check good and fault continues, replace switch and test for faults.</p>

Table 284 Stop Arm Connector Circuit Tests

Stop Arm Connector (J34) Voltage Checks		
With key in ignition position on, all relays installed and stop arm connector J34 disconnected.		
Test Points	Spec.	Comments
Stop arm connector J34 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector J34 cavity 4 to ground.	0 volts	If voltage is present, check for open or short in circuit 16 BLU 63.
While meter is still connected to stop arm connector from cavity 4 to ground, activate stop arm by activating the red pupil warning lights.		
Stop arm connector J34 cavity 4 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Leave red pupil warning lights activated.		
Stop arm connector J34 cavity 4 to 6.	12 ± 1.5 volts	If voltage is missing, check for open or short in stop arm ground circuits. If circuits check good and stop arm is still faulty, replace stop arm.

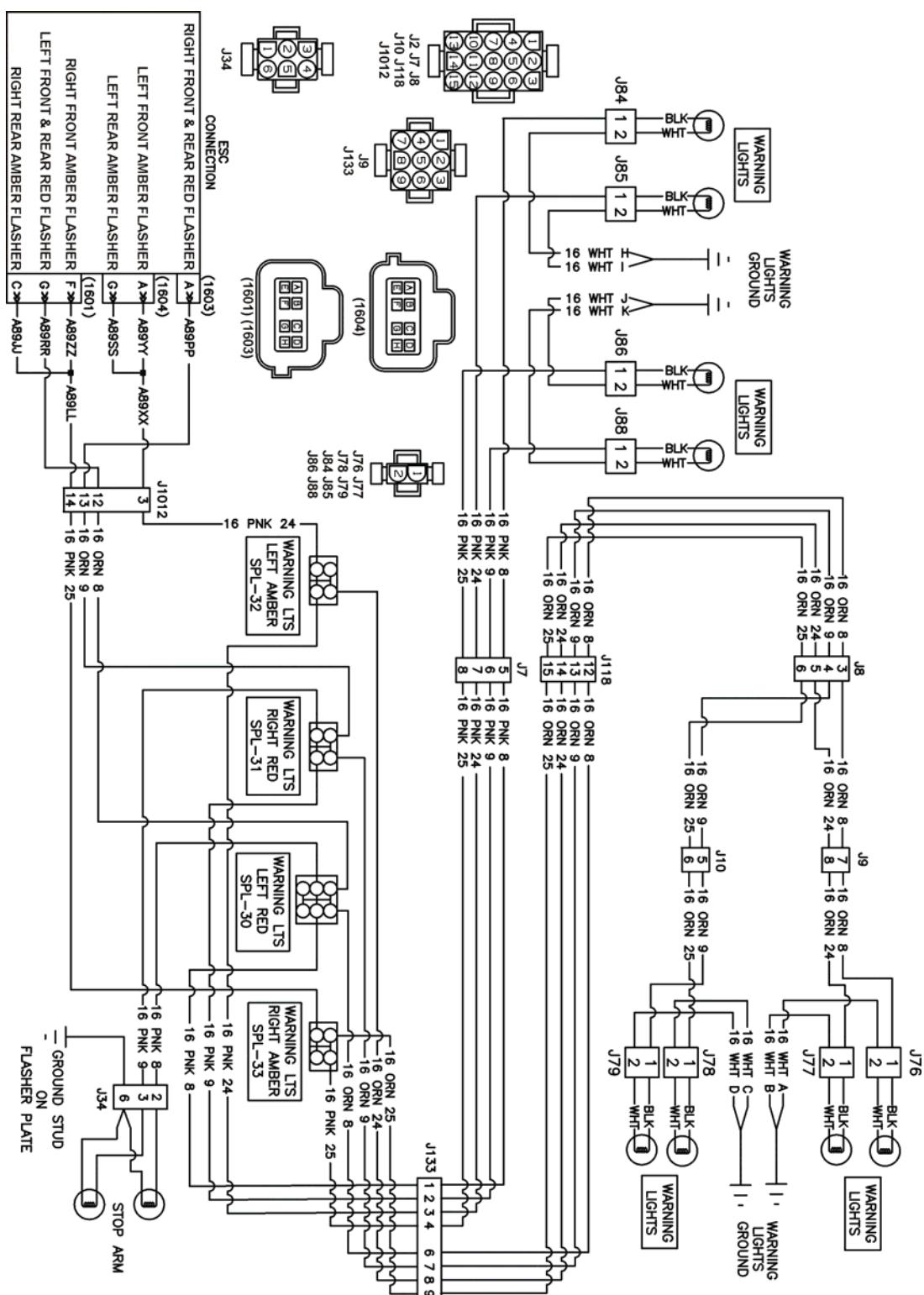


Figure 459 Red and Amber Pupil Warning Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1012) BODY BUILDER CONNECTOR
 LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
 (1601) (1603) (1604) SYSTEM CONTROLLER
 LOCATED INSIDE RIGHT SIDE DASH PANEL
 J7 J8 J118 LEFT HAND BODY TO FRONT CAP
 J9 J10 LEFT HAND BODY TO REAR CAP
 J34 FLASHER PLATE TO STOP ARM
 J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
 J77 LEFT RED AMBER WARNING LIGHT TO REAR CAP
 J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
 J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
 J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
 J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J88 RIGHT FRONT RED WARNING LIGHT TO FRONT CAP
 J133 FLASHER PLATE TO LEFT HAND BODY
 SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
 SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE
 SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR SPLICE
 SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR SPLICE

NOTE – Before testing any red or amber pupil warning light circuits, check individual bulbs to ensure that they are not burnt out.

Table 285 Amber Pupil Warning Lights Circuit Tests

Amber Pupil Warning Lights Voltage Checks		
Check with ignition on, amber pupil warning lights connectors disconnected and amber pupil warning lights activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front amber PWL connector (J85) cavity 1 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 24, A89XX, A89YY and A89SS.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>

Table 285 Amber Pupil Warning Lights Circuit Tests (cont.)

Left front amber PWL connector (J85) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT I.
Right front amber PWL connector (J86) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 25, A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front amber PWL connector (J86) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT J.
Left rear amber PWL connector (J77) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 24, 16 PNK 24, A89XX, A89YY and A89SS. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear amber PWL connector (J77) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT B.

Table 285 Amber Pupil Warning Lights Circuit Tests (cont.)

Right rear amber PWL connector (J78) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 25, 16 PNK 25 A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear amber PWL connector (J78) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT C.

Table 286 Red Pupil Warning Lights Circuit Tests

Red Pupil Warning Lights Voltage Checks		
With red pupil warning light disconnected and red pupil warning light activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front red PWL connector (J84) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 286 Red Pupil Warning Lights Circuit Tests (cont.)

Left front red PWL connector (J84) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT H.
Right front red PWL connector (J88) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front red PWL connector (J88) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT K.
Left rear red PWL connector (J76) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear red PWL connector (J76) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT A.

Table 286 Red Pupil Warning Lights Circuit Tests (cont.)

Right rear red PWL connector (J79) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear red PWL connector (J79) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.
Stop arm red PWL connector J34 cavity 2 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 2 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.
Stop arm red PWL connector J34 cavity 3 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Table 286 Red Pupil Warning Lights Circuit Tests (cont.)

		Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 3 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.

Extended Description

With key off:

Power from body fuse #23 will be supplied to the TST Flasher Relay on the PWR terminal.

When the Override Switch is closed, power from body fuse #23 will flow through the switch to terminal 30 of the Override key off relay. Since this relay is not charged, the power will flow through the relay at terminal 87a and charge the Ground disable relay at terminal 86. This will allow power to flow through the Ground disable relay from terminal 87 to terminal 30 and then trigger the TST flasher relay at the TRIG. terminal. Power will then flow through this relay to power the red pupil warning lights.

When the Override switch is closed the stop arm key off relay will energize. This will allow power from body fuse #22 to pass through it at terminals 30 to 87. This power will then be used to power the stop arm.

Ground is provide for these circuits from the ground stud on the flasher plate.

With key on:

The zero volt reference signal supplied from the ESC connector pin 3 will be applied to the zero reference SPL-40 circuit splice. From there the zero volt reference signal will be supplied to the switches in the left hand switch panel as well as the rotary door switch. When any of these switches are closed, the zero volt reference signal will then be supplied to the ESC signaling that that specific function is being requested.

Power from the chassis fuse F14 will be supplied to the Ign/Acc SPL-20 circuit splice. This power will charge the override key off relay (creating an open circuit between terminals 30 and 87a) and the ground disable key on relay. The Override switch will not power the red pupil warning lights as long as the override key off relay is energized. While the ignition switch is in the on position, the pupil warning lights will be controlled through the ESC.

When the stop arm is commanded, power will flow from the ESC connector (1601) terminal A to energize the stop arm key on relay. Once energized, the same power will pass through the relay from terminal 30 to 87 to power the stop arm.

8.8. PUPIL WARNING LIGHTS — VIRGINIA WARNING LIGHTS

Fault Detection Management

This section is for those busses that are wired with the Virginia Warning Lights wiring configuration. If the bus is **NOT** wired with this configuration, then go to Red & Amber Pupil Warning Lights Inputs from Steering Wheel Switches to begin diagnostics.

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Virginia warning lights will be apparent when the pupil warning lights are activated and the red or amber pupil warning lights do not flash. The ESC will also log a diagnostic trouble code (DTC) when there is a short in pupil warning lights. Problems in the pupil warning lights circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

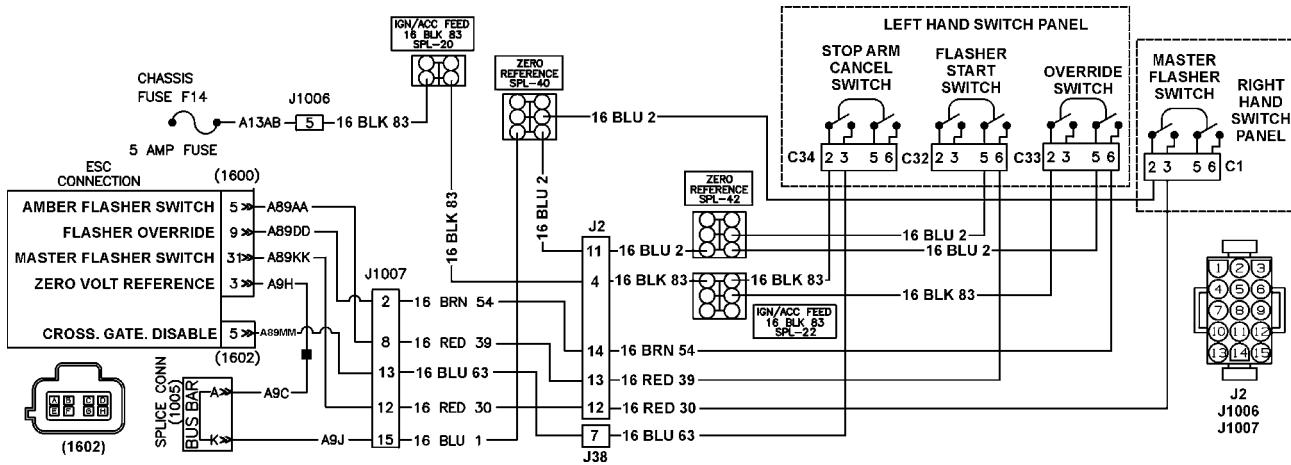


Figure 460 Virginia Warning Lights Inputs Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE
LOCATED RIGHT SIDE INSTRUMENT PANEL
 - (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
 - (1600) (1602) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL

J2 J38 FLASHER PLATE TO DASH
SPL-20 SPL-22 IGNITION ACCESSORY FEED SPLICE
SPL-40 SPL-42 ZERO VOLT REFERENCE SPLICE

Table 287 Virginia Warning Lights Input Circuits Voltage Tests

Override Switch (C33) Voltage Checks		
Check with ignition position on and override switch connector (C33) disconnected.		
Test Points	Spec.	Comments
		NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		

Table 287 Virginia Warning Lights Input Circuits Voltage Tests (cont.)

Override switch (C33) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.
Override switch (C33) cavity 5 to ground	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Override switch (C33) cavity 5 to 6	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BRN 54 and A89DD. If circuits check good and switch is still faulty, replace override switch.
Flasher Start Switch (C32) Voltage Checks		
<p>Check with ignition position on and flasher start switch connector (C32) disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p>		

Table 287 Virginia Warning Lights Input Circuits Voltage Tests (cont.)

Test Points	Spec.	Comments
Flasher start switch (C32 cavity 5 to ground.)	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Flasher start switch (C32 cavity 5 to 6.)	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 RED 39 and A89AA. If circuits check good and switch is still faulty, replace flasher start switch.

Stop Arm Cancel Switch (C34) Voltage Checks

Check with ignition position on and stop arm cancel switch connector (C34) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Test Points	Spec.	Comments
Stop arm cancel switch (C34) cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.
Stop arm cancel switch (C34) cavity 2 to 3.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BLU 63 and A89MM.

Master Flasher Switch (C1) Right Hand Switch Panel Voltage Checks

Check with ignition position on and master flasher switch in right hand switch panel connector (C34) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Table 287 Virginia Warning Lights Input Circuits Voltage Tests (cont.)

Test Points	Spec.	Comments
Master flasher switch (C1) cavity 2 to ground.	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Master flasher switch (C1) cavity 2 to 3.	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits 16 RED 30 and A89KK.</p> <p>If circuits check good and switch is still faulty, replace master flasher switch.</p>

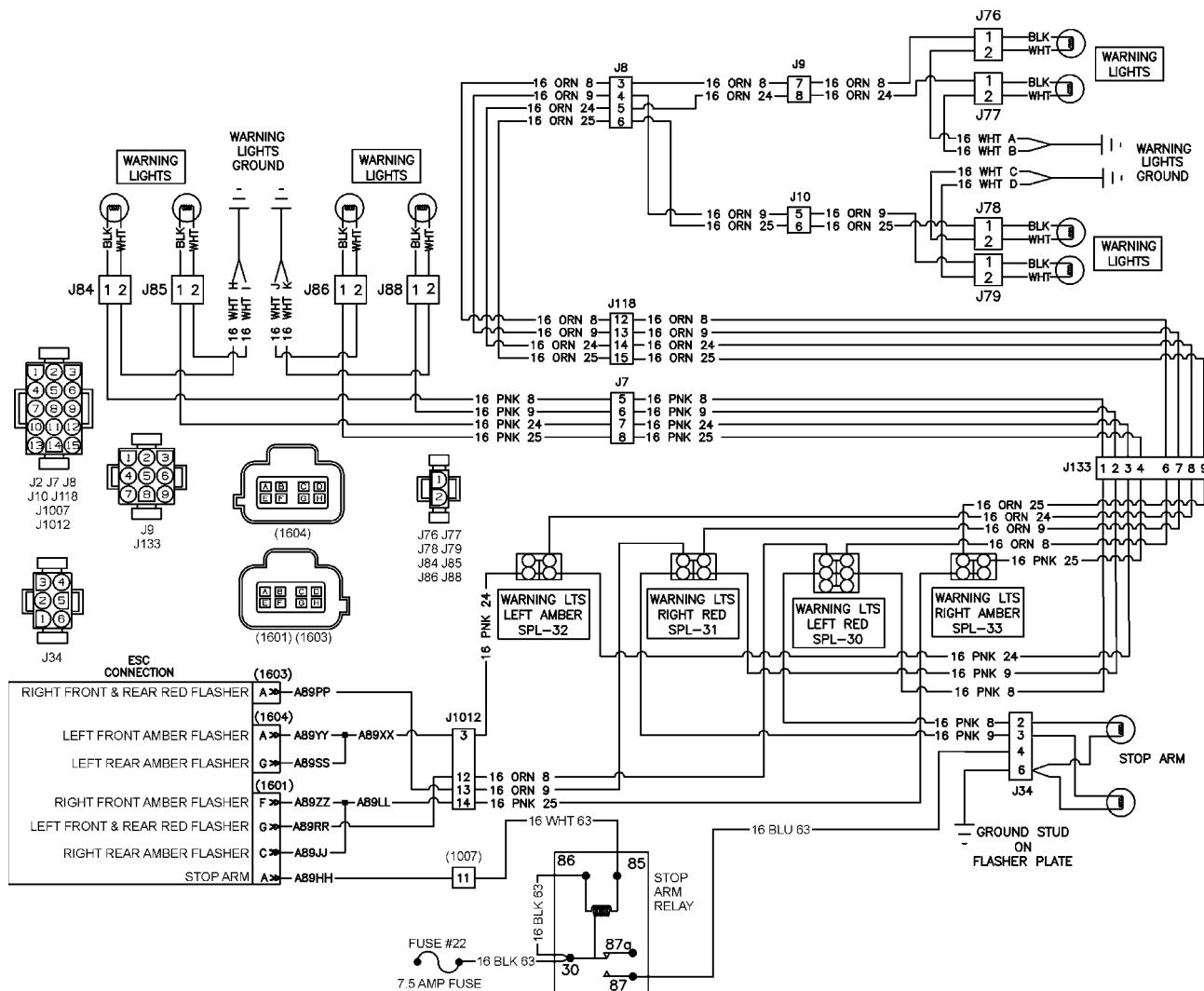


Figure 461 Virginia Warning Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1007) (1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1601) (1603) (1604) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J7 J8 J118 LEFT HAND BODY TO FRONT CAP
J9 J10 LEFT HAND BODY TO REAR CAP
J34 FLASHER PLATE TO STOP ARM
J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
J77 LEFT RED AMBER WARNING LIGHT TO REAR CAP
J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
J88 RIGHT FRONT RED WARNING LIGHT TO FRONT CAP
J133 FLASHER PLATE TO LEFT HAND BODY
SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE
SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR SPLICE
SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR SPLICE

NOTE – Before testing any red or amber pupil warning light circuits, check individual bulbs to ensure that they are not burnt out.

Table 288 Virginia Amber Pupil Warning Lights Circuit Tests

Amber Pupil Warning Lights Voltage Checks		
Check with ignition on, amber pupil warning lights connectors disconnected and amber pupil warning lights activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front amber PWL connector (J85) cavity 1 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 24, A89XX, A89YY and A89SS.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>

Table 288 Virginia Amber Pupil Warning Lights Circuit Tests (cont.)

Left front amber PWL connector (J85) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT I.
Right front amber PWL connector (J86) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 25, A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front amber PWL connector (J86) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT J.
Left rear amber PWL connector (J77) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 24, 16 PNK 24, A89XX, A89YY and A89SS. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear amber PWL connector (J77) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT B.

Table 288 Virginia Amber Pupil Warning Lights Circuit Tests (cont.)

Right rear amber PWL connector (J78) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 25, 16 PNK 25 A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear amber PWL connector (J78) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT C.

Table 289 Virginia Red Pupil Warning Lights Circuit Tests

Red Pupil Warning Lights Voltage Checks		
With red pupil warning light disconnected and red pupil warning light activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front red PWL connector (J84) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 289 Virginia Red Pupil Warning Lights Circuit Tests (cont.)

Left front red PWL connector (J84) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT H.
Right front red PWL connector (J88) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front red PWL connector (J88) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT K.
Left rear red PWL connector (J76) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear red PWL connector (J76) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT A.

Table 289 Virginia Red Pupil Warning Lights Circuit Tests (cont.)

Right rear red PWL connector (J79) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear red PWL connector (J79) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.
Stop arm red PWL connector J34 cavity 2 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 2 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.
Stop arm red PWL connector J34 cavity 3 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Table 289 Virginia Red Pupil Warning Lights Circuit Tests (cont.)

		Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector J34 cavity 3 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.

Table 290 Virginia Stop Arm Circuit Tests

Stop Arm Relay Voltage Checks		
Check with red pupil warning lights deactivated and stop arm relay disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Stop arm relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short to ground in circuit 16 BLK 63.
Stop arm relay cavity 86 to 85.	0 volts	If voltage is present, check for open or short in circuits 16 WHT 63 and A89HH.
While meter is still connected to stop arm relay from cavity 86 to 85, activate red pupil warning lights.		
Stop arm relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuits 16 WHT 63 and A89HH. Also insure proper ground signal on system controller (1601) pin A. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Leave red pupil warning lights activated.		

Table 290 Virginia Stop Arm Circuit Tests (cont.)

Stop arm relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short to ground in circuit 16 BLK 63.
Stop arm relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short to ground in circuit 16 BLU 63. If circuits check good and stop arm is still faulty, replace stop arm.

8.9. PUPIL WARNING LIGHTS — FLORIDA WARNING LIGHTS

Fault Detection Management

This section is for those busses that are wired with the Florida Warning Lights wiring configuration. If the bus is **NOT** wired with this configuration, then go to Red & Amber Pupil Warning Lights Inputs from Steering Wheel Switches to begin diagnostics.

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Florida warning lights will be apparent when the pupil warning lights are activated and the red or amber pupil warning lights do not flash. The ESC will also log a diagnostic trouble code (DTC) when there is a short in pupil warning lights. Problems in the pupil warning lights circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

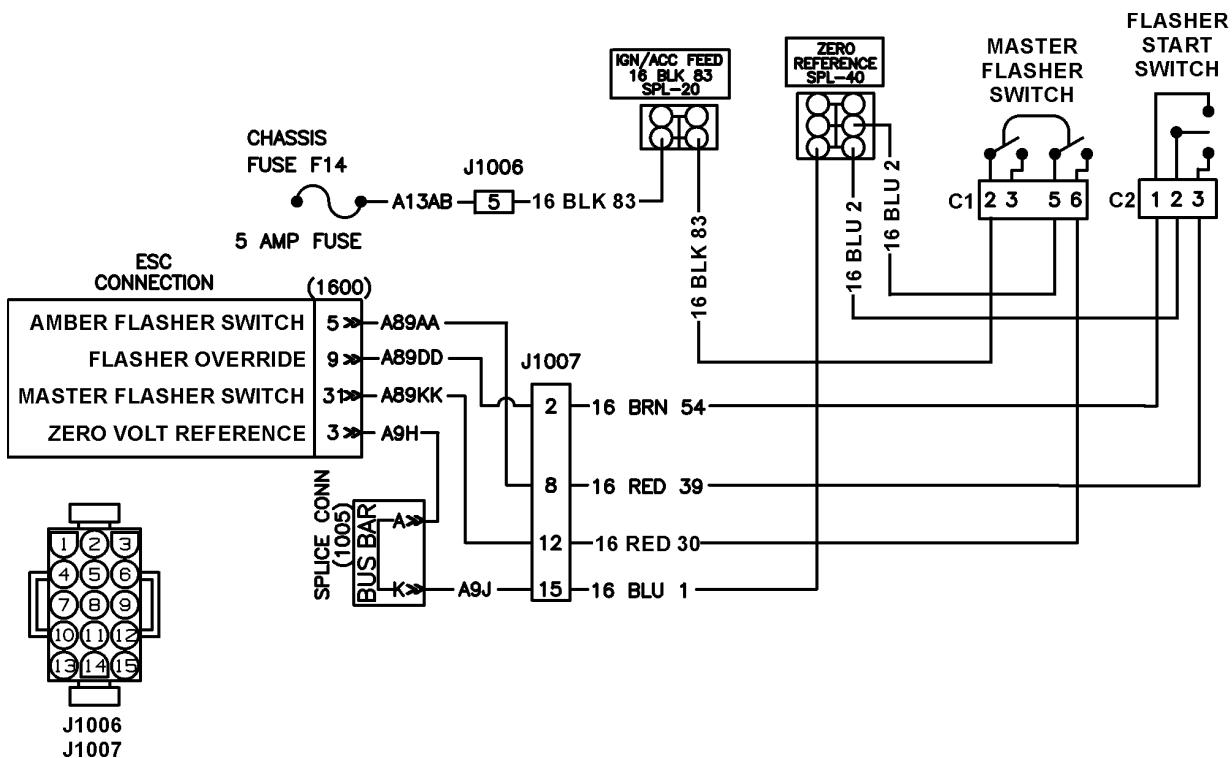


Figure 462 Florida Warning Lights Inputs Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- SPL-20 IGNITION ACCESSORY FEED SPLICE
- SPL-40 ZERO VOLT REFERENCE SPLICE

Table 291 Florida Warning Lights Input Circuits Voltage Tests

Master Flasher Switch (C1) Voltage Checks		
Check with ignition position on and master flasher switch connector (C1) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Master flasher switch (C1) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.

Table 291 Florida Warning Lights Input Circuits Voltage Tests (cont.)

Master flasher switch (C1) cavity 5 to ground	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Master flasher switch (C1) cavity 5 to 6	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 RED 30 and A89KK. If circuits check good and switch is still faulty, replace master flasher switch.

Flasher Start Switch (C2) Voltage Checks

Check with ignition position on and flasher start switch connector (C2) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Flasher start switch (C2) cavity 2 to ground.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Flasher start switch (C2) cavity 2 to 1.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BRN 54 and A89DD.
Flasher start switch (C2) cavity 2 to 3.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 RED 39 and A89AA. If circuits check good and switch is still faulty, replace flasher start switch.

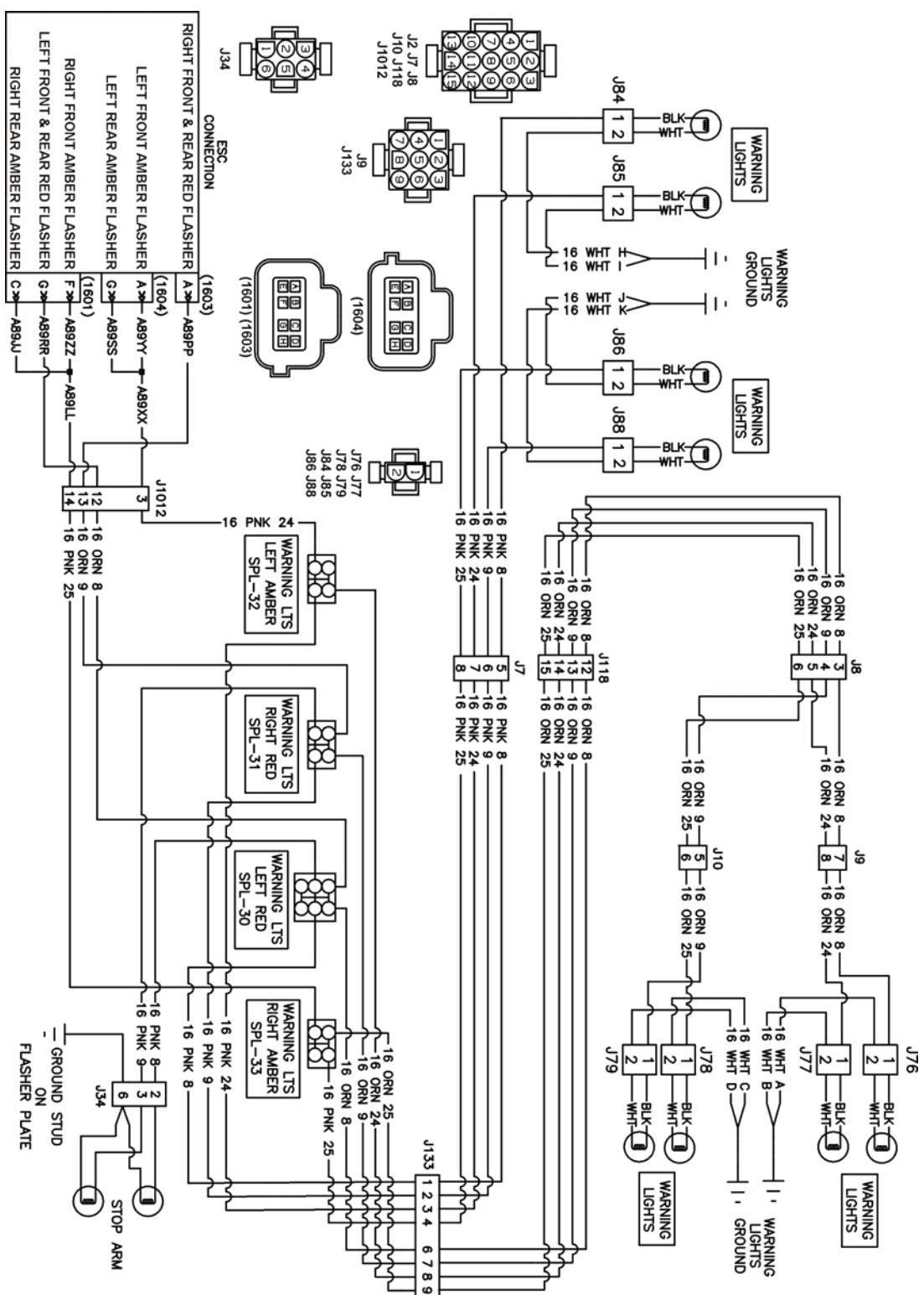


Figure 463 Florida Warning Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1601) (1603) (1604) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
J7 J8 J118 LEFT HAND BODY TO FRONT CAP
J9 J10 LEFT HAND BODY TO REAR CAP
J34 FLASHER PLATE TO STOP ARM
J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
J77 LEFT RED AMBER WARNING LIGHT TO REAR CAP
J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
J88 RIGHT FRONT RED WARNING LIGHT TO FRONT CAP
J133 FLASHER PLATE TO LEFT HAND BODY
SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE
SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR SPLICE
SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR SPLICE

NOTE – Before testing any red or amber pupil warning light circuits, check individual bulbs to ensure that they are not burnt out.

Table 292 Florida Amber Pupil Warning Lights Circuit Tests

Amber Pupil Warning Lights Voltage Checks		
Check with ignition on, amber pupil warning lights connectors disconnected and amber pupil warning lights activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front amber PWL connector (J85) cavity 1 to ground	<p>NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage.</p> <p>Flashing between 12 ± 1.5 volts and 0 volts</p>	<p>If voltage is missing, check for open or short to ground in circuits 16 PNK 24, A89XX, A89YY and A89SS.</p> <p>Also insure proper voltage out of ESC.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>

Table 292 Florida Amber Pupil Warning Lights Circuit Tests (cont.)

Left front amber PWL connector (J85) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT I.
Right front amber PWL connector (J86) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 25, A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front amber PWL connector (J86) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT J.
Left rear amber PWL connector (J77) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 24, 16 PNK 24, A89XX, A89YY and A89SS. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear amber PWL connector (J77) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT B.

Table 292 Florida Amber Pupil Warning Lights Circuit Tests (cont.)

Right rear amber PWL connector (J78) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 25, 16 PNK 25 A89LL, A89ZZ and A89JJ. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right rear amber PWL connector (J78) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT C.

Table 293 Florida Red Pupil Warning Lights Circuit Tests

Red Pupil Warning Lights Voltage Checks		
With red pupil warning light disconnected and red pupil warning light activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Left front red PWL connector (J84) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left front red PWL connector (J84) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT H.

Table 293 Florida Red Pupil Warning Lights Circuit Tests (cont.)

Right front red PWL connector (J88) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Right front red PWL connector (J88) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT K.
Left rear red PWL connector (J76) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Left rear red PWL connector (J76) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT A.
Right rear red PWL connector (J79) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)

Table 293 Florida Red Pupil Warning Lights Circuit Tests (cont.)

Right rear red PWL connector (J79) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.
Stop arm red PWL connector (J34) cavity 2 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8, 16 ORN 8 and A89RR. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector (J34) cavity 2 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.
Stop arm red PWL connector (J34) cavity 3 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9, 16 ORN 9 and A89PP. Also insure proper voltage out of ESC. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Stop arm red PWL connector (J34) cavity 3 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.

NOTE – To troubleshoot the Stop Arm, refer to the Stop Arm Outputs from ESC section of this manual. (See Stop Arm Outputs From ESC, page 927)

8.10. PUPIL WARNING LIGHTS — MARYLAND WARNING LIGHTS

Fault Detection Management

This section is for those busses that are wired with the Maryland Warning Lights wiring configuration. If the bus is **NOT** wired with this configuration, then go to Red & Amber Pupil Warning Lights Inputs from Steering Wheel Switches to begin diagnostics.

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Maryland warning lights will be apparent when the pupil warning lights are activated and the red or amber pupil warning lights do not flash. The ESC will also log a diagnostic trouble code (DTC) when there is a short in pupil warning lights. Problems in the pupil warning lights circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

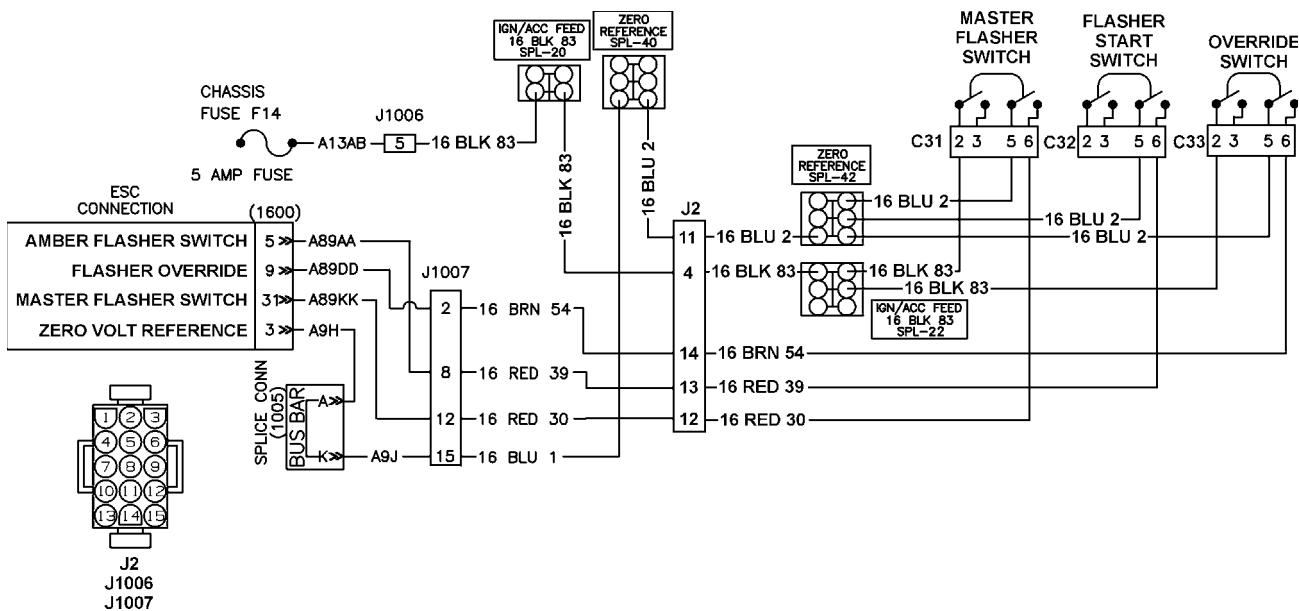


Figure 464 Maryland Warning Lights Inputs Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1006) (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- J2 FLASHER PLATE TO DASH
- SPL-20 SPL-22 IGNITION ACCESSORY FEED SPLICE
- SPL-40 SPL-42 ZERO VOLT REFERENCE SPLICE

Table 294 Maryland Warning Lights Input Circuits Voltage Tests

Master Flasher Switch (C31) Voltage Checks		
Check with ignition position on and master flasher switch connector (C31) disconnected.		
Test Points	Spec.	Comments
Master flasher switch (C31) cavity 2 to ground	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.
Master flasher switch (C31) cavity 5 to ground	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Master flasher switch (C31) cavity 5 to 6	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits 16 RED 30 and A89KK.</p> <p>If circuits check good and switch is still faulty, replace master flasher switch.</p>
Flasher Start Switch (C32) Voltage Checks		
Check with ignition position on and flasher start switch connector (C32) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		

Table 294 Maryland Warning Lights Input Circuits Voltage Tests (cont.)

Test Points	Spec.	Comments
Flasher start switch (C32) cavity 5 to ground.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Flasher start switch (C32) cavity 5 to 6.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 RED 39 and A89AA. If circuits check good and switch is still faulty, replace switch.

Flasher Start Switch (C33) Voltage Checks

Check with ignition position on and override switch connector (C33) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Override switch (C33) cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.
Override switch (C33) cavity 5 to ground.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Override switch (C33) cavity 5 to 6.	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BRN 54 and A89DD. If circuits check good and switch is still faulty, replace switch.

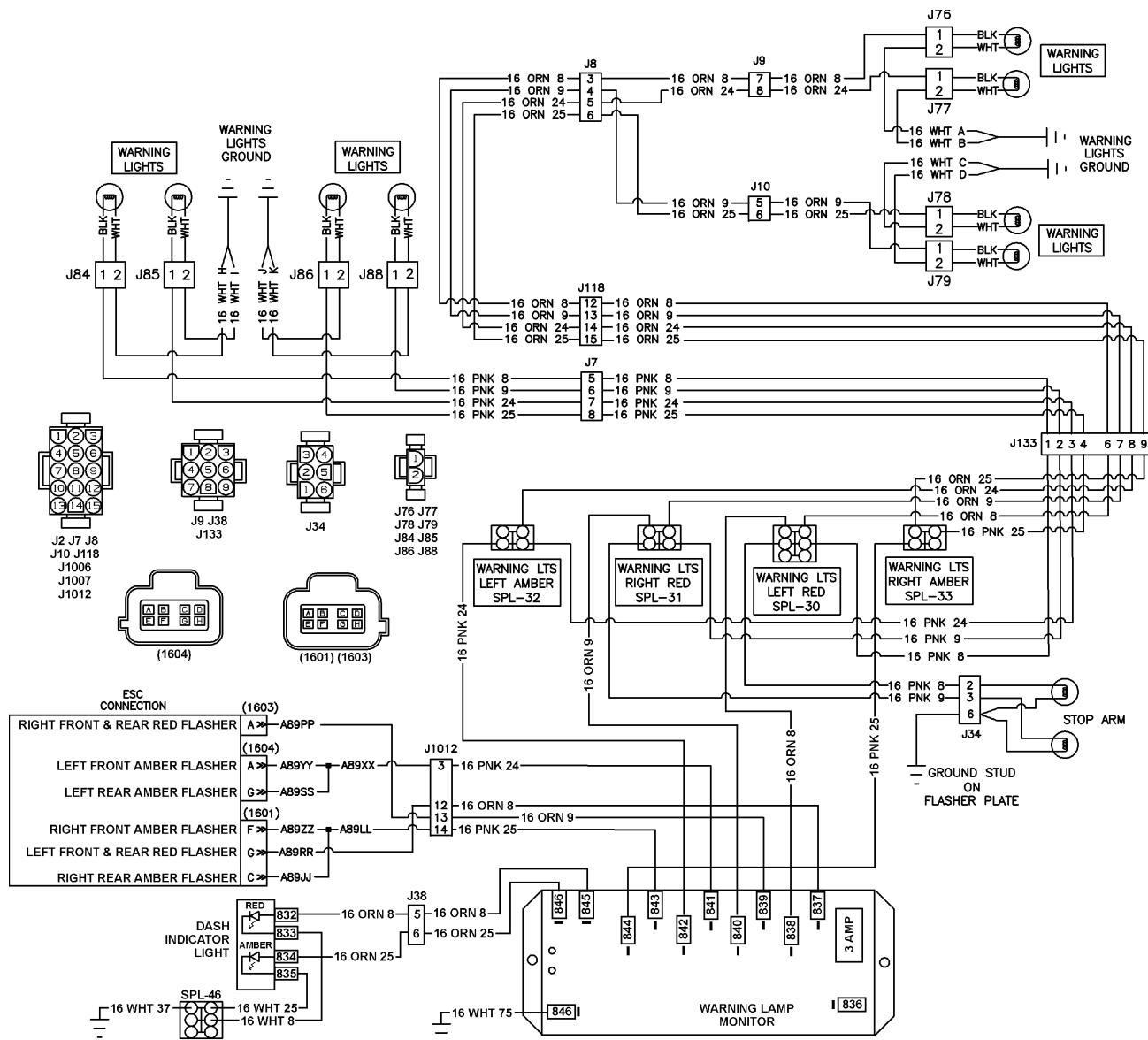


Figure 465 Maryland Warning Lights Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1012) BODY BUILDER CONNECTOR
 LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
 (1601) (1603) (1604) SYSTEM CONTROLLER
 LOCATED INSIDE RIGHT SIDE DASH PANEL
 J7 J8 J118 LEFT HAND BODY TO FRONT CAP
 J9 J10 LEFT HAND BODY TO REAR CAP
 J34 FLASHER PLATE TO STOP ARM
 J38 FLASHER PLATE TO DASH
 J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
 J77 LEFT RED AMBER WARNING LIGHT TO REAR CAP
 J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
 J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
 J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
 J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J88 RIGHT FRONT RED WARNING LIGHT TO FRONT CAP
 J133 FLASHER PLATE TO LEFT HAND BODY
 SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
 SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE
 SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR SPLICE
 SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR SPLICE
 SPL-46 SWITCH ILLUMINATION FEED (RIGHT HAND SWITCH PANEL)

NOTE – Before testing any red or amber pupil warning light circuits, check individual bulbs to ensure that they are not burnt out.

Table 295 Maryland Amber Pupil Warning Lights Circuit Tests

Amber Pupil Warning Lights Voltage Checks		
Check with ignition on, amber pupil warning lights connectors disconnected and amber pupil warning lights activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Left front amber PWL connector (J85) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 PNK 24.
Left front amber PWL connector (J85) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT I.

Table 295 Maryland Amber Pupil Warning Lights Circuit Tests (cont.)

Right front amber PWL connector (J86) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 PNK 25.
Right front amber PWL connector (J86) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT J.
Left rear amber PWL connector (J77) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 24 and 16 PNK 24.
Left rear amber PWL connector (J77) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT B.
Right rear amber PWL connector (J78) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 25 and 16 PNK 25.
Right rear amber PWL connector (J78) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT C.

Table 296 Maryland Red Pupil Warning Lights Circuit Tests

Red Pupil Warning Lights Voltage Checks		
With red pupil warning light disconnected and red pupil warning light activated.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Left front red PWL connector (J84) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8 and 16 ORN 8.
Left front red PWL connector (J84) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT H.
Right front red PWL connector (J88) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9 and 16 ORN 9.
Right front red PWL connector (J88) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT K.
Left rear red PWL connector (J76) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 ORN 8.
Left rear red PWL connector (J76) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT A.

Table 296 Maryland Red Pupil Warning Lights Circuit Tests (cont.)

Right rear red PWL connector (J79) cavity 1 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 ORN 9.
Right rear red PWL connector (J79) cavity 1 to 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in circuit 16 WHT D.
Stop arm red PWL connector J34 cavity 2 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 8 and 16 ORN 8.
Stop arm red PWL connector J34 cavity 2 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.
Stop arm red PWL connector J34 cavity 3 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 9 and 16 ORN 9.
Stop arm red PWL connector J34 cavity 3 to cavity 6	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in stop arm ground circuit to ground stud on flasher plate.

Table 297 Maryland Warning Lamp Monitor Circuit Tests

Warning Lamp Monitor Voltage Checks		
Check with ignition on, amber pupil warning lights activated and warning lamp monitor disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments

Table 297 Maryland Warning Lamp Monitor Circuit Tests (cont.)

Warning lamp monitor connector cavity 841 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 24, A89XX, A89YY and A89SS. Also ensure proper voltage from ESC connector (1604) pins A and G. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Warning lamp monitor connector cavity 841 to 842	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 PNK 24.
Warning lamp monitor connector cavity 843 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 PNK 25, A89LL, A89ZZ and A89JJ. Also ensure proper voltage from ESC connector (1601) pins F and C. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Warning lamp monitor connector cavity 843 to 844	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 PNK 25.
Warning lamp monitor connector cavity 843 to 846	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short in circuit 16 WHT 75.
Activate red pupil warning lights.		

Table 297 Maryland Warning Lamp Monitor Circuit Tests (cont.)

Warning lamp monitor connector cavity 839 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 9 and A89PP. Also ensure proper voltage from ESC connector (1603) pin A. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Warning lamp monitor connector cavity 839 to 840	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 ORN 9.
Warning lamp monitor connector cavity 837 to ground	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuits 16 ORN 8 and A89RR. Also ensure proper voltage from ESC connector (1601) pin G. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Warning lamp monitor connector cavity 837 to 838	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short to ground in circuit 16 ORN 8. If all circuits check good and all pupil warning lights function to specification, but lamp monitor is still faulty, replace warning lamp monitor.
Dash Indicator Light Voltage Checks		
Check with ignition on, amber pupil warning lights activated and dash indicator lights connector disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Dash indicator light connector cavity 834 to ground	Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short in circuit 16 ORN 25.

Table 297 Maryland Warning Lamp Monitor Circuit Tests (cont.)

Dash indicator light connector cavity 834 to 835	Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short in circuit 16 WHT 25.
Dash indicator light connector cavity 832 to ground	Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short in circuit 16 ORN 8.
Dash indicator light connector cavity 832 to 833	Flashing between 12 ± 1.5 volts and 0 volts	If voltage is missing, check for open or short in circuit 16 WHT 8. If all circuits check good and dash indicator lights are still faulty, replace dash indicator lights. If dash indicator lights are not faulty and all circuits check good, replace warning lamp monitor.

NOTE – To troubleshoot the Stop Arm, refer to the Stop Arm Outputs from ESC section of this manual. (See Stop Arm Outputs From ESC, page 927)

8.11. PUPIL WARNING LIGHTS — HOT ALL TIME OVERRIDE WITH MANUAL DOOR

Fault Detection Management

This section is for those busses that are wired with the hot all time override with manual door configuration. If the bus is **NOT** wired with this configuration, then go to Red & Amber Pupil Warning Lights Inputs from Steering Wheel Switches to begin diagnostics.

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset fuse, key switch must be cycled.

A fault in the Hot All Time Override with Manual Door pupil warning lights circuits will be apparent when the pupil warning lights are activated and the red or amber pupil warning lights do not flash. The ESC will also log a diagnostic trouble code (DTC) when there is a short in pupil warning lights. Problems in the pupil warning lights circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

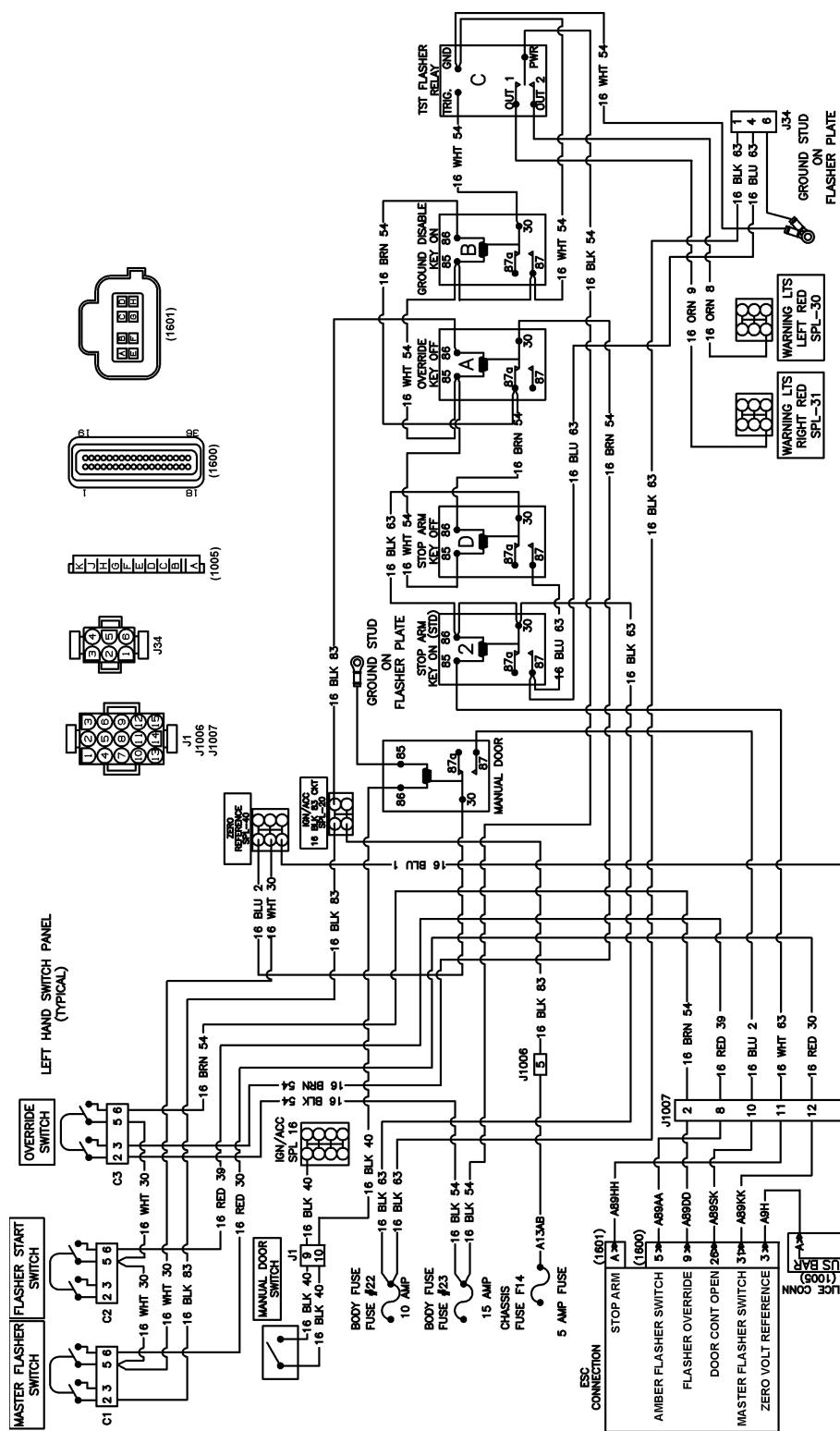


Figure 466 Hot All Time Override With Manual Door Pupil Warning Lights Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE
 LOCATED RIGHT SIDE INSTRUMENT PANEL
 (1600) (1601) SYSTEM CONTROLLER
 LOCATED INSIDE RIGHT SIDE DASH PANEL
 J1 FLASHER PLATE TO DASH
 J34 FLASHER PLATE TO STOP ARM
 SPL-16 SPL-20 IGNITION ACCESSORY FEED SPLICE
 SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE
 SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR SPLICE
 SPL-40 ZERO VOLT REFERENCE SPLICE

Table 298 Pupil Warning Lights Relay Circuit Tests

Override Key Off Relay Voltage Checks		
With ignition position on, override key off relay removed and all other relays installed.		
Test Points	Spec.	Comments
Override key off relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F14. Also check for open or short in circuits 16 BLK 83 and A13AB.
Override key off relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 54.
Override key off relay cavity 30 to ground	0 volts	If voltage is present, check for short to high in circuit 16 BRN 54.
With leads still connected to Override key off relay cavity 30 to ground, close Override Switch in the left hand switch panel.		
Override key off relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #23. Also check for open or short in circuits 16 BRN 54 and 16 BLK 54. Also check override switch cavities 2 and 3 for continuity.
Leave Override switch closed.		
Override key off relay cavity 30 to cavity 87a	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 BRN 54 and 16 WHT 54.

Table 298 Pupil Warning Lights Relay Circuit Tests (cont.)

Stop Arm Key On Relay Voltage Checks		
With key in ignition position on, stop arm key on relay removed and all other relays installed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Stop arm key on relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm key on relay cavity 30 to cavity 87	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm key on relay cavity 85 to ground	0 volts	If voltage is present, check for open or short in circuits 16 WHT 63 and A89HH.
With test leads still connected to stop arm key on relay cavity 85 to ground, activate red pupil warning lights.		
Stop arm key on relay cavity 85 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 WHT 63 and A89HH. Also ensure proper 12 volt signal from ESC connector (1601) pin A.
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)		
Leave red pupil warning lights activated.		
Stop arm key on relay cavity 85 to cavity 86	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BLK 63 and 16 BLU 63.
Stop Arm Key Off Relay Voltage Checks		
With ignition off, stop arm key off relay removed and all other relays installed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		

Table 298 Pupil Warning Lights Relay Circuit Tests (cont.)

Test Points	Spec.	Comments
Stop arm key off relay cavity 30 to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm key off relay cavity 30 to cavity 87	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.
Stop arm key off relay cavity 86 to ground	0 volts	If voltage is present, check for open or short to high in circuit 16 BRN 54.
Stop arm key off relay cavity 86 to cavity 85	0 volts	If voltage is present, check for open or short to high in circuit 16 WHT 54.
With test leads still connected to the stop arm key off relay, close Override Switch on the left hand switch panel.		
Stop arm key off relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 BRN 54, 16 BLK 54 and 16 WHT 54.

Ground Disable Key On Relay Voltage Checks

With ignition off, ground disable key on relay removed and all other relays installed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Ground disable key on relay cavity 86 to ground	0 volts	If voltage is present, check for open or short to high in circuit 16 BRN 54.
Ground disable key on relay cavity 86 to cavity 85	0 volts	If voltage is present, check for open or short to high in circuit 16 WHT 54.
With test leads still connected to the ground disable key on relay, close Override Switch in the left hand switch panel.		
Ground disable key on relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #23. Also check for open or short in circuits 16 BRN 54 and 16 BLK 54.
Leave Override Switch closed.		
Ground disable key on relay cavity 87 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BRN 54.
Ground disable key on relay cavity 87 to cavity 30	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 54.

Table 298 Pupil Warning Lights Relay Circuit Tests (cont.)

TST Flasher Relay Voltage Checks		
With ignition off, Override Switch closed, TST flasher relay removed and all other relays installed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
TST flasher relay cavity TRIG. to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 54.
TST flasher relay cavity TRIG. to GND	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 54.
TST flasher relay cavity PWR to ground	12 ± 1.5 volts	If voltage is missing, check for blown body fuse #23. Also check for open or short in circuit 16 BLK 54.
TST flasher relay cavity PWR to OUT 1	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 ORN 9.
TST flasher relay cavity PWR to OUT 2	NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage. 12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 ORN 8.
Manual Door Relay Voltage Checks		
With ignition on, manual door switch closed, manual door relay removed and all other relays installed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		

Table 298 Pupil Warning Lights Relay Circuit Tests (cont.)

Test Points	Spec.	Comments	
Manual door relay cavity 86 to ground	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLK 40. Ensure proper voltage supply to Ign/Acc Splice 16. Refer to the Accessory Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42) Also check for continuity in manual door switch.	
Manual door relay cavity 86 to cavity 85	12 ± 1.5 volts	If voltage is missing, check for open or short to high in the connecting circuit to the ground stud on flasher plate.	
With test leads still connected to the manual door relay cavity 86 to 85, open manual door switch.			
Manual door relay cavity 86 to cavity 85	0 volts	If voltage is present, check for open or short to high in circuit 16 BLK 40 and the connecting circuit to the ground stud on flasher plate. Also perform a continuity test on the manual door switch. Replace if faulty.	
Close manual door switch.			
Manual door relay cavity 30 to ground	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)	
Manual door relay cavity 30 to cavity 87	0 volts	If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2 and A89SK. Also ensure proper input signal on ESC connector (1600) pin 26. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)	

Table 299 Left Hand Switch Panel Switch Circuit Tests

Override Switch Connector C3 Voltage Checks		
With key in ignition position on, all relays installed and connector C3 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Override Switch connector C3 cavity 5 to ground.	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 WHT 30, 16 BLU 1, A9J and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Override Switch connector C3 cavity 5 to cavity 6.	0 volts	<p>If voltage is present or tester reads open circuit, check for open or short in circuits 16 BRN 54 and A89DD.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Master Flasher Switch Connector C1 Voltage Checks		
With key in ignition position on, all relays installed and connector C1 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Master flasher switch connector C1 cavity 2 to ground	12 ± 1.5 volts	<p>If voltage is missing, check for blown chassis fuse F14.</p> <p>Also check for open or short on circuits 16 BLK 83 and A13AB.</p>

Table 299 Left Hand Switch Panel Switch Circuit Tests (cont.)

Master flasher switch connector C1 cavity 5 to ground	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 WHT 30, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Master flasher switch connector C1 cavity 5 to cavity 6	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 RED 30 and A89KK. Also ensure proper input signal on ESC connector (1600) pin 31. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) If circuits check good and fault continues, replace switch and test for faults.

Flasher Start Switch Connector C2 Voltage Checks

With key in ignition position on, all relays installed and connector C2 disconnected.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Test Points	Spec.	Comments
Flasher start switch connector C2 cavity 5 to ground	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 WHT 30, 16 BLU 1, A9J and A9H. Also ensure proper zero volt reference signal from ESC connector (1600) pin 3. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
Flasher start switch connector C2 cavity 5 to cavity 6	0 volts	If voltage is present or tester reads open circuit, check for open or short in circuits 16 RED 39 and A89AA. Also ensure proper input signal on ESC connector (1600) pin 5.

Table 299 Left Hand Switch Panel Switch Circuit Tests (cont.)

		NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125) If circuits check good and fault continues, replace switch and test for faults.
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Table 300 Stop Arm Connector Circuit Tests

Stop Arm Connector (J34) Voltage Checks		
With key in ignition position on, all relays installed, red pupil warnings lights off and connector (J34) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Stop arm connector J34 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #22. Also check for open or short in circuit 16 BLK 63.
Stop arm connector J34 cavity 1 to 6.	12 ± 1.5 volts	If voltage is missing, check for open or short in ground circuits to stop arm connector.
Stop arm connector J34 cavity 4 to 6.	0 volts	If voltage is present, check for open or short in circuit 16 BLU 63.
While meter is still connected to stop arm connector J34 from cavity 4 to 6, activate red pupil warning lights.		
Stop arm connector J34 cavity 4 to 6.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLU 63.

Extended Description

With key off:

Power from body fuse #23 will be supplied to the TST Flasher Relay on the PWR terminal.

When the Override Switch is closed, power from body fuse #23 will flow through the switch to terminal 30 of the Override key off relay. Since this relay is not charged, the power will flow through the relay at terminal 87a and charge the Ground disable relay at terminal 86. This will allow power to flow through the Ground disable relay from terminal 87 to terminal 30 and then trigger the TST flasher relay at the TRIG. terminal. Power will then flow through this relay to power the red pupil warning lights.

When the Override switch is closed the stop arm key off relay will energize. This will allow power from body fuse #22 to pass through it at terminals 30 to 87. This power will then be used to power the stop arm.

Ground is provide for these circuits from the ground stud on the flasher plate.

With key on:

The zero volt reference signal supplied from the ESC connector pin 3 will be applied to the zero reference SPL-40 circuit splice. From there the zero volt reference signal will be supplied to the switches in the left hand switch panel as well as the manual door relay. When any of the switches are closed, the zero volt reference signal will then be supplied to the ESC signaling that that specific function is being requested.

Power from the chassis fuse F14 will be supplied to the Ign/Acc SPL-20 circuit splice. This power will charge the override key off relay (creating an open circuit between terminals 30 and 87a) and the ground disable key on relay. The Override switch will not power the red pupil warning lights as long as the override key off relay is energized. While the ignition switch is in the on position, the pupil warning lights will be controlled through the ESC.

When the stop arm is commanded, power will flow from the ESC connector (1601) terminal A to energize the stop arm key on relay. Once energized, the same power will pass through the relay from terminal 30 to 87 to power the stop arm.

Ground is provide for these circuits from the ground stud on the flasher plate.

8.12. RED PUPIL WARNING LIGHTS ACTIVATED BY LIFT DOOR

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.

A fault in the Red Pupil Warning Lights Activated By Lift Door circuits will be apparent when the red pupil warning lights do not activate with the lift door is opened. The ESC will also log a diagnostic trouble code (DTC) when there is a short in pupil warning lights. Problems in the pupil warning lights circuits can be caused by burned out lamps, a short, an open, or a problem in the ESC.

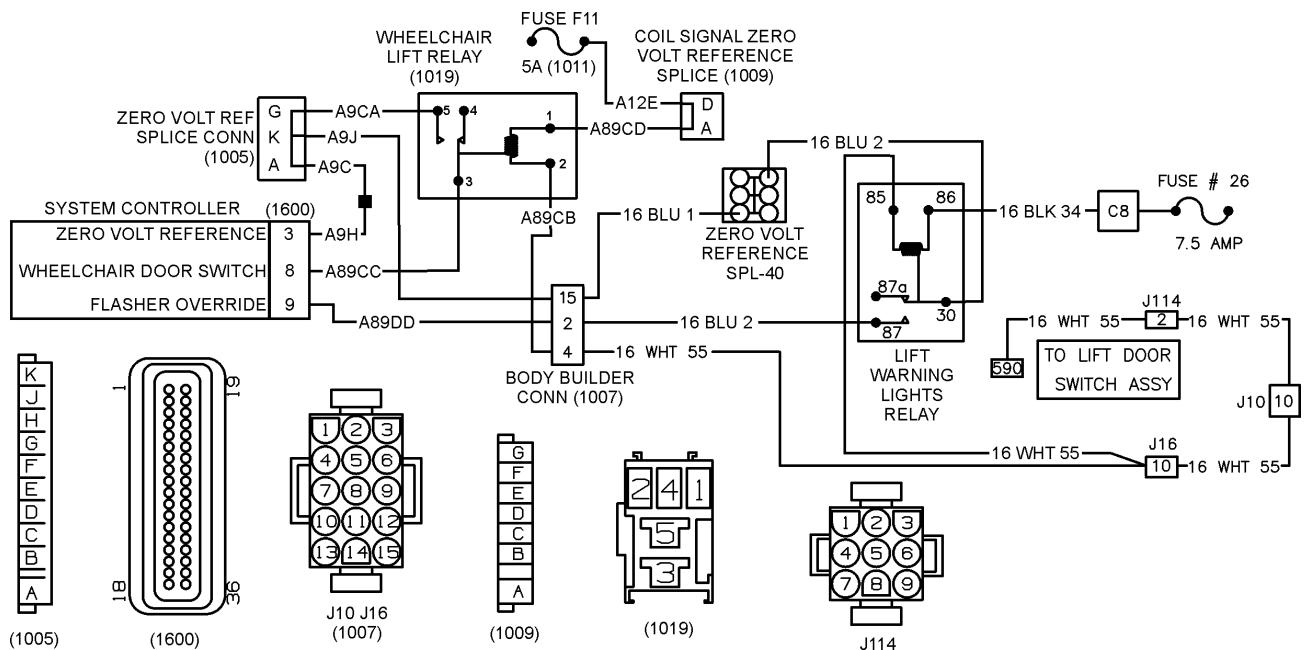


Figure 467 Red Pupil Warning Lights Activated by Lift Door Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

- (1005) ZERO VOLT REFERENCE
LOCATED RIGHT SIDE INSTRUMENT PANEL
- (1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1009) COIL SIGNAL ZERO VOLT REFERENCE SPLICE
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1019) WHEELCHAIR LIFT RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
- (1600) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
- J10 LEFT HAND BODY TO REAR CAP
- J16 FLASHER PLATE TO LEFT HAND BODY
- J114 RIGHT HAND BODY TO REAR CAP
- SPL-40 ZERO VOLT REFERENCE SPLICE

Table 301 Red Pupil Warning Lights Activated By Lift Door Circuit Tests

Wheelchair Lift (1019) Relay Voltage Checks

With ignition position on, wheelchair lift relay (1019) removed, all other relays installed and lift door closed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
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Table 301 Red Pupil Warning Lights Activated By Lift Door Circuit Tests (cont.)

Wheelchair lift relay cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown chassis fuse F11. Also check for open or short in circuits A89CD and A12E.
Wheelchair lift relay cavity 1 to 2.	0 volts	If voltage is present, check for short to high in circuits A89CB and 16 WHT 55.
While meter is still connected to wheelchair lift relay (1019) from cavity 1 to 2, open lift door.		
Wheelchair lift relay cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits A89CB and 16 WHT 55.
Leave lift door open.		
Wheelchair lift relay cavity 5 to ground.	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits A9CA, A9C and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Wheelchair lift relay cavity 5 to 3.	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuit A89CC.</p> <p>Also ensure proper input signal on ESC connector (1600) pin 8.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>

Lift Warning Lights Relay Voltage Checks

With ignition position on, lift warning lights relay removed, all other relays installed and lift door closed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Lift warning lights relay cavity 86 to ground.	12 ± 1.5 volts	<p>If voltage is missing, check for blown body fuse #26.</p> <p>Also check for open or short in circuit 16 BLK 34.</p>
Lift warning lights relay cavity 86 to 85.	0 volts	If voltage is present, check for short in circuit 16 WHT 55.

Table 301 Red Pupil Warning Lights Activated By Lift Door Circuit Tests (cont.)

While meter is still connected to lift warnings lights relay from cavity 86 to 85, open lift door.		
Lift warning lights relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 55.
Leave lift door open.		
Lift warning lights relay cavity 30 to ground.	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H.</p> <p>Also ensure proper zero volt reference signal from ESC connector (1600) pin 3.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p>
Lift warning lights relay cavity 30 to 87.	0 volts	<p>If voltage is present or meter reads open circuit, check for open or short in circuits 16 BLU 2 and A89DD.</p> <p>Also ensure proper input signal on ESC connector (1600) pin 9.</p> <p>NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.</p> <p>Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)</p> <p>If circuits check good and the Red Pupil Warning Lights Activated by Lift Door are still faulty, then troubleshoot lift door circuits and pupil warning light circuits.</p>

8.13. OPTIONAL WARNING LIGHT INDICATOR IN RIGHT HAND SWITCH PANEL

Fault Detection Management

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

A fault in the Warning Light Indicator Circuits will be apparent when the indicators do not flash when the red and amber pupil warning lights are functioning properly. Problems in the warning light indicator circuits can be caused by burned out lamps, a short, an open or a problem in the pupil warning light circuits.

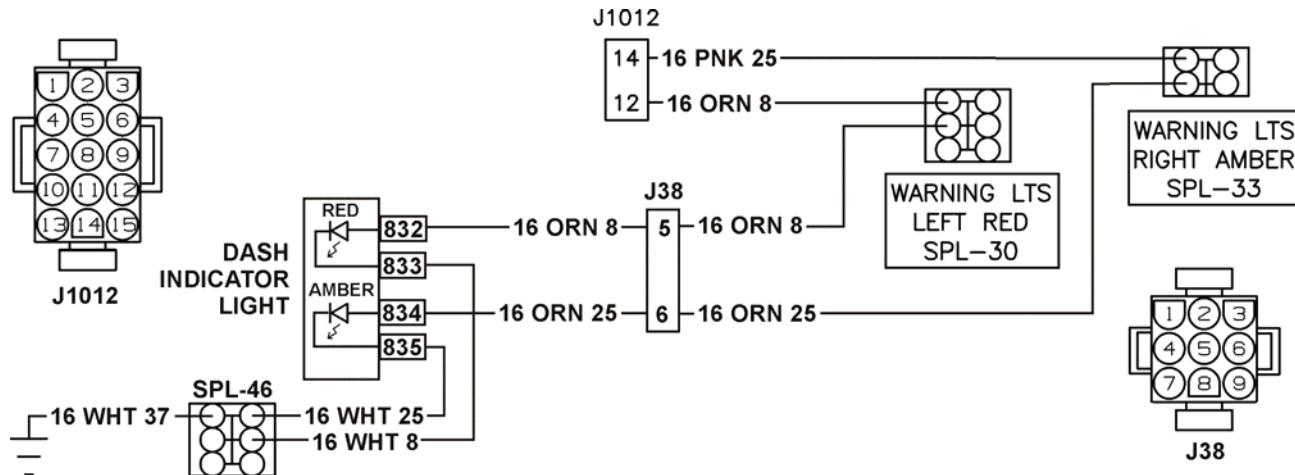


Figure 468 Warning Light Indicator Circuit Diagram — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
J38 FLASHER PLATE TO DASH
SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR
SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR
SPL-46 SWITCH ILLUMINATION FEED (RIGHT HAND SWITCH PANEL)

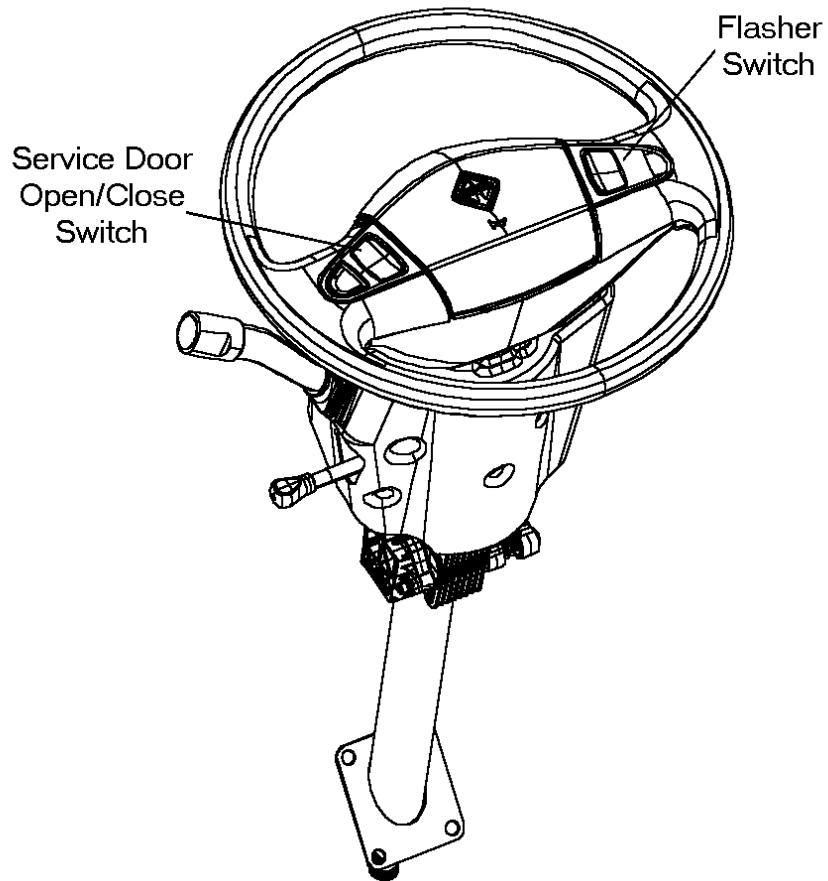
Table 302 Warning Light Indicator Circuit Tests

Dash Indicator Light Voltage Checks		
Check with ignition position on, amber pupil warning lights activated and dash indicator light connector disconnected.		
NOTE — Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Test Points	Spec.	Comments
Dash indicator light connector cavity 834 to ground.	Switching from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 ORN 25 and 16 PNK 25. Refer to the Pupil Warning Lights to further troubleshoot the appropriate pupil warning light configuration that is present on vehicle.
Dash indicator light connector cavity 834 to 835.	Switching from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 WHT 25 and 16 WHT 37.
Activate red pupil warning lights.		

Table 302 Warning Light Indicator Circuit Tests (cont.)

Dash indicator light connector cavity 832 to ground.	Switching from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 ORN 8. Refer to the Pupil Warning Lights to further troubleshoot the appropriate pupil warning light configuration that is present on vehicle.
Dash indicator light connector cavity 832 to 833.	Switching from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 WHT 8 and 16 WHT 37. If all circuits check good and dash indicator lights is still faulty, replace dash indicator light.

8.14. COMPONENT LOCATIONS

**Figure 469 Steering Wheel Switches**

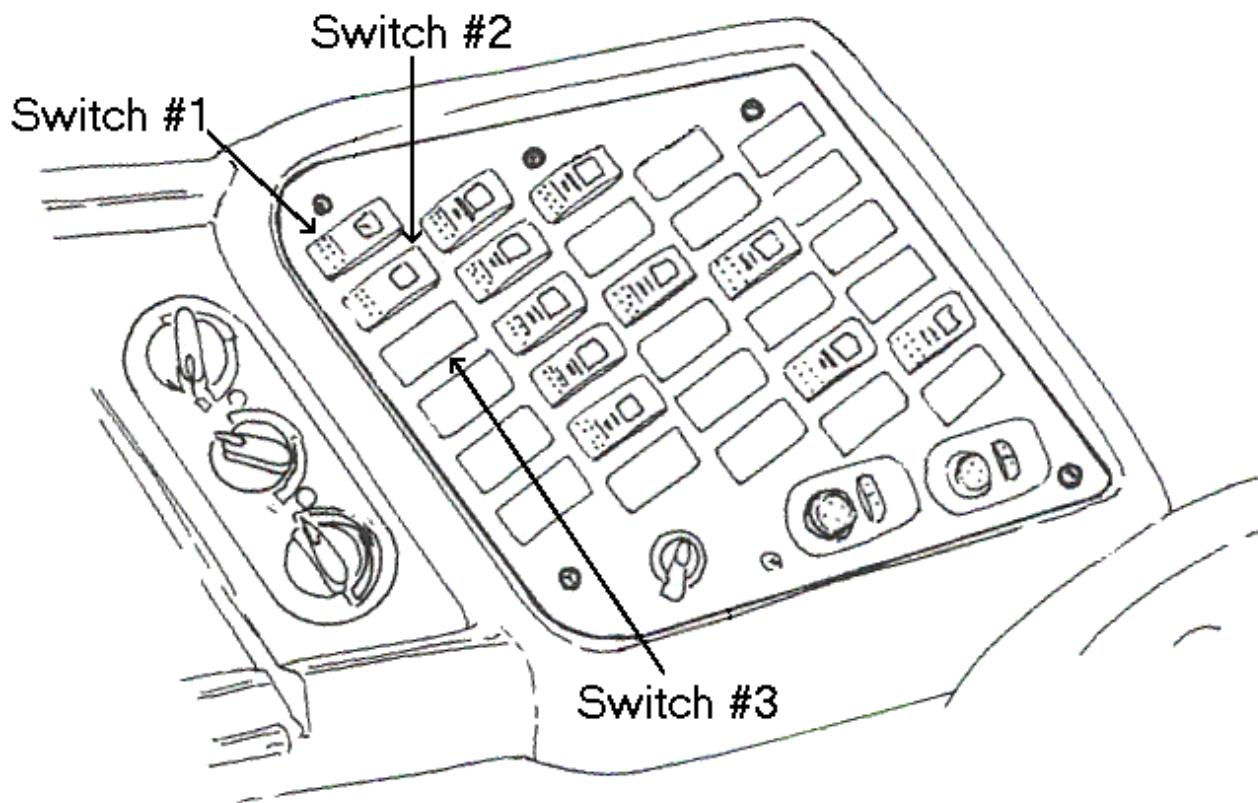


Figure 470 Left Hand Switch Panel

SWITCH #1 — MASTER FLASHER

SWITCH #2 — FLASHER START

SWITCH #3 — FLASHER SYSTEM OVERRIDE

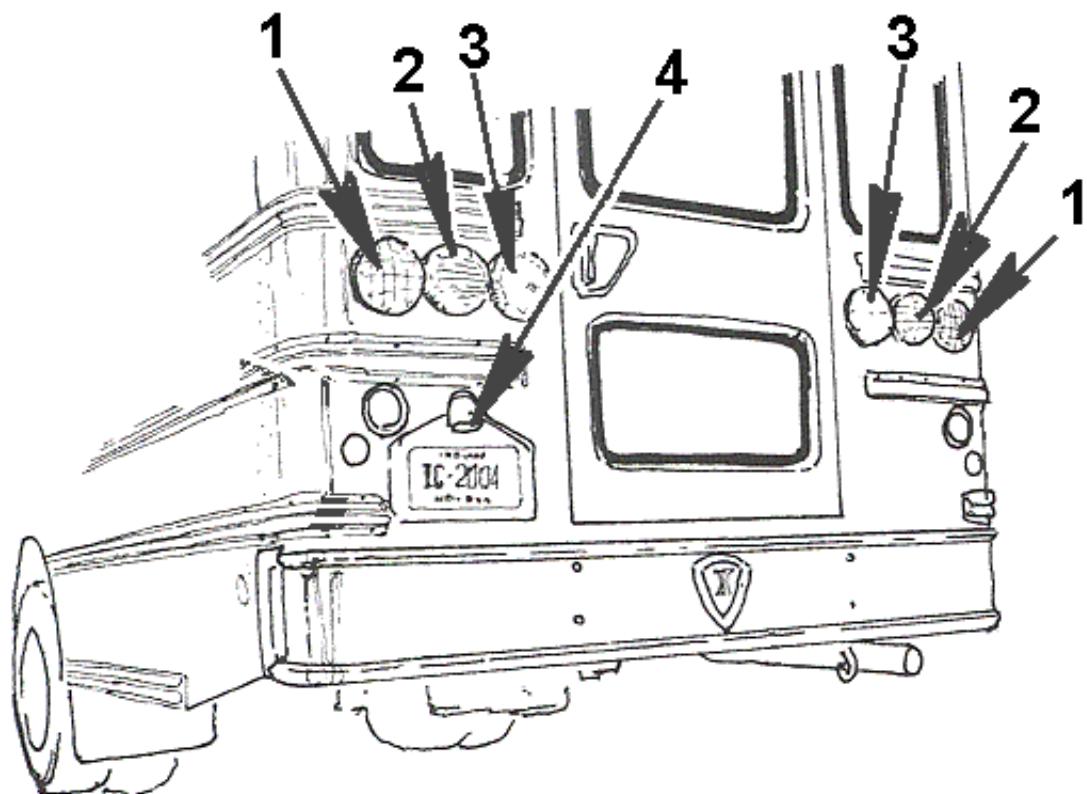


Figure 471 Rear Light Locations

1. REAR TURN SIGNAL LIGHT
2. REAR STOP/TAIL LIGHT
3. REAR BACK-UP LIGHT
4. LICENSE PLATE LIGHT

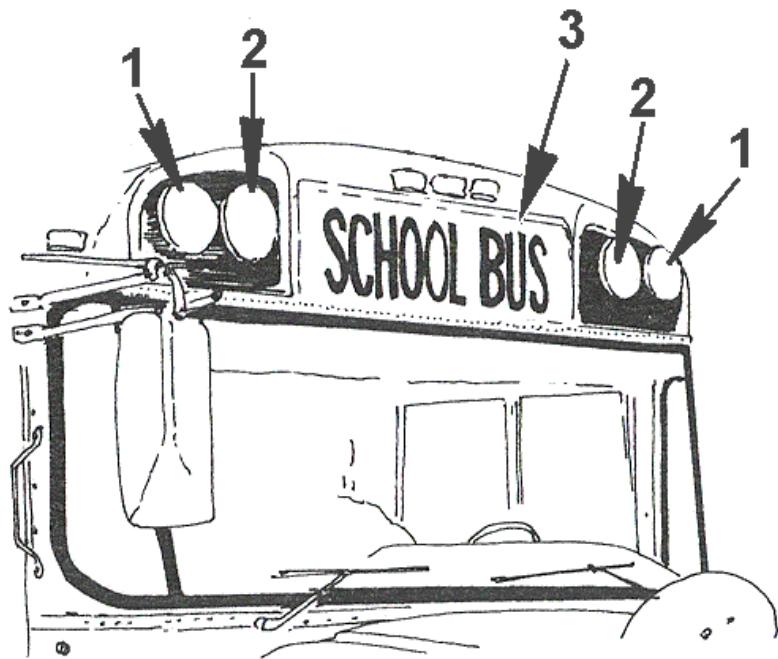


Figure 472 Front Pupil Warning Light Locations

1. RED PUPIL WARNING LIGHT
2. AMBER PUPIL WARNING LIGHT
3. DESTINATION SIGN

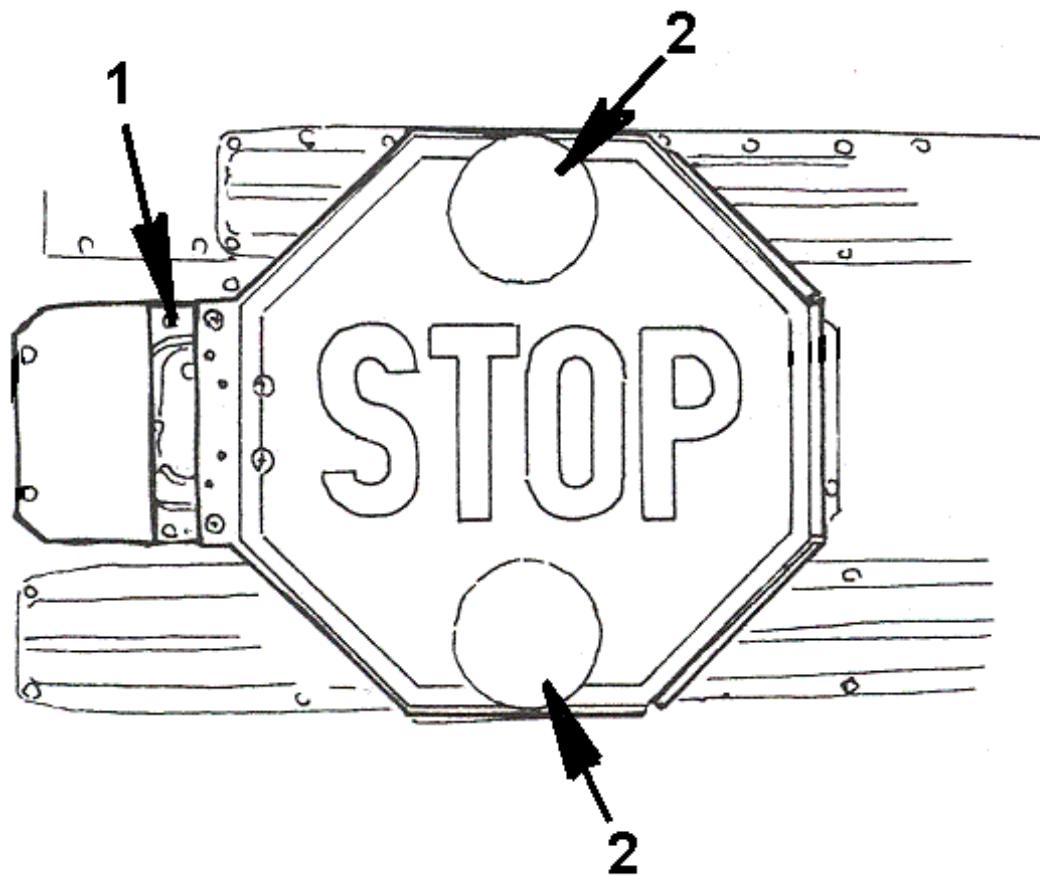


Figure 473 Stop Arm Lights & Location

1. STOP ARM MOTOR
2. RED PUPIL WARNING LIGHTS

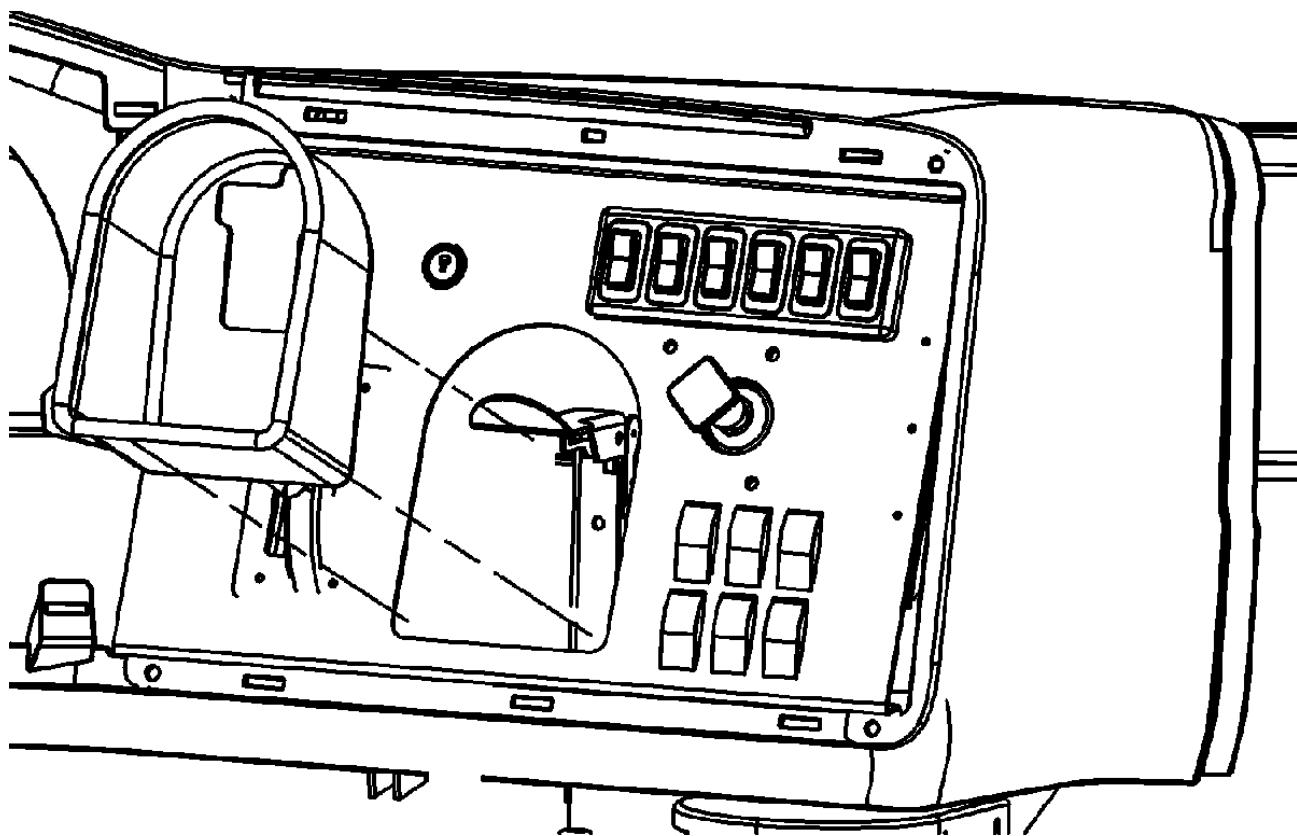


Figure 474 Manual Door Switch Location

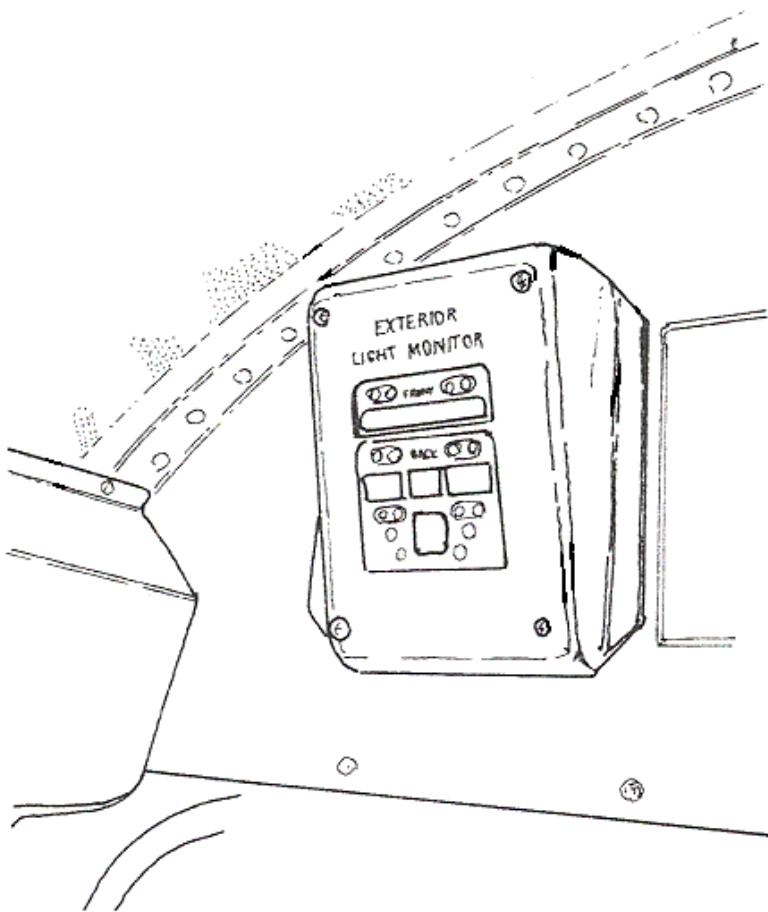


Figure 475 Exterior Light Monitor

9. STROBE LIGHT

9.1. CIRCUIT FUNCTIONS

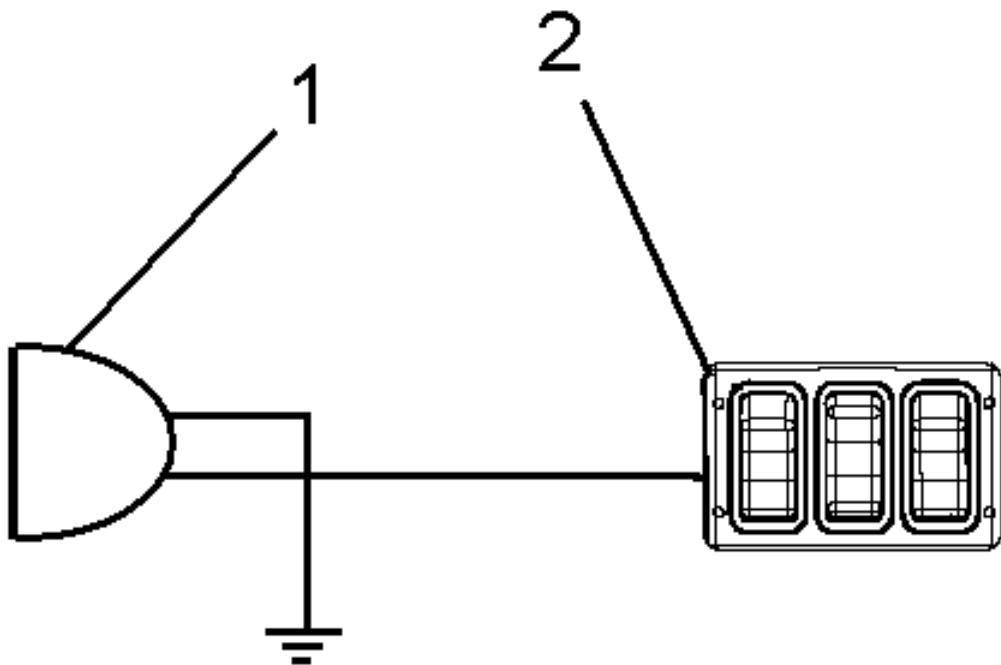


Figure 476 Strobe Light Function Diagram

1. STROBE LIGHT
2. SWITCH IN LEFT HAND SWITCH PANEL

The strobe light is a clear flashing light located on the roof of the bus. It is used in darkness or poor weather conditions to alert other vehicles of the bus's presence.

When the strobe light switch is turned on power will be applied to the strobe light by a direct circuit. The internal circuits of the strobe light will cause it to flash.

9.2. DIAGNOSTICS



WARNING – To avoid electrical shock causing injury, wait a minimum of five minutes after turning off power before servicing strobe light.

Should the strobe light fail to operate, the problem could be attributed to a faulty switch in the left hand switch panel, a faulty strobe light or an open or short in the strobe light circuit.

Strobe Light Preliminary Check

Table 303 Strobe Light Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify strobe light is inoperative. (Ignition on and strobe light switch on.)	Visually check strobe light.	Strobe light is inoperative.	Go to next step.	Strobe light is operating. Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to fault detection management. (See Basic Strobe Light Fault Detection Management, page 1011)	Identify and repair condition causing several features to be inoperative.

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the strobe light circuits.

9.3. BASIC STROBE LIGHT FAULT DETECTION MANAGEMENT

A fault in the strobe light circuits will be apparent when the light does not come on. Problems in the strobe light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

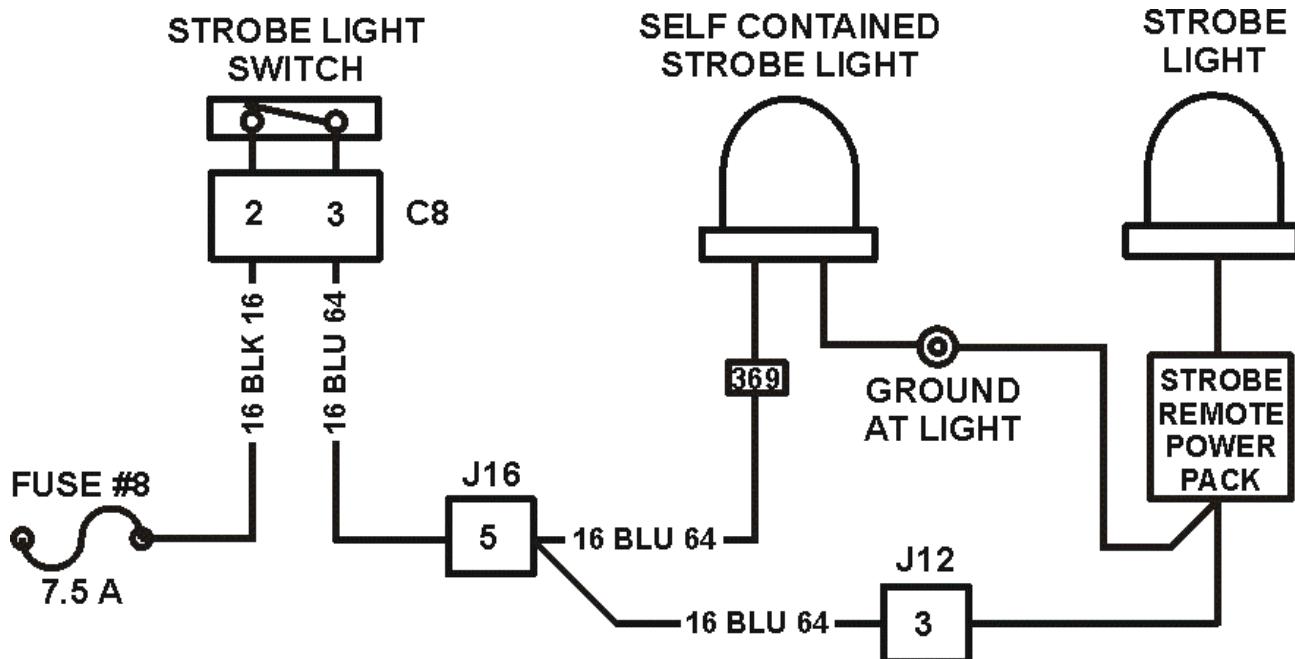


Figure 477 Strobe Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

C8 STROBE LIGHT SWITCH
LOCATED IN LEFT HAND SWITCH PANEL
J12 LEFT HAND BODY TO REAR CAB
J16 FLASHER PLATE TO LEFT HAND BODY

Table 304 Strobe Light Circuit Tests

Strobe Light Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C28 cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #8 and check for short or open in circuit 16 BLK 16.
Connector C8 cavity 2 to cavity 3	12 ± 1.5 volts	If strobe light functions during this test, replace strobe light switch.
For self contained strobe light: cavity 36 at light to ground	12 ± 1.5 volts	If voltage is missing check for open or short to ground in circuit 16 BLU 64.
For strobe remote power pack: Connector J12 cavity 3 to ground		Also ensure proper grounding of strobe light. If circuits are good and strobe light still fails, replace strobe light.

9.4. STROBE LIGHT ACTIVATED BY IGNITION FAULT DETECTION MANAGEMENT

A fault in the strobe light circuits will be apparent when the light does not come on. Problems in the strobe light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

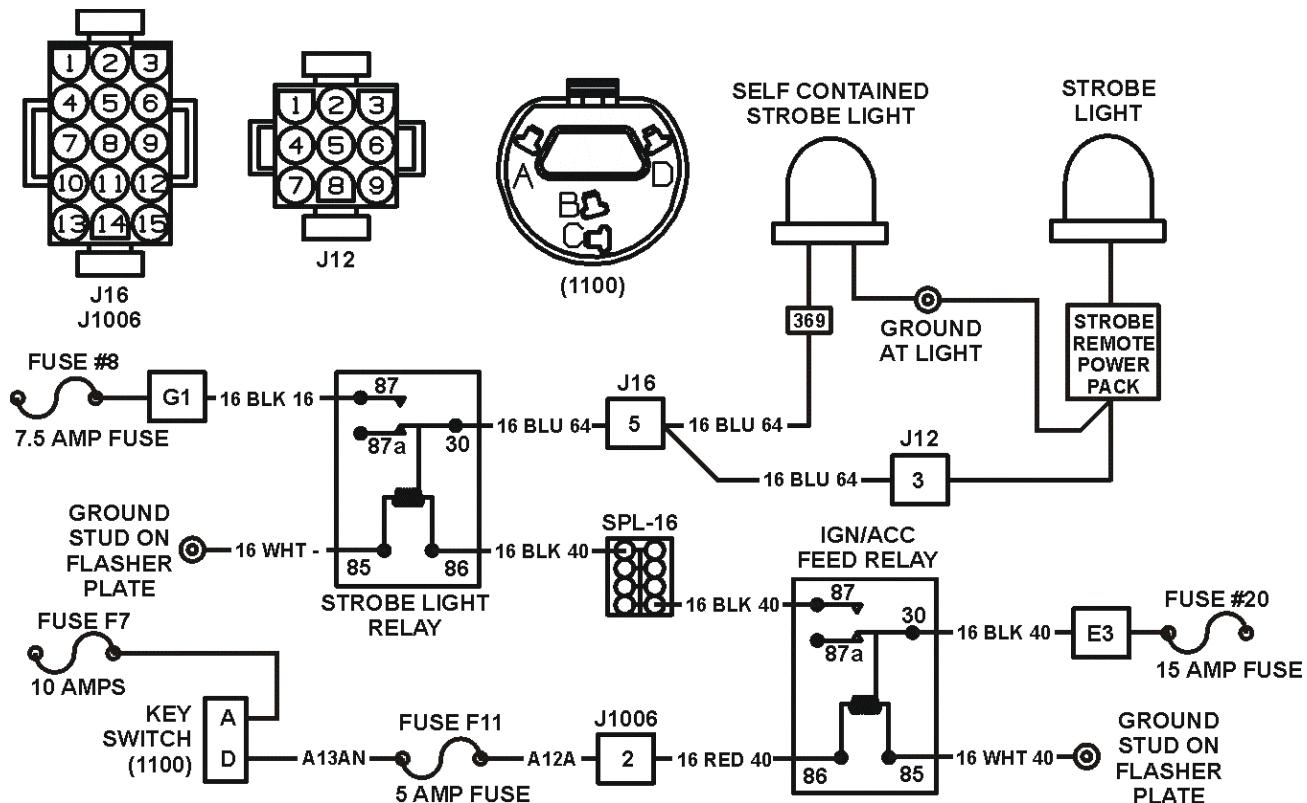


Figure 478 Strobe Light Activated by Ignition Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

(1100) KEY SWITCH

LOCATED AT INSTRUMENT WING PANEL

J12 LEFT HAND BODY TO REAR CAB

J16 FLASHER PLATE TO LEFT HAND BODY

J1006 BODY BUILDER CONNECTOR

LOCATED IN FLASHER PLATE ON LEFT SIDE OF VEHICLE

SPL-16 IGNITION ACCESSORY SPLICE

Table 305 Strobe Light Activated By Ignition Circuit Tests

Ignition/Accessory Feed Relay Voltage Checks

Check with ignition on, strobe light relay installed and Ign/Acc Feed relay removed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
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Table 305 Strobe Light Activated By Ignition Circuit Tests (cont.)

Ign/Acc Feed relay connector cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuses F7 and F11. Also check for open or short in circuits A13AN, A12A and 16 RED 40. Also check Key Switch for proper operation.
Ign/Acc Feed relay connector cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 40.
Ign/Acc Feed relay connector cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #20. Also check for open or short in circuit 16 BLK 40.
Ign/Acc Feed relay connector cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLK 40.

Strobe Light Relay Voltage Checks

Check with ignition on, Ign/Acc Feed relay installed and Strobe Light relay removed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Strobe Light relay connector cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLK 40.
Strobe Light relay connector cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT —.
Strobe Light relay connector cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #8. Also check for open or short in circuit 16 BLK 16.

Strobe Light Voltage Checks

Check with ignition on, Ign/Acc Feed relay installed and Strobe Light relay installed.

NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
For self contained strobe light: cavity 369 at light to ground For strobe remote power pack: Connector J12 cavity 3 to ground	12 ± 1.5 volts	If voltage is missing check for open or short to ground in circuit 16 BLU 64. Also ensure proper grounding of strobe light. If circuits are good and strobe light still fails, replace strobe light.

9.5. STROBE LIGHT ACTIVATED BY PUPIL WARNING LIGHTS FAULT DETECTION MANAGEMENT

A fault in the strobe light circuits will be apparent when the light does not come on. Problems in the strobe light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

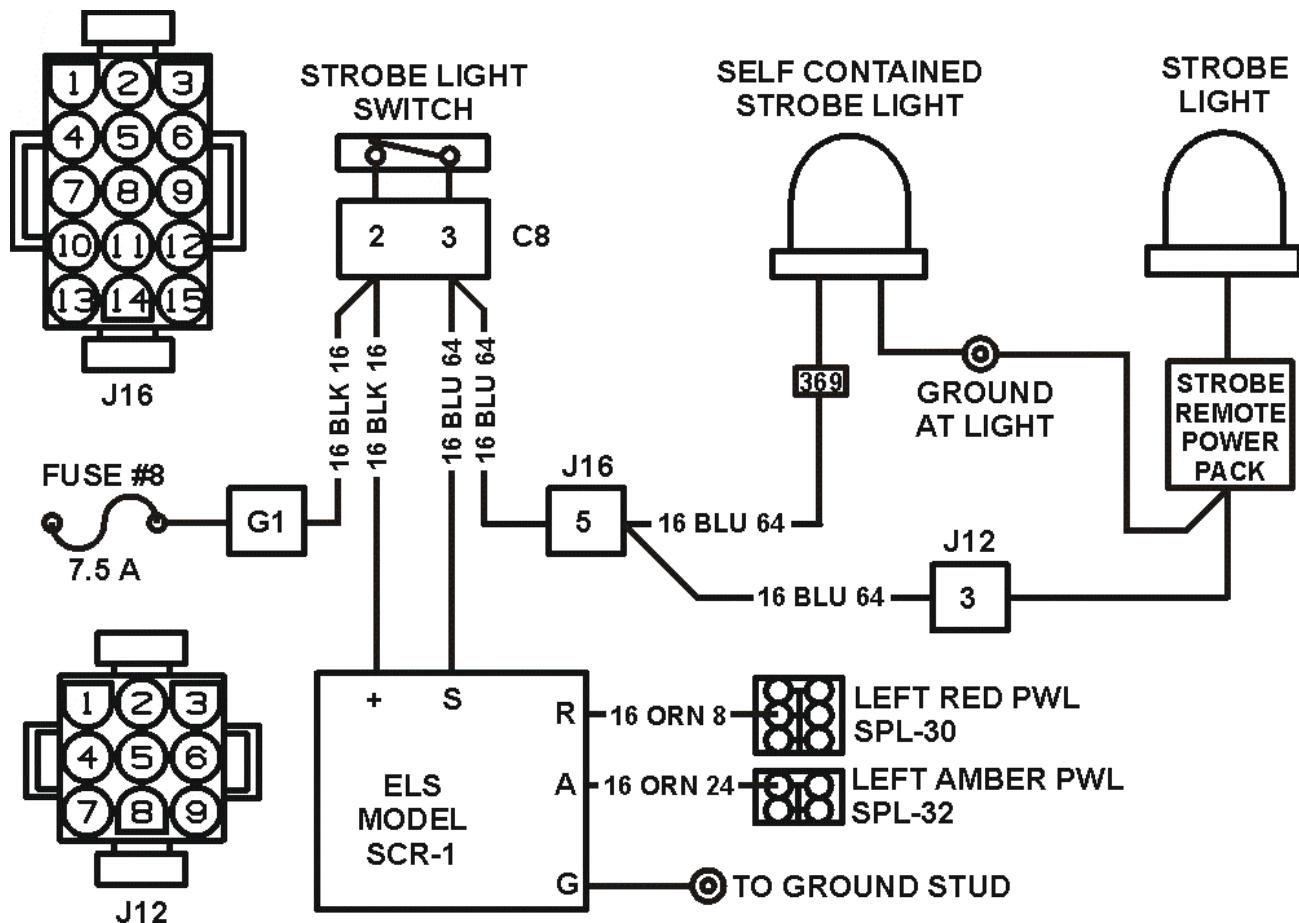


Figure 479 Strobe Light Activated by Amber or Red Pupil Warning Lights Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J12 LEFT HAND BODY TO REAR CAB

J16 FLASHER PLATE TO LEFT HAND BODY

SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR SPLICE

SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR SPLICE

Table 306 Strobe Light Activated By Amber or Red Pupil Warning Lights Circuit Tests

ELS Model SCR-1 Voltage Checks		
Check with ignition on.		
Test Points	Spec.	Comments
ELS Model SCR-1 cavity + to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #8. Also check for open or short in circuit 16 BLK 16.
ELS Model SCR-1 cavity + to cavity S.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLU 64.
ELS Model SCR-1 cavity A to cavity G.	0 volts	If voltage is present ensure pupil warning lights are deactivated and check for short in circuit 16 ORN 8. Also ensure proper ground connection at cavity G.
While meter is still connected to ELS Model SCR-1 from cavity A to cavity G, activate amber pupil warning lights.		
ELS Model SCR-1 cavity A to cavity G.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 8.
Deactivate amber pupil warning lights.		
ELS Model SCR-1 cavity R to cavity G.	0 volts	If voltage is present ensure pupil warning lights are deactivated and check for short in circuit 16 ORN 24. Also ensure proper ground connection at cavity G.
While meter is still connected to ELS Model SCR-1 from cavity R to cavity G, activate red pupil warning lights.		
ELS Model SCR-1 cavity A to cavity G.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 24. If voltages check good and strobe light still fails, check continuity of switch C8 and replace if faulty. If strobe light works with switch but is faulty with the pupil warning lights, replace ELS Model SCR-1 module. If strobe light is faulty with switch and faulty with the pupil warning lights, replace strobe light.

9.6. STROBE LIGHT ACTIVATED BY RED PUPIL WARNING LIGHTS ONLY FAULT DETECTION MANAGEMENT

A fault in the strobe light circuits will be apparent when the light does not come on. Problems in the strobe light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

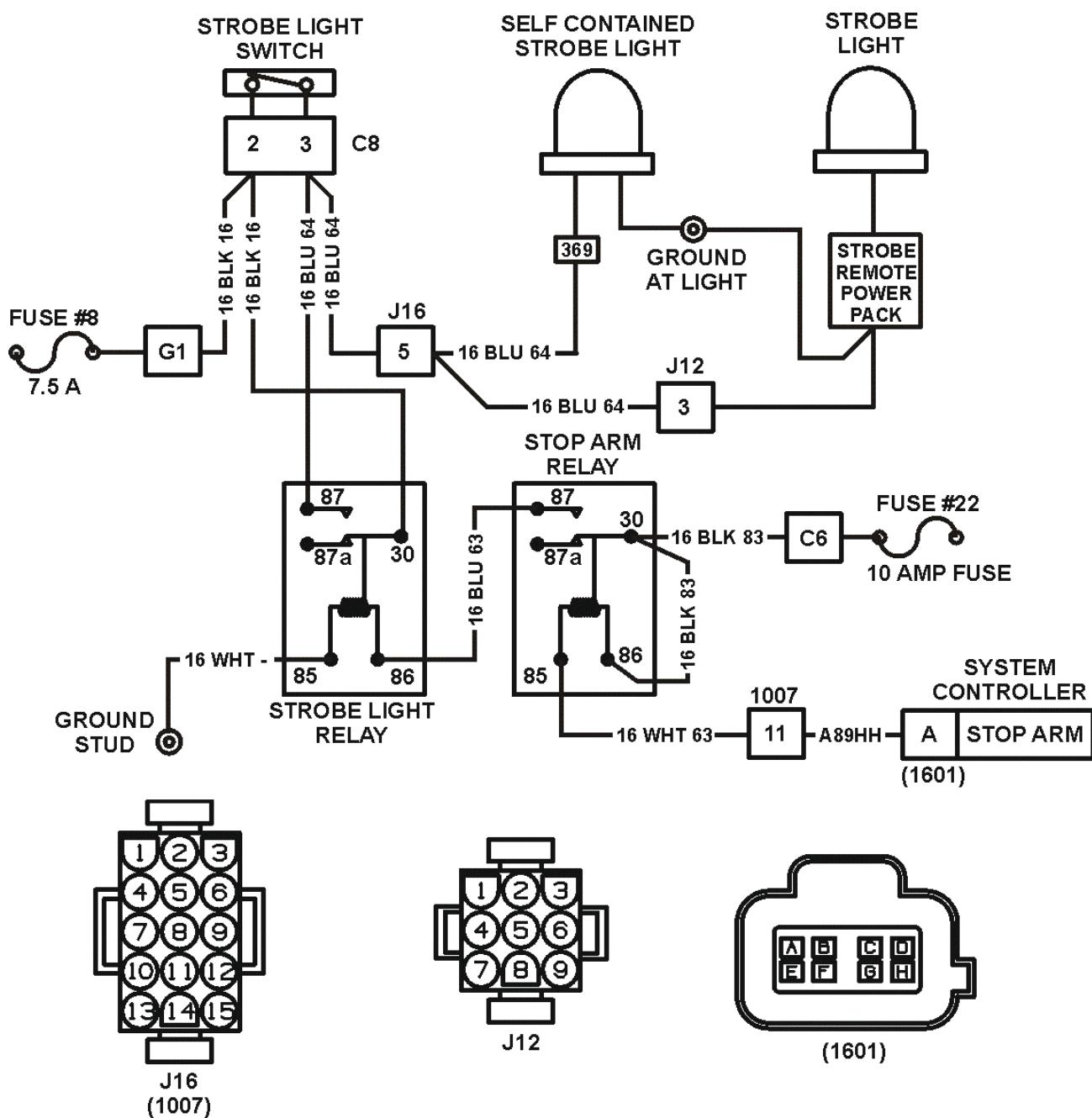


Figure 480 Strobe Light Activated by Red Pupil Warning Lights Only Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

(1601) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL

C8 STROBE LIGHT SWITCH
LOCATED IN LEFT HAND SWITCH PANEL

J12 LEFT HAND BODY TO REAR CAB

J16 FLASHER PLATE TO LEFT HAND BODY

J1007 BODY BUILDER CONNECTOR

LOCATED IN FLASHER PLATE ON LEFT SIDE OF VEHICLE

Table 307 Strobe Light Activated By Red Pupil Warning Lights Only Circuit Tests

Stop Arm Relay Voltage Checks		
Check with ignition on, Strobe Light relay installed and Stop Arm relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Stop Arm relay connector cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F20. Also check for open or short in circuit 16 BLK 83.
Stop Arm relay connector cavity 86 to 85.	0 volts	If voltage is present ensure red pupil warning lights are not activated. Also check for open or short in circuits 16 WHT 63 and A89HH. Also ensure that there is an open signal present on System Controller connector (1601) pin A.
While meter is connected to Stop Arm Relay cavity 86 to 85, activate red pupil warning lights.		
Stop Arm relay connector cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing ensure red pupil warning lights are activated. Also check for open or short in circuits 16 WHT 63 and A89HH. Also ensure that there is a ground signal present on System Controller connector (1601) pin A.
Deactivate red pupil warning lights.		
Stop Arm relay connector cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F20. Also check for open or short in circuit 16 BLK 83.
Stop Arm relay connector cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLU 63.
Strobe Light Relay Voltage Checks		
Check with ignition on, Stop Arm relay installed and Strobe Light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals. Also check turn signal assemblies for damage or corrosion.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Strobe Light relay connector cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLU 63.
Strobe Light relay connector cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT —.

Table 307 Strobe Light Activated By Red Pupil Warning Lights Only Circuit Tests (cont.)

Strobe Light relay connector cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #8. Also check for open or short in circuit 16 BLK 16.
Strobe Light relay connector cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to ground in circuit 16 BLU 64. Also ensure proper grounding of strobe light. If voltages check good and strobe light still fails, check continuity of switch C8 and replace if faulty. If circuits check good and strobe light is still faulty, replace strobe light.

9.7. EXTENDED DESCRIPTION

The strobe light switch will close a circuit that provides power to the strobe light.

Ground is supplied to the strobe light at the fixture.

9.8. COMPONENT LOCATIONS

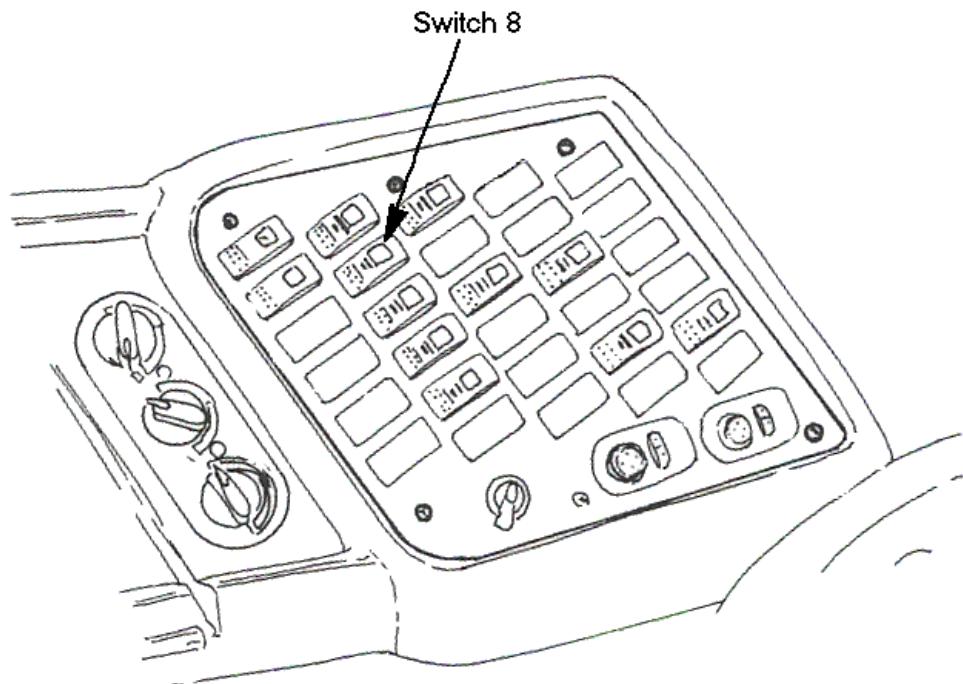


Figure 481 Strobe Light Switch

SWITCH #8 — STROBE LIGHT SWITCH LOCATION IN SWITCH PANEL

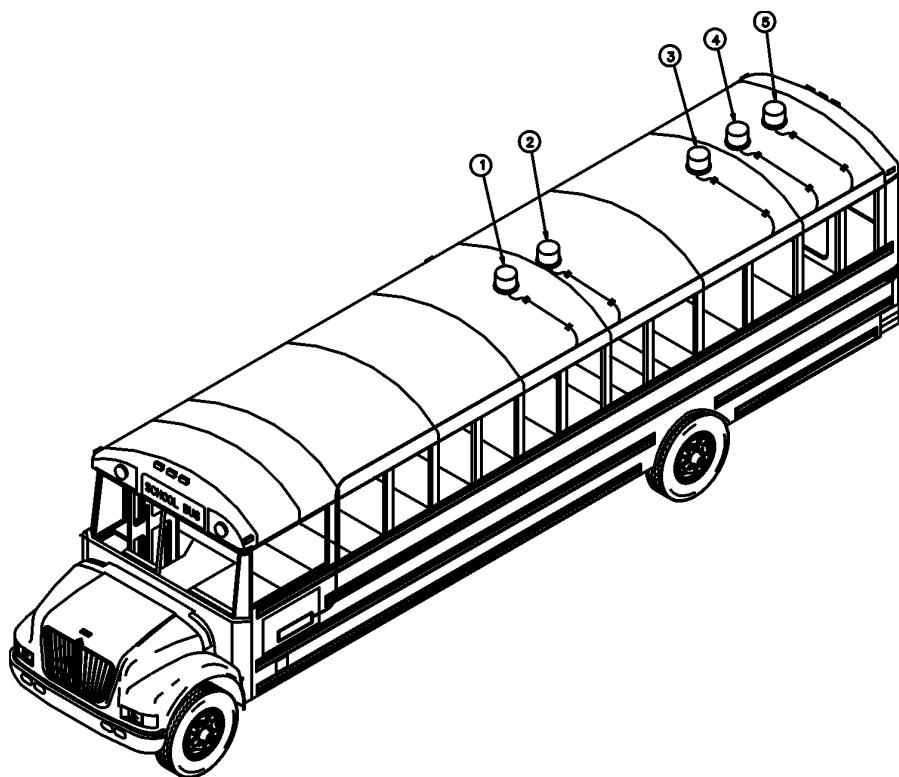


Figure 482 Self Contained Strobe Light Locations

1. CENTER SECTION OF BUS
2. FIRST SECTION AFT OF BUS
3. THIRD SECTION FROM REAR
4. SECOND SECTION FROM REAR
5. FIRST SECTION FROM REAR

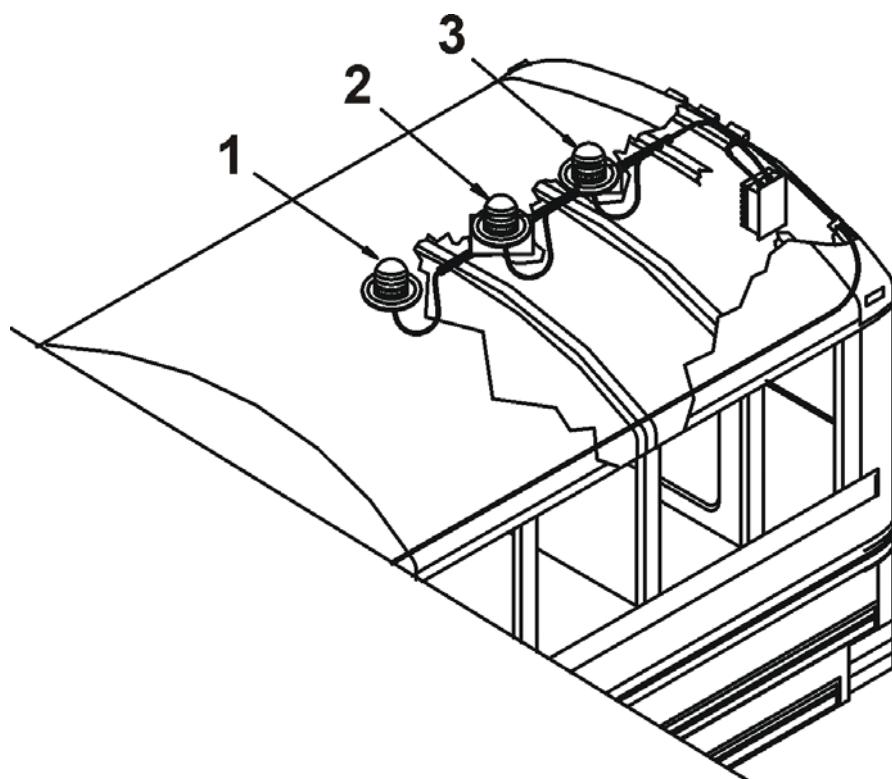


Figure 483 Strobe Light With Remote Power Pack Locations

1. THIRD SECTION FROM REAR OF BUS
2. SECOND SECTION FROM REAR OF BUS
3. FIRST SECTION FROM REAR OF BUS

10. DOME LIGHTS

10.1. CIRCUIT FUNCTIONS

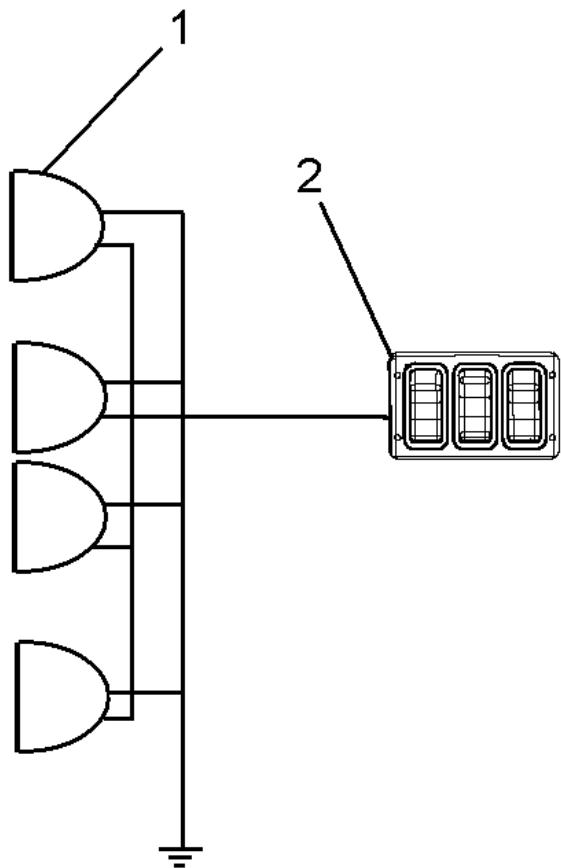


Figure 484 Dome Lights Function Diagram

1. DOME LIGHTS
2. SWITCH IN LEFT HAND SWITCH PANEL

The dome lights are located throughout the inside body of the bus. They are there to illuminate the interior in times of poor light.

The dome lights are directly connected to the dome light switches. When these switches are closed, voltage is applied to illuminate the lights.

The dome lights are available in two configurations:

- Left side/right side dome lights
- Front/rear dome lights

Both configurations use two switches for their operation. In the left side/right side configuration, one switch will control the left side dome lights and the other switch will control the right side dome lights. In the front/rear dome lights, one switch will control the front dome lights and the other switch will control the rear dome lights.

There is also an optional driver's dome light which is independent of the other dome light configurations.

10.2. DIAGNOSTICS

Should the dome lights fail to operate, the problem could be attributed to a blown fuse, a faulty switch in the left hand switch panel, a burnt out light bulb or an open or short in the dome light circuits.

Dome Light Preliminary Check

Table 308 Dome Light Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify dome lights are inoperative. (Ignition on and dome light switches on.)	Visually check dome lights.	Dome lights are inoperative.	Go to next step.	Dome lights are operating. Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to fault detection management.	Identify and repair condition causing several features to be inoperative.

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the dome light circuits.

10.3. RIGHT SIDE/LEFT SIDE DOME LIGHT FAULT DETECTION MANAGEMENT

A fault in the dome light circuits will be apparent when the dome lights do not come on. Problems in the dome light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

Typical Right Side/Left Side Dome Light Configuration

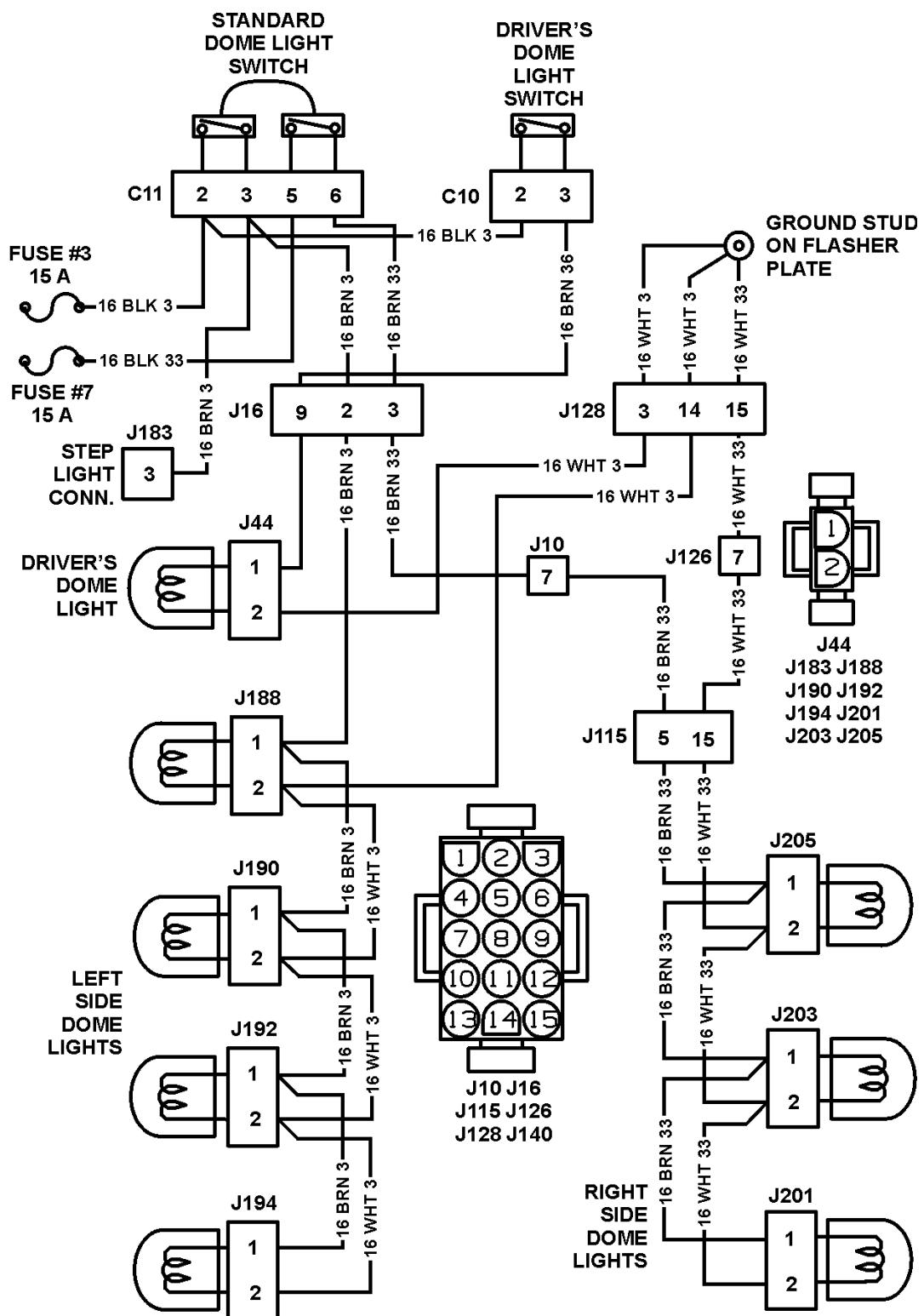


Figure 485 Right Side/Left Side Dome Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J10 LEFT HAND BODY TO REAR CAP
 J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J44 LEFT HAND BODY
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J183 STEP LIGHT OPTIONS
 J188 J190 J192 J194 DOME LIGHT TO LEFT HAND BODY
 J201 J203 J205 DOME LIGHT TO RIGHT HAND BODY

Table 309 Right Side/Left Side Dome Light Circuit Tests

Right Side/Left Side Dome Light Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C11, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Connector C11, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.
Connector C11, cavity 5 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuit 16 BLK 33.
Connector C11, cavity 5 to 6	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
Connector C10, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Connector C10, cavity 2 to 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 36 and 16 WHT 3. If dome light illuminates during this test, replace dome light switch. If circuits test good and lights still fail, test circuits at each individual bulb.

Right Side/Left Side Dome Lights On Individual Switches

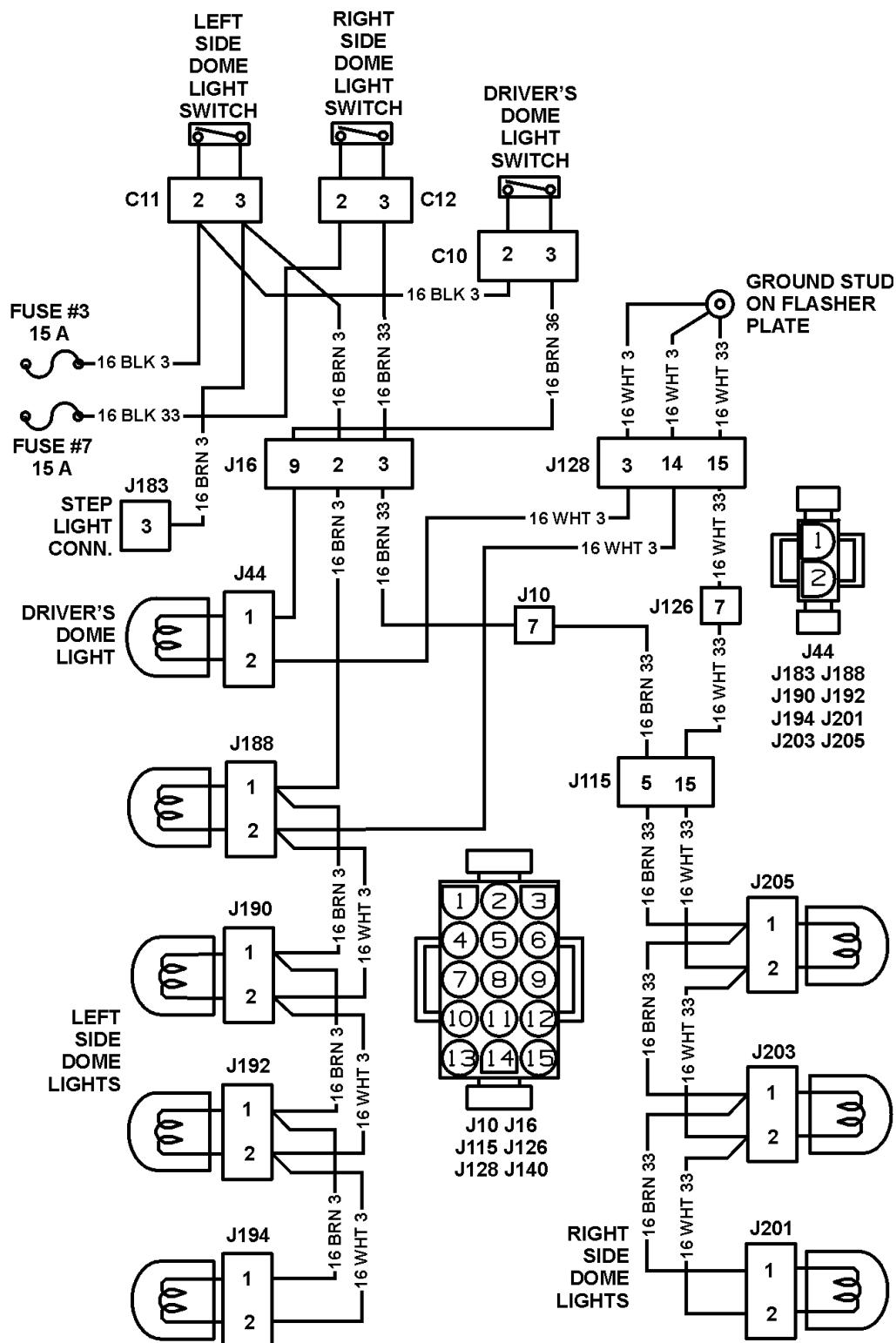


Figure 486 Right Side/Left Side Dome Lights On Individual Switches Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J10 LEFT HAND BODY TO REAR CAP
 J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J44 LEFT HAND BODY
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J183 STEP LIGHT OPTIONS
 J188 J190 J192 J194 DOME LIGHT TO LEFT HAND BODY
 J201 J203 J205 DOME LIGHT TO RIGHT HAND BODY

Table 310 Right Side/Left Side Dome Light Circuit Tests

Right Side/Left Side Dome Lights On Individual Switches Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C11, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Connector C11, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.
Connector C12, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuit 16 BLK 33.
Connector C12, cavity 2 to 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
Connector C10, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Connector C10, cavity 2 to 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 36 and 16 WHT 3. If dome light illuminates during this test, replace dome light switch. If circuits test good and lights still fail, test circuits at each individual bulb.

10.4. FRONT/REAR DOME LIGHT FAULT DETECTION MANAGEMENT

A fault in the dome light circuits will be apparent when the dome lights do not come on. Problems in the dome light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

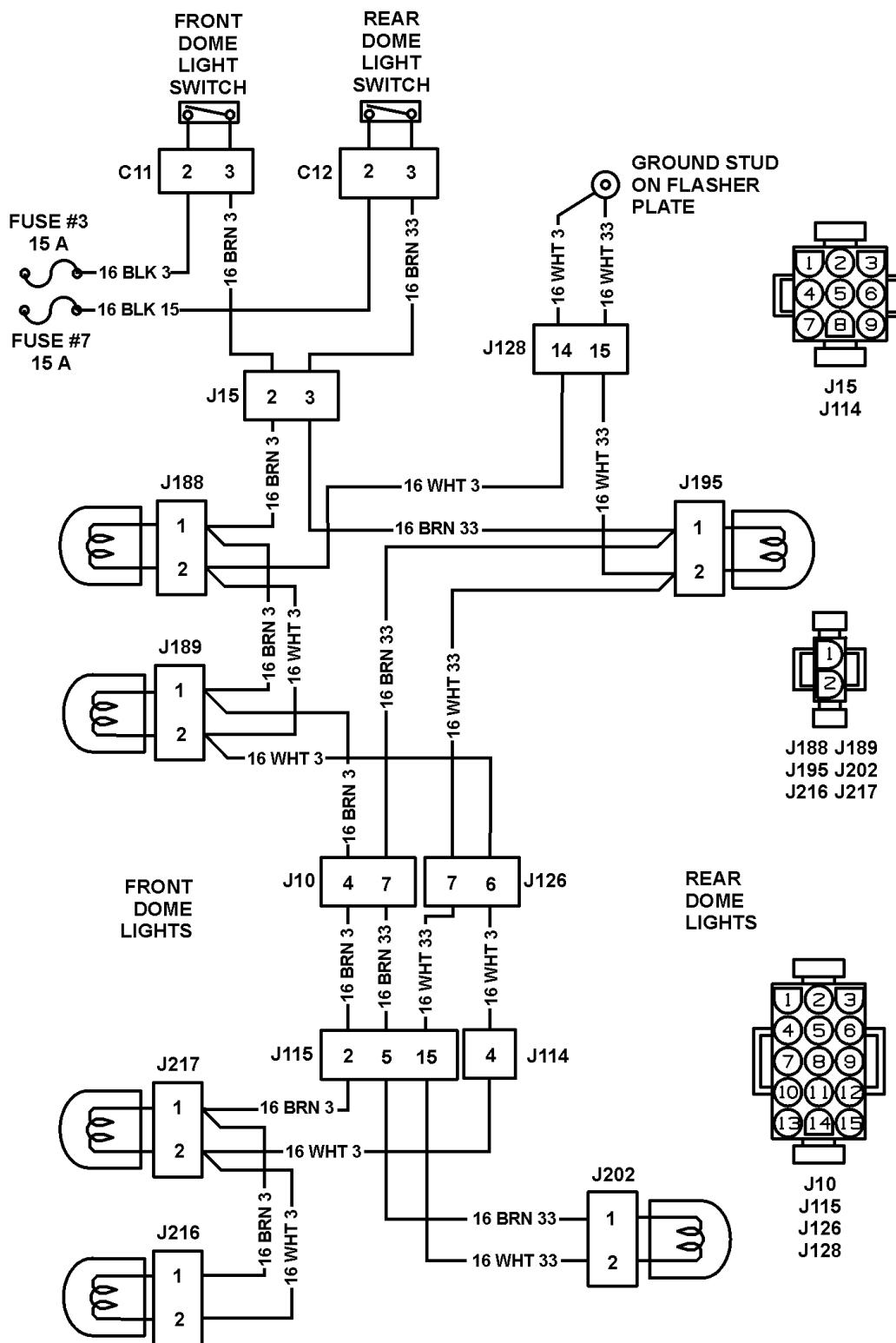


Figure 487 Front/Rear Dome Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

Table 311 Front/Rear Dome Light Circuit Tests

Front/Rear Dome Light Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C11, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Connector C11, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.
Connector C12, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuit 16 BLK 15.
Connector C12, cavity 2 to 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.

10.5. LAST DOME LIGHT FAULT DETECTION MANAGEMENT

A fault in the dome light circuits will be apparent when the dome lights do not come on. Problems in the dome light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

Single Rear Dome Light Control

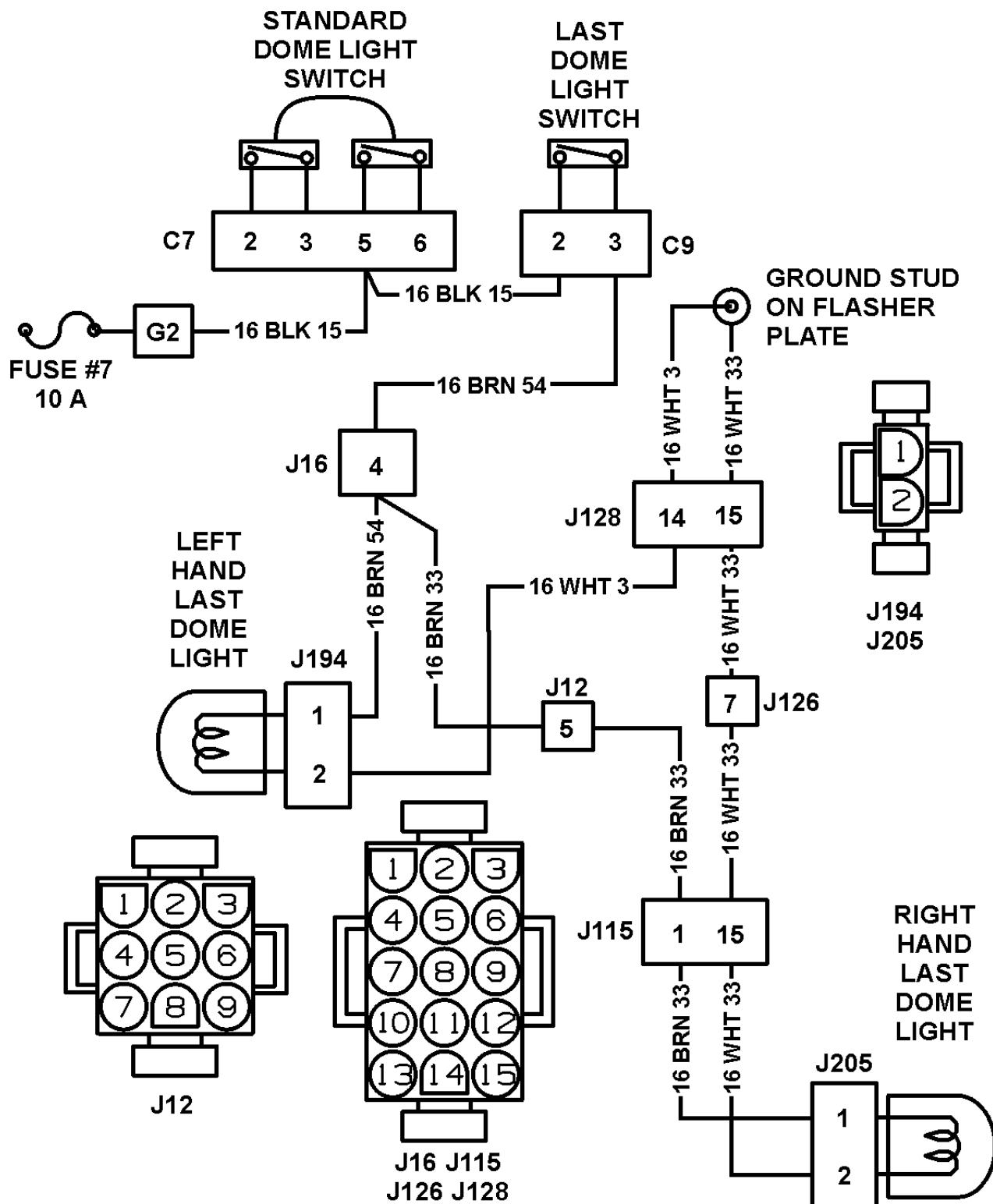


Figure 488 Last Dome Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J12 LEFT HAND BODY TO REAR CAP
 J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J194 DOME LIGHT TO LEFT HAND BODY
 J205 DOME LIGHT TO RIGHT HAND BODY

The last dome light can located on either the right or left side of the bus.

Table 312 Last Dome Light Circuit Tests

Last Dome Light Voltage Checks		
Check with ignition on and last dome light switch connector C9 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Last dome light switch connector C9, cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuit 16 BLK 15.
Last dome light switch connector C9, cavity 2 to 3.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 54 and 16 WHT 3 for left hand last dome light. If voltage is missing check for open or short in circuits 16 BRN 54, 16 BRN 33 and 16 WHT 33 for right hand last dome light. If circuits check good and last dome light is still faulty, replace last dome light switch.

Rear Row Dome Light Control

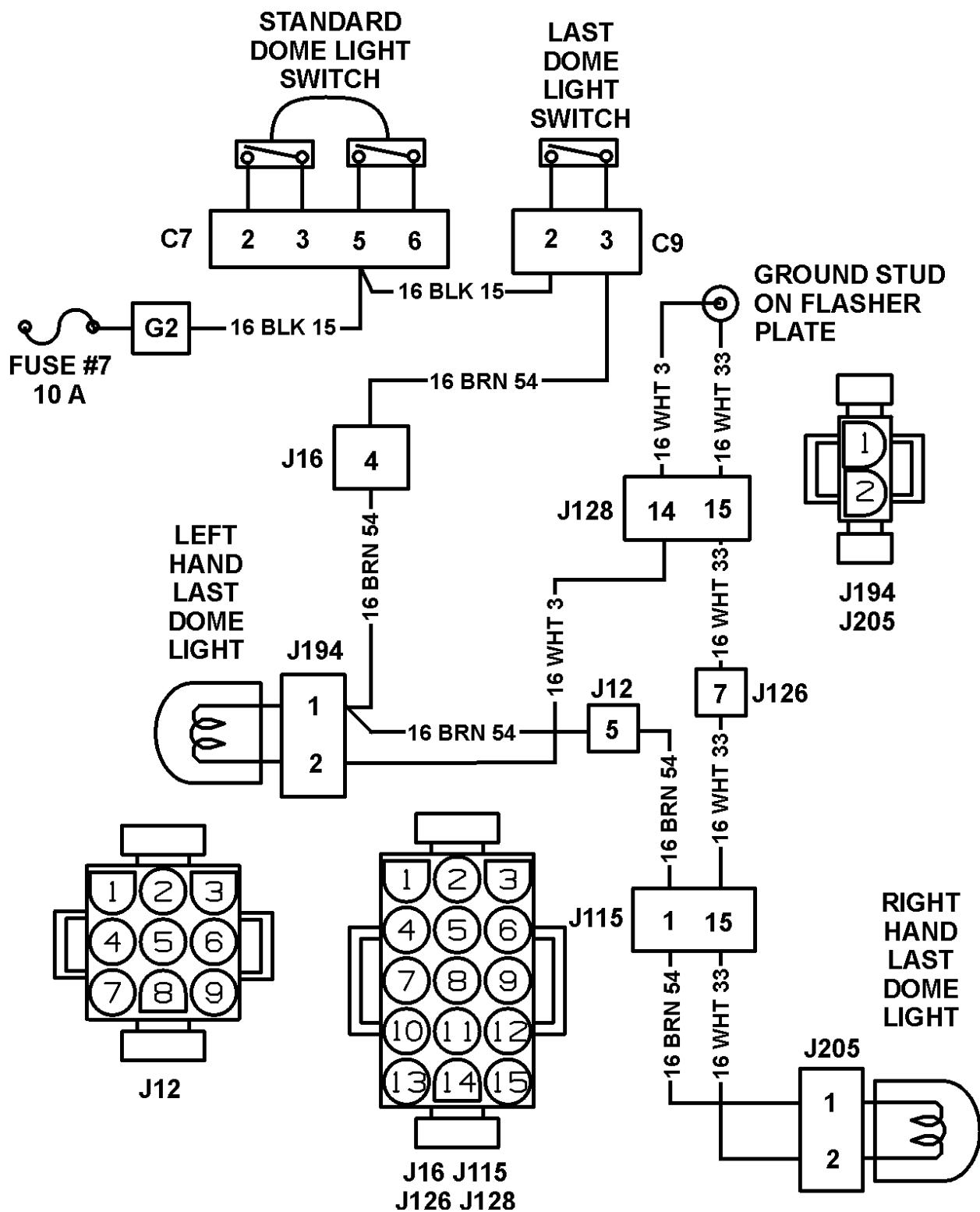


Figure 489 Last Row Dome Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J12 LEFT HAND BODY TO REAR CAP
 J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J194 DOME LIGHT TO LEFT HAND BODY
 J205 DOME LIGHT TO RIGHT HAND BODY

Table 313 Last Dome Light Circuit Tests

Last Row Dome Light Voltage Checks		
Check with ignition on and last dome light switch connector C9 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Last dome light switch connector C9, cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuit 16 BLK 15.
Last dome light switch connector C9, cavity 2 to 3.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 54, 16 WHT 3 and 16 WHT 33 . If circuits check good and last row dome lights are still faulty, replace last dome light switch.

10.6. DOME LIGHTS CONTROLLED BY RHEOSTAT FAULT DETECTION MANAGEMENT

A fault in the dome light circuits will be apparent when the dome lights do not come on. Problems in the dome light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

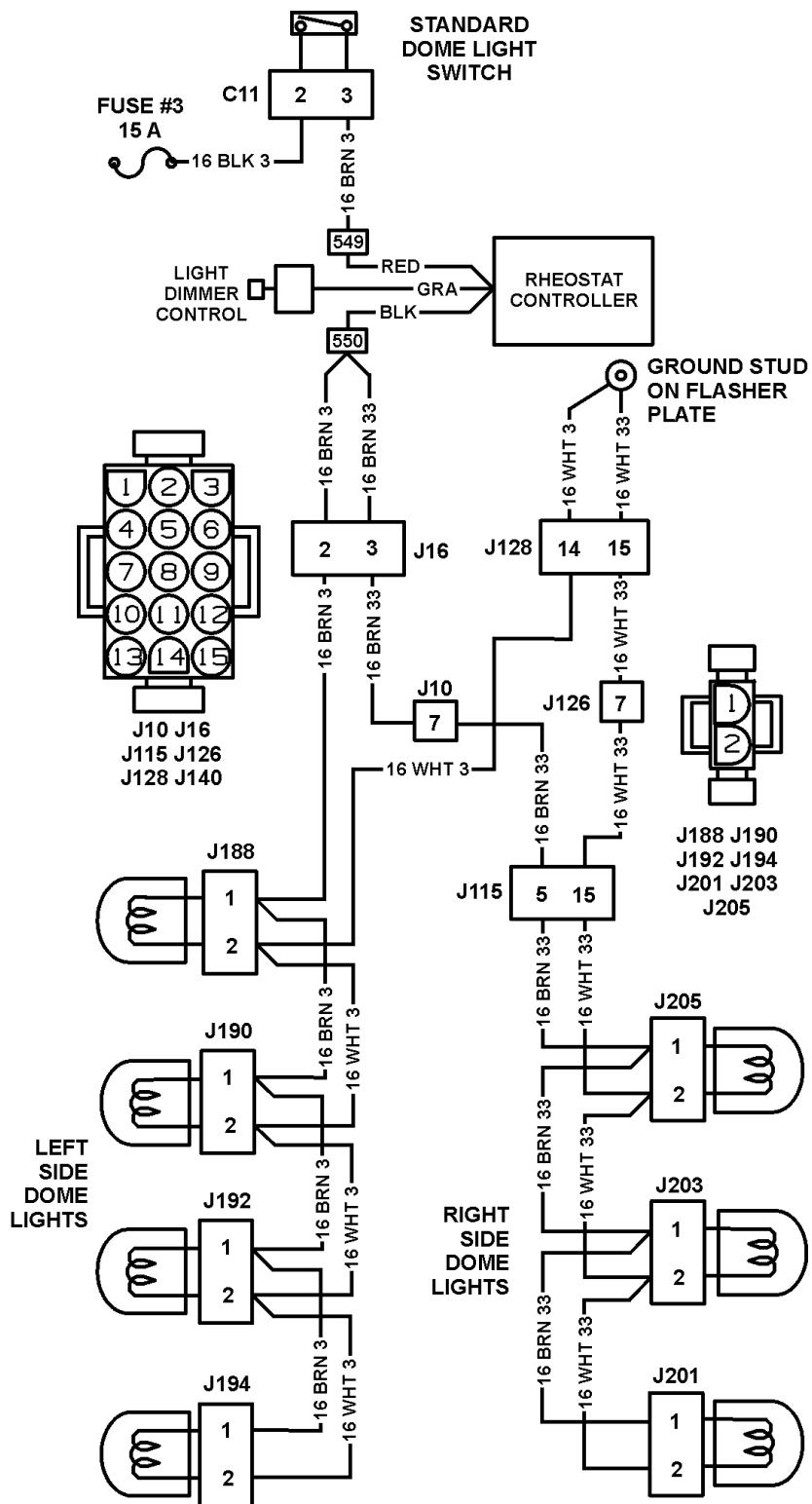


Figure 490 Dome Lights Controlled By Rheostat Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

Table 314 Dome Lights Controlled By Rheostat Circuit Tests

Standard Dome Light Switch Voltage Checks		
Check with ignition on and connector C11 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C11, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Connector C11, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3, 16 BRN 33, 16 WHT 3 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
Rheostat Controller Voltage Checks		
Check with ignition on and rheostat control set to maximum brightness.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Rheostat controller cavity 550 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit BLK.
While meter is still connected to rheostat controller cavity 550 to ground, turn rheostat switch to dim dome lights. Meter should show a decrease in voltage.		
If voltage does not vary with light dimmer control knob, replace light dimmer control knob and retest.		
If voltage does not vary with light dimmer control know on retest, replace rheostat controller.		

10.7. DOME LIGHTS ACTIVATED BY EMERGENCY EXITS FAULT DETECTION MANAGEMENT

A fault in the dome light circuits will be apparent when the dome lights do not come on. Problems in the dome light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

Dome Lights Activated By Rear Emergency Exit or Rocker Switches

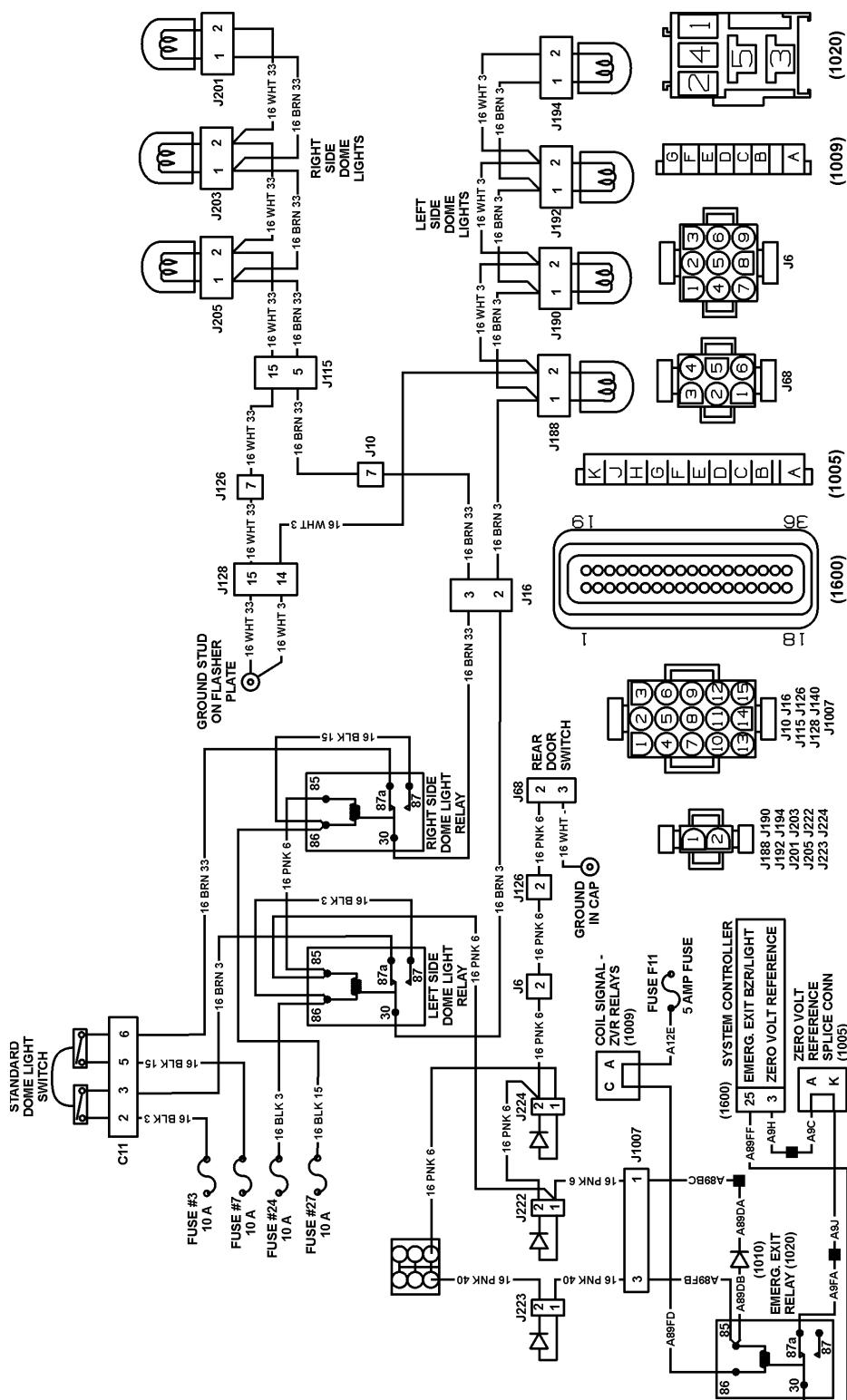


Figure 491 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1009) COIL SIGNAL ZERO VOLT REFERENCE SPLICE
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1010) POST TRIP INSPECTION DIODE ASSEMBLY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1020) EMERGENCY EXIT RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J6 J16 J128 FLASHER PLATE TO LEFT HAND BODY
J10 LEFT HAND BODY TO REAR CAP
J68 REAR CAP
J115 RIGHT HAND BODY TO REAR CAP
J126 REAR CAP TO LEFT HAND BODY
J188 J190 J192 J194 DOME LIGHT TO LEFT HAND BODY
J201 J203 J205 DOME LIGHT TO RIGHT HAND BODY
J222 POST TRIP RELAY DIODE ASSEMBLY ON FLASHER PLATE
J223 EMERGENCY EXIT RELAY DIODE ASSEMBLY ON FLASHER PLATE
J224 REAR DOOR SWITCH DIODE ASSEMBLY ON FLASHER PLATE

Table 315 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuit Tests

Left Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, rear door closed and left side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Left side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #24 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 86 to 85.	0 volts	If voltage is present check for proper operation and orientation of diodes J22, J224 and (1010). Also check for open or short in circuits 16 PNK 6, A89BC and A89DA.
While meter is still connected to left side dome light relay from cavity 86 to 85, open rear emergency exit door.		
Left side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for proper operation and orientation of diodes J22, J224 and (1010). Also check for open or short in circuits 16 PNK 6, 16 WHT —, A89BC and A89DA. Also check for continuity in rear door switch J68.
Leave rear emergency exit door open.		

Table 315 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuit Tests (cont.)

Left side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #24 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 3.
While meter is still connected to left side dome light relay from cavity 87a to ground, activate dome lights by closing the standard dome light switch (C11).		
Left side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuits 16 BRN 3 and 16 BLK 3. Also check for continuity in standard dome light switch (C11).
Leave dome lights on.		
Left side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.

Right Side Dome Light Relay Voltage Checks

Check with ignition on, dome lights off, rear door closed and right side dome light relay removed.

NOTE – Always check connectors for damage and pushed-out terminals.

Bench test relay. If relay fails bench test, replace and check for faults.

Test Points	Spec.	Comments
Right side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #27 and check for open or short in circuit 16 BLK 15.
Right side dome light relay, cavity 86 to 85.	0 volts	If voltage is present check for proper operation and orientation of diodes J22, J224 and (1010). Also check for open or short in circuits 16 PNK 6, A89BC and A89DA.
While meter is still connected to right side dome light relay from cavity 86 to 85, open rear emergency exit door.		
Right side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for proper operation and orientation of diodes J22, J224 and (1010). Also check for open or short in circuits 16 PNK 6, 16 WHT —, A89BC and A89DA. Also check for continuity in rear door switch J68.
Leave rear emergency exit door open.		
Right side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #27 and check for open or short in circuit 16 BLK 15.

Table 315 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuit Tests (cont.)

Right side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 33.
While meter is still connected to right side dome light relay from cavity 87a to ground, activate dome lights by closing the standard dome light switch (C11).		
Right side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuits 16 BRN 33 and 16 BLK 15. Also check for continuity in standard dome light switch (C11).
Leave dome lights on.		
Right side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
To troubleshoot the emergency exit circuits, refer to the Emergency Exit Controls section of this manual. (See CIRCUIT FUNCTIONS, page 531)		

Dome Lights Activated By Any Emergency Exit or Rocker Switches

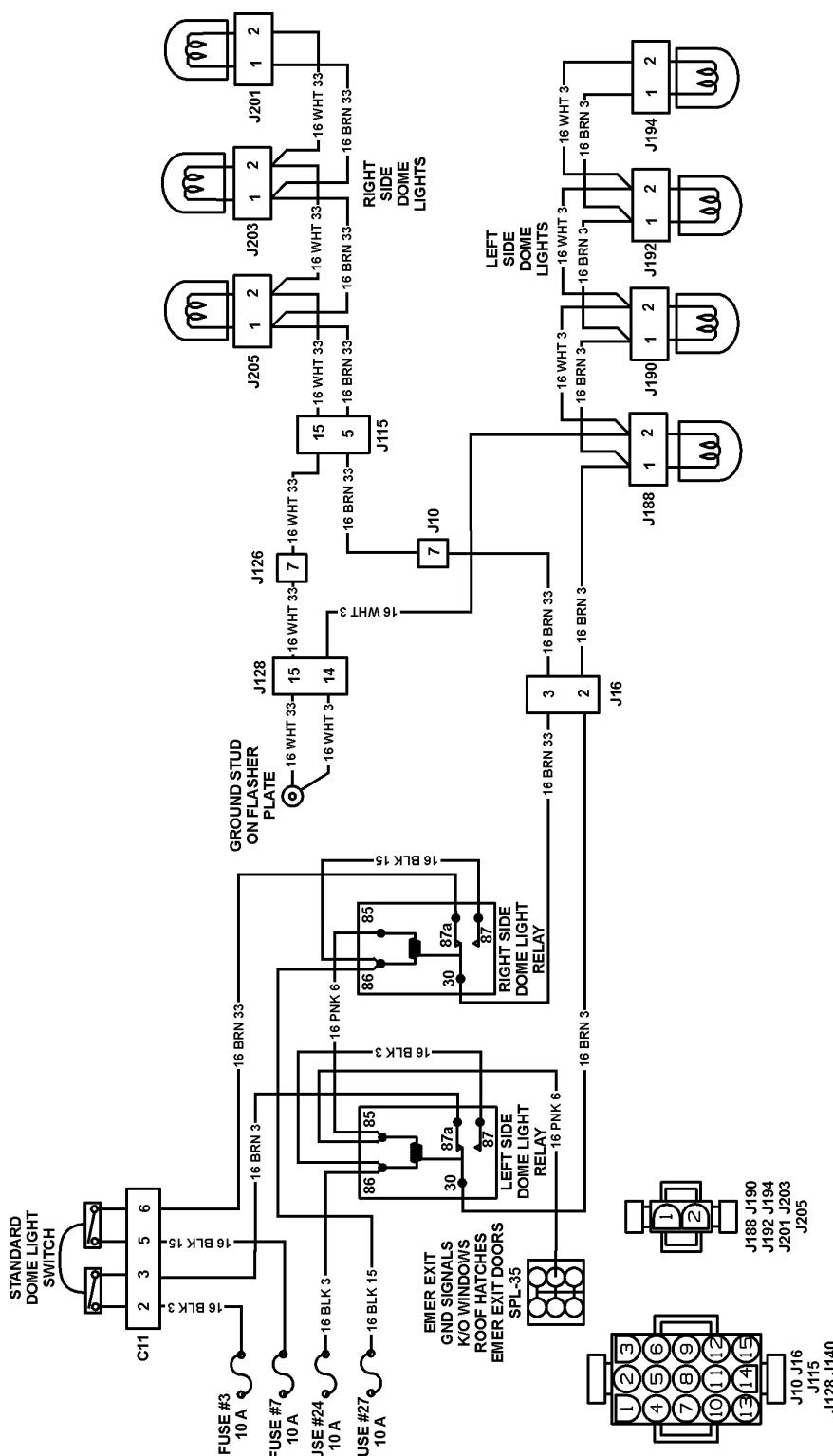


Figure 492 Dome Lights Activate By Any Emergency Exit Or Rocker Switch Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J10 LEFT HAND BODY TO REAR CAP
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J188 J190 J192 J194 DOME LIGHT TO LEFT HAND BODY
 J201 J203 J205 DOME LIGHT TO RIGHT HAND BODY
 SPL-35 EMERGENCY EXIT SIGNAL SPLICE

Table 316 Dome Lights Activate By Any Emergency Exit Or Rocker Switch Circuit Tests

Left Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, rear door closed and left side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Left side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #24 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 86 to 85.	0 volts	If voltage is present check for open or short in circuit 16 PNK 6.
While meter is still connected to left side dome light relay from cavity 86 to 85, open any emergency exit.		
Left side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 6.
Leave emergency exit open.		
Left side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #24 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 3.
While meter is still connected to left side dome light relay from cavity 87a to ground, activate dome lights by closing the standard dome light switch (C11).		
Left side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuits 16 BRN 3 and 16 BLK 3. Also check for continuity in standard dome light switch (C11).
Leave dome lights on.		
Left side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.

Table 316 Dome Lights Activate By Any Emergency Exit Or Rocker Switch Circuit Tests (cont.)

Right Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, rear door closed and right side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Right side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #27 and check for open or short in circuit 16 BLK 15.
Right side dome light relay, cavity 86 to 85.	0 volts	If voltage is present check for open or short in circuit 16 PNK 6.
While meter is still connected to right side dome light relay from cavity 86 to 85, open any emergency exit.		
Right side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 6.
Leave emergency exit or open.		
Right side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #27 and check for open or short in circuit 16 BLK 15.
Right side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 33.
While meter is still connected to right side dome light relay from cavity 87a to ground, activate dome lights by closing the standard dome light switch (C11).		
Right side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuits 16 BRN 33 and 16 BLK 15. Also check for continuity in standard dome light switch (C11).
Leave dome lights on.		
Right side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
To troubleshoot the emergency exit circuits, refer to the Emergency Exit Controls section of this manual. (See CIRCUIT FUNCTIONS, page 531)		

Dome Lights Activated By Any Emergency Exit or Rocker Switches w/Separate Switches

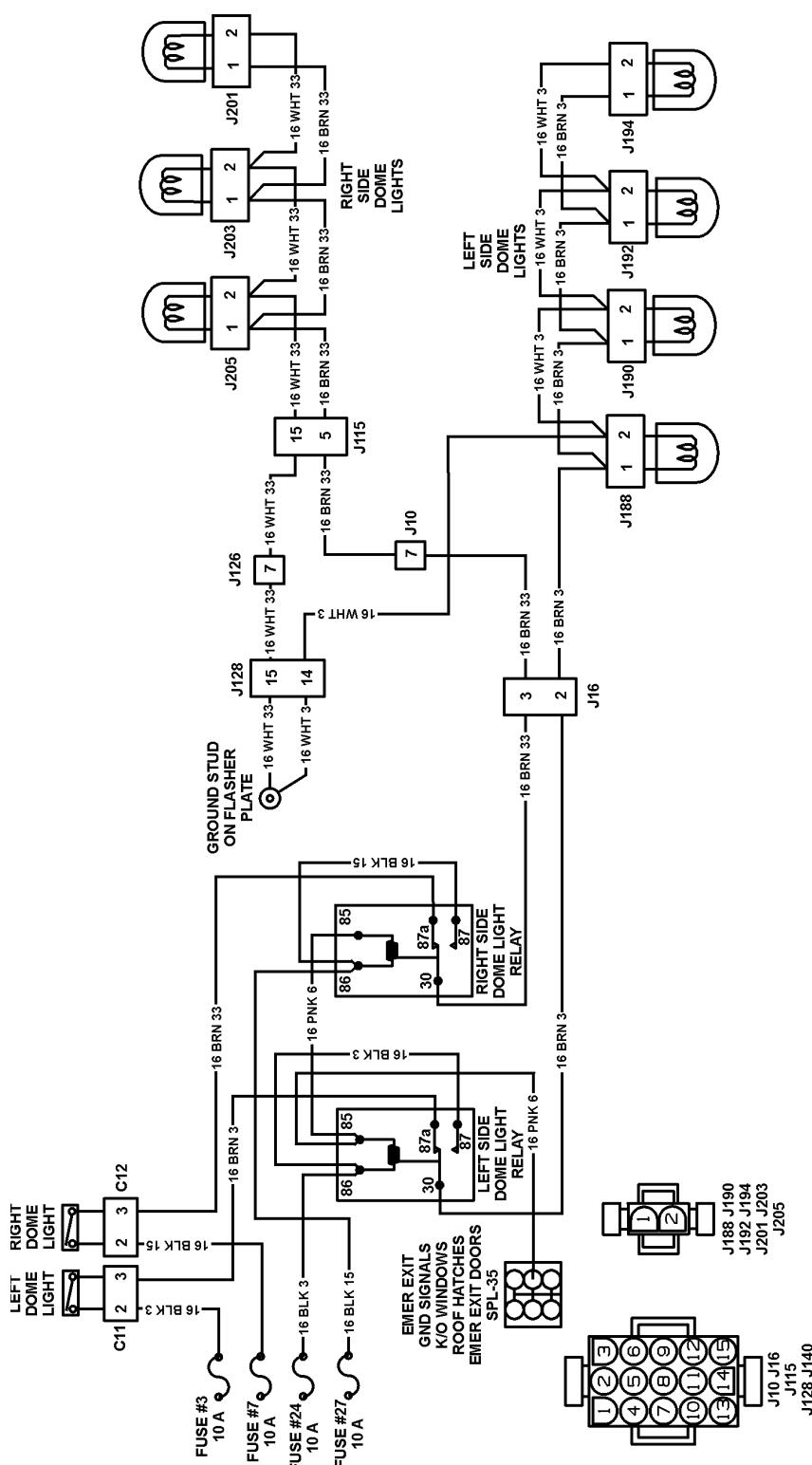


Figure 493 Dome Lights Activate By Any Emergency Exit Or Rocker Switch w/Separate Switches Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J10 LEFT HAND BODY TO REAR CAP
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J188 J190 J192 J194 DOME LIGHT TO LEFT HAND BODY
 J201 J203 J205 DOME LIGHT TO RIGHT HAND BODY
 SPL-35 EMERGENCY EXIT SIGNAL SPLICE

Table 317 Dome Lights Activate By Any Emergency Exit Or Rocker Switch w/Separate Switches Circuit Tests

Left Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, rear door closed and left side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Left side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #24 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 86 to 85.	0 volts	If voltage is present check for open or short in circuit 16 PNK 6.
While meter is still connected to left side dome light relay from cavity 86 to 85, open any emergency exit.		
Left side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 6.
Leave emergency exit open.		
Left side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #24 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 3.
While meter is still connected to left side dome light relay from cavity 87a to ground, activate dome lights by closing the left side dome light switch (C11).		
Left side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuits 16 BRN 3 and 16 BLK 3. Also check for continuity in standard dome light switch (C11).
Leave dome lights on.		
Left side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.

Table 317 Dome Lights Activate By Any Emergency Exit Or Rocker Switch w/Separate Switches Circuit Tests (cont.)

Right Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, rear door closed and right side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Right side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #27 and check for open or short in circuit 16 BLK 15.
Right side dome light relay, cavity 86 to 85.	0 volts	If voltage is present check for open or short in circuit 16 PNK 6.
While meter is still connected to right side dome light relay from cavity 86 to 85, open any emergency exit.		
Right side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 6.
Leave emergency exit or open.		
Right side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #27 and check for open or short in circuit 16 BLK 15.
Right side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 33.
While meter is still connected to right side dome light relay from cavity 87a to ground, activate dome lights by closing the right side dome light switch (C12).		
Right side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuits 16 BRN 33 and 16 BLK 15. Also check for continuity in standard dome light switch (C12).
Leave dome lights on.		
Right side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
To troubleshoot the emergency exit circuits, refer to the Emergency Exit Controls section of this manual. (See CIRCUIT FUNCTIONS, page 531)		

10.8. DOME LIGHTS ACTIVATED BY ENTRANCE DOOR FAULT DETECTION MANAGEMENT

A fault in the dome light circuits will be apparent when the dome lights do not come on. Problems in the dome light circuits can be caused by burned out lamps, a blown fuse, a short, an open, or a faulty switch.

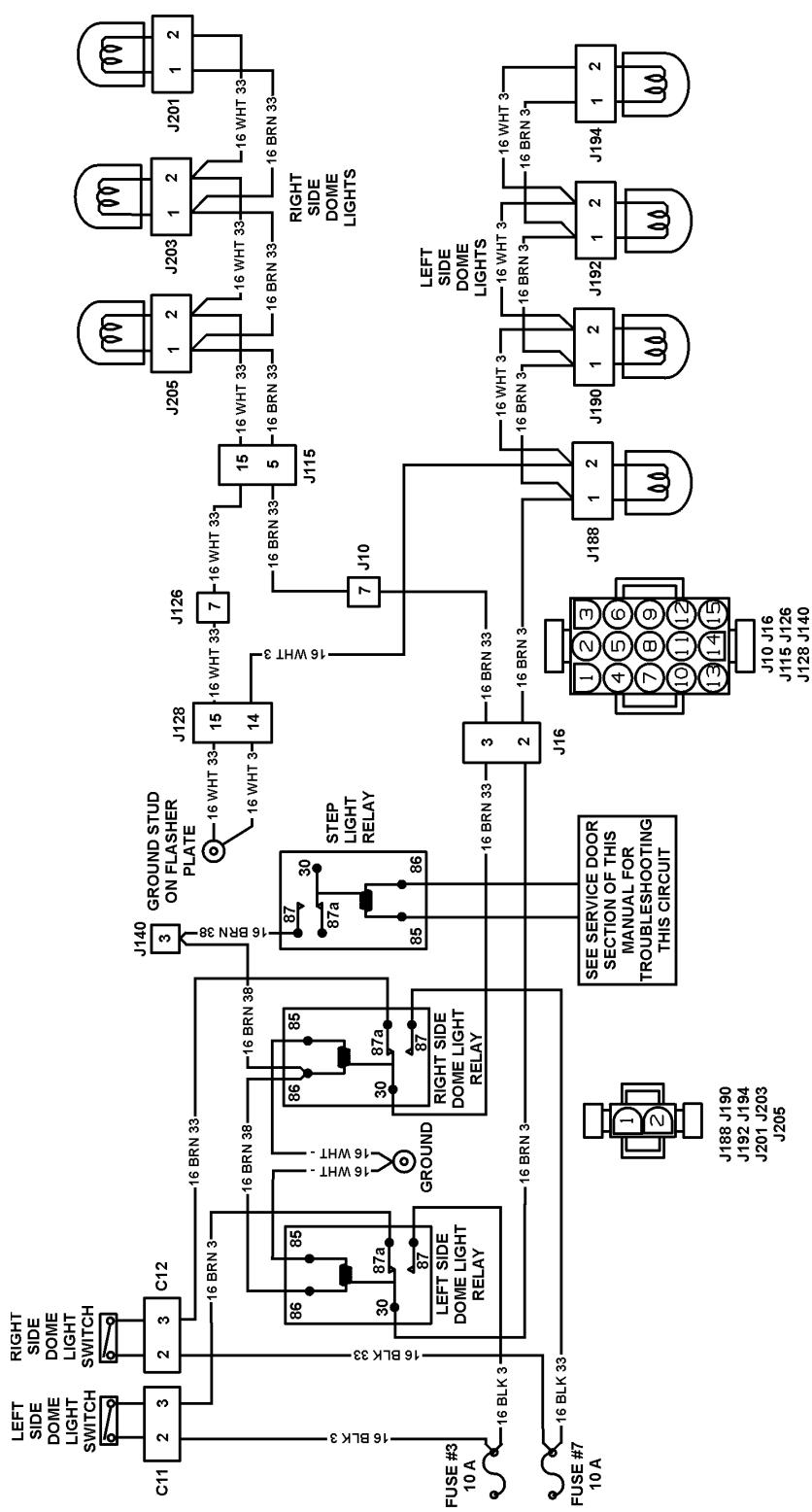


Figure 494 Dome Lights Activate By Entrance Door Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J10 LEFT HAND BODY TO REAR CAP
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J140 FLASHER PLATE TO DASH AND TOE
 J188 J190 J192 J194 DOME LIGHT TO LEFT HAND BODY
 J201 J203 J205 DOME LIGHT TO RIGHT HAND BODY

Table 318 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuit Tests

Left Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, service door closed and left side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Left side dome light relay, cavity 86 to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 38. Also check service door circuits by referring to the Service Door Controls section of this manual. (See CIRCUIT FUNCTIONS, page 474)
While meter is still connected to left side dome light relay from cavity 86 to ground, open service door.		
Left side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BRN 38. Also check service door circuits by referring to the Service Door Controls section of this manual. (See CIRCUIT FUNCTIONS, page 474)
Leave service door open.		
Left side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT –.
Left side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuit 16 BLK 3.
Left side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 3.
While meter is still connected to left side dome light relay from cavity 87a to ground, activate dome lights by closing the left side dome light switch (C11).		
Left side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #3 and check for open or short in circuits 16 BRN 3 and 16 BLK 3. Also check for continuity in left side dome light switch (C11).

Table 318 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuit Tests (cont.)

Leave dome lights on.		
Left side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 3 and 16 WHT 3. If dome lights illuminate during this test, replace dome light switch.
Right Side Dome Light Relay Voltage Checks		
Check with ignition on, dome lights off, service door closed and right side dome light relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Right side dome light relay, cavity 86 to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 38. Also check service door circuits by referring to the Service Door Controls section of this manual. (See CIRCUIT FUNCTIONS, page 474)
While meter is still connected to right side dome light relay from cavity 86 to ground, open service door.		
Right side dome light relay, cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BRN 38. Also check service door circuits by referring to the Service Door Controls section of this manual. (See CIRCUIT FUNCTIONS, page 474)
Leave service door open.		
Right side dome light relay, cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK —.
Right side dome light relay, cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuit 16 BLK 33.
Right side dome light relay, cavity 87a to ground.	0 volts	If voltage is present check for open or short in circuit 16 BRN 33.
While meter is still connected to right side dome light relay from cavity 87a to ground, activate dome lights by closing the right side dome light switch (C12).		
Right side dome light relay, cavity 87a to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7 and check for open or short in circuits 16 BRN 33 and 16 BLK 33. Also check for continuity in right side dome light switch (C12).
Leave dome lights on.		

Table 318 Dome Lights Activate By Rear Emergency Exit Or Rocker Switch Circuit Tests (cont.)

Right side dome light relay, cavity 87a to 30.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 33 and 16 WHT 33. If dome lights illuminate during this test, replace dome light switch.
To troubleshoot the service door circuits, refer to the Service Door Controls section of this manual. (See CIRCUIT FUNCTIONS, page 474)		

10.9. EXTENDED DESCRIPTION

The dome light switches will close a circuit that provides power to the dome lights through the dome light relays.

The rear emergency exit door will provide a ground to the coil of the dome light relays allowing power to be supplied to the dome lights bypassing the switch.

Ground is supplied to the dome lights from the ground stud on the flasher plate.

10.10. COMPONENT LOCATIONS

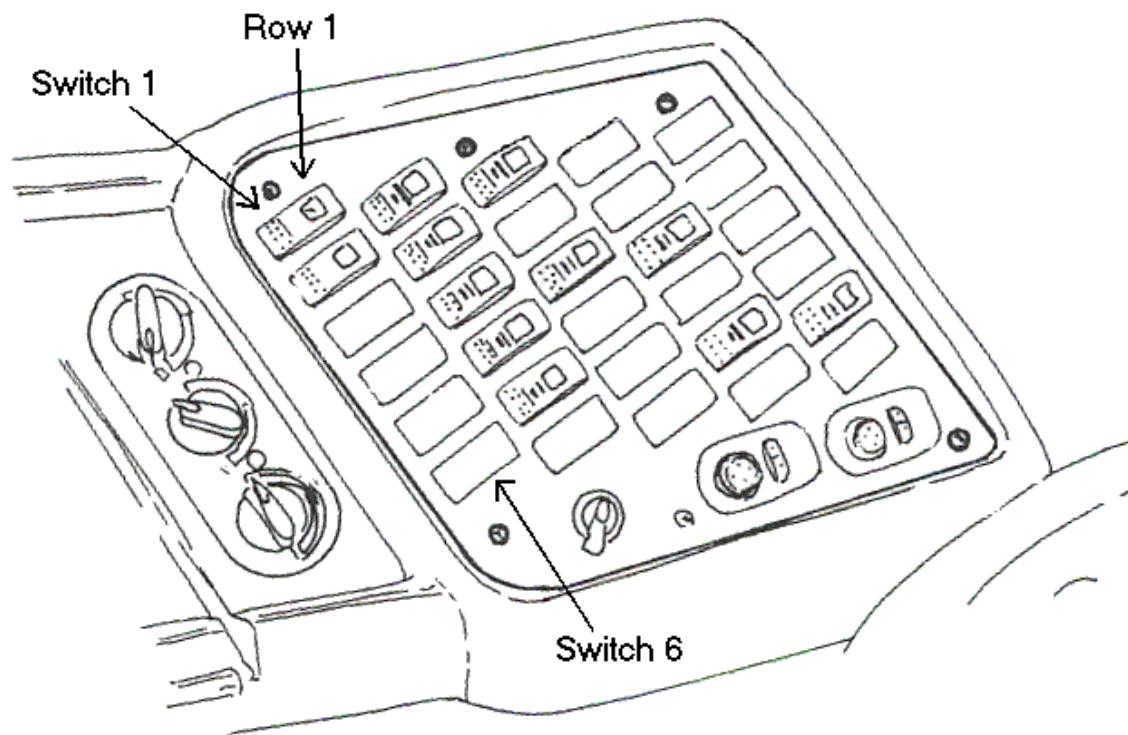


Figure 495 Left Hand Switch Panel

SWITCH #10 — DRIVER'S DOME LIGHT SWITCH

SWITCH #11 — LEFT SIDE OR FRONT DOME LIGHT SWITCH

SWITCH #12 — RIGHT SIDE OR REAR DOME LIGHT SWITCH

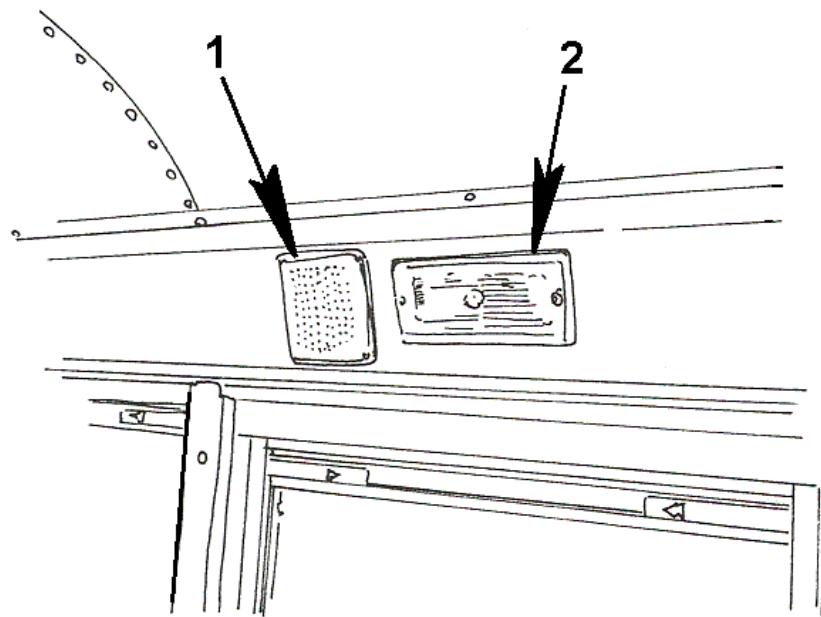


Figure 496 Typical Dome Light

1. SPEAKER
2. DOME LIGHT

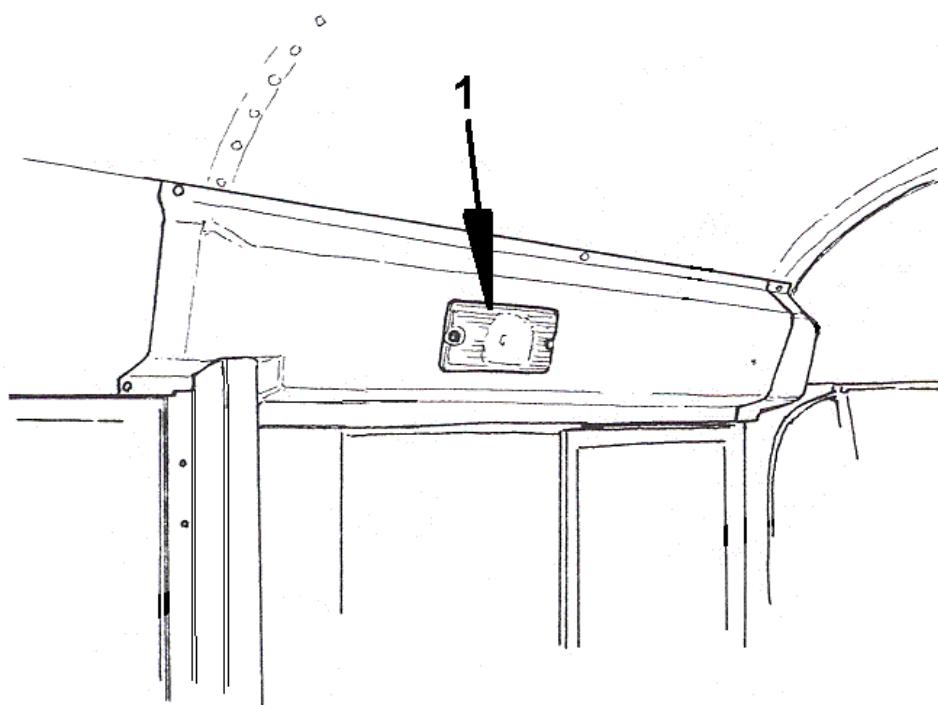


Figure 497 Driver's Dome Light

1. DRIVER'S DOME LIGHT

11. ACTIVITY LIGHT

11.1. CIRCUIT FUNCTIONS

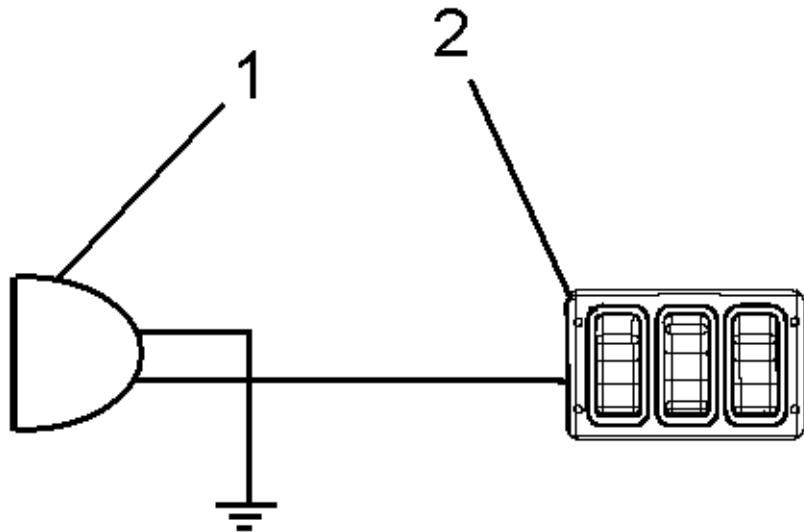


Figure 498 Activity Light Function Diagram

1. ACTIVITY LIGHT
2. SWITCH IN LEFT HAND SWITCH PANEL

The activity light can be located on the right or left side of the bus depending on the location of the last dome light.

The activity is an independent system from the dome lights. When the activity light switch is close, voltage is applied to the light illuminating it.

11.2. DIAGNOSTICS

Should the activity light fail to operate, the problem could be attributed to a blown fuse, a faulty switch in the left hand switch panel, a burnt out light bulb or an open or short in the activity light circuits.

Activity Light Preliminary Check

Table 319 Activity Light Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify activity light is inoperative. (Ignition on and dome light switches on.)	Visually check activity light.	Activity light is inoperative.	Go to next step.	Activity light is operating. Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to fault detection management.	Identify and repair condition causing several features to be inoperative.

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the activity light circuits.

11.3. ACTIVITY LIGHT FAULT DETECTION MANAGEMENT

A fault in the activity light circuits will be apparent when the activity light does not come on. Problems in the activity light circuits can be caused by a burned out lamp, a blown fuse, a short, an open, or a faulty switch.

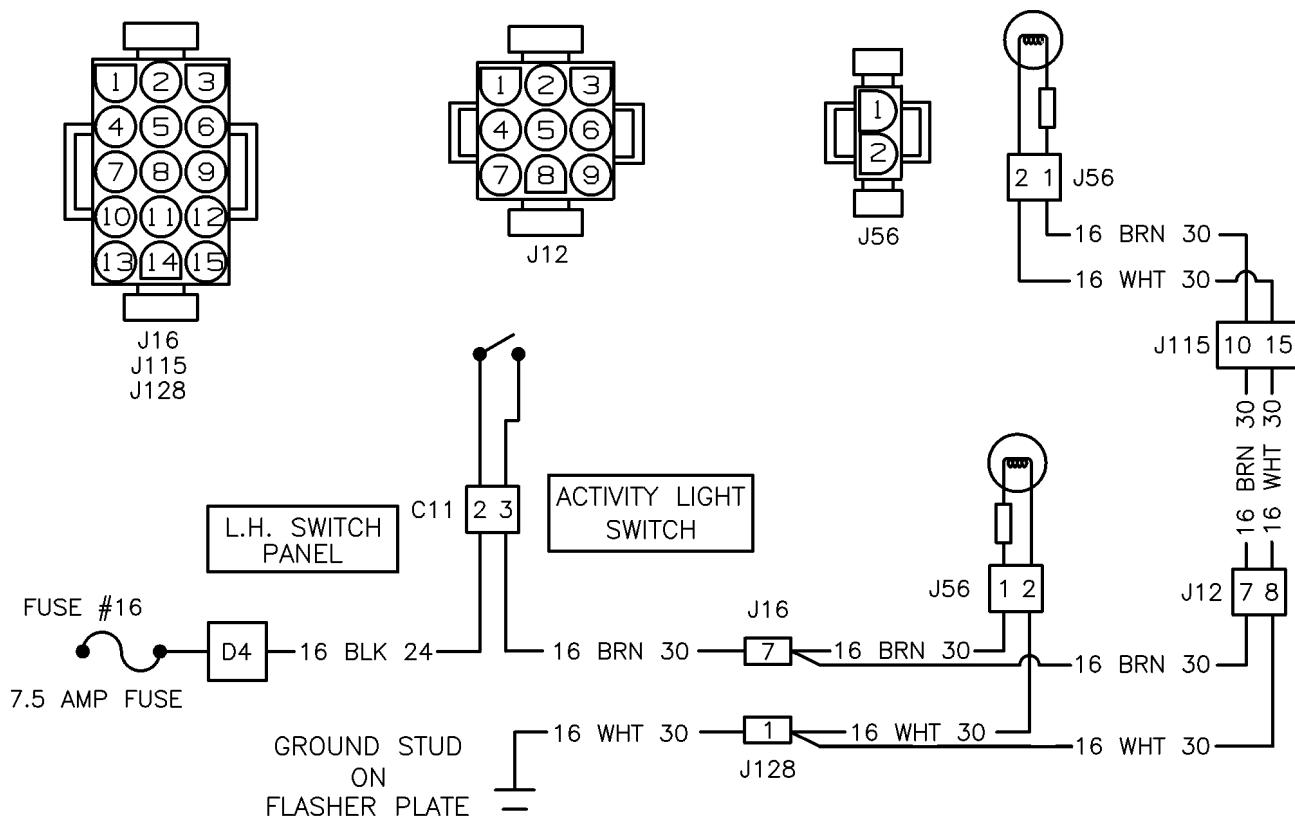


Figure 499 Activity Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J12 LEFT HAND BODY TO REAR CAP
 J16 J128 FLASHER PLATE TO LEFT HAND BODY
 J115 RIGHT HAND BODY TO REAR CAP

Table 320 Activity Light Circuit Tests

Activity Light Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C11, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #16 and check for open or short in circuit 16 BLK 24.
Connector C11, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 30 and 16 WHT 30. If activity light illuminates during this test, replace activity light switch. If circuits test good and light is still faulty, test circuits at bulb.

11.4. EXTENDED DESCRIPTION

The activity light switch will close a circuit that provides power to the activity light.

Ground is supplied to the activity light from the ground stud on the flasher plate.

11.5. COMPONENT LOCATIONS

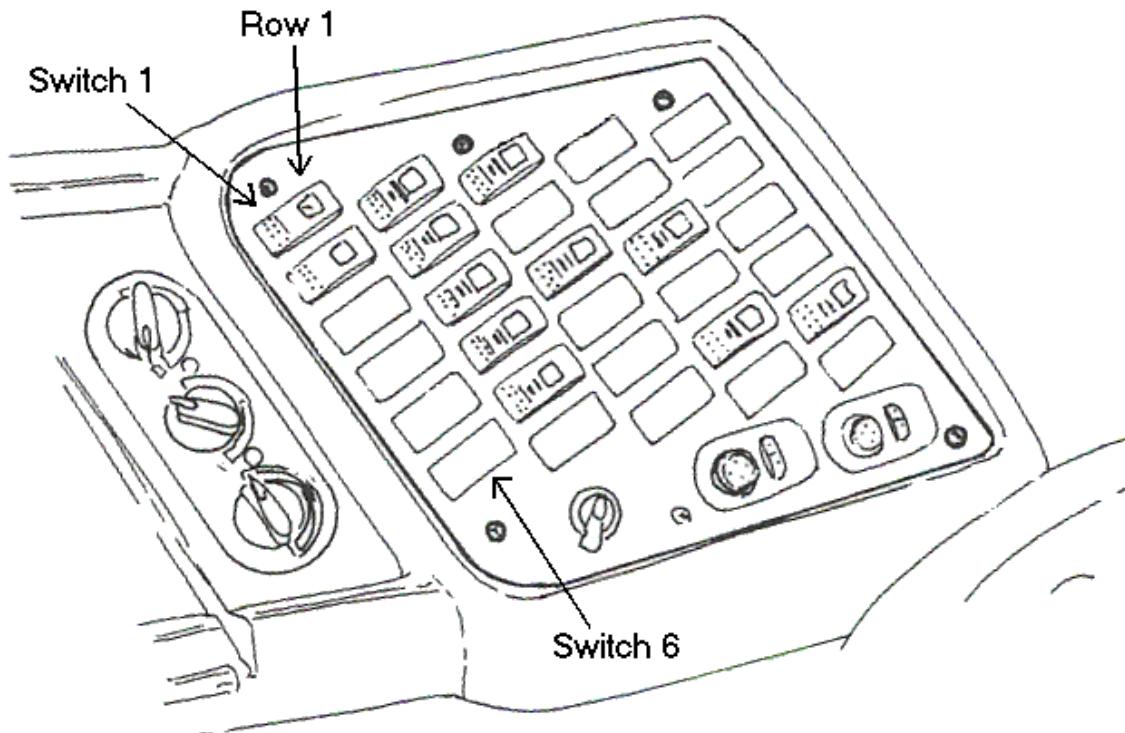


Figure 500 Left Hand Switch Panel

SWITCH #9 — ACTIVITY LIGHT SWITCH

12. DESTINATION SIGN

12.1. CIRCUIT FUNCTIONS

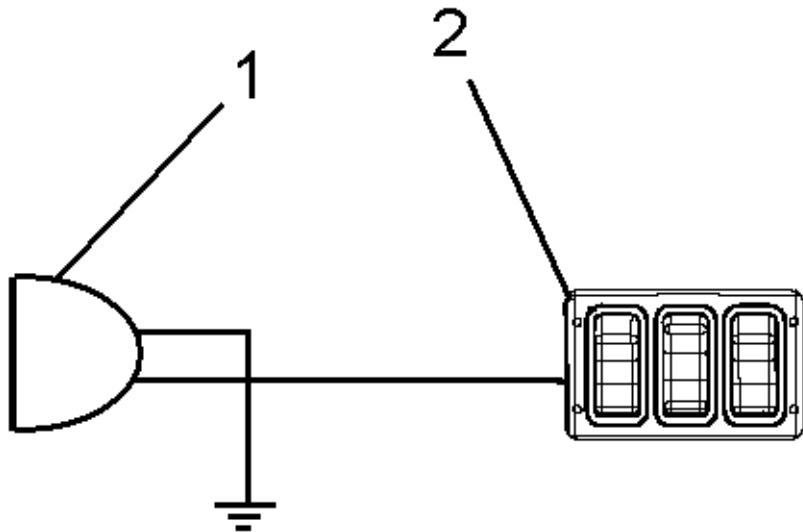


Figure 501 Destination Sign Function Diagram

1. DESTINATION SIGN LIGHT
2. SWITCH IN LEFT HAND SWITCH PANEL

The destination signs can be found at the front and rear of the exterior of the bus.

The destination sign system is an independent system. When the destination sign switch is closed, voltage is applied to the lights in the sign.

12.2. DIAGNOSTICS

Should the destination signs fail to operate, the problem could be attributed to a blown fuse, a faulty switch in the left hand switch panel, a burnt out light bulb or an open or short in the destination sign circuits.

Destination Sign Preliminary Check

Table 321 Destination Sign Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify destination signs are inoperative. (Ignition on and dome light switches on.)	Visually check destination signs.	Destination sign are inoperative.	Go to next step.	Destination signs are operating. Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 1057)	Identify and repair condition causing several features to be inoperative.

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the destination sign circuits.

12.3. FAULT DETECTION MANAGEMENT

A fault in the destination sign circuits will be apparent when the destination signs do not come on. Problems in the destination sign circuits can be caused by a burned out lamp, a blown fuse, a short, an open, or a faulty switch.

Typical Destination Sign

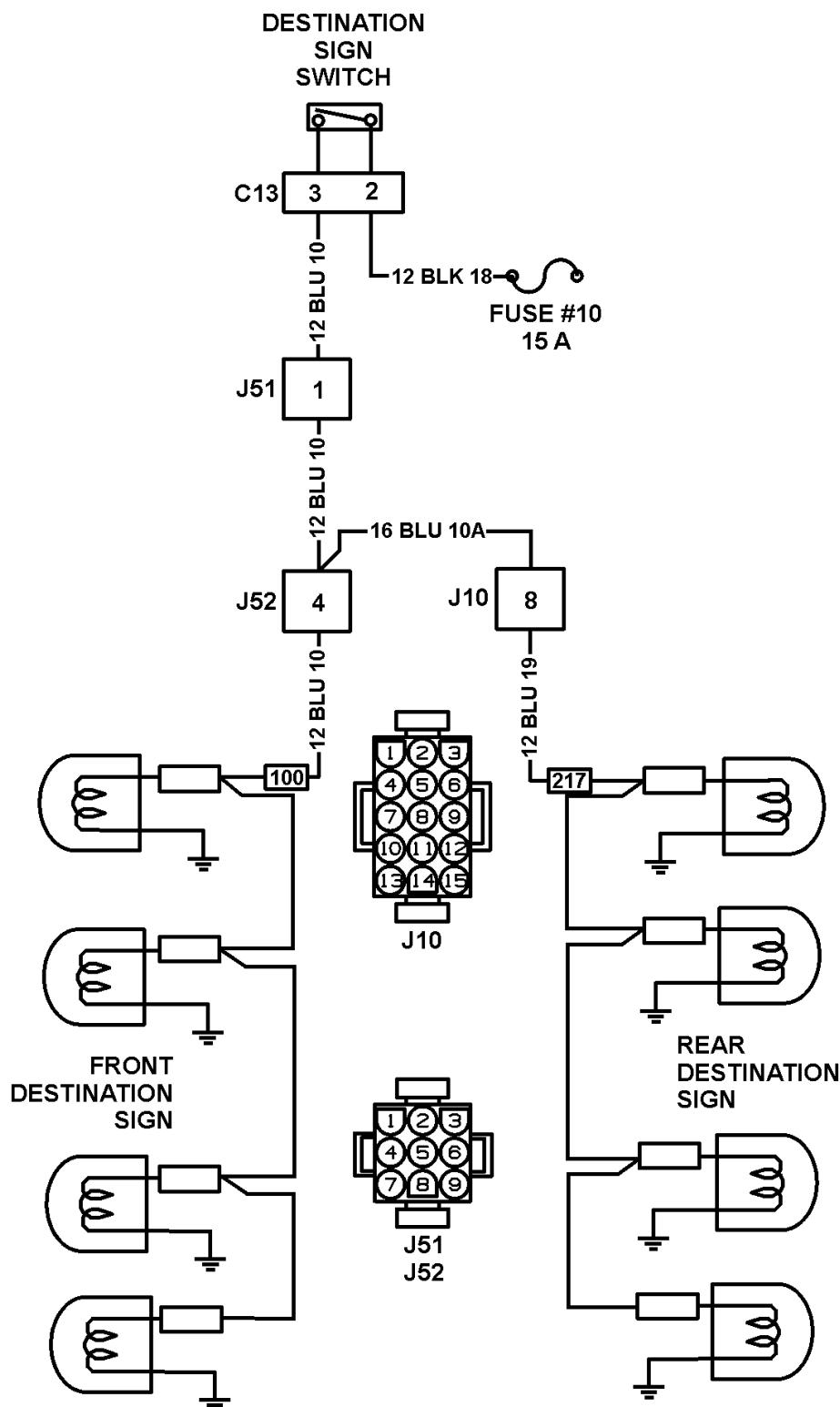


Figure 502 Destination Sign Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

Table 322 Destination Sign Circuit Tests

Destination Sign Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C13, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #10 and check for open or short in circuit 12 BLK 18.
Connector C13, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 12 BLU 10 and 12 BLU 10A. If destination signs illuminate during this test, replace destination sign switch. If circuits test good and lights still fail, test circuits at bulbs.

Dual Switch Destination Sign

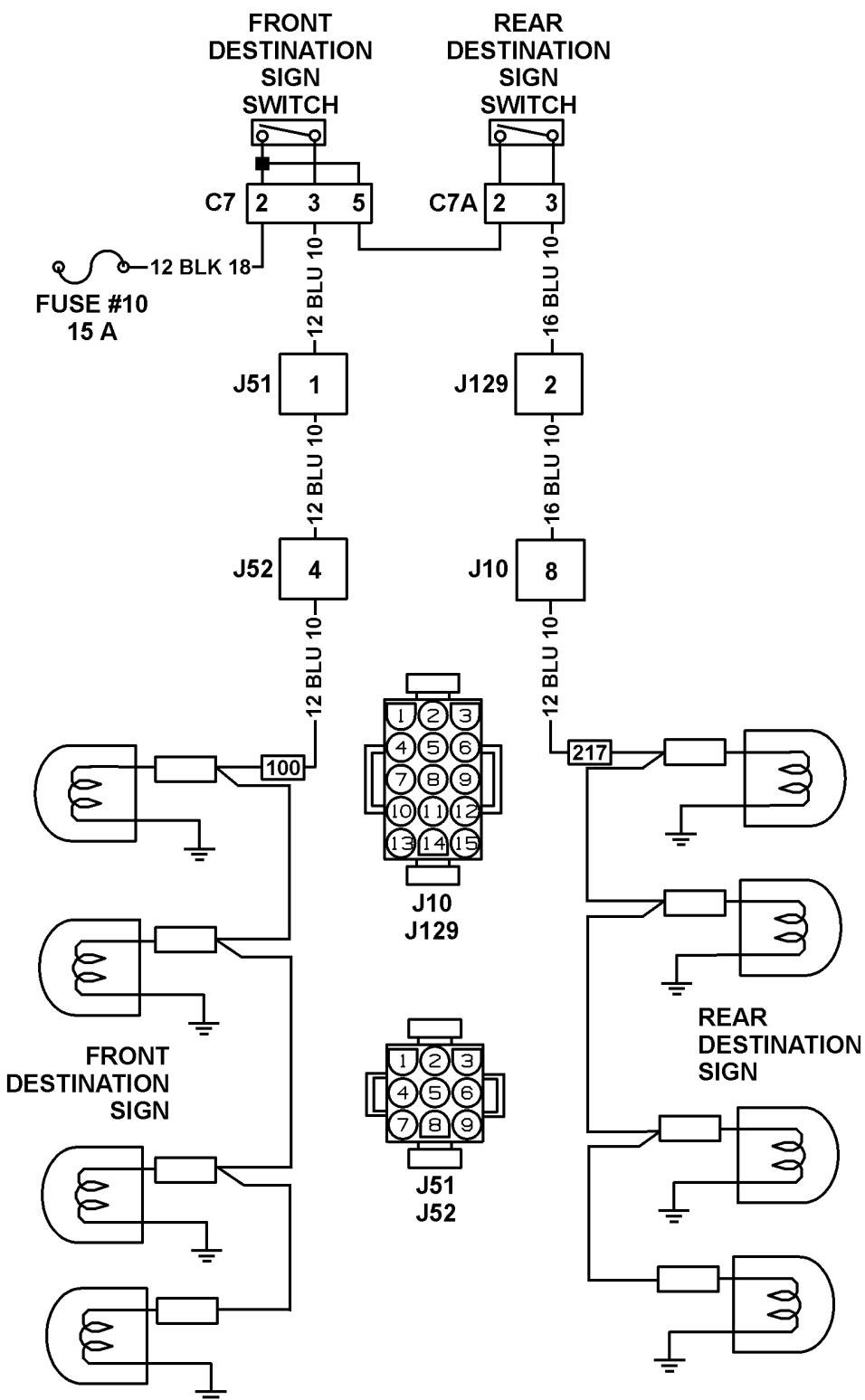


Figure 503 Dual Switch Destination Sign Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

Table 323 Dual Switch Destination Sign Circuit Tests

Destination Sign Voltage Checks		
Check with ignition on.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Connector C7, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #10 and check for open or short in circuit 12 BLK 18.
Connector C7, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 12 BLU 10. If front destination sign illuminates during this test, replace destination sign switch. If circuits test good and lights still fail, test circuits at bulbs.
Connector C7A, cavity 2 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #10 and check for open or short in circuit 12 BLK 18.
Connector C7, cavity 2 to cavity 3	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BLU 10 and 12 BLU 10. If rear destination sign illuminates during this test, replace destination sign switch. If circuits test good and lights still fail, test circuits at bulbs.

12.4. EXTENDED DESCRIPTION

The destination sign switch will close a circuit that provides power to the destination signs.

Ground is internal to the destination sign fixtures.

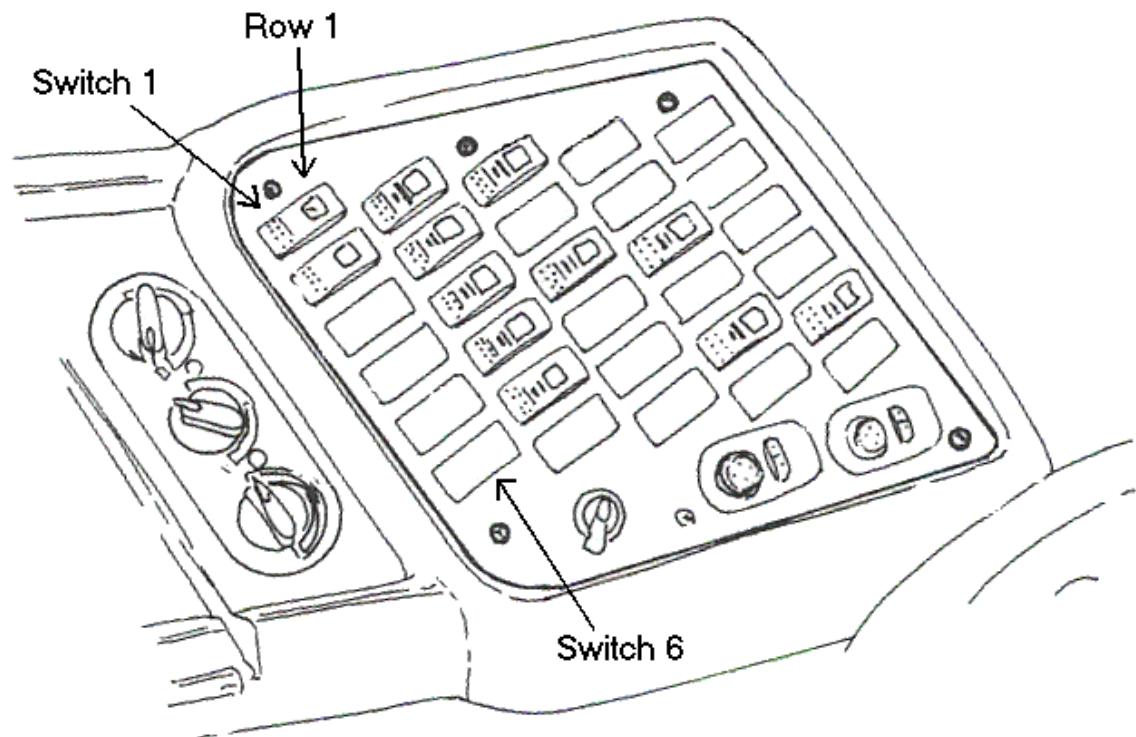
12.5. COMPONENT LOCATIONS

Figure 504 Left Hand Switch Panel

SWITCH #7 — DESTINATION SIGN SWITCH

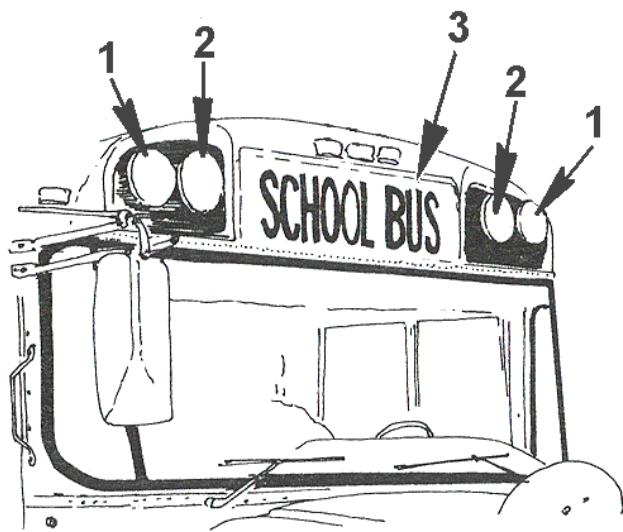


Figure 505 Front Pupil Warning Light & Destination Sign Locations

1. RED PUPIL WARNING LIGHTS
2. YELLOW PUPIL WARNING LIGHTS
3. DESTINATION SIGN

13. STEP AND SKIRT LIGHTS

13.1. CIRCUIT FUNCTIONS

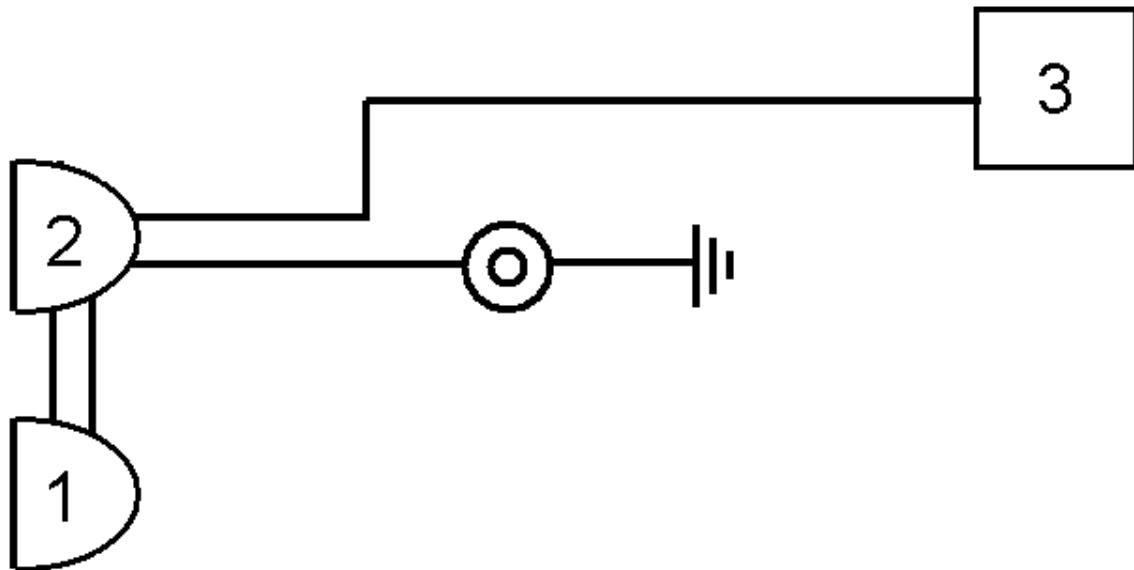


Figure 506 Step and Skirt Lights Function Diagram

1. STEP LIGHT
2. SKIRT LIGHT
3. SERVICE DOOR SWITCH

The step and skirt lights can be found near the service door of the bus.

The step and skirt light system is a relay driver system dependant on the service door. When the service door is open the step and skirt lights will illuminate. When the service door is closed, the step and skirt lights will shut off.

13.2. DIAGNOSTICS

Should the destination signs fail to operate, the problem could be attributed to a blown fuse, a faulty switch in the left hand switch panel, a burnt out light bulb or an open or short in the destination sign circuits.

Step and Skirt Lights Preliminary Check

Table 324 Step and Skirt Lights Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify step and skirt lights are	Visually check step	Step and skirt lights	Go to next step.	Step and skirt lights are operating.

Table 324 Step and Skirt Lights Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
		inoperative. (Ignition on and dome light switches on.)	and skirt lights.	are inoperative.		Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 1065)	Identify and repair condition causing several features to be inoperative.

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the destination sign circuits.

13.3. FAULT DETECTION MANAGEMENT

A fault in the step and skirt lights circuits will be apparent when the step or skirt lights do not come on when the service door is opened and step and skirt light power conditions are met. Problems in the step and skirt light circuits can be caused by a burned out lamp, a blown fuse, a short, an open, a faulty switch or a faulty relay.

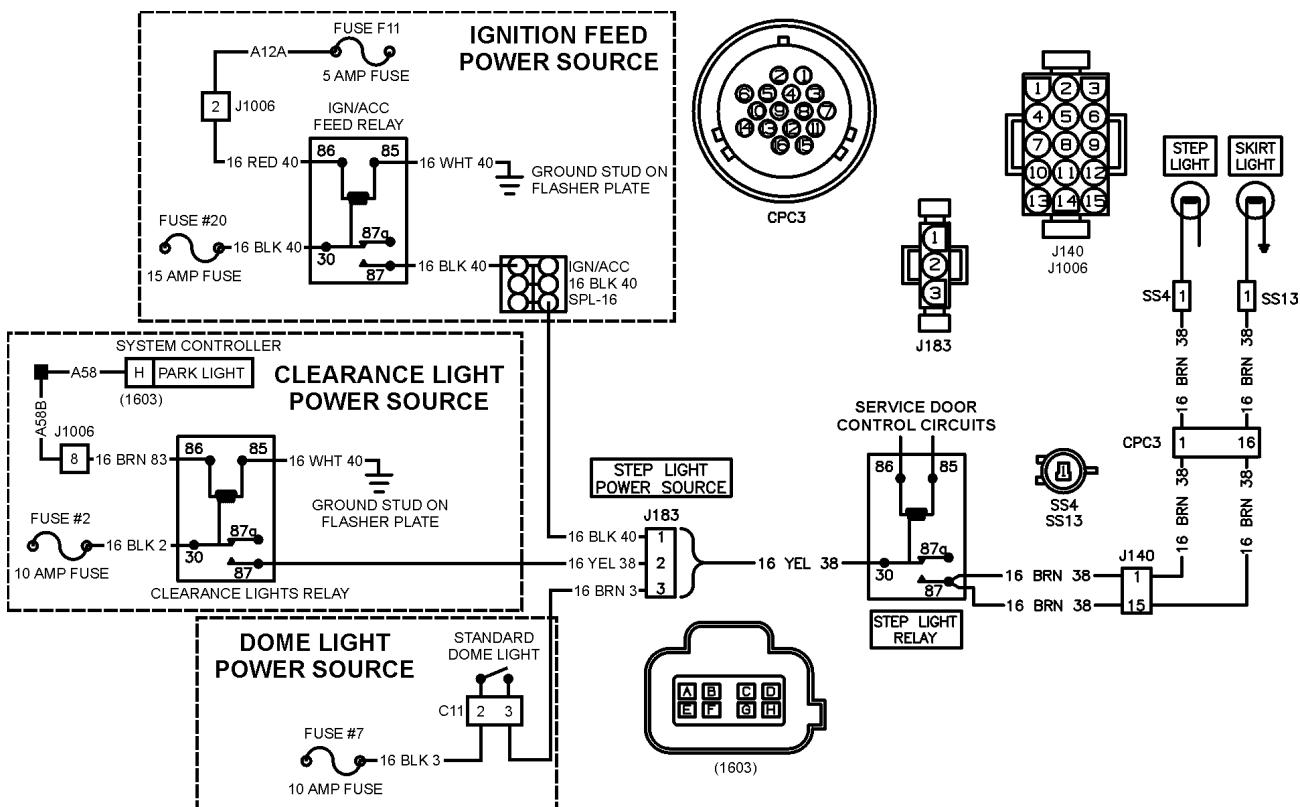


Figure 507 Step and Skirt Lights Power Source Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

(1603) SYSTEM CONTROLLER

LOCATED AT INSIDE RIGHT SIDE DASH PANEL

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS

J140 FLASHER PLATE TO DASH AND TOE

J183 STEP LIGHT OPTIONS

J1006 BODY BUILDER CONNECTION

LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE

SPL-16 IGNITION/ACCESSORY FEED SPLICE

SS4 SEALED ENGINE HARNESS TO STEP LIGHT

SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

There are three different power options available for the step and skirt lights. Looking at connector J183 will determine which power source is present on the vehicle. More than one power source may be present.

Pin 1 of Connector J183: Ignition Feed Power Source

Pin 2 of Connector J183: Clearance Light Power Source

Pin 3 of Connector J183: Dome Light Power Source

Ignition Feed Power Source

For this power source to illuminate the step and skirt light, the following conditions must be met:

1. Ignition is on.
2. Service door is open.

Table 325 Step and Skirt Lights (Ignition Feed Power Source) Circuit Tests

Ignition/Accessory Feed Relay Voltage Checks		
Check with ignition on and Ign/Acc feed relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Bench test relay. If relay fails bench test, replace and check for faults.		
Test Points	Spec.	Comments
Ign/Acc feed relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11. Also check for open or short in circuits 16 RED 40 and A12A.
Ign/Acc feed relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 40.
Ign/Acc feed relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #20. Also check for open or short in circuit 16 BLK 40.
Ign/Acc feed relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLK 40.

Clearance Light Power Source

For this power source to illuminate the step and skirt light, the following conditions must be met:

1. Ignition is on.
2. Clearance lights are illuminated.
3. Service door is open.

Table 326 Step and Skirt Lights (Clearance Light Power Source) Circuit Tests

Clearance Lights Relay Voltage Checks		
Check with ignition on, clearance light activated and clearance lights relay removed.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Bench test relay. If relay fails bench test, replace and check for faults.		

Table 326 Step and Skirt Lights (Clearance Light Power Source) Circuit Tests (cont.)

Test Points	Spec.	Comments
Clearance lights relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 83, A58B and A58. Also ensure proper voltage from system controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
Clearance lights relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 40.
Clearance lights relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #2. Also check for open or short in circuit 16 BLK 2.
Clearance lights relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 YEL 38.

Dome Light Power Source

For this power source to illuminate the step and skirt light, the following conditions must be met:

1. Ignition is on.
2. Dome lights are illuminated.
3. Service door is open.

Table 327 Step and Skirt Lights (Dome Light Power Source) Circuit Tests

Dome Lights Switch (C11) Voltage Checks		
Check with ignition on and standard dome light switch C11 disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Standard dome light switch cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #7. Also check for open or short in circuit 16 BLK 3.
Standard dome light switch cavity 2 to 3.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BRN 3. If circuits check good and power is not available at connector J183, replace standard dome light switch.

13.4. EXTENDED DESCRIPTION

When the above conditions are met, power will be available for the step and skirt lights on connector J183 when the service door is opened.

13.5. COMPONENT LOCATIONS

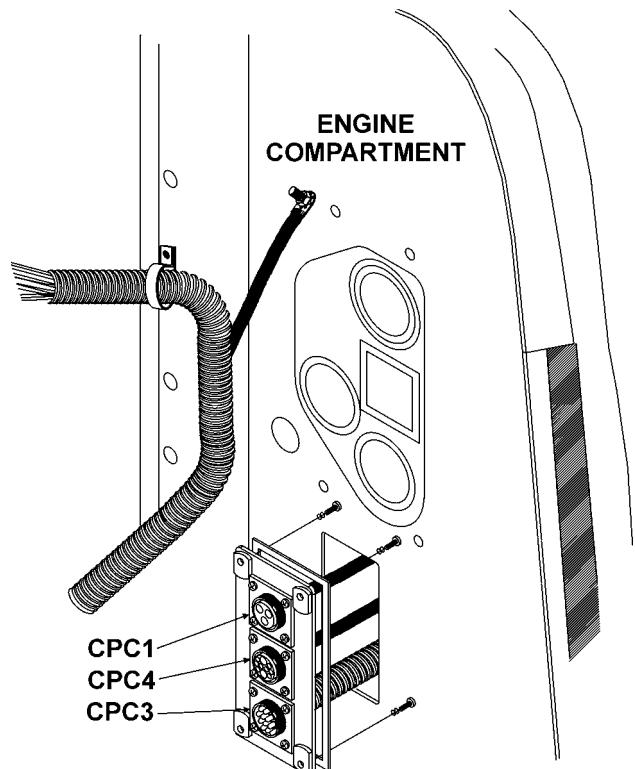


Figure 508 Engine Compartment Pass Thrus

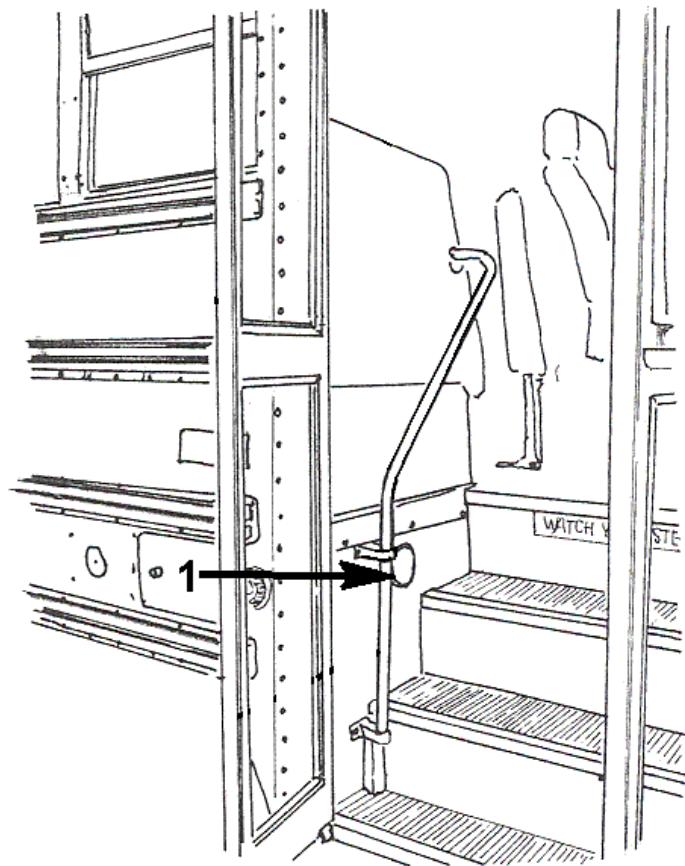


Figure 509 Step Light Location

1. STEP LIGHT

14. LAMP MONITOR

14.1. CIRCUIT FUNCTIONS

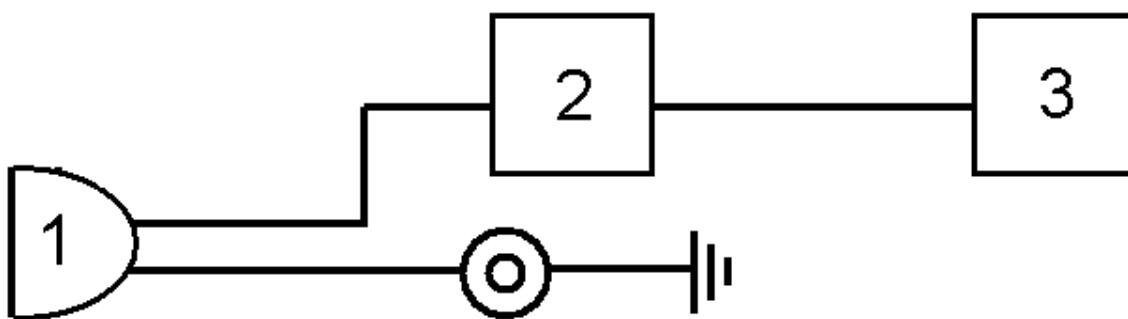


Figure 510 Lamp Monitor Function Diagram

1. LIGHTS
2. LAMP MONITOR
3. LAMP POWER SUPPLY

The lamp monitor can be found at the front of the bus above the dashboard.

The lamp monitor system allows the driver to see if any lamps connected to the monitor are not functioning properly without having to exit the vehicle.

14.2. DIAGNOSTICS

Should the lamp monitor fail to operate, the problem could be attributed to a blown fuse, a burnt out light bulb or an open or short in the lamp monitor circuits.

Lamp Monitor Preliminary Check

Table 328 Lamp Monitor Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify lamp monitor is inoperative. (Ignition on and dome light switches on.)	Visually lamp monitor.	Lamp monitor is inoperative.	Go to next step.	Lamp monitor is operating. Problem does not exist or is intermittent.
2.	On	Determine if any other features are	Visually check	No other features	Go to fault detection	Identify and repair condition causing

Table 328 Lamp Monitor Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
		malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	for other malfunctioning features.	are malfunctioning.	management. (See FAULT DETECTION MANAGEMENT, page 1072)	several features to be inoperative.

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the lamp monitor circuits although there are diagnostic trouble codes associated with some of the lights systems governed by the lamp monitor. Please refer to their appropriate section for those codes.

14.3. FAULT DETECTION MANAGEMENT

A fault in the lamp monitor will be apparent when the lights controlled by the monitor do not come on when commanded to illuminate. Problems in the lamp monitor circuits can be caused by a burned out lamp, a blown fuse, a short or an open.

8 Lamp Monitor Inputs

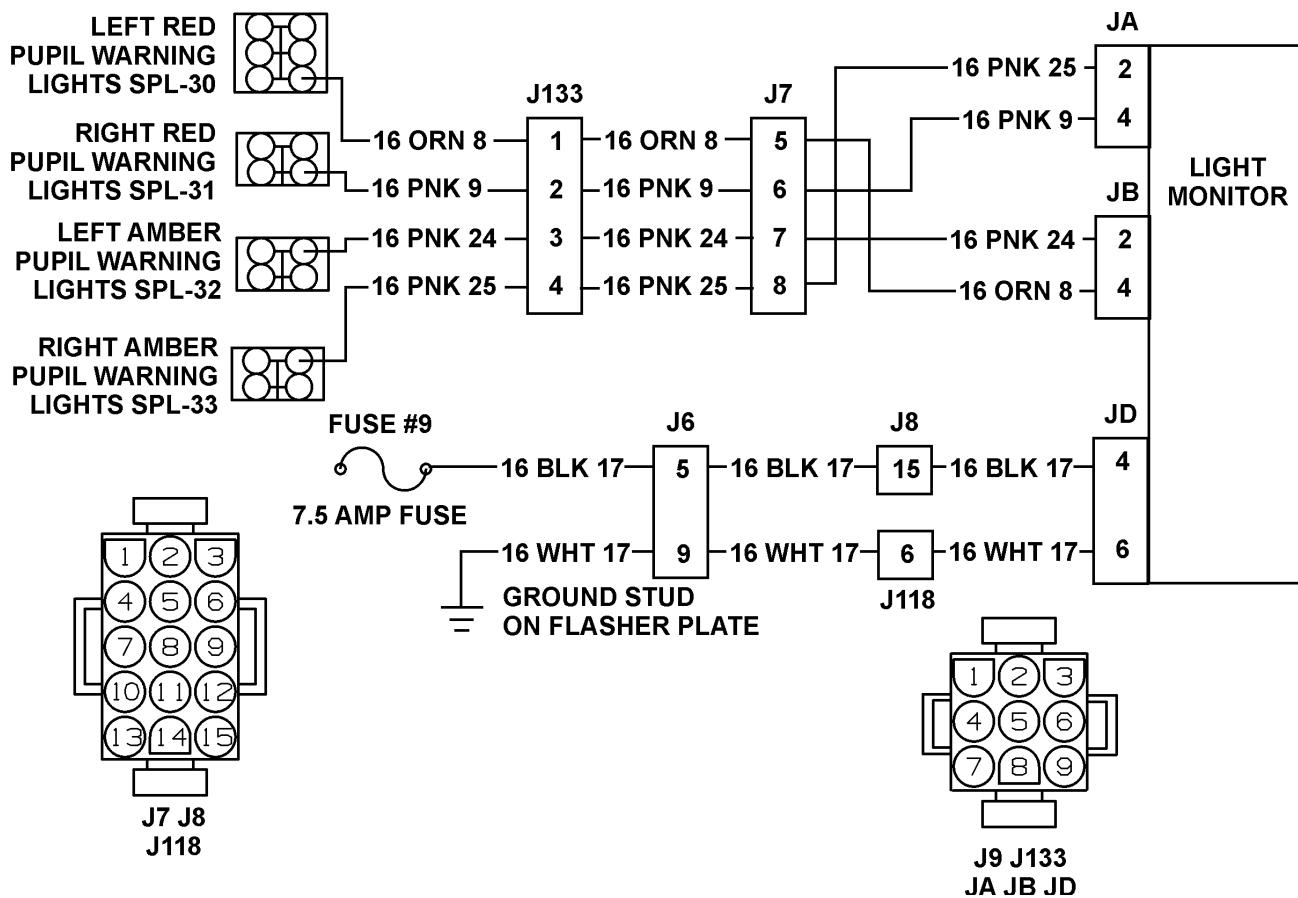


Figure 511 8 Lamp Monitor Input Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J6 J133 FLASHER PLATE TO LEFT HAND BODY

J7 J8 J118 LEFT HAND BODY TO FRONT CAP

JA JB JD FRONT CAP HARNESS TO LIGHT MONITOR

SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR

SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR

SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR

SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR

Table 329 8 Lamp Monitor Input Circuit Tests

Lamp Monitor Connector (JD) Voltage Checks		
Check with ignition on and lamp monitor connector (JD) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Lamp monitor connector JD cavity 4 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F9. Also check for open or short in circuit 16 BLK 17.

Table 329 8 Lamp Monitor Input Circuit Tests (cont.)

Lamp monitor connector JD cavity 4 to 6.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 17.
Lamp Monitor Connector (JA) Voltage Checks		
Check with ignition on and lamp monitor connector (JA) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Lamp monitor connector JA cavity 2 to ground.	0 volts	If voltage is present, check for short on circuit 16 PNK 25.
While meter is still connected is lamp monitor connector JA from cavity 2 to ground, activate amber pupil warning lights.		
Lamp monitor connector JA cavity 2 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 25. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)
Lamp monitor connector JA cavity 4 to ground.	0 volts	If voltage is present, check for short on circuit 16 PNK 9.
While meter is still connected is lamp monitor connector JA from cavity 4 to ground, activate red pupil warning lights.		
Lamp monitor connector JA cavity 4 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 9. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)
Lamp Monitor Connector (JB) Voltage Checks		
Check with ignition on and lamp monitor connector (JB) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Lamp monitor connector JB cavity 2 to ground.	0 volts	If voltage is present, check for short on circuit 16 PNK 24.
While meter is still connected is lamp monitor connector JB from cavity 2 to ground, activate amber pupil warning lights.		
Lamp monitor connector JB cavity 2 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 24.
Lamp monitor connector JB cavity 4 to ground.	0 volts	If voltage is present, check for short on circuit 16 ORN 8.

Table 329 8 Lamp Monitor Input Circuit Tests (cont.)

While meter is still connected is lamp monitor connector JB from cavity 4 to ground, activate red pupil warning lights.		
Lamp monitor connector JB cavity 4 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 8. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)

8 Lamp Monitor Outputs

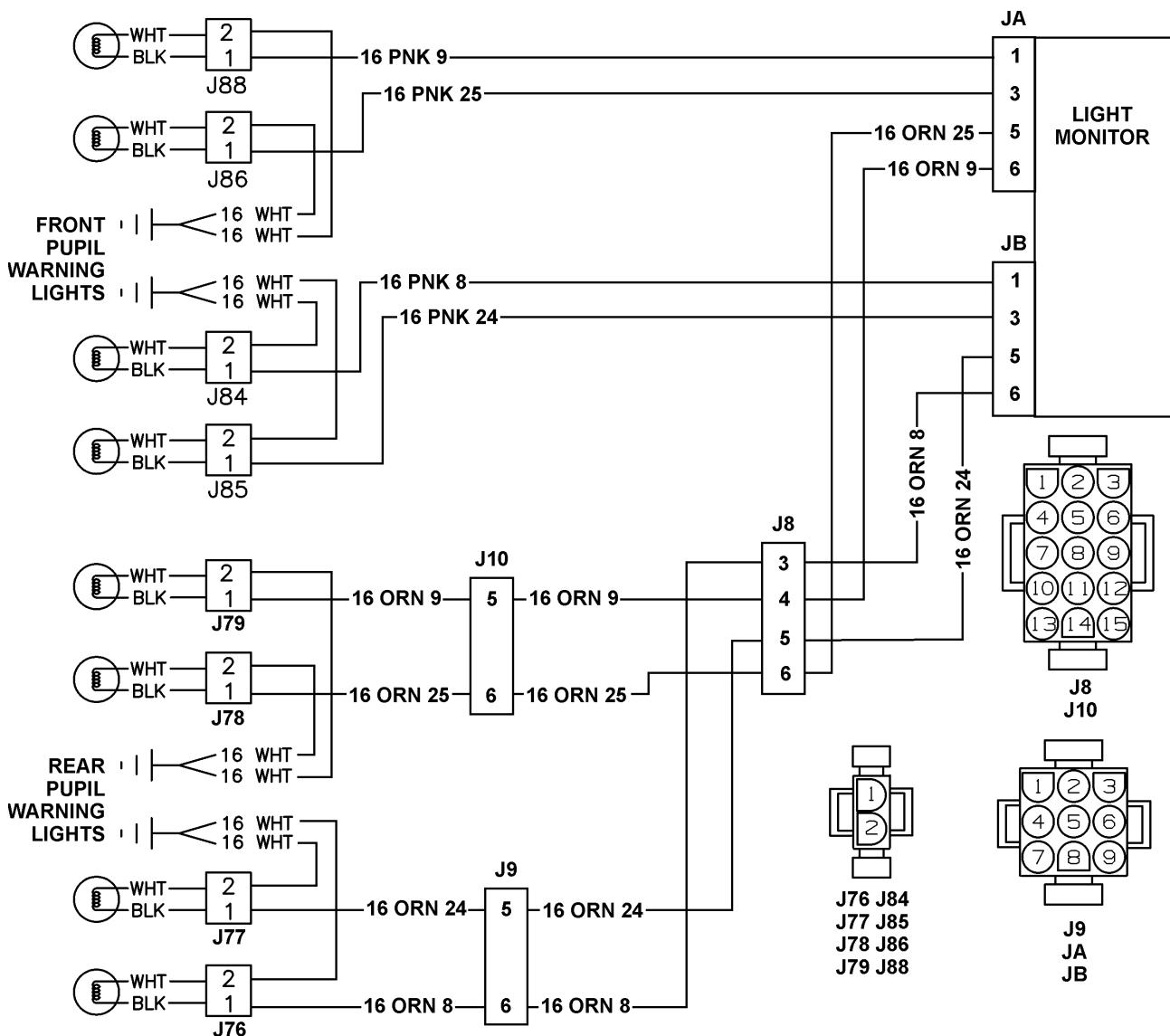


Figure 512 8 Lamp Monitor Output Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

- J8 LEFT HAND BODY TO FRONT CAP
- J9 J10 LEFT HAND BODY TO REAR CAP
- J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
- J77 LEFT REAR AMBER WARNING LIGHT TO REAR CAP
- J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
- J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
- J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
- J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
- J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
- J88 RIGHT FRONT RED WARNING LIGHT TO REAR CAP
- JA JB FRONT CAP HARNESS TO LIGHT MONITOR

Table 330 8 Lamp Monitor Output Circuit Tests

Amber Pupil Warning Light Voltage Checks		
<p>Check with ignition on, amber pupil warning lights activated and amber pupil warning lights connectors (J86), (J85), (J77) and (J78) disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals.</p>		
Test Points	Spec.	Comments
Front amber pupil warning light connector (J86) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 25. If circuits check good and lights is still faulty, replace pupil warning light.
Front amber pupil warning light connector (J85) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 24. If circuits check good and lights is still faulty, replace pupil warning light.
Rear amber pupil warning light connector (J78) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 25. If circuits check good and lights is still faulty, replace pupil warning light.
Rear amber pupil warning light connector (J77) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 24. If circuits check good and lights is still faulty, replace pupil warning light.
Red Pupil Warning Light Voltage Checks		
<p>Check with ignition on, red pupil warning lights activated and red pupil warning lights connectors (J84), (J88), (J76) and (J79) disconnected.</p> <p>NOTE – Always check connectors for damage and pushed-out terminals.</p>		
Test Points	Spec.	Comments
Front red pupil warning light connector (J88) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 9. If circuits check good and lights is still faulty, replace pupil warning light.
Front red pupil warning light connector (J84) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 8. If circuits check good and lights is still faulty, replace pupil warning light.

Table 330 8 Lamp Monitor Output Circuit Tests (cont.)

Rear red pupil warning light connector (J76) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 8. If circuits check good and lights is still faulty, replace pupil warning light.
Rear red pupil warning light connector (J79) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 9. If circuits check good and lights is still faulty, replace pupil warning light.

12/16 Lamp Monitor Inputs

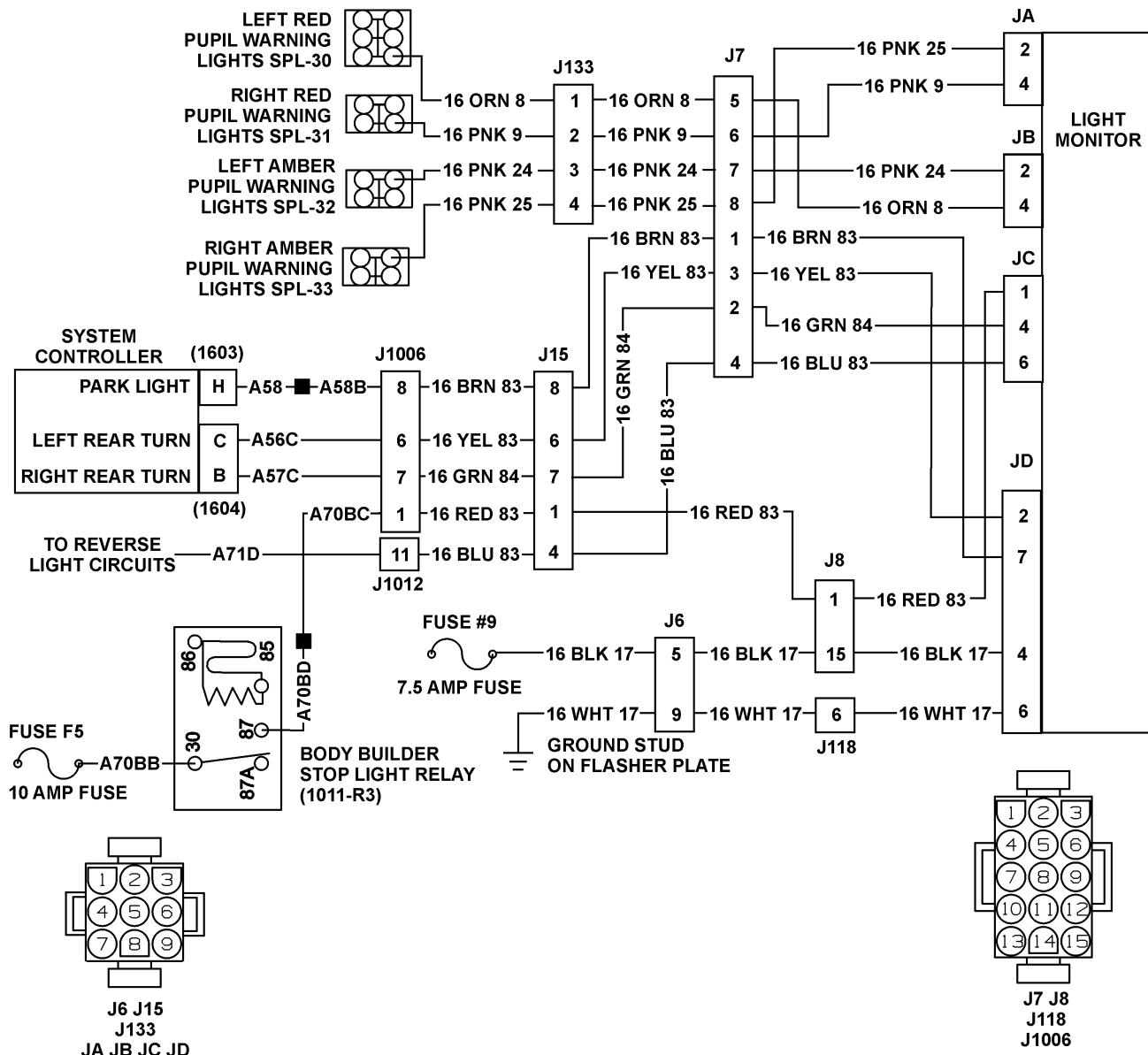


Figure 513 12/16 Lamp Monitor Input Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

(1006) (1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE

(1603) (1604) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE VEHICLE

J6 J15 J133 FLASHER PLATE TO LEFT HAND BODY

J7 J8 J118 LEFT HAND BODY TO FRONT CAP

JA JB JC JD FRONT CAP HARNESS TO LIGHT MONITOR

SPL-30 WARNING LIGHTS, LEFT RED — FRONT/REAR

SPL-31 WARNING LIGHTS, RIGHT RED — FRONT/REAR

SPL-32 WARNING LIGHTS, LEFT AMBER — FRONT/REAR

SPL-33 WARNING LIGHTS, RIGHT AMBER — FRONT/REAR

Table 331 12/16 Lamp Monitor Input Circuit Tests

Lamp Monitor Connector (JD) Voltage Checks		
Check with ignition on and lamp monitor connector (JD) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Lamp monitor connector JD cavity 4 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F9. Also check for open or short in circuit 16 BLK 17.
Lamp monitor connector JD cavity 4 to 6.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 17.
Lamp monitor connector JD cavity 2 to ground.	0 volts	If voltage is present, check for short on circuits 16 YEL 83 and A56C.
While meter is still connected to lamp monitor connector JD from cavity 2 to ground, activate left turn signal.		
Lamp monitor connector JD cavity 2 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 YEL 83 and A56C. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Lamp monitor connector JD cavity 7 to ground.	0 volts	If voltage is present, check for short on circuits 16 BRN 83, A58B and A58.
While meter is still connected to lamp monitor connector JD from cavity 7 to ground, activate park lights.		
Lamp monitor connector JD cavity 7 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BRN 83, A58B and A58. Refer to the Marker, Park and Tail Lamps section of this manual to further troubleshoot this circuit. (See MARKER, PARK AND TAIL LAMPS, page 781)
Lamp Monitor Connector (JA) Voltage Checks		
Check with ignition on and lamp monitor connector (JA) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Lamp monitor connector JA cavity 2 to ground.	0 volts	If voltage is present, check for short on circuit 16 PNK 25.
While meter is still connected is lamp monitor connector JA from cavity 2 to ground, activate amber pupil warning lights.		
Lamp monitor connector JA cavity 2 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 25. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)

Table 331 12/16 Lamp Monitor Input Circuit Tests (cont.)

Lamp monitor connector JA cavity 4 to ground.	0 volts	If voltage is present, check for short on circuit 16 PNK 9.
While meter is still connected is lamp monitor connector JA from cavity 4 to ground, activate red pupil warning lights.		
Lamp monitor connector JA cavity 4 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 9. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)

Lamp Monitor Connector (JB) Voltage Checks

Check with ignition on and lamp monitor connector (JB) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals.

Test Points	Spec.	Comments
Lamp monitor connector JB cavity 2 to ground.	0 volts	If voltage is present, check for short on circuit 16 PNK 24.
While meter is still connected is lamp monitor connector JB from cavity 2 to ground, activate amber pupil warning lights.		
Lamp monitor connector JB cavity 2 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 24. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)
Lamp monitor connector JB cavity 4 to ground.		
Lamp monitor connector JB cavity 4 to ground.	0 volts	If voltage is present, check for short on circuit 16 ORN 8.
While meter is still connected is lamp monitor connector JB from cavity 4 to ground, activate red pupil warning lights.		
Lamp monitor connector JB cavity 4 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 8. Refer to the Red and Amber Pupil Warning Lights section of this manual to further troubleshoot this circuit. (See Red And Amber Pupil Warning Lights, page 893)

Lamp Monitor Connector (JC) Voltage Checks

Check with ignition on and lamp monitor connector (JC) disconnected.

NOTE – Always check connectors for damage and pushed-out terminals.

Test Points	Spec.	Comments
Lamp monitor connector JC cavity 1 to ground.	0 volts	If voltage is present, check for short on circuits 16 RED 83, A70BC, A70BD and A70BB.

Table 331 12/16 Lamp Monitor Input Circuit Tests (cont.)

While meter is still connected to lamp monitor connector JC cavity 1 to ground activate brake lights by pressing brake pedal.		
Lamp monitor connector JC cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 RED 83, A70BC, A70BD and A70BB. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Lamp monitor connector JC cavity 4 to ground.	0 volts	If voltage is present, check for short on circuits 16 GRN 84 and A57C.
While meter is still connected to lamp monitor connector JC from cavity 4 to ground, activate right turn signal.		
Lamp monitor connector JC cavity 4 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 GRN 84 and A57C. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Lamp monitor connector JC cavity 6 to ground.	0 volts	If voltage is present, check for short on circuits 16 BLU 83and A71D.
While meter is still connected to lamp monitor connector JC from cavity 6 to ground, activate reverse lights by placing transmission in reverse.		
Lamp monitor connector JC cavity 6 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLU 83and A71D. Refer to the Back—Up Lights section of this manual to further troubleshoot this circuit. (See BACK-UP LIGHTS, page 747)

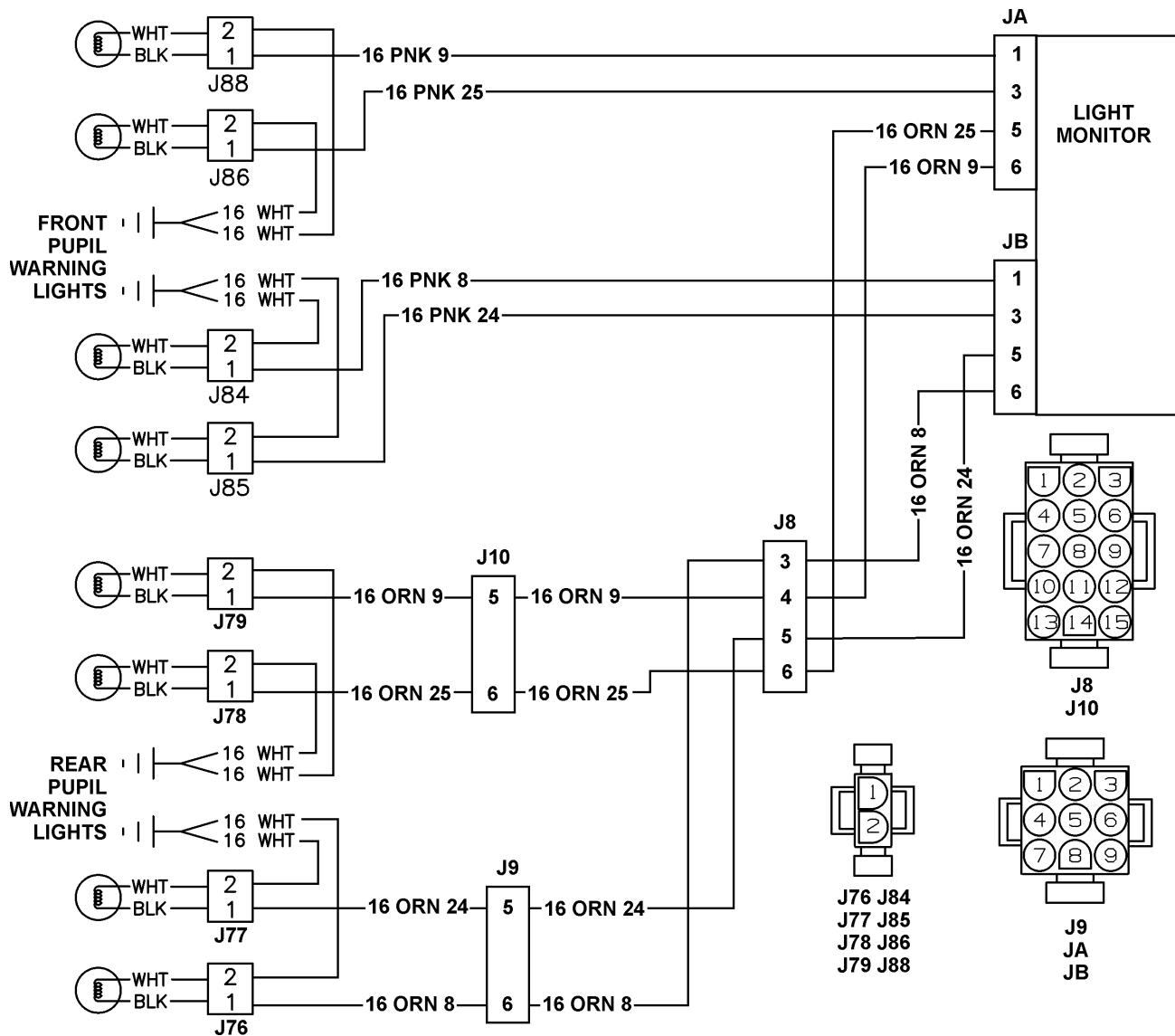
12/16 Lamp Monitor Outputs For Pupil Warning Lights


Figure 514 12/16 Lamp Monitor Outputs For Pupil Warning Lights Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J8 LEFT HAND BODY TO FRONT CAP
 J9 J10 LEFT HAND BODY TO REAR CAP
 J76 LEFT REAR RED WARNING LIGHT TO REAR CAP
 J77 LEFT REAR AMBER WARNING LIGHT TO REAR CAP
 J78 RIGHT REAR AMBER WARNING LIGHT TO REAR CAP
 J79 RIGHT REAR RED WARNING LIGHT TO REAR CAP
 J84 LEFT FRONT RED WARNING LIGHT TO FRONT CAP
 J85 LEFT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J86 RIGHT FRONT AMBER WARNING LIGHT TO FRONT CAP
 J88 RIGHT FRONT RED WARNING LIGHT TO REAR CAP
 JA JB FRONT CAP HARNESS TO LIGHT MONITOR

Table 332 12/16 Lamp Monitor Outputs For Pupil Warning Lights Circuit Tests

Amber Pupil Warning Light Voltage Checks		
Check with ignition on, amber pupil warning lights activated and amber pupil warning lights connectors (J86), (J85), (J77) and (J78) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Front amber pupil warning light connector (J86) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 25. If circuits check good and lights is still faulty, replace pupil warning light.
Front amber pupil warning light connector (J85) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 24. If circuits check good and lights is still faulty, replace pupil warning light.
Rear amber pupil warning light connector (J78) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 25. If circuits check good and lights is still faulty, replace pupil warning light.
Rear amber pupil warning light connector (J77) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 24. If circuits check good and lights is still faulty, replace pupil warning light.
Red Pupil Warning Light Voltage Checks		
Check with ignition on, red pupil warning lights activated and red pupil warning lights connectors (J84), (J88), (J76) and (J79) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Front red pupil warning light connector (J88) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 9. If circuits check good and lights is still faulty, replace pupil warning light.
Front red pupil warning light connector (J84) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 PNK 8. If circuits check good and lights is still faulty, replace pupil warning light.

Table 332 12/16 Lamp Monitor Outputs For Pupil Warning Lights Circuit Tests (cont.)

Rear red pupil warning light connector (J76) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 8. If circuits check good and lights is still faulty, replace pupil warning light.
Rear red pupil warning light connector (J79) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 ORN 9. If circuits check good and lights is still faulty, replace pupil warning light.

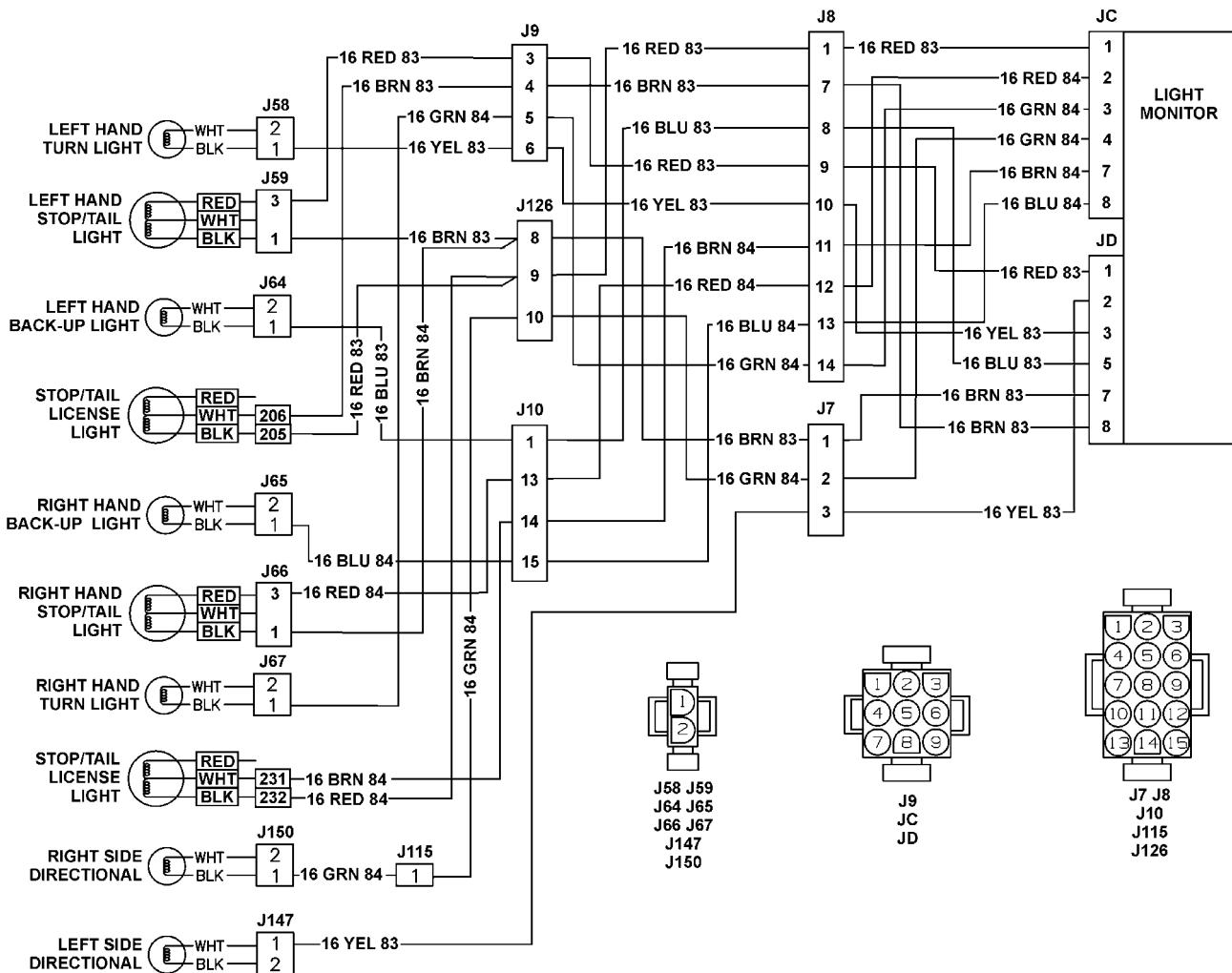
12/16 Lamp Monitor Outputs For All Other Lights


Figure 515 12/16 Lamp Monitor Outputs For All Other Lights Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J7 J8 LEFT HAND BODY TO FRONT CAP
 J9 J10 LEFT HAND BODY TO REAR CAP
 J58 LEFT REAR DIRECTIONAL LIGHT TO REAR CAP
 J59 LEFT REAR STOP/TAIL LIGHT TO REAR CAP
 J64 LEFT REAR BACK-UP LIGHT TO REAR CAP
 J65 RIGHT REAR BACK-UP LIGHT TO REAR CAP
 J66 RIGHT REAR STOP/TAIL LIGHT TO REAR CAP
 J67 RIGHT REAR DIRECTIONAL LIGHT TO REAR CAP
 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J147 LEFT HAND BODY TO SIDE DIRECTIONAL
 J150 RIGHT HAND BODY TO REAR DIRECTIONAL LIGHT
 JC JD FRONT CAP HARNESS TO LIGHT MONITOR

Table 333 12/16 Lamp Monitor Outputs For All Other Lights Circuit Tests

Turn Signal Lights Voltage Checks		
Check with ignition on and turn signal connectors (J58), (J67), (J147) and (J150) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Left hand turn light connector (J58) cavity 1 to ground.	0 volts	If voltage is present check for short in circuit 16 YEL 83.
While meter is still connected to the left hand turn light connector (J58) from cavity 1 to ground activate left turn signal.		
Left hand turn light connector (J58) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 YEL 83. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Left side turn light connector (J147) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 YEL 83. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Right hand turn light connector (J67) cavity 1 to ground.	0 volts	If voltage is present check for short in circuit 16 GRN 84.
While meter is still connected to the right hand turn light connector (J67) from cavity 1 to ground activate right turn signal.		
Right hand turn light connector (J67) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 GRN 84. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Right side turn light connector (J150) cavity 1 to ground.	Alternating from 0 volts to 12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 GRN 84. Refer to the Stop/Turn Signal/Hazard Light section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Back-Up Light Voltage Checks		
Check with ignition on, parking brake set, transmission in reverse and back-up light connectors (J64) and (J65) disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		

Table 333 12/16 Lamp Monitor Outputs For All Other Lights Circuit Tests (cont.)

Test Points	Spec.	Comments
Left back-up light connector (J64) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLU 83. Refer to the Back-Up Lights section of this manual to further troubleshoot this circuit. (See BACK-UP LIGHTS, page 747)
Right back-up light connector (J65) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BLU 84. Refer to the Back-Up Lights section of this manual to further troubleshoot this circuit. (See BACK-UP LIGHTS, page 747)

Stop/Tail Light Voltage Checks

Check with ignition on, headlights on and all stop tail light connectors disconnected.

NOTE – Always check connectors for damage and pushed-out terminals.

Test Points	Spec.	Comments
Left hand stop/tail light connector (J59) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BRN 83. Refer to the Marker, Park, and Tail Lamps section of this manual to further troubleshoot this circuit. (See MARKER, PARK AND TAIL LAMPS, page 781)
Left hand stop/tail light connector (J59) cavity 3 to ground.	0 volts	If voltage is present, check for short on circuit 16 RED 83.
While meter is still connected to left hand stop/tail light connector (J59) from cavity 3 to ground activate brake lights by pressing brake pedal.		
Left hand stop/tail light connector (J59) cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 83. Refer to the Stop/Turn Signal/Hazard Lights section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Release brake pedal.		
Left hand stop/tail license light connector cavity 206 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BRN 83. Refer to the Marker, Park, and Tail Lamps section of this manual to further troubleshoot this circuit. (See MARKER, PARK AND TAIL LAMPS, page 781)

Table 333 12/16 Lamp Monitor Outputs For All Other Lights Circuit Tests (cont.)

Left hand stop/tail license light connector cavity 205 to ground.	0 volts	If voltage is present, check for short on circuit 16 RED 83.
While meter is still connected to left hand stop/tail license light connector from cavity 205 to ground activate brake lights by pressing brake pedal.		
Left hand stop/tail license light connector cavity 205 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 83. Refer to the Stop/Turn Signal/Hazard Lights section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Release brake pedal.		
Right hand stop/tail light connector (J66) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 84 and 16 BRN 83. Refer to the Marker, Park, and Tail Lamps section of this manual to further troubleshoot this circuit. (See MARKER, PARK AND TAIL LAMPS, page 781)
Right hand stop/tail light connector (J66) cavity 3 to ground.	0 volts	If voltage is present check for short in circuits 16 RED 84.
While meter is still connected to the right hand stop/tail light connector (J66) from cavity 3 to ground activate brake lights by pressing brake pedal.		
Right hand stop/tail light connector (J66) cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 84. Refer to the Stop/Turn Signal/Hazard Lights section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)
Release brake pedal.		
Right hand stop/tail license light connector cavity 231 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BRN 84. Refer to the Marker, Park and Tail Lamps section of this manual to further troubleshoot this circuit. (See MARKER, PARK AND TAIL LAMPS, page 781)
Right hand stop/tail license light connector cavity 232 to ground.	0 volts	If voltage is present, check for short on circuits 16 RED 84 and 16 RED 83.

Table 333 12/16 Lamp Monitor Outputs For All Other Lights Circuit Tests (cont.)

While meter is still connected to right hand stop/tail license light connector from cavity 232 to ground activate brake lights by pressing brake pedal.		
Right hand stop/tail license light connector cavity 232 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 RED 84 and 16 RED 83. Refer to the Stop/Turn Signal/Hazard Lights section of this manual to further troubleshoot this circuit. (See STOP/TURN SIGNAL/HAZARD LIGHT, page 844)

14.4. EXTENDED DESCRIPTION

Power is supplied from the power source of the specific light to the light monitor. When the circuit is complete (good ground connection and no burnt out bulbs) the specific lights will function properly and the corresponding light in the light monitor will illuminate.

When a light is not functioning properly, the corresponding light in the light monitor will not illuminate.

14.5. COMPONENT LOCATIONS

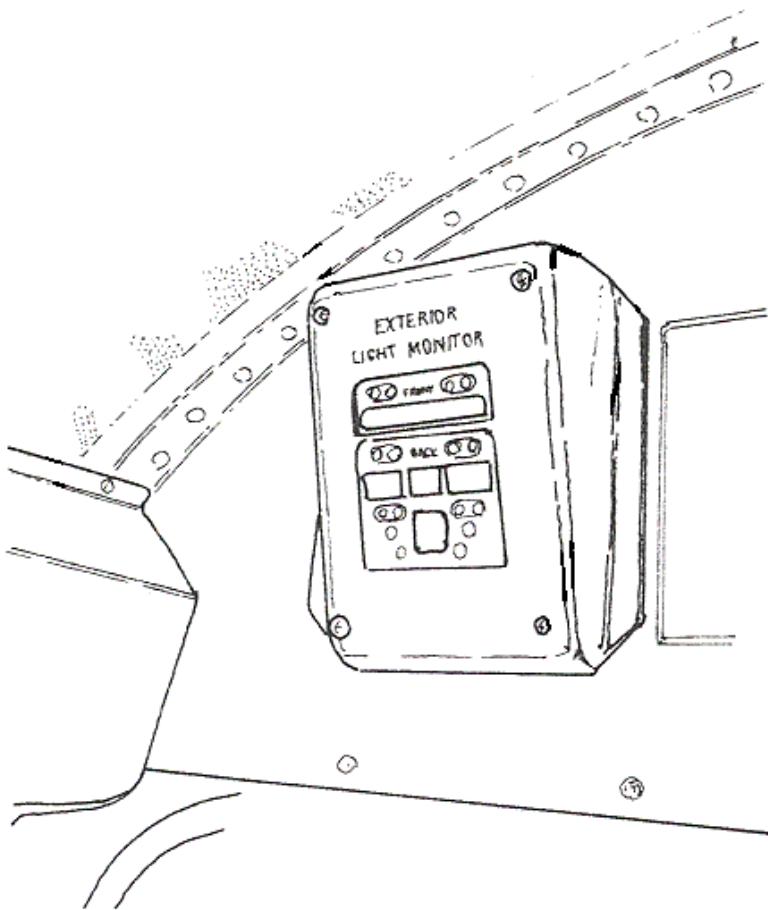


Figure 516 Light Monitor Box

15. LUGGAGE BOX LIGHTS

15.1. CIRCUIT FUNCTIONS

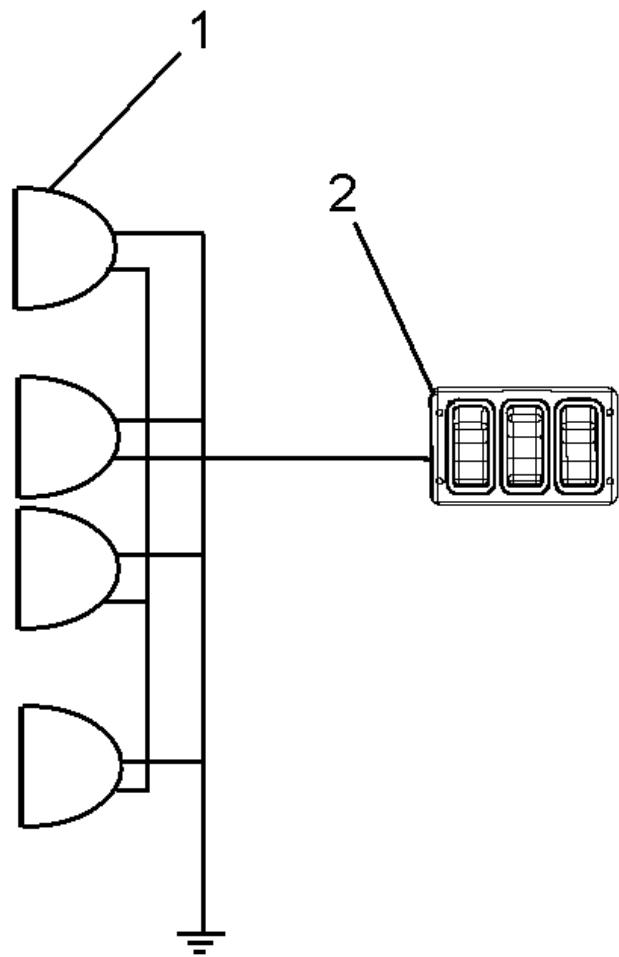


Figure 517 Luggage Box Lights Function Diagram

1. LUGGAGE BOX LIGHTS
2. LEFT HAND SWITCH PANEL

Refer to Luggage Box Lights Function Diagram.

Luggage box lights are present with busses equipped with luggage boxes. The lights are activated to illuminate the luggage box area.

15.2. DIAGNOSTICS

Should the luggage box lights fail to operate, the problem could be attributed to a faulty switch in the switch panel, a burnt out bulb, a blown fuse or an open or shorted wire.

Luggage Box Lights Preliminary Check

Table 334 Luggage Box Lights Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify luggage box lights are inoperative. (Ignition on, headlights on, low beam selected and fog light switch on.)	Visually check luggage box lights.	Luggage box lights are inoperative.	Go to next step.	Luggage box lights are operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Are all luggage box lights inoperative?	Visually check if all luggage box lights are inoperative.	All luggage box lights are inoperative.	Go to next step.	Check specific circuits of the inoperative light for open circuits.
4.					Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 1093)	

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the luggage box lights.

15.3. FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Luggage Box Lights Circuits.

A fault in the luggage box lights circuits will be apparent when the lights do not come on.

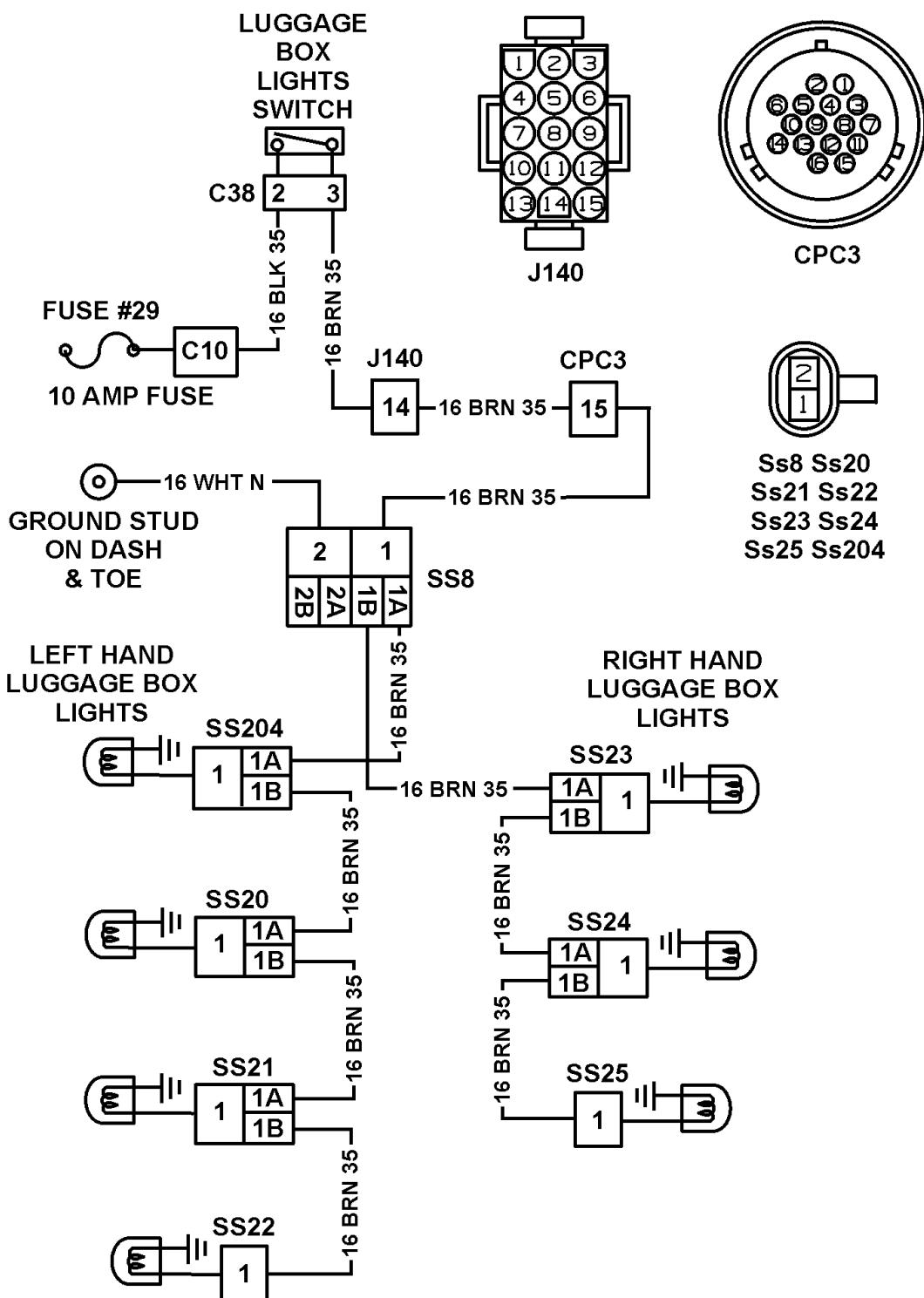


Figure 518 Luggage Box Lights Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS

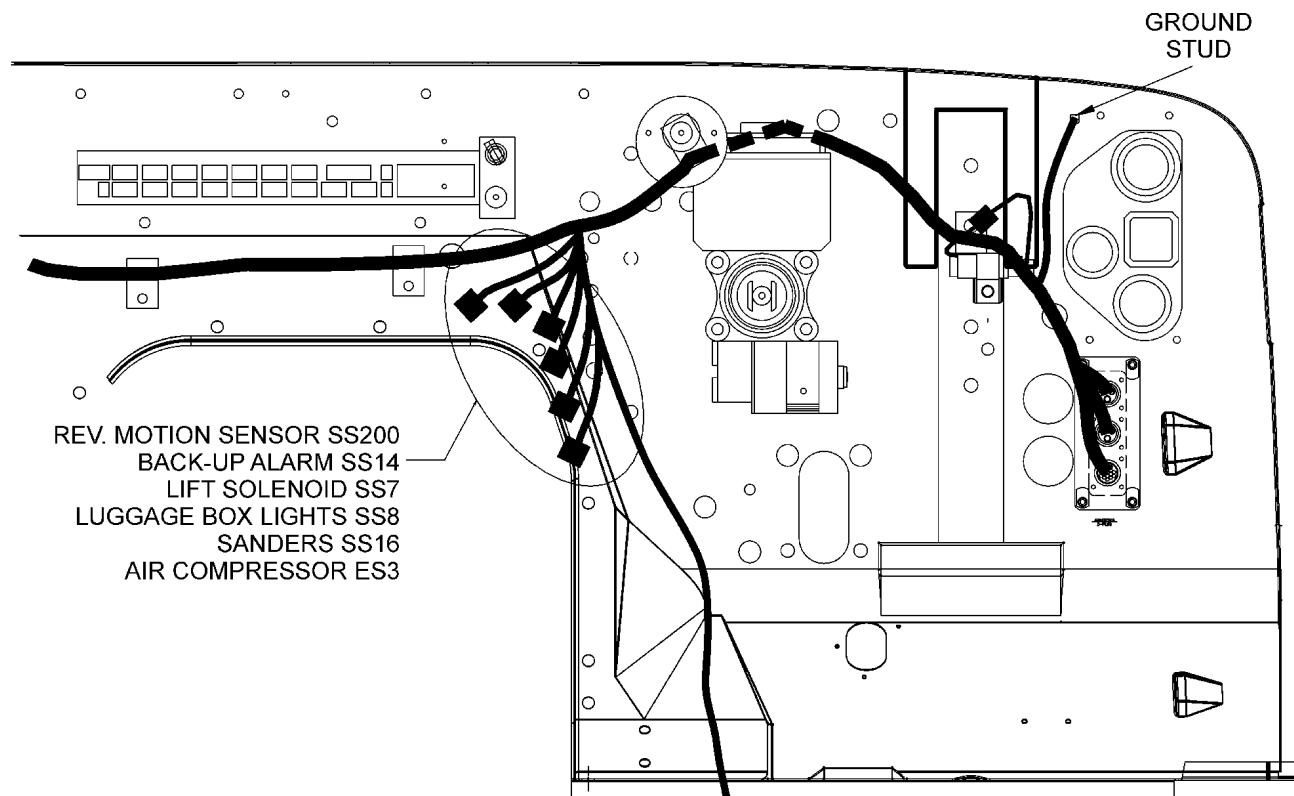
J140 FLASHER PLATE TO DASH AND TOE

SS8 SS20 SS21 SS22 SS23 SS24 SS25 SS204 SEALED ENGINE HARNESS TO LUGGAGE BOX LIGHTS

Table 335 Luggage Box Lights Circuit Tests

Luggage Box Lights Switch (C38) Voltage Checks		
Test Points	Spec.	Comments
Luggage box lights switch (C38) cavity 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #29 and check for short or open in circuit 16 BLK 35.
Luggage box lights switch (C38) cavity 2 to 3.	12 ± 1.5 volts	If voltage is missing check for short or open in circuit 16 BRN 35. If circuits check good and lights are still faulty, replace luggage box lights switch.

15.4. COMPONENT LOCATIONS

**Figure 519 Sealed Engine Harness Wiring**

16. ENGINE COMPARTMENT LIGHT

16.1. CIRCUIT FUNCTIONS

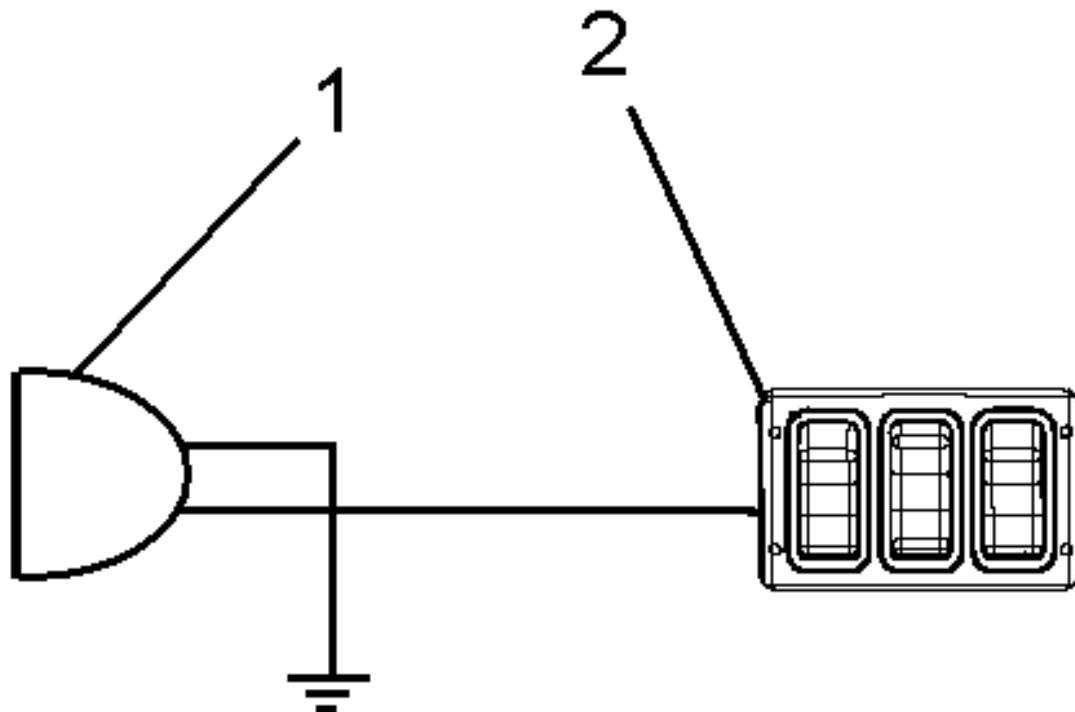


Figure 520 Engine Compartment Light Function Diagram

1. ENGINE COMPARTMENT LIGHT
2. ENGINE COMPARTMENT LIGHT SWITCH

16.2. DIAGNOSTICS

Should the engine compartment light fail to operate, the problem could be attributed to a faulty switch, a burnt out bulb, a blown fuse or an open or shorted wire.

Engine Compartment Light Preliminary Check

Table 336 Engine Compartment Light Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify engine compartment light is inoperative. (Ignition on, headlights on, low beam selected and fog light switch on.)	Visually check engine compartment light.	Engine compartment light is inoperative.	Go to next step.	Engine compartment light is operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.					Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 1097)	

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the engine compartment light.

16.3. FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Engine Compartment Light Circuits.

A fault in the engine compartment light circuits will be apparent when the light does not come on.

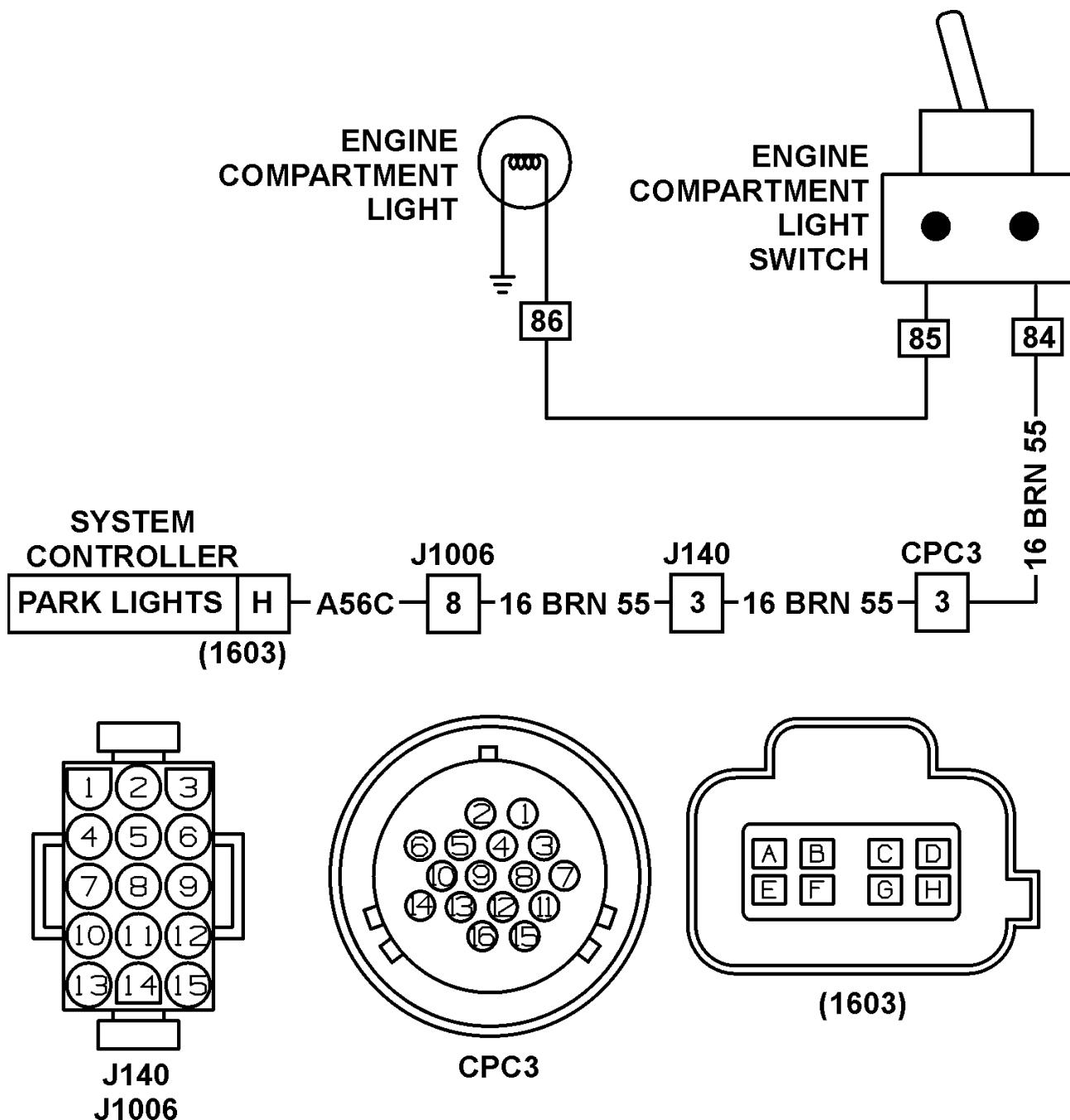


Figure 521 Engine Compartment Light Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

(1603) SYSTEM CONTROLLER

LOCATED AT INSIDE RIGHT SIDE VEHICLE

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS

J140 FLASHER PLATE TO DASH AND TOE

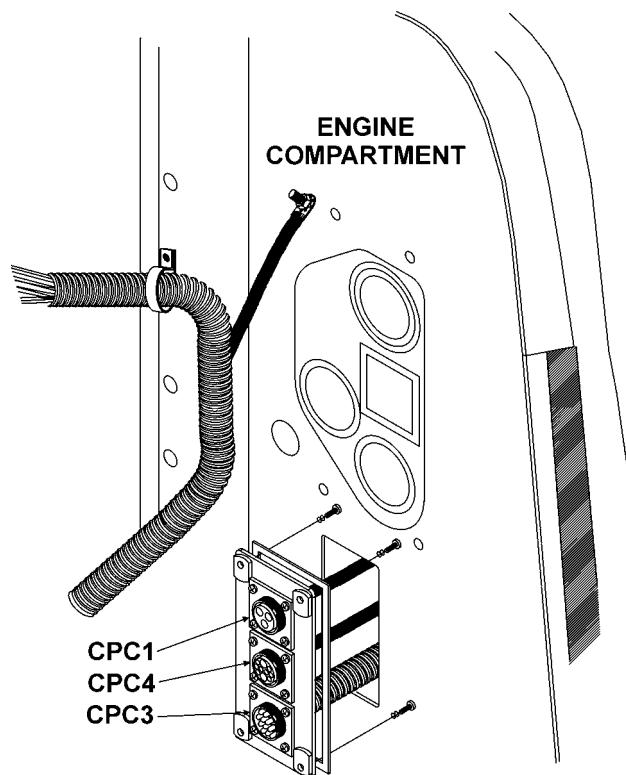
J1006 BODY BUILDER CONNECTOR

LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE

Table 337 Engine Compartment Light Circuit Tests

Engine Compartment Light Switch Voltage Checks		
Check with ignition on, park lights on and engine compartment light switch disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.		
Test Points	Spec.	Comments
Engine compartment light switch cavity 84 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 55 and A56C. Also ensure proper voltage out of system controller (1603) pin H. NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.
Engine compartment light switch cavity 84 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit to engine compartment light. If circuits check good and light is still faulty, replace engine compartment light switch.

16.4. COMPONENT LOCATIONS

**Figure 522**

17. INTERIOR AND EXTERIOR LIFT LIGHTS

17.1. CIRCUIT FUNCTIONS

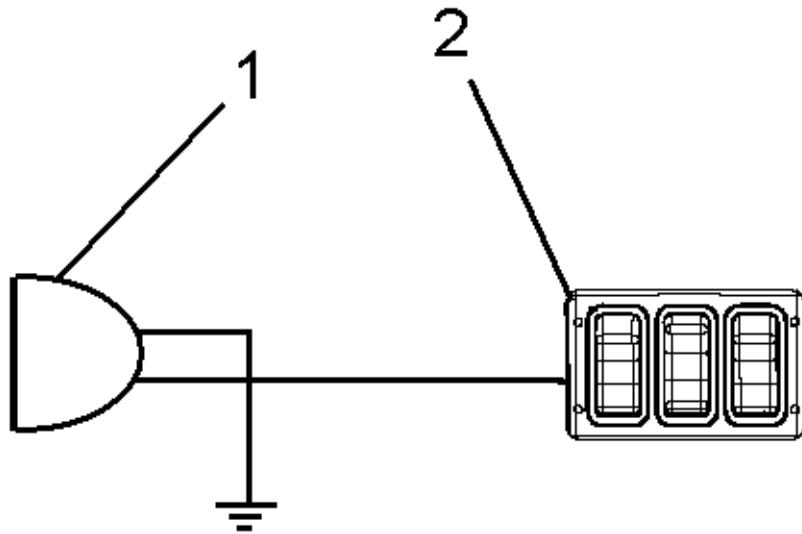


Figure 523 Interior And Exterior Lift Lights Function Diagram

1. LIFT LIGHTS
2. LIFT DOOR SWITCH

17.2. DIAGNOSTICS

Should the lift door lights fail to operate, the problem could be attributed to a faulty switch, a burnt out bulb, a blown fuse or an open or shorted wire.

Lift Lights Preliminary Check

Table 338 Lift Lights Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify lift lights are inoperative. (Ignition on, headlights on, low beam selected and fog light switch on.)	Visually check lift lights.	Lift lights are inoperative.	Go to next step.	Lift lights are operating. Problem does not exist or is intermittent. (Check for inactive diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing ground common to several features.)	Visually check for other malfunctioning features.	No other features are malfunctioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.					Go to fault detection management. (See FAULT DETECTION MANAGEMENT, page 1101)	

Diagnostic Trouble Codes

There are no diagnostic trouble codes associated with the lift lights.

17.3. FAULT DETECTION MANAGEMENT

NOTE – The testing method for troubleshooting the electrical systems portrayed in this manual is a basic voltage test. An alternative method of checking for voltage drops within a given circuit may be a quicker method of identifying an exact problem.

Refer to Lift Lights Circuits.

A fault in the lift lights circuits will be apparent when the lights do not come on.

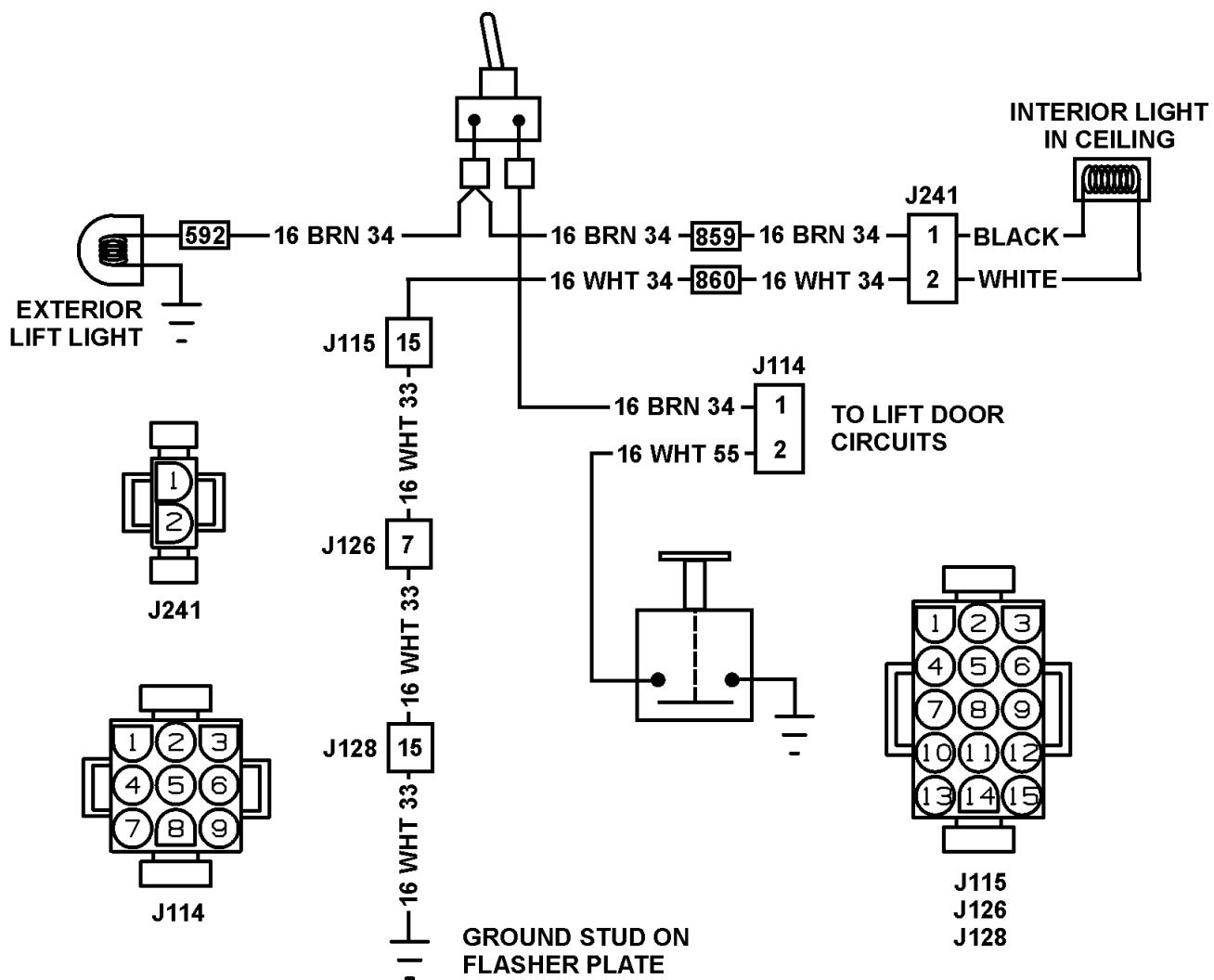


Figure 524 Lift Lights Circuits — Always Refer To Circuit Diagram Book For Latest Circuit Information

J114 J115 RIGHT HAND BODY TO REAR CAP
 J126 REAR CAP TO LEFT HAND BODY
 J128 FLASHER PLATE TO LEFT HAND BODY
 J241 RIGHT HAND BODY TO LIFT LIGHT

Table 339 Lift Lights Circuit Tests

Lift Lights Switch Voltage Checks		
Check with ignition on, lift door closed and lift light switch connector disconnected.		
NOTE – Always check connectors for damage and pushed-out terminals.		
Test Points	Spec.	Comments
Lift lights switch high cavity to ground.	0 volts	If voltage is present check for short in circuit 16 BRN 34. Refer to the Wheelchair Light Controls section of this manual to further troubleshoot this circuit. (See CIRCUIT FUNCTIONS, page 574)
While meter is still connected to the lift lights switch from high cavity to ground, open lift door.		
Lift lights switch high cavity to ground.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 BRN 34. Refer to the Wheelchair Light Controls section of this manual to further troubleshoot this circuit. (See CIRCUIT FUNCTIONS, page 574)
Lift lights switch high cavity to low cavity.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits 16 BRN 34 and 16 WHT 33. If circuits check good and lights are still faulty, replace lift lights switch and retest. Refer to the Wheelchair Light Controls section of this manual to further troubleshoot this circuit. (See CIRCUIT FUNCTIONS, page 574)

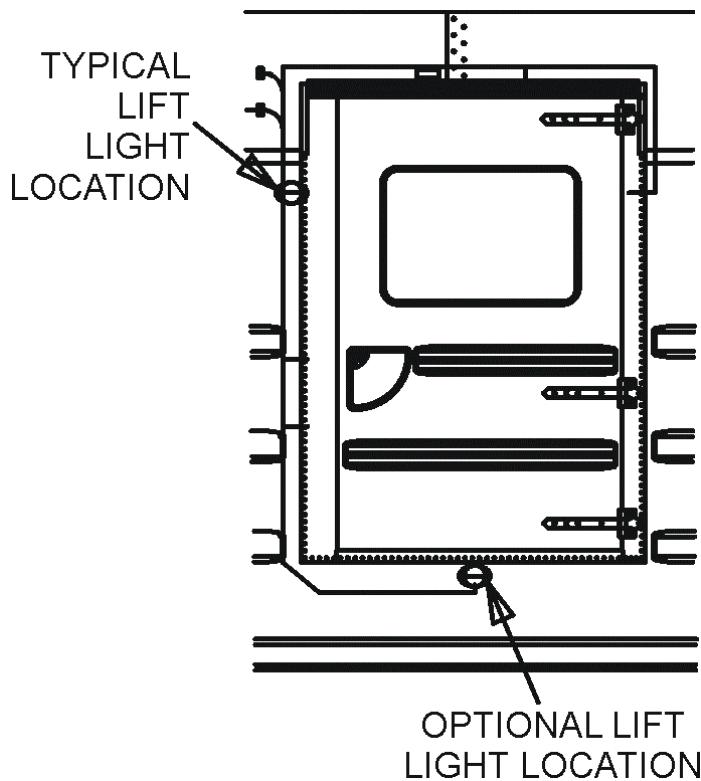
17.4. COMPONENT LOCATIONS

Figure 525 Lift Light Locations