Table of Contents

1. DC POWER FEEDS

1.1. CIRCUIT FUNCTIONS

Refer to DC Power Feeds Function diagram.

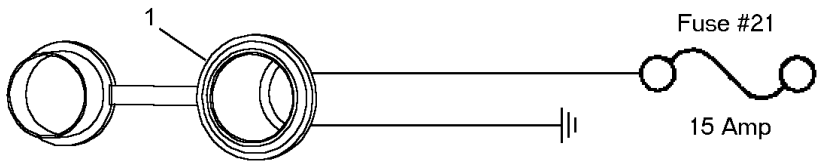

Figure 175 DC Power Feeds Function Diagram

1. DC POWER SOURCE

The DC power source circuits provide power to accessories plugged into the lighter socket.

1.2. DIAGNOSTICS

Should the DC power feeds fail to operate, the problem could be attributed to open or shorted wiring between the power circuits, an open ground circuit or a blown fuse.

An open element in the DC power socket would also keep the power leads from working supplying power.

There are no diagnostic trouble codes associated with the DC power feed circuits.

DC Power Feed Preliminary Check

Table 101 DC Power Feed Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	Off	Verify DC power feed is inoperative.	Check DC power feeds.	DC power feeds are inoperative.	Go to next step.	DC power feeds are operating. Problem does not exist or is intermittent.
2.	Off	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Refer to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 344)	Identify and repair condition causing several features to be inoperative.

1.3. 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.

A failure in the DC power feed circuits will be apparent when the DC power feeds are inoperative. The electrical system controller (ESC) will not log any diagnostic trouble codes for cigar lighter and power feeds.

Should the DC power feeds fail to operate, the problem could be attributed to open or shorted wiring in the power circuits, an open ground circuit or a blown fuse.

Refer to DC Power Feed Circuits.

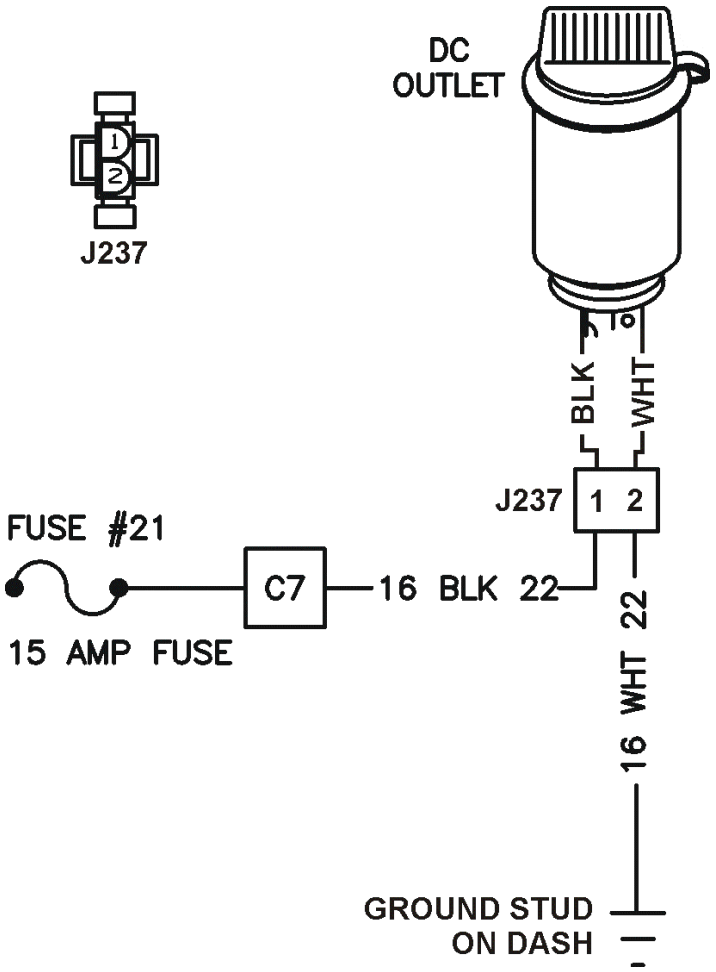

Figure 176 Typical DC Power Feed Circuits (Located In Left Hand Console) — Always Refer To Circuit Diagram Book For Latest Circuit Information

J237 FLASHER PLATE TO DC OUTLET IN LEFT HAND CONSOLE

Table 102 DC Power Feed Circuit Tests

Diagnostic Trouble Codes
There are no diagnostic trouble codes associated with the DC power feed circuits.

Table 102 DC Power Feed Circuit Tests (cont.)

DC Power Source Voltage Checks Check with DC power source connector J237 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Connector J237 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #21. Also check for open or short in circuit 16 BLK 22.
Connector J237 cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 22. If all circuits check good and DC power supply still fails, replace DC power supply socket.

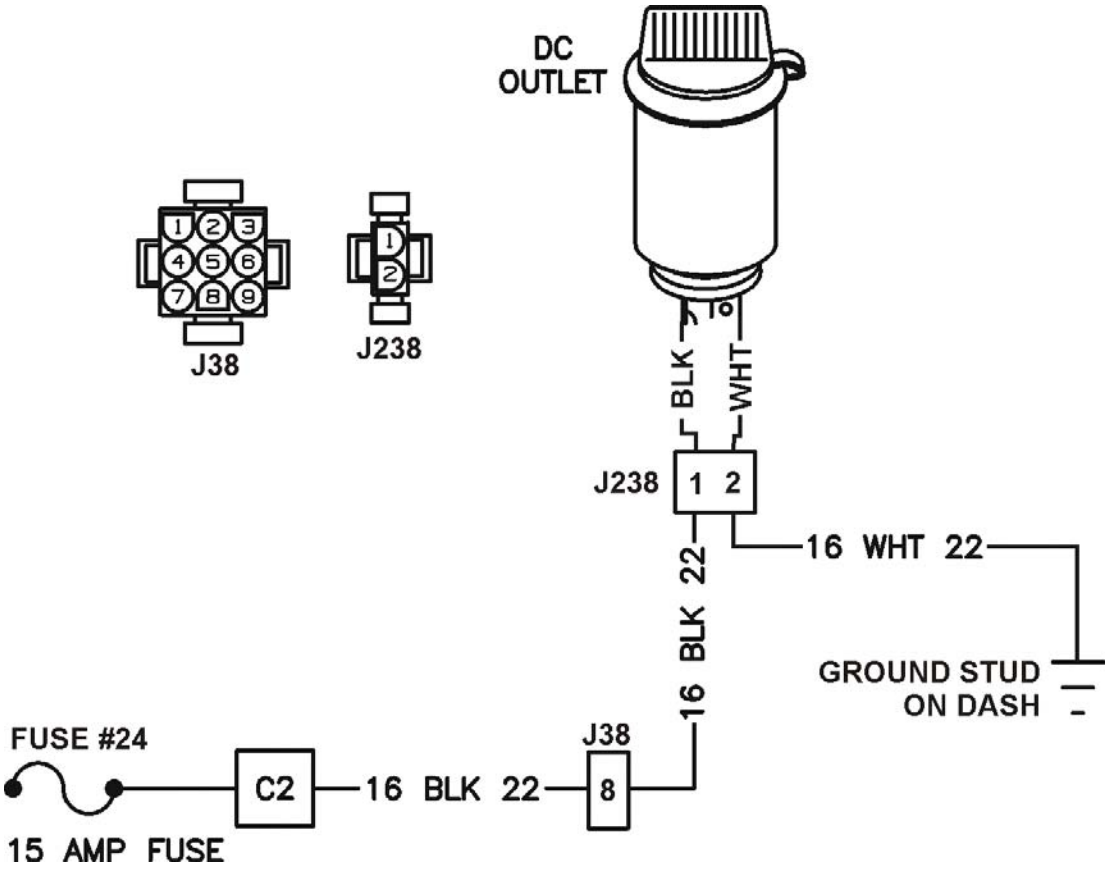

Figure 177 Optional DC Power Feed Circuits (Located On Dash Panel) — Always Refer To Circuit Diagram Book For Latest Circuit Information

J238 DASH MOUNTED DC OUTLET POWER SOURCE

Table 103 DC Power Feed Circuit Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the DC power feed circuits.		
DC Power Source Voltage Checks Check with DC power source connector J238 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Connector J238 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #24. Also check for open or short in circuit 16 BLK 22.
Connector J238 cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 22. If all circuits check good and DC power supply still fails, replace DC power supply socket.

1.4. EXTENDED DESCRIPTION

The DC power source receives power from fuse #21or #24 on circuit 16 BLK 22 to connector J237 or J238.

Ground is supplied from the ground stud on the flasher plate to circuit 16 WHT 22.

1.5. COMPONENT LOCATIONS

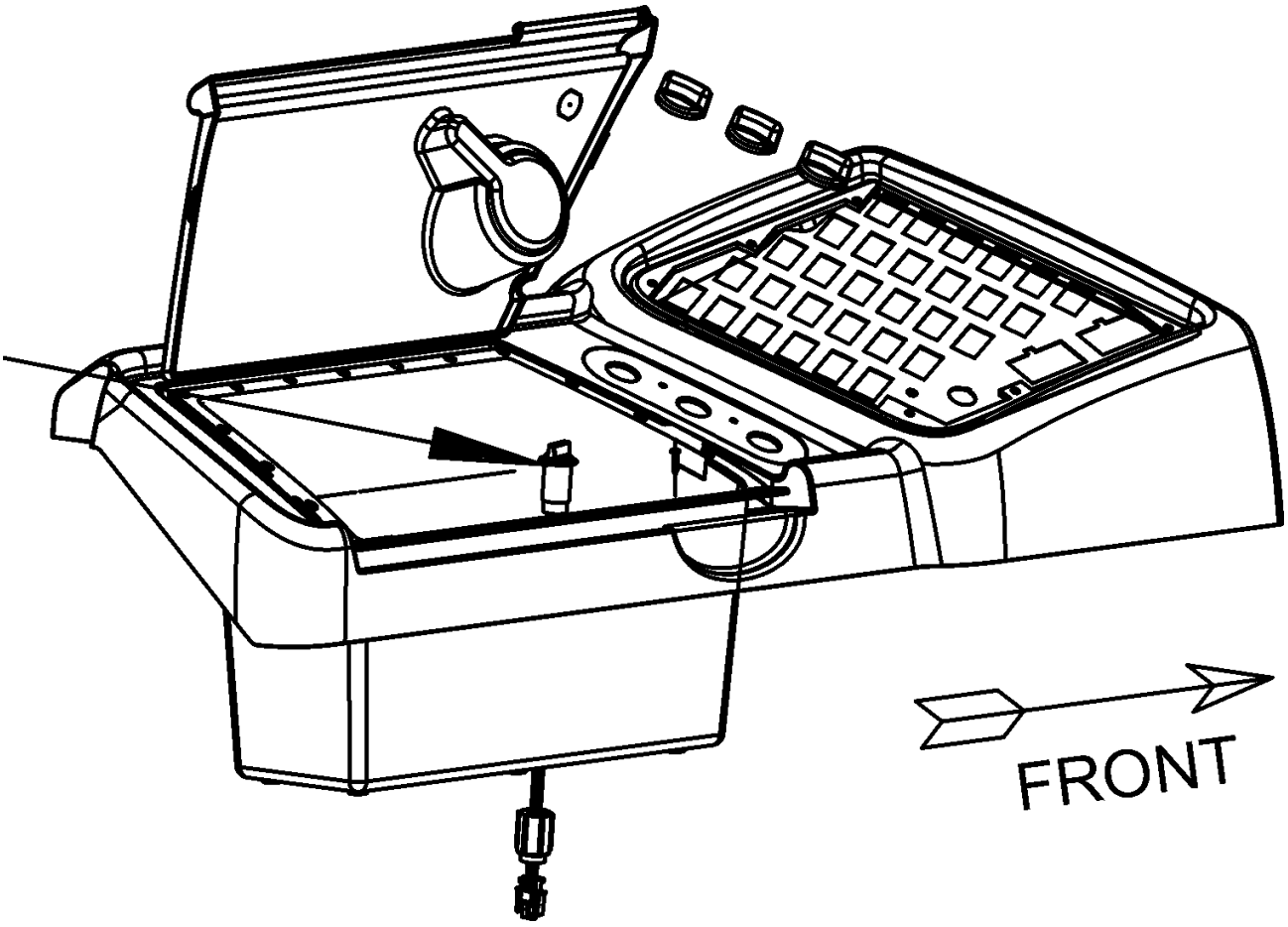

Figure 178 Typical DC Power Source Location

TYPICAL DC POWER SOURCE LOCATED IN LEFT HAND CONSOLE

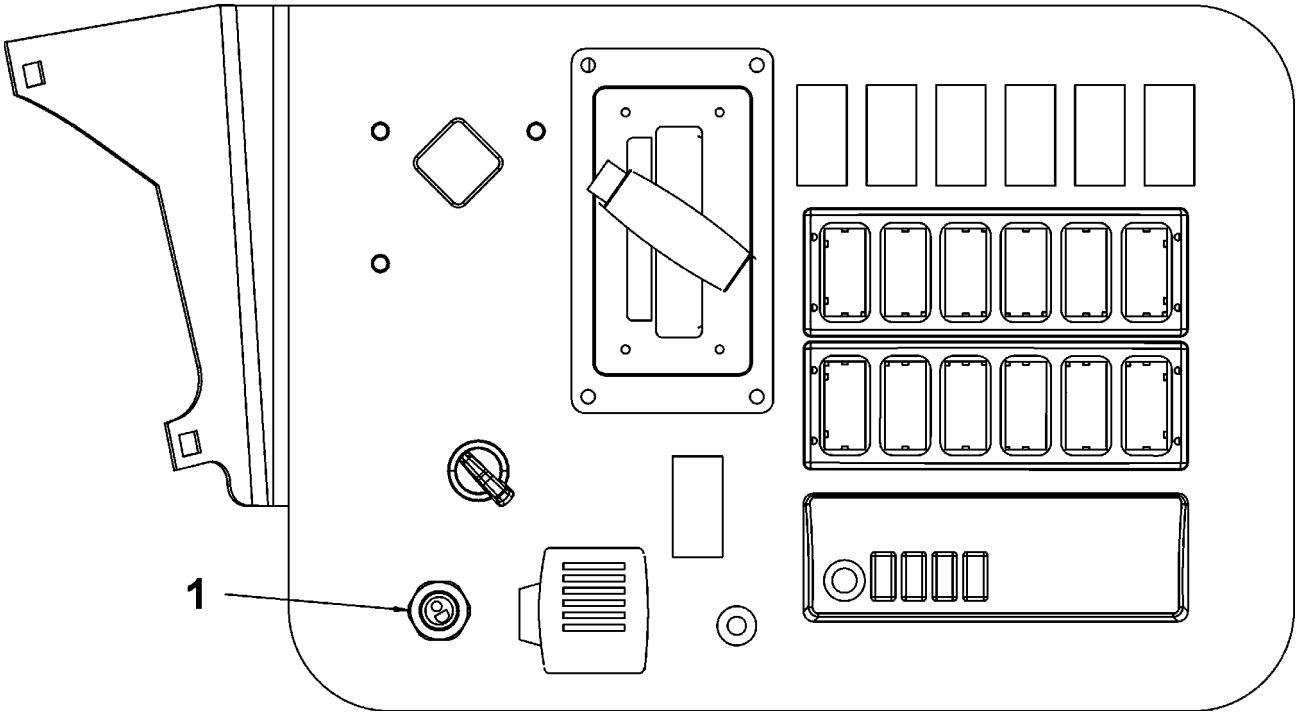

Figure 179 Optional DC Power Source Location

1. OPTIONAL DC POWER SOURCE

2. CRUISE CONTROL

2.1. CIRCUIT FUNCTION

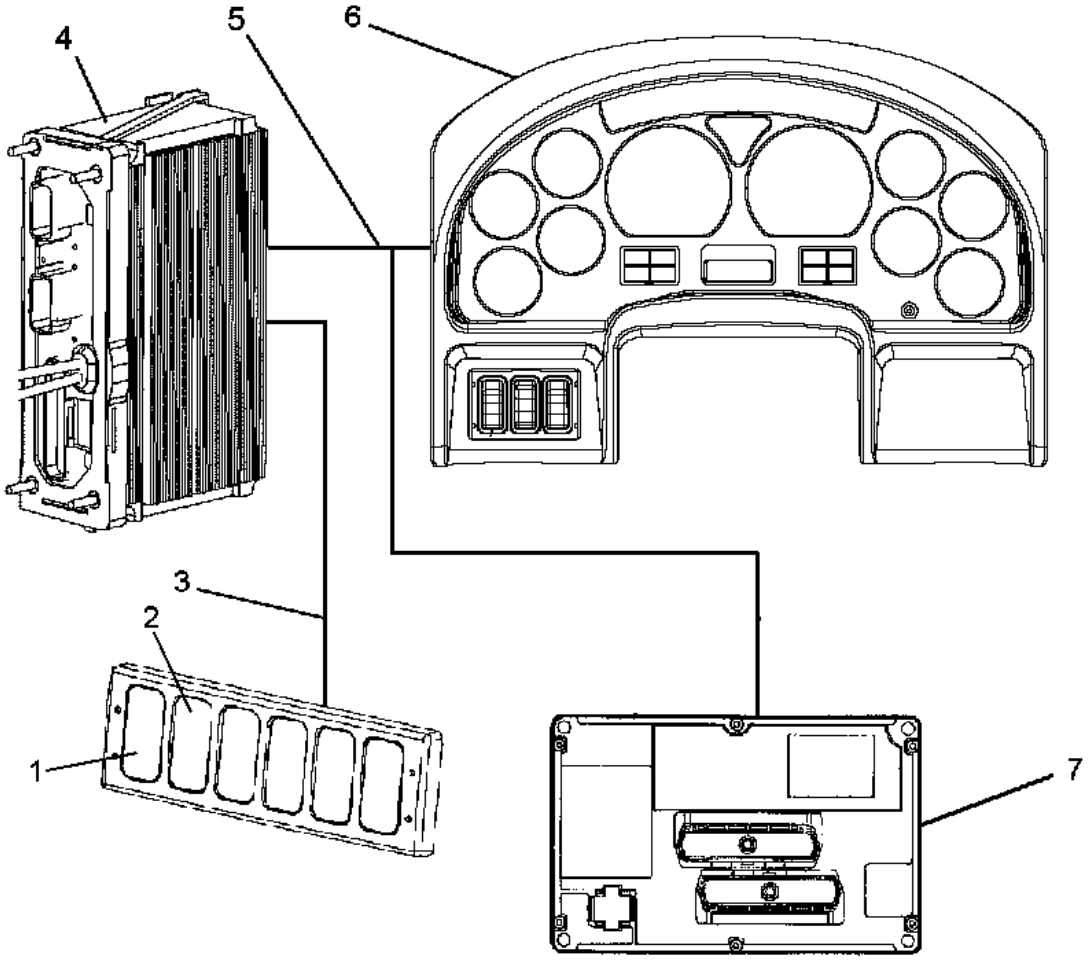

Figure 180 Cruise Control Function Diagram

1. CRUISE ON/OFF SWITCH
2. CRUISE SET/RESUME SWITCH
3. DIRECT CIRCUITS TO ESC
4. ESC
5. DRIVETRAIN 1939 DATA LINK
6. ELECTRONIC GAUGE CLUSTER (EGC)
7. ENGINE CONTROLLER
8. BRAKE AND CLUTCH SWITCH CIRCUITS (NOT SHOWN)

The engine controller activates the cruise control when it receives a message on the Drivetrain 1939 data link from the ESC. The ESC generates this message when it receives input from the cruise control switches on the steering wheel or from the switch pack.

The key must be in the accessory or run position for the cruise control to work.

The ESC will command the cruise to be deactivated when the brake or clutch is activated.

The ESC will also command the cruise to be deactivated when a brake or clutch switch DTC is set or an ABS or traction control event has occurred.

See the engine diagnostic manual for detailed information on troubleshooting cruise control problems not related to the truck circuits.

2.2. DIAGNOSTICS

NOTE – If cruise control switches are located in the switch pack, then refer to the switch pack troubleshooting section of this manual.

The service tool (EZ-Tech®) running the "Diamond Logic Builder™" diagnostic software can be used to illuminate all of the warning lamps and monitor inputs to the ESC from the cruise control switches on the steering wheel.

The EGC cannot be put in diagnostic mode when there is a fault in these circuits. The Diamond Logic Builder™ software must be used to view this DTC.

Faults in the brake, clutch, ABS and drivetrain data link will set DTC's and will effect cruise control operation.

Table 104 Cruise Control Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On, with engine running	Verify cruise control is inoperative. Insure the brake and clutch are released, there are no active brake or clutch DTC's and no ABS/ATC events.	Test cruise control.	Cruise control is inoperative.	Go to next step.	Cruise control is operating. Problem does not exist or is intermittent.
2.	On, with engine off	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.

Table 104 Cruise Control Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
3.	On	Connect diagnostic tool (EZ-Tech) to the diagnostic connector. Turn key to ignition position. Start the "Diamond Logic Builder™" diagnostic software. Verify operation of the cruise control switch input to ESC.		Diamond Logic Builder™ software shows switches are operating.	Cruise switches are working. Go to next step.	Go to Cruise Switch Fault Detection/ Management. (See CRUISE SWITCH FAULT DETECTION/ MANAGEMENT, page 351)
4.	On	Use the "Diamond Logic Builder™" diagnostic software to verify the brake or clutch switches are not active inputs to the ESC.		Diamond Logic Builder™ software shows switches are not active.	Brake and clutch switches are not disabling cruise control.	Go to Cruise Switch Fault Detection/ Management. (See CRUISE SWITCH FAULT DETECTION/ MANAGEMENT, page 351)
5.	On	Use "Diamond Logic Builder™" diagnostic software to verify cruise commands from the ESC to the engine controller.		Cruise commands are being generated by the ESC.	Go to next step.	Message from ESC is not being transmitted. Consider replacing ESC. (See ESC REPLACEMENT, page 125)
6.	On	ESC is processing switch inputs and generating cruise commands to the engine controller. Refer to the engine troubleshooting manual for the engine installed in the vehicle.				

2.3. CRUISE SWITCH FAULT DETECTION/ MANAGEMENT

Refer to Cruise Switch Circuits.

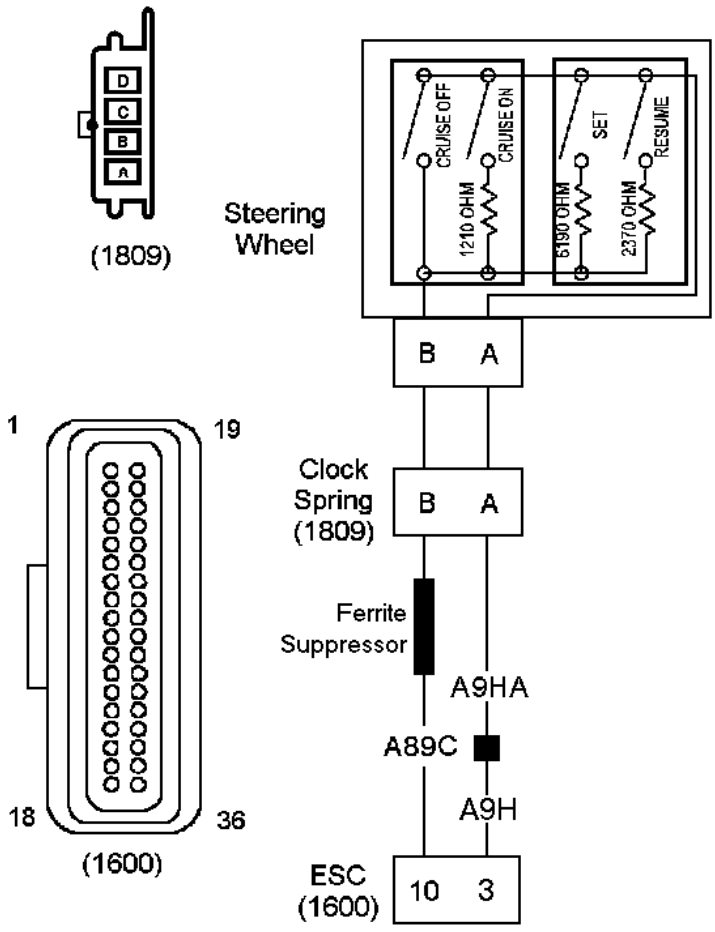

Figure 181 Cruise Switch Circuits (located in Steering Column) — Always refer to Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1809) CLOCK SPRING
LOCATED IN STEERING COLUMN

Table 105 Cruise Control Switch (Located in Steering Column) Voltage Tests

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
612 14 5 1	Analog cruise switch out of range low Shorted to ground or open circuit
612 14 5 2	Analog cruise switch out of range high Shorted high

Table 105 Cruise Control Switch (Located in Steering Column) Voltage Tests (cont.)

Cruise Control Switch (Located in Steering Column) Voltage Checks Remove horn switch cover. Check with ignition key on and steering wheel switch connector removed. **NOTE – Voltage to the switch will be approximately 5 volts with the key off.** **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Steering wheel switch harness connector cavity A to B.	12 ± 1.5 volts	If voltage is incorrect, check for open in clock spring or circuits to ESC connector (1600) pin 3. Resistance check of clock spring, disconnect connector (1809) from bottom of clock spring, check continuity between pin A to A. Repair or replace circuits.
If voltage is correct the circuits between the ESC and the cruise switches are functioning properly. Check switch resistances. If voltage is incorrect and there are no open or shorted circuits the ESC may need replaced.		
Cruise Control Switch (Located in Steering Column) Resistance Checks Check with ignition key off and steering wheel switch connector removed.		
Test Points	Spec.	Comments
Steering wheel switch connector cavity A to B, no switches pushed.	>100K ohms	If resistance is incorrect there is a short in one of the switches.
Steering wheel switch connector cavity A to B, resume switch pushed.	2.4K ± 470 ohms	If resistance is incorrect replace the set/resume switch.
Steering wheel switch connector cavity A to B, set switch pushed.	6.2K ± 1200 ohms	If resistance is incorrect replace the set/resume switch.
Steering wheel switch connector cavity A to B, cruise on switch pushed.	1.2K ± 250 ohms	If resistance is incorrect replace the on/off switch.
Steering wheel switch connector cavity A to B, cruise off switch pushed.	<2 ohms	If resistance is incorrect replace the on/off switch. If all resistances check good the switches are functioning properly.

2.4. EXTENDED DESCRIPTION

The zero volt reference level from ESC connector (1600) pin 3 is supplied to steering wheel switch connector pin A.

Battery voltage from ESC connector (1600) pin 10 is supplied to steering wheel switch connector pin B.

Each cruise control switch is connected to a resistor with a different resistance. The switch and resistor are connected in parallel with the other switches and resistors. When a switch is pressed the ESC will sense the voltage drop across the switch and the resistor. This will signal the ESC to generate the appropriate cruise commands to the engine controller.

2.5. COMPONENT LOCATIONS

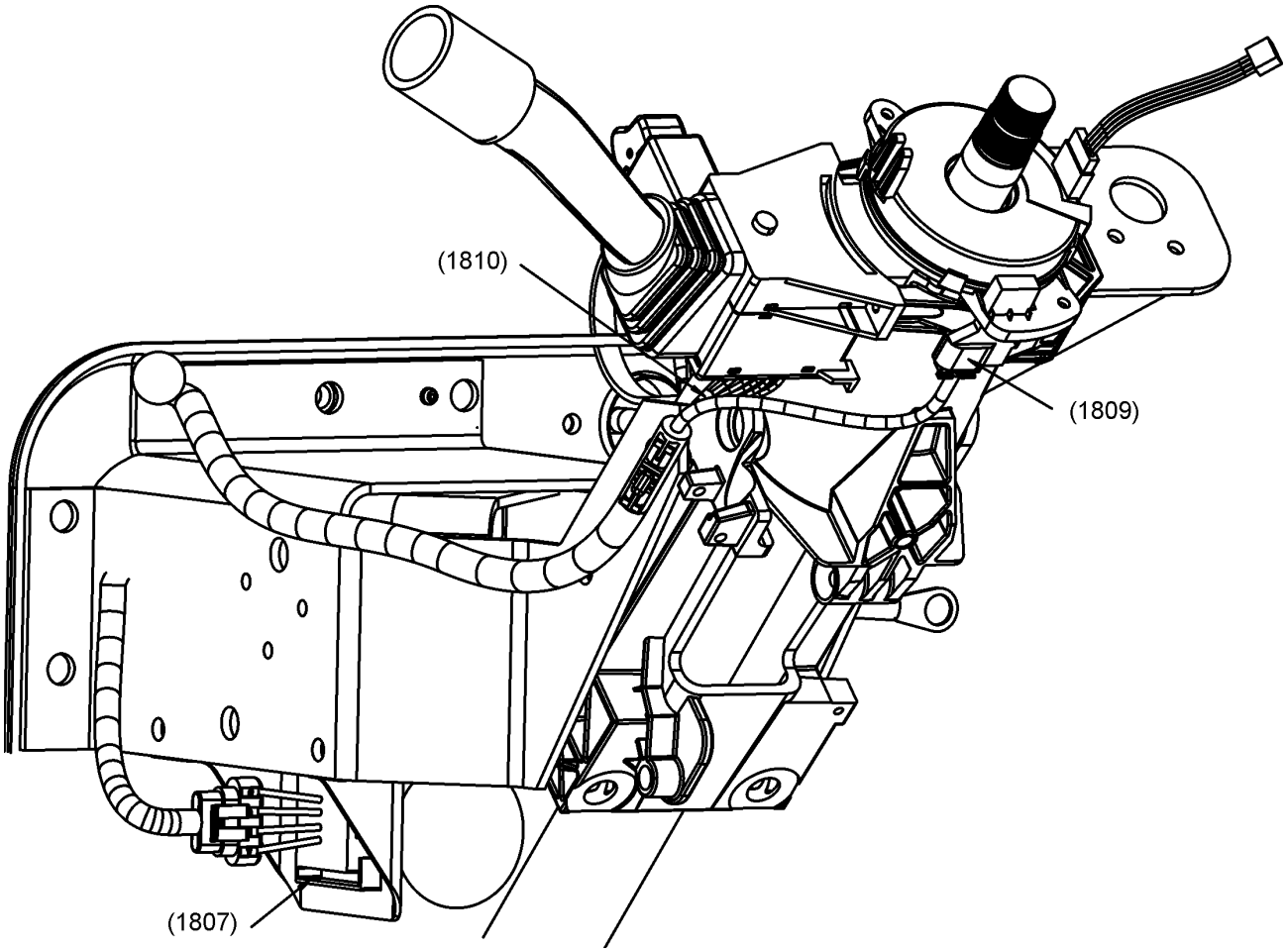

Figure 182 Steering Column

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

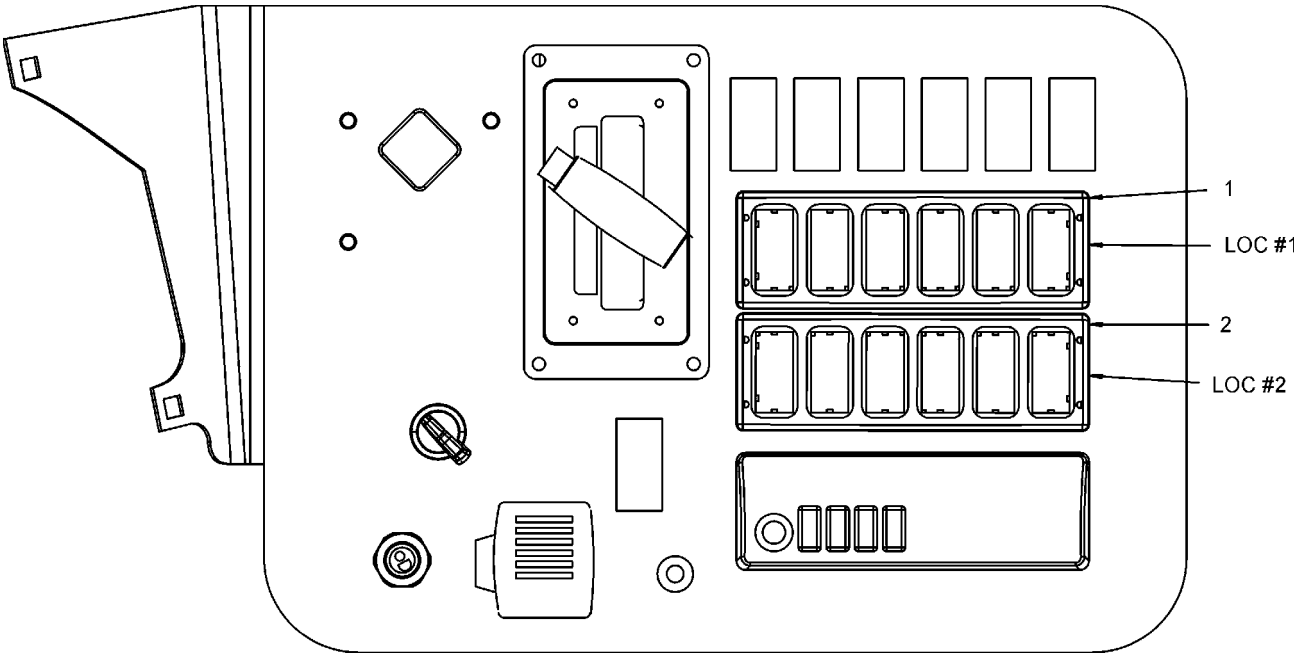

Figure 183 Right Wing Panel

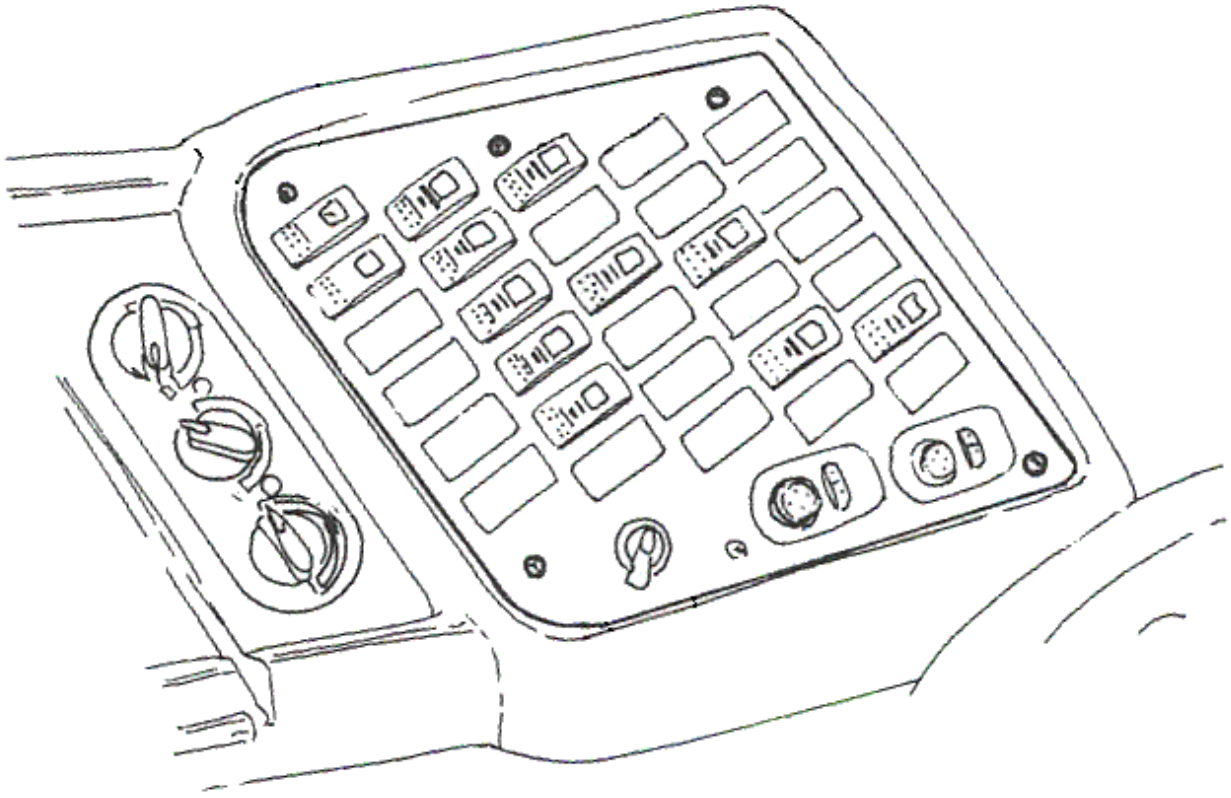

Figure 184 Left Hand Switch Panel

3. ELECTRIC HORNS

3.1. CIRCUIT FUNCTIONS

Refer to electric horn function diagram.

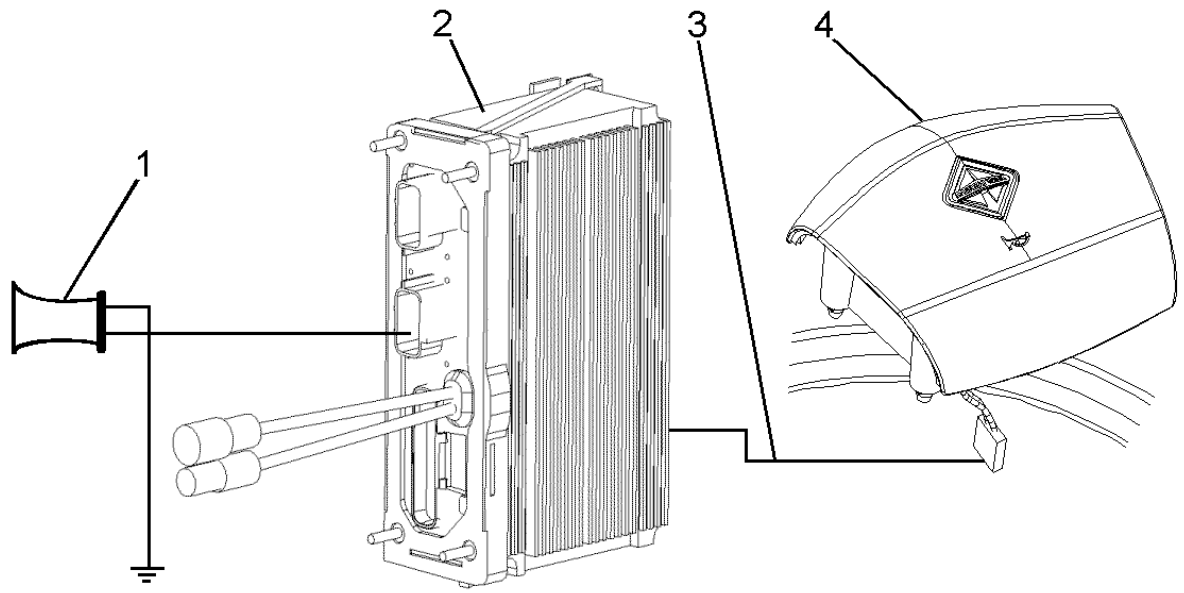

Figure 185 Electric Horn Function Diagram

1. ELECTRIC HORNS, RIGHT SIDE #2 (8312) & LEFT SIDE #1 (8311)
2. ELECTRICAL SYSTEM CONTROLLER
3. CIRCUITS TO ESC CONNECTOR (1600)
4. ELECTRIC HORN SWITCH IN STEERING WHEEL

The electric horns provide the driver audio warning to warn others.

The electric horn switch is a direct input (not multiplexed) to the ESC. When the horn button is pushed the ESC provides voltage to the horns. The circuits from the steering wheel travel through a clock spring assembly which is used instead of a slip ring assembly. Its winds and unwinds as the wheel is turned.

3.2. DIAGNOSTICS

Should the electric horns fail to operate, the problem could be attributed to a faulty switch in the steering wheel, open or shorted circuits between the horn switch and ESC or open or shorted output wiring between the ESC and the horns.

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

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 both electric horns.

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

Electric Horns Preliminary Check

Table 106 Electric Horns Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify electric horns are inoperative.	Attempt to operate electric horns.	Electric horns are inoperative.	Go to next step.	Electric horns are operating. Problem does not exist or is intermittent. (Check for previously active diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	If more than one electric horn is connected to this circuit, are all horns inoperative?	Check if all electric horns are inoperative.	All electric horns are inoperative.	Go to next step.	Check specific circuits of the inoperative horn for open circuits.
4.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 357)	Read display on odometer.	No electric horns diagnostic trouble codes are active.	Go to electric horns input circuits to the ESC. (See ELECTRIC HORN CIRCUIT INPUTS TO ESC, page 358)	Go to electric horns circuit outputs from ESC. (See ELECTRIC HORN CIRCUIT OUTPUTS FROM ESC, page 361)

Diagnostic Trouble Codes (DTC)

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes

or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 107 Electric Horn Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
611 14 12 1	Electric horn open circuit
611 14 12 2	Electric horn over current
611 14 12 3	Electric horn, less than normal low current but more than open circuit
611 14 12 4	Electric horn, greater than normal high current and less than fusing current
611 14 12 6	Electric horn has current flow when output commanded off

3.3. ELECTRIC HORN 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.

A fault in the input circuits will be apparent when the horns do not come on and no active diagnostic trouble codes are present. The ESC will not log any diagnostic trouble codes for electric horn input circuits to the ESC. Problems in the electric horn input circuits could be attributed to a short circuit between the horn switch and the ESC, an open circuit between the horn switch and the ESC, a faulty switch, or a problem in the ESC.

Refer to electric horn and ESC input circuits.

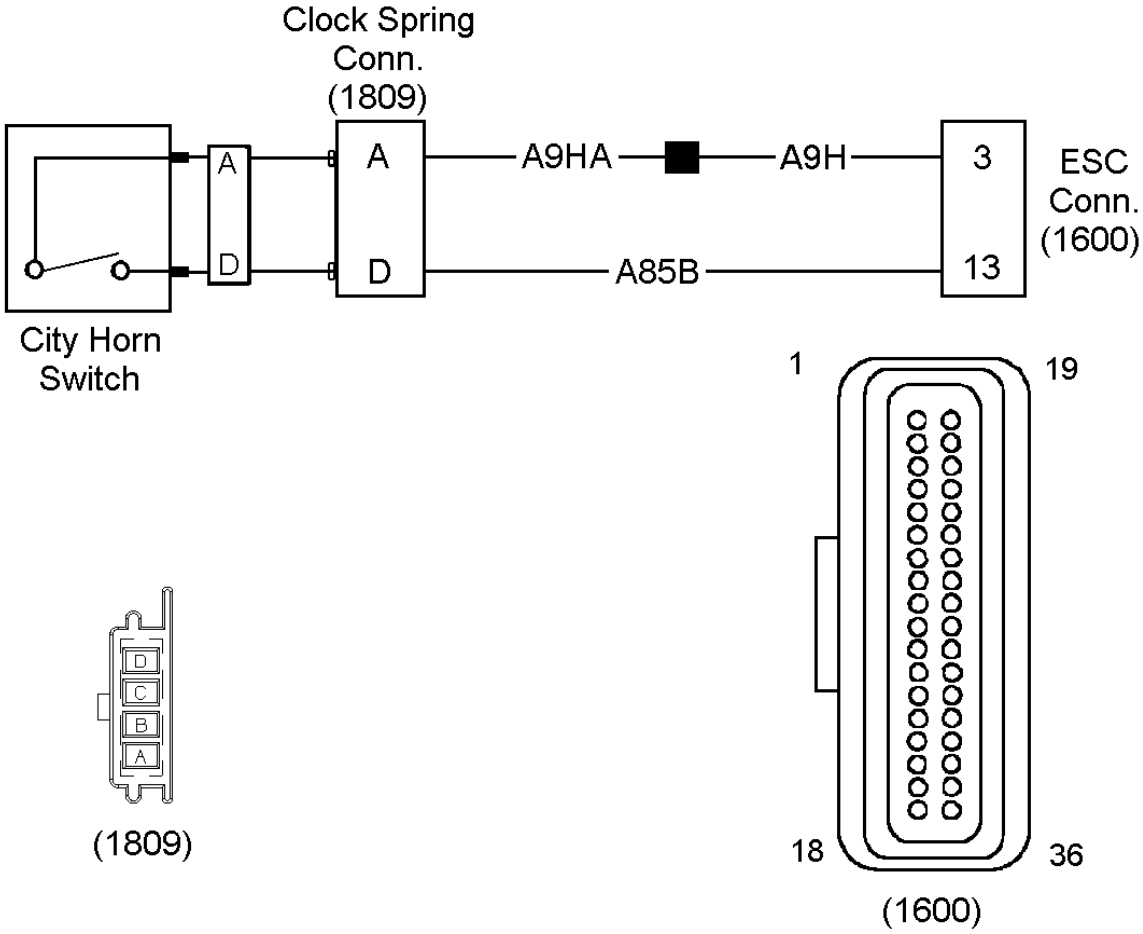

Figure 186 Electric Horn and ESC Input Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1809) CLOCK SPRING
LOCATED IN STEERING COLUMN

Table 108 Horn Switch Voltage Tests

Diagnostic Trouble Codes
There are no diagnostic trouble codes associated with the steering column horn switch.
A mechanically faulty electric horn switch could also prevent the electric horn from operating. Remove the steering column horn switch and use jumper wire between the two harness connectors to the clock spring connector (1809) pins A and D. If the electric horns sound, the mechanical switch assembly should be replaced.

Table 108 Horn Switch Voltage Tests (cont.)

Steering Wheel Switch Harness Horn Switch Voltage Check Remove Horn Switch Cover. Check with ignition key on and horn switch disconnected. **NOTE – Voltage to the switch will be approximately 12 volts with the key off.** **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Steering wheel switch harness cavity D to ground.	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuit A85B, through the horn switch harness, the clock spring connector (1809) and ESC connector (1600). Resistance check of clock spring, disconnect connector (1809) from bottom of clock spring, check continuity between pin D to D. Repair or replace circuits.
Steering wheel switch cavity A to D.	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuits A9HA and A9H, through the horn switch harness, the clock spring connector (1809) and ESC connector (1600). Resistance check of clock spring, disconnect connector (1809) from bottom of clock spring, check continuity between pin A to A. Repair or replace circuits.
If voltage is correct the circuits between the ESC and the horn switch are functioning properly. Check switch resistances. If voltage is incorrect and there are no open or shorted circuits the ESC may need replaced.		
Horn Switch Resistance Check **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Steering wheel switch connector cavity A to D, horn switch not pushed.	>100K ohms	If resistance is incorrect there is a short in the horn switch.
Steering wheel switch connector cavity A to D, horn switch pushed.	<1 ohm	If there is no continuity, replaced the horn switch.

Extended Description

The electric horn switch is wired directly to the ESC. When the electric horn switch is turned on, 0 volt reference on pin 3 from the ESC will pass through the switch to pin 13 back to the ESC. This will cause the ESC to send 12 volts to the air solenoid pack to operate the horn.

3.4. ELECTRIC HORN CIRCUIT 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 electric horn output circuits from the ESC will be apparent when the horns do not come on and an active electric horn fault is active. The ESC will log a fault when there is a short in any of the circuits between the ESC and the electric horn or when there is an open in a circuit between the electric horn and ground. Problems in the electric horn circuits could be attributed to a short, an open, a faulty switch or a problem in the ESC.

Refer to electric horn outputs from ESC.

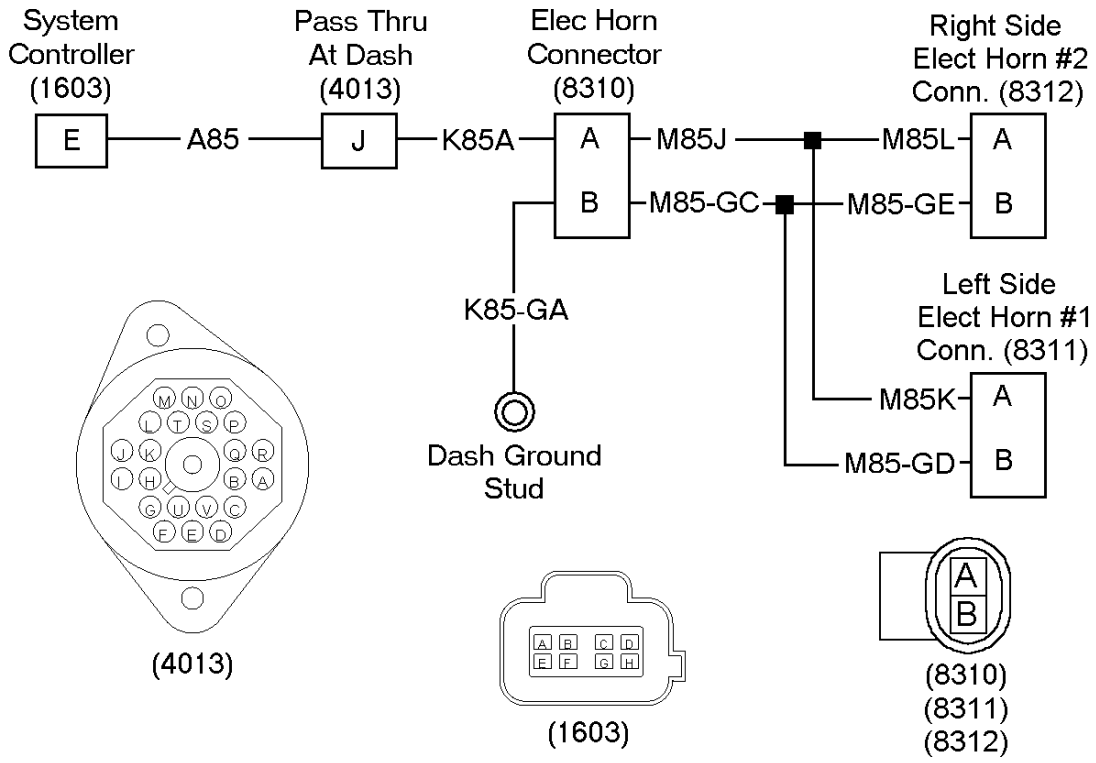

Figure 187 Electric Horn Outputs from ESC — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1603) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
(4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(8310) ELECTRIC HORN
LOCATED AT ENGINE COMPARTMENT NEAR BUMPER
(8311) LEFT SIDE ELECTRIC HORN
LOCATED AT ENGINE COMPARTMENT NEAR BUMPER
(8312) RIGHT SIDE ELECTRIC HORN
LOCATED AT ENGINE COMPARTMENT NEAR BUMPER

Table 109 Electric Horn Tests

Diagnostic Trouble Codes	
611 14 12 3	Electric horn, less than normal low current but more than open circuit
611 14 12 4	Electric horn, greater than normal high current and less than fusing current
611 14 12 6	Electric horn has current flow when output commanded off
611 14 12 2	Electric horn over current

Table 109 Electric Horn Tests (cont.)

This fault is logged when there is a short in the circuits between the electric horn and the ESC or an excessive load on the circuit attributed to too many accessories on the electric horn circuits. **NOTE – Disconnecting connectors will cause new open circuit diagnostic trouble codes to be logged. Clear all diagnostic trouble codes after connections have been restored.** Disconnect electric horns right side connector (8312) and left side connector (8311). Cycle key switch and clear DTC's. Then turn on the electric horn switch and check for fault. If the fault does not reoccur, there is a short or an overload in the electric horn. If the fault reoccurs there is a short in the circuits between the ESC and horn switch or in the ESC. Disconnect brown ESC connector (1603). Cycle key switch and clear DTC's. Turn on electric horn switch and check for fault. If the fault does not reoccur, there is a short in the circuits between the ESC and electric horns. If the fault reoccurs there is a short inside the ESC.	
611 14 12 1	Electric horn open circuit
This fault is due to an open in circuits between the electric horn output of the ESC or the horn and ground. Check for open circuits	

Electric Horn Harness Connectors (8311) and (8312) Voltage Checks

Check with ignition key off, electric horn on, and electric horn connectors (8311) and (8312) disconnected.

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

Test Points	Spec.	Comments
Horn on. (8311) and (8312) Harness connectors, pin A to ground.	12 ± 1.5 volts	If voltage is missing, check for open in circuits A85, K85A, M85J, M85L or M85K. If circuits check good and problem is still present, verify voltage out of ESC. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
(8311) and (8312) Harness connectors, pin A to pin B.	12 ± 1.5 volts	If voltage is missing, check for open in ground circuits K85–GA, M85–GC, M85–GD or M85–GE. If voltage is present and horn is inoperative, replace horn.

Extended Description

The ESC will supply 12 volts from system controller brown connector (1603) terminal E to electric horn connectors (8311) and (8312) terminals A.

Ground for the electric horn is supplied from ground stud to electric horn connector (8311) and (8312) terminals B.

3.5. COMPONENT LOCATIONS

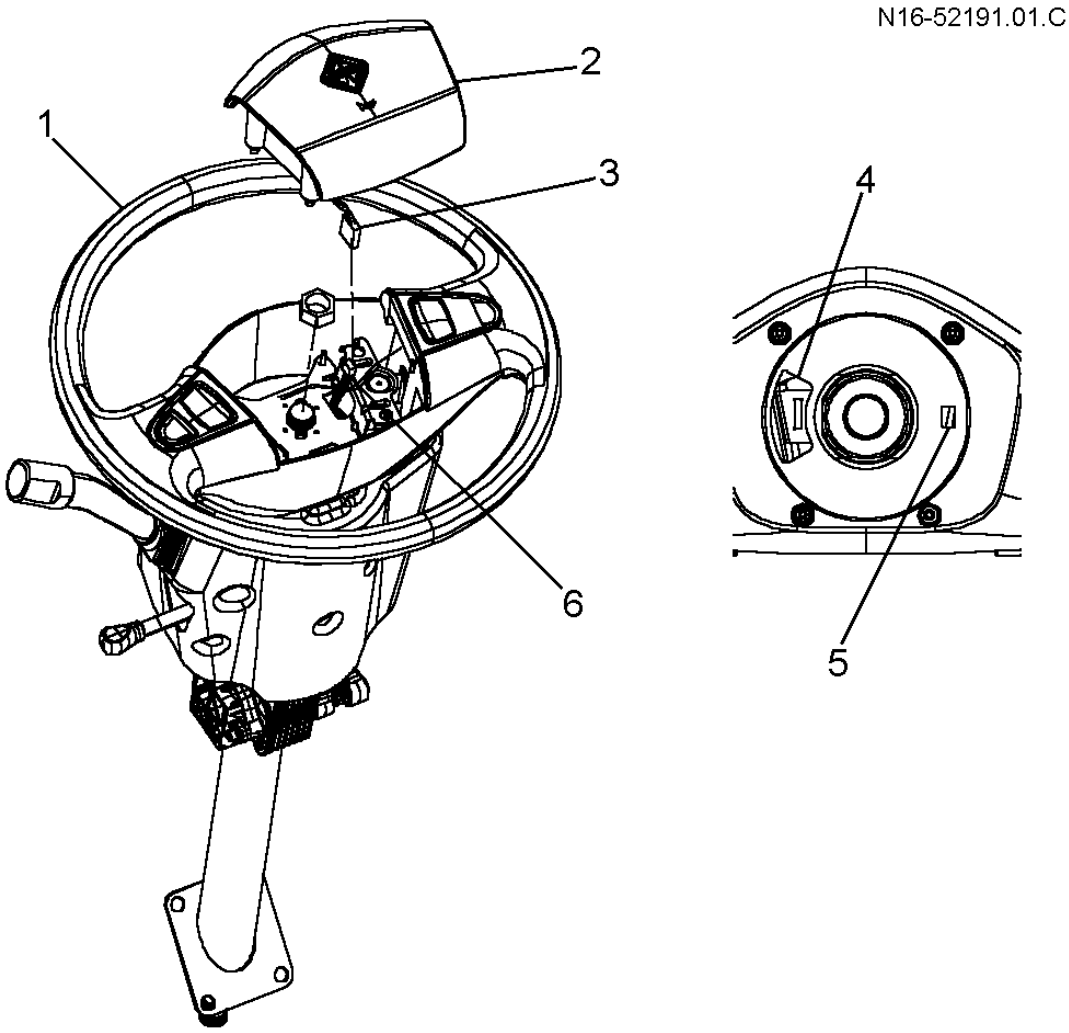

Figure 188 Electric Horn Wiring Steering Column

1. STEERING WHEEL
2. CITY HORN SWITCH
3. HARNESS TO HORN SWITCH
4. (1809) CLOCK SPRING CONNECTOR FOR CAB HARNESS
5. CLOCK SPRING TANG
6. CLOCK SPRING CONNECTOR TO HORN SWITCH AND CRUISE CONTROL SWITCHES

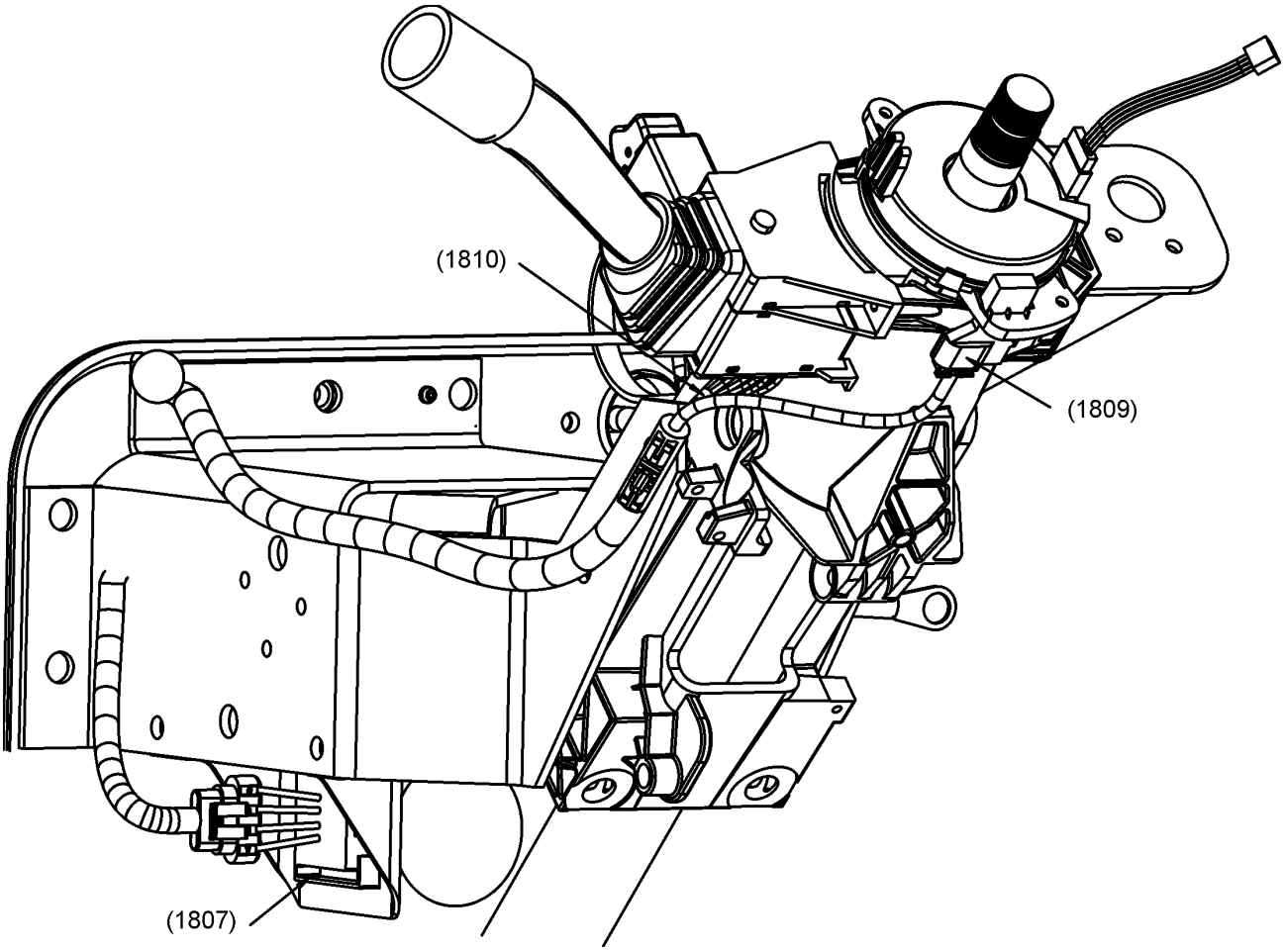

Figure 189 Steering Column Wiring

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

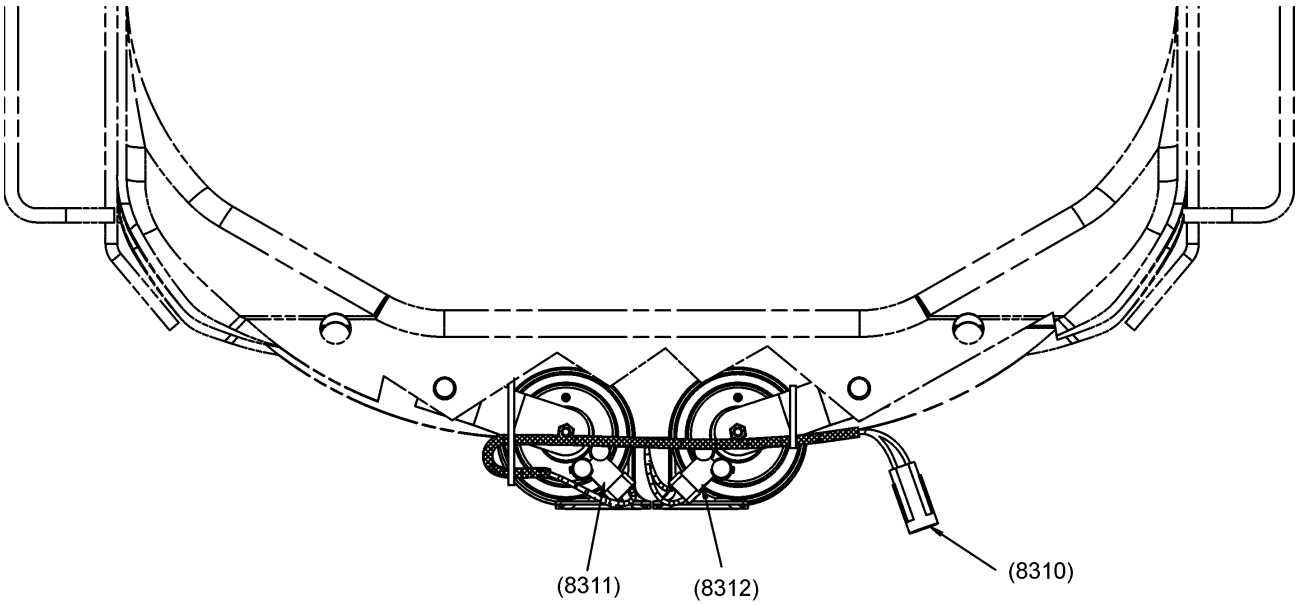

Figure 190 Electric Horn FWD Chassis Wiring Crossmember

(8310) ELECTRIC HORN
(8311) LEFT SIDE ELECTRIC HORN
(8312) LEFT SIDE ELECTRIC HORN

4. AIR HORNS

4.1. CIRCUIT FUNCTIONS

Refer to air horn function diagram.

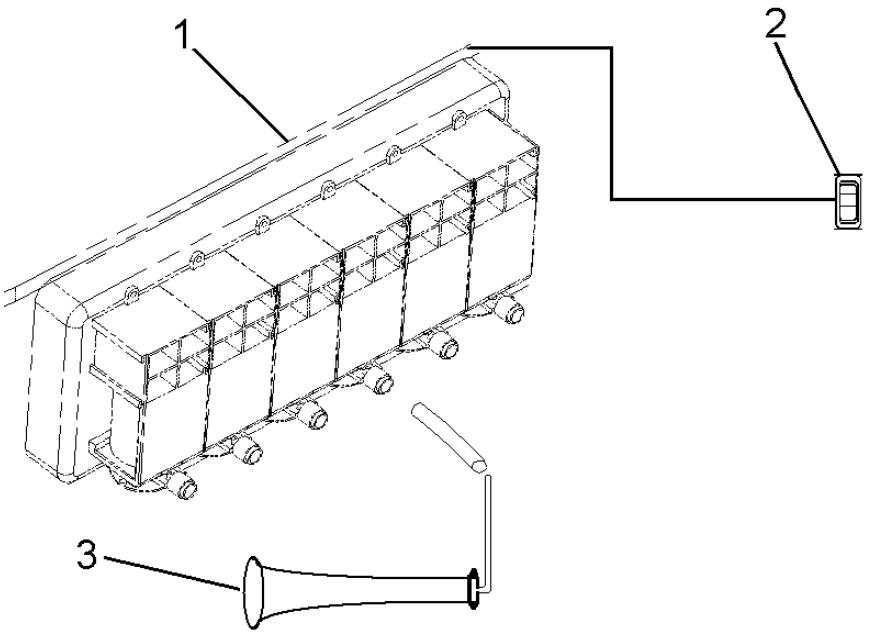

Figure 191 Air Horn Function Diagram

1. AIR SOLENOID PACK
2. AIR HORN FOOT SWITCH
3. AIR HORN

The air horn provides the driver audio warning to warn others.

The air horn switch is a direct power source to the air horn solenoid. When the horn button is pushed power is applied to the air horn solenoid.

4.2. DIAGNOSTICS

Should the air horn fail to operate, the problem could be attributed to:

- A faulty foot switch.
- Open or shorted circuits between the horn switch air horn solenoid.
- A failure in the air horn solenoid.

Air Horns Preliminary Check

NOTE – Insure there is air pressure to the air solenoid pack, there are no air line restrictions to the air horn, and the horn is mechanically sound before performing the Preliminary Check.

Table 110 Air Horns Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Insure there is air pressure to the air solenoid pack. Verify air horn is inoperative.	Check air horn.	Air horn is inoperative.	Go to next step.	Air horn is operating. Problem does not exist or is intermittent. (Check for previously active diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 368)	Read display on odometer.	No air horn air solenoid diagnostic trouble codes are active.	Go to next step	Go to air horn air solenoid circuit outputs from ESC. (See 4-PACK AIR SOLENOID CIRCUITS FROM ESC, page 686)

Diagnostic Trouble Codes (DTC)

There are no diagnostic trouble codes for the air horn on the BE and CE Bus. There are, however diagnostic trouble codes for the solenoid packs.

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 111 4 Pack Air Solenoid Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
2033 14 10 1	(4 Pack Air Solenoid Channel 3) Too much load attached, faulty relay or 4 pack air solenoid
2033 14 12 1	(4 Pack Air Solenoid Channel 2) Too much load attached, faulty relay or 4 pack air solenoid

Table 111 4 Pack Air Solenoid Diagnostic Trouble Codes (cont.)

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
2033 14 15 1	(4 pack Air Solenoid Channel 4) Too much load attached, faulty relay or 4 pack air solenoid
2033 14 16 1	(4 Pack Air Solenoid Channel 1) Too much load attached, faulty relay or 4 pack air solenoid
2033 14 10 2	(4 Pack Air Solenoid Channel 3) Open circuit, faulty relay or 4 pack air solenoid module
2033 14 12 2	(4 Pack Air Solenoid Channel 2) Open circuit, faulty relay or 4 pack air solenoid module
2033 14 15 2	(4 pack Air Solenoid Channel 4) Open circuit, faulty relay or 4 pack air solenoid module
2033 14 16 2	(4 Pack Air Solenoid Channel 1) Open circuit, faulty relay or 4 pack air solenoid module
2033 14 10 3	(4 Pack Air Solenoid Channel 3) Shorted to ground, faulty relay or 4 pack air solenoid module
2033 14 12 3	(4 Pack Air Solenoid Channel 2) Shorted to ground, faulty relay or 4 pack air solenoid module
2033 14 15 3	(4 pack Air Solenoid Channel 4) Shorted to ground, faulty relay or 4 pack air solenoid module
2033 14 16 3	(4 Pack Air Solenoid Channel 1) Shorted to ground, faulty relay or 4 pack air solenoid module

4.3. AIR HORN CIRCUITS

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 air horn circuits will be apparent when the horn does not operate and no diagnostic trouble codes are present. Problems in the air horn circuits could be attributed to an open or short circuit between the horn switch and the air horn solenoid, a faulty switch or a faulty air horn solenoid.

Refer to air horn circuits.

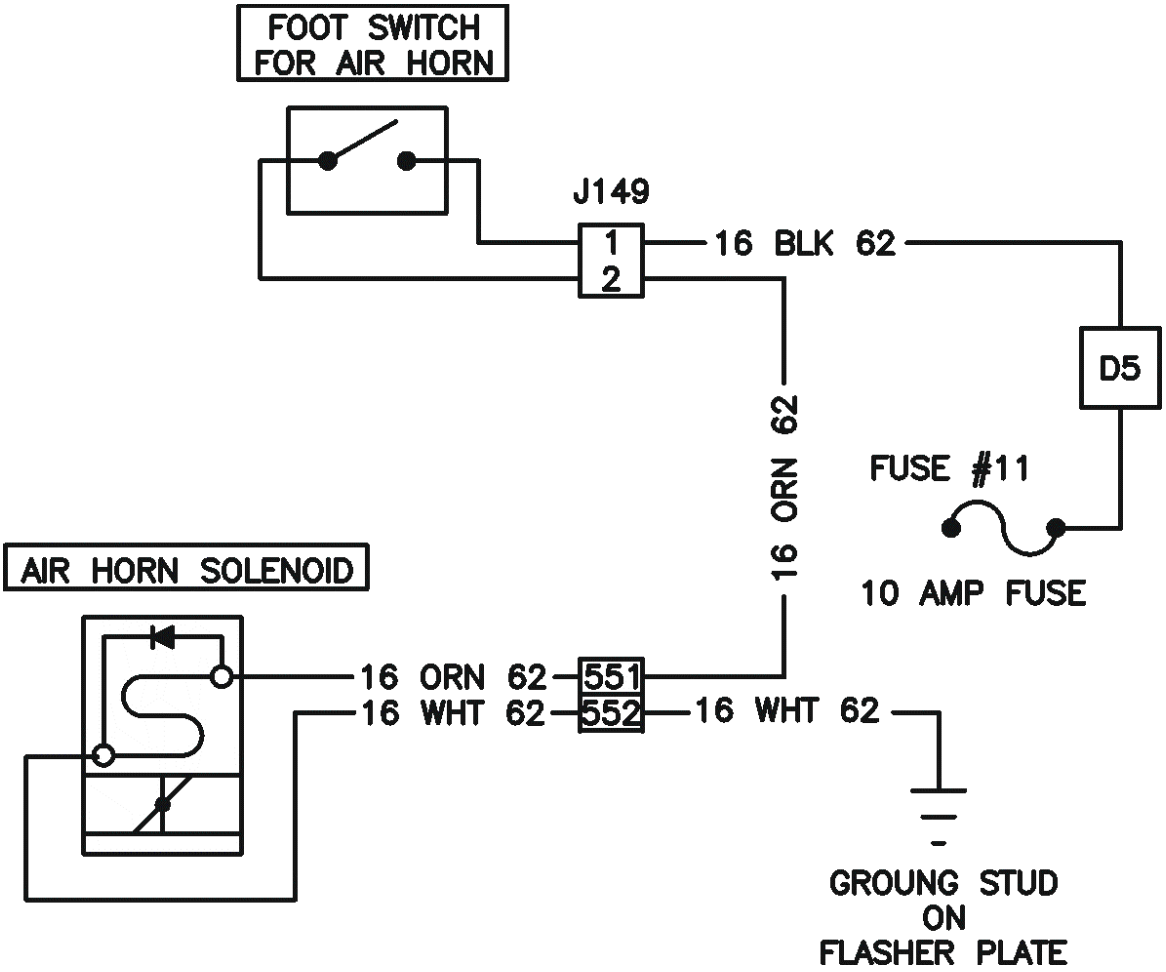

Figure 192 Air Horn Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

Table 112 Air Horn Circuits Voltage Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the air horn foot switch.		
A mechanically faulty air horn switch could also prevent the air horn from operating. Remove the air horn foot switch and use jumper wire between the two harness connectors. If the air horn sounds, the mechanical switch assembly should be replaced.		
Air Horn Foot Switch Voltage Check Check with ignition key on and horn switch disconnected. **NOTE – Voltage to the switch will be approximately 5 volts with the key off.** **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments

Table 112 Air Horn Circuits Voltage Tests (cont.)

Air horn foot switch harness (J149), pin 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 BLK 62. Also check for blown fuse #11.
Air horn foot switch harness (J149), pin 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 ORN 62.

Extended Description

The air horn switch is wired directly to the air horn solenoid. When the air horn switch is turned on, voltage will be applied to the air horn solenoid. The solenoid will then open and pass air to the air horn.

4.4. COMPONENT LOCATIONS

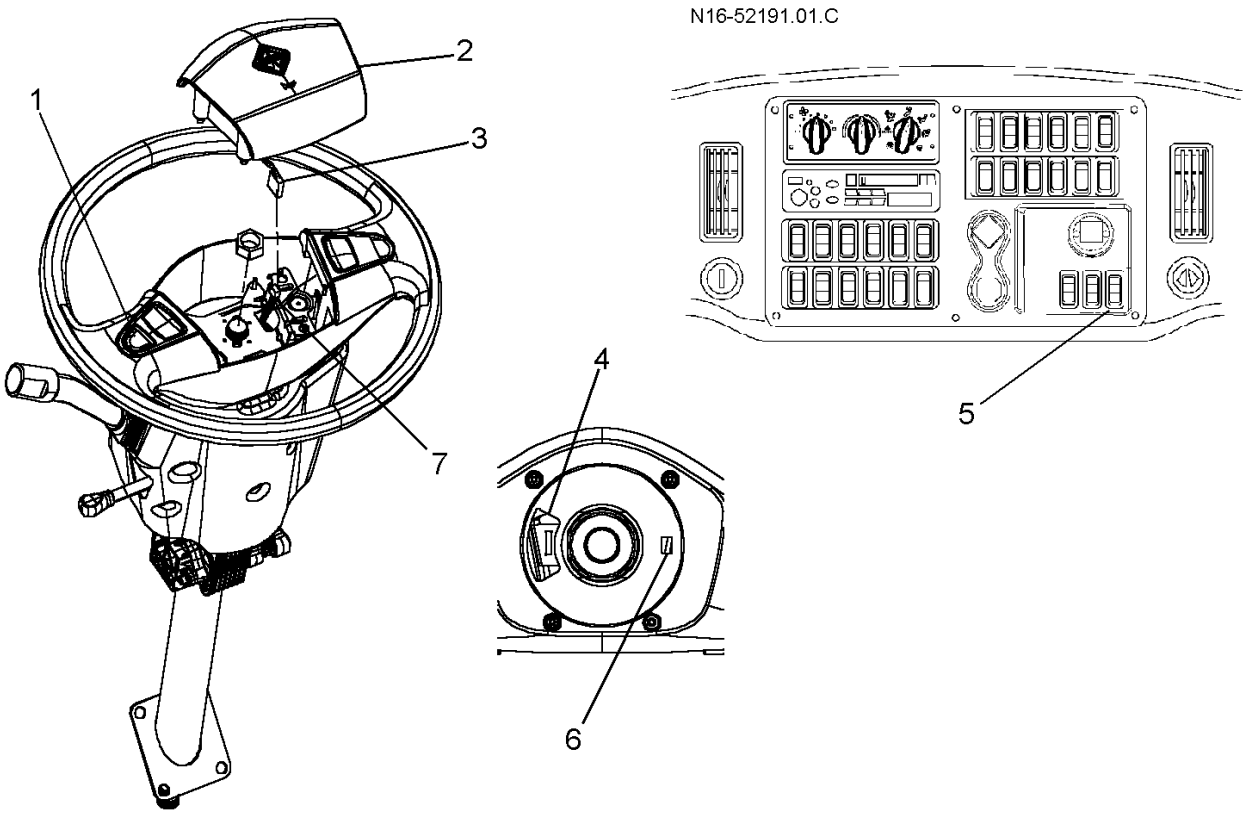

Figure 193 Air Horn Wiring In Steering Wheel And Instrument Panel

1. AIR HORN SWITCH IN STEERING WHEEL
2. CITY HORN SWITCH
3. HARNESS TO CITY HORN SWITCH
4. (1809) CLOCK SPRING CONNECTOR FOR CAB HARNESS
5. (1018) INSTRUMENT PANEL AIR HORN SWITCH
6. CLOCK SPRING TANG
7. CLOCK SPRING CONNECTOR TO AIR HORN SWITCH AND CRUISE CONTROL SWITCHES

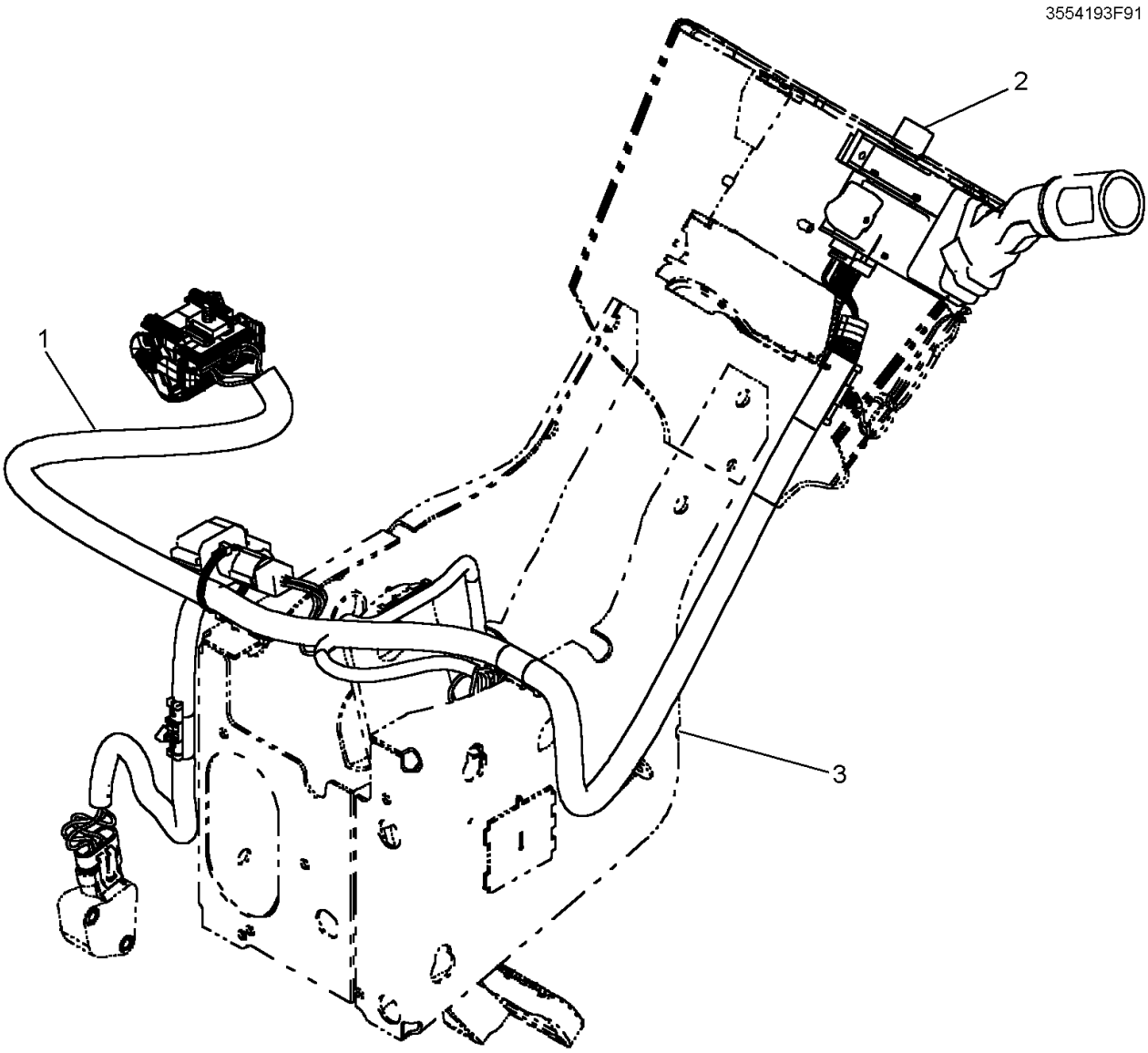

Figure 194 Steering Column Wiring

1. CAB HARNESS
2. (1809) CLOCK SPRING CONNECTOR
3. DRIVER CONTROL MODULE

5. HEATED MIRRORS

5.1. CIRCUIT FUNCTIONS

Refer to heated mirror function diagram.

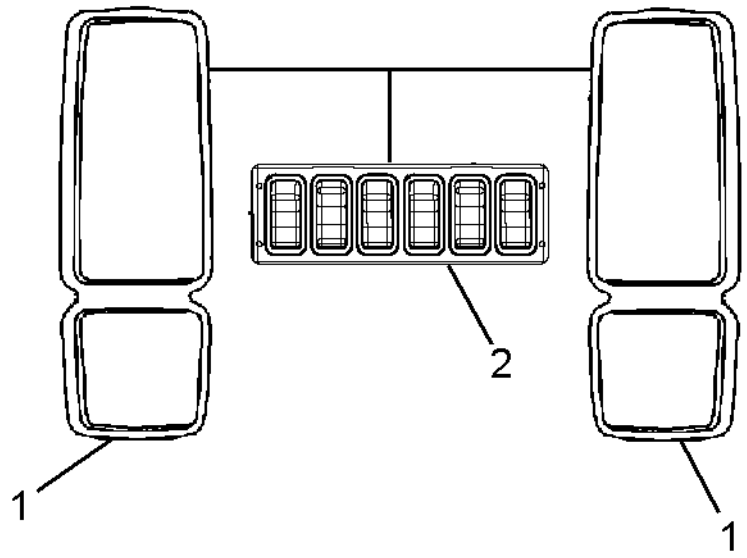

Figure 195 Heated Mirror Function Diagram

1. HEATED MIRRORS
2. LEFT HAND SWITCH PANEL

This function controls the heated mirrors. The mirrors turn on and off with the appropriate panel mounted, momentary switch. This feature will only work when the ignition is ON.

The heated mirror switch is located in the left hand instrument panel. When selected, the switch will close a circuit that will provide power to the heated mirrors.

5.2. DIAGNOSTICS

Should the mirror heat fail to operate, the problem could be attributed to a blown fuse, open or shorted wiring between the fuse and mirror heat switch, open or short in the wiring between the heated mirror switch and the mirrors, faulty heat elements in a mirror or a faulty heated mirror switch.

Heated Mirror Preliminary Check

Table 113 Heated Mirror Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify heated mirrors operate incorrectly.	Check heated mirror operation.	Heated mirrors operate incorrectly.	Go to next step.	Heated mirrors operate correctly. Problem does not exist or is intermittent.

Table 113 Heated Mirror Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Are all heated mirrors inoperative?	Check if all heated mirrors are inoperative.	All heated mirrors are inoperative.	Go to next step.	Check specific circuits of the inoperative mirrors for open circuits.

Diagnostic Trouble Codes (DTC)

There are no diagnostic trouble codes associated with the heated mirrors.

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 Heated Mirror Circuits

A failure in a heated mirror circuit will be apparent when a heated mirror is inoperative.

Should the mirror heat fail to operate, the problem could be attributed to a blown fuse, open or shorted wiring between the fuse and mirror heat switch, open or short in the wiring between the heated mirror switch and the mirrors, faulty heat elements in a mirror or a faulty heated mirror switch.

Refer to heated mirror circuits.

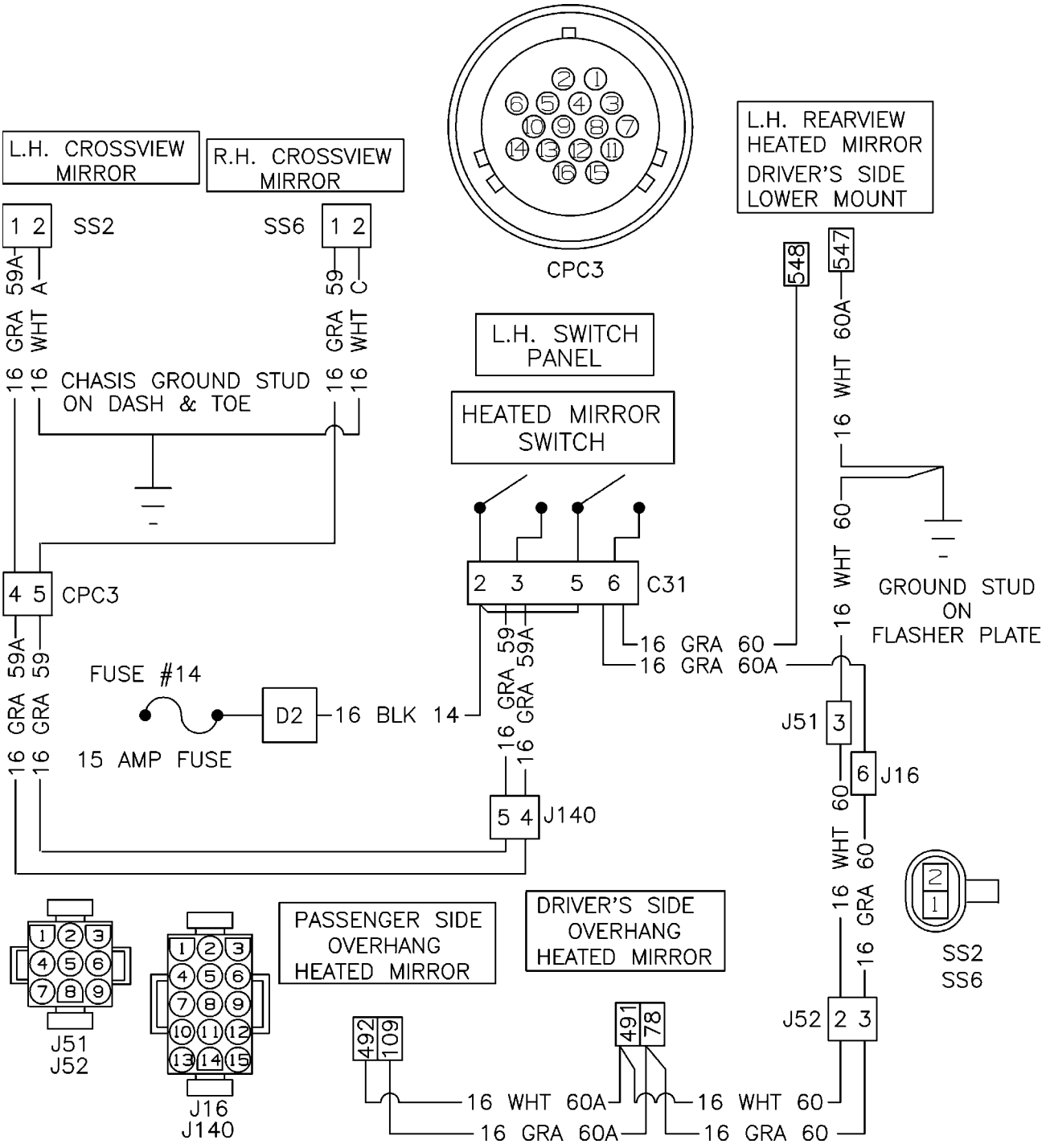

Figure 196 Heated Mirror Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J16 FLASHER PLATE TO LEFT HAND BODY
J51 FLASHER PLATE TO LEFT HAND BODY
J52 LEFT HAND BODY TO FRONT CAP
J140 FLASHER PLATE TO DASH AND TOE
SS2 SEALED ENGINE HARNESS TO RIGHT HAND CROSS VIEW MIRROR
SS6 SEALED ENGINE HARNESS TO LEFT HAND CROSS VIEW MIRROR

Table 114 Heated Mirror Circuits Voltage Checks

Crossview Heated Mirror Voltage Checks Check with ignition key on, heated mirrors on and crossview mirror connectors SS2 and SS6 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
Harness connector (SS2) 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 GRA 59A and 16 BLK 14. Also check for blown fuse #14.
Harness connector (SS2) 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 A. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.
Harness connector (SS6) 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 GRA 59 and 16 BLK 14. Also check for blown fuse #14.
Harness connector (SS6) 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 C. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.
Driver's Side Lower Mount Heated Mirror Voltage Checks Check with ignition key on, heated mirrors on and lower mount mirror connectors disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments

Table 114 Heated Mirror Circuits Voltage Checks (cont.)

Harness connector (548) 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 circuit 16 GRA 60 and 16 BLK 14. Also check for blown fuse #14.
Harness connector (548) to connector (547).	**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 60A. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.
Overhang Heated Mirror Voltage Checks Check with ignition key on, heated mirrors on and overhang mount mirror connectors disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
Harness connector (78) 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 GRA 60, 16 GRA 60A and 16 BLK 14. Also check for blown fuse #14.
Harness connector (78) to connector (491).	**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 60. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.
Harness connector (109) 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 GRA 60, 16 GRA 60A and 16 BLK 14. Also check for blown fuse #14.
Harness connector (109) to connector (492).	**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 60. If voltage is present and mirror heater is inoperative, the mirror heater or

Table 114 Heated Mirror Circuits Voltage Checks (cont.)

	12 ± 1.5 volts	circuits inside the mirror assembly may need to be replaced.

Heated Mirror w/20 Minute Timer Circuits

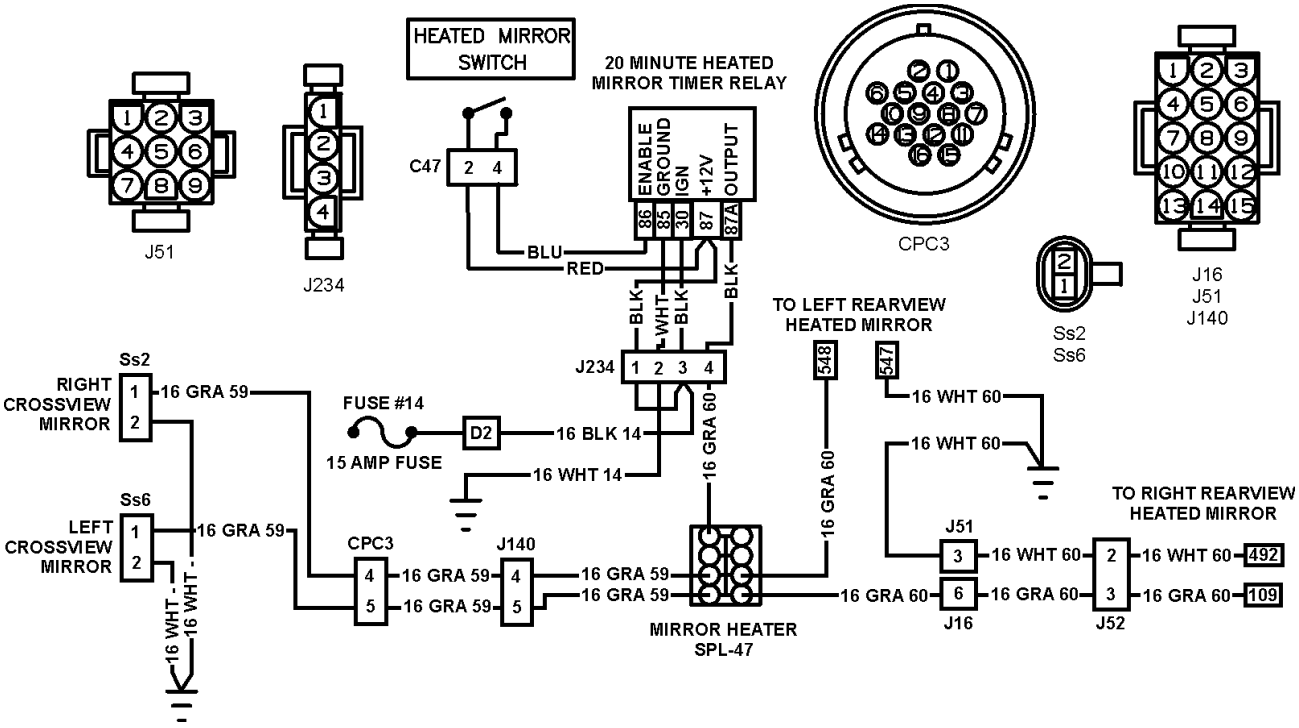

Figure 197 Heated Mirror w/20 Minute Timer Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J16 FLASHER PLATE TO LEFT HAND BODY
J51 FLASHER PLATE TO LEFT HAND BODY
J52 LEFT HAND BODY TO FRONT CAP
J140 FLASHER PLATE TO DASH AND TOE
J234 FLASHER PATE TO HEATED MIRROR TIMER ASSEMBLY
SPL-47 20 MINUTE HEATED MIRROR TIMER RELAY SWITCH
SS2 SEALED ENGINE HARNESS TO RIGHT HAND CROSS VIEW MIRROR
SS6 SEALED ENGINE HARNESS TO LEFT HAND CROSS VIEW MIRROR

Table 115 Heated Mirror w/20 Minute Timer Circuit Voltage Checks

20 Minute Heated Mirror Timer Relay		
Check with ignition key on and 20 minute heated mirror timer relay removed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments

Table 115 Heated Mirror w/20 Minute Timer Circuit Voltage Checks (cont.)

20 minute heated mirror timer relay cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #14. Also check for open or short on circuits 16 BLK 14 and BLK.
20 minute heated mirror timer relay cavity 87 to 87A.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits BLK and 16 GRA 60.
20 minute heated mirror timer relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 14 and BLK.
20 minute heated mirror timer relay cavity 30 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 WHT 14 and WHT.
20 minute heated mirror timer relay cavity 86 to ground.	0 volts	If voltage is present, check for open or short on circuits RED and BLU.
While meter is still connected on 20 minute heated mirror timer relay from cavity 86 to ground, close heated mirror switch C47.		
20 minute heated mirror timer relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits RED and BLU. If circuits check good and 20 minute heated mirror timer relay fails to activate, replace 20 minute heated mirror timer relay.
Crossview Heated Mirror Voltage Checks Check with ignition key on, heated mirrors on and crossview mirror connectors SS2 and SS6 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments
Harness connector (SS2) 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 GRA 59 and 16 GRA 60.

Table 115 Heated Mirror w/20 Minute Timer Circuit Voltage Checks (cont.)

Harness connector (SS2) 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 —.
Harness connector (SS6) 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 GRA 59 and 16 GRA 60.
Harness connector (SS6) 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 —. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.
Left Hand Rearview Heated Mirror Voltage Checks Check with ignition key on and left hand rearview heated mirror connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments
Left hand rearview heated mirror connector (548) 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 circuit 16 GRA 60.
Left hand rearview heated mirror connector (548) to (547).	**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 60. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Table 115 Heated Mirror w/20 Minute Timer Circuit Voltage Checks (cont.)

Right Hand Rearview Heated Mirror Voltage Checks Check with ignition key on and right hand rearview heated mirror connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments
Right hand rearview heated mirror connector (109) 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 GRA 60.
Right hand rearview heated mirror connector (109) to (492).	**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 60. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

5.3. COMPONENT LOCATIONS

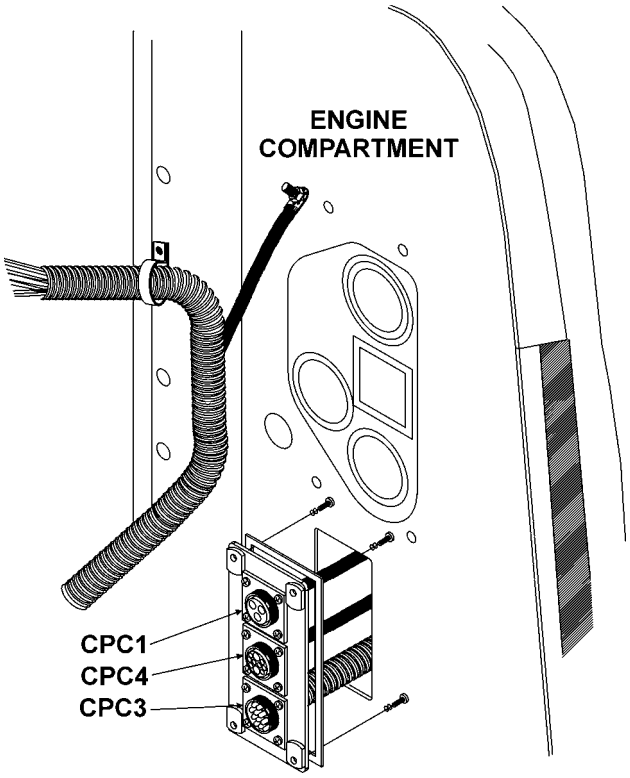

Figure 198 Left Hand Switch Panel

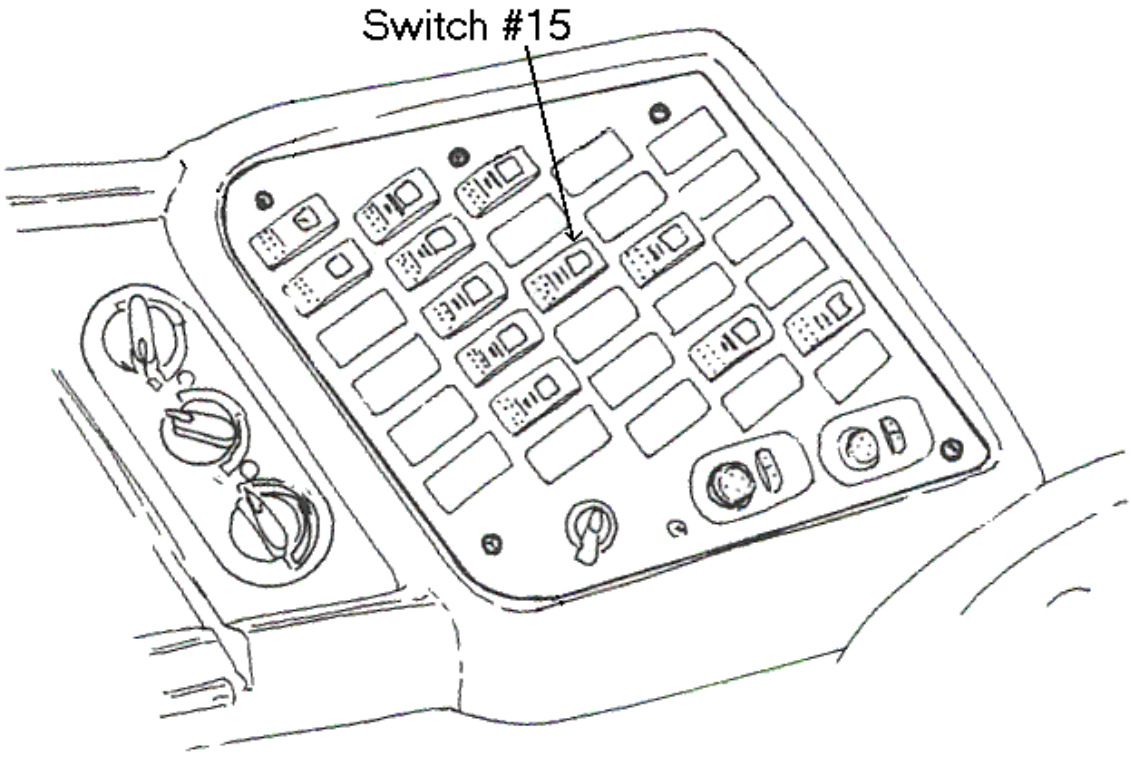

Figure 199 Left Hand Switch Panel

SWITCH #15 — HEATED MIRROR SWITCH

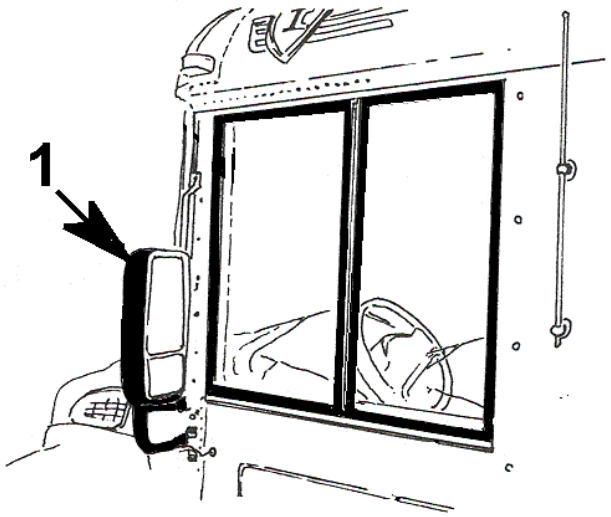

Figure 200 Heated Mirror

1. HEATED MIRROR

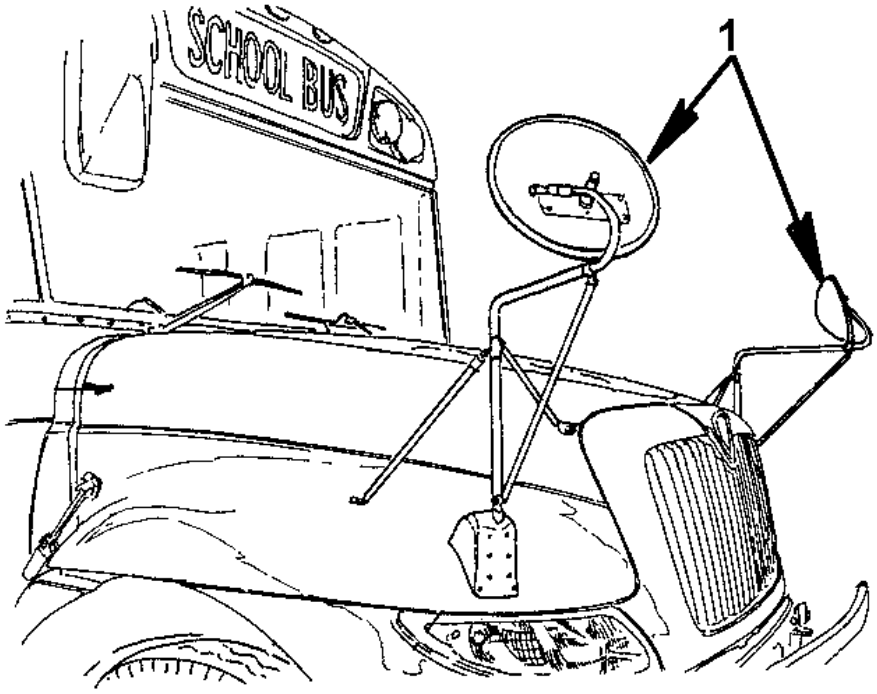

Figure 201 Crossview Mirror Locations

1. CROSSVIEW MIRRORS

6. MOTORIZED AND HEATED MIRRORS

6.1. CIRCUIT FUNCTIONS

Refer to motorized and heated mirror function diagram.

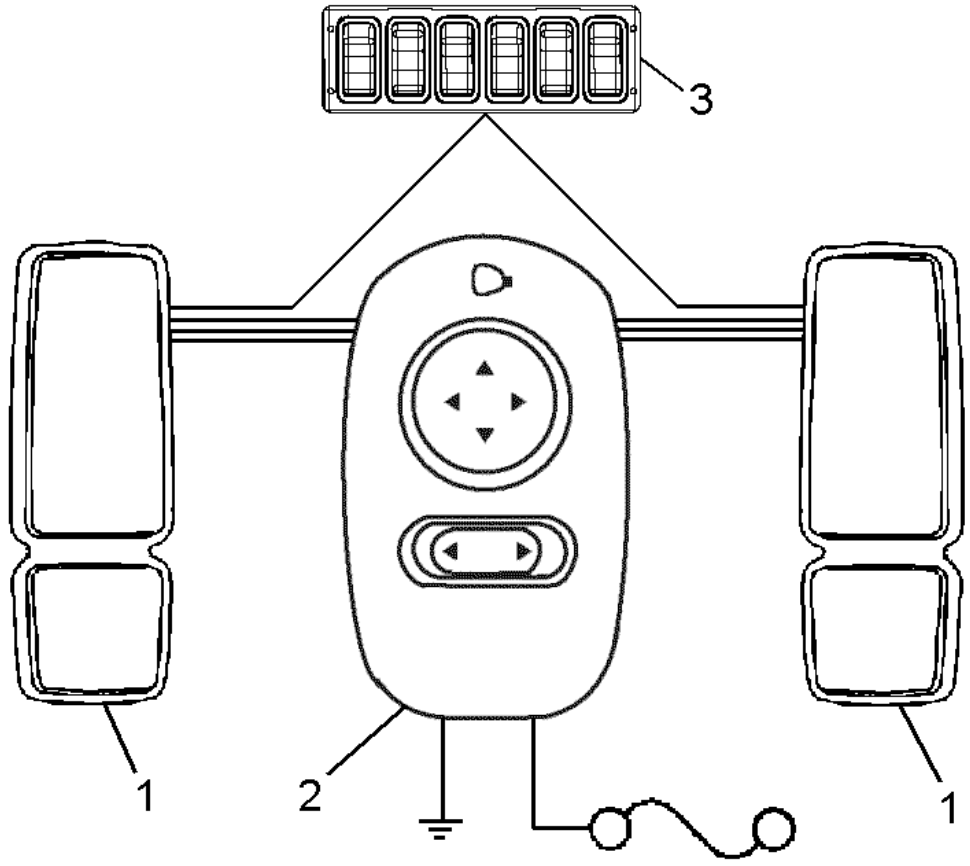

Figure 202 Motorized and Heated Mirrors Function Diagram

1. MOTORIZED AND HEATED MIRRORS
2. POWER MIRROR SWITCH
3. HEATED MIRROR SWITCH

The power mirror feature allows the driver to adjust the upper mirrors for optimal viewing.

The power mirror switch is directly wired to both mirrors. The mirror controlled by the switch is selected with the left/right selector.

The heated mirror switch is located in the left hand instrument panel. When selected, the switch will close a circuit that will provide power to the heated mirrors.

6.2. DIAGNOSTICS

Should the power mirrors fail to operate, the problem could be attributed to a blown fuse #4, a faulty power mirror switch, a faulty motor in the mirror, open or shorted wiring between the switch and the mirror, or missing power or ground to the switch.

Should the mirror heat fail to operate, the problem could be attributed to a blown fuse #14, open or shorted wiring between the fuse and mirror heat switch, open or short in the wiring between the heated mirror switch and the mirrors, faulty heat elements in a mirror or a faulty heated mirror switch.

There are no diagnostic trouble codes associated with the power mirror feature.

Motorized and Heated Mirror Preliminary Check

Table 116 Motorized and Heated Mirror Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify motorized and heated mirrors operate incorrectly.	Check motorized and heated mirror operation.	Motorized and heated mirrors operate incorrectly.	Go to next step.	Motorized and heated mirrors operate correctly. Problem does not exist or is intermittent.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Does manipulation of the mirror switch operate either mirror at all?	Check if either mirror could be controlled from the switch.	The switch will not control either mirror in any position.	Problem is most likely in power circuits to switch.	Go to next step.
4.	On	Does the left mirror respond correctly to activation of the mirror switch?	Check if the left mirror could be controlled correctly from the switch.	Left mirror responds correctly to activation of the mirror switch.	Go to next step.	Problem is most likely in circuits between switch and left mirror or mirror motor(s).
5.	On	Does the right mirror respond correctly to activation of the mirror switch?	Check if the right mirror could be controlled correctly from the switch.	Right mirror responds correctly to activation of the mirror switch.	Power mirrors operate correctly. Problem does not exist or is intermittent.	Problem is most likely in circuits between switch and right mirror or mirror motor(s).

6.3. MOTORIZED AND HEATED MIRROR CIRCUITS

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 Motorized & Heated Mirror Circuits

A failure in the motorized and heated mirror circuits will be apparent when the power mirrors do not operate correctly or the heating element does not heat.

Problems in the motorized and heated mirrors could be attributed to a blown fuse, a faulty power mirror switch, a faulty mirror heat switch, a faulty motor in the mirror, a faulty heating element, open or shorted wiring between the switch and the mirror, or missing power or ground to the switch.

Refer to motorized and heated mirror circuits.

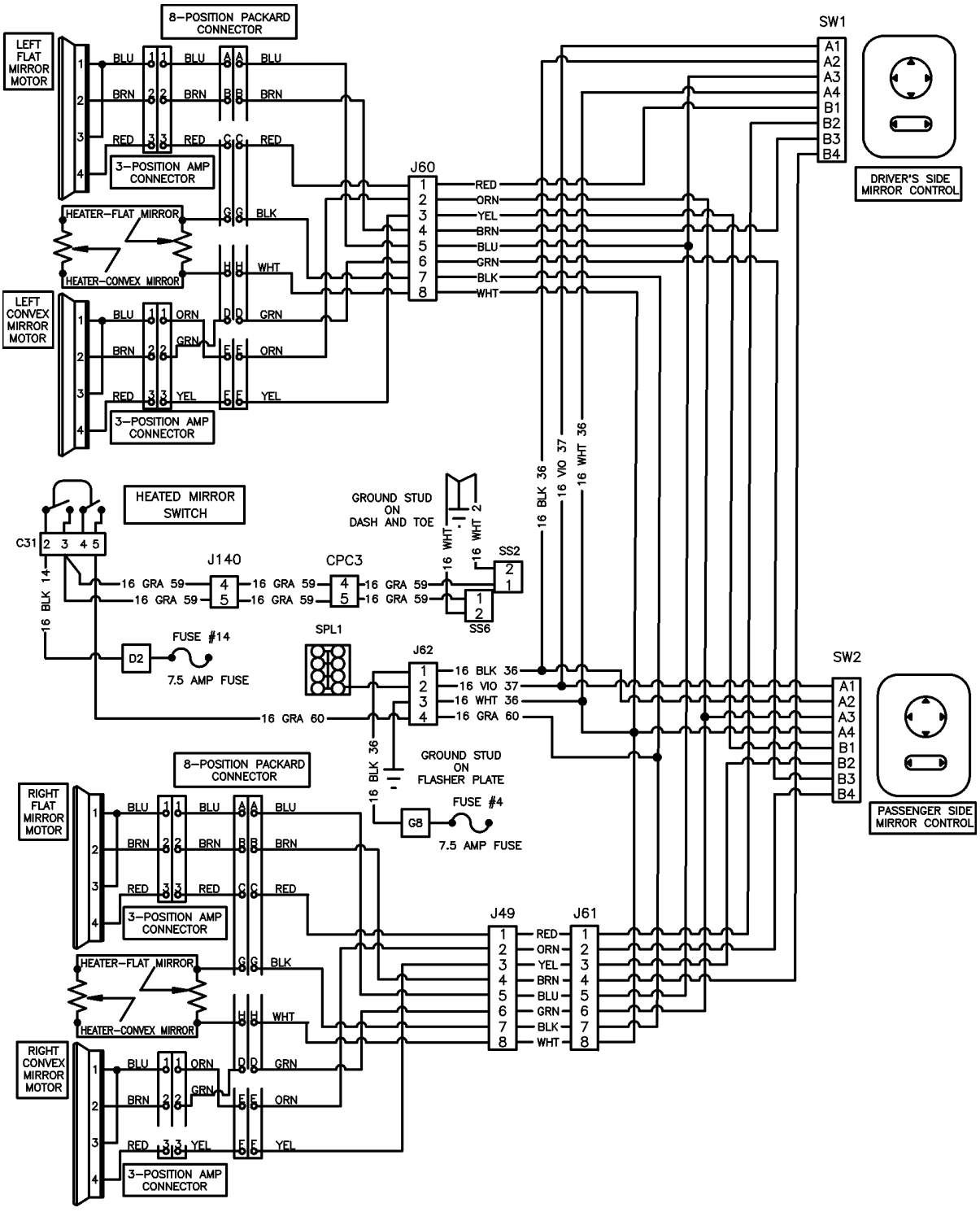

Figure 203 Motorized and Heated Mirror Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J49 LEFT HAND BODY TO FRONT CAP
J62 POWER MIRRORS/HEATED
J140 FLASHER PLATE TO DASH AND TOE
SS2 SEALED ENGINE HARNESS TO RIGHT HAND CROSSVIEW MIRROR
SS6 SEALED ENGINE HARNESS TO LEFT HAND CROSSVIEW MIRROR

Table 117 Motorized and Heated Mirror Circuits Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the motorized and heated mirrors.		
Upper (Flat) Motorized Mirror Switch Voltage Checks Check with ignition key on, panel lights on and power mirror switch (SW1) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Mirror switch connector (SW1), cavity A1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 VIO 37. To troubleshoot SPL-1, refer to the Panel Light section of this manual.
Mirror switch connector (SW1), cavity A2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #4. Also check for open or short in circuits 16 BLK 36.
Mirror switch connector (SW1), cavity A2 to A4.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 36.
Lower (Convex) Motorized Mirror Switch Voltage Checks Check with ignition key on, panel lights on and power mirror switch disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Mirror switch connector (SW2), cavity A1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 VIO 37. To troubleshoot SPL-1, refer to the Panel Light section of this manual.
Mirror switch connector (SW2), cavity A2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #4. Also check for open or short in circuits 16 BLK 36.
Mirror switch connector (SW2), cavity A2 to A4.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 36.
Mirror Switch Resistance Check **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments

Table 117 Motorized and Heated Mirror Circuits Tests (cont.)

Mirror switch connector (SW1 or SW2) cavity A2 to A3.	<1 ohm with up/down left/right switch activated.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to A4.	<1 ohm with up/down left/right switch activated.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B1.	<1 ohm with up/down left/right switch activated for driver.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B3.	<1 ohm with up/down left/right switch activated for driver.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B2.	<1 ohm with up/down left/right switch activated for pass.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B4.	<1 ohm with up/down left/right switch activated for pass.	If there is no continuity with switch activated, replace mirror switch module.
Driver Power Mirror (J60), Harness Connector Voltage Checks Check with ignition key on, mirror control switches (SW1) and (SW2) connected and driver power mirror connector (J60) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
While activating mirror switch to move flat driver mirror left then right, mirror harness connector (J60), cavity 1 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in left/right axis, the mirror motor needs replaced.
While activating mirror switch to move flat driver mirror up then down, mirror harness connector (J60), cavity 4 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.
While activating mirror switch to move convex driver mirror left then right, mirror harness connector (J60), cavity 3 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in right/left axis, the mirror motor needs replaced.

Table 117 Motorized and Heated Mirror Circuits Tests (cont.)

While activating mirror switch to move convex driver mirror up then down, mirror harness connector (J60), cavity 6 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.
Mirror harness connector (J60) cavity 7 to ground	0 volts	If voltage is present check for short to high on circuits BLK and 16 GRA 60.
While meter is still connected to mirror harness connector cavity 7 to ground, activate heated mirrors.		
Mirror harness connector (J60) cavity 7 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #14. Also check for open or short on circuits BLK, 16 GRA 60 and 16 BLK 40. Also perform a continuity test on switch C31.
Mirror harness connector (J60) cavity 7 to 8	12 ± 1.5 volts	If voltage is missing check for open or short on circuits WHT and 16 WHT 36. If voltages check good and heater still fails, replace heater.
Passenger Power Mirror (J49), Harness Connector Voltage Checks Check with ignition key on and driver power mirror connector (J49) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
While activating mirror switch to move flat passenger mirror left then right, mirror harness connector (J49), cavity 1 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in left/right axis, the mirror motor needs replaced.
While activating mirror switch to move flat passenger mirror up then down, mirror harness connector (J49), cavity 4 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.
While activating mirror switch to move convex passenger mirror left then right, mirror harness connector (J49), cavity 3 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in right/left axis, the mirror motor needs replaced.

Table 117 Motorized and Heated Mirror Circuits Tests (cont.)

While activating mirror switch to move convex passenger mirror up then down, mirror harness connector (J49), cavity 6 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.
Mirror harness connector (J49) cavity 7 to ground	0 volts	If voltage is present check for short to high on circuits BLK and 16 GRA 60.
While meter is still connected to mirror harness connector cavity 7 to ground, activate heated mirrors.		
Mirror harness connector (J49) cavity 7 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #14. Also check for open or short on circuits BLK, 16 GRA 60 and 16 BLK 14. Also perform a continuity test on switch C31.
Mirror harness connector (J49) cavity 7 to 8	12 ± 1.5 volts	If voltage is missing check for open or short on circuits WHT and 16 WHT 36. If voltages check good and heater still fails, replace heater.
Crossview Heated Mirror (SS2) and (SS6) Voltage Checks Check with ignition key on, heated mirrors on and crossview mirror connectors SS2 and SS6 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
Harness connector (SS2) 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 #14. Also check for open or short in circuits 16 GRA 59 and 16 BLK 14.
Harness connector (SS2) 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 2. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Table 117 Motorized and Heated Mirror Circuits Tests (cont.)

Harness connector (SS6) 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 #14. Also check for open or short in circuits 16 GRA 59 and 16 BLK 14.
Harness connector (SS6) 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. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Motorized and Heated Mirrors w/20 Minute Timer Circuits

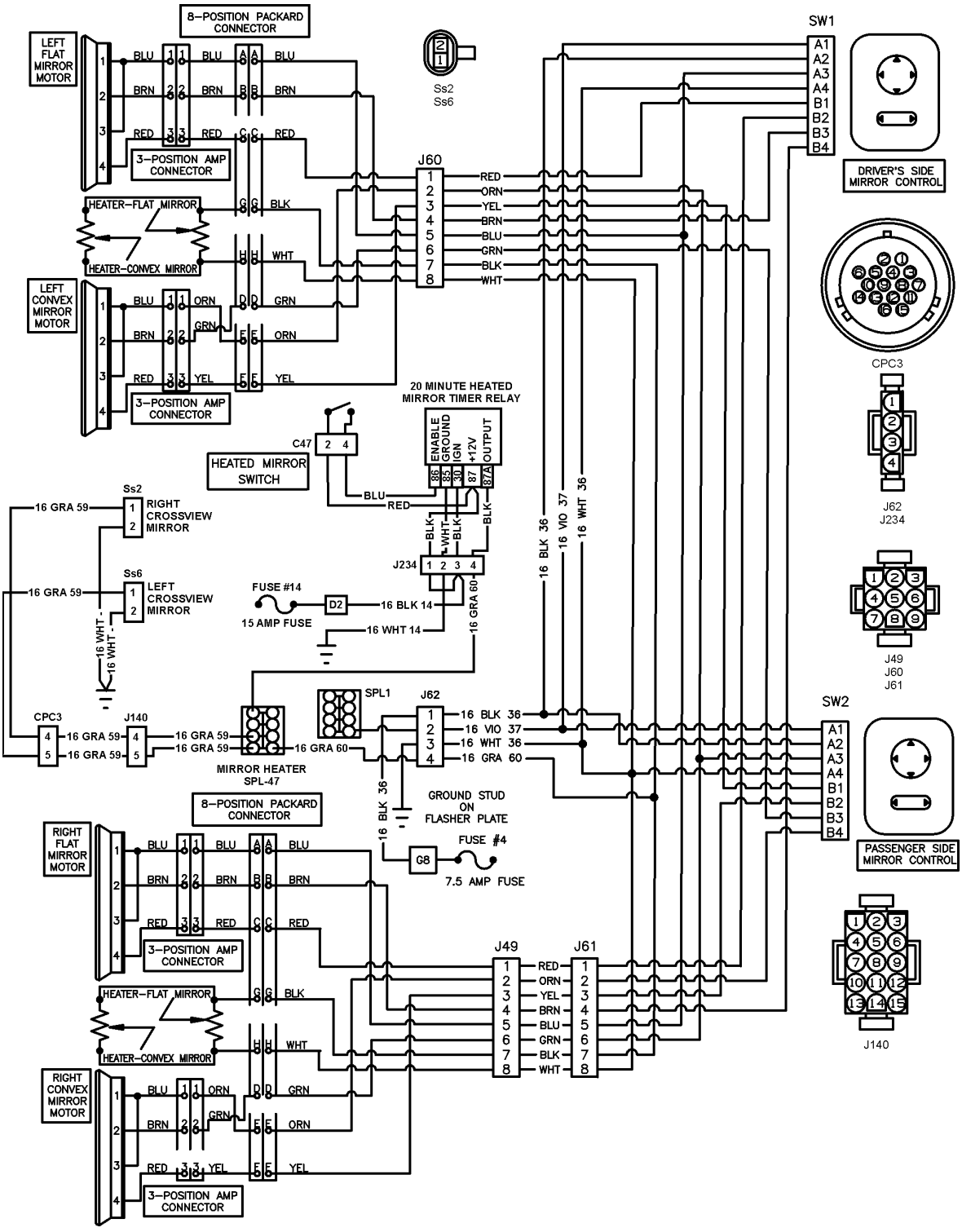

Figure 204 Motorized and Heated Mirror w/20 Minute Timer Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J49 LEFT HAND BODY TO FRONT CAP
J62 POWER MIRRORS/HEATED
J140 FLASHER PLATE TO DASH AND TOE
J234 FLASHER PLATE TO HEATED MIRROR TIMER ASSEMBLY
SS2 SEALED ENGINE HARNESS TO RIGHT HAND CROSSVIEW MIRROR
SS6 SEALED ENGINE HARNESS TO LEFT HAND CROSSVIEW MIRROR

Table 118 Motorized and Heated Mirror w/20 Minute Timer Circuits Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the motorized and heated mirrors.		
Upper (Flat) Motorized Mirror Switch Voltage Checks Check with ignition key on, panel lights on and power mirror switch (SW1) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Mirror switch connector (SW1), cavity A1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 VIO 37. To troubleshoot SPL-1, refer to the Panel Light section of this manual.
Mirror switch connector (SW1), cavity A2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #4. Also check for open or short in circuits 16 BLK 36.
Mirror switch connector (SW1), cavity A2 to A4.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 36.
Lower (Convex) Motorized Mirror Switch Voltage Checks Check with ignition key on, panel lights on and power mirror switch disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Mirror switch connector (SW2), cavity A1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 VIO 37. To troubleshoot SPL-1, refer to the Panel Light section of this manual.
Mirror switch connector (SW2), cavity A2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #4. Also check for open or short in circuits 16 BLK 36.
Mirror switch connector (SW2), cavity A2 to A4.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 36.

Table 118 Motorized and Heated Mirror w/20 Minute Timer Circuits Tests (cont.)

Mirror Switch Resistance Check Check with power mirror switch disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Mirror switch connector (SW1 or SW2) cavity A2 to A3.	<1 ohm with up/down left/right switch activated.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to A4.	<1 ohm with up/down left/right switch activated.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B1.	<1 ohm with up/down left/right switch activated for driver.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B3.	<1 ohm with up/down left/right switch activated for driver.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B2.	<1 ohm with up/down left/right switch activated for pass.	If there is no continuity with switch activated, replace mirror switch module.
Mirror switch connector (SW1or SW2) cavity A2 to B4.	<1 ohm with up/down left/right switch activated for pass.	If there is no continuity with switch activated, replace mirror switch module.
Driver Power Mirror (J60), Harness Connector Voltage Checks Check with ignition key on, mirror control switches (SW1) and (SW2) connected and driver power mirror connector (J60) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
While activating mirror switch to move flat driver mirror left then right, mirror harness connector (J60), cavity 1 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in left/right axis, the mirror motor needs replaced.
While activating mirror switch to move flat driver mirror up then down, mirror harness connector (J60), cavity 4 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.

Table 118 Motorized and Heated Mirror w/20 Minute Timer Circuits Tests (cont.)

While activating mirror switch to move convex driver mirror left then right, mirror harness connector (J60), cavity 3 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in right/left axis, the mirror motor needs replaced.
While activating mirror switch to move convex driver mirror up then down, mirror harness connector (J60), cavity 6 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.
Mirror harness connector (J60) cavity 7 to ground	0 volts	If voltage is present check for short to high on circuits BLK and 16 GRA 60.
While meter is still connected to mirror harness connector cavity 7 to ground, activate heated mirrors. **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Mirror harness connector (J60) cavity 7 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #14. Also check for open or short on circuits BLK, 16 GRA 60.
Mirror harness connector (J60) cavity 7 to 8	12 ± 1.5 volts	If voltage is missing check for open or short on circuits WHT and 16 WHT 36.
Passenger Power Mirror (J49), Harness Connector Voltage Checks Check with ignition key on and driver power mirror connector (J49) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.**		
Test Points	Spec.	Comments
While activating mirror switch to move flat passenger mirror left then right, mirror harness connector (J49), cavity 1 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in left/right axis, the mirror motor needs replaced.
While activating mirror switch to move flat passenger mirror up then down, mirror harness connector (J49), cavity 4 to 5.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.

Table 118 Motorized and Heated Mirror w/20 Minute Timer Circuits Tests (cont.)

While activating mirror switch to move convex passenger mirror left then right, mirror harness connector (J49), cavity 3 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in right/left axis, the mirror motor needs replaced.
While activating mirror switch to move convex passenger mirror up then down, mirror harness connector (J49), cavity 6 to 2.	± (12 ± 1.5) volts	If voltage is missing, check for open in circuits between switch and mirror connector. If voltage is present and mirror is inoperative in up/down axis, the mirror motor needs replaced.
Mirror harness connector (J49) cavity 7 to ground	0 volts	If voltage is present check for short to high on circuits BLK and 16 GRA 60.
While meter is still connected to mirror harness connector cavity 7 to ground, activate heated mirrors. **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Mirror harness connector (J49) cavity 7 to ground	12 ± 1.5 volts	If voltage is missing check for blown fuse #14. Also check for open or short on circuits BLK, 16 GRA 60 and 16 BLK 14. Also perform a continuity test on switch C31.
Mirror harness connector (J49) cavity 7 to 8	12 ± 1.5 volts	If voltage is missing check for open or short on circuits WHT and 16 WHT 36. If voltages check good and heater still fails, replace heater.
20 Minute Heated Mirror Timer Relay Check with ignition key on and 20 minute heated mirror timer relay removed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments
20 minute heated mirror timer relay cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #14. Also check for open or short on circuits 16 BLK 14 and BLK.
20 minute heated mirror timer relay cavity 87 to 87A.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits BLK and 16 GRA 60.
20 minute heated mirror timer relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 14 and BLK.

Table 118 Motorized and Heated Mirror w/20 Minute Timer Circuits Tests (cont.)

20 minute heated mirror timer relay cavity 30 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 WHT 14 and WHT.
20 minute heated mirror timer relay cavity 86 to ground.	0 volts	If voltage is present, check for open or short on circuits RED and BLU.
While meter is still connected on 20 minute heated mirror timer relay from cavity 86 to ground, close heated mirror switch C47.		
20 minute heated mirror timer relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits RED and BLU. If circuits check good and 20 minute heated mirror timer relay fails to activate, replace 20 minute heated mirror timer relay.
Crossview Heated Mirror (SS2) and (SS6) Voltage Checks Check with ignition key on, heated mirrors on and crossview mirror connectors SS2 and SS6 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments
Harness connector (SS2) 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 #14. Also check for open or short in circuits 16 GRA 59 and 16 BLK 14.
Harness connector (SS2) 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 2. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Table 118 Motorized and Heated Mirror w/20 Minute Timer Circuits Tests (cont.)

Harness connector (SS6) 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 #14. Also check for open or short in circuits 16 GRA 59 and 16 BLK 14.
Harness connector (SS6) 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. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Remote Heated Mirror Circuits

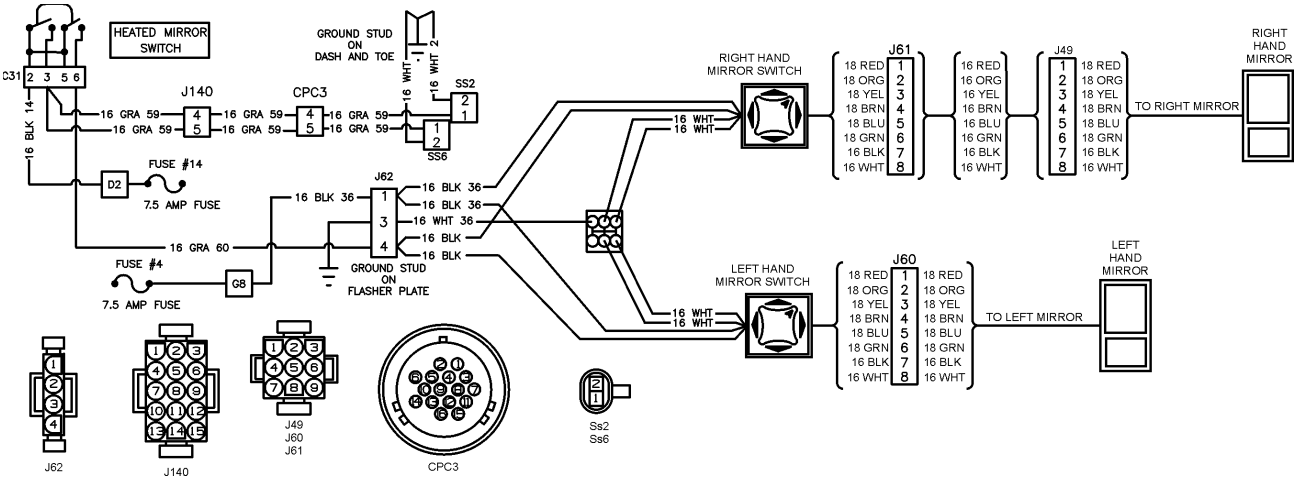

Figure 205 Remote Motorized and Heated Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J49 LEFT HAND BODY TO FRONT CAP
J62 POWER MIRRORS/HEATED
J140 FLASHER PLATE TO DASH AND TOE
SS2 SEALED ENGINE HARNESS TO RIGHT HAND CROSSVIEW MIRROR
SS6 SEALED ENGINE HARNESS TO LEFT HAND CROSSVIEW MIRROR

Table 119 Remote Motorized and Heated Mirror Circuits Tests

Diagnostic Trouble Codes
There are no diagnostic trouble codes associated with the motorized and heated mirrors.

Table 119 Remote Motorized and Heated Mirror Circuits Tests (cont.)

Power Mirrors Connector (J62) Voltage Checks Check with ignition key on, heated mirror switch open and power mirror connector (J62) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Power mirror connector (J62), cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #4. Also check for open or short on circuit 16 BLK 36.
Power mirror connector (J62), cavity 1 to 3.	12 ± 1.5 volts	If voltage is missing, check for open of short on circuits 16 WHT 36 and 16 WHT.
Power mirror connector (J62), cavity 4 to ground.	0 volts	If voltage is present, check for short on circuit 16 GRA 60.
While meter is still connected to power mirror connector (J62), cavity 4 to ground, activate heated mirrors by closing heated mirror switch (C31).		
Power mirror connector (J62), cavity 4 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 GRA 60 and 16 BLK 14. Also check for continuity on switch C31.
Crossview Heated Mirror (SS2) and (SS6) Voltage Checks Check with ignition key on, heated mirrors on and crossview mirror connectors SS2 and SS6 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – To remove a mirror, tilt the bottom in and sliding the mirror up and out.** **NOTE – If testing takes longer than 20 minutes, the heated mirrors will need to be turned on again due to the 20 minute timer.**		
Test Points	Spec.	Comments
Harness connector (SS2) 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 #14. Also check for open or short in circuits 16 GRA 59 and 16 BLK 14.
Harness connector (SS2) 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 2. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Table 119 Remote Motorized and Heated Mirror Circuits Tests (cont.)

Harness connector (SS6) 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 #14. Also check for open or short in circuits 16 GRA 59 and 16 BLK 14.
Harness connector (SS6) 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. If voltage is present and mirror heater is inoperative, the mirror heater or circuits inside the mirror assembly may need to be replaced.

Extended Description

The power mirror switch is supplied voltage at (SW1) and (SW2) terminal A2 from power mirror fuse #4. Ground is supplied at (SW1) and (SW2) terminal A4 from the ground stud on the flasher plate.

When the upper mirror switch is in the driver mirror control position, activating the mirror left/right control will apply voltage to connector (SW1) cavity B1. The polarity of the voltage on these circuits is reversed between left and right selection.

When the upper mirror switch is in the driver mirror control position, activating the mirror up/down control will apply voltage to connector (SW1) cavity B3. The polarity of the voltage on these circuits is reversed between up and down selection.

When the upper mirror switch is in the passenger mirror control position, activating the mirror left/right control will apply voltage to connector (SW1) cavity B2. The polarity of the voltage on these circuits is reversed between left and right selection.

When the upper mirror switch is in the passenger mirror control position, activating the mirror up/down control will apply voltage to connector (SW1) cavity B4. The polarity of the voltage on these circuits is reversed between up and down selection.

When the lower mirror switch is in the driver mirror control position, activating the mirror left/right control will apply voltage to connector (SW2) cavity B1. The polarity of the voltage on these circuits is reversed between left and right selection.

When the lower mirror switch is in the driver mirror control position, activating the mirror up/down control will apply voltage to connector (SW2) cavity B3. The polarity of the voltage on these circuits is reversed between up and down selection.

When the lower mirror switch is in the passenger mirror control position, activating the mirror left/right control will apply voltage to connector (SW2) cavity B2. The polarity of the voltage on these circuits is reversed between left and right selection.

When the lower mirror switch is in the passenger mirror control position, activating the mirror up/down control will apply voltage to connector (SW2) cavity B4. The polarity of the voltage on these circuits is reversed between up and down selection.

The return path for all motors in the motorized mirrors is connectors (SW1) (for the upper control) and (SW2) (for the lower control) pin A3.

Panel light voltage for the power mirror switch lights is provided at (SW1) and (SW2) pin A1 on circuit 16 VIO 37 from panel light splice.

6.4. COMPONENT LOCATIONS

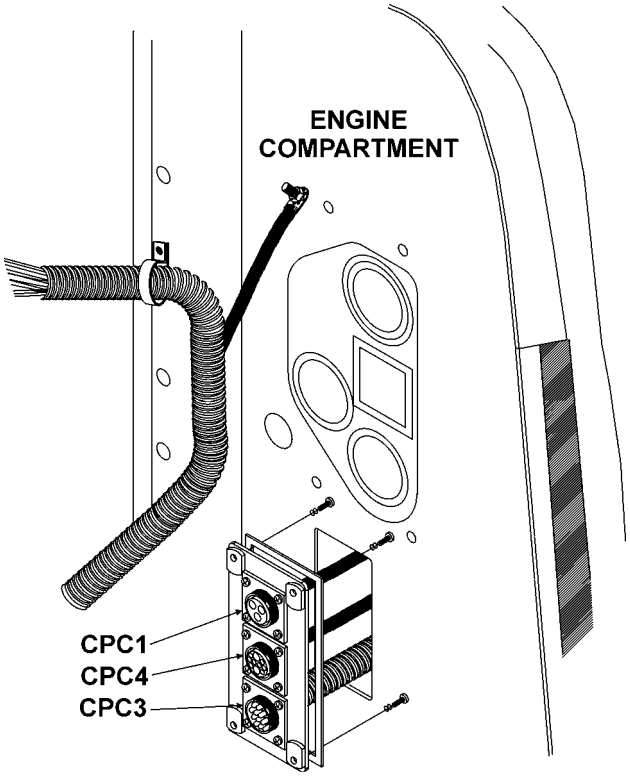

Figure 206 Left Hand Switch Panel

SWITCH #15 — HEATED MIRROR SWITCH

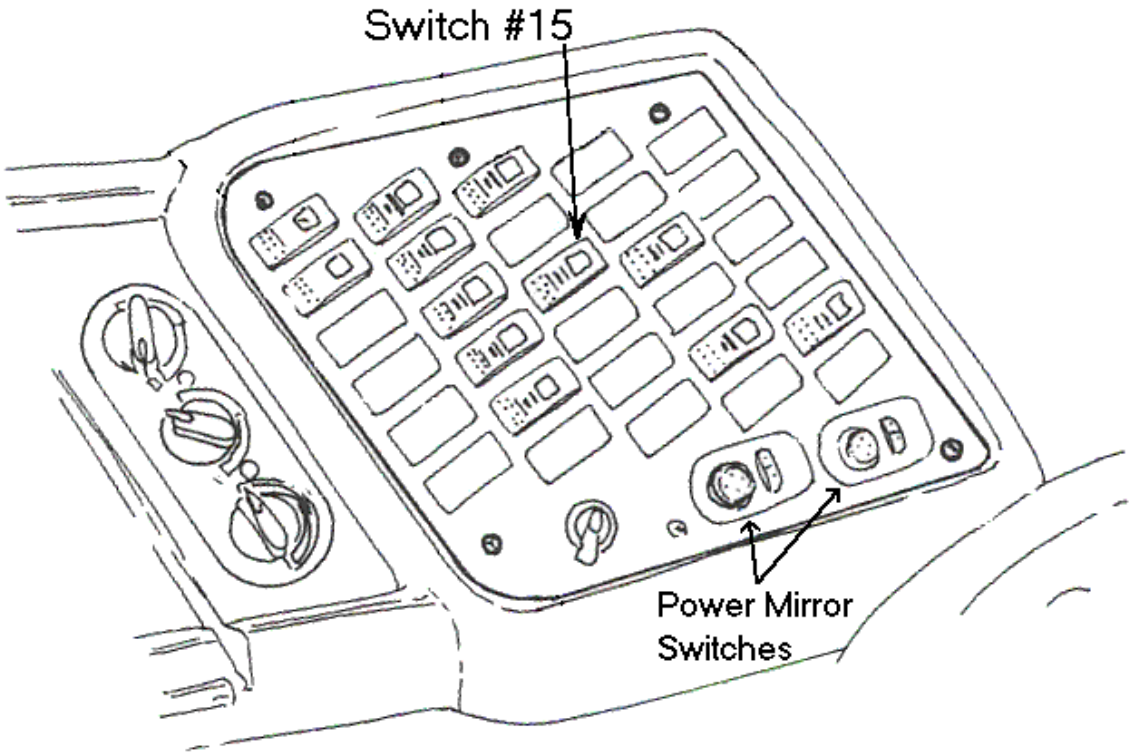

Figure 207 Left Hand Switch Panel

SWITCH #15 — HEATED MIRROR SWITCH

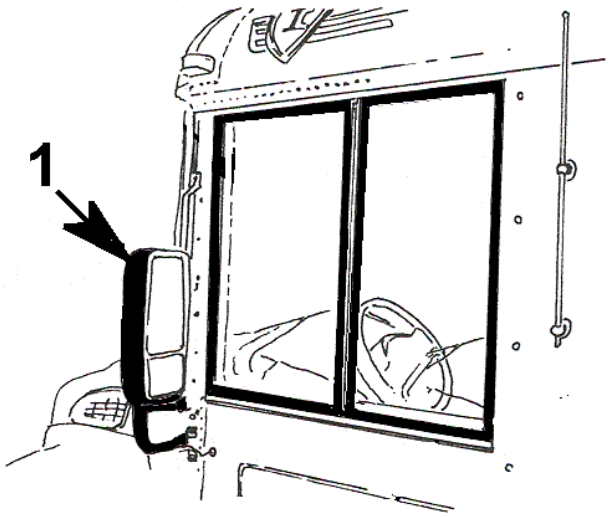

Figure 208 Power Mirror

1. POWER & HEATED MIRROR

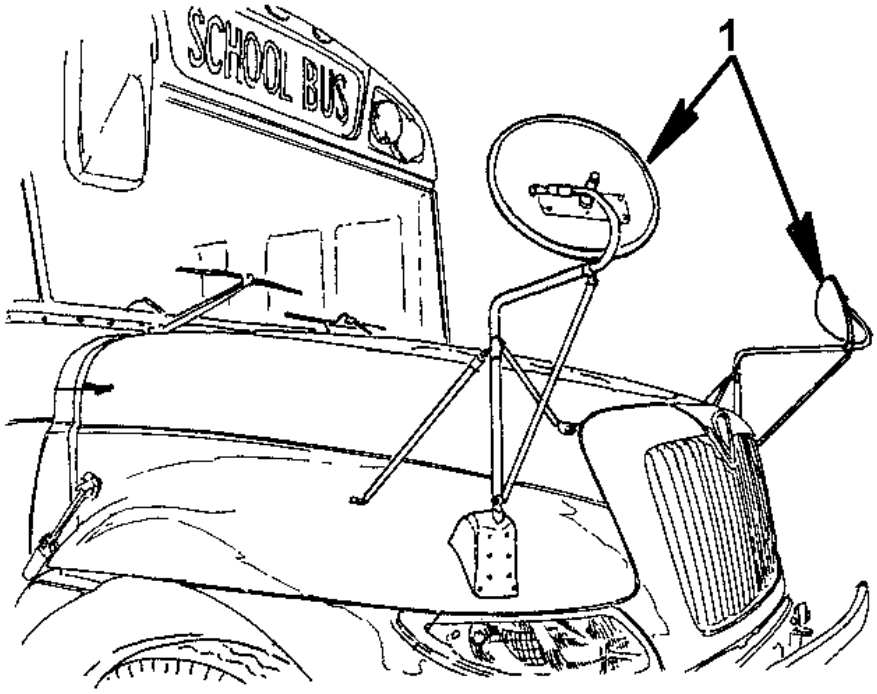

Figure 209 Crossview Mirror Locations

1. CROSSVIEW MIRRORS

7. RADIO (ENTERTAINMENT), SPEAKERS

7.1. CIRCUIT FUNCTIONS

Refer to entertainment radio function diagram.

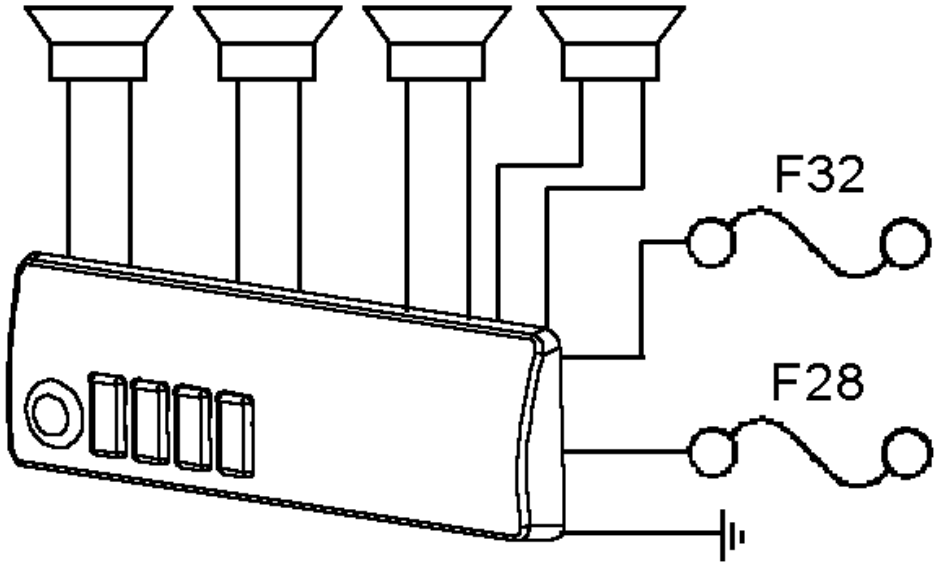

Figure 210 Entertainment Radio Function Diagram

1. ENTERTAINMENT RADIO

The entertainment radio is permanently installed and operates from the vehicle 12 volt system using an external antenna and speakers.

The radio is supplied switched battery voltage to allow it to operate when the key is on. The radio also receives battery voltage to provide power from the radio memory.

Panel light voltage is supplied to the radio for backlighting.

7.2. DIAGNOSTICS

Should the radio fail to operate, the problem could be attributed to open or shorted wiring in power or ground circuits to the radio or a failure in the radio.

Should a speaker fail to operate, troubleshoot the circuit attributed to that specific speaker before replace radio unit.

There are no diagnostic trouble codes associated with the radio circuits.

Entertainment Radio Preliminary Check

Table 120 Entertainment Radio Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify radio is inoperative.	Check radio operation.	Radio is not operating correctly.	Go to next step.	Radio 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 power or 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	Is radio operating but missing sound from one or more, but not all, speakers?	Check if some speakers are inoperative.	All speakers are inoperative.	Go to next step.	Check specific circuits of the inoperative speakers for open or shorted circuits. Also check for broken speakers.
4.	On	Is radio display active when power is turned on.	Check radio display.	Radio display is active when power is turned on.	Remove radio and bench check. Replace radio if it fails bench check.	Go to radio power circuits. (See Dash Mounted Entertainment Radio Power Circuits, page 409)

7.3. DASH MOUNTED ENTERTAINMENT RADIO POWER CIRCUITS

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 radio power circuits will be apparent when the radio display is not active when the radio is turned on.

Problems in the radio power circuits could be attributed to blown fuses, shorted or open circuits to power or ground, or a faulty radio.

Refer to dash mounted entertainment radio power circuits.

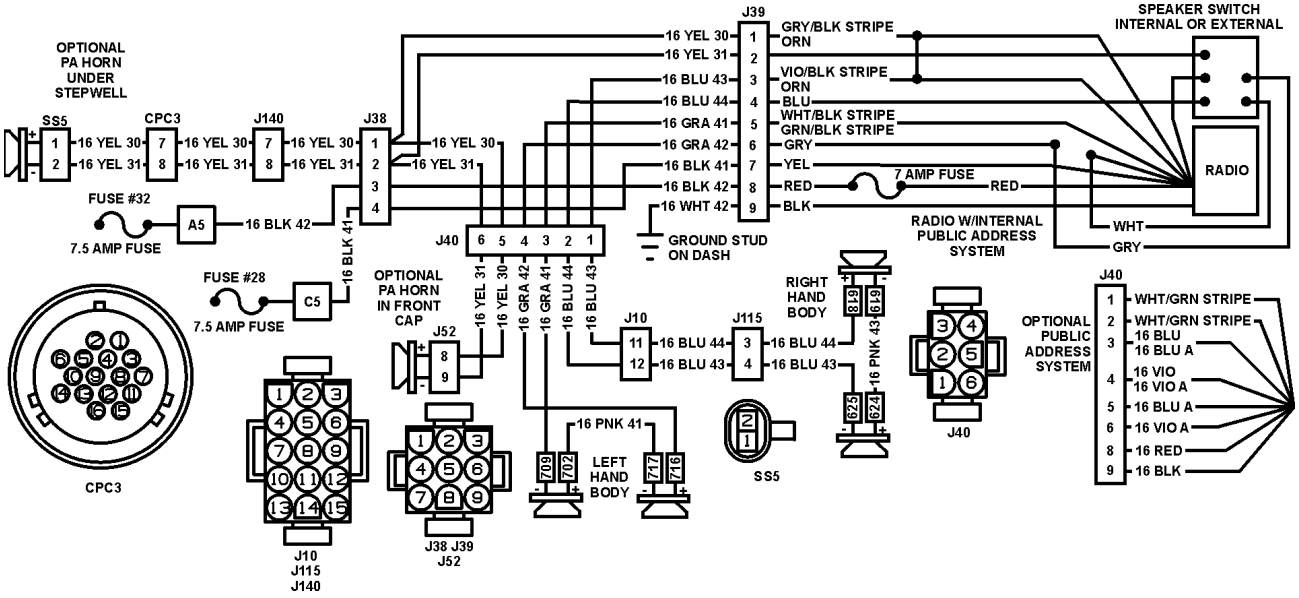

Figure 211 Dash Mounted Entertainment Radio Power Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J10 LEFT HAND BODY TO REAR CAP
J38 FLASHER PLATE TO DASH
J39 RADIO TO DASH HARNESS
J40 DASH TO LEFT HAND BODY
J52 LEFT HAND BODY TO FRONT CAP
J115 RIGHT HAND BODY TO REAR CAP
J140 FLASHER PLATE TO DASH AND TOE
SS5 SEALED ENGINE HARNESS TO PUBLIC ADDRESS HORN

Table 121 Dash Mounted Entertainment Radio Circuit Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the entertainment radio.		
Radio Connector J39 Voltage Checks Check with ignition key off and radio connector J39 disconnected. The radio adapter harness may have the two connectors into one connector. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Radio connector J39 pin 7 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 41. Also insure proper installation of fuse block for “hot all time” fuses.

Table 121 Dash Mounted Entertainment Radio Circuit Tests (cont.)

Radio connector J39 pin 7 to pin 9	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 42. Also insure proper installation of fuse block for "hot all time" fuses.
Radio connector J39 pin 8 to pin 9	0 volts	If voltage is present, check for short in circuit 16 BLK 42. Also insure proper installation of fuse block for "ignition fuses through noise kill solenoid".
While meter is still connected to radio connector J39 from pin 8 to pin 9, turn key switch to on position.		
Radio connector J39 pin 8 to pin 9	12 ± 1.5 volts	If voltage is missing, check for blown fuse #32. Also check for open or short in circuit 16 BLK 42. Also check for blown 7 amp in-line fuse. Also insure proper installation of fuse block for "ignition fuses through noise kill solenoid".
If power circuits check good and radio is still faulty, replace the radio adapter harness or entertainment radio.		

Extended Description

The entertainment radio receives radio memory power at radio connector J39 pin 7 from fuse #28. Operating power is provided at radio connector J39 pin 8 from fuse #32.

Ground for the radio is supplied at radio connector J39 pin 9 from the ground stud on dash.

7.4. OVERHEAD MOUNTED ENTERTAINMENT RADIO POWER CIRCUITS

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 radio power circuits will be apparent when the radio display is not active when the radio is turned on.

Problems in the radio power circuits could be attributed to blown fuses, shorted or open circuits to power or ground, or a faulty radio.

Refer to overhead mounted entertainment radio power circuits.

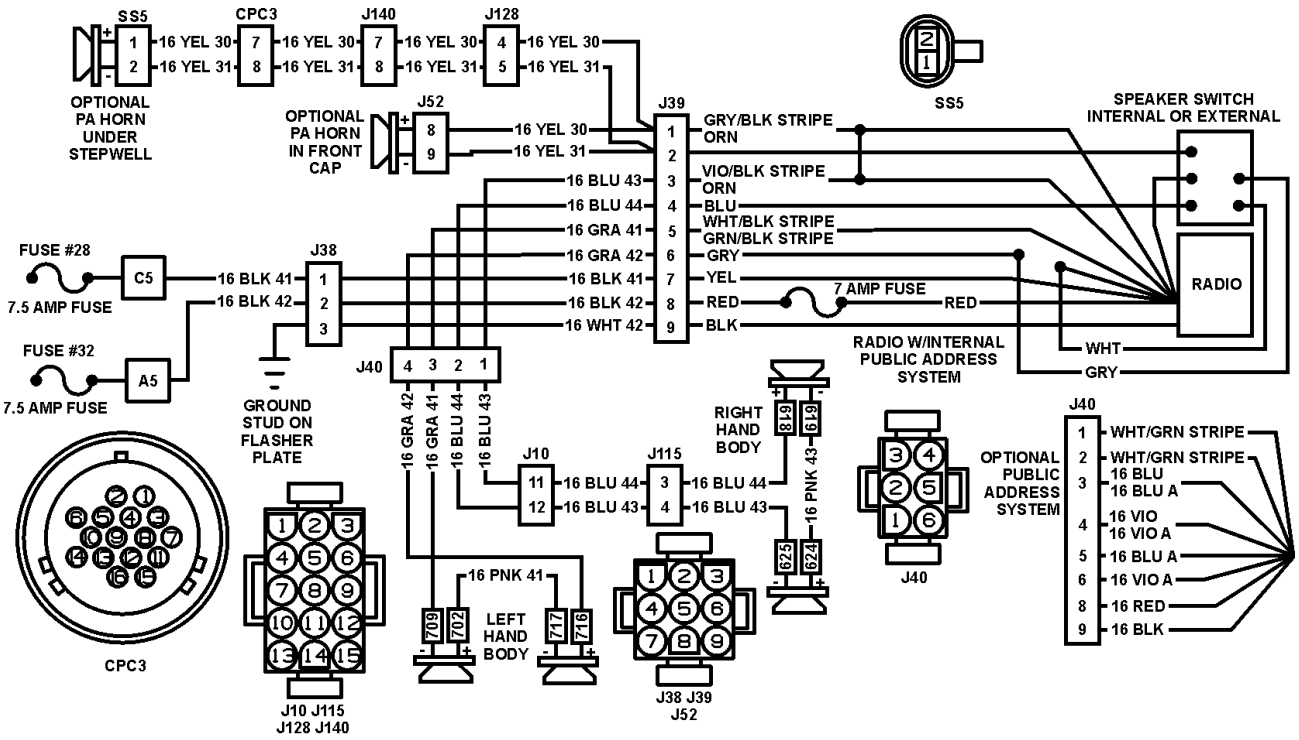

Figure 212 Overhead Mounted Entertainment Radio Power Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J10 LEFT HAND BODY TO REAR CAP
J38 FLASHER PLATE TO DASH
J39 RADIO TO DASH HARNESS
J40 DASH TO LEFT HAND BODY
J52 LEFT HAND BODY TO FRONT CAP
J115 RIGHT HAND BODY TO REAR CAP
J128 FLASHER PLATE TO LEFT HAND BODY
J140 FLASHER PLATE TO DASH AND TOE
SS5 SEALED ENGINE HARNESS TO PUBLIC ADDRESS HORN

Table 122 Overhead Mounted Entertainment Radio Circuit Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the entertainment radio.		
Radio Connector J39 Voltage Checks Check with ignition key off and radio connector J39 disconnected. The radio adapter harness may have the two connectors into one connector. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Radio connector J39 pin 7 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 41. Also insure proper installation of fuse block for “hot all time” fuses.
Radio connector J39 pin 7 to pin 9	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 42. Also insure proper installation of fuse block for “hot all time” fuses.
Radio connector J39 pin 8 to pin 9	0 volts	If voltage is present, check for short in circuit 16 BLK 42. Also insure proper installation of fuse block for “ignition fuses through noise kill solenoid”.
While meter is still connected to radio connector J39 from pin 8 to pin 9, turn key switch to on position.		
Radio connector J39 pin 8 to pin 9	12 ± 1.5 volts	If voltage is missing, check for blown fuse #32. Also check for open or short in circuit 16 BLK 42. Also check for blown 7 amp in-line fuse. Also insure proper installation of fuse block for “ignition fuses through noise kill solenoid”.
If power circuits check good and radio is still faulty, replace the radio adapter harness or entertainment radio.		

Extended Description

The entertainment radio receives radio memory power at radio connector J39 pin 7 from fuse #28. Operating power is provided at radio connector J39 pin 8 from fuse #32.

Ground for the radio is supplied at radio connector J39 pin 9 from the ground stud on dash.

7.5. COMPONENT LOCATIONS

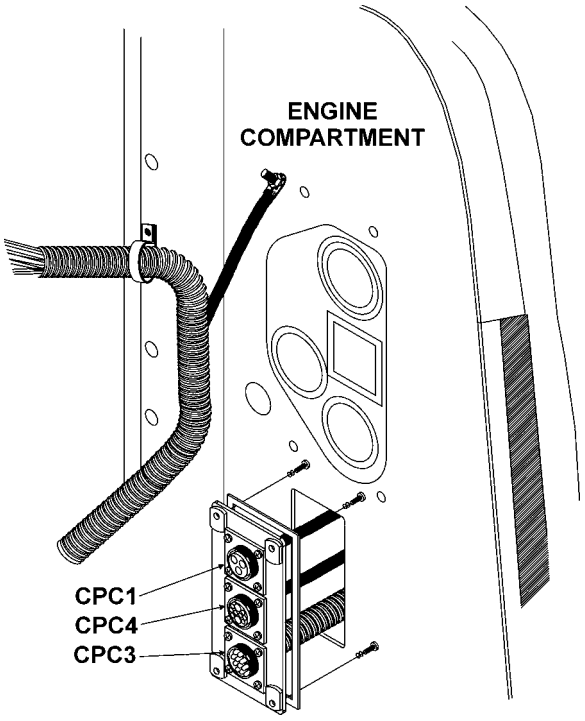

Figure 213 Pass Thru Locations

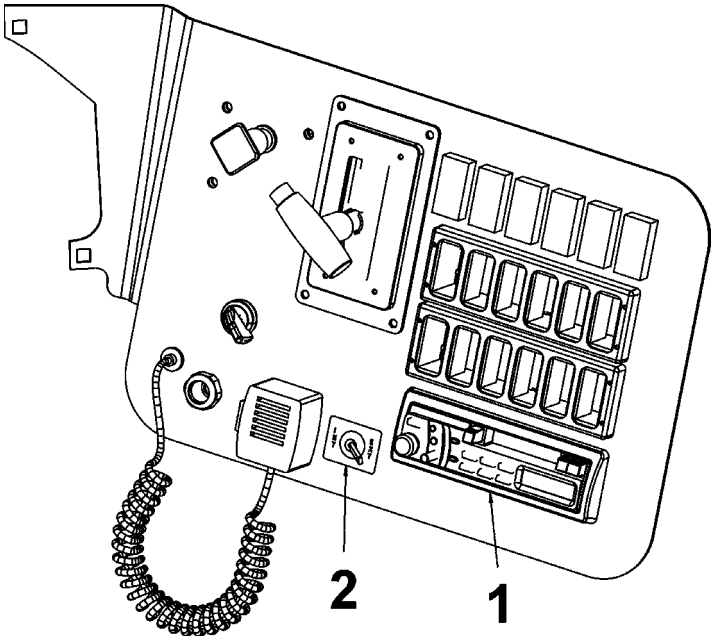

Figure 214 Dash Entertainment Radio Location

1. ENTERTAINMENT RADIO
2. INTERNAL/EXTERNAL P.A. SWITCH

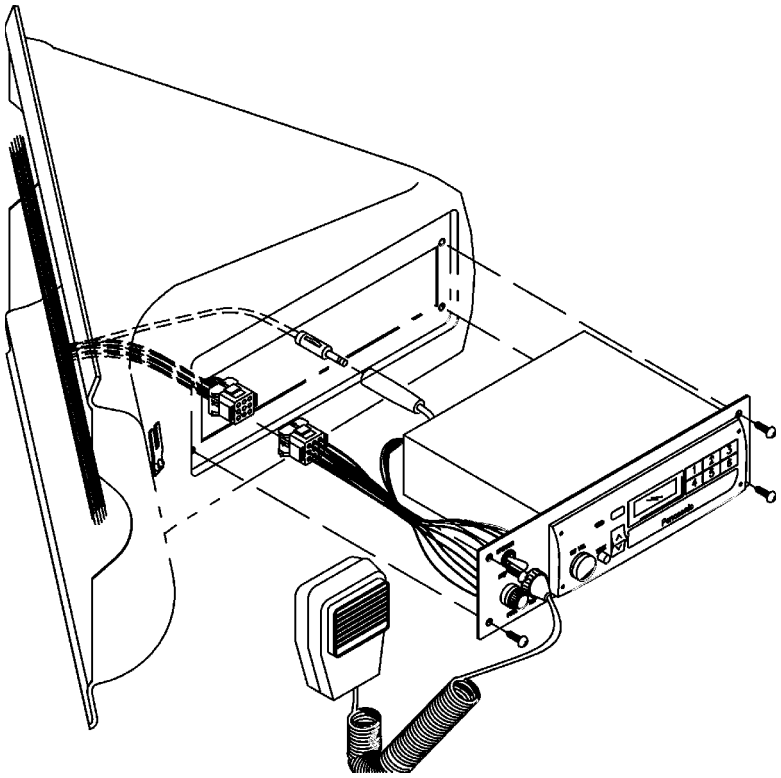

Figure 215 Overhead Radio Location

1. ENTERTAINMENT RADIO SPEAKER
2. DOME LIGHT

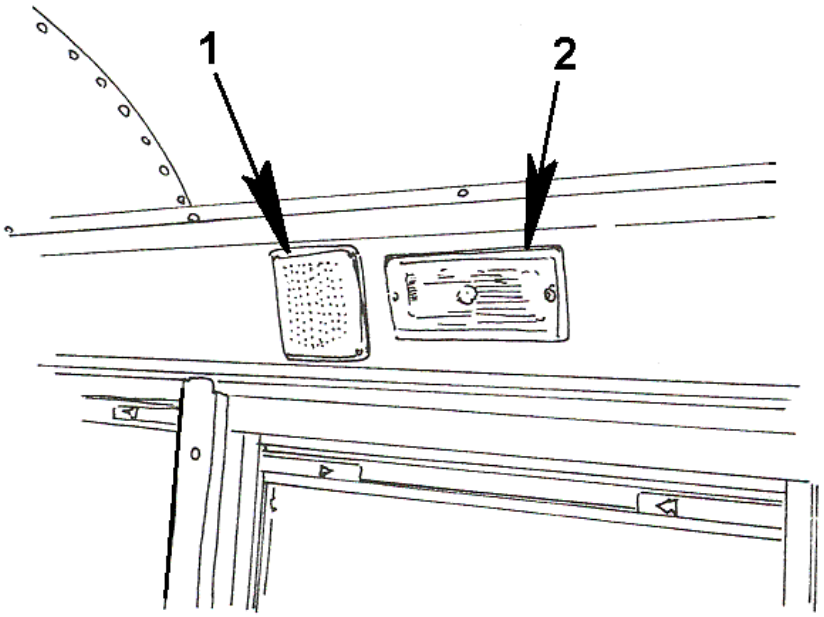

Figure 216 Entertainment Radio Speaker Location

1. ENTERTAINMENT RADIO SPEAKER
2. DOME LIGHT

8. WINDSHIELD WIPERS AND WASHER PUMP

8.1. CIRCUIT FUNCTIONS

Circuit Functions

Refer to Washer and Wiper function diagram.

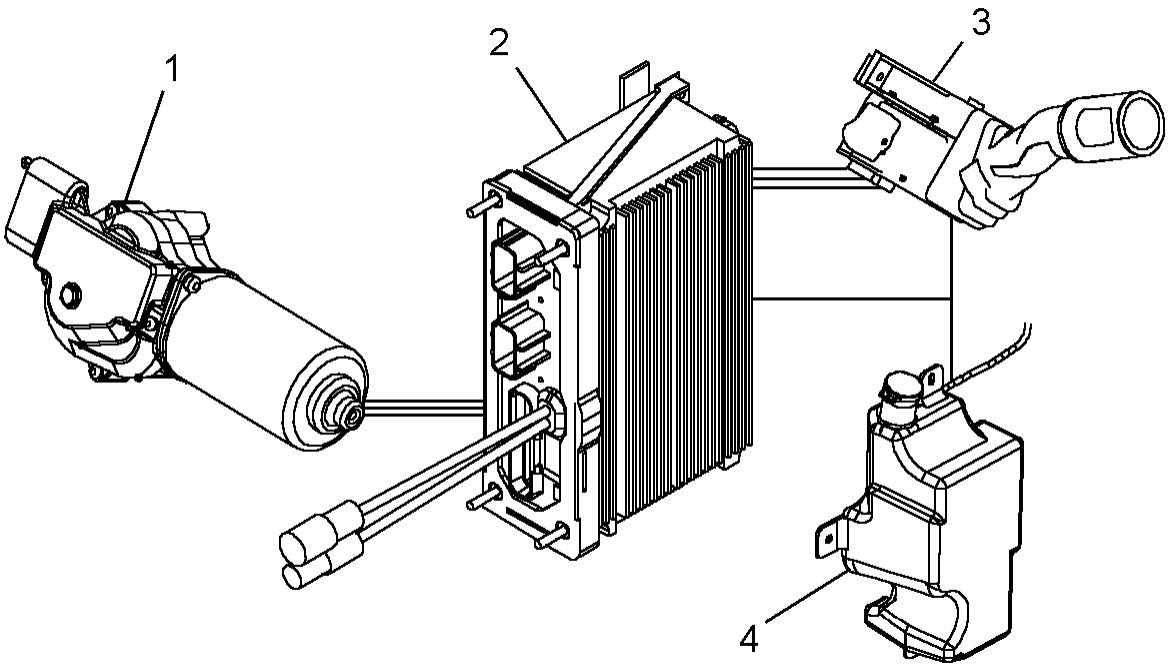

Figure 217 Washer and Wiper Function Diagram

1. WIPER MOTOR
2. ELECTRICAL SYSTEM CONTROLLER
3. TURN SIGNAL WASHER/WIPER CONTROL
4. WASHER BOTTLE (WITH WASHER PUMP MOTOR)

Windshield wiper functions Include, low wipers, high wipers, intermittent wipers, wiper park, windshield washer and washer fluid level.

The wiper switches are direct inputs to the ESC (not multiplexed). The switches determine the speeds controlled by the ESC.

The ESC provides battery voltage on a 20 amp circuit to the wiper motor park circuits and two wiper control relays.

The wiper power relay switches control of the wiper motor from park circuit control to ESC circuit control.

While the ignition is on, the windshield washer will always come on when the washer switch is activated. The washer pump is directly connected to the washer switch and is not controlled by the ESC. There is also an input from the washer switch to the ESC. If the windshield washer is requested and the current wiper speed is not high, the wipers shall be set to low speed and stay in low speed for a set amount of time after the request. If the windshield washer is requested and the current wiper speed is high, the wipers speed will remain high.

The windshield wipers have eight speeds: off, high, low, and five different intermittent speeds. These are determined by the condition of the three wiper switches in the turn signal assembly.

When the wipers are turned off, while the ignition is on, the wipers will automatically park. The wiper park circuits also control the cycle of the intermittent wiper sweep.

8.2. DIAGNOSTICS

Faults with the wiper and washer systems are apparent when the wiper or washers do not operate correctly. The ESC will also log diagnostic trouble codes for some types of failures.

There is no shortcut available to identify if a problem is caused by failures with inputs to the ESC or failures in circuits out of the ESC. The “Diamond Logic Builder™” software can identify if switch inputs are reaching the ESC. It can also override switch inputs to test outputs from the ESC. Using the software will allow you to quickly identify if the problem is with an input to the ESC or an output from the ESC. If the software is not available check output circuits, then check switch input circuits to the ESC.

A problem with wiper operation could be attributed to an open or short in the wiper switch, missing power or ground to the wiper motor, open or shorted wires, a failed relay, a bad wiper motor or an internal problem in the ESC.

A problem with washer operation could be attributed to an open or short in the washer switch, missing power or ground to the washer pump motor, open or shorted wires, or a bad washer pump motor.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to request operation of the wiper motor and monitor activation of the wiper switches. See the diagnostic software manual for details on using the software.

Wiper and Washer Preliminary Check

Table 123 Wiper and Washer Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify washer or wipers are not operating incorrectly.	Attempt to operate washer and wipers.	Washer or wipers are **not** operating correctly.	Go to next step.	Washer and wipers are operating correctly. Problem does not exist or is intermittent. (Check for previously active diagnostic trouble codes.)
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check if washer is operating correctly.	Attempt to operate washer.	Washer is operating correctly.	Go to next step.	Go to washer circuits. (See Heated Wiper Blade Circuits, page 442)

Table 123 Wiper and Washer Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
4.	On	Are wipers working correctly except for wiper parking?	Visually check if wipers work correctly except for wiper parking.	Wipers work correctly except for wiper parking.	Go to wiper park circuits. (See WIPER PARK CIRCUITS, page 434)	Go to next step.
5.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 442)	Read display on odometer.	No wiper diagnostic trouble codes are active.	Go to next step.	Go to Wiper Motor Circuits. (See WIPER MOTOR CIRCUITS, page 426)
6.	There is no shortcut available to identify if a problem is caused by failures with switch inputs to the ESC or failures in circuits out of the ESC. The “Diamond Logic Builder™” software can identify if switch inputs are reaching the ESC. It can also override switch inputs to test outputs from the ESC. Using the software will allow you to quickly identify if the problem is with an input to the ESC or an output from the ESC. If the software is not available check output circuits, then check switch input circuits to the ESC. Go to Wiper Motor Circuits. (See WIPER MOTOR CIRCUITS, page 426) Go to Wiper Input Circuits to the ESC. (See WIPER CIRCUIT INPUTS TO ESC, page 423)					

Diagnostic Trouble Codes (DTC)

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 124 Wiper Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
611 14 6 1	Wiper power under current. 1604 pin F. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).
611 14 6 2	**NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.** Wiper power over current. 1604 pin F. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).
611 14 6 3	Wiper power, less than normal low current but more than open circuit
611 14 6 4	Wiper power, greater than normal high current and less than fusing current
611 14 6 6	Wiper power has current flow when output commanded off
2033 14 8 1	Wiper high speed relay circuit overloaded. Connector 1602 pin 20 current overload. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).
2033 14 8 2	Wiper high speed relay circuit open circuit. Connector 1602 Pin 20 open. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).
2033 14 8 3	Wiper high speed relay circuit shorted to ground. Connector 1602 Pin 20 shorted to ground. Shorted to ground or faulty relay. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).
2033 14 14 1	Wiper on relay circuit overloaded. Connector 1602 pin 29 current overload. Refer to Wiper Motor Circuits .
2033 14 14 2	Wiper on relay circuit open circuit. Connector 1602 Pin 29 open. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).
2033 14 14 3	Wiper on relay circuit shorted to ground. Connector 1602 Pin 29 shorted to ground. Shorted to ground or faulty relay. Refer to Wiper Motor Circuits (See WIPER MOTOR CIRCUITS, page 426).

8.3. WASHER CIRCUITS

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 washer system will be apparent when the washers do not operate correctly. There are no diagnostic trouble codes associated with the washer circuits.

A problem with washer operation could be attributed to an open or short in the washer switch, missing power to the washer pump motor, open or shorted wires or a failed washer pump motor.

Refer to washer pump circuits.

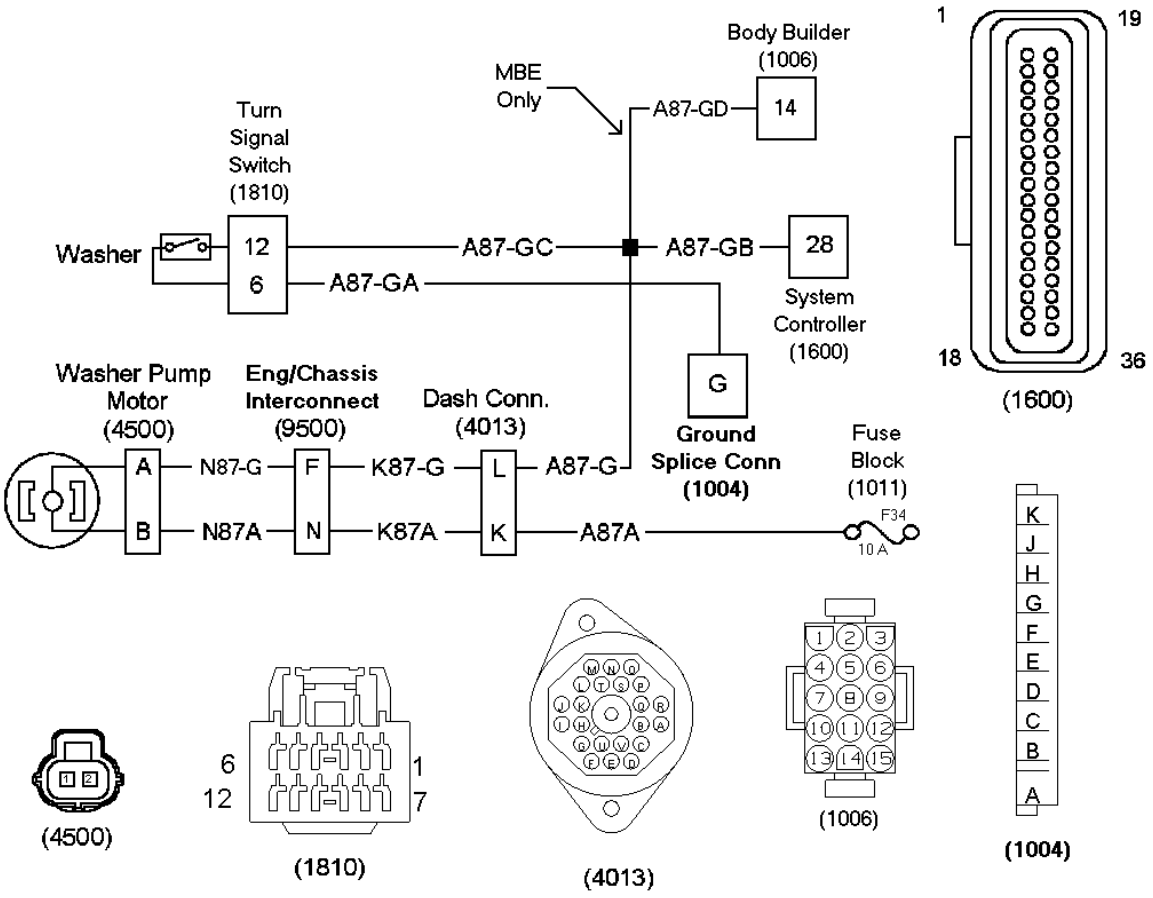

Figure 218 Washer Pump Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1004) GROUND SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1006) BODY BUILDER CONN
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER
LOCATED AT RIGHT SIDE DASH PANEL
(1810) TURN SIGNAL SWITCH
LOCATED AT STEERING COLUMN
(4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(4500) WINDSHIELD WASHER PUMP
LOCATED AT ENGINE COMPARTMENT
(9500) ENGINE/CHASSIS INTERCONNECT
LOCATED AT INSIDE LEFT FRAME RAIL BEHIND ENGINE

Table 125 Washer Connector Tests

Washer Pump Connector (4021) Voltage Checks Check with ignition on and pump connector (4021) removed. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Pump harness connector (4500) cavity B to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse or open or short in circuits N87A, K87A, and A87A to fuse block.
With washer switch activated, pump harness connector (4500) cavity B to cavity A.	12 ± 1.5 volts	Tests circuit between ESC and pump motor. If voltage is missing, check for open or short in circuit N87–G, K87–G, A87–G, A87–GC, and A87–GA Also perform a continuity test on turn signal switch (1810) between pins 12 and 6. Replace turn signal switch (1810) if it fails the continuity test. If no opens or shorts are found and the turn signal switch (1810) passes the resistance test, replace the washer pump.

Extended Description

The washer pump motor is wired directly to the washer switch, in the turn signal switch assembly. 12 volts to the washer pump motor is provided from a 10 amp fuse in the fuse block (1011). When the washer switch is depressed, a ground will be supplied to the washer pump motor. This will cause the pump to run until the washer switch is released. The ground from the washer switch is also applied to ESC connector (1600) terminal 28. This will signal the ESC that the washer has been activated. The ESC will activate the low speed wipers for several wipes.

8.4. WIPER 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.

A fault in the wiper circuit inputs to the ESC will be apparent when the wipers do not operate correctly and there are no active wiper diagnostic trouble codes. Problems in the wiper input circuits could be attributed to short circuits, open circuits, a faulty switch or a problem in the ESC.

NOTE – Open circuits or failed switches may cause high speed wipers to operate when they haven't been selected.

Refer to wiper switch input circuits.

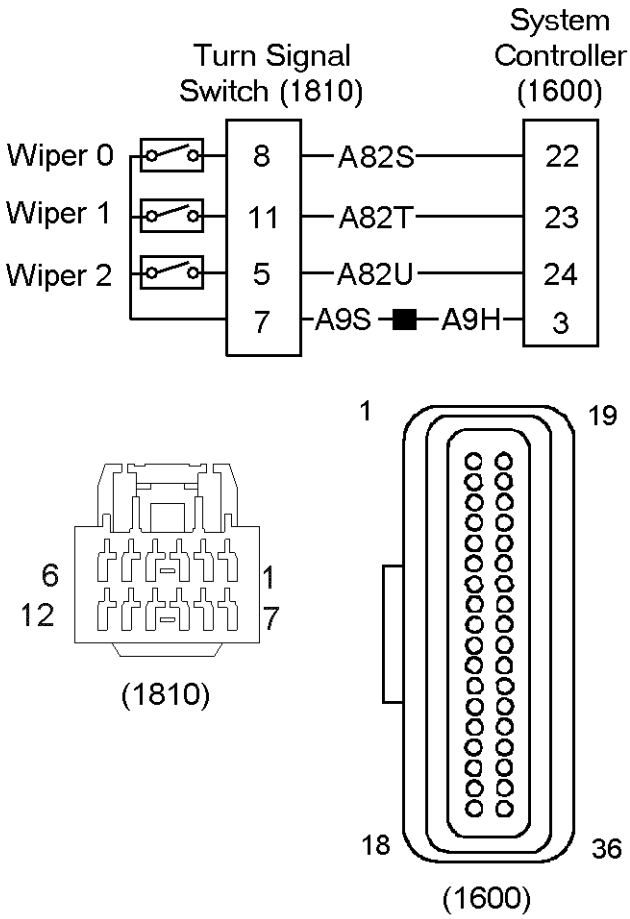

Figure 219 Wiper Switch Input Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT RIGHT SIDE DASH PANEL
(1810) TURN SIGNAL SWITCH
LOCATED AT STEERING WHEEL

Table 126 Wiper Switch Input Tests

Turn signal switch Harness Connector (1810) Voltage Checks Check with ignition key on and connector (1810) removed. **NOTE – Voltage to the switch will be approximately 5 volts with the key off.** **NOTE – The high speed wipers and head lights should come on when connector (1810) is disconnected. Disconnect wiper motor connector (4046) to disable wiper during checks.** **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
(1810) harness connector, pin 8 to ground	11 ± 1.5 volts	If voltage is missing, check for open in circuit A82S. If circuits check good and problem is still present, verify voltage out of ESC. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
(1810) harness connector, pin 11 to ground	11 ± 1.5 volts	If voltage is missing, check for open in circuit A82T. If circuits check good and problem is still present, verify voltage out of ESC. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
(1810) harness connector, pin 5 to ground	11 ± 1.5 volts	If voltage is missing, check for open in circuit A82U. If circuits check good and problem is still present, verify voltage out of ESC. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
(1810) harness connector, pin 7 to ground	<2 Volts	Zero volt reference level. No voltage expected. If voltage is incorrect, check for shorts to voltage or incorrect output from ESC.
Reconnect wiper motor connector (4046). Reconnect turn signal switch harness connector (1810) and wiper stops operating. Ignition key off and on, ESC turns off headlights. Operate wiper speed control in the turn signal switch through all eight speeds, if wiper fails to operate and no diagnostic trouble codes are generated, replace switch.		

Table 126 Wiper Switch Input Tests (cont.)

Wiper Speed Control Switch in the Turn Signal Switch Connector (1810) Resistance Checks Check with ignition key off and turn signal connector (1810) removed. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Operate wiper speed control to the OFF position, check for continuity between pin 7 and pins 5, 8, and 11.	<1 ohm	If there is no continuity, replace turn signal switch.
Operate wiper speed control to the HI position, check for continuity between pin 7 and pins 5, 8, and 11.	>100K ohms	If there is continuity, replace turn signal switch.

Extended Description

The three wiper switches, in the turn signal assembly, are wired directly to the ESC. When the three wiper switches are turned on, 0 volt reference on pin 3 from the ESC will pass through the wiper switch 0 to pin 22 in the ESC, the wiper switch 1 to pin 23 in the ESC and the wiper switch 2 to pin 24 in the ESC. This will cause the ESC to send 12 volts to the windshield wipers and operate eight speeds (off, high, low, and five different intermittent speeds).

8.5. WIPER MOTOR CIRCUITS

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 wiper motor circuits will be apparent when the high or low speed wipers do not work. The ESC will log an active diagnostic trouble code when there is a short or open in the wiper power relay R1 circuits or the wiper high-low relay circuits. Problems in the wiper circuits could be attributed to a failed relay, a failed motor, a tripped wiper motor circuit breaker, a short, an open or a problem in the ESC.

Refer to wiper circuits.

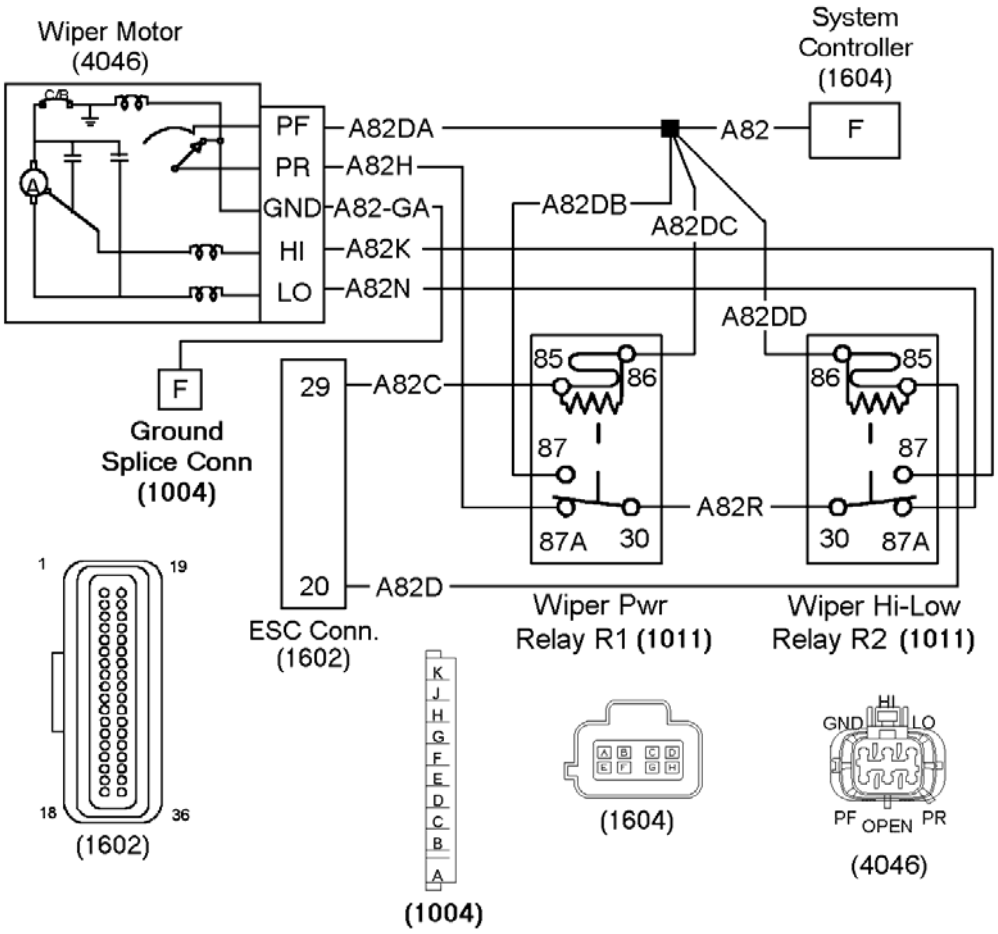

Figure 220 Wiper Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1004) GROUND SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1604) SYSTEM CONTROLLER
LOCATED AT RIGHT SIDE DASH PANEL
(4046) WIPER MOTOR
LOCATED INSIDE RIGHT SIDE TOP SIDE COWL

Table 127 Wiper Motor Diagnostic Trouble Codes

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

Table 127 Wiper Motor Diagnostic Trouble Codes (cont.)

611 14 6 2	Wiper power over current
This diagnostic trouble code is logged when there is a short to ground or an excessive load in a circuit connected to the wiper power output of ESC connector (1604) pin F. **NOTE – The virtual fuse in the ESC will trip during a short. To reset the fuse, the key switch must be cycled.** **NOTE – Disconnecting connectors will cause new open circuit diagnostic trouble codes to be logged. Clear all diagnostic trouble codes after connections have been restored.** Turn off wipers and disconnect wiper motor connector (4046). Cycle key switch and clear diagnostic trouble code codes. Turn on the high speed wipers. If the diagnostic trouble code does not reoccur, there is a short or an overload in the wiper motor. If the diagnostic trouble code reoccurs, there is a short in the circuits to the wiper relays or between the ESC and the wiper motor, or in the ESC. Disconnect blue ESC connector (1604). Cycle key switch and clear diagnostic trouble code codes. Turn on the high speed wiper and check for diagnostic trouble codes. If the diagnostic trouble code does not reoccur, there is a short in the circuits between the ESC and the wiper motor. If the diagnostic trouble code reoccurs, there is a short inside the ESC. Check high speed wiper voltage between harness connector (4046) pin HI and GND.	
611 14 6 1	Wiper power under current
This diagnostic trouble code is logged when the wipers are turned on and there is an open in circuits between the high speed wiper motor output of the ESC, through the motor, and ground. Check for open circuits or tripped wiper motor circuit breaker. Check high speed wiper voltage between harness connector (4046) pin HI and GND with high speed wiper switch on.	
2033 14 14 1	Wiper on relay driver overloaded. Connector 1602 pin 29 current overload. To much load attached or faulty relay.
This diagnostic trouble code is logged when there is an overload in the circuits between wiper power relay R1 and the ESC, an excessive load on the circuit or a high resistance in the relay coil. **NOTE – Disconnecting connectors will cause new open circuit diagnostic trouble codes to be logged. Clear all diagnostic trouble codes after connections have been restored.** Remove wiper power relay R1. Clear diagnostic trouble codes and turn on the high speed wipers. If the diagnostic trouble code does not reoccur, there is a short or an overload in the relay. If the diagnostic trouble code reoccurs, there is a short in the circuits between the relay socket and the ESC, or in the ESC. Disconnect ESC connector (1602), and clear diagnostic trouble codes. Turn on the high speed wiper and check for diagnostic trouble codes. If the diagnostic trouble code does not reoccur, there is an overload in the circuits between the ESC and the relay. If the diagnostic trouble code reoccurs, there is an overload inside the ESC.	
2033 14 14 2	Wiper on relay driver circuit open circuit.

Table 127 Wiper Motor Diagnostic Trouble Codes (cont.)

Connector 1602 Pin 29 open. Open circuit or faulty relay. This diagnostic trouble code is logged when wipers are turned on and there is an open in circuits between ESC connector (1602) pin 29, through the wiper power relay, and ground. Check for open circuits or open relay coil.	
2033 14 14 3	Wiper on relay driver circuit shorted. Connector 1602 pin 29 shorted to ground. short circuit or faulty relay.
This diagnostic trouble code is logged when there is a short in the circuits between wiper power relay R1 and the ESC, an excessive load on the circuit or a short in the relay coil. **NOTE – Disconnecting connectors will cause new open circuit diagnostic trouble codes to be logged. Clear all diagnostic trouble codes after connections have been restored.** Remove wiper power Relay R1. Clear diagnostic trouble codes and turn on the high speed wipers. If the diagnostic trouble code does not reoccur, there is a short or an overload in the relay. If the diagnostic trouble code reoccurs, there is a short in the circuits between the relay socket and the ESC, or in the ESC. Disconnect ESC connector (1602), and clear diagnostic trouble codes. Turn on the high speed wiper and check for diagnostic trouble codes. If the diagnostic trouble code does not reoccur, there is a short in the circuits between the ESC and the relay. If the diagnostic trouble code reoccurs, there is a short inside the ESC.	
2033 14 8 1	Wiper high–low relay driver overloaded. Connector 1602 pin 20 current overload. To much load attached or faulty relay.
This diagnostic trouble code is logged when there is an overload in the circuits between wiper hi-low relay R2 and the ESC, an excessive load on the circuit or a high resistance in the relay coil. **NOTE – Disconnecting connectors will cause new open circuit diagnostic trouble codes to be logged. Clear all diagnostic trouble codes after connections have been restored.** Remove high–low relay R2. Clear diagnostic trouble codes and turn on the high speed wipers. If the diagnostic trouble code does not reoccur, there is a short or an overload in the relay. If the diagnostic trouble code reoccurs, there is a short in the circuits between the relay socket and the ESC, or in the ESC. Disconnect ESC connector (1602), and clear diagnostic trouble codes. Turn on the high speed wiper and check for diagnostic trouble codes. If the diagnostic trouble code does not reoccur, there is an overload in the circuits between the ESC and the relay. If the diagnostic trouble code reoccurs, there is an overload inside the ESC.	
2033 14 8 2	Wiper high–low relay driver circuit open circuit.
Connector 1602 Pin 20 open. Open circuit or faulty relay. This diagnostic trouble code is logged when high wipers are turned on and there is an open in circuits between ESC connector (1602) pin 20, through the wiper power relay, and ground. Check for open circuits or open relay coil.	

Table 127 Wiper Motor Diagnostic Trouble Codes (cont.)

2033 14 8 3	Wiper high–low relay driver circuit shorted. Connector 1602 pin 20 shorted to ground, short circuit or faulty relay.
This diagnostic trouble code is logged when there is a short in the circuits between wiper high–low relay R2 and the ESC, an excessive load on the circuit or a short in the relay coil. **NOTE – Disconnecting connectors will cause new open circuit diagnostic trouble codes to be logged. Clear all diagnostic trouble codes after connections have been restored.** Remove wiper high–low relay R2. Clear diagnostic trouble codes and turn on the high speed wipers. If the diagnostic trouble code does not reoccur, there is a short or an overload in the relay. If the diagnostic trouble code reoccurs, there is a short in the circuits between the relay socket and the ESC, or in the ESC. Disconnect ESC connector (1602), and clear diagnostic trouble codes. Turn on the high speed wiper and check for diagnostic trouble codes. If the diagnostic trouble code does not reoccur, there is a short in the circuits between the ESC and the relay. If the diagnostic trouble code reoccurs, there is a short inside the ESC.	

Table 128 Wiper Motor Voltage Checks

Wiper Motor Harness Connector (4046) Voltage Checks Check with ignition on and (4046) disconnected. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**		
Test Points	Spec.	Comments
(4046) Harness connector, pin PF 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 A82DA or A82. If circuits check good check for voltage from ESC connector (1604) pin F. **NOTE – A load device, such as a test light, must be used in parallel with voltmeter probes to read an accurate voltage from pin F.** If voltage is missing consider replacing ESC. Refer to ESC Replacement in this manual. (See ESC REPLACEMENT, page 125)
(4046) Harness connector, pin PF to pin GND.	12 ± 1.5 volts	If voltage is missing, check for open in circuit A82–GA to ground.
With wiper switch in low selection (4046) Harness connector, pin LO to ground	With low speed wiper switch on, 12 ± 1.5 volts. With low speed wiper switch off and wipers parked, 0 volts.	If voltage is incorrect, check for open or short in circuit A82N and perform wiper relay R1 and R2 circuit checks. If circuit and relays check good, verify voltage out of ESC.

Table 128 Wiper Motor Voltage Checks (cont.)

(4046) Harness connector, pin HI to ground	With high speed wiper switch on, 12 ± 1.5 volts With low speed wiper switch off, 0 volts	If voltage is incorrect, check for open or short in circuit A82K and perform wiper relay R1 and R2 circuit checks. If circuit and relays check good, verify voltage out of ESC.
Wiper Power Relay R1 (1011) Voltage Checks Check with ignition on, (4046) connected, windshield wiper switch in low position, relay R2 installed and relay R1 removed. Bench check relay. If relay fails, replace and check for faults. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**		
Test Points	Spec.	Comments
Wiper Power Relay R1 cavity 86 to ground.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuits A82DC and A82. Also check for proper voltage from System Controller (1604) pin F. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is missing from ESC, then consider Reprogramming the ESC.
Wiper Power Relay R1 cavity 86 to 85.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82C. Also check for proper input from System Controller (1602) pin 29. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is missing from ESC, then consider Reprogramming the ESC.
With test leads still connected to Wiper Power Relay R1 cavity 86 to 85, switch windshield wiper function switch to a delay speed.		
Wiper Power Relay R1 cavity 86 to 85.	0 volts	If voltage is incorrect, check for open or short in circuit A82C. Also check for proper input from System Controller (1602) pin 29. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is missing from ESC, then consider Reprogramming the ESC.
Wiper Power Relay R1 cavity 87A to ground.	Variable voltage, but less than 12 volts	If voltage is incorrect, check for open or short in circuit A82H.

Table 128 Wiper Motor Voltage Checks (cont.)

With test leads still connected to Wiper Power Relay R1 cavity 87A to ground, switch the Windshield Wiper Function switch to different delay positions. The voltage should change with each level of the delay, but should not exceed 12 volts.		
Wiper Power Relay R1 cavity 87A to 30.	Variable voltage, but less than 12 volts	If voltage is incorrect, check for open or short in circuits A82R and A82N.
With test leads still connected to Wiper Power Relay R1 cavity 87A to 30, switch the Windshield Wiper Function switch to different delay positions. The voltage should change with each level of the delay, but should not exceed 12 volts. If voltage does not change with the different delay positions, then check Wiper Switch Input Tests. Switch Windshield Wiper Function Switch back to the “Lo” position before continuing with remaining voltage checks.		
Wiper Power Relay R1 cavity 87 to ground.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82DB. Also check for proper voltage from System Controller (1604) pin F. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is missing from ESC, then consider Reprogramming the ESC.
Wiper Power Relay R1 cavity 87 to 30.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82R.
Wiper Hi—Low Relay R2 (1011) Voltage Checks Check with ignition on, (4046) connected, windshield wiper switch in low position, relay R1 installed and relay R2 removed. Bench check relay. If relay fails, replace and check for faults. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**		
Test Points	Spec.	Comments
Wiper Hi—Low Relay R2 cavity 86 to ground.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuits A82DD and A82. Also check for proper voltage from System Controller (1604) pin F. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is missing from ESC, then consider Reprogramming the ESC.

Table 128 Wiper Motor Voltage Checks (cont.)

Wiper Hi—Low Relay R2 cavity 86 to 85.	0 volts	If voltage is incorrect, check for open or short in circuit A82D. Also check for proper input from System Controller (1602) pin 20. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is incorrect from ESC, then consider Reprogramming the ESC.
With test leads still connected to Wiper Hi-Low Relay R2 cavity 86 to 85, switch wiper speed from Low to Hi.		
Wiper Hi—Low Relay R2 cavity 86 to 85.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82C. Also check for proper input from System Controller (1602) pin 20. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If voltage is incorrect from ESC, then consider Reprogramming the ESC.
Switch windshield wiper function back to the “Lo” position.		
Wiper Hi—Low Relay R2 cavity 30 to ground.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82R.
Wiper Hi—Low Relay R2 cavity 30 to 87A.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82N.
Wiper Hi—Low Relay R2 cavity 30 to 87.	12 ± 1.5 volts	If voltage is incorrect, check for open or short in circuit A82K.

Extended Description

When the key is on, the ESC will supply battery voltage to blue connector (1604) pin F. This voltage is applied to wiper motor connector (4046) cavity PF, wiper power relay R1 pins 4 and 5, and wiper high–low relay R2.

When high or low wipers are selected the ESC will supply a ground from system controller connector (1602) terminal 29 to wiper power relay R1 terminal 2. This will energize the wiper power relay and apply 12 volts to the common contact of wiper high–low relay R2.

When low speed wipers are selected the wiper high-low relay will remain de-energized and the voltage at the common contact will pass through the normally closed contact to the low speed wiper motor windings.

When high speed wipers are selected the wiper high-low relay will energize and the voltage at the common contact will pass through the normally open contact to the high speed wiper motor windings.

Ground for the wiper motor is supplied from ground splice (1004) to wiper motor connector (4046) terminal GND.

8.6. WIPER PARK CIRCUITS

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.

When the high and low speed wipers are turned off and the ignition is on, the wipers should return to the parked position.

A fault in the wiper park circuits will be apparent when the wipers do not park, after they are turned turn off and the intermittent wipers are inoperative (low wipers should still operate when selected). There are no diagnostic trouble codes associated with the wiper parking circuits. Problems in the wiper parking circuits could be attributed to, a short to ground, an open, faulty circuits in the motor or a problem in the ESC.

Refer to Wiper Park Circuits.

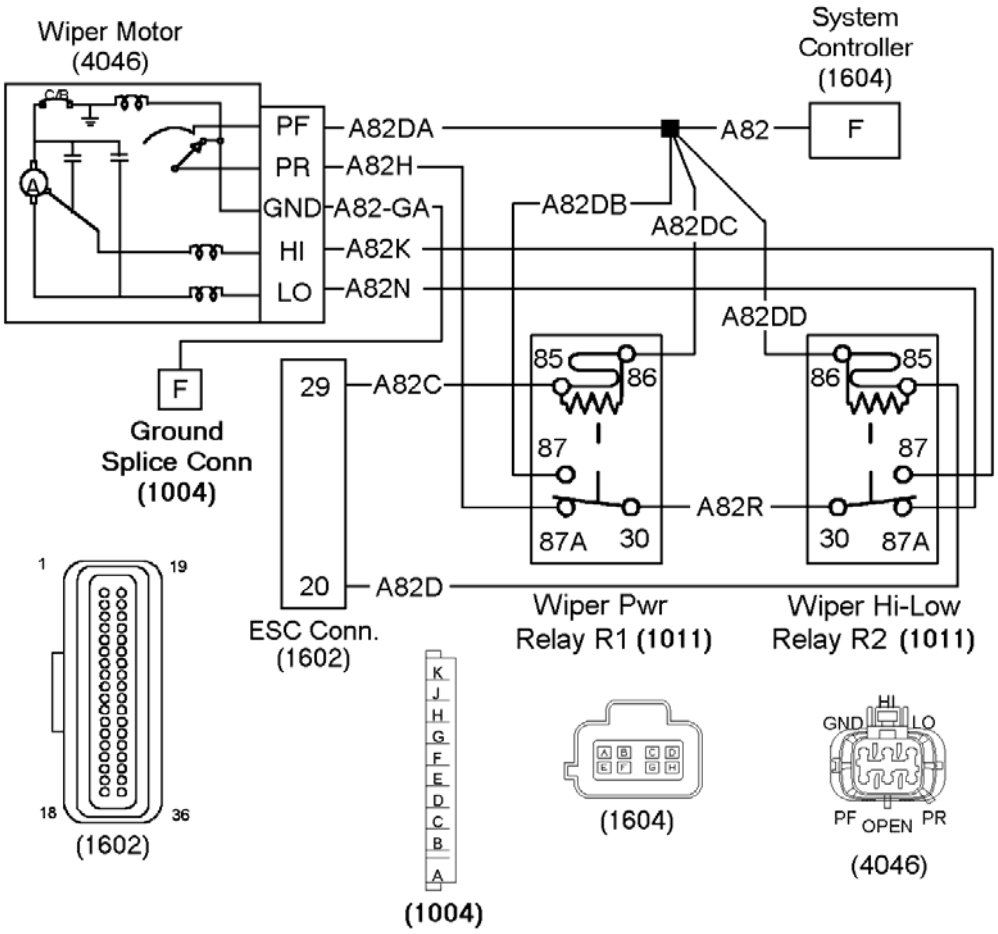

Figure 221 Wiper Park Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1004) GROUND SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1604) SYSTEM CONTROLLER
LOCATED AT RIGHT SIDE DASH PANEL
(4046) WIPER MOTOR
LOCATED INSIDE RIGHT SIDE TOP SIDE COWL

Table 129 Park Circuits Tests

Diagnostic Trouble Codes		
There are no specific diagnostic trouble codes associated with the wiper park circuits.		
Wiper Motor Harness Connector (4046) Park Circuit Voltage Checks Check with ignition on and (4046) disconnected. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**		
Test Points	Spec.	Comments
(4046) Harness connector, pin PF 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 A82DA or A82. If circuits check good check for voltage from ESC.
Wiper Motor Harness Connector (4046) Park Circuit Resistance Checks Check with ignition off and (4046) disconnected.		
(4046) Harness connector, pin PR to pin LO.	< 1 ohm	If resistance is high check for open in circuits A82H, A82R and A82N. Also check for failed normally closed contacts of wiper power relay R1 and wiper high low relay R2.
If voltages and resistances check good, consider replacing wiper motor.		

Extended Description

When the high and low speed wipers are turned off and the ignition is on, the wipers should return to the parked position.

When the key is on the ESC will supply battery voltage to blue connector (1604) pin F. This voltage is applied to wiper motor connector (4046) cavity PF, wiper power relay R1 pins 4 and 5, and wiper high–low relay R2.

When the wipers are off and the wipers are not parked, the voltage at (4046) pin PF will pass through the wiper motor park contact to (4046) pin PR and the normally closed contact of wiper power relay. This voltage will also be applied to the wiper power relay common contact, wiper high–low relay normally closed contact, and the wiper motor low speed winding.

When the wipers reach the park position a ground will replace the voltage causing the wipers to stop at the parked position.

8.7. COMPONENT LOCATIONS

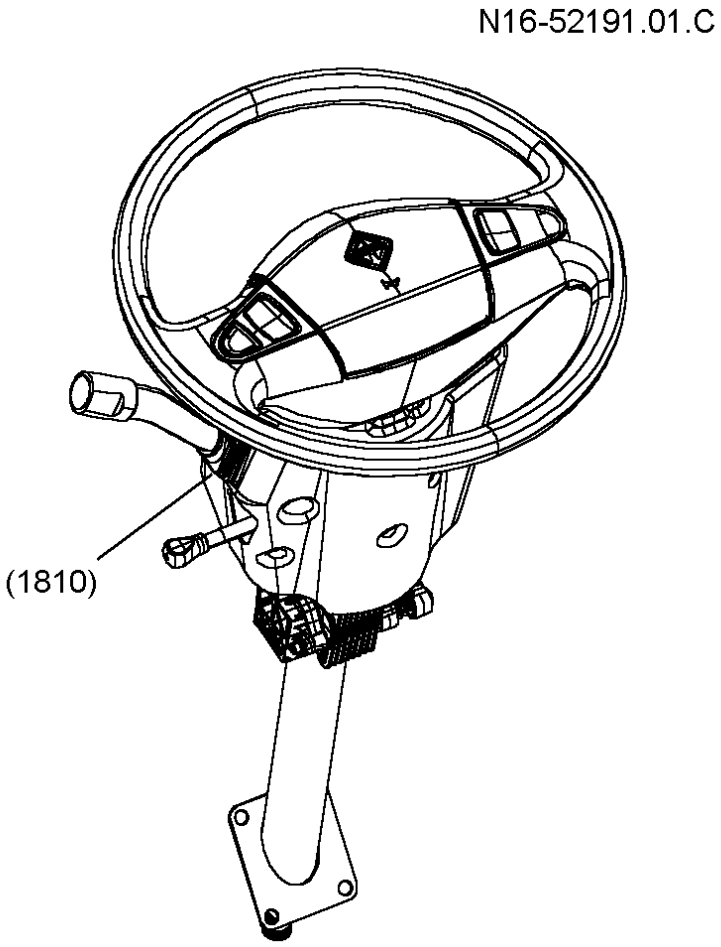

Figure 222 Turn Signal Assembly (Wiper Switch)

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

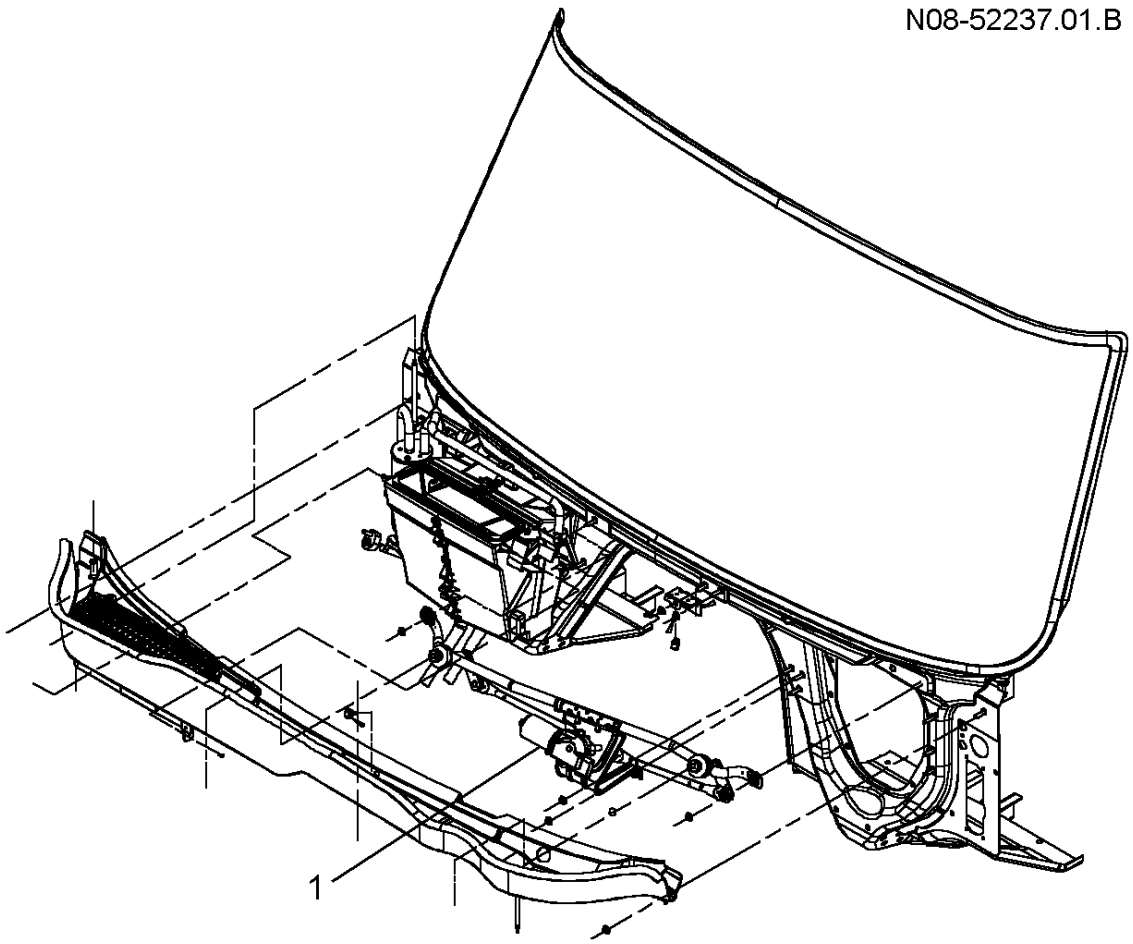

Figure 223 Wiper Motor Location

1. WIPER MOTOR

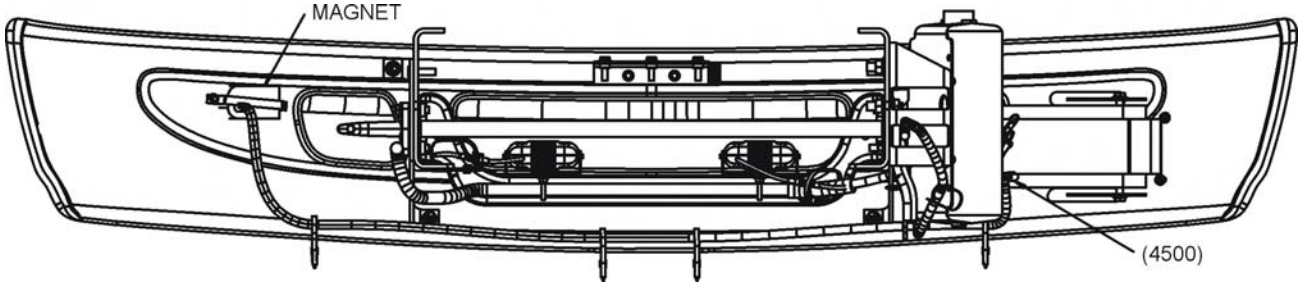

Figure 224 Washer Pump Location

(4500) WINDSHIELD WASHER PUMP CONNECTOR

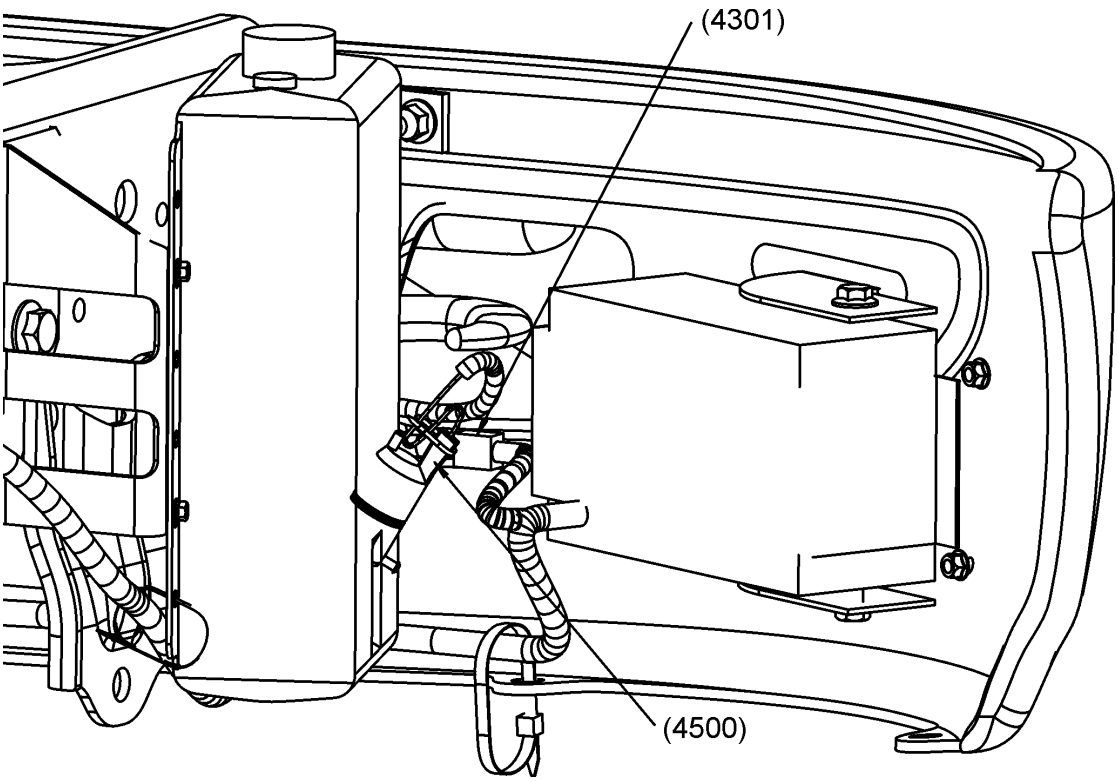

Figure 225 Washer Pump and Reservoir Location

(4301) CROSSING GATE ASSEMBLY MOTOR CONNECTOR
(4500) WINDSHIELD WASH PUMP

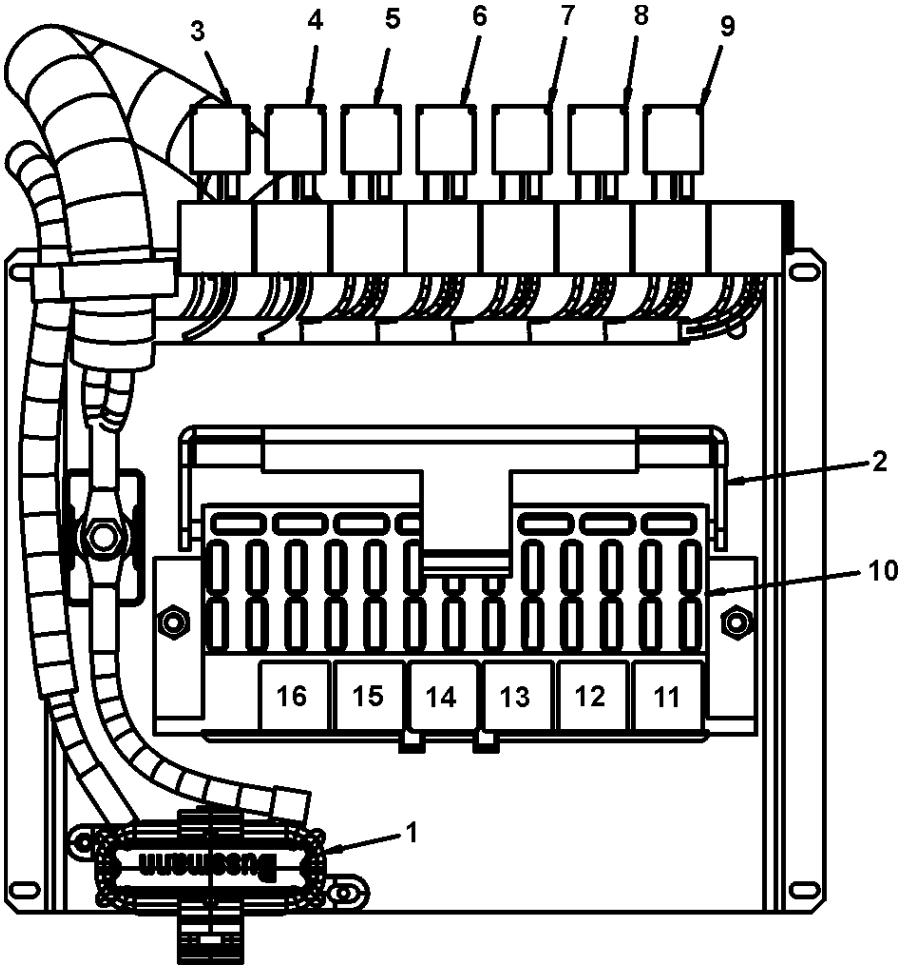

Figure 226 Chassis Relay Locations

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

9. HEATED WIPER BLADES

9.1. CIRCUIT FUNCTIONS

Circuit Functions

Refer to Heated Wiper Blades.

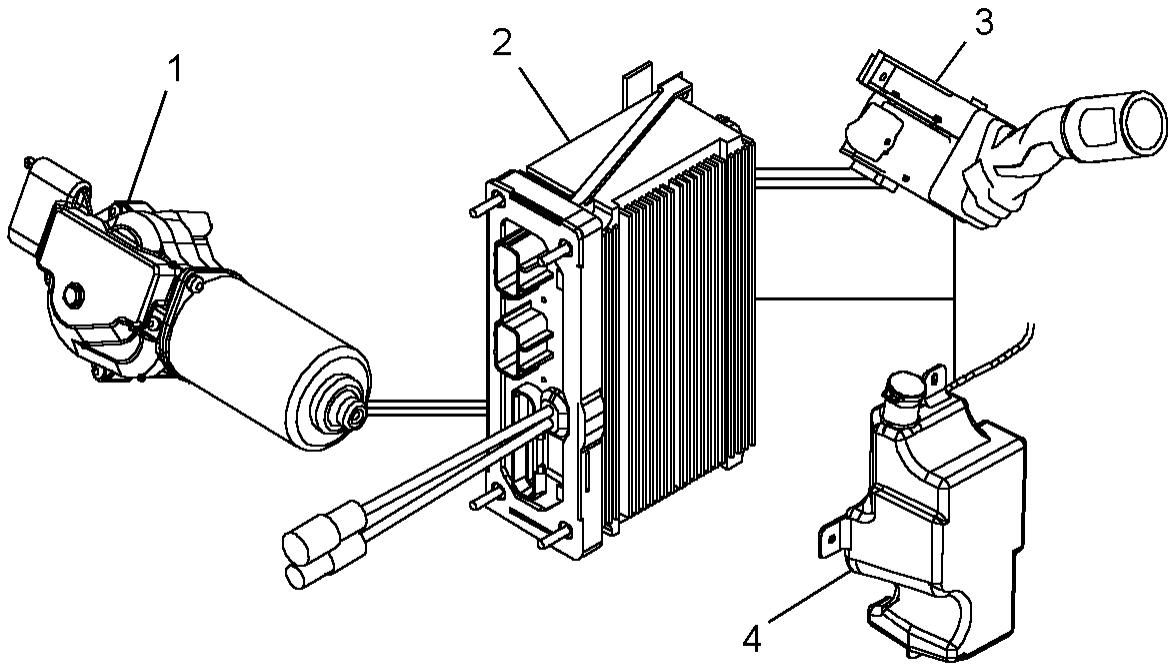

Figure 227 Heated Wiper Blade Function Diagram

1. WIPER MOTOR
2. ELECTRICAL SYSTEM CONTROLLER
3. TURN SIGNAL WIPER CONTROL
4. HEATED WIPER BLADE SWITCH

The heated wiper blades are an independent system from the wiper system. The heated wiper blades will activate a heating coil to prevent ice buildup. The heated wiper blades can be activated when the wiper motor is on or off. To diagnose the windshield wiper motor, washer pump or wiper function switch, refer to the Windshield Wipers & Washer Pump section of this manual.

9.2. DIAGNOSTICS

Faults with the heated wiper blades are apparent when the wiper blades do not heat up.

A problem with the heated wiper blades operation could be attributed to an open or short in the heated wiper blade switch, missing power or ground to the heated wiper blades or open or shorted wires.

Heated Wiper Blades Preliminary Check

Table 130 Heated Wiper Blades Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify heated wiper blades are not operating incorrectly.	Attempt to operate heated wiper blades.	Heated wiper blades are **not** operating correctly.	Go to next step.	Heated wiper blades 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 power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.						Go to Fault Detection Management

Diagnostic Trouble Codes (DTC)

There are no diagnostic trouble codes associated with the heated wiper blades.

9.3. HEATED WIPER BLADE CIRCUITS

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 heated wiper blade system will be apparent when the heated wipers do not heat up. There are no diagnostic trouble codes associated with the heated wiper blade circuits.

Refer to heated wiper blade circuits.

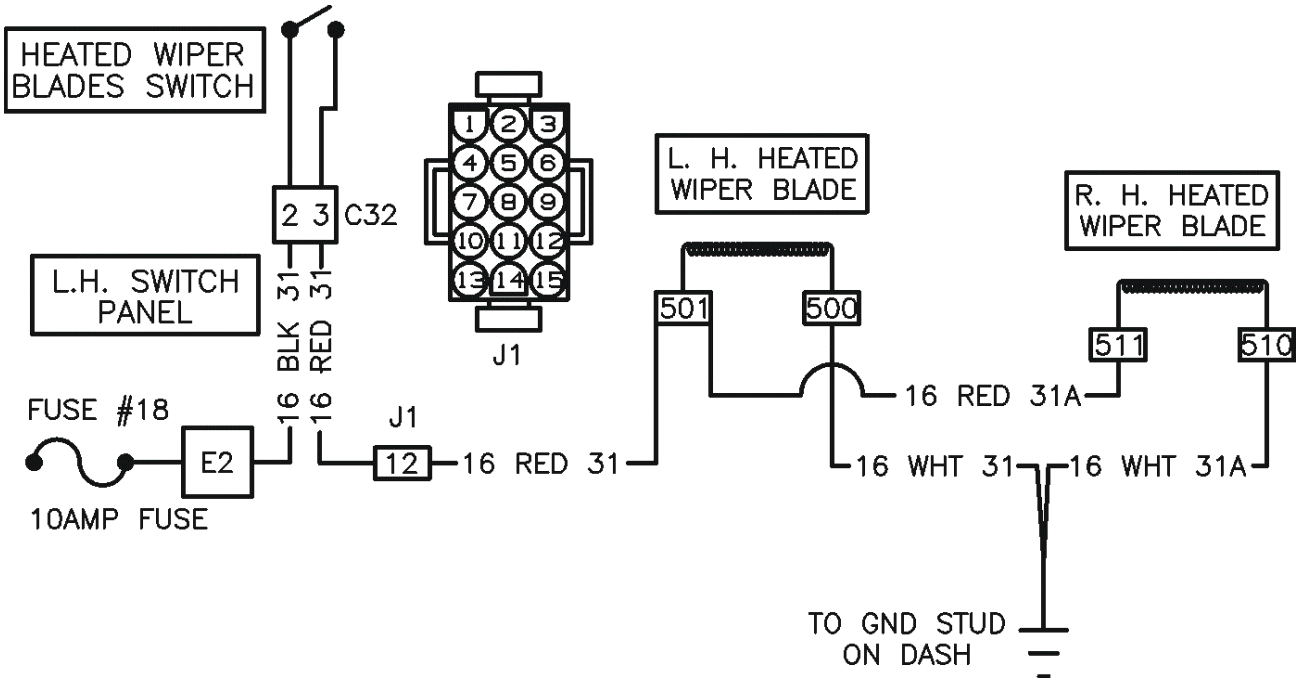

Figure 228 Heated Wiper Blade Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

Table 131 Heated Wiper Blade Voltage Tests

Heated Wiper Blade Switch Voltage Checks Check with ignition on and left hand switch panel connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.** Test heated wiper blade switch for continuity.		
Test Points	Spec.	Comments
Left hand switch panel connector (C32) pin 2 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #18 and for open or short in circuit 16 BLK 31.
Left hand switch panel connector (C32) pin 2 to 3.	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuits 16 RED 31 and 16 RED 31A.
Left Hand Heated Wiper Blade Voltage Checks Check with ignition on, heated wiper blades turned 'on' and left hand heated wiper blade connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Left hand heated wiper blade connector (501) to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 RED 31.

Table 131 Heated Wiper Blade Voltage Tests (cont.)

Left hand heated wiper blade connector (501) to (500).	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 31. If circuits test good and heated wiper blade still malfunctions, replace wiper heater element.
Right Hand Heated Wiper Blade Voltage Checks Check with ignition on, heated wiper blades turned 'on' and right hand heated wiper blade connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Right hand heated wiper blade connector (511) to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 RED 31 and 16 RED 31A.
Right hand heated wiper blade connector (511) to (510).	12 ± 1.5 volts	If voltage is missing, check for open or short to high in circuit 16 WHT 31A. If circuits test good and heated wiper blade still malfunctions, replace wiper heater element.

Extended Description

The heated wiper blades are wired directly to the heated wiper blade switch in the left hand switch panel. 12 volts to the heated wiper blades is provided from a 10 amp fuse when the heated wiper blade switch is closed.

Ground is supplied to the heated wiper blades from the ground stud in the dash panel.

9.4. COMPONENT LOCATIONS

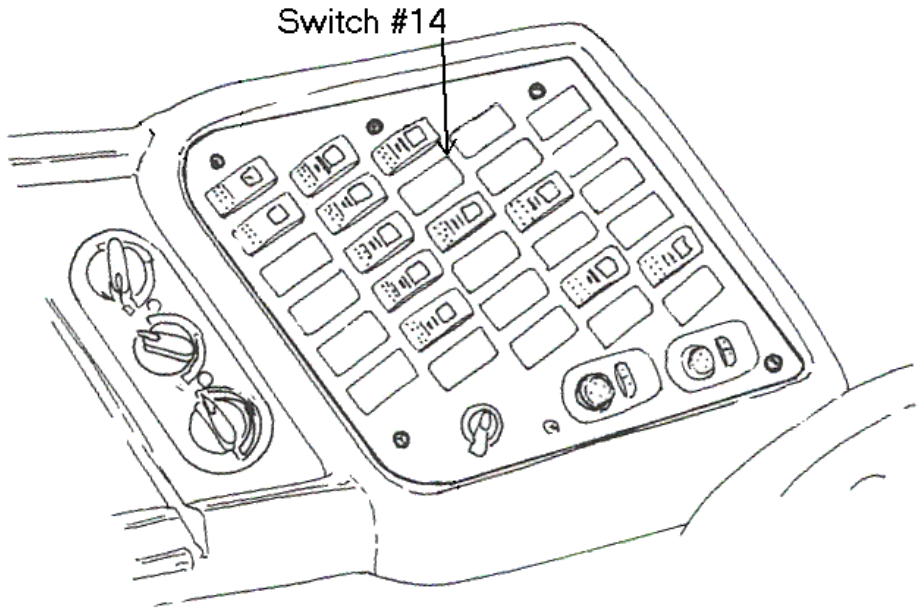

Figure 229 Left Hand Switch Panel

SWITCH #14 — HEATED WIPER BLADE SWITCH

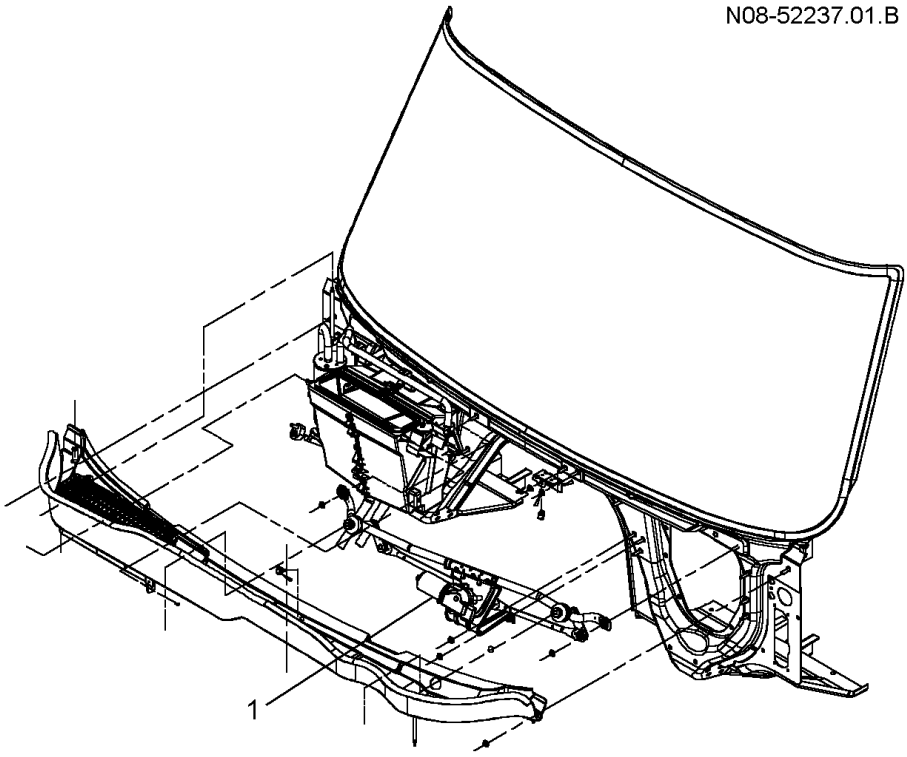

Figure 230 Wiper Motor Location

1. WIPER MOTOR

10. CLUTCH SWITCH

10.1. CIRCUIT FUNCTIONS

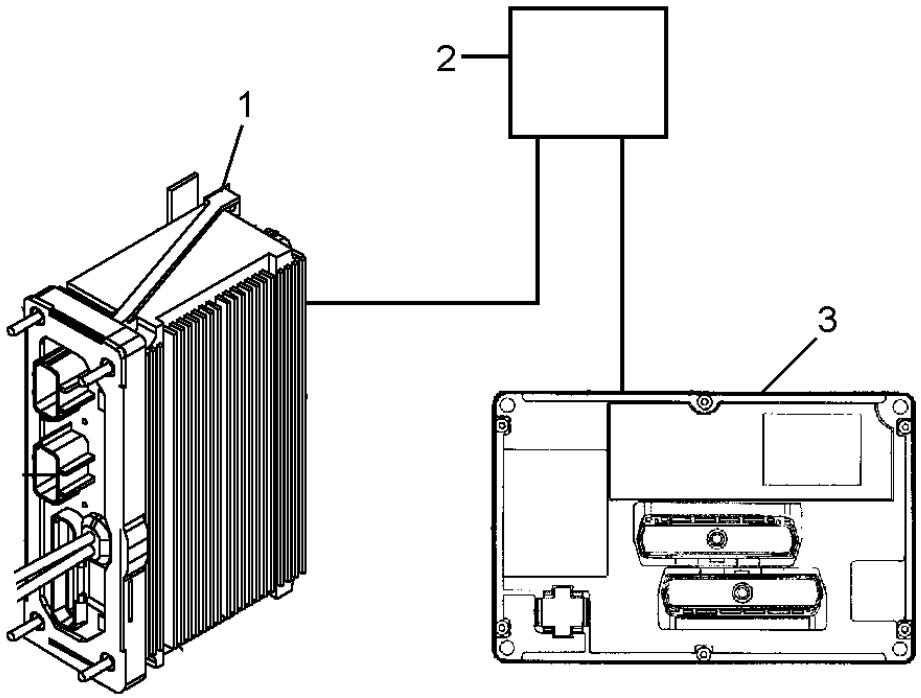

Figure 231 Clutch Switch Function Diagram

1. ELECTRICAL SYSTEM CONTROLLER
2. CLUTCH SWITCH MODULE
3. ENGINE CONTROL MODULE

Refer to Clutch Switch Function Diagram.

The clutch switch module contains two clutch switches. One switch is an input to the ESC and senses clutch pedal position to disengage the cruise control. The other clutch switch is an input to the engine controller and senses clutch pedal position to enable engine cranking.

Both switches are magnetic and require no adjustment.

10.2. DIAGNOSTICS

A failure of the clutch switch to the ESC should be suspected if the cruise control does not engage or disengage when the clutch pedal is pushed. A diagnostic trouble code (DTC) for this switch will be logged if there is an open or short in circuits to the switch. A (DTC) will also be logged if the switch is stuck in the open or closed position.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the clutch switch to the ESC. See the diagnostic software manual for details on using the software.

A failure of the clutch switch to the engine controller should be suspected if the engine does not crank when the key is in the start position.

An electronic service tool, running the "Master Diagnostics" diagnostic software, can be used to check operation of the clutch switch to the engine controller. See the diagnostic software manual for details on using the software.

Clutch Switch Preliminary Check

Table 132 Clutch Switch Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Attempt to crank engine with clutch pedal depressed.		Engine cranks.	Go to next step.	Refer to the Engine Cranking section of this manual.
2.	On	Start engine and operate cruise control. Attempt to disengage cruise control by depressing clutch pedal.		Cruise control does not engage or does not disengage when clutch pedal is depressed.	Go to next step.	Clutch Switches are operating correctly. Problem does not exist or is intermittent. (Check for previously active diagnostic trouble codes.)
3.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
4.	On	Check for diagnostic trouble codes.(See Diagnostic Trouble Codes (DTC), page 447)	Read display on odometer.	**No** clutch switch diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 448)
5.	On	Clutch switch is operating correctly.				

Diagnostic Trouble Codes (DTC)

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes

or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 133 Clutch Switch Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
598 14 1 0	Upper Clutch Switch stuck in the open or closed position Occurs if the vehicle speed increases from 0 kph to 72 kph without a change in state of the clutch switch. Fautly upper clutch switch Refer to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 448)
612 14 2 1	Upper Clutch Switch out of range low Shorted to ground. Refer to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 448)
612 14 2 2	Upper Clutch Switch out of range high Shorted high or open circuit. Refer to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 448)

10.3. 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.

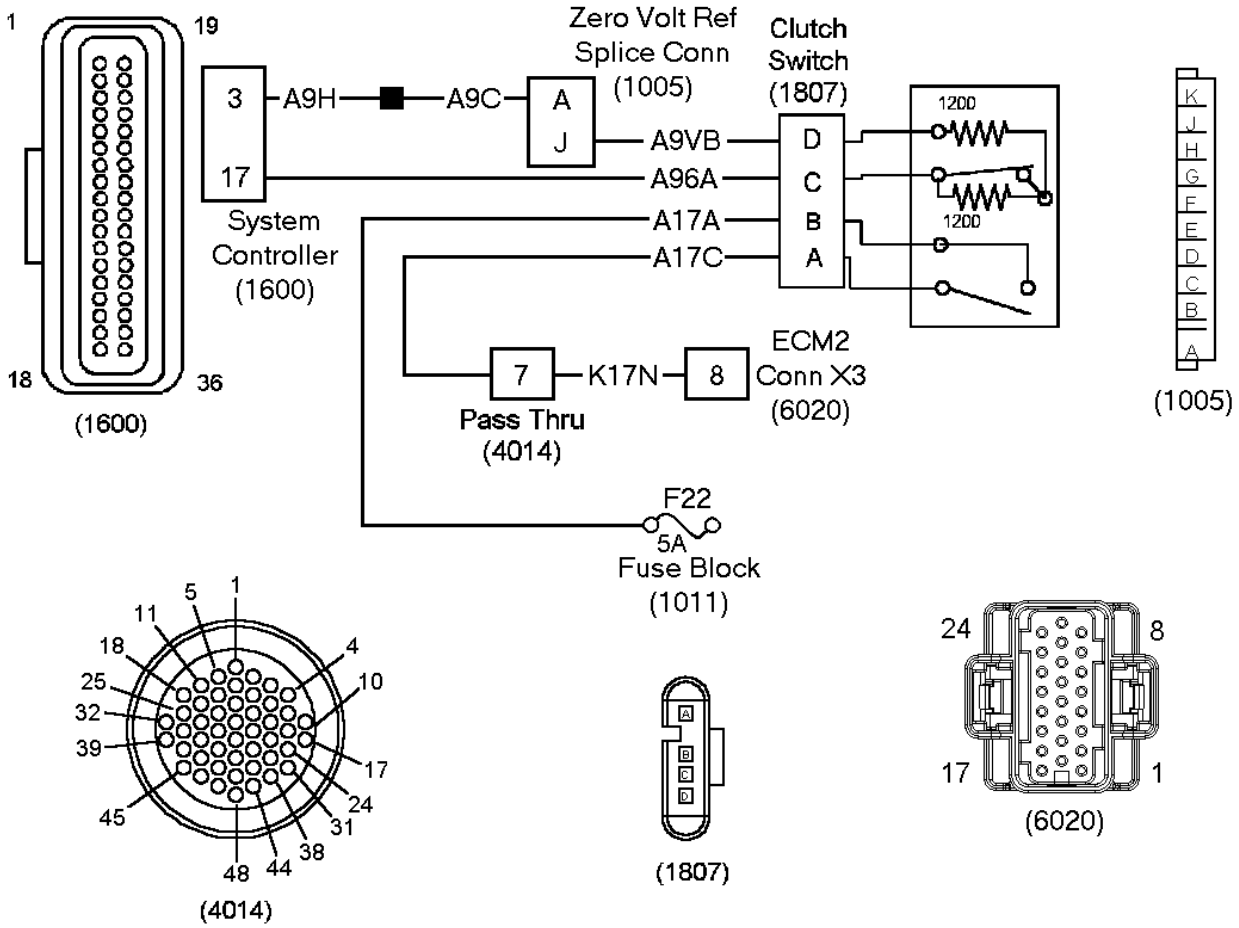

Figure 232 Clutch Switch Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REF SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER
LOCATED INSIDE RIGHT SIDE DASH PANEL
(1807) CLUTCH SWITCH
LOCATED ABOVE ACCELERATOR PEDAL
(4014) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(6020) ECM2 CONN — X3
LOCATED AT ENGINE COMPARTMENT AT ECM

Refer to Clutch Switch Circuits.

Table 134 Clutch Switch Circuit Tests

Clutch Switch Harness Connector (1807) Voltage Checks Check with ignition key on and connector (1807) removed. **NOTE – Voltage to the switch will be approximately 5 volts with the key off.** **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
(1807) harness connector, pin B to ground	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuit A17A. Also check for blown fuse F22.
(1807) harness connector, pin B to A	12 ± 1.5 volts	If voltage is good. Bench check clutch switch. Replace if faulty. If voltage is missing, check for open in circuits between clutch switch and engine controller. If circuits check good and voltage is still missing, verify signal (low) out of engine controller. Refer to the applicable engine manual.
(1807) harness connector, pin C to ground	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuit A96A.
(1807) harness connector, pin C to pin D	12 ± 1.5 volts	If voltage is correct, bench check clutch switch. Replace if faulty. If voltage is missing, check for open in circuit A9VB or circuits to ESC (1600) cavity 3. If circuits check good and voltage is not present, verify zero volt reference level from ESC. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Clutch Switch Module Resistance Checks Check with clutch switched removed. **NOTE – Always check connectors for damage and pushed–out terminals.** This is a magnetic switch. To activate the switch put a piece of steel (such as a wrench) against the switch face.		
Test Points	Spec.	Comments

Table 134 Clutch Switch Circuit Tests (cont.)

Clutch switch connector (1807) cavity A to B.	<1 ohm with switch activated. >10K ohms with switch not activated.	If there is no continuity with switch activated or continuity with switch activated, replace clutch switch module.
Clutch switch connector (1807) cavity C to D.	Approximately 1200 ohms with switch activated. Approximately 2400 ohms with switch not activated	If switch module resistances are not correct, replace clutch switch module.

10.4. EXTENDED DESCRIPTION

Clutch Switch to ESC

The ESC supplies approximately 6 volts to Pin C of the clutch switch module and the zero volt reference signal to pin D.

When nothing is in front of the switch module face, the switch will be closed and the ESC will sense the voltage drop across one 1200 ohm resistor.

When steel is passed in front of the switch module face, the switch will open and the ESC sense the voltage drop across two 1200 ohm resistors.

The ESC will use this information to enable or disable the cruise control.

These resistors, one in series with the switch and one in parallel with the switch, allow the ESC to monitor the switch and its circuits for opens or shorts to ground.

An open circuit or short to ground will cause the voltage drop to be out of rang and the ESC will log the appropriate DTC.

Clutch Switch to Engine Controller

Battery voltage is supplied to pin B of the clutch switch. When steel is passed in front of the switch module face, the switch will close and the voltage will connect to pin A and will be applied to the engine controller.

10.5. COMPONENT LOCATIONS

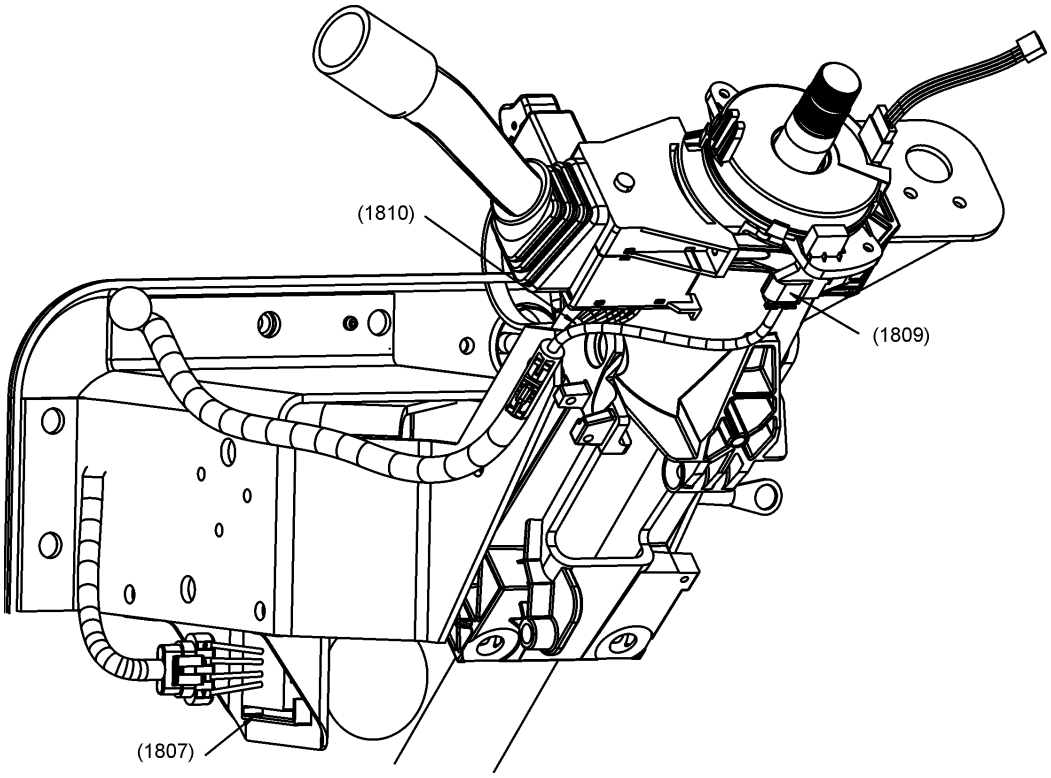

Figure 233 Clutch Switch Location

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

11. PARK BRAKE SWITCH

11.1. CIRCUIT FUNCTIONS

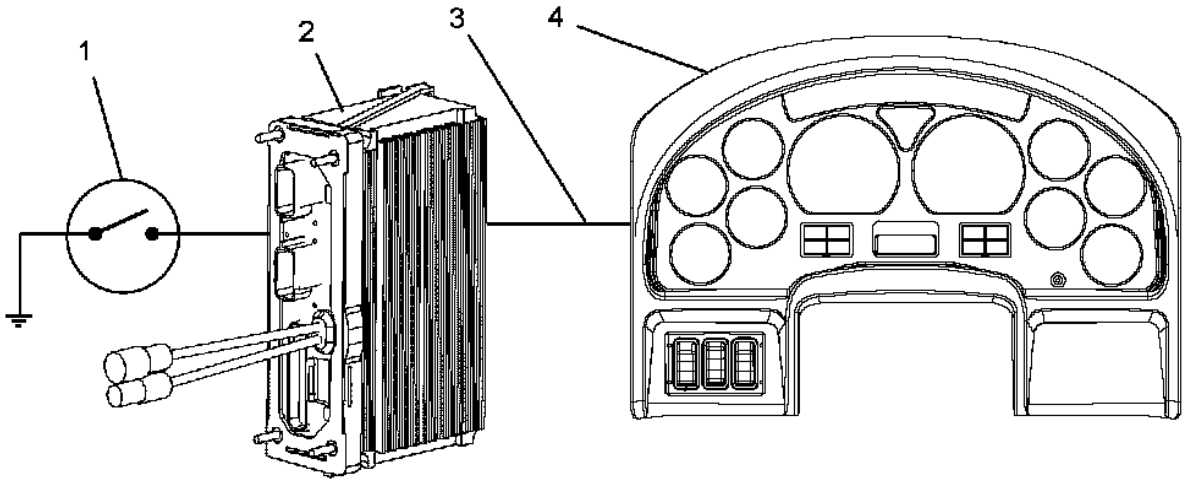

Figure 234 Park Brake Switch Function Diagram

1. PARK BRAKE SWITCH
2. ELECTRONIC SYSTEM CONTROLLER
3. DRIVE TRAIN 1939 DATA LINK
4. ELECTRONIC GAUGE CLUSTER (EGC)

NOTE – There is no park brake switch if the vehicle is equipped with the full power brake system option.

The ESC uses the park brake switch input for the following functions:

- To determine when to turn on the park lamp on the EGC.
- To turn off the daytime running lights when the headlights are off, the engine is not running and the key is in the ignition position.
- To enable the diagnostic trouble code retrieval procedure.
- Used as an input to generate the command to the transmission controller to shift to neutral (used with auto neutral feature only).

11.2. DIAGNOSTICS

A failure of the park brake switch inputs to the ESC should be suspected if the park indicator lamp in the EGC does not illuminate when the park brake is set and the EGC cannot be put in diagnostic mode.

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

Park Brake Switch Preliminary Check

Table 135 Park Brake Switch Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify park brake switch operation.	Set and release park brake	Park indicator on EGC Illuminates with brake set and goes out with brake off.	Park brake switch is functioning.	Go to next step.
2.	On	Attempt to put EGC in diagnostic mode.	Set park brake and press cruise “ON” and RESUME” simultaneously.	EGC displays fault messages.	Go to next step.	Go to Fault Detection Management. (See FAULT DETECTION MANAGEMENT, page 454)
3.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or 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.
4.	On	Go to Park Brake Warning Lamp. (See Diagnostic Trouble Codes (DTC), page 190)				

11.3. 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.

The service tool (EZ-Tech®) running the "Diamond Logic Builder™" diagnostic software can be used to monitor park brake switch operation. See the diagnostic software manual for details on using the software.

If the park indicator on the EGC stays on continuously or does not come on when the park brake is on, the problem may be in ESC/EGC programming, ESC/EGC hardware, the park brake switch or the park brake switch wiring to the ESC.

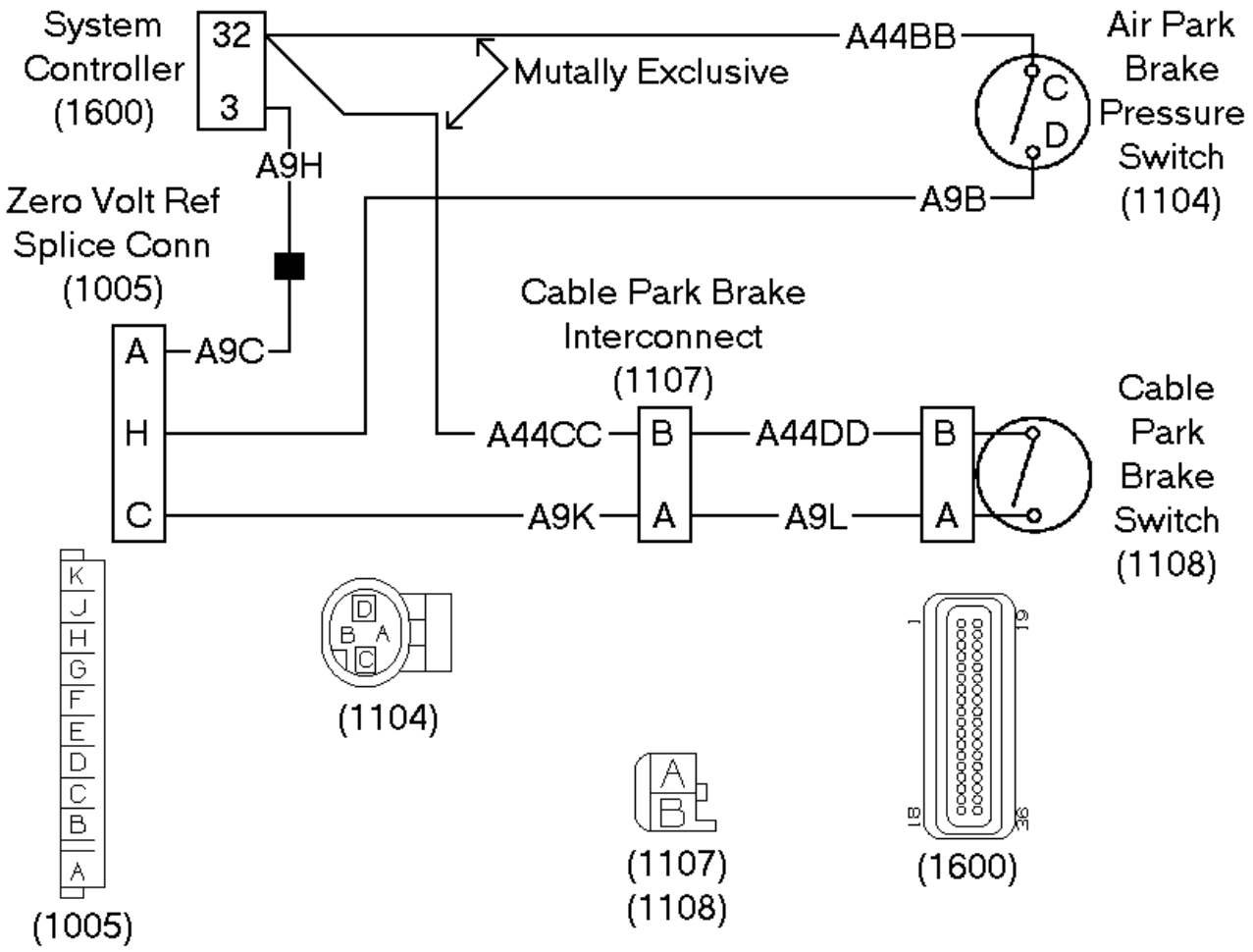

Figure 235 Park Brake Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(4013) PASS THRU AT DASH
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(4014) DASH/ENGINE PASS THRU
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(4036) HYDRAULIC BRAKE SWITCH
LOCATED AT HYDRAULIC MASTER CYLINDER
(4905) AIR BRAKE SOLENOID
LOCATED AT OUTSIDE LEFT SIDE DASH PANEL
(6350) GROUND SPLICE PACK
LOCATED AT ENGINE COMPARTMENT NEAR STARTER
(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 136 Park Brake Switch Circuits Voltage Check Chart

Diagnostic Trouble Codes		
70 14 1 0	Air Powered Park Brake is stuck.	
70 14 1 1	The auto apply portion with the Air Powered Park Brake is not operating.	
639 14 241 254	Full Power Brake information not communicating to the ESC.	
Park Brake Switch Connector (1813) or (1815) Voltage Checks Check with Brake Switch Disconnected and the Ignition Key “On” **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
(1104) harness connector, cavity C or (1107) cavity B to ground.	12 ± 1.5 volts	If voltage is incorrect, check circuits A44BB or A44CC for open or short circuits. If circuits check good voltage is missing from ESC connector (1600) pin 32.
(1104) harness connector, cavity C or (1107) cavity B to (1104) cavity D or (1107) cavity A.	12 ± 1.5 volts	If voltage is correct and condition still exists, the brake switch has failed. Replace brake switch. If voltage is incorrect, check circuit A9B, A9K, A9C or A9H for an open circuit or good connection to ground. If no open circuits are found, check system controller connector (1600) pin 3 for zero volt reference signal.
There are no diagnostic trouble codes associated with the park brake switch.		

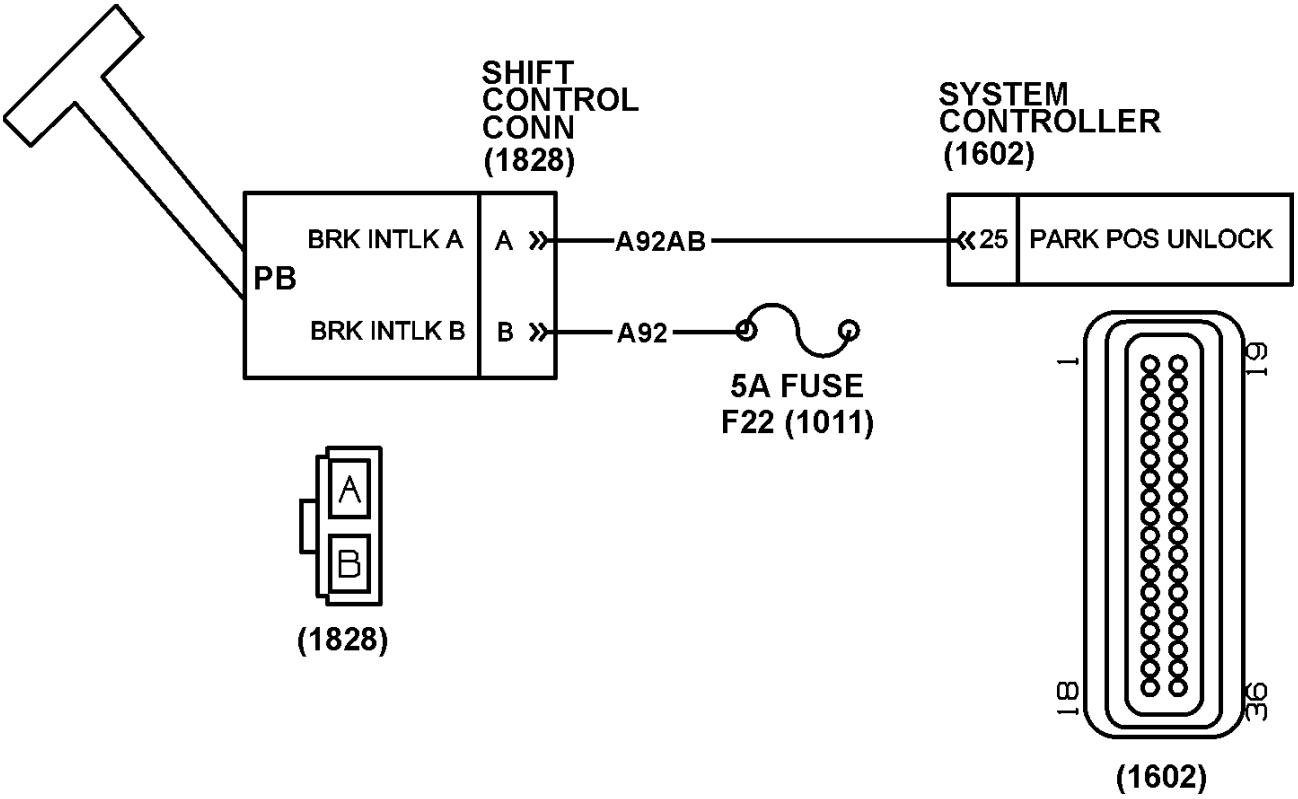

Figure 236 Hydraulic Park Brake Circuits (w/Full Power Brakes) — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1828) LCT SHIFT CONTROL
LOCATED AT INSTRUMENT WING PANEL

Table 137 Hydraulic Park Brake Lamp Circuits Voltage Check Chart

Shift Control Connector (1828)) Voltage Checks Check with ignition in key switch position on and hydraulic park brake switch connector (1128) 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
Shift control connector (1828) pin B to ground.	12 ± 1.5 volts	If voltage is incorrect, check for blown fuse F22. Also check for open or short in circuit A92.

Table 137 Hydraulic Park Brake Lamp Circuits Voltage Check Chart (cont.)

Shift Control Connector (1828)) Voltage Checks		
Check with ignition in key switch position on and hydraulic park brake switch connector (1128) 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
Shift control connector (1828) pin B to pin A.	12 ± 1.5 volts	**NOTE – Park Brake Light should illuminate.** If voltage is correct check for open on circuit A92AB. If circuits check good and Park brake light still fails, the problem could be a faulty EGC or faulty ESC. Refer to their respective sections in this manual for troubleshooting guides.
There are no diagnostic trouble codes associated with this feature.		

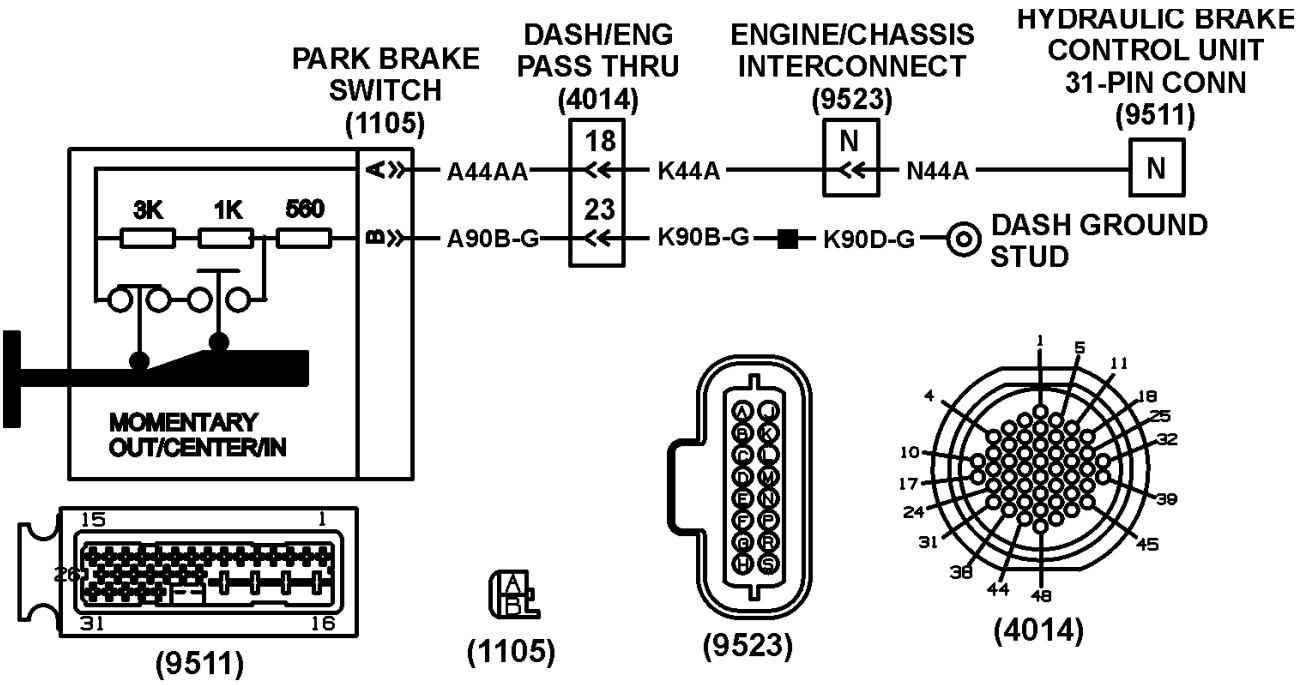

Figure 237 Hydraulic Park Brake Circuits (w/Momentary Switch) — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1105) HYDRAULIC PARK BRAKE SWITCH
LOCATED AT INSTRUMENT WING PANEL
(4014) DASH ENGINE PASS THRU
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(9511) HYDRAULIC BRAKE CONTROL UNIT
LOCATED AT INSIDE LEFT FRAME RAIL AT HCU
(9523) ENGINE/CHASSIS INTERCONNECT
LOCATED AT INSIDE LEFT FRAME RAIL BEHIND ENGINE

Table 138 Hydraulic Park Brake Circuits (w/Momentary Switch) Voltage Check Chart

Hydraulic Park Brake Switch (1105) Resistance Checks Check with hydraulic park brake switch connector (1105) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Park brake switch connector (1105) cavity A to cavity B (with switch in “middle” position).	approx. 1.56 Kohms	If resistance is incorrect, replace park brake switch.
Park brake switch connector (1105) cavity A to cavity B (with switch in “out” position).	approx. 4.56 Kohms	If resistance is incorrect, replace park brake switch.

Table 138 Hydraulic Park Brake Circuits (w/Momentary Switch) Voltage Check Chart (cont.)

Hydraulic Park Brake Switch (1105) Resistance Checks Check with hydraulic park brake switch connector (1105) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Park brake switch connector (1105) cavity A to cavity B (with switch in “in” position).	approx. 560 ohms	If resistance is incorrect, replace park brake switch. If switch resistances are correct and failure still exists, the check for open of short on circuits N44A, K44A, A44AA, A90B-G, K90B-G and K90D-G. If all circuits check good, then hydraulic brake control unit may need replaced or reprogrammed.
There are no diagnostic trouble codes associated with this feature.		

11.4. EXTENDED DESCRIPTION

On vehicles with hydraulic brakes, the zero volt reference level is supplied from ESC connector (1600) terminal 3 to park brake switch connector (1107) terminal A.

On vehicles with air brakes, the zero volt reference level is supplied from ESC connector (1600) terminal 3 to park brake switch connector (1104) terminal D.

When the park brake is engaged the switch is closed and the zero volt reference level is supplied to ESC connector (1600) terminal 32 signaling the ESC that the park brake has been applied.

11.5. COMPONENT LOCATIONS

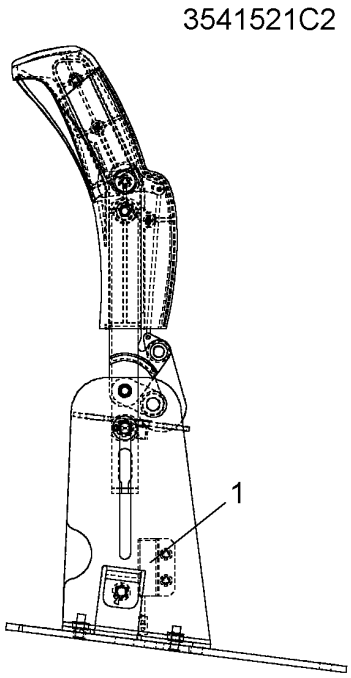

Figure 238 Park Brake Switch Location (With Cable Park Brake)

1. PARK BRAKE SWITCH

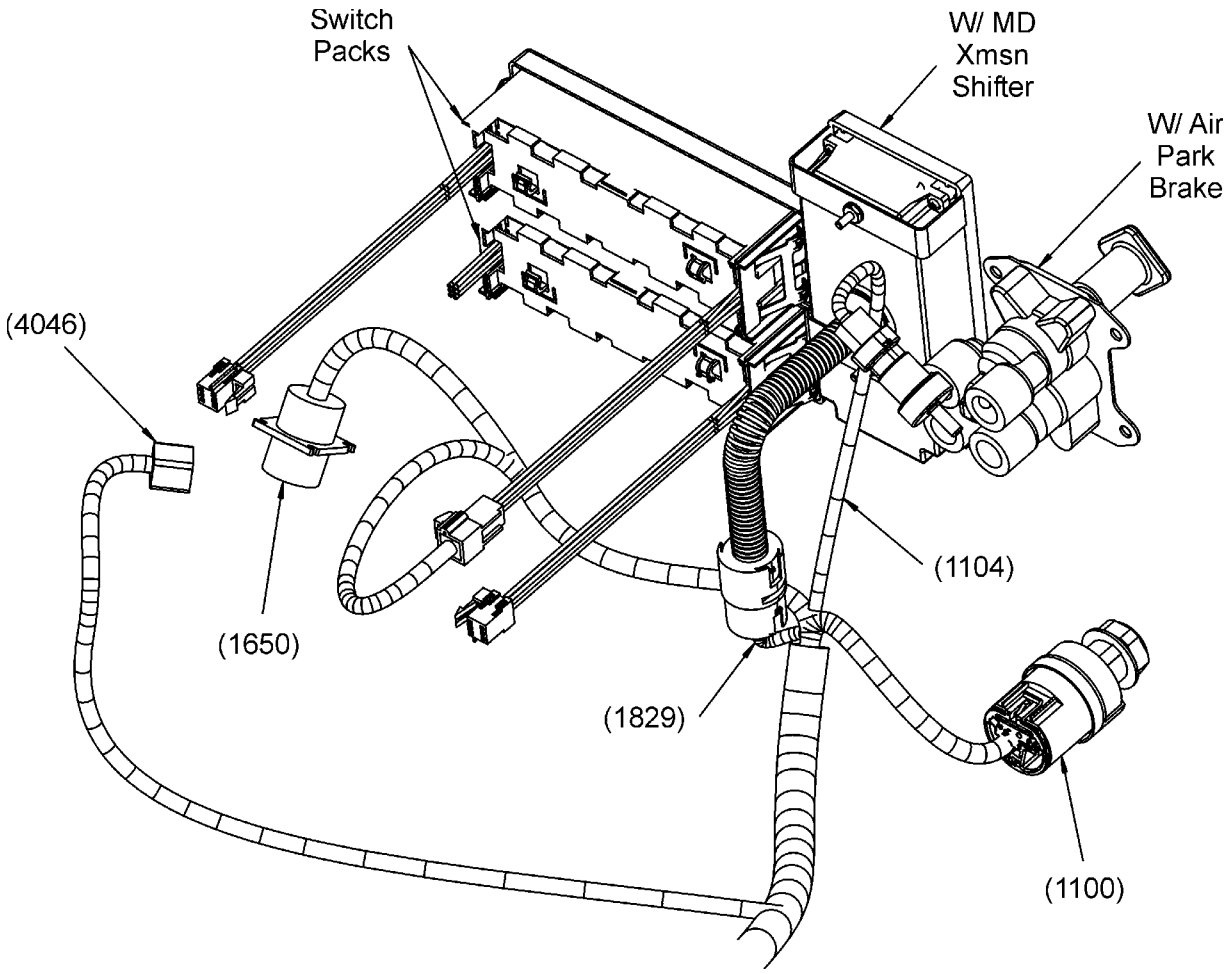

Figure 239 Air Park Brake Switch Location (Steering Column Support View)

(1100) KEY SWITCH
(1104) AIR PARK BRAKE PRESS SWITCH
(1650) DIAGNOSTICS CONNECTOR
(1829) MD TRANSMISSION PRIMARY SHIFT SELECTOR

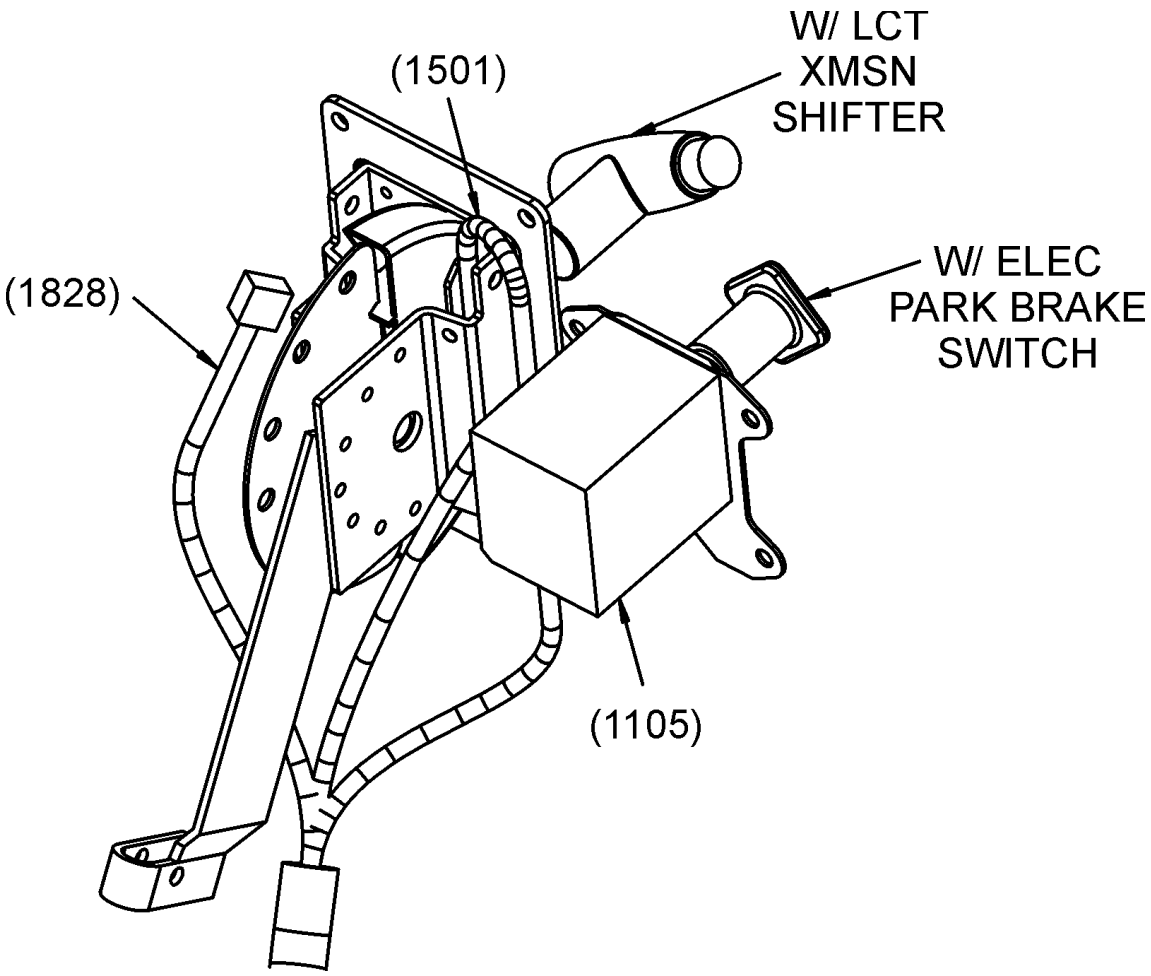

Figure 240 Hydraulic Park Brake Switch Location

(1105) HYDRAULIC PARK BRAKE SWITCH
(1501) SHIFT CONTROL CONNECTOR
(1828) LCT TRANSMISSION SHIFT CONTROL

12. DIAGNOSTIC CONNECTOR

12.1. CIRCUIT FUNCTIONS

Refer to diagnostic connector function diagram.

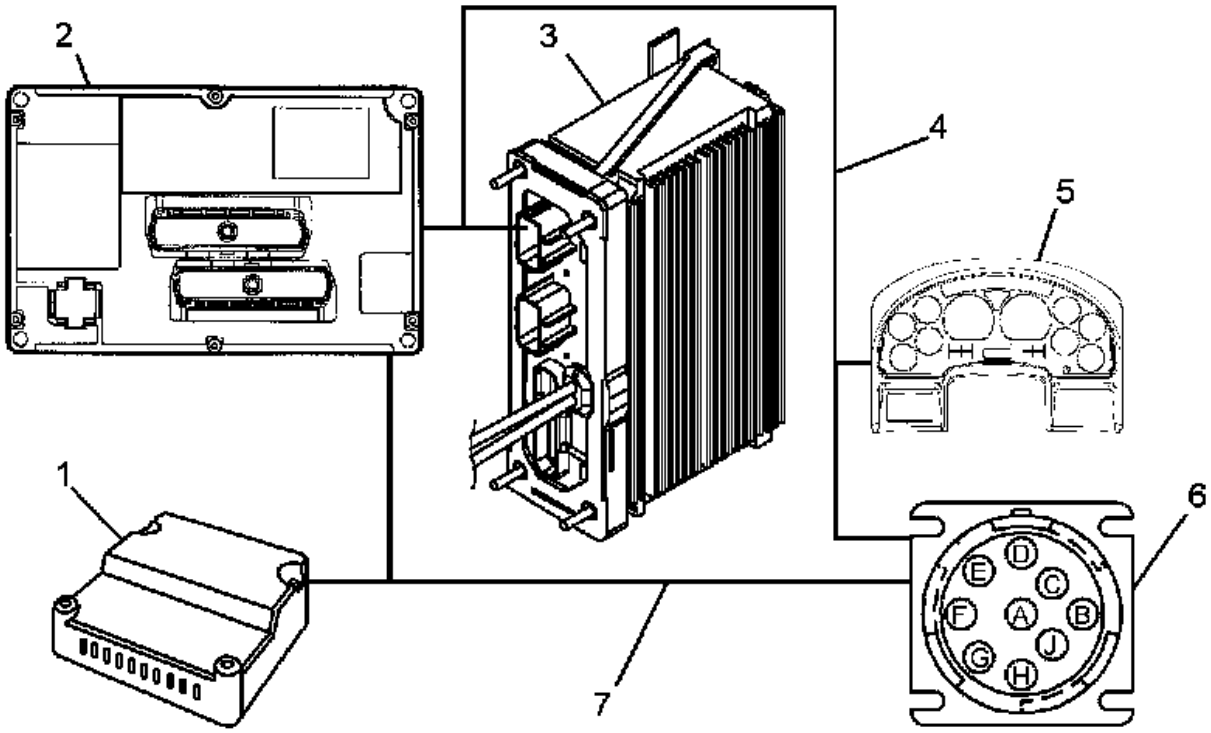

Figure 241 Diagnostic Connector Function Diagram

1. ABS CONTROLLER (OTHER CONTROLLERS ALSO CONNECTED)
2. ENGINE ECM
3. ESC
4. DRIVETRAIN 1939 DATA LINK
5. EGC
6. (1650) DIAGNOSTIC CONNECTOR
7. 1708 DATA LINK

The diagnostic connector provides an connection to the vehicle drivetrain 1939 data link, the 1708 data link, battery voltage and ground.

The diagnostic connector provides an interface between the vehicle and an electronic service tool (EST) such as the EZ-Tech®.

12.2. DIAGNOSTIC CONNECTOR CIRCUITS

Fault Detection Management

A fault in the diagnostic connector circuits will be apparent when the EST (EZ-Tech®) is not able to communicate with any devices communicating on the data links.

Should the diagnostic connector fail to provide an interface with the vehicle electronic controllers, the problem could be attributed to open or shorted wiring in power or ground circuits to the diagnostic connector or a failure in data link circuits.

Refer to diagnostic connector circuits.

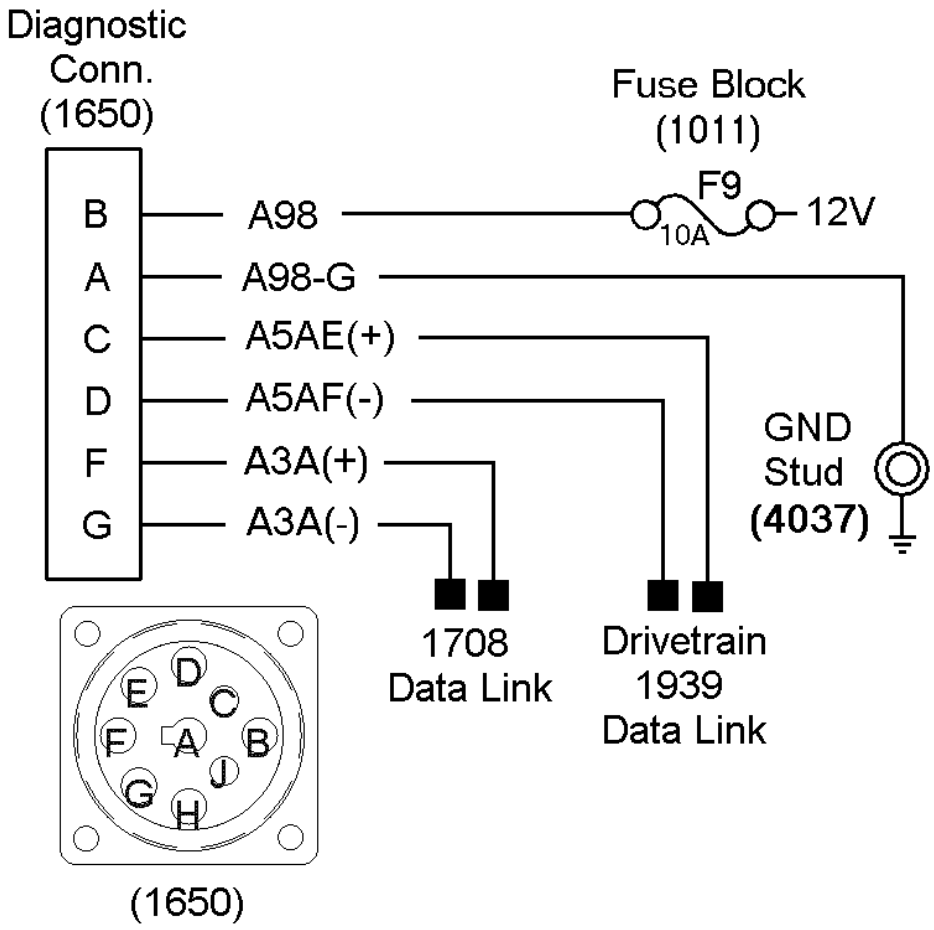

Figure 242 Diagnostic Connector Circuits — Always Refer to Circuit Diagram Book for Latest Circuit Information

(1011) FUSE BLOCK
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1650) DIAGNOSTICS CONNECTOR
LOCATED AT INSTRUMENT WING PANEL

Table 139 Diagnostic Connector Tests

Diagnostic Trouble Codes		
There are no diagnostic trouble codes associated with the diagnostic connector circuits.		
Diagnostic Connector Voltage Checks **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Diagnostic connector cavity B to ground	12 ± 1.5 volts	If voltage is missing, check for open or shorts in circuits between diagnostic connector and F9. Also check for blown fuse F9.
Diagnostic connector cavity B to cavity A	12 ± 1.5 volts	If voltage is missing, check for open in ground circuits between diagnostic connector and ground stud. If voltage is correct diagnostic connector is inoperative, the diagnostic connector should be replaced.
Diagnostic connector cavity C to cavity A	2.5 ± 0.5 volts	If voltage is missing, check for open in circuits between diagnostic connector and 1939 data link circuits.
Diagnostic connector cavity D to cavity A	2.5 ± 0.5 volts	If voltage is missing, check for open in circuits between diagnostic connector and 1939 data link circuits.
(1650) Pin F to ground	Approximately 4 volts	(+) data link circuit. If voltage is low check for open in positive data link circuits.
(1650) Pin G to ground	Approximately 1 volt	(-) data link circuit. If voltage is low check for open in negative data link circuits. If voltage is high check for crossed data link circuits.

Extended Description

Battery voltage, required to operate the diagnostic circuits, is supplied from fuse F9 on circuit A98 to diagnostic connector (1650) pin B. Ground is supplied from ground stud connector to diagnostic connector (1650) pin A.

12.3. COMPONENT LOCATIONS

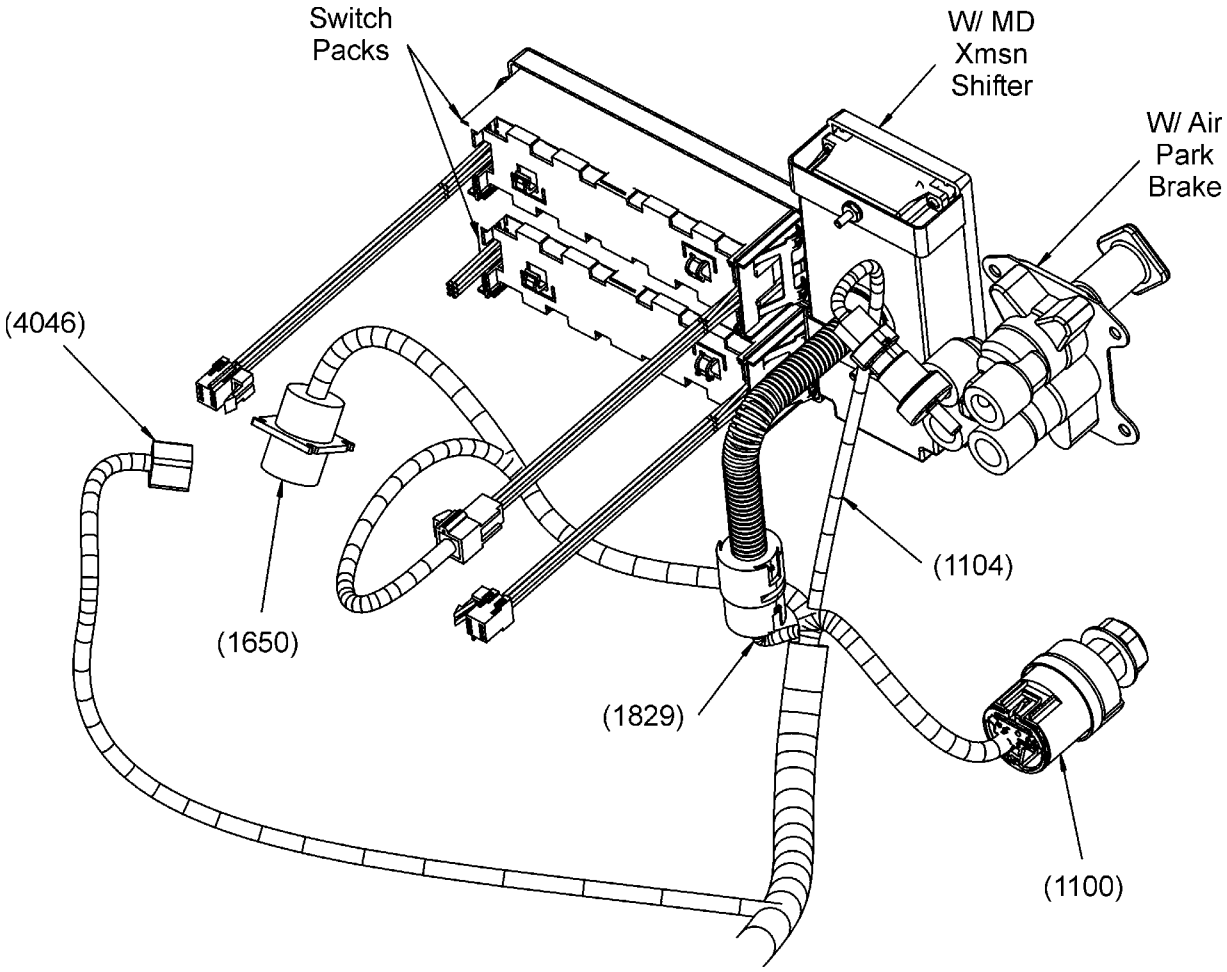

Figure 243 Diagnostic Connector Location

(1100) KEY SWITCH
(1104) AIR PARK BRAKE PRESS SWITCH
(1650) DIAGNOSTICS CONNECTOR
(1829) MD TRANSMISSION PRIMARY SHIFT SELECTOR

13. BRAKE SWITCH / STOP LIGHT SWITCH

13.1. CIRCUIT FUNCTION

The brake switch(es) sense when the driver is pressing the brake pedal to apply the brakes and thus signal the ESC to turn on the stop lights and turn off the cruise control.

On vehicles with hydraulic brakes the stop light signal to the ESC comes from a switch activated by the brake pedal. The switch also signals the ESC to activate the brake booster pump when the engine is off and/or a failure in the brake system has occurred.

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.

Refer to the Hydraulic Brake Switch(See HYDRAULIC BRAKE SWITCH INPUTS TO ESC, page 853) or the Air Brake Switch(See AIR BRAKE SWITCH INPUTS TO ESC, page 855) section of this manual for more details.

14. ALLISON MD TRANSMISSION SHIFTER

14.1. CIRCUIT FUNCTIONS

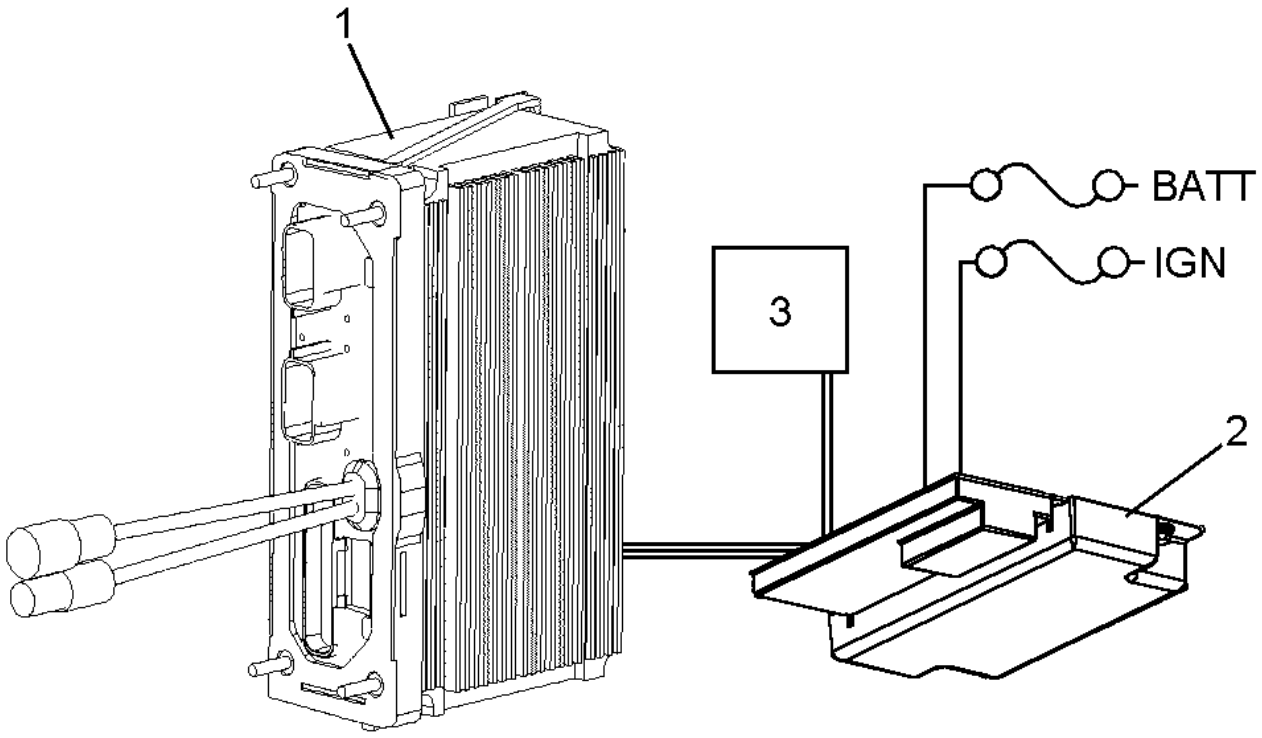

Figure 244 Allison MD Transmission Shifter Function Diagram

1. ELECTRICAL SYSTEM CONTROLLER (ESC)
2. MD TRANSMISSION CONTROL MODULE
3. MD TRANSMISSION PUSH BUTTON SHIFTER

14.2. DIAGNOSTICS

A failure in the Allison MD Transmission Shifter circuits should be suspected. A diagnostic trouble code (DTC) for this switch will be logged if there is an open or short in circuits to the switch.

An electronic service tool, running the "Diamond Logic Builder™" diagnostic software, can be used to check operation of the micro relay to the ESC. See the diagnostic software manual for details on using the software.

Allison MD Transmission Shifter Preliminary Check

Table 140 Allison MD Transmission Shifter Preliminary Check Table

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of Allison MD Transmission Push Button Shifter.	Visually check Allison MD Transmission Push Button Shifter.	Allison MD Transmission Push Button Shifter does not operate.	Go to next step.	Allison MD Transmission Push Button Shifter is operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or 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	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 469)	Read display on odometer.	**No** Allison MD Transmission Push Button Shifter diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management . (See FAULT DETECTION MANAGEMENT, page 470)
4.	On	Go to Fault Detection Management . (See FAULT DETECTION MANAGEMENT, page 470)				

Diagnostic Trouble Codes (DTC)

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 141 Allison MD Transmission Shifter Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
2033 14 13 0	Park Position Unlock solenoid. There is a load on this pin that has been configured as unused.
2033 14 13 1	Park Position Unlock solenoid. Output overloaded.
2033 14 13 2	Park Position Unlock solenoid. Output open circuit.
2033 14 13 3	Park Position Unlock solenoid. Output shorted to ground.

14.3. 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.

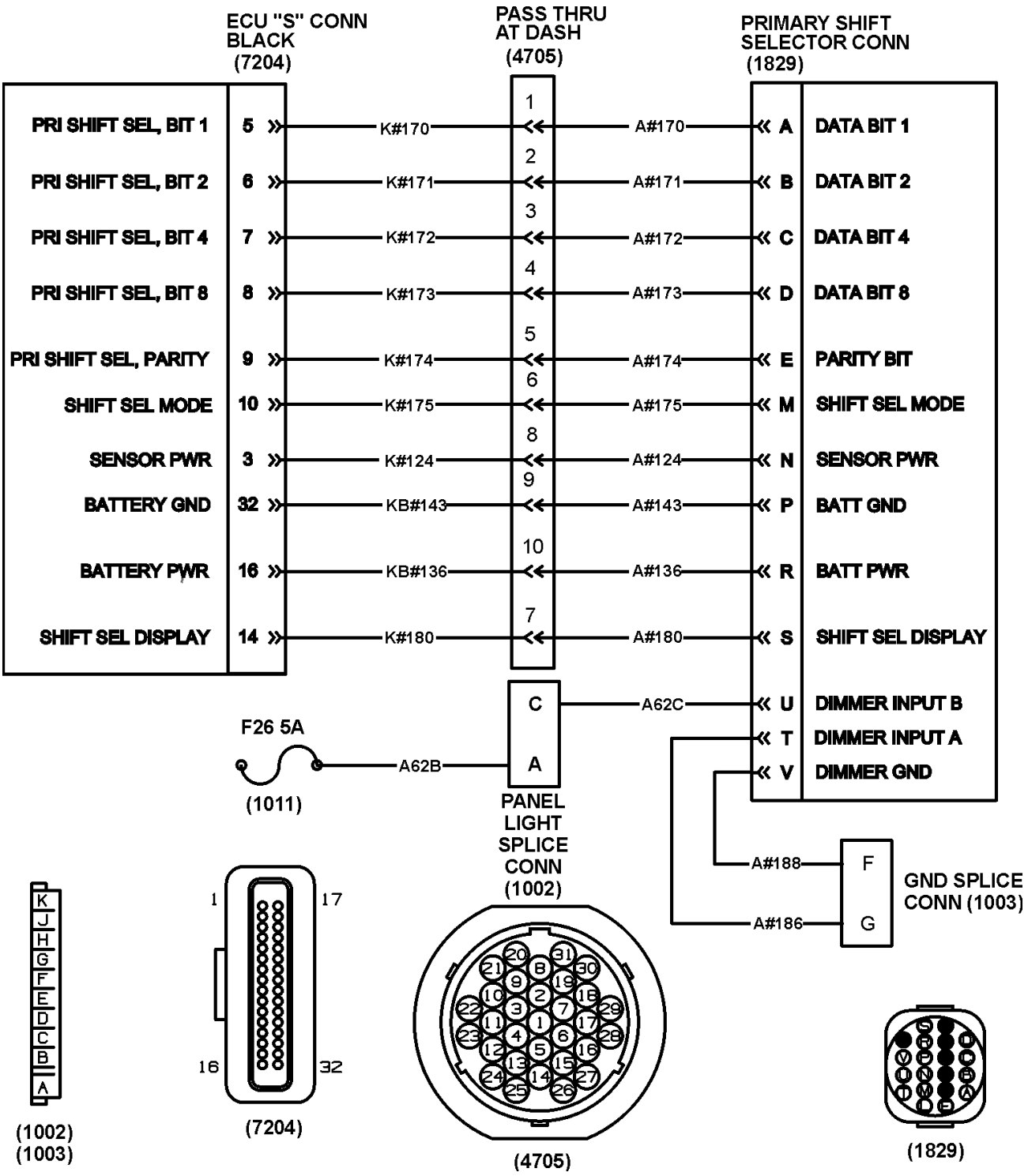

Figure 245 Allison MD Transmission Shifter Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1002) PANEL LIGHT SPLICE CONNECTOR
LOCATED AT LEFT SIDE INSTRUMENT PANEL
(1003) GROUND SPLICE CONNECTOR
LOCATED LEFT SIDE INSTRUMENT PANEL
(1011) FUSE BLOCK
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1829) MD XMSN PRIMARY SHIFT SELECTOR CONNECTOR
LOCATED AT INSTRUMENT WING PANEL
(4705) PASS THRU AT DASH
LOCATED AT INSIDE DASH PANEL LEFT SIDE
(7204) MD ECU “S” CONNECTOR BLACK
LOCATED AT ENGINE COMPARTMENT TRANSMISSION

Refer to Allison MD Transmission Shifter Circuits.

Table 142 Allison MD Transmission Shifter Circuit Tests

Allison MD Transmission Shifter Checks Check with key in ignition position switch on.		
Test Points	Spec.	Comments
Allison MD Transmission Shifter connector (1829) cavity R to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits A#136 and KB#136.
Allison MD Transmission Shifter connector (1829) cavity R to P.	12 ± 1.5 volts	If voltage is missing, check for open or short to high on circuits A#143 and KB#143. Also check power supply to ECU. Also check all other connections from ECU to Allison MD Transmission Shifter for open or short. If all voltages and connections are good, but shift control still fails, replace shift control.

14.4. COMPONENT LOCATIONS

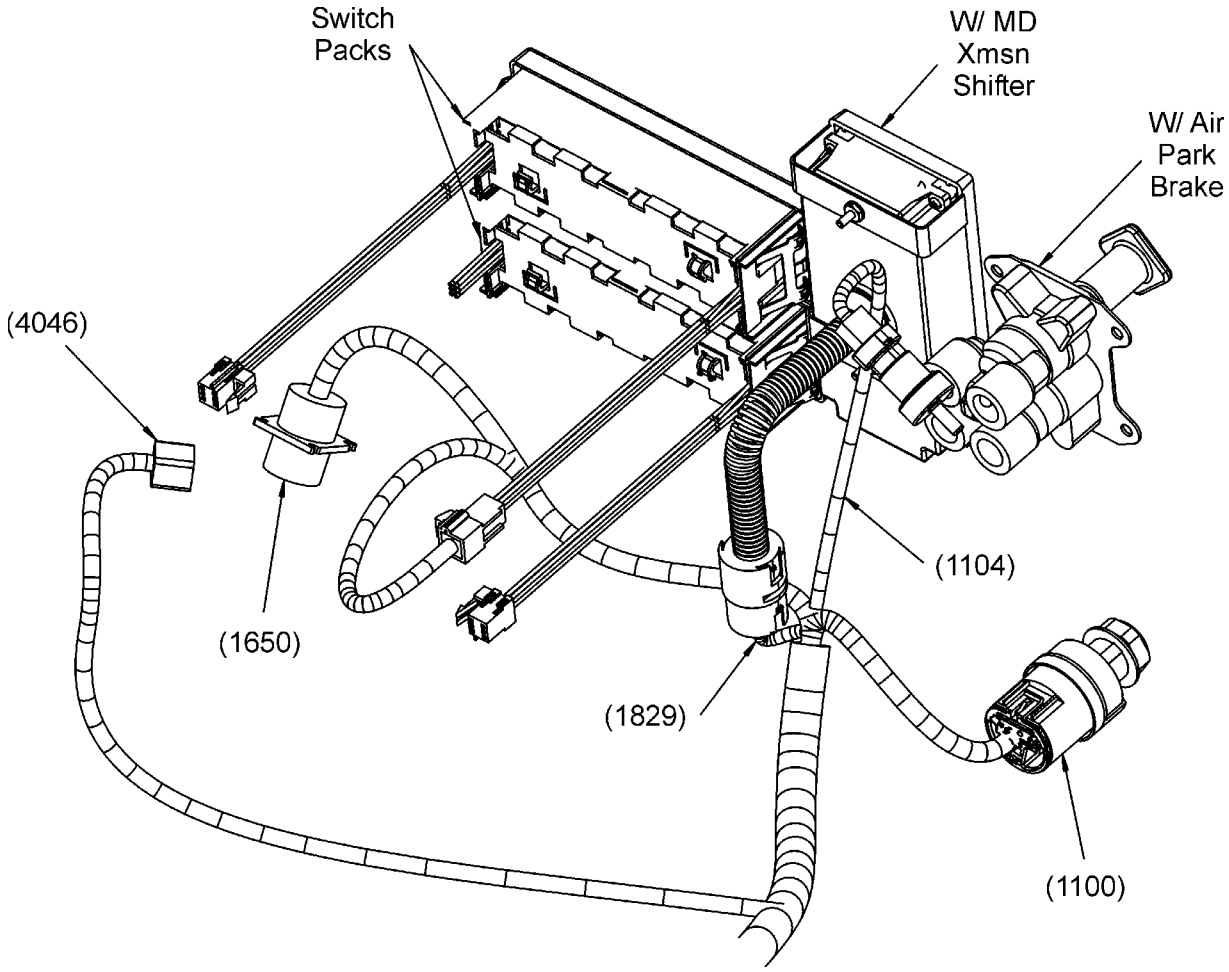

Figure 246 Allison MD Transmission Shifter Cab Wiring

(1104) AIR PARK BRAKE PRESS SWITCH
(1650) DIAGNOSTICS CONNECTOR
(1829) MD TRANSMISSION PRIMARY SHIFT SELECTOR CONNECTOR

15. SERVICE DOOR CONTROLS

15.1. CIRCUIT FUNCTIONS

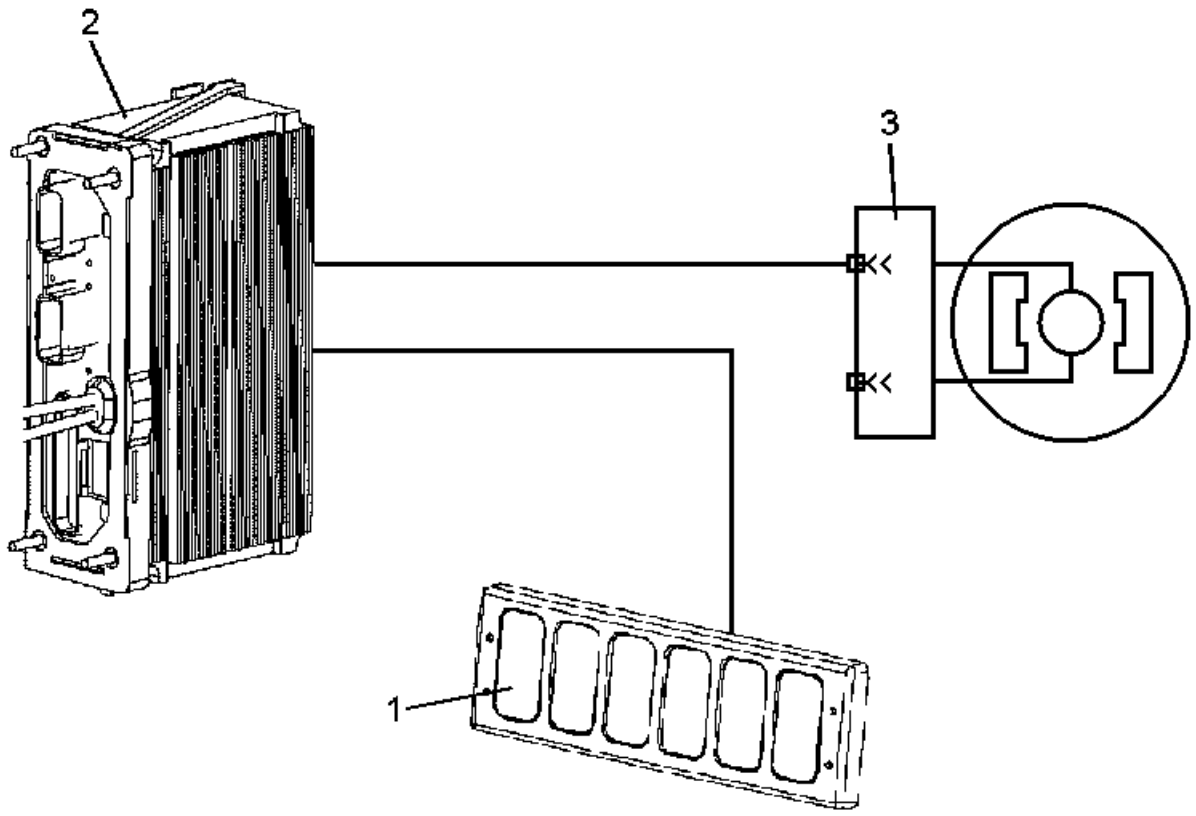

Figure 247 Service Door Controls Function Diagram

1. SERVICE DOOR CONTROL SWITCHES (LOCATION VARIES)
2. ELECTRONIC SYSTEM CONTROLLER
3. SERVICE DOOR MOTOR (ELECTRIC) OR SOLENOID (AIR)

15.2. DIAGNOSTICS

NOTE – If Service Door Control Switches are located in dash board switch pack, please refer to the Switch Pack diagnostics section of this manual for troubleshooting the service door inputs to the ESC.

A failure in the service door will be apparent when the door fails to operate.

Service Door Controls Preliminary Check

Table 143 Service Door Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of service door.	Visually check service door.	Service door does not operate.	Go to next step.	Service door is operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 475)	Read display on odometer.	**No** service door control diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management for electric service door and Fault Detection Management for air door.
4.	On	Go to Fault Detection Management for electric service door and Fault Detection Management for air door.				

Diagnostic Trouble Codes (DTC)

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 144 Service Door Control Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
612 14 5 1	Diags/flashers/Entrance Door Input out of range low.

Table 144 Service Door Control Diagnostic Trouble Codes (cont.)

612 14 5 2	Diags/flashers/Entrance Door Input out of range high.
2033 14 3 1	Electric Door Open Output overloaded.
2033 14 3 2	Electric Door Output open circuit.
2033 14 3 3	Electric Door Open Output shorted to ground.
2033 14 6 1	Electric Door Control is Output overloaded.
2033 14 6 2	Electric Door Control, Output open circuit.
2033 14 6 3	Electric Door Control, Output shorted to ground.

15.3. SERVICE DOOR CONTROLS 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.

Steering Wheel Service Door Controls

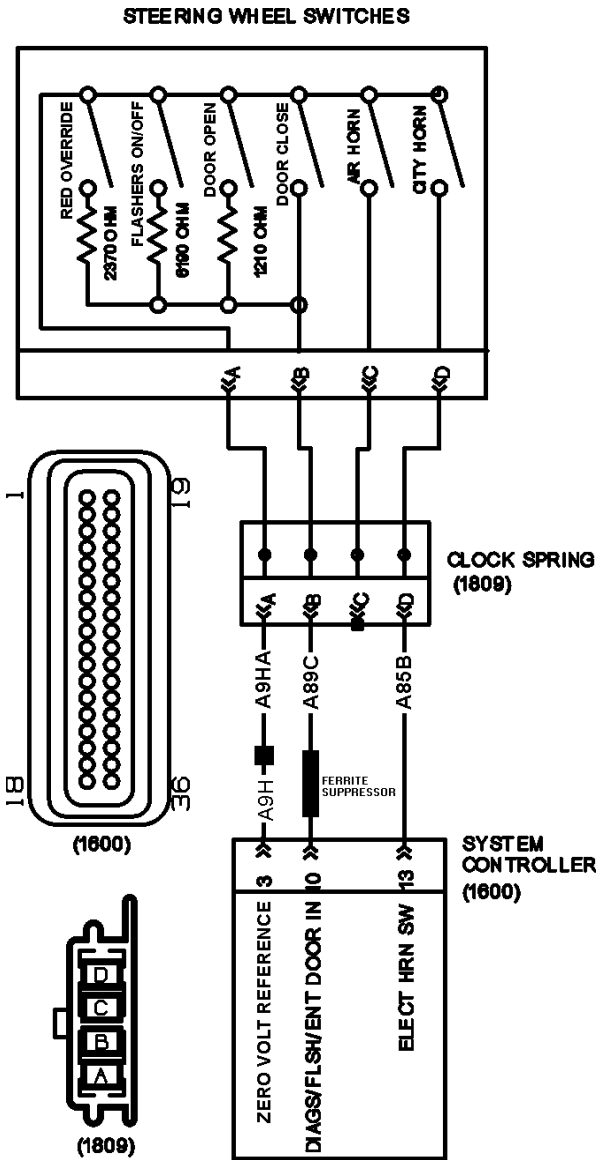

Figure 248 Service Door Control Circuits (Inputs to ESC) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1809) CLOCK SPRING
LOCATED IN STEERING COLUMN

Table 145 Service Door Control Circuit Tests

Door Control Switch Resistance Checks Check with clock spring connector (1809) 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
Clock spring connector cavity A to D.	>200 Kohms	If resistance value is less, then there is a short in the steering wheel switches. Replace steering wheel switches.
Clock spring connector cavity A to D (while pushing city horn button).	<0.5 ohms	If resistance is greater significantly greater than 0.5 ohms, then there is an open in the steering wheel switches. Replace steering wheel switches.
Clock spring connector cavity A to B.	>200 Kohms	If resistance value is less, then there is a short in the steering wheel switches. Replace steering wheel switches.
Clock spring connector cavity A to B (while pushing Red Override switch).	Approximately 2.4 Kohms	If resistance value is incorrect, then there is a fault in the steering wheel switches. Replace steering wheel switches.
Clock spring connector cavity A to B (while pushing Flashers On/Off switch).	Approximately 6.2 Kohms	If resistance value is incorrect, then there is a fault in the steering wheel switches. Replace steering wheel switches.
Clock spring connector cavity A to B (while pushing Door Open switch).	Approximately 1.2 Kohms	If resistance value is incorrect, then there is a fault in the steering wheel switches. Replace steering wheel switches.
Clock spring connector cavity A to B (while pushing Door Close switch).	<0.5 ohms	If resistance value is incorrect, then there is a fault in the steering wheel switches. Replace steering wheel switches.

2 or 3 Position Non-Sequential Rotary Service Door Controls

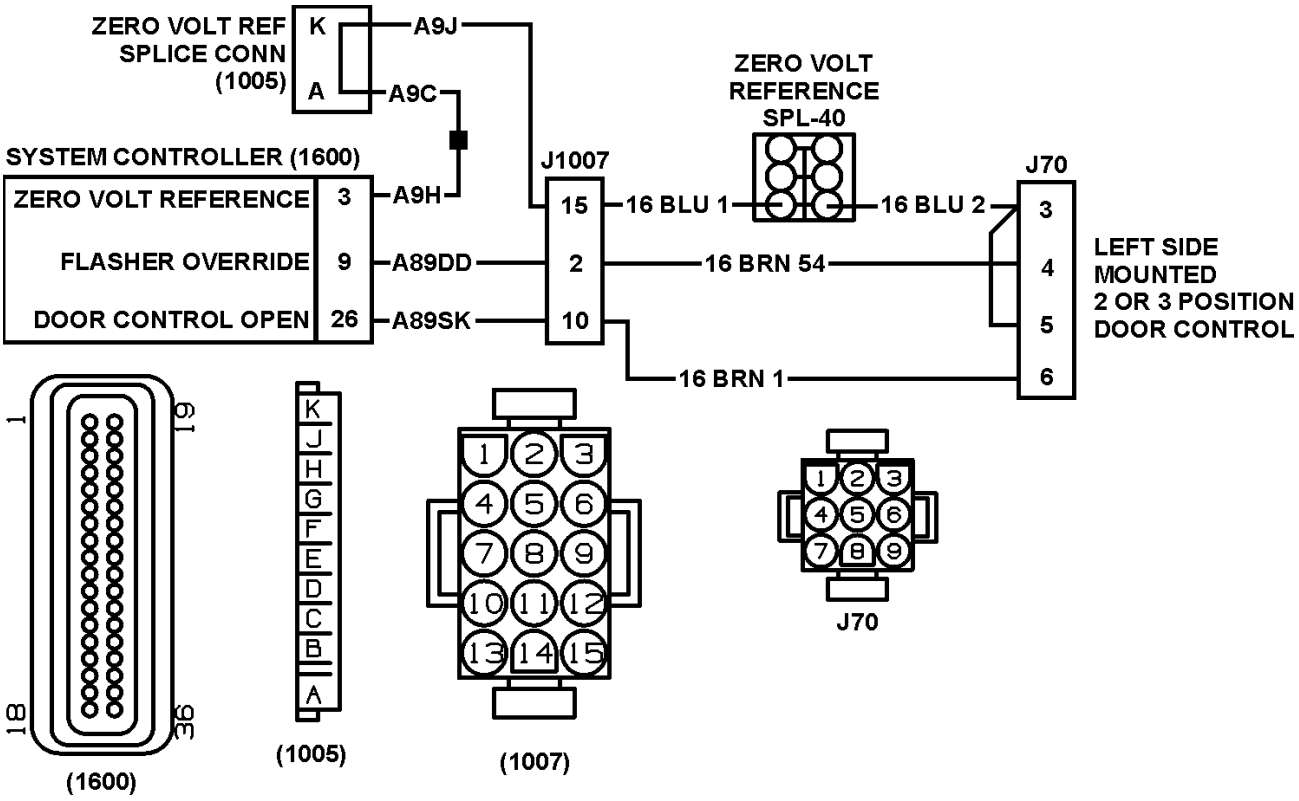

Figure 249 2 Or 3 Position Non-Sequential Left Side Mounted Rotary Service Door Control Circuits (Inputs to ESC) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
J70 FLASHER PLATE TO LEFT HAND ROTARY DOOR SWITCH
SPL-40 ZERO VOLT REFERENCE SPLICE

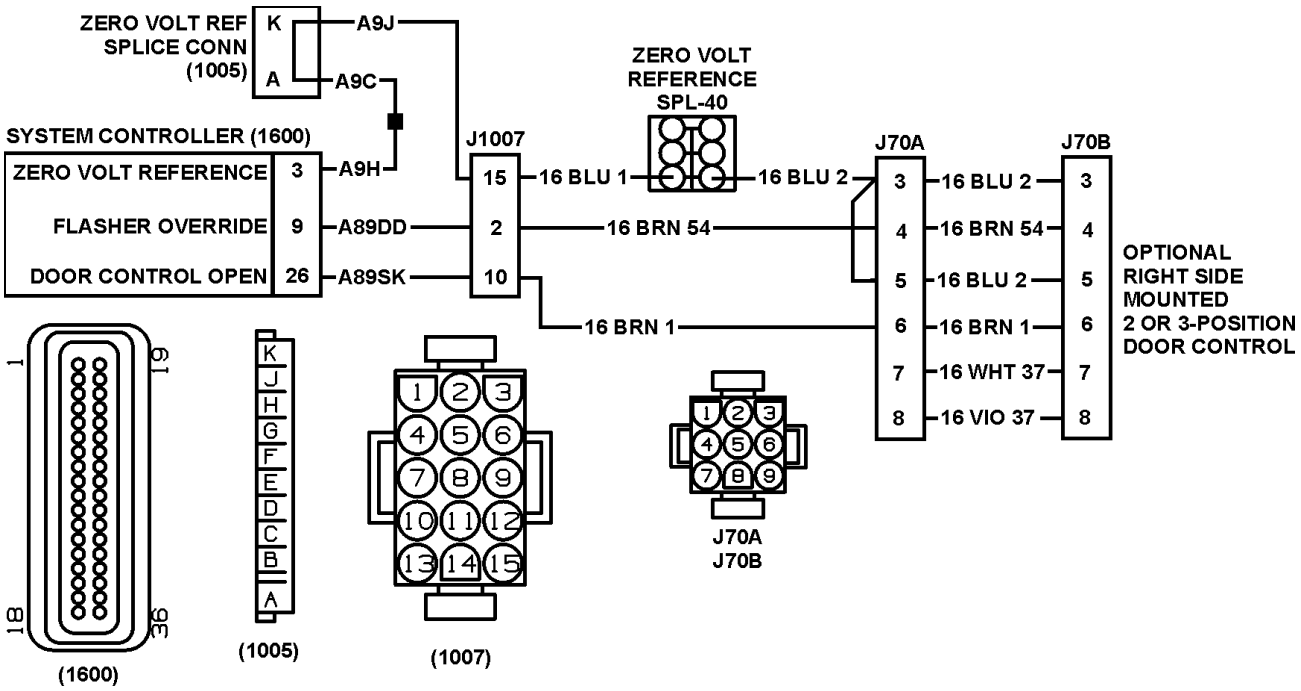

Figure 250 2 Or 3 Position Non-Sequential Right Side Mounted Rotary Service Door Control Circuits (Inputs to ESC) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
J70A FLASHER PLATE TO DASH HARNESS FOR RIGHT HAND ROTARY DOOR SWITCH
J70B DASH HARNESS TO RIGHT HAND ROTARY DOOR SWITCH
SPL-40 ZERO VOLT REFERENCE SPLICE

Table 146 2 Or 3 Position Non-Sequential Rotary Service Door Control Circuits Tests

Rotary Door Control Circuit Voltage Tests
Check ignition on and rotary switch connector J70 (for left mounted switch) or J70B for right mounted 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.

Table 146 2 Or 3 Position Non-Sequential Rotary Service Door Control Circuits Tests (cont.)

Test Points	Spec.	Comments
Rotary door switch connector J70 or J70B cavity 3 to ground.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from system controller (1600) pin 3. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Rotary door switch connector J70 or J70B cavity 3 to 4.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 BRN 54 and A89DD.
Rotary door switch connector J70 or J70B cavity 5 to 6.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 BRN 1 and A89SK.
Rotary Door Switch Resistance Tests Check ignition on, rotary switch connector J70 (for left mounted switch) or J70B for right mounted switch) disconnected and rotary switch set in door open position. **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
Rotary door switch cavity 1 to 2	Open circuit	If meter shows resistance value, replace rotary door switch.
While meter is still connected to rotary door switch from cavity 1 to 2, move switch to close door position.		
Rotary door switch cavity 1 to 2	Short circuit	If meter shows another value, replace rotary door switch.
Leave rotary door switch in door closed position		
Rotary door switch cavity 5 to 6	Open circuit	If meter shows resistance value, replace rotary door switch.
While meter is still connected to rotary door switch from cavity 5 to 6, move switch to close door position.		
Rotary door switch cavity 5 to 6	Short circuit	If meter shows another value, replace rotary door switch.

3 Position Sequential Rotary Service Door Controls

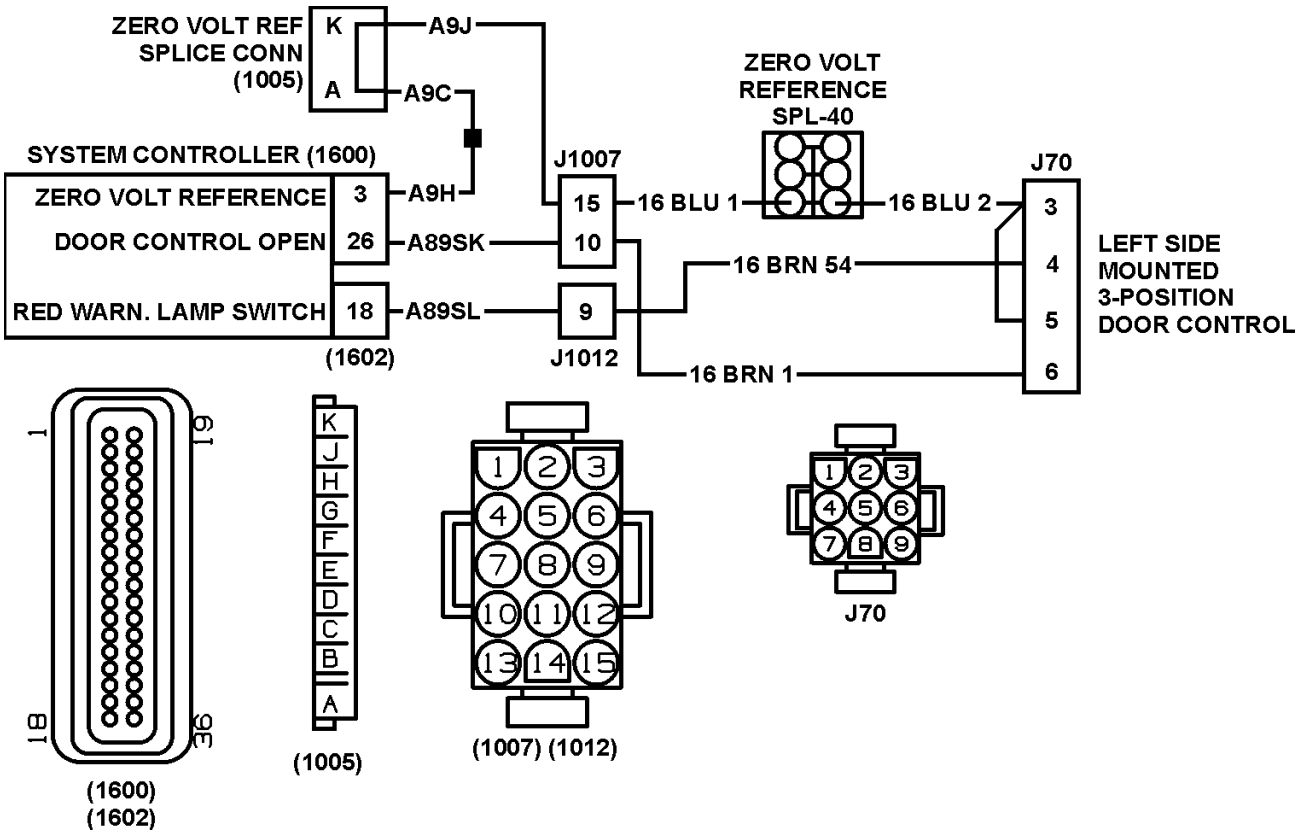

Figure 251 3 Position Sequential Left Side Mounted Rotary Service Door Control Circuits (Inputs to ESC) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) (1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J70 FLASHER PLATE TO LEFT HAND ROTARY DOOR SWITCH
SPL-40 ZERO VOLT REFERENCE SPLICE

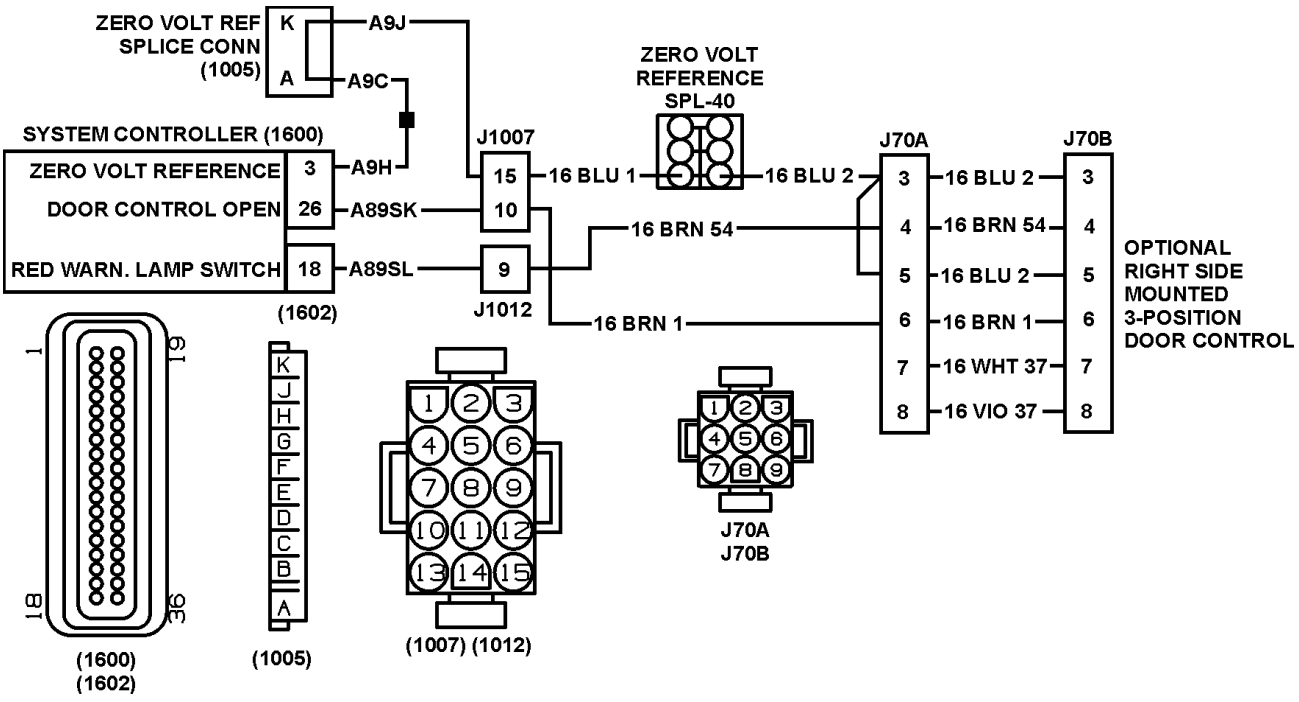

Figure 252 3 Position Sequential Right Side Mounted Rotary Service Door Control Circuits (Inputs to ESC) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) (1012) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J70A FLASHER PLATE TO DASH HARNESS FOR RIGHT HAND ROTARY DOOR SWITCH
J70B DASH HARNESS TO RIGHT HAND ROTARY DOOR SWITCH
SPL-40 ZERO VOLT REFERENCE SPLICE

Table 147 3 Position Sequential Rotary Service Door Control Circuits Tests

Rotary Door Control Circuit Voltage Tests Check ignition on and rotary switch connector J70 (for left mounted switch) or J70B for right mounted 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

Table 147 3 Position Sequential Rotary Service Door Control Circuits Tests (cont.)

Rotary door switch connector J70 or J70B cavity 3 to ground.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal from system controller (1600) pin 3. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Rotary door switch connector J70 or J70B cavity 3 to 4.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 BRN 54 and A89SL.
Rotary door switch connector J70 or J70B cavity 5 to 6.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 BRN 14 and A89SK.
Rotary Door Switch Resistance Tests Check ignition on, rotary switch connector J70 (for left mounted switch) or J70B for right mounted switch) disconnected and rotary switch set in door open position. **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
Rotary door switch cavity 1 to 2	Open circuit	If meter shows resistance value, replace rotary door switch.
While meter is still connected to rotary door switch from cavity 1 to 2, move switch to close door position.		
Rotary door switch cavity 1 to 2	Short circuit	If meter shows another value, replace rotary door switch.
Leave rotary door switch in door closed position.		
Rotary door switch cavity 3 to 4	Open circuit	If meter shows resistance value, replace rotary door switch.
While meter is still connected to rotary door switch from cavity 3 to 4, move switch to warning lights position.		
Rotary door switch cavity 3 to 4	Short circuit	If meter shows another value, replace rotary door switch.
Leave rotary door switch in warning lights position.		
Rotary door switch cavity 5 to 6	Open circuit	If meter shows resistance value, replace rotary door switch.
While meter is still connected to rotary door switch from cavity 5 to 6, move switch to open door position.		
Rotary door switch cavity 5 to 6	Short circuit	If meter shows another value, replace rotary door switch.

Manual Service Door Control Circuits

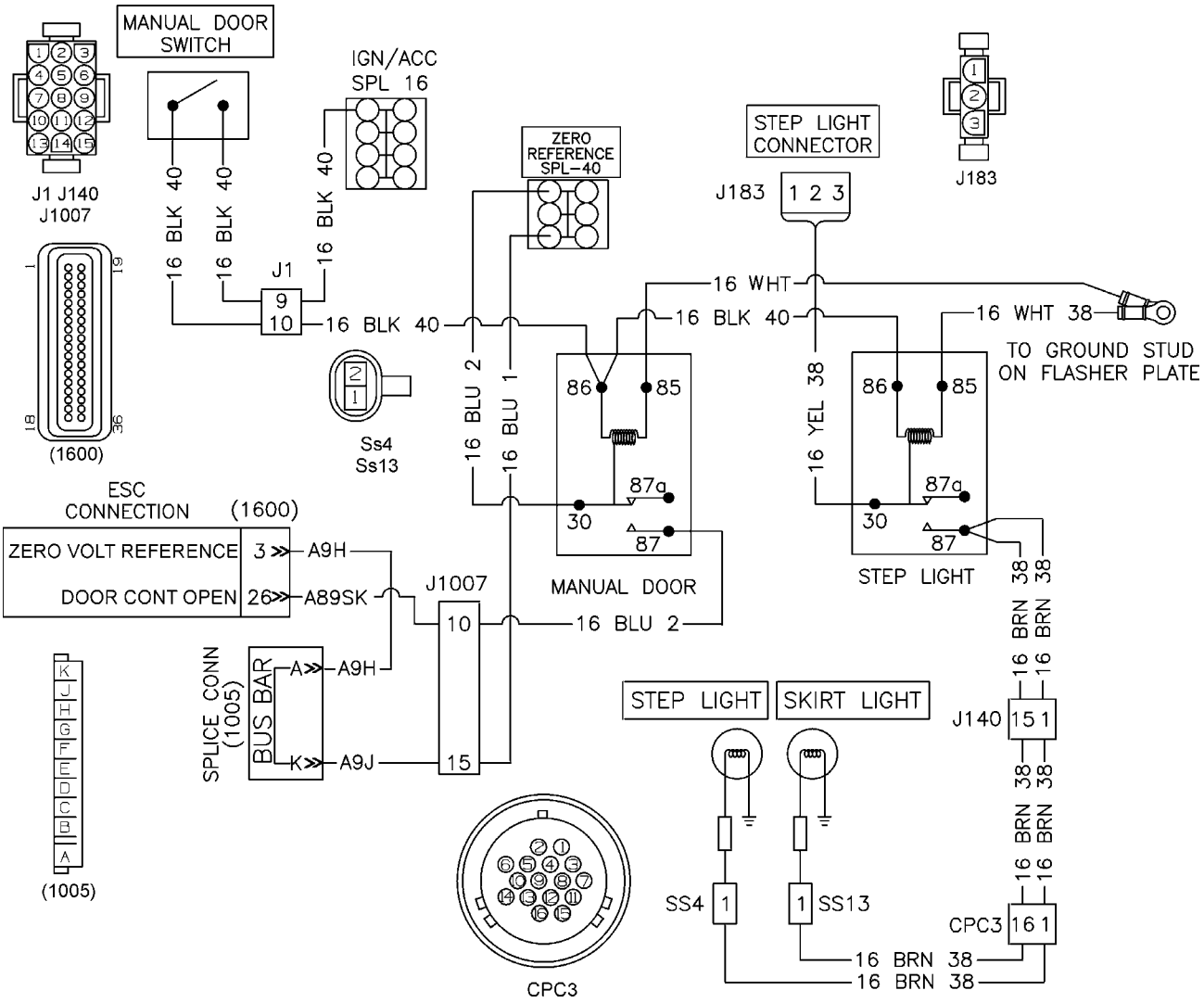

Figure 253 Manual Service Door Control Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(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
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J1 FLASHER PLATE TO DASH
J140 FLASHER PLATE TO DASH AND TOE
J183 STEP LIGHT OPTIONS
SPL 16 IGNITION ACCESSORY FEED RELAY
SPL 40 ZERO VOLT REFERENCE SPLICE
SS4 SEALED ENGINE HARNESS TO STEP LIGHT
SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

Table 148 Manual Service Door Circuits Tests

Step Light Relay Voltage Tests Check ignition on, manual service door closed, step light relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	0 volts	If voltage is present, check for short on circuit 16 BLK 40.
While meter is still connected to step light relay cavity 86 to ground, open manual service door (which will close manual service door switch).		
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 40. Also ensure proper voltage source to Ign/Acc splice. Refer to the Accessory Power Feed section of this manual. (See ACCESSORY POWER DISTRIBUTION, page 38)
Leave manual service door open.		
Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 38.
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BRN 38. If circuits check good and step or skirt light still fails, replace step or skirt light receptacle

Table 148 Manual Service Door Circuits Tests (cont.)

Manual Door Relay Voltage Tests		
Check ignition on, manual service door closed, manual door relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Manual door relay cavity 86 to ground.	0 volts	If voltage is present, check for short on circuit 16 BLK 40.
While meter is still connected to manual door relay cavity 86 to ground, open manual service door (which will close manual service door switch).		
Manual door relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 40. Also ensure proper voltage source to Ign/Acc splice. Refer to the Accessory Power Feed section of this manual. (See ACCESSORY POWER DISTRIBUTION, page 38)
Leave manual service door open.		
Manual door relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT.
Manual door relay cavity 30 to ground.	0 volts	If voltage is different, check for open or short on circuits 16 BLU 2, 16 BLU 1, A9J, A9C and A9H. Also ensure proper zero volt reference signal on system controller (1600) pin 3. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Manual door relay cavity 30 to 87.	0 volts	If voltage is different, check for open or short on circuits 16 BLU 2 and A89SK. If circuits check good and malfunction is still present, replace manual door switch.

15.4. ELECTRIC SERVICE DOOR FAULT DETECTION MANAGEMENT

Typical Electric Service Door Circuits

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.

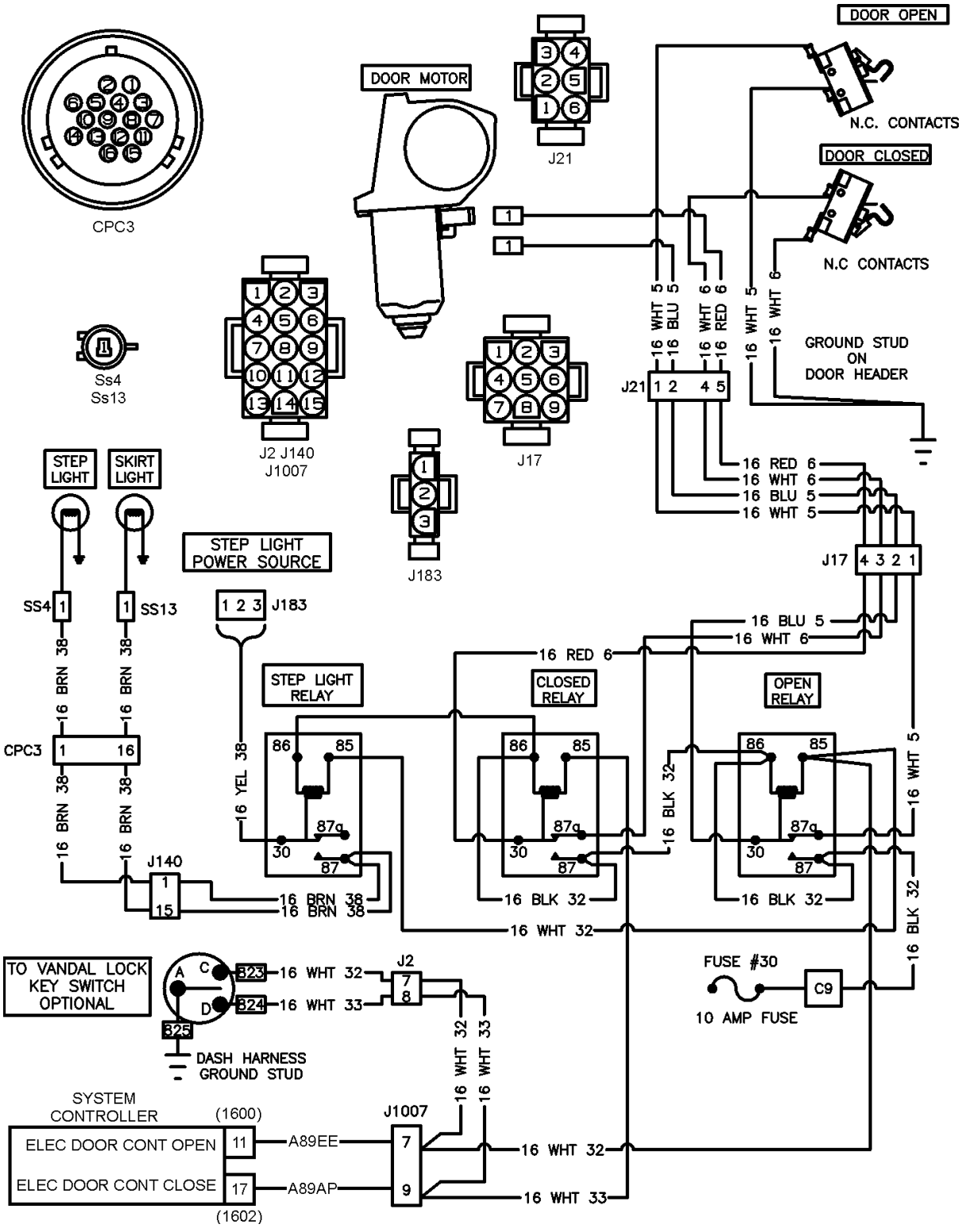

Figure 254 Electric Service Door Control Circuits (Outputs from ESC to Door Motor) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J2 FLASHER PLATE TO DASH
J17 FLASHER PLATE TO LEFT HAND BODY
J21 LEFT HAND BODY TO FRONT CAP
J140 FLASHER PLATE TO DASH AND TOE
J183 STEP LIGHT OPTIONS
SS4 SEALED ENGINE HARNESS TO STEP LIGHT
SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

Table 149 Electric Service Door Circuit Tests

Electric Service Door Open Relay Voltage Checks Check with key in ignition switch position on, electric service door controls set to close, open relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Open relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuit 16 BLK 32.
Open relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 32 and A89EE.
With voltmeter still connected to open relay socket cavity 86 to 85, open electric service door by activating open electric service control circuits.		
Open relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 32 and A89EE. Also ensure proper signal from system controller (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Close electric service door.		
Open relay cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check blown fuse #30. Also check for open or short on circuit 16 BLK 32.

Table 149 Electric Service Door Circuit Tests (cont.)

Open relay cavity 87 to 30.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLU 5. Also ensure proper grounding of electric service door motor. If circuits check good and door fails to open, replace service door motor.
Electric Service Door Closed Relay Voltage Checks Check with key in ignition switch position on, electric service door controls set to open, closed relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Closed relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuit 16 BLK 32.
Closed relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 33 and A89AP.
With voltmeter still connected to closed relay socket cavity 86 to 85, active closed service door circuits by pressing the close service door button.		
Closed relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 33 and A89AP. Also ensure proper signal from system controller (1602) pin 17. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Open electric service door.		
Closed relay cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check blown fuse #30. Also check for open or short on circuit 16 BLK 32.
Closed relay cavity 87 to 30.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 RED 6. Also ensure proper grounding of electric service door motor. If circuits check good and door fails to open, replace service door motor.

Table 149 Electric Service Door Circuit Tests (cont.)

Step Light Relay Voltage Checks Check with key in ignition switch position on, electric service door closed, step light relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuit 16 BLK 32.
Step light relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 32 and A89EE.
With voltmeter still connected to open relay socket cavity 86 to 85, open electric service door by activating open electric service control circuits.		
Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 33 and A89AP. Also ensure proper signal from system controller (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Close electric service door.		
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BRN 38. Also check ground source at step lights. If circuits check good and service lights fail to operate, replace light fixtures.

Table 149 Electric Service Door Circuit Tests (cont.)

Vandal Lock Key Switch Voltage Checks Check with key off. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Vandal lock key switch connector cavity 823 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuits 16 WHT 32 and 16 BLK 32.
Vandal lock key switch connector cavity 824 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuits 16 WHT 33 and 16 BLK 32. If circuits check good, but vandal lock switch still fails, replace vandal lock switch.

Electric Service Door Circuits with Redundant Controls

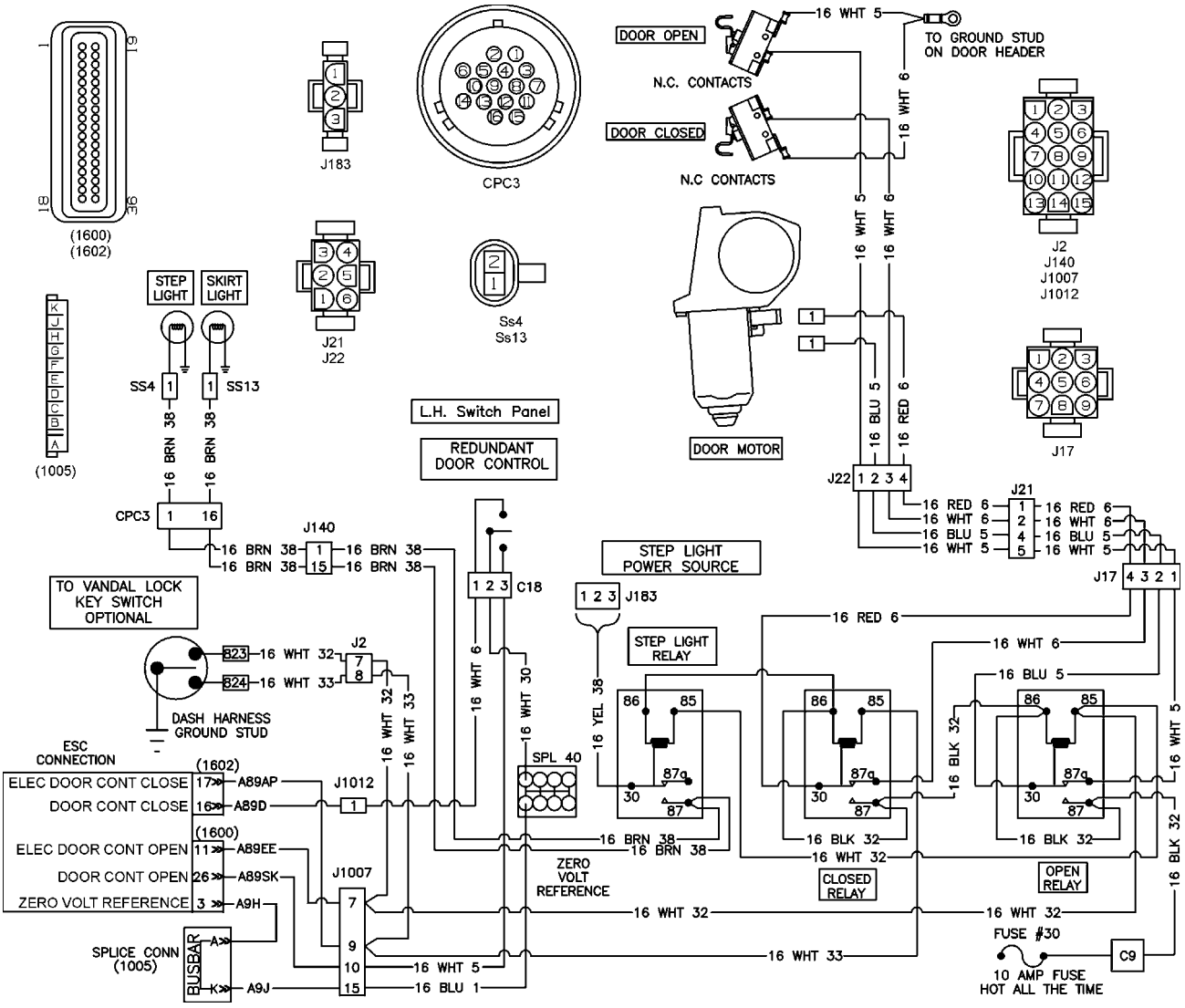

Figure 255 Electric Service Door Control Circuits w/Redundent Control (Outputs from ESC to Door Motor) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) (1012) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J2 FLASHER PLATE TO DASH
J17 FLASHER PLATE TO LEFT HAND BODY
J21 LEFT HAND BODY TO FRONT CAP
J22 FRONT CAP TO ENTRANCE DOOR
J140 FLASHER PLATE TO DASH AND TOE
J183 STEP LIGHT OPTIONS
SPL-40 ZERO VOLT REFERENCE SPLICE
SS4 SEALED ENGINE HARNESS TO STEP LIGHT
SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

Table 150 Electric Service Door w/ Redundant Controls Circuit Tests

Electric Service Door Open Relay Voltage Checks Check with key in ignition switch position on, electric service door controls set to close, open relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Open relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuit 16 BLK 32.
Open relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 32 and A89EE.
With voltmeter still connected to open relay socket cavity 86 to 85, open electric service door by activating open electric service control circuits.		
Open relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 32 and A89EE. Also ensure proper signal from system controller (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Close electric service door.		
Open relay cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check blown fuse #30. Also check for open or short on circuit 16 BLK 32.
Open relay cavity 87 to 30.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLU 5. Also ensure proper grounding of electric service door motor. If circuits check good and door fails to open, replace service door motor.

Table 150 Electric Service Door w/ Redundant Controls Circuit Tests (cont.)

Electric Service Door Closed Relay Voltage Checks Check with key in ignition switch position on, electric service door controls set to open, closed relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Closed relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuit 16 BLK 32.
Closed relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 33 and A89AP.
With voltmeter still connected to closed relay socket cavity 86 to 85, active closed service door circuits by pressing the close service door button.		
Closed relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 33 and A89AP. Also ensure proper signal from system controller (1602) pin 17. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Open electric service door.		
Closed relay cavity 87 to ground.	12 ± 1.5 volts	If voltage is missing check blown fuse #30. Also check for open or short on circuit 16 BLK 32.
Closed relay cavity 87 to 30.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 RED 6. Also ensure proper grounding of electric service door motor. If circuits check good and door fails to open, replace service door motor.

Table 150 Electric Service Door w/ Redundant Controls Circuit Tests (cont.)

Step Light Relay Voltage Checks Check with key in ignition switch position on, electric service door closed, step light relay removed and all other relays installed. **NOTE – Always check connectors for damage and pushed–out terminals.** **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuit 16 BLK 32.
Step light relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 32 and A89EE.
With voltmeter still connected to open relay socket cavity 86 to 85, open electric service door by activating open electric service control circuits.		
Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 32 and A89EE. Also ensure proper signal from system controller (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Close electric service door.		
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BRN 38. Also check ground source at step lights. If circuits check good and service lights fail to operate, replace light fixtures.

Table 150 Electric Service Door w/ Redundant Controls Circuit Tests (cont.)

Vandal Lock Key Switch Voltage Checks Check with key off. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Vandal lock key switch connector cavity 823 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuits 16 WHT 32 and 16 BLK 32.
Vandal lock key switch connector cavity 824 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30 and for open or short on circuits 16 WHT 33 and 16 BLK 32. If circuits check good, but vandal lock switch still fails, replace vandal lock switch.
Redundant Door Control Switch (C18) Voltage Checks Check with key in ignition position and redundant door control switch (C18) 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
Redundant door control switch cavity 2 to 1.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 WHT 30, 16 BLU 1, A9J, A9C, A9H, 16 WHT 6 and A89D. Also ensure proper zero volt reference signal from system controller (1600) pin 3. Also ensure proper input signal on system controller (1602) pin 16. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Redundant door control switch cavity 2 to 3.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits 16 WHT 30, 16 BLU 1, A9J, A9C, A9H, 16 WHT 5 and A89SK. Also ensure proper zero volt reference signal from system controller (1600) pin 3. Also ensure proper input signal on system controller (1600) pin 26.

Table 150 Electric Service Door w/ Redundant Controls Circuit Tests (cont.)

		NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors. If circuits check good and redundant door control switch still fails, replace redundant door control switch.

15.5. EXTENDED DESCRIPTION

When the door open switch is closed the electronic system controller will supply a ground signal on connector (1600) pin 11. This will allow voltage from fuse #30 to charge the open service door relay. The charged relay will allow voltage from fuse #30 to power the door motor to open the service door.

When the door close switch is closed the electronic system controller will supply a ground signal on the system controller connector (1602) pin 17. This will allow voltage from fuse #30 to charge the close service door relay. The charged relay will allow voltage from fuse #30 to power the door motor to close the service door.

The step light relay is charged whenever the service door open switch is closed. The ground signal supplied on system controller connector (1600) pin 11 will charge the step light relay with voltage from fuse #30. Voltage from the step light power source will then be applied to the step light turning it on. The step light will remain on until the close service door circuits are activated.

The vandal lock key switch bypasses the electronic system controller by applying a ground to the open service door circuits or close service door circuits, depending on which direction the key switch is turned. This allows for the electronic service door to be opened or closed without the key in the ignition switch.

Ground is supplied to the service door motor through internal connections.

Ground is supplied to the vandal lock key switch from the dash ground stud.

15.6. AIR SERVICE 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.

Typical Air Service Door w/Dump Valve Circuits

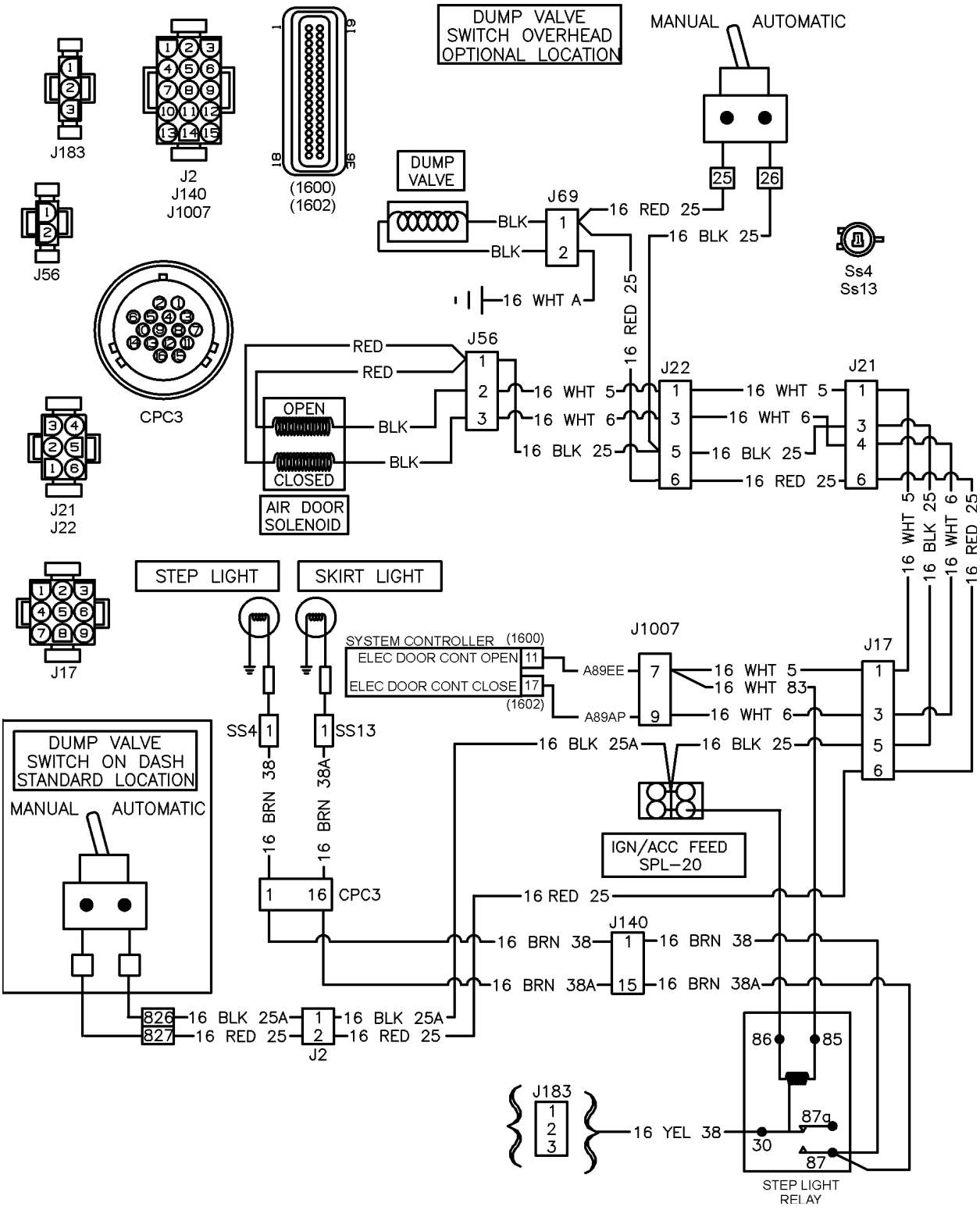

Figure 256 Air Service Door Control Circuits (Outputs from ESC to Door Solenoid) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J2 FLASHER PLATE TO DASH
J17 FLASHER PLATE TO LEFT HAND BODY
J21 LEFT HAND BODY TO FRONT CAP
J22 FRONT CAP TO ENTRANCE DOOR
J56 ENTRANCE DOOR AIR CYLINDER TO ENTRANCE DOOR HARNESS
J140 FLASHER PLATE TO DASH AND TOE
J183 STEP LIGHT OPTIONS
SPL-20 IGNITION ACCESSORY FEED SPLICE
SS4 SEALED ENGINE HARNESS TO STEP LIGHT
SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

Table 151 Air Service Door Circuit Tests

Air Service Door Step Light Relay Voltage Checks Check with key in ignition switch position on, air service door closed and step 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.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 25. Also check ignition/accessory feed splice 20 for proper power connection. Refer to the Ignition Power Feed section of this manual to troubleshoot this circuit. (See IGNITION POWER DISTRIBUTION, page 42)
Step light relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 83 and A89EE.
While voltmeter is still connected to step light relay cavity 86 to 85, open air service door by activating the open air service door circuits.		
Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for short on circuits 16 WHT 83 and A89EE. Also ensure proper ground signal from system controller connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**

Table 151 Air Service Door Circuit Tests (cont.)

Close air service door using air service door close circuits.		
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 BRN 38 and 16 BRN 38a. Also ensure proper ground at step light and skirt light fixtures. If circuits check good and step light still fails, replace step light fixture.
Air Service Door Solenoid Voltage Checks Check with key in ignition switch position on and air service door closed. **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
Air service door solenoid connector J56 pin 1 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 25. Also check ignition/accessory feed splice 20 for proper power connection. Refer to the Ignition Power Feed section of this manual to troubleshoot this circuit. (See IGNITION POWER DISTRIBUTION, page 42)
Air service door solenoid connector J56 pin 1 to pin 3.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 6 and A89AP. Also ensure proper ground signal from system controller connector (1600) pin 17. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
While meter is connected to connector J56 pin 1 to pin 3, open air service door by activating the open air service door circuits.		

Table 151 Air Service Door Circuit Tests (cont.)

Air service door solenoid connector J56 pin 1 to pin 3.	0 volts	If voltage is present check for short to high on circuits 16 WHT 6 and A89AP.
Leave air service door open		
Air service door solenoid connector J56 pin 1 to pin 2.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 5 and A89EE. Also ensure proper ground signal from system controller connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
While meter is connected to connector J56 pin 1 to pin 2, close air service door by activating the close air service door circuits.		
Air service door solenoid connector J56 pin 1 to pin 2.	0 volts	If voltage is missing check for open or short to high on circuits 16 WHT 5 and A89EE. If all circuits check good and air service door solenoid still fails, replace air service door solenoid.
Dump Valve Voltage Checks Check with key in ignition switch position on, air service door closed, dump valve switch(es) in “automatic” position and dump valve connector (J69) 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
Overhead dump valve connector J69 cavity 1 to ground.	0 volts	If voltage is different, check for open or short on circuit 16 RED 25, 16 BLK 25 and 16 BLK 25A.
While meter is still connected, flip dump valve switch(es) to “manual”.		
Overhead dump valve connector J69 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 25, 16 BLK 25 and 16 BLK 25A. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Overhead dump valve connector J69 cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT A.

Table 151 Air Service Door Circuit Tests (cont.)

		If circuits check good and dump valve is still faulty, replace dump valve.

Typical Air Service Door w/Redundant Control Circuits

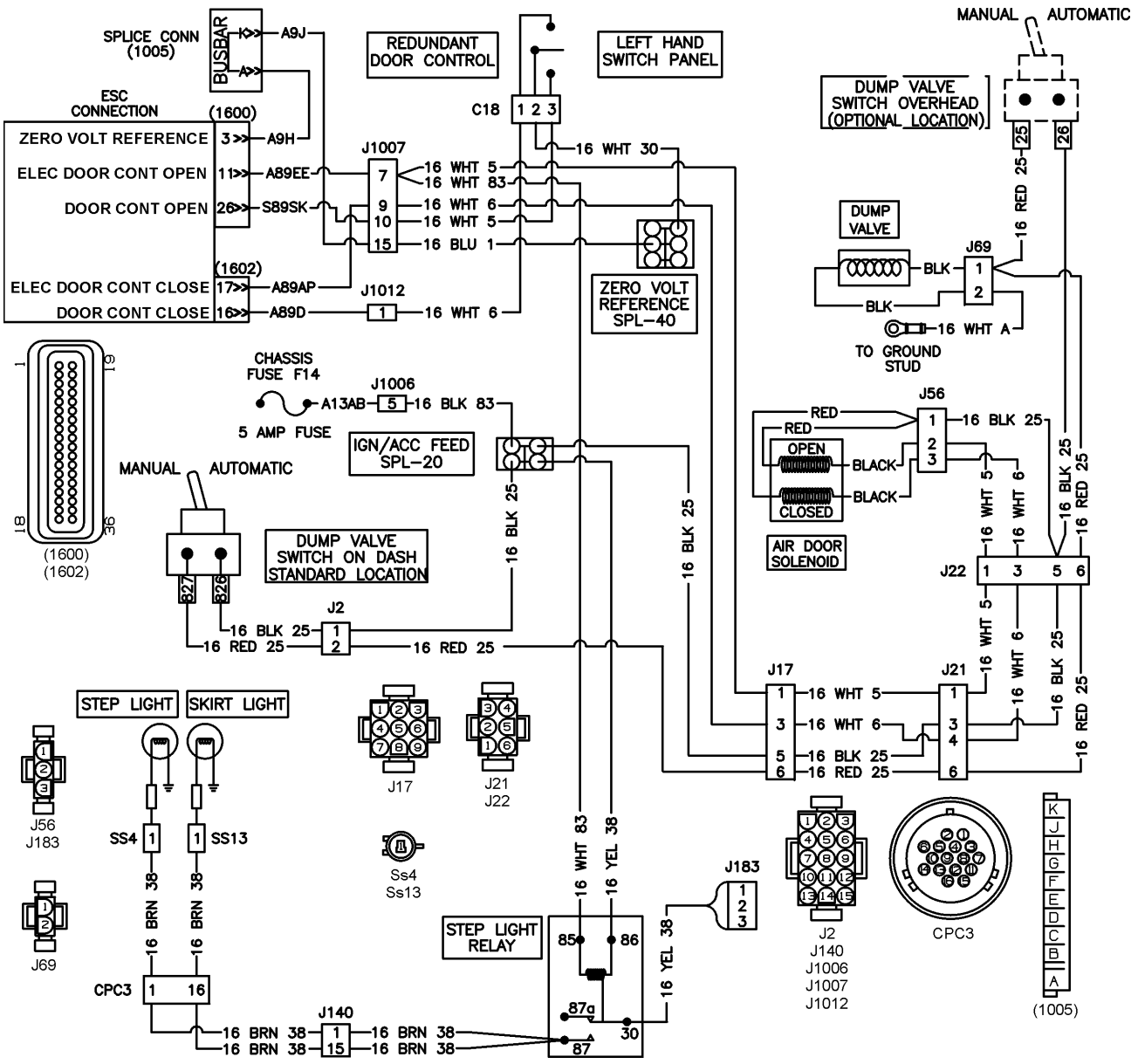

Figure 257 Air Service Door With Redundant Switch Control Circuits (Outputs from ESC to Door Solenoid) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1006) (1007) (1012) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J2 FLASHER PLATE TO DASH
J17 FLASHER PLATE TO LEFT HAND BODY
J21 LEFT HAND BODY TO FRONT CAP
J22 FRONT CAP TO ENTRANCE DOOR
J56 ENTRANCE DOOR AIR CYLINDER TO ENTRANCE DOOR HARNESS
J140 FLASHER PLATE TO DASH AND TOE
J183 STEP LIGHT OPTIONS
SPL-20 IGNITION ACCESSORY FEED SPLICE
SPL-40 ZERO VOLT REFERENCE SPLICE
SS4 SEALED ENGINE HARNESS TO STEP LIGHT
SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

Table 152 Air Service Door w/Redundant Door Control Circuit Tests

Air Service Door Step Light Relay Voltage Checks

Check with key in ignition switch position on, service door closed and step 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.

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

Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38, 16 BLK 83 and A13AB. Also check for blown chassis fuse F14.
Step light relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 83 and A89EE. Also check for proper open circuit signal on ESC connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
While voltmeter is still connected to step light relay cavity 86 to 85, activate service door open circuits by pressing service door open switch.		

Table 152 Air Service Door w/Redundant Door Control Circuit Tests (cont.)

Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for short on circuits 16 WHT 83 and A89EE. Also ensure proper ground signal from system controller connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Close service door.		
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 BRN 38. Also ensure proper ground signal at step light fixtures. If circuits check good and step light still fails, replace step light/skirt light fixture(s).
Air Service Door Solenoid (J56) Voltage Checks Check with key in ignition switch position on, service door closed and air door solenoid connector (J56) 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
Air service door solenoid connector (J56) pin 1 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 25, 16 BLK 83 and A13AB. Also check for blown chassis fuse F14.

Table 152 Air Service Door w/Redundant Door Control Circuit Tests (cont.)

Air service door solenoid connector (J56) pin 1 to pin 3	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 16 and A89AP. Also insure proper ground signal from ESC connector (1602) pin 17. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual.
Air service door solenoid connector (J56) pin 1 to pin 2	0 volts	If voltage is present check for short to high on circuits 16 WHT 5 and A89EE. Also insure proper open circuit signal from ESC connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual.
While voltmeter still connected to connector (J56) pin 1 to pin 2, activate air service door open circuits by pressing open service door switch.		
Air service door solenoid connector (J56) pin 1 to pin 2	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 5 and A89EE. Also insure proper ground signal from ESC connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual. If all circuits check good and air door solenoid still fails, replace air door solenoid.

Table 152 Air Service Door w/Redundant Door Control Circuit Tests (cont.)

Air Service Door Redundant Door Control Switch (C18) Voltage Checks Check with key in ignition switch position on, service door closed and air door solenoid redundant control switch connector (C18) 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
Air service door redundant control switch connector (C18) pin 2 to ground.	0 volts	If voltage is present check for 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.** Refer to the ESC Replacement section of this manual.
Air service door redundant control switch connector (C18) pin 2 to pin 1.	0 volts	If voltage is present check for short on circuits 16 WHT 6 and A89D. Also ensure proper input signal on ESC connector (1602) pin 16. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual.
Air service door redundant control switch connector (C18) pin 2 to pin 3.	0 volts	If voltage is present check for short on circuits 16 WHT 5 and S89SK. 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 the ESC Replacement section of this manual. If circuits check good and switch still fails, replace redundant door control switch.

Table 152 Air Service Door w/Redundant Door Control Circuit Tests (cont.)

Dump Valve Voltage Checks Check with key in ignition switch position on, air service door closed, dump valve switch(es) in “automatic” position and dump valve connector (J69) 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
Overhead dump valve connector J69 cavity 1 to ground.	0 volts	If voltage is different, check for open or short on circuit 16 RED 25, 16 BLK 25 and 16 BLK 25A.
While meter is still connected, flip dump valve switch(es) to “manual”.		
Overhead dump valve connector J69 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 25, 16 BLK 25, 16 BLK 83 and A13AB. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Overhead dump valve connector J69 cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT A. If circuits check good and dump valve is still faulty, replace dump valve.

Air Service Door w/Dump Valve Switch Outside and Overhead Control Circuits

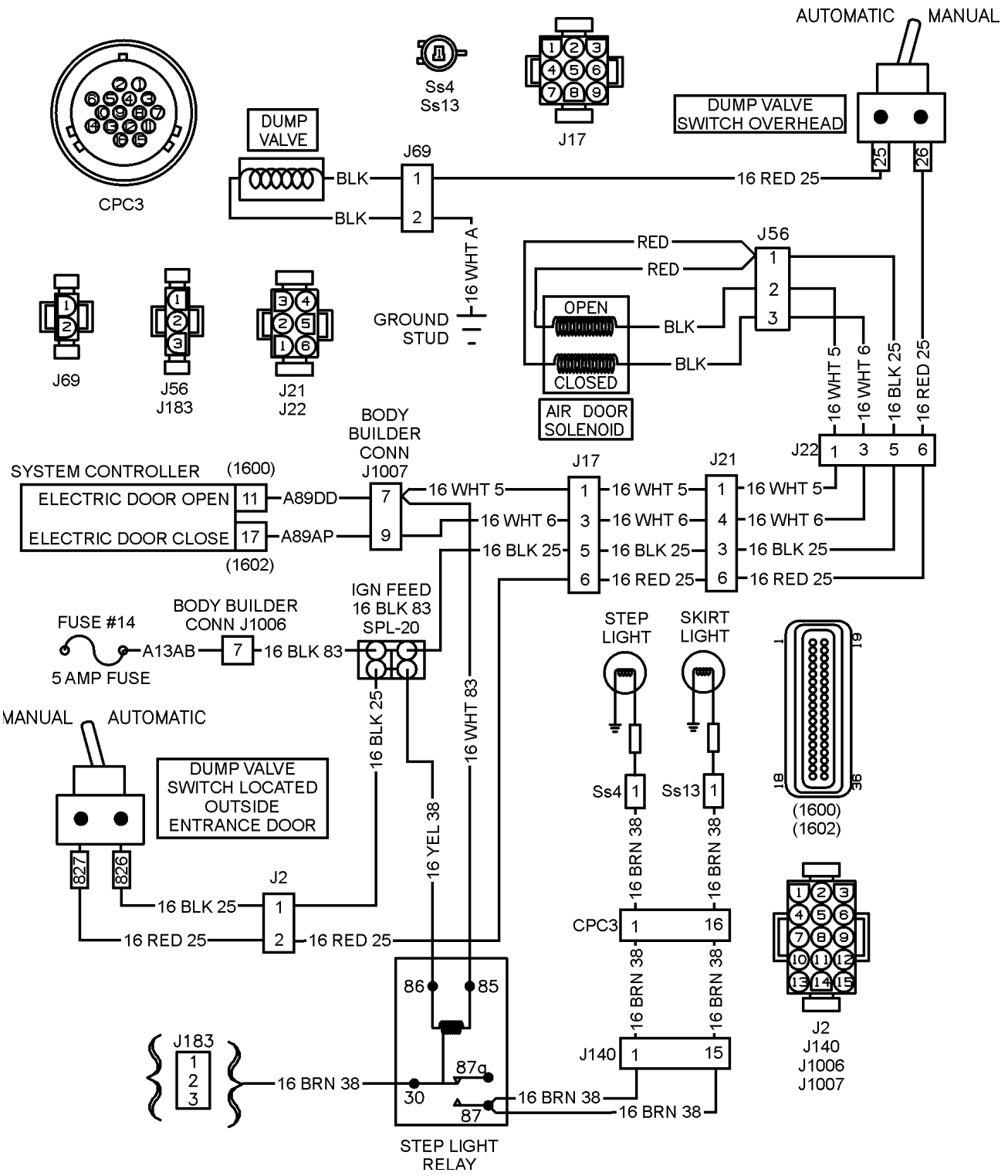

Figure 258 Air Service Door With Dump Valve Switch Outside and Overhead Control Circuits (Outputs from ESC to Door Solenoid) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) (1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J2 FLASHER PLATE TO DASH
J17 FLASHER PLATE TO LEFT HAND BODY
J21 LEFT HAND BODY TO FRONT CAP
J22 FRONT CAP TO ENTRANCE DOOR
J56 ENTRANCE DOOR AIR CYLINDER TO ENTRANCE DOOR HARNESS
J140 FLASHER PLATE TO DASH AND TOE
J183 STEP LIGHT OPTIONS
SPL-20 IGNITION ACCESSORY FEED SPLICE
SS4 SEALED ENGINE HARNESS TO STEP LIGHT
SS13 SEALED ENGINE HARNESS TO SKIRT LIGHT

Table 153 Air Service Door w/Dump Valve Switch Outside and Overhead Control Circuit Tests

Air Service Door Step Light Relay Voltage Checks

Check with key in ignition switch position on, service door closed and step 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.

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

Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38, 16 BLK 83 and A13AB. Also check for blown chassis fuse F14.
Step light relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 83 and A89DD. Also check for proper open circuit signal on ESC connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**

While voltmeter is still connected to step light relay cavity 86 to 85, activate service door open circuits by pressing service door open switch.

Table 153 Air Service Door w/Dump Valve Switch Outside and Overhead Control Circuit Tests (cont.)

Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for short on circuits 16 WHT 83 and A89DD. Also ensure proper ground signal from system controller connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Close service door.		
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 BRN 38. Also ensure proper ground signal at step light fixtures. If circuits check good and step light still fails, replace step light/skirt light fixture(s).
Air Service Door Solenoid (J56) Voltage Checks Check with key in ignition switch position on, service door closed and air door solenoid connector (J56) 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
Air service door solenoid connector (J56) pin 1 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 25, 16 BLK 83 and A13AB. Also check for blown chassis fuse F14.

Table 153 Air Service Door w/Dump Valve Switch Outside and Overhead Control Circuit Tests (cont.)

Air service door solenoid connector (J56) pin 1 to pin 3	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 16 and A89AP. Also insure proper ground signal from ESC connector (1602) pin 17. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual.
Air service door solenoid connector (J56) pin 1 to pin 2	0 volts	If voltage is present check for short to high on circuits 16 WHT 5 and A89EE. Also insure proper open circuit signal from ESC connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual.
While voltmeter still connected to connector (J56) pin 1 to pin 2, activate air service door open circuits by pressing open service door switch.		
Air service door solenoid connector (J56) pin 1 to pin 2	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 5 and A89DD. Also insure proper ground signal from ESC connector (1600) pin 11. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** Refer to the ESC Replacement section of this manual. If all circuits check good and air door solenoid still fails, replace air door solenoid.

Table 153 Air Service Door w/Dump Valve Switch Outside and Overhead Control Circuit Tests (cont.)

Dump Valve Voltage Checks Check with key in ignition switch position on, air service door closed, dump valve switch(es) in “automatic” position and dump valve connector (J69) 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
Overhead dump valve connector J69 cavity 1 to ground.	0 volts	If voltage is different, check for open or short on circuit 16 RED 25.
While meter is still connected, flip dump valve switch(es) to “manual”.		
Overhead dump valve connector J69 cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 25, 16 BLK 25, 16 BLK 83 and A13AB. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Overhead dump valve connector J69 cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT A. If circuits check good and dump valve is still faulty, replace dump valve.

Alternate Left Side Air Service Door Control Circuits

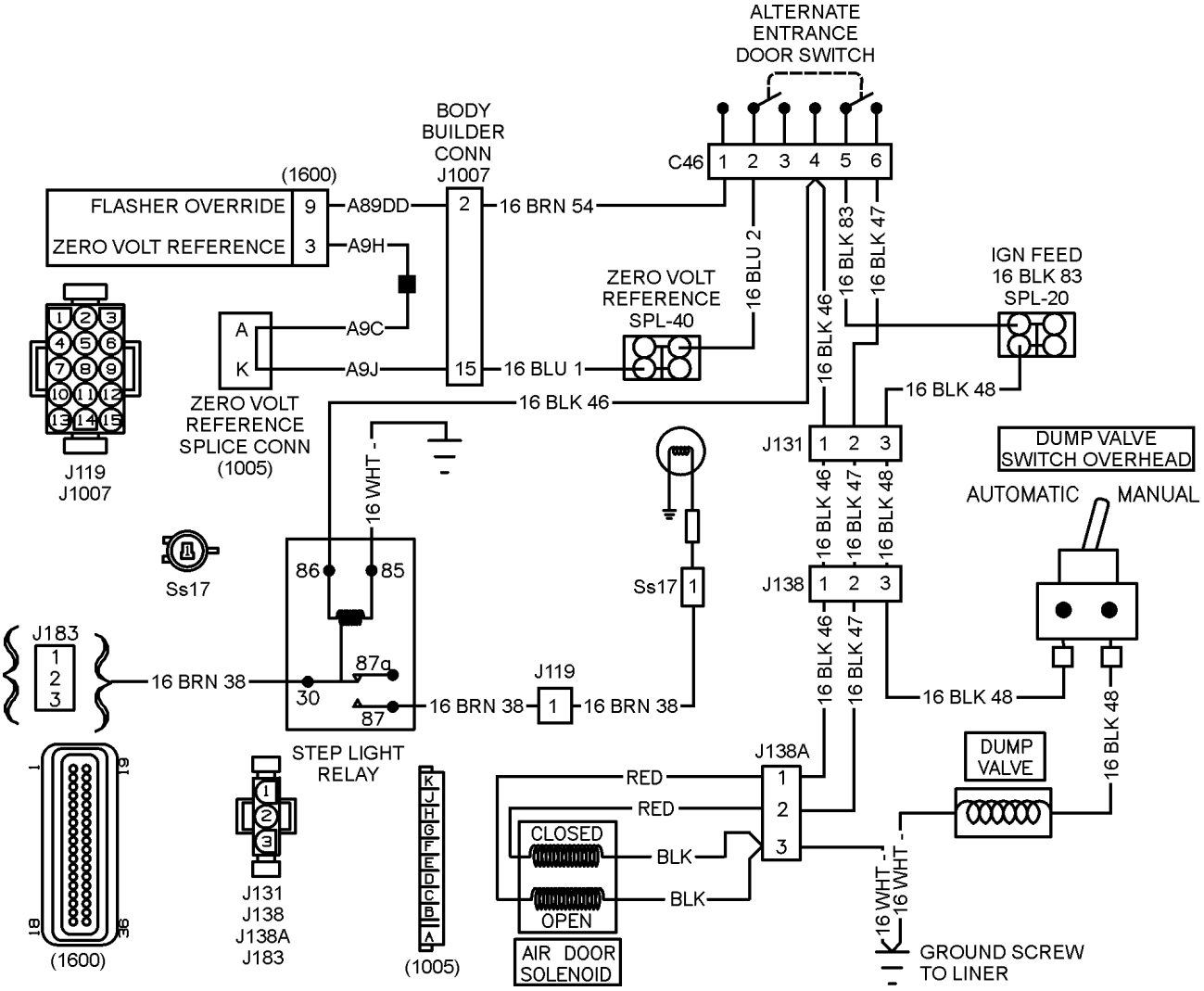

Figure 259 Alternate Left Side Air Service Door Control Circuits (Outputs from ESC to Door Solenoid) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J119 FLASHER PLATE TO LEFT HAND BODY
J131 FLASHER PLATE TO LEFT HAND BODY
J138 LEFT HAND BODY TO ALTERNATE ENTRANCE DOOR
J183 STEP LIGHT OPTIONS
SPL-20 IGNITION ACCESSORY FEED SPLICE
SS17 SEALED ENGINE HARNESS TO LEFT HAND ALTERNATE ENTRANCE DOOR STEP LIGHT

Table 154 Alternate Left Side Air Service Door Control Circuit Tests

Air Service Door Step Light Relay Voltage Checks Check with key in ignition switch position on, service door closed and step light relay removed. **NOTE – Always check connectors for damage and pushed–out terminals.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	0 volts	If voltage is present, check for short on circuit 16 BLK 46.
While meter is still connected to step light relay cavity 86 to ground, open alternate left side air service door by activating the open door circuits.		
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 46 and 16 BLK 83. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Leave alternate left side air service door open.		
Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT —.
Close service door.		
Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 YEL 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 BRN 38. Also ensure proper ground signal at step light fixtures. If circuits check good and step light still fails, replace step light/skirt light fixture(s).

Table 154 Alternate Left Side Air Service Door Control Circuit Tests (cont.)

Air Service Door Solenoid (J138A) Voltage Checks Check with key in ignition switch position on, service door closed and air door solenoid connector (J56) 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
Air service door solenoid connector (J138A) pin 2 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 47 and 16 BLK 83. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Air service door solenoid connector (J138A) pin 2 to pin 3	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT —.
While meter is still connected to air service door solenoid connector (J138A) pin 2 to pin 3, open alternate air service door by activating the open service door controls.		
Air service door solenoid connector (J138A) pin 2 to pin 3	0 volts	If voltage is missing check for open or short on circuits 16 BLK 47 and 16 WHT —. Also check for switch continuity. See below.
Leave alternate left side air service door open.		
Air service door solenoid connector (J138A pin 1 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 46 and 16 BLK 83. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Air service door solenoid connector (J138A) pin 1 to pin 3.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 WHT —.
While meter is still connected to air service door solenoid connector (J138A) pin 1 to pin 3, close alternate air service door by activating the close service door controls.		

Table 154 Alternate Left Side Air Service Door Control Circuit Tests (cont.)

Air service door solenoid connector (J138A) pin 1 to pin 3.	0 volts	If voltage is missing check for open or short on circuits 16 BLK 47 and 16 WHT —. Also check for switch continuity. See below.
Dump Valve Voltage Checks Check with key in ignition switch position on, air service door closed, dump valve switch in “automatic” position and dump valve connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Dump valve connector switch side to ground.	0 volts	If voltage is different, check for open or short on circuit 16 BLK 48.
While meter is still connected, flip dump valve switch to “manual”.		
Dump valve connector switch side to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 48. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Dump valve connector switch side to ground side.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT —. If circuits check good and dump valve is still faulty, replace dump valve.
Alternate Entrance Door Switch (C46) Continuity Checks Check with alternate entrance door switch disconnected and in door closed position. **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
Alternate entrance door switch (C46) cavity 2 to 1.	Open circuit	If meter shows another value, replace alternate entrance door switch.
With meter still connected, move switch to door open position.		
Alternate entrance door switch (C46) cavity 2 to 1.	Short circuit	If meter shows another value, replace alternate entrance door switch.
Leave switch in door open position.		
Alternate entrance door switch (C46) cavity 5 to 6.	Open circuit	If meter shows another value, replace alternate entrance door switch.

Table 154 Alternate Left Side Air Service Door Control Circuit Tests (cont.)

With meter still connected, move switch to door closed position.		
Alternate entrance door switch (C46) cavity 5 to 6.	Short circuit	If meter shows another value, replace alternate entrance door switch.
Leave switch in door closed position.		
Alternate entrance door switch (C46) cavity 5 to 4.	Open circuit	If meter shows another value, replace alternate entrance door switch.
With meter still connected, move switch to door open position.		
Alternate entrance door switch (C46) cavity 5 to 4.	Short circuit	If meter shows another value, replace alternate entrance door switch.

Alternate Right Side Air Service Door Control Circuits

NOTE – This option is available on Iraq busses ONLY.

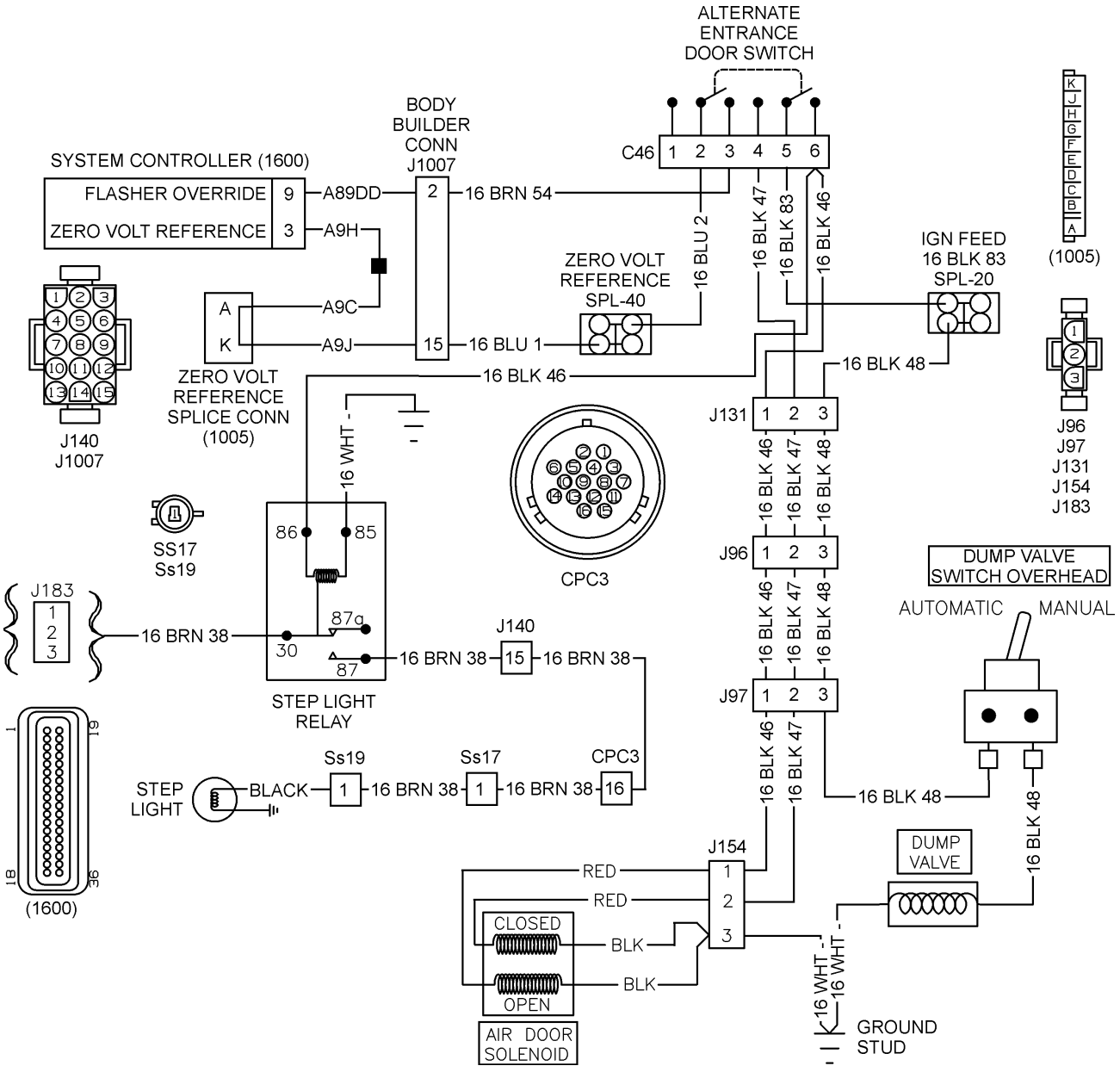

Figure 260 Alternate Right Side Air Service Door Control Circuits (Outputs from ESC to Door Solenoid) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J96 REAR CAP TO LEFT HAND BODY
J97 REAR CAP TO RIGHT HAND BODY
J131 FLASHER PLATE TO LEFT HAND BODY
J140 FLASHER PLATE TO DASH AND TOE
J154 RIGHT HAND BODY TO ALTERNATE ENTRANCE DOOR CYLINDER
J183 STEP LIGHT OPTIONS
SPL-20 IGNITION ACCESSORY FEED SPLICE
SPL-40 ZERO VOLT REFERENCE SPLICE
SS17 SEALED ENGINE HARNESS TO LEFT HAND ALTERNATE ENTRANCE DOOR STEP LIGHT

Table 155 Alternate Right Side Air Service Door Control Circuit Tests

Step Light Relay Voltage Checks Check with key in ignition switch position on, alternate right side air service door closed and step light relay removed. **NOTE – Always check connectors for damage and pushed–out terminals.** Bench check relay. If relay fails, replace and check for faults.		
Test Points	Spec.	Comments
Step light relay cavity 86 to ground.	0 volts	If voltage is present, check for short on circuit 16 BLK 46.
While meter is still connected to step light relay cavity 86 to ground, open alternate right side air service door by activating the open door circuits.		
Step light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 46 and 16 BLK 83. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Leave alternate right side air service door open.		
Step light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT —.
Close service door.		

Table 155 Alternate Right Side Air Service Door Control Circuit Tests (cont.)

Step light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BRN 38. Also ensure proper voltage source from step light power source. Refer to the Step Light Power Source section of this manual. (See Step And Skirt Lights, page 1064)
Step light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 BRN 38. Also ensure proper ground signal at step light fixtures. If circuits check good and step light still fails, replace step light/skirt light fixture(s).
Air Service Door Solenoid (J154) Voltage Checks Check with key in ignition switch position on, service door closed and air door solenoid connector (J154) 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
Air service door solenoid connector (J154) pin 2 to ground	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 47 and 16 BLK 83. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Air service door solenoid connector (J154) pin 2 to pin 3	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT —.
While meter is still connected to air service door solenoid connector (J154) pin 2 to pin 3, open alternate air service door by activating the open service door controls.		
Air service door solenoid connector (J154) pin 2 to pin 3	0 volts	If voltage is missing check for open or short on circuits 16 BLK 47 and 16 WHT —. Also check for switch continuity. See below.
Leave alternate right side air service door open.		

Table 155 Alternate Right Side Air Service Door Control Circuit Tests (cont.)

Air service door solenoid connector (J154) pin 1 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 46 and 16 BLK 83. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Air service door solenoid connector (J154) pin 1 to pin 3.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 WHT —.
While meter is still connected to air service door solenoid connector (J154) pin 1 to pin 3, close alternate air service door by activating the close service door controls.		
Air service door solenoid connector (J154) pin 1 to pin 3.	0 volts	If voltage is missing check for open or short on circuits 16 BLK 47 and 16 WHT —. Also check for switch continuity. See below.
Dump Valve Voltage Checks Check with key in ignition switch position on, air service door closed, dump valve switch in “automatic” position and dump valve connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Dump valve connector switch side to ground.	0 volts	If voltage is different, check for open or short on circuit 16 BLK 48.
While meter is still connected, flip dump valve switch to “manual”.		
Dump valve connector switch side to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 48. Also ensure proper voltage from Ign/Acc Feed Splice SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Dump valve connector switch side to ground side.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT —. If circuits check good and dump valve is still faulty, replace dump valve.

Table 155 Alternate Right Side Air Service Door Control Circuit Tests (cont.)

Alternate Entrance Door Switch (C46) Continuity Checks Check with alternate entrance door switch disconnected and in door closed position. **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
Alternate entrance door switch (C46) cavity 2 to 3.	Open circuit	If meter shows another value, replace alternate entrance door switch.
With meter still connected, move switch to door open position.		
Alternate entrance door switch (C46) cavity 2 to 3.	Short circuit	If meter shows another value, replace alternate entrance door switch.
Leave switch in door open position.		
Alternate entrance door switch (C46) cavity 5 to 4.	Open circuit	If meter shows another value, replace alternate entrance door switch.
With meter still connected, move switch to door closed position.		
Alternate entrance door switch (C46) cavity 5 to 4.	Short circuit	If meter shows another value, replace alternate entrance door switch.
Leave switch in door closed position.		
Alternate entrance door switch (C46) cavity 5 to 6.	Open circuit	If meter shows another value, replace alternate entrance door switch.
With meter still connected, move switch to door open position.		
Alternate entrance door switch (C46) cavity 5 to 6.	Short circuit	If meter shows another value, replace alternate entrance door switch.

15.7. VANDAL LOCK FOR AIR ENTRANCE 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.

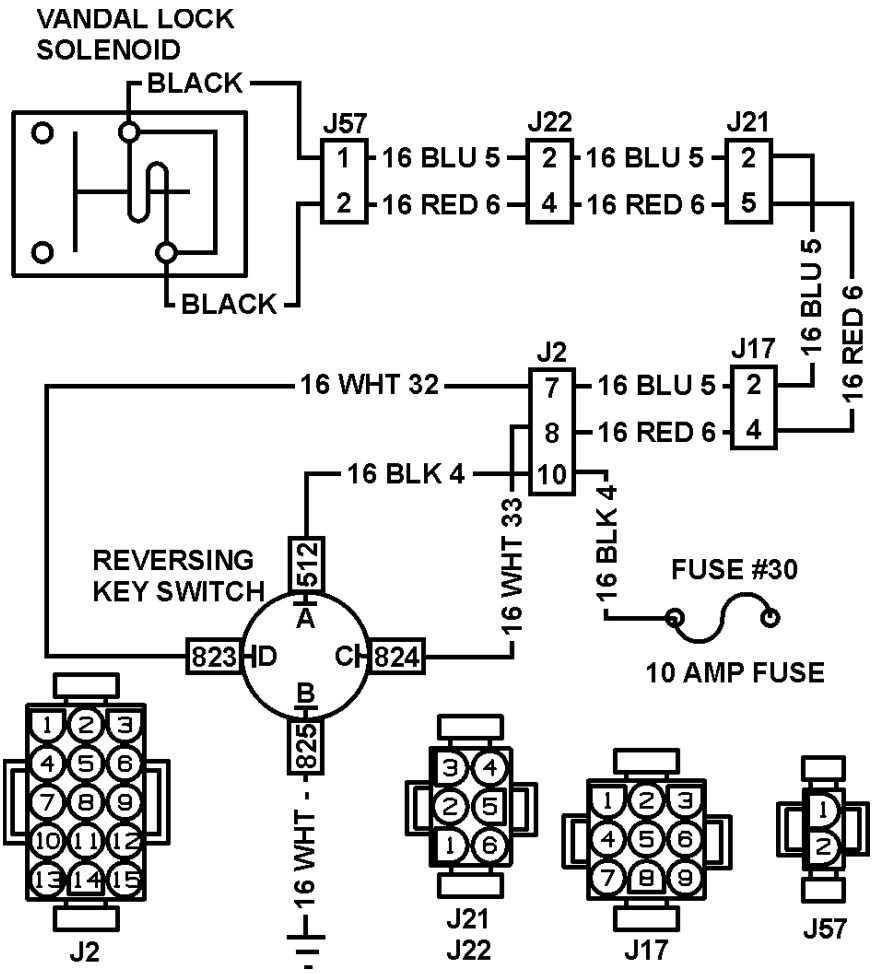

Figure 261 Vandal Lock For Air Entrance Door Circuits (Outputs from ESC to Door Solenoid) — Always Refer to the Circuit Diagram Book for Latest Circuit Information

J2 FLASHER PLATE TO DASH
J17 FLASHER PLATE TO LEFT HAND BODY
J21 LEFT HAND BODY TO FRONT CAP
J22 FRONT CAP TO ENTRANCE DOOR
J57 ENTRANCE DOOR HARNESS TO ENTRANCE DOOR VANDAL LOCK SOLENOID

Table 156 Vandal Lock For Air Entrance Door Circuit Tests

Reversing Key Switch Connector Voltage Checks Check with ignition off, air service door closed and reversing key switch connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Reversing door switch cavity 512 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #30. Also check for open or short on circuit 16 BLK 4.

Table 156 Vandal Lock For Air Entrance Door Circuit Tests (cont.)

Reversing door switch cavity 512 to 825.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 WHT —.
Vandal Lock Solenoid Connector (J57) Voltage Checks Check with ignition off, air service door closed, reversing key switch connector connected and key in neutral position and vandal lock solenoid connector (J57) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Vandal lock solenoid connector (J57) cavity 1 to 2.	0 volts	If voltage is present check for short on circuits 16 BLU 5 and 16 RED 6.
While meter is still connected to vandal lock solenoid connector (J57), rotate key switch to door open position.		
Vandal lock solenoid connector (J57) cavity 1 to 2.	± 12 ± 1.5 volts	Positive and negative voltage will depend on orientation of reversing key switch. If voltage is missing, check for open or short on circuits 16 BLU 5 and 16 RED 6. If voltage is missing and circuits check good, replace reversing key switch and retest.
While meter is still connected to vandal lock solenoid connector (J57), rotate key switch to door closen position.		
Vandal lock solenoid connector (J57) cavity 1 to 2.	± 12 ± 1.5 volts	Positive and negative voltage will depend on orientation of reversing key switch. If voltage is missing, check for open or short on circuits 16 BLU 5 and 16 RED 6. If voltage is missing and circuits check good, replace reversing key switch and retest. If all circuits check good and vandal lock solenoid still fails, replace vandal lock solenoid.

15.8. EXTENDED DESCRIPTION

For electric and air service doors:

When the door open switch is closed the electronic system controller will supply a ground signal on connector (1600) pin 11. This will allow voltage from the ignition/accessory feed splice-20 to power the open service door solenoid.

When the door close switch is closed the electronic system controller will supply a ground signal on connector (1602) pin 17. This will allow voltage from the ignition/accessory feed splice-20 to power the close service door solenoid.

The step light relay is charged whenever the service door open switch is closed. The ground signal supplied on system controller connector (1600) pin 11 will charge the step light relay with voltage from the ignition/accessory feed splice-20. Voltage from the step light power source will then be applied to the step light turning it on. The step light will remain on until the close service door circuits are activated.

For manual service door:

When the manual service door is opened the manual door switch will close charging the manual door relay and the step light relay. The zero volt reference signal will then flow from ESC connector (1600) pin 3 to through the closed manual door relay to the ESC connector (1600) pin 26. This will tell the ESC that the manual service door is opened. Likewise voltage from the step light connector J183 will flow through the closed step light relay to power the step light and the skirt light.

When the manual service door is closed the manual door switch will open creating an open circuit in the manual door relay charging circuit.

Ground for the manual door relay and the step light relay is provided from the ground stud on the flasher plate.

15.9. COMPONENT LOCATIONS

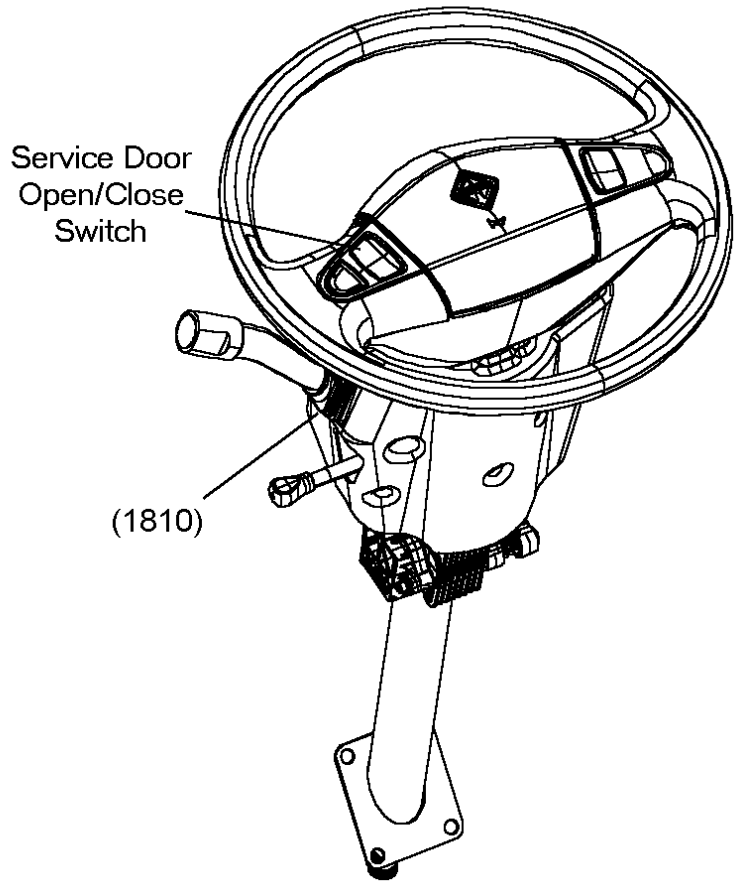

Figure 262 Service Door Control Switches Located In Steering Column

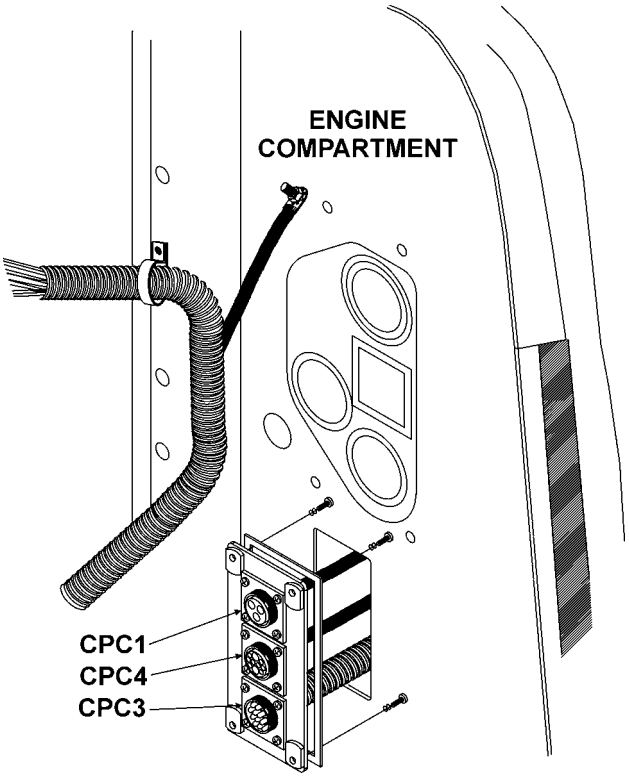

Figure 263 Engine Compartment Pass Thurs

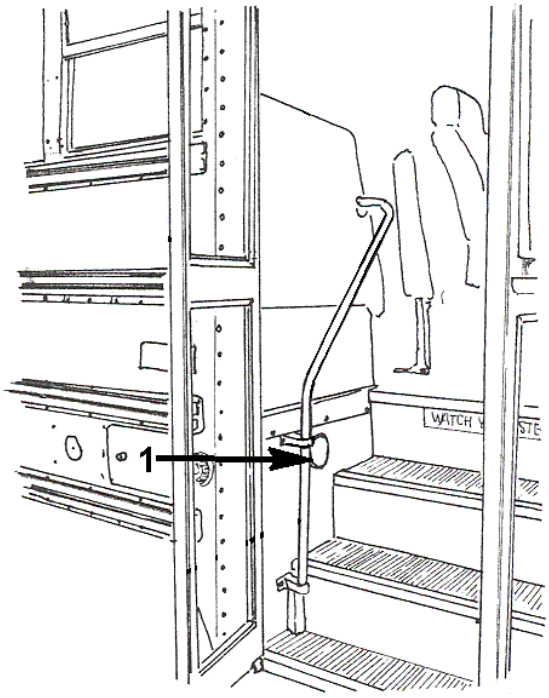

Figure 264 Service Door

1. STEP LIGHT

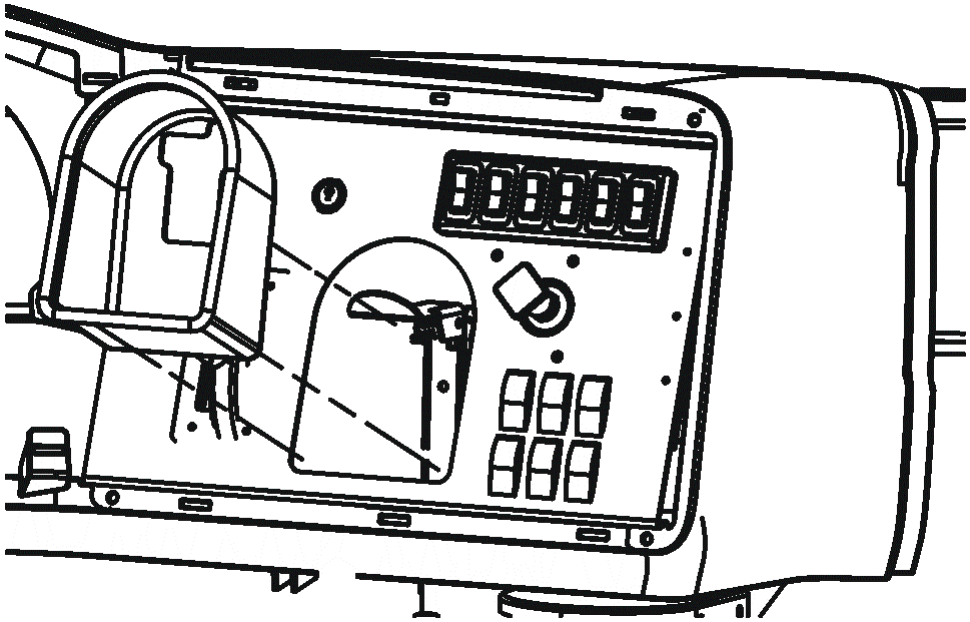

Figure 265 Manual Service Door Right Hand Switch Panel

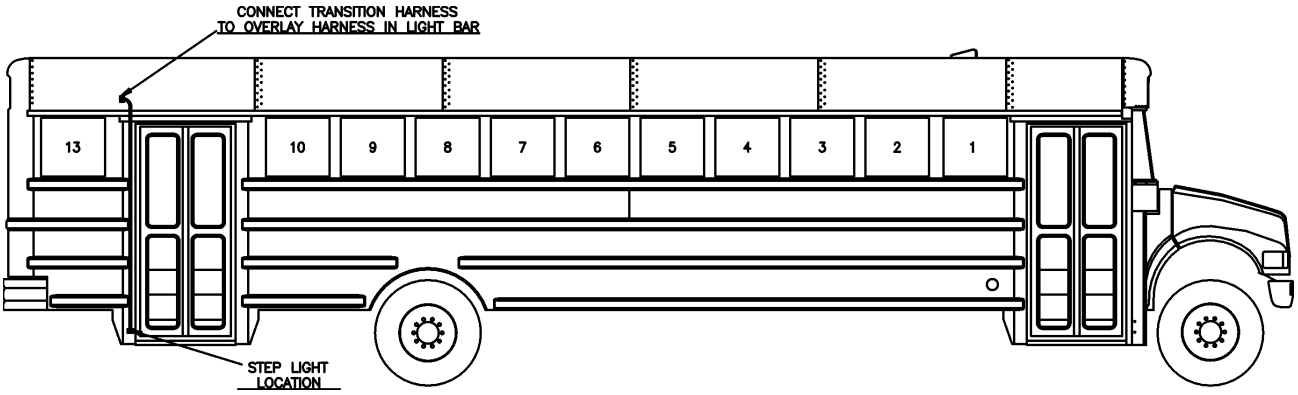

Figure 266 Right Side Alternate Entrance Service Door

16. EMERGENCY EXIT CONTROLS

16.1. CIRCUIT FUNCTIONS

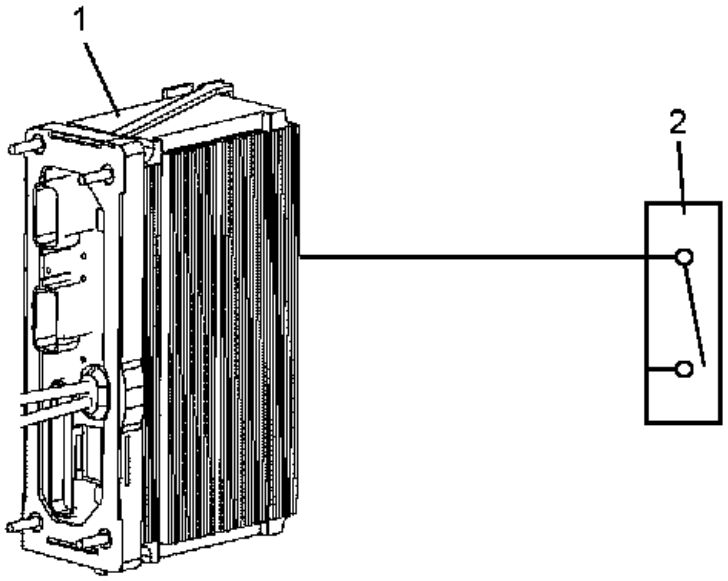

Figure 267 Emergency Exit Controls Function Diagram

1. ELECTRONIC SYSTEM CONTROLLER
2. EMERGENCY EXIT SWITCH

16.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the Emergency Exits.

Emergency Exit Controls Preliminary Check

Table 157 Emergency Exit Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of emergency exits.	Visually check emergency exits.	Emergency exits do not operate.	Go to next step.	Emergency exits are operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 531)	Read display on odometer.	**No** Emergency exit diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See Emergency Kick-Out Windows Fault Detection Management, page 532)
4.	On	Go to Fault Detection Management (See Emergency Kick-Out Windows Fault Detection Management, page 532)				

16.3. EMERGENCY KICK-OUT WINDOWS 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.

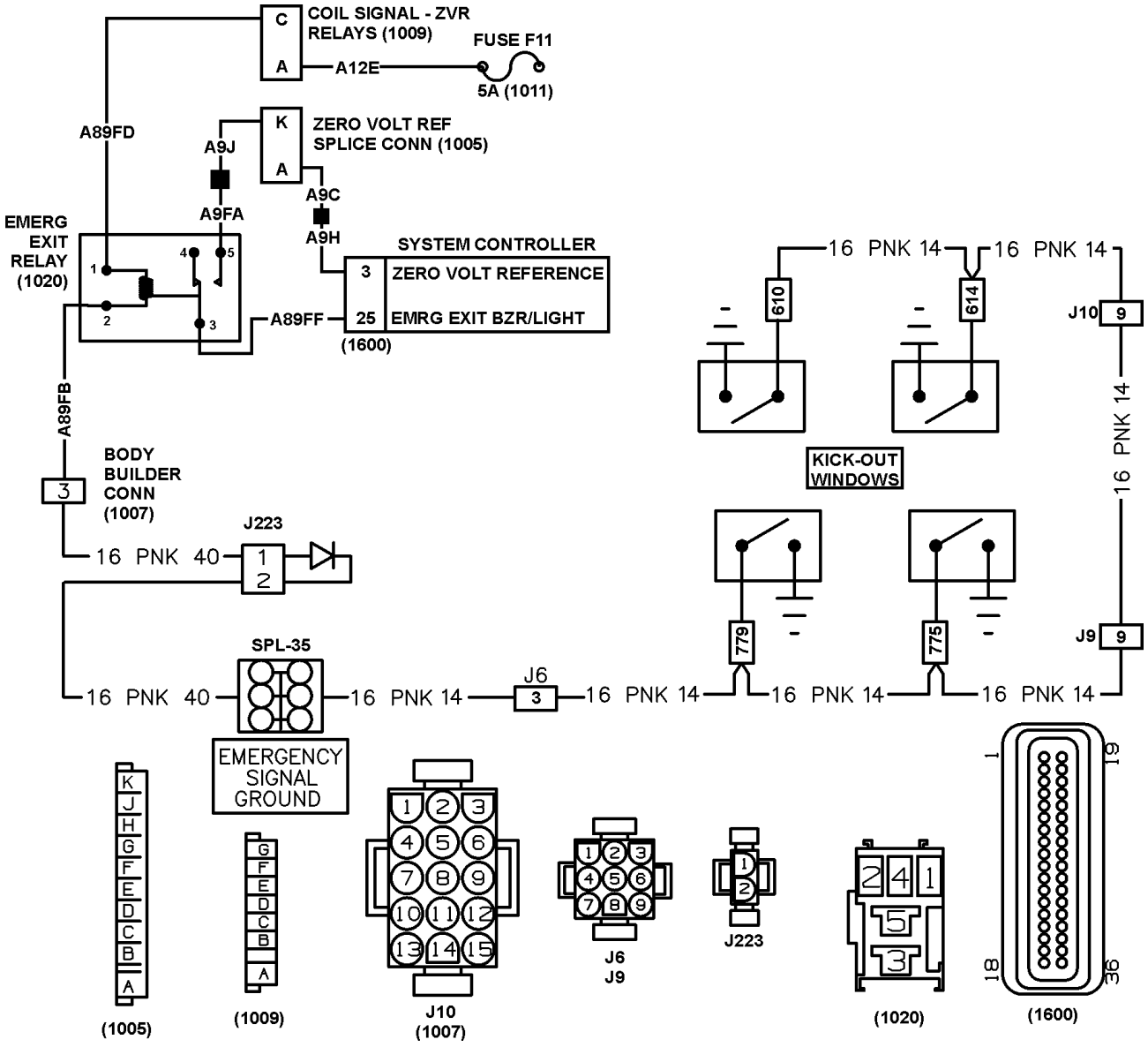

Figure 268 Emergency Kick-Out Window Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1020) EMERGENCY EXIT 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
J9 LEFT HAND BODY TO REAR CAP
J10 LEFT HAND BODY TO REAR CAP
J223 EMERGENCY EXIT RELAY DIODE ASSEMBLY ON FLASHER PLATE
SPL-35 EMERGENCY EXIT SPLICE

Table 158 Emergency Kick—Out Window Circuit Tests

Emergency Exit Relay (1020) Voltage Checks Check with emergency exit relay (1020) removed and key in ignition position switch on. **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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	Open circuit	If voltage is present check for short to ground in circuits A89FB, 16 PNK 40 and 16 PNK 14.
While voltmeter is still connected to emergency exit relay (1020) from cavity 1 to cavity 2, open emergency kick-out window.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuits A89FB, 16 PNK 40 and 16 PNK 14. Also check for proper orientation and operation of diode (J223).

Table 158 Emergency Kick—Out Window Circuit Tests (cont.)

Leave emergency kick—out window open.		
Emergency exit relay (1020) cavity 5 to cavity 3.	0 volts	If voltage is present or emergency exit buzzer and lights fail to operate, check for open or short on circuits A89FF, A9FA A9J, A9C and A9H. Also ensure proper zero volt signal on system controller (1600) pin 3. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, retest with different emergency kick-out window open. If emergency exit sounds, replace emergency kick-out window switch.

16.4. EMERGENCY EXIT 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.

For busses built prior to May 1, 2004

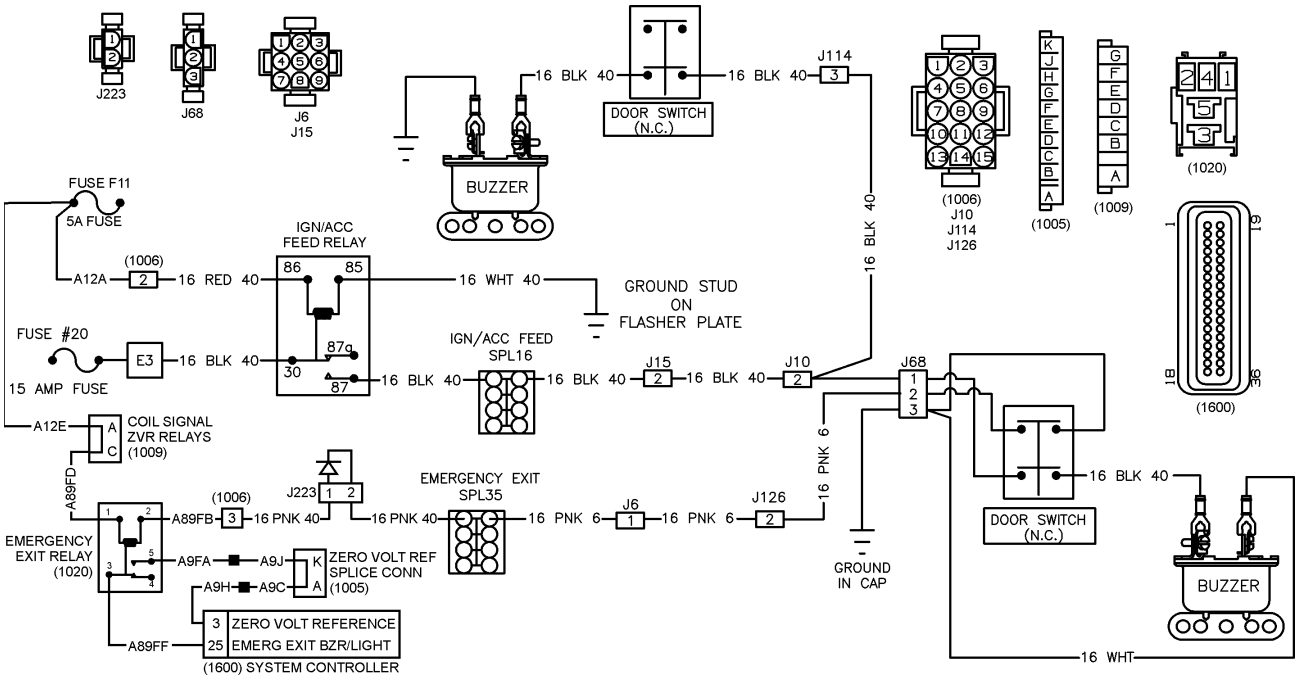

Figure 269 Emergency Door Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) BODY BUILDER CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1020) EMERGENCY EXIT RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J6 FLASHER PLATE TO LEFT HAND BODY
J10 LEFT HAND BODY TO REAR CAP
J15 FLASHER PLATE TO LEFT HAND BODY
J68 REAR CAP
J114 RIGHT HAND BODY TO REAR CAP
J126 REAR CAP TO LEFT HAND BODY
J223 EMERGENCY EXIT RELAY DIODE ASSEMBLY ON FLASHER PLATE
SPL-16 IGNITION ACCESSORY FEED SPLICE
SPL-35 EMERGENCY EXIT FEED SPLICE

Table 159 Emergency Exit Door 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 relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A12A and 16 RED 40.
Ign/acc relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is present check for open or short to high in circuit 16 WHT 40.
Ign/acc relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #20 and for open or short on circuit 16 BLK 40.
Ign/acc relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 40 to SPL-16.
Emergency Exit Relay (1020) Voltage Checks Check with ignition on and emergency exit relay (1020) 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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11. Also check for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	0 volts	If voltage present check for short on circuits A89FB, 16 PNK 40 and 16 PNK 6. Also ensure proper operation and orientation of diode J223.
While meter is still connected to emergency exit relay from cavity 1 to 2, open rear emergency exit.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage missing, check for blown fuse F11. Also check for open or short on circuits A12E, A89FD, A89FB, 16 PNK 40 and 16 PNK 6. Also ensure proper operation and orientation of diode J223.
Close emergency exit		

Table 159 Emergency Exit Door Circuit Tests (cont.)

Emergency exit relay (1020) cavity 5 to ground.	0 volts	If voltage is different, check for open or close on circuits A9FA, A9J, A9C and A9H. Also check for proper zero volt reference signal from system controller (1600) pin 3. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Emergency exit relay (1020) cavity 5 to 3.	0 volts	If voltage is different, check for open or close on circuit A89FF.
Emergency Exit Door Switch Checks Check with emergency exit closed and connector J68 disconnected. **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
Door switch connector cavity 1 to 3.	Open circuit	If meter shows any other value, replace emergency exit door switch.
While meter is still connected to door switch from cavity 1 to 3, open emergency exit.		
Door switch connector cavity 1 to 3.	Short circuit	If meter shows any other value, replace emergency exit door switch.
Close emergency exit.		
Door switch connector cavity 2 to 3.	Open circuit	If meter shows any other value, replace emergency exit door switch.
While meter is still connected to door switch from cavity 2 to 3, open emergency exit.		
Door switch connector cavity 2 to 3.	Short circuit	If meter shows any other value, replace emergency exit door switch.

For busses built after May 1, 2004

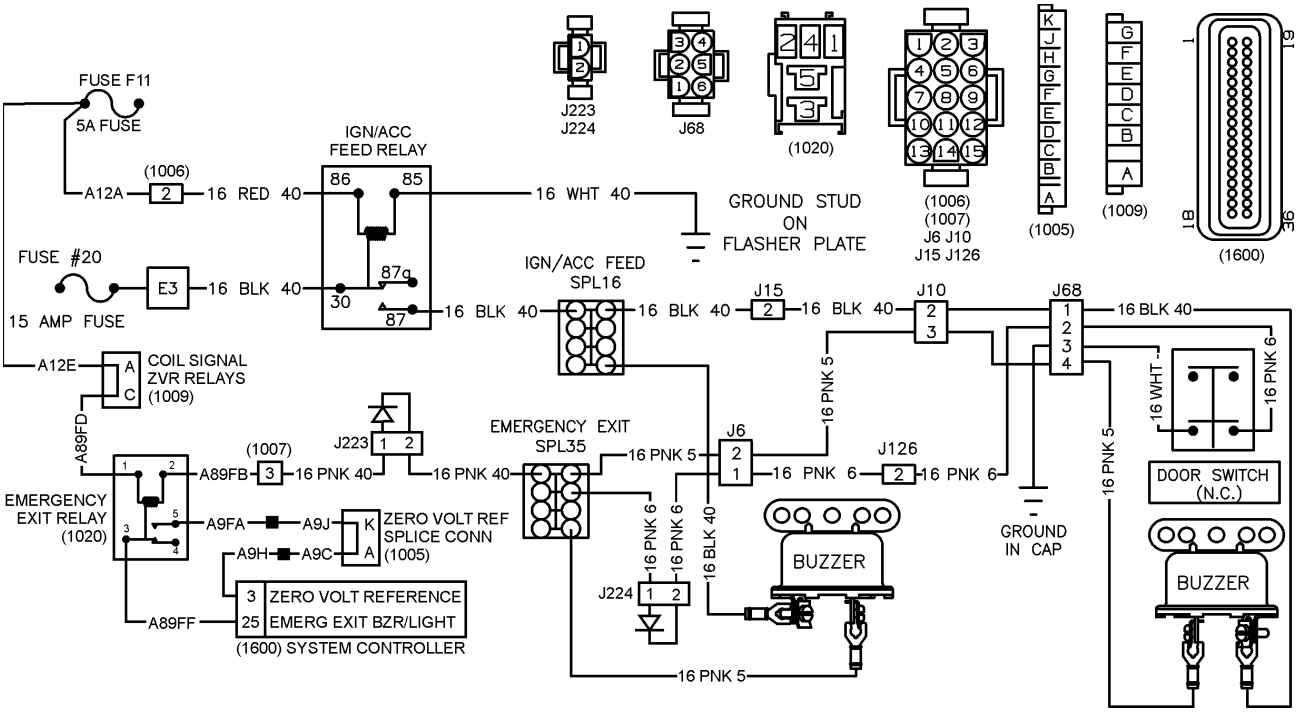

Figure 270 Emergency Door Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) BODY BUILDER 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
(1020) EMERGENCY EXIT RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) SYSTEM CONTROLLER
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
J6 FLASHER PLATE TO LEFT HAND BODY
J10 LEFT HAND BODY TO REAR CAP
J15 FLASHER PLATE TO LEFT HAND BODY
J68 REAR CAP
J126 REAR CAP TO LEFT HAND BODY
J223 EMERGENCY EXIT RELAY DIODE ASSEMBLY ON FLASHER PLATE
J224 REAR DOOR SWITCH DIODE ASSEMBLY ON FLASHER PLATE
SPL-16 IGNITION ACCESSORY FEED SPLICE
SPL-35 EMERGENCY EXIT FEED SPLICE

Table 160 Emergency Exit Door 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 relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A12A and 16 RED 40.
Ign/acc relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is present check for open or short to high in circuit 16 WHT 40.
Ign/acc relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #20 and for open or short on circuit 16 BLK 40.
Ign/acc relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 40.
Emergency Exit Relay (1020) Voltage Checks Check with ignition on and emergency exit relay (1020) 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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11. Also check for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	0 volts	If voltage present check for short on circuits A89FB, 16 PNK 40, 16 PNK 5 and 16 PNK 6. Also ensure proper operation and orientation of diodes J223 and J224.
While meter is still connected to emergency exit relay from cavity 1 to 2, open rear emergency exit.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage missing, check for blown fuse F11. Also check for short on circuits A89FB, 16 PNK 40, 16 PNK 5 and 16 PNK 6. Also ensure proper operation and orientation of diodes J223 and J224.
Close emergency exit		

Table 160 Emergency Exit Door Circuit Tests (cont.)

Emergency exit relay (1020) cavity 5 to ground.	0 volts	If voltage is different, check for open or close on circuits A9FA, A9J, A9C and A9H. Also check for proper zero volt reference signal from system controller (1600) pin 3. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Emergency exit relay (1020) cavity 5 to 3.	0 volts	If voltage is different, check for open or close on circuit A89FF.
Emergency Exit Door Switch Checks Check with emergency exit closed and connector J68 disconnected. **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
Door switch connector cavity 2 to 3.	Open circuit	If meter shows any other value, replace emergency exit door switch.
While meter is still connected to door switch from cavity 2 to 3, open emergency exit.		
Door switch connector cavity 2 to 3.	Short circuit	If meter shows any other value, replace emergency exit door switch.
Close emergency exit.		
Door switch connector cavity 1 to 4.	Open circuit	If meter shows any other value, replace emergency exit door switch.
While meter is still connected to door switch from cavity 1 to 4, open emergency exit.		
Door switch connector cavity 1 to 4.	Short circuit	If meter shows any other value, replace emergency exit door switch.

16.5. ROOF HATCH 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 Roof Hatches

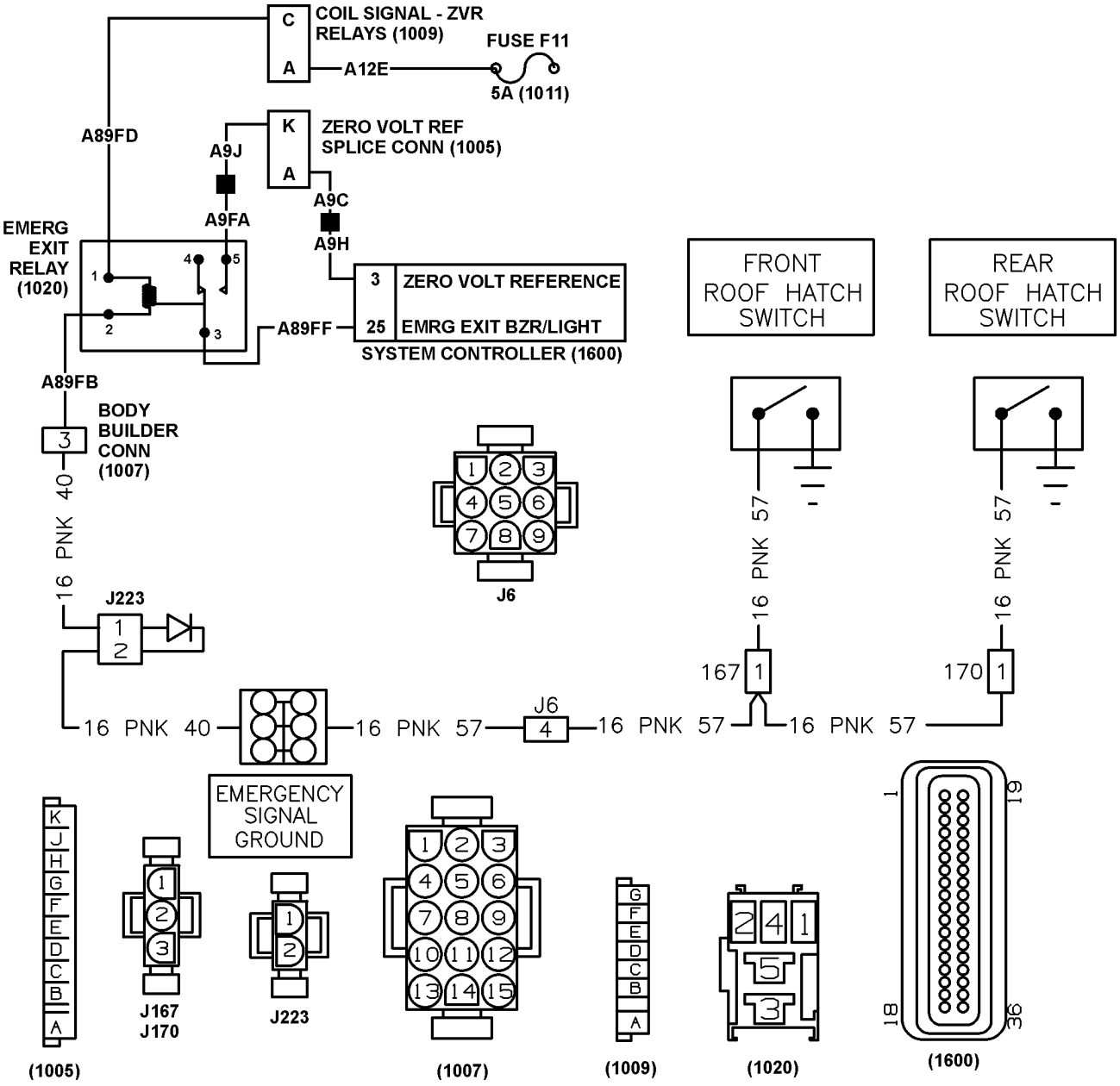

Figure 271 Roof Hatch Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1020) EMERGENCY EXIT 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
J167 J170 LEFT HAND BODY TO ROOF HATCH
J223 EMERGENCY EXIT RELAY DIODE ASSEMBLY ON FLASHER PLATE

Table 161 Rook Hatch Exit Circuit Tests

Emergency Exit Relay (1020) Voltage Checks Check with emergency exit relay (1020) removed and key in ignition position switch on. **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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11. Also check for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	0 volts	If voltage is present check for short to ground in circuits A89FB, 16 PNK 40 and 16 PNK 57.
While voltmeter is still connected to emergency exit relay (1020) from cavity 1 to cavity 2, open emergency roof hatch exit.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuits A89FB, 16 PNK 40 and 16 PNK 57. Also check for proper orientation and operation of diode (J223).

Table 161 Rook Hatch Exit Circuit Tests (cont.)

Leave emergency roof hatch exit open.		
Emergency exit relay (1020) cavity 5 to cavity 3.	0 volts	If voltage is present, check for open or short on circuits A89FF, A9FA and A9J. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, retest with different emergency roof hatch exit open. If emergency exit sounds, replace emergency roof hatch exit switch.

Roof Hatches w/Single Speed Power Vent

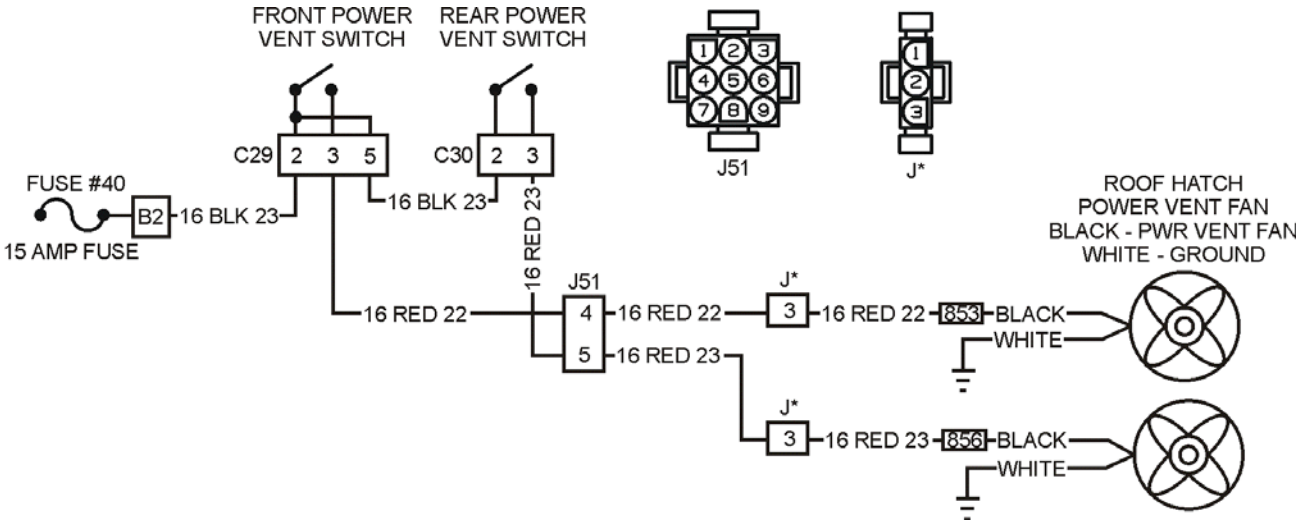

Figure 272 Roof Hatches w/Single Speed Power Vent Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

J51 FLASHER PLATE TO LEFT HAND BODY
J* FRONT POWER VENT
CAN BE J164 — J170 DEPENDING ON LOCATION OF ROOF HATCH
J* REAR POWER VENT
CAN BE J167 — J173 DEPENDING ON LOCATION OF ROOF HATCH

Table 162 Roof Hatches w/Single Speed Power Vent Circuit Tests

Roof Hatch Power Vent Fan Voltage Checks Check with ignition on, roof hatch power vent fan disconnected and power vent switches off. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Front roof hatch power vent cavity 853 to ground.	0 volts	If voltage is present check for short on circuit 16 RED 22. Also ensure that front power vent switch (C29) is open.
While meter is still connected to front roof hatch power vent cavity 853 to ground, activate front power vent by closing front power vent switch (C29).		
Front roof hatch power vent cavity 853 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #40. Also check for open or short in circuits 16 BLK 23 and 16 RED 22. If circuits check good and power vent fan is still faulty, check ground connection on circuit WHITE at fan. If circuits check good and fan is still faulty, replace front power vent switch (C29) and retest. If power vent fan does not pass retest, replace front power vent fan.
Rear roof hatch power vent cavity 856 to ground.	0 volts	If voltage is present check for short on circuit 16 RED 23. Also ensure that front power vent switch (C30) is open.
While meter is still connected to rear roof hatch power vent cavity 856 to ground, activate rear power vent by closing rear power vent switch (C30).		
Rear roof hatch power vent cavity 856 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #40. Also check for open or short in circuits 16 BLK 23 and 16 RED 23. If circuits check good and power vent fan is still faulty, check ground connection on circuit WHITE at fan. If circuits check good and fan is still faulty, replace rear power vent switch (C30) and retest. If power vent fan does not pass retest, replace rear power vent fan.

Roof Hatches w/Dual Speed Power Vent

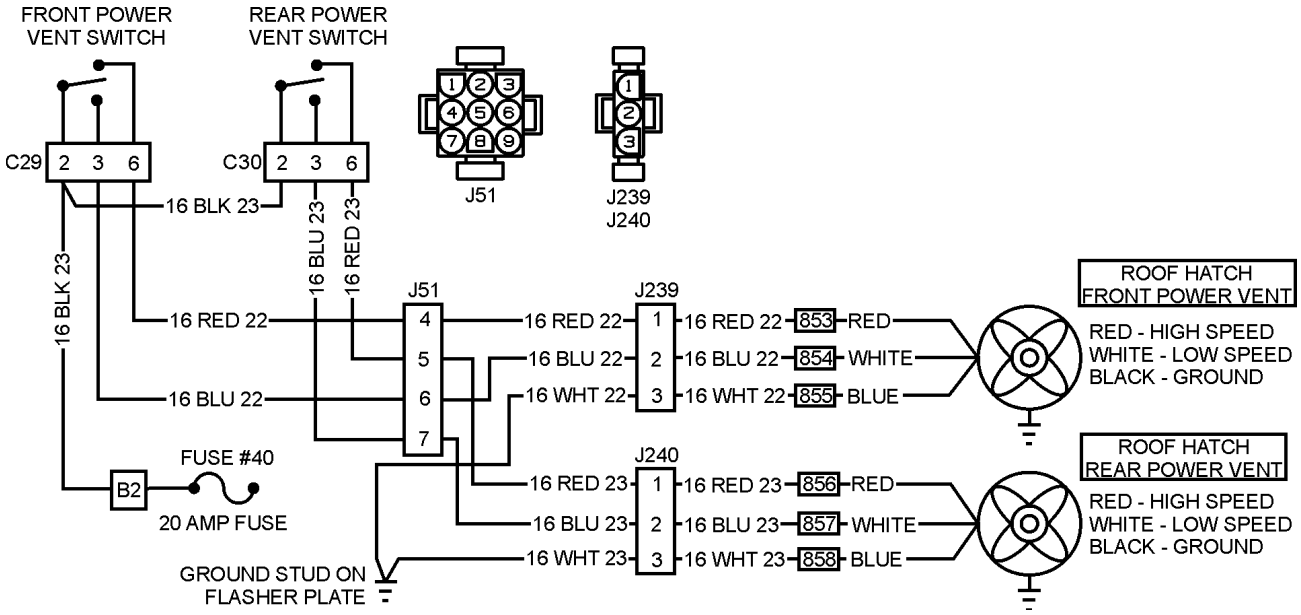

Figure 273 Roof Hatches w/Dual Speed Power Vent Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

J51 FLASHER PLATE TO LEFT HAND BODY
J239 ROOF HATCH W/DUAL SPEED POWER VENT
J240 ROOF HATCH W/DUAL SPEED POWER VENT

Table 163 Roof Hatches w/Dual Speed Power Vent Circuit Tests

Front Roof Hatch Power Vent Fan Voltage Checks Check with ignition on, roof hatch power vent fan disconnected and power vent switches off. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Front roof hatch power vent cavity 853 to ground.	0 volts	If voltage is present check for short on circuit 16 RED 22. Also ensure that front power vent switch (C29) is open.
While meter is still connected to front roof hatch power vent cavity 853 to ground, activate front power vent in high speed by closing front power vent switch (C29).		

Table 163 Roof Hatches w/Dual Speed Power Vent Circuit Tests (cont.)

Front roof hatch power vent cavity 853 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #40. Also check for open or short in circuits 16 BLK 23 and 16 RED 22. If circuits check good and power vent fan is still faulty, check ground connection on circuit WHITE at fan. If circuits check good and fan is still faulty, replace front power vent switch (C29) and retest. If power vent fan does not pass retest, replace front power vent fan.
Front roof hatch power vent cavity 854 to ground.	0 volts	If voltage is present check for short on circuit 16 BLU 22. Also ensure that front power vent switch (C29) is open.
While meter is still connected to front roof hatch power vent cavity 854 to ground, activate front power vent in low speed by closing front power vent switch (C29).		
Front roof hatch power vent cavity 854 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #40. Also check for open or short in circuits 16 BLK 23 and 16 BLU 22.
Front roof hatch power vent cavity 854 to 855.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 22. If circuits check good and fan is still faulty, replace front power vent switch (C29) and retest. If power vent fan does not pass retest, replace front power vent fan.
Rear Roof Hatch Power Vent Fan Voltage Checks Check with ignition on, roof hatch power vent fan disconnected and power vent switches off. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Rear roof hatch power vent cavity 856 to ground.	0 volts	If voltage is present check for short on circuit 16 RED 23. Also ensure that front power vent switch (C30) is open.
While meter is still connected to rear roof hatch power vent cavity 856 to ground, activate rear power vent in high speed by closing rear power vent switch (C30).		

Table 163 Roof Hatches w/Dual Speed Power Vent Circuit Tests (cont.)

Rear roof hatch power vent cavity 856 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #40. Also check for open or short in circuits 16 BLK 23 and 16 RED 23.
Rear roof hatch power vent cavity 857 to ground.	0 volts	If voltage is present check for short on circuit 16 BLU 23. Also ensure that front power vent switch (C30) is open.
While meter is still connected to rear roof hatch power vent cavity 857 to ground, activate rear power vent in low speed by closing rear power vent switch (C30).		
Rear roof hatch power vent cavity 857 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #40. Also check for open or short in circuits 16 BLK 23 and 16 BLU 23.
Rear roof hatch power vent cavity 857 to 858.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit 16 WHT 23. If circuits check good and fan is still faulty, replace rear power vent switch (C30) and retest. If power vent fan does not pass retest, replace rear power vent fan.

16.6. EMERGENCY EXIT — STARTER INTERRUPT 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.

For busses built prior to June 1, 2004

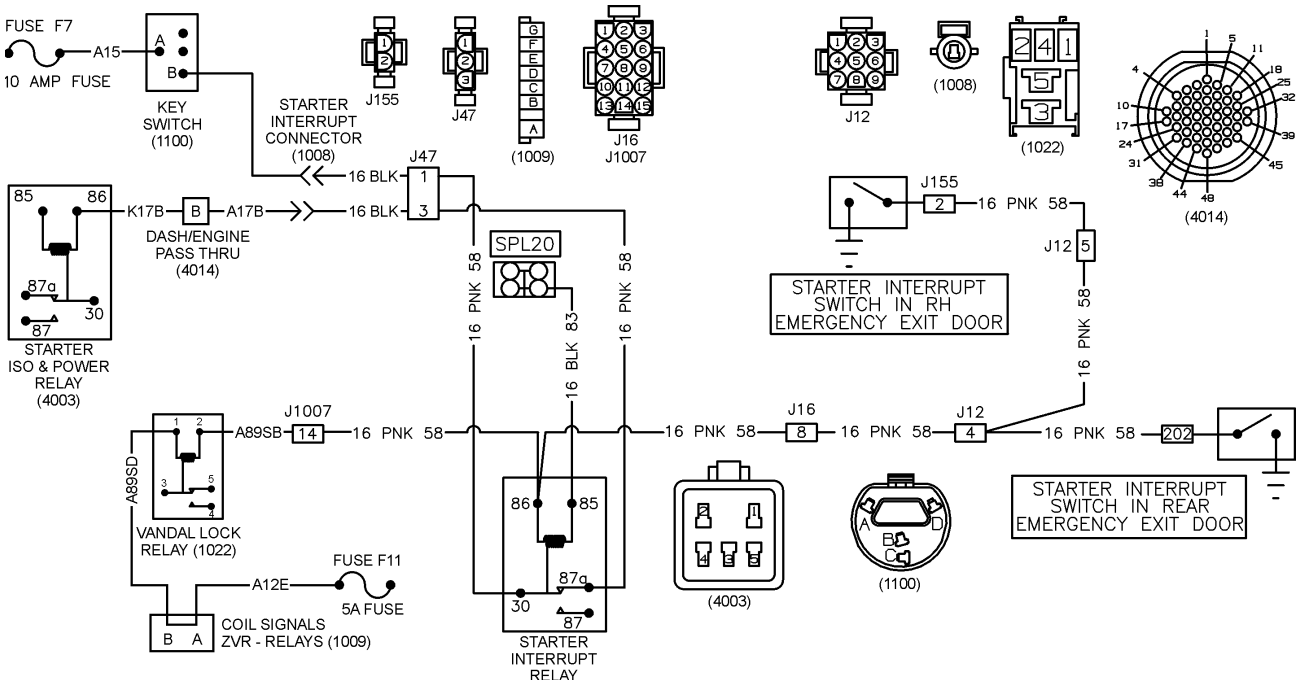

Figure 274 Starter Interrupt — Emergency Exit Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1008) STARTER INTERRUPT
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1009) COIL SIGNAL ZERO VOLT REFERENCE (ZVR)
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1022) VANDAL LOCK RELAY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1100) KEY SWITCH
LOCATED AT INSTRUMENT WING PANEL
(4003) STARTER ISO & POWER RELAY
LOCATED AT OUTSIDE CENTER DASH PANEL
(4014) DASH/ENGINE PASS THRU
LOCATED AT INSIDE LEFT SIDE DASH PANEL
J12 LEFT HAND BODY TO REAR CAP
J16 FLASHER PLATE TO LEFT HAND BODY
J47 FLASHER PLATE TO PLATFORM HARNESS
J155 LEFT OR RIGHT SIDE TO EMERGENCY EXIT DOOR
SPL-20 IGNITION ACCESSORY FEED SPLICE

Table 164 Starter Interrupt — Emergency Exit Circuit Tests

Starter Interrupt Relay Voltage Checks Check with starter interrupt relay removed, emergency exits closed and ignition on. **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
Starter interrupt relay cavity 85 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 83. Also for proper voltage supply to SPL-20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Starter interrupt relay cavity 85 to 86.	0 volts	If voltage is present check for short to ground in circuit 16 PNK 58.
While voltmeter is still connected to starter interrupt relay from cavity 85 to cavity 86, open rear emergency exit.		
Starter interrupt relay cavity 85 to 86.	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuit 16 PNK 58. Also ensure proper grounding of switches in emergency exit.
Close emergency exit.		
Starter interrupt relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F7. Also check for open or short on circuits 16 PNK 58, 16 BLK and A15.
Starter interrupt relay cavity 30 to 87a.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 PNK 58, 16 BLK, A17 and K17B. If circuits check good and voltage is still missing, troubleshoot Starter ISO & Power Relay (4003). Refer to the Starter ISO & Power Circuits section of this manual. (See STARTER ISO & POWER RELAY CIRCUITS, page 301)

For busses built after June 1, 2004

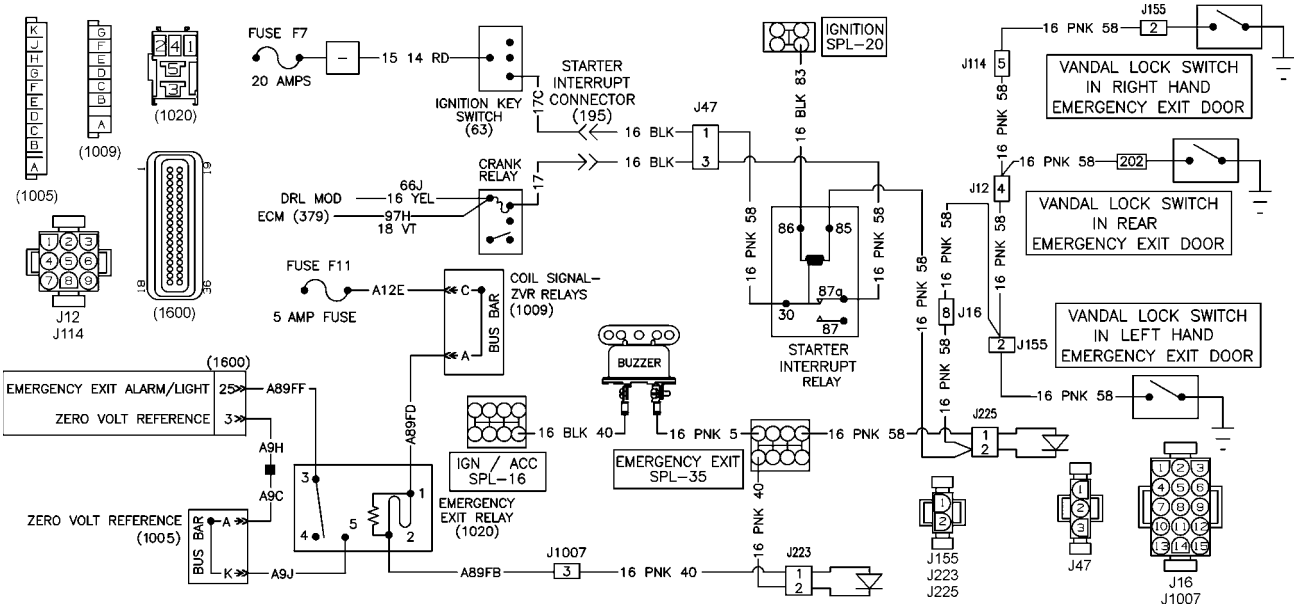

Figure 275 Starter Interrupt w/Buzzer — Emergency Exit Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTION
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) BODY BUILDER CONNECTOR
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1009) COIL SIGNAL ZERO VOLT REFERENCE (ZVR)
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
J12 LEFT HAND BODY TO REAR CAP
J16 FLASHER PLATE TO LEFT HAND BODY
J47 FLASHER PLATE TO PLATFORM HARNESS
J114 RIGHT HAND BODY TO REAR CAP
J155 LEFT OR RIGHT SIDE TO EMERGENCY EXIT DOOR
J223 EMERGENCY EXIT RELAY DIODE ASSEMBLY ON FLASHER PLATE
J225 STARTER INTERRUPT/VANDAL LOCK DIODE ASSEMBLY ON FLASHER PLATE
SPL-16 IGNITION ACCESSORY FEED SPLICE
SPL-20 IGNITION ACCESSORY FEED SPLICE
SPL-35 EMERGENCY EXIT FEED SPLICE

Table 165 Starter Interrupt — Emergency Exit Circuit Tests

Emergency Exit Relay Voltage Checks Check with emergency exit relay removed, emergency exits closed and key in ignition in on position. **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
Emergency exit relay (1020) 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 A89FD and A12E.
Emergency exit relay (1020) cavity 1 to cavity 2.	0 volts	If voltage is present check for open or short to high in circuits A89FB, 16 PNK 40 and 16 PNK 58.
While voltmeter is still connected to emergency exit relay (1020) from cavity 1 to cavity 2, open rear emergency exit.		
Emergency exit relay (1020) cavity 1 to cavity 2.	12 ± 1.5 volts	If voltage is missing check for open or short in circuits A89FB, 16 PNK 40 and 16 PNK 58.
Close rear emergency exit.		
Emergency exit relay (1020) cavity 5 to cavity 3.	0 volts	If voltage is present or meter shows open circuit check for open or short in circuits A9J, A9C, A9H and A89FF. Also ensure proper zero volt signal from ESC connector (1600) pin 3 and proper input signal on ESC connector (1600) pin 25. Refer to the ESC Replacement section of this manual. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Starter Interrupt Relay Voltage Checks Check with Starter Interrupt relay removed, emergency exits closed and key in ignition in on position. **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

Table 165 Starter Interrupt — Emergency Exit Circuit Tests (cont.)

Starter Interrupt Relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 83. Also check power supply to ignition splice 20. Refer to the Ignition Power Feed section of this manual.
Starter Interrupt Relay cavity 86 to cavity 85.	0 volts	If voltage is present, check for open or short on circuit 16 PNK 58. Also check for proper alignment of diode J225.
While meter is still connected to starter interrupt relay from cavity 86 to 85, open emergency exit door.		
Starter Interrupt Relay cavity 86 to cavity 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 PNK 58. Also check for proper alignment of diode J225.
Close emergency exit door. If more than one emergency exit door is present on bus, repeat the last step for each door. If any door does not produce voltage at meter, replace door switch in that emergency exit door.		
Starter Interrupt Relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown chassis fuse F7. Also check for open or short on circuits 16 PNK 58, 16 BLK, 17C and 15.
Starter Interrupt Relay cavity 30 to cavity 87a.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 PNK 58, 16 BLK, 17, 66J and 97H. If circuits check good, but fault still present, then refer to the Cranking Motor System section of this manual.

16.7. EXTENDED DESCRIPTION

When a kick-out window or roof hatch is opened a circuit will close charging the emergency exit relay (1020). This will close a circuit between the zero volt reference signal and the system controller (1600) pin 25. When the ESC sees the zero volt signal, it will activate the emergency lights and buzzer.

When the emergency exit door is opened a circuit will close allowing voltage to flow from fuse #20 through relay #3 to the emergency buzzer and lights. Relay #3 is charged by the accessory fuse F11.

Ground to relay #3 is provided by the ground stud on flasher plate.

16.8. COMPONENT LOCATIONS

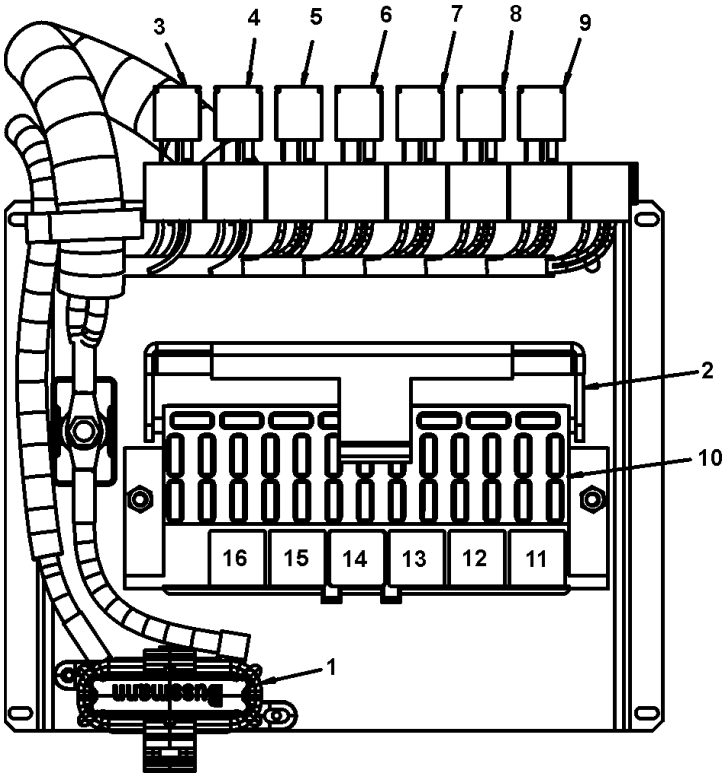

Figure 276 Relay Location Diagram

1. 125 A MAXIFUSE
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 — BODY BUILDER STOP LIGHT RELAY
14. R4 — AIR SOLENOID POWER RELAY
15. R5 — IGNITION RELAY
16. R6 — IGNITION RELAY

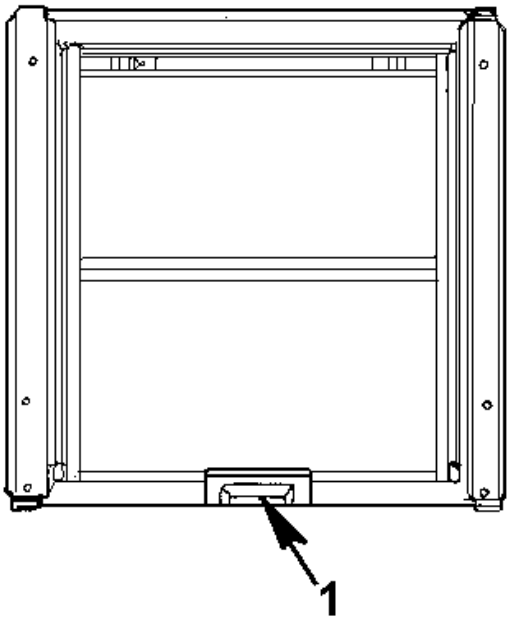

Figure 277 Emergency Exit — Kick Out Window

1. EMERGENCY EXIT KICK OUT WINDOW LIFT HANDLE

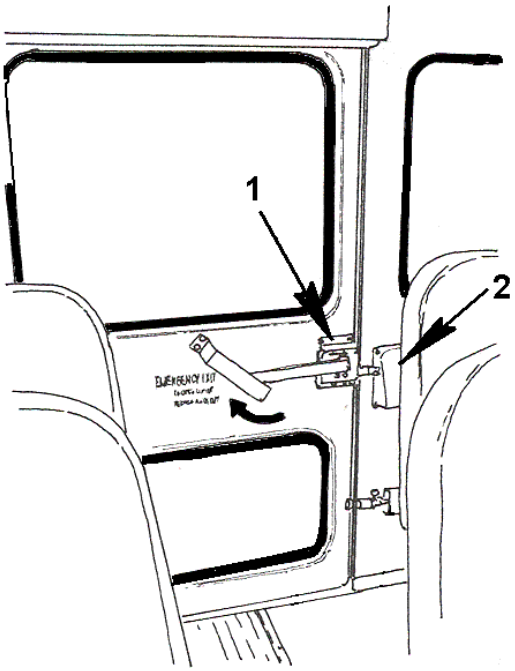

Figure 278 Emergency Exit — Rear Door

1. EMERGENCY EXIT REAR DOOR LIFT HANDLE
2. EMERGENCY EXIT REAR DOOR SWITCH

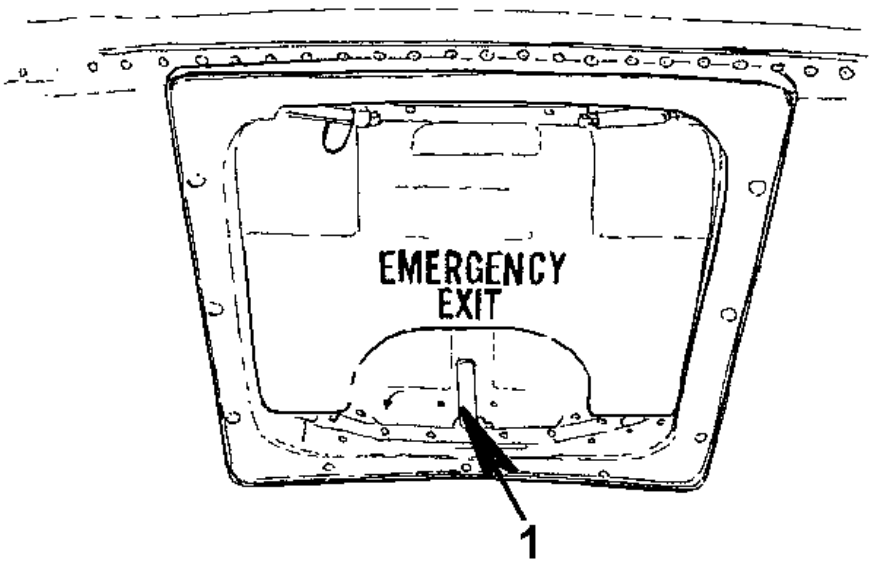

Figure 279 Emergency Exit — Roof Hatch

1. EMERGENCY EXIT ROOF HATCH LIFT HANDLE

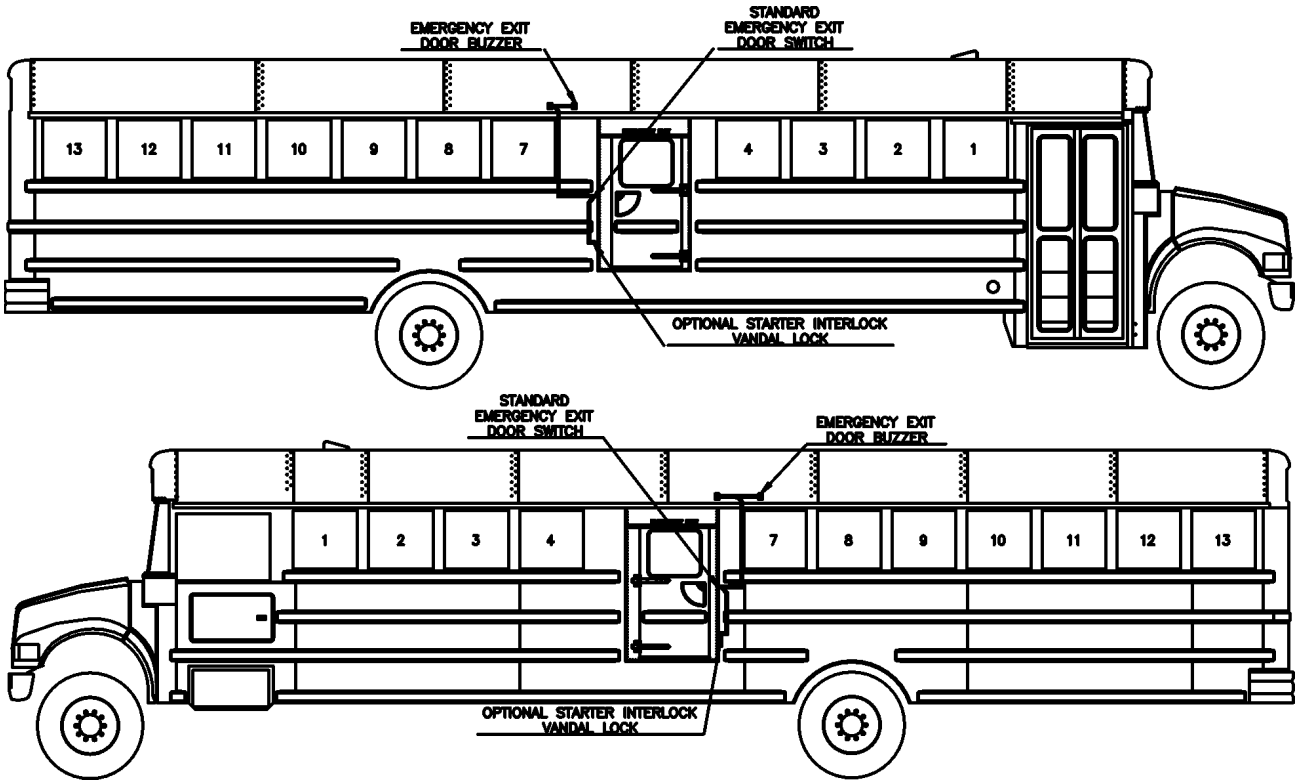

Figure 280 Emergency Exit Door Locations

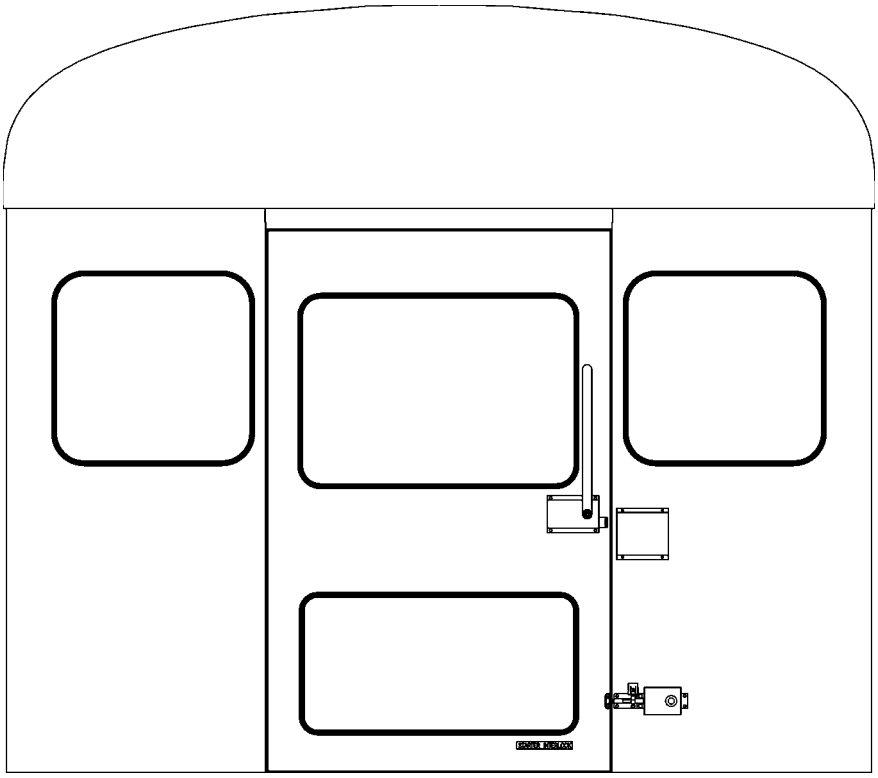

Figure 281 Rear Emergency Exit Door Switch Location

17. POST TRIP INSPECTION CIRCUITS

17.1. CIRCUIT FUNCTIONS

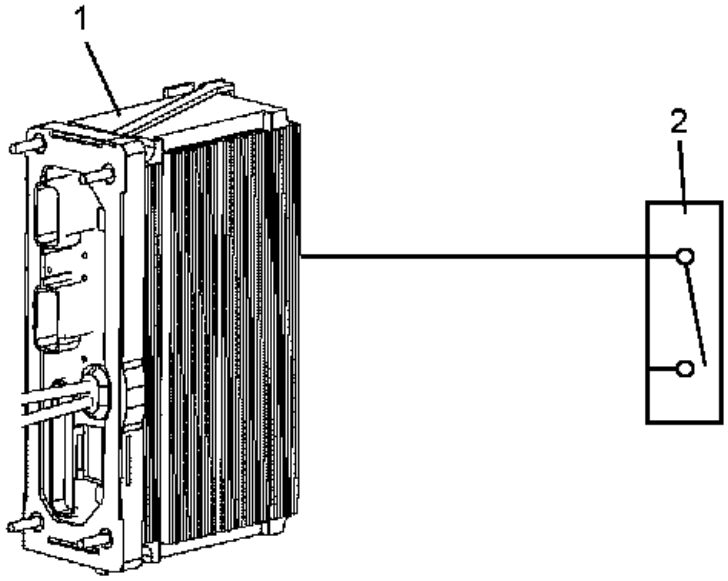

Figure 282 Post Trip Inspection Function Diagram

1. ELECTRONIC SYSTEM CONTROLLER
2. EMERGENCY EXIT DOOR SWITCH

The post trip inspection relay governs a safety system to ensure that the driver inspects the vehicle when the route has been completed. This feature was added to ensure no passengers are left on the bus when it is secured at the end of its route.

The post trip inspection system is armed when the service door is opened while the red pupil warning lights (PWL) are energized. While the engine is running the post trip inspection system will have no effect on any other system or vehicle operation.

The post trip inspection system is activated when the key switch is turned off. At this point the operator will have sixty (60) seconds to do the following to disarm the system:

A. Set park brake

B. Place key switch in the accessory position

C. Lift the **rear emergency exit handle** and return to the locked position

NOTE – Opening and closing one of the emergency window exits or roof hatches will NOT disarm the post trip inspection alarm. Only opening and closing the rear emergency exit will disarm the post trip inspection alarm.

If the post trip inspection system is not disarmed in the allotted time then the electric horn will pulse and the headlights will flash for twenty minutes or until the alarm is disarmed as stated in the steps above.

17.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the Post Trip Inspection Circuits.

Emergency Exit Controls Preliminary Check

Table 166 Emergency Exit Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of emergency exits.	Visually check emergency exits.	Emergency exits do not operate.	Go to next step.	Emergency exits are operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 559)	Read display on odometer.	**No** Emergency exit diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 559)
4.	On	Go to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 559)				

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.

On buses built prior to April 20, 2004

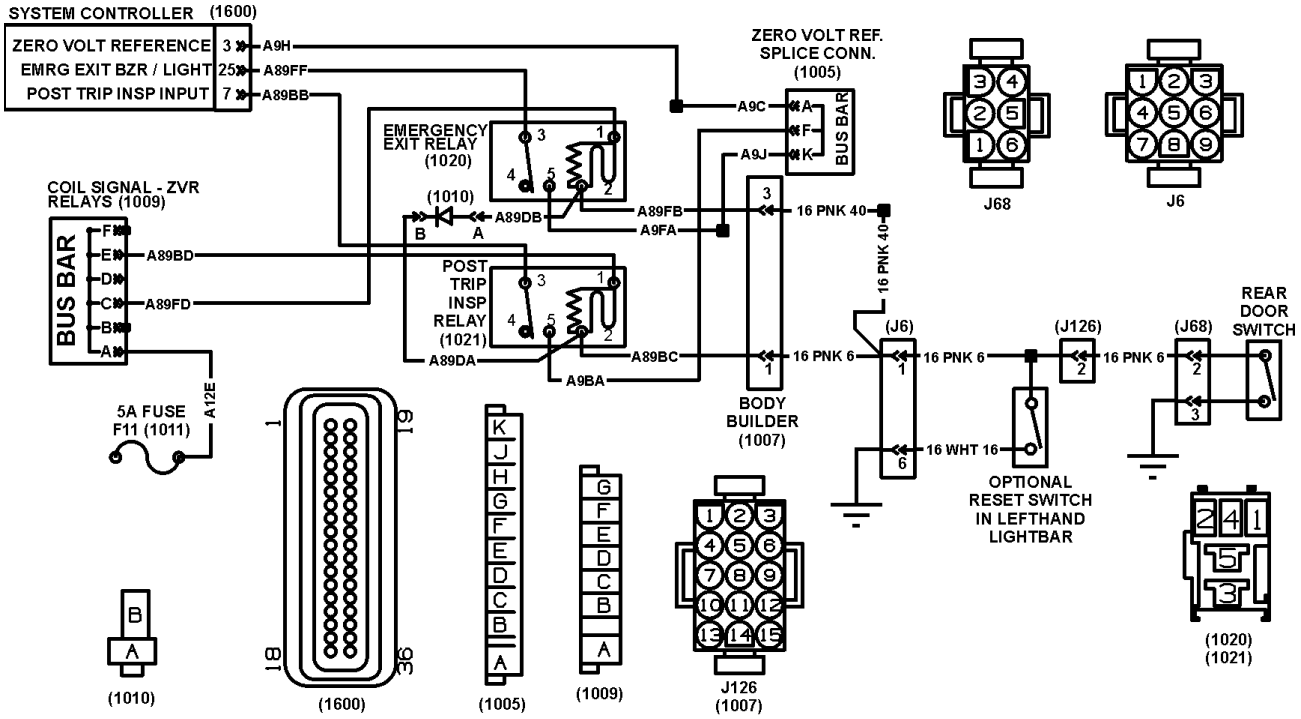

Figure 283 Post Trip Inspection Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REF SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1010) POST TRIP INSPECTION DIODE ASSEMBLY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1011) FUSE BLOCK
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1020) EMERGENCY EXIT RELAY
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
J68 REAR CAP
J126 REAR CAP TO LEFT HAND BODY

Table 167 Post Trip Inspection Circuit Tests

Emergency Exit Relay Voltage Checks		
Check with ignition on, rear emergency exit door closed and emergency exit relay (1020) 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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	0 volts	If voltage is present check for short in circuits A89FB, A89DB, A89DA, A89BC, 16 PNK 40 and 16 PNK 6.
While voltmeter is still connected to emergency exit relay (1020) from cavity 1 to cavity 2, open rear emergency exit.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuits A89FB, A89DB, A89DA, A89BC, 16 PNK 40 and 16 PNK 6. Also check proper function and orientation of post trip inspection diode (1010). Also ensure proper ground connection at rear emergency exit.
Leave emergency exit open.		
Emergency exit relay (1020) cavity 5 to cavity 3.	0 volts	If voltage is different, check for open or short on circuits A89FF, A9FA and A9J. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and may require reprogramming.

Table 167 Post Trip Inspection Circuit Tests (cont.)

Post Trip Inspection Relay Voltage Checks Check with ignition on, rear emergency exit door 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 (1021) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89BD and A12E.
Post trip inspection relay (1021) cavity 1 to 2.	0 volts	If voltage is present check for short to ground in circuits A89BC, A89DA and 16 PNK 6. Also check for proper operation and orientation of post trip inspection diode (1010).
While voltmeter is still connected to post trip inspection relay (1021) from cavity 1 to cavity 2, open rear emergency exit.		
Post trip inspection relay (1021) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit A89BC, A89DA and 16 PNK 6. Also ensure proper ground connection at rear emergency exit.
Post trip inspection relay (1021) cavity 5 to cavity 3.	0 volts	If voltage is present check for open or short on circuits A89BB and A9BA. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and may require reprogramming. Refer to the ESC Replacement section of this manual.

Table 167 Post Trip Inspection Circuit Tests (cont.)

Emergency Exit Rear Door Switch Voltage Checks Check with all relays installed, key in ignition position switch on and connector (J68) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Rear door switch connector J68 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits 16 PNK 6, 16 PNK 40, A89BC, A89DA, A89DB, A89FB, A89BD and A89FD.
Rear door switch connector J68 pin 2 to pin 3.	12 ± 1.5 volts	If voltage is missing check for proper ground connection at pin 3 of rear door switch. If circuits check good and fault still exists, replace door switch.

On buses built after April 20, 2004

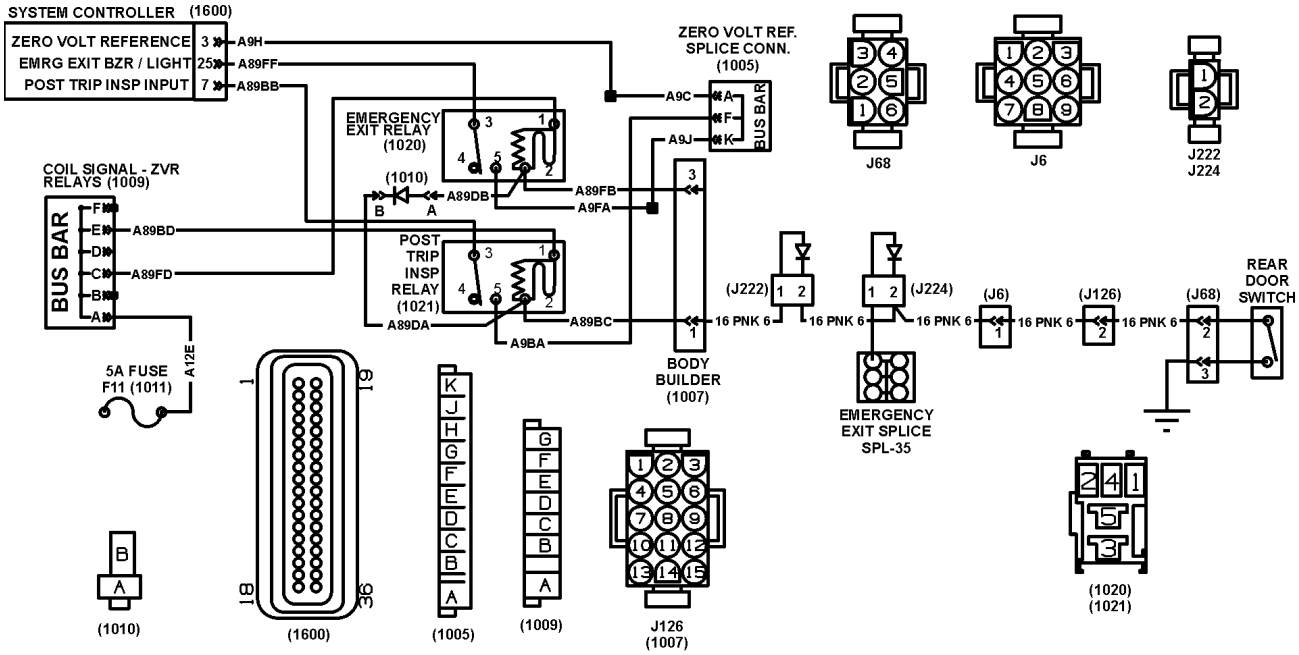

Figure 284 Post Trip Inspection Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REF SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1010) POST TRIP INSPECTION DIODE ASSEMBLY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1011) FUSE BLOCK
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1020) EMERGENCY EXIT RELAY
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
J68 REAR CAP
J126 REAR CAP 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 168 Post Trip Inspection Circuit Tests

Emergency Exit Relay Voltage Checks		
Check with ignition on, rear emergency exit door closed and emergency exit relay (1020) 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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	0 volts	If voltage is present check for short in circuits A89FB, A89DB, A89DA, A89BC, and 16 PNK 6.
While voltmeter is still connected to emergency exit relay (1020) from cavity 1 to cavity 2, open rear emergency exit.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuits A89FB, A89DB, A89DA, A89BC and 16 PNK 6. Also check proper function and orientation of post trip inspection diode (1010) and diodes J222 and J224. Also ensure proper ground connection at rear emergency exit.
Leave emergency exit open.		
Emergency exit relay (1020) cavity 5 to cavity 3.	0 volts	If voltage is different, check for open or short on circuits A89FF, A9FA and A9J. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and may require reprogramming.

Table 168 Post Trip Inspection Circuit Tests (cont.)

Post Trip Inspection Relay Voltage Checks		
Check with ignition on, rear emergency exit door 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 (1021) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89BD and A12E.
Post trip inspection relay (1021) cavity 1 to 2.	0 volts	If voltage is present check for short to ground in circuits A89BC, A89DA and 16 PNK 6. Also check for proper operation and orientation of post trip inspection diode (1010).
While voltmeter is still connected to post trip inspection relay (1021) from cavity 1 to cavity 2, open rear emergency exit.		
Post trip inspection relay (1021) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit A89BC, A89DA and 16 PNK 6. Also ensure proper ground connection at rear emergency exit. Also ensure proper operation and orientation of diodes J222 and J224
Post trip inspection relay (1021) cavity 5 to cavity 3.	0 volts	If voltage is present check for open or short on circuits A89BB and A9BA. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and may require reprogramming. Refer to the ESC Replacement section of this manual.

Table 168 Post Trip Inspection Circuit Tests (cont.)

Emergency Exit Rear Door Switch Voltage Checks Check with all relays installed, key in ignition position switch on and connector (J68) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Rear door switch connector J68 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits 16 PNK 6, A89BC, A89DA, A89DB, A89FB, A89BD and A89FD.
Rear door switch connector J68 pin 2 to pin 3.	12 ± 1.5 volts	If voltage is missing check for proper ground connection at pin 3 of rear door switch. Also ensure proper operation and orientation of diodes J222 and J224. If circuits check good and fault still exists, replace door switch.

On buses built after April 20, 2004 w/Separate Deactivation Switch

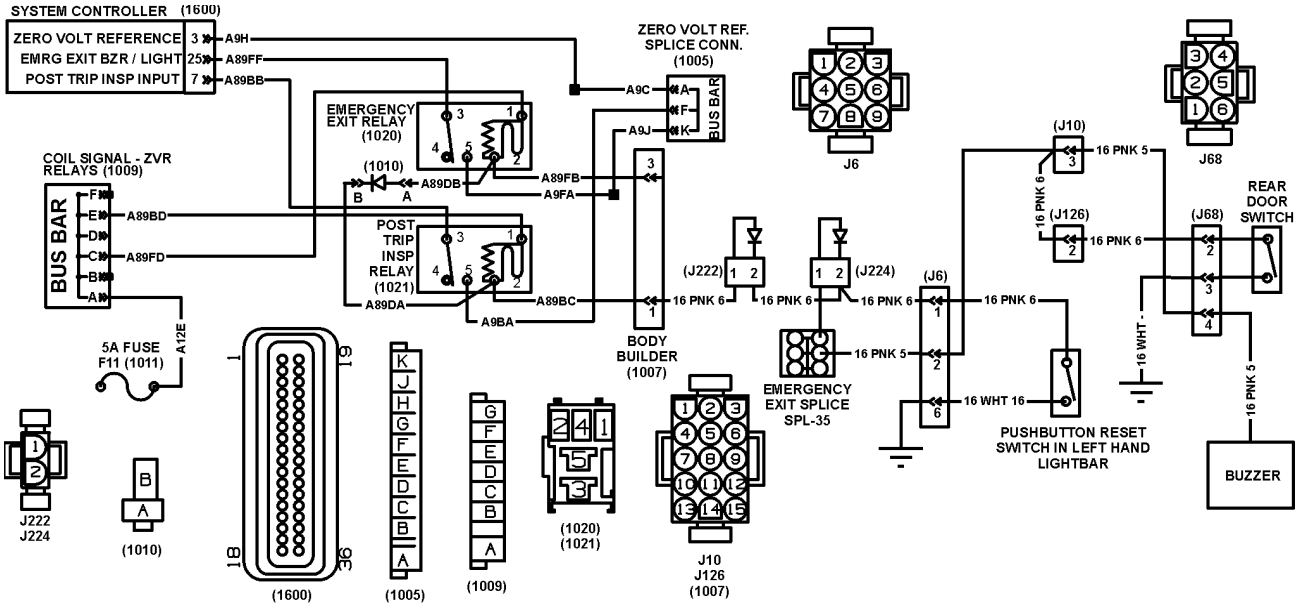

Figure 285 Post Trip Inspection Circuits w/Separate Deactivation Switch — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REF SPLICE CONN
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1010) POST TRIP INSPECTION DIODE ASSEMBLY
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
(1011) FUSE BLOCK
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1020) EMERGENCY EXIT RELAY
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
J10 LEFT HAND BODY TO REAR CAP
J68 REAR CAP
J126 REAR CAP 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 169 Post Trip Inspection w/Separate Deactivation Switch Circuit Tests

Emergency Exit Relay Voltage Checks		
Check with ignition on, rear emergency exit door closed and emergency exit relay (1020) 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
Emergency exit relay (1020) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89FD and A12E.
Emergency exit relay (1020) cavity 1 to 2.	0 volts	If voltage is present check for short in circuits A89FB, A89DB, A89DA, A89BC, and 16 PNK 6.
While voltmeter is still connected to emergency exit relay (1020) from cavity 1 to cavity 2, open rear emergency exit.		
Emergency exit relay (1020) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short to high in circuits A89FB, A89DB, A89DA, A89BC and 16 PNK 6. Also check proper function and orientation of post trip inspection diode (1010) and diodes J222 and J224. Also ensure proper ground connection at rear emergency exit.
Leave emergency exit open.		
Emergency exit relay (1020) cavity 5 to cavity 3.	0 volts	If voltage is different, check for open or short on circuits A89FF, A9FA and A9J. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and may require reprogramming.

Table 169 Post Trip Inspection w/Separate Deactivation Switch Circuit Tests (cont.)

Post Trip Inspection Relay Voltage Checks		
Check with ignition on, rear emergency exit door 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 (1021) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89BD and A12E.
Post trip inspection relay (1021) cavity 1 to 2.	0 volts	If voltage is present check for short to ground in circuits A89BC, A89DA and 16 PNK 6. Also check for proper operation and orientation of post trip inspection diode (1010).
While voltmeter is still connected to post trip inspection relay (1021) from cavity 1 to cavity 2, open rear emergency exit.		
Post trip inspection relay (1021) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short in circuit A89BC, A89DA and 16 PNK 6. Also ensure proper ground connection at rear emergency exit. Also ensure proper operation and orientation of diodes J222 and J224.
Post trip inspection relay (1021) cavity 5 to cavity 3.	0 volts	If voltage is present check for open or short on circuits A89BB and A9BA. Also ensure proper zero volt signal from zero volt reference splice connector (1005) and from ESC (1600) pin 3 on circuits A9H and A9C. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and may require reprogramming. Refer to the ESC Replacement section of this manual.

Table 169 Post Trip Inspection w/Separate Deactivation Switch Circuit Tests (cont.)

Emergency Exit Rear Door Switch Voltage Checks Check with all relays installed, key in ignition position switch on and connector (J68) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Rear door switch connector J68 pin 2 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits 16 PNK 6, A89BC, A89DA, A89DB, A89FB, A89BD and A89FD.
Rear door switch connector J68 pin 2 to pin 3.	12 ± 1.5 volts	If voltage is missing check for proper ground connection at pin 3 of rear door switch. Also ensure proper operation and orientation of diodes J222 and J224. If circuits check good and fault still exists, replace door switch.

17.4. EXTENDED DESCRIPTION

The Post Trip Inspection system is armed when all of the following conditions are met:

- Engine is running
- Red pupil warning lights are activated
- Service door is opened

To disarm the Post Trip Inspection system the following procedure must be completed:

1. Put transmission in park
2. Apply parking brake
3. Shut off engine
4. Turn key to accessory position
5. Open and close rear emergency exit

The operator will have sixty (60) seconds to disarm the Post Trip Inspection system. If the system is not disarmed in time, then the electric horn will pulse and the headlights will flash for twenty minutes or until the disarming procedure is complete. The Post Trip Inspection system can be disarmed at any time by following the steps above.

If the Post Trip Inspection system was not armed during operation of the bus, then the system will not need to be disarmed.

17.5. COMPONENT LOCATIONS

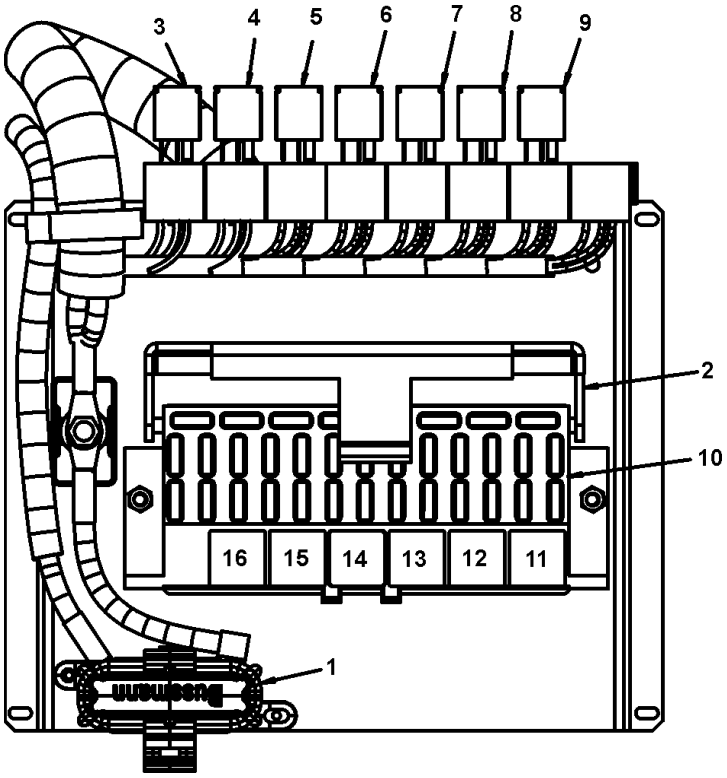

Figure 286 Chassis Relay Location Diagram

1. 125 A MAXIFUSE
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 — BODY BUILDER STOP LIGHT RELAY
14. R4 — AIR SOLENOID POWER RELAY
15. R5 — IGNITION RELAY
16. R6 — IGNITION RELAY

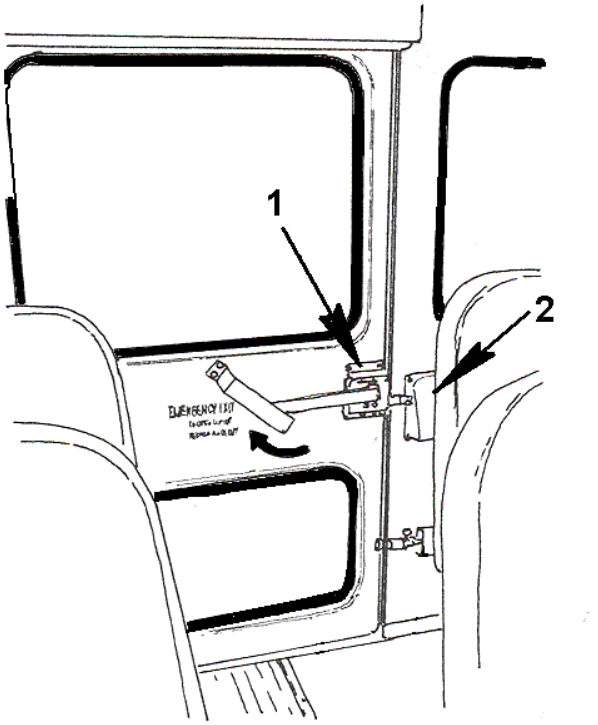

Figure 287 Emergency Exit — Rear Door

1. EMERGENCY EXIT REAR DOOR LIFT HANDLE
2. EMERGENCY EXIT REAR DOOR SWITCH

18. WHEELCHAIR LIFT CONTROLS

18.1. CIRCUIT FUNCTIONS

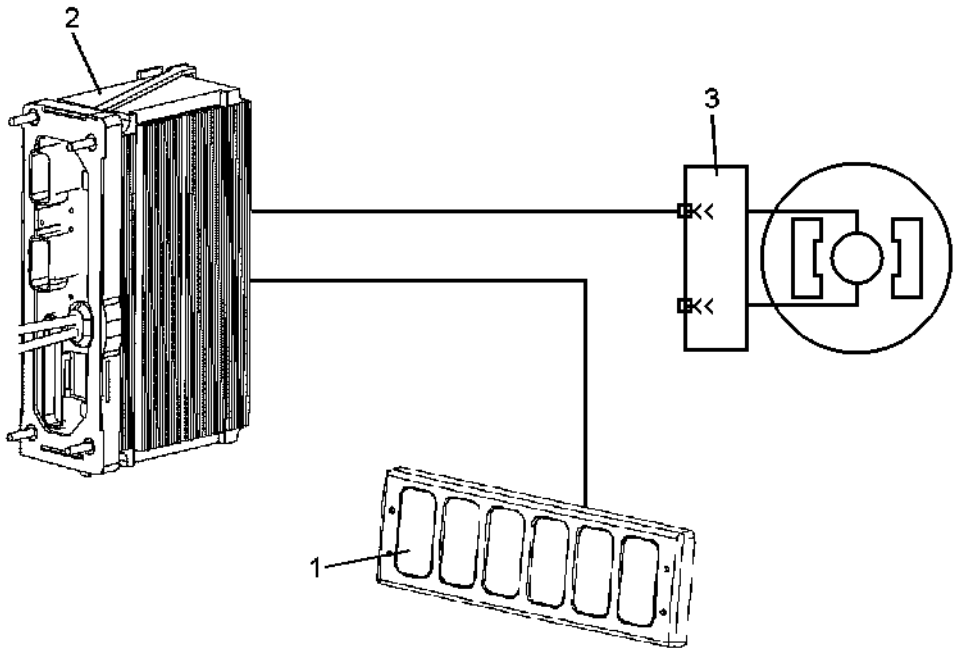

Figure 288 Wheelchair Lift Controls Function Diagram

1. WHEELCHAIR LIFT SWITCH
2. ELECTRONIC SYSTEM CONTROLLER
3. WHEELCHAIR LIFT MOTOR

NOTE – The wheelchair lift will NOT operate unless the park brake is applied, transmission is in neutral or park and lift door is open.

The wheelchair lift can be operated with the key on or key off position.

With the key on, the wheelchair lift will operate only if the park brake is applied, the transmission is in neutral or park, and the lift door is open.

With the key off, the wheelchair lift will operate once the lift door is opened.

18.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

To display diagnostic codes, put the vehicle in diagnostic mode. Set the parking brake and turn the Ignition key “ON”. Then press the Cruise “ON” switch and the Cruise “Resume” switch. If no diagnostic trouble codes are present, the cluster odometer will display “NO FAULT”. If diagnostic trouble codes are present, the gauge cluster will display the total number of faults and cycle to the next diagnostic trouble code after 10 seconds. To manually cycle through the diagnostic trouble code list, press the cluster display select/reset

button. The last character of the diagnostic trouble code will end in “A” for active diagnostic trouble codes or “P” for previously active diagnostic trouble codes. Turning the ignition key off or releasing the park brake will take the ESC and the gauge cluster out of the diagnostic mode.

The previously active diagnostic trouble codes may be cleared, while in the diagnostic mode, by turning on the left turn signal and pressing the cruise on and set switches simultaneously.

Table 170 Wheelchair Lift Control Diagnostic Trouble Codes

DIAGNOSTIC TROUBLE CODE	FAULT DESCRIPTION
2033 14 11 1	Wheelchair lift solenoid current overload.
2033 14 11 2	Wheelchair lift solenoid open circuit.
2033 14 11 3	Wheelchair lift solenoid shorted to ground.

Wheelchair Lift Controls Preliminary Check

Table 171 Wheelchair Lift Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of wheelchair lift.	Visually check wheelchair lift.	Wheelchair lift does not operate.	Go to next step.	Wheelchair lift is operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 574)	Read display on odometer.	**No** Wheelchair lift diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 575)
4.	On	Go to Fault Detection Management (See FAULT DETECTION MANAGEMENT, page 575)				

18.3. 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.

Typical Wheelchair Lift Circuits

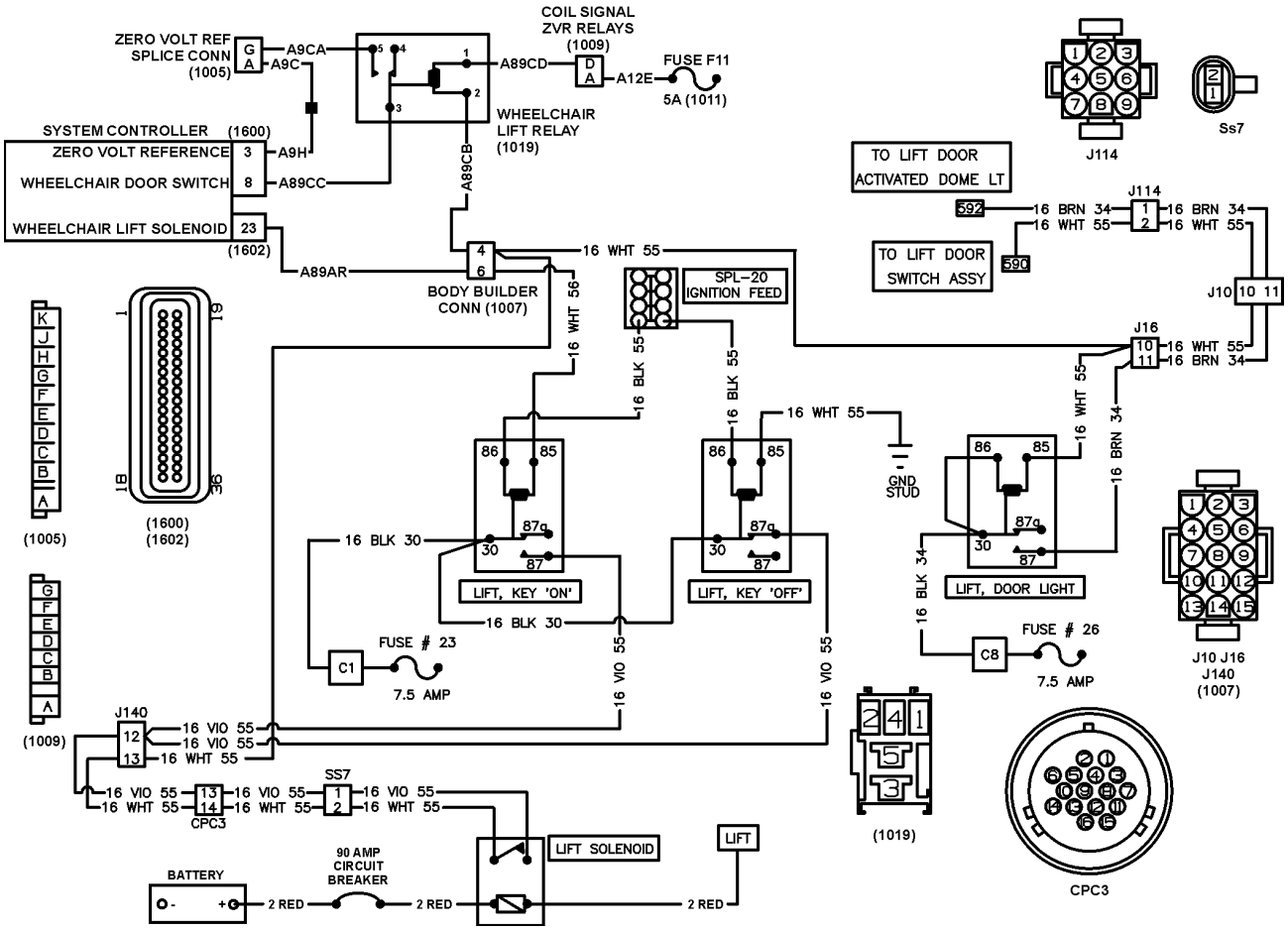

Figure 289 Wheelchair Lift Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1019) WHEELCHAIR LIFT RELAY
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J10 FLASHER PLATE TO DASH
J16 FLASHER PLATE TO LEFT HAND BODY
J114 RIGHT HAND BODY TO REAR CAP
J140 FLASHER PLATE TO DASH AND TOE
SPL-20 IGNITION ACCESSORY FEED SPLICE
SS7 SEALED ENGINE HARNESS TO INVALIFT SOLENOID

Table 172 Wheelchair Lift Circuit Tests

Wheelchair Lift Relay (1019) Voltage Checks Check with wheelchair lift relay (1019) removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed, and all other relays installed. **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
Wheelchair lift relay (1019) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89CD and A12E.
Wheelchair lift relay (1019) cavity 1 to 2.	0 volts	If voltage is present check for a short on circuits A89CB and 16 WHT 55.
While meter is still connected to wheelchair lift relay (1019) from cavity 1 to 2, open wheelchair lift door.		
Wheelchair lift relay (1019) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits A89CB and 16 WHT 55.
Close wheelchair lift door.		
Wheelchair lift relay cavity 5 to cavity 3.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits A89CC and A9CA. Also ensure proper zero volt signal from zero volt reference splice connector (1005). **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and require reprogramming.
Wheelchair Lift, Key 'On' Relay Voltage Checks Check with wheelchair lift, key 'on' relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed and all other relays installed. **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

Table 172 Wheelchair Lift Circuit Tests (cont.)

Wheelchair lift, key 'on' relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Wheelchair lift, key 'on' relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 56 and A89AR. Also ensure proper open circuit signal on system controller (1602) pin 23. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
While meter is still connected to wheelchair lift, key 'on' relay, open wheelchair lift door.		
Wheelchair lift, key 'on' relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 WHT 56 and A89AR. Also ensure proper ground signal from ESC (1602) pin 23. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Wheelchair lift, key 'on' relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and for open or short on circuit 16 BLK 30.
Wheelchair lift, key 'on' relay cavity 30 to 87.	Open circuit	If voltage is present check for short on circuit 16 VIO 55.
While voltmeter is still connected to wheelchair lift, key 'on' relay from cavity 30 to cavity 87, activate wheelchair lift.		
Wheelchair lift, key 'on' relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 VIO 55 and 16 WHT 55.

Table 172 Wheelchair Lift Circuit Tests (cont.)

Wheelchair Lift, Key 'Off' Relay Voltage Checks		
Check with wheelchair lift, key 'off' relay removed, ignition on, park brake applied, transmission in neutral, lift door open and all other relays installed. **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
Wheelchair lift, key 'off' relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Wheelchair lift, key 'off' relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuit 16 WHT 55.
Wheelchair lift, key 'off' relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and for open or short on circuit 16 BLK 30.
Wheelchair lift, key 'off' relay cavity 30 to 87a.	Open circuit	If voltage is present check for short on circuit 16 VIO 55.
While voltmeter is still connected to wheelchair lift, key 'off' relay from cavity 30 to cavity 87a, activate wheelchair lift.		
Wheelchair lift, key 'off' relay cavity 30 to 87a.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 VIO 55 and 16 WHT 55.
Wheelchair Lift, Door Light Relay Voltage Checks Check with wheelchair lift, door light relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door open and all other relays installed. **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
Wheelchair lift, door light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #26 and check for open or short on circuit 16 BLK 34.

Table 172 Wheelchair Lift Circuit Tests (cont.)

Wheelchair lift, door light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuit 16 BRN 34.
Wheelchair lift, door light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #25 and for open or short on circuit 16 BLK 34.
Wheelchair lift, door light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 55.
While voltmeter is still connected to wheelchair lift, door light relay from cavity 86 to 85, close lift door.		
Wheelchair lift, door light relay cavity 86 to 85.	Open circuit	If voltage is present check for open or short on circuits 16 WHT 55.
Wheelchair Lift Solenoid Voltage Checks Check with key in ignition position on, wheelchair lift door closed and wheelchair lift solenoid 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
Wheelchair lift solenoid cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and check for open or short on circuits 16 BLK 30 and 16 VIO 55.
Wheelchair lift solenoid cavity 1 to cavity 2.	Open circuit	If voltage is present check for short on circuit 16 WHT 55.
While meter is still connected to wheelchair lift solenoid cavity 1 to cavity 2, open wheelchair lift door.		
Wheelchair lift solenoid cavity 1 to cavity 2.	12 ± 1.5 volts	If voltage is present check for open or short on circuit 16 WHT 55.
Wheelchair lift solenoid cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing check for open 90 amp circuit breaker. Also check for open or short on circuit 2 red.
Wheelchair lift solenoid cavity 3 to cavity 4.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 2 red. Also check for proper ground connection on lift. If all circuits check good and lift still fails, replace lift mechanism.

Wheelchair Lift and Interlock w/ Air Brakes Circuits

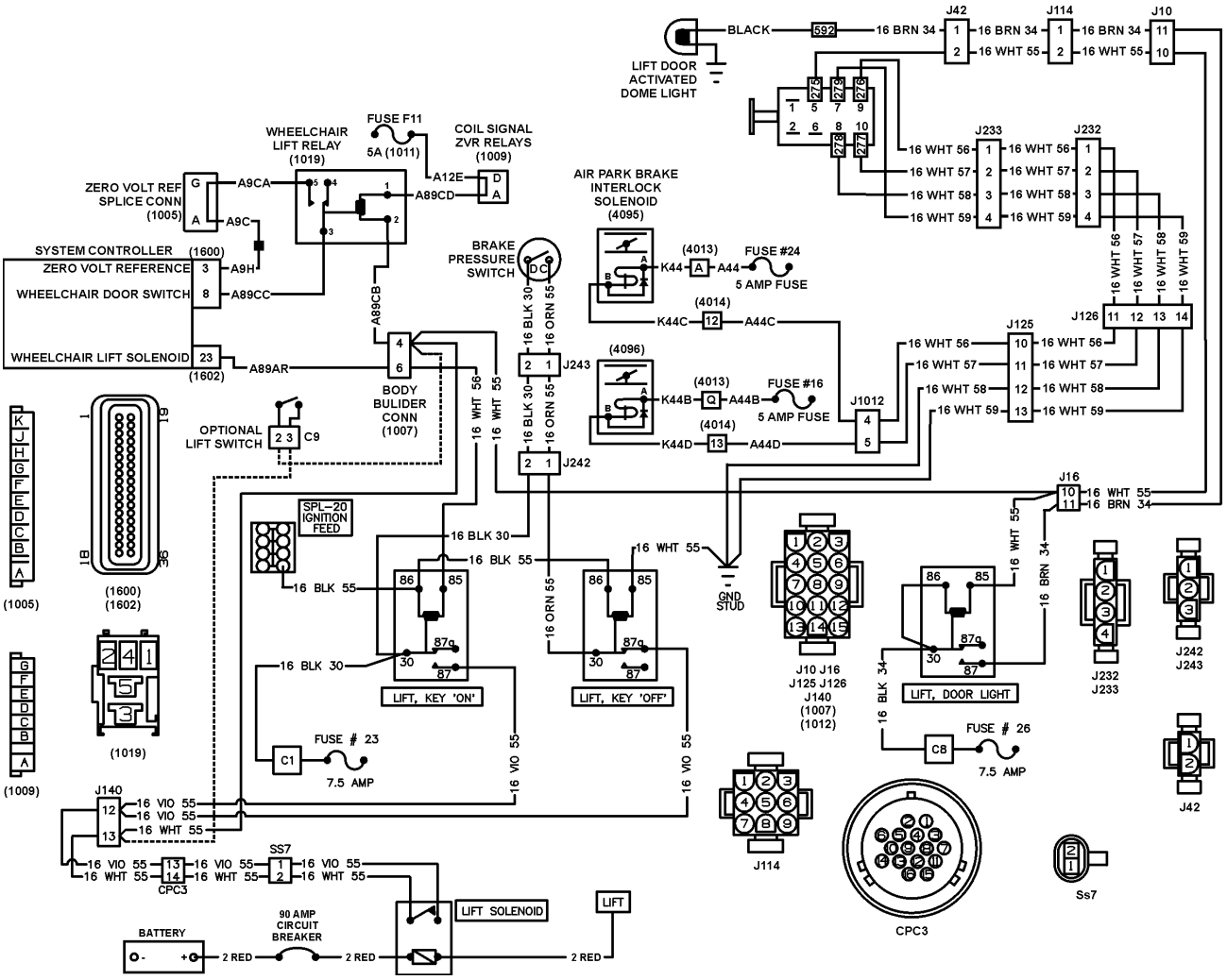

Figure 290 Wheelchair Lift and Interlock w/ Air Brakes Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(1007) (1012) 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
(1019) WHEELCHAIR LIFT RELAY
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(4013) PASS THRU AT DASH
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
(4014) DASH/ENGINE PASS THRU
LOCATED AT INSIDE LEFT SIDE DASH PANEL
(4095) (4096) AIR PARK BRAKE SOLENOID
CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J10 FLASHER PLATE TO DASH
J16 FLASHER PLATE TO LEFT HAND BODY
J42 RIGHT HAND BODY TO LIFT HARNESS CONNECTOR
J114 RIGHT HAND BODY TO REAR CAP
J125 LEFT HAND BODY TO FLASHER PLATE
J126 REAR CAP TO LEFT HAND BODY
J140 FLASHER PLATE TO DASH AND TOE
J232 REAR CAP TO RIGHT HAND BODY
J233 RIGHT HAND BODY TO LIFT DOOR TRANSITION HARNESS
J242 FLASHER PLATE TO DASH HARNESS
J243 DASH HARNESS TO PARK BRAKE PRESSURE SENSOR
SPL-20 IGNITION ACCESSORY FEED SPLICE
SS7 SEALED ENGINE HARNESS TO INVALIFT SOLENOID

Table 173 Wheelchair Lift and Interlock w/ Air Brakes Circuit Tests

Wheelchair Lift Relay (1019) Voltage Checks

Check with wheelchair lift relay (1019) removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed, and all other relays installed.

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
Wheelchair lift relay (1019) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89CD and A12E.
Wheelchair lift relay (1019) cavity 1 to 2.	0 volts	If voltage is present check for a short on circuits A89CB and 16 WHT 55.
While meter is still connected to wheelchair lift relay (1019) from cavity 1 to 2, open wheelchair lift door.		

Table 173 Wheelchair Lift and Interlock w/ Air Brakes Circuit Tests (cont.)

Wheelchair lift relay (1019) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits A89CB and 16 WHT 55.
Close wheelchair lift door.		
Wheelchair lift relay cavity 5 to cavity 3.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits A89CC and A9CA. Also ensure proper zero volt signal from zero volt reference splice connector (1005). **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and require reprogramming.
Wheelchair Lift, Key 'On' Relay Voltage Checks Check with wheelchair lift, key 'on' relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed and all other relays installed. **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
Wheelchair lift, key 'on' relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Wheelchair lift, key 'on' relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 56 and A89AR. Also ensure proper open circuit signal on system controller (1602) pin 23. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
While meter is still connected to wheelchair lift, key 'on' relay, open wheelchair lift door.		

Table 173 Wheelchair Lift and Interlock w/ Air Brakes Circuit Tests (cont.)

Wheelchair lift, key 'on' relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 WHT 56 and A89AR. Also ensure proper ground signal from ESC (1602) pin 23. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Leave Wheelchair lift door open.		
Wheelchair lift, key 'on' relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and for open or short on circuit 16 BLK 30.
Wheelchair lift, key 'on' relay cavity 30 to 87.	Open circuit	If voltage is present check for short on circuit 16 VIO 55.
While voltmeter is still connected to wheelchair lift, key 'on' relay from cavity 30 to cavity 87, activate wheelchair lift.		
Wheelchair lift, key 'on' relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 VIO 55 and 16 WHT 55.
Wheelchair Lift, Key 'Off' Relay Voltage Checks Check with wheelchair lift, key 'off' relay removed, ignition on, park brake applied, transmission in neutral, lift door open and all other relays installed. **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
Wheelchair lift, key 'off' relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Wheelchair lift, key 'off' relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuit 16 WHT 55.

Table 173 Wheelchair Lift and Interlock w/ Air Brakes Circuit Tests (cont.)

Wheelchair lift, key 'off' relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and for open or short on circuits 16 BLK 30 and 16 ORN 55. Also check proper function of brake pressure switch.
Wheelchair lift, key 'off' relay cavity 30 to 87a.	Open circuit	If voltage is present check for short on circuit 16 VIO 55.
While voltmeter is still connected to wheelchair lift, key 'off' relay from cavity 30 to cavity 87a, activate wheelchair lift.		
Wheelchair lift, key 'off' relay cavity 30 to 87a.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 VIO 55 and 16 WHT 55.
Wheelchair Lift, Door Light Relay Voltage Checks Check with wheelchair lift, door light relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door open and all other relays installed. **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
Wheelchair lift, door light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #26 and check for open or short on circuit 16 BLK 34.
Wheelchair lift, door light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuit 16 BRN 34.
Wheelchair lift, door light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #25 and for open or short on circuit 16 BLK 34.
Wheelchair lift, door light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 55.
While voltmeter is still connected to wheelchair lift, door light relay from cavity 86 to 85, close lift door.		
Wheelchair lift, door light relay cavity 86 to 85.	Open circuit	If voltage is present check for open or short on circuits 16 WHT 55.
Wheelchair Lift Solenoid Voltage Checks Check with key in ignition position on, wheelchair lift door closed and wheelchair lift solenoid 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

Table 173 Wheelchair Lift and Interlock w/ Air Brakes Circuit Tests (cont.)

Wheelchair lift solenoid cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and check for open or short on circuits 16 BLK 30 and 16 VIO 55.
Wheelchair lift solenoid cavity 1 to cavity 2.	Open circuit	If voltage is present check for short on circuit 16 WHT 55.
While meter is still connected to wheelchair lift solenoid cavity 1 to cavity 2, open wheelchair lift door.		
Wheelchair lift solenoid cavity 1 to cavity 2.	12 ± 1.5 volts	If voltage is present check for open or short on circuit 16 WHT 55. If Optional lift switch (C9) is installed on bus, ensure switch is closed. Replace switch if faulty.
Wheelchair lift solenoid cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing check for open 90 amp circuit breaker. Also check for open or short on circuit 2 red.
Wheelchair lift solenoid cavity 3 to cavity 4.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 2 red. Also check for proper ground connection on lift. If all circuits check good and lift still fails, replace lift mechanism.
Air Park Brake Solenoid Voltage Checks Check with key in ignition position on and wheelchair door switch disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Wheelchair lift door switch cavity 276 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #24. Also check for open or short on circuits A44, K44, K44C, A44C and 16 WHT 56.
Wheelchair lift door switch cavity 276 to 279.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 59. If circuits check good and air park brake does not engage when wheelchair lift door is opened, replace Air park brake interlock solenoid (4095).

Table 173 Wheelchair Lift and Interlock w/ Air Brakes Circuit Tests (cont.)

Wheelchair lift door switch cavity 277 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #16. Also check for open or short on circuits A44B, K44B, K44D, A44D and 15 WHT 57.
Wheelchair lift door switch cavity 277 to 278.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 58. If circuits check good and air park brake does not engage when wheelchair lift door is opened, replace Air park brake interlock solenoid (4096).

Wheelchair Lift and Interlock w/Hydraulic Brakes Circuits

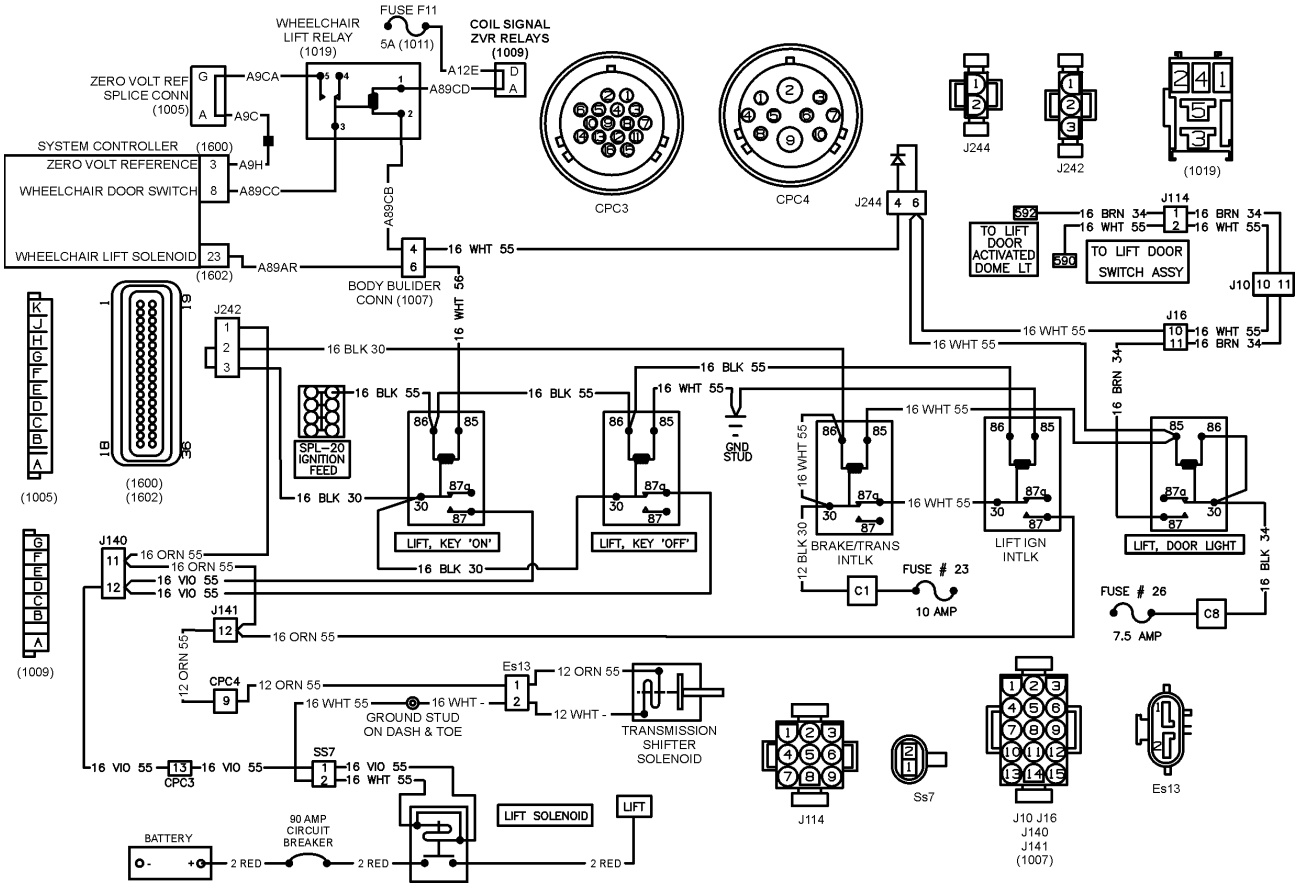

Figure 291 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1005) ZERO VOLT REFERENCE SPLICE CONNECTOR
LOCATED RIGHT SIDE INSTRUMENT PANEL
(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
(1019) WHEELCHAIR LIFT RELAY
LOCATED AT LEFT SIDE VEHICLE AT FLASHER PLATE
(1600) (1602) SYSTEM CONTROLLER CONNECTOR
LOCATED AT INSIDE RIGHT SIDE DASH PANEL
CPC3 CPC4 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
ES13 SEALED ENGINE HARNESS TO TRANSMISSION SHIFT INHIBIT SOLENOID
J10 FLASHER PLATE TO DASH
J16 FLASHER PLATE TO LEFT HAND BODY
J114 RIGHT HAND BODY TO REAR CAP
J140 J141 FLASHER PLATE TO DASH AND TOE
J242 FLASHER PLATE TO DASH HARNESS
J244 FLASHER PLATE — LIFT DOOR OPEN
SPL-20 IGNITION ACCESSORY FEED SPLICE
SS7 SEALED ENGINE HARNESS TO INVALIFT SOLENOID

Table 174 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuit Tests

Wheelchair Lift Relay (1019) Voltage Checks Check with wheelchair lift relay (1019) removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed, and all other relays installed. **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
Wheelchair lift relay (1019) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11 and for open or short on circuits A89CD and A12E.
Wheelchair lift relay (1019) cavity 1 to 2.	0 volts	If voltage is present check for a short on circuits A89CB and 16 WHT 55.
While meter is still connected to wheelchair lift relay (1019) from cavity 1 to 2, open wheelchair lift door.		
Wheelchair lift relay (1019) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits A89CB and 16 WHT 55. Also check for proper operation and orientation of diode J244.
Close wheelchair lift door.		
Wheelchair lift relay cavity 5 to cavity 3.	0 volts	If voltage is present or meter shows open circuit, check for open or short on circuits A89CC and A9CA. Also ensure proper zero volt signal from zero volt reference splice connector (1005). **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.** If circuits are good, ESC could be malfunctioning and require reprogramming.

Table 174 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuit Tests (cont.)

Wheelchair Lift, Key 'On' Relay Voltage Checks Check with wheelchair lift, key 'on' relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed and all other relays installed. **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
Wheelchair lift, key 'on' relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Wheelchair lift, key 'on' relay cavity 86 to 85.	0 volts	If voltage is present, check for short on circuits 16 WHT 56 and A89AR. Also ensure proper open circuit signal on system controller (1602) pin 23. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
While meter is still connected to wheelchair lift, key 'on' relay, open wheelchair lift door.		
Wheelchair lift, key 'on' relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuits 16 WHT 56 and A89AR. Also ensure proper ground signal from ESC (1602) pin 23. **NOTE – Always use breakout box ZTSE 4477 to take measurements on ESC connectors.**
Leave Wheelchair lift door open.		
Wheelchair lift, key 'on' relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and for open or short on circuit 12 BLK 30, 16 WHT 55 and 16 BLK 30.
Wheelchair lift, key 'on' relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 VIO 55 and 16 WHT 55.

Table 174 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuit Tests (cont.)

Wheelchair Lift, Key 'Off' Relay Voltage Checks Check with wheelchair lift, key 'off' relay removed, ignition on, park brake applied, transmission in neutral, lift door open and all other relays installed. **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
Wheelchair lift, key 'off' relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Wheelchair lift, key 'off' relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuit 16 WHT 55.
Wheelchair lift, key 'off' relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and for open or short on circuits 12 BLK 30, 16 WHT 55 and 16 BLK 30.
Wheelchair lift, key 'off' relay cavity 30 to 87a.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 VIO 55 and 16 WHT 55.
Wheelchair Lift, Door Light Relay Voltage Checks Check with wheelchair lift, door light relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door open and all other relays installed. **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
Wheelchair lift, door light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #26 and check for open or short on circuit 16 BLK 34.
Wheelchair lift, door light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short to high on circuit 16 BRN 34.
Wheelchair lift, door light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #25 and for open or short on circuit 16 BLK 34.
Wheelchair lift, door light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 WHT 55.

Table 174 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuit Tests (cont.)

While voltmeter is still connected to wheelchair lift, door light relay from cavity 86 to 85, close lift door.		
Wheelchair lift, door light relay cavity 86 to 85.	Open circuit	If voltage is present check for open or short on circuits 16 WHT 55.
Brake/Transmission Interlock Relay Voltage Checks Check with brake/transmission interlock relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed and all other relays installed. **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
Brake/transmission interlock relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #23. Also check for open or short in circuit 12 BLK 30.
Brake/transmission interlock relay cavity 30 to 87a.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 WHT 55, 16 ORN 55, 12 ORN 55, 12 WHT — and 16 WHT —.
Brake/transmission interlock relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #23. Also check for open or short in circuits 12 BLK 30 and 16 WHT 55.
Brake/transmission interlock relay cavity 86 to 85.	Open circuit	If voltage is present, check for short on circuit 16 WHT 55.
While meter is connected to brake/transmission interlock relay cavity 86 to 85, open wheelchair lift door.		
Brake/transmission interlock relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuit 16 WHT 55.
Lift Ignition Interlock Relay Voltage Checks Check with lift ignition interlock relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed and all other relays installed. **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
Lift ignition interlock relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #23. Also check for open or short in circuits 16 WHT 55 and 12 BLK 30.
Lift ignition interlock relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short in circuits 16 ORN 55, 12 ORN 55, 12 WHT — and 16 WHT —.

Table 174 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuit Tests (cont.)

Lift ignition interlock relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BLK 55. Also ensure proper voltage feed to ignition feed splice 20. Refer to the Ignition Power Feed section of this manual. (See IGNITION POWER DISTRIBUTION, page 42)
Lift ignition interlock relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 WHT 55.
Wheelchair Lift Solenoid Voltage Checks Check with key in ignition position on, wheelchair lift door closed and wheelchair lift solenoid 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
Wheelchair lift solenoid cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #23 and check for open or short on circuits 12 BLK 30, 16 WHT 55, 16 BLK 30 and 16 VIO 55.
Wheelchair lift solenoid cavity 1 to cavity 2.	12 ± 1.5 volts	If voltage is present check for short on circuit 16 WHT 55.
Wheelchair lift solenoid cavity 3 to ground.	12 ± 1.5 volts	If voltage is missing check for open 90 amp circuit breaker. Also check for open or short on circuit 2 red.
Wheelchair lift solenoid cavity 3 to cavity 4.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 2 red. Also check for proper ground connection on lift. If all circuits check good and lift still fails, replace lift mechanism.
Transmission Shifter Solenoid Continuity Checks Check with transmission in park and connector ES13 disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Transmission shifter solenoid connector ES13 cavity 1 to 2.	Closed circuit.	If meter shows open circuit, replace transmission shifter solenoid

Table 174 Wheelchair Lift and Interlock w/Hydraulic Brakes Circuit Tests (cont.)

While meter is still connected to transmission shifter solenoid connector ES13 cavity 1 to 2, shift transmission into gear.		
Transmission shifter solenoid connector ES13 cavity 1 to 2.	Open circuit	If meter shows closed circuit, replace transmission shifter solenoid

18.4. OPTIONAL LIFT INDICATOR LIGHT IN RIGHT HAND SWITCH PANEL

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.

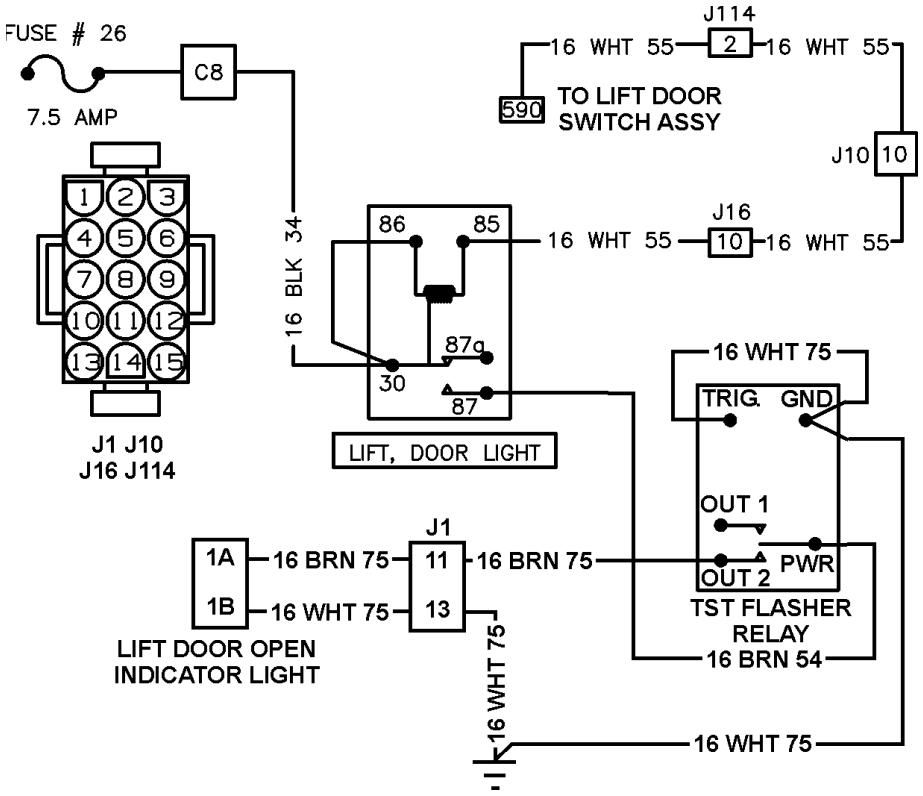

Figure 292 Lift Indicator Light Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

J1 FLASHER PLATE TO DASH
J10 LEFT HAND BODY TO REAR CAP
J16 FLASHER PLATE TO LEFT HAND BODY
J114 RIGHT HAND BODY TO REAR CAP

Table 175 Lift Indicator Light Circuit Tests

Lift, Door Light Relay Voltage Checks Check with lift, door light relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed, and all other relays installed. **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
Lift, door light relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #26 and for open or short on circuit 16 BLK 34.
Lift, door light relay cavity 86 to 85.	0 volts	If voltage is present check for a short on circuit 16 WHT 55.
While meter is still connected to lift, door light relay from cavity 86 to 85, open wheelchair lift door.		
Lift, door light relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 WHT 55.
Close wheelchair lift door.		
Lift, door light relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #26 and for open or short on circuit 16 BLK 34.
Lift, door light relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 BRN 54.
TST Flasher Relay Voltage Checks Check with TST flasher relay removed, key in ignition position switch on, park brake applied, transmission in neutral, lift door closed and all other relays installed. **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
TST flasher relay cavity TRIG. to ground.	0 volts	If voltage is present check for short on circuit 16 WHT 75.
TST flasher relay cavity PWR to ground.	0 volts	If voltage is present, check for short on circuit 16 BRN 54.
While meter is still connected to TST flasher relay from cavity PWR to ground, open wheelchair lift door.		
TST flasher relay cavity PWR to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BRN 54.
Leave wheelchair lift door open.		
TST flasher relay cavity PWR to OUT 2.	12 ± 1.5 volts	If voltage is missing check for open or short on circuits 16 BRN 75 and 16 WHT 75.

18.5. EXTENDED DESCRIPTION

With key off.

Since no power is applied to the key off relay, the normally closed relay will supply power to the lift door power relay. When the wheelchair lift door is opened, the lift door proximity switch will apply a ground signal to the lift door relay allow the wheelchair lift to operate.

With key on.

When the wheelchair lift door is opened, the lift door proximity switch will close supplying a ground to the wheelchair lift relay (1019). This will cause the wheelchair lift relay to energize and supply the zero volt signal to ESC (1600). The ESC (1600) will then supply a ground signal on pin 23. This will allow the key on relay to energize as long as the follow conditions are met:

- Park brake is activated.
- Transmission is placed in neutral.
- Lift door is open.

If all conditions are met, then power is now supplied to the lift door power relay and the wheelchair lift can operate.

Power is supplied to the wheelchair lift, door light relay when the lift door is opened.

18.6. COMPONENT LOCATIONS

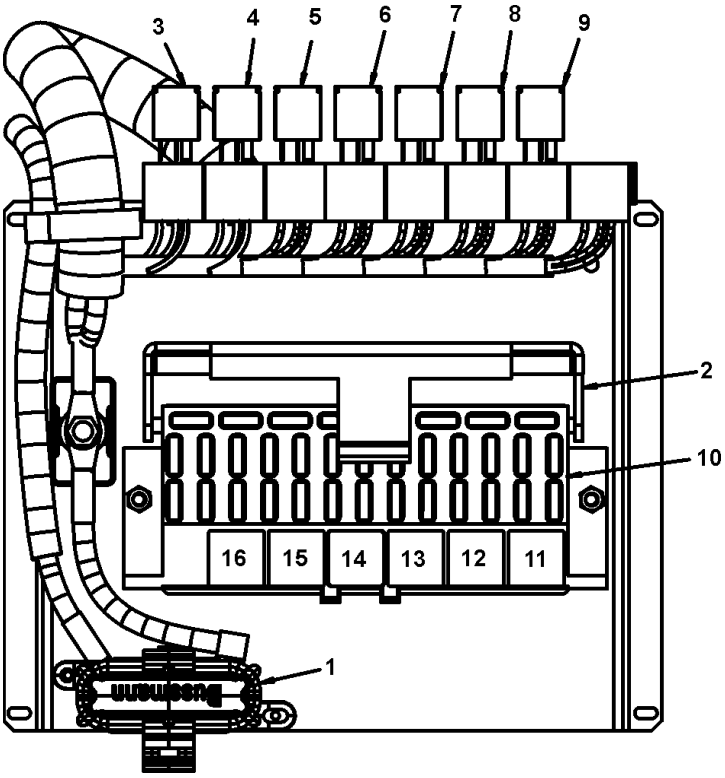

Figure 293 Chassis Relay Location Diagram

1. 125 A MAXIFUSE
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 — BODY BUILDER STOP LIGHT RELAY
14. R4 — AIR SOLENOID POWER RELAY
15. R5 — IGNITION RELAY
16. R6 — IGNITION RELAY

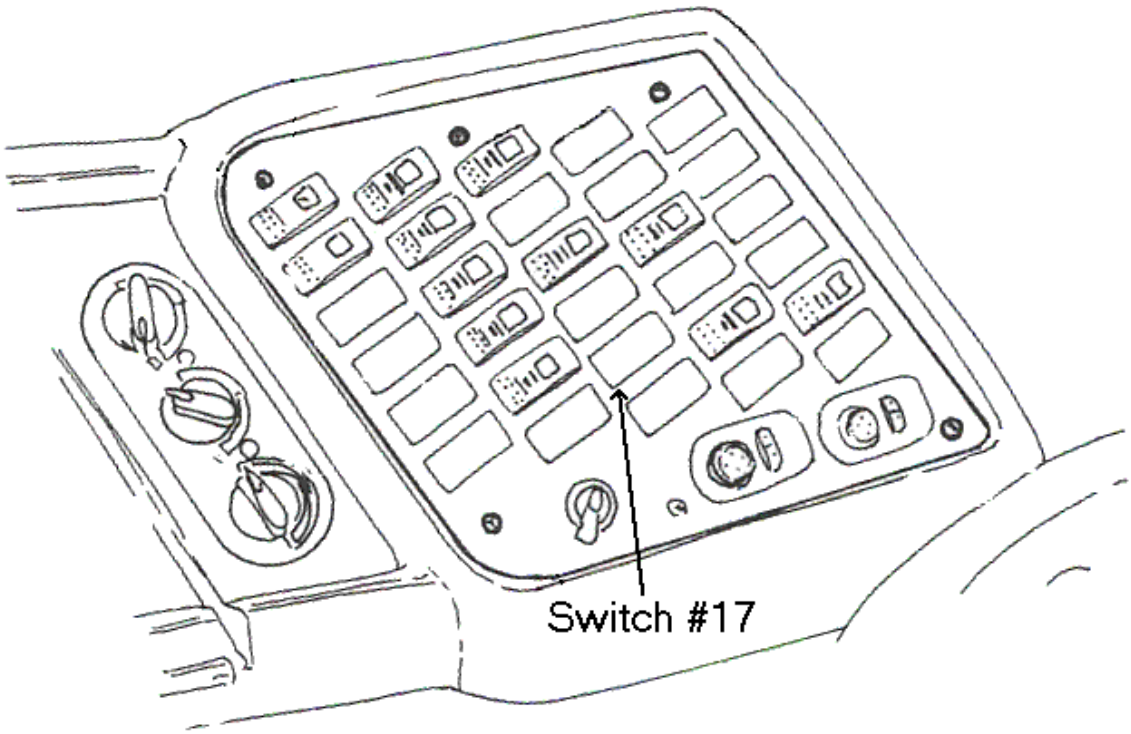

Figure 294 Lift Solenoid Switch Location Diagram

SWITCH #17 — LIFT SOLENOID SWITCH

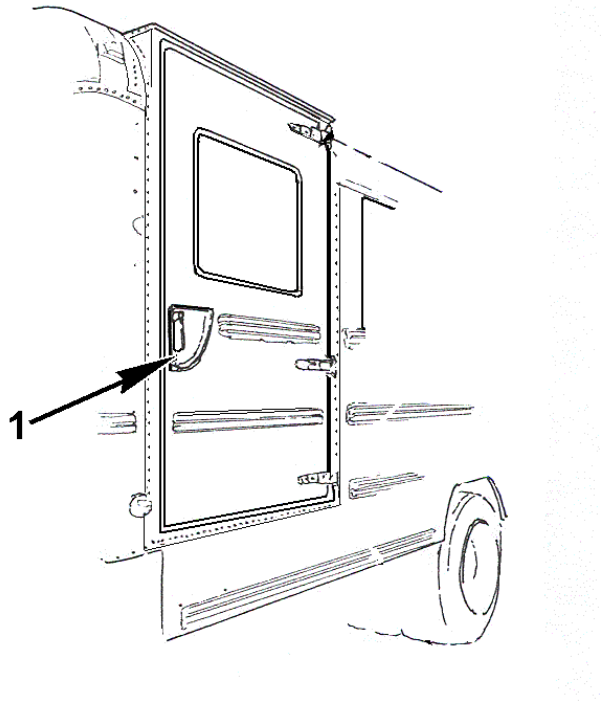

Figure 295 Wheelchair Lift Door

WHEELCHAIR LIFT DOOR HANDLE

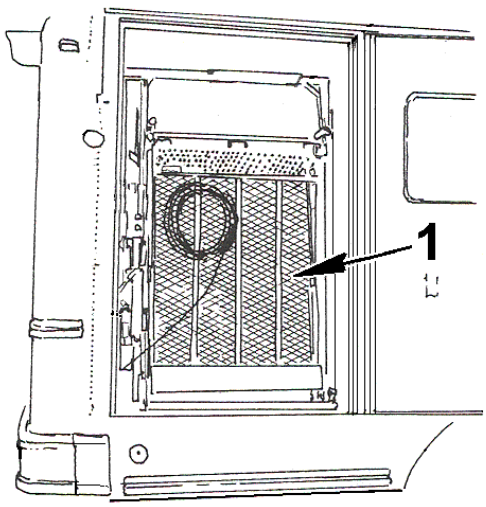

Figure 296 Wheelchair Lift

WHEELCHAIR LIFT (IN UP POSITION)

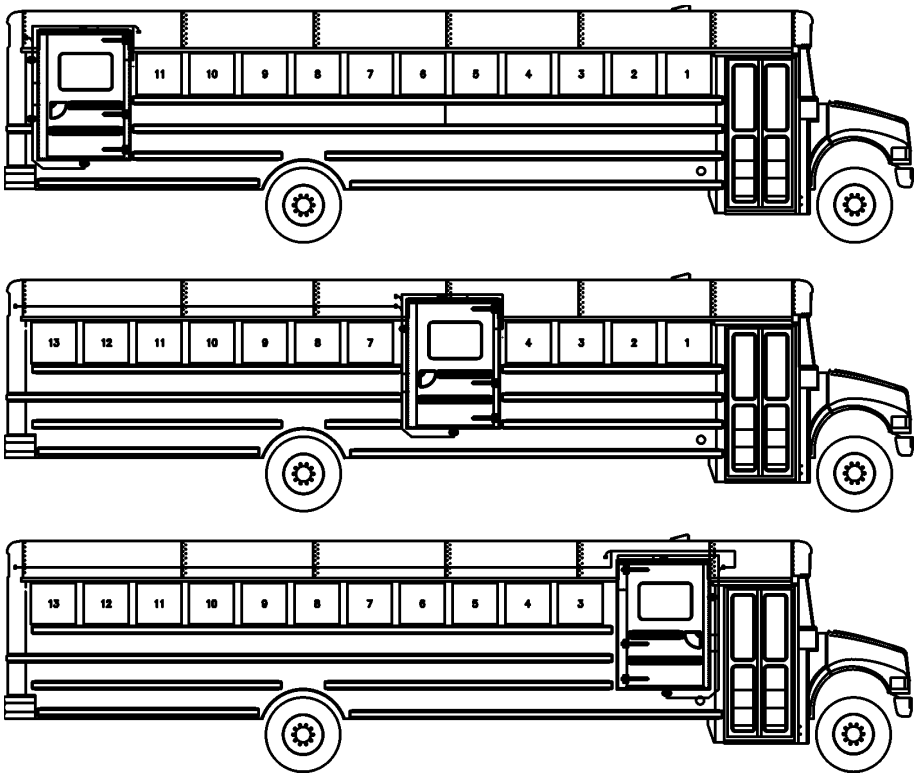

Figure 297 Wheelchair Lift Door Right Side Locations

19. CAMERA

19.1. CIRCUIT FUNCTIONS

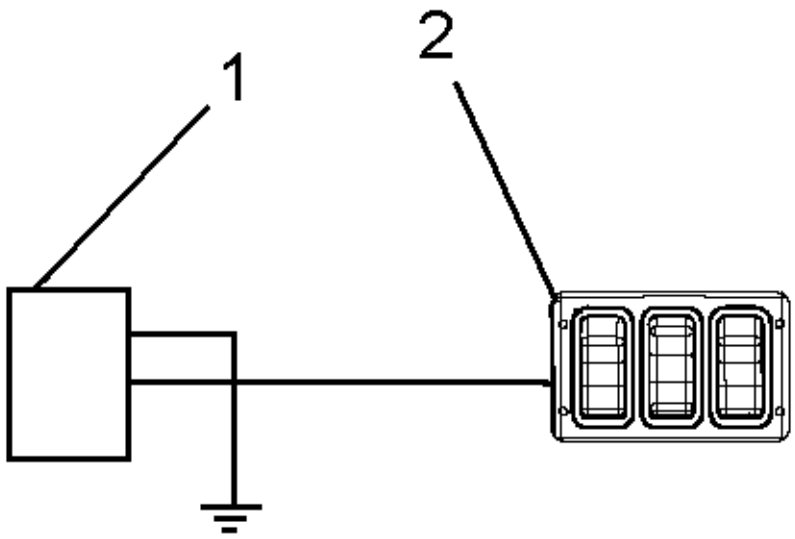

Figure 298 Camera Controls Function Diagram

1. CAMERA
2. CAMERA POWER SWITCH

19.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the Camera circuits.

Camera Preliminary Check

Table 176 Camera Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of camera.	Visually check camera.	Camera does not operate.	Go to next step.	Camera operating correctly.

Table 176 Camera Controls Preliminary Check (cont.)

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes. (See Diagnostic Trouble Codes (DTC), page 574)	Read display on odometer.	**No** Camera diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See Switched Camera Fault Detection Management, page 602)
4.	On	Go to Fault Detection Management (See Switched Camera Fault Detection Management, page 602)				

19.3. SWITCHED CAMERA 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.

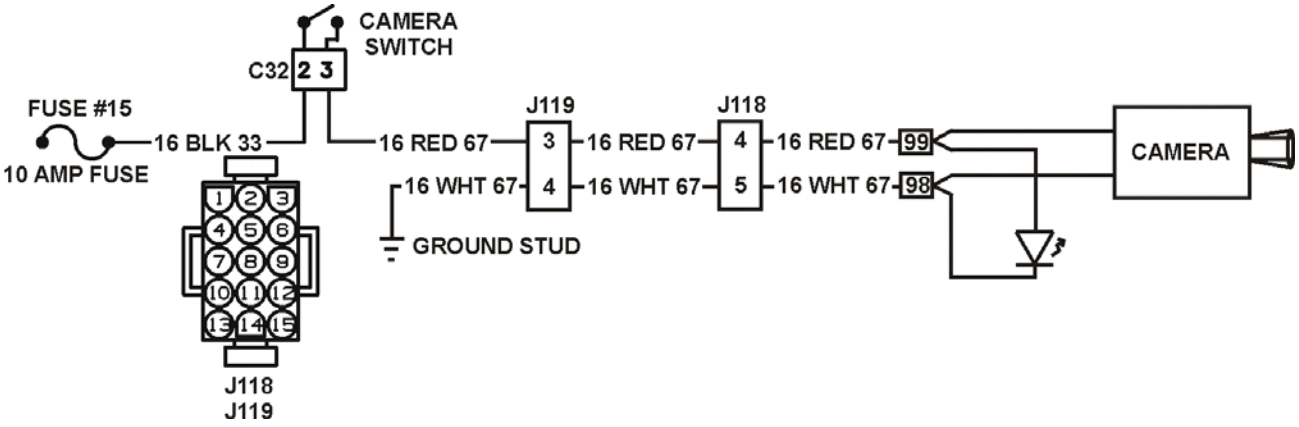

Figure 299 Switched Camera Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

C32 — CAMERA POWER SWITCH
LOCATED ON LEFT HAND SWITCH PANEL
J118 LEFT HAND BODY TO FRONT CAP
J119 FLASHER PLACE TO LEFT HAND BODY

Table 177 Switched Camera Circuit Tests

Camera Voltage Checks Check with ignition on, camera switch open and camera connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Camera connector 99 to ground.	0 volts	If voltage is present check for short on circuit 16 RED 67.
While meter is still connected from camera connector 99 to ground, close Camera Switch.		
Camera connector 99 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #15. Also check for open or short on circuits 16 RED 67 and 16 BLK 33. Also perform a continuity test on Camera Switch C32. Replace if faulty.
Leave Camera Switch closed.		
Camera connector 99 to 98.	12 ± 1.5 volts	If voltage is missing check for open or short on circuit 16 WHT 67. If all circuits check good and camera still fails, replace camera.

19.4. IGNITION ACTIVATED CAMERA 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.

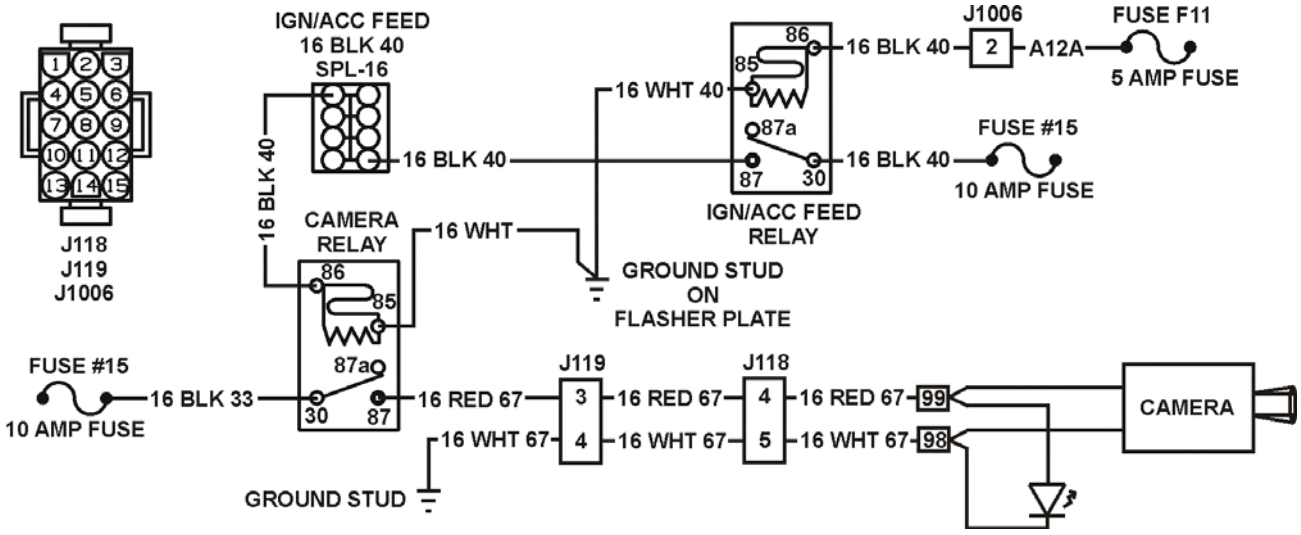

Figure 300 Ignition Activated Camera Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

J118 LEFT HAND BODY TO FRONT CAP
J119 FLASHER PLACE TO LEFT HAND BODY
J1006 BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
SPL-16 — IGNITION/ACCESSORY FEED SPLICE

Table 178 Ignition Activated Camera Circuit Tests

Ignition/Accessory Relay Voltage Checks Check with ignition on, camera relay installed and ignition/accessory 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 Relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse F11. Also check for open or short on circuits A12A and 16 BLK 40.
Ign/Acc Relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 40.
Ign/Acc Relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing check for blown fuse #15. Also check for open or short on circuit 16 BLK 40.
Ign/Acc Relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing check for blown fuse #15. Also check for open or short on circuit 16 BLK 40.

Table 178 Ignition Activated Camera Circuit Tests (cont.)

Camera Relay Voltage Checks Check with ignition on, camera relay removed and ignition/accessory relay installed. **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
Camera Relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 40.
Camera Relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT.
Camera Relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #15. Also check for open or short on circuit 16 BLK 33.
Camera Relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 67.
Camera Voltage Checks Check with ignition on, camera relay installed, ignition/accessory relay installed and camera connector disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Camera connector 99 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 RED 67.
Camera connector 99 to 98.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 67. If circuits check good and camera is still faulty, replace camera.

19.5. EXTENDED DESCRIPTION

The Camera will only receive power when the ignition is on.

For the Switched Camera, power will be applied when the camera switch is closed.

For the Ignition Activated Camera, power from fuse F11 will energize the Ign/Acc Feed Relay. The will allow power from fuse #15 to go to the Ign/Acc Feed Splice SPL-16. This power will energize the Camera Relay. Power from Fuse #15 will then be applied to the Camera.

19.6. COMPONENT LOCATIONS

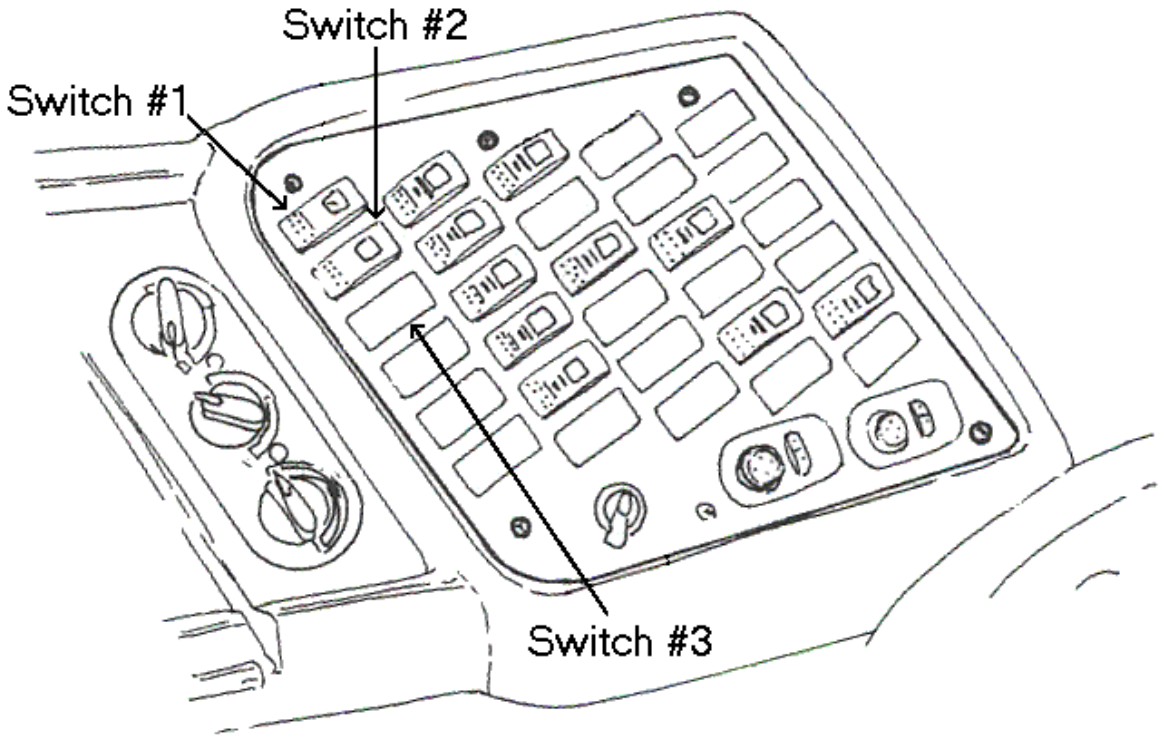

Figure 301 Left Hand Switch Panel

SWITCH #16 — CAMERA SWITCH

20. TRACTION SANDERS

20.1. CIRCUIT FUNCTIONS

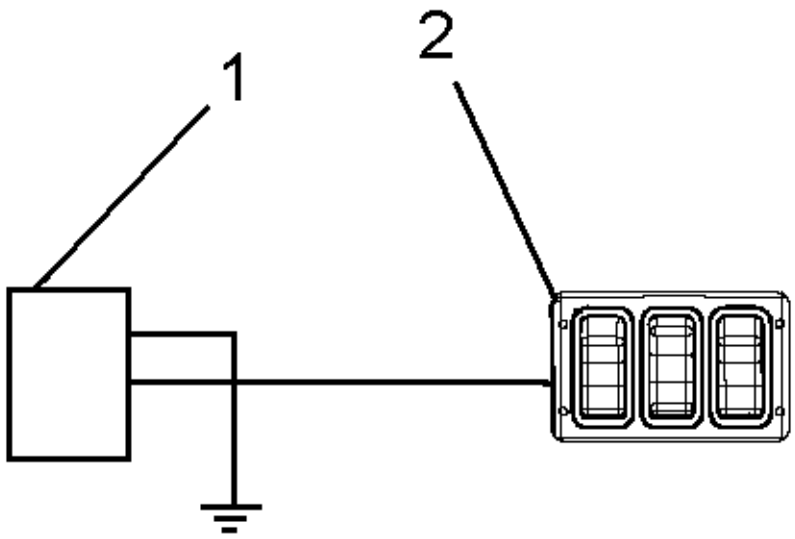

Figure 302 Traction Sanders Controls Function Diagram

1. TRACTION SANDER
2. SANDER SWITCH

20.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the Traction sander circuits.

Traction Sander Preliminary Check

Table 179 Traction Sander Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of traction sanders.	Visually check traction sanders.	Traction sanders do not operate.	Go to next step.	Traction sanders operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Go to Fault Detection Management (See Traction Sanders Fault Detection Management, page 608)				

20.3. TRACTION SANDERS 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.

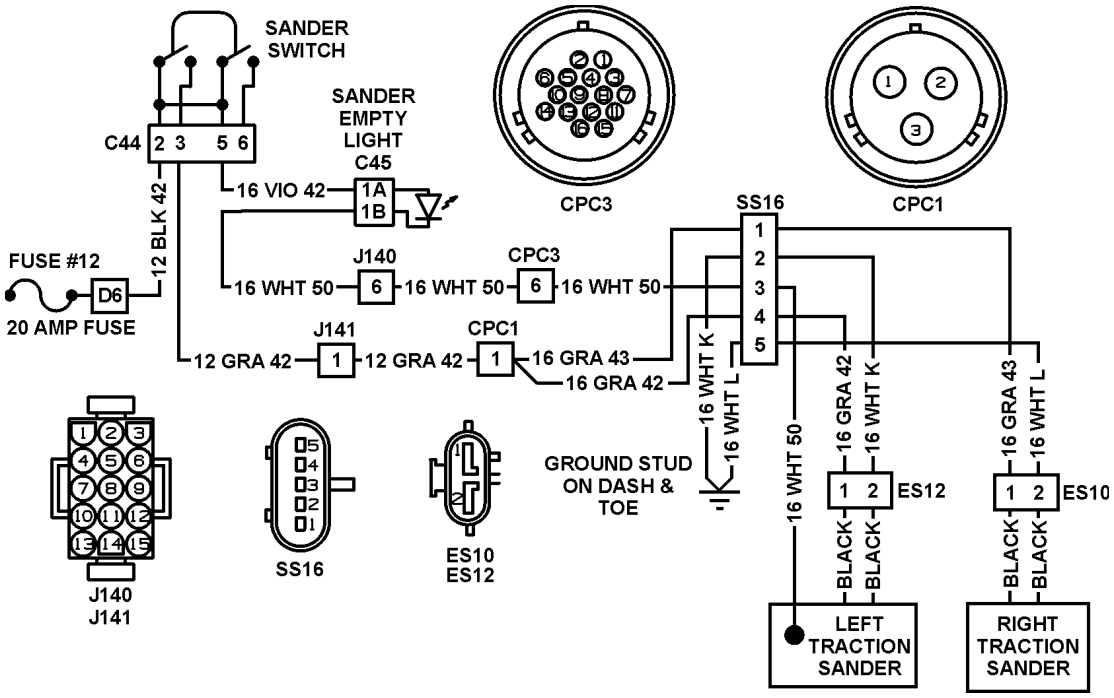

Figure 303 Traction Sander Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

CPC1 CPC3 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
ES10 SEALED ENGINE TO RIGHT HAND SANDER
ES12 SEALED ENGINE TO LEFT HAND SANDER
J140 J141 FLASHER PLATE TO DASH AND TOE
SS16 SEALED ENGINE HARNESS TO SANDER HARNESS

Table 180 Traction Sander Circuit Tests

Right Traction Sander Voltage Checks Check with ignition on, traction sander switch open and right traction sander connector (ES10) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Right traction sander connector (ES10) cavity 1 to ground.	0 volts	If voltage is present check for short on circuits 16 GRA 43 and 12 GRA 42.
While meter is still connected from right traction sander connector (ES10) cavity 1 to ground, close Sander Switch.		
Right traction sander connector (ES10) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #12. Also check for open or short on circuits 16 GRA 43 and 12 GRA 42. Also perform a continuity test on Sander Switch (C44). Replace if faulty.

Table 180 Traction Sander Circuit Tests (cont.)

Right traction sander connector (ES10) cavity 1 to cavity 2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT L. If circuits check good and sander is still faulty, replace sander.
Left Traction Sander Voltage Checks Check with ignition on, traction sander switch open and left traction sander connector (ES12) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Left traction sander connector (ES12) cavity 1 to ground.	0 volts	If voltage is present check for short on circuits 16 GRA 42 and 12 GRA 42.
While meter is still connected from left traction sander connector (ES12) cavity 1 to ground, close Sander Switch.		
Left traction sander connector (ES12) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #12. Also check for open or short on circuits 16 GRA 42 and 12 GRA 42.
Left traction sander connector (ES12) cavity 1 to cavity 2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT K. If circuits check good and sander is still faulty, replace sander.
Left traction sander light plug to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 WHT 50, 16 VIO 42 and 12 BLK 42. Also ensure proper operation and orientation of sander empty light C45 light emitting diode.

20.4. EXTENDED DESCRIPTION

The Traction Sanders will only receive power when the ignition is on and the user controlled switch in the left hand switch panel is closed..

The Sander Empty Light is controller by an internal switch on the left traction sander. When the sand level gets low, the internal switch will close provided a ground to the Sander Empty Light.

Ground is provided from the ground stud on the dash and toe panel.

20.5. COMPONENT LOCATIONS

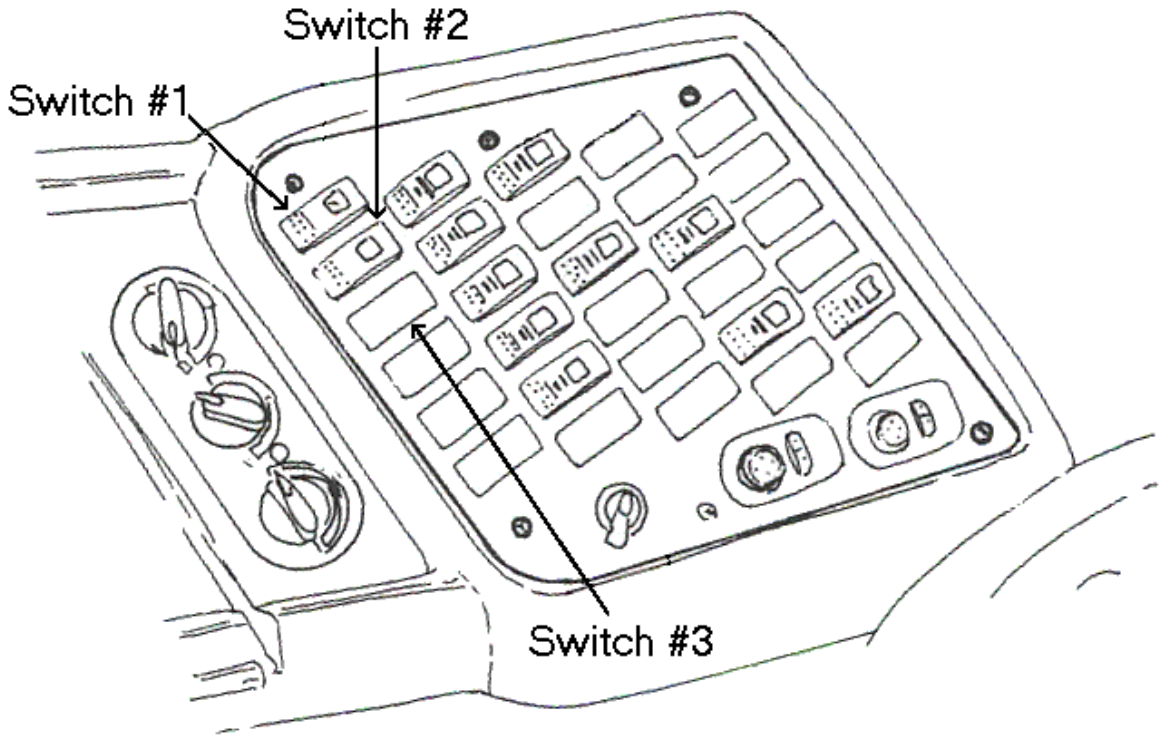

Figure 304 Left Hand Switch Panel

SWITCH #17 — SANDER SWITCH

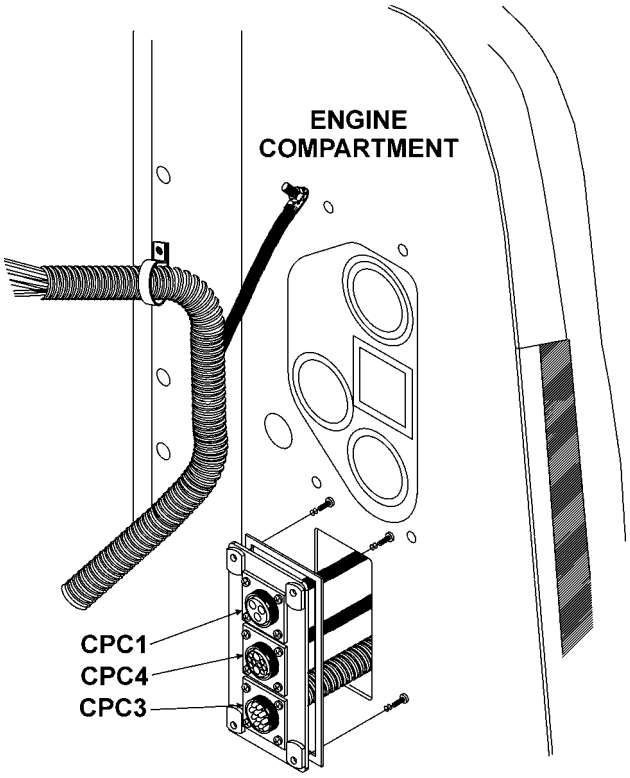

Figure 305 Engine Compartment Pass Thrus

21. AIR COMPRESSOR

21.1. CIRCUIT FUNCTIONS

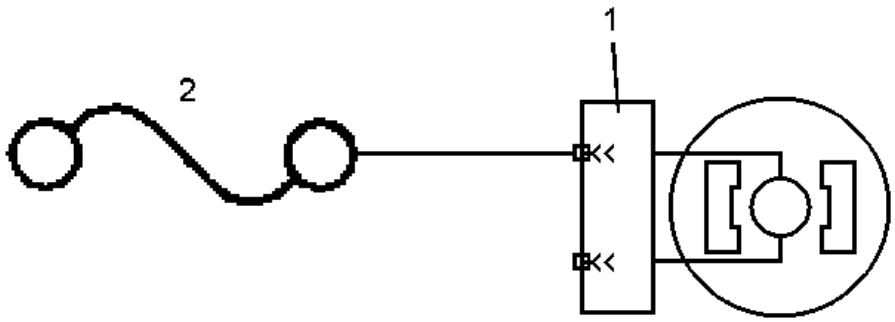

Figure 306 Air Compressor Controls Function Diagram

1. AIR COMPRESSOR MOTOR
2. AIR COMPRESSOR POWER SOURCE

21.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the Air compressor circuits.

Air Compressor Preliminary Check

Table 181 Air Compressor Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of air compressor.	Visually check air compressor.	Air compressor does not operate.	Go to next step.	Air compressor is operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or 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	Check for diagnostic trouble codes.	Read display on odometer.	**No** Camera diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See Air Compressor Fault Detection Management, page 613)
4.	On	Go to Fault Detection Management (See Air Compressor Fault Detection Management, page 613)				

21.3. AIR COMPRESSOR 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.

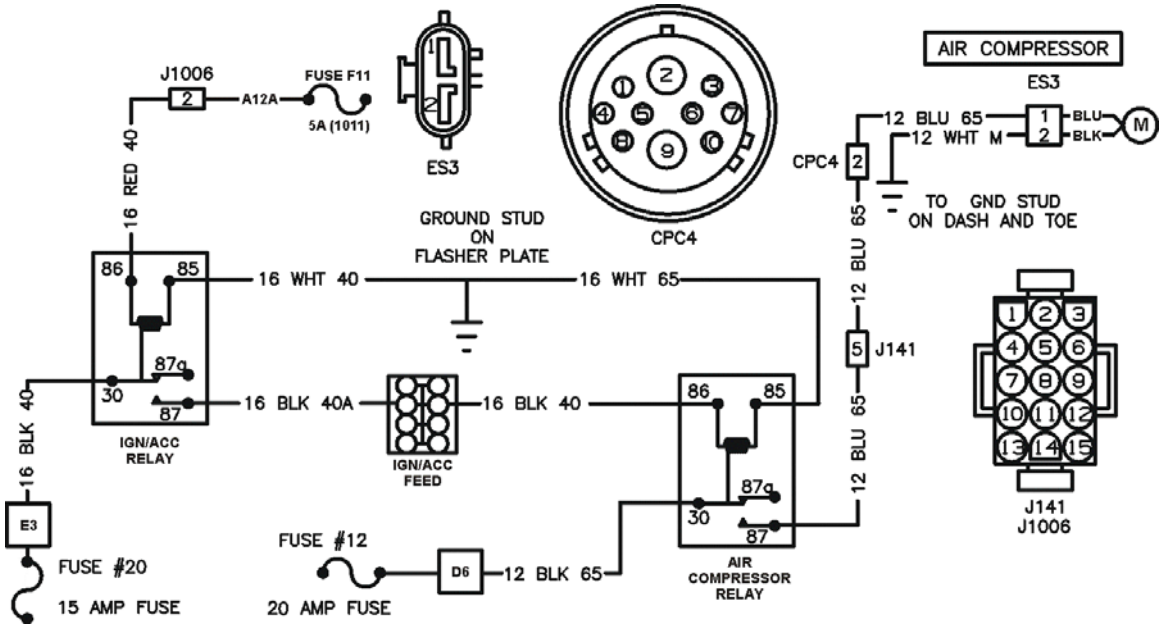

Figure 307 Air Compressor Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
CPC4 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J141 FLASHER PLATE TO DASH AND TOE
ES3 SEALED ENGINE TO AIR COMPRESSOR
SPL-16 IGNITION ACCESSORY FEED SPLICE
SS16 SEALED ENGINE HARNESS TO SANDER HARNESS

Table 182 Air Compressor Circuit Tests

Ignition/Accessory Relay Voltage Checks Check with ignition on and ignition/accessory 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
Ignition/accessory relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F11. Also check for open or short on circuits 16 RED 40 and A12A.
Ignition/accessory relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 40.
Ignition/accessory relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #20. Also check for open or short on circuit 16 BLK 40.

Table 182 Air Compressor Circuit Tests (cont.)

Ignition/accessory relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 40A and 16 BLK 40.
Air Compressor Relay Voltage Checks Check with ignition on and air compressor 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
Air compressor relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 40A and 16 BLK 40.
Air compressor relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 65.
Air compressor relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse # 12. Also check for open or short on circuit 12 BLK 65.
Air compressor relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 12 BLU 65.
Air Compressor Connector (ES3) Voltage Checks Check with ignition on and air compressor connector (ES3) disconnected. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Air compressor connector (ES3) cavity 1 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 12 BLU 65.
Air compressor connector (ES3) cavity 1 to 2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 12 WHT M. If all circuits check good and air compressor still fails, replace air compressor.

21.4. EXTENDED DESCRIPTION

The Air compressor will only receive power when the ignition is on. When power is applied, the air compressor will only run when pressure in the tank falls below a pre-programmed limit.

Ground is provided from the ground stud on the dash and toe panel.

21.5. COMPONENT LOCATIONS

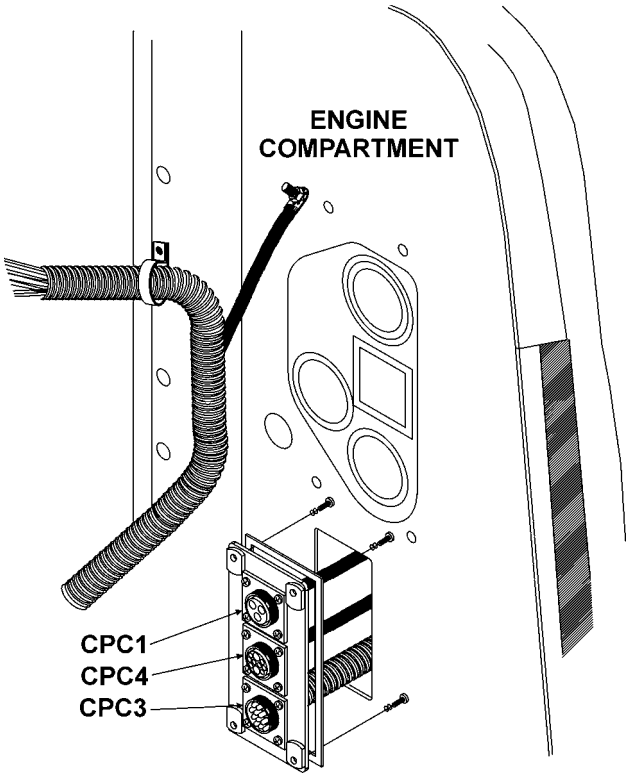

Figure 308 Engine Compartment Pass Thrus

22. LOCKING OVERHEAD COMPARTMENT W/BUZZER

22.1. CIRCUIT FUNCTIONS

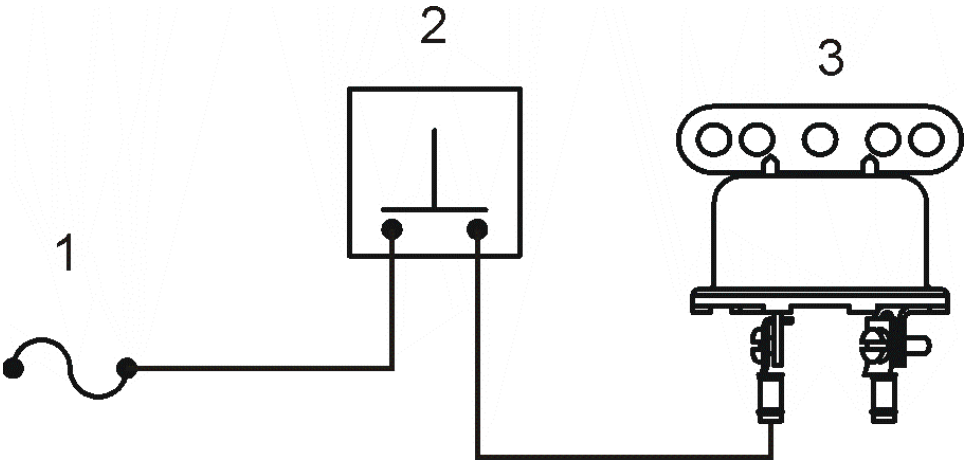

Figure 309 Locking Overhead Compartment w/Buzzer Controls Function Diagram

1. POWER SOURCE
2. KEY SWITCH
3. BUZZER

22.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the Locking Overhead Compartment w/Buzzer circuits.

Locking Overhead Compartment w/Buzzer Preliminary Check

Table 183 Locking Overhead Compartment w/Buzzer Controls Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of the locking overhead compartment.	Visually check the locking overhead compart-ment.	The locking overhead compart-ment does not operate.	Go to next step.	The locking overhead compartment is operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
3.	On	Check for diagnostic trouble codes.	Read display on odometer.	**No** Camera diagnostic trouble codes are active.	Go to next step.	Go to Fault Detection Management (See Locking Overhead Compartment Fault Detection Management, page 617)
4.	On	Go to Fault Detection Management (See Locking Overhead Compartment Fault Detection Management, page 617)				

22.3. LOCKING OVERHEAD COMPARTMENT 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.

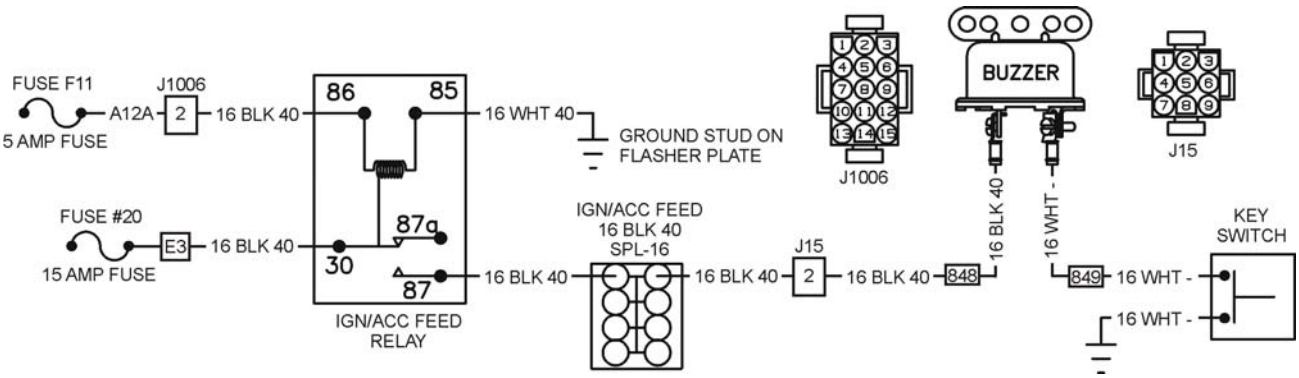

Figure 310 Locking Overhead Compartment Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

(1006) BODY BUILDER CONNECTOR
LOCATED LEFT SIDE VEHICLE AT FLASHER PLATE
J15 FLASHER PLATE TO LEFT HAND BODY
SPL-16 IGNITION ACCESSORY FEED SPLICE

Table 184 Locking Overhead Compartment Circuit Tests

Ignition/Accessory Relay Voltage Checks Check with ignition on and ignition/accessory 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
Ignition/accessory relay cavity 86 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse F11. Also check for open or short on circuits 16 RED 40 and A12A.
Ignition/accessory relay cavity 86 to 85.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 WHT 40.
Ignition/accessory relay cavity 30 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuse #20. Also check for open or short on circuit 16 BLK 40.
Ignition/accessory relay cavity 30 to 87.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuit 16 BLK 40.
Key Switch Voltage Checks Check with ignition on. **NOTE – Always check connectors for damage and pushed–out terminals.**		

Table 184 Locking Overhead Compartment Circuit Tests (cont.)

Test Points	Spec.	Comments
Key Switch cavity 849 to ground.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 16 BLK 40 and 16 WHT —. If all circuits check good and locking overhead compartment is still faulty, replace key switch.

22.4. EXTENDED DESCRIPTION

The locking overhead compartment buzzer will only receive power when the ignition is on. When the compartment is opened, a switch will close which will provide power to the buzzer.

Ground is provided at the key switch.

23. ELECTRIC TIRE WINCH

23.1. CIRCUIT FUNCTIONS

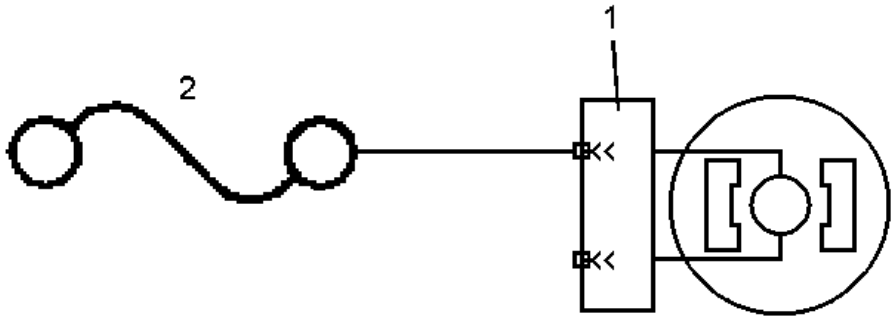

Figure 311 Electric Tire Winch Function Diagram

1. ELECTRIC TIRE WINCH
2. ELECTRIC TIRE WINCH POWER SOURCE

NOTE – This option is available on Iraq busses ONLY.

23.2. DIAGNOSTICS

Diagnostic Trouble Codes (DTC)

There are no Diagnostic Trouble Codes associated with the electric tire winch circuits.

Electric Tire Winch Preliminary Check

Table 185 Electric Tire Winch Preliminary Check

STEP	KEY	ACTION	TEST POINTS	SPEC.	YES - IN SPEC.	NO - OUT OF SPEC.
1.	On	Verify operation of the electric tire winch.	Visually check the electric tire winch.	The electric tire winch does not operate.	Go to next step.	The electric tire winch is operating correctly.
2.	On	Determine if any other features are malfunctioning that may have common circuits. (Example: Missing power or ground common to several features.)	Visually check for other malfunc-tioning features.	No other features are malfunc-tioning.	Go to next step.	Identify and repair condition causing several features to be inoperative.
4.	On	Go to Fault Detection Management (See Electric Tire Winch Fault Detection Management, page 620)				

23.3. ELECTRIC TIRE WINCH 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.

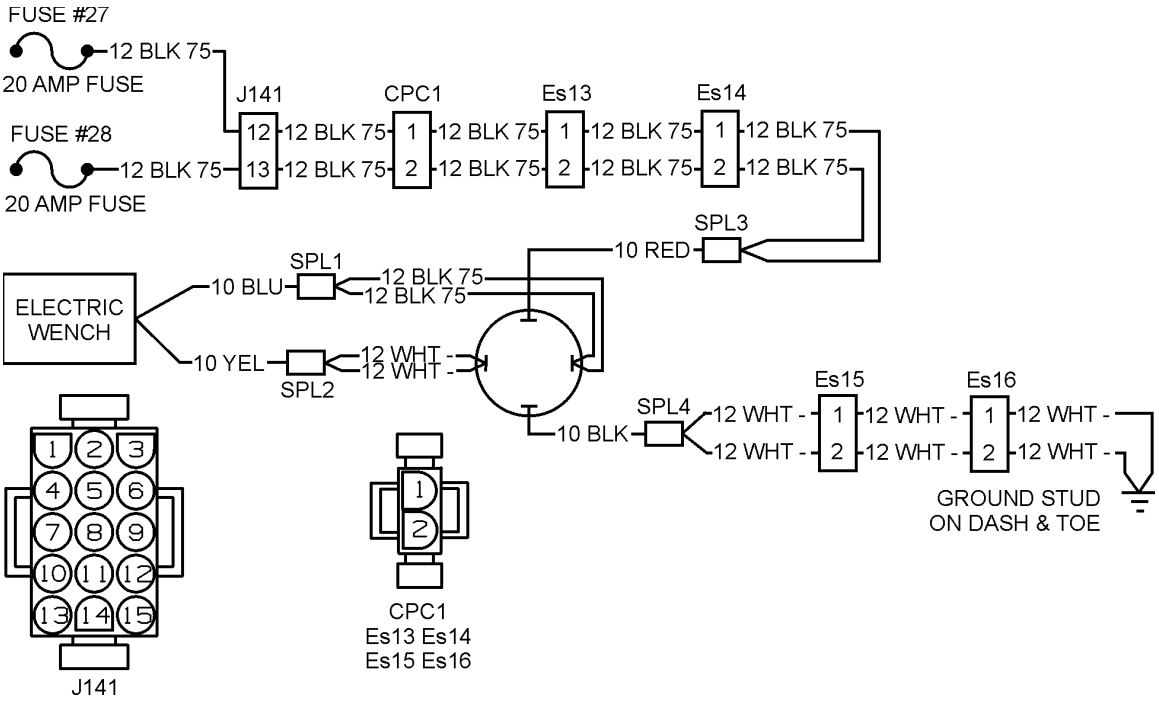

Figure 312 Electric Tire Winch Circuits — Always Refer to the Circuit Diagram Book for Latest Circuit Information

CPC1 DASH AND TOE HARNESS TO SEALED ENGINE HARNESS
J141 FLASHER PLATE TO DASH AND TOE

Table 186 Electric Tire Winch Circuit Tests

Electric Tire Winch Voltage Checks Check with ignition on and electric tire winch deactivated. **NOTE – Always check connectors for damage and pushed–out terminals.**		
Test Points	Spec.	Comments
Electric tire winch power splice SPL1 to ground.	12 ± 1.5 volts	If voltage is missing, check for blown fuses #27 and #28. Also check for open or short on circuits 12 BLK 75 and 10 RED.
Electric tire winch power splice SPL1 to SPL2.	12 ± 1.5 volts	If voltage is missing, check for open or short on circuits 12 WHT — and 10 BLK. If circuits check good and electric tire winch is still faulty, check for open or short on circuits 10 BLU and 10 YEL. If all circuits check good and electric tire winch still fails, replace electric tire winch.

23.4. EXTENDED DESCRIPTION

The electric tire winch receives power from the “Hot All The Time” fuses #27 and #28. Power is supplied from controls located at the electric tire winch motor.

Ground is provided to the electric tire winch from the ground stud on the dash and toe panel.