# Section 12T Electrical Troubleshooting

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## GENERAL

Because of its complexity, the electrical system is divided into the following functional systems for troubleshooting:

- Battery
- Starting system
- Fuel system
- Brake system
- Windshield wiper and washer system
- Transmission system
- Indicators, gauges, and warning system
- Lighting system
  Front
  Rear
  Cab
- Trailer connection system
- Heat and air conditioning system
- Winch
- Power door locks
- Power mirrors
- Power window
- The wiring schematics provided with this manual, fold-outs 1 through 12 show the interrelationship of all electrical systems and should be used when performing electrical troubleshooting.

## BASIC ELECTRICAL CIRCUITS

***WARNING: Batteries emit explosive hydrogen gas. Keep flames or sparks away from batteries. Battery acid is extremely harmful. If acid contacts eyes or skin, flush affected area(s) liberally with clear water, and seek medical help immediately. If acid contacts clothing, remove and discard affected clothing. Always disconnect ground cable, and remove all jewelry before working on batteries.***

***WARNING: When removing battery cables, disconnect ground cable first. Ensure all switches are off before disconnecting battery ground cable. Do not allow tools to come in contact with vehicle when disconnecting the cables. Indirect short can result causing instant heating of tools, tool damage, battery damage, or battery explosion.***

***WARNING: Never wear loose or baggy clothing around moving machinery. Remove ties and tie back long hair.***

### General

An electrical circuit is a number of electrical devices which are connected in a loop from a positive voltage source (battery positive) to a negative voltage source (battery negative).

### Parallel Circuits

The Hummer electrical system is a parallel circuit. In a parallel circuit, the electrical devices are connected to form more than one current path to and from the power supply. The supply voltage is the same in each path.

### Circuit Components

A normal circuit path usually starts at the power supply (battery system or alternator). Next is the circuit protection fusible link, fuse, or circuit breaker. The current then goes on to the circuit load, which may be lights, motors, or solenoids and returns to the power supply through the ground system.

### Fusible Links

A fusible link is a section of wire, usually two gauge sizes smaller than the circuit it protects. A special insulation swells when heated, and the fusible link melts open, preventing damage to the circuit.

### Circuit Controllers

Circuit controllers are manually-operated switches or relays. Switches are usually found at the beginning of a circuit, such as the headlight switch. Relays are used in high current circuits controlled by sensors, and are designed so that a small current circuit will be able to control a large current circuit.

### Circuit Breakers

Circuit breakers used in the HUMMER are automatic reset circuit breakers, which will continue to cycle until excess electrical current is corrected, or the circuit is disconnected from the power supply.

### Fuses

The most common protector in the vehicle electrical circuit is the fuse. A fuse is designed to melt before the wiring in a circuit can be damaged.

### Maxi-Fuses

Maxi-fuses allow a greater electrical load while still providing protection to the wiring circuit. Maxi-fuses are often used in place of fusible links.

The maxi-fuse block is located in the convenience center of the fuse box. The circuits protected are shown in the chart below.

| FUSE | AMPERAGE | |
|---|---|---|
| 1 | 20 | HEADLIGHTS |
| 2 | 30 | RUNNING LIGHTS |
| 3 | 30 | REAR WINDOW DEFROSTER |
| 4 | 20 | BLANK |
| 5 | 30 | POWER WINDOW |
| 6 | 40 | IGNITION |

## Circuit Diagnosis

Before taking any action to correct a possible malfunction, the following rules should be followed:

- Question the operator for any information that may help determine the cause of the problem.
- Never overlook the chance that the problem could be of simple origin, and corrected with minor adjustment.
- Use test instruments or gauges to help determine the problem.
- Always isolate the system where the problem occurs, then locate the defective equipment.
- Use standard automotive theories and principles when troubleshooting this vehicle.
- Always use the electrical harness wiring schematics (foldouts 1 through 12). These diagrams show how each component or device depends on others, and allows you to see how the entire system works.
- If a charging or low battery charge problem exists, check the accessory drivebelt.
- Check the battery for damage and charge, and clean, tight connections.
- Visually inspect wires and connectors. Verify terminal pins are clean and that no loose pins or terminals are present.
- Before checking a circuit by means of a multimeter, check to see if other components or systems fed or grounded by the circuit are operating properly.
- Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem. You can either test for the most likely cause of failure, or perform those tests which are most easily and quickly done.

The following are the four electrical fault conditions that can cause a non-working circuit: an open circuit, a short circuit, a grounded circuit, or a high resistance connection.

## Open Circuit

An open circuit occurs whenever there is a break in the circuit continuity. The break can be caused by a connector disconnect, a broken wire, or a defective component (Figure 12-1).

## Short Circuit

A short circuit happens when the current bypasses part of the normal circuit. This bypassing is usually caused by wire pinching or chaffing. Usual symptoms are inappropriate activation of a load device (Figure 12-2).

## Grounded Circuit

A grounded circuit is also a short circuit, except the current flows directly to ground with very little restriction. This is usually caused by wire pinching or chaffing against the frame or body (Figure 12-3).

## High Resistance Connection

A high resistance connection is an electrical connection that is corroded or loose. High resistance connections cause a decrease in current flow that can affect the proper operation of an electrical load.

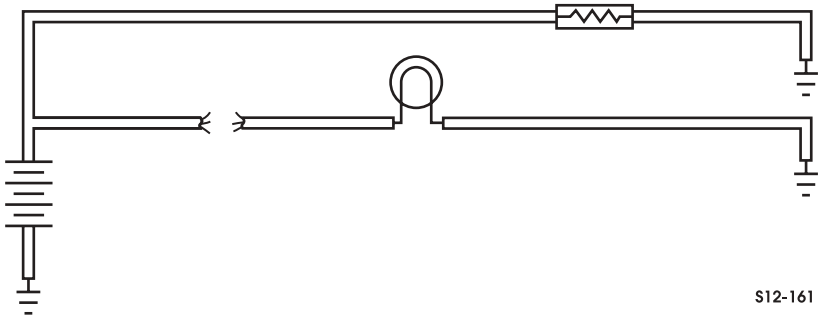



*Figure 12-1: Open Circuit*

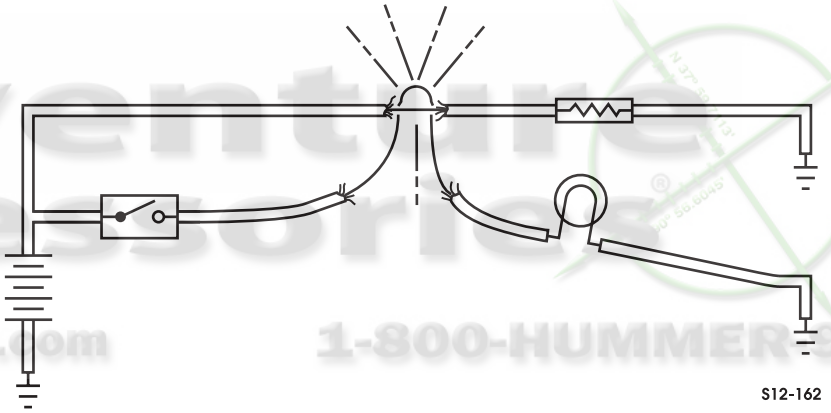



*Figure 12-2: Short Circuit*

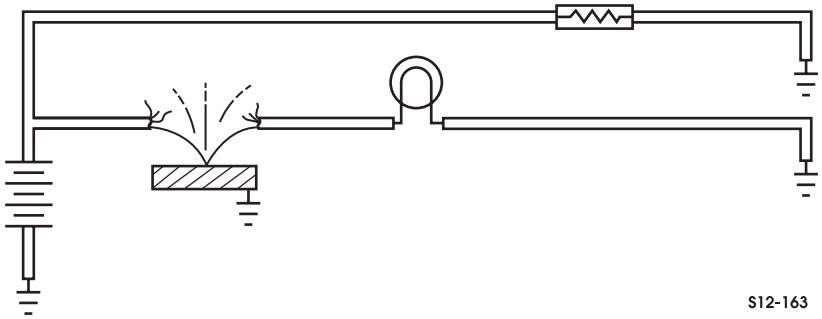



*Figure 12-3: Grounded Circuit*

## DIAGNOSTIC TOOLS

### Digital Multimeter

A digital multimeter is required to safely test for electrical malfunctions within the Hummer. Due to the complexity of the electrical system, a test light should not be used to test electrical circuits.

- Troubleshooting with a test light cannot be used to determine the difference between 6 volts and 7 volts. A digital multimeter displays exact voltage.
- Sharp test light probes may break wire strands, causing circuit failure.
- Breaks in the insulation allow moisture and contaminants to enter connectors and components, increasing the chances for corrosion. Even a small increase in resistance can give false readings from a sensor to an electronic component.

A digital multimeter performs all the tests a test light can perform with a greater degree of accuracy. In addition, a multimeter can be used to test for current in a circuit.

## DIAGNOSTIC TESTS

**NOTE:** Follow all manufacturer's recommendations when testing for current. All multimeters have a maximum current rating. Not all multimeters contain a fuse that protects the multimeter from larger current draw.

### Amperage Test

Use caution when testing for current. Always check multimeter owner's manual for maximum current to be tested. Most multimeters are fuse-protected when measuring current. However, some meters are not protected and therefore can be damaged by excessive current. Position multimeter leads after closed switch and before load (Figure 12-4).

### Voltage Test

Multimeters have a number of different voltage scales to choose from. Always use the lowest scale possible to test the circuit. For example, if you select the 200 volt scale and you are testing for battery voltage, most multimeters will display 12 volts. By selecting the next smallest scale, 20 volts, the display will read 12.8 volts, a more accurate measurement. Position multimeter leads on each side of the load (Figure 12-5).

### OHM Test

***CAUTION:*** *Before using a multimeter, ensure the circuit is not energized. Even a small voltage applied to an multimeter will damage it.*

Continuity - Testing for continuity in a circuit requires the use of the lowest ohm scale available. Position the multimeter leads on each side of the circuit or component being tested. A reading of less than one ohm is acceptable continuity (Figure 12-6).

Resistance - To test for resistance, first touch the meter leads together to ensure that the meter zeros out, then position the leads of the multimeter on each side of the circuit or component. Adjust the multimeter ohm setting until an acceptable reading is observed. Verify the reading with the specification.

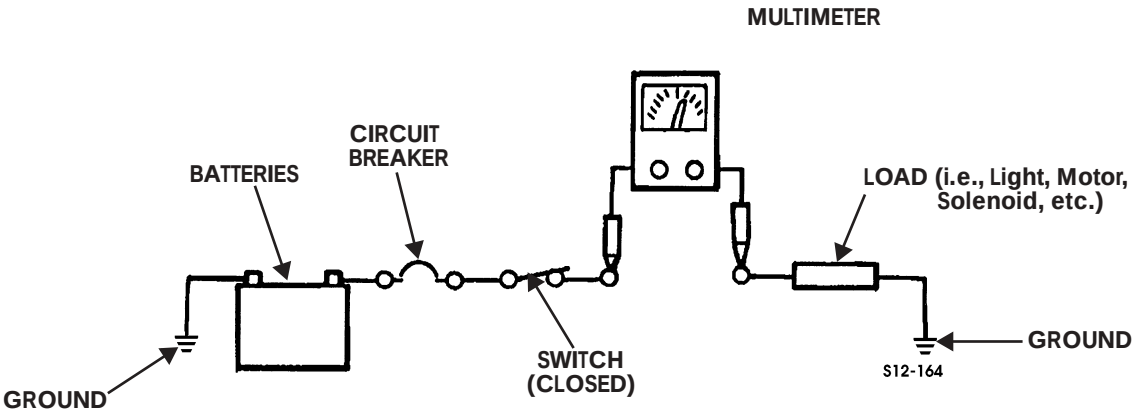



*Figure 12-4: Amperage Test*

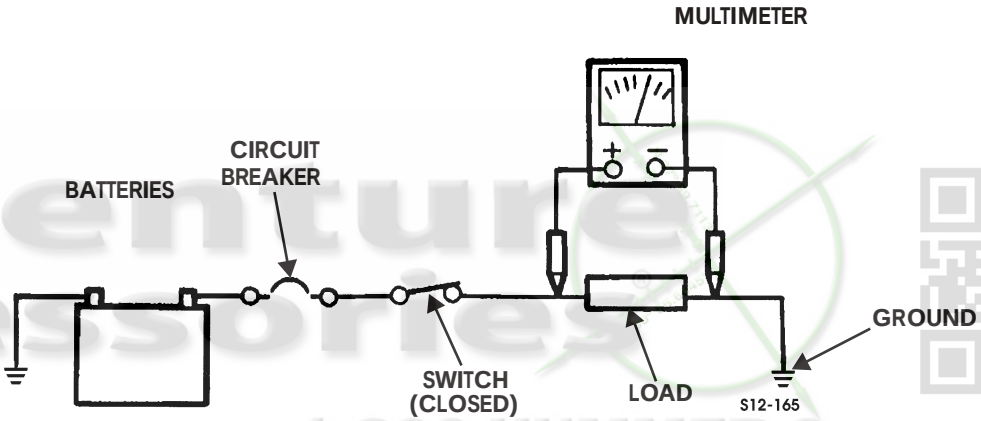





*Figure 12-5: Voltage Test*

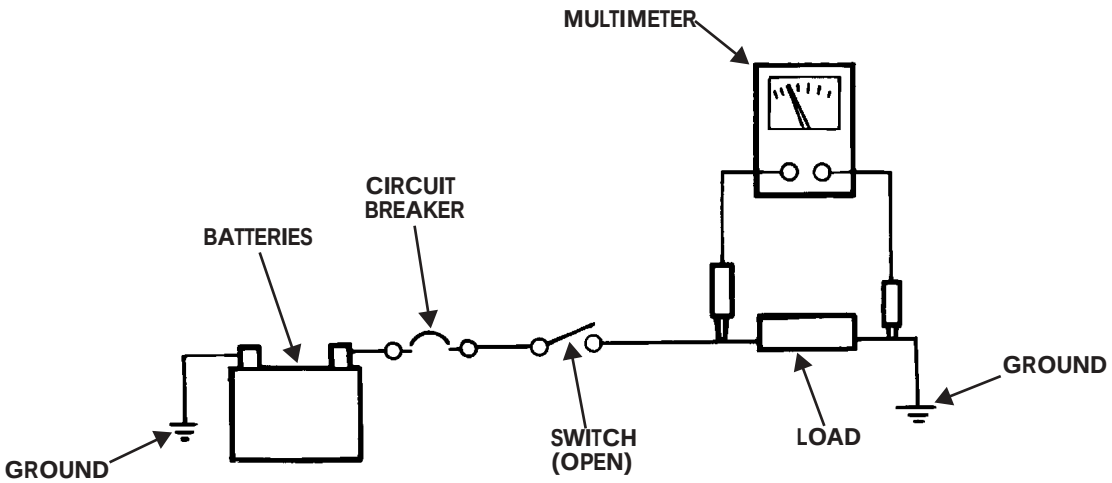



*Figure 12-6: Ohm Test*

## CIRCUIT MAINTENANCE AND REPAIR

All electrical connections must be kept clean and tight. Loose or corroded connections may cause a discharged battery, weak starting, dim lights, or possible electrical system damage.

Wires must be replaced or repaired if insulation becomes burned, cracked, or deteriorated. When replacing a wire, it is important that the same gauge size wire be used. Refer to wiring diagram for proper wire gauge sizes. Never replace a wire with one of a smaller size or replace a fusible link wire with a wire of a larger size. It should also be noted that fusible link wire utilizes a special insulation covering. When replacing a fusible link wire, the replacement wire should be the type in accordance with SAE J156. Further, fusible link wire should never be shortened or spliced. If a repair is necessary, entire fusible link wire must be replaced with one of the proper gauge size, length and insulation type.

Any wire repair must maintain the waterproof integrity of the vehicle. Any splice located below the 30 in. (76 cm.) fording level or in a high splash area must be waterproof and heavy duty adhesive wall shrink tubing should be used as a minimum in these areas.

Each harness or wire must be held securely in position to prevent damage to insulation caused by vibrating and chafing.

**NOTE:** Before performing any wire repair, disconnect battery ground cable.

### Wiring Repair

Wiring harness and wires - All wires are of a specific insulation color indicated on the wiring diagrams. Insulation color helps to identify circuits and make correct connections. Insulation colors and their abbreviations are as follows:

| | |
|---|---|
| BK - Black | PK - Pink |
| BR - Brown | PP - Purple |
| DB - Dark Blue | RD - Red |
| DG - Dark Green | RT - Rust |
| GY - Gray | TN - Tan |
| LB - Light Blue | WH - White |
| LG - Light Green | YL - Yellow |
| OR - Orange | |

Wire repair is very important for the continued, reliable operation of the vehicle. This repair must be done as described in the following procedure:

#### *Single Wire Repair (Exposed)*

1. Remove damaged area, removing as little wire as possible (Figure 12-7).

**NOTE:** Care should be exercised in stripping the wire insulation to avoid cutting wire conductor strands.

2. Strip wire ends to the appropriate length required by the splice clip (Figure 12-8).

**NOTE:** Heat shrink tubing is available in various diameters. Typically the heat shrink tubing will shrink to approximately one-half of its original diameter, therefore the tubing diameter selected for the repair should not be greater than twice the wire insulation diameter to ensure a proper seal.

3. Slide heat shrink tubing over one of the wire ends (Figure 12-8).

**NOTE:** Splice clips are available for different wire gauge sizes. Therefore, it is important to select the appropriate size for the wire gauge being repaired.

4. Slide both ends of wire into splice clip and crimp splice clip to wire ends (Figure 12-9).
5. Pull wires, by hand, in opposite directions to test the crimp of the splice clip.
6. Center heat shrink tubing over splice clip (Figure 12-10).
7. Using a heat gun or equivalent heat source, apply heat to heat shrink tubing until tubing conforms to splice clip and wire insulation (Figure 12-11).
8. After the splice cools, apply two layers of vinyl adhesive electrical tape to complete the repair (Figure 12-12).

#### *Single Wire Repair (In a Harness)*

1. Remove harness covering in the affected area (Figure 12-13).
2. Repair damaged wire using the exposed single wire repair procedures. (Go to Step 1.)
3. After completing the wire repair, apply two layers of vinyl adhesive electrical tape over the affected area to complete the repair (Figure 12-14).

#### *Multiple Wire Repair (In a Harness)*

**NOTE:** Since more than one splice is required in this case, stagger the wire splices such that they are no closer than 3 in. (7.6 cm) from each other.

Repair affected wires using the single wire repair (in a harness) procedures (Figure 12-15).

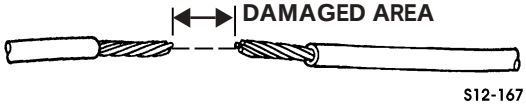



***Figure 12-7: Damaged Wire***

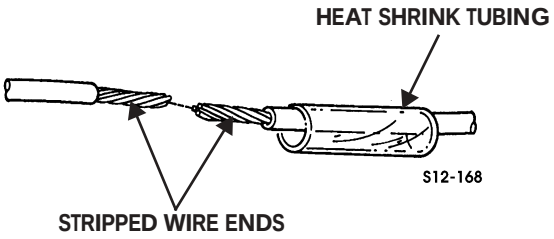



*Figure 12-8: Heat Shrink Tubing*

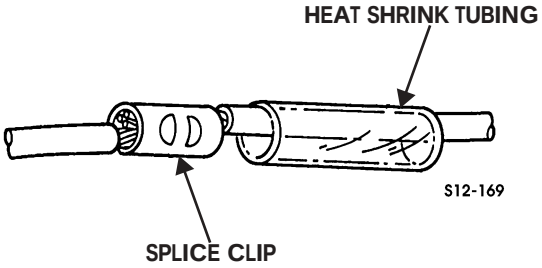



*Figure 12-12: Splice Clip*

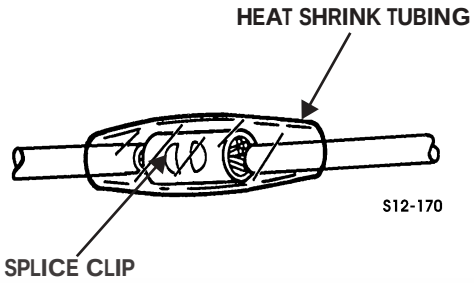



*Figure 12-9: Splice Clip*

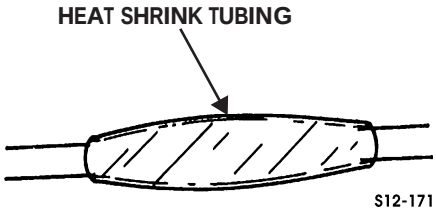



*Figure 12-13: Heat Shrink Tubing*

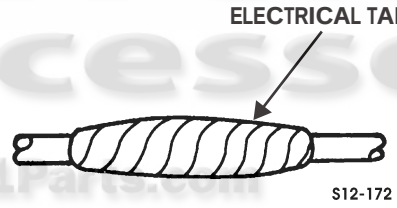



*Figure 12-10: Electrical Tape*


*Figure 12-14: Damaged Wire*

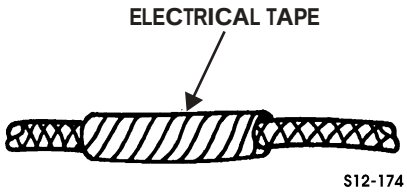



*Figure 12-11: Electrical Tape*

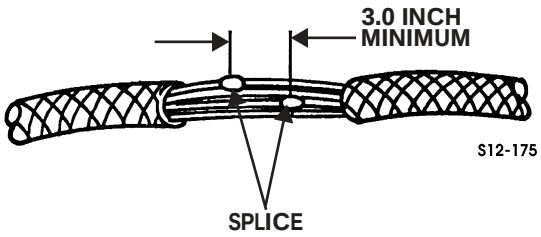



*Figure 12-15: Multiple Wire Splice*

## FUSE/RELAY LOCATION AND IDENTIFICATION

### Power Distribution Center

The power distribution center, or fuse box, is located under the instrument panel to the left of the steering column. The fuse box is divided into two mini-fuse junction blocks, a maxi-fuse junction block, five relays, and a convenience center. The mini-fuse blocks may be accessed without removing the main fuse box cover (Figure 12-16).

### Fuses

Fuses and circuit breakers protect the vehicle's electrical system from damage caused by overloading. If any electrical components are not working, there is a good chance that there has been an overload in the electrical system. In such a case, a blown fuse or tripped circuit breaker is usually the problem or it is an indicator of a more serious problem.

They have separate upper and lower access covers. To access the maxi-fuse block and relays, the main fuse box cover must be removed. The convenience center, as the name implies, may be conveniently accessed without having to remove any covers. Before removing any of the fuse box access covers, refer to the illustrations and charts in this section for the location of specific fuses, relays, and circuit breakers. Doing this will enable you to go directly to the fuse or circuit breaker you want to inspect.

Whenever a fuse blows or a circuit breaker opens a circuit, all electrical components using that circuit will not operate. Therefore, before replacing any of these electrical components, check the appropriate fuses and circuit breakers for damage (Figure 12-17).



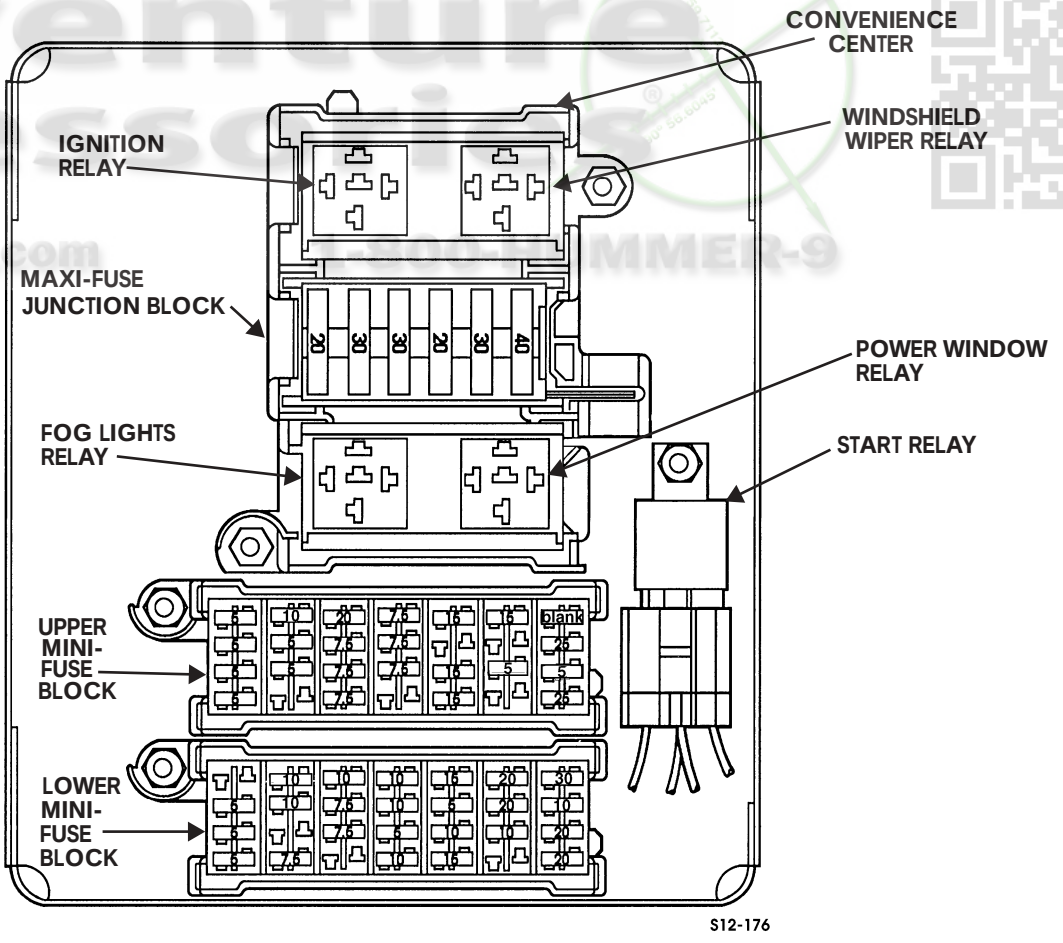



*Figure 12-16: Fuse Panel and Convenience Center*

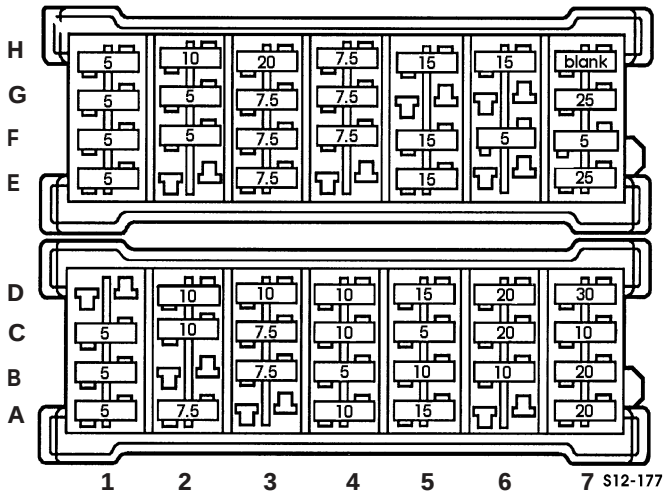
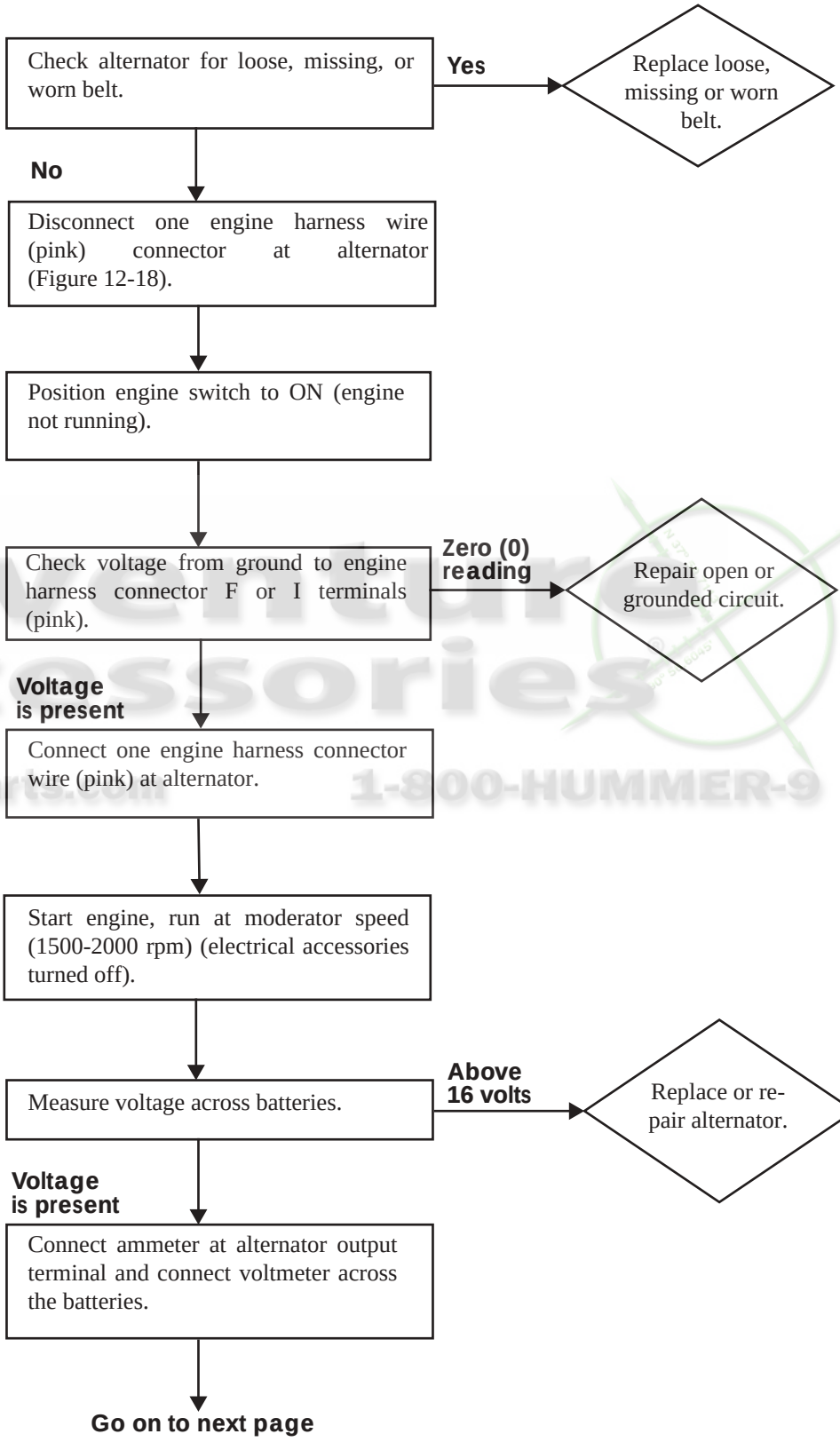



*Figure 12-17: Fuse Identification*

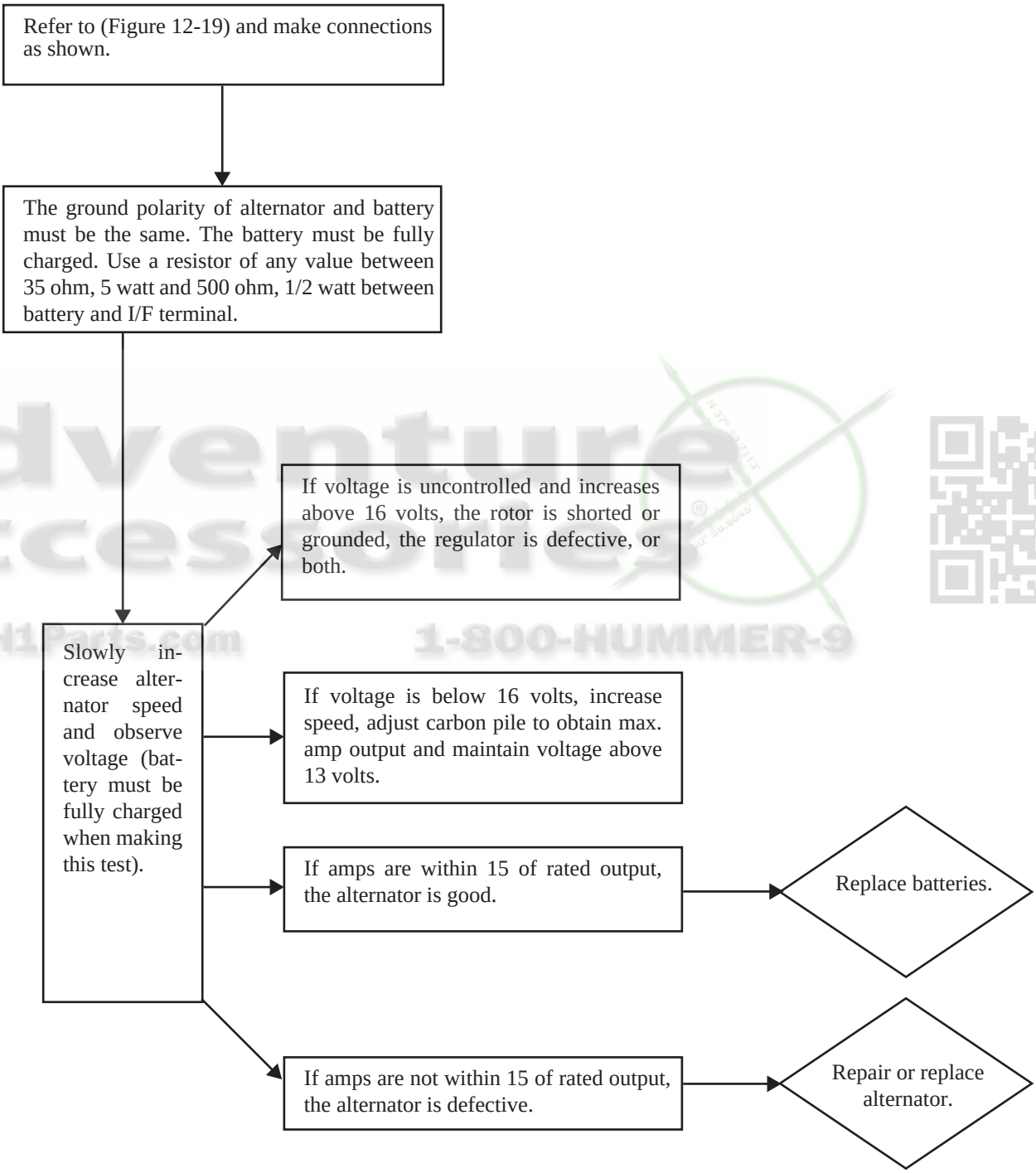
| FUSE | AMPERAGE | CIRCUIT PROTECTED |
|---|---|---|
| 1E | 5 | Spare Fuse |
| 2E | – | Blank |
| 3E | 7.5 | Spare Fuse |
| 4E | – | Blank |
| 5E | 15 | Spare Fuse |
| 6E | – | Blank |
| 7E | 25 | Spare Fuse |
| 1F | 5 | Spare Circuit-Lights |
| 2F | 5 | Panel Lights Dimmer Module |
| 3F | 7.5 | Front Parking/Running Lights |
| 4F | 7.5 | Rear Parking/Running Lights |
| 5F | 15 | Trailer Lights |
| 6F | 5 | Underhood and Trouble Lights |
| 7F | 5 | Light Circuit to Chime and HVAC |
| 1G | 5 | CTIS/Key Buzzer |
| 2G | 5 | Power Windows |
| 3G | 7.5 | Spare Circuit/Ignition Acc |
| 4G | 7.5 | Radio |
| 5G | – | Blank |
| 6G | – | Blank |
| 7G | 25 | Windshield Wiper/Washer |
| 1H | 5 | ALDL Power |
| 2H | 10 | Radio Memory |
| 3H | 20 | Power Door Locks |
| 4H | 7.5 | Spare Circuit-Battery |
| 5H | 15 | Dome/Courtesy Lights |
| 6H | 15 | Fog Lamp |
| 7H | – | Trailer Brake Controller |
| 1A | 5 | Spare Fuse |
| 2A | 7.5 | Spare Fuse |
| 3A | – | Blank |
| 4A | 10 | Spare Fuse |
| 5A | 15 | Spare Fuse |
| 6A | – | Blank |
| 7A | 20 | Spare Fuse |

| FUSE | AMPERAGE | CIRCUIT PROTECTED |
|---|---|---|
| 1B | 5 | Glow Plug Controller |
| 2B | – | Blank |
| 3B | 7.5 | Glow Plug Controller/Gas Engine Injectors |
| 4B | 5 | Gauges |
| 5B | 10 | Transmission/Ignition |
| 6B | 10 | TCM/Ignition |
| 7B | 20 | Engine Ignition Feed |
| 1C | 5 | Transmission Shift Lock |
| 2C | 10 | A/C Clutch/Rear Defrost |
| 3C | 7.5 | Backup Lights |
| 4C | 10 | Turn Signals |
| 5C | 5 | Digital Ratio Adapter/ Speedometer |
| 6C | 20 | Rear A/C |
| 7C | 10 | Cruise Control |
| 1D | – | Blank |
| 2D | 10 | TCM/PCM Battery |
| 3D | 10 | Lighter |
| 4D | 10 | Stoplights |
| 5D | 15 | Hazard |
| 6D | 20 | Horn Relay |
| 7D | 30 | Additional Equipment |

## BATTERIES AND CHARGING SYSTEM — Alternator Troubleshooting



## BATTERIES AND CHARGING SYSTEM — Alternator Bench Test



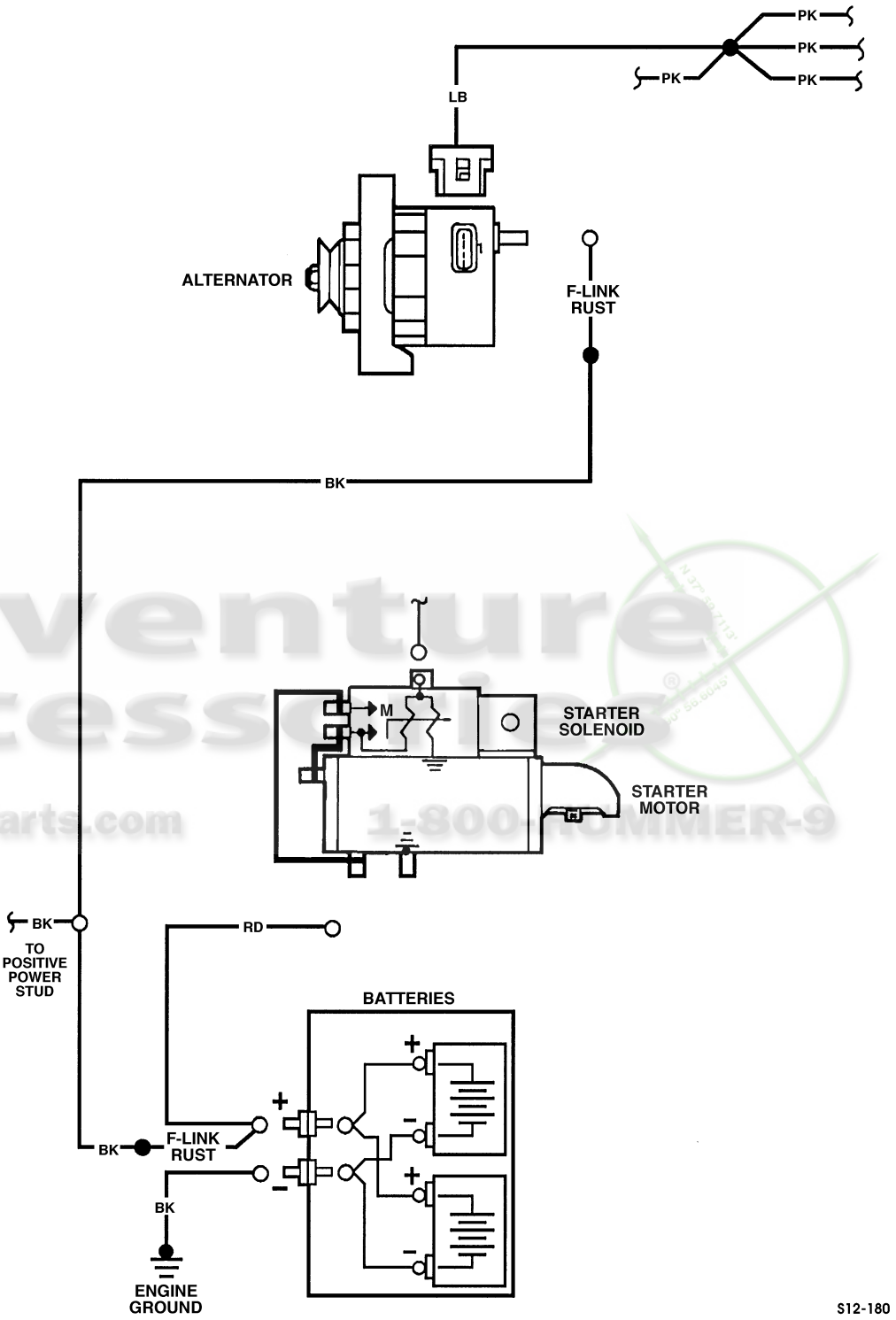
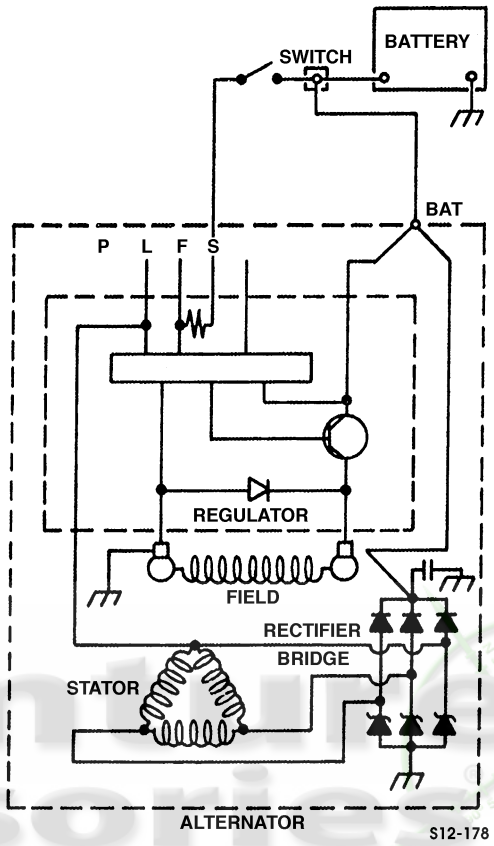





*Figure 12-18: Batteries, Starter, and Alternator*





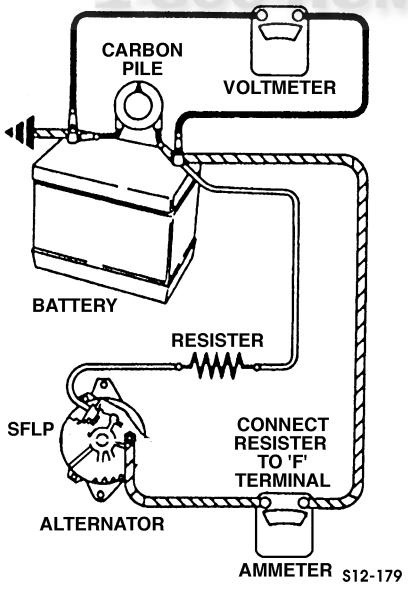
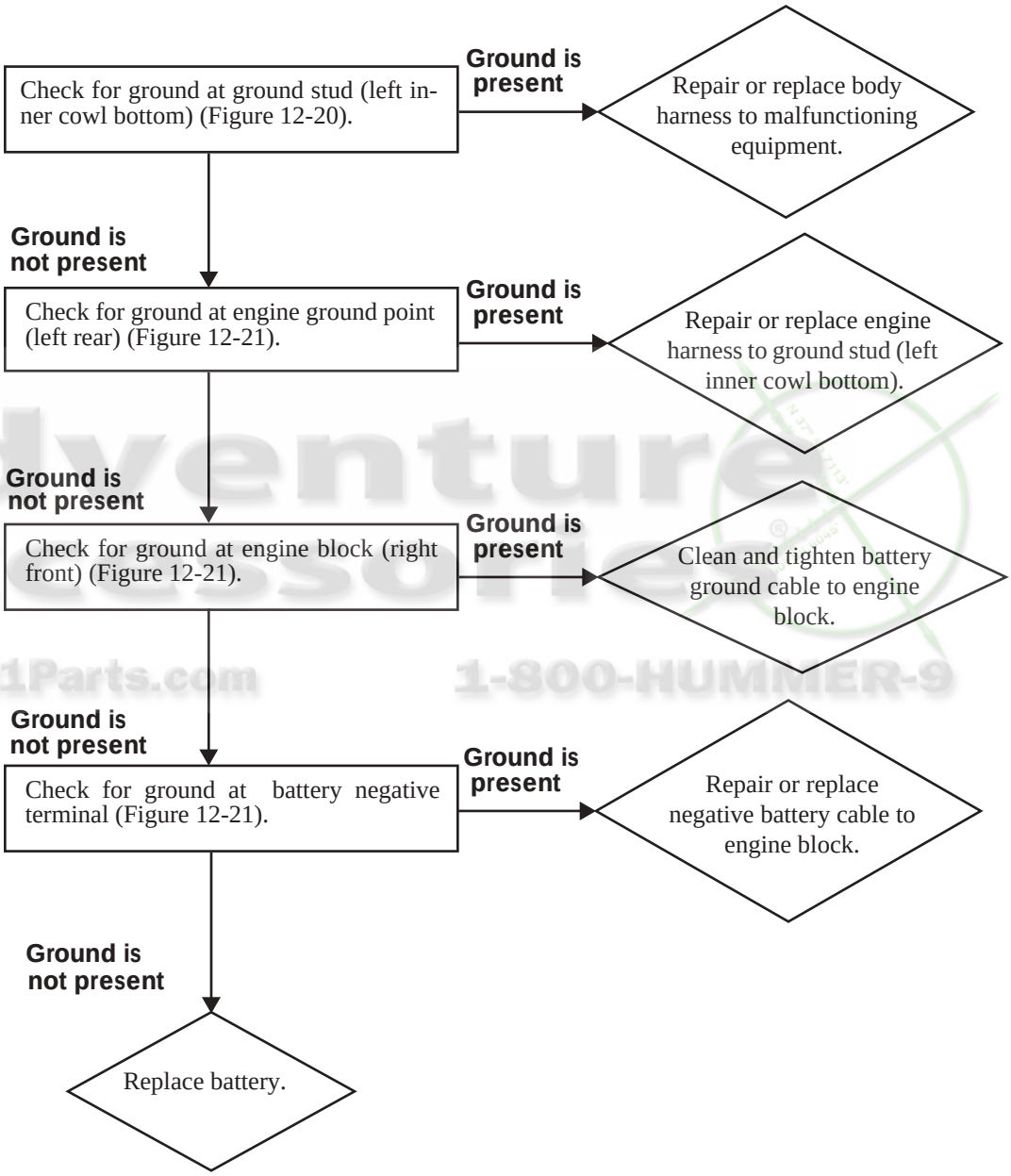
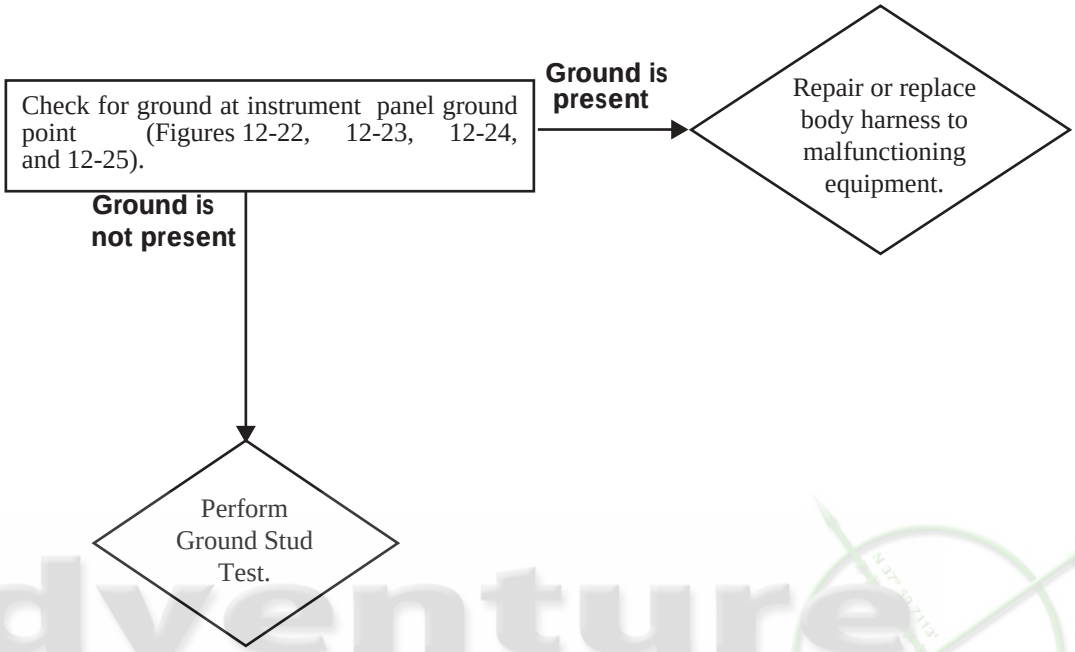




*Figure 12-19: Alternator Test*

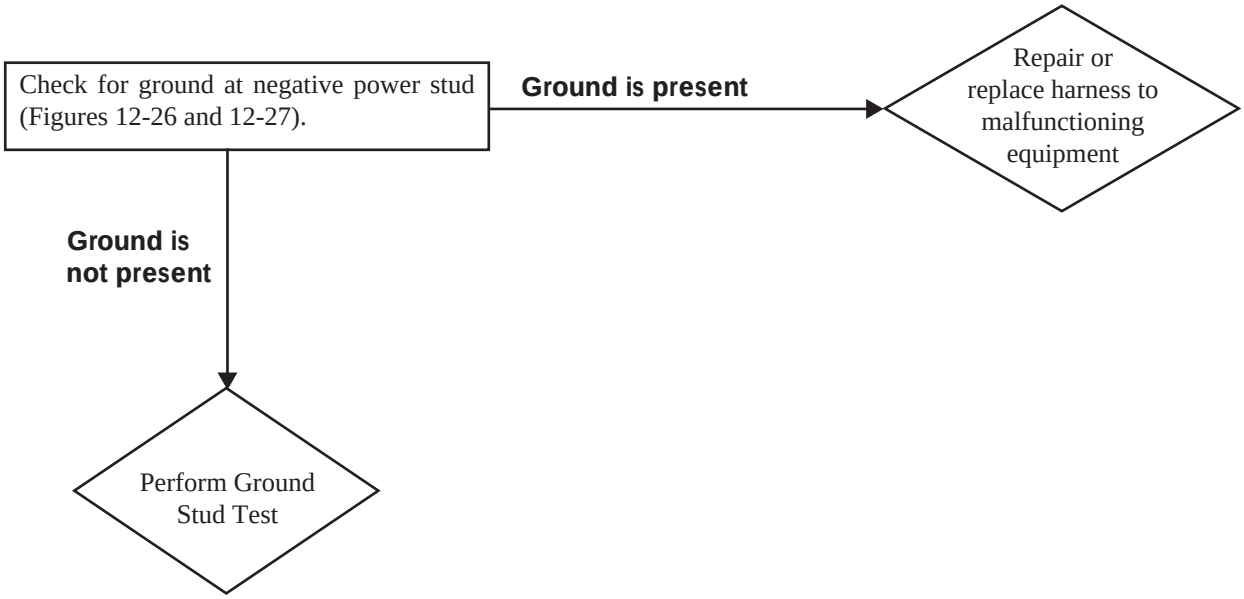
## GROUND STUD TEST



## INSTRUMENT PANEL GROUND POINT TEST





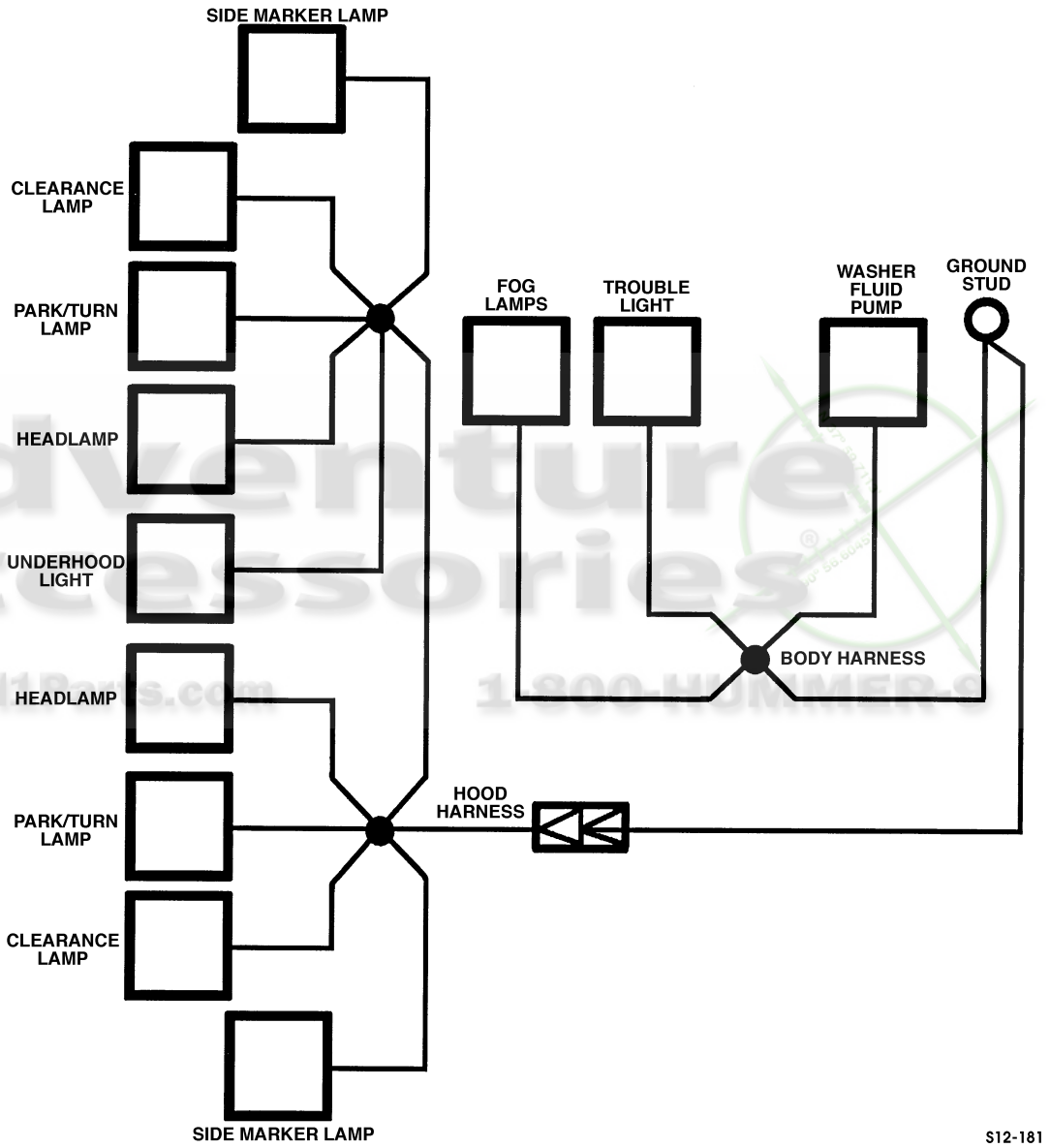





*Figure 12-20: Front Grounds*

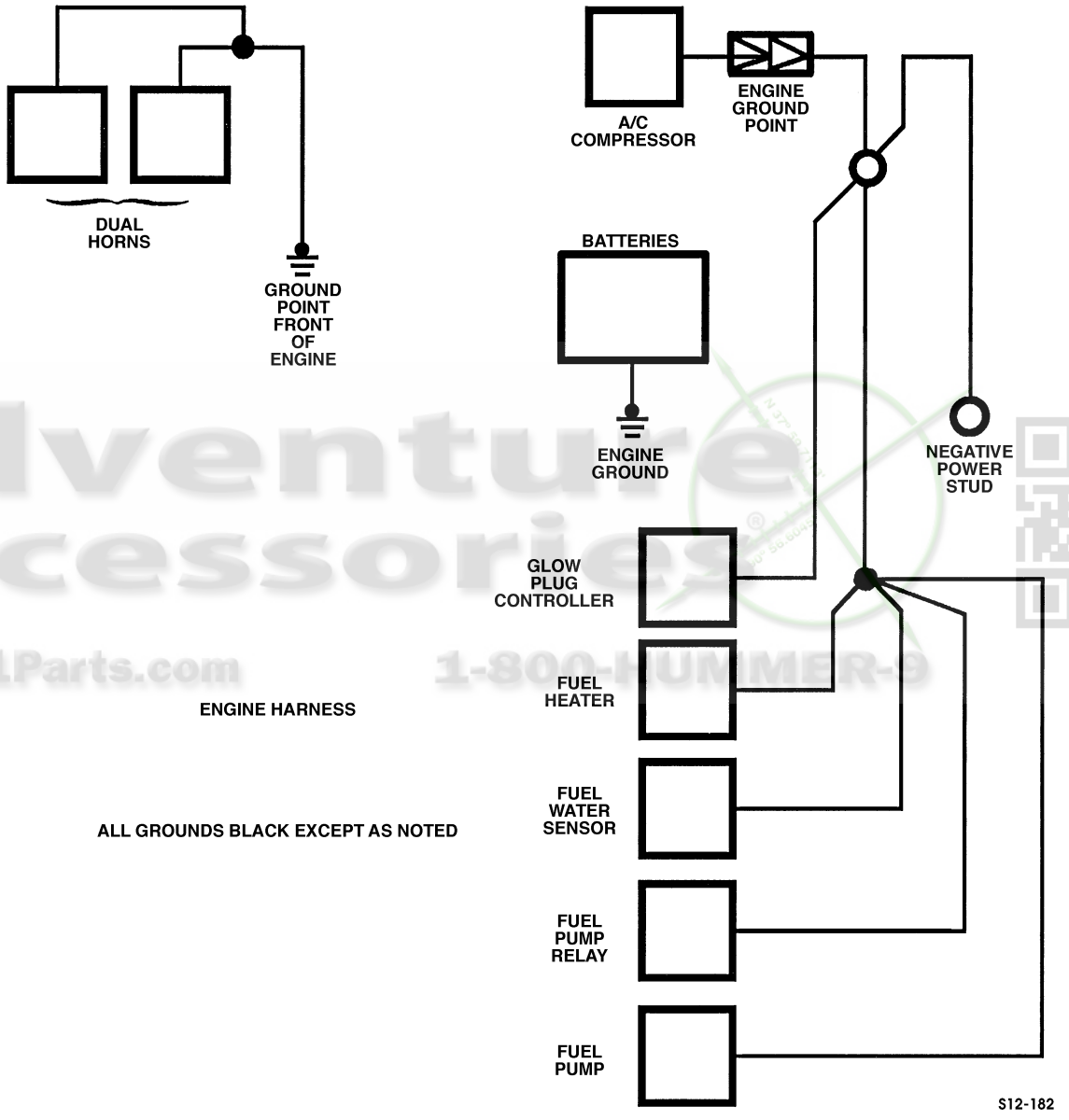





*Figure 12-21: Engine Grounds*

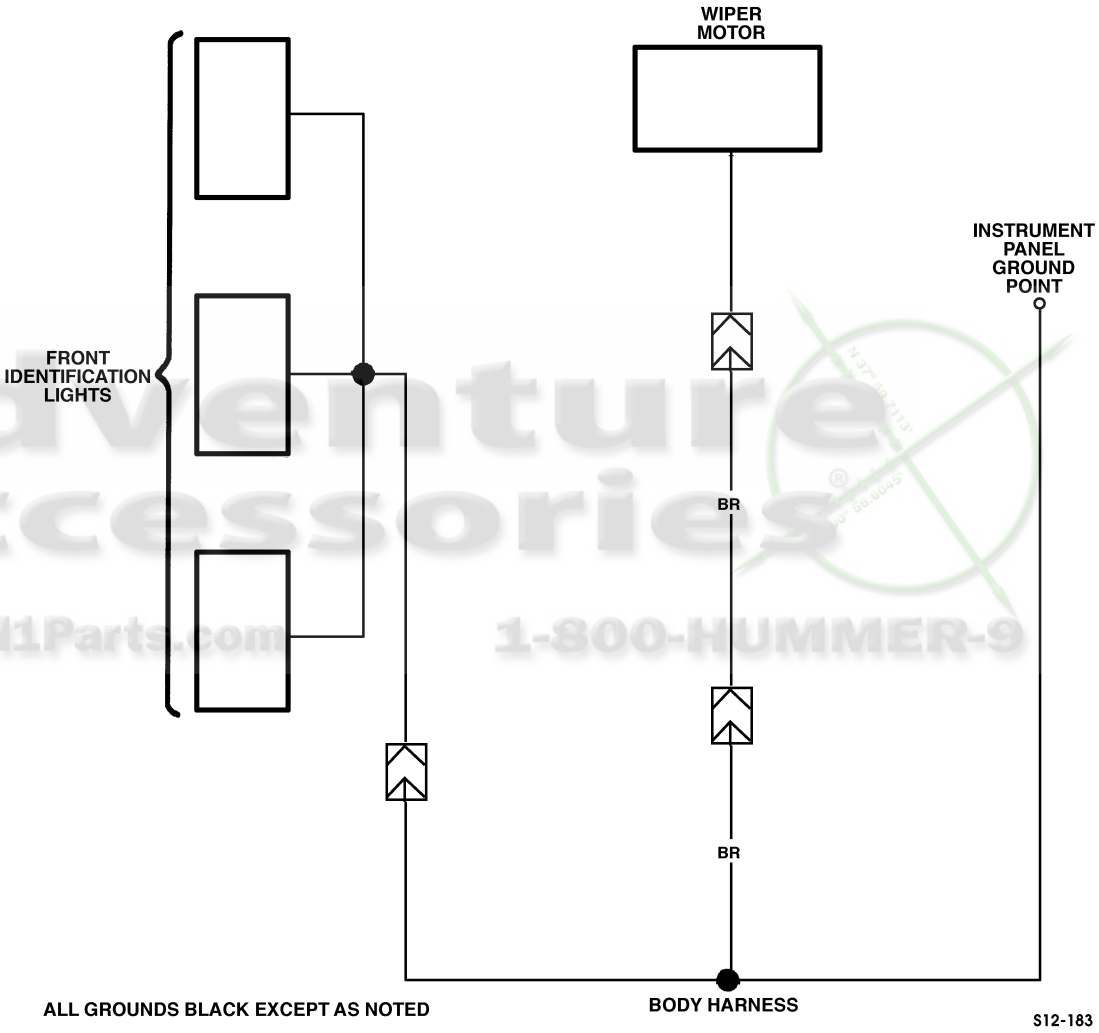





*Figure 12-22: Body Front Grounds*

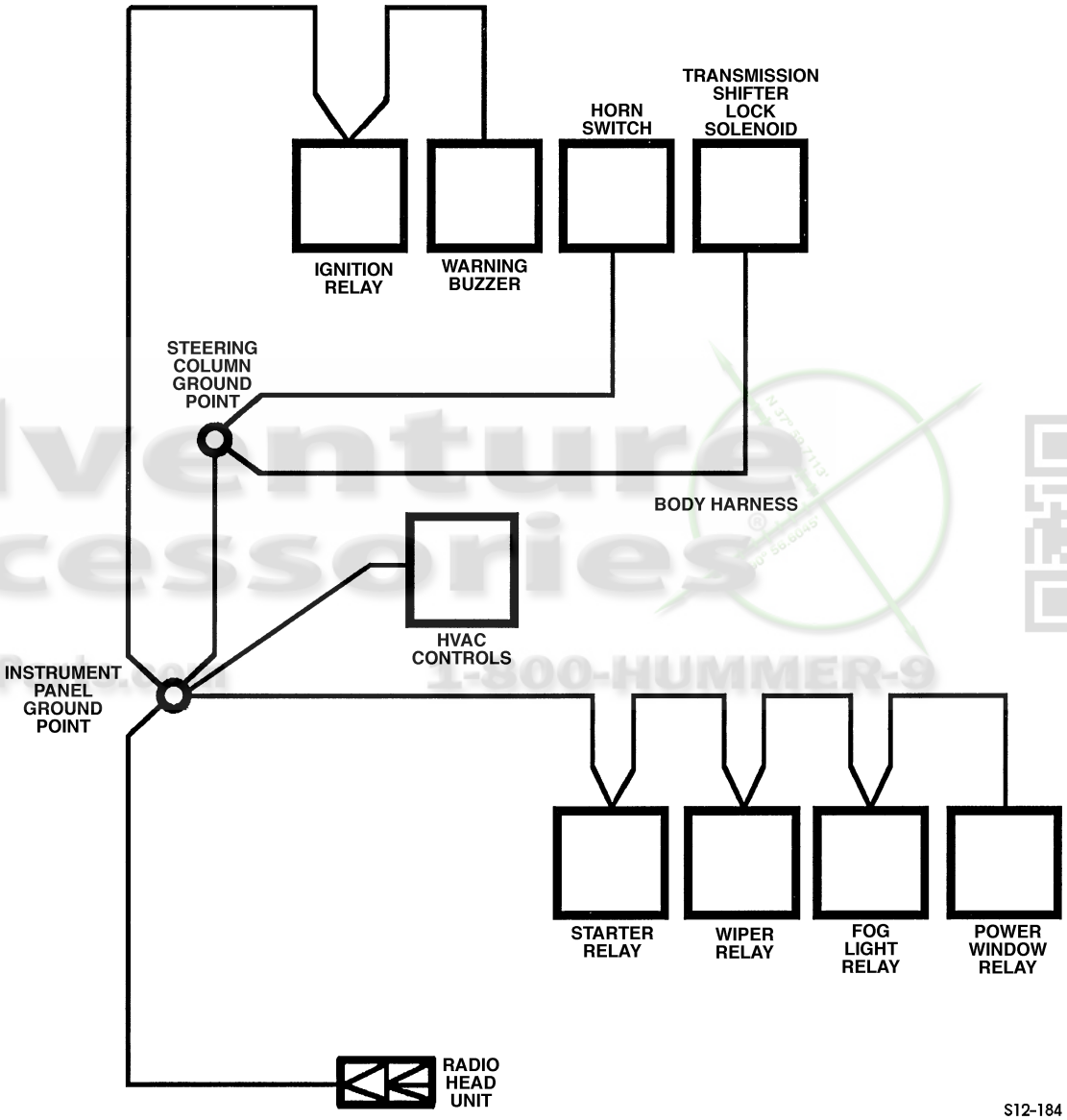





*Figure 12-23: Power Distribution Center Grounds*

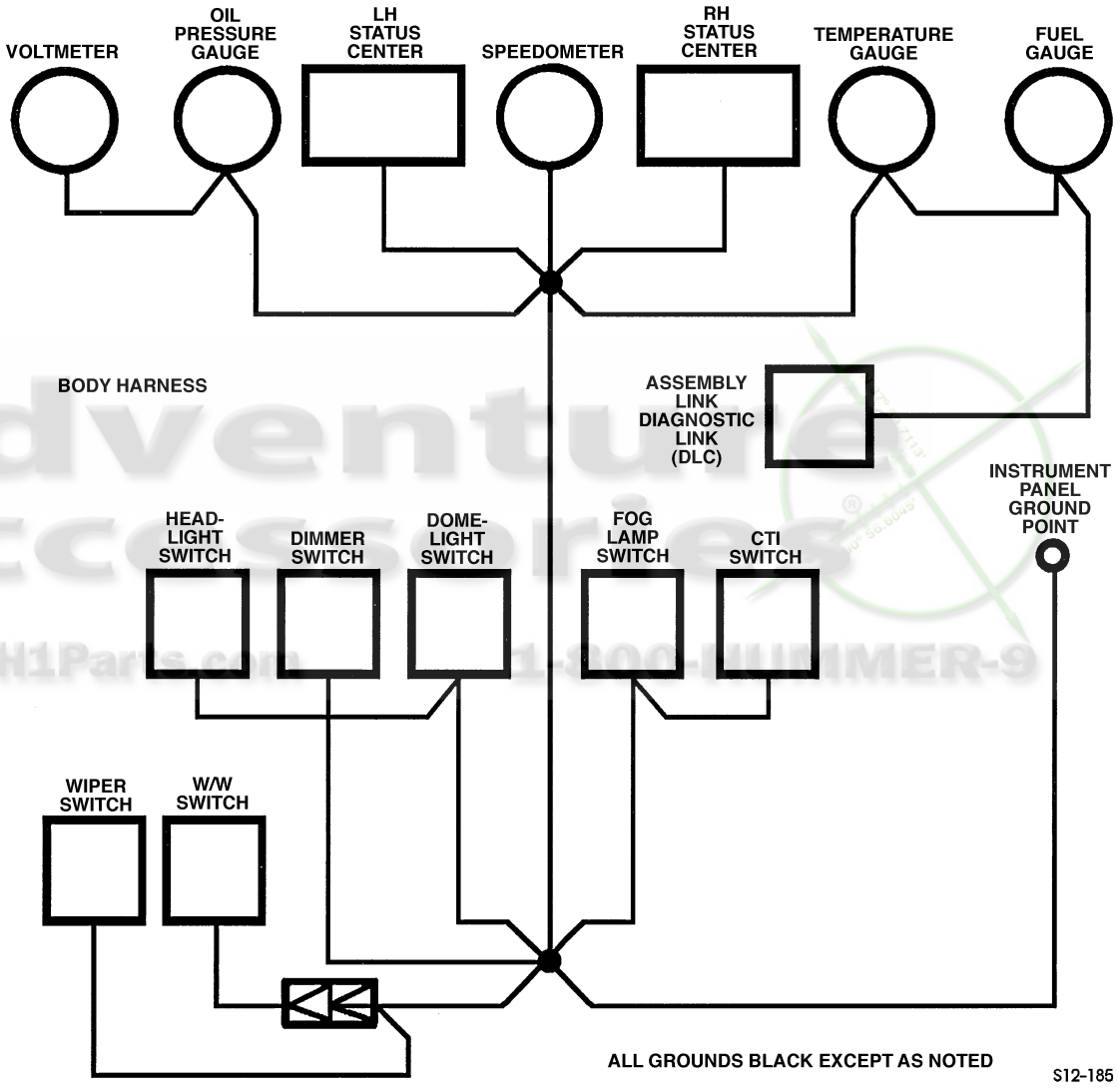





*Figure 12-24: Instrument Panel Gauge Grounds*

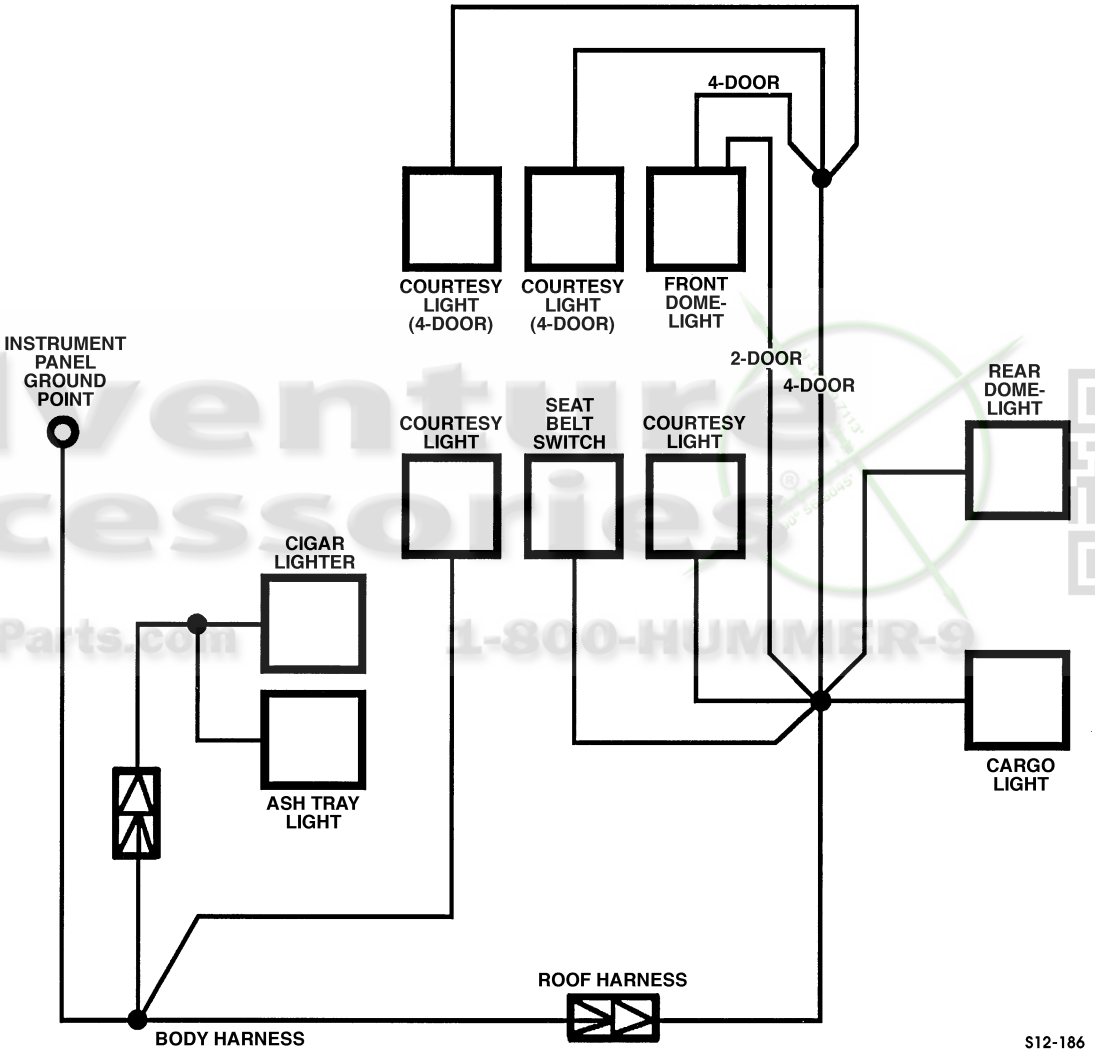





*Figure 12-25: Mid-Body Grounds*

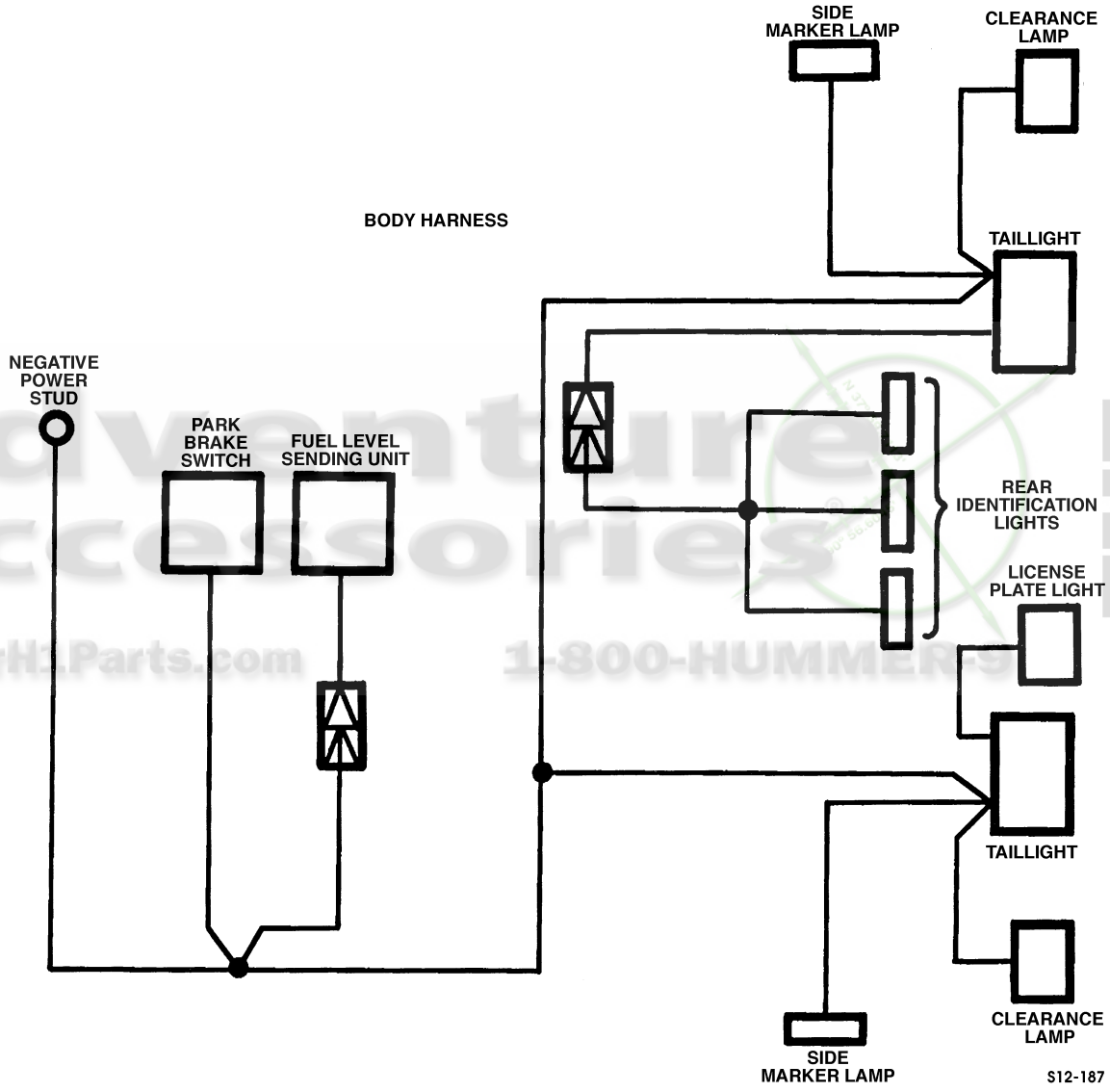





*Figure 12-26: Rear Body Grounds*

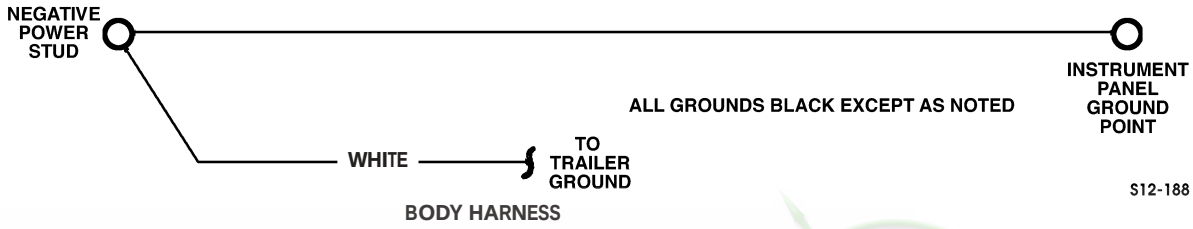


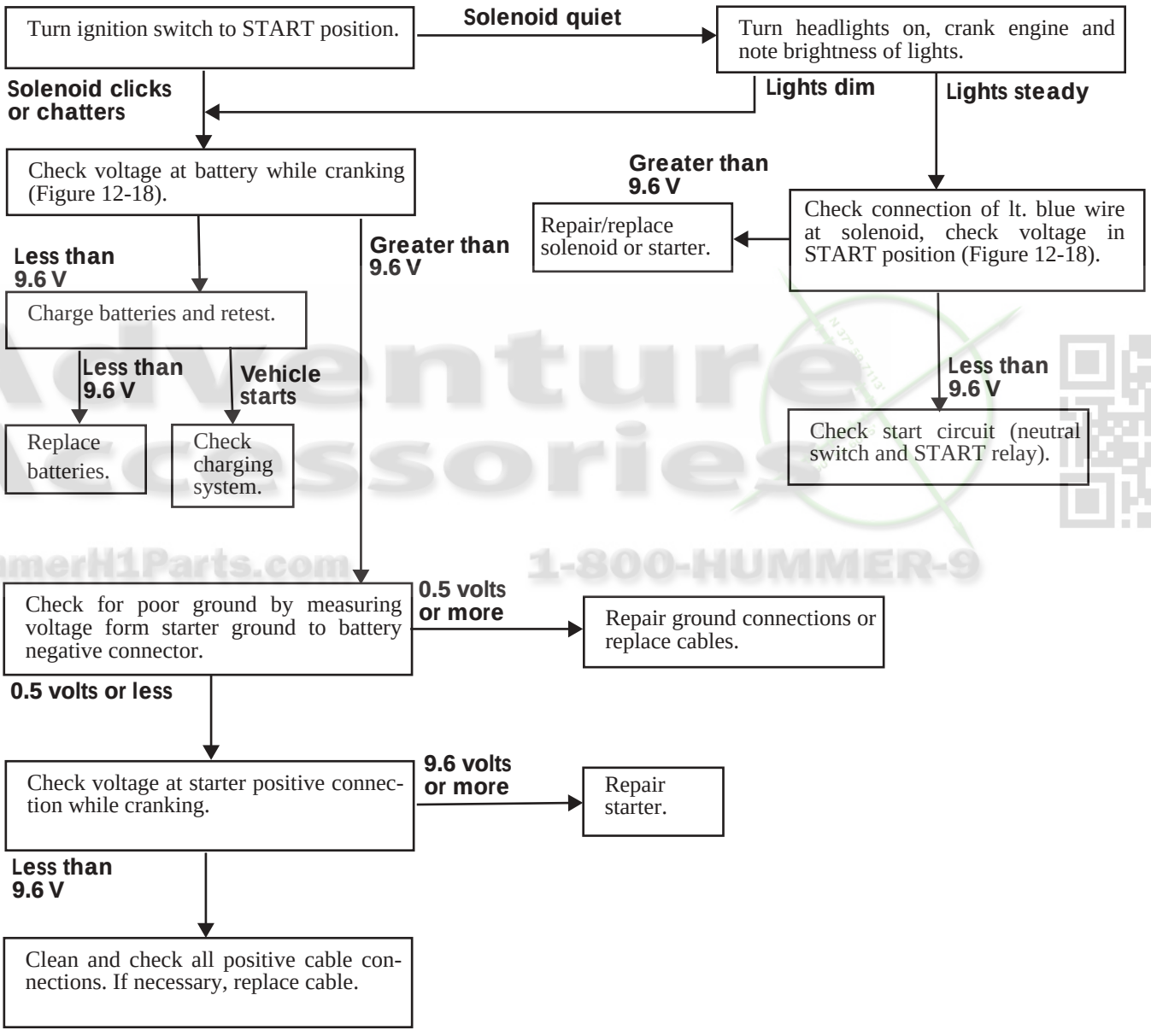



*Figure 12-27: Trailer Grounds*

## STARTER MOTOR INOPERATIVE

The following chart will assist in diagnosing an inoperative or weak starting system.

If no-start condition is corrected, stop and ensure permanent repair is made before releasing vehicle to customer.



## GLOW PLUG SYSTEM DESCRIPTION

The glow plug controller circuit operates the relay with cycling action that varies in length, based on the underhood air temperature and engine temperature sensed at its mounting bracket.

At room temperature, the glow plug system operates as follows:

4. When the ignition switch is positioned to RUN, the following things occur (Figure 12-28):
   a. The controller circuit completes the relay coil circuit, causing glow plug and indicator lamp operation for 4 to 6 seconds.
   b. Based on the temperature and feedback inputs, the controller circuit opens the relay coil circuit for 4 to 5 seconds.

**NOTE:** At this time, the ignition switch would normally be positioned to the crank position to start the engine.

5. If the ignition switch remains in the RUN position, the following things occur:
   a. The controller circuit completes the relay coil circuit again, causing glow plug and indicator lamp operation for 1 to 2 seconds.
   b. Based on the temperature and feedback inputs, the controller circuit opens the relay coil circuit for 4 to 5 seconds.
   c. The on/off cycling action will continue until a total cycling time of approximately 20 seconds has elapsed.
6. If the ignition switch is positioned to crank during or after the previous cycling sequence, the following things occur (Figure 12-29):
   a. The controller circuit completes the relay coil circuit again, causing glow plug and indicator lamp operation for 1 to 2 seconds.
   b. Based on the temperature and feedback inputs, the controller circuit opens the relay coil circuit for 4 to 5 seconds.
   c. The on/off cycling action will continue until the total cycling time after the ignition switch has returned to the RUN position is approximately 20 seconds.

**NOTE:** The maximum length of glow plug cycling does not depend on whether or not the engine runs after cranking.

Glow plug system cycling times are approximate, because temperature and feedback voltage inputs vary. As a rule, colder ambient starting temperatures result in longer initial ON times and total duration of cycling.

A controller/relay that applies power to the glow plugs for longer than five seconds may cause damage to the glow plugs. If all eight glow plugs are replaced because of open circuit faults, the controller/relay should also be replaced.

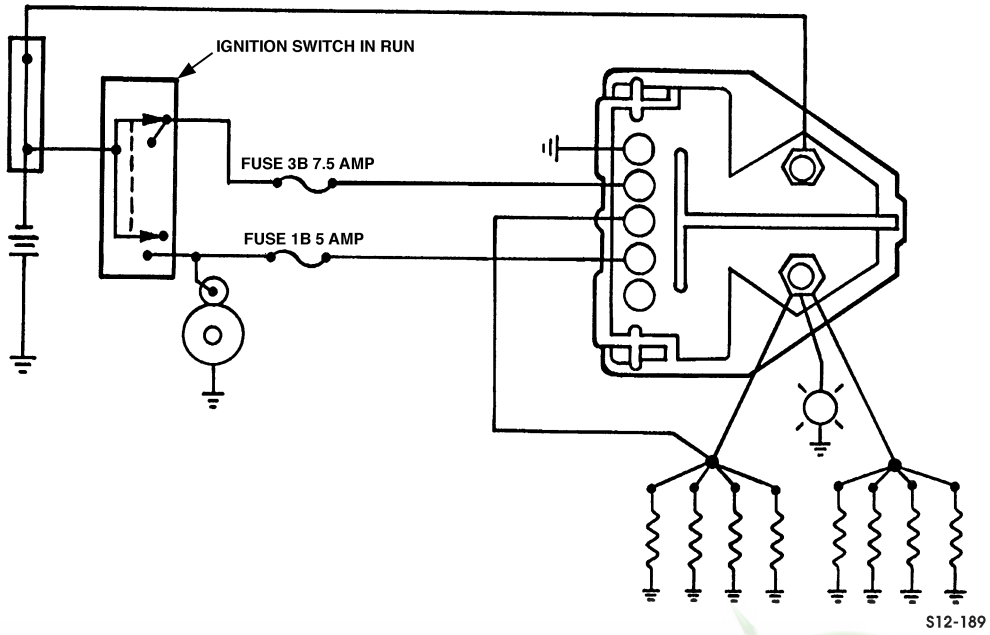



*Figure 12-28: Glow Plug System Cycling – Before Cranking*



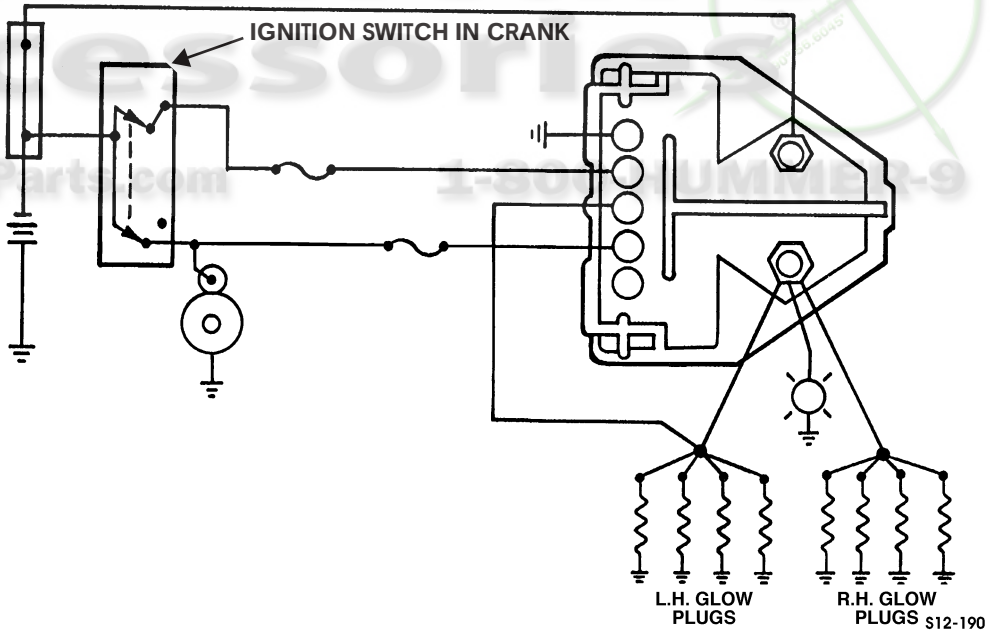
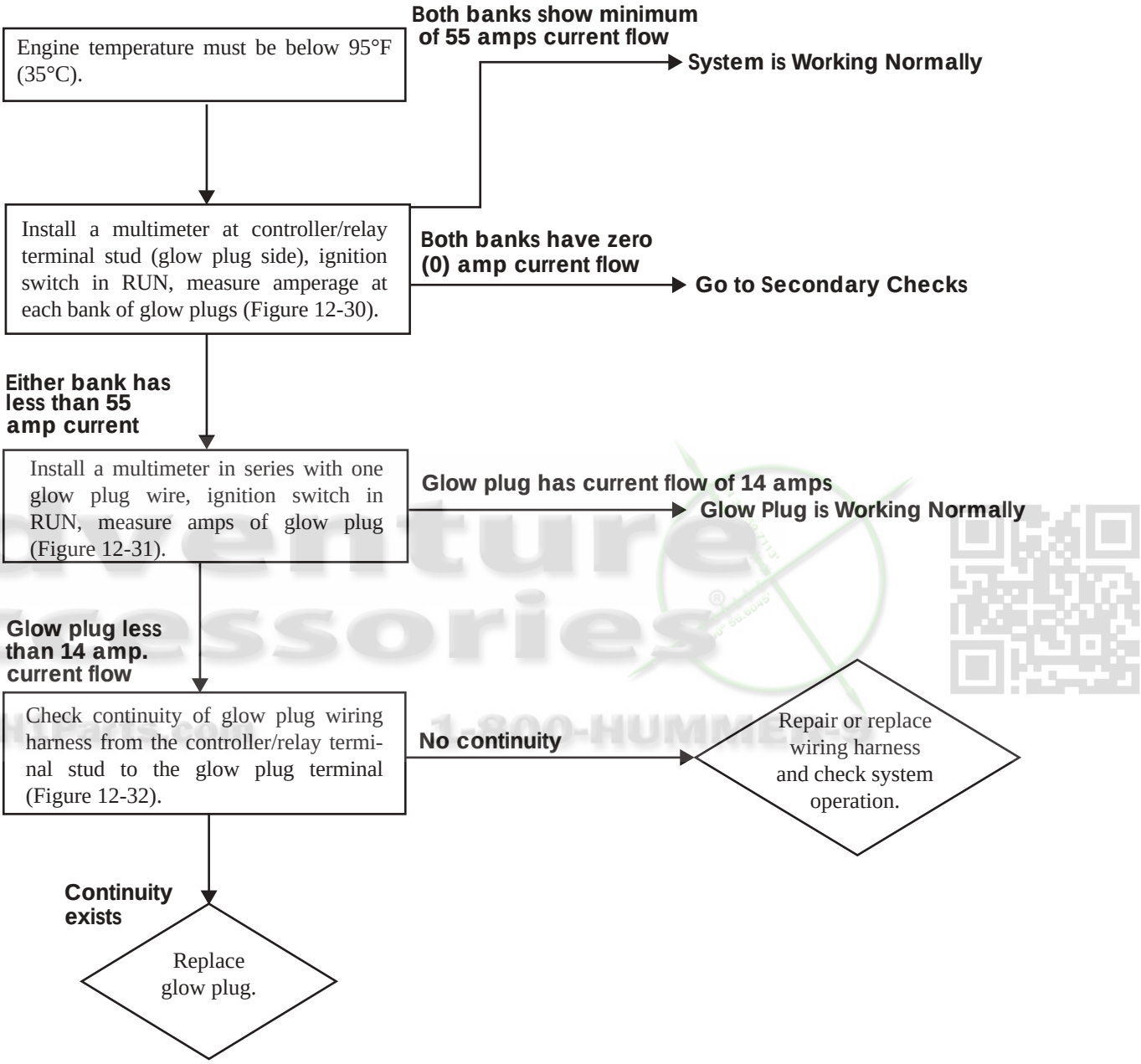



*Figure 12-29: Glow Plug System Cycling – After Cranking*

## GLOW PLUG SYSTEM PRIMARY CHECKS




**Use an AC-type 9G glow plug. Repeat checks for all glow plugs.**

**When all plugs have 14 amps of current flow, end the diagnosis.**

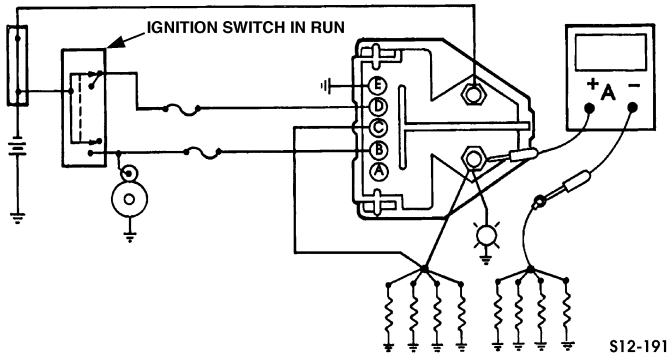



*Figure 12-30: Ignition Switch in RUN*

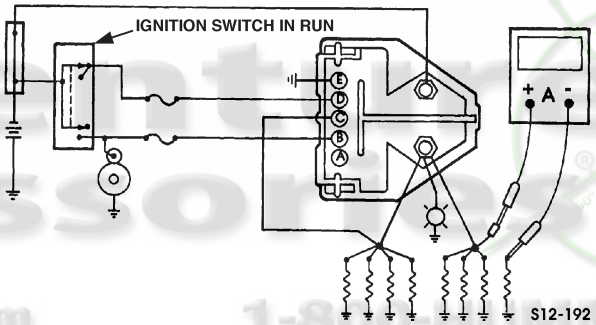





*Figure 12-31: Ignition Switch in RUN*

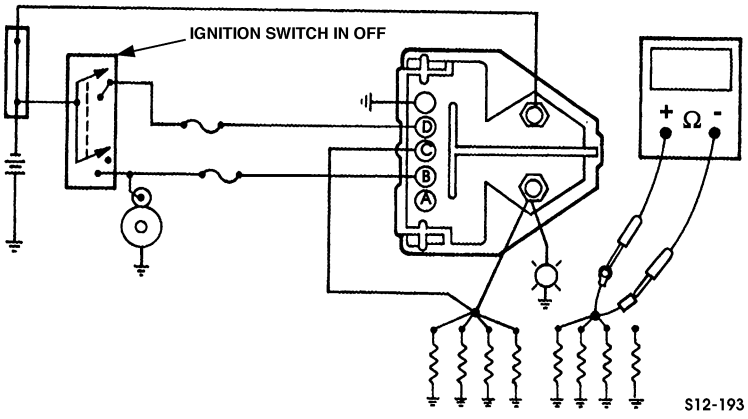



*Figure 12-32: Ignition Switch in OFF*

## GLOW PLUG SYSTEM SECONDARY CHECKS

Prepare for test. Check the following items:

Fuel system must check OK.

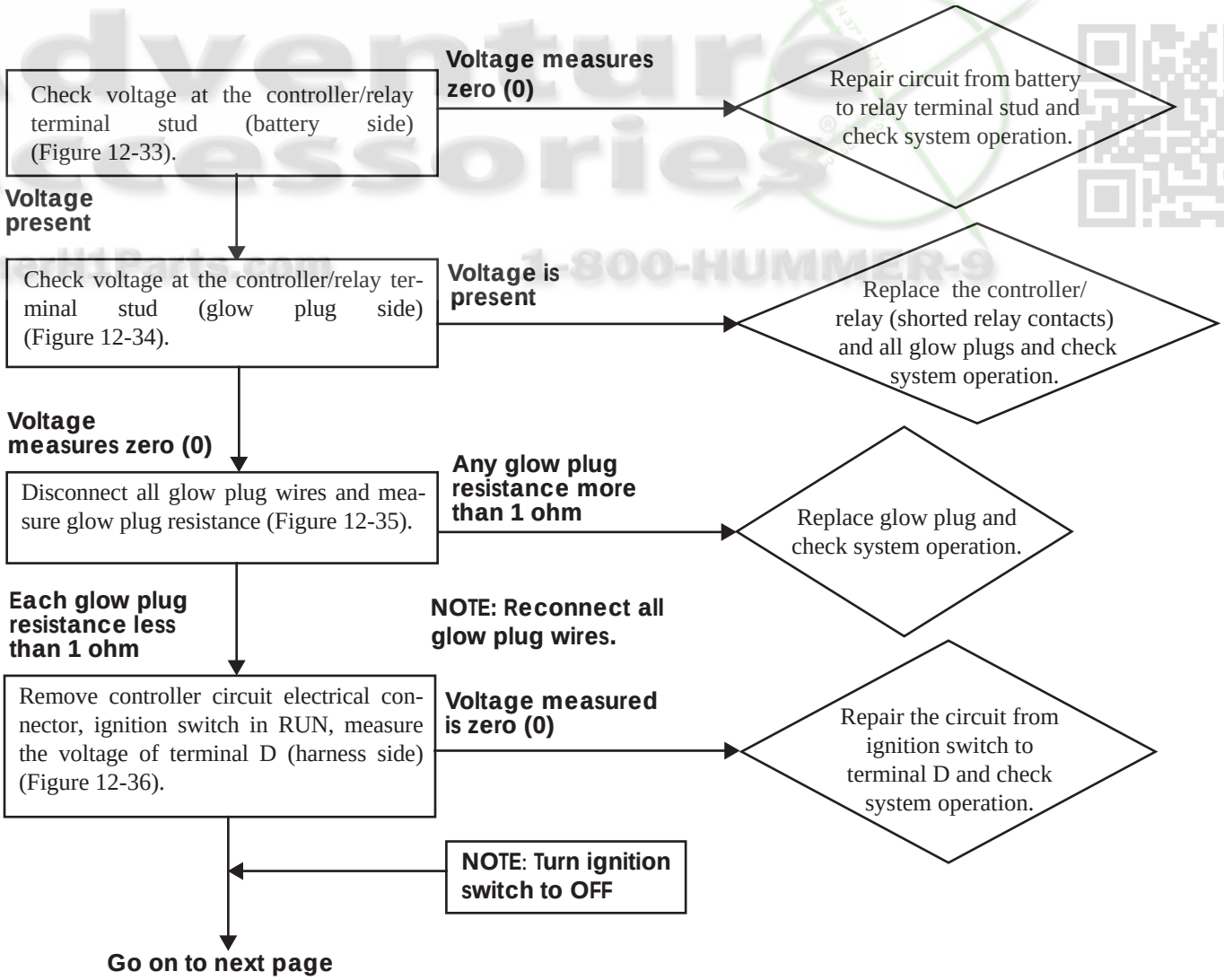
Cranking/charging system (battery must have 12.3 volts minimum).

Cranking speed must be at 100 rpm minimum.

While performing the Glow Plug System Check it may be necessary to refer to the following chart:

| Terminal | Circuit | Electrical Check |
|---|---|---|
| A | None | |
| B | Crank Input | Battery voltage while cranking |
| C | Feedback Input | Continuity (less than 1 ohm) |
| D | Power Supply | Battery voltage in RUN |
| E | Power Ground | Continuity (less than 1 ohm) |





## GLOW PLUG SYSTEM SECONDARY CHECKS – CONTINUED

**Reconnect the controller circuit electrical connector.**

**Battery voltage measured**

With controller circuit electrical connector removed, measure the resistance between terminal E (harness side) and the cylinder case (Figure 12-37).

**Resistance measures more than 1 ohm** → Repair the circuit from terminal E and the vehicle ground and check system operation.

**Resistance less than 1 ohm**

Connector still removed, measure resistance between terminals C and E (harness side) (Figure 12-38).

**Resistance measures more than 2 ohms** → Repair circuit from the glow plug wiring harness to terminal C and check system operation.

**Resistance less than 2 ohms**

Ignition switch in RUN, measure voltage at the controller/relay terminal stud (glow plug side) (Figure 12-39).

**Voltage measures zero (0)** → Replace glow plug controller/relay and check system operation.

**Voltage measures battery voltage**

Ignition switch in RUN, measure voltage at any glow plug on each cylinder bank (Figure 12-40).

**Voltage measures zero (0)** → Repair circuit between controller/relay and glow plugs and check system operation.

**Voltage measures battery voltage**

Note glow plugs lamp operation (Figure 12-41).

**Lamp does not cycle on and off when controller/relay cycles** → Repair lamp circuit and check system operation.

**Lamp cycles on and off**

End the diagnosis.

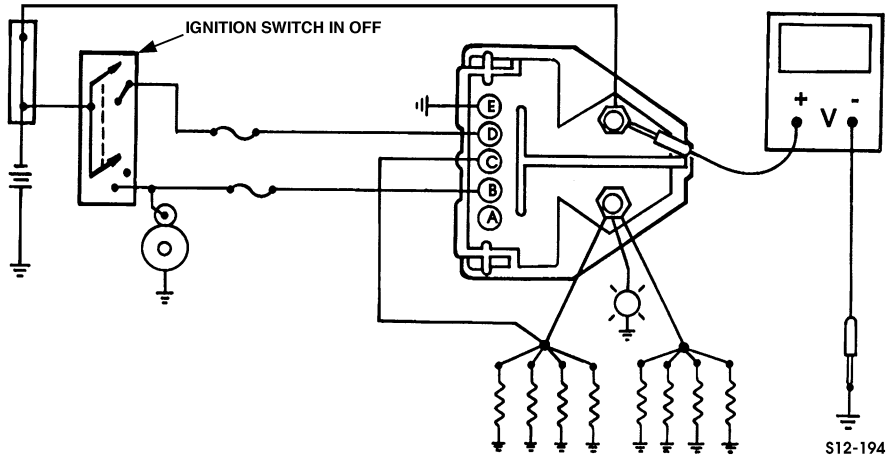



*Figure 12-33: Ignition Switch in OFF*

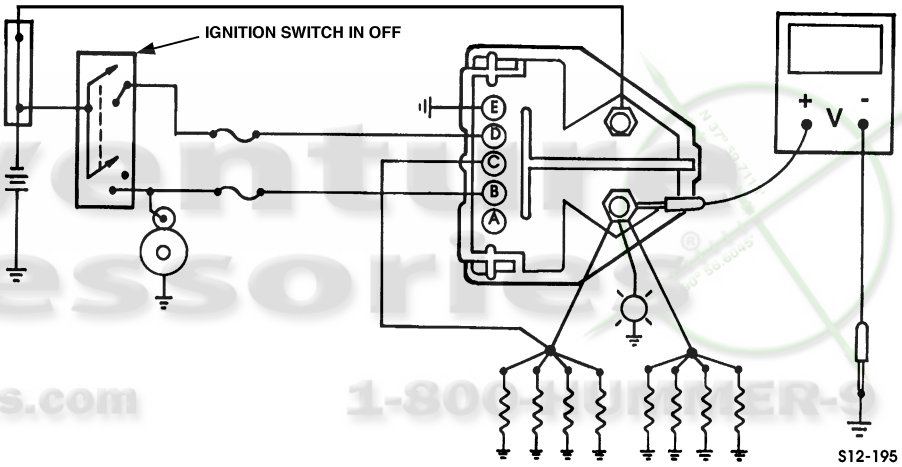



*Figure 12-34: Ignition Switch in OFF*

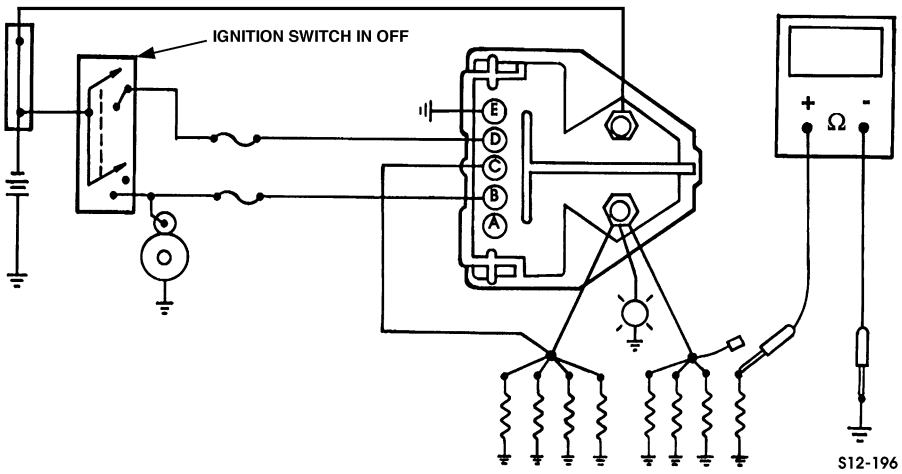



*Figure 12-35: Ignition Switch in OFF*

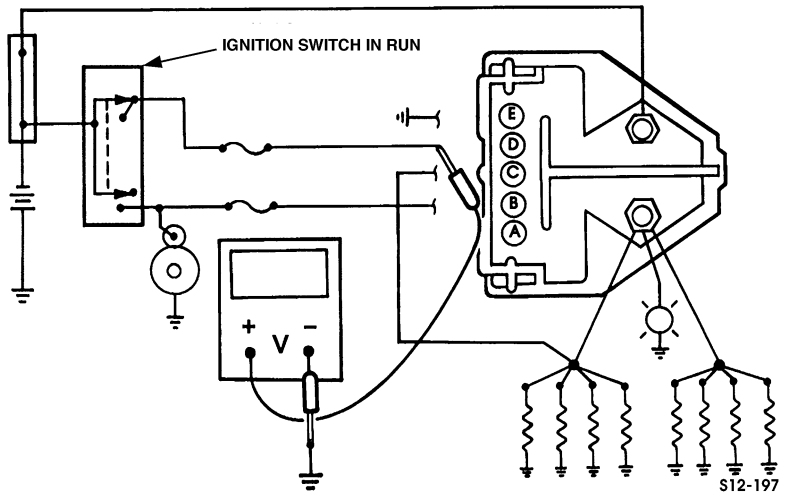



*Figure 12-36: Ignition Switch in RUN*

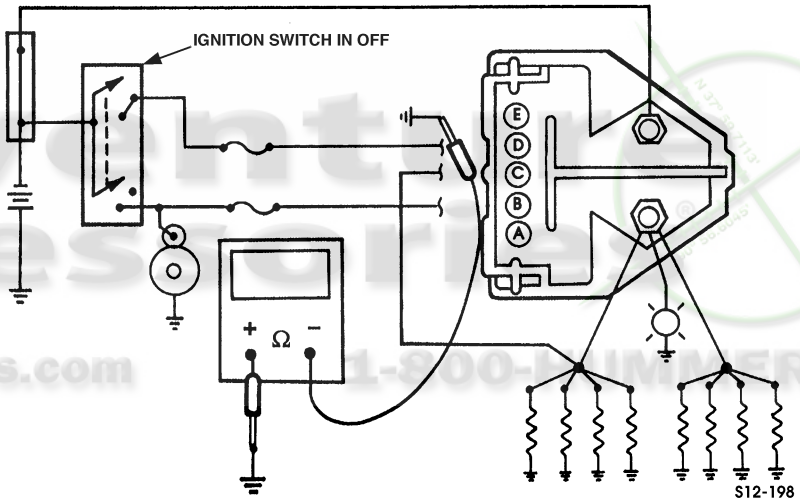



*Figure 12-37: Ignition Switch in OFF*

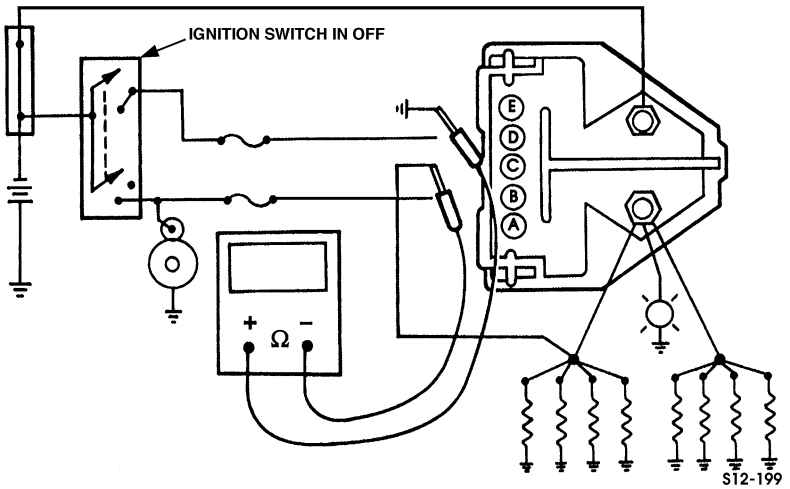



*Figure 12-38: Ignition Switch in OFF*

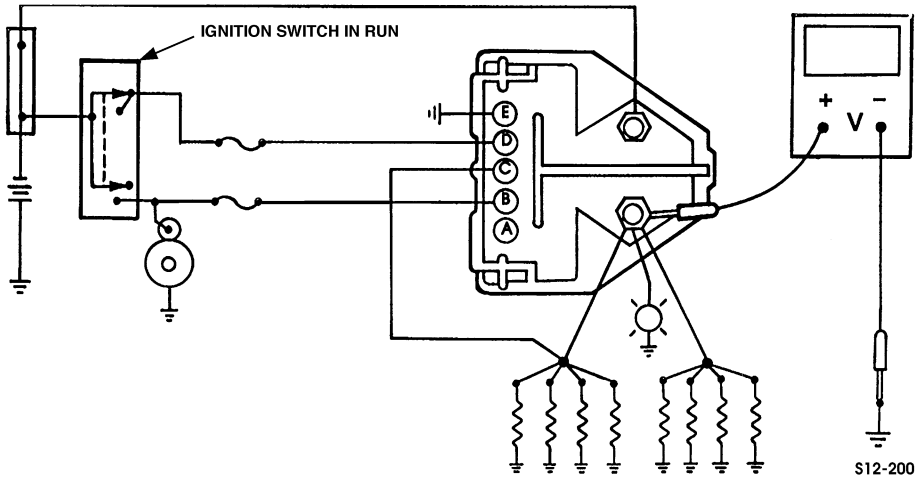



*Figure 12-39: Ignition Switch In RUN*

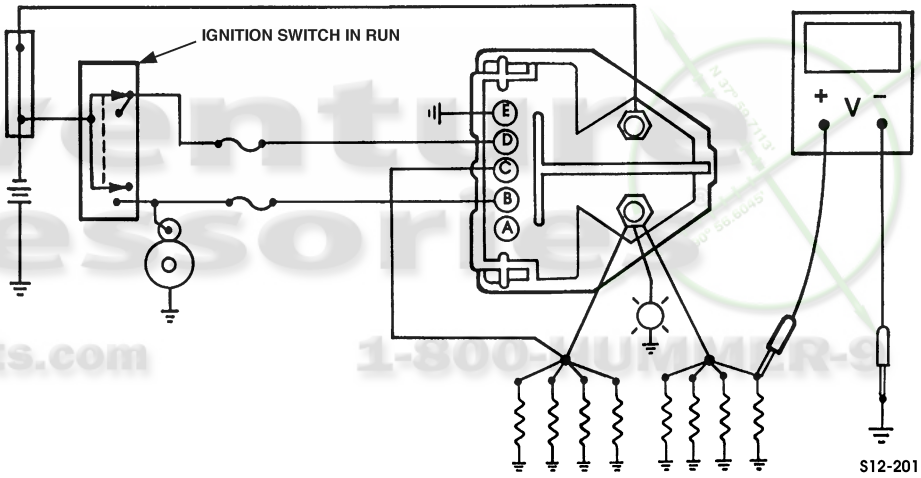



*Figure 12-40: Ignition Switch In RUN*

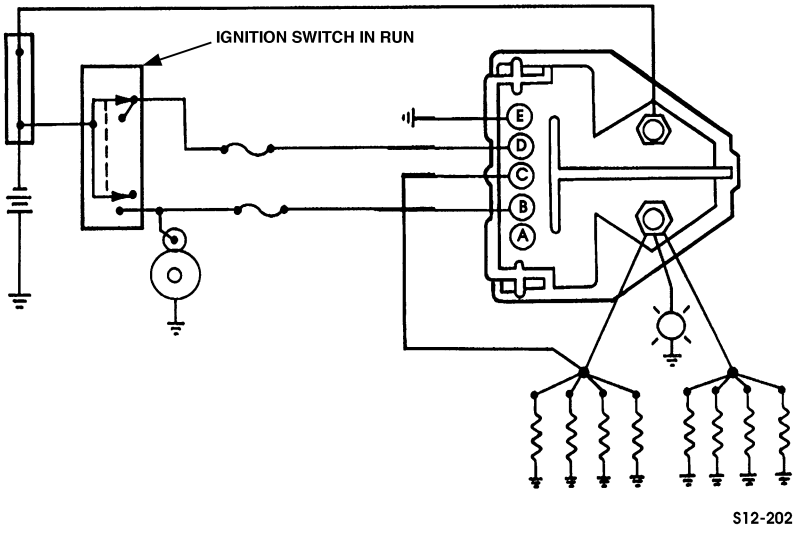


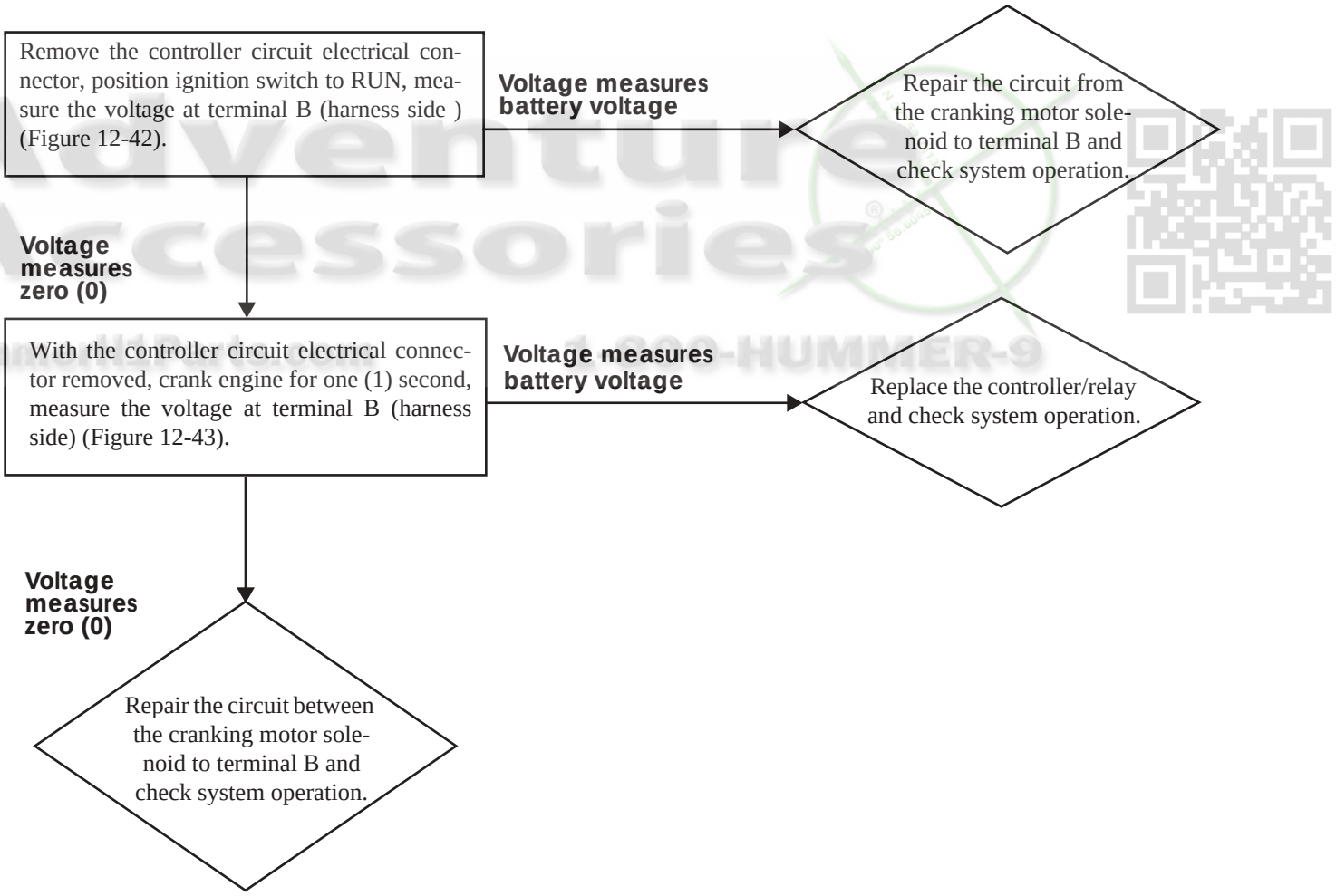

*Figure 12-41: Ignition Switch In RUN*

## GLOW PLUG AFTERSTART CHECK

**NOTE:** Follow this procedure to diagnose the cause of excessive white smoke and/or poor idle quality after start.

- Begin the test with the engine at 80°F (27°C).
- Turn ignition switch to RUN and allow plug system to cycle for 2 minutes.
- Start the engine and observe that the glow plug system continues to cycle at least one after cranking (indicated by fluctuation in voltmeter).

If the glow plug system does not cycle, stop the engine.



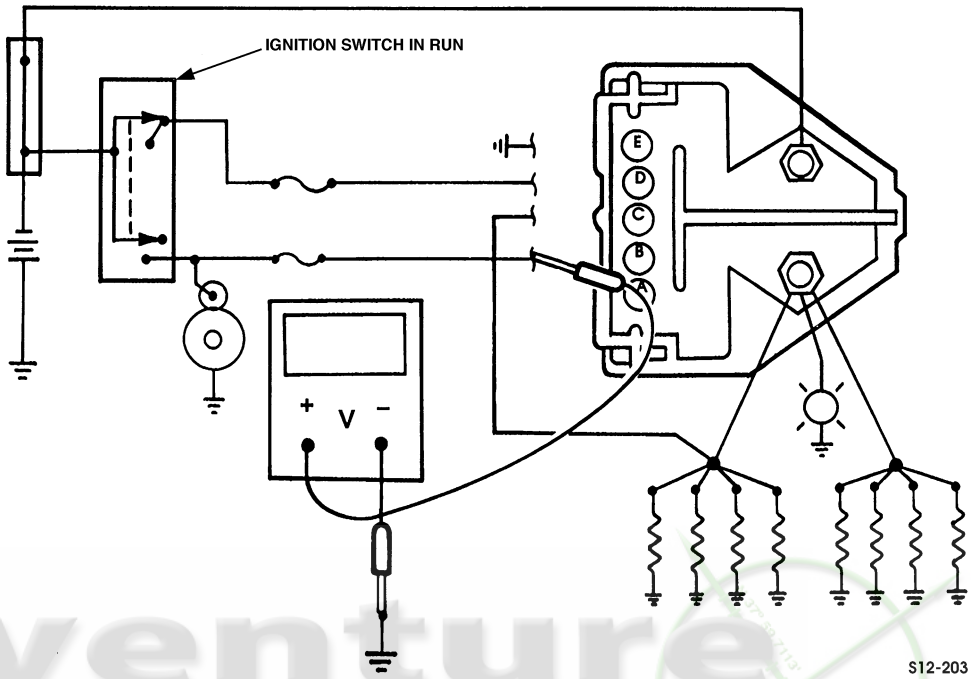



*Figure 12-42: Ignition Switch in RUN*



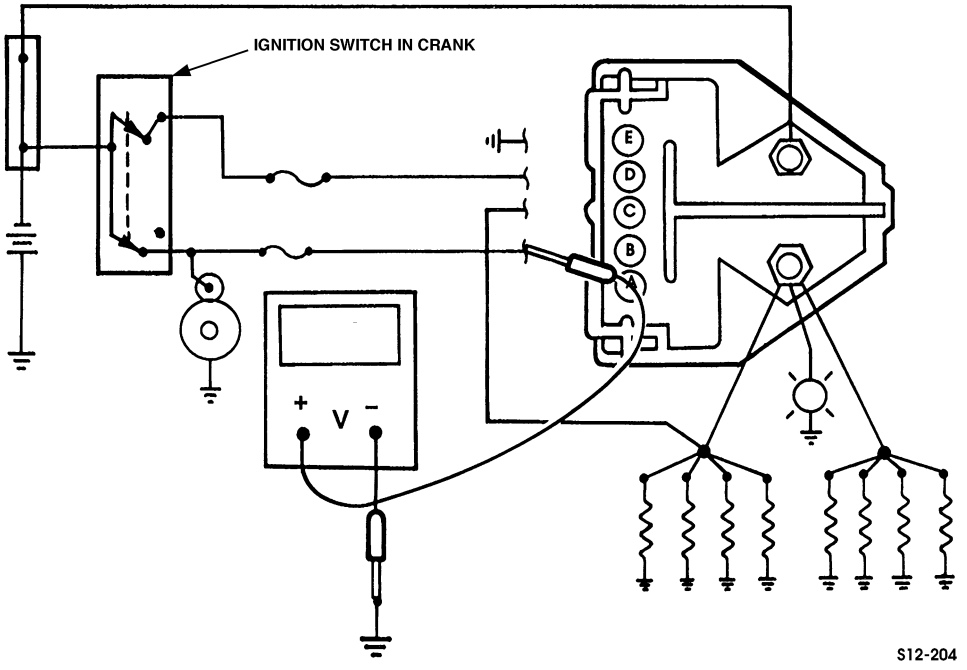



*Figure 12-43: Ignition Switch in CRANK*

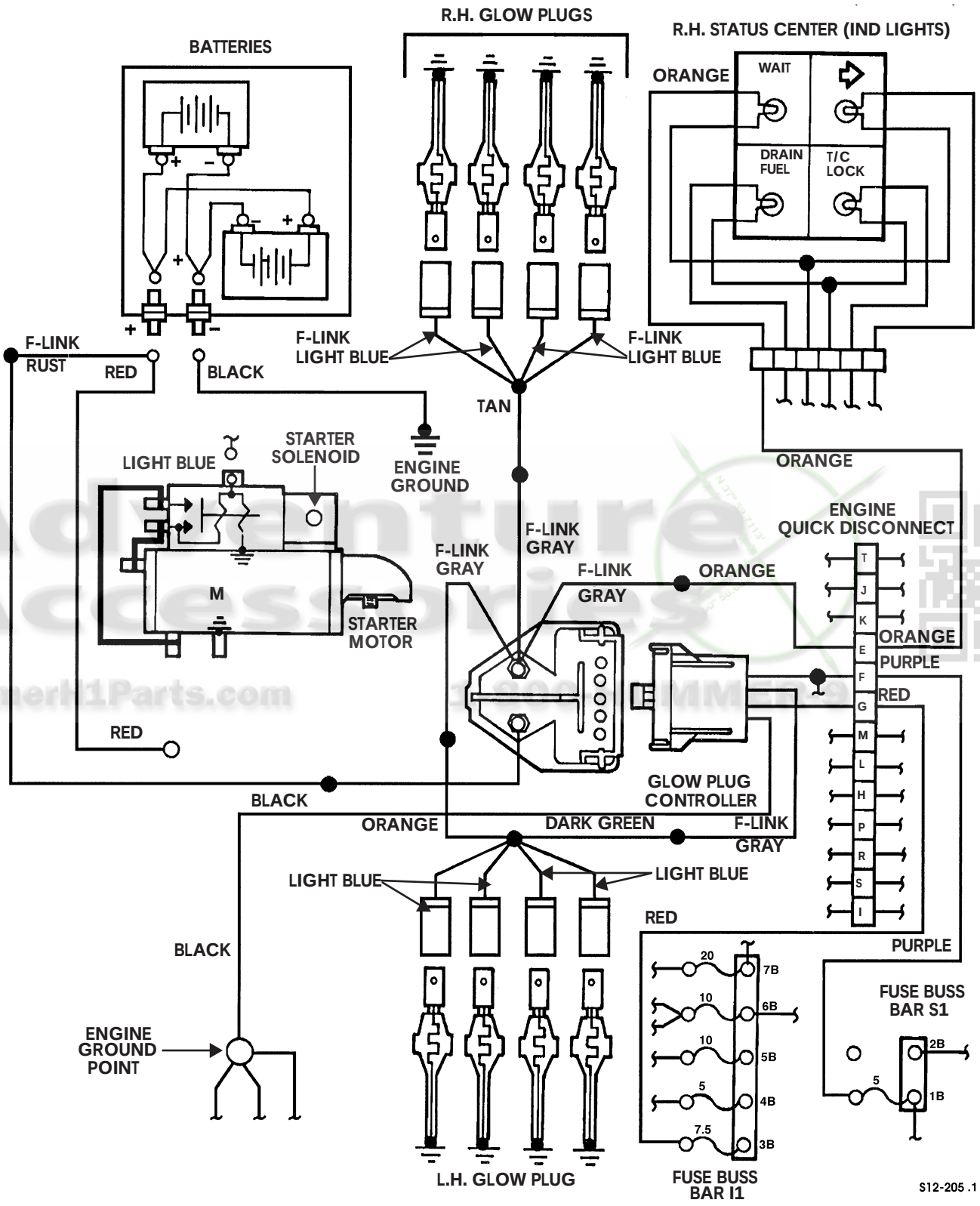
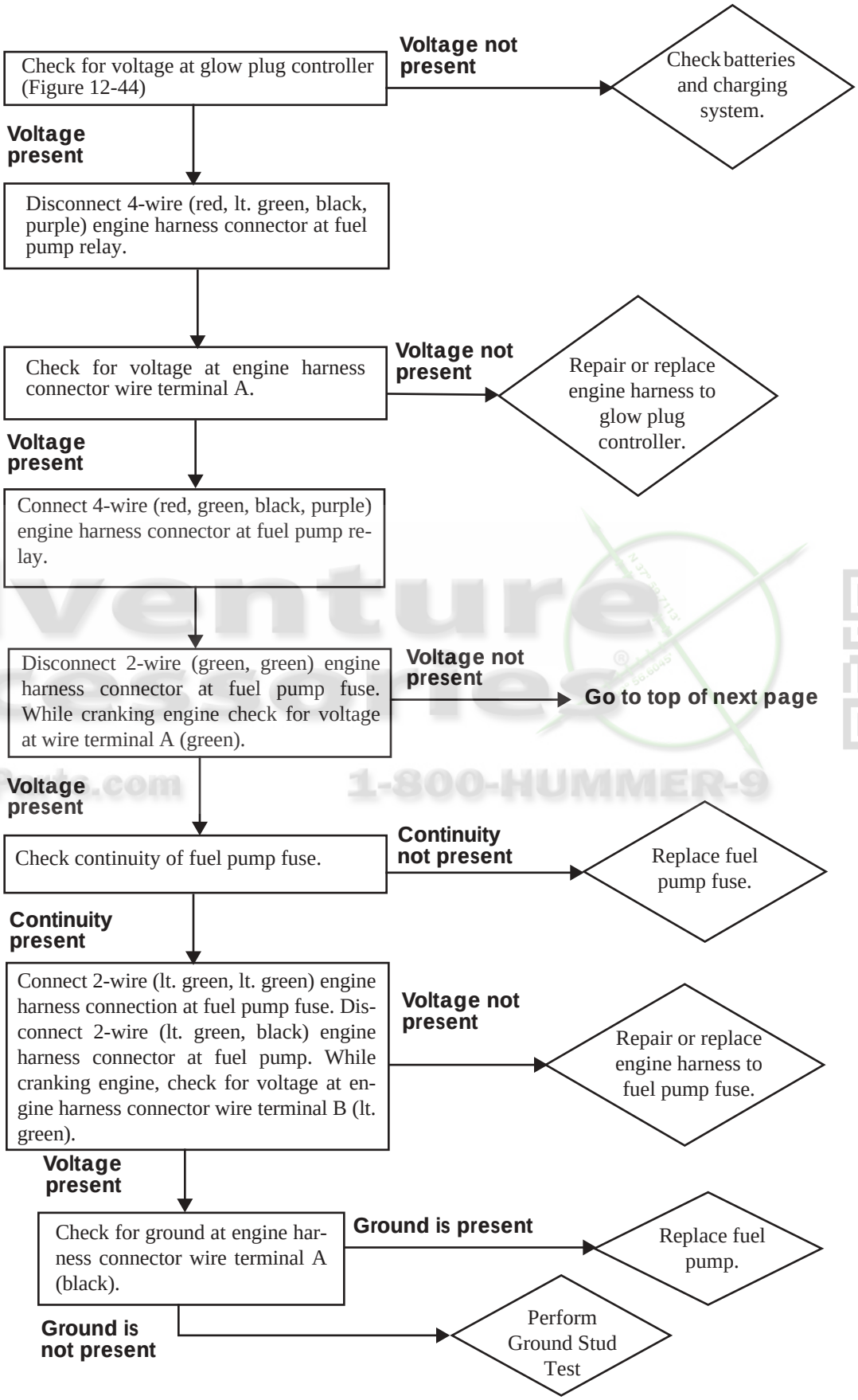
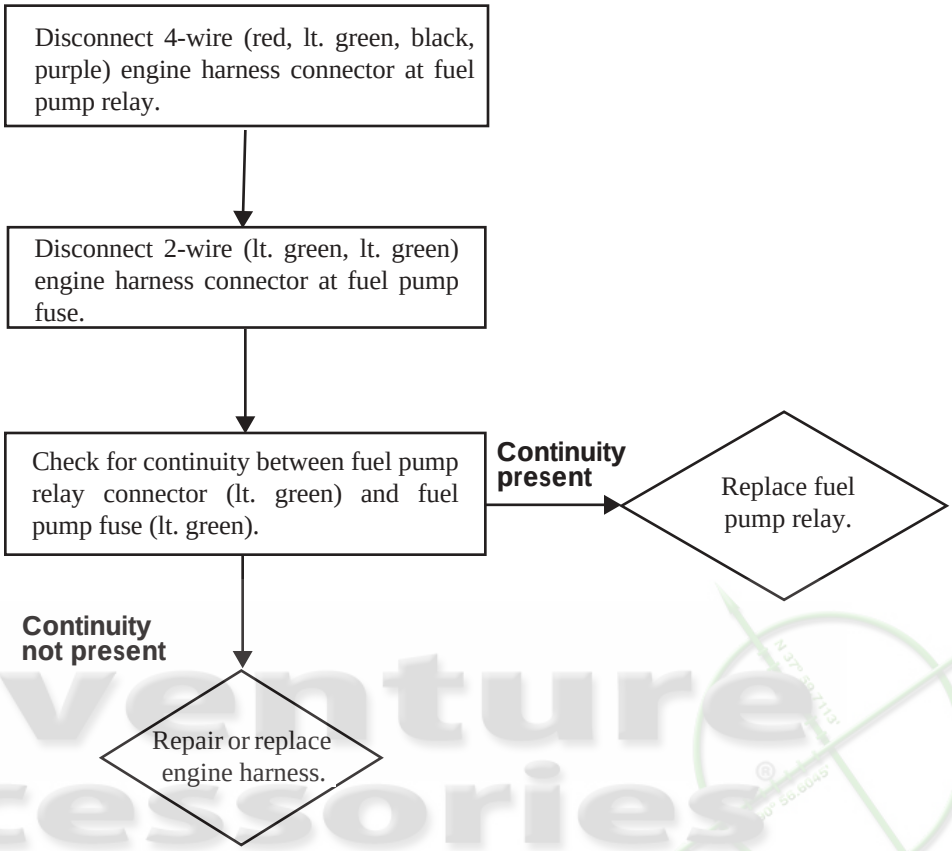



*Figure 12-44: Glow Plugs*

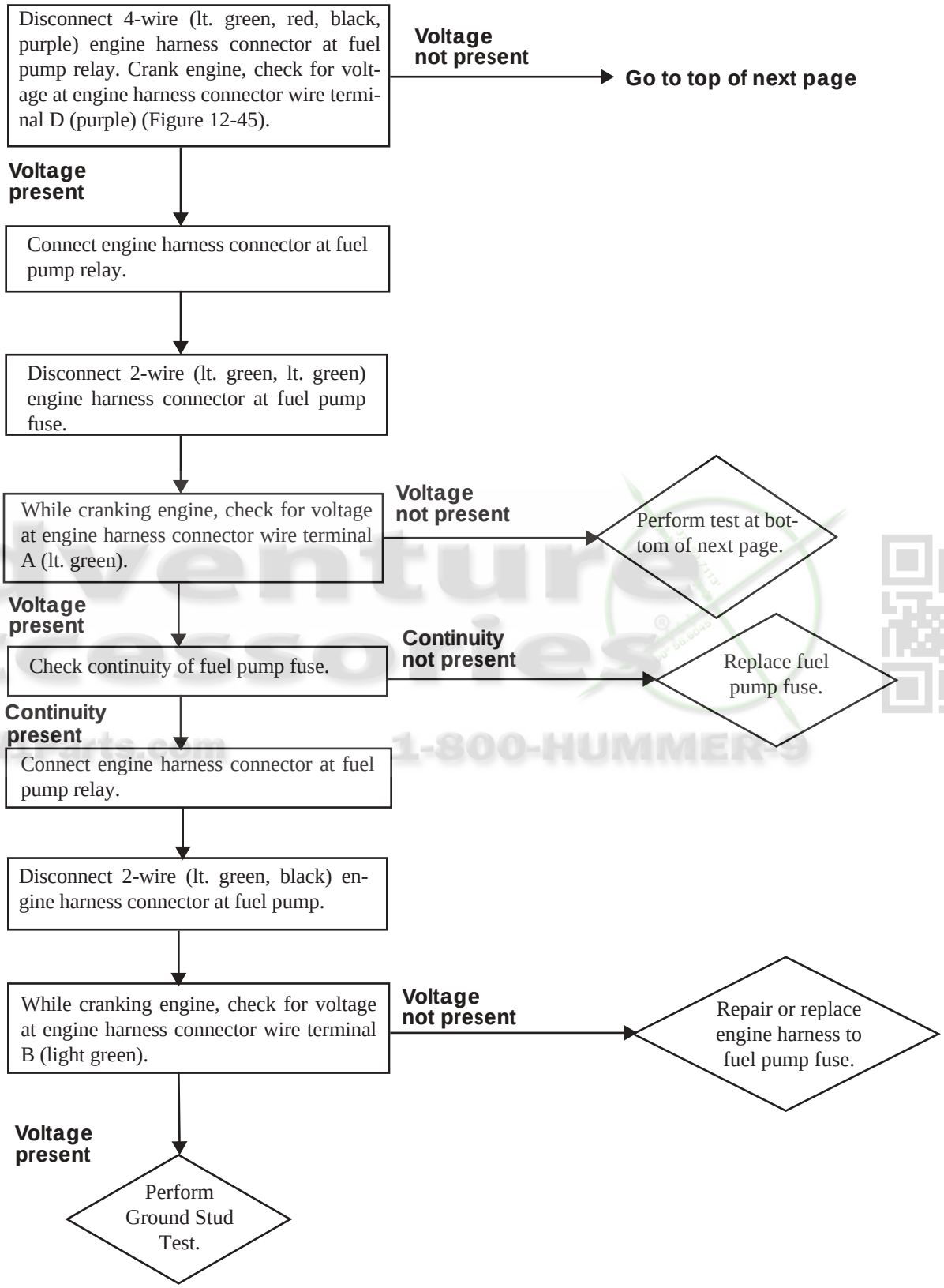
## FUEL PUMP INOPERATIVE (ENGINE FAILS TO START)



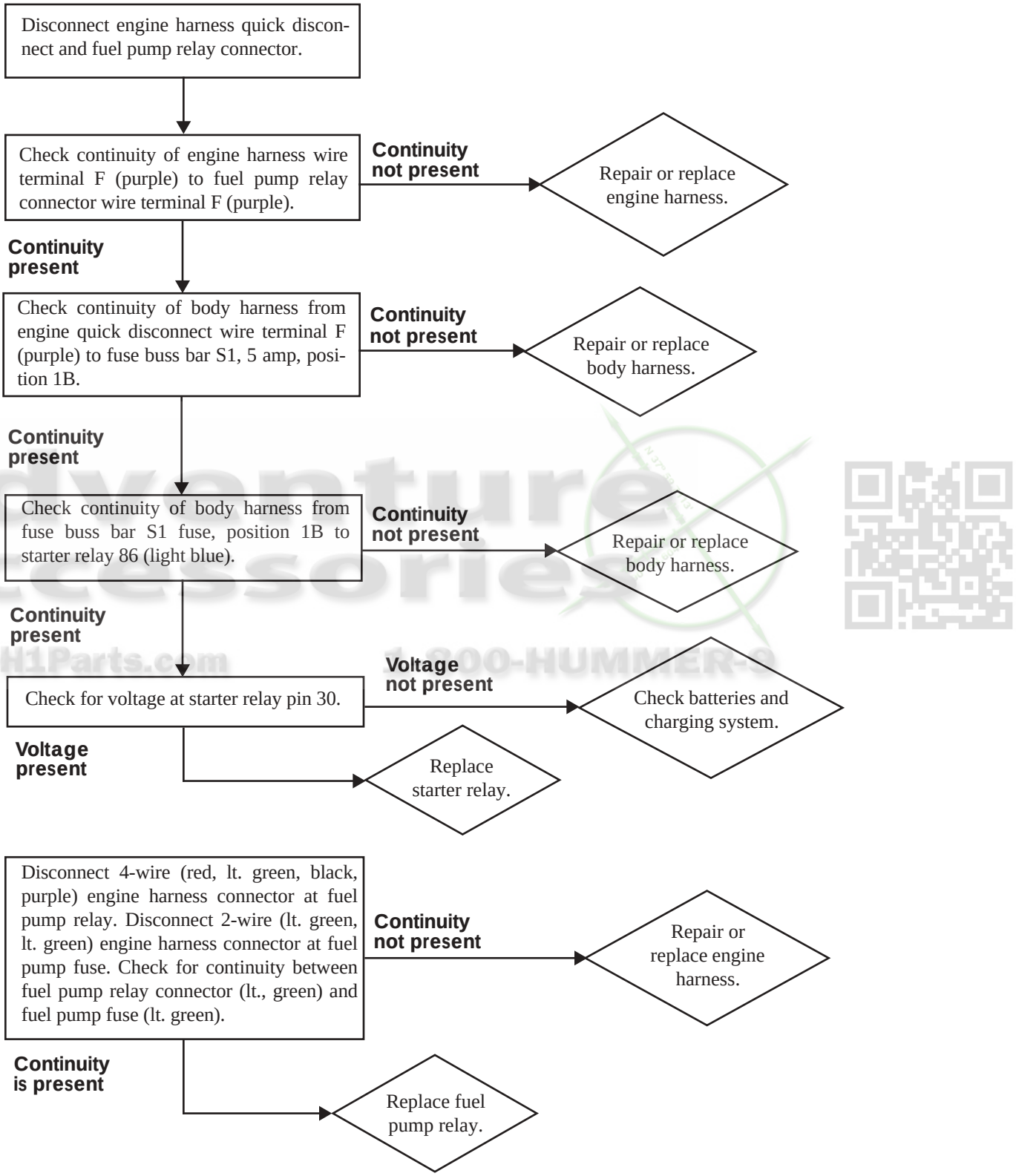
## FUEL PUMP INOPERATIVE – CONTINUED



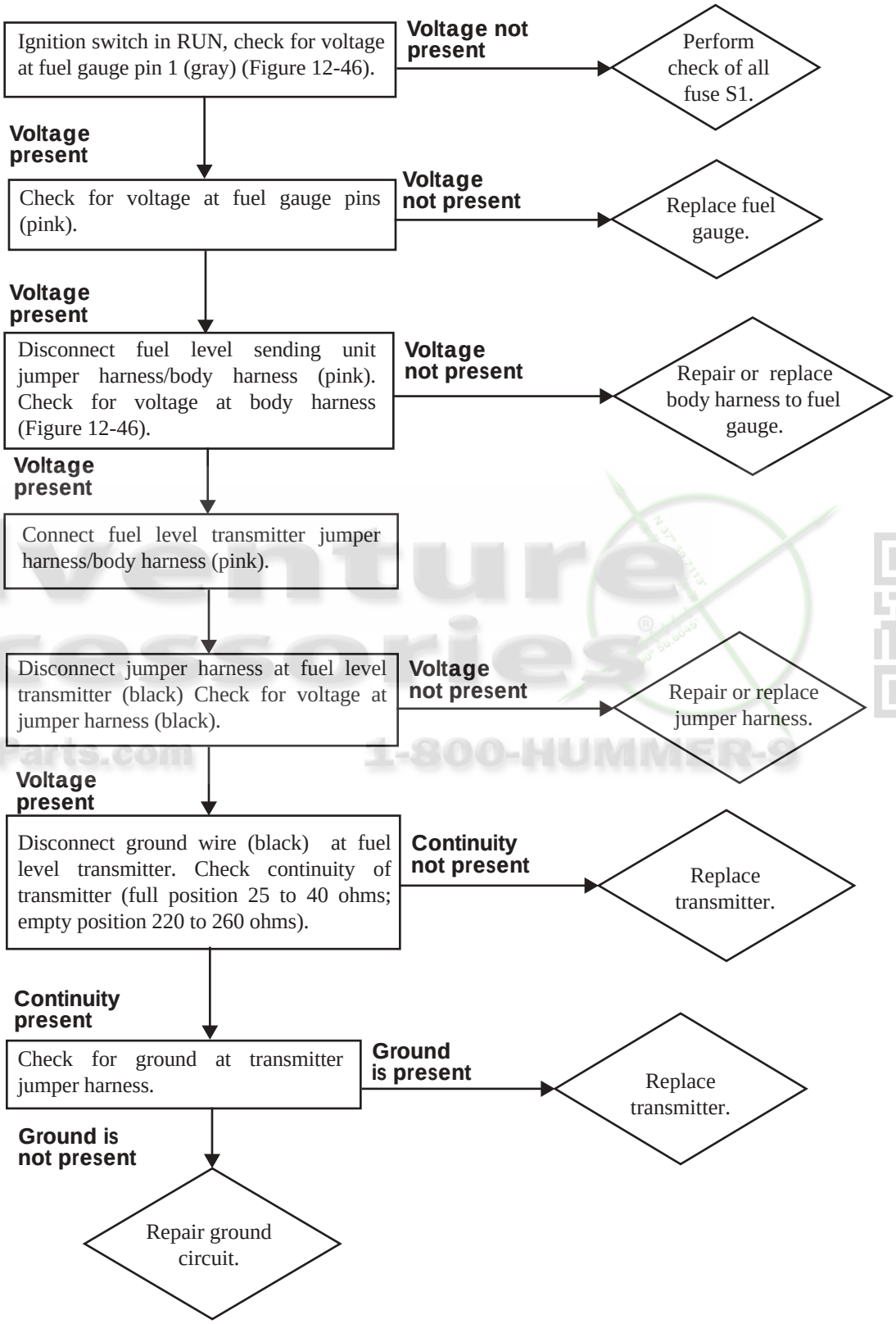
## FUEL PUMP INOPERATIVE (ENGINE STALLS)



## FUEL PUMP INOPERATIVE — CONTINUED



## FUEL TANK SENDING UNIT INOPERATIVE



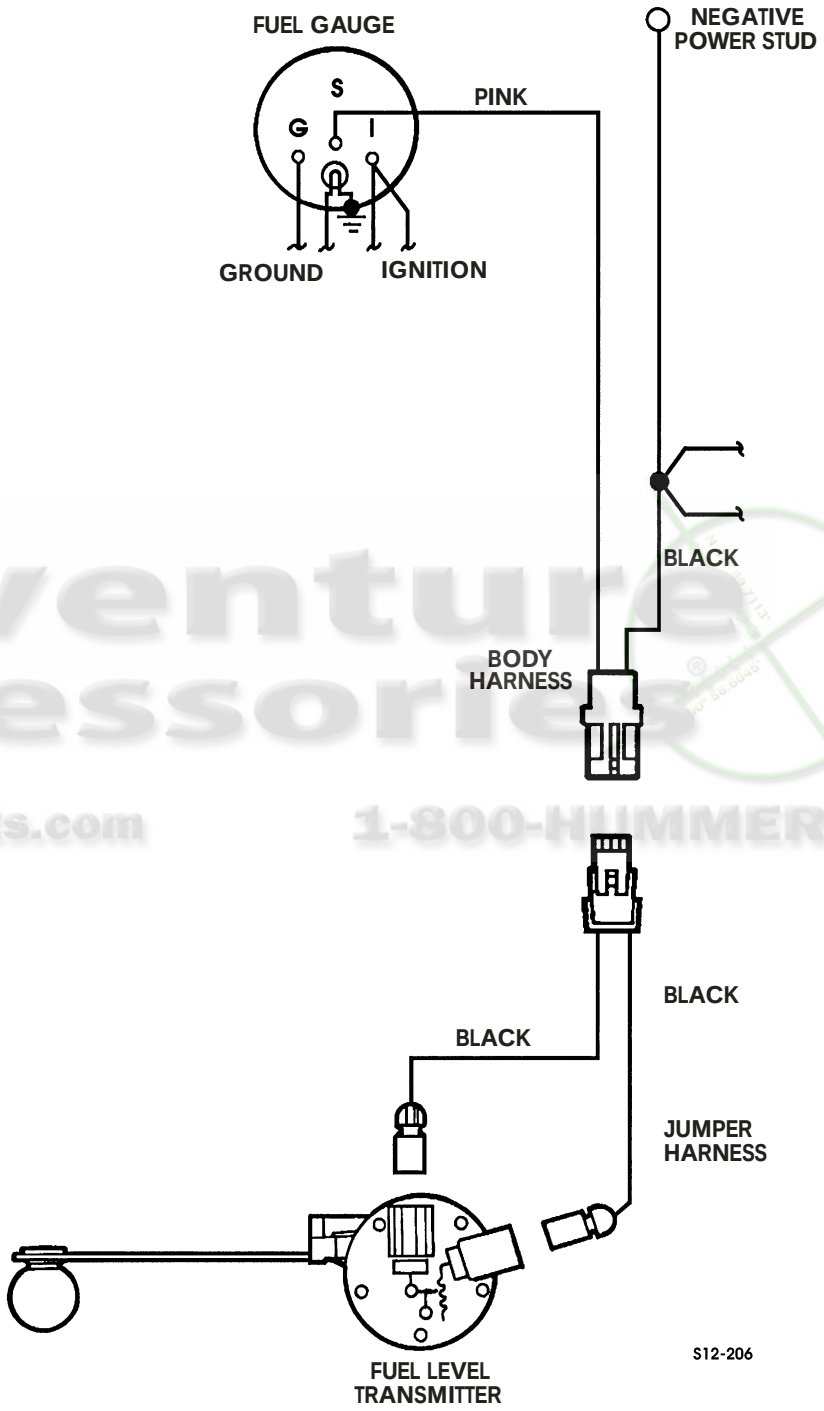





*Figure 12-45: Fuel System (Sheet 1 of 2)*

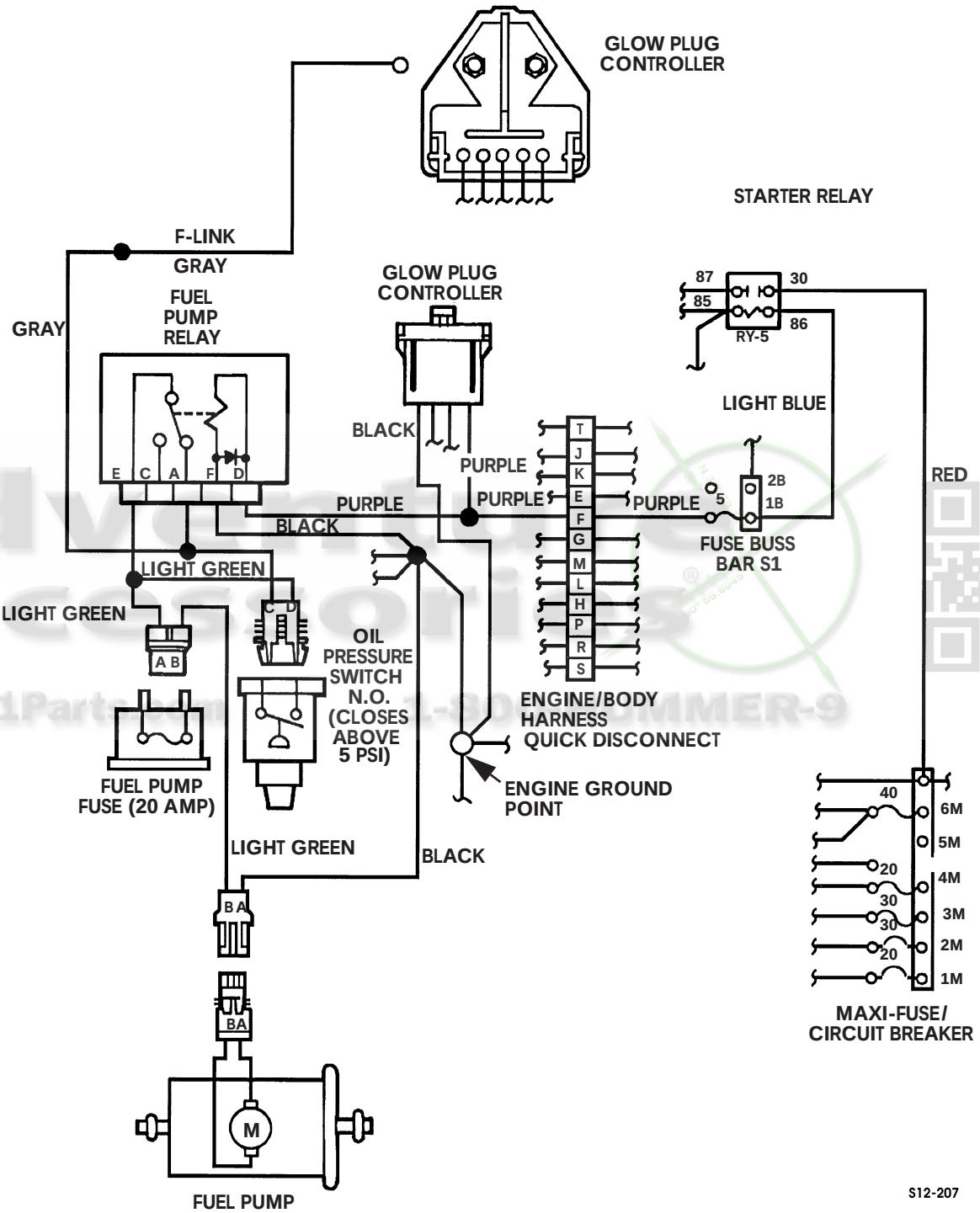
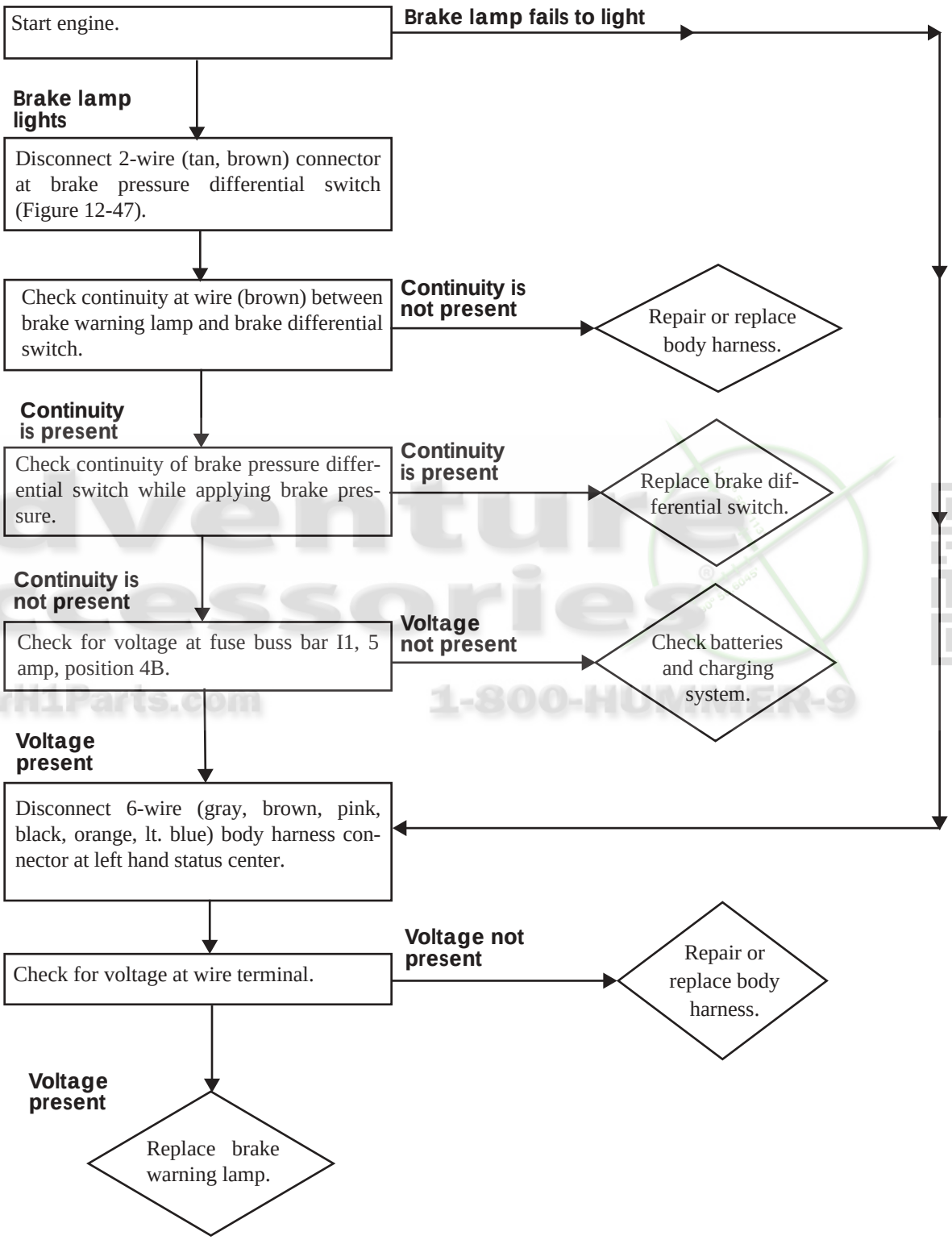
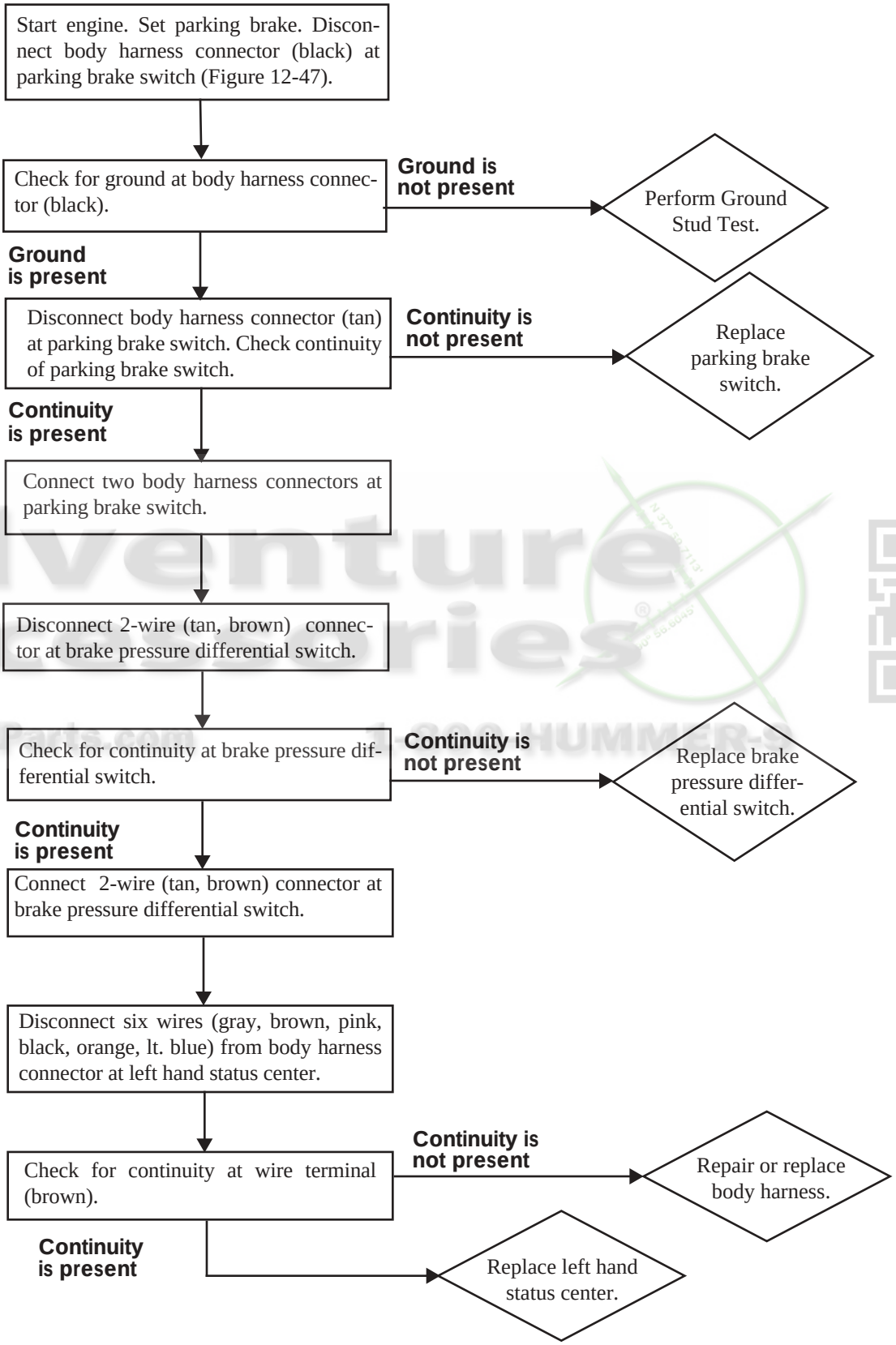



*Figure 12-46: Fuel System (Sheet 2 of 2)*

## BRAKE PRESSURE DIFFERENTIAL SWITCH INOPERATIVE



## PARKING BRAKE LIGHT FAILS TO LIGHT



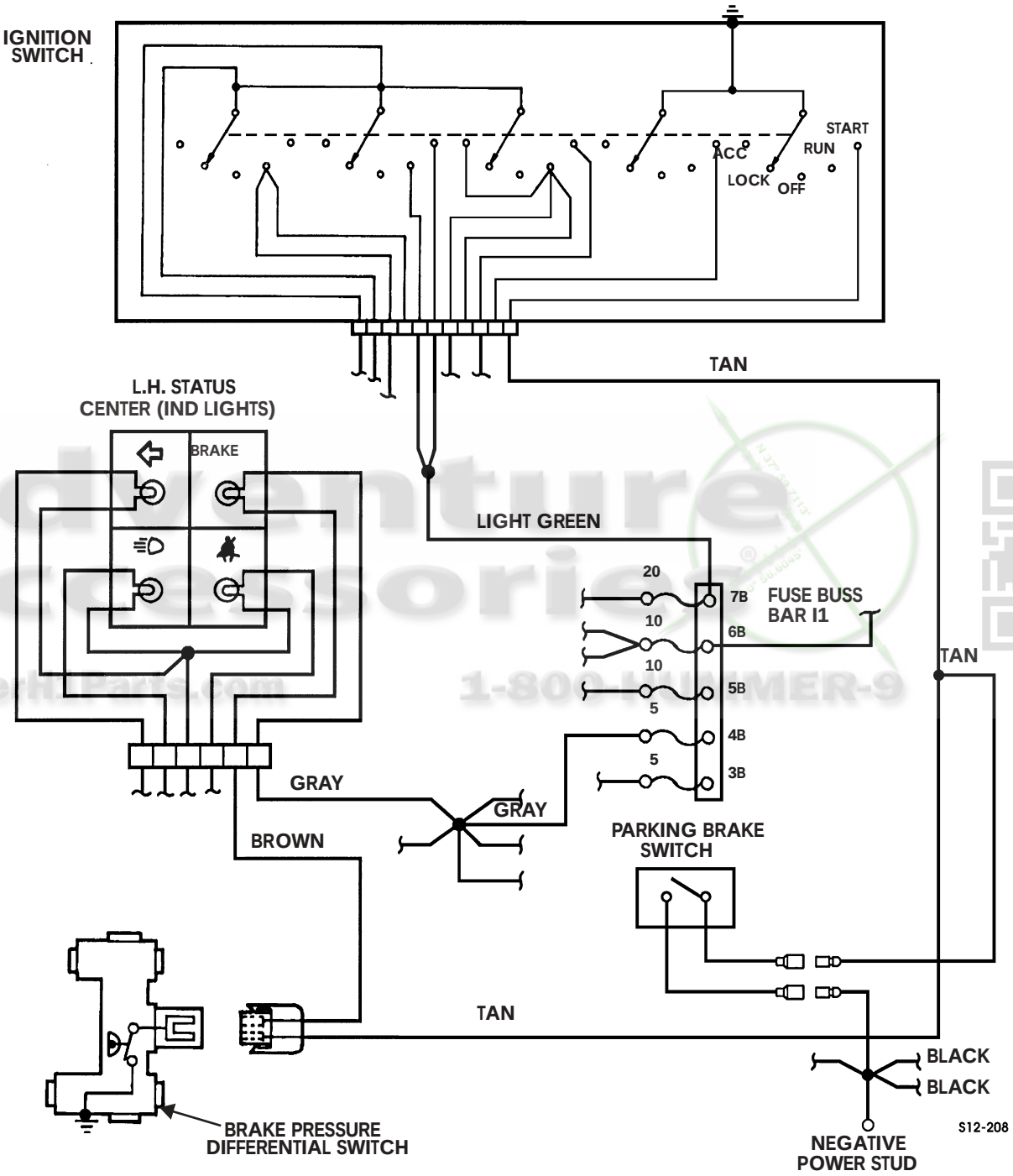
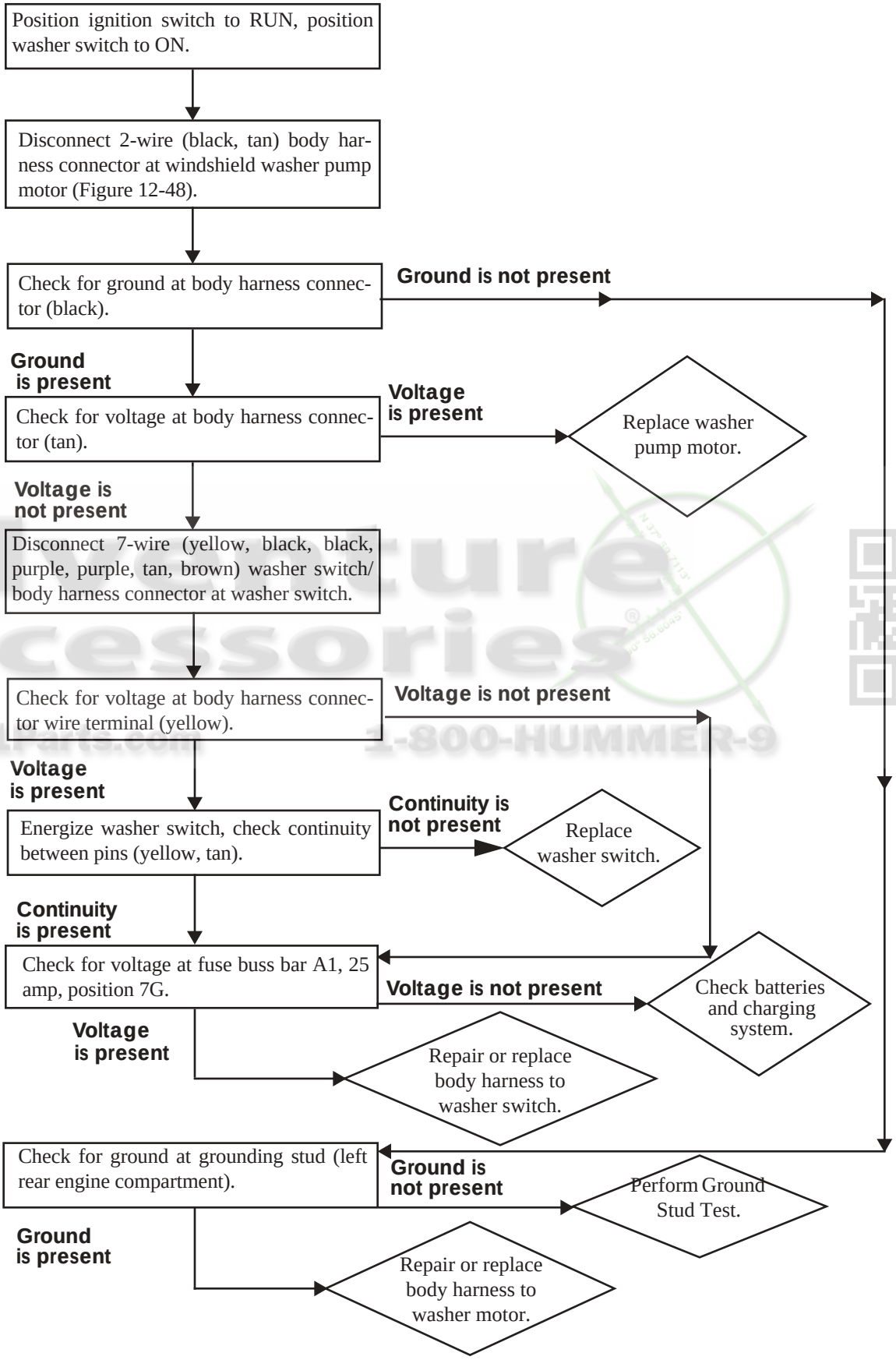


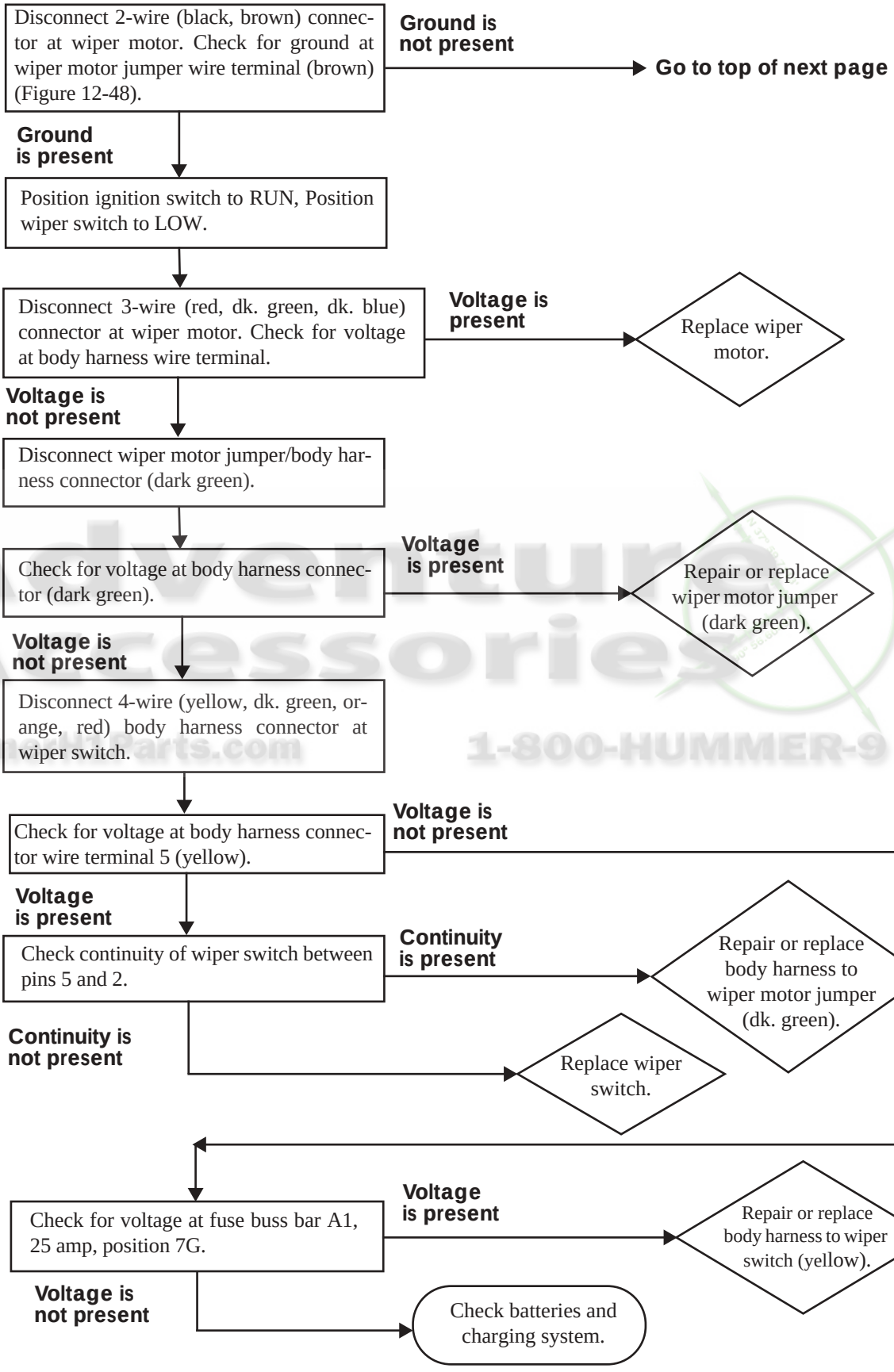



*Figure 12-47: Brake System*

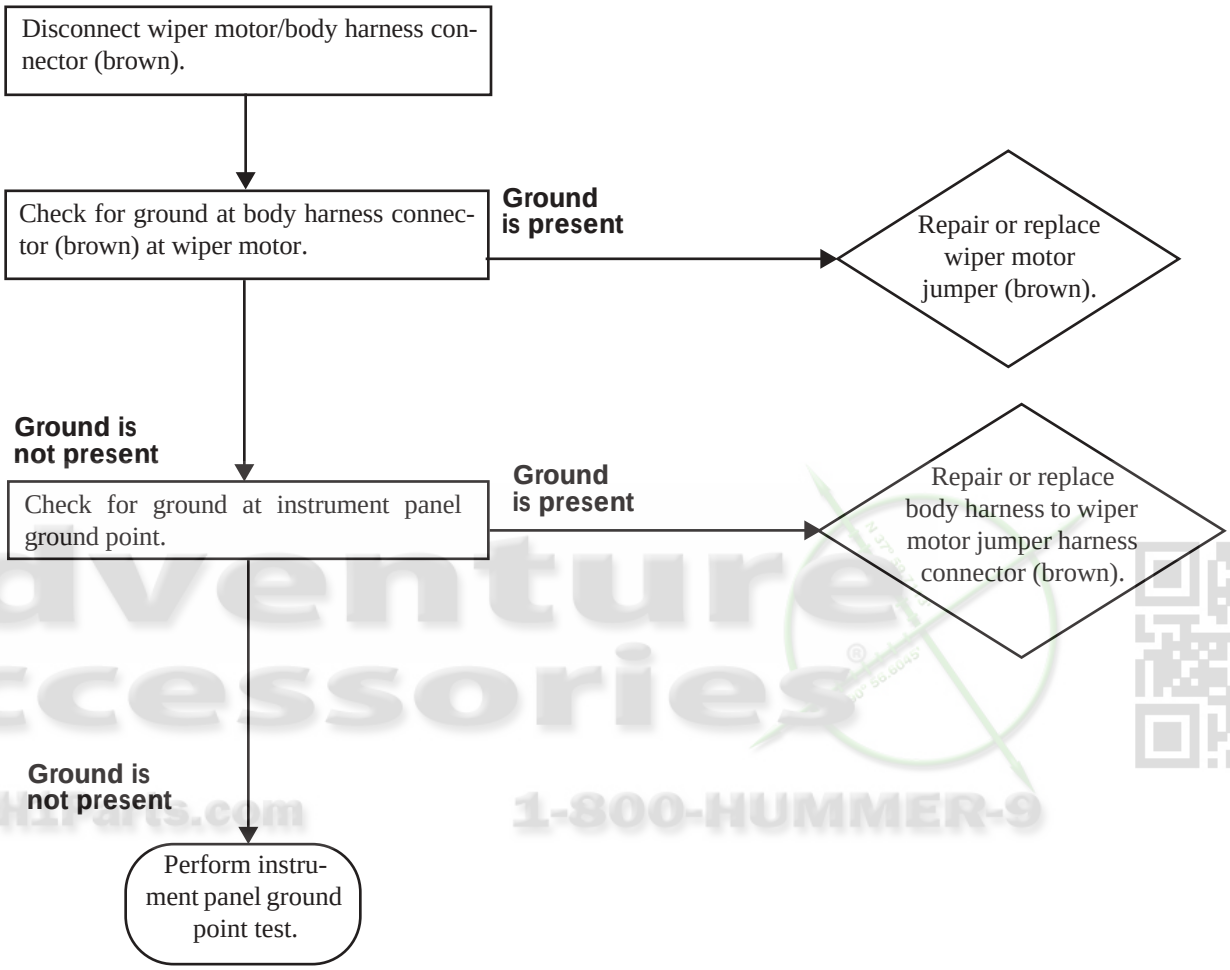
## WINDSHIELD WASHER PUMP MOTOR INOPERATIVE



## WINDSHIELD WIPERS (LOW) INOPERATIVE



## WINDSHIELD WIPERS (LOW) INOPERATIVE — CONTINUED



## WINDSHIELD WIPERS (HI) INOPERATIVE

Disconnect 2-wire (black, brown) connector at wiper motor, check for ground at wiper motor jumper wire terminal (brown) (Figure 12-48).

**Ground is not present** → **Go to top of next page**

**Ground is present**

Position ignition switch to RUN, Connect 2-wire (black, brown) connector.

Disconnect 3-wire (red, dk. green, dk. blue) connector at wiper motor. Check for voltage at wire motor jumper wire terminal (red).

**Voltage is present** → Replace wiper motor.

**Voltage is not present**

Disconnect wiper motor jumper/body harness connector (red).

Check for voltage at body harness connector (red).

**Voltage is present** → Repair or replace wiper motor jumper (red).

**Voltage is not present**

Disconnect 4-wire (yellow, dk. green, orange, red) body harness connector at wiper switch.

Check for voltage at body harness connector wire terminal 5 (yellow).

**Voltage is not present** → Check for voltage at fuse buss bar A1, 25 amp, position 7G.

**Voltage is present**

With the wiper switch in HIGH position, check continuity between pins 5 and 4.

**Continuity is present** → Repair or replace body harness to wiper motor jumper (red).

**Continuity is not present** → Replace wiper switch.

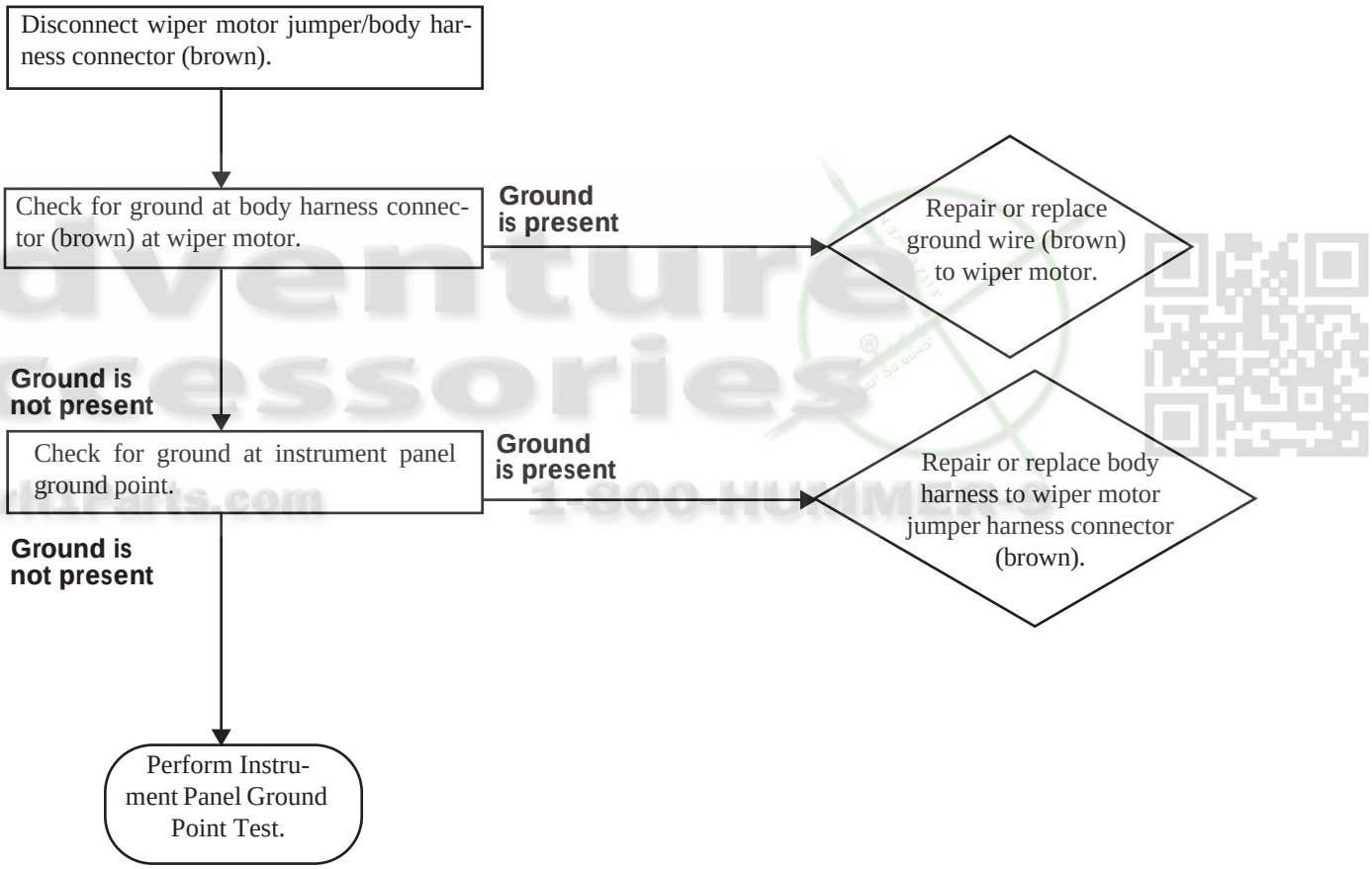
Check for voltage at fuse buss bar A1, 25 amp, position 7G.

**Voltage is present**

Repair or replace body harness to wiper switch (yellow).

**Voltage is not present** → Check batteries and charging system.

## WINDSHIELD WIPERS (HI) INOPERATIVE — CONTINUED



## WINDSHIELD WIPERS FAIL TO PARK IN PROPER POSITION

Position ignition to RUN. Position wiper switch to OFF. Disconnect wiper motor/jumper harness connector (Figure 12-48).

Check for voltage at jumper harness connector (black).

**Voltage is present** → Reconnect 2-wire (black, brown) wiper motor/jumper harness connector. Disconnect 3-wire (red, green, blue) wiper motor/jumper harness connector.

**Voltage is not present**

Connect wiper motor jumper/body harness connector (black). Disconnect 2-wire (black, brown) wiper motor jumper/body harness connector.

Check for voltage at body harness (black).

**Voltage is present** → Repair or replace wiper motor jumper harness.

**Voltage is not present** → Repair or replace body harness to wiper motor jumper.

**NOTE:** Motor should be stopped in a position other than the normal park position.

Reconnect 2-wire (black, brown) wiper motor/jumper harness connector. Disconnect 3-wire (red, green, blue) wiper motor/jumper harness connector.

Check for voltage at wiper motor connector (blue).

**Voltage is not present** → Replace wiper motor.

**Voltage is present**

Connect 3-wire (red, dk. green, dk. blue) wiper motor/jumper harness connector. Disconnect wiper motor jumper/body harness connector (dk. blue).

Check for voltage at jumper harness (dk. blue).

**Voltage is not present** → Replace wiper motor jumper harness.

**Voltage is present**

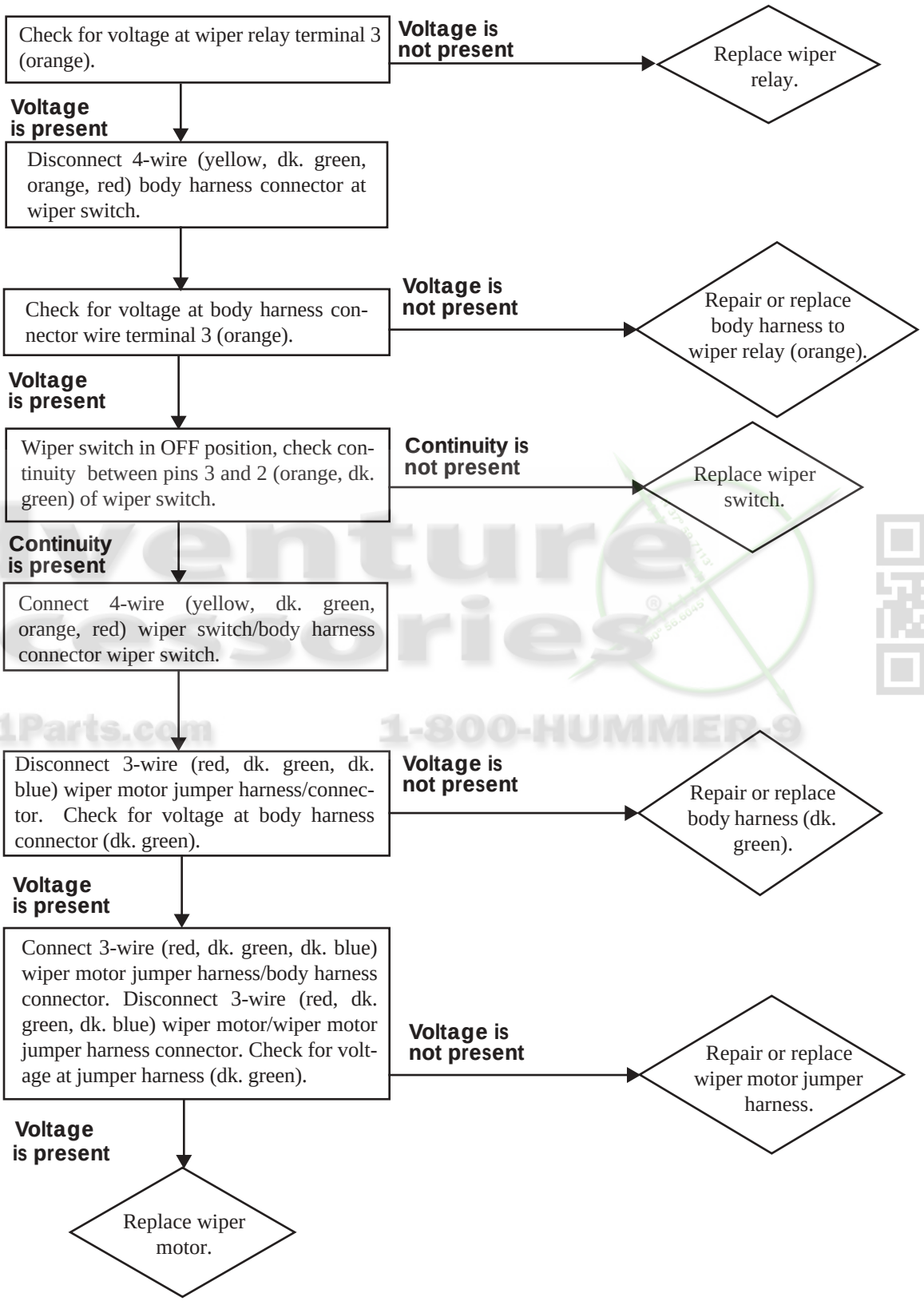
Check for voltage at wiper relay terminal 4 (dk. blue).

**Voltage is not present** → Repair or replace body harness to wiper motor jumper.

**Voltage is present**

**Go to top of next page**

## WINDSHIELD WIPERS FAIL TO PARK IN PROPER POSITION — CONTINUED



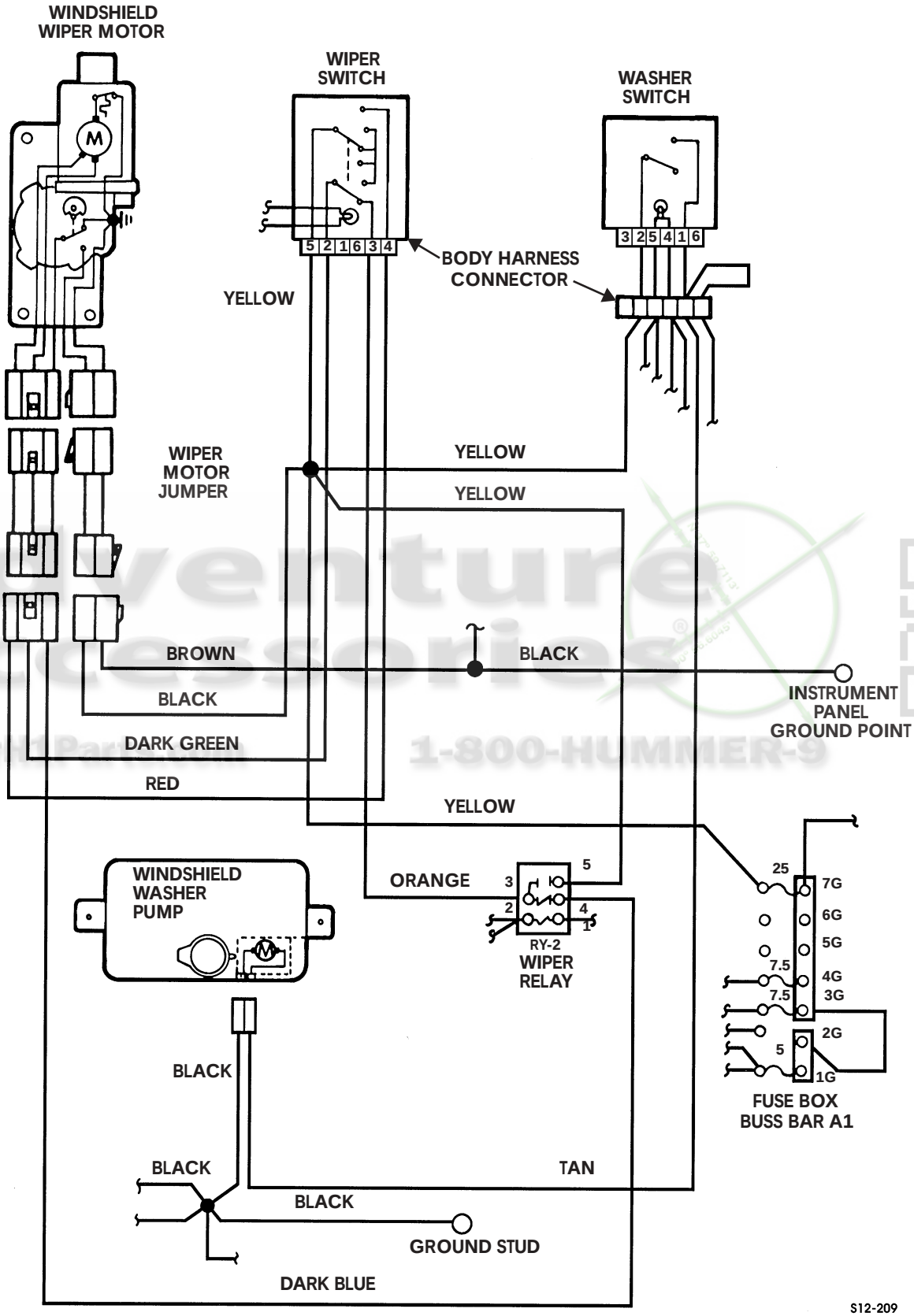
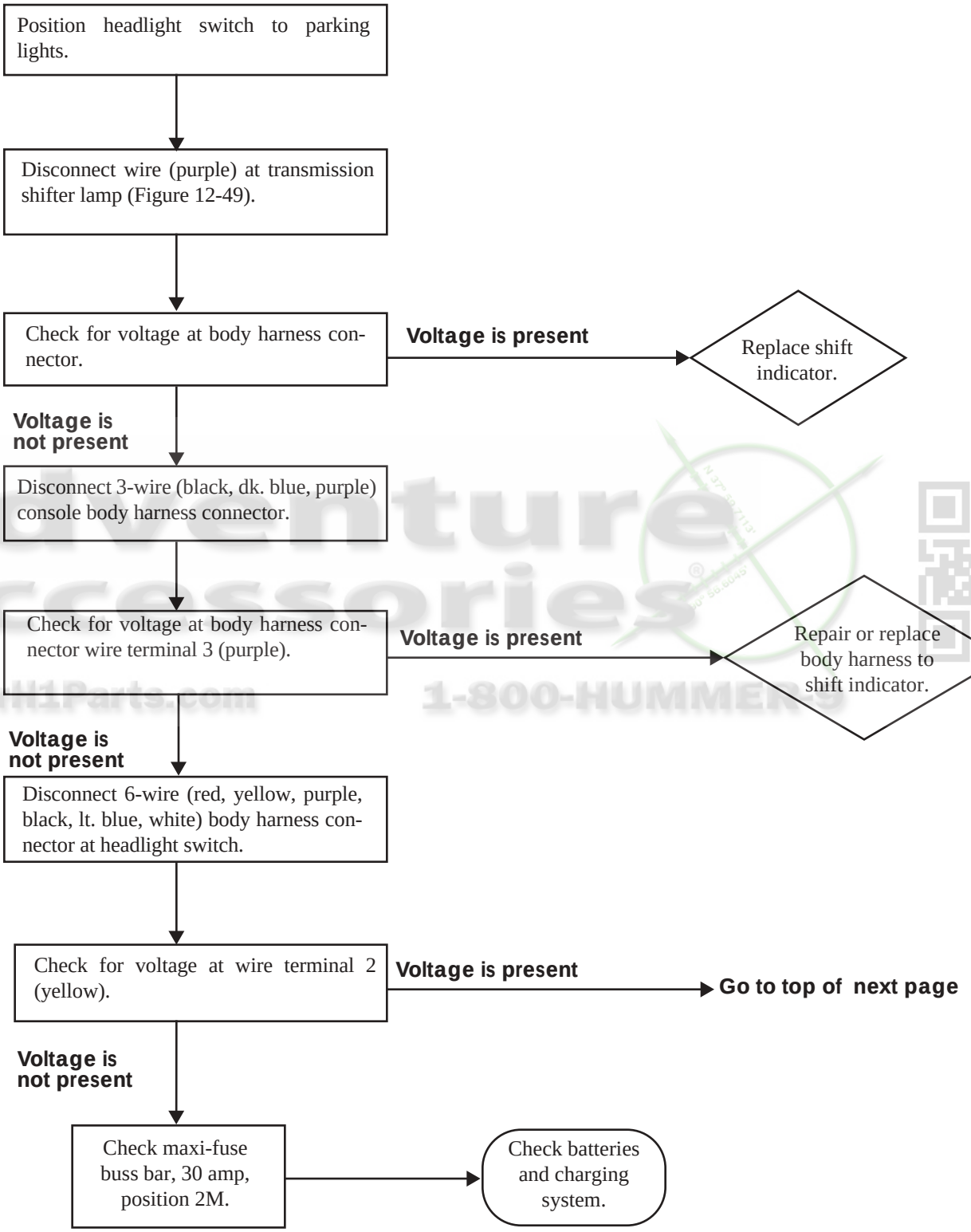
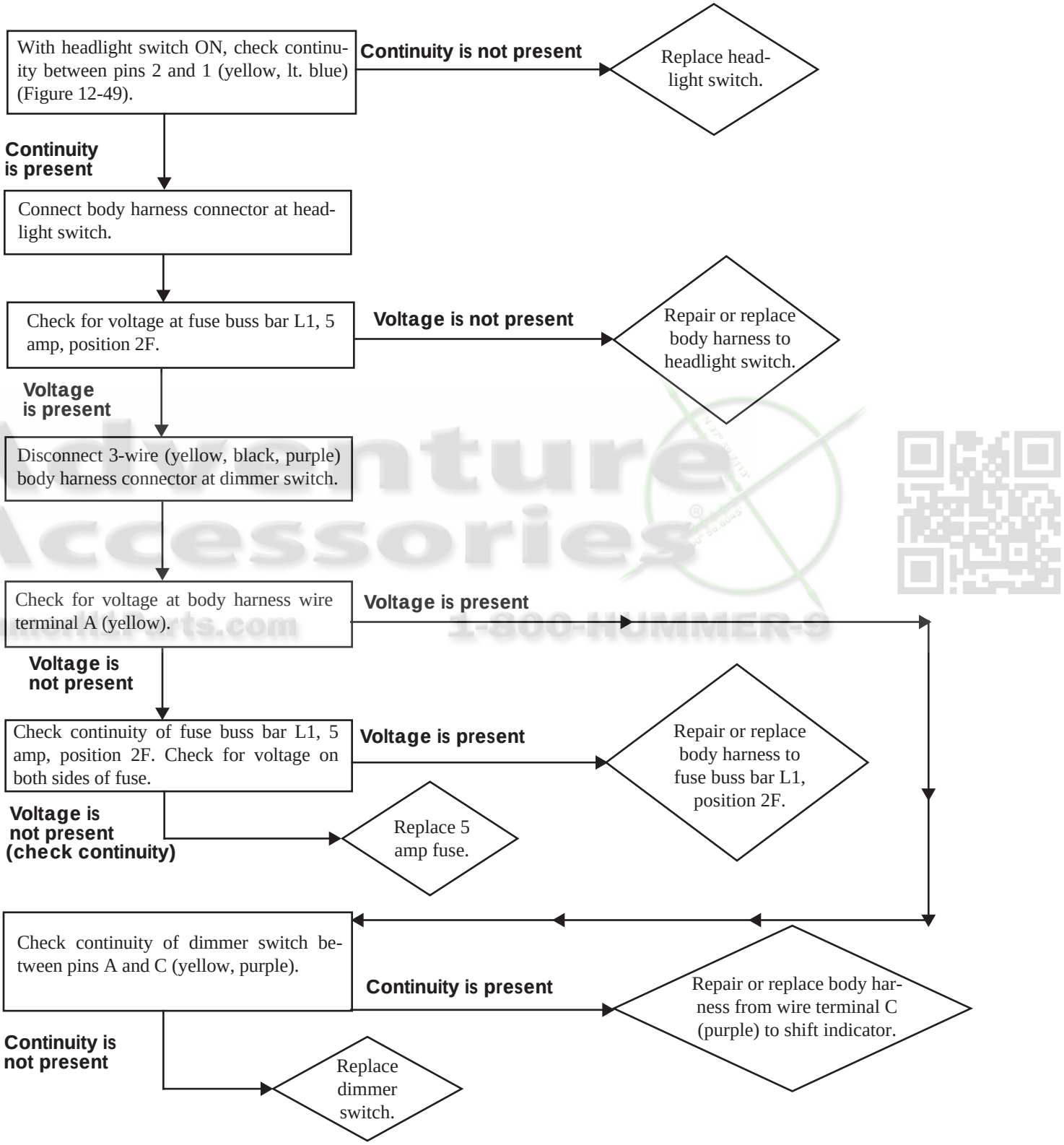



*Figure 12-48: Windshield Wiper and Washer System*

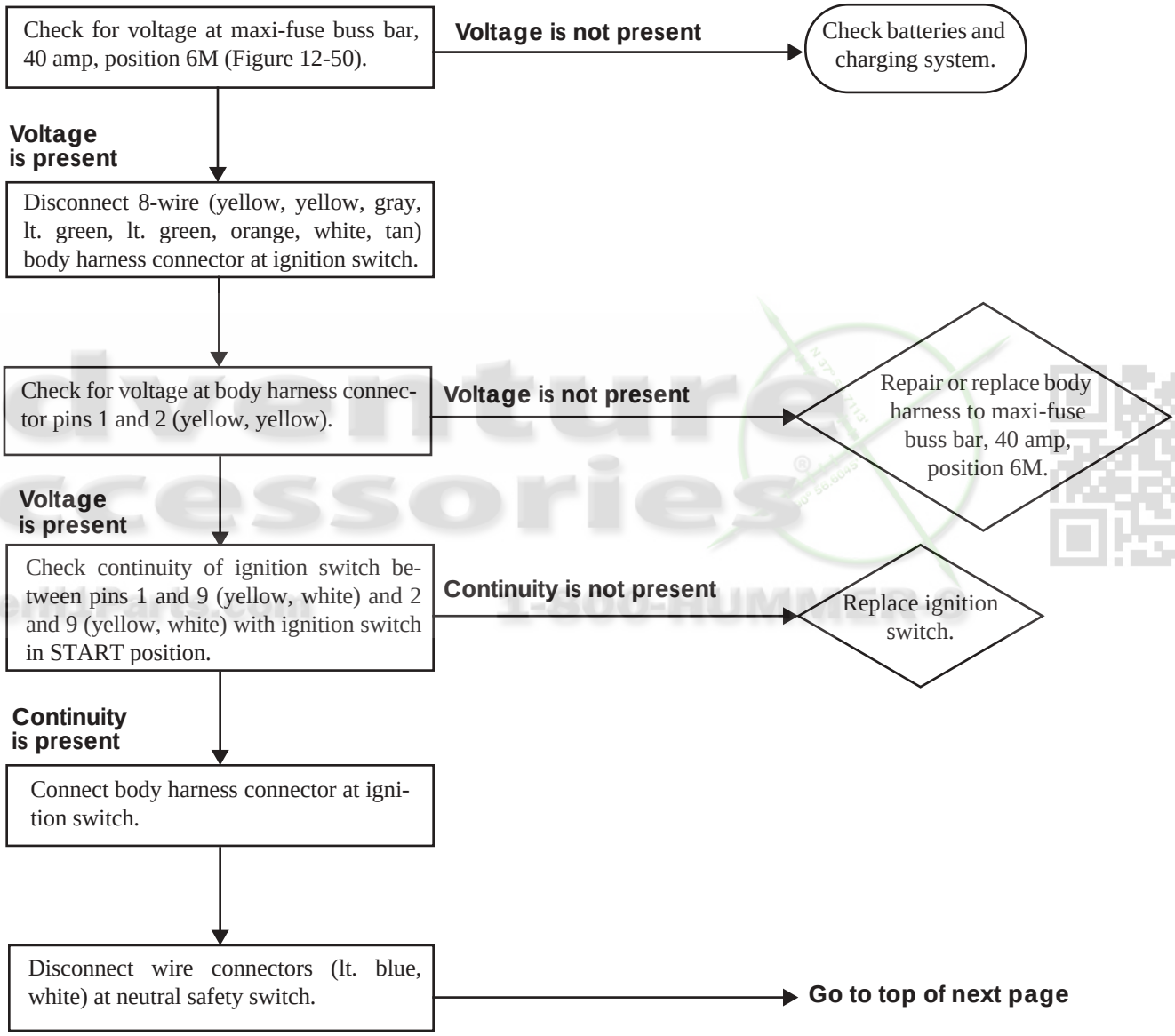
## SHIFT INDICATOR INOPERATIVE



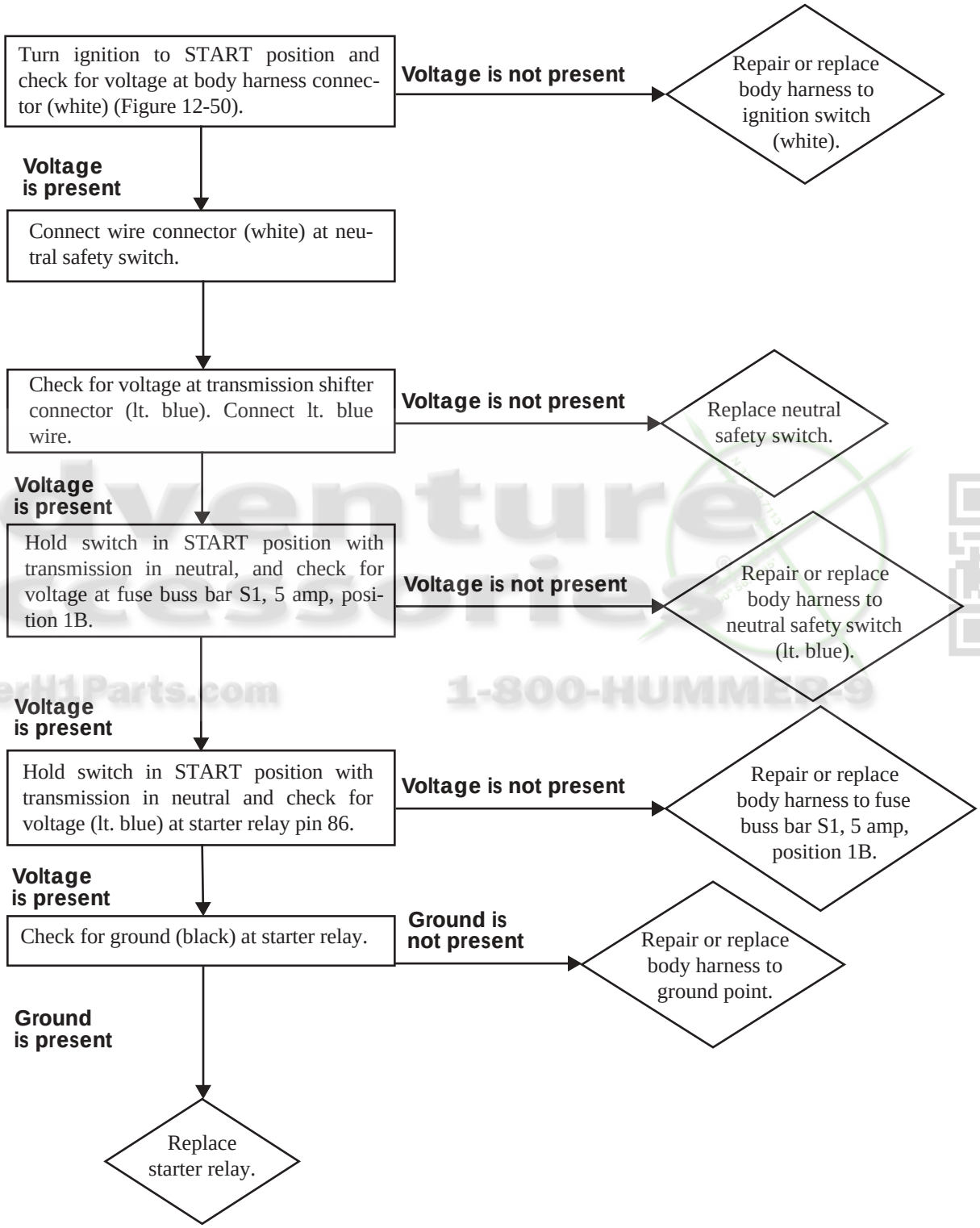
## SHIFT INDICATOR INOPERATIVE – CONTINUED



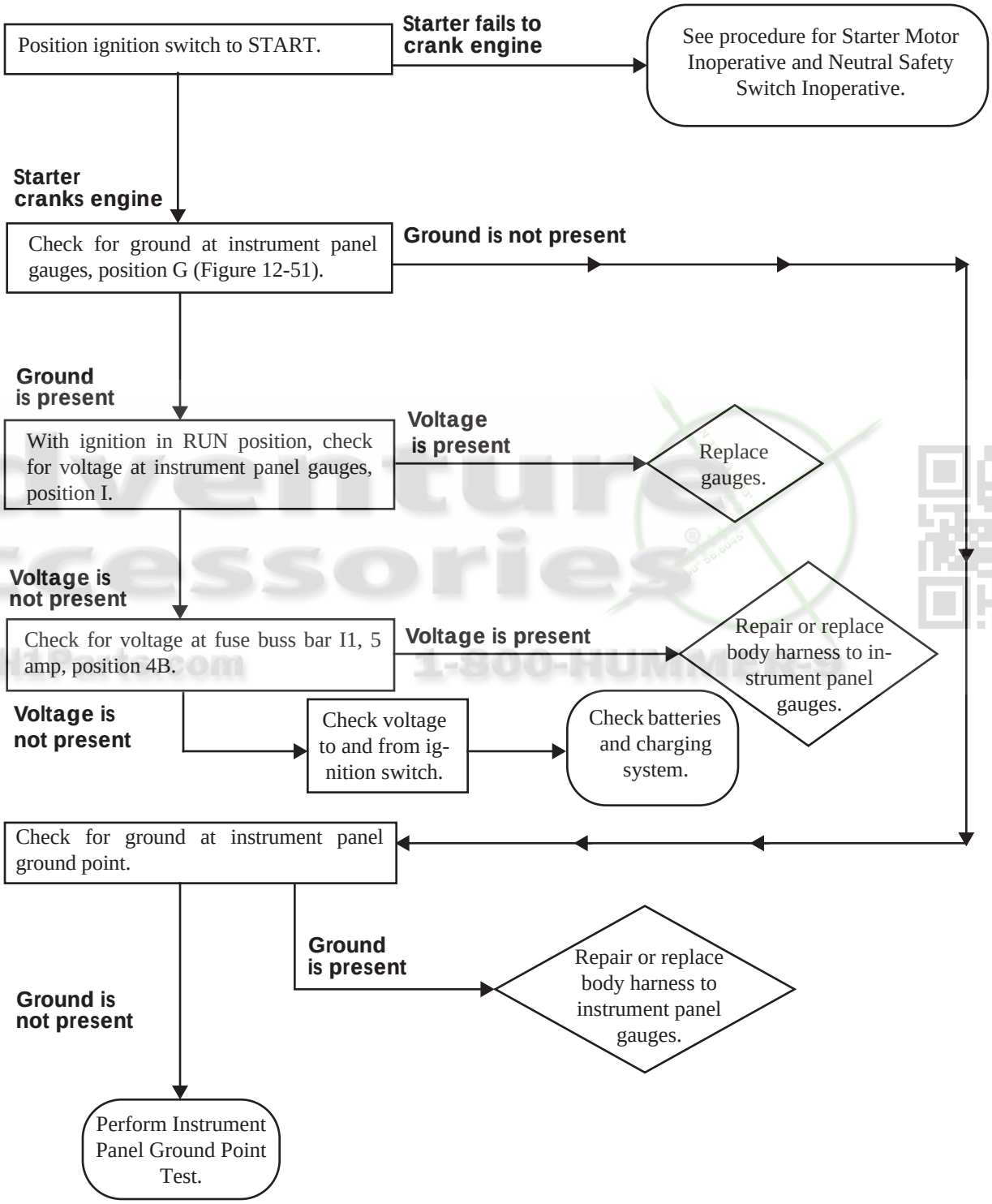
## NEUTRAL SAFETY SWITCH INOPERATIVE



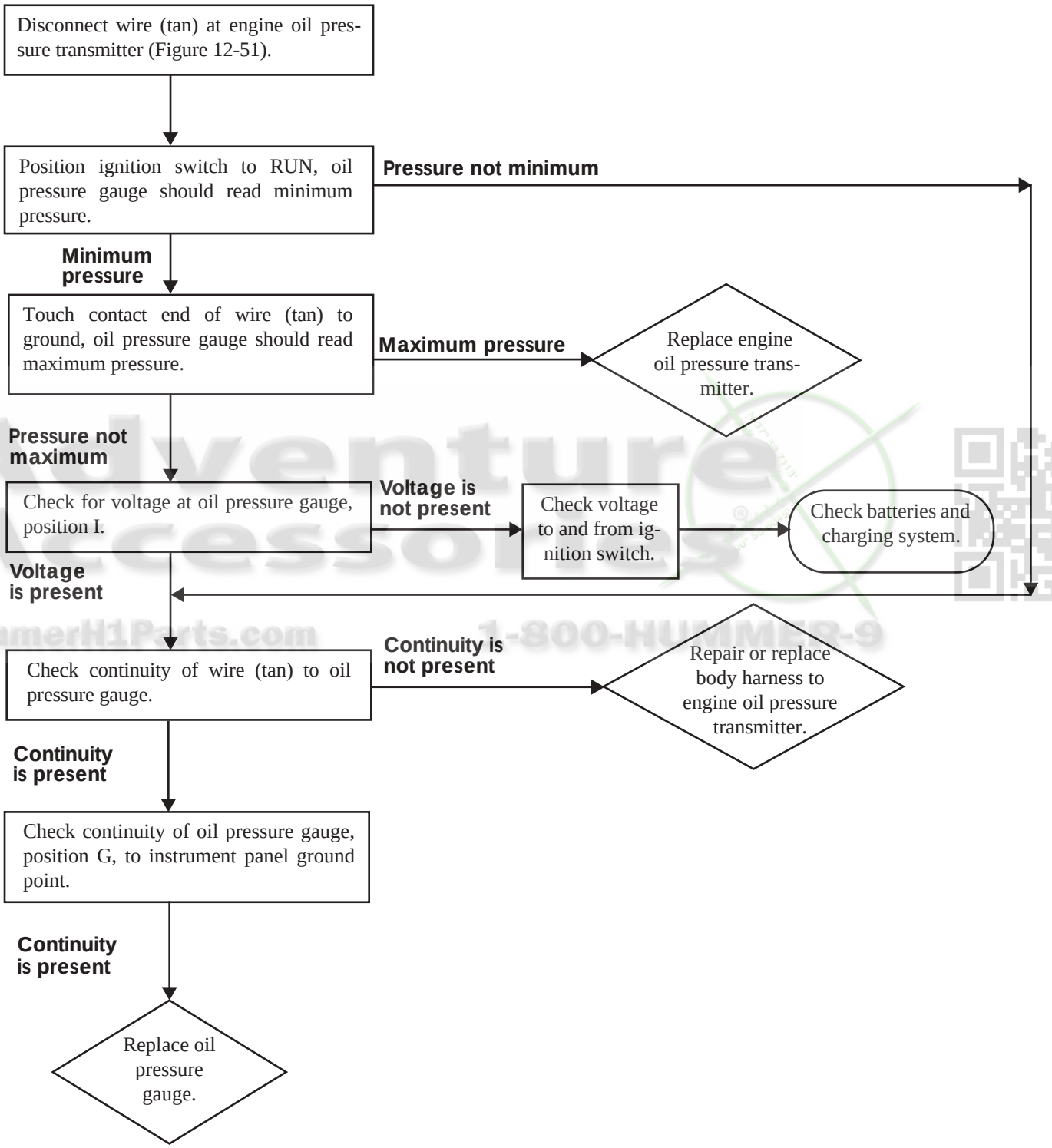
## NEUTRAL SAFETY SWITCH INOPERATIVE – CONTINUED



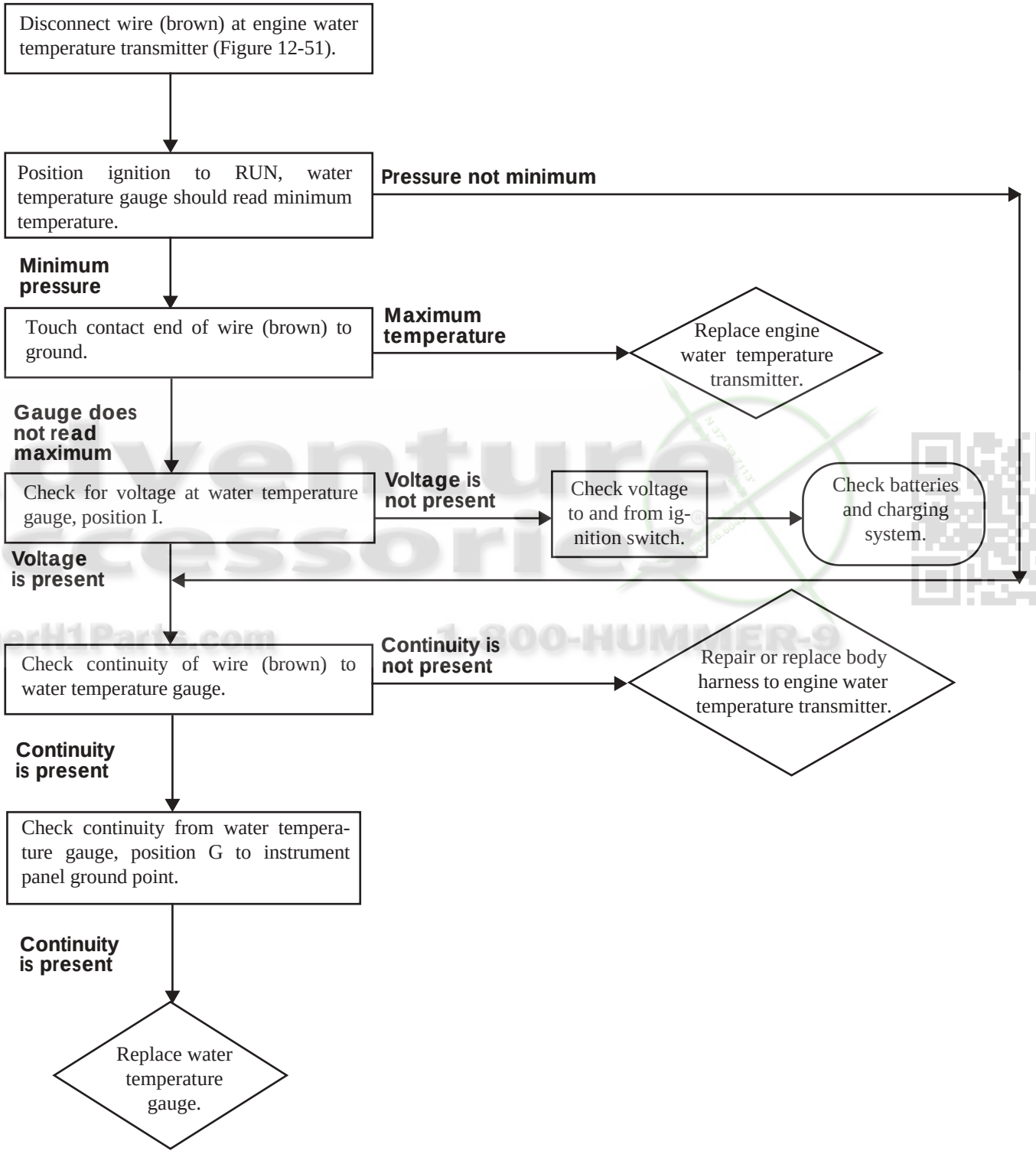
## ALL GAUGES INOPERATIVE



## OIL PRESSURE GAUGE INOPERATIVE

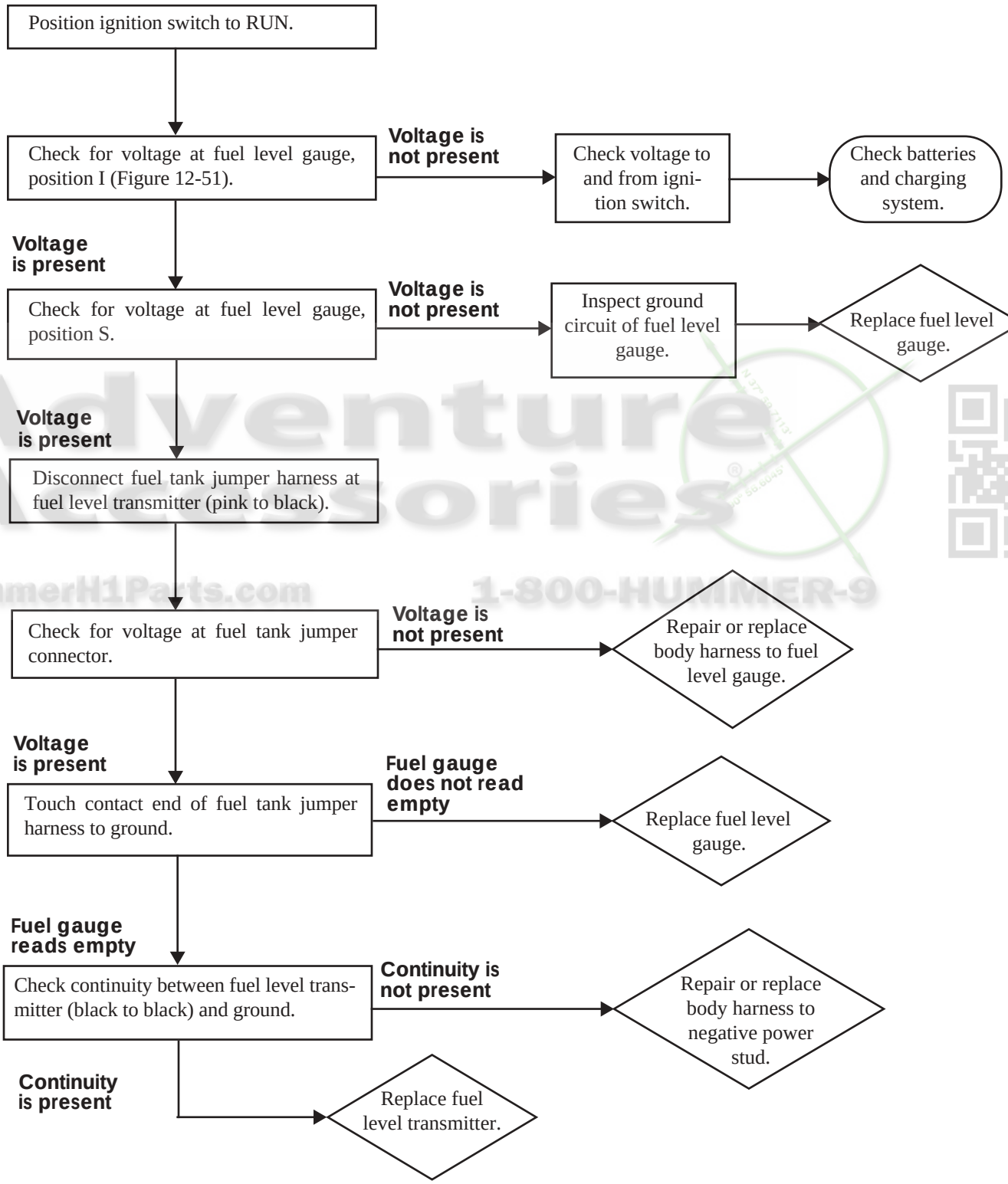


## WATER TEMPERATURE GAUGE INOPERATIVE

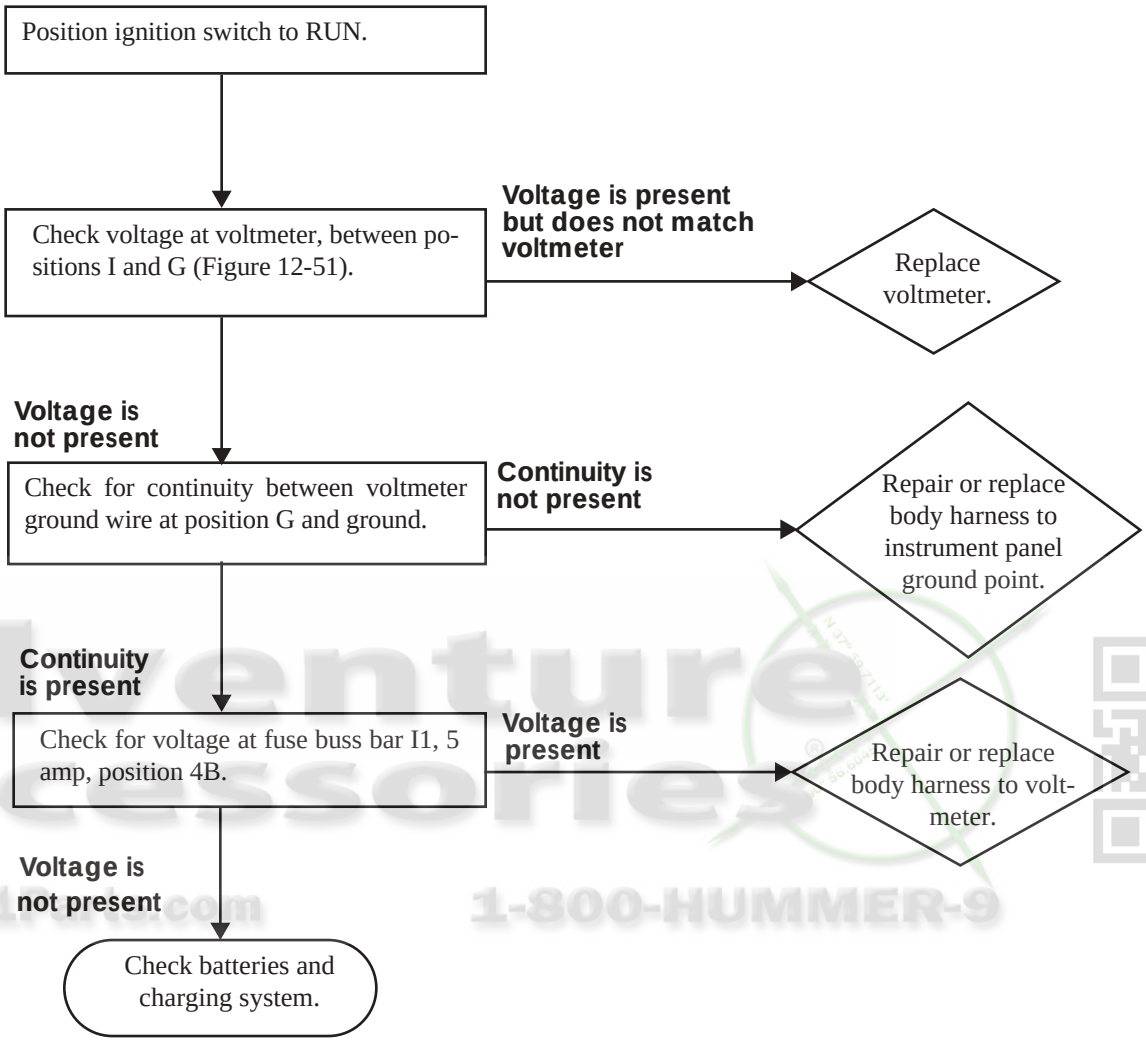


## FUEL LEVEL GAUGE INOPERATIVE

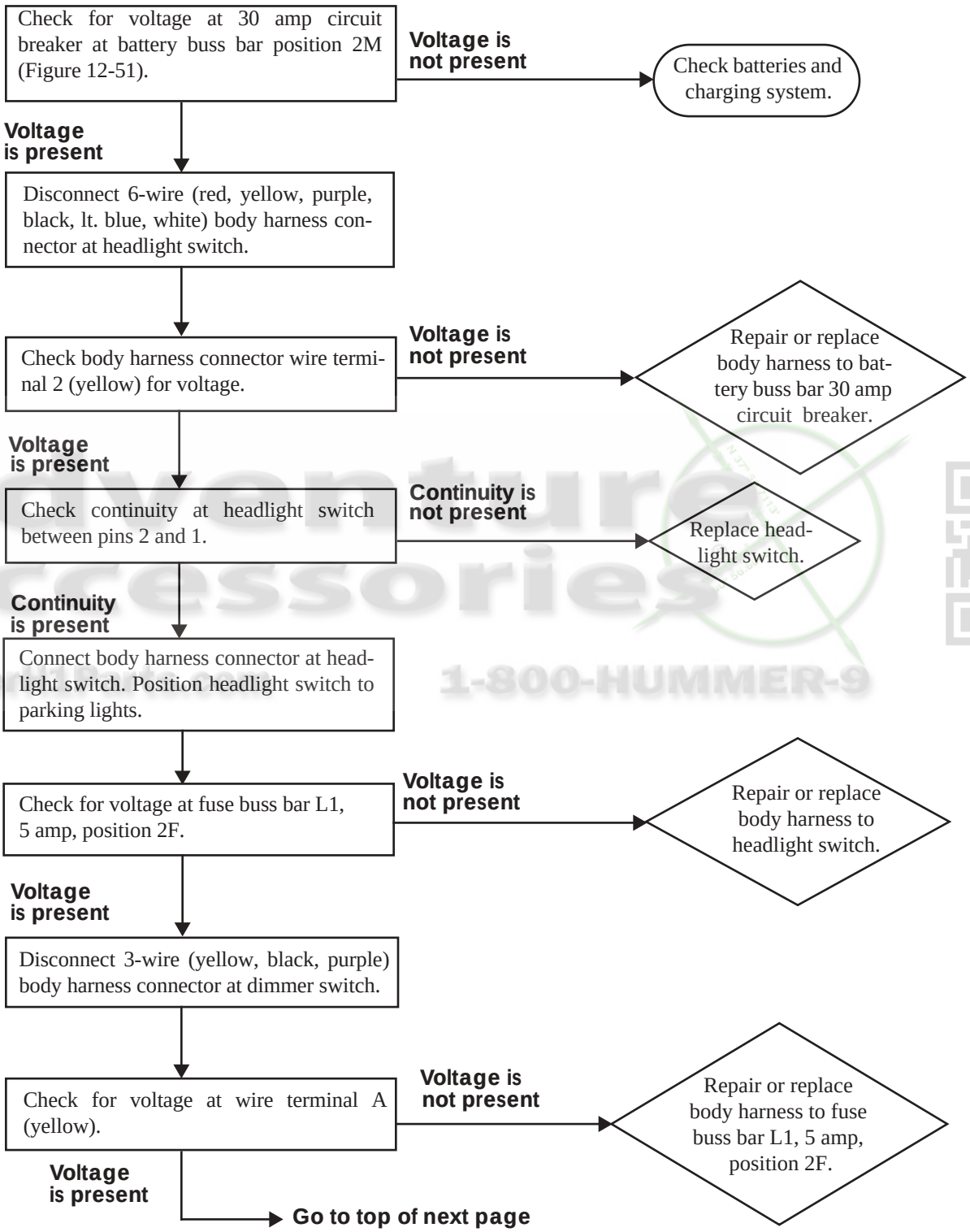
***WARNING: Do not perform electrical troubleshooting near fuel tank with fill cap or sending unit removed. Fuel may ignite and cause injury.***



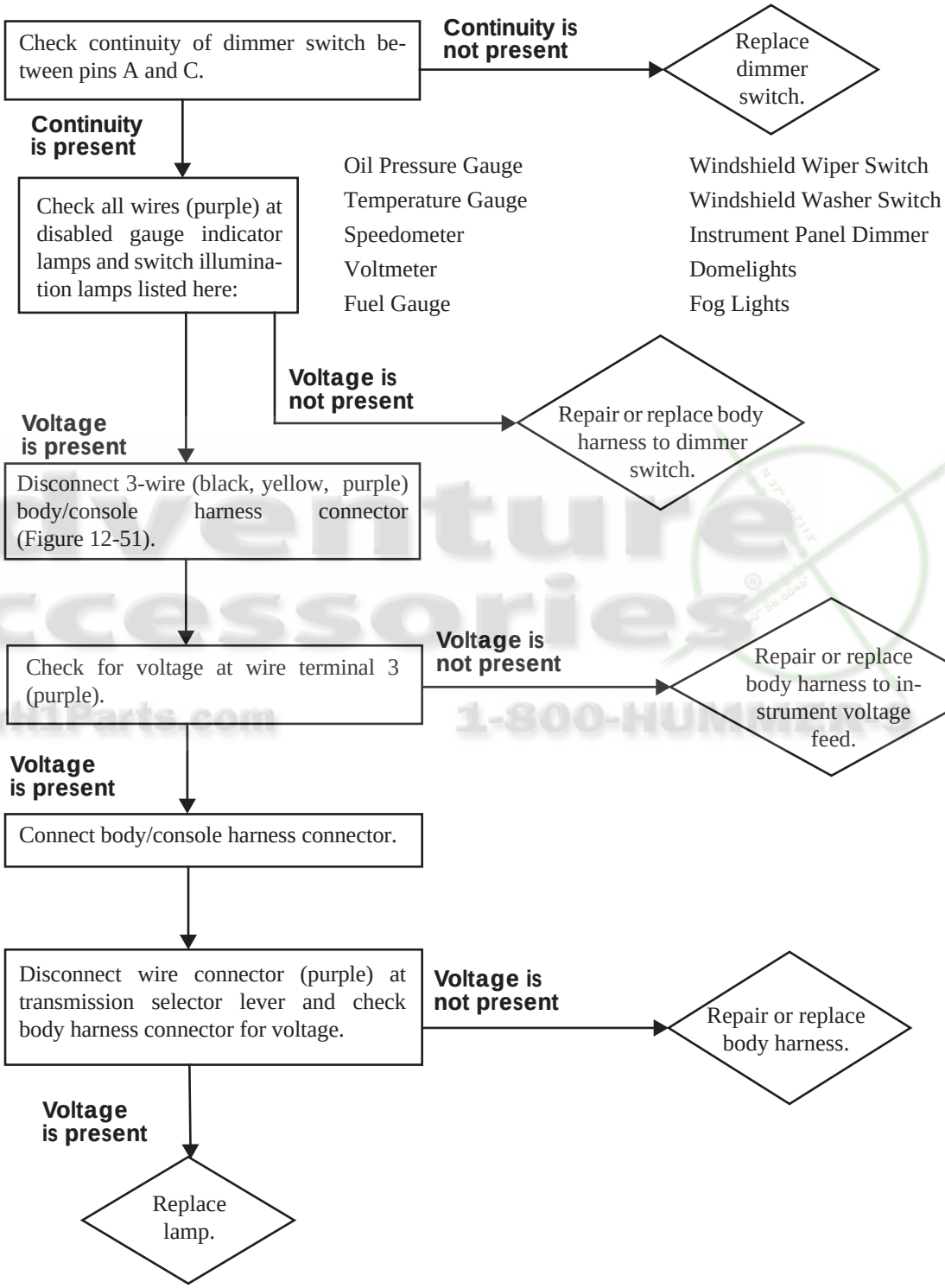
## VOLTMETER GAUGE INOPERATIVE



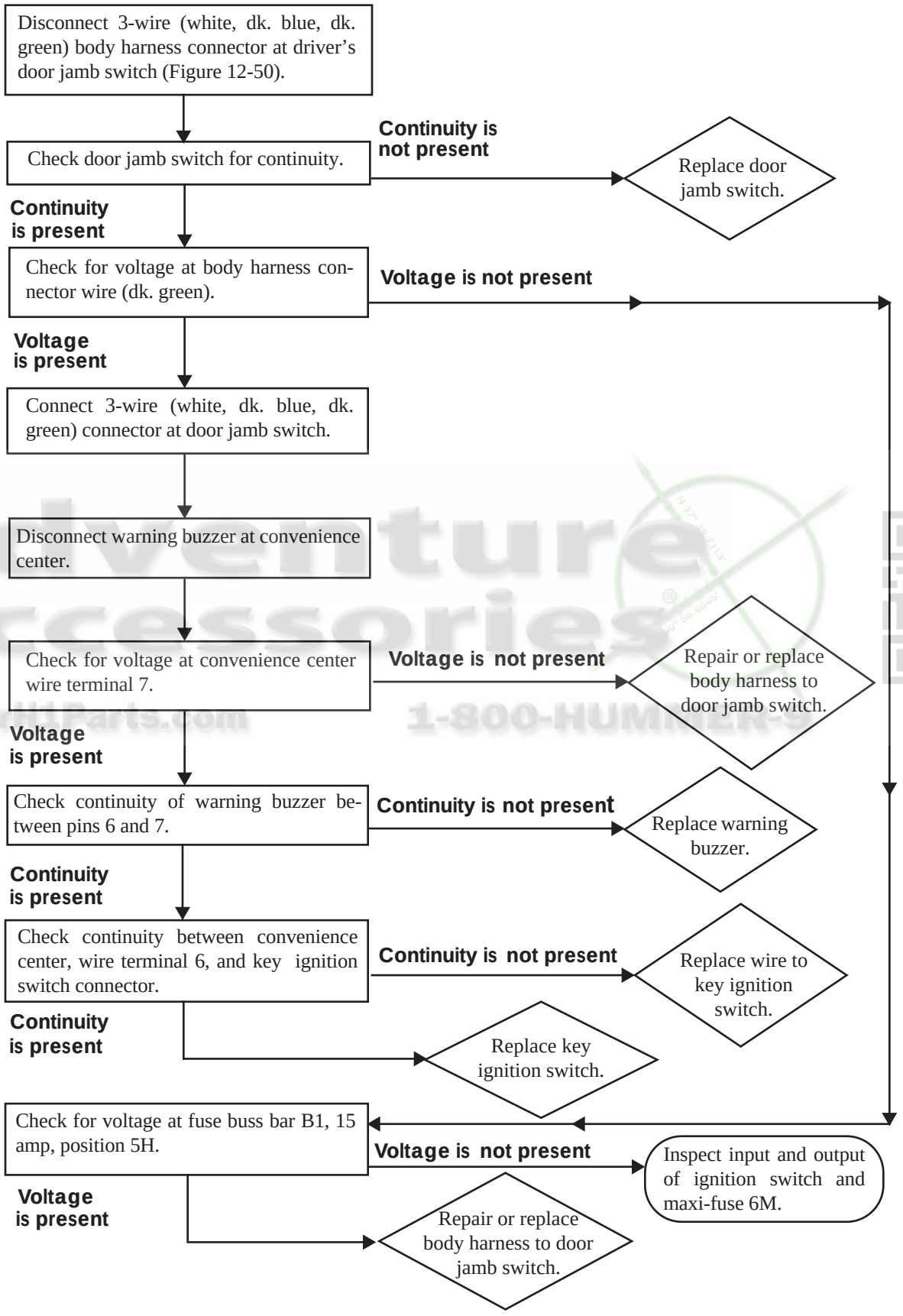
## GAUGE INDICATOR LAMP(S) INOPERATIVE



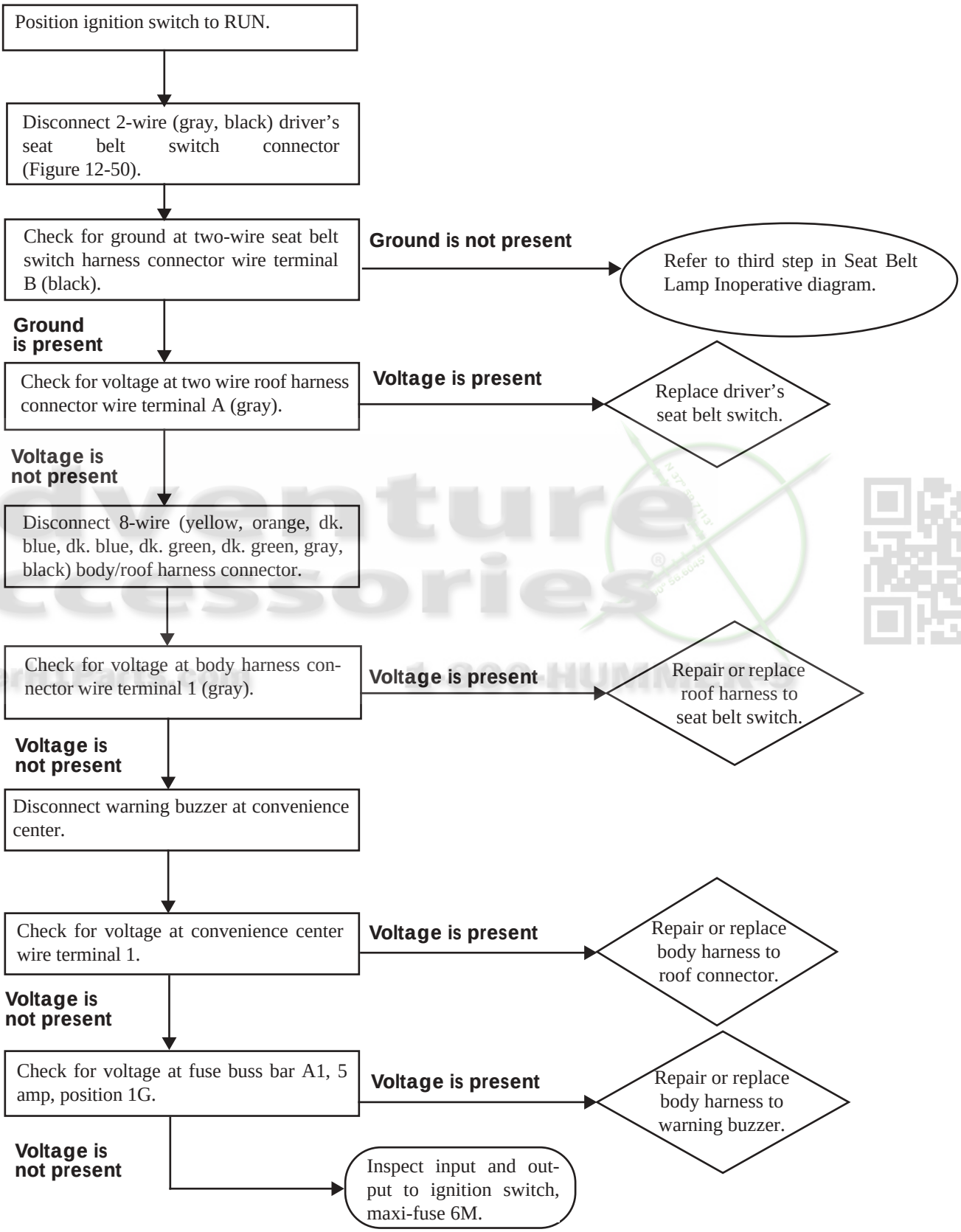
## GAUGE INDICATOR LAMP(S) INOPERATIVE – CONTINUED



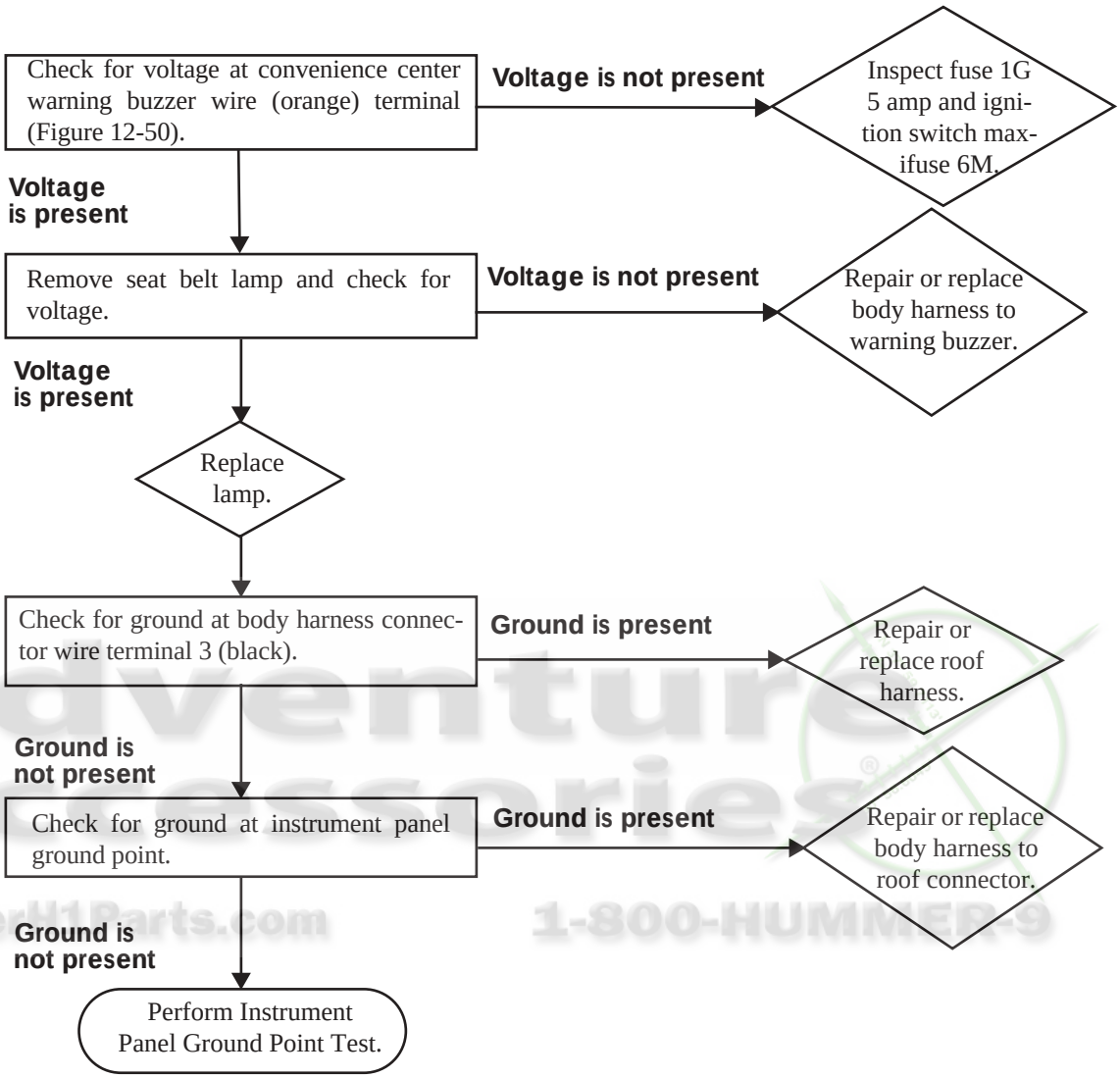
## ANTI-THEFT KEY BUZZER INOPERATIVE



## SEAT BELT BUZZER ALARM INOPERATIVE



## SEAT BELT LAMP INOPERATIVE



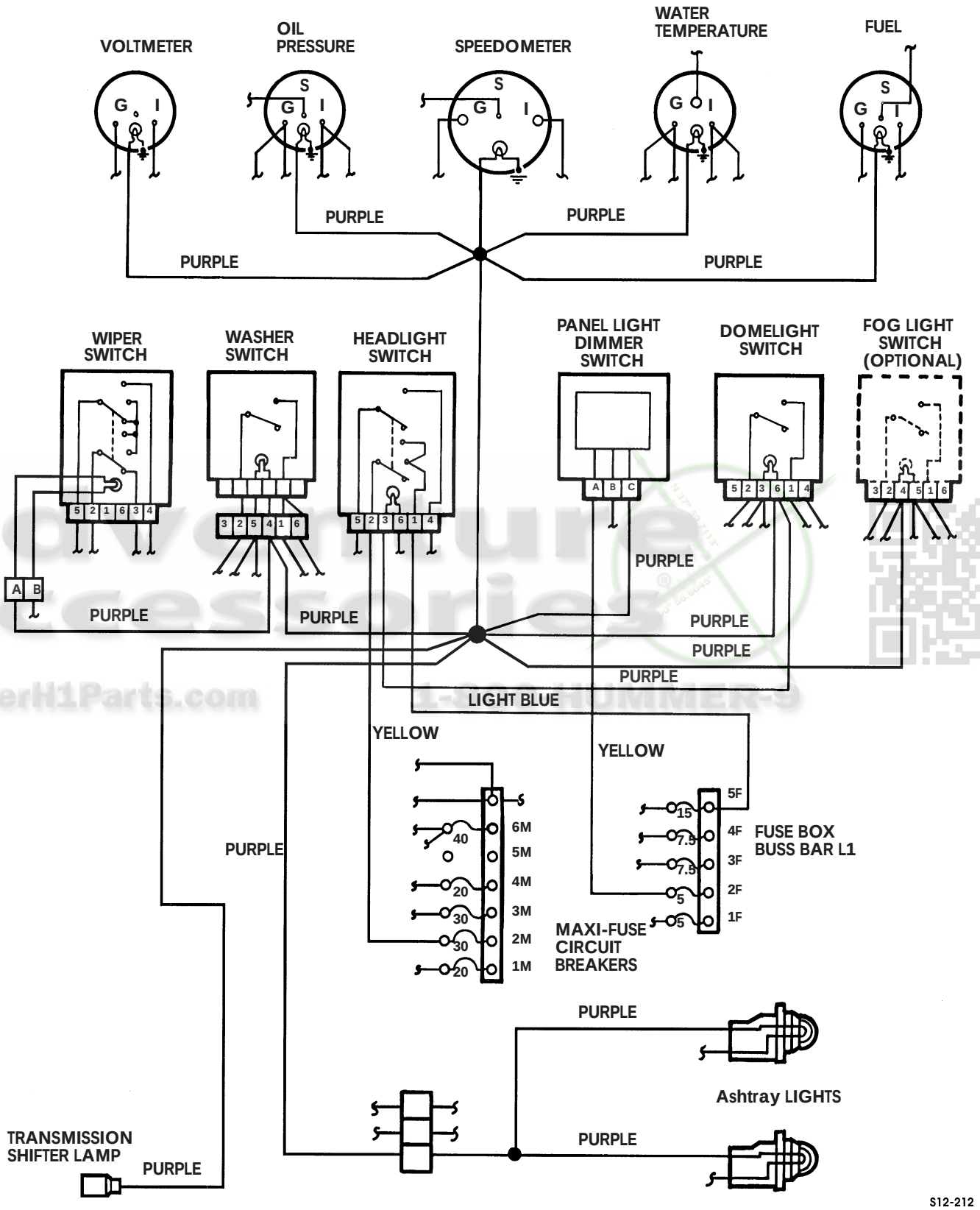



*Figure 12-49: Gauge Indicator Lamps*

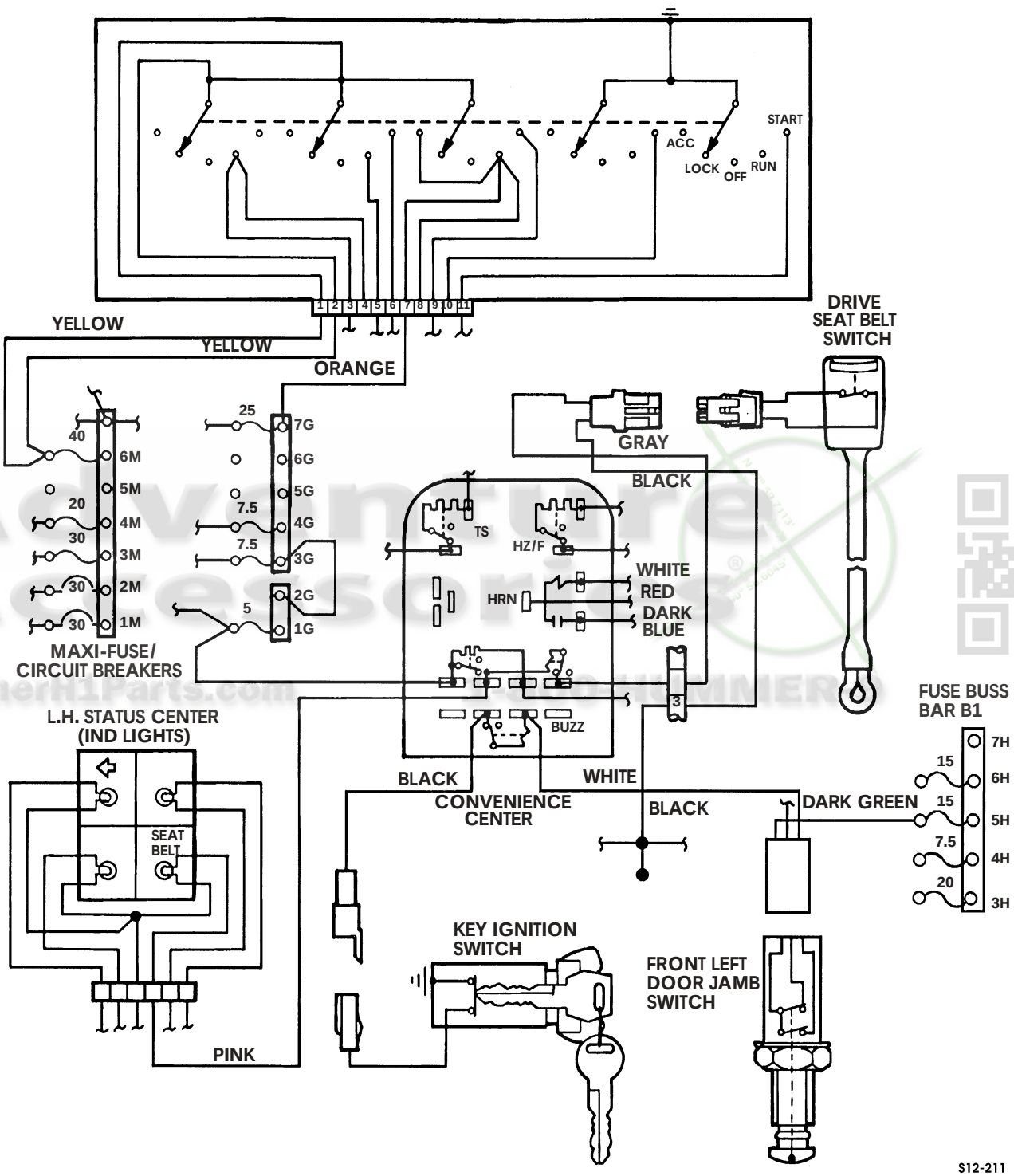



*Figure 12-50: Seat Belt Buzzer*

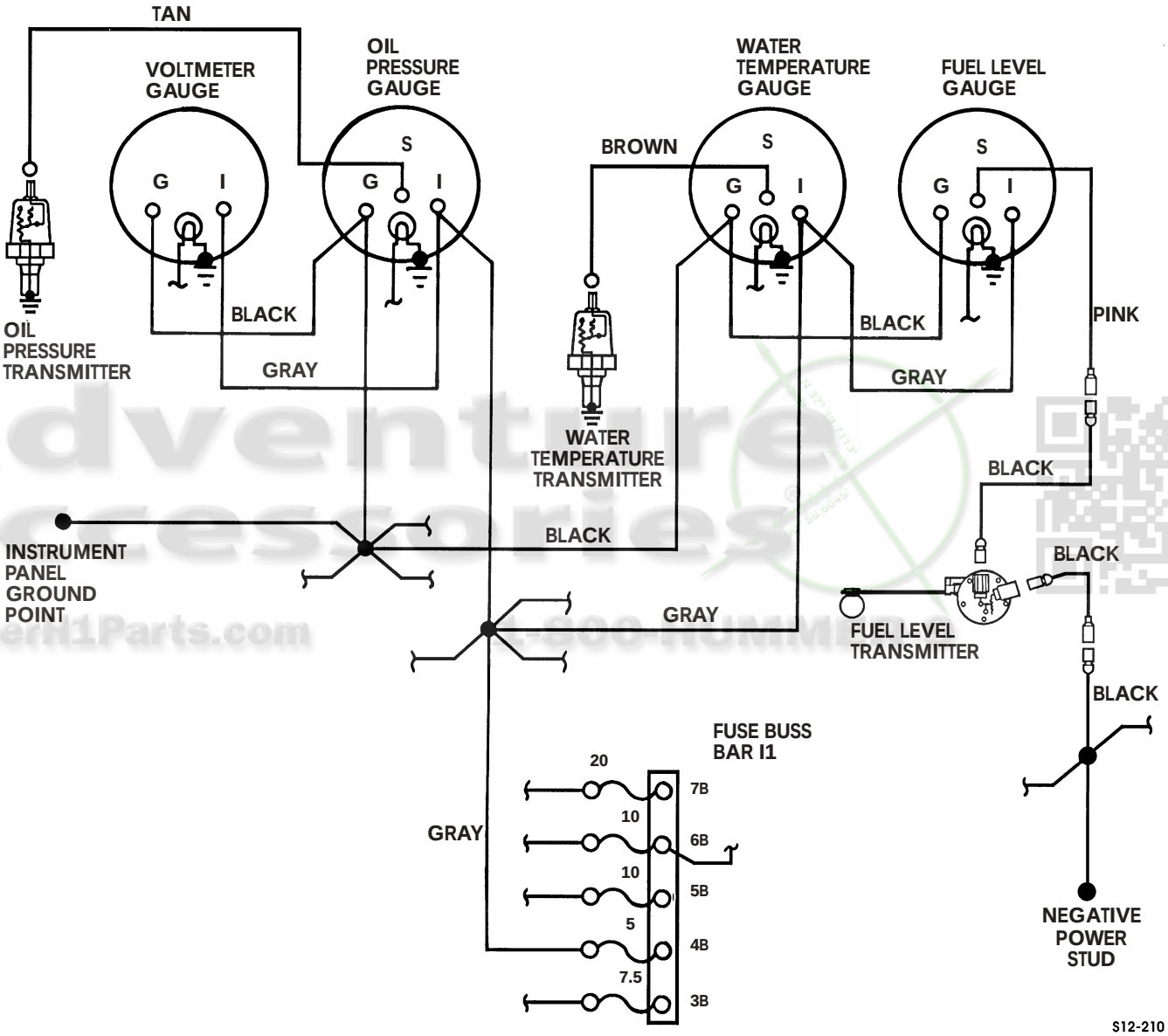
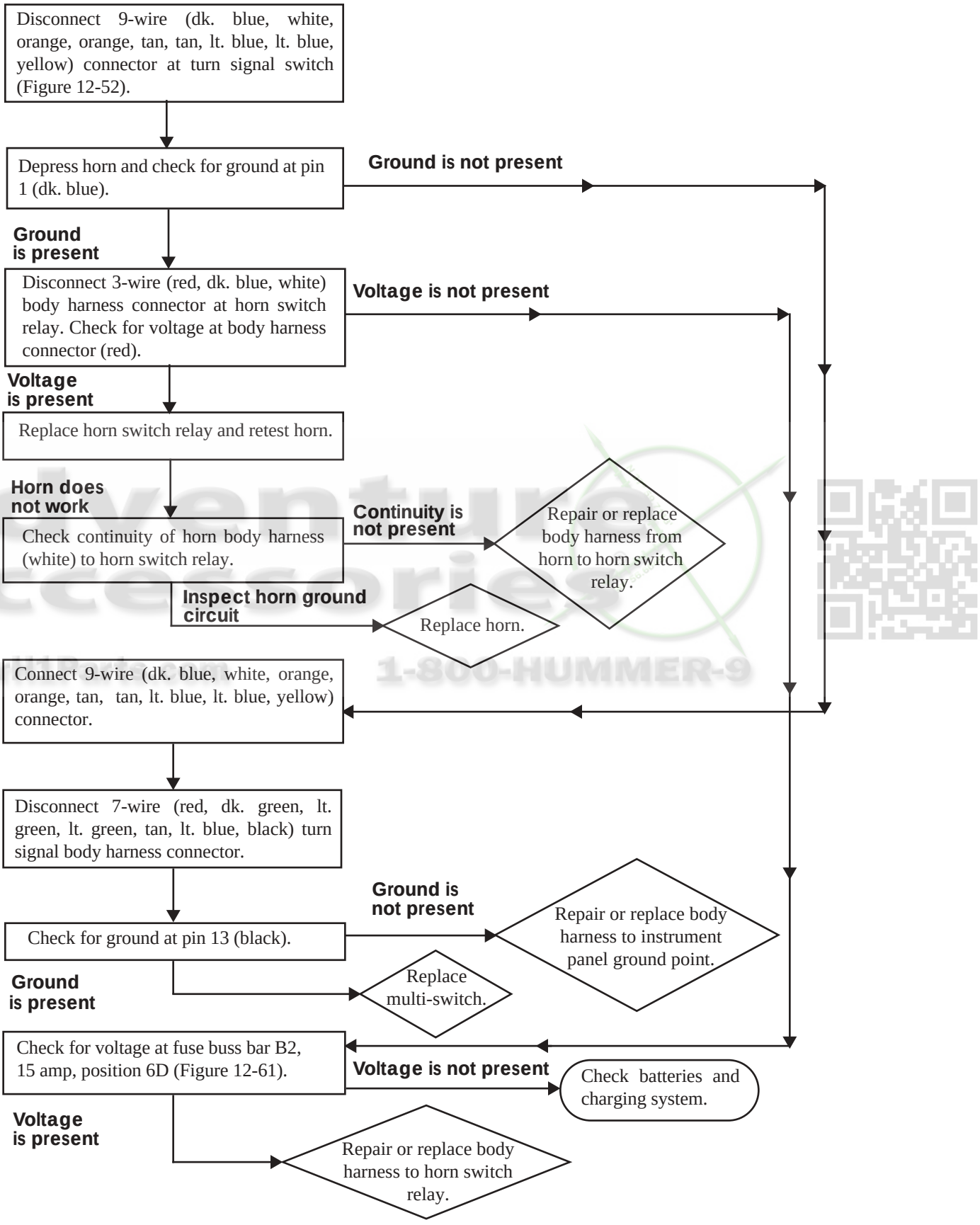
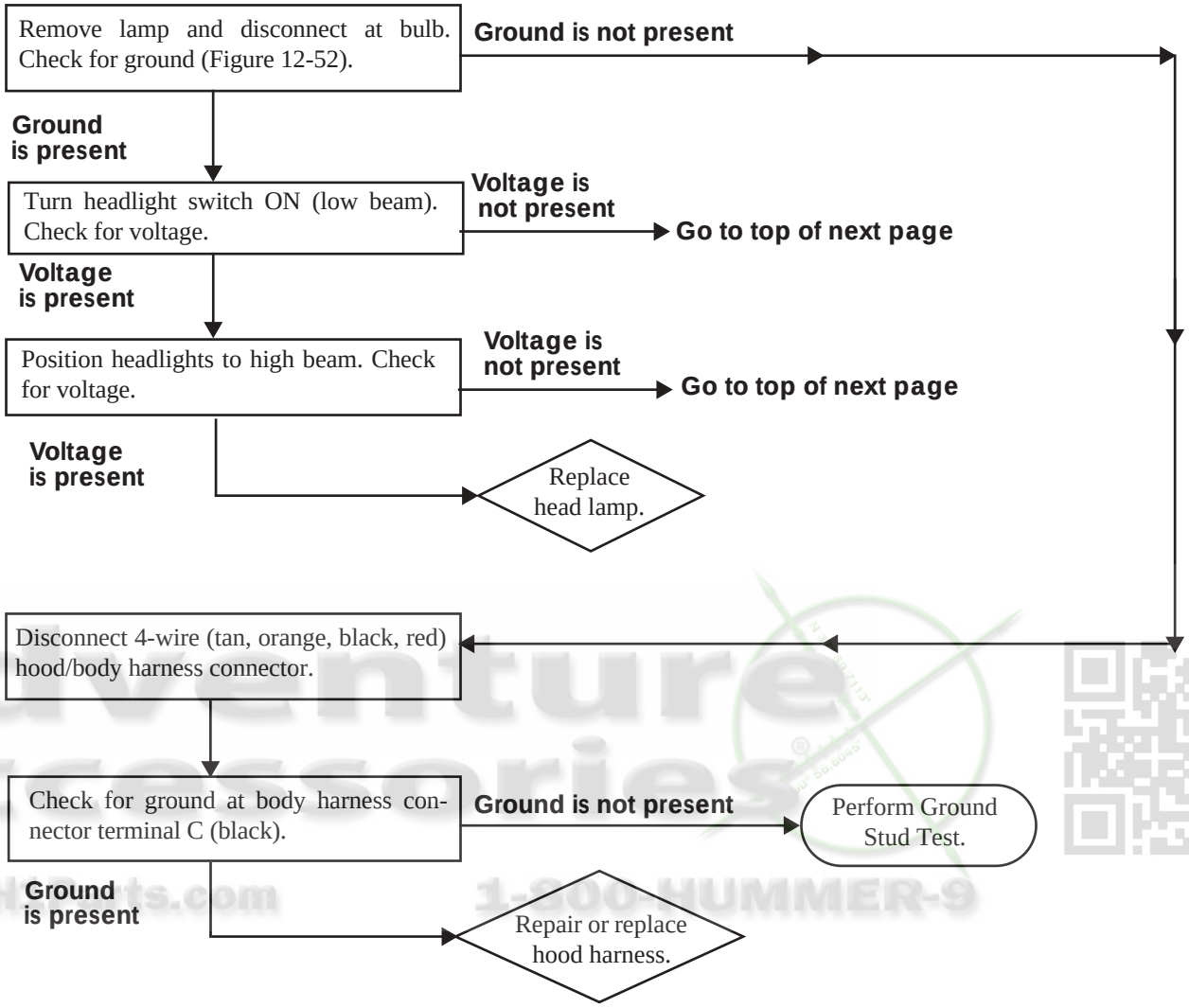



*Figure 12-51: Instrument Panel Gauges*

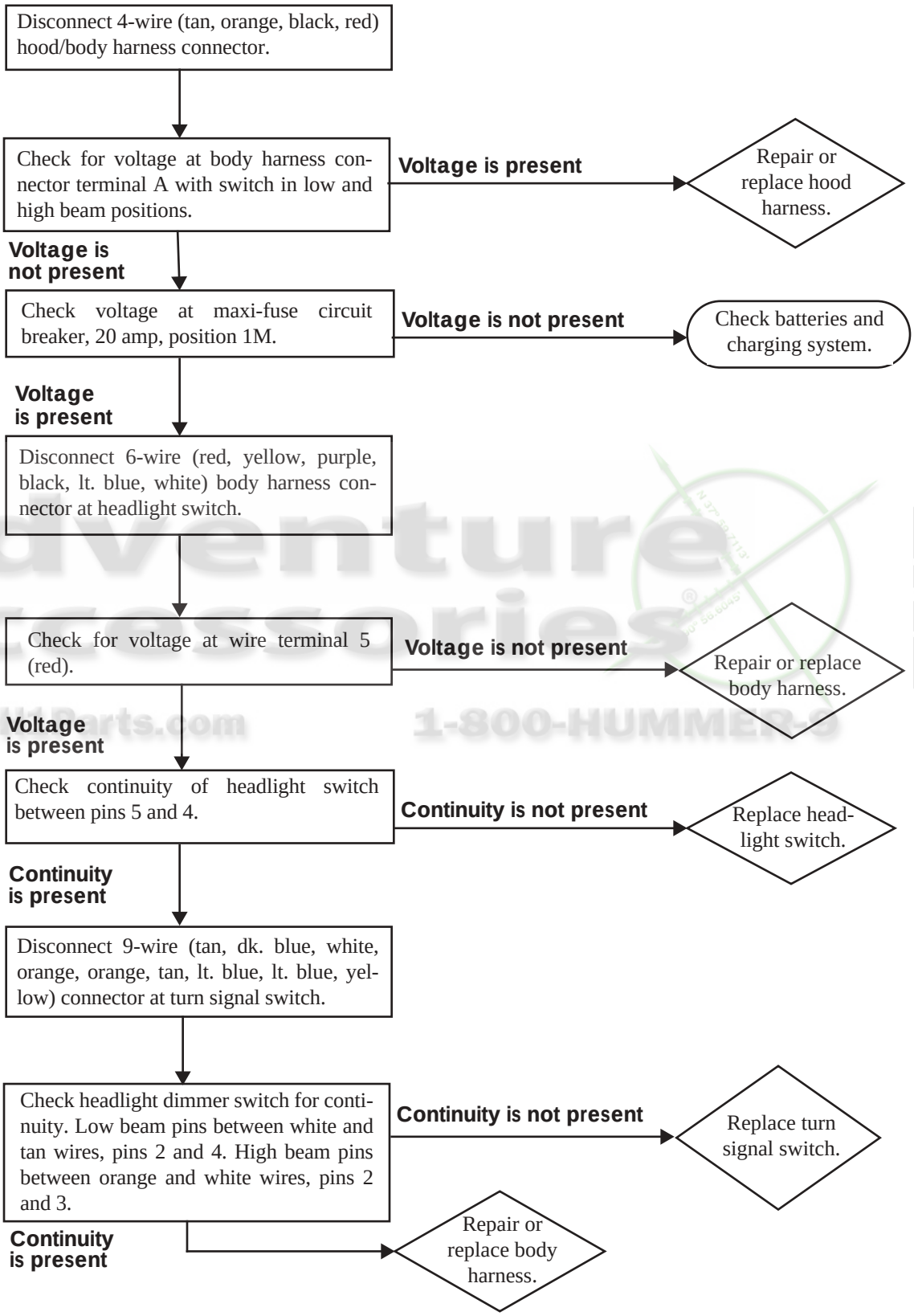
## HORN INOPERATIVE



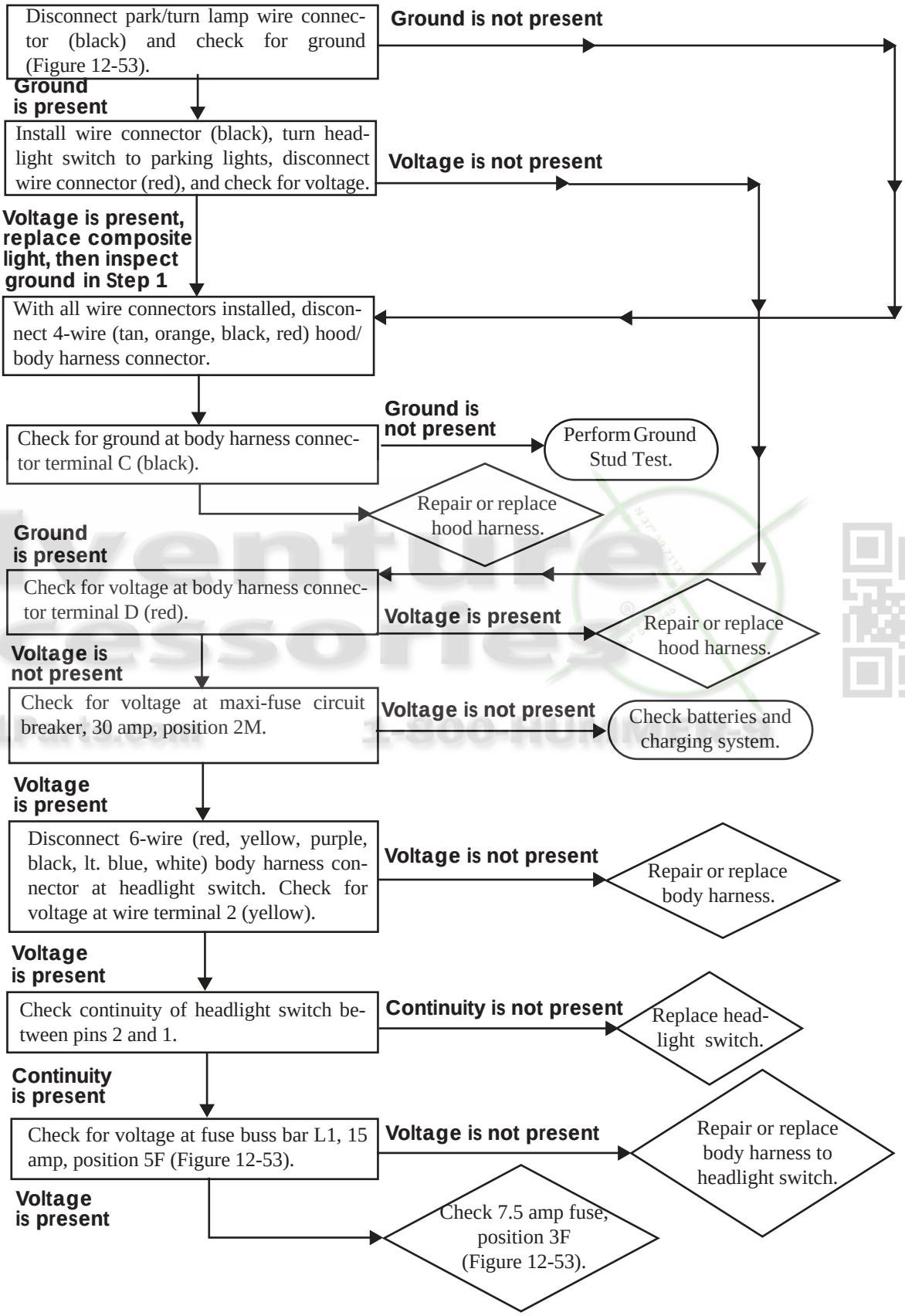
## HEADLIGHT(S) INOPERATIVE



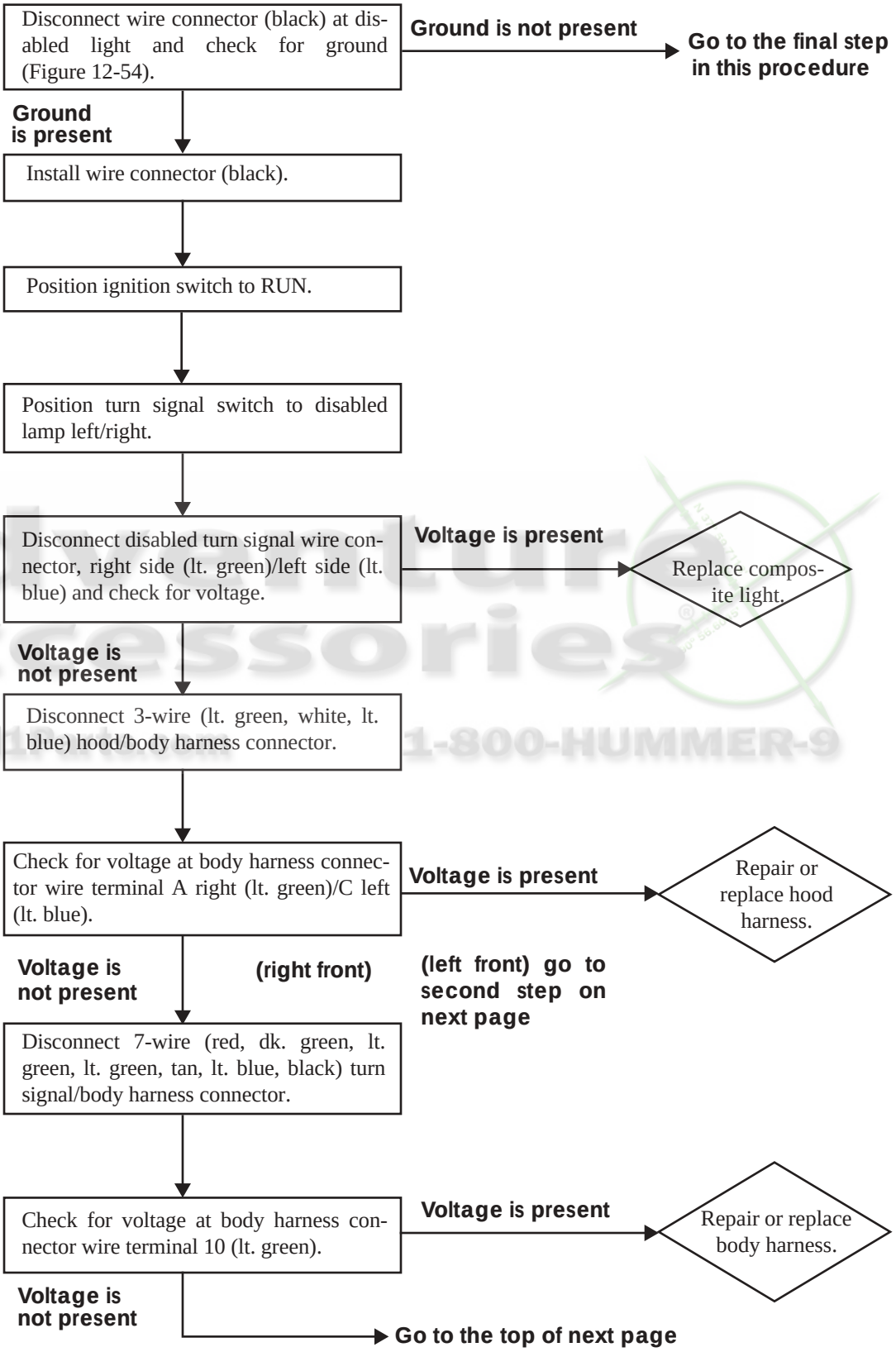
## HEADLIGHT(S) INOPERATIVE – CONTINUED



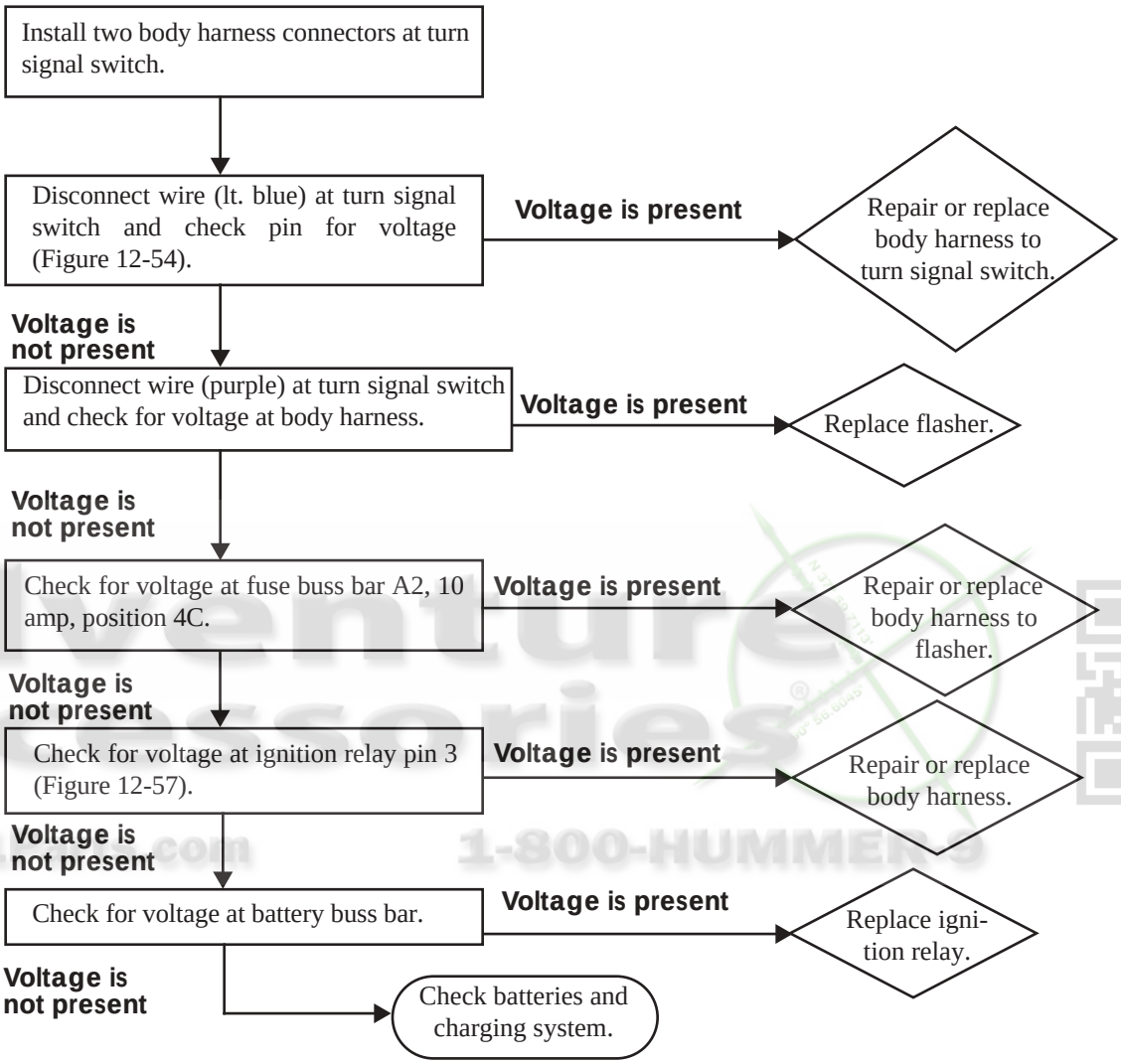
## PARKING LIGHT(S) INOPERATIVE



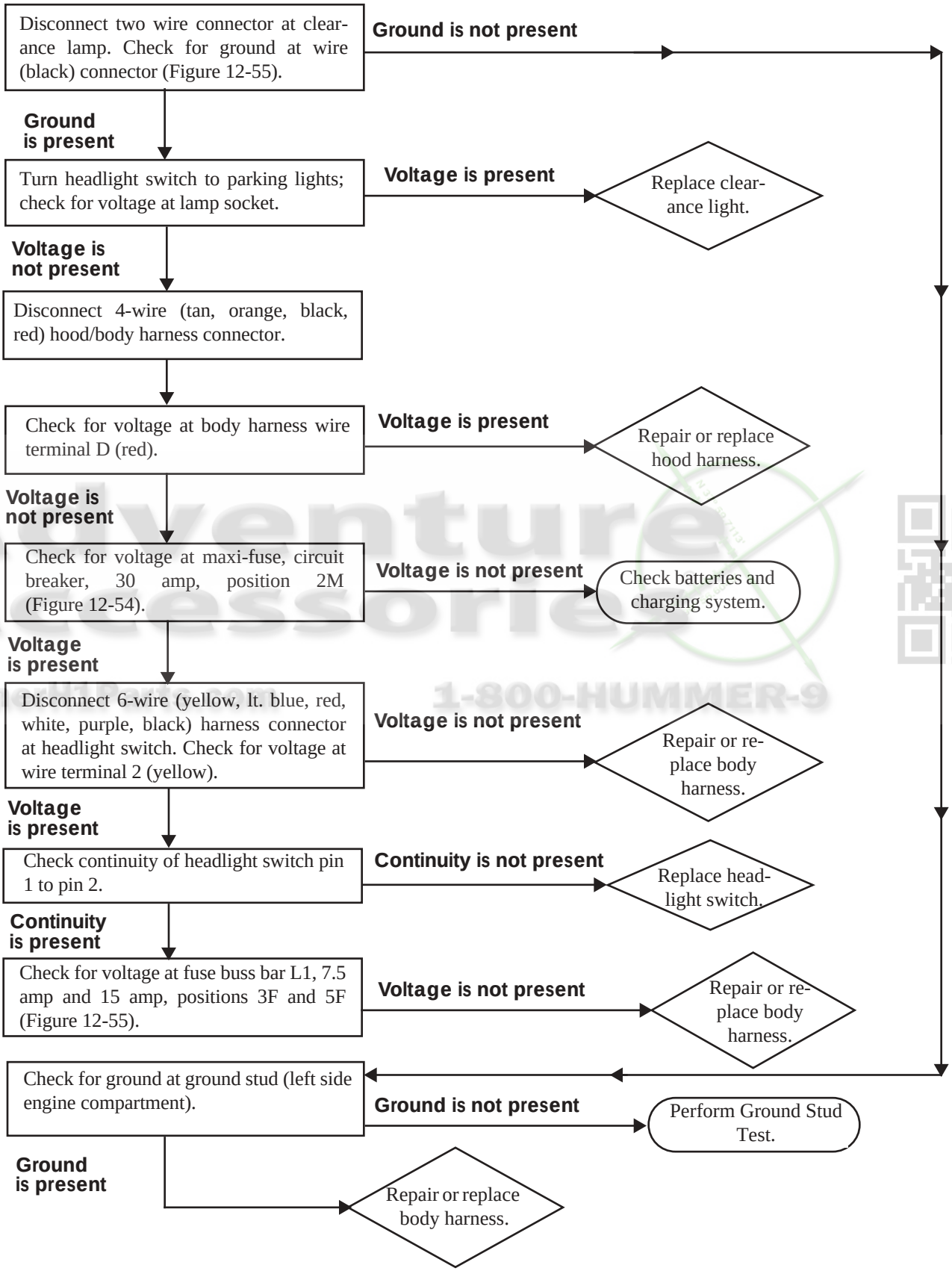
## TURN SIGNAL(S) INOPERATIVE



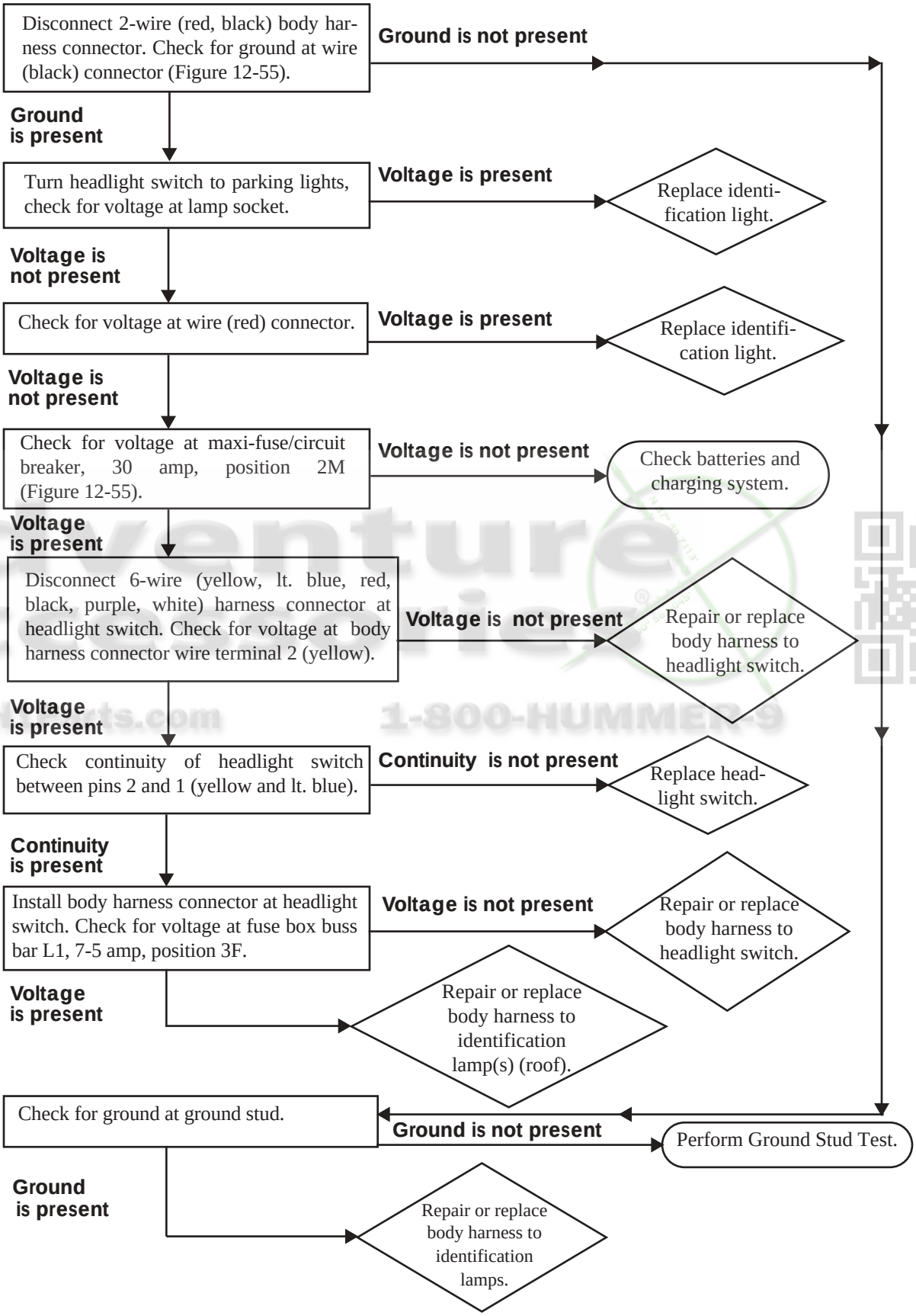
## TURN SIGNAL(S) INOPERATIVE – CONTINUED



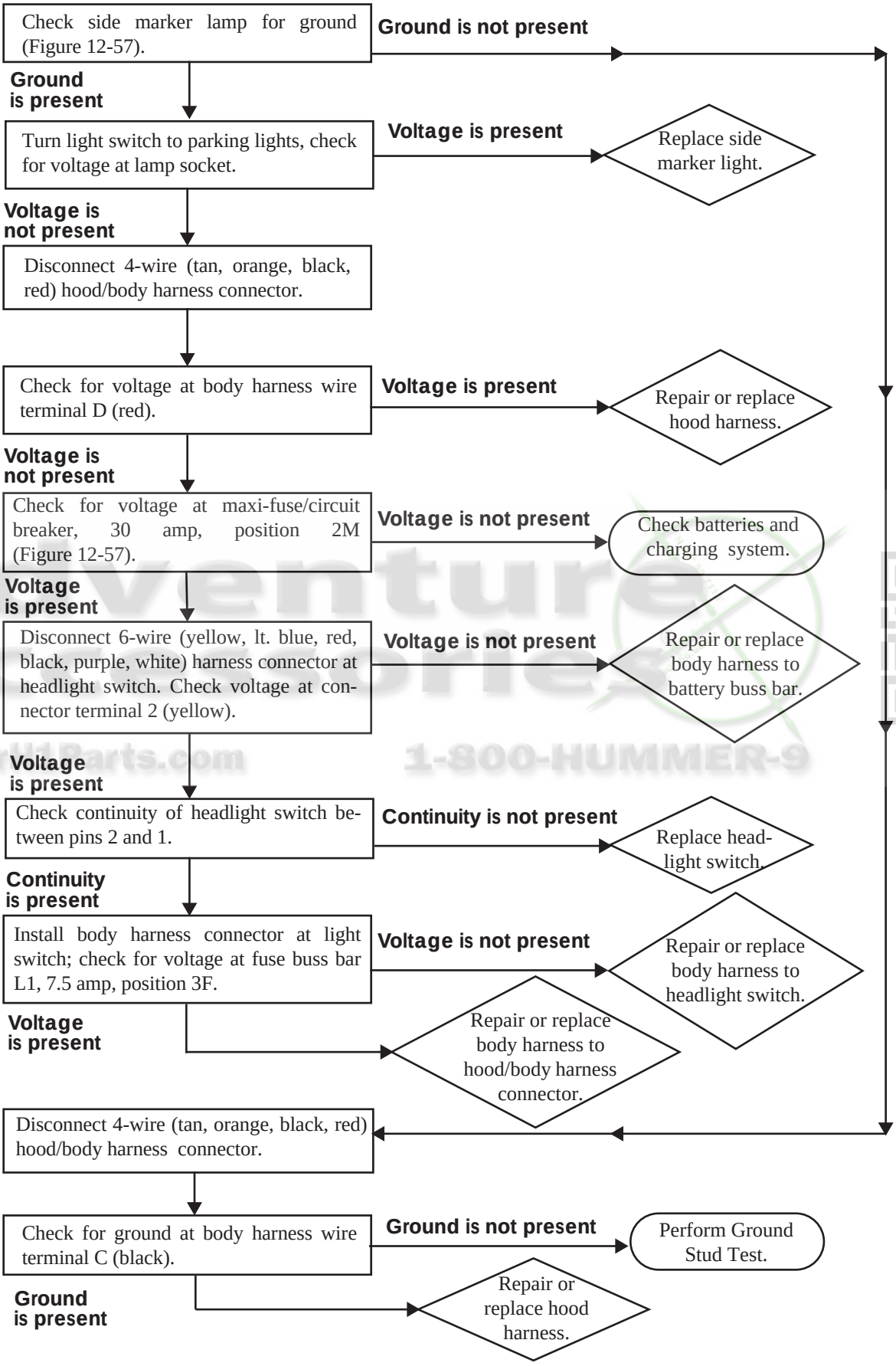
## HOOD CLEARANCE LIGHT(S) INOPERATIVE



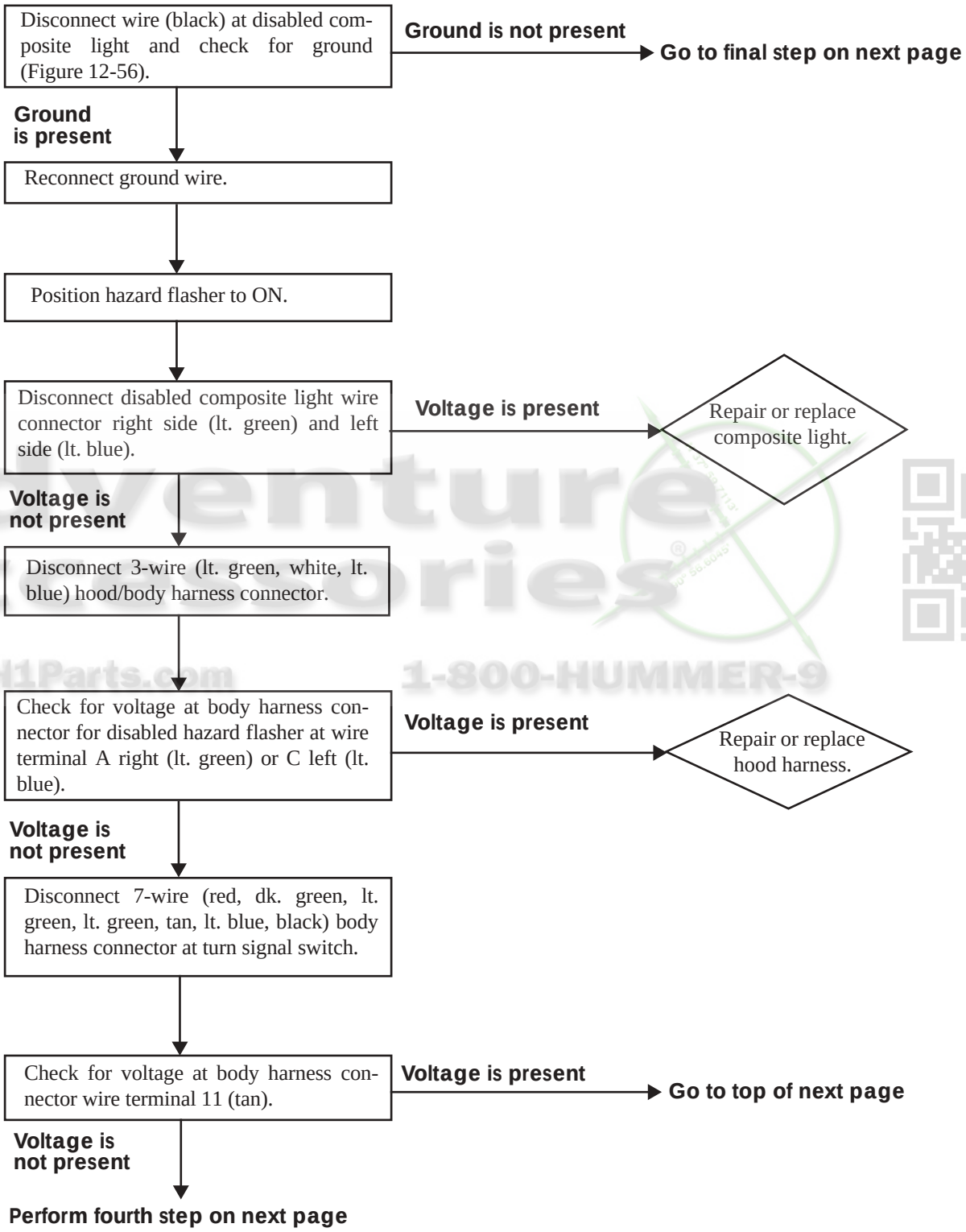
## ROOF IDENTIFICATION LIGHT(S) INOPERATIVE



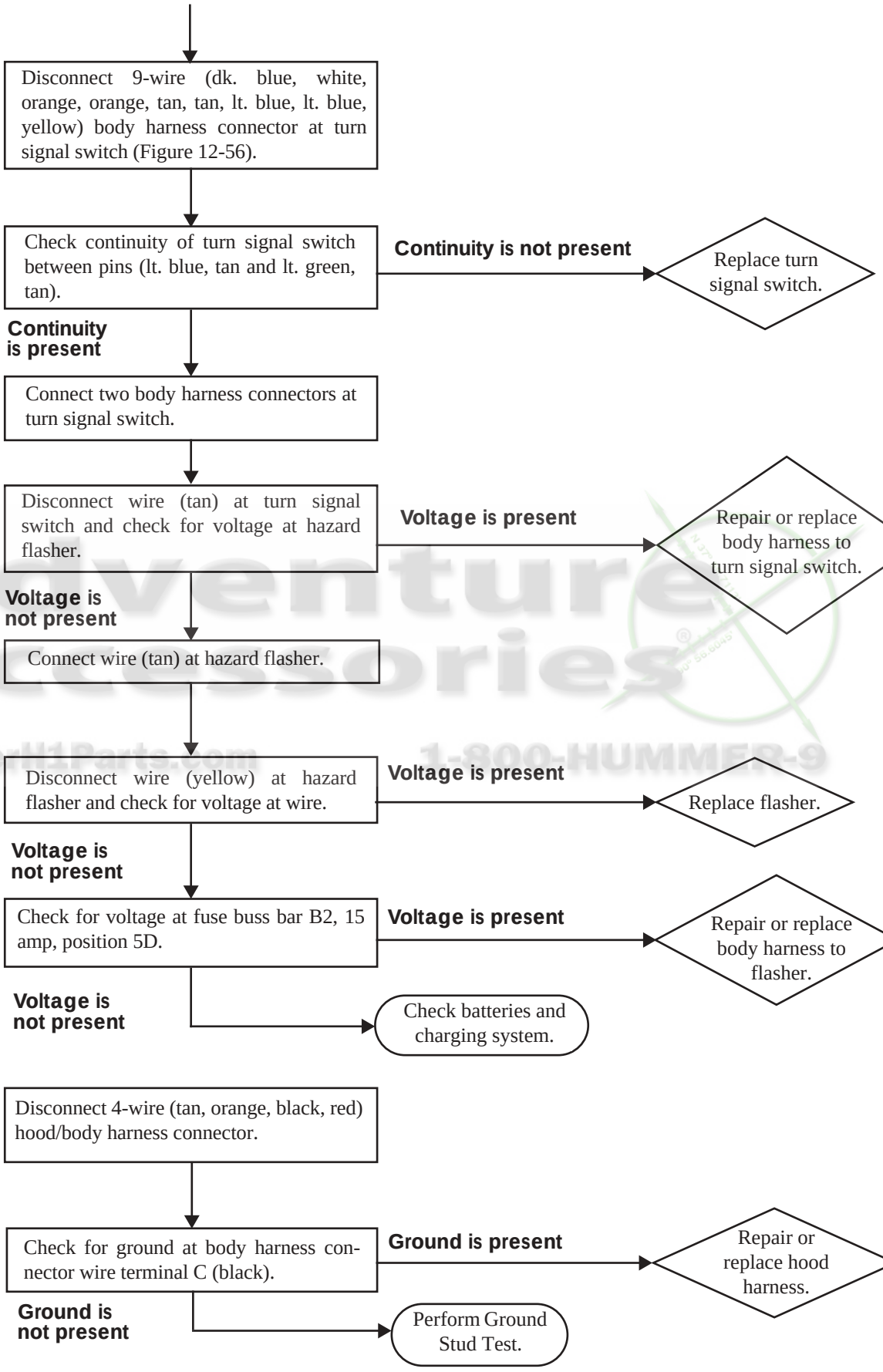
## SIDE MARKER LIGHT(S) INOPERATIVE



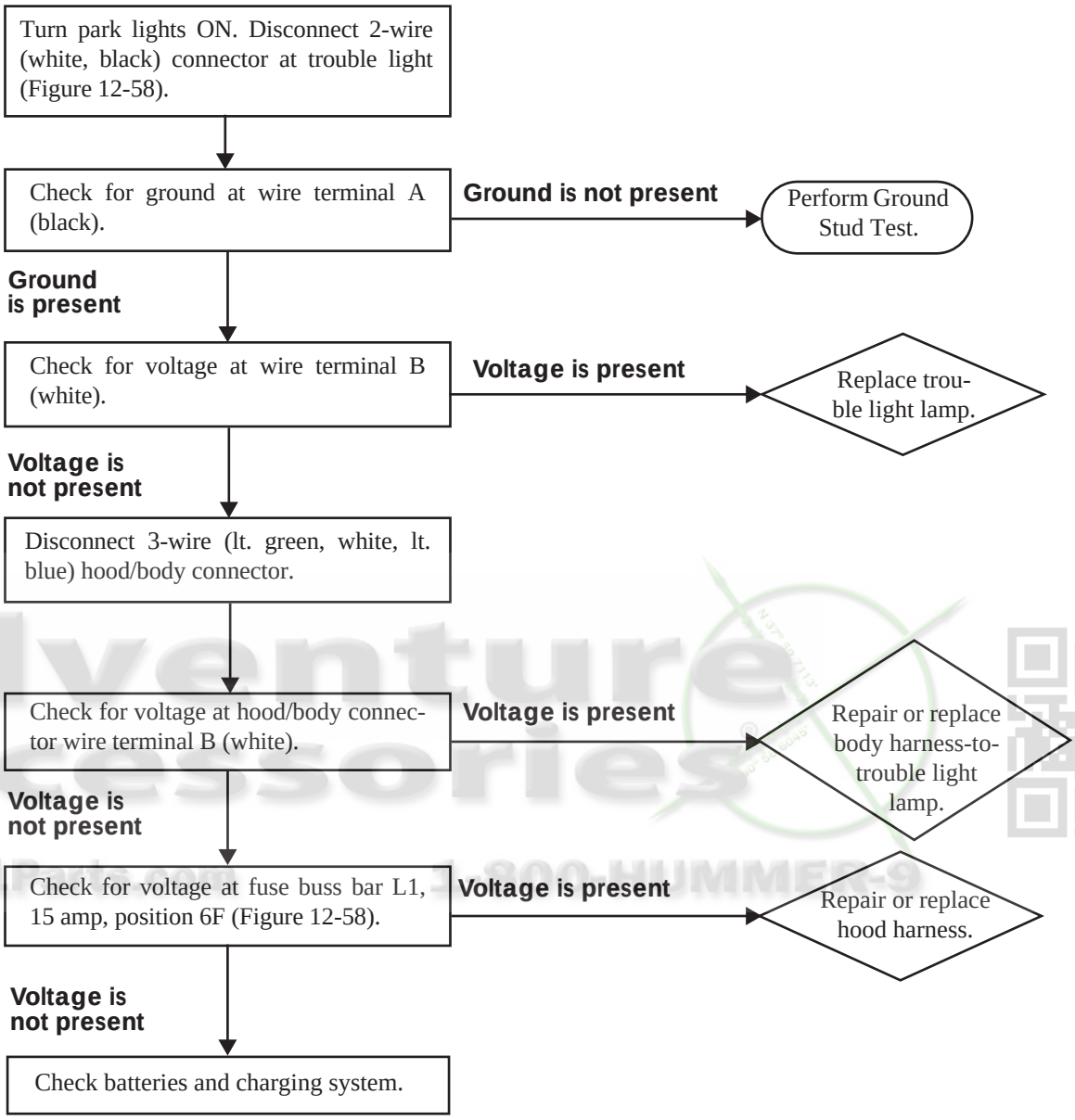
## HAZARD FLASHER(S) (HOOD HARNESS) INOPERATIVE



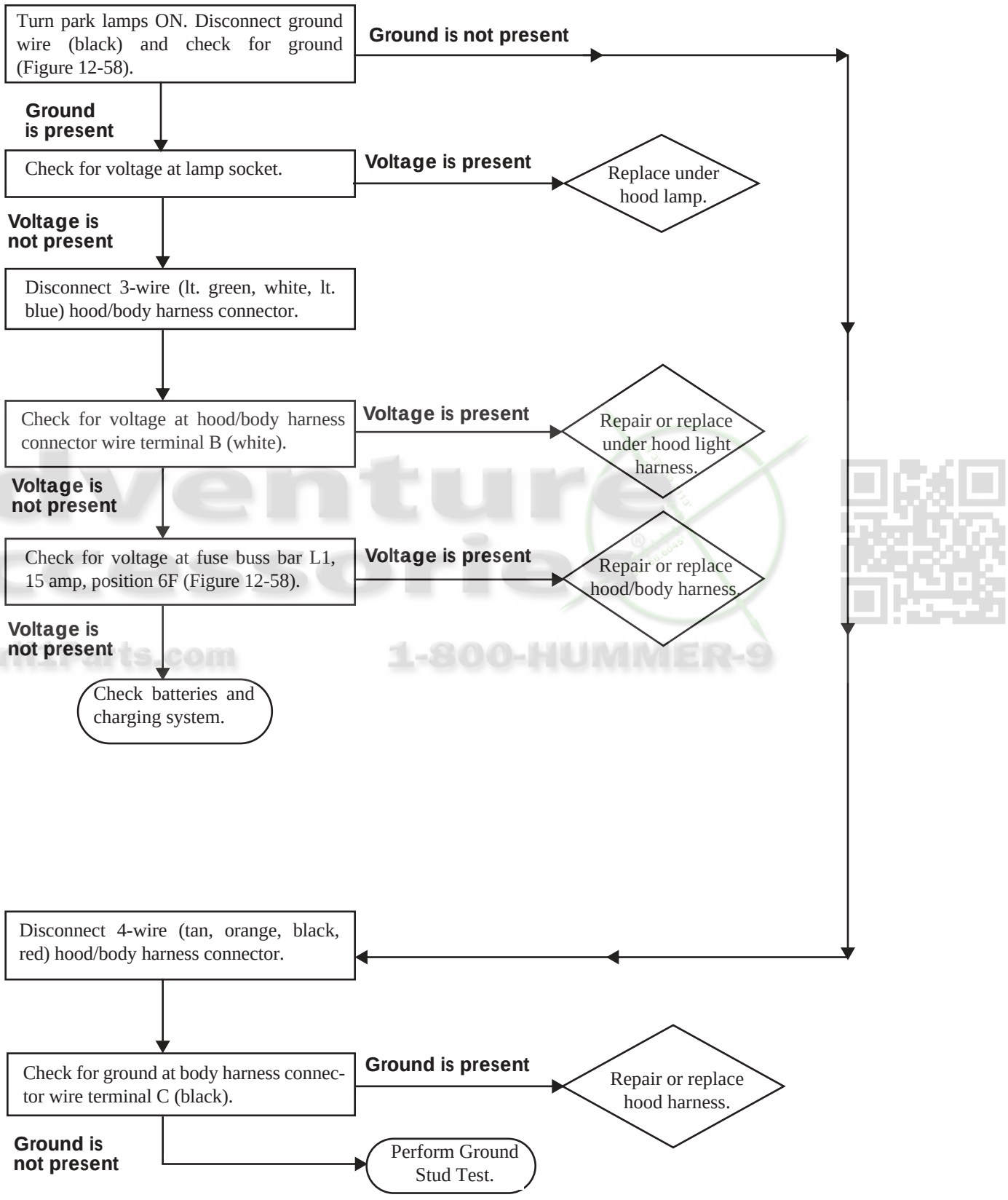
## HAZARD FLASHER(S) (HOOD HARNESS) INOPERATIVE – CONTINUED



## TROUBLE LIGHT INOPERATIVE



## UNDER HOOD LIGHT INOPERATIVE



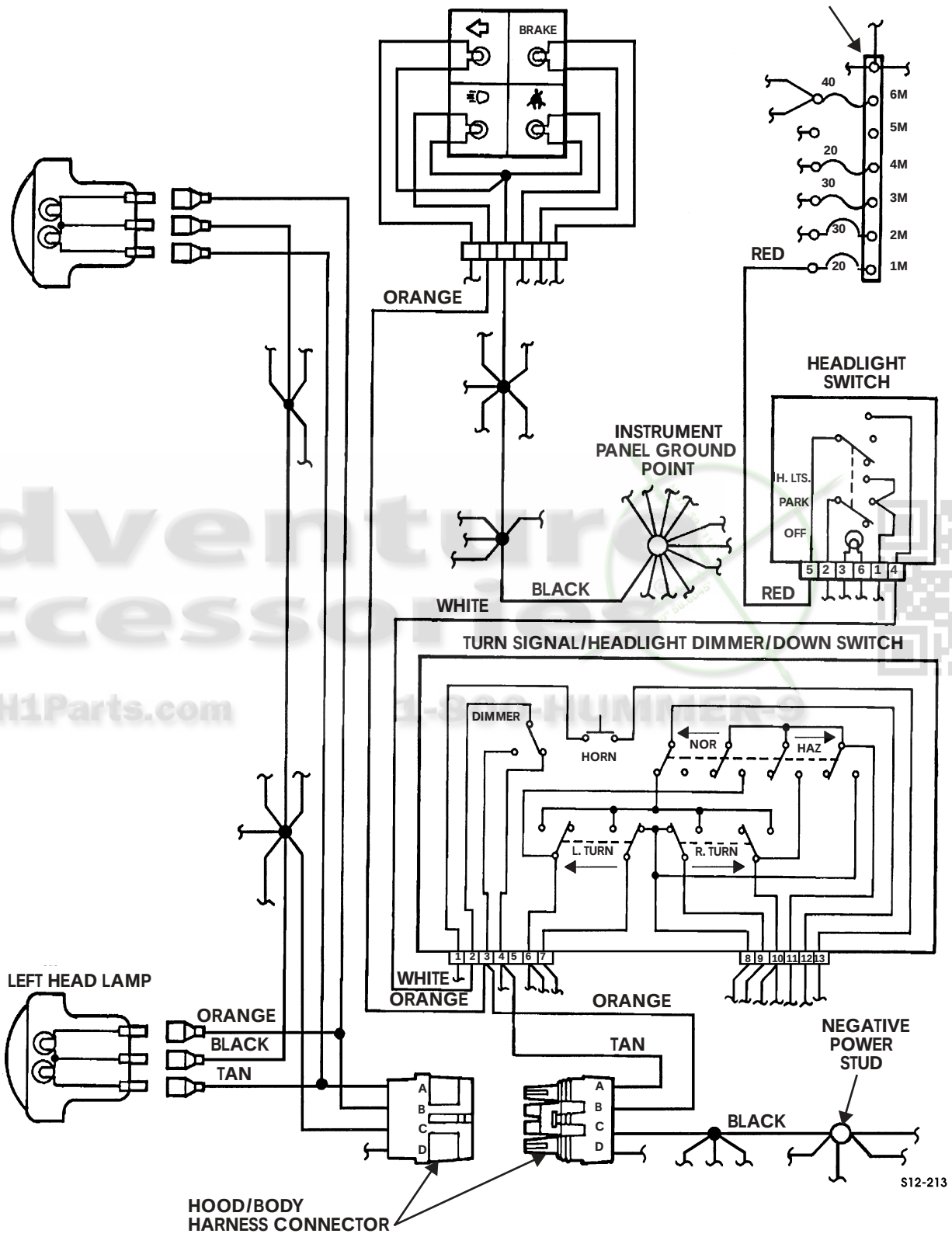



*Figure 12-52: Headlights*

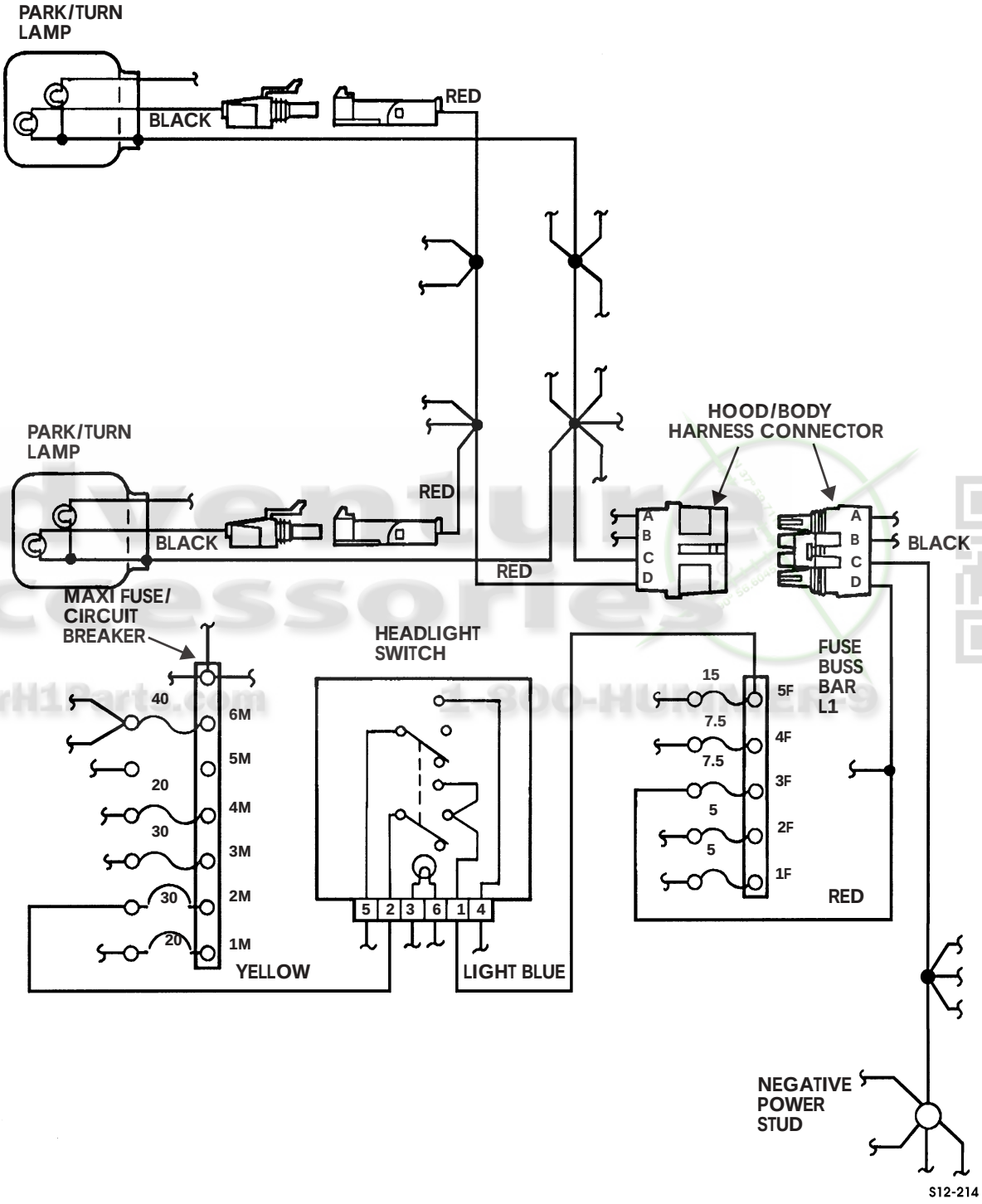



*Figure 12-53: Front Parking Lights*

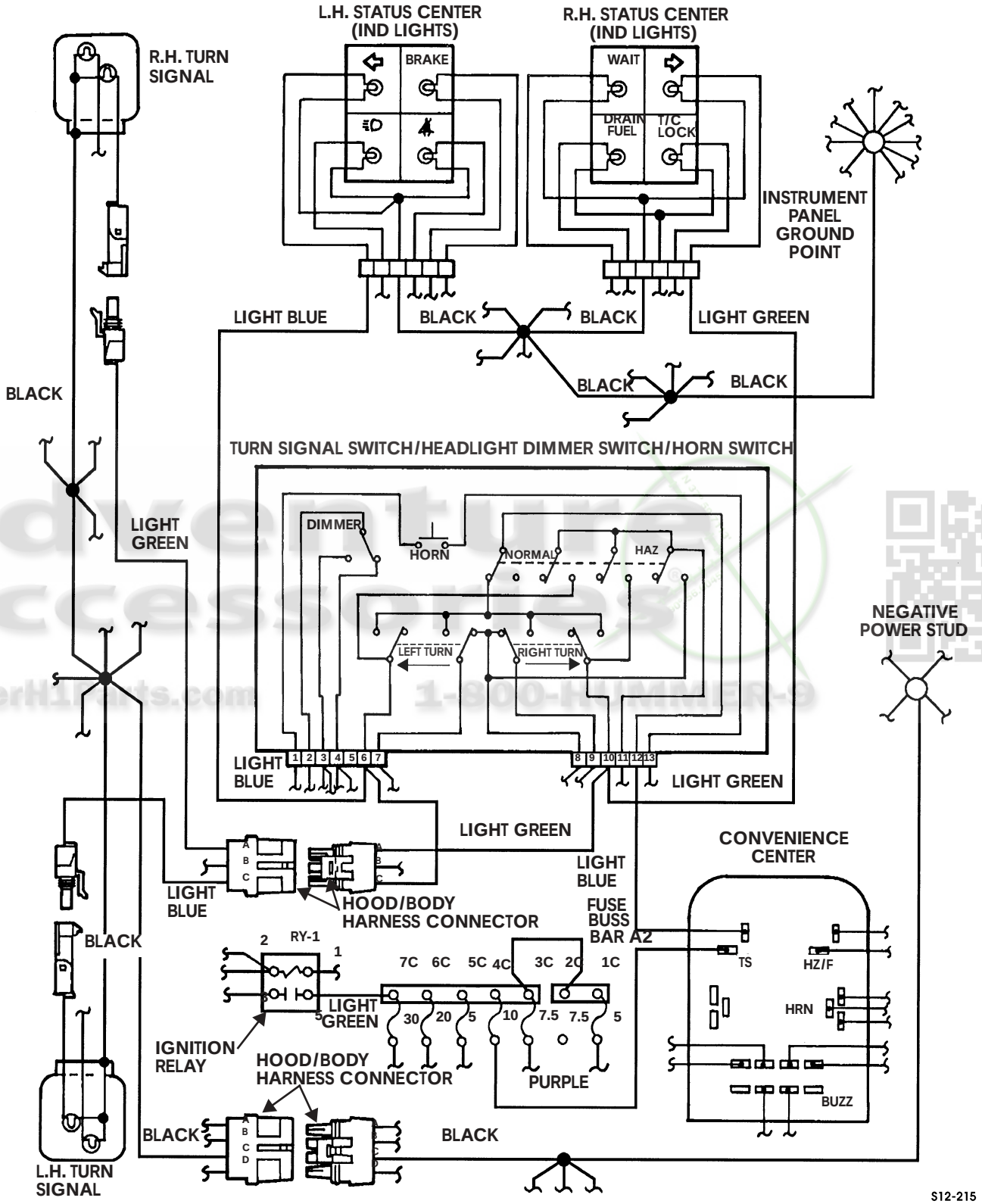



*Figure 12-54: Front Turn Signals*

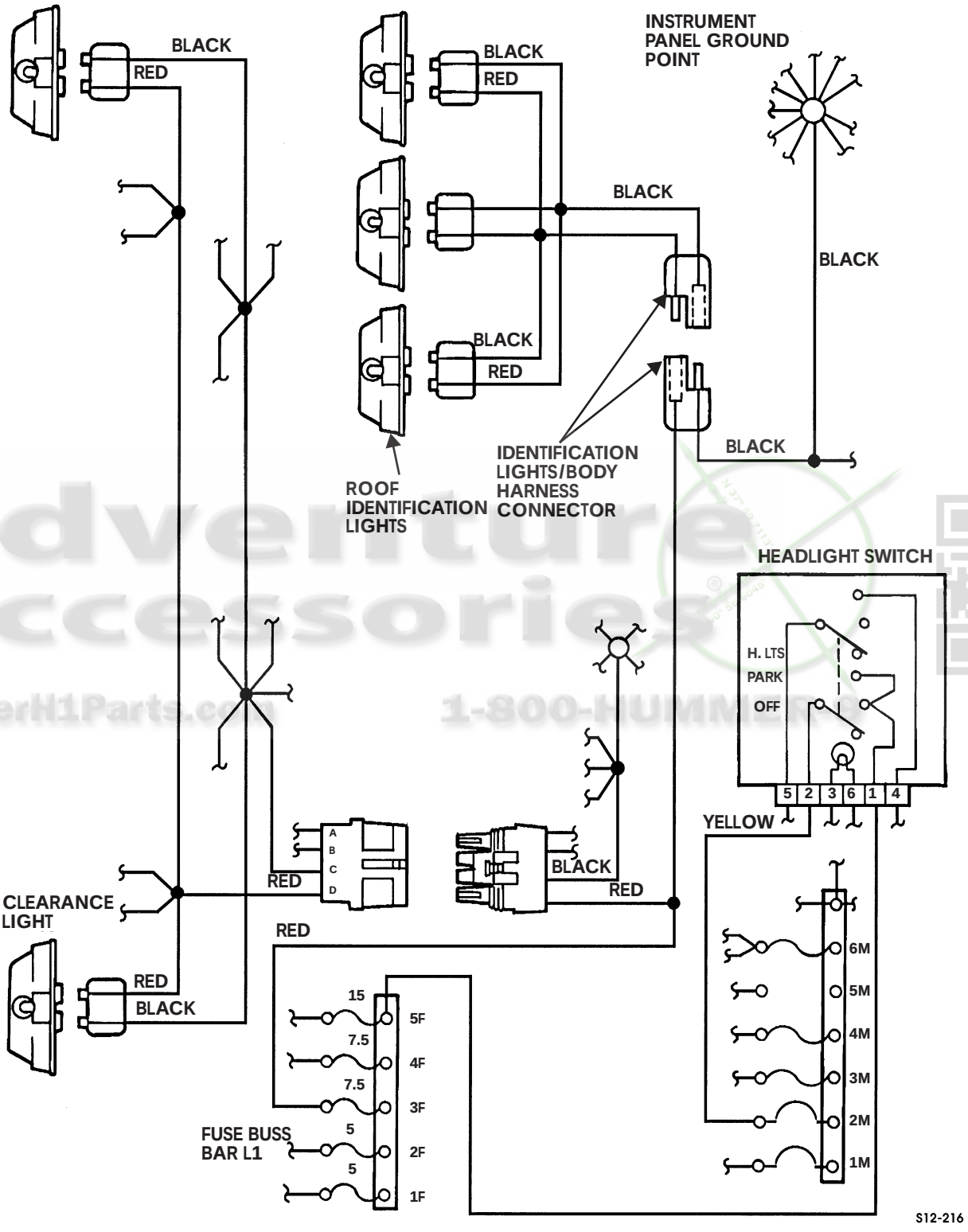





*Figure 12-55: Hood and Roof Identification Lights*

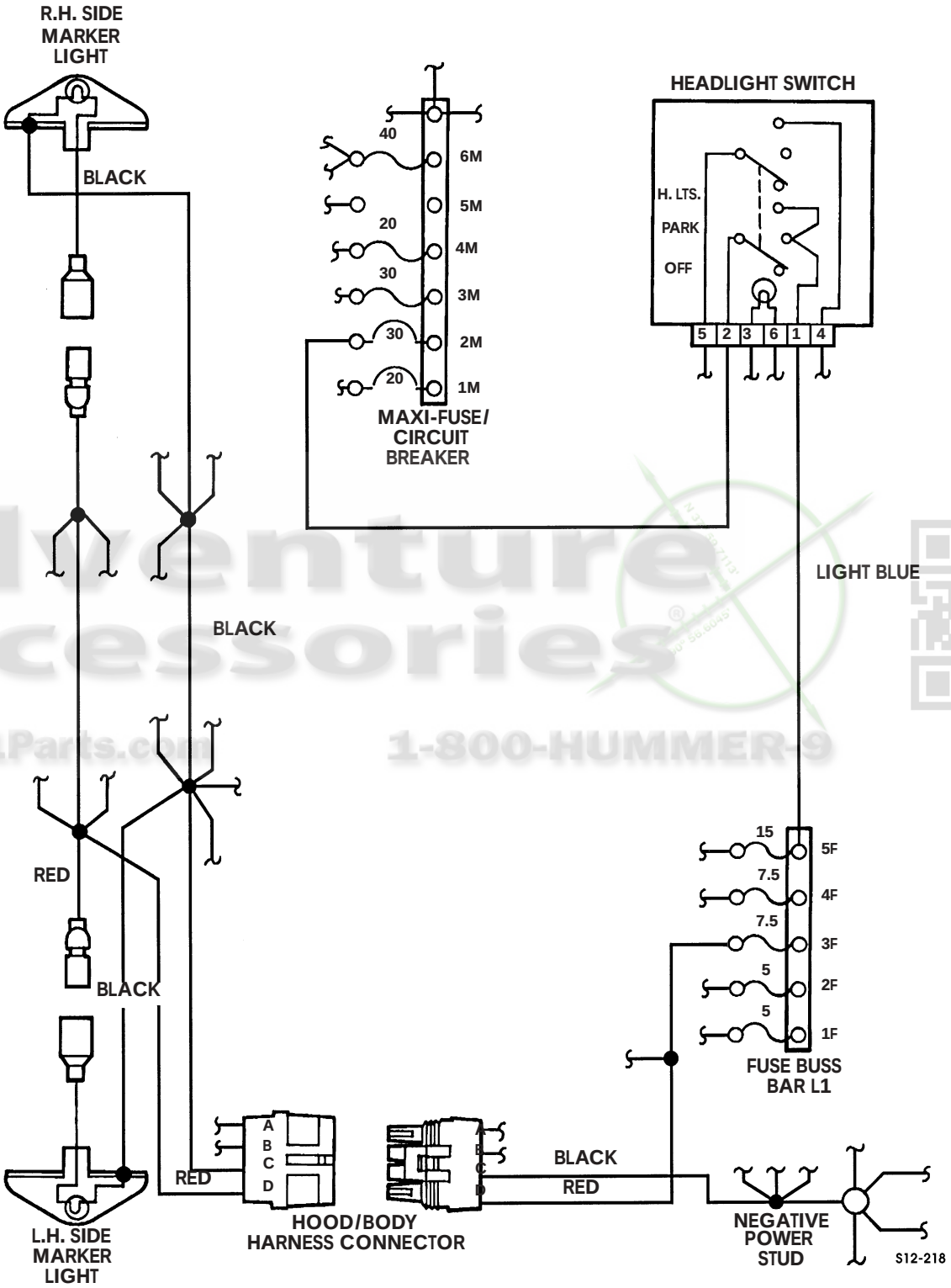



*Figure 12-56: Front Side Marker Lights*

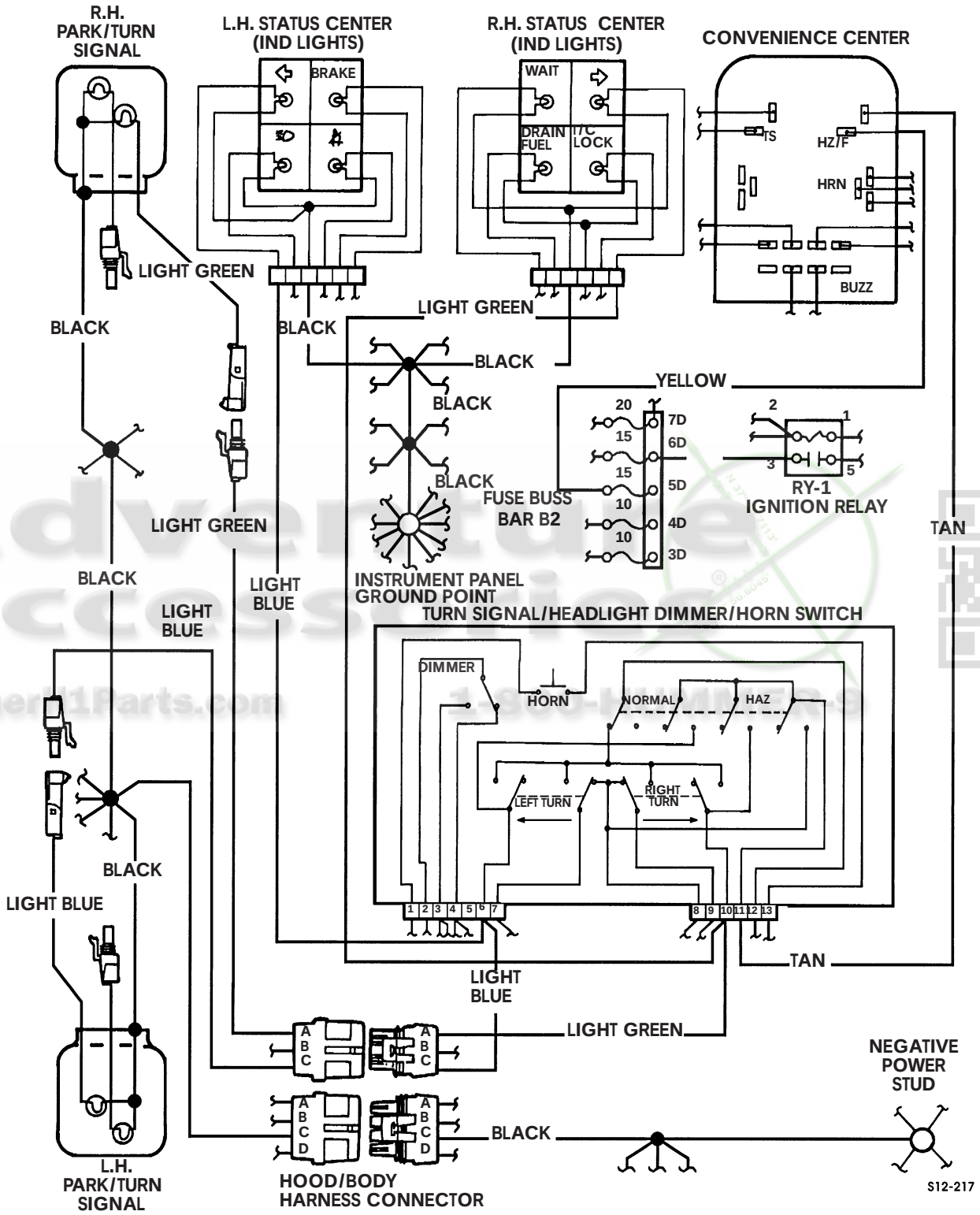



*Figure 12-57: Hazards Flashers*

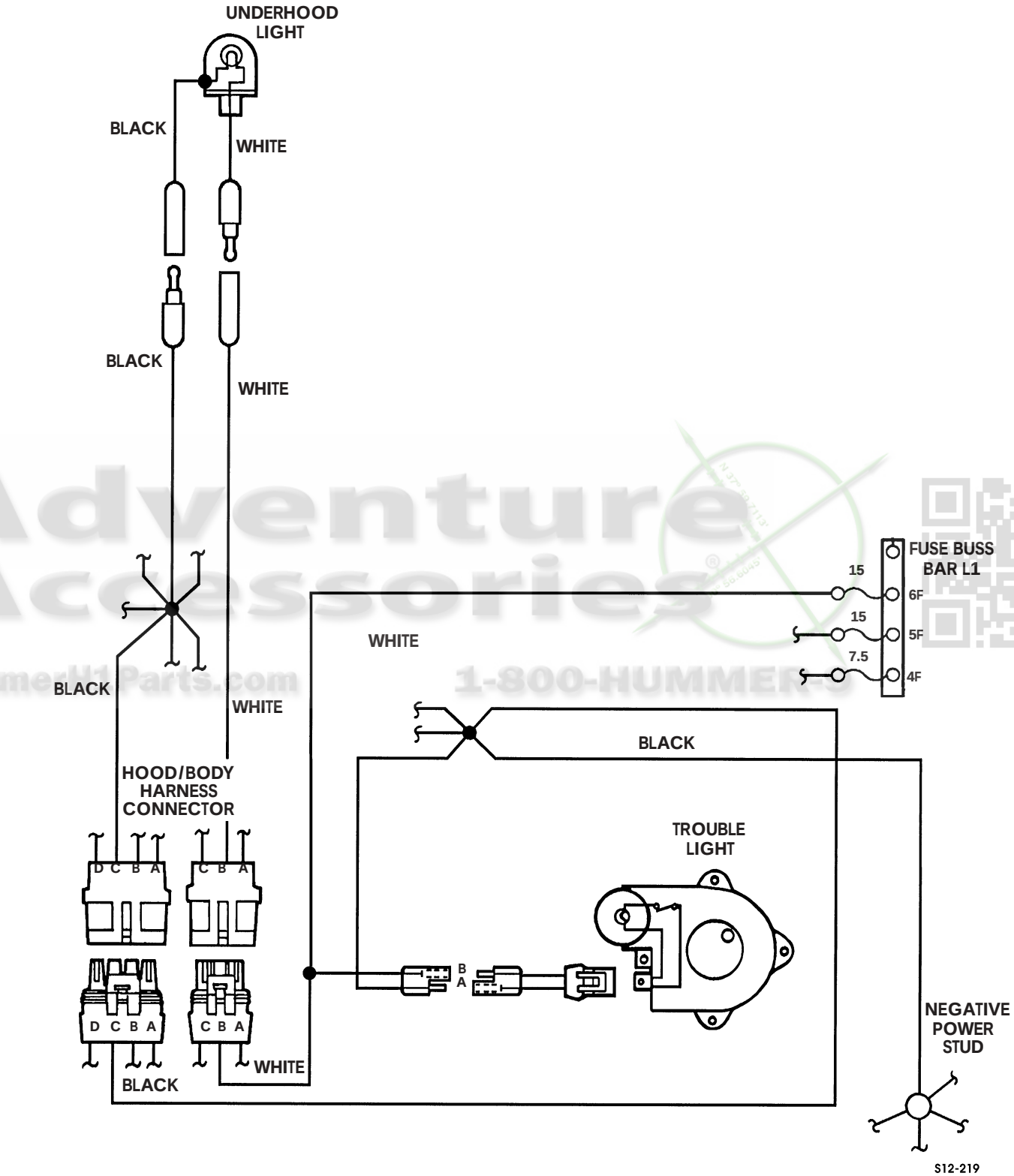
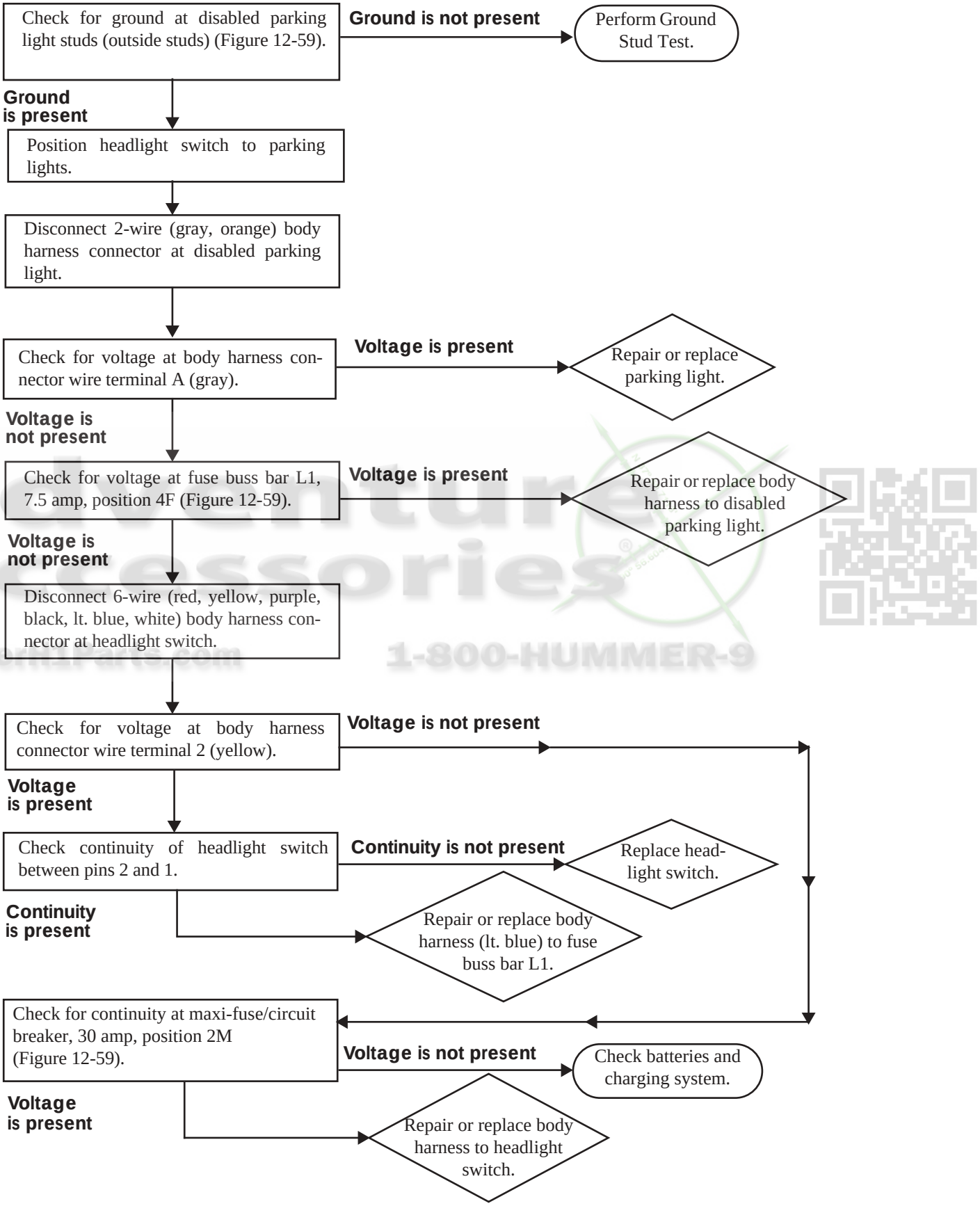
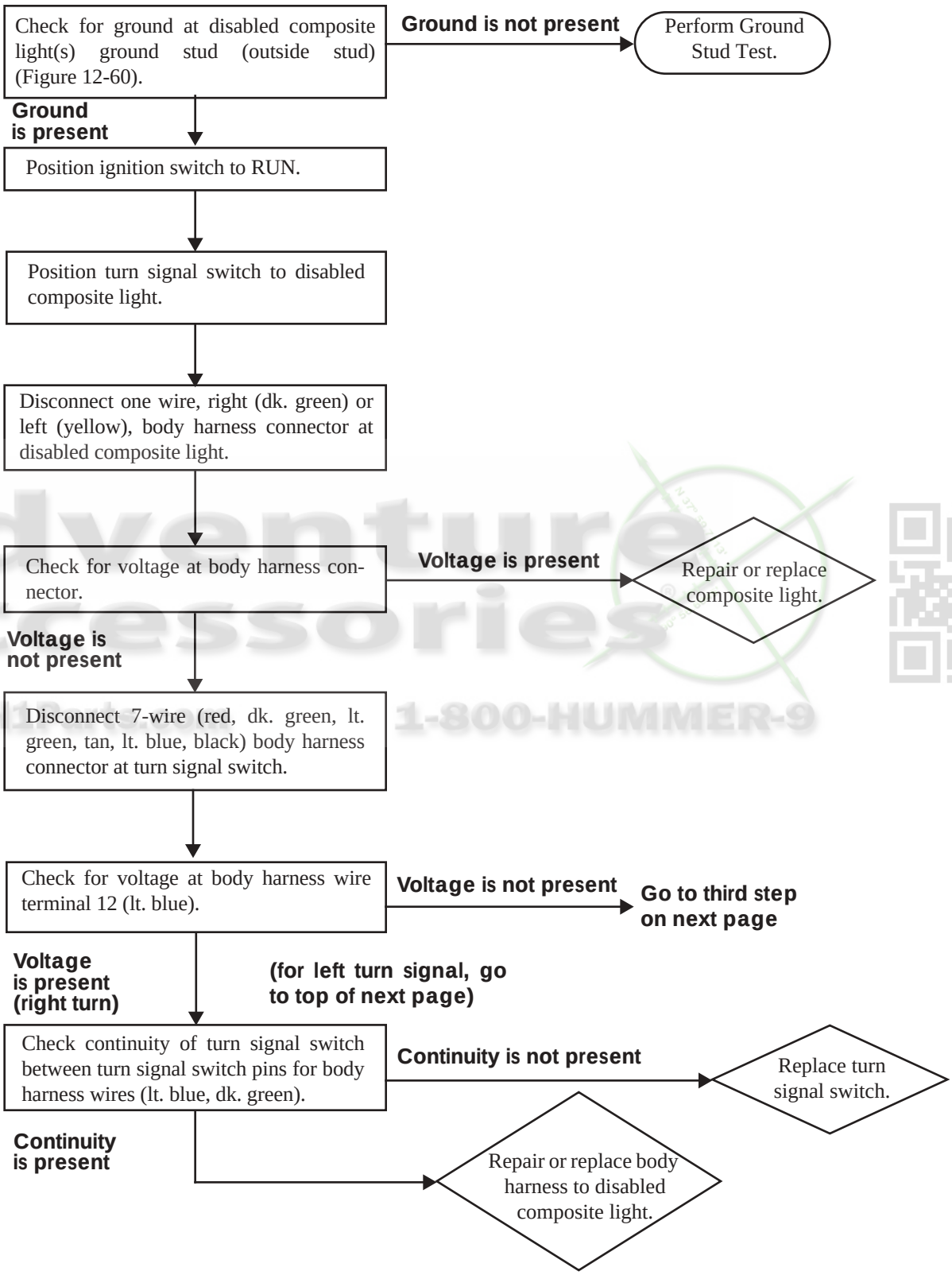



*Figure 12-58: Under Hood and Trouble Lights*

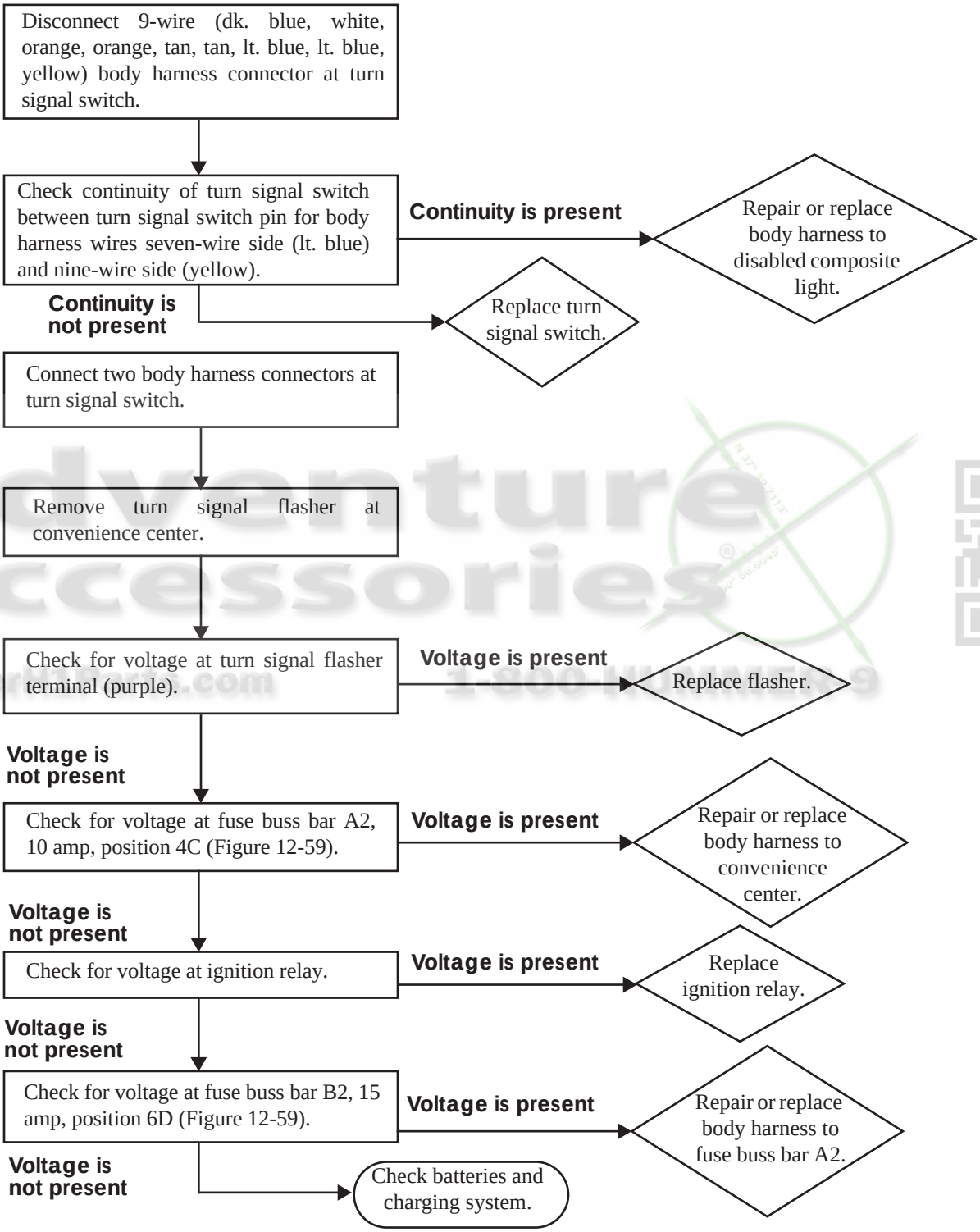
## PARKING LIGHT(S) (REAR) INOPERATIVE



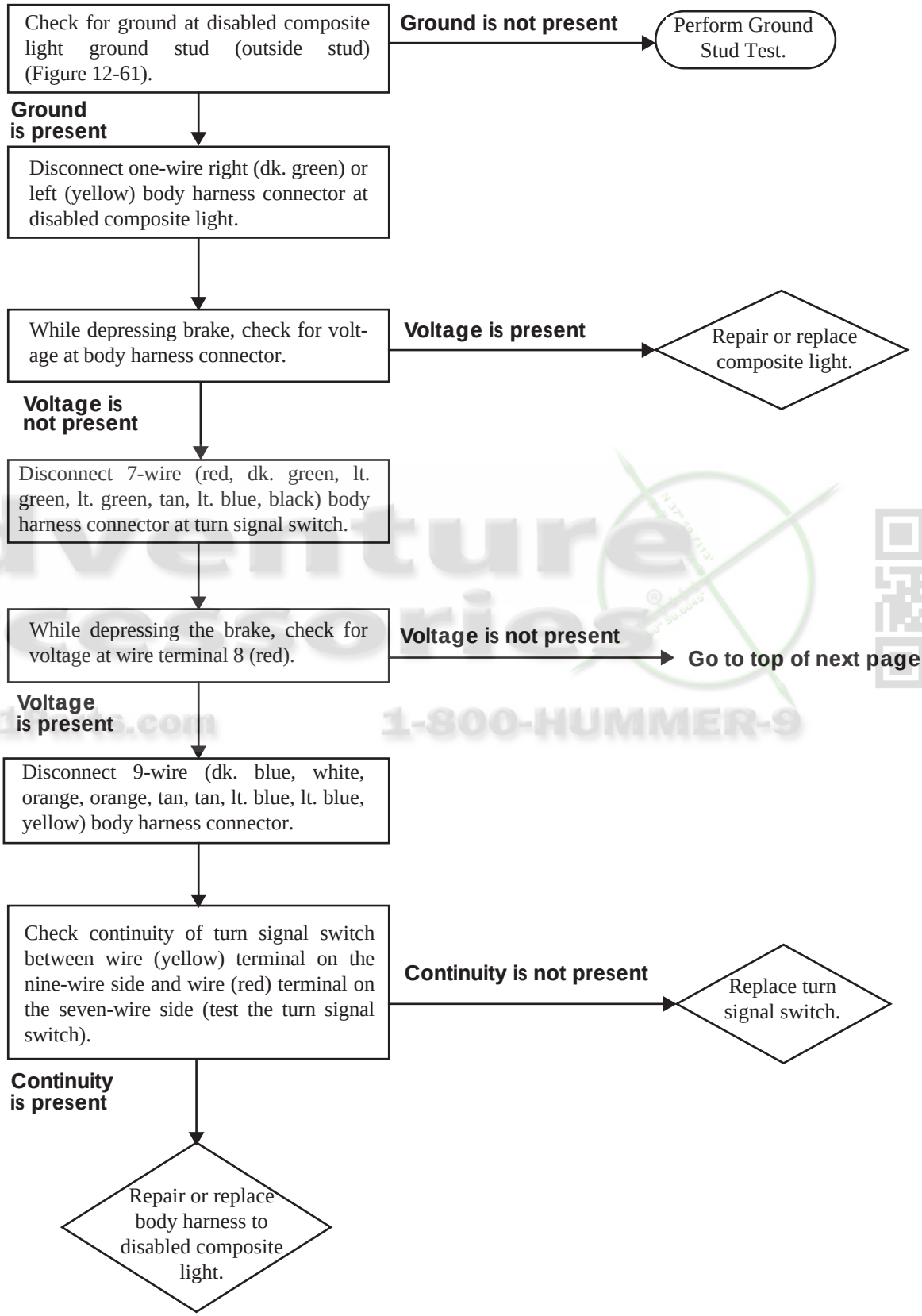
## TURN SIGNAL LIGHT(S) (REAR) INOPERATIVE



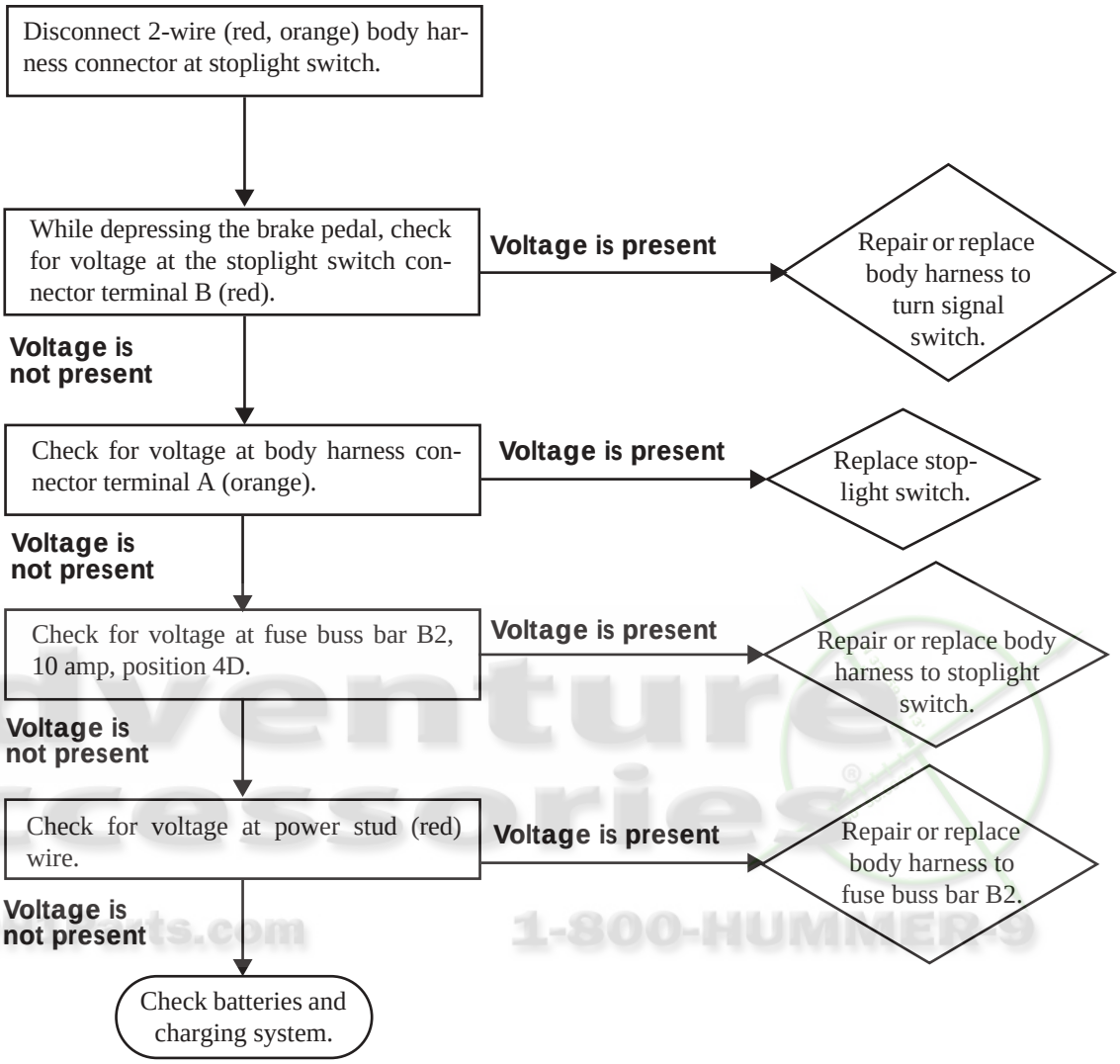
## TURN SIGNAL LIGHT(S) (REAR) INOPERATIVE — CONTINUED



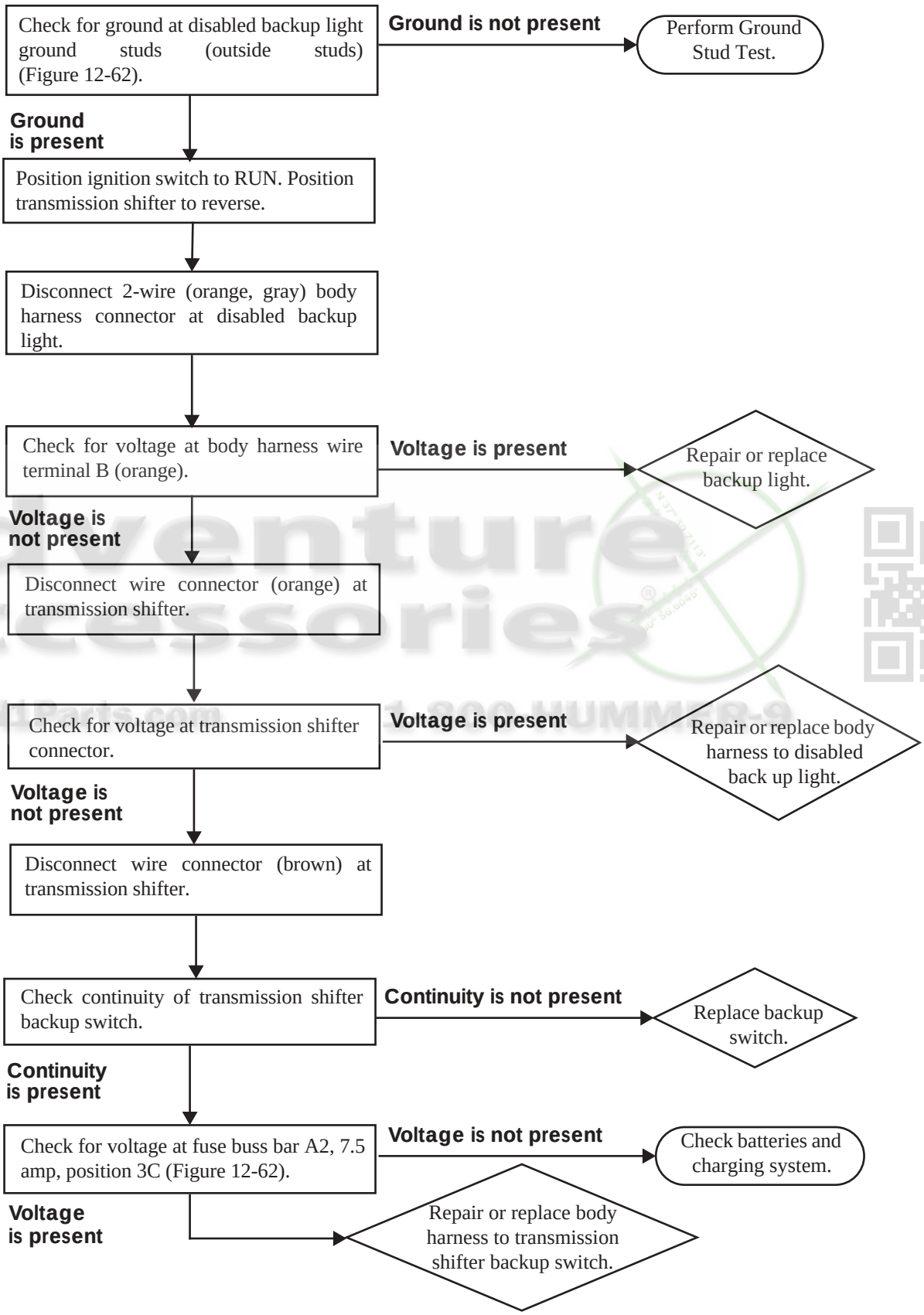
## STOPLIGHT(S) INOPERATIVE



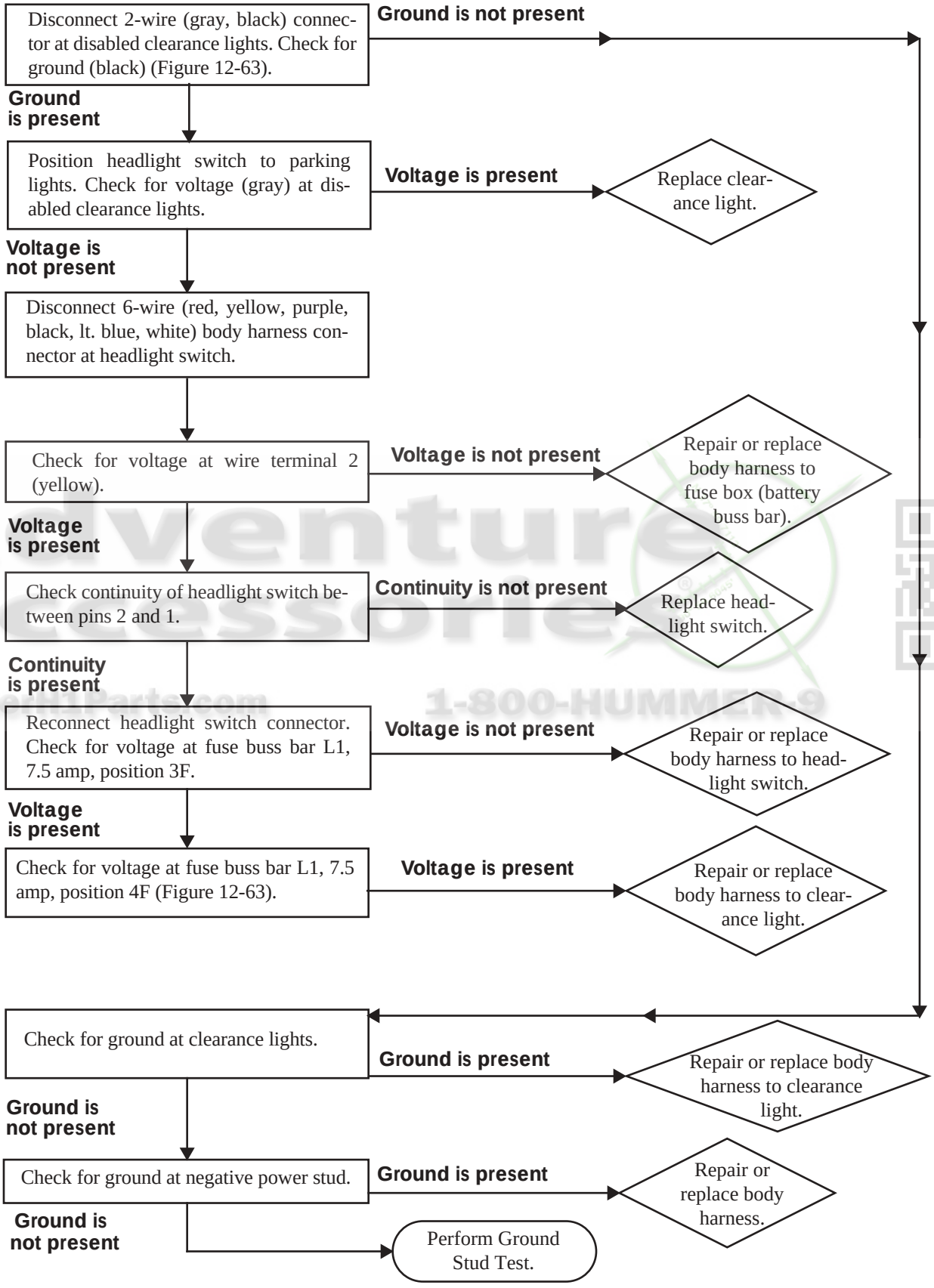
## STOPLIGHT(S) INOPERATIVE – CONTINUED



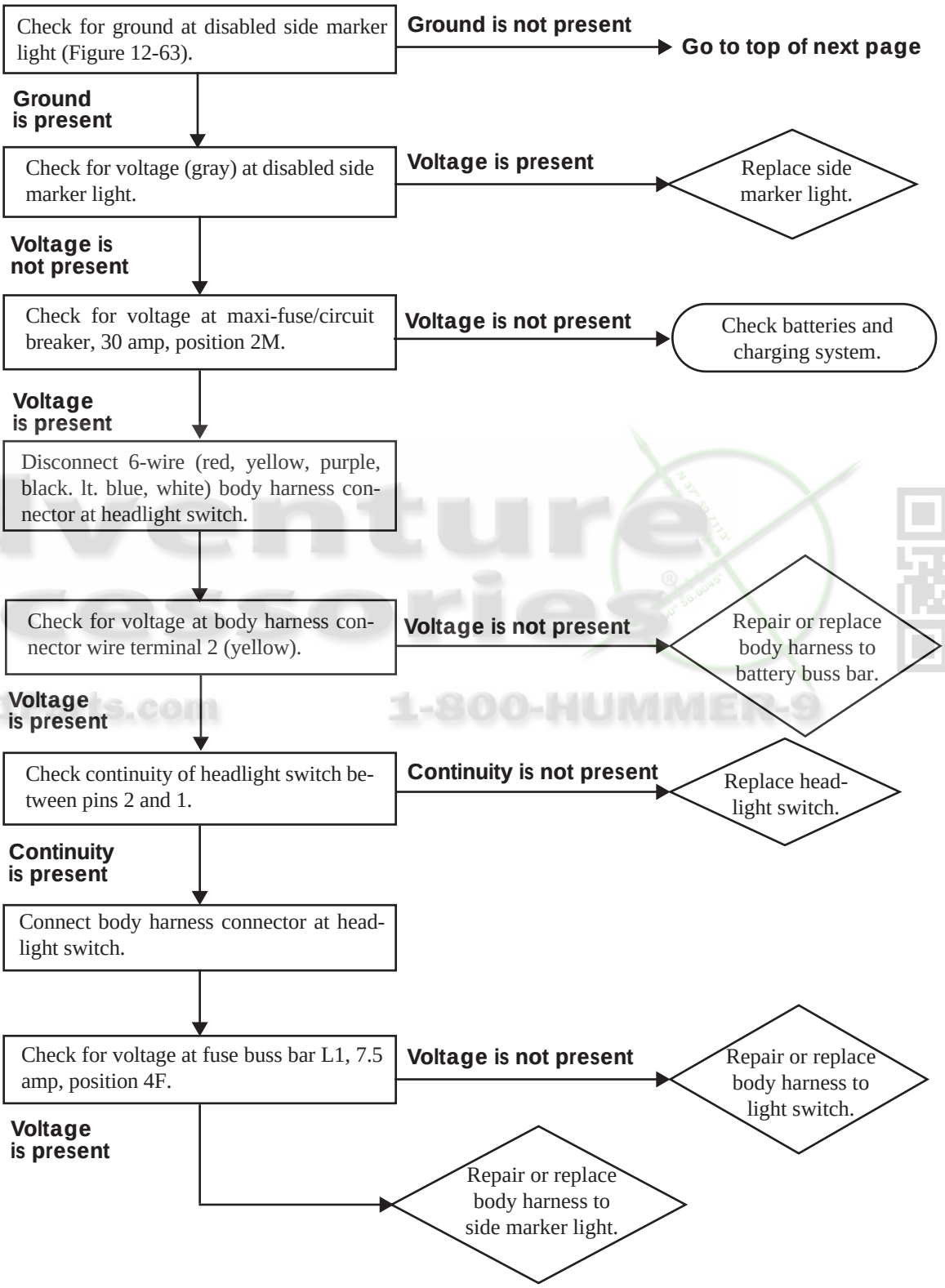
## BACKUP LIGHT(S) INOPERATIVE



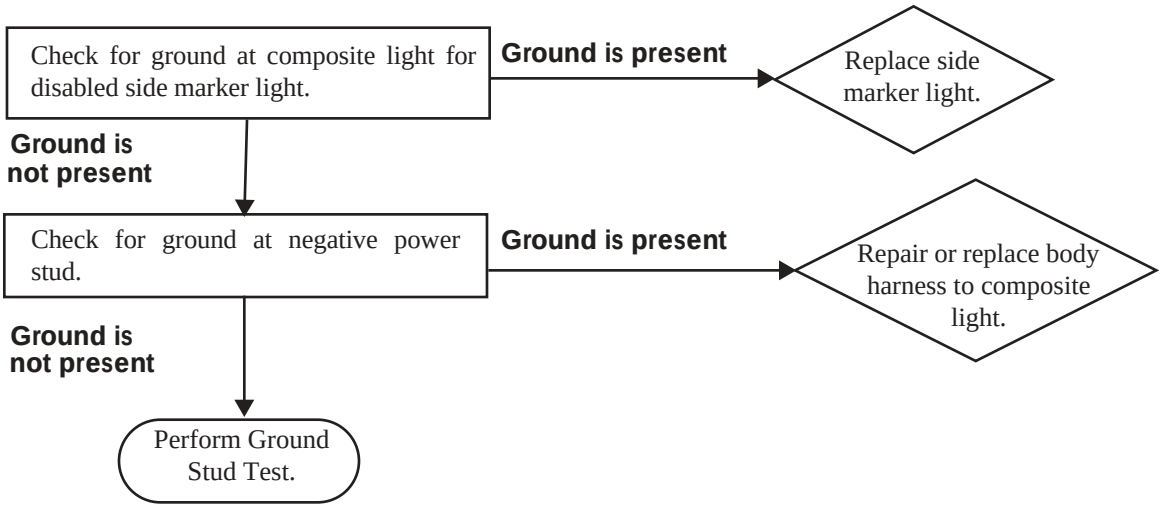
## CLEARANCE LIGHT(S) INOPERATIVE



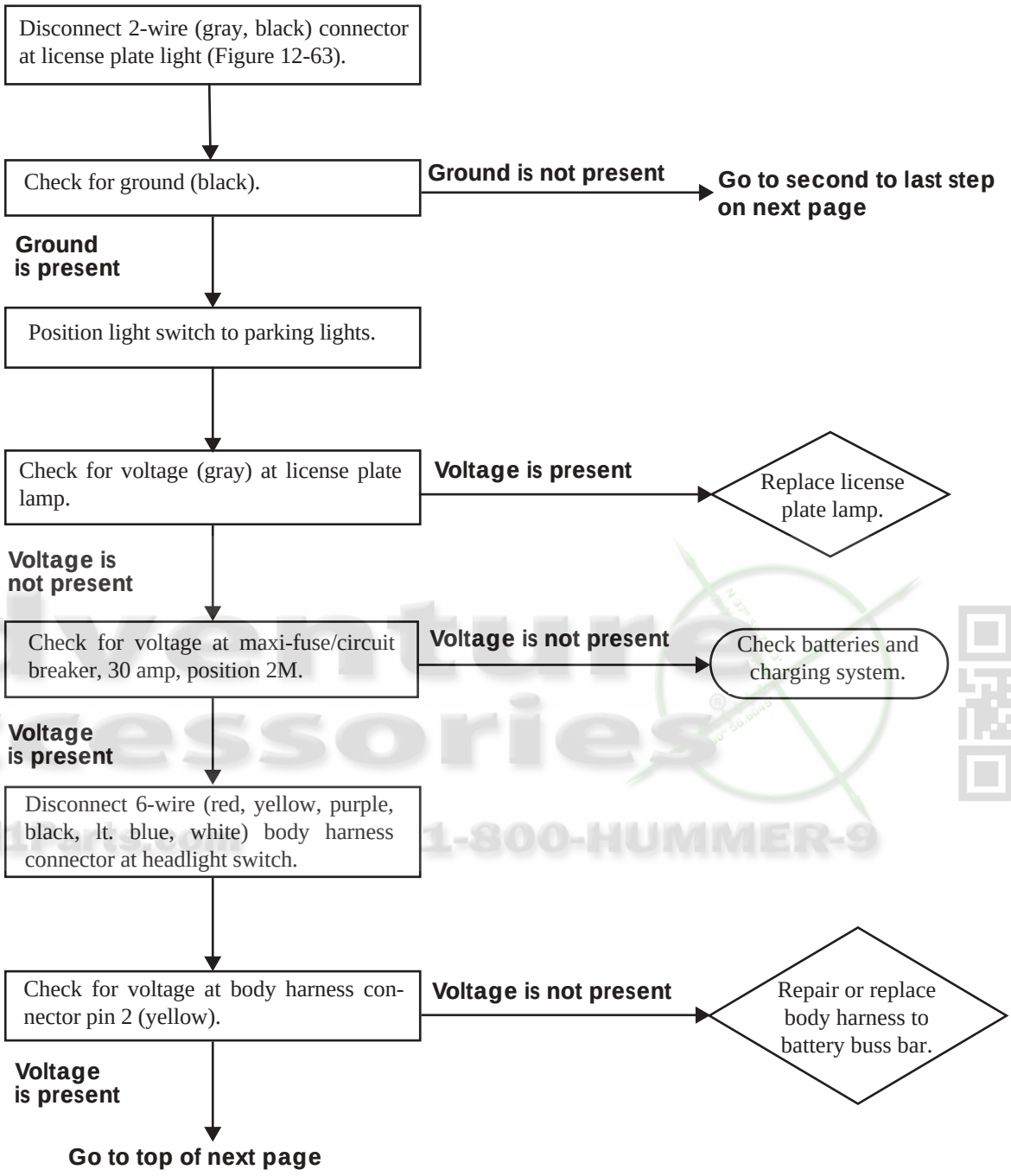
## SIDE MARKER LIGHT(S) (REAR) INOPERATIVE



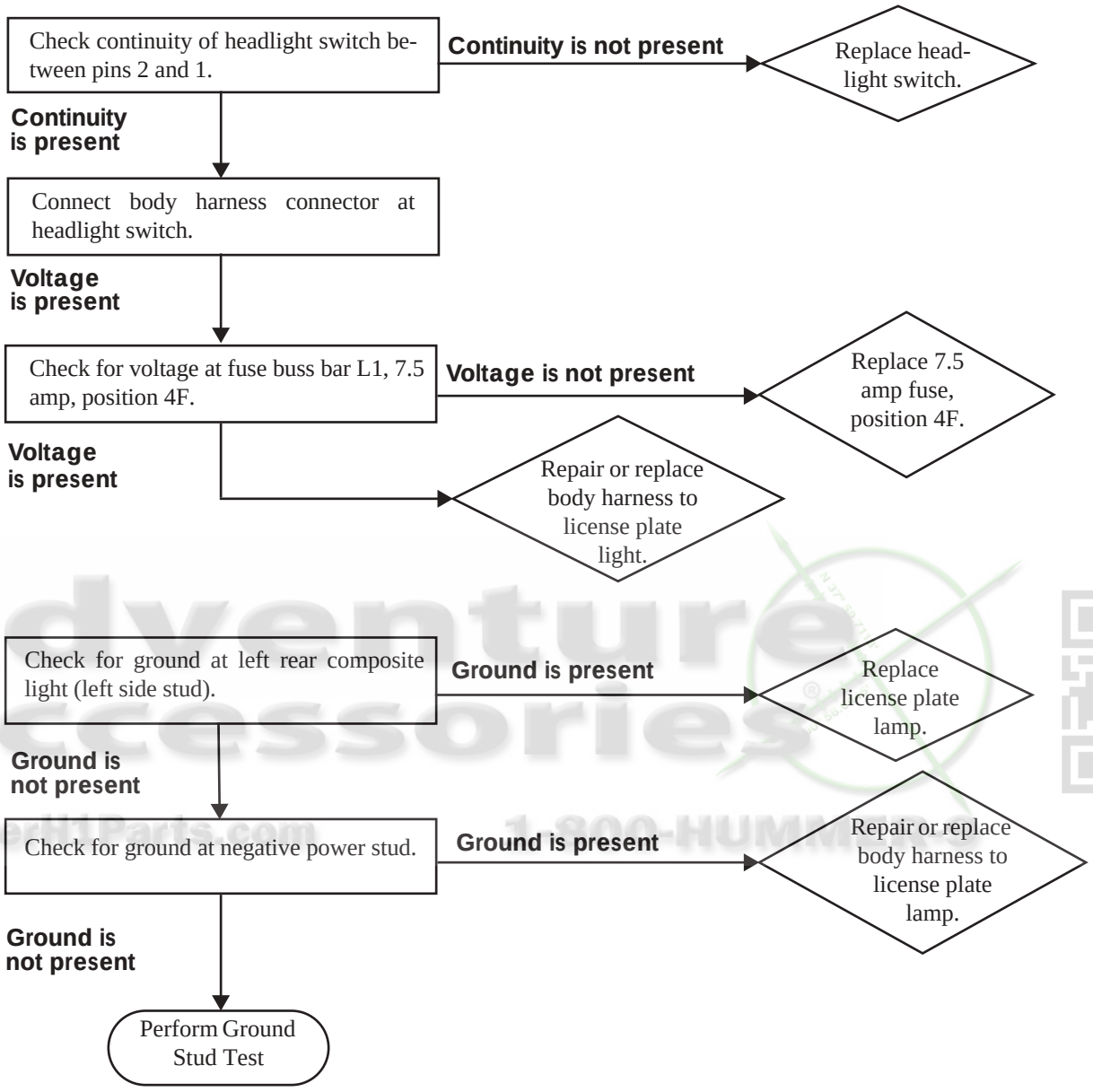
## SIDE MARKER LIGHT(S) (REAR) INOPERATIVE – CONTINUED



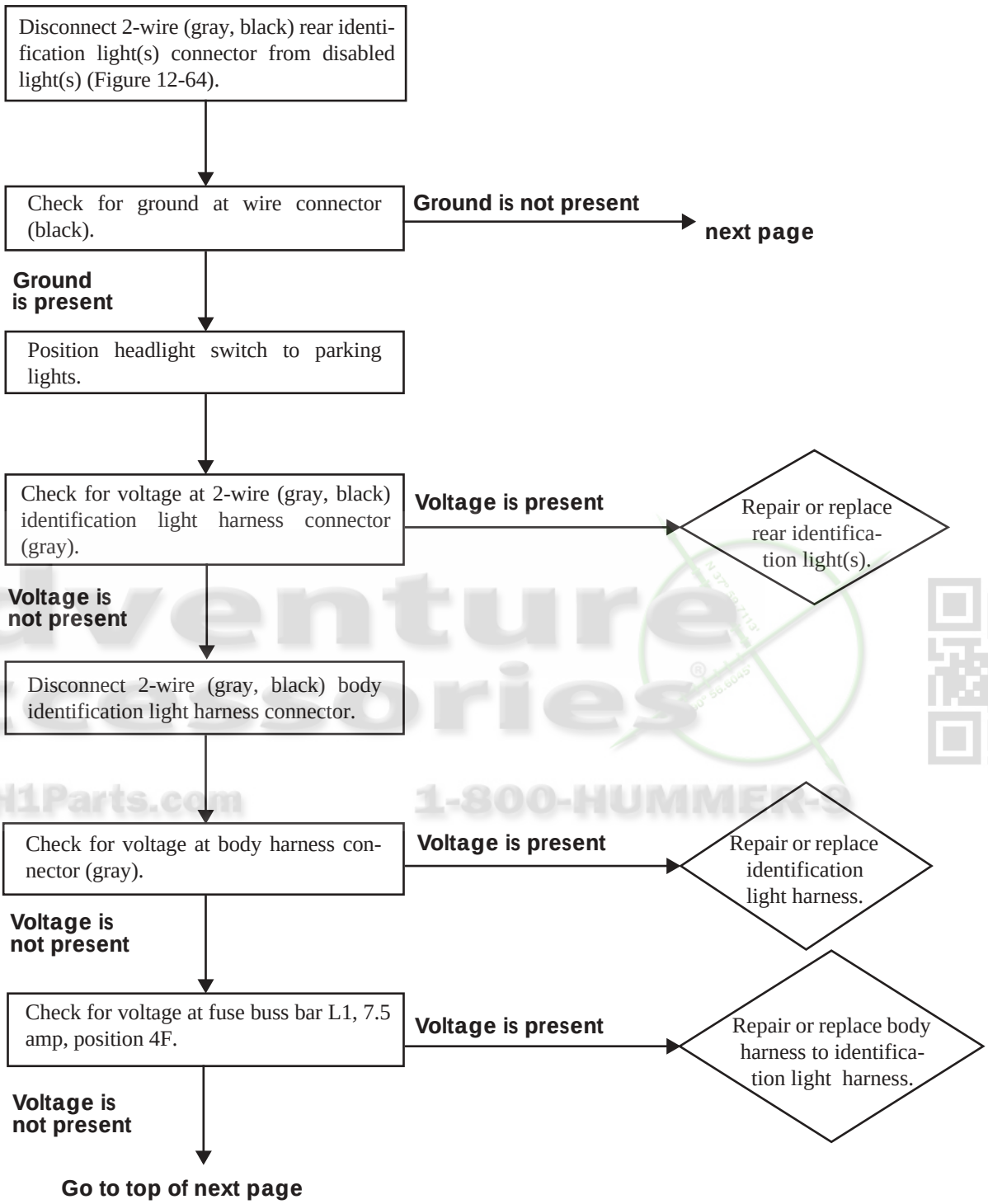
## LICENSE PLATE LIGHT INOPERATIVE



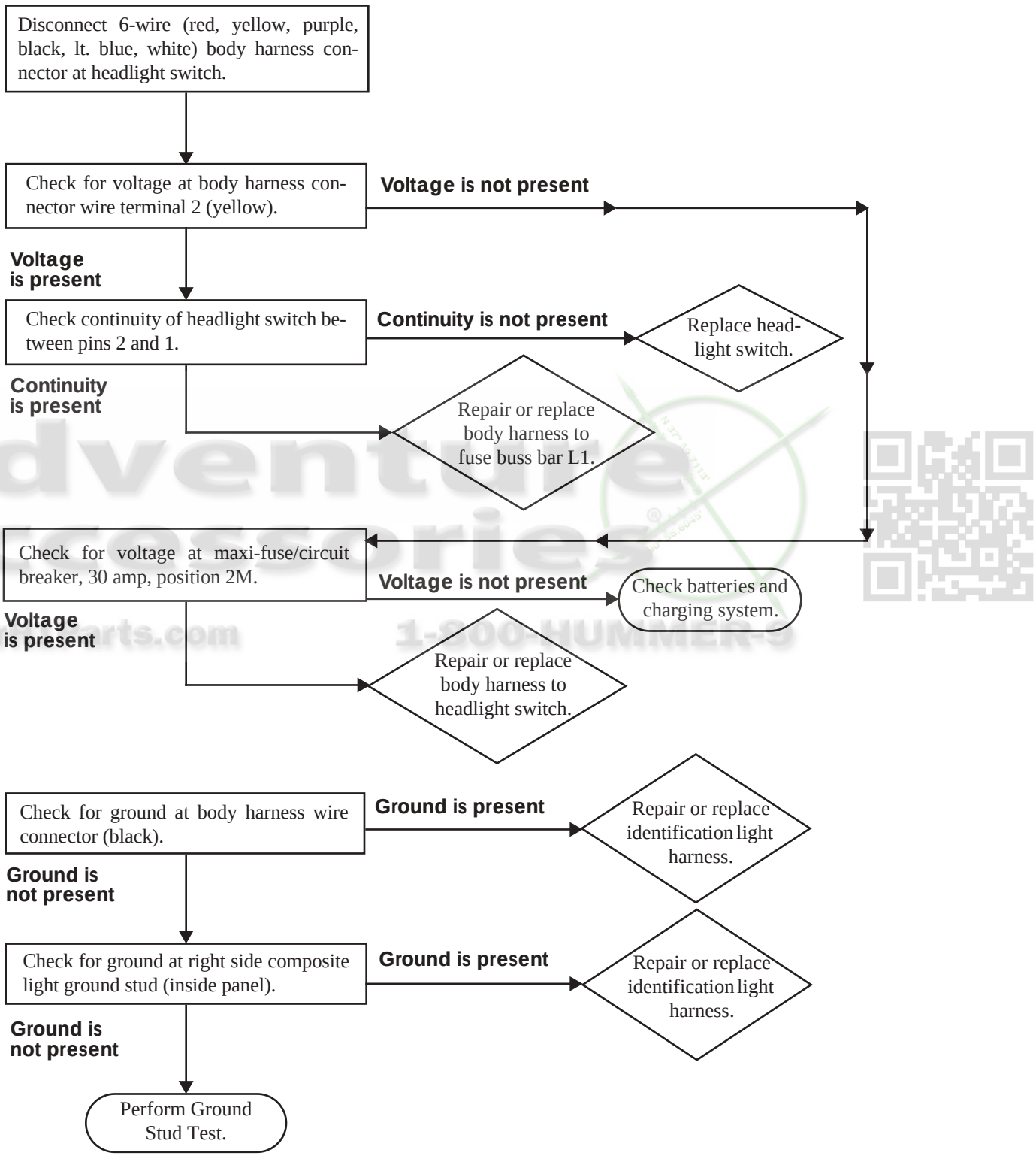
## LICENSE PLATE LIGHT INOPERATIVE – CONTINUED



## REAR IDENTIFICATION LIGHT(S) INOPERATIVE



## REAR IDENTIFICATION LIGHT(S) INOPERATIVE – CONTINUED



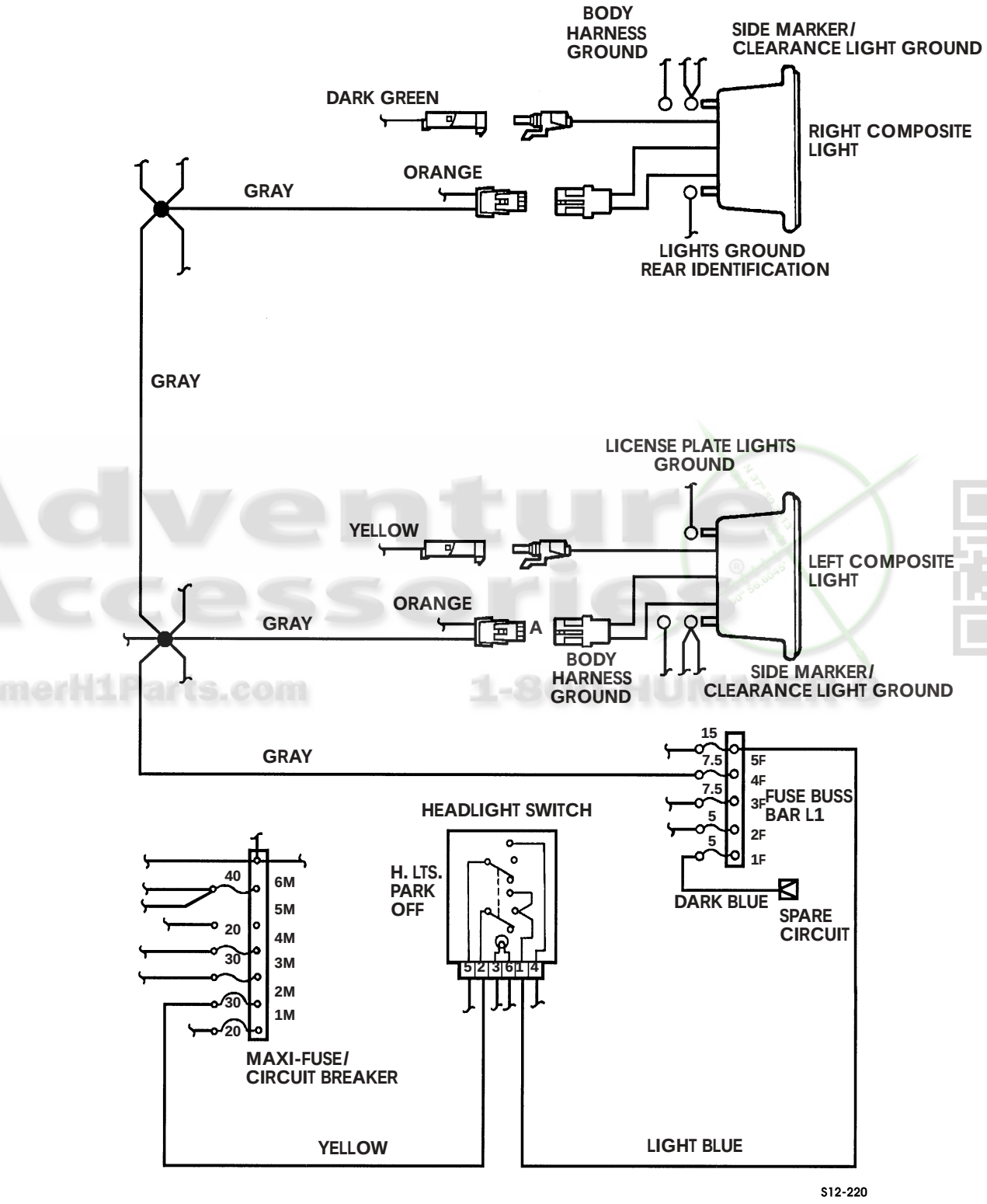



*Figure 12-59: Rear Parking Lights*

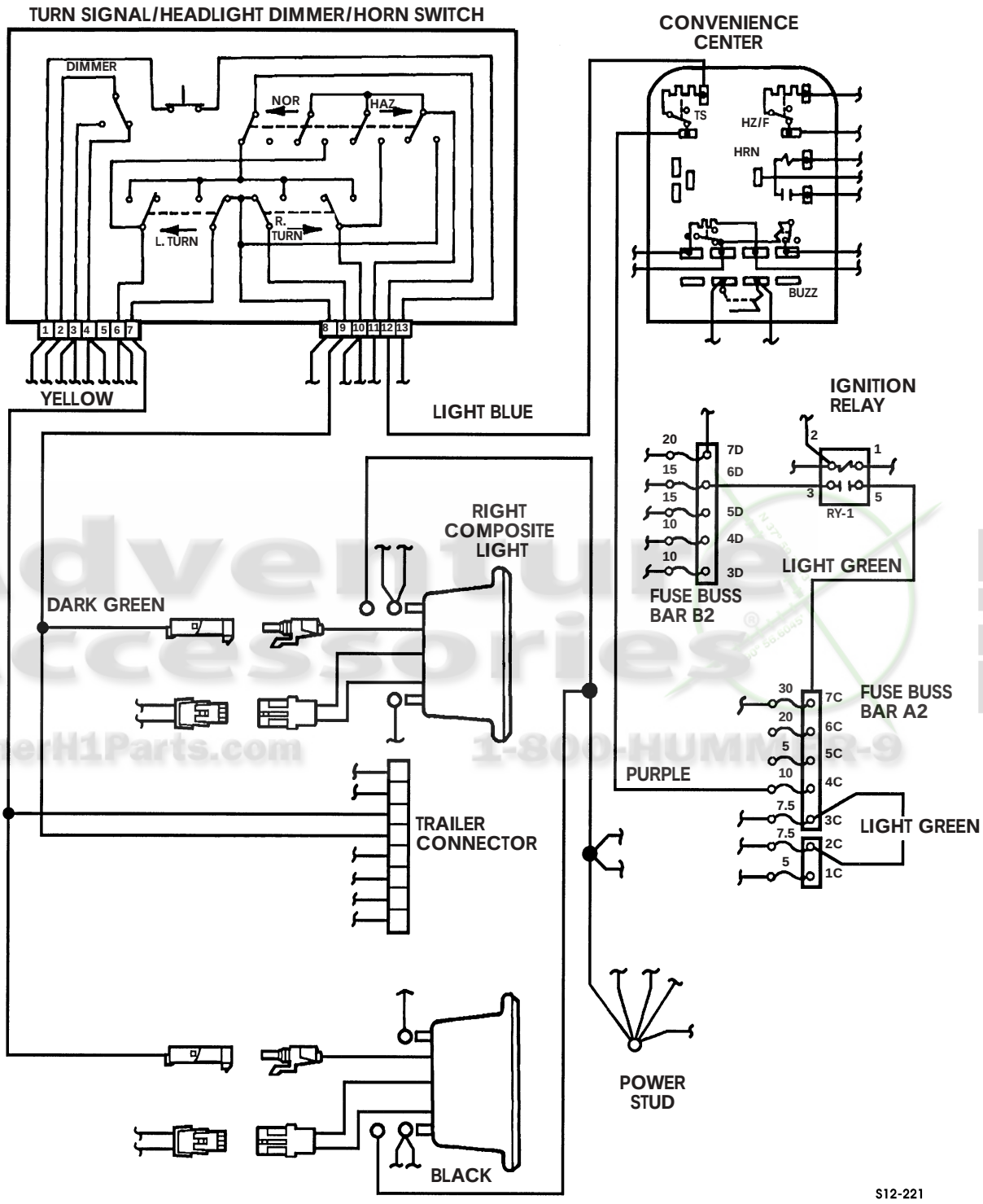





*Figure 12-60: Rear Turn Signal*

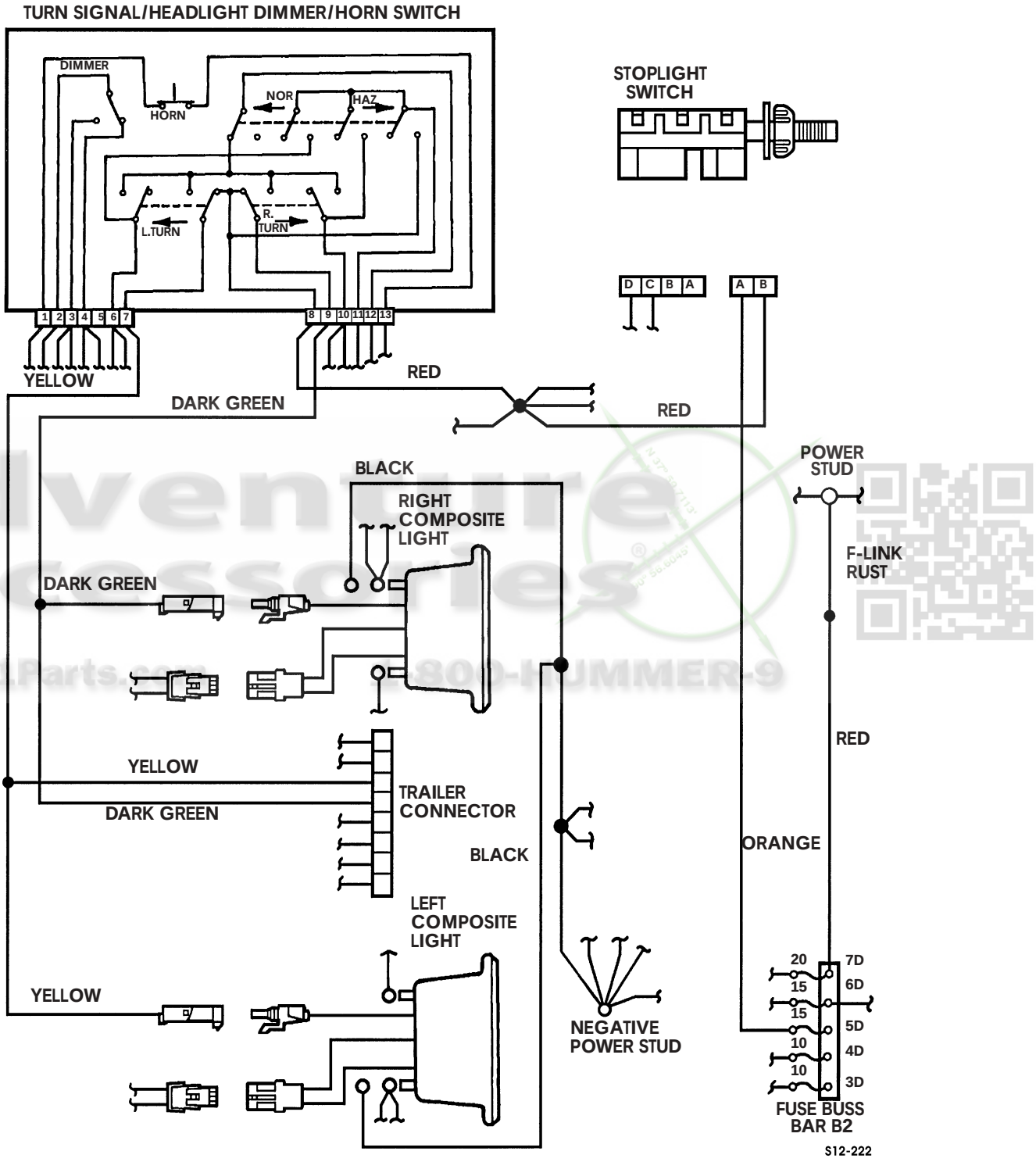



*Figure 12-61: Stoplights*

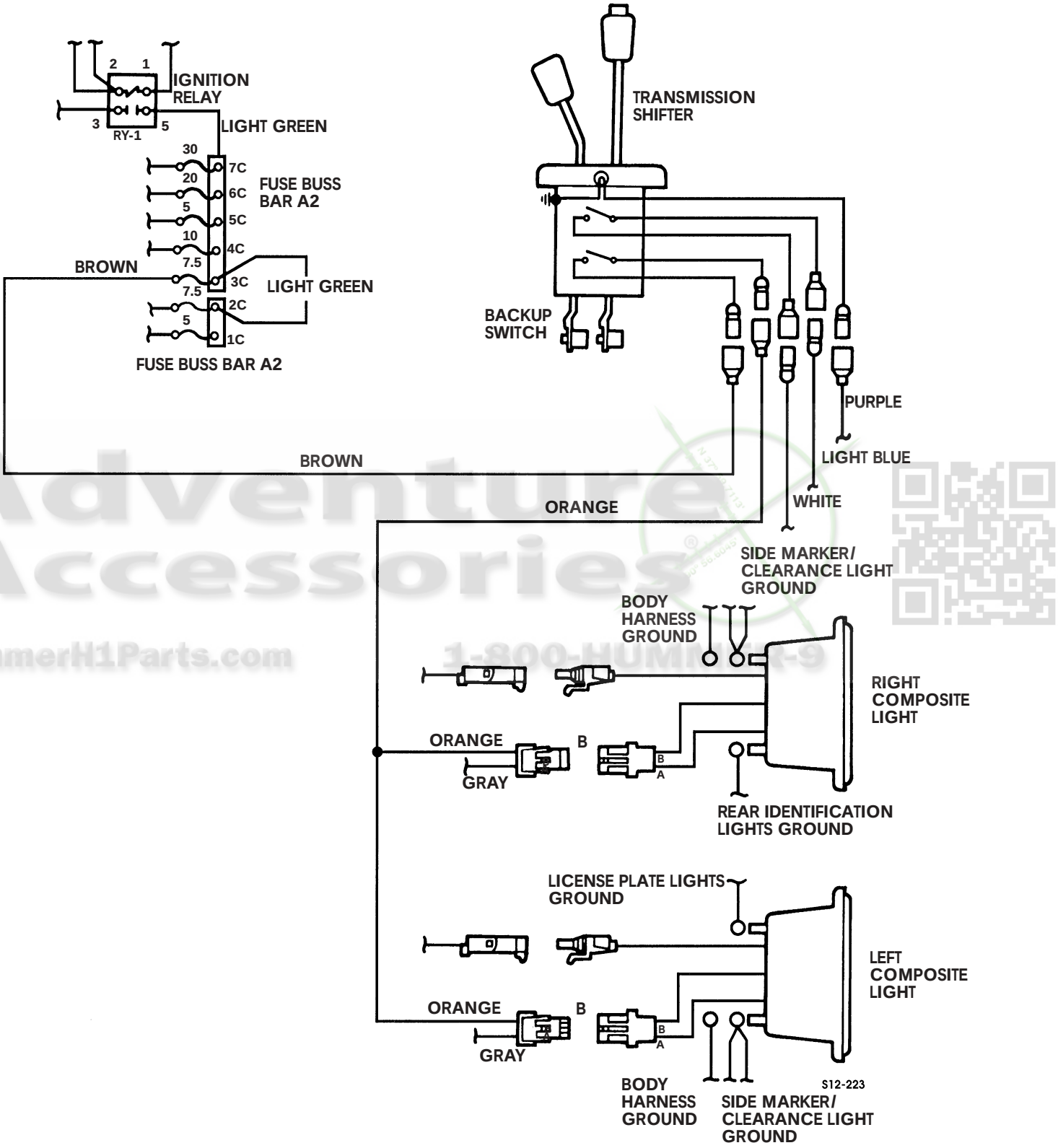



*Figure 12-62: Backup LIghts*

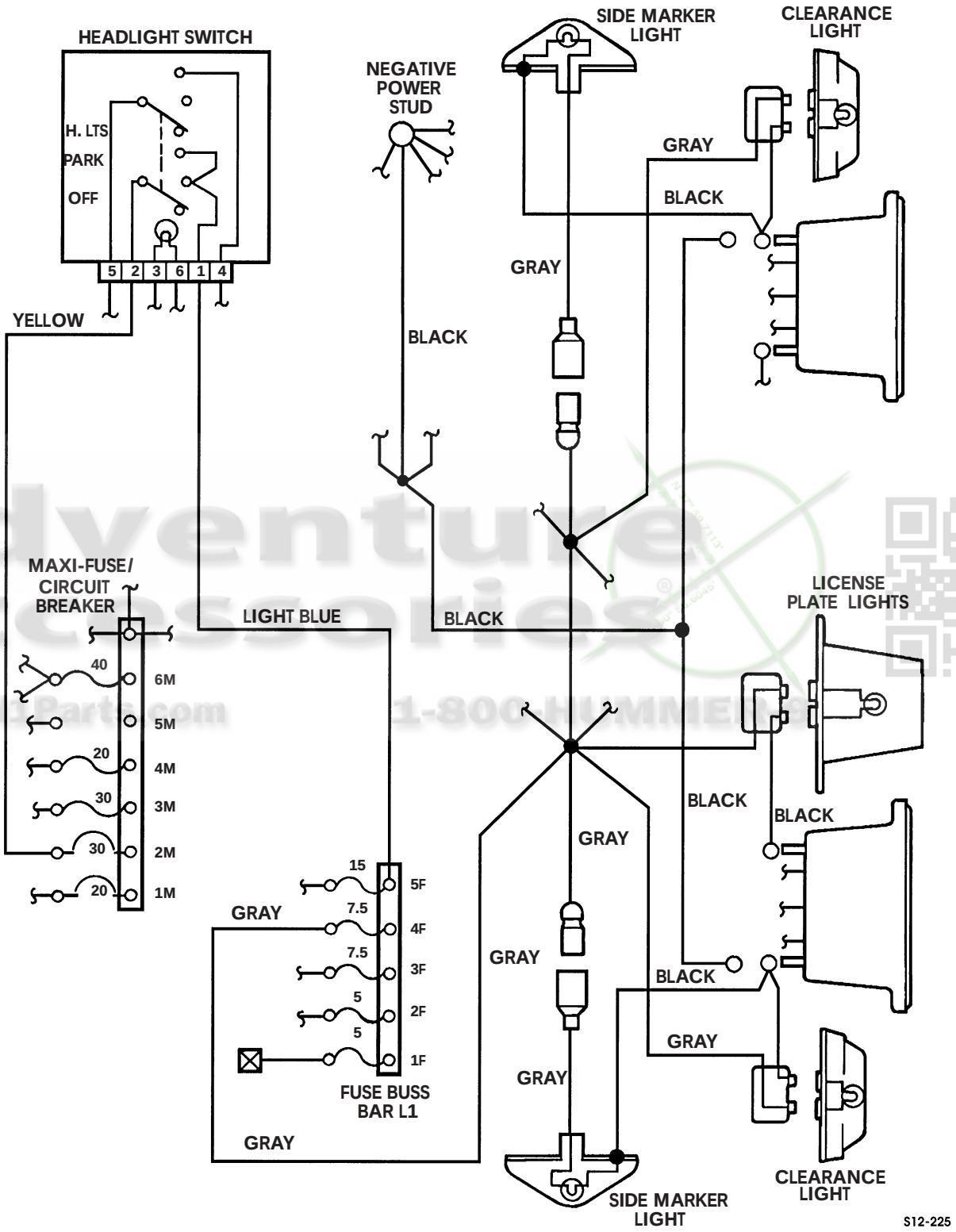



*Figure 12-63: Clearance, Side Markers, and License Plate Lights*

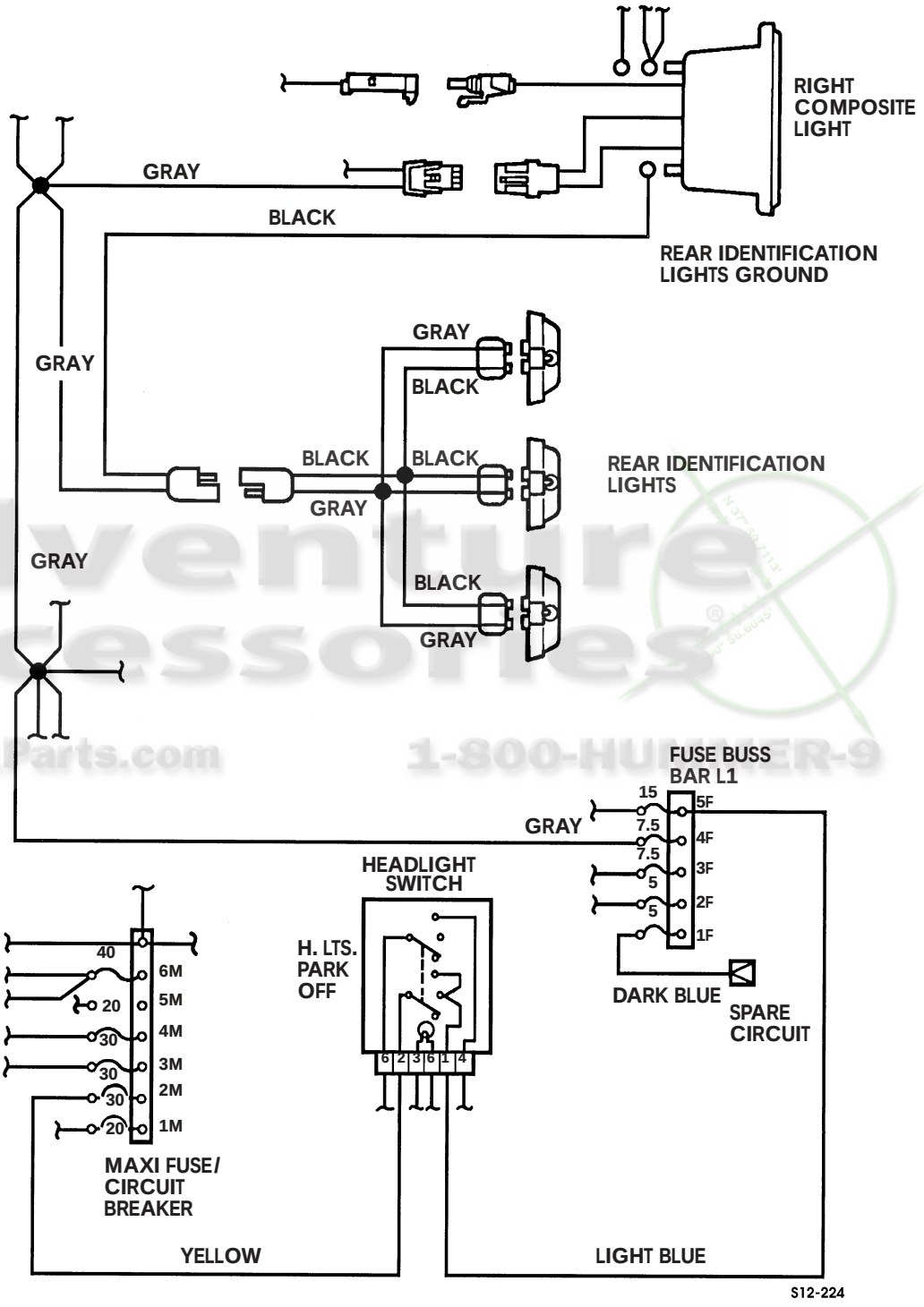
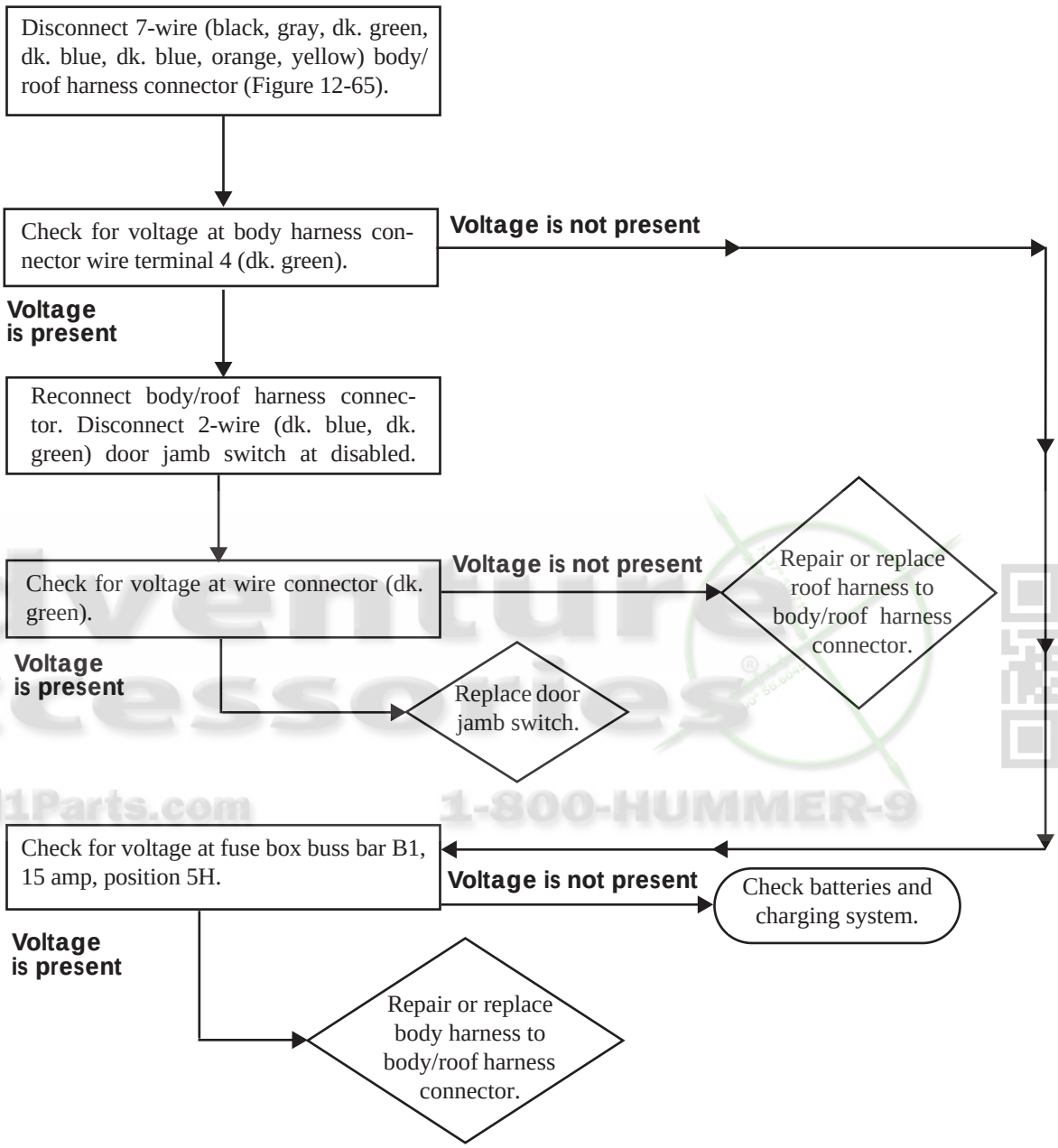




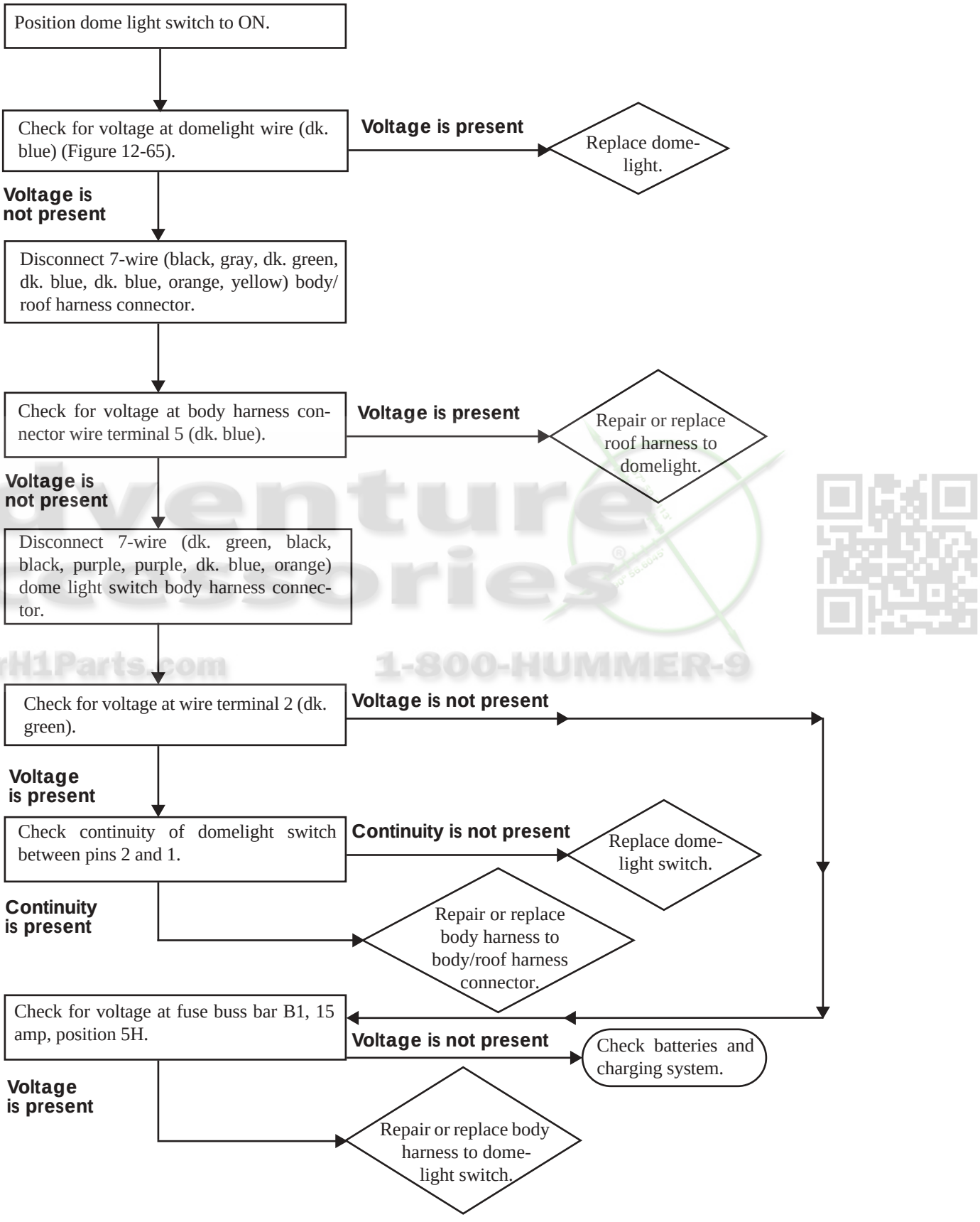

*Figure 12-64: Rear Identification Lights*

## DOMELIGHT(S) (DOOR SWITCH) INOPERATIVE

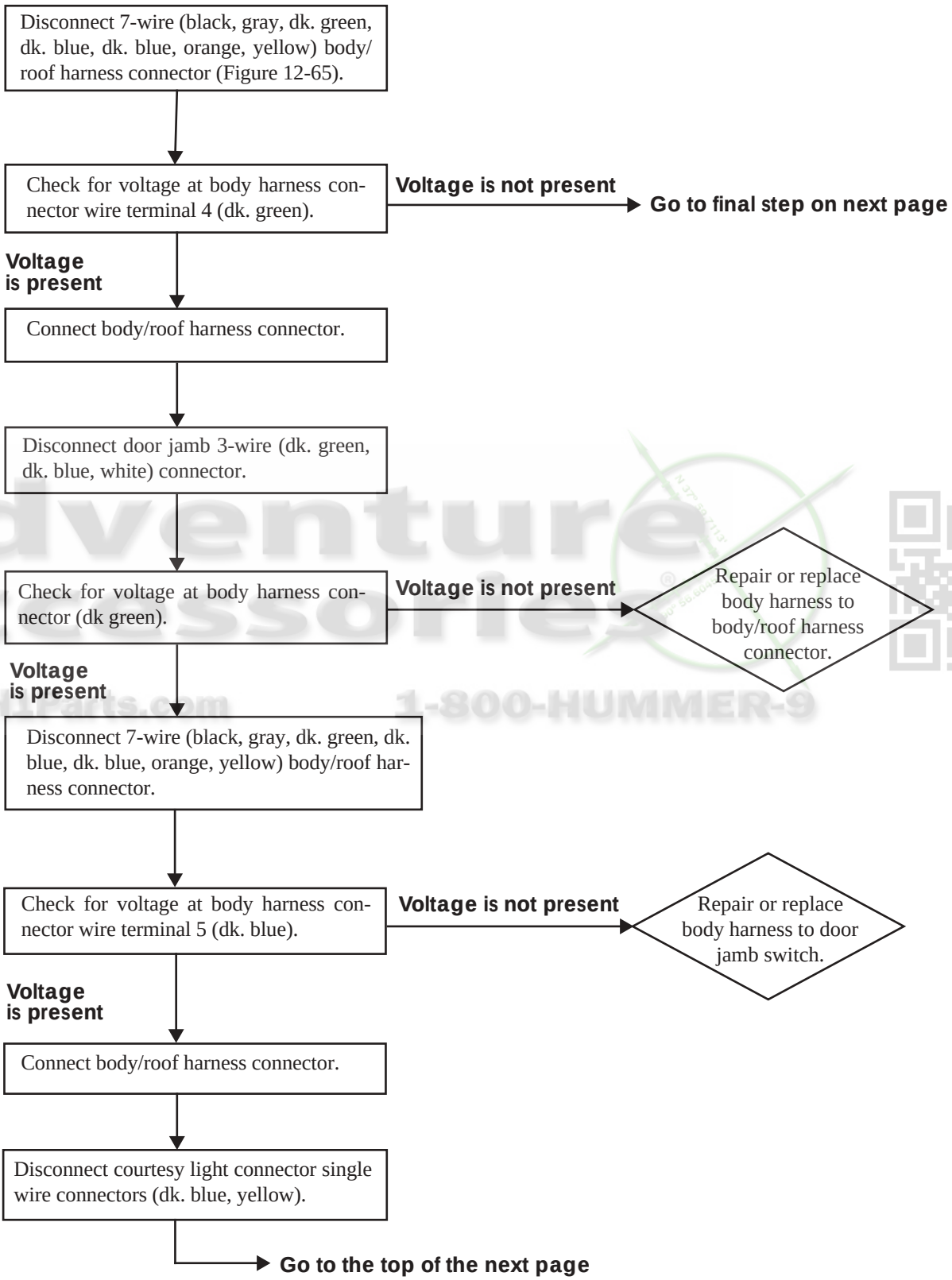
**NOTE: Before testing, check domelight door switches by opening other doors.**



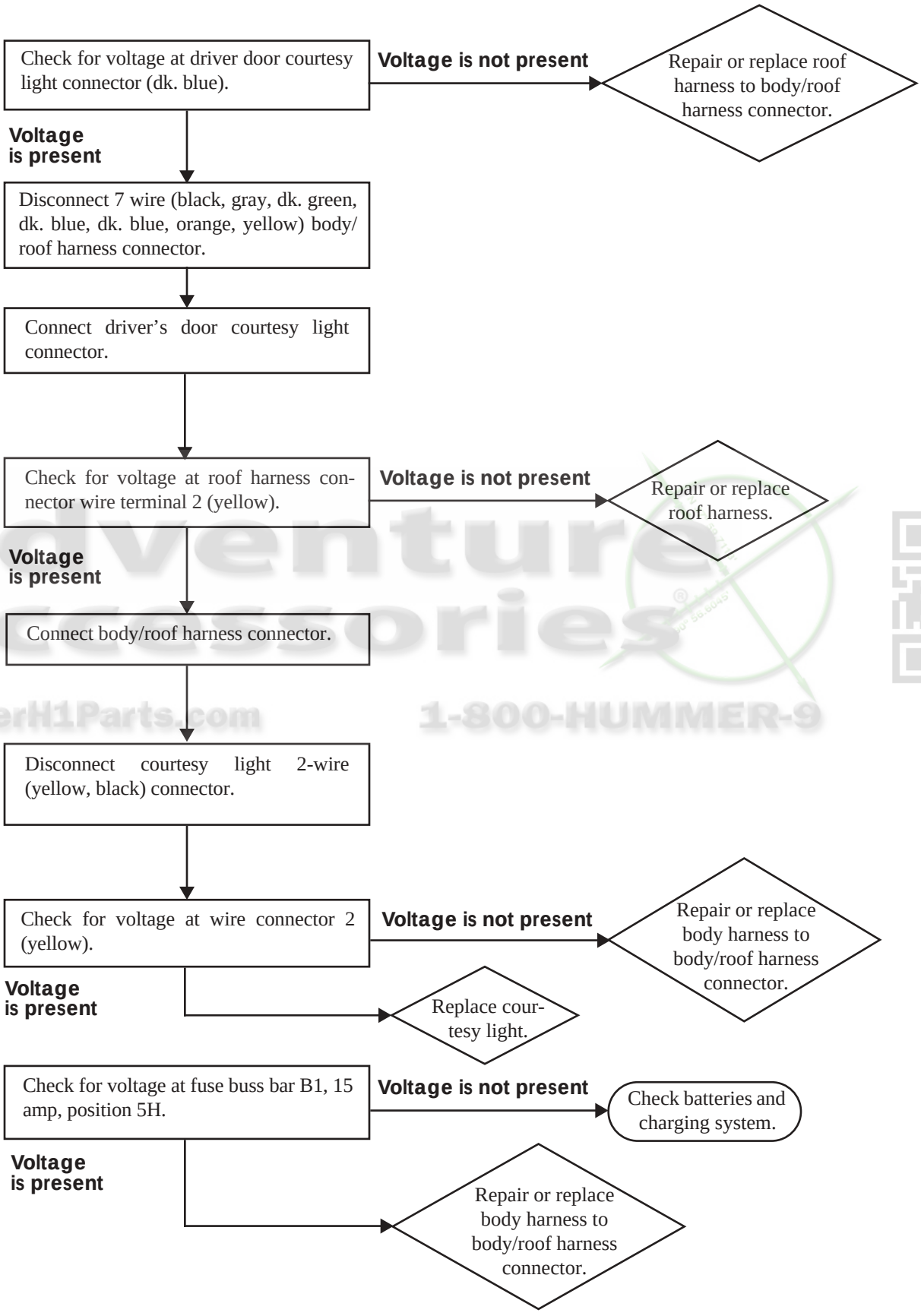
## DOMELIGHT(S) (DOME SWITCH) INOPERATIVE



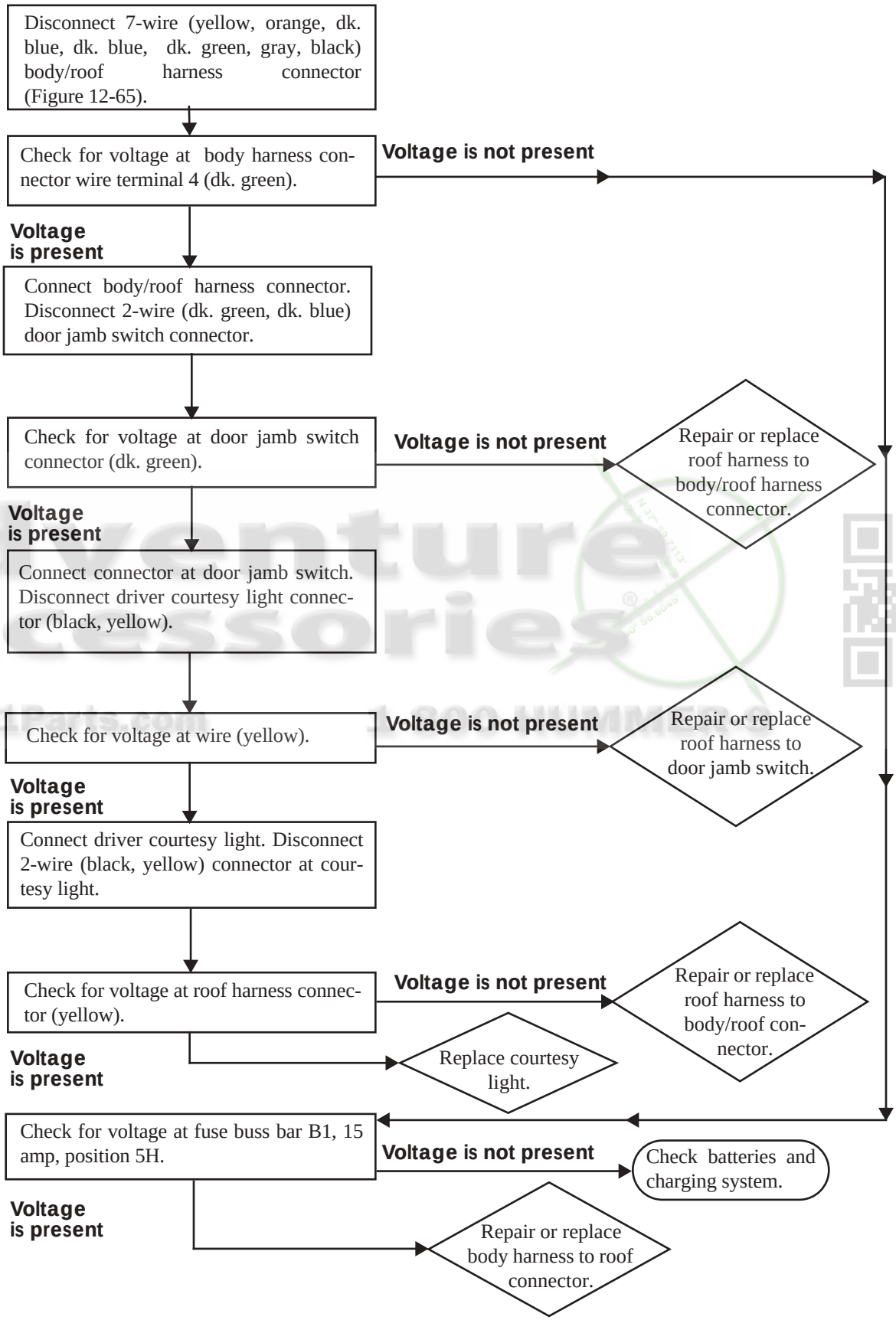
## COURTESY LIGHT(S) (DRIVER'S) INOPERATIVE



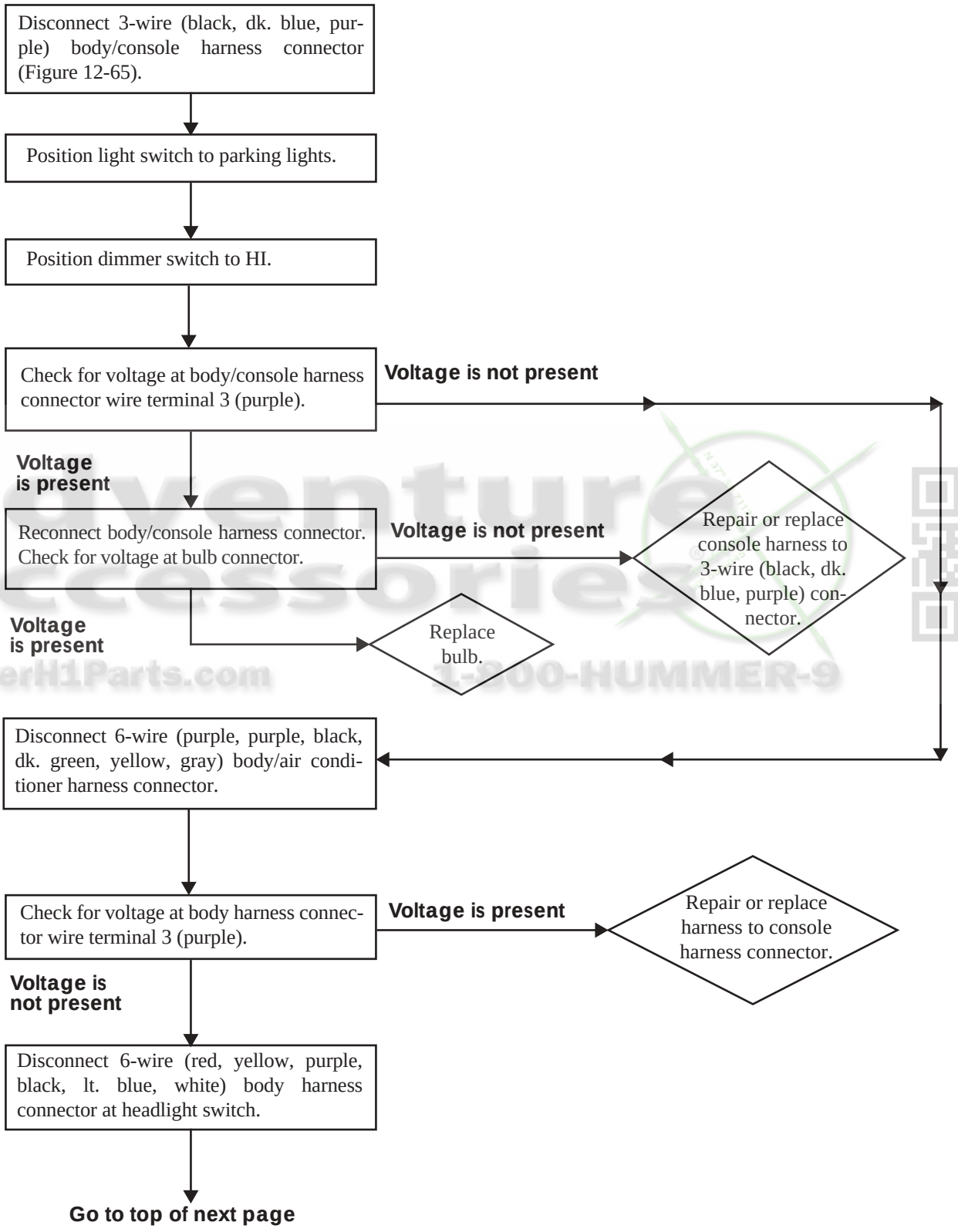
## COURTESY LIGHT(S) (DRIVER'S) INOPERATIVE — CONTINUED



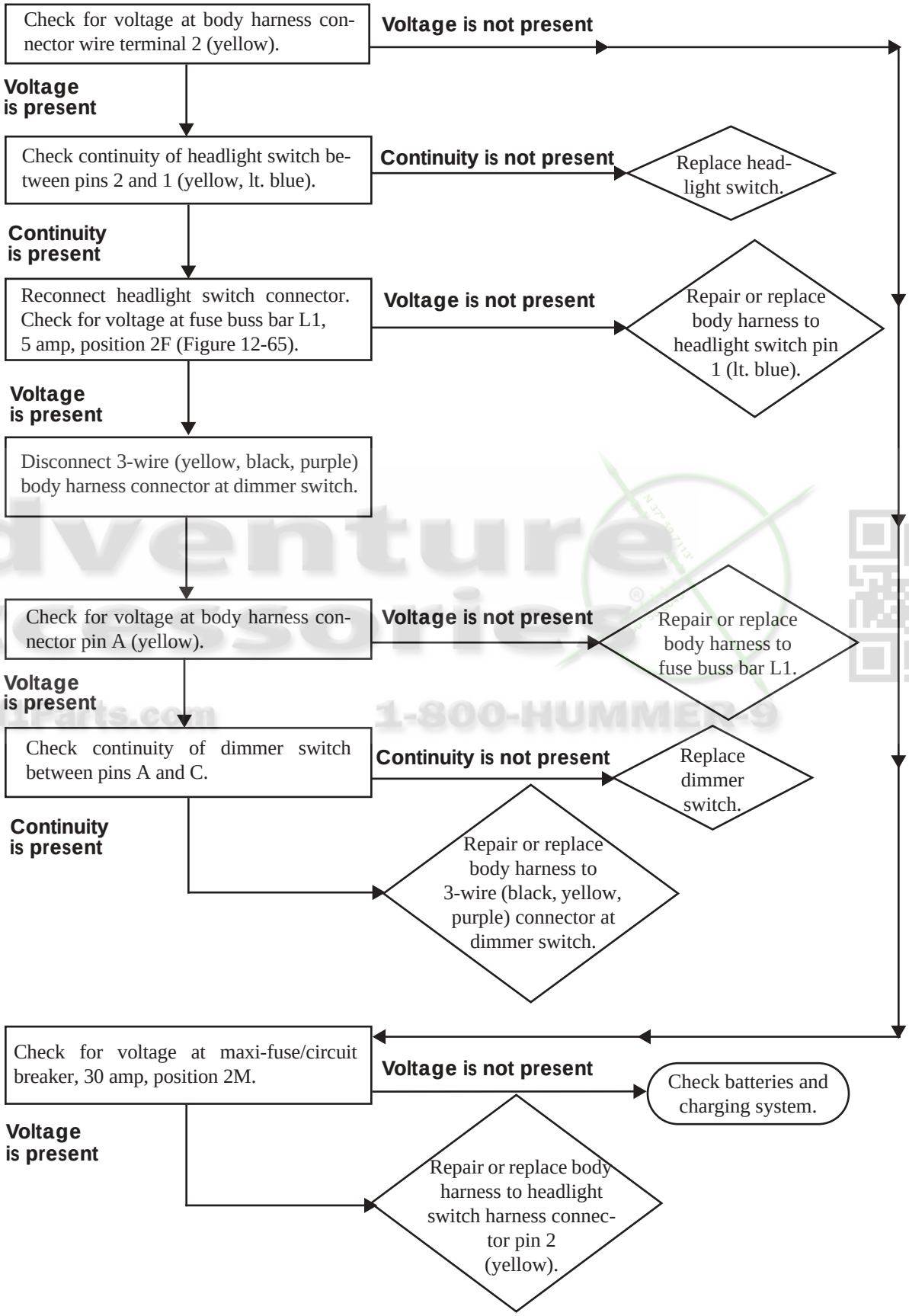
## COURTESY LIGHT(S) (PASSENGER'S AND REAR) INOPERATIVE



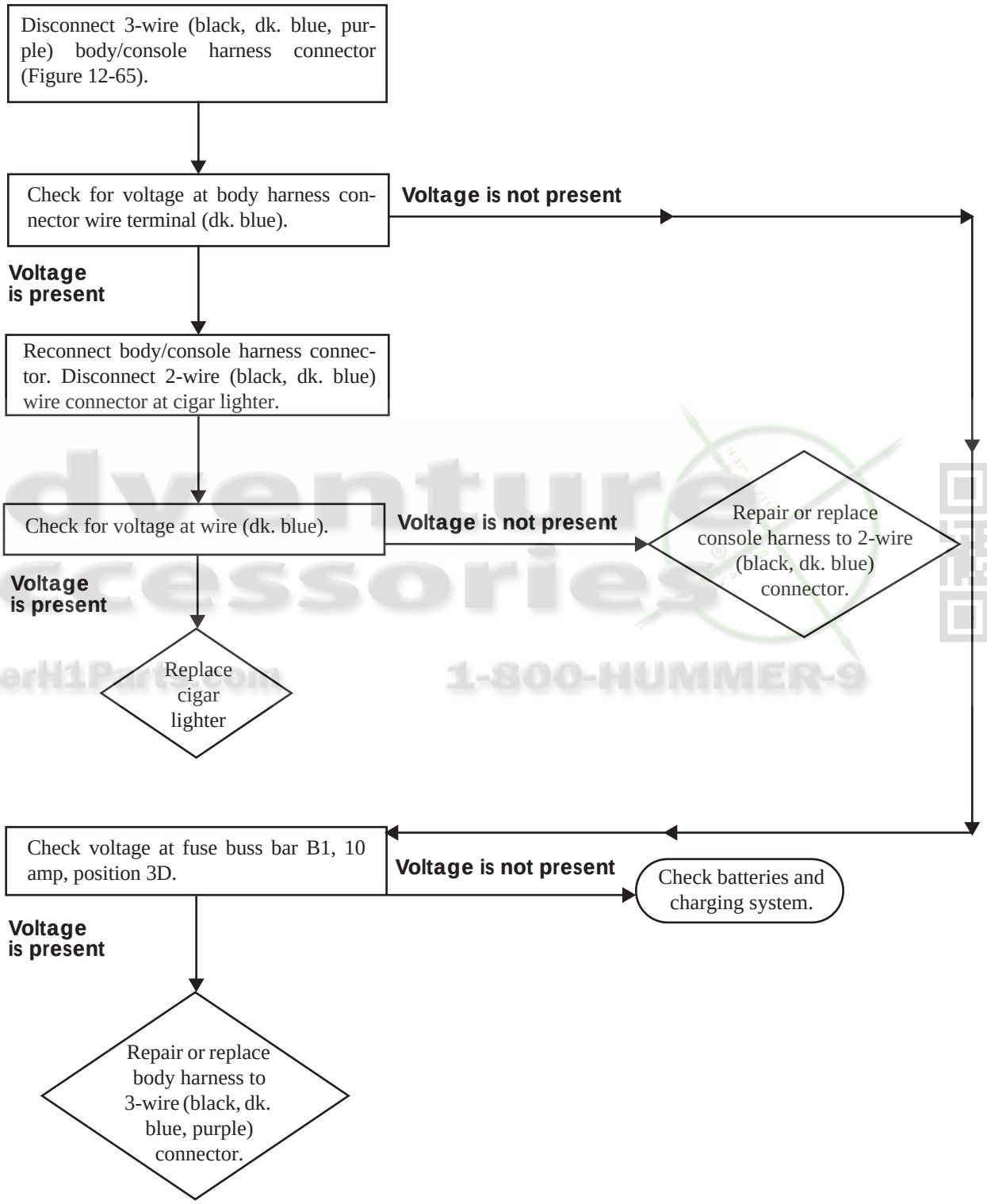
## ASHTRAY LIGHT(S) INOPERATIVE



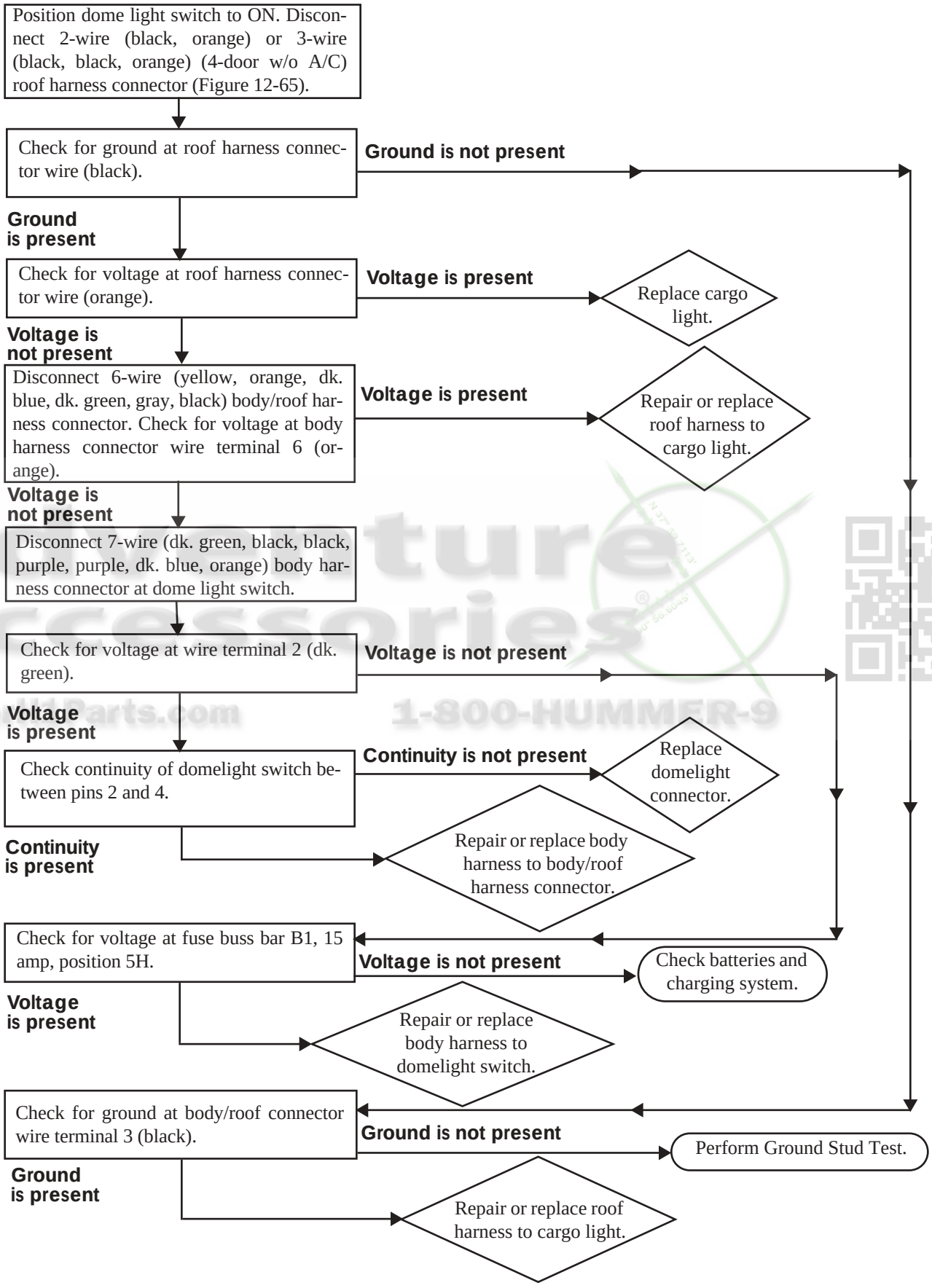
## ASHTRAY LIGHT(S) INOPERATIVE – CONTINUED



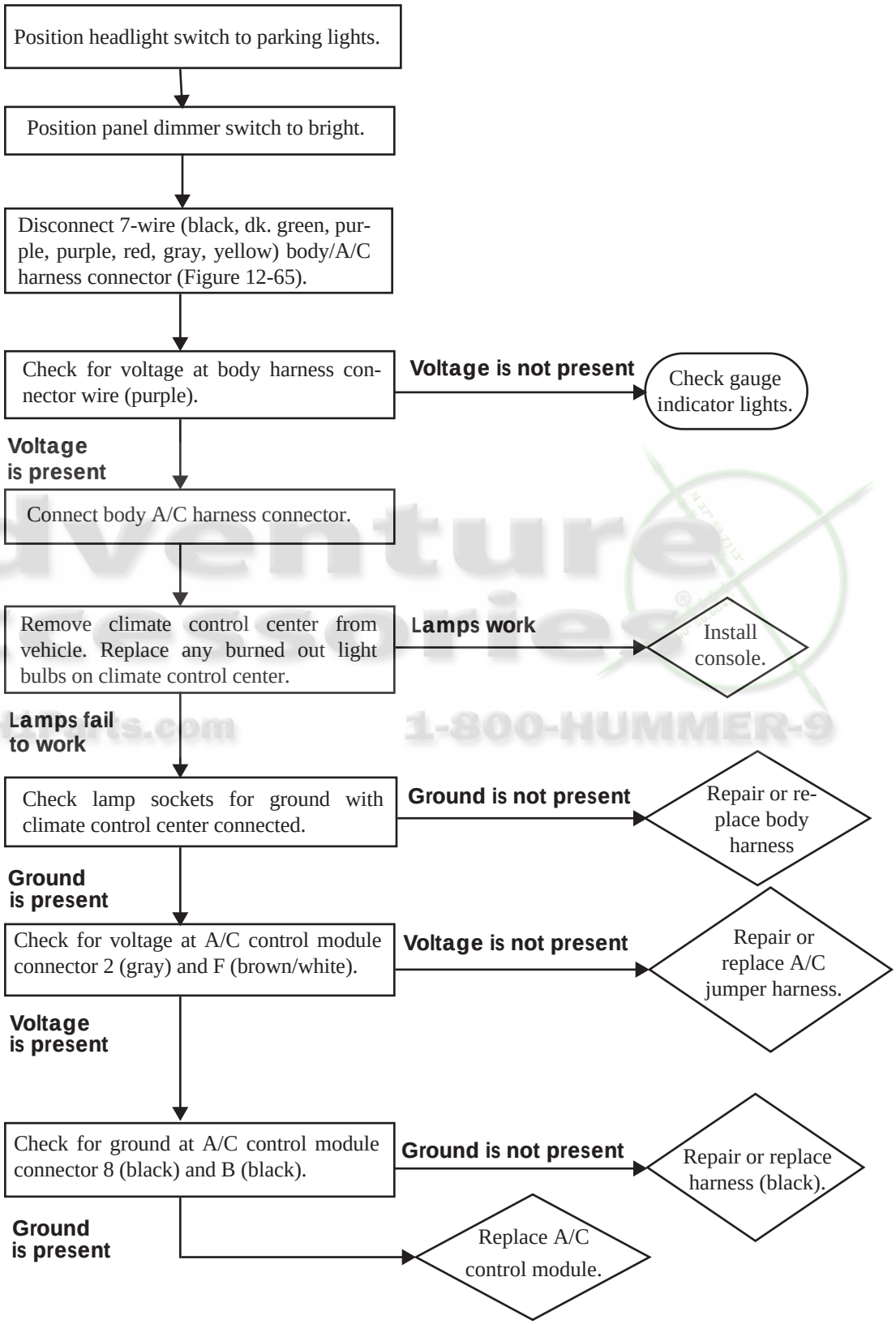
## CIGAR LIGHTER INOPERATIVE



## CARGO LIGHT INOPERATIVE



## CLIMATE CONTROL LAMP(S) INOPERATIVE



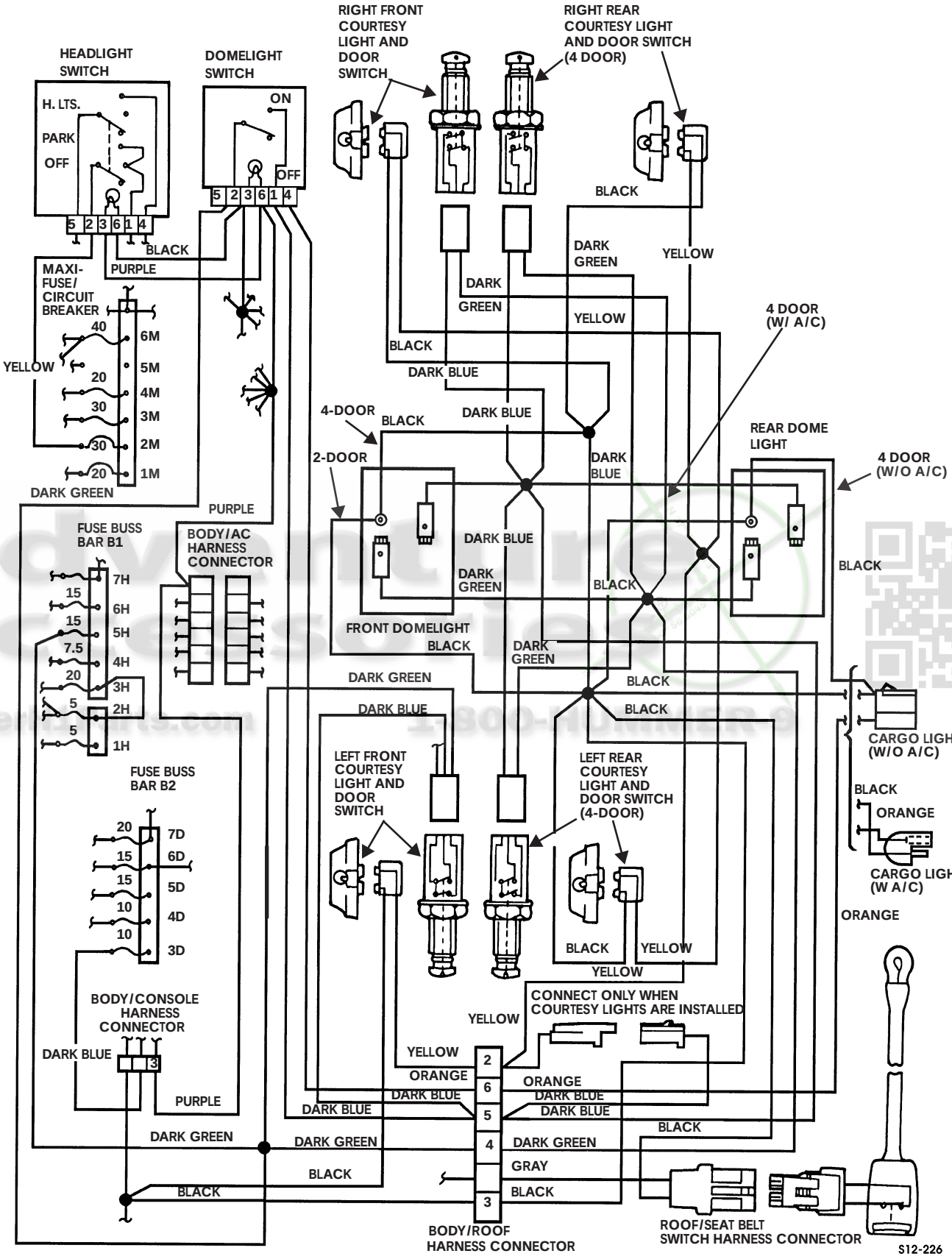



*Figure 12-65: Courtesy, Dome, and Cargo Lights*

## TRAILER CONNECTION SYSTEM

**NOTE:** Check fuse panel for blown fuse(s) before performing electrical troubleshooting. Ensure inoperative lamp(s) and bulb(s) are replaced or known to be good before performing electrical troubleshooting.

### Trailer Connector Inoperative (One or More Pins)

Step 1. Position ignition switch and light switch to circuit being tested (electrical harness foldouts 1-12).

Step 2. Check trailer connector pin (electrical harness foldouts 1-12) for voltage.

a. Nominal voltage is present, repair or replace trailer wiring harness.

b. Nominal voltage is not present, go to body wiring harness troubleshooting specific to trailer connector circuit being tested.

__ Ground

__ Trailer, I.D. clearance

__ Left turn

__ Right turn

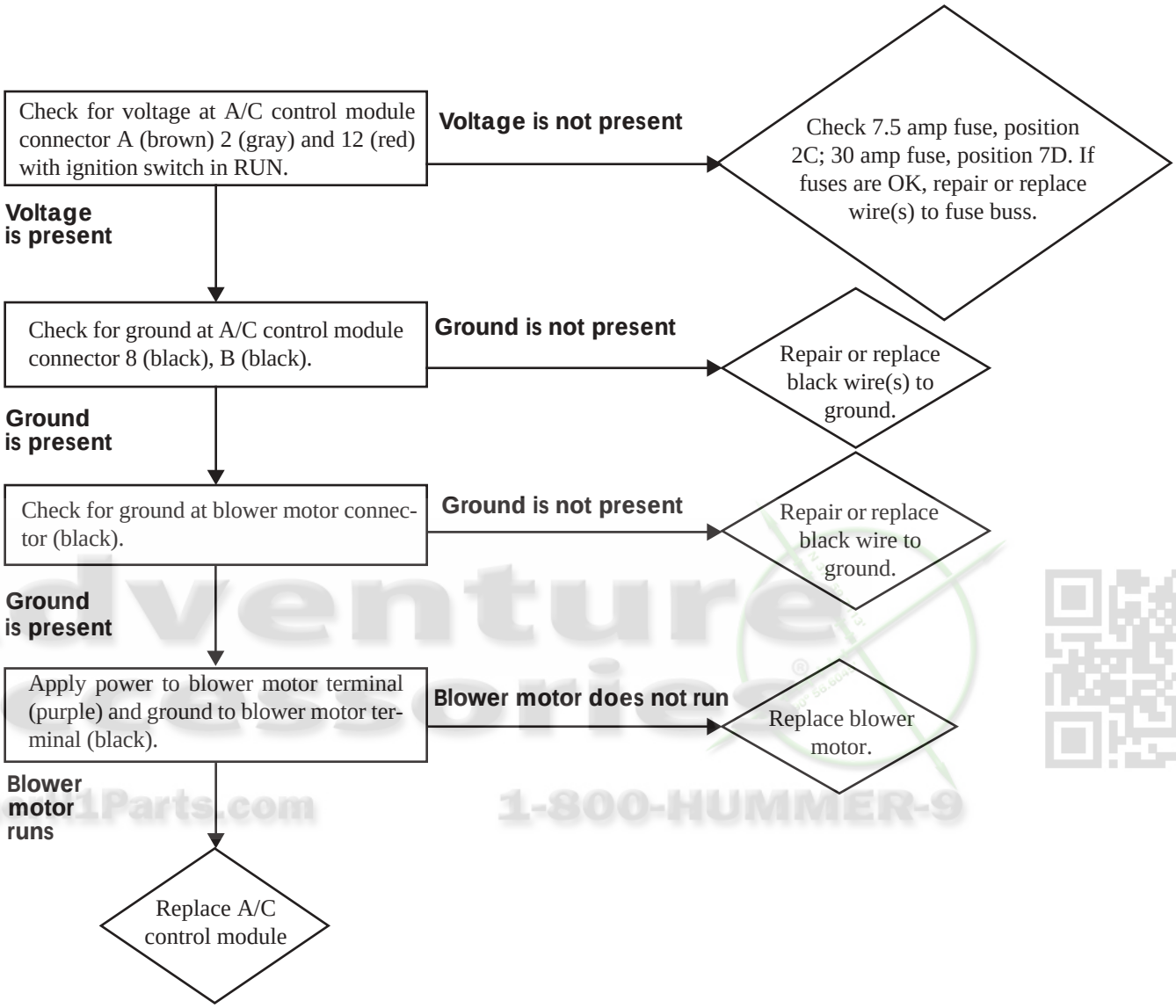
__ Independent stop

__ Brake control unit

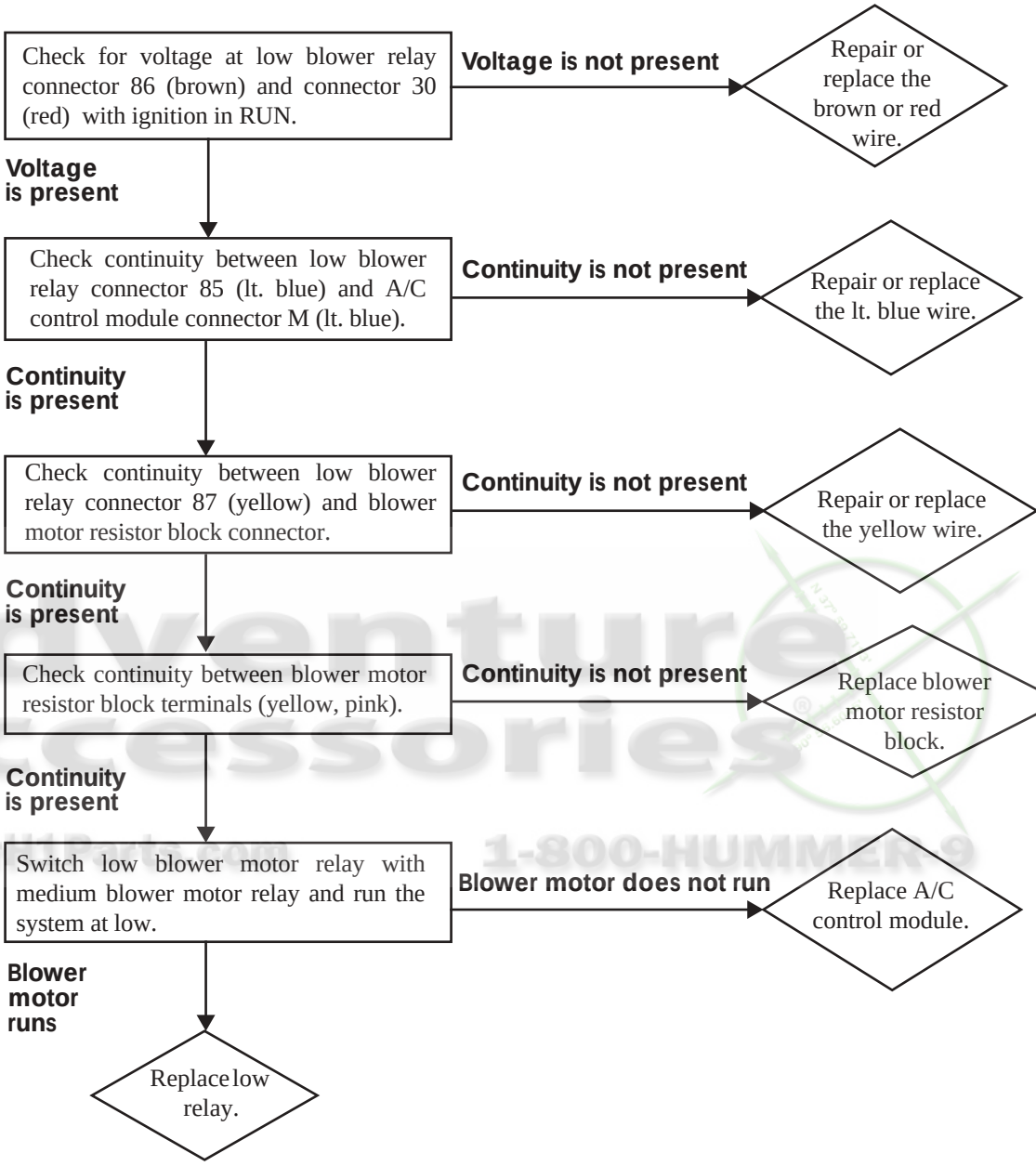
__ Auxiliary

__ Battery charge

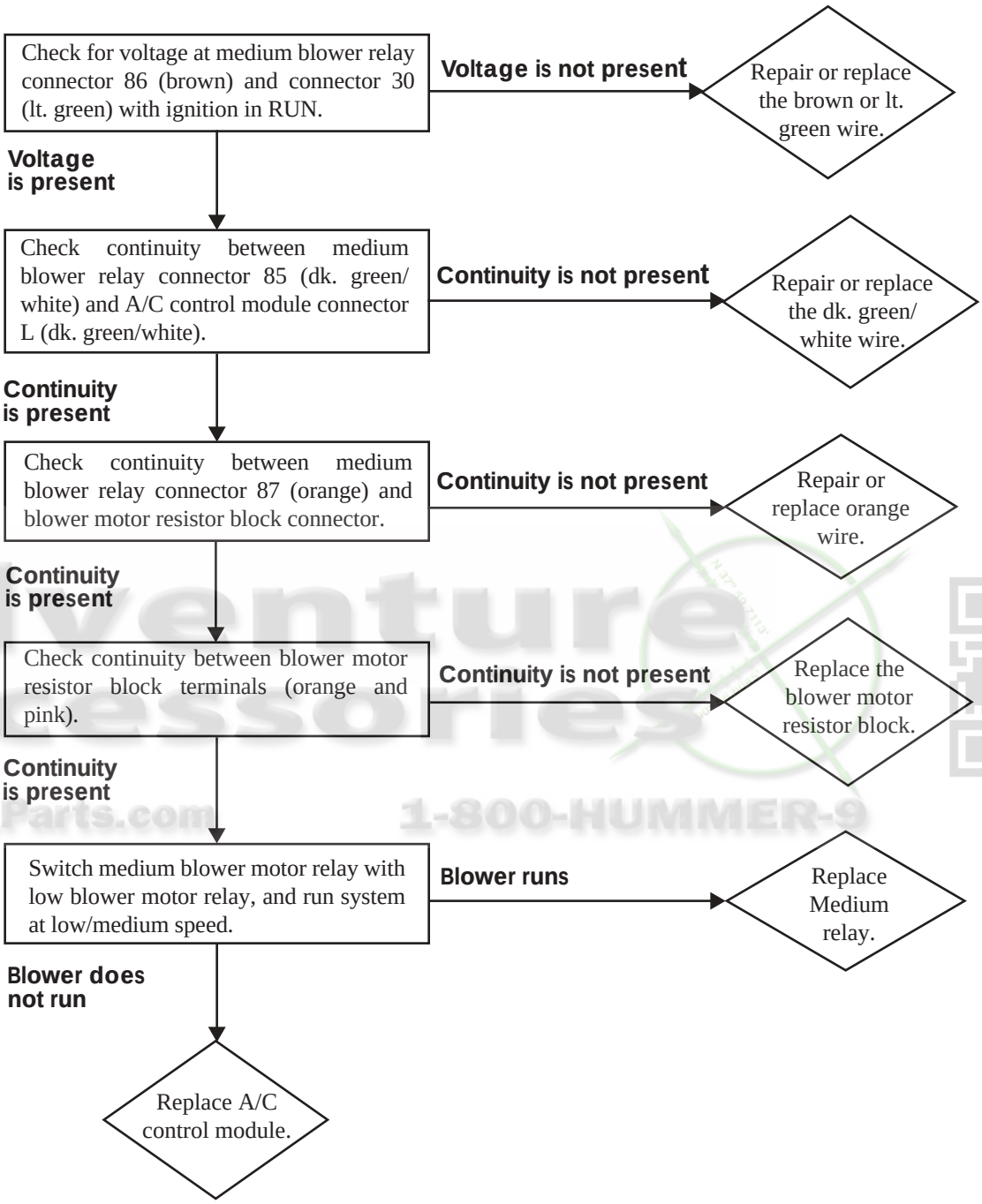
## A/C BLOWER MOTOR DOES NOT FUNCTION AT ANY SPEED



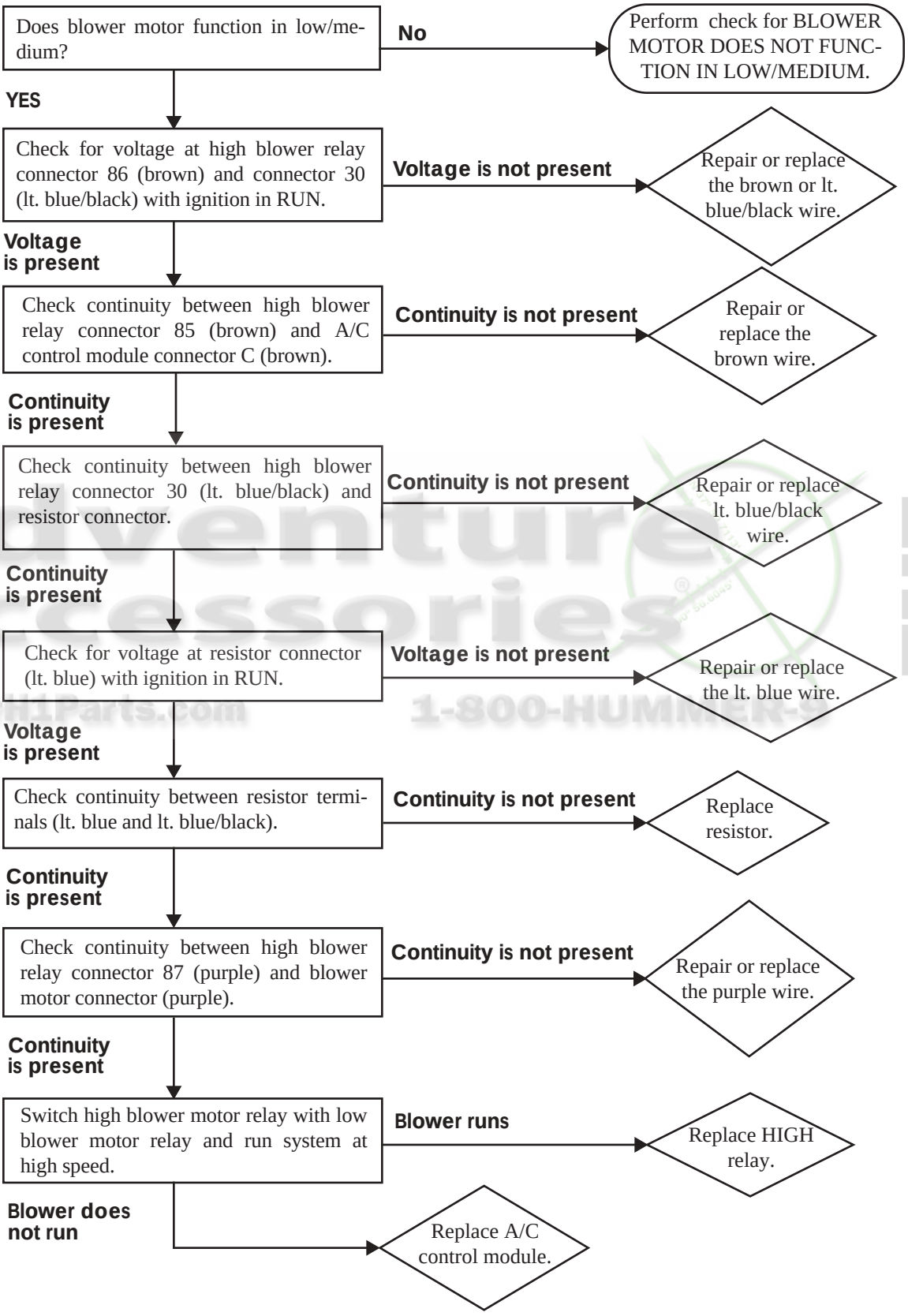
## A/C BLOWER MOTOR DOES NOT FUNCTION IN "LOW"



## A/C BLOWER MOTOR DOES NOT FUNCTION IN "LOW/MEDIUM"

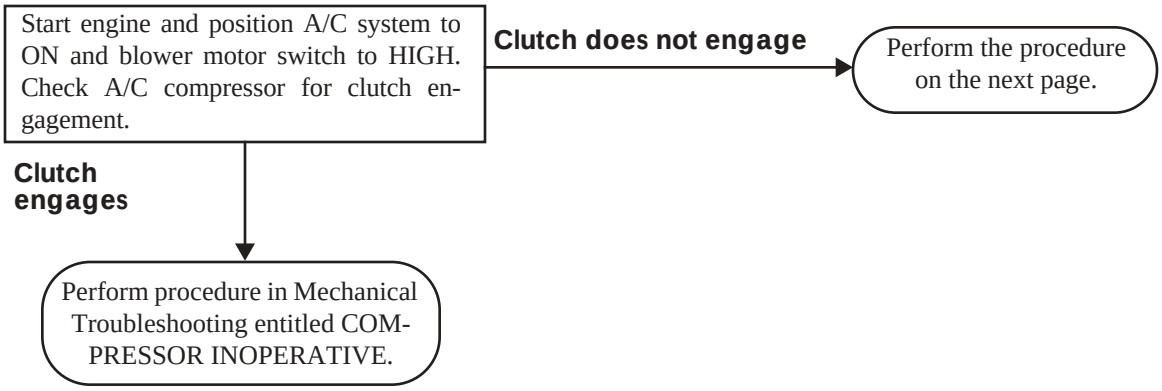


## A/C BLOWER MOTOR DOES NOT FUNCTION IN "MEDIUM/HIGH" OR "HIGH" MODE

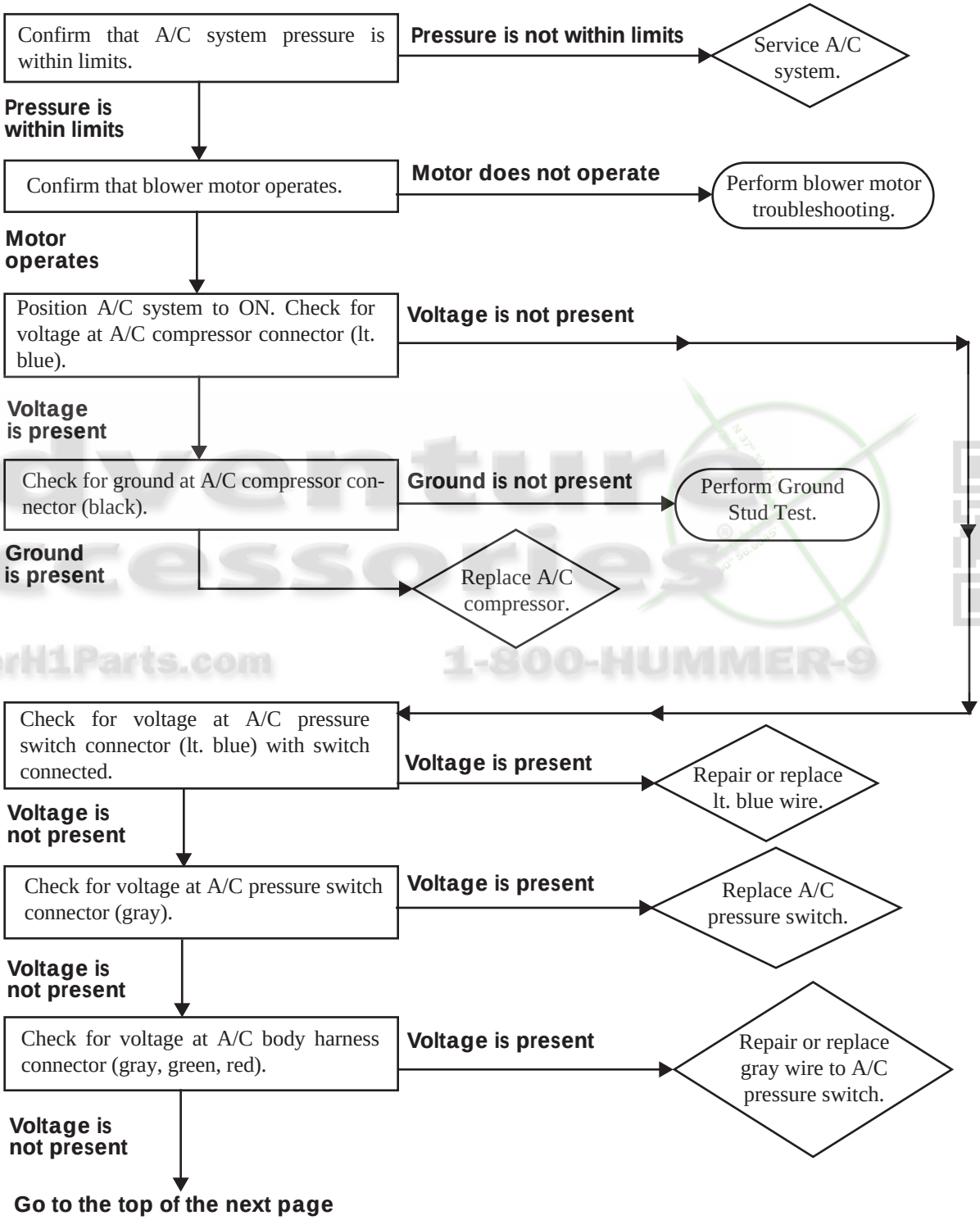


## AIR CONDITIONING SYSTEM FAILS TO COOL

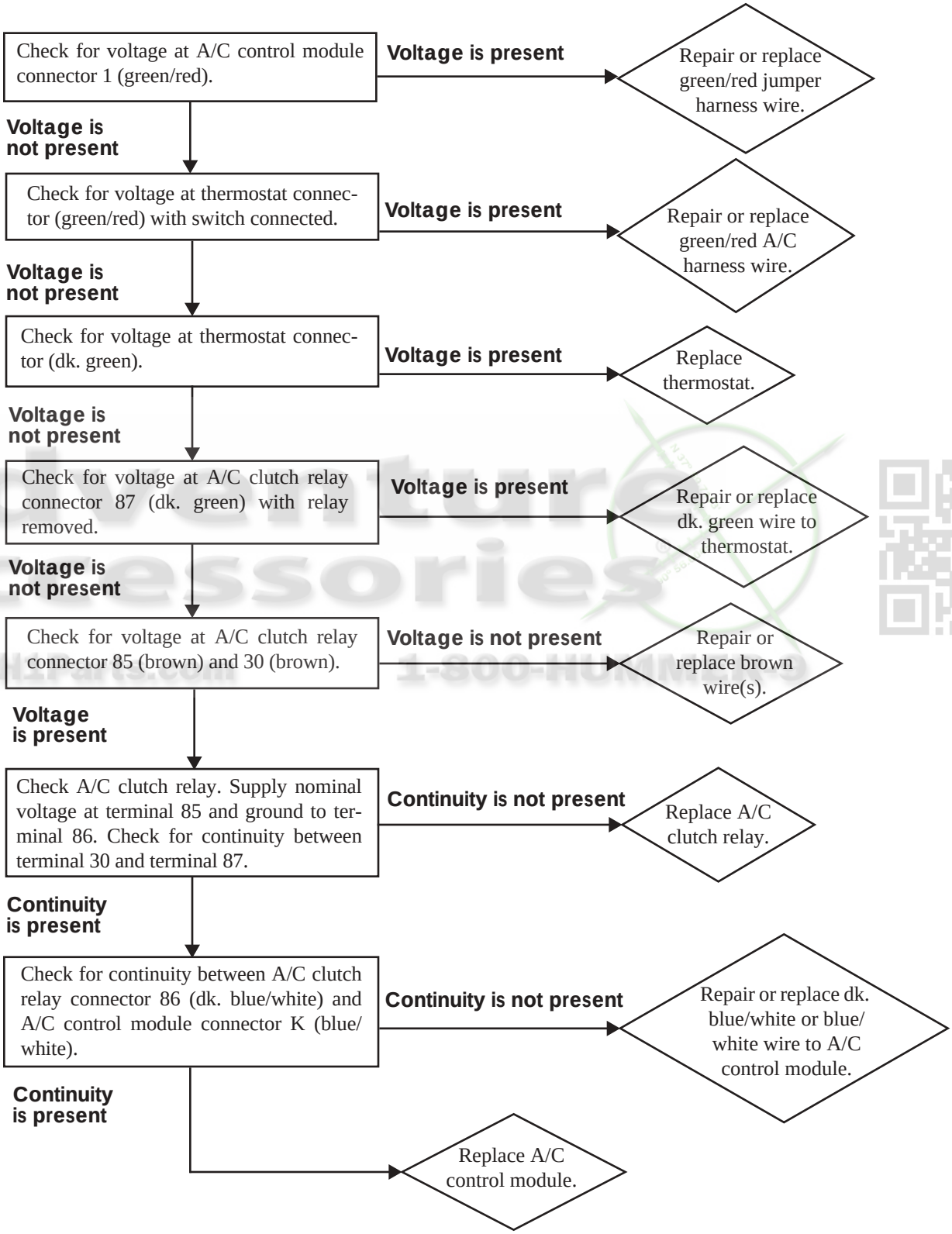
**NOTE:** Check fuse panel for blown fuse(s) and/or circuit breaker(s) before performing electrical troubleshooting. Check engine accessory drivebelts for wear and tension.



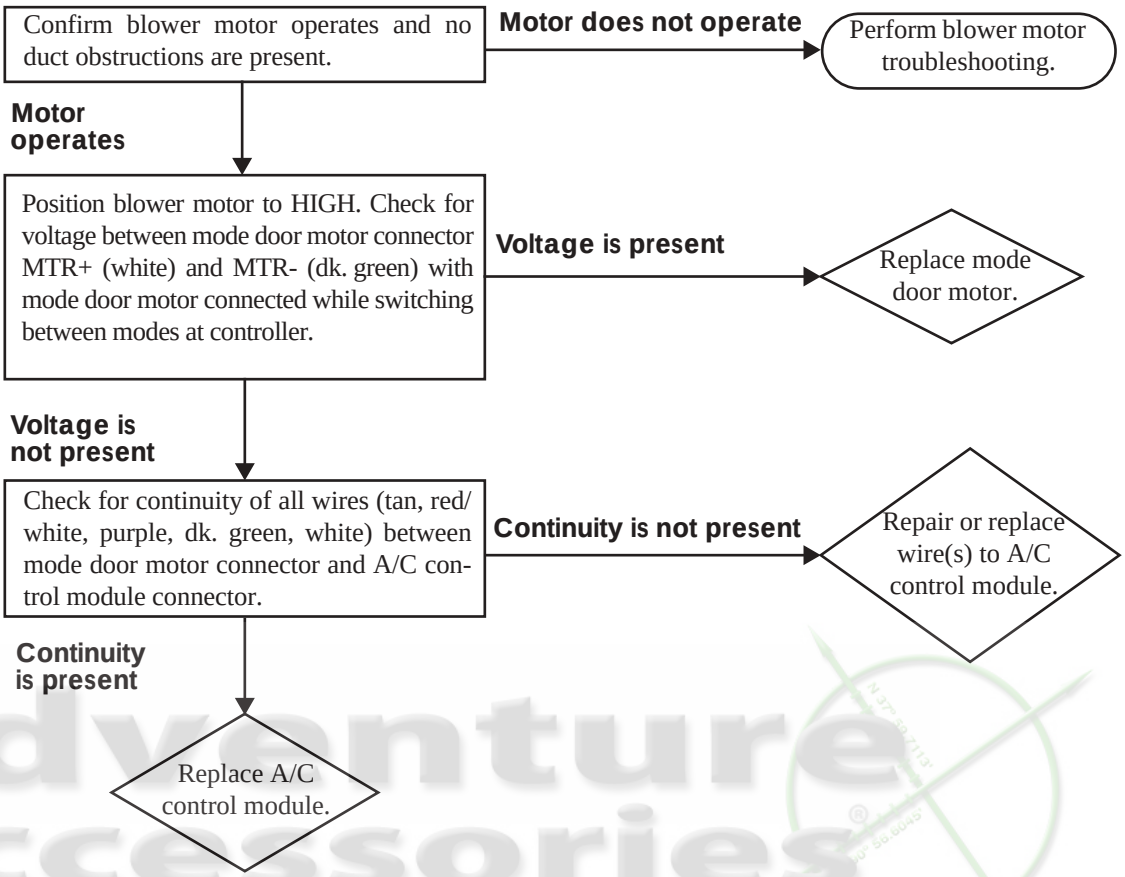
## A/C COMPRESSOR CLUTCH DOESN'T OPERATE (ENGAGE)



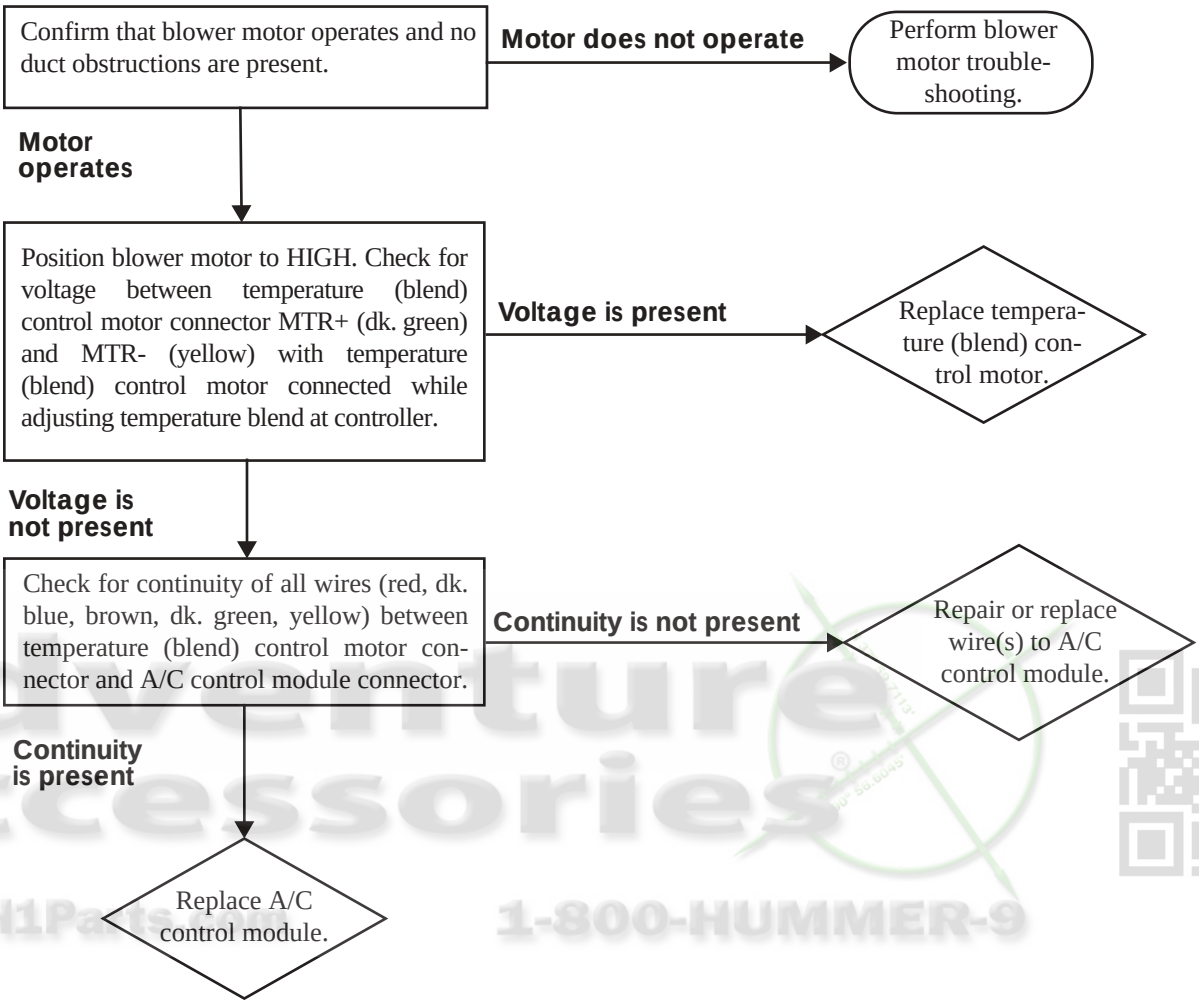
## A/C COMPRESSOR CLUTCH DOESN'T OPERATE (ENGAGE) – CONTINUED



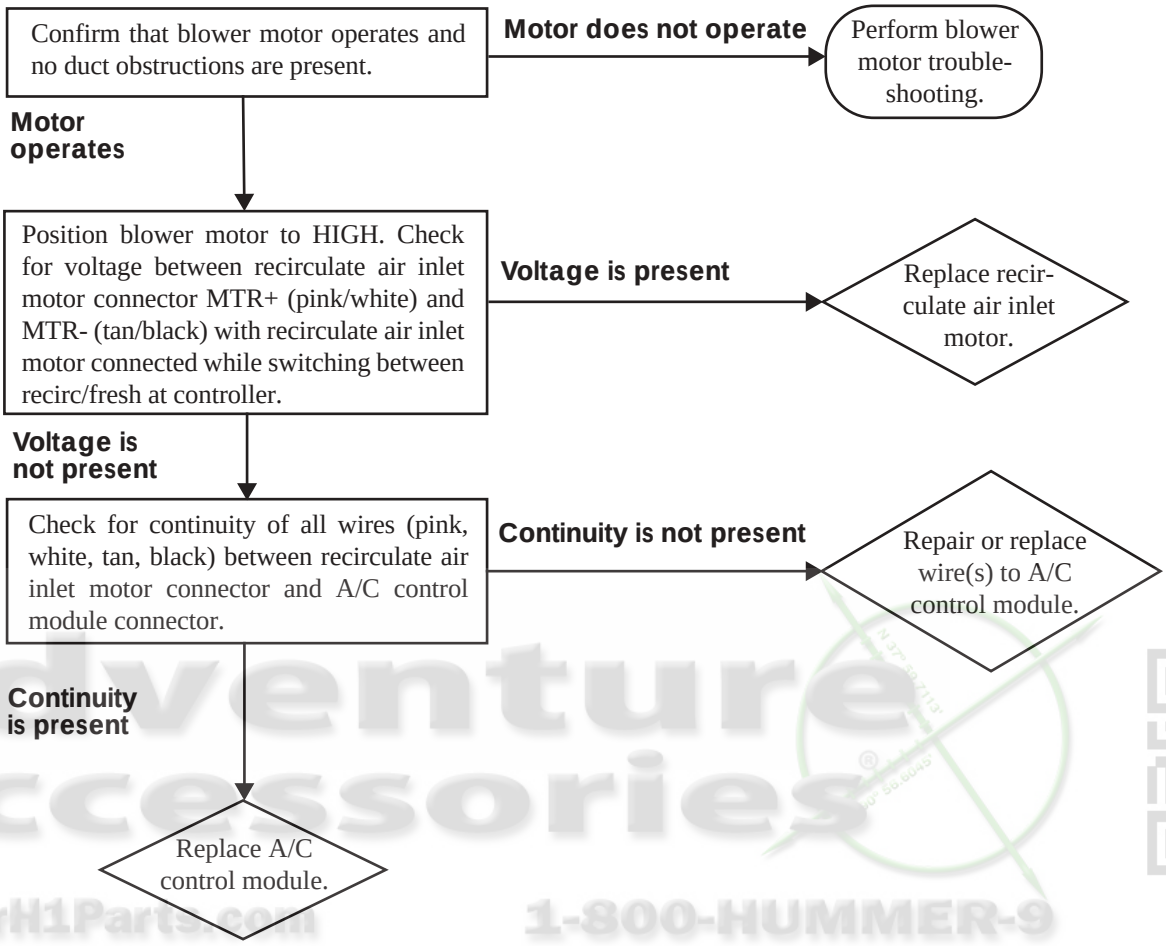
## MODE DOOR MOTOR FAILS TO OPERATE



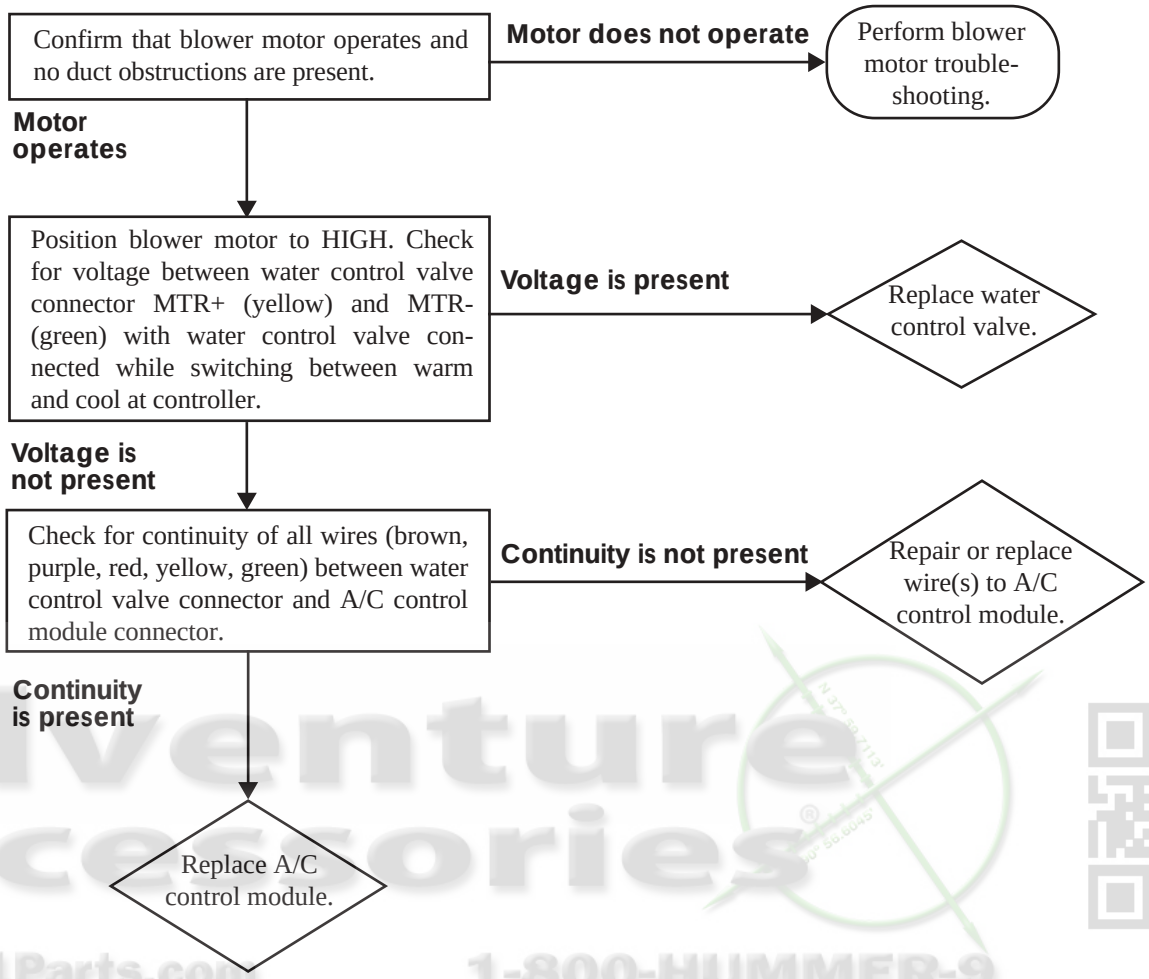
## TEMPERATURE (BLEND) CONTROL MOTOR FAILS TO OPERATE



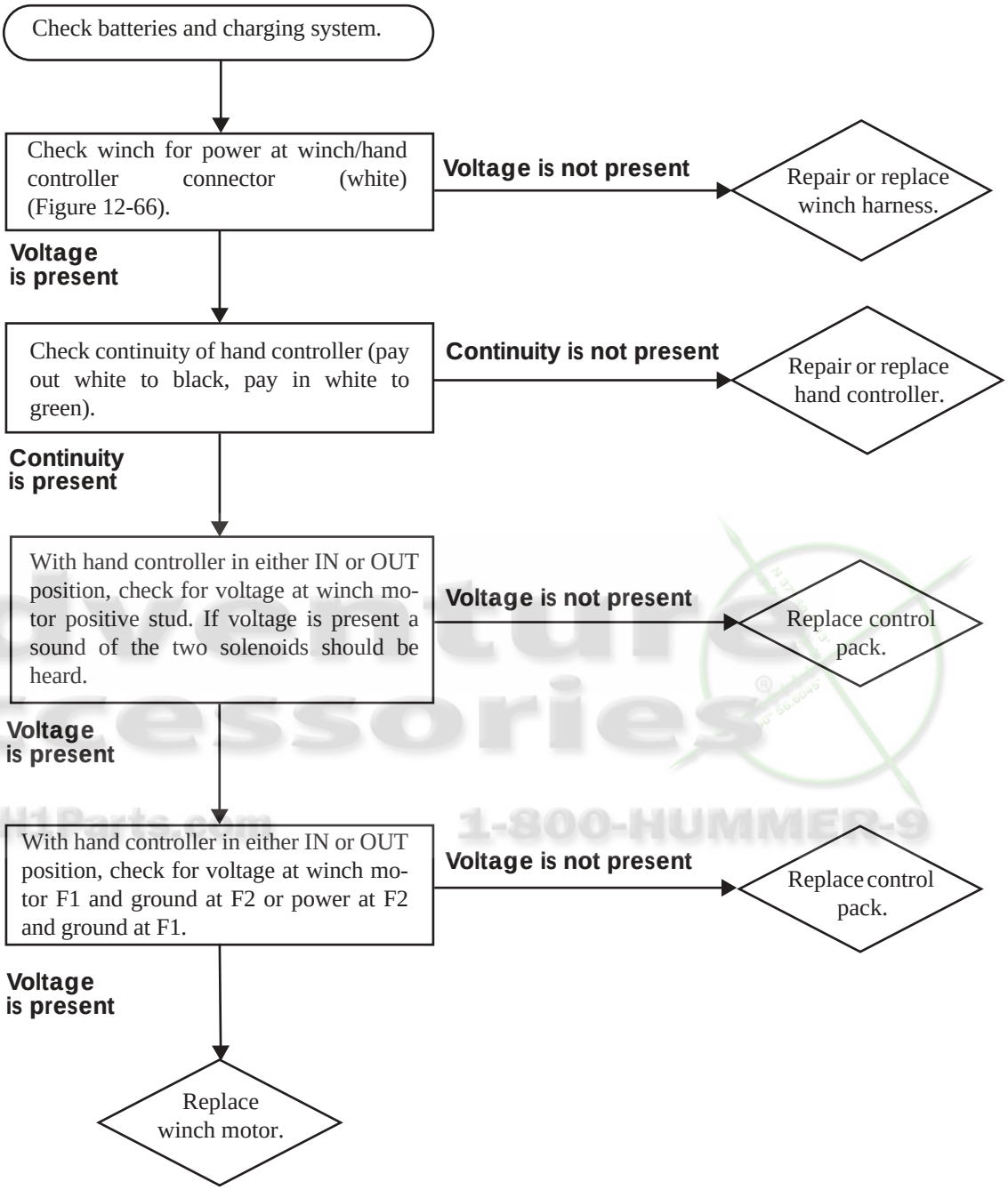
## RECIRCULATE AIR INLET MOTOR FAILS TO OPERATE



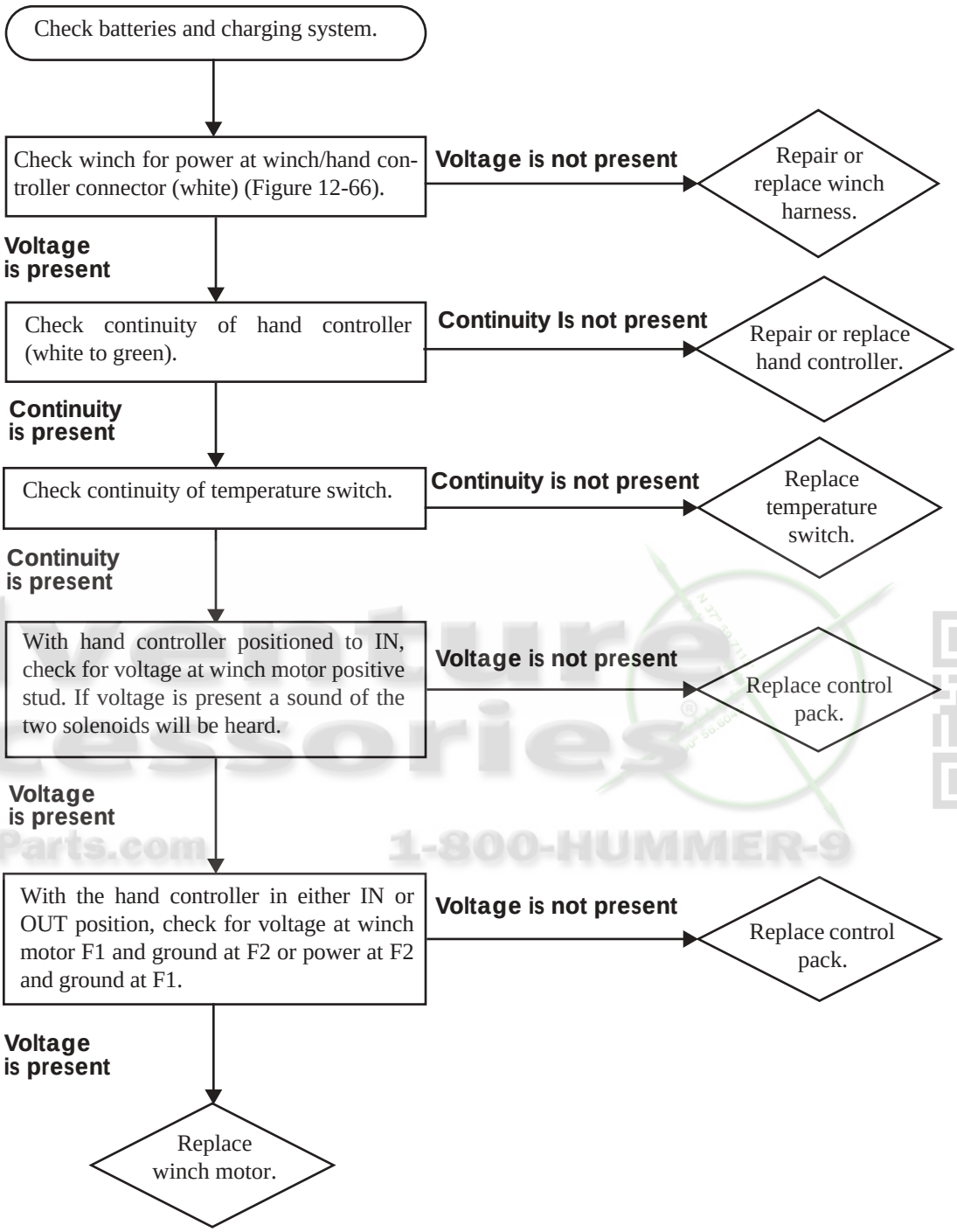
## WATER CONTROL VALVE FAILS TO OPERATE



## WINCH FAILS TO REEL OUT OR TO OPERATE IN BOTH DIRECTIONS



## WINCH FAILS TO REEL IN



## WINCH SHUTS OFF DURING OPERATION

7. Electronic Current Limiter

   The winch is equipped with an Electronic Current Limiter (ECL). This device will automatically shut off the winch on “power in” operation if the rated capacity of 12,000 lbs. is exceeded. When this occurs, you should “power out” some line to prevent damage to the winch. (“Power out” operation is not affected by the ECL.) The load must somehow be lightened, or a double line may be used in conjunction with a snatch block to reduce the load on the winch. When the ECL has tripped, it will reset itself within 5 to 10 seconds and “power in” will again be available.

8. Temperature Switch

   The winch is equipped with a motor temperature switch. When the motor approaches stall speed, a very rapid heat buildup occurs which could cause permanent motor damage. This device will automatically shut off the winch. The switch will automatically reset as the motor cools.

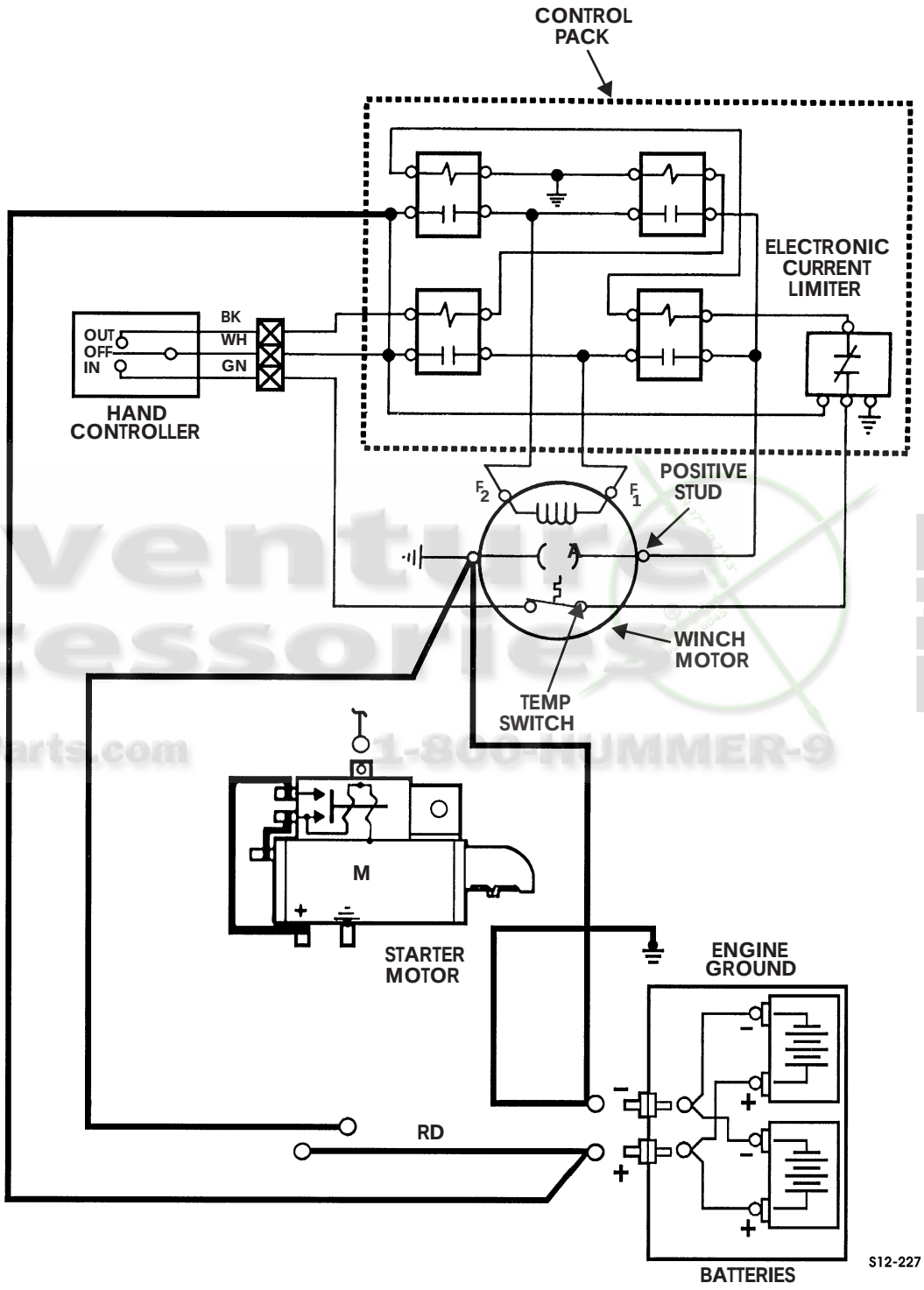
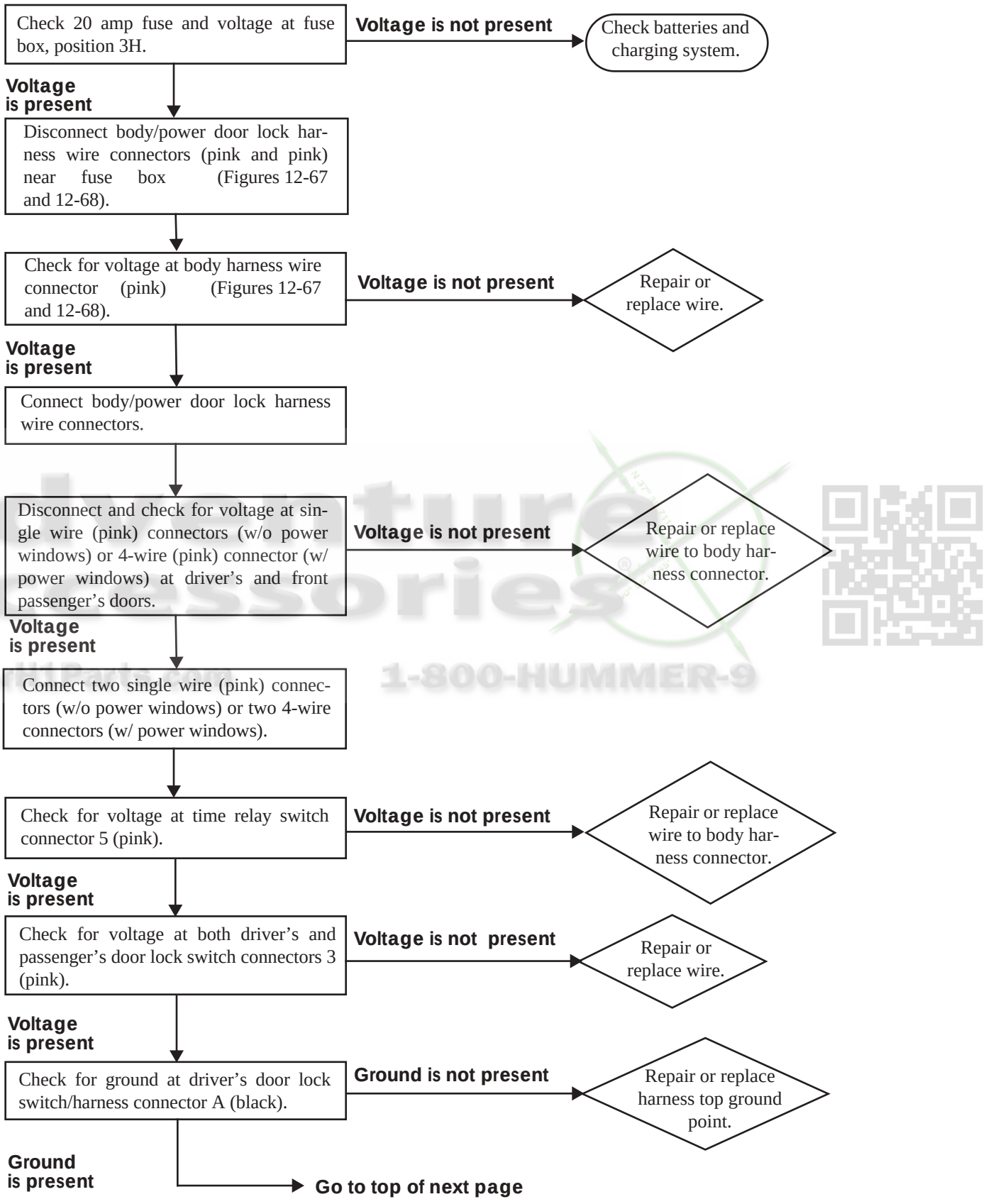
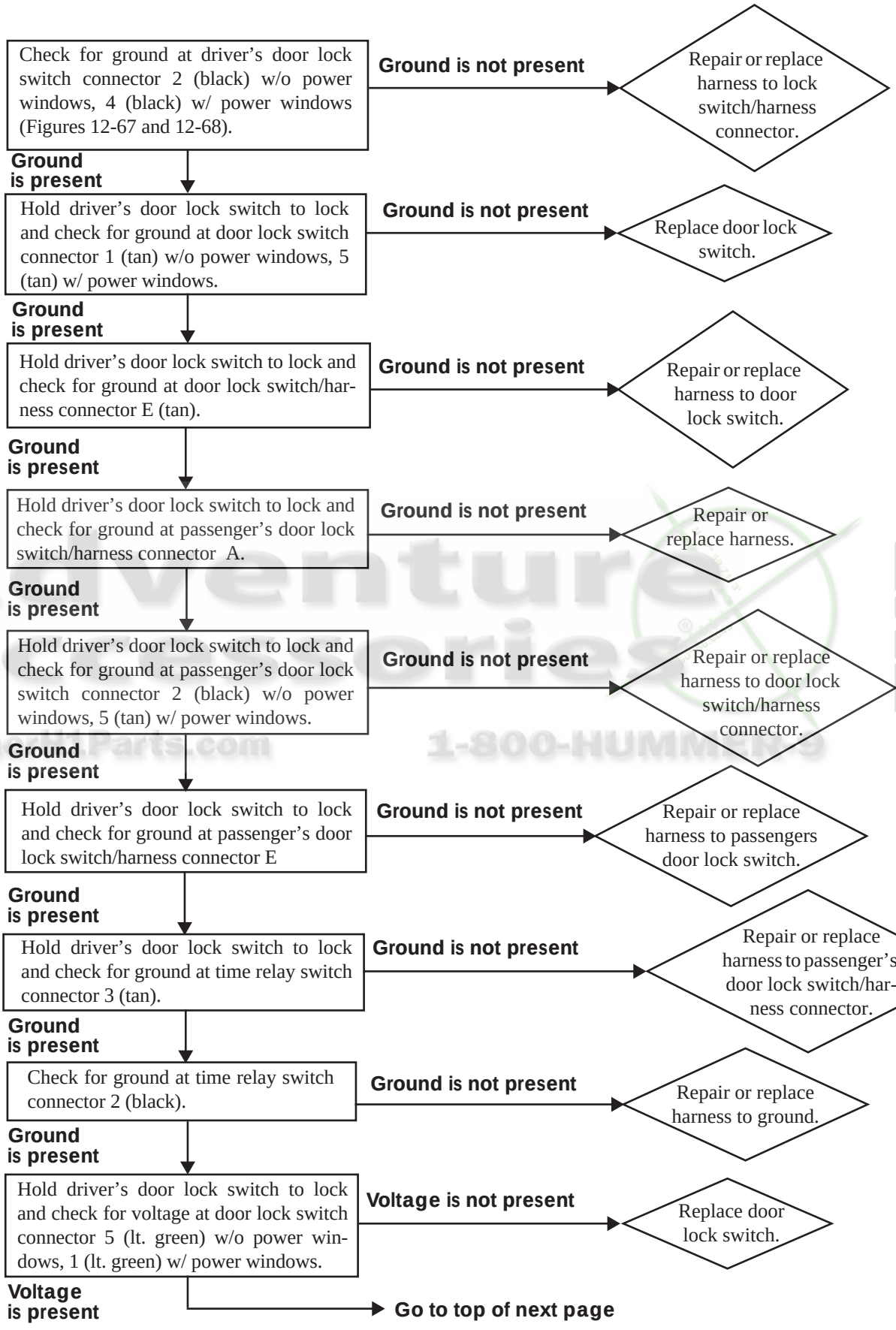



*Figure 12-66: Winch System*

## POWER DOOR LOCKS FAIL TO LOCK

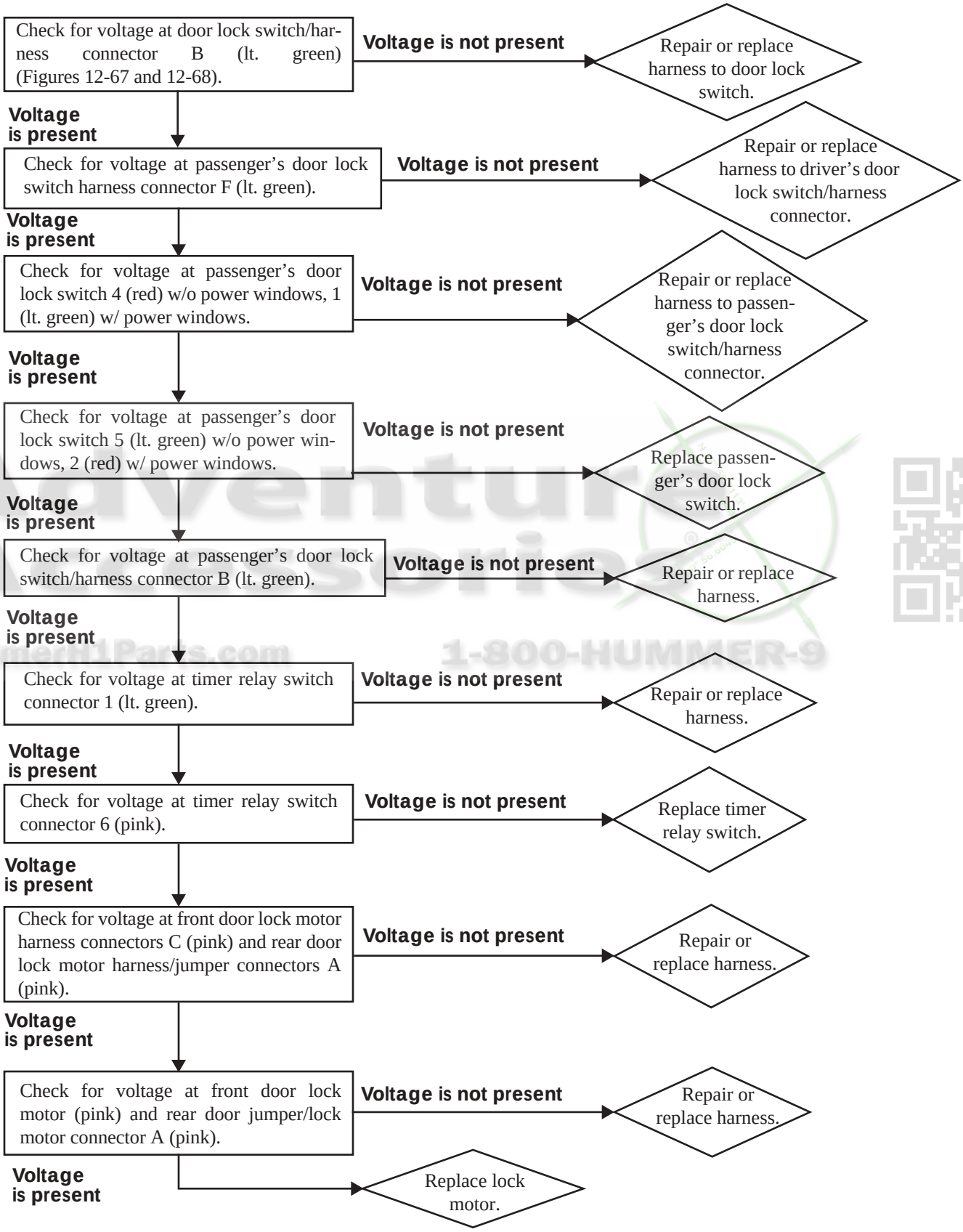


## POWER DOOR LOCKS FAIL TO LOCK – CONTINUED

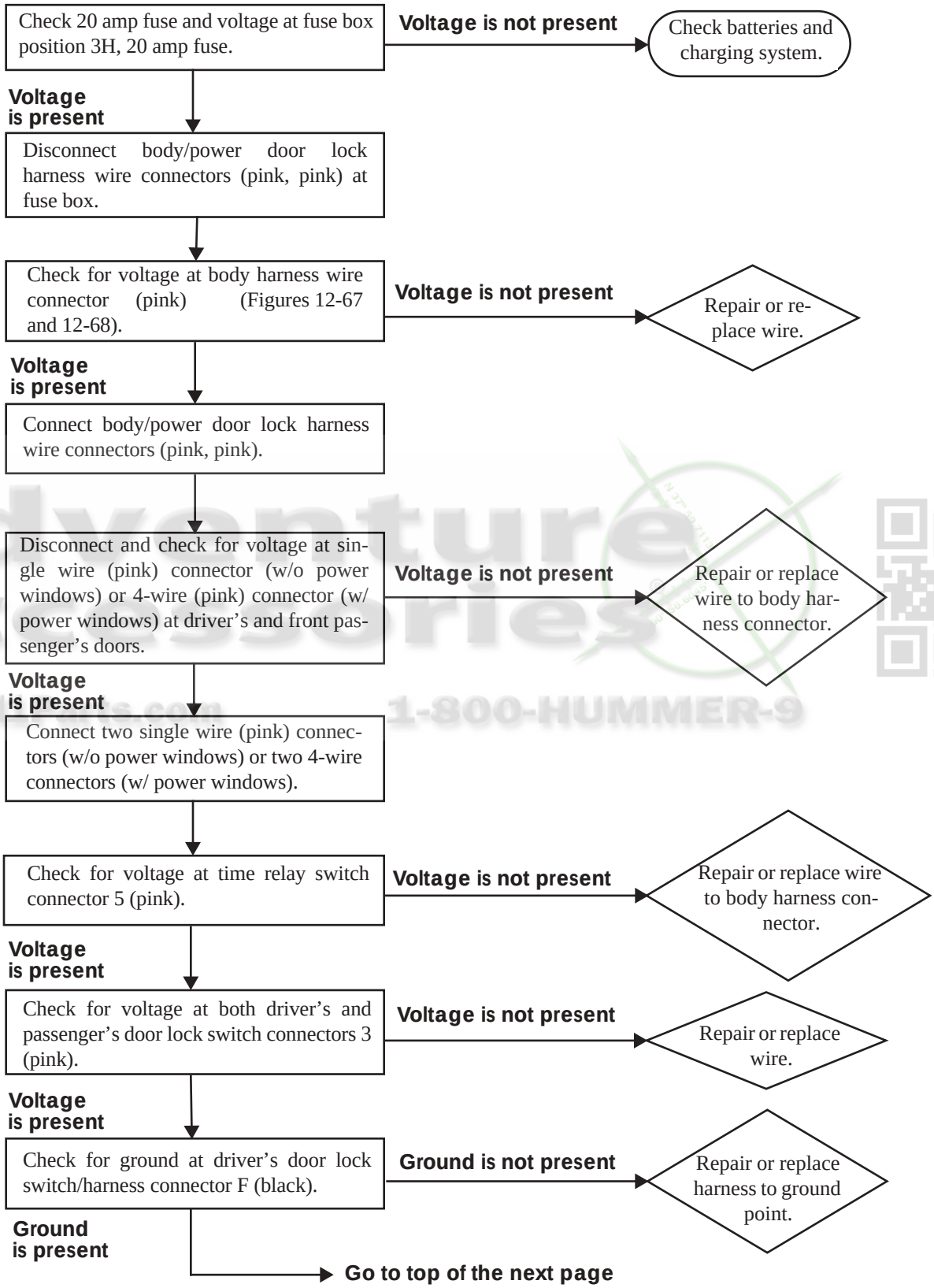


## POWER DOOR LOCKS FAIL TO LOCK – CONTINUED

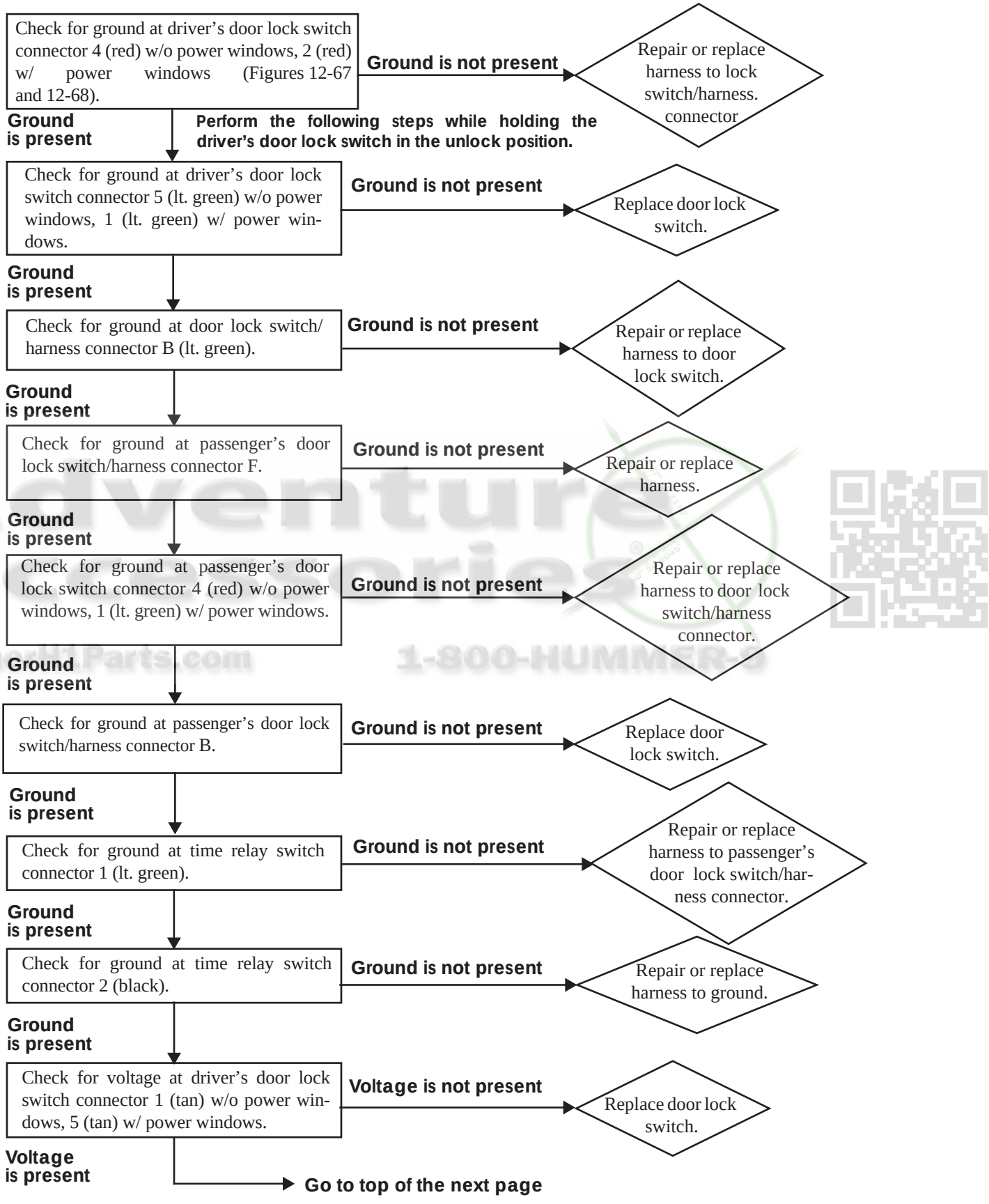
**Perform all of the following steps while holding the driver's door lock switch to lock.**



## POWER DOOR LOCKS FAIL TO UNLOCK

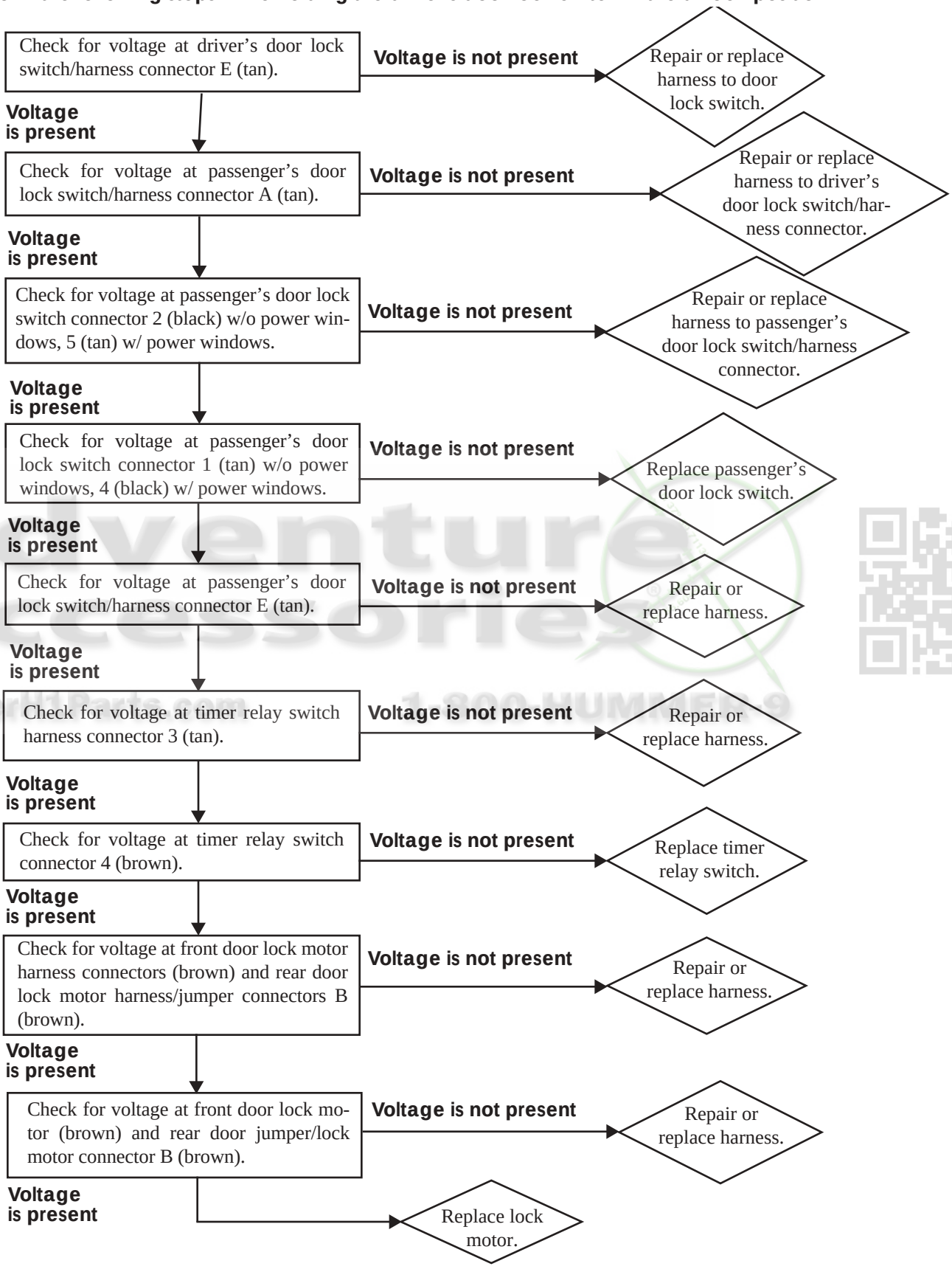


## POWER DOOR LOCKS FAIL TO UNLOCK – CONTINUED



## POWER DOOR LOCKS FAIL TO UNLOCK – CONTINUED

**Perform the following steps while holding the driver's door lock switch in the unlock position.**



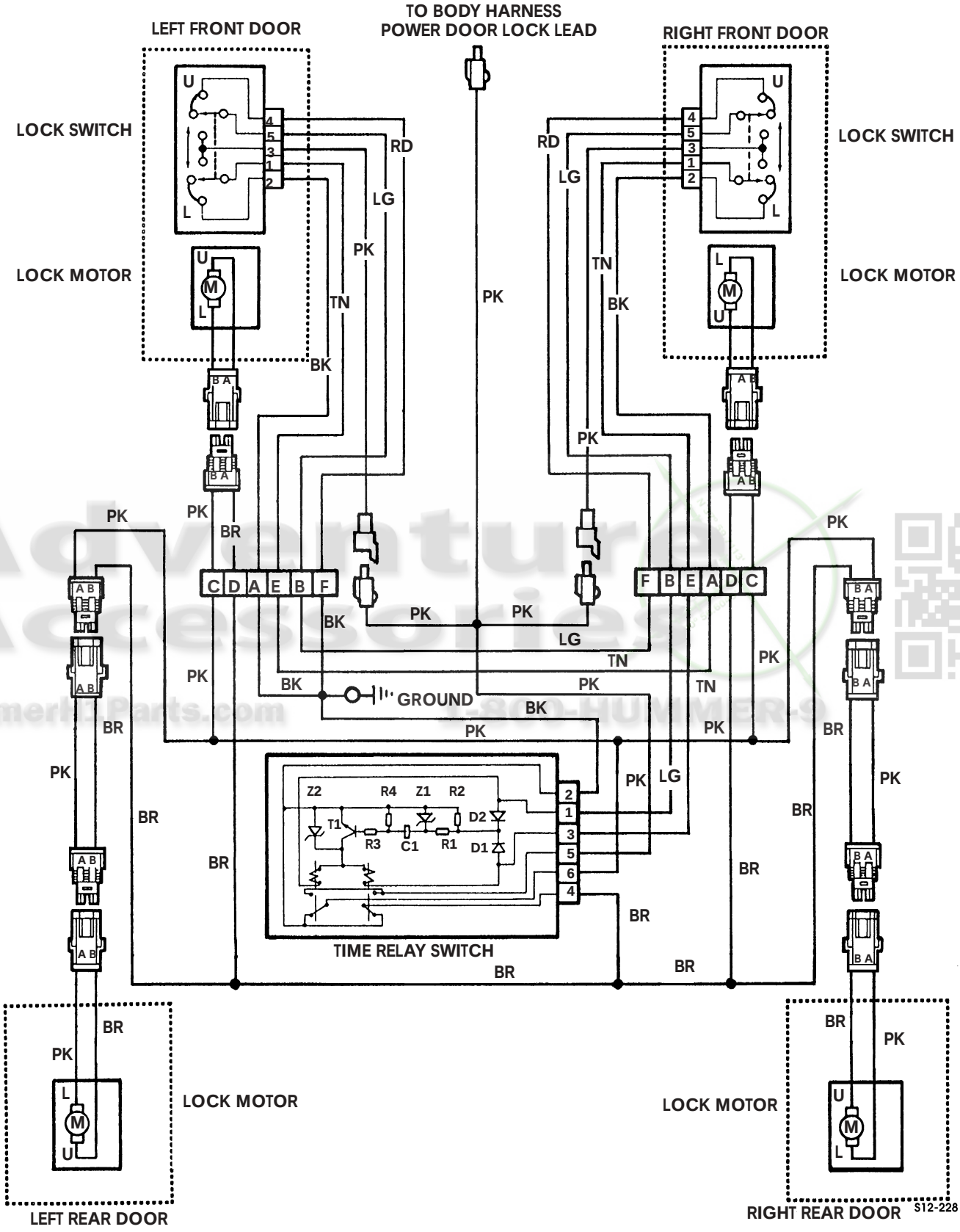



*Figure 12-67: Power Door Locks (w/o Power Windows)*

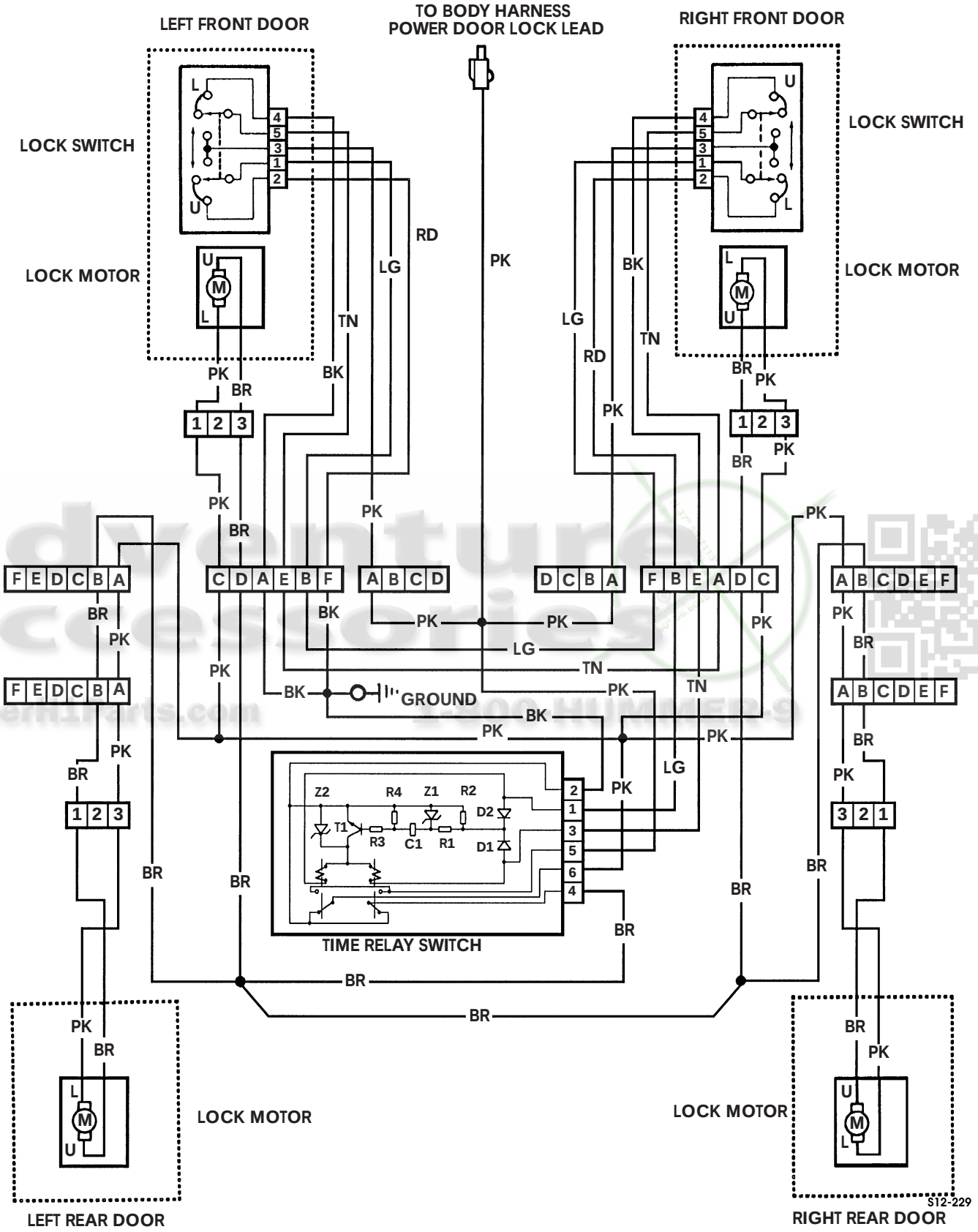
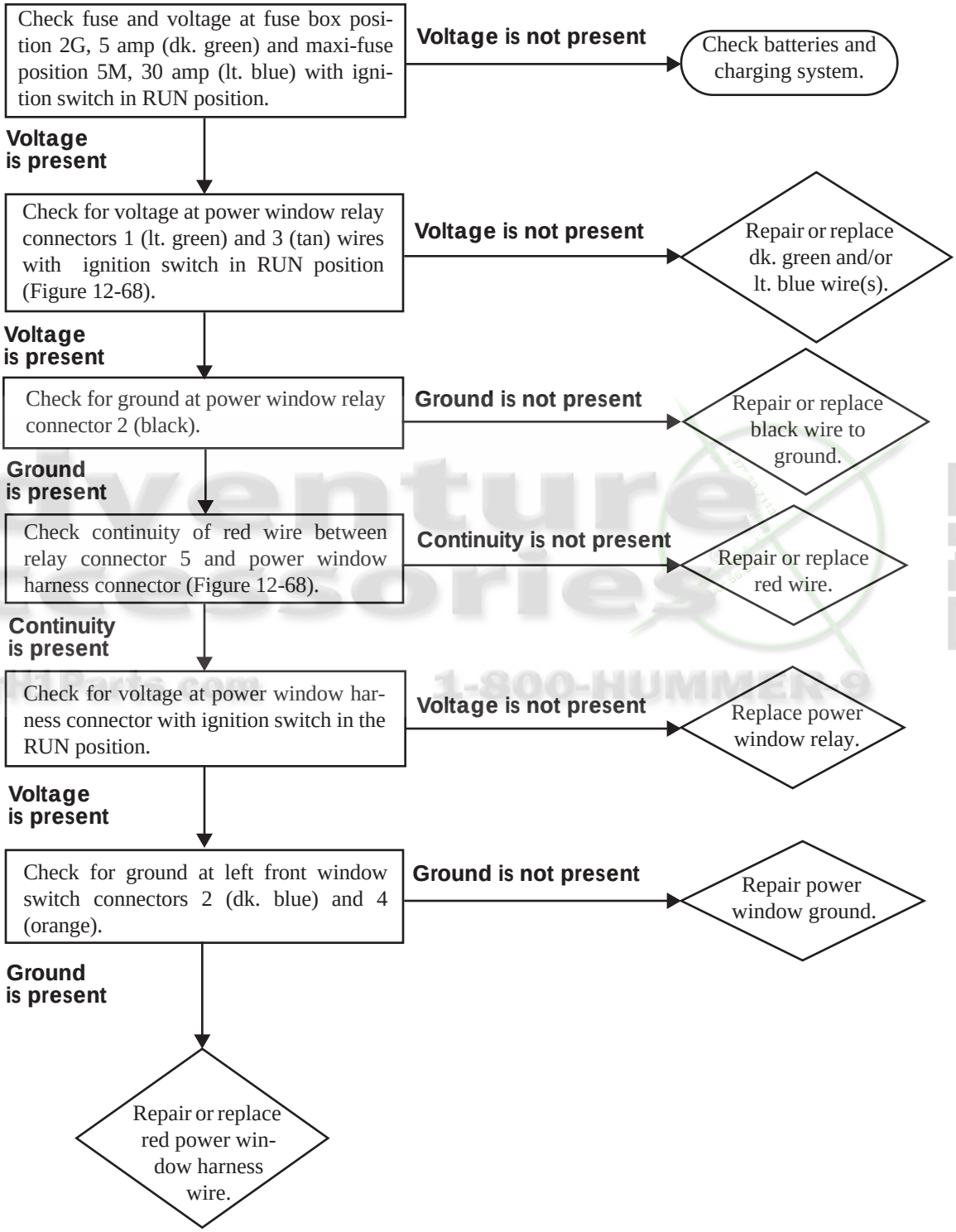
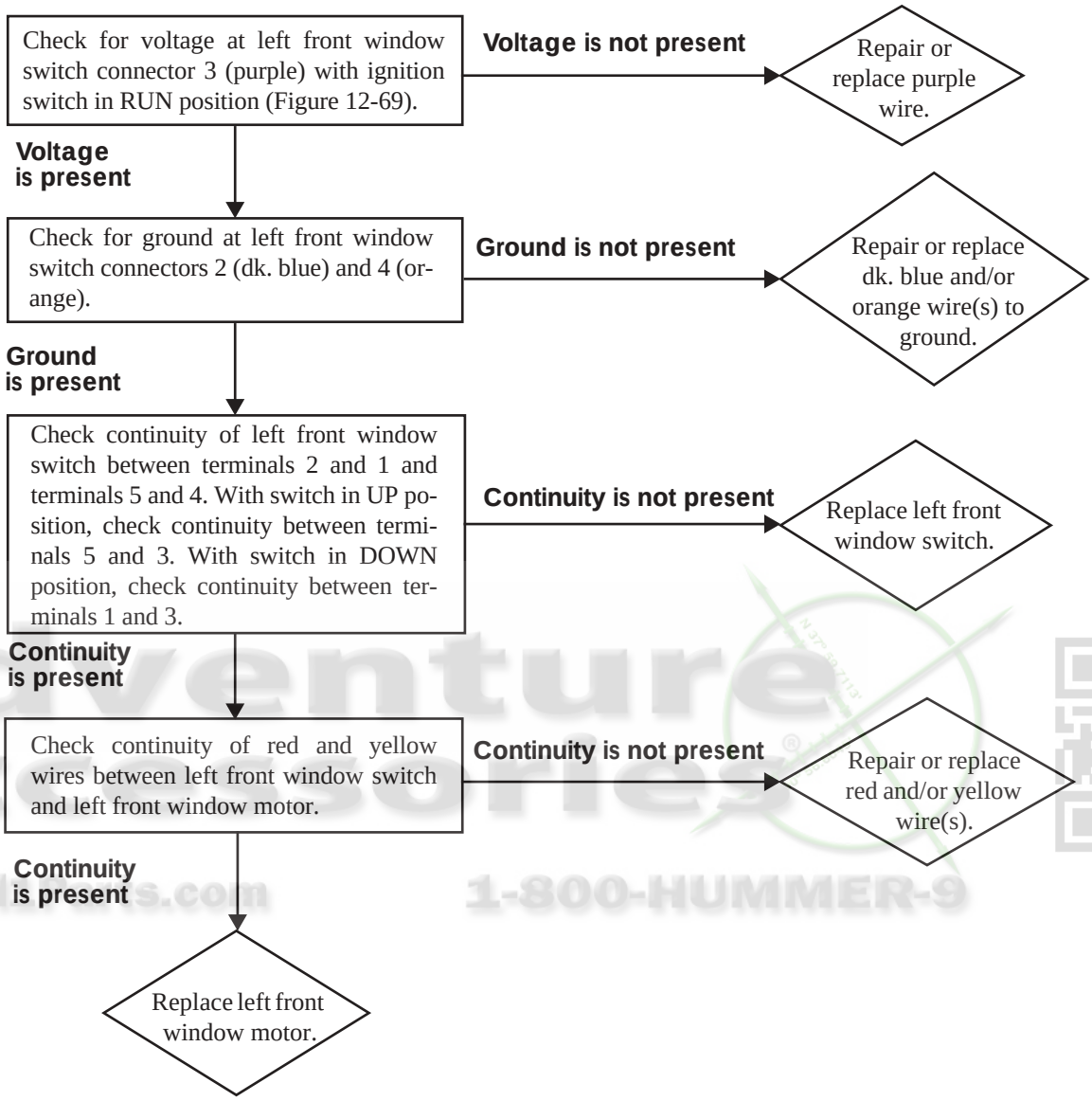



*Figure 12-68: Power Door Locks (w/ Power Windows*

## ALL POWER WINDOWS INOPERATIVE



## DRIVER'S POWER WINDOW INOPERATIVE



## RIGHT FRONT, RIGHT REAR, OR LEFT REAR WINDOW INOPERATIVE

Check for voltage at window lock switch connector 3 (red) with ignition switch in RUN position (Figure 12-69).

**Voltage is not present** → Repair or replace red wire.

**Voltage is present**

Check for voltage at driver controlled window switch connector 3 (red) of inoperative window with ignition in RUN position.

**Voltage is not present** → Repair or replace red wire.

**Voltage is present**

Check continuity of inoperative window's driver controlled window switch between terminals 1 and 2, and terminals 4 and 5. With switch in UP position, check continuity between terminals 3 and 5. With switch in DOWN position, check continuity between terminals 1 and 3.

**Continuity is not present** → Replace driver controlled window switch.

**Continuity is present**

Check continuity of window lock switch between terminals 1 and 3 with the switch in the UNLOCK position.

**Continuity is not present** → Replace the window lock switch.

**Continuity is present**

Check continuity between window lock switch connector 1 (purple) and window switch connector 3 (purple) located at inoperative window.

**Continuity is not present** → Repair or replace purple wire.

**Continuity is present**

Check continuity of wires between driver controlled window switch and window switch located at inoperative window (rear window wire colors are lt. green and tan; front window wire colors are dk. blue and orange).

**Continuity is not present** → Repair or replace wires.

**Continuity is present**

At driver controlled window switch of inoperative window, check for ground at connectors 2 (black) and 4 (black).

**Ground is not present** → Repair or replace black wire(s) to ground.

**Ground is present**

Check continuity of window switch located at inoperative window between terminals 1 and 2, and terminals 4 and 5. With switch in UP position, check continuity between terminals 1 and 3. With switch in DOWN position check continuity between terminals 3 and 5.

**Continuity is not present** → Replace window switch.

**Continuity is present**

Check continuity of yellow and red wires between window motor and window switch located at inoperative window.

**Continuity is not present** → Repair or replace red and/or yellow wire(s).

**Continuity is present** → Replace window motor.

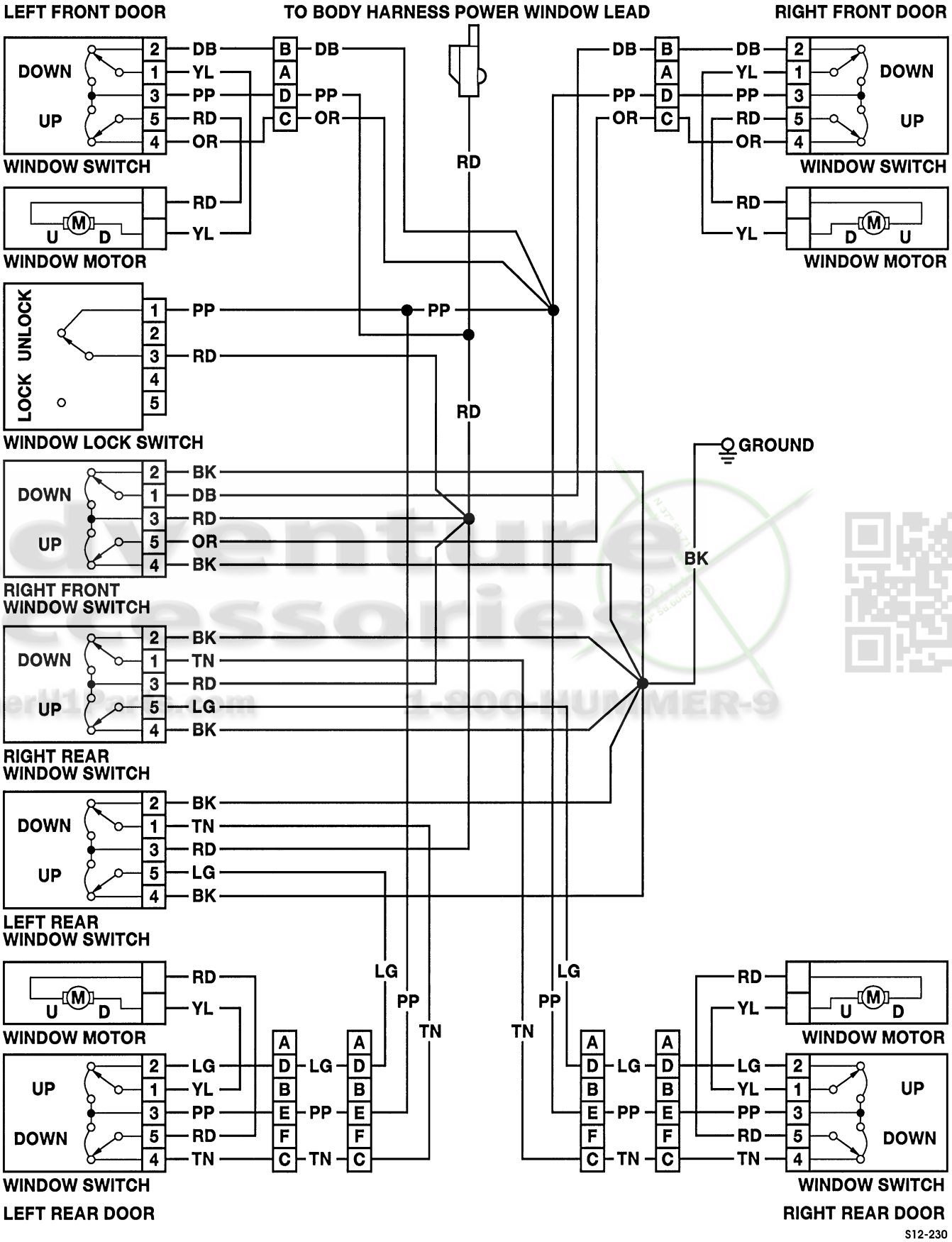
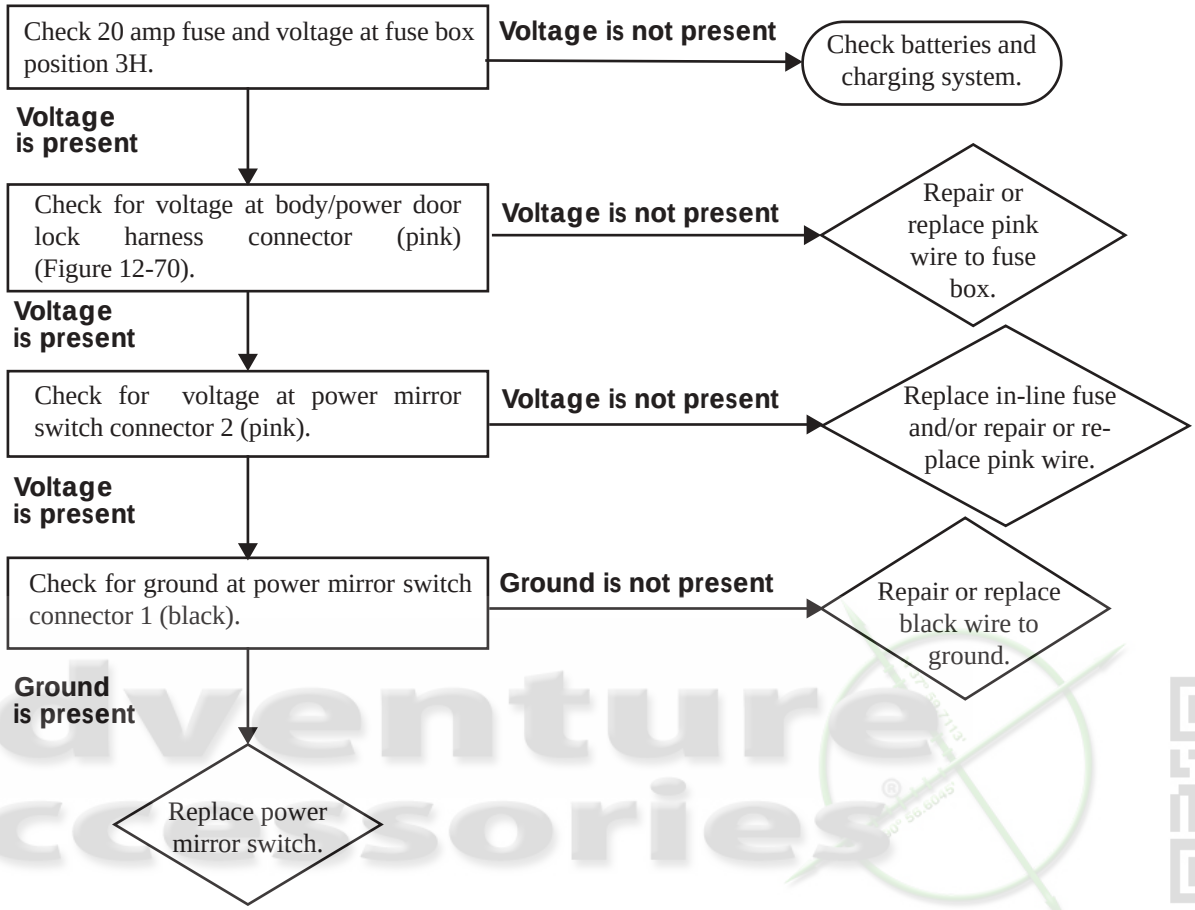
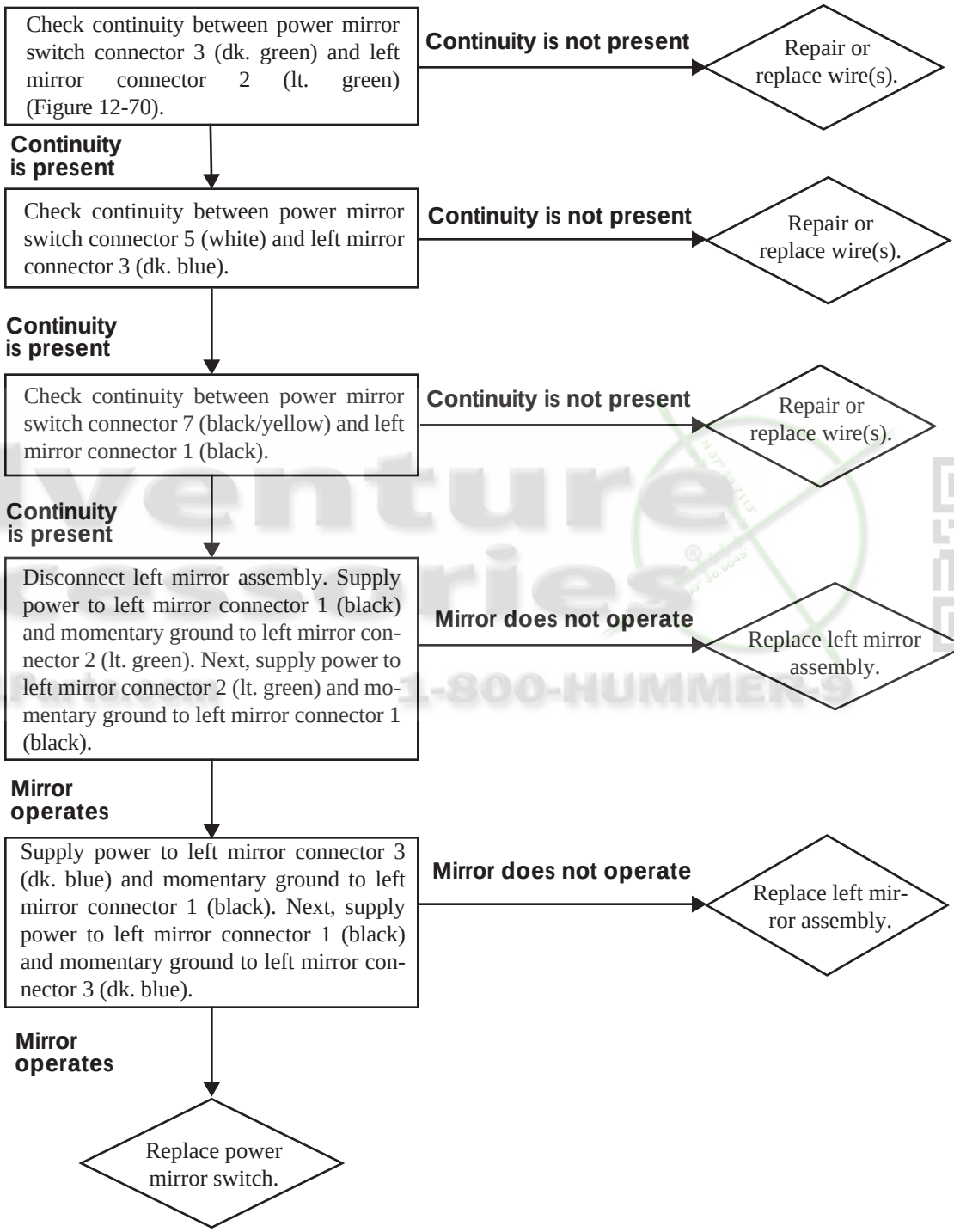



*Figure 12-69: Power Windows*

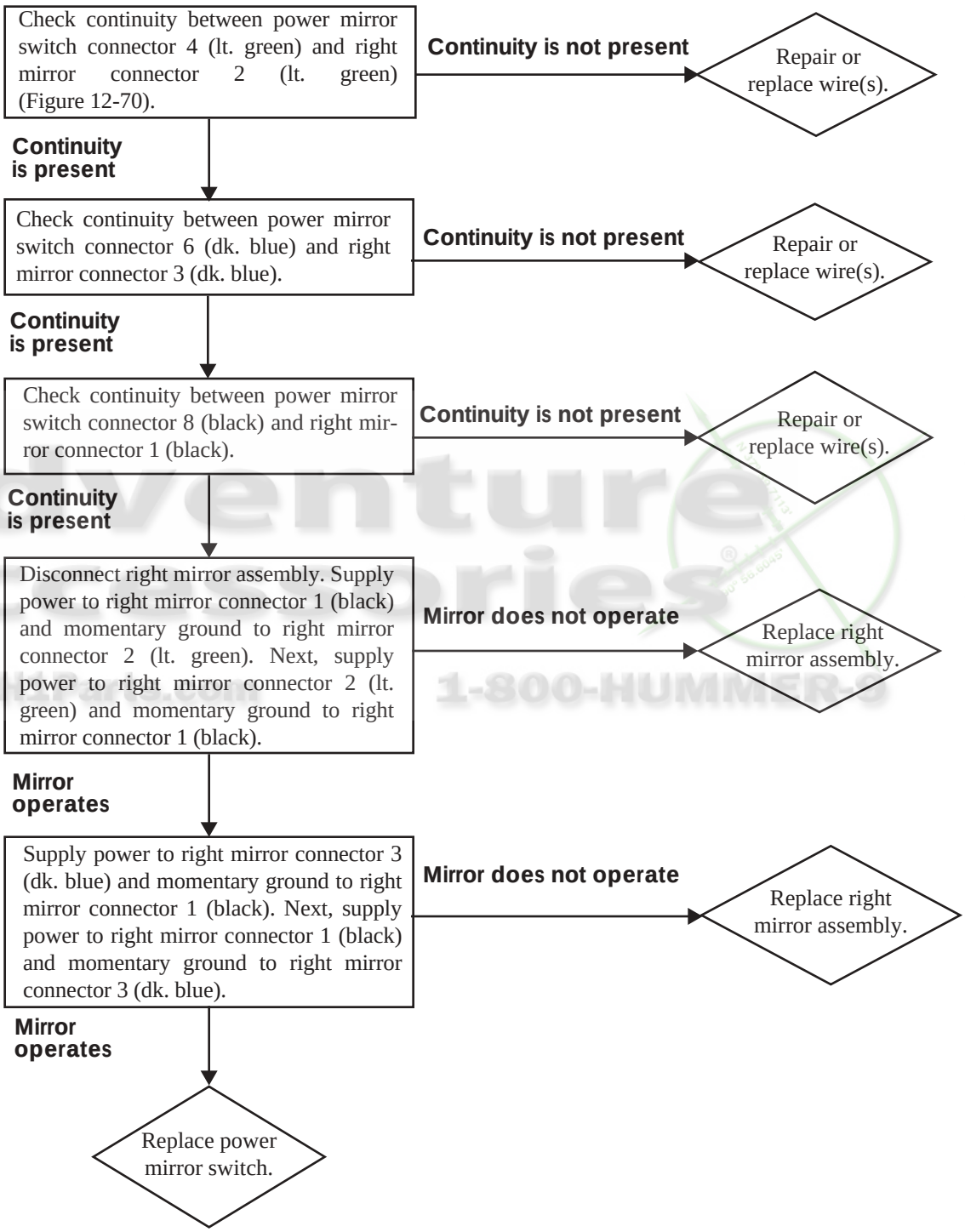
## BOTH POWER MIRRORS INOPERATIVE



## LEFT POWER MIRROR INOPERATIVE



## RIGHT POWER MIRROR INOPERATIVE



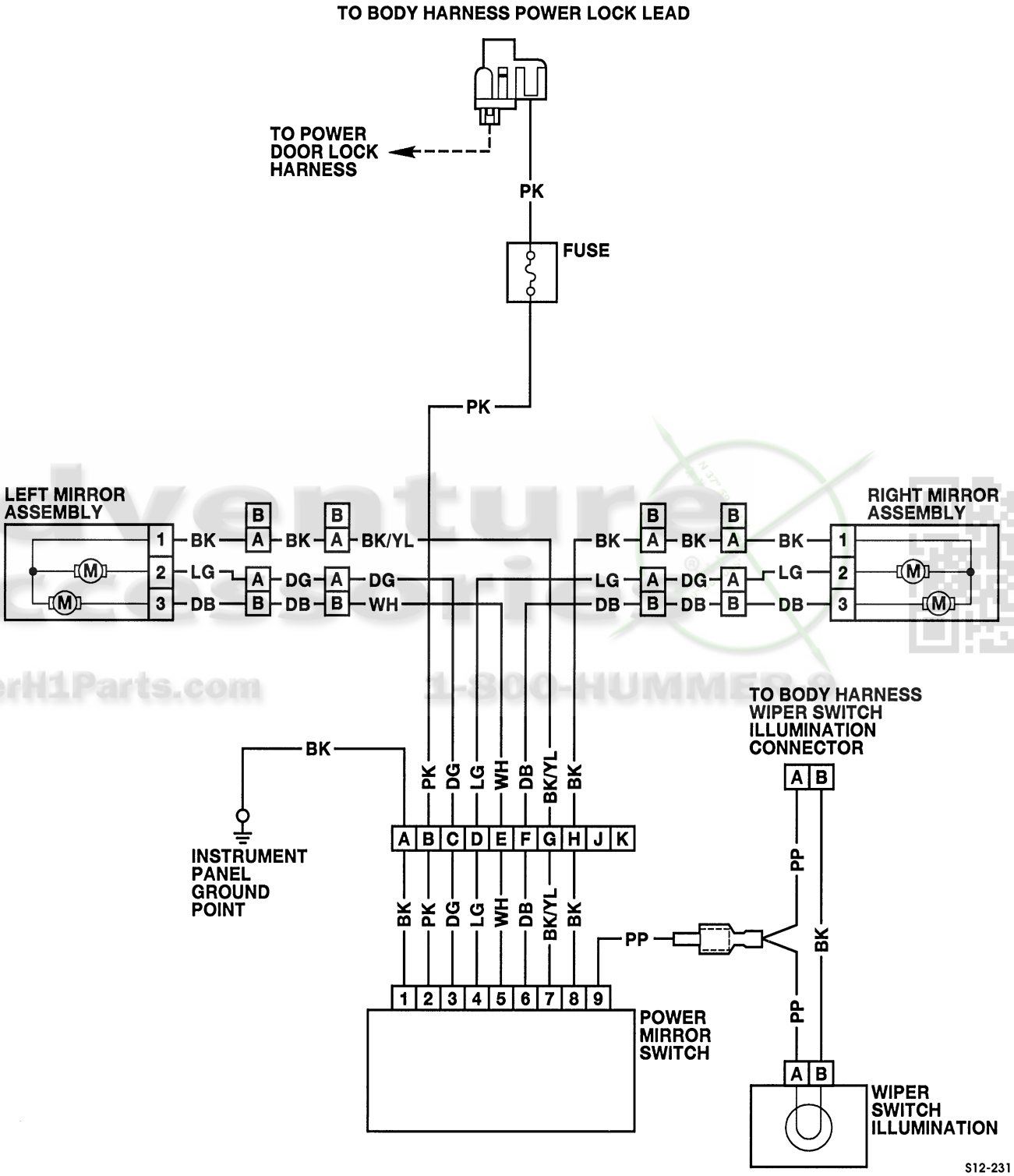



*Figure 12-70: Power Mirrors*

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