FEDERAL SIGNAL
Safety and Security Systems

# Integrity® Light Bar



# *Installation, Maintenance, and Service Manual*

*25500670*
*Rev A1 1125*
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## Limited Warranty

This product is subject to and covered by a limited warranty, a copy of which can be found at www.fedsig.com/SSG-Warranty. A copy of this limited warranty can also be obtained by written request to Federal Signal Corporation, 2645 Federal Signal Drive, University Park, IL 60484, email to info@fedsig.com or call +1 708-534-3400.

This limited warranty is in lieu of all other warranties, express or implied, contractual or statutory, including, but not limited to the warranty of merchantability, warranty of fitness for a particular purpose and any warranty against failure of its essential purpose.

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# Safety Messages

For your safety, read and understand this manual thoroughly before installing, operating, and servicing the Integrity® light bar. The safety messages presented in this section and throughout the manual are reminders to exercise extreme care at all times. Read and understand the safety instructions and keep them close at hand for reference. To download copies of this manual, go to www.fedsig.com or call the Federal Signal Service Department at 1-800-433-9132, 7 AM to 5 PM, Monday through Friday (CT).

## Safety Message to Installers and Service Personnel of Warning Lights

**⚠ WARNING**

**Before Installation or Service**

*Qualifications*

- To properly install or service this equipment, you must have a good understanding of automotive mechanical and electrical procedures and systems, along with proficiency in the installation and service of safety warning equipment. Always refer to the vehicle's service manuals when performing equipment installations on a vehicle.

*Light Hazards*

- In order to be an effective warning device, this product produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into this lighting product at a close range, or permanent damage to your eyesight may occur.
- Do not install the light system in an area that would block, impair, or blind the driver's vision. Ensure that the light system is mounted in a position that is outside of the driver's field of vision so the driver can maintain safe vehicle operation.
- Federal Signal power supplies and light heads are designed to work together as a system. Combining light heads and a power supply from different manufacturers may reduce the warning effectiveness of the lighting system and may damage the components. Verify or test your combination to make sure the system works together and meets federal, state, and local standards or guidelines.

*Electrical Hazards*

- Strobe systems present a shock hazard because they use high voltage to operate. Do not handle strobe cables, the power supply, or bulbs or remove the lens while the equipment is connected. Strobe systems can also hold their charge even after they have been turned off. After disconnecting power to the unit, wait five minutes before handling any parts of the strobe system.
- A light system is a high-current system. In order for the system to function properly, a separate negative (-) connection and positive (+) connection must be made. All negative connections should be connected to the negative battery terminal, and a suitable fuse should be installed on the positive battery terminal connection as close to the battery as possible. Ensure that all wires and fuses are rated correctly to handle the device and system amperage requirements.

- Never attempt to install aftermarket equipment that connects to the vehicle wiring without reviewing a vehicle wiring diagram available from the vehicle's manufacturer. Ensure that your installation will not affect vehicle operation or mandated safety functions or circuits. Always check the vehicle for proper operation after installation.
- The lighting system components, especially light bulbs, strobe tubes, LEDs, and the outer housing, get hot during operation. Disconnect power to the system and allow the system to cool down before handling any components of the system.
- Halogen light bulbs and strobe tubes are pressurized and, if broken, can burst and result in flying glass. Always wear gloves and eye protection when handling these components.
- Do not mount a radio antenna within 18 inches of the lighting system. Placing the antenna too close to the lighting system could cause the lighting system to malfunction or be damaged by strong radio fields. Mounting the antenna too close to the lighting system may also cause the radio noise emitted from the lighting system to interfere with the reception of the radio transmitter and reduce radio reception.
- Do not attempt to wash this or any other electrical device while it is connected to its power source. Exposure to liquid while the product is connected to the power source may result in an electrical shock and personal injury and may short circuit and damage the product.

**During Installation and Service**

- DO NOT get metal shavings inside the product. Metal shavings in the product can cause the system to fail. If drilling must be done near the unit, place an ESD-approved cover over the unit. Inspect the unit after mounting to ensure that there are no shavings present in or near the unit.
- To avoid a battery explosion, always disconnect the negative battery cable first and reconnect it last. Avoid causing a spark when connecting near or to the battery. The gases produced by a battery can cause a battery explosion that could result in vehicle damage and serious injury.
- DO NOT connect this system to the vehicle battery until ALL other electrical connections are made, mounting of all components is complete, and you have verified that no shorts exist. If the wiring is shorted to the vehicle body or frame, high-current conductors can cause hazardous sparks, resulting in electrical fires or flying molten metal.
- DO NOT install equipment or route wiring (or the plug-in cord) in the deployment path of an airbag.
- If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.
- Before mounting any components, check the manual to verify that the component you are installing is suitable for use in that area of the vehicle. Many components are not suitable for use in the engine compartment or other extreme environmental exposure areas.

- The service life of light bulbs and strobes tubes will be shortened if the glass portion is touched during installation. Use gloves when handling these components. If the glass portion has been touched, clean the glass carefully with isopropyl alcohol.
- When drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes. Ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.
- To avoid denting the roof of the vehicle, place the light bar mounting feet as close to outer edge of the roof as possible.
- Roof damage can occur if the hook adjustment bolts are overtightened. Torque the adjustment bolts to 6 ft-lb to 7 ft-lb. Install keeper plates.
- Locate the light system controls so the VEHICLE and CONTROLS can be operated safely under all driving conditions.

**After Installation or Service**

- After installation, test the light system to ensure that it is operating properly.
- If a seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.
- Test all vehicle functions, including horn operation, vehicle safety functions, and vehicle light systems, to ensure proper operation. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety function or circuit.
- Scratched or dull reflectors, mirrors, or lenses will reduce the effectiveness of the lighting system. Avoid heavy pressure and use of caustic or petroleum-based products when cleaning the lighting system. Replace any optical components that may have been scratched or crazed during system installation.
- Do not attempt to activate or deactivate the light system control while driving in a hazardous situation.
- Frequently inspect the light system to ensure that it is operating properly and that it is securely attached to the vehicle.
- After installation and testing are complete, provide a copy of these instructions to instructional staff and all operating personnel.
- Do not use a pressure washer to clean the light bar. Failure to heed this notice will damage the light bar.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death.

## Safety Messages to Operators of Federal Signal Sound/Light Systems

**⚠ WARNING**

People's lives depend on your safe operation of Federal Signal products. It is important to read and follow all instructions shipped with the products. Listed below are some other important safety instructions and precautions you should follow:

- Do not attempt to activate or deactivate the light system control while driving in a hazardous situation.
- Although your warning system is operating properly, it may not be completely effective. People may not see or heed your warning signal. You must recognize this fact and continue to drive cautiously.
- Situations may occur that obstruct your warning signal when natural and man made objects are between your vehicle and others, such as raising your hood or trunk lid. If these situations occur, be especially careful.
- All effective sirens and horns produce loud sounds that may cause, in certain situations, permanent hearing loss. You and your passengers should consider taking appropriate safety precautions, such as wearing hearing protection.
- The effectiveness of an interior-mounted warning light depends on the clarity, the tinting, and the angle of the glass it is being placed behind. Tinting, dirt defects, and steeply angled glass reduce the light output of the warning light. This may reduce the effectiveness of the light as a warning signal. If your vehicle has dirty, tinted, or steeply angled glass, use extra caution when driving your vehicle or blocking the right of way with your vehicle.
- To be an effective warning device, this product produces bright light that can be hazardous to your eyesight when viewed at a close range. Do not stare directly into this lighting product at a close range, or permanent damage to your eyesight may occur.
- It is important that you fully understand how to safely operate this warning system before use.
- Operate your vehicle and the light/sound system in accordance with your department's Standard Operating Procedures.
- If a selected function does not perform properly or if any of the lamps remain illuminated when the control is off, disconnect the power connector from the control unit and contact the nearest service center.
- At the start of your shift, ensure that the entire warning light system and the siren system is securely attached and operating properly.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death.

# An Overview of the Integrity® Light Bar

The Integrity light bar is a single-level LED light bar with ROC™ (Reliable On-Board Circuitry) and Solaris® LED technologies. ROC eliminates approximately 85 percent of potential failure points by incorporating a printed circuit board (PCB) in one assembly to substantially reduce the number of electrical connections. Solaris S2 LED modules use offset, complex reflector surfaces for accurate beam-shaping and the highest optical efficiency. The reflectors' overlapping, 360-degree lighting eliminates weak spots and provides off-axis warning around the light bar.

## LED Lights, Colors, and Flash Patterns

The microprocessor inside the light bar supplies three priority operational modes and a library of flash patterns. To increase the safety of officers, pedestrians, and motorists, the light bar has standard front and rear cutoff, dimming, and intersection warning. Bright white LED takedown and alley lights that are horizontally adjustable are also available with the HotFoot® configured option.

Multi-color heads are available with up to three different colored LEDs, eliminating the loss of primary warning colors in takedown, alley, and directional warning positions. Individual Integrity light heads can flash between red, blue, amber, or white.

## Electrical System

The Integrity light bar is protected against reversed polarity damage. The Integrity light car can be installed in any vehicle with a 12-volt negative-ground electrical system.

## Controller Options

Flash patterns are controlled through the light bar CAT5 communication cable. The cable connects to Federal Signal Convergence network controllers, or the Convergence Serial Interface Module (Part Number 858303641).

With the Serial Interface Module, the light bar can be activated by Federal Signal light bar controllers, SignalMaster™ directional-light controllers, or by individual low-current switch boxes.

## Ambient Light Sensor/AutoDim Option

The Integrity light bar can be ordered with an optional ambient light sensor. The sensors that detect the ambient light and automatically dim flashing lights during nighttime are located on the ROC boards at each end of the light bar. If used with a controller that has a dedicated dim button, the user has the option to temporarily override the dimming. AutoDim is disabled in MODE 3 and is enabled when MODE 3 is removed.

Other advanced features of the Integrity light bar include:

- A high degree of reliability through the use of advanced microprocessors and other integrated circuits.
- One-piece, seamless construction that eliminates leaking bulkhead gaskets.
- High-output, long-life LEDs with no bulbs to change.

## FSJoin®

FSJoin light bars allow flash patterns to synchronize with other FSJoin-compatible devices. Light bar patterns and features can be programmed on an individual light head basis with the Convergence Network Configuration Software. Outputs or light heads set to the same flash rate automatically synchronize. A variety of system features can be programmed with the Convergence Network Configuration Software (available on the Federal Signal website at www.fedsig.com). Programming requires an FSJoin-compatible controller such as a Pathfinder® Siren/Light Controller. Programming does not require disassembling or removing any hardware from the vehicle.

## Product Specifications

Operating and technical specifications for the Integrity light bar are listed in this section by model.

**Table 1 Dimensions**

| Model | Integrity44 | Integrity51 |
|---|---|---|
| Size (L x W x H) | 43.7 x 9.7 x 1.96 inches<br>(111.0 x 246.4 x 5.0 cm) | 51.3 x 9.7 x 1.96 inches<br>(130.3 x 9.7 x 5.0 cm) |
| Weight* | 21.5 lb (9.8 kg) | 24.5 lb (11.1 kg) |

**with standard mounting feet*

**Table 2 Light specifications**

| Lighting Option | Current Draw | Lamp Technology | Reflector Style |
|---|---|---|---|
| LED (all heads) | 1.0 A in Steady-Burn Mode | High-brightness LED | Offset, compound curve, polished reflector |

**with standard mounting feet*

**Table 3 Electrical and temperature**

| Model | Electrical Potential | Current Draw (50 % Flash Rate) | Operating Temp. |
|---|---|---|---|
| Integrity44 | 12.8 Vdc | 11.0 A<br>13.0 A with HotFoot | -40°F to 149°F (-40°C 50 to 65°C) |
| Integrity51 | 12.8 Vdc | 13.0 A<br>15.0 A with HotFoot | -40°F to 149°F (-40°C 50 to 65°C) |

# Reprogramming the Light Bar

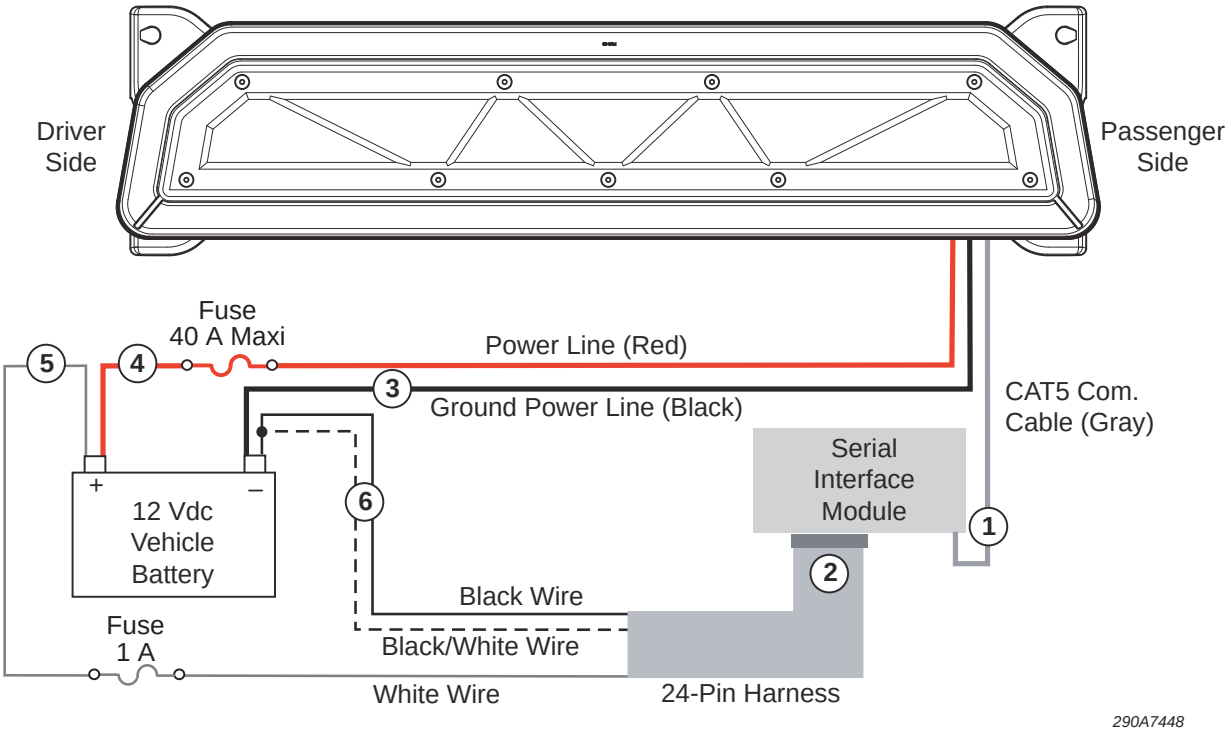
See Serial Interface Module Instructions for more information on programming.

### Making the Electrical Connections for Reprogramming

To supply power to the light bar, use a fully-charged 12-volt automotive battery and follow these steps:

1. Place the light bar on a sturdy, flat surface.
2. Plug the CAT5 communication cable (1) from the light bar into the Serial Interface Module (J1). See Figure 1.

**Figure 1 Electrical connections for reprogramming the light bar**




3. Plug the 24-pin harness (2) into the Serial Interface Module.
4. Attach the black ground power line (3) to the negative battery (–GND) terminal.
5. Attach the red power line (4) through a 40 A MAXI® fuse to the positive battery (+BAT) terminal.
6. Attach the white wire (5) from the 24-pin harness through a 1 A fuse to the positive battery (+BAT) terminal.
7. Attach the black wire and the black/white wire (6) from the 24-pin harness to the negative battery (–GND) lug.

### Identifying the Control Wires for Flash Patterns

This section describes how to program flash patterns by applying 12 Vdc to the control wires in the 24-pin harness of Serial Interface Module. Table 4 shows the control wires and colors. The first color is the predominant color, and additional colors are stripes.

**Table 4 Control wires from the Serial Interface Module with Default Programming**

| Light Bar Controls | Wire Color | Description |
|---|---|---|
| MODE 1 | Blue | Lowest priority. |
| MODE 2 | Blue/White | Overrides MODE 1. |
| MODE 3 | Black/Red | Overrides MODES 1 and 2. |
| STEADY BURN | Red/White | One or more LEDs steadily burn when 12 Vdc is applied to the control wire for a MODE and the control wire for STEADY BURN. |
| FRONT CUTOFF | Green/White | Turns OFF the FRONT of the light bar. |
| FRONT ENABLE | | Turns ON the FRONT of the light bar. |
| REAR CUTOFF | Orange/Black | Turns OFF the REAR of the light bar. |
| REAR ENABLE | | Turns ON the REAR of the light bar. |
| LOW POWER | White/Black/ Red | Dims the lights approximately 50% to prevent blinding approaching drivers. LOW POWER is available only in MODES 1 and 2. |
| FLASH TAKEDOWN/ ALLEY | Red/Black | Flashes the ALLEY and TAKEDOWN lights in MODES 1, 2, or 3. |
| LEFT ALLEY | Green/Black | Turns on LEFT ALLEY lights. Overrides the FLASH TAKEDOWN/ALLEY lights. |
| RIGHT ALLEY | Orange/Red | Turns on RIGHT ALLEY lights. Overrides the FLASH TAKEDOWN/ALLEY lights. |
| TAKEDOWN | White/Black | Provides white light to the front. Overrides FLASH TAKEDOWN/ALLEY lights and FRONT CUTOFF. |
| SCENE LIGHT, LEFT | Blue/Black | Applying 12 Vdc to the Scene Light, Left wire turns on the left half of the light bar. |
| SCENE LIGHT, RIGHT | Black/White/ Red | Applying 12 Vdc to the Scene Light, Right wire turns on the right half of the light bar. |

## Wiring the Integrity® Light Bar in the Vehicle

Before proceeding, ensure that the light bar has been installed on the vehicle roof in accordance with the instructions included with the mounting kit. Depending on the type of vehicle and mounting system feature, there are two options available for installing the light bar to the roof of the vehicle: hook-on mounting or permanent mounting.

**⚠ WARNING**

***INSTALLATION PRECAUTION: Do not mount a radio antenna within 18 inches of the lighting system. Placing the antenna too close to the lighting system could cause the lighting system to malfunction or be damaged by strong radio fields. Mounting the antenna too close to the lighting system may also cause the radio noise emitted from the lighting system to interfere with the reception of the radio transmitter and reduce radio reception.***

### Planning the Electrical Installation

The light bar is completely wired at the factory and does not require any additional internal wiring. All the conductors necessary for control of any and all basic and optional functions are contained in the CAT5 cable. The basic light functions of the Integrity must be controlled by a installer-supplied control head.

To prevent damage to the light bar and vehicle and to ensure that all equipment operates properly, carefully plan where to mount and wire the light bar and controlling equipment:

1. Verify that the light bar and mounting hardware fit the vehicle.
2. Determine where to mount the light bar on the vehicle.
3. Determine where to mount the controlling equipment:
   - Trunk or remote location
   - Console

**⚠ WARNING**

***AIRBAG DEPLOYMENT: Do not install equipment or route wiring in the deployment path of an airbag. Failure to observe this warning will reduce the effectiveness of the airbag or potentially dislodge the equipment, causing serious injury or death.***

4. Decide where to route wiring around airbag areas.
5. Decide where to route the light bar power and ground wires.
6. To make wiring easier, remove the seats and spare tire, and pull down the headliner where needed.
7. Separate all electronic equipment wiring from two-way radio equipment wiring.
8. To avoid interference, keep two-way radio antennas a minimum of 18 in (45.7 cm) away from warning equipment.

9. Whenever possible, run full wire lengths. DO NOT splice the wires.

10. Do not coil excess wire. Leave a drain loop for servicing.

11. After drilling holes for wires, de-burr them, smooth sharp edges, and insert grommets to protect the wires from chafing.

12. When you frame ground the equipment, use the manufacturer-supplied ground locations in the vehicle.

**IMPORTANT:** After the installation, frequently inspect the light bar and mounting feet to ensure that all fasteners and brackets are tight.

## Connecting Power to the Light Bar

**NOTE:** Plan the location of the wire routing hole in the vehicle roof so that the power and communication cables do not have tight bends and have some slack to allow disconnection on removal.

**⚠ WARNING**

***BATTERY EXPLOSION: To avoid a battery explosion, always disconnect the negative battery cable first and reconnect it last. Avoid causing a spark when connecting near or to the battery. The gases produced by a battery can cause a battery explosion that could result in vehicle damage and serious injury.***

**⚠ WARNING**

***SEAT REMOVAL PRECAUTION: If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment. Failure to follow this warning cause serious injury or death.***

**NOTICE**

***REVERSE POLARITY / MISWIRING: Reverse polarity or incorrect voltage may damage the light. To avoid damage to the light, ensure that the battery voltage is the same as the voltage rating of the light and that the correct polarity is observed. If you are connecting to an accessory plug or 12 V outlet, connect the positive wire to the center terminal and connect the negative wire to the outer terminal.***

To make the power connections:

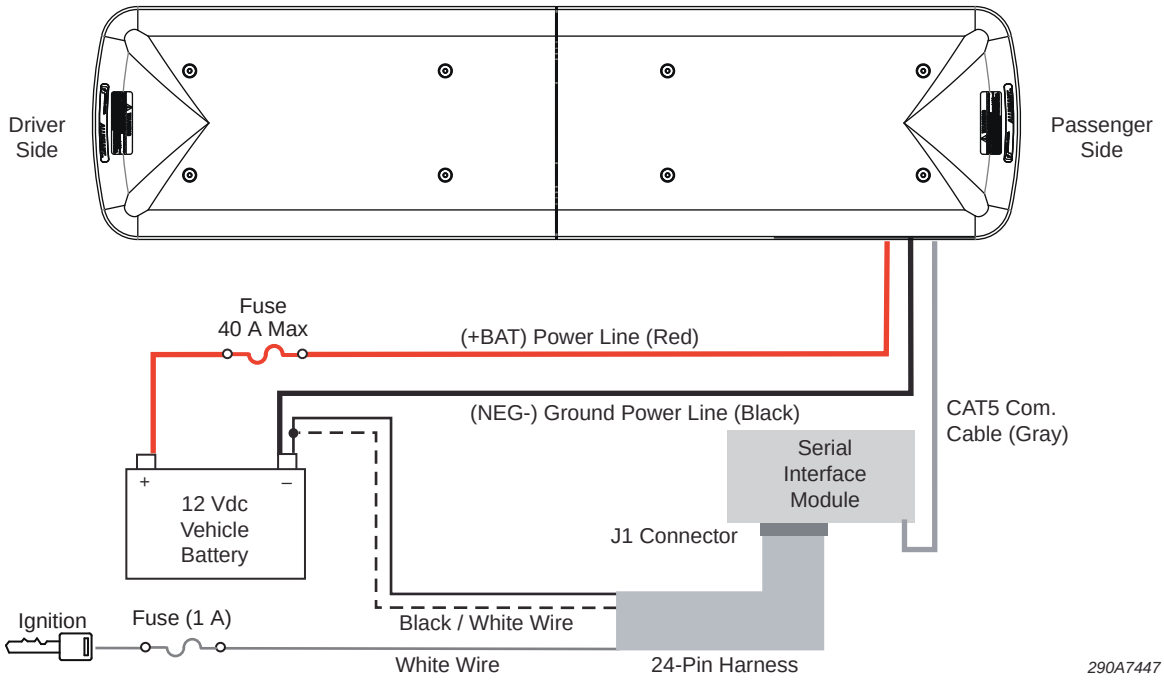
1. Ensure that the lines are adequately fused as shown in Figure 2 on page 15.

2. From the light bar, route the CAT5 control cable into the vehicle cab or trunk near the eventual location of the Serial Interface Module. An input cable is also provided with the Interface Module.

3. Route and connect the black lead from the light bar to the vehicle battery's ground (–GND) terminal.

4. Route and connect the red lead from the light bar through a 40 A MAXI® fuse at the source, which is the positive battery terminal (+BAT).

**Figure 2 Power and cable connections**




## Installing the Serial Interface Module

***NOTICE***

***UNIT REQUIRES VENTILATION: The Serial Interface Module needs to radiate heat. Do not install it in an area where it cannot dissipate heat into the air. Do not mount it near a heater duct.***

***NOTICE***

***UNIT REQUIRES SHELTER FROM WEATHER: The Serial Interface Module is NOT waterproof. It must be mounted in a location that is sheltered from rain, snow, standing water, etc.***

**IMPORTANT:** The Serial Interface Module must be installed within 36 inches (91 cm) of the light bar controller.

To mount and wire the Serial Interface Module:

1. Use the Serial Interface Module as a template to scribe four drill-position marks at the selected mounting location. Mounting centers are 2 by 5.95 inches (5.08 by 15.11 cm).

**⚠ WARNING**

***DRILLING PRECAUTIONS: Before drilling holes, check the area into which you plan to drill to ensure that you do not damage vehicle components. All drilled holes should be de-burred, and all sharp edges should be smoothed. Additionally, all exterior drilled holes must be sealed with Motorcraft® seam sealer T-A-2-B or equivalent to prevent the potential exposure to carbon monoxide or other potentially harmful fumes. Failure to observe this warning could cause serious injury or death.***

2. Drill a mounting hole at each of the four drill-position marks, sized for the recommended user-supplied #8 mounting hardware.

3. Secure the Serial Interface Module to the mounting surface with installer-supplied #8 hardware.

4. Install the CAT5 serial cable from the light bar to the J3 output jack of the Serial Interface Module.

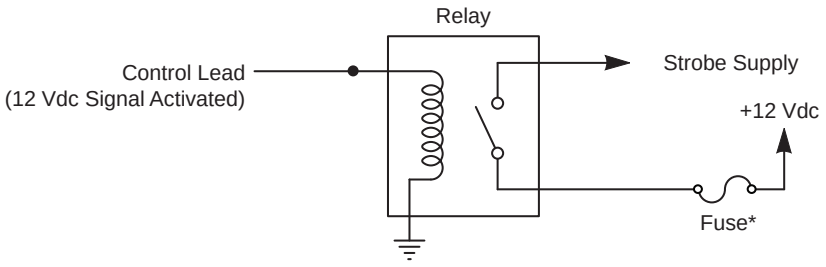
5. Install the three-foot-long, 24-conductor cable from the light bar to the J1 input connector of the Serial Interface Module.

**NOTE:** Powering multiple devices with a common control wire may cause one or more devices to briefly remain functional after signal power is removed. For example, due to the high-input filter capacitance, a strobe supply can briefly supply the current required to signal a light bar function to remain on. If necessary, use a relay to isolate devices with large filter capacitors. See Figure 3. All components/wires are user-supplied.

**⚠ WARNING**

***SHOCK HAZARD: Strobe and HID light systems generate high voltages. Disconnect power from the system and wait at least 5 minutes before opening the unit. Do not apply power to the unit while the unit is open. Failure to follow this warning could result in serious injury or death.***

**Figure 3 Relay for isolating devices with large filter capacitors**




290A7446

**Fuse Amperage depends on amperage of devices.*

## SignalMaster™ Connections

If SignalMaster operation is not activated by a control head or external controller, the SignalMaster LED heads flash with the selected priority mode (Mode 1, 2, or 3) of operation.

### *Internal SignalMaster (Factory Default)*

Internal operation uses the light bar's built-in SignalMaster controller to generate directional warning patterns. With internal operation, an external SignalMaster controller is not needed. A standard low current switch box can activate the light bar's internal SignalMaster controller. To activate the light bar's internal SignalMaster controller, apply 12 Vdc (+BAT) to the SignalMaster control wires

### *External SignalMaster*

External operation uses the Serial Interface Module to drive each SignalMaster directional warning head independently through an external Federal Signal SignalMaster controller or SS2000SM series siren (Figures 4 through 7). Either device provides an independent ground signal to turn on each head. To cross reference external SignalMaster wiring to a Federal Signal controller or the SM2000SM series siren, see Table 5.

**Table 5 Cross reference for controller leads (external Serial Interface Module control)**

| 24-Pin Harness from the Serial Interface Module | SignalMaster Wire (Figure 4) | SS2000SM* Wire (Figure 5) |
|---|---|---|
| Red | White | White (1) |
| Green | Brown | Brown (2) |
| Green/Black/White | Green | Green (3) |
| Orange/Green | Orange | Orange (4) |
| Orange | Purple | Purple (5) |
| Blue/Red | Gray | Gray (6) |
| Red/Green | Yellow | Yellow (7) |
| White/Red | Blue | Blue (8) |

**Wire colors as described in the controller's installation instructions.*

**Figure 4 SignalMaster® 331105 controller (external SignalMaster control)**

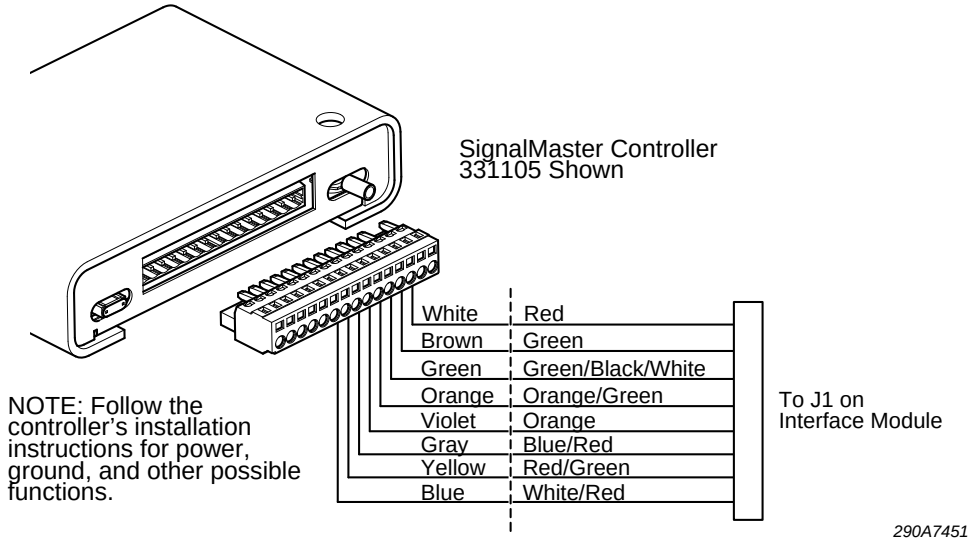



**Figure 5 SmartSiren® SS2000SM Series controller (external SignalMaster control)**

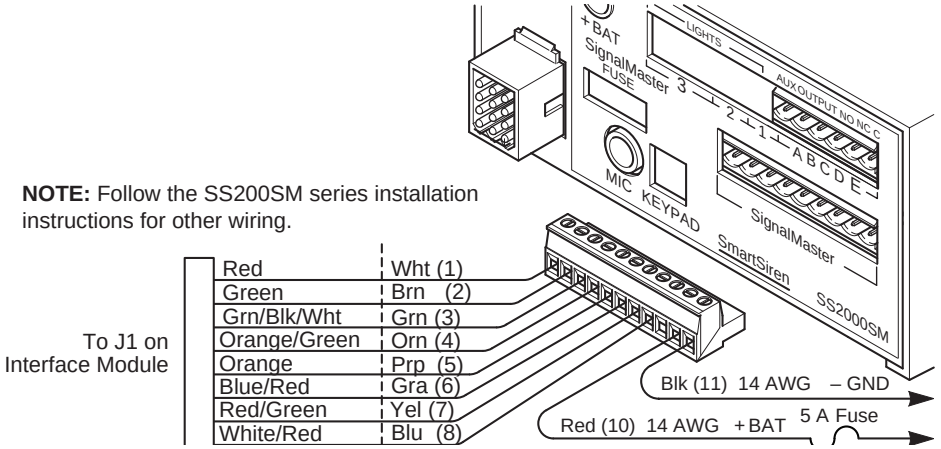


**Table 6 SignalMaster™ control wires and warning patterns (internal SM control)**

| Warning Pattern | Control Wires | Description (with 8-head example) |
|---|---|---|
| LEFT | Red | Rear LEDs flash from right to left<br>8 7 6 5 4 3 2 1 |
| CENTER OUT | Green | Rear LEDs flash from center out to both sides<br>4 3 2 1 1 2 3 4 |
| RIGHT | Green/Black/White | Rear LEDs flash from left to right<br>1 2 3 4 5 6 7 8 |
| WARN 1 | Orange/Green | Outer LEDs alternate<br>1 2 |
| WARN 2 | Orange | Two outer LEDs alternate<br>1 1 2 2 |
| WARN 3 | Blue/Red | Right four LEDs alternate with left four LEDs<br>1 1 1 1 2 2 2 2 |
| WARN 4 | Red/Green | Two outer LEDs flash, then the four LEDs between the inner/outer LEDs flash<br>1 1 2 2 2 2 1 1 |
| FAST | White/Red | Operates the selected pattern 50 percent faster |

**Figure 6 SignalMaster™ control functions wired to ground for external Serial Interface Module control**

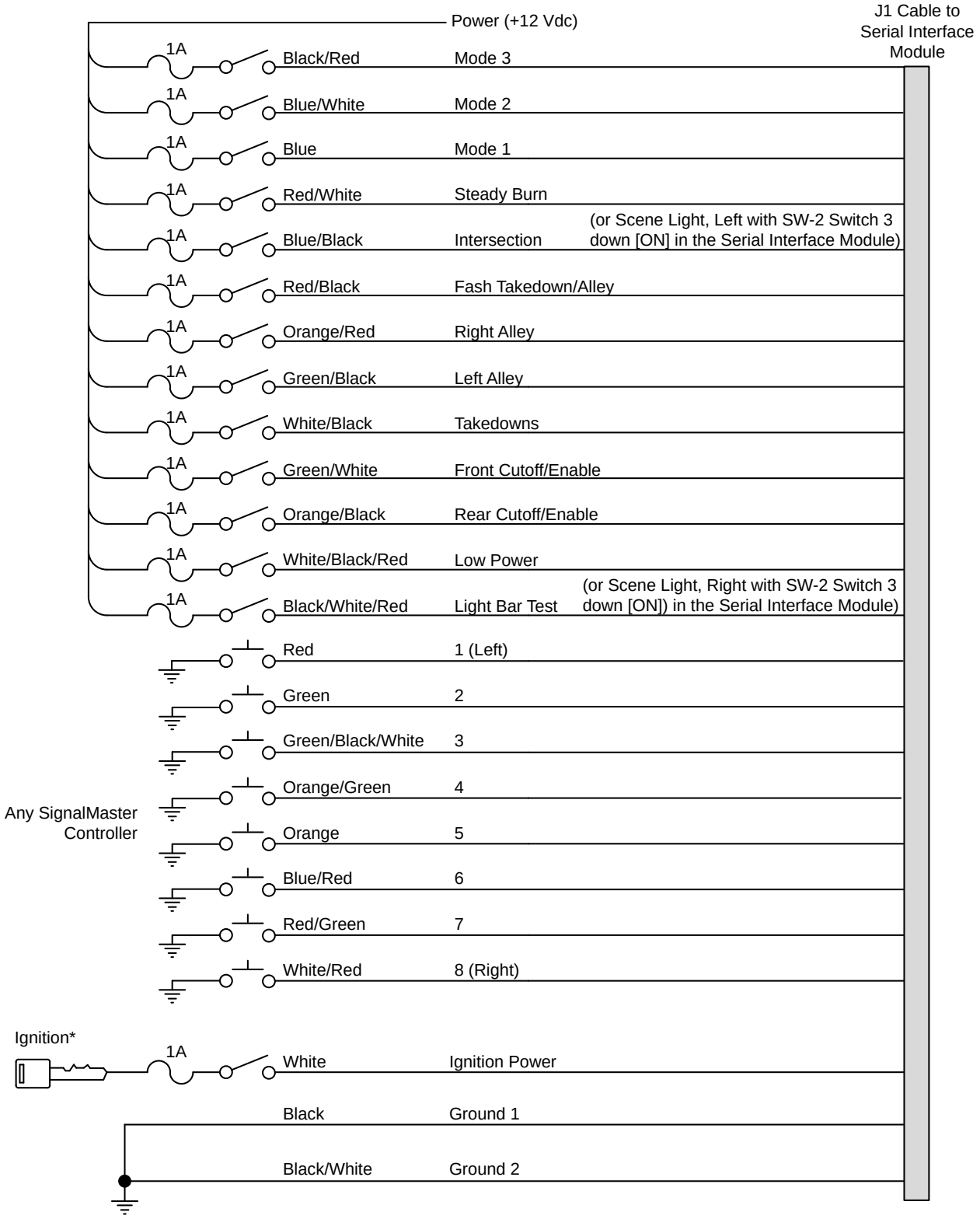
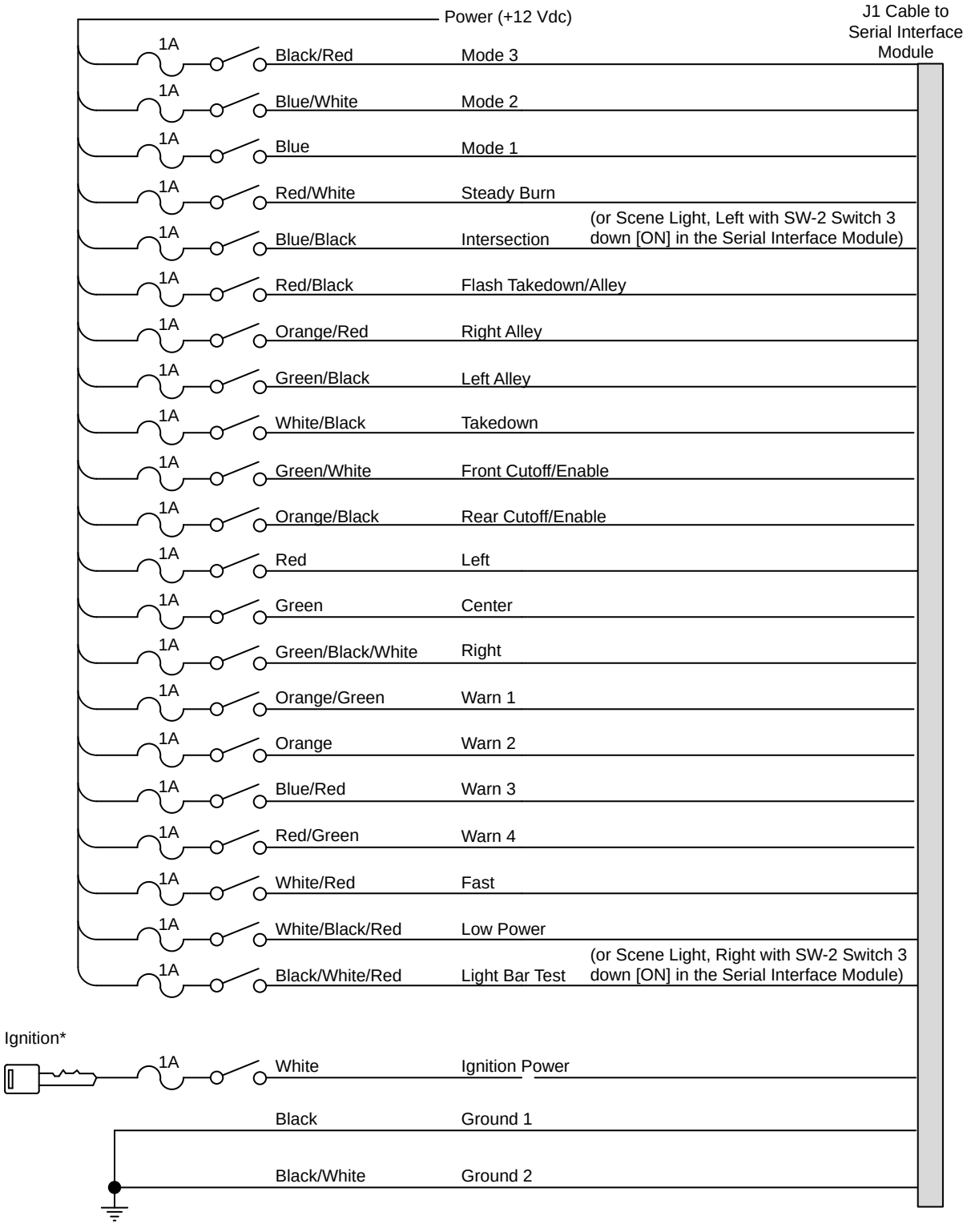


**Figure 7 SignalMaster™ control functions wired to 12 Vdc for Internal control**




* Ignition power includes power in the cranking position

*290A7461*

**Figure 8 Typical connections with a SignalMaster™ controller (external control)**

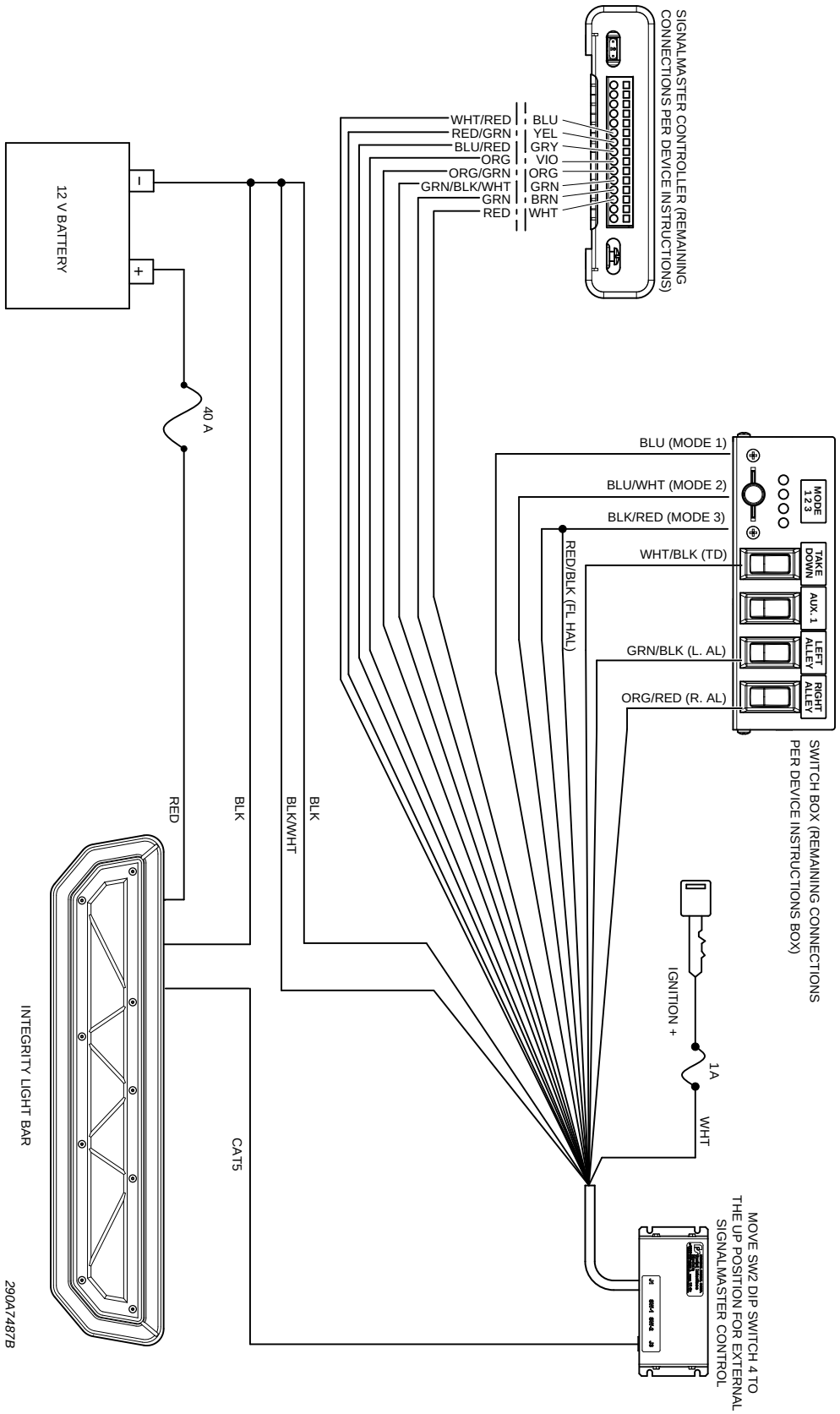


**Figure 9 Typical connections with a Model SW400SS Switch Module (internal control)**

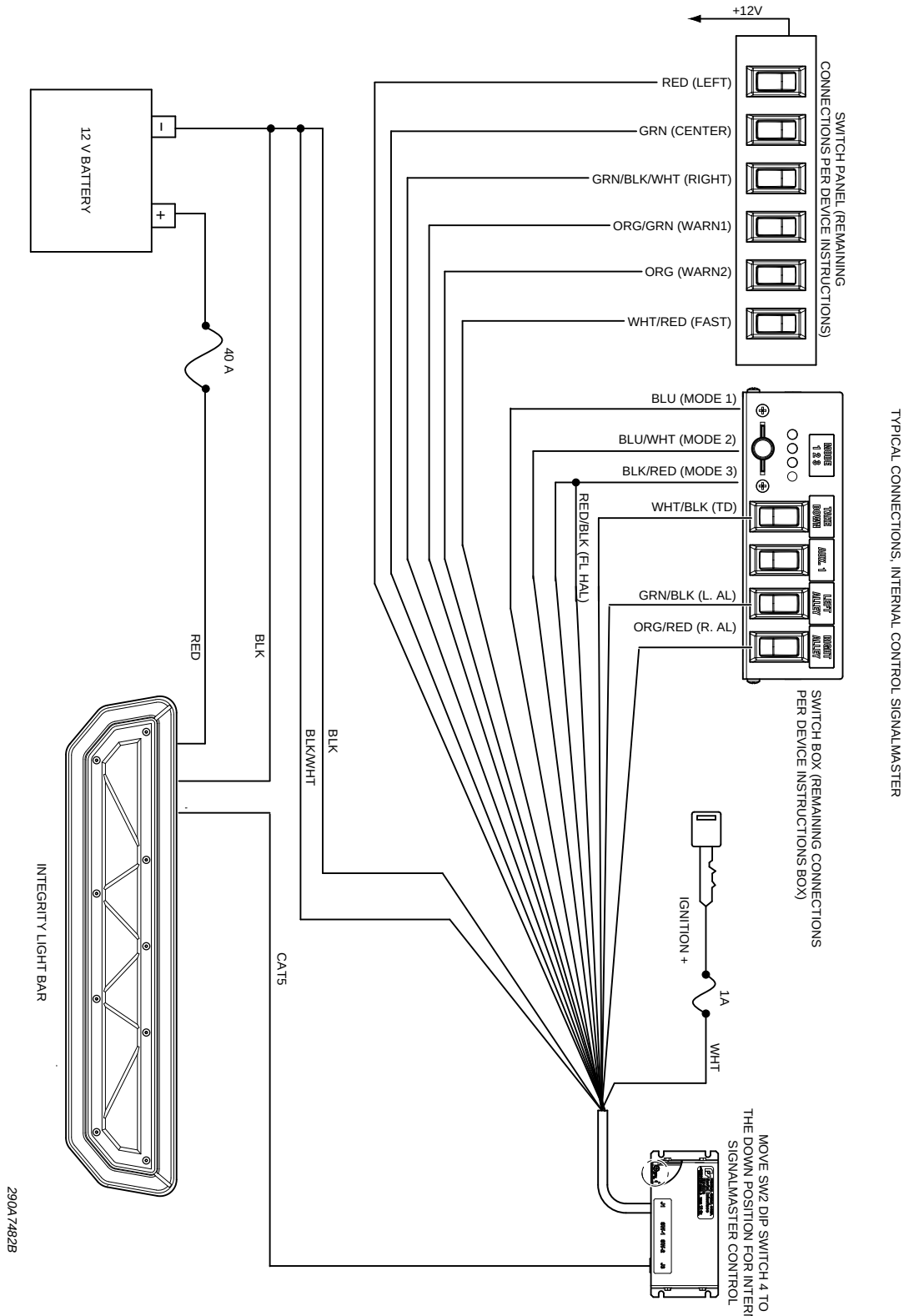


**Figure 10 Typical connections with a SmartSiren® Model SS2000SM controller**

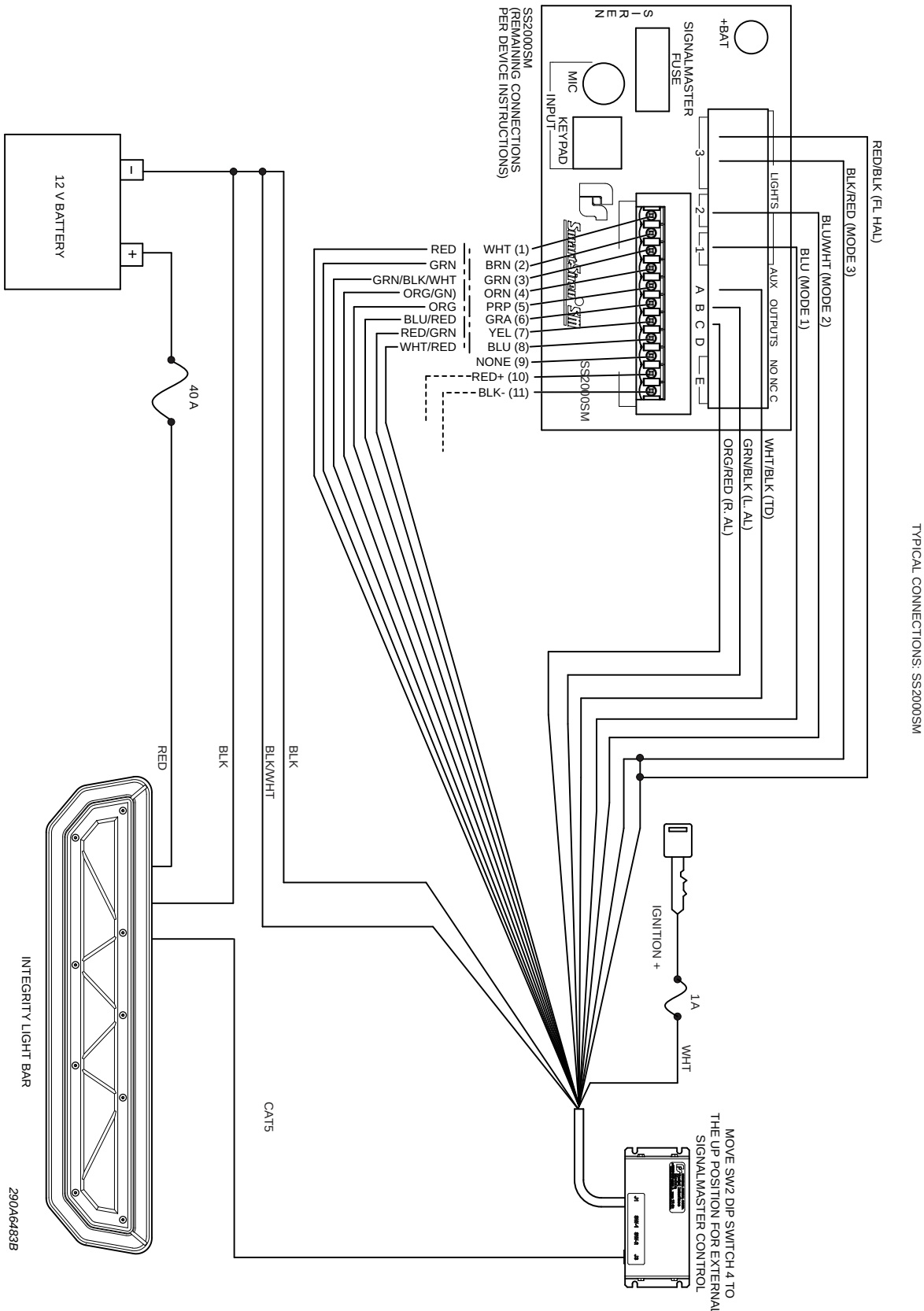


**Figure 11 Typical connections with a non-SignalMaster™ controller**

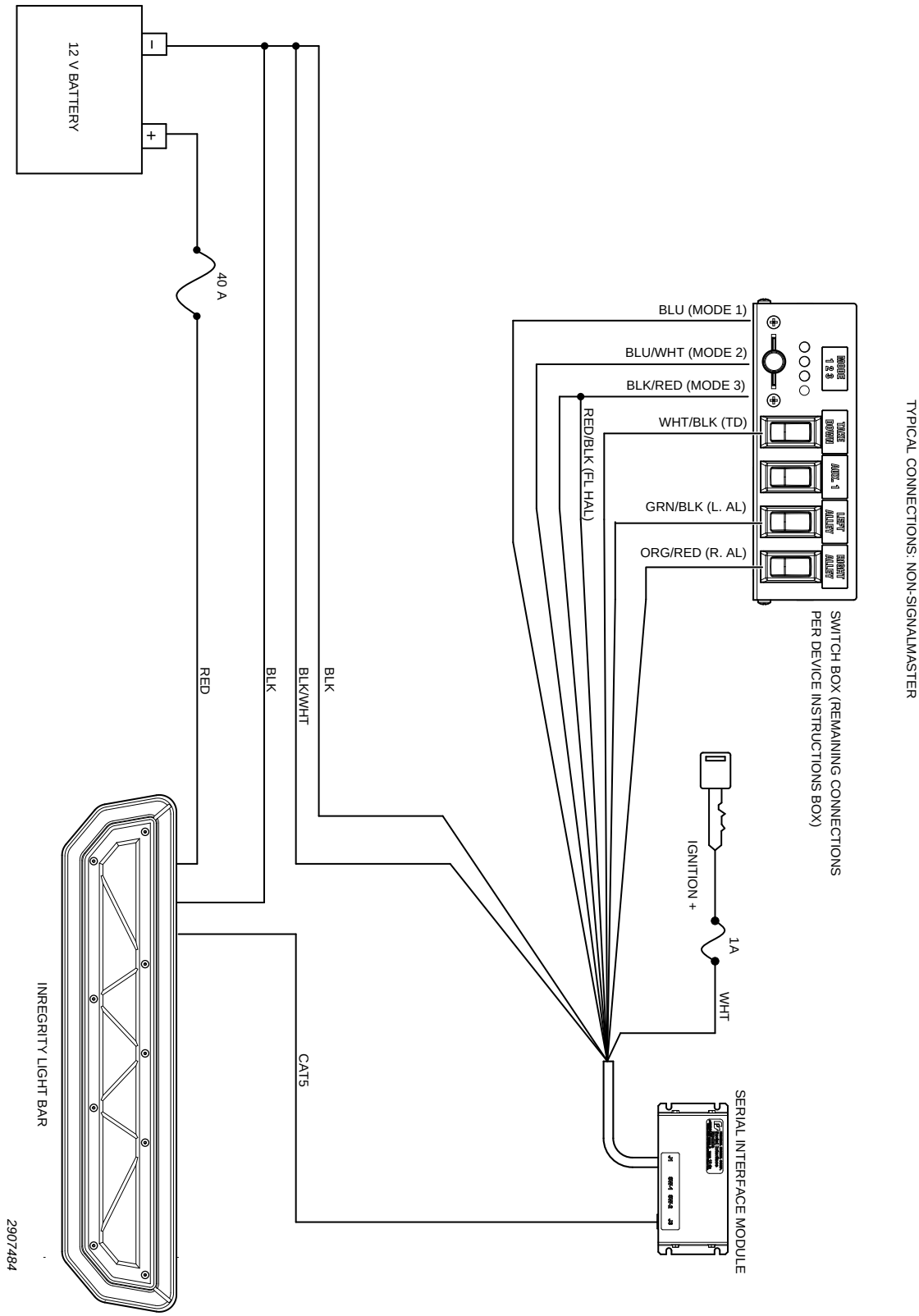
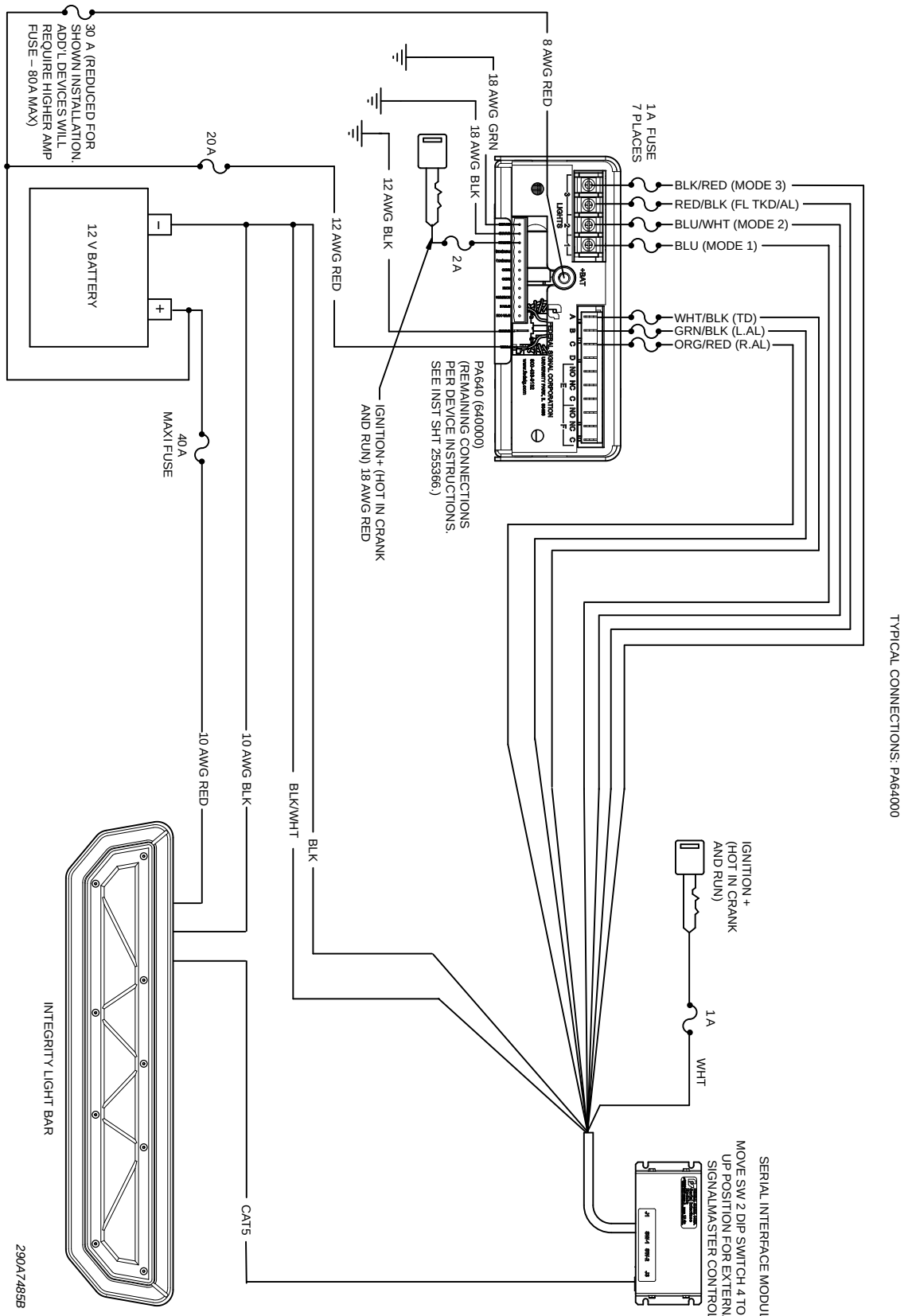


**Figure 12 Connexions types avec un contrôleur modèle PA640 (PA64000)**



# Maintaining and Servicing the Integrity

This section describes how to maintain and service the Integrity light bar. Establishing a regular maintenance and inspection schedule extends the life of the light bar and ensures safety. For service, support, or replacement parts, contact the Federal Signal Service Department at 1-800-433-9132, 7:00 a.m. to 5:00 p.m., Monday through Friday (CT). See Table 8 on page 35 for replacement parts and part numbers.

**⚠ WARNING**

***SHOCK HAZARD: Disconnect ALL power to the light bar before any maintenance is performed. Failure to do so may result in property damage, serious injury, or death.***

**⚠ WARNING**

***BURN HAZARD: After prolonged operation, the unit gets hot and can cause burns. Do not touch the unit while or shortly after it has been operating. Always allow the unit to cool before handling it.***

**⚠ WARNING**

***HEAVY OBJECT: Use lifting aids and proper lifting techniques when removing or replacing this product. Failure to follow this warning may cause personal injury.***

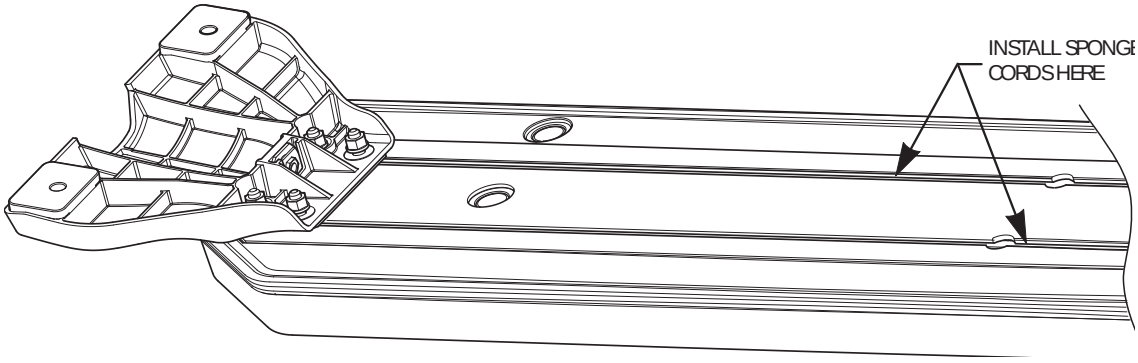
## Installing the Filler Strips (Sponge Cords)

To reduce the potential for a high-speed noise, use the one enclosed sponge cord (P/N 864900707-84) to fill the carriage bolt slots after adjusting the mounts to their final position.

To install the sponge cords:

**1.** Adjust the mounting feet to their final position. See Figure 13.

**Figure 13 Locations of ROC PCBs**




**2.** Starting at one end, press the sponge cord fully into slot. Cut off the excess cord.

**3.** Repeat step 2 with the cut-off piece for the other slot.

## Cleaning the Light Bar Lens

**NOTICE**

***CRAZING/CLEANING SOLUTIONS: The use of cleaning solutions, such as strong detergents, solvents, and petroleum products, can cause crazing (cracking) of the light bar lens and reflectors. To clean the reflectors, use a soft, damp cloth. To clean the lens, use a soft cloth and a solution of water and a mild detergent.***

**⚠ WARNING**

***CRAZING/CHEMICALS: Crazed, cracked or faded lenses or reflectors reduce the light output and the effectiveness of the lighting system. A lens or reflectors showing this type of aging must be replaced. Failure to follow this warning may result in bodily injury or death.***

**NOTICE**

***EQUIPMENT DAMAGE: Do not use a pressure washer to clean the light bar. Failure to heed this notice will damage the light bar.***

To clean the light bar lens:

1. Rinse the lens with lukewarm water to loosen dirt and debris.
2. Use a mild detergent, lukewarm water, and a soft cloth to gently clean the lens. To avoid damaging the finish, do not use heavy pressure or caustic, abrasive, or petroleum-based cleaners.
3. Rinse and dry the lens with a soft cloth to prevent water spotting.
4. To remove fine scratches and haze, use a soft cloth and a high-quality automotive paste cleaner/wax that is non-abrasive.

## Removing and Reinstalling the Light Bar Lens

The light bar lens, which is the top half of the Integrity® housing, covers the ROC (Reliable Onboard Circuitry™) PCBs and controller PCB.

Tool required:

- T27 Torx driver

### Removing the Lens

To remove the lens:

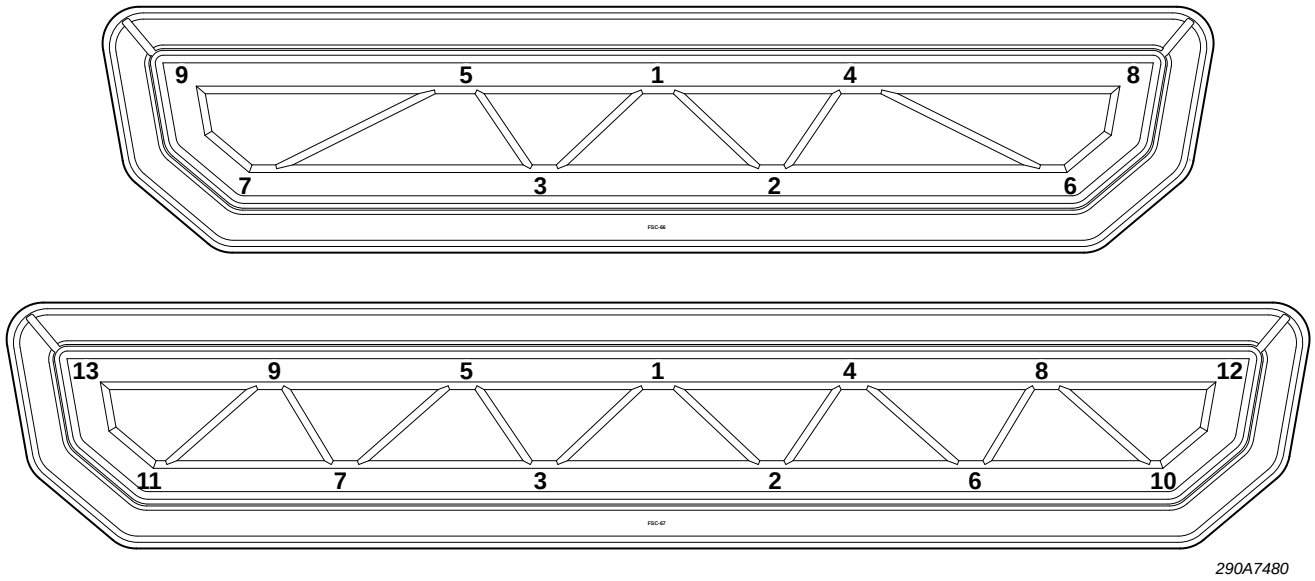
1. Disconnect all power to the light bar at the battery.
2. Use a T27 Torx driver to remove the 1/4-20 Torx-head barrel nuts securing the lens. See Figure 13 on page 27. Carefully remove the lens and cover as a unit. Avoid damaging the lip seal.

3. Verify that an O-ring is under the head of each barrel nut and not stuck to the lens. Use a wooden or plastic pick to carefully remove the O-rings from the lens to prevent damaging them.

4. Inspect the O-rings and the lip seal for deformation, brittleness, cuts, or tears. To maintain watertightness, replace a questionable O-ring or seal.

5. Inspect the lens for cracks, crazing (hairline cracks), and other defects.

**Figure 14 Locations of the barrel nuts in lens (numbers indicate tightening sequence)**




### Reinstalling the Lens

To reinstall the lens:

1. Reinstall the cover and lens. To prevent cross-threading the barrel nuts, back them counterclockwise until you hear the click of the threads engaging.

2. Tighten the barrel nuts to 16-24 in-lb in the sequence shown in Figure 13 on page 27.

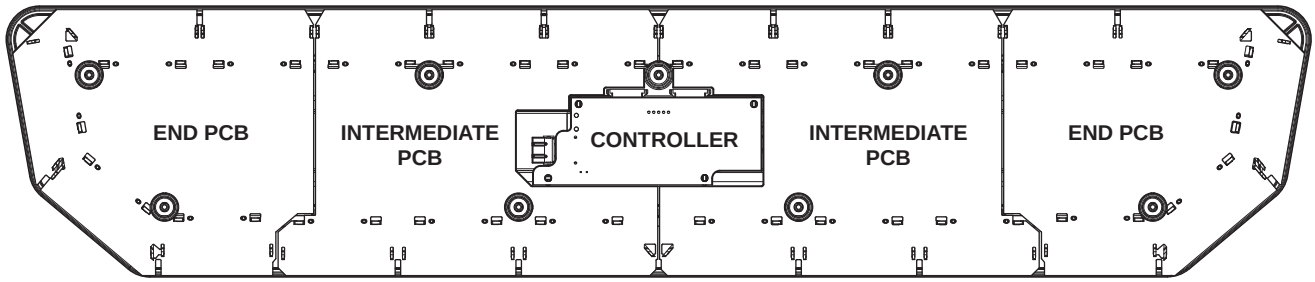
## Replacing a PCB

The Integrity light bar has two end and two intermediate ROC PCBs as well as a controller PCB. See Figure 15 on page 30. They are configured at the factory per the customer order.

**NOTICE**

***STATIC SENSITIVE DEVICE: This light bar circuitry can be damaged by electrostatic discharge (ESD). Follow anti-static procedures when servicing this light bar.***

**Figure 15 Locations of ROC PCBs**




Tool required:

- T27 Torx driver

### Removing a PCB

To remove a PCB:

1. Disconnect all power to the light bar.
2. Use a T27 Torx driver to remove the 1/4-20 Torx-head barrel nuts securing the lens. See Figure 14 on page 29. Carefully remove the lens and cover as a unit. Avoid damaging the lip seal.
3. Verify that an O-ring is under the head of each barrel nut and not stuck to the lens. Use a wooden or plastic pick to carefully remove the O-rings from the lens to prevent damaging them.
4. Inspect the O-rings and the lip seal for deformation, brittleness, cuts, or tears. To maintain watertightness, replace a questionable O-ring or seal.
5. Note and record the connection to the PCB, then lift it and disconnect the harnesses.
6. Remove the PCB from the light bar.

### Reinstalling a ROC PCB

To reinstall a PCB:

1. Place the new PCB in the same position as the old PCB and reconnect the harnesses.
2. Reinstall the lens with the cover. To prevent cross-threading the barrel nuts, back them counterclockwise until you hear the click of the threads engaging, and then tighten them to 16-24 in-lb in the sequence shown in Figure 14 on page 29.
3. Reconnect power to the light bar.

## Resetting the Controller

These instructions explain how to reset the light bar controller after you install a service replacement board or if the light heads operate erratically. For the light bar to operate correctly, the controller stores information about which LED colors it controls. Resetting the light bar controller may be necessary if you replace the controller board or if the LEDs flash erratically. To scan which colors are available at the end of the reset cycle, the controller briefly flashes all LEDs simultaneously.

Be sure to perform the reset cycle on a vehicle with a well-charged battery. Failure to do so may cause the light bar to flash or operate incorrectly.

To reset the controller:

1. Remove the barrel nuts and lens from the light bar. (See Removing and Reinstalling the Light Bar Lens on page 37.)

   **NOTE:** If you are replacing the controller, ensure that power to the light bar is off, and then disconnect all connectors to the controller. Install the new controller and reconnect all cables to the controller board.

2. Connect the main power and ground wires from the light bar to the battery.
3. Apply ignition power to the light bar control head. Verify that the “POWER ON” LED is lit on the controller board.
4. Unplug the two ROC board connectors from the controller board. (See diagram.)
5. Cycle power to the light bar by removing both the Convergence Network CAT5 connector and the power connector and reconnecting both after at least 5 seconds. In response, the “ROC TX/RX” LED and the “Convergence TX/RX” LEDs flash ON/OFF together. The “POWER ON” LED turns ON.
6. Plug the two ROC board connectors back into their connections.
7. Cycle power to the light bar by removing both the Convergence Network CAT5 connector and the power connector and reconnecting both after at least 5 seconds. All LEDs briefly flash once to indicate reset is finished.
8. Test and reassemble light bar.

## Troubleshooting the Light Bar

This section provides troubleshooting assistance for common problems. If you have any questions left unanswered, call the Federal Signal Service Department at 1-800-433-9132, 7:00 a.m. to 5:00 p.m., Monday through Friday (CT).

**Table 7 Troubleshooting tips**

| Problem | Corrective Action |
|---|---|
| The light bar does not light | • Verify that the light bar's red power line (+BAT) and the black ground- power line (–GND) are properly connected to a good, fully charged 12-volt battery. Check the 40 A fuse.<br>• Ensure that the ground connection from the light bar controller to the aluminum extrusion is good.<br>• Verify that the CAT5 cable is connected to the Serial Interface Module (J1) and there are no damaged pins in the sockets.<br>• Try a new CAT5 cable.<br>• Check the connections on the Serial Interface Module:<br>  • the black wire and the black/white wire are connected to ground (–GND)<br>  • the white wire is connected to 12 Vdc. Check the 1 A fuse.<br>  • a MODE wire has 12 Vdc<br>• Check the position of Switch 1 on SW-2 in the Serial Interface Module. If Switch 1 is down (ON), ensure that the ENABLE control wires (green/white and orange/black) have 12 Vdc applied.<br>• Check the positions of the DIP switches in the Interface Module.<br>• Check the fuses on the main bar controller.<br>• Reset the controller (page 31). |
| An LED module does not light | • Swap the LED board with a known good board to see if the board is bad.<br>• Check the connections of the cable that goes from the light bar controller to the LED ROC board.<br>• If it is a rear module, check the SignalMaster™ connections.<br>• Reset the controller (page 31). |
| Half of an LED module does not light | • Replace the ROC board that the LED is on.<br>• Reset the controller (page 31). |
| The light bar turns off when the Flash Takedown/Alley lights turn on | • Ensure that the vehicle battery is fully charged.<br>• Verify that the light bar's red power line (+BAT) and black ground-power line (–GND) are properly connected to a good, fully charged 12-volt battery.<br>• Check the red power line (+BAT) and the black ground-power line (–GND) connections in the light bar and vehicle.<br>• Reset the controller (page 31). |

| Problem | Corrective Action |
|---|---|
| The light bar has a delayed response to being shut off | • Ensure that the connections on the Serial Interface Module are kept separate from strobe supplies.<br>• Check all the ground connections, especially on the Serial Interface Module.<br>• Reset the controller (page 31). |
| A Flash Takedown/Alley light stays on with ignition power applied | • Ensure that there is no voltage on the corresponding control wire.<br>• To see if the ROC board is bad, swap it with a similar board.<br>• Swap the cables on the light bar controller outputs with a known good output. If the problem moves to another halogen light, send the light bar controller to Federal Signal for repair.<br>• Reset the controller (page 31). |
| Takedown/alley lights work, but Flash Takedown/Alley lights do not work | • Ensure that 12 Vdc is applied to the takedown and alley (red/black) control wire.<br>• Check the 12 Vdc power and negative ground connections to the light bar to ensure there is enough current.<br>• Reset the controller (page 31). |
| Only one takedown light turns on | • Check the connections from the light bar controller to the ROC boards and ensure they are in the proper locations.<br>• Reset the controller (page 31). |
| SignalMaster™ LEDs do not light | • Check the switch settings on the Serial Interface Module. Ensure that they are set for the correct operation. See Table 5 on page 17.<br>• Ensure that Switch 4 on SW-2 is in the correct position for the selected operation on the Serial Interface Module and ignition power was removed and reapplied.<br>• Check the connections at the SignalMaster controller. If the controller is a model SS2000SM, ensure that the connector has power and the ground is connected to pins 10 and 11 on the SignalMaster plug.<br>• Reset the controller (page 31). |

# Getting Technical Support and Service

For technical support and service, please contact:

Service Department
Federal Signal Corporation
Phone: 1-800-433-9132
Email: empserviceinfo@fedsig.com
www.fedsig.com

## Getting Repair Service

The Federal Signal factory provides technical assistance with any problems that cannot be handled locally.

Any units returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization (RMA). Obtain an RMA from a local Distributor or Manufacturer's Representative.

Provide a brief explanation of the service requested or the nature of the malfunction.

Address all communications and shipments to the following:

Federal Signal Corporation
Service Department
2645 Federal Signal Drive
University Park, IL 60484-3167

## Ordering Replacement Parts

This section contains a partial list of replacement parts. To order replacement parts, call the Federal Signal Service Department at 1-800-433-9132, 1-708-534-3400, 7:00 a.m. to 5:00 p.m., Monday through Friday (Central Time), or contact your nearest distributor.

**Table 8 Replacement parts**

| Description | Part Number |
|---|---|
| PCB Assembly End (Configured) | Contact Factory |
| PCB Assembly, Front (Configured) | Contact Factory |
| PCB Assembly, Rear (Configured) | Contact Factory |
| PCB Assembly, Controller (Configured) | Contact Factory |
| Nut, 1/4-20, Barrel | 7065071 |
| Seal, Lip, Lens | 8651116-XX |
| O-Ring, Lens Nut | 7067016 |
| Gasket, Lens | 8651125 |
| Lens, Clear, 44" | 864900254 |
| Lens, Clear, 51" | 864900256 |

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