



# **INTEGRITY™ Lightbar**

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## ***Installation, Maintenance, and Service Manual***



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# CHAPTER 1

## Safety Messages

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For your safety, read and understand this manual thoroughly before installing, operating, and servicing the INTEGRITY lightbar. The safety messages presented in this chapter and throughout the manual are reminders to exercise extreme care at all times. In addition, read and understand the safety instructions and keep it close at hand for reference. To download copies of this manual, go to [www.fedsig.com](http://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. You should 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 manufacturer. Ensure that your installation will not effect 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. Be sure to 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 be sure 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 be sure 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, be sure 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. Also, ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.
- Because vehicle roof construction and driving conditions vary, do not drive a vehicle with a magnetically mounted warning light installed. The light could fly off the vehicle causing injury or damage. Repair of damage incurred because of ignoring this warning shall be the sole responsibility of the user.
- To avoid denting the roof of the vehicle, place the lightbar mounting feet as close to outer edge of the roof as possible.
- Roof damage can occur if the hook adjustment bolts are over-tightened. On Arjent® lightbars tighten the adjustment bolts 10 ft-lb to 11 ft-lb. On all other lightbar models torque the adjustment bolts 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 de-activate the light system control while driving in a hazardous situation.
- You should 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 lightbar. Failure to heed this notice will damage the lightbar.
- File these instructions in a safe place and refer to them when maintaining and/or re-installing 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. In addition, listed below are some other important safety instructions and precautions you should follow:

- Do not attempt to activate or de-activate 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 driving cautiously.
- Also, situations may occur which 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.
- You should only 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, you should ensure that the entire warning light system and the siren system is securely attached and operating properly.
- Suction cup mounting is for temporary applications only. Window-mounted warning lights should be removed from the window and stored securely when not in use. Temperature changes and sunlight can cause suction cups to lose holding power. Periodically check the unit to be sure the suction cups have a firm grip on the mounting surface. An improperly secured light could fall off of the vehicle causing injury and damage.
- The holding power of magnetic mounting systems is dependent upon surface finish, surface flatness, and thickness of the steel mounting surface. Therefore, to promote proper magnetic mounting:

- ✓ The mounting surface and the magnets must be kept clean, dry, and free of foreign particles that prevent good surface contact.
- ✓ Ensure that mounting surface is flat.
- ✓ A magnet mounting system should not be used on vehicles with vinyl tops.
- ✓ To prevent sliding of light assembly on mounting surface, quick acceleration and hard stops should be avoided.

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

# CHAPTER 2

## An Overview of the Integrity™ Lightbar

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The INTEGRITY™ lightbar is a single-level LED lightbar 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 lightbar.

### LED Lights, Colors, and Flash Patterns

The microprocessor inside the lightbar supplies three priority operational modes and a library of 27 flash patterns. To increase the safety of officers, pedestrians, and motorists, the lightbar 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 lightheads can flash between red, blue, amber, or white.

### Electrical System

The INTEGRITY lightbar is protected against reversed polarity damage. The INTEGRITY Lightbar can be installed in any vehicle with a 12-volt negative-ground electrical system.

### Controller Options

Flash patterns are controlled through the lightbar CAT5 communication cable. The cable connects to Federal Signal Convergence network controllers, the Serial Interface Module (Part Number 8583446), or the Federal Signal Six-Button Serial Controller.

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

### Ambient Light Sensor/AutoDim Option

The INTEGRITY lightbar 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 lightbar. 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 lightbar 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.

## Product Specifications

Operating and technical specifications for the INTEGRITY lightbar are listed in this section by model.

Dimensions		
Model	INTEGRITY44	INTEGRITY51
Length	43.7 in (111.0 cm)	51.3 in (130.3 cm)
Height	1.96 in (5.0 cm)	1.96 in (5.0 cm)
Width	9.7 in (246.4 cm)	9.7 in (246.4 cm)
Weight*	21.5 lb (9.8 kg)	24.5 lb (11.1 kg)

\*with standard mounting feet

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

Electrical and Temperature			
Model	Electrical Potential	Current Draw (50 % Flash Rate)	Operating Temp.
INTEGRITY44	12.8 Vdc	11.0 A 13.0 A with HotFoot	-40 °F to 149 °F (-40 °C 50 to 65 °C)
INTEGRITY51	12.8 Vdc	13.0 A 15.0 A with HotFoot	-40 °F to 149 °F (-40 °C 50 to 65 °C)

# CHAPTER 3

## Reprogramming the Lightbar

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### **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.

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Carefully unpack the lightbar assembly and any other products included in the shipment. Inspect them for damage that may have occurred during shipping. If a product has been damaged, do not install or operate it. Immediately file a claim with the carrier describing the damage.

Carefully check all envelopes, shipping labels, and tags before removing or destroying them. If you are missing any parts, contact Customer Support at 1-800-264-3578, 7 AM to 5 PM, Monday through Friday (CT).

## Reprogramming the Lightbar

Although the INTEGRITY lightbar is configured and programmed at the factory, you may want change default settings and flash patterns before you install the lightbar. Before you begin, decide if you want to change these default settings:

- **SignalMaster Operation: External (default) or Internal**  
Internal operation uses the on-board SignalMaster controller in the lightbar to generate directional warning patterns. With Internal operation, an external SignalMaster controller is not needed. A standard low-current switch box can activate the internal SignalMaster controller.
- **MODE 1, 2, 3, and INTERSECTION**  
MODES 1 through 3 are most often selected by a progressive slide switch, which enables the driver to turn on the lightbar without looking down. You can select a pattern for each mode from the lightbar's library of 26 patterns.

The INTERSECTION flash pattern is typically a high activity pattern that attracts attention to the vehicle as it approaches an intersection. You can select a pattern from the library and choose one of three ways to turn on and off the pattern. The INTERSECTION flash pattern overrides the three priority modes.

**NOTE:** If the SignalMaster flash pattern is turned on, it overrides the current flash pattern.

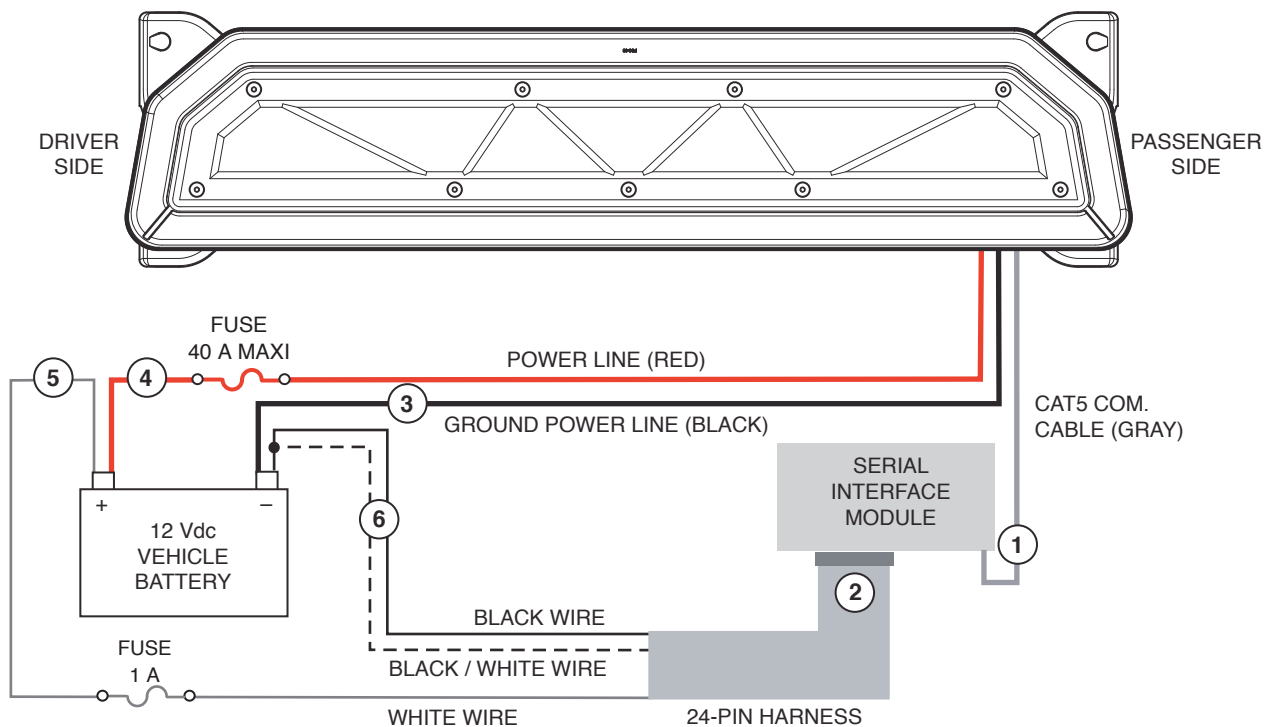
- **FRONT and REAR lights: CUTOFF (default) or ENABLE**  
Set these options after you change the default settings for MODE and INTERSECTION flash patterns. CUTOFF turns OFF the front or rear LEDs when 12 Vdc is applied to the FRONT or REAR light control wire. ENABLE turns ON the front or rear LEDs when 12 Vdc is applied.

## Making the Electrical Connections for Reprogramming

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

1. Place the lightbar on a sturdy, flat surface.
2. See Figure 3.1. Plug the CAT5 communication cable (1) from the lightbar into the Serial Interface Module (J1).
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.

**Figure 3.1** Electrical connections for reprogramming the lightbar

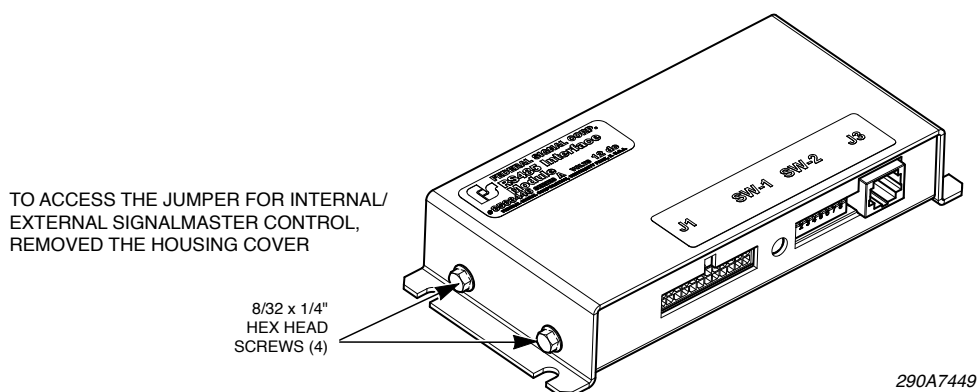


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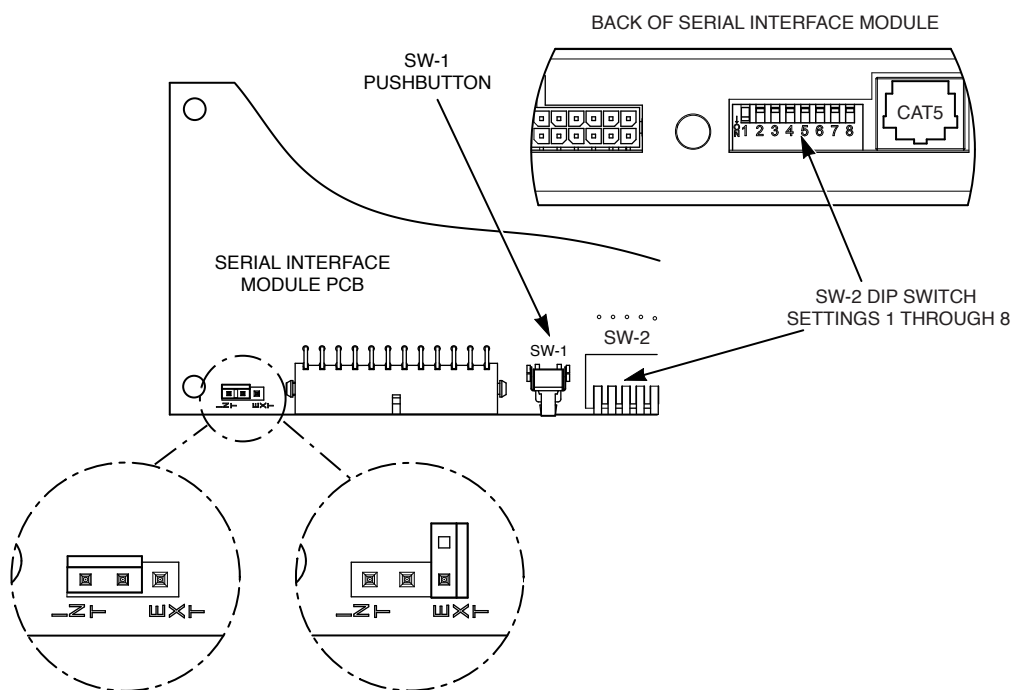
## Identifying Switch and Jumper Settings

The jumper for Internal/External SignalMaster control and the switches to reprogram flash patterns are on the PCB in the Serial Interface Module. The switches (SW-1 and SW-2) are accessible through openings in the housing. To access the SignalMaster jumper, remove the cover from the Interface Module (Figure 3.2). Be sure to reattach the cover when you are finished.

**Figure 3.2** Serial Interface Module with cover attached



**Figure 3.3** DIP switch settings in Serial Interface Module



**Table 3.1** SW-2 DIP Switch Settings

SW-2 Switch Number	Switch Setting		Function
	Up (OFF)	Down (ON)	
1	✓		FRONT/REAR LEDs cut off (turn off) when 12 Vdc is applied their control wires (Table 3.2 on page 17)
1		✓	FRONT/REAR LEDs enable (turn on) when 12 Vdc is applied to their control wires
2	✓		Keep in OFF position
3	✓		Keep in OFF position
4	✓		SignalMaster, External controller
4		✓	SignalMaster, Internal controller
5	✓		Cycle forward through the selection of flash patterns
5		✓	Cycle backward through the selection of flash patterns
6	✓		Operation Mode
6		✓	Program Mode
7	Switch for INTERSECTION operational settings (Table 3.3 on page 20)		
8	Switch for INTERSECTION operational settings (Table 3.3)		

## Selecting Internal SignalMaster Control

To select Internal SignalMaster control:

1. Unplug the 24-pin harness from the Serial Interface Module.
2. On the Interface Module, use a 1/4-inch driver to remove the four #8-32 x 1/4 in hex-head screws and remove the cover.
3. On the Interface Module PCB, move JP 1 from EXT to INT (see Figure 3.3 on page 15).
4. Reinstall the cover on the Interface Module.
5. Move Switch 4 on SW-2 to the down (ON) position.
6. Plug the 24-pin harness into the Serial Interface Module.

## Selecting External SignalMaster Control

To return to External SignalMaster control (factory default):

1. Unplug the 24-pin harness from the Serial Interface Module.
2. On the Serial Interface Module, use a 1/4-inch driver to remove the four 8-32 x 1/4 hex-head screws and remove the cover.
3. On the Serial Interface Module PCB, move JP 1 from INT to EXT (Figure 3.3).
4. Reinstall the cover on the Interface Module.
5. Move Switch 4 on SW-2 to the up (OFF) position.
6. Plug the 24-pin harness into the Serial Interface Module.



## 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 3.2 shows the control wires and their colors. The wire's first color is the predominant color and additional colors are stripes.

**Table 3.2** Control wires from the Serial Interface Module

Lightbar 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 lightbar
FRONT ENABLE		Turns ON the FRONT of the lightbar
REAR CUTOFF	Orange/Black	Turns OFF the REAR of the lightbar
REAR ENABLE		Turns ON the REAR of the lightbar
INTERSECTION	Blue/Black	Typically a high-activity pattern. Overrides all three priority modes.
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.
LOW POWER	White/Black/ Red	Dims the lights approximately 50 percent to prevent blinding approaching drivers. LOW POWER is only available in MODES 1 and 2 and is disabled when switched to another flash pattern, including MODE 3 and INTERSECTION.
LIGHTBAR TEST PATTERN	Black/White/ Red	Flashes the LEDs sequentially and then flashes the TAKEDOWN and ALLEY lights

## Entering Program Mode

To switch the module from Operation Mode to Program Mode:

1. Unplug the 24-pin harness from the Serial Interface Module.
2. On the Serial Interface Module, move Switch 6 on SW-2 to the down (ON) position (Figure 3.3 on page 15).

3. Plug the 24-pin harness into the Serial Interface Module.

**NOTE:** When you press and release the SW-1 pushbutton on the Serial Interface Module to select a pattern, the lightbar briefly turns off and then displays the next pattern. To cycle backwards to a previous pattern, move Switch 5 to ON (up position) on SW-2.

### ***SW-2 DIP Switch Settings in the Serial Interface Module***

For the location of SW-2, see Figure 3.2 on page 15. Table 3.1 on page 16 lists the DIP switch settings in the Serial Interface Module for programming flash patterns.

### ***Programming Priority MODES 1, 2, 3, and INTERSECTION***

The three modes operate with MODE 3 having the highest priority: MODE 3 overrides MODE 2, and MODE 2 overrides MODE 1. When the lightbar operates in one of these modes, the SignalMaster modules keep sequence with the flash pattern.

You can change default MODE flash patterns by programming each mode with one of 26 patterns in the lightbar's library. A typical setup would be:

- MODE 1: REAR LEDs
- MODE 2: FRONT/REAR LEDs
- MODE 3: Siren (SmartSiren® or Federal Signal compatible), and FRONT/REAR LEDs and FLASH TAKEDOWN/ALLEY LEDs on the mainbar
- MODES 1 and 2: FRONT/REAR CUTOFF

**NOTE:** If you are reprogramming the lightbar after you have connected a progressive slide switch, the programming sequence must be MODE 3, MODE 2, MODE 1, INTERSECTION.

### **Mode 3**

1. Apply 12 Vdc (+BAT) to the MODE 3 control wire (black/red) from the Serial Interface Module to display the assigned pattern.
2. On the Serial Interface Module, press and release the SW-1 pushbutton until the pattern you want appears on the lightbar.
3. Remove 12 Vdc from the MODE 3 control wire.

### **Mode 2**

1. Apply 12 Vdc (+BAT) to the MODE 2 control wire (blue/white) from the Serial Interface Module to display the assigned pattern.
2. On the Serial Interface Module, press and release the SW-1 pushbutton until the pattern you want appears on the lightbar.
3. Remove 12 Vdc from the MODE 2 control wire.

**Mode 1**

1. Apply 12 Vdc (+BAT) to the MODE 1 control wire (blue) from the Serial Interface Module to display the assigned pattern.
2. On the Serial Interface Module, press and release the SW-1 pushbutton until the pattern you want appears on the lightbar.
3. Remove 12 Vdc from the MODE 1 control wire.

**Intersection**

The INTERSECTION flash pattern overrides all three priority modes when activated. To select a new pattern, you must apply 12 Vdc to the control wire for either MODE 1, 2, or 3 (Table 3.2 on page 17) and the blue/black control wire for INTERSECTION.

**NOTE:** This procedure only programs the INTERSECTION pattern. It does not assign the pattern to a MODE.

1. Apply 12 Vdc (+BAT) to a control wire for either MODE 1, 2, or 3, and the control wire for INTERSECTION from the Serial Interface Module.
2. On the Serial Interface Module, press and release the SW-1 pushbutton until the pattern you want appears on the lightbar.
3. Remove 12 Vdc from the MODE and INTERSECTION control wires.

**Intersection Operational Settings**

Select one of three options to turn on the INTERSECTION pattern:

- HIGH with +BAT power maintained (default): the lightbar displays the INTERSECTION pattern until power is removed.
- TAP II (push-on/push-off): the INTERSECTION flash pattern is turned on and off by pressing a momentary contact switch, such as a horn button. Momentary 12 Vdc turns on the pattern, a second momentary 12 Vdc signal turns it off.
- 8-SECOND TIMEOUT activated by +BAT: momentary 12 Vdc turns on the INTERSECTION flash pattern for eight seconds.

To change from HIGH to TAP II or 8-SECOND TIMEOUT.

1. Unplug the 24-pin harness from the Serial Interface Module.
2. On the Serial Interface Module, set Switch 7 and Switch 8 on SW-2 to select a method of operation (Figure 3.3 on page 15 and Table 3.3 on page 20.) Each setting is independent of the other.
3. Plug the 24-pin harness into the Serial Interface Module.

**Table 3.3** Switch settings for INTERSECTION operation

Operational Settings	SW-2	
	SW7	SW8
HIGH (+BAT maintained)	OFF (up)	OFF (up)
TAP II (+BAT, push on/push off )	ON (down)	OFF (up)
8-SECOND TIMEOUT (activated by +BAT)	OFF (up)	ON (down)

**Front/Rear Enable or Cutoff**

The operational setting for FRONT/REAR ENABLE or CUTOFF must be programmed after MODE and INTERSECTION. The default setting is for CUTOFF in which the FRONT or REAR LEDs turn off when 12 Vdc (+BAT) is applied to their control wires (Table 3.2 on page 17). In contrast, FRONT/REAR ENABLE turns on these LED modules when +BAT is applied to their control wires. Both FRONT and REAR share the same operational setting and are not independent.

To program the lightbar for FRONT/REAR ENABLE or CUTOFF:

1. Unplug the 24-pin harness from the Serial Interface Module.
2. See Figure 3.3 on page 15. On the Serial Interface Module, move Switch 1 on SW-2 to:
  - a) the down (on) position for Front/Rear Enable.
  - b) the up (off) position for Front/Rear Cutoff.
3. Plug the 24-pin harness into the Serial Interface Module.

**NOTE:** When set to ENABLE, 12 Vdc must be applied to a MODE control wire and the FRONT and/or REAR ENABLE control wire for the lightbar to operate.

In a typical installation, if you want only the REAR LED modules to flash in MODE 1, set the operation for ENABLE. Connect the green/white and blue/white control wires to the MODE 2 connection and the orange/black and blue control wires to the MODE 1 connection.

**Exiting Program Mode**

When you are finished, switch the Serial Interface Module from Operation Mode to Program Mode.

1. Unplug the 24-pin harness from the Serial Interface Module.
2. On the Serial Interface Module, move SW-2 Switch 6 to the up (OFF) position.
3. Plug the 24-pin harness into the Serial Interface Module.

# CHAPTER 4

## Wiring the INTEGRITY Lightbar in the Vehicle

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Before proceeding, ensure that the lightbar 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 lightbar to the roof of the vehicle: hook-on mounting or permanent mounting.

### NOTICE

**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 lightbar 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 lightbar and vehicle and ensure that all equipment operates properly, carefully plan where to mount and wire the lightbar and controlling equipment:

1. Verify that the lightbar and mounting hardware fit the vehicle.
2. Determine where to mount the lightbar on the vehicle.
3. Determine where to mount the controlling equipment:
  - a) Trunk or remote location
  - b) 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.

**⚠ 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.

---

5. Decide where to route the lightbar power and ground wires.

**⚠ 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.

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6. To make wiring easier, remove the seats, 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, deburr 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 lightbar and mounting feet to ensure that all fasteners and brackets are tight.

## Connecting Power to the Lightbar

**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.

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**⚠ 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.

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**NOTICE**

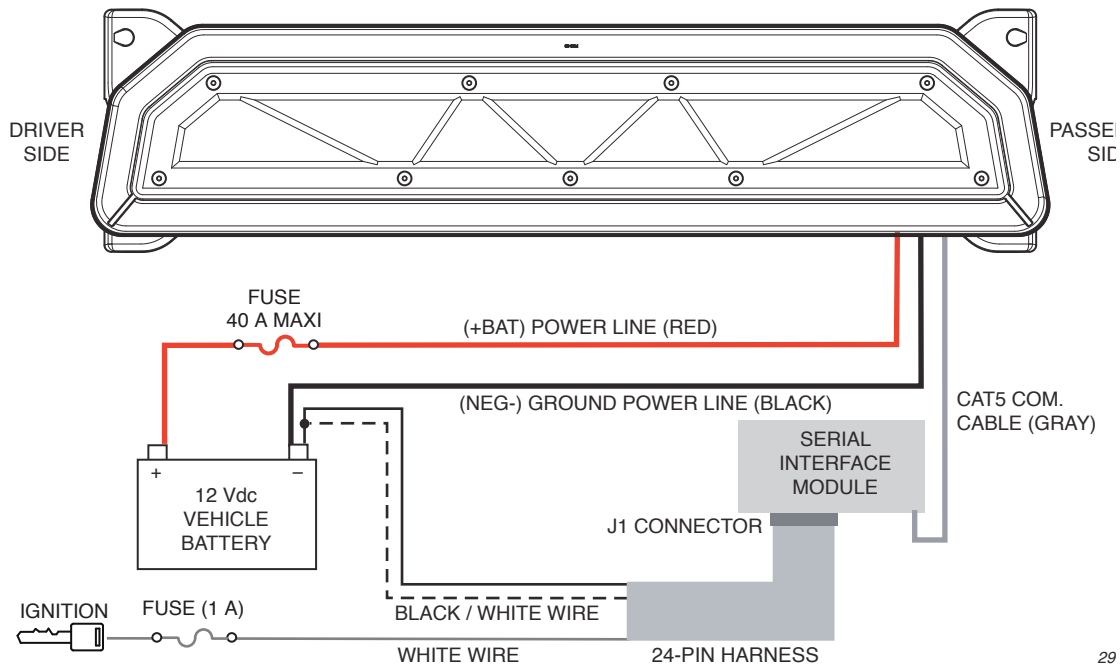
**REVERSE POLARITY / MISWIRING**—Reverse polarity or incorrect voltage may damage the light. To avoid damage to the light, ensure that the battery voltage is the same as the voltage rating of the light and that the correct polarity is observed. If you are connecting to a cigarette lighter plug or 12 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 3.1.

**Figure 4.1** Power and cable connections



29

2. From the lightbar, 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 lightbar to the vehicle battery's ground (–GND) terminal.
4. Route and connect the red lead from the lightbar through the supplied 40 A Maxi fuse holder at the source, which is the positive battery terminal (+BAT).

## 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 in (91 cm) of the lightbar 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 2.00 in x 5.95 in (5.08 cm x 15.11 cm).



**NOTICE**

**DRILLING PRECAUTIONS**—Before drilling holes, check the area into which you plan to drill to ensure you do not damage vehicle components. All drilled holes should be de-burred and all sharp edges should be smoothed. All wires going through drilled holes should be protected by a grommet or convolute/split-loom tubing.

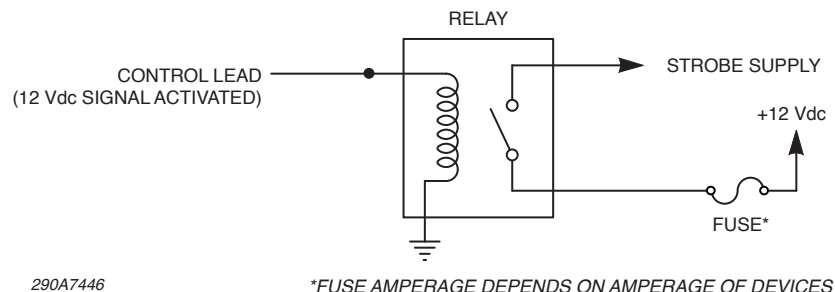
2. Drill a mounting hole at each of the four drill-position marks, sized for the recommended user-supplied #8 mounting hardware.
3. Secure the Serial Interface Module to the mounting surface with installer-supplied #8 hardware.
4. Install the CAT5 serial cable from the lightbar to the J3 output jack of the Serial Interface Module.
5. Install the three-foot-long, 24-conductor cable from the lightbar 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 lightbar function to remain on. If necessary, use a relay to isolate devices with large filter capacitors (Figure 4.2). 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 4.2** Relay for isolating devices with large filter capacitors



## Wiring the Serial Interface Module

**⚠ WARNING**

**FUSE ELECTRICAL SOURCES**—Always fuse current/voltage sources with a fuse connected near the power source. Be sure that the fuse is properly rated to protect the electrical load, the wiring and the connectors used in the circuit. Failure to follow this notice could result in vehicle or equipment damage.

This section is an overview of default settings that are activated when connecting LED and Mode control wires to 12 Vdc (+BAT). The basic light functions of the lightbar must be controlled by an installer-supplied control head. All programming and changes to default settings should be done after quick testing the lightbar and before installation. Programming is covered in “Programming Priority Modes 1, 2, 3, and Intersection” on page 18.



For a description of the control wires from the Serial Interface Module, see Table 3.3 on page 20. For typical installations with common controllers and switch boxes, see the wiring schematics in Chapter 6 on page 39.

For wiring the controller's functions to the Serial Interface Module's 24-pin cable harness, see Table 3.2 on page 17 and the figures starting on page 39. If additional wire is necessary for the harness (except ground), 22 AWG wire is adequate. The ground wires must be extended with 16 AWG or thicker wire.

## **Priority Modes 1, 2, and 3**

To activate a priority mode, apply 12 Vdc (+BAT) to a mode control wire. Mode 3 (black/red) overrides Mode 2 (blue/white), and Mode 2 overrides Mode 1 (blue). You can program one of the flash patterns in the lightbar to each Mode input.

## **Steady Burn**

Applying 12 Vdc (+BAT) to the red/white control wire turns on the red LED (driver side) and the blue LED (passenger side) Steady Burn modules. Steady Burn defaults to the HotFoot modules if red/blue colors are available; otherwise, Steady Burn turns on the red/blue colors in the lightbar if available. In the 44" INTEGRITY, red is located in Module 4 and blue in Module 7. In the 51" INTEGRITY, red is located in Module 5 and blue in Module 8.

## **Front Cutoff**

When 12 Vdc (+BAT) is applied to the Front Cutoff control wire (green/white), the selected Mode operation is deactivated to the front of the lightbar. Only the rear LEDs function. Additionally, with Flash Takedown/Alley (red/black) active, only the alley lights turn on.

## **Rear Cutoff**

When 12 Vdc (+BAT) is applied to the Rear Cutoff control wire (orange/black), the selected Mode operation is deactivated to the rear of the lightbar. Only the front LEDs flash.

**NOTE:** The operational settings for Front Cutoff and Rear Cutoff are not independent. The default setting is for 12 Vdc (+BAT) to be applied for the lightbar's front and rear lightheads to turn them off (Cutoff). To change the default setting to turn on these LEDs when 12 Vdc is applied (Enable), see "Front/Rear Enable or Cutoff" on page 20.

## **Intersection**

When 12 Vdc (+BAT) is applied to the Intersection control wire (blue/black) and a Mode control wire, it turns on the Intersection pattern. When 12 Vdc is removed, the lightbar returns to its previous state. SW-2 Switch 3 must be in the up (ON) position in the Serial Interface Module. (See "Scene Light, Left, and Scene Light, Right" on page 26.)

**NOTE:** With the flexibility of the SmartSiren Platinum System, both the Intersection and the Scene Light, Left option are available in Vision SLR and INTEGRITY lightbars without the need to choose one or the other.

## **Flash Takedown/Alley**

When 12 Vdc (+BAT) is applied to the Flash Takedown/Alley control wire (red/black) and a MODE control wire, the takedown and alley lights flash.

## Left and Right Alley Lights

When 12 Vdc (+BAT) is applied to the control wire for Left (green/black) or Right Alley (orange/red), the appropriate alley LEDs turn on. The left and right alley lights override the flash/takedown alley lights.

## Takedown Lights

When 12 Vdc (+BAT) is applied to the control wire for Takedown (white/black), the takedown LEDs turn on. Takedown overrides Flash Takedown/Alley and Front Cutoff.

## Scene Light, Left and Scene Light, Right

This function applies only to lightbars with SpectraLux™ Technology (INTEGRITY and Vision SLR). To use this function with the Serial Interface Module, place SW-2 Switch 3 in the Module in the down position (ON). When 12 Vdc is applied to the control wire for Scene Light, Left (blue/black), the left half of the lightbar lights up. When 12 Vdc is applied to the control wire for Scene Light, Right (black/white/red), the right half of the lightbar lights up. Intersection and Lightbar Test are unavailable with these options.

## Low Power or Optional AutoDim

**NOTE:** Low Power Mode and the optional AutoDim feature are disabled when the lightbar is in MODE 3 or displaying the Intersection flash pattern.

### WARNING

**USE THE LOW POWER FUNCTION PROPERLY—Enabling the Low Power function in the lightbar causes the light output to fall below current light output standards and guidelines for emergency warning lights. Use extreme caution when using this function. Ensure that the ambient light conditions are low enough that you are seen and that the reduction of glare from the lightbar is safer than full light output in the situation. Failure to heed this warning may result in serious injury or death to you or others in your vicinity.**

When 12 Vdc (+BAT) is applied to the control wire for Low Power, the LEDs are dimmed to approximately 50 percent of their full brightness. Low Power is only functional in MODE 1 or MODE 2. Low Power is disabled when switching to another flash pattern, including Intersection. To use Low Power again, disconnect 12 Vdc from the Low Power control wire and reapply 12 Vdc to the Low Power control wire after a change in flash pattern occurs.

If the lightbar is equipped with AutoDim, it will automatically dim at night as long as the controller is not in MODE 3. Once MODE 3 is removed, the lightbar will again dim to 50 percent of full brightness.

**NOTE:** The may take a few minutes to change light intensity after an ambient light change.

## Ignition

To connect the Serial Interface Module to the ignition circuit:

1. Connect the white wire from the supplied J1 cable harness on the Interface Module to a 1 A fuse.
2. Connect the fuse end as close as possible to switched ignition power. Power should also be present in the cranking position.

3. Connect the black and black/white wire from the 24-pin cable harness on J1 from the Serial Interface Module to battery ground (–GND). Use 16 AWG wire to extend the cable length.

## 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.

### External SignalMaster

The Serial Interface Module is preset for the External SignalMaster option. 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 (Figure 4.3 below and Figure 4.4 on page 28). 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 4.1.

**Table 4.1** Cross reference for controller leads (external Serial Interface Module control)

24-Pin Harness from the Serial Interface Module	SIGNALMASTER* Wire (Figure 4.2)	SS2000SM* Wire (Figure 4.3)
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 4.3** SignalMaster 331105 controller (external SignalMaster control)

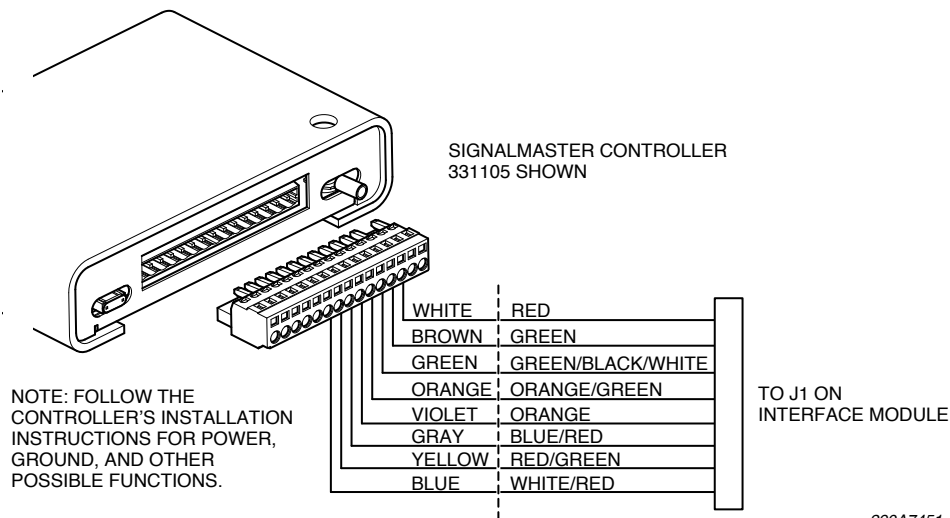
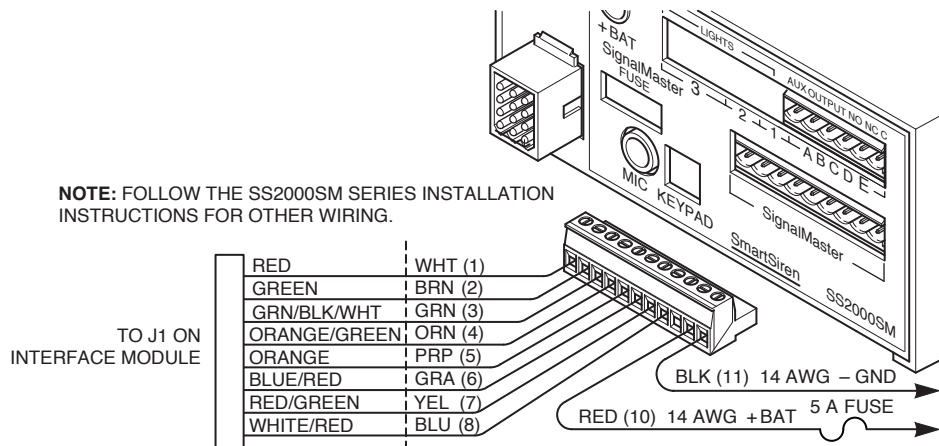


Figure 4.4 SmartSiren SS2000SM Series controller (external SignalMaster control)



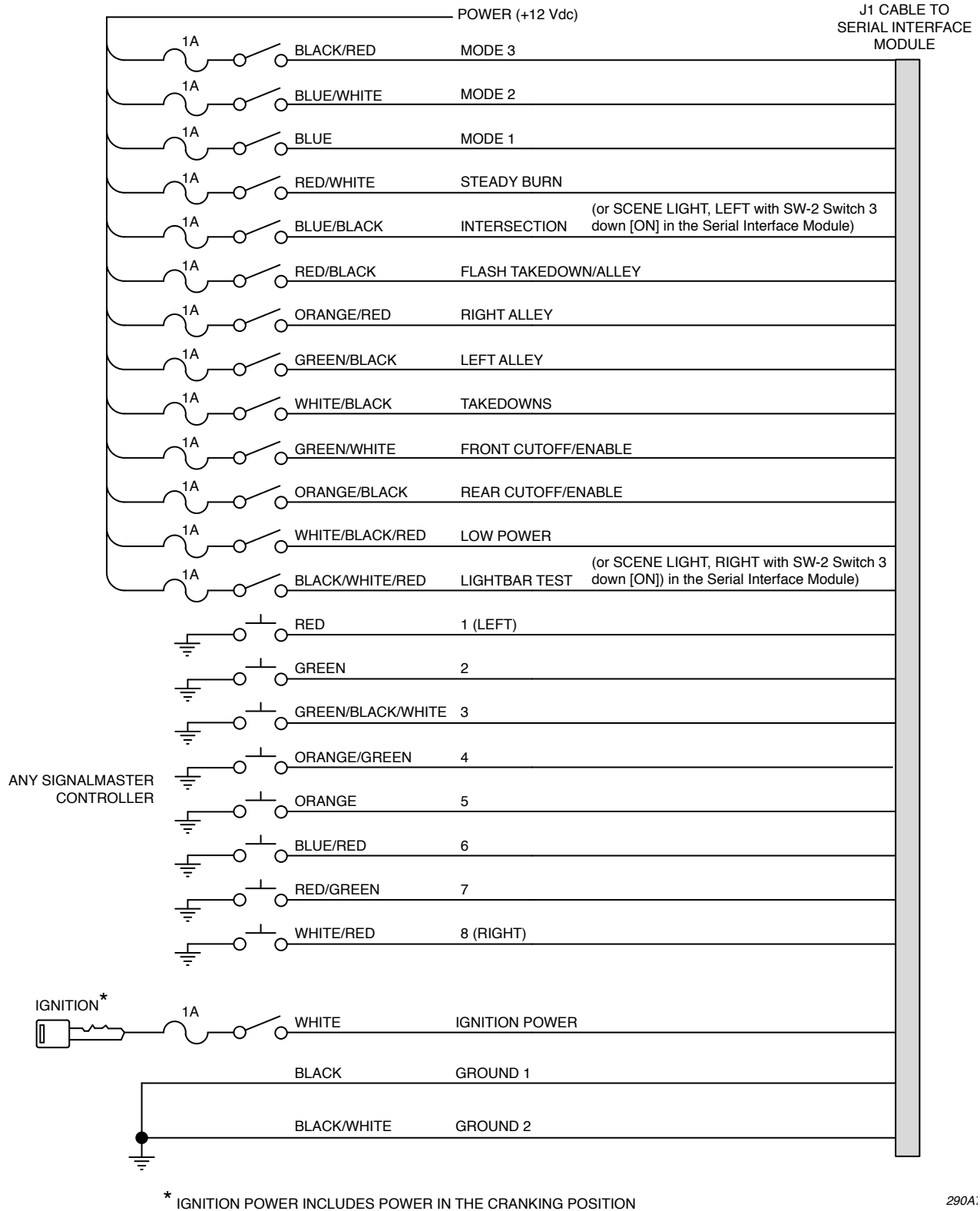
**Internal SignalMaster**

Internal operation uses the lightbar’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 lightbar’s internal SignalMaster controller. For the jumper setting in the Serial Interface Module, see “Selecting Internal SignalMaster Control” on page 16. To activate the lightbar’s internal SignalMaster controller, apply 12 Vdc (+BAT) to the SignalMaster control wires.

Table 4.2 SignalMaster control wires and warning patterns (internal SM control)

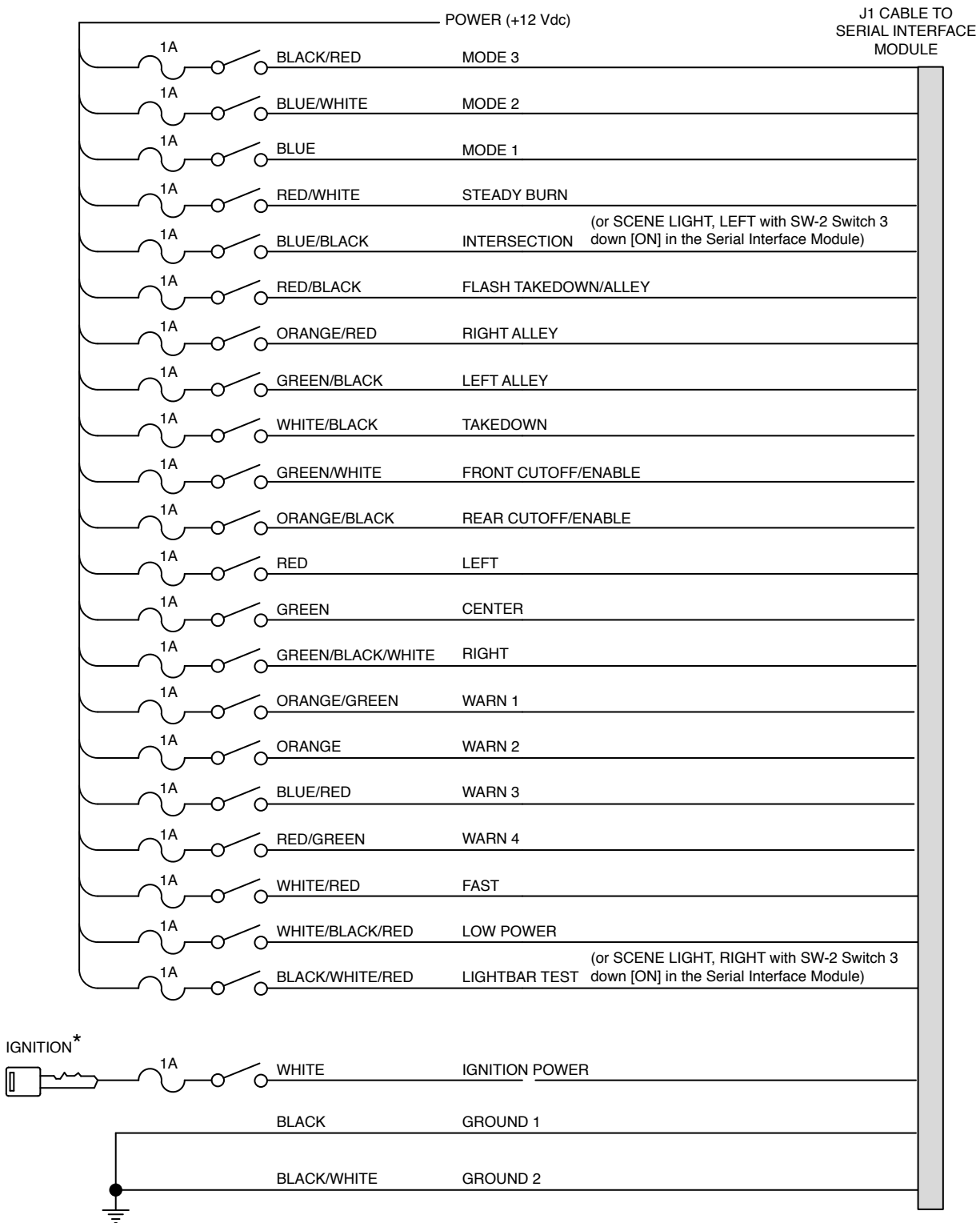
Warning Pattern	Control Wires	Description (with 8-head example)								
LEFT	Red	Rear LEDs flash from right to left <table><tr><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr></table>	8	7	6	5	4	3	2	1
8	7	6	5	4	3	2	1			
CENTER OUT	Green	Rear LEDs flash from center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

**Figure 4.5** SignalMaster control functions wired to ground for external Serial Interface Module control



290A;

**Figure 4.6** SignalMaster control functions wired to 12 Vdc for Internal control



\* IGNITION POWER INCLUDES POWER IN THE CRANKING POSITION

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# CHAPTER 5

## Maintaining and Servicing the INTEGRITY

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### **⚠ WARNING**

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

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### **⚠ 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.

---

This chapter describes how to maintain and service the INTEGRITY lightbar. Establishing a regular maintenance and inspection schedule extends the life of the lightbar and ensures safety. For service, support, or replacement parts, contact the Federal Signal Service Department at 1-800-433-9132, 7 a.m. to 5 p.m., Monday through Friday (CT). See Table 5.2 on page 37 for replacement parts and part numbers.

## Cleaning the Lightbar Lens

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### **⚠ WARNING**

**CRAZING/CLEANING SOLUTIONS**—The use of cleaning solutions, such as strong detergents, solvents, and petroleum products, can cause crazing (cracking) of the lightbar 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 lightbar. Failure to heed this notice will damage the lightbar.

---

To clean the lightbar 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 Lightbar Lens

The lightbar lens, which is the top half of the INTEGRITY housing, covers the ROC (Reliable Onboard Circuitry) PCBs and controller PCB.

Tool required:

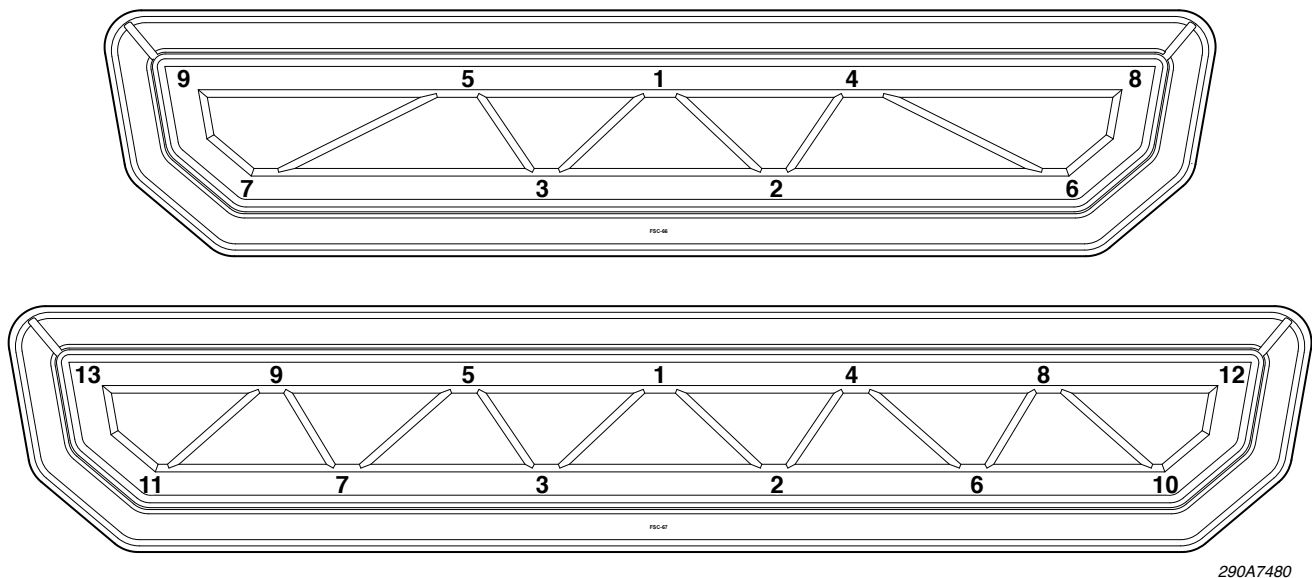
- ✓ T27 Torx driver

### Removing the Lens

To remove the lens:

1. Disconnect all power to the lightbar at the battery.
2. Use a T27 Torx driver to remove the 1/4"-20 Torx-head barrel nuts securing the lens (Figure 5.1). 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 5.1** Locations of the barrel nuts in lens (numbers indicate tightening sequence)



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## 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 5.1 on page 32.

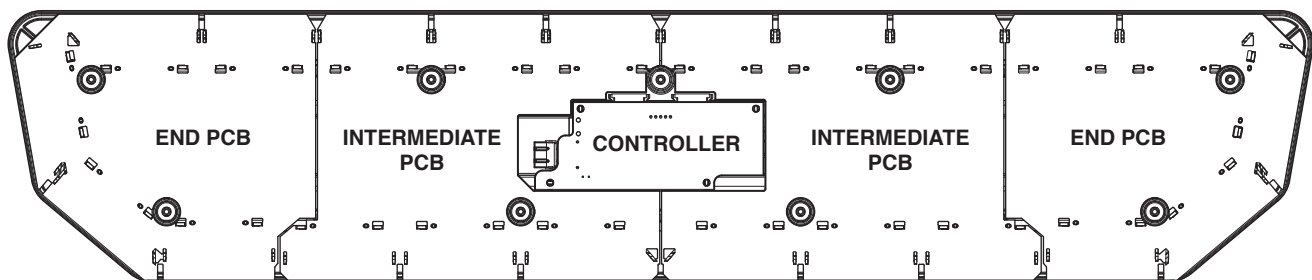
## Replacing a PCB

The INTEGRITY lightbar has two end and two intermediate ROC PCBs as well as a controller PCB (Figure 5.2). They are configured at the factory per the customer order.

### NOTICE

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

Figure 5.2 Locations of ROC PCBs



290A7481

Tool required:

- ✓ T27 Torx driver

## Removing a PCB

To remove a PCB:

1. Disconnect all power to the lightbar.
2. Use a T27 Torx driver to remove the 1/4"-20 Torx-head barrel nuts securing the lens (Figure 5.1 on page 32). 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 lightbar.

## 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 counter-clockwise until you hear the click of the threads engaging, then tighten them to 16-24 in-lb in the sequence shown in Figure 5.1 on page 32.
3. Reconnect power to the lightbar.

## Resetting the Controller

These instructions explain how to reset the Valor lightbar controller after you install a service replacement board or if the lightheads operate erratically. For the Valor lightbar to operate correctly, the controller stores information about which LED colors it controls. Resetting the lightbar 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 lightbar to flash or operate incorrectly.

To reset the controller:

1. Remove the barrel nuts and lens from the lightbar. (See Removing and Reinstalling the Lightbar Lens on page 32).
- NOTE:** If you are replacing the controller, ensure that power to the lightbar is off, then disconnect all connectors to the controller. Install the new controller and re-connect all cables to the controller board.
2. Connecting the main power and ground wires from the lightbar to the battery.
  3. Apply ignition power to lightbar control head. Verify that the “POWER ON” LED is lit on the Valor controller board.
  4. Unplug the two ROC board connectors from the controller board (see diagram).
  5. Cycle power to the lightbar 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 lightbar 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 lightbar.

## Troubleshooting the Lightbar

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 a.m. to 5 p.m., Monday through Friday (CT).

**Table 5.1** Troubleshooting tips

Problem	Corrective Action
The lightbar does not light	<ul style="list-style-type: none"> <li>✓ Check that the lightbar'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.</li> <li>✓ Ensure that the ground connection from the lightbar controller to the aluminum extrusion is good.</li> <li>✓ Check that the CAT5 cable is connected to the Serial Interface Module (J1) and there are no damaged pins in the sockets.</li> <li>✓ Try a new CAT5 cable.</li> <li>✓ Check the connections on the Serial Interface Module:               <ol style="list-style-type: none"> <li>1. the black wire and the black/white wire are connected to ground (–GND)</li> <li>2. the white wire is connected to 12 Vdc. Check the 1 A fuse.</li> <li>3. a MODE wire has 12 Vdc</li> </ol> </li> <li>✓ Check the position of Switch 1 on SW-2 in the Serial Interface Module (Figure 3.3 on page 15). If Switch 1 is down (ON), ensure that the ENABLE control wires (green/white and orange/black) have 12 Vdc applied.</li> <li>✓ Check the positions of the DIP switches in the Serial Interface Module. See Figure 3.3 on page 15 and Table 3.2 on page 17.</li> <li>✓ Check the fuses on the mainbar controller.</li> <li>✓ Reset the controller (page 34).</li> </ul>
An LED module does not light	<ul style="list-style-type: none"> <li>✓ Swap the LED board with good board to see if the board is bad.</li> <li>✓ Check the connections of the cable that goes from the lightbar controller to the LED ROC board.</li> <li>✓ If it is a rear module, check the SignalMaster connections.</li> <li>✓ Reset the controller (page 34).</li> </ul>
Half of an LED module does not light	<ul style="list-style-type: none"> <li>✓ Replace the ROC board that the LED is on.</li> <li>✓ Reset the controller (page 34).</li> </ul>

*(continued on next page)*

**Table 5.1** Troubleshooting tips (continued)

Problem	Corrective Action
The lightbar turns off when the Flash Takedown/Alley lights turn on	<ul style="list-style-type: none"> <li>✓ Ensure that the vehicle battery is fully charged.</li> <li>✓ Check that the lightbar's red power line (+BAT) and black ground-power line (–GND) are properly connected to a good, fully charged 12-volt battery.</li> <li>✓ Check the red power line (+BAT) and the black ground-power line (–GND) connections in the lightbar and vehicle.</li> <li>✓ Reset the controller (page 34).</li> </ul>
The lightbar has a delayed response to being shut off	<ul style="list-style-type: none"> <li>✓ Ensure that the connections on the Serial Interface Module are kept separate from strobe supplies.</li> <li>✓ Check all the ground connections, especially on the Serial Interface Module.</li> <li>✓ Reset the controller (page 34).</li> </ul>
A Flash Takedown/Alley light stays on with ignition power applied	<ul style="list-style-type: none"> <li>✓ Ensure there is no voltage on the corresponding control wire.</li> <li>✓ To see if the ROC board is bad, swap it with a similar board.</li> <li>✓ Swap the cables on the lightbar controller outputs with a known good output. If the problem moves to another halogen light, send the lightbar controller to Federal Signal for repair.</li> <li>✓ Reset the controller (page 34).</li> </ul>
Takedown/alley lights work, but Flash Takedown/Alley lights do not work	<ul style="list-style-type: none"> <li>✓ Ensure that 12 Vdc is applied to the takedown and alley (red/black) control wire.</li> <li>✓ Check the 12 Vdc power and negative ground connections to the lightbar to ensure there is enough current.</li> <li>✓ Reset the controller (page 34).</li> </ul>
Only one takedown light turns on	<ul style="list-style-type: none"> <li>✓ Check the connections from the lightbar controller to the ROC boards and ensure they are in the proper locations.</li> <li>✓ Reset the controller (page 34).</li> </ul>
SignalMaster LEDs do not light	<ul style="list-style-type: none"> <li>✓ Check the jumper and switch settings on the Serial Interface Module. Ensure they are both set for the correct operation. See Figure 3.3 on page 15 and Table 3.2 on page 17.</li> <li>✓ 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.</li> <li>✓ 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.</li> <li>✓ Reset the controller (page 34).</li> </ul>

## Getting Technical Support and Service

Federal Signal Corporation will service your equipment or provide technical assistance with any problems that cannot be handled locally. Any product returned to Federal Signal for service, inspection, or repair must be accompanied by a Return Material Authorization number. The RMA number can be obtained from your local distributor or Federal Signal. Please provide a brief explanation of the service requested or the nature of the malfunction. Contact your local dealer/distributor for replacement parts availability or contact the Federal Signal Service Department (7 a.m. to 5 p.m., Monday through Friday, Central Time) at:

Service Department  
Federal Signal Corporation  
2645 Federal Signal Drive  
University Park, IL 60484-3167  
800-433-9132 (phone) 800-343-9706 (fax)

## Ordering Replacement Parts

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

**Table 5.2** 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

## Returning a Product to Federal Signal

Before returning a product to Federal Signal, call 800-264-3578, 800-433-9132, or 800-824-0254 to obtain a Returned Merchandise Authorization number (RMA number). To expedite the process please be prepared with the following information:

- Your Federal Signal customer or account number.
- The purchase order number under which the items were purchased.
- The shipping method.
- The model or part number of the product being returned.
- The quantity of products being returned.
- Drop ship information as needed.

- Any estimate required.

When you receive your RMA Number:

- Write the RMA number on the outside of the box of returned items.
- Reference the RMA number on your paperwork inside of the box.
- Write the RMA number down, so that you can easily check on status of the returned equipment.

Send all material with the issued RMA Number to:

Federal Signal Corporation  
2645 Federal Signal Drive  
University Park, IL 60484-3167  
Attn: Service Department  
RMA: # \_\_\_\_\_

## CHAPTER 6

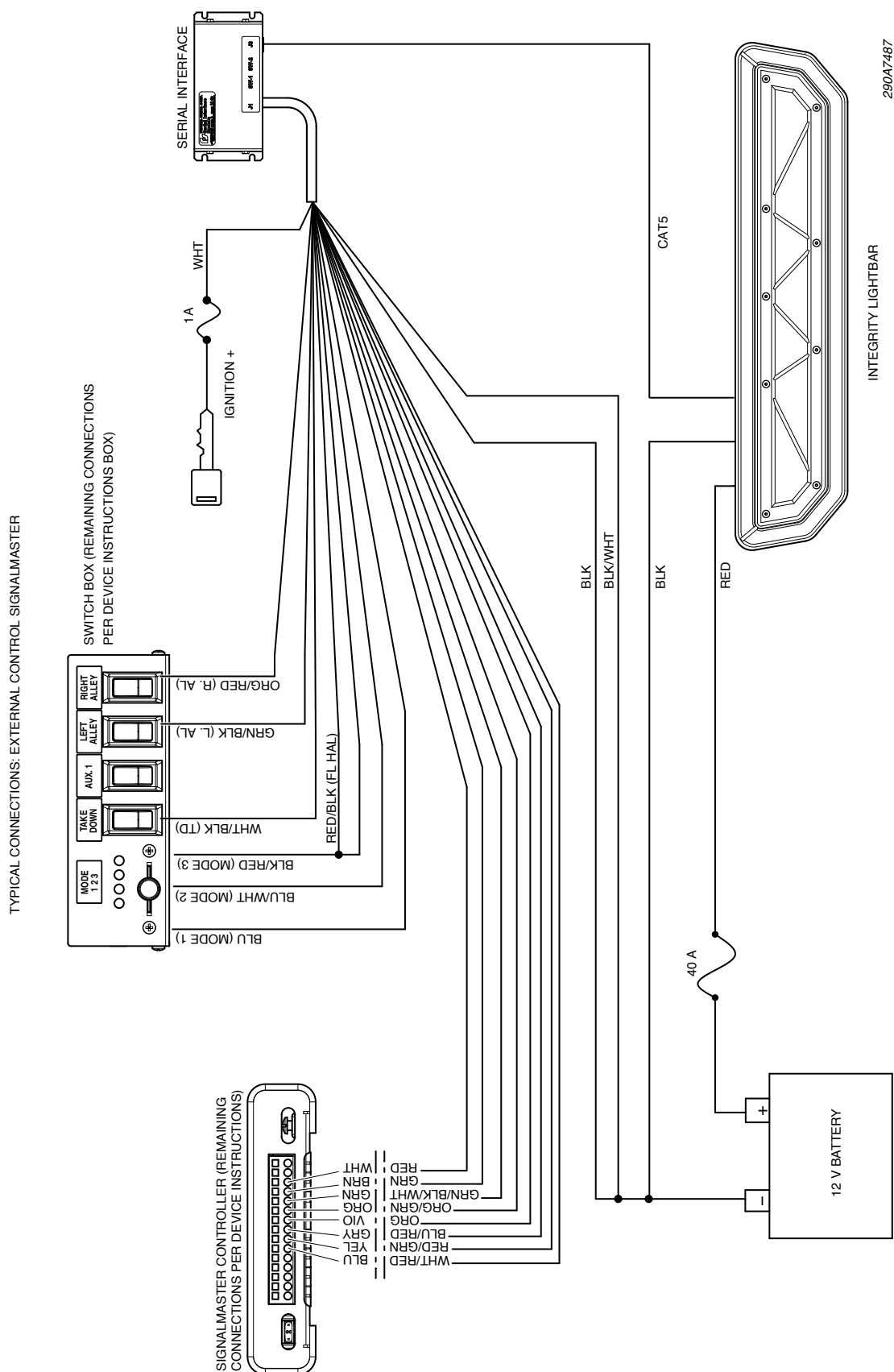
### **Wiring Schematics**

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This chapter has schematics showing the INTEGRITY lightbar with typical connections to these controllers:

- SignalMaster controller (external control)
- SW400SS Switch Module (internal control)
- SmartSiren Model SS2000SM
- Non-SignalMaster
- PA640

**Figure 6.1** Typical connections with a SignalMaster controller (external control)





**Figure 6.2** Typical connections with a Model SW400SS Switch Module (internal control)

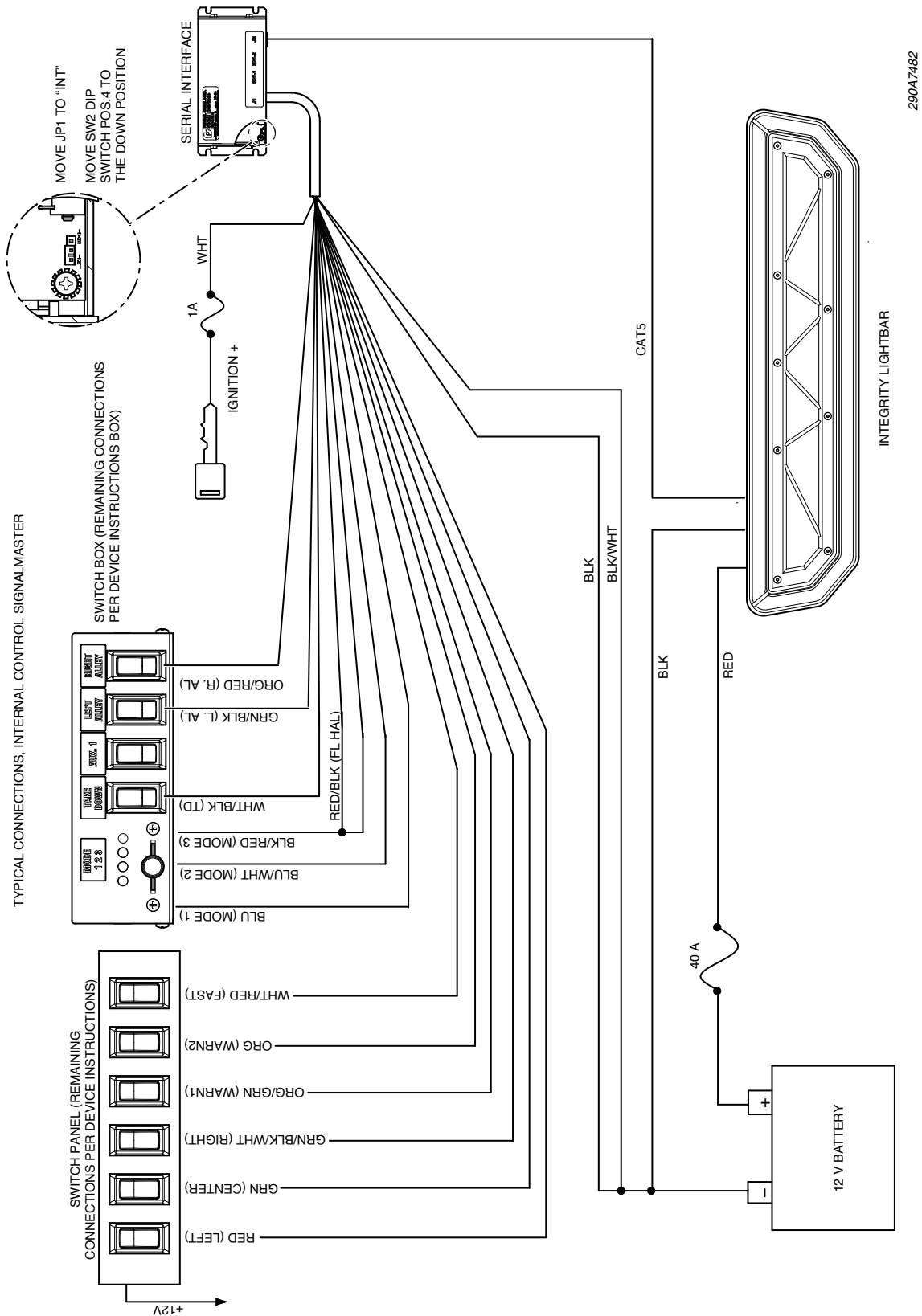
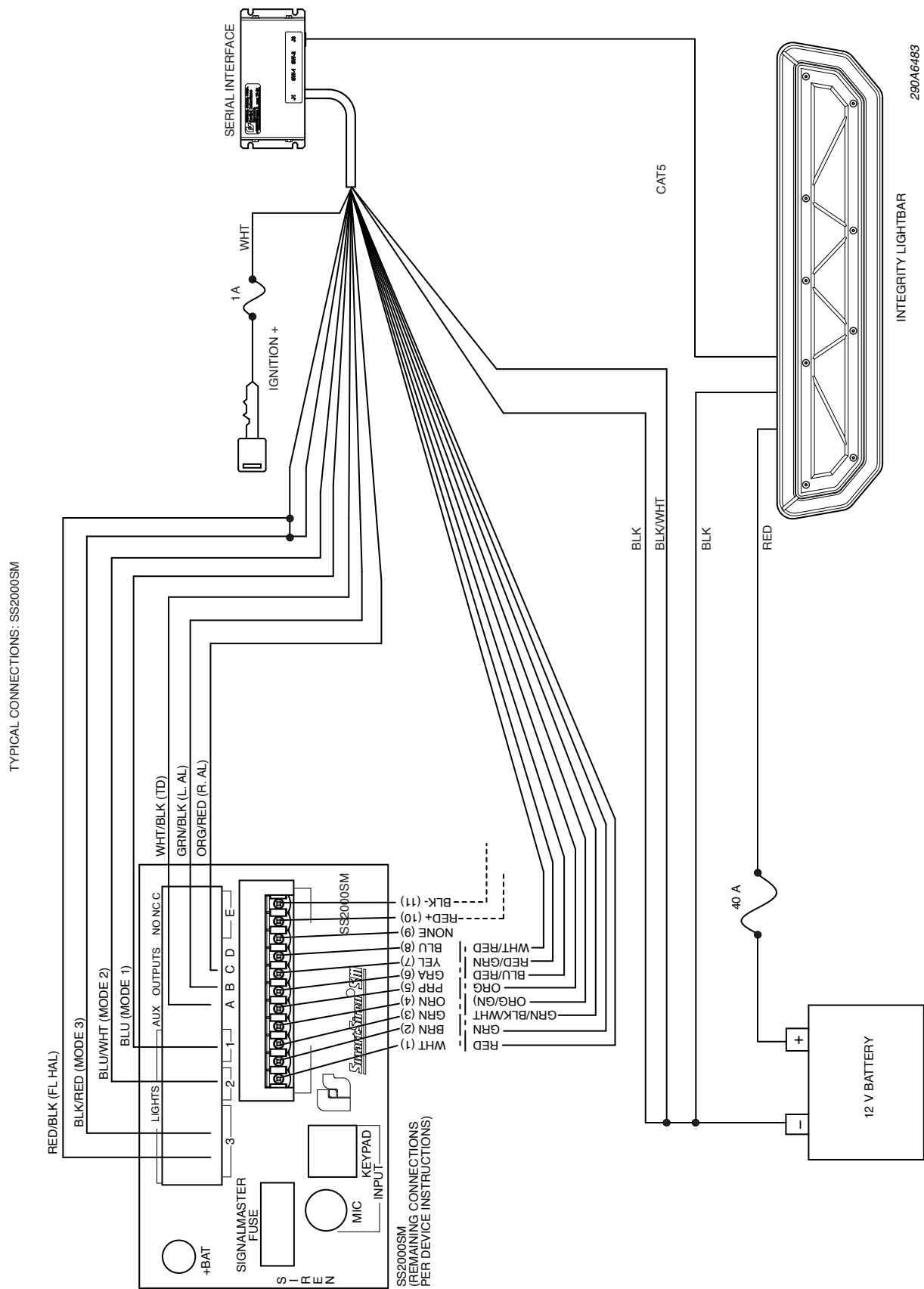
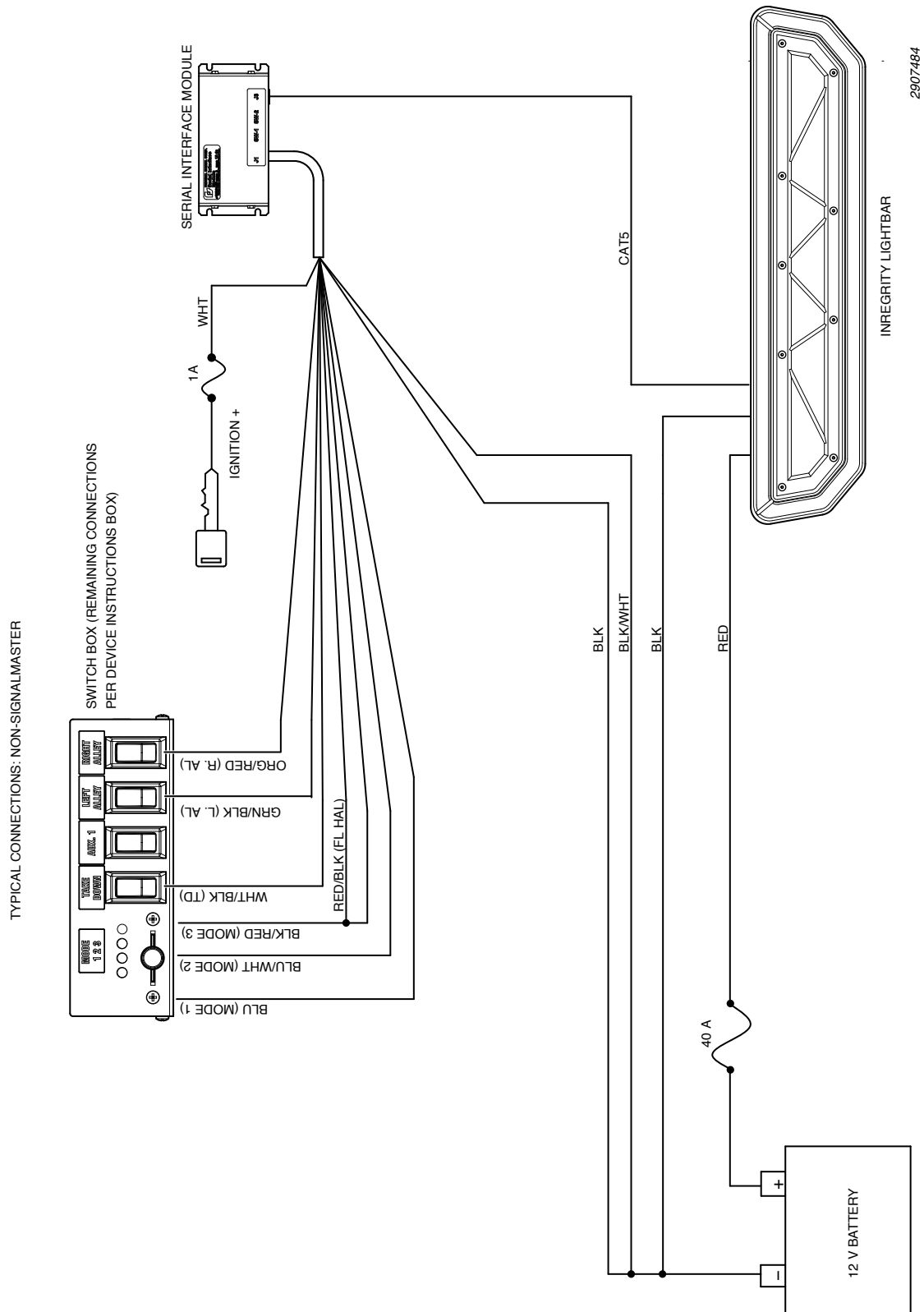


Figure 6.3 Typical connections with a SmartSiren Model SS2000SM controller



**Figure 6.4** Typical connections with a non-SignalMaster controller

**Figure 6.5** Typical connections with a Model PA640 (PA64000) controller

