



LED JETSOLARIS**® Lightbar with ROC™ Technology JLX 48", 54", 60", and 72" Series**



Installation and Service Manual

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Chapter 1: Safety Messages

For your safety, read this manual thoroughly before installing, operating, and servicing the Legend® lightbar. The safety messages presented in this chapter and throughout the manual are reminders to exercise extreme care at all times. To download copies of the 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 Messages to Installers and Service Personnel of Warning Light Equipment

WARNING

People's lives depend on your proper installation and servicing of Federal Signal products. It is important to read and follow all instructions shipped with this product. In addition, listed below are some other important safety instructions and precautions you should follow:

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 service manuals when performing equipment installations on a vehicle.

Light Hazards

- 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 safely operate the vehicle.
- 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 ensure 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 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. 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 (45.7 cm) 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 any unsealed electrical device while it is connected to its power source.

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.
- 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.
- 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.
- 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.
- Refer to the manual packed with the lighting system for proper electrical connections, additional precautions, and information.
- 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 the outer edge of the roof as possible.
- Roof damage can occur if the hook adjustment bolts are over-tightened. Tighten adjustment bolts 6 to 7 ft-lb to prevent the JLX lightbar from sliding front-to-back when pulling on the mounting bracket. 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.
- 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 domes 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.
- File these instructions in a safe place and refer to them when maintaining or re-installing the product.

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

RETAIN AND REFER TO THIS MESSAGE

Safety Message to Operators of Warning Light Equipment

⚠ WARNING

People's lives depend on your safe use of our products. Listed below are some 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.
- 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.
- It is important that you fully understand how to safely operate this warning system before use.
- You should only operate your vehicle and its 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. The unit 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.
- 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:
 - ✓ Mounting surface and 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.

RETAIN AND REFER TO THIS MESSAGE

Chapter 2: An Overview of the JLX JetSolaris

The JET^{SOLARIS}® is an LED lightbar that can be used in a variety of applications for Fire/Rescue, Police, DOT, and Tow/Recovery. The JET^{SOLARIS} features the latest in SOLARIS® LED and ROC (Reliable Onboard Circuitry) technology. ROC substantially reduces wiring and connections with its consolidated design of printed circuit boards, and the SOLARIS LED reflectors provide maximum LED performance. SOLARIS LED and ROC technology improves the performance and virtually eliminates any maintenance while being supported by a five year warranty on the LED components.

The standard JET^{SOLARIS} comes with 40 selectable flash patterns, including a test pattern. The LEDs are available in amber, blue, red, white, and green. Dome colors are available in amber, blue, red, and clear. Halogen worklight options are also available.

Lightbar Specifications

Dimensions (H x L x W):

JLX 48"	4.7 in x 47.5 in x 11.2 in (119 mm x 1207 mm x 284 mm)
JLX 54"	4.7 in x 54 in x 11.2 in (119 mm x 1372 mm x 284 mm)
JLX 60"	4.7 in x 60 in x 11.2 in (119 mm x 1524 mm x 284 mm)
JLX 72"	4.7 in x 72 in x 11.2 in (119 mm x 1829 mm x 284 mm)

Current Draw:

Three-button Solaris LED reflector (any color)	0.5 A
Six-button Solaris LED reflector (any color)	1.0 A
Traffic Clearing Light:	4.3 A
Halogen Worklight:	4.0 A
Stop/Tail/Turn Light:	0.32 A

Voltage: 12 Vdc

Cable Length: 15 ft (457.2 cm)

Shipping Weight:

JLX 48"	32.0 lb (14.5 kg)
JLX 54"	33.5 lb (14.2 kg)
JLX 60"	35.0 lb (16.3 kg)
JLX 72"	38.0 lb (17.2 kg)

Approvals: NFPA 1901 compliant models are available.
SAE J1318, J595, and J845 Class 1

Unpacking the Product

After unpacking the product, examine it for damage that may have occurred in transit. If the product has been damaged, file a claim immediately with the carrier stating the extent of damage. Carefully check all envelopes, shipping labels, and tags before removing or destroying them.

Before You Begin

WARNING

AIRBAG DEPLOYMENT

Locate the controls for the light system so that the vehicle and control can be operated safely under all driving conditions.

Failure to heed this precaution could result in driver distraction or driver error while operating the vehicle.

Before you begin, ensure that the lightbar has been installed on the vehicle roof according to the instructions included with the mounting kit. An installer-supplied control head controls the basic functions of the lightbar.

Chapter 3: Installing the JLX JETSolaris

The lightbar is completely wired at the factory and does not require any additional internal wiring. All the conductors necessary to control the lightbar's functions are contained in the cable. Installation of options requires additional wiring to the warning light system and vehicle battery. An installer-supplied switch or relay rated at 30 A is required for the connection between the JLX red power lead and the fused power source. If additional wire length is needed, splice wire of the same gauge or heavier to the leads

Connecting the Power Leads for the Standard JLX

⚠ 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, damage the airbag or potentially dislodge the equipment, causing serious injury to you or others.

1. Route the control cable into the vehicle and under the dash, near the eventual location of the installer-supplied control head. Apply sealant to all drilled holes.
2. For proper lightbar operation, the control cable must be properly terminated inside the installer-supplied control head. The current capacities of the switch for the control head should be at least 15 A. See *Table 3.1* on page 14 for the wire colors and functions.

⚠ WARNING

PROPER GROUNDING

The lightbar WILL NOT light up or flash if it is improperly grounded. Be sure that the lightbar is connected to a good vehicle ground.

Failure to observe this warning can lead to equipment failure and may result in serious injury or death to you or others.

3. Connect the black 10 AWG ground lead to a good battery or chassis ground.

⚠ WARNING

SPARK HAZARD

If wires are shorted to the vehicle frame or each other, high current conductors can cause hazardous sparks resulting in electrical fires and molten metal.

Verify that no short circuits exist before connecting to the positive (+) battery terminal.

⚠ WARNING**CURRENT CAPABILITY**

To provide safe operation of the lightbar, the power control switch and wiring must be capable of handling the rated current of the fuse at the source.

⚠ CAUTION**HIGH CURRENT ARCING**

Do not connect this system to the vehicle battery until **ALL** other electrical connections are completed, mounting of all components are complete, and you have verified that no shorts exist.

High current shorts can cause hazardous sparks or burning wire resulting in an electrical fire.

NOTICE**FUSE ELECTRICAL SOURCES**

Always fuse the 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 in the circuit.

Failure to follow this notice could result in vehicle or equipment damage.

4. Connect the red 10 AWG power lead from the lightbar to an installer-supplied switch or relay rated at 30 A.
5. Connect the other side of the fuse/circuit breaker to the +12 Vdc supply.

NOTE: The driver and passenger sides of the lightbar are individually and internally fused with a 15 A fuse located on the lightbar control board at F3 and F4. See "Replacing a Fuse" on page 31.

Control Wires For the Standard JLX Lightbar

All of the lightbar controls are integrated in the ROC PC board. Lightbars are manufactured with an 11-conductor control cable. See *Table 3.1* on page 14 for the functions of the control wires. You can activate any of the lightbar functions by applying 12 Vdc to the wire that controls the function.

Table 3.1: 11-conductor cable wires (12 AWG) (Standard J LX)

Wire Color	Function
Red*	PRIMARY MODE: +12 Vdc: Activates the lightbar in Primary Mode. For a description of Primary Mode, see "Selecting Flash Patterns for Primary and Secondary Mode" on page 15.
Black	GND (-): Connects to a good battery/chassis ground.
Gray	Takedown, traffic clearing light, worklight, or SignalMaster left directional lights.
Green	Front light cutoff, rear light cutoff, driver-side stop/turn/tail lights, steady burn, or SignalMaster center out directional lights.
Blue*	SECONDARY MODE: Applying +12 Vdc changes the pattern of the lightbar to the pattern selected for Secondary Mode. Only active if the lightbar is normally flashing in Primary Mode. For a description of Secondary Mode, see "Selecting Flash Patterns for Primary and Secondary Mode" on page 15.
Orange	PROGRAM for Primary Mode: Applying GND (-) advances the flash pattern to the next pattern in the library and stores it in memory. For a description of the flash patterns, see <i>Table 3.2</i> on page 18.
Yellow	WHITE LIGHT CUTOFF: Used only in lightbars that have white light in the front three positions. White lights flash with the rest of the lightbar when +12 Vdc is applied to the yellow wire. White lights are cut off when disconnected or power is removed. See "Wiring the Controls for White Light and Front/Rear Cutoff" in the next section. If the wire is not used for white light cutoff, other options are takedown lights, traffic clearing lights, or worklights.
Brown	Driver-side brake, turn, or alley lights.
Brown/White	Passenger-side brake, turn, alley light, or passenger-side traffic clearing light.
Black/White	Dim mode in Mode 2 only. Tail lights, takedown lights, traffic clearing lights, or worklights. See "Operating in Dim Mode on page 19.
Red/White	SignalMaster right directional lights, passenger-side stop/turn/tail lights, or both alleys simultaneously.

*The red and blue wires also serve as programming wires for Secondary Mode. See "Programming Secondary Mode" on page 16.

** The wire color for a function (with the exceptions of the red, blue, and orange wires) may vary depending on the configured options in the lightbar.

Wiring the Controls for White Light and Front/Rear Cutoff

The standard lightbar can be configured when ordered from the factory with options that turn off white lights or turn off the front or rear of the lightbar. The options are controlled by applying and removing power to the control wire of the function in the lightbar's cable.

White Light Cutoff

The option to cut off the standard lightbar's white lights is set at the factory with dip switches on the lightbar's control board. The cable's yellow wire controls White Light Cutoff. When +12 Vdc is applied to the wire, the white lights flash in the same flash pattern as the rest of the lightbar. When +12 Vdc is removed from the wire, the white lights turn off. If white light cutoff is not needed, fold and insulate the wire.

Front or Rear Light Cutoff

The lightbar may be equipped to shut off the front of the lightbar or the rear of the lightbar, while the rest of the lightbar is still flashing. The option is controlled by the green wire in the lightbar control cable. When +12 Vdc is applied to the wire, the lights flash. When +12 Vdc is removed from the wire, the lights shut off. If front or rear light cutoff is not needed, fold and insulate the wire.

Selecting Flash Patterns for Primary and Secondary Mode

Although the standard JetSolaris is shipped with preselected flash patterns for Primary and Secondary Mode, you can select new patterns from the lightbar internal library of 40 flash patterns. A pattern displayed in Primary Mode is typically more active than the pattern displayed in Secondary Mode. It indicates the primary purpose of the vehicle; for example, the vehicle is on its way to the scene of an emergency or is towing a car. A pattern displayed in Secondary Mode is a more relaxed pattern, indicating that the vehicle is returning from the scene.

The default pattern in Primary Mode is Pattern 1, Alternating Quad Flash 76 QFPM. In Secondary Mode, it is Pattern 2, Overlapping Penta Flash 87 FPM. *Table 3.2* on page 18 lists the flash patterns in the lightbar pattern library. We recommended that you select flash patterns for both Primary and Secondary Mode during the installation of the lightbar. There are two methods of selecting a flash pattern for Primary and Secondary Mode. One method enables you to directly apply ground or 12 Vdc power to wires in the lightbar control cable. This method is best suited for a lightbar not yet connected to a control head. The other method enables you to press a mode button on the control head and select a pattern using a programming button inside the lightbar. The two methods are described in the next sections: programming via a control wire or the S1 pushbutton. For descriptions of the control wires, see *Table 3.1* on page 14.

NOTE: To return to the default flash pattern while programming Primary or Secondary Mode using the control wire method, apply GND (–) to the orange wire for 5 seconds.

Programming Primary Mode

To select a flash pattern for Primary Mode.

1. Apply +12 Vdc to the Primary (red) wire in the lightbar cable.
2. Apply GND (–) to the orange wire in the lightbar cable.

⚠ WARNING

LIGHT HAZARDS

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.

3. When the pattern changes, disconnect the orange wire for a few seconds and observe the pattern. To display the next pattern in the library, apply and remove GND (–) to the orange wire.
4. To select the pattern, allow it to run for at least 15 seconds to set it in memory.

Programming Secondary Mode

To select a flash pattern for Secondary Mode:

1. Apply +12 Vdc to both the Primary (red) and Secondary (blue) Mode wires to turn on the lightbar in Secondary Mode.
2. Apply GND (–) to the orange wire in the lightbar cable.

⚠ WARNING

LIGHT HAZARDS

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.

3. When the pattern changes, disconnect the orange wire for a few seconds and observe the pattern. To display the next pattern in the library, apply and remove GND (–) to the orange wire.
4. To select a pattern, allow it to run for at least 15 seconds to save it in memory.

Programming with the PROGRAM Pushbutton

The S1 PROGRAM pushbutton is on the underside of the passenger-side end PCB directly below the label "PROGRAM" silkscreened on the top of the board (*Figure 3.2* on page 17). *Table 3.2* on page 18 lists the flash patterns in the lightbar's library

NOTICE

STATIC-SENSITIVE DEVICE

This product's circuitry can be damaged by electrostatic discharge (ESD). Follow anti-static procedures while installing this product.

NOTE: To return to the default flash pattern while programming Primary or Secondary Mode using the pushbutton method, apply GND (–) to the orange wire for 5 seconds.

1. Use a large flat-head screwdriver to remove the two 1/4-20 screws that secure the passenger side end dome to the aluminum extrusion (*Figure 3.1*) and remove the nameplate.



Figure 3.1: Location (circles) of screws securing end dome

2. Slide the end dome off the aluminum extrusion.
3. Choose a mode to program:

To select a pattern for in Primary Mode, apply +12 Vdc to the Primary (red) wire in the lightbar cable.

To select a pattern for Secondary Mode, apply +12 Vdc to both the Primary (red) and Secondary (blue) Mode wires in the lightbar cable.

⚠ WARNING

LIGHT HAZARDS

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.

4. Press the S1 PROGRAM button on the underside of the passenger-side end PCB (*Figure 3.2*). The lightbar turns off momentarily and flashes the next pattern. When the pattern changes, observe the pattern.

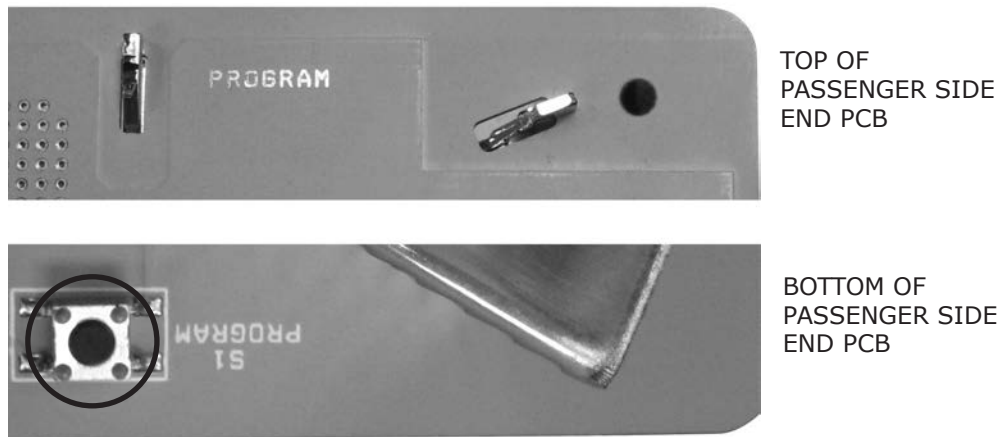


Figure 3.2: Location (circle) of S1 PROGRAM button

5. To see the next pattern in the library, press the PROGRAM button until the lightbar again changes patterns.
6. To select a pattern, allow it to run for at least 15 seconds to save it in memory.

Table 3.2: Lightbar Flash Patterns for Standard JLX ROC Lightbars

Pattern	Description
Pattern 1*	175 Alternating Single
Pattern 2*	Overlapping Penta Flash—87 FPM
Pattern 3*	Overlapping Alternating—95 FPM
Pattern 4*	Alternate Quad Flash—76 QFPM
Pattern 5*	Simultaneous/Overlapping Triple/Nine
Pattern 6	Alternating Single
Pattern 7	640 FPM Overlapping With Overlap 5/2
Pattern 8	2 at 60 FPM 4 Pulse Alternating, then 2 at 60 FPM 2 Pulse Simultaneous
Pattern 9	Driver-Side End Rear Alt with Passenger-Side End Rear—120 Single FPM
Pattern 10	Driver Side End Rear Alt with Passenger Side End Rear—90 Single FPM
Pattern 11	Driver-Side End Rear Alt with Passenger-Side End Rear Alternate with Center Rear—80 Double FPM
Pattern 12	Driver-Side/ Passenger-Side Center Rear Alternate with Center Rear/Driver and Passenger Ends—80 Double FPM
Pattern 13	Lightheads Oscillate In/Out
Pattern 14	Driver and Passenger Front Ends Alt with Center Front
Pattern 15	Driver and Passenger Front Ends Alt with Center Front Followed by Center Front Alt with Driver and Passenger Front Ends—80 Double FPM
Pattern 16	Wraparound Inside to Outside
Pattern 17	Wraparound Inside to Outside to Inside Followed by Wig/Wag Alt Flash
Pattern 18	Wig/Wag Driver-Side Front Alt with Passenger Side Front
Pattern 19	In Tow Mode Pattern 1—Mode 2, Pattern 1
Pattern 20	In-Tow Mode Pattern 2—Mode 2, Pattern 2
Pattern 21	In-Tow Mode Pattern 3—Mode 2, Pattern 3
Pattern 22	Flash—Mode 2, Pattern 4
Pattern 23	Quad—Wraparound In-Out—Full Quad
Pattern 24	Wraparound In-Out—40 mS Per Lighthead
Pattern 25	Wig/Wag Driver-Side Front Alt with Passenger Side Front Followed by Alt Flash
Pattern 26	Quad Flash
Pattern 27	Wraparound Inside to Outside to Inside Followed by Wig/Wag Alt Flash Followed by Full Quad Flash
Pattern 28	Wraparound Inside to Outside to Inside Followed by a Quad Flash
Pattern 29	Double Flash of Pairs Followed by a Quad Flash of Pairs and End Caps
Pattern 30	Quadrant Flash Followed by Wraparound Inside to Outside Followed by a Triple Full Flash
Pattern 31	Increasing-Rate Alt Flash Followed by a Triple Full Flash
Pattern 32	Alternate Triple Flash of Entire Lightbar
Pattern 33	Double Flash Driver and Passenger Front with Driver and Passenger Rear
Pattern 34	Double Flash Driver and Passenger Front with Driver and Passenger Rear Followed by Wraparound Inside to Outside

continued on next page

Table 3.2: Lightbar Flash Patterns for Standard JLX ROC Lightbars (continued)

Pattern 35	Double Flash Driver and Passenger Front Wraparound In-Out Followed by Double Flash of Driver and Passenger Rear Wraparound Out-In
Pattern 36	Wraparound In-Out, Alt Double Flash, Wraparound Out-In, Full Quad Flash
Pattern 37	Full Quad Flash, Wraparound Out-In, Alt Double Flash, Wraparound In-Out
Pattern 38	Alternate Triple Flash Entire Lightbar Twice, Wraparound In-Out, Alt Double Flash, Wraparound In-Out
Pattern 39*	Alternating 90 FPM
Pattern 40	Test Pattern—Rotate Entire Lightbar 750 mS Per Head

* Denotes that the pattern is SAE compliant.

Operating in Dim Mode

Dim Mode, which dims the flashing lights, is available in Mode 2.

To enable Dim Mode:

1. To enter Mode 2, apply +12 Vdc to both the Primary (red) and Secondary (blue) Mode wires.
2. Apply +12 Vdc to the Dim Mode wire (black/white). All of the flashing lights are now flashing at a lower intensity.

The lights will continue to flash in Dim Mode only if the lightbar is operating in Secondary Mode and the Dim wire has +12 Vdc applied to it. If the Secondary Mode (blue) wire is disconnected, the lightbar will go back to Primary Mode in which dimming not allowed. If the Dim wire (black/white) wire is disconnected, the lightbar will flash without dimming.

Chapter 4: Installing the SignalMaster (Option)

The SignalMaster option includes a control head with a cable that has five 22 AWG leads and one 18 AWG jumper wire. If additional wire length is need, splice wire of the same gauge or heavier to the leads.

Assembling and Mounting the Control Head

⚠ 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, damage the airbag or potentially dislodge the equipment, causing serious injury to you or others.

To assemble the control head:

1. Assemble the control head as shown in *Figure 4.1*. The switches must be installed as shown for the control head to operate properly. Two installer-supplied sheet-metal screws are required for mounting the control head.

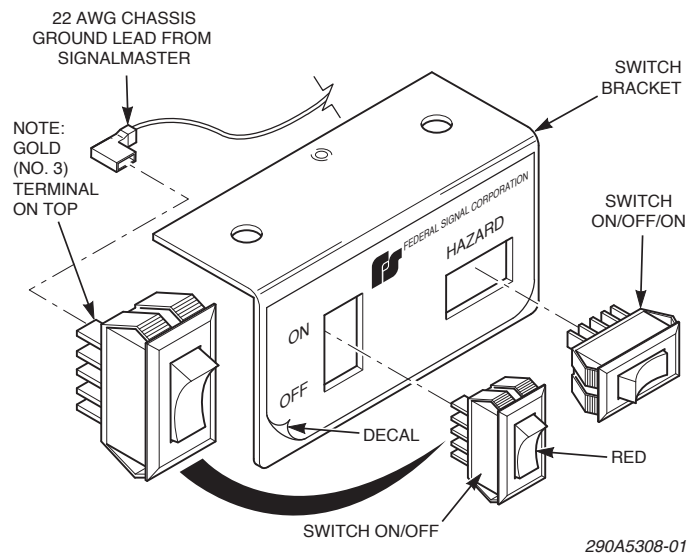


Figure 4.1: SignalMaster control head

NOTE: When selecting a mounting location for the control head, it is necessary to keep in mind the SignalMaster cable length. Plan wiring and cable routing before installation.

1. Select a mounting location for the control head that allows the vehicle and controls to be operated safely at all times.

2. Use the control head as a template and scribe two drill position marks at the selected mounting location.

NOTICE**DRILLING PRECAUTIONS**

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

3. Drill a hole at each drill-position mark.
4. Secure the control head to the mounting surface with two installer-supplied sheet metal screws.

Wiring the Control Head

⚠ WARNING**SPARK HAZARD**

If wires are shorted to the vehicle frame or each other, high current conductors can cause hazardous sparks resulting in electrical fires and molten metal.

Verify that no short circuits exist before connecting to the positive (+) battery terminal.

⚠ CAUTION**HIGH CURRENT ARCING**

Do not connect this system to the vehicle battery until all other electrical connections are completed, mounting of all components is complete, and you have verified that no shorts exist.

High-current shorts can cause hazardous sparks or burning wire resulting in an electrical fire.

To wire the control head:

1. Wrap the control cable's stripped wire ends with tape and route the cable to the control head mounting location.
2. Crimp the 1/4-inch FASTON terminals on the ends of the cable leads.
3. Connect the terminals on the switch as shown in *Figure 4.2* on page 22.
4. Ensure that there are no loose wire strands or other bare wires that may cause a short circuit. All wires must be protected from any sharp edges that could eventually cut through the insulation.

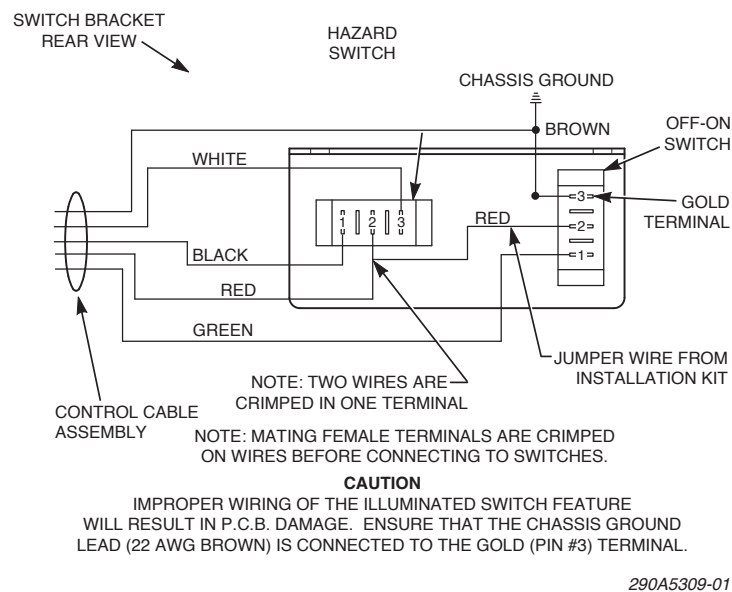


Figure 4.2: Connections for SignalMaster control head

Table 4.1: SignalMaster control cable wires

Color	Description
Red	+12 Vdc
Brown	Chassis
Green	Center Out directional pattern
White	Left arrow directional pattern
Black	Right arrow directional pattern
White/Green	Not used

Operating the Control Head

The control head has a power switch and a rocker switch that enables the operator to select SignalMaster patterns.

ON/OFF Switch

When the control head's power switch is in the ON position, the LED in the switch turns on. If the LED does not turn on, check the ground lead on the control head's mounting bracket properly grounded to the vehicle chassis.

Rocker Switch

The patterns the switch positions display override the turn signal/brake option.

LEFT position: Displays a left-arrow flashing pattern, directing traffic to proceed around the vehicle to the left.

CENTER position: The middle lights alternate with two outer lights on each side.

RIGHT position: Displays right-arrow flashing pattern, directing traffic to proceed around the vehicle to the right.

Chapter 5: Servicing the Lightbar

WARNING

QUALIFICATIONS

To properly service a lightbar, you must have a good understanding of automotive electrical procedures and systems along with proficiency in the installation and use of safety warning equipment.

Establishing a regular maintenance schedule for the LED JLX extends the life of the lightbar and ensures safety. Periodically check that the lightbar operates properly and that all mounting hardware is securely fastened to the vehicle. Also, inspect the domes and reflectors for cracks, crazing (hairline cracks), discoloration, and other defects.

This chapter has information for replacing components such as lamps, printed circuit boards (PCBs) and fuses. For service, support, or replacement parts, contact the Federal Signal Service Department at 1-800-433-9132, 7 AM to 5 PM, Monday through Friday (CT).

Cleaning the Plastic Domes

WARNING

CRAZING/CHEMICALS

Crazing (cracking) of domes will cause reduced effectiveness of the light. Do not use cleaning agents (which will cause crazing) such as strong detergents, solvents, or petroleum products. If crazing of domes does occur, the reliability of light for emergency signaling purposes may be reduced until domes are replaced.

Failure to follow this warning can damage the domes and may result in bodily injury or death to you or others.

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

The most effective product you can use for cleaning, protecting, and polishing clear and colored plastics is Plexus® Plastic Cleaner, Protectant & Polish. Over time, exposure to heat, sunlight, and smog causes plastic to fade, discolor, scratch, or become brittle. Plexus seals the pores of the plastic, making the plastic easier to clean, improving scratch resistance, and increasing product longevity.

Cleaning the Reflectors

1. Use a large flat-head screwdriver to remove the two 1/4-20 screws that secure the end dome to the aluminum extrusion (*Figure 3.1* on page 16) and remove the nameplate.
2. Slide the end dome off the aluminum extrusion along with any additional domes to access the PCB containing the reflectors.
3. Use a soft tissue to clean the reflectors. Avoid heavy pressure and the use of caustic or petroleum base solvents, which will scratch or dull the surface.

Replacing the Halogen Lamps

⚠ WARNING

CAREFULLY HANDLE THE HALOGEN LAMP

Halogen lamps get hot enough to burn you. Always allow these devices to cool before handling them. Halogen lamps are also pressurized and if broken can result in flying glass. Always wear gloves and eye protection when handling these devices.

Failure to follow this caution may result in personal injury.

⚠ WARNING

LAMP WATTAGE

This device is designed to use a halogen lamp of 50 watts only. Use of a lamp of more than 50 watts can result in damage to the lens, property damage, or injury to you or others.

⚠ CAUTION

HANDLE STROBE AND HALOGEN LAMPS CAREFULLY

Strobe and halogen lamps get hot enough to burn you. Always allow the lamps to cool before handling these devices. Halogen and strobe lamps are also pressurized and if broken can result in flying glass. Always wear gloves and eye protection when handling these devices.

Failure to follow this caution may result in personal injury.

NOTICE

DO NOT TOUCH LAMPS WITH BARE HANDS

Oil deposits on the glass portion of a halogen lamp can cause the glass to fracture during use. If you are unsure whether the glass portion has been handled without gloves, clean the glass using a soft cloth and isopropyl alcohol before installing the lamp.

NOTICE

DO NOT OVERTIGHTEN SCREWS/NUTS

To avoid damage to the lightbar, do not overtighten the screws and nuts.

NOTICE**STATIC SENSITIVE DEVICE**

The PCBs can be damaged by an electrostatic discharge (ESD). Follow anti-static procedures while servicing the PCB.

Replacing the Worklight and Takedown Halogen Lamps

Depending on your lightbar configuration, the lightbar may be equipped with either type of lamp shown in *Figure 5.1* below.

1. Disconnect power to the lightbar.
2. Use a large flat-head screwdriver to remove the two 1/4-20 screws that secure the end dome to the aluminum extrusion (*Figure 3.1* on page 16) and remove the nameplate.
3. Slide the end dome off the aluminum extrusion along with any additional domes to access the PCB containing the lamp.
4. Replace the lamp:
 - If the lamp is P/N 810A119 (*Figure 5.1*, left): Twist the lamp counterclockwise to unlock it, then pull it out of the socket. Insert a lamp that is an exact replacement and gently twist it clockwise into the socket until it locks.
 - If the lamp is P/N 8107169 (*Figure 5.1*, right), pull it straight out of the socket. Align the two pins of the new lamp with the pin holes in the socket and gently push the lamp into the socket until the lamp is properly seated.
5. Reinstall the domes and secure the end dome and nameplate with the two 1/4-20 screws.
6. Reconnect power to the lightbar.

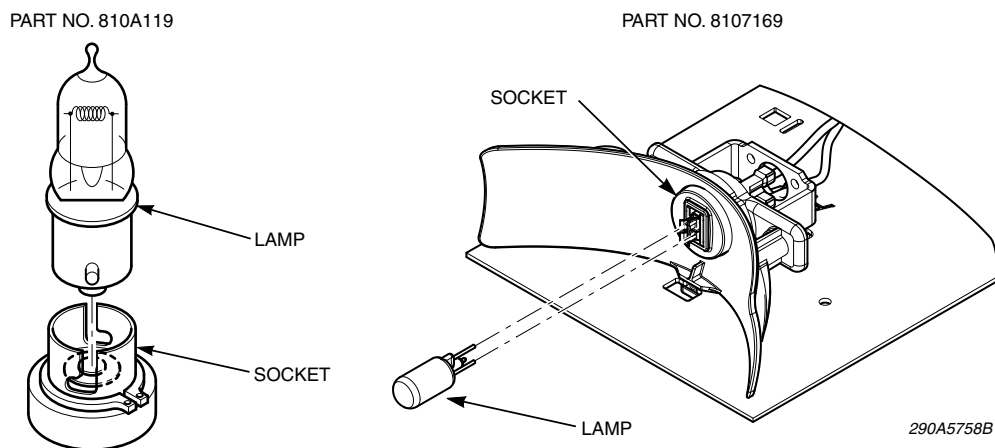


Figure 5.1: Halogen worklight and takedown replacement types

Replacing the Alley Lamps

1. Disconnect power to the lightbar.
2. Access the PCB containing the alley lamp:
 - a. Use a large flat-head screwdriver to remove the two 1/4-20 screws that secure the end dome to the aluminum extrusion and remove the nameplate (*Figure 3.1* on page 16).
 - b. Slide the end dome off the aluminum extrusion.
 - c. Use a 1/4" nut driver to remove the eight hex head screws that secure the lamp PCB to the bracket and turn the PCB over.
 - d. Use a 1/16" hex key to remove the lamp's retaining screws and clamps (*Figure 5.2* below).
3. Replace the lamp:
 - a. Slide the lamp and socket from the housing just far enough to grasp the socket. You may need to unplug the connector to gain adequate slack in leads.
 - b. Hold the socket firmly and unplug lamp.
 - c. Insert a new lamp and reinstall the clamps and retaining screws. Do not overtighten screws.
4. Turn the PCB over and secure it to the bracket with the eight 1/4" screws.
5. Secure the end dome and nameplate with the two 1/4-20 screws.
6. Reconnect power to the lightbar.

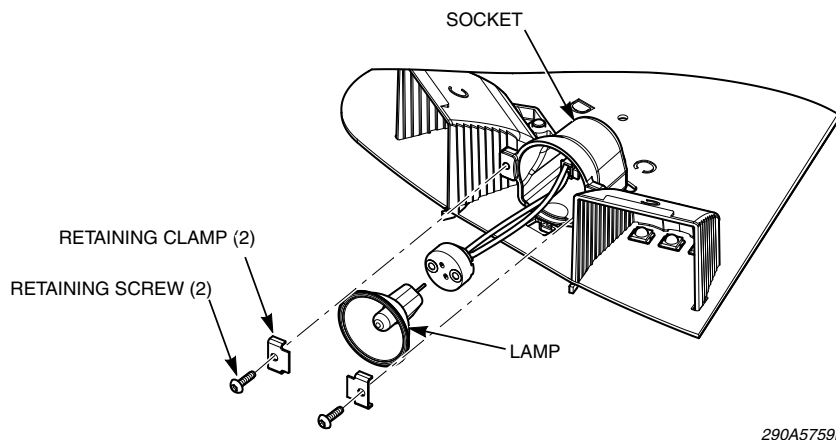


Figure 5.2: Alley lamp replacement PN 8107241

Aiming the Halogen Lamps

You can adjust the aim of the halogen lamps horizontally ± 8 degrees and vertically ± 2 degrees/ ± 5 degrees.

NOTICE

STATIC SENSITIVE DEVICE

The PCBs can be damaged by an electrostatic discharge (ESD). Follow anti-static procedures while servicing the PCB.

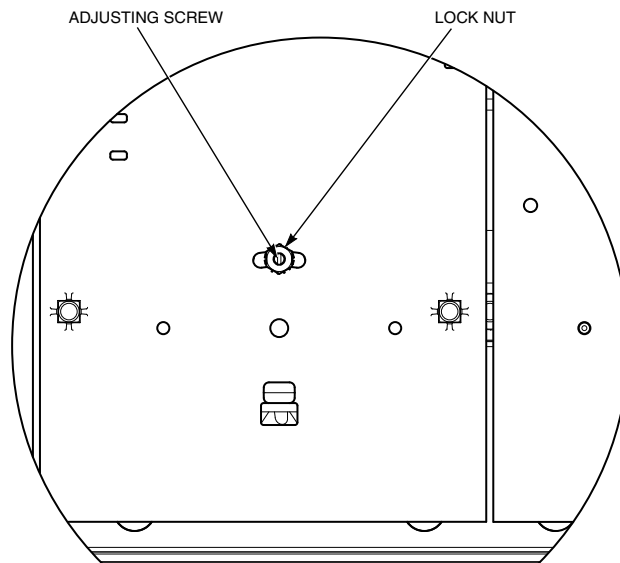
1. Disconnect power to the lightbar.
2. Remove the appropriate end dome.

NOTICE

DO NOT OVERTIGHTEN SCREWS/NUTS

To avoid damage to the lightbar, do not overtighten the screws and nuts.

3. Adjust the horizontal or vertical aim of the lamp (*Figure 5.3* below):
 - a. Horizontal adjustment: Loosen the lock nut with a $3/8$ " wrench while holding the adjusting screw with a small screwdriver. Aim the lamp, then carefully tighten the locknut with the wrench while holding the adjusting screw with screwdriver.
 - b. Vertical adjustment: Loosen the lock nut with a $3/8$ " wrench while holding the adjusting screw with a small screwdriver. Turn the screw clockwise to lower the aim or counter-clockwise to raise the aim. Carefully tighten locknut with wrench while holding adjusting screw with screwdriver.



290A5760B

Figure 5.3: Adjustment screw for aiming the halogen lamp

Replacing an End Board

If the LEDs and halogen lamps on the end board do not light, the fuse at F3 or F3 on the control board is intact, and you have replaced the lamps, the problem may lie with the end board or the control board. For additional information, see "Replacing the Halogen Lamps" on page 24, "Replacing the Control Board" on page 29, and "Replacing a Fuse" on page 31.

Removing an End Board

1. Disconnect power to the lightbar.
2. Use a flat-head screwdriver to remove the two 1/4-20 screws that secure the passenger side end dome to the aluminum extrusion and remove the nameplate (*Figure 3.1* on page 16).
3. Slide the end dome off the aluminum extrusion.

NOTICE

STATIC SENSITIVE DEVICE

The PCBs can be damaged by an electrostatic discharge (ESD). Follow anti-static procedures while servicing the PCB.

4. Use a 1/4" nut driver to remove the eight hex-head screws securing the end board to the end bracket.
5. Turn the endboard over, noting the placement of the ground lead on the aluminum extrusion.

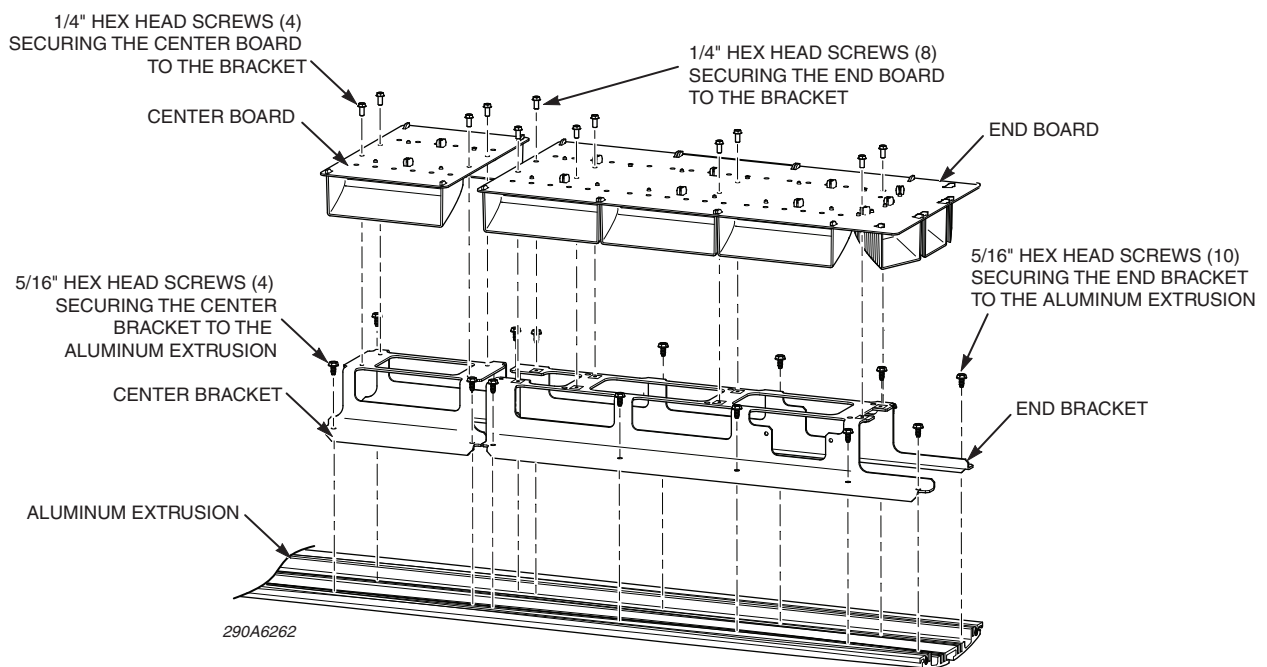


Figure 5.4: Center board and end board exploded view

6. Use a 5/16" nut driver to remove the nut securing the ground connection to the aluminum extrusion. Remove the ring terminal from the ground stud.
7. Remove the #8-32 Phillips screw securing the ground wire (GND) to the end PCB and remove the wire from the board.
8. Cut any wire ties that group the wire connections to the end board.

NOTE: The colors of the wires connected to the end board are silk screened next to their connectors.

9. Disconnect wires and harnesses from the end board and remove it from the lightbar.

Installing an End Board

1. Reconnect the wires and harness to the end board and secure them with plastic ties.
2. Reconnect the black ground wire (GND) to the end board with the #8-32 Phillips screw.

NOTICE

DO NOT OVERTIGHTEN SCREWS/NUTS

To avoid damage to the lightbar, do not overtighten the screws and nuts.

3. Reconnect the ground wire to the aluminum extrusion with the 5/16" nut.
4. Secure the end board to the end bracket with the eight 1/4" hex-head screws.
5. Slide the end dome onto the aluminum extrusion.
6. Secure the nameplate and end dome with the two 1/4-20 screws.

Replacing the Control Board

The control board generates and receives the signals that control the lightbar's flash patterns. If the lightbar fails, the problem may lie with the board. The board is underneath the passenger-side end PCB. The board also has two 15 A fuses that protect the lightbar. To replace them, see "Replacing a Fuse" on page 31.

NOTICE

STATIC SENSITIVE DEVICE

The PCBs can be damaged by an electrostatic discharge (ESD). Follow anti-static procedures while servicing the PCB.

Removing the Control Board

1. Disconnect power to the lightbar.
2. Remove the end dome and end board from the passenger side of the lightbar as described in "Removing an End board" on page 28.
3. Use a 5/16" nut driver to remove the ten hex-head screws securing the end bracket to the aluminum extrusion (*Figure 5.4* on page 28).

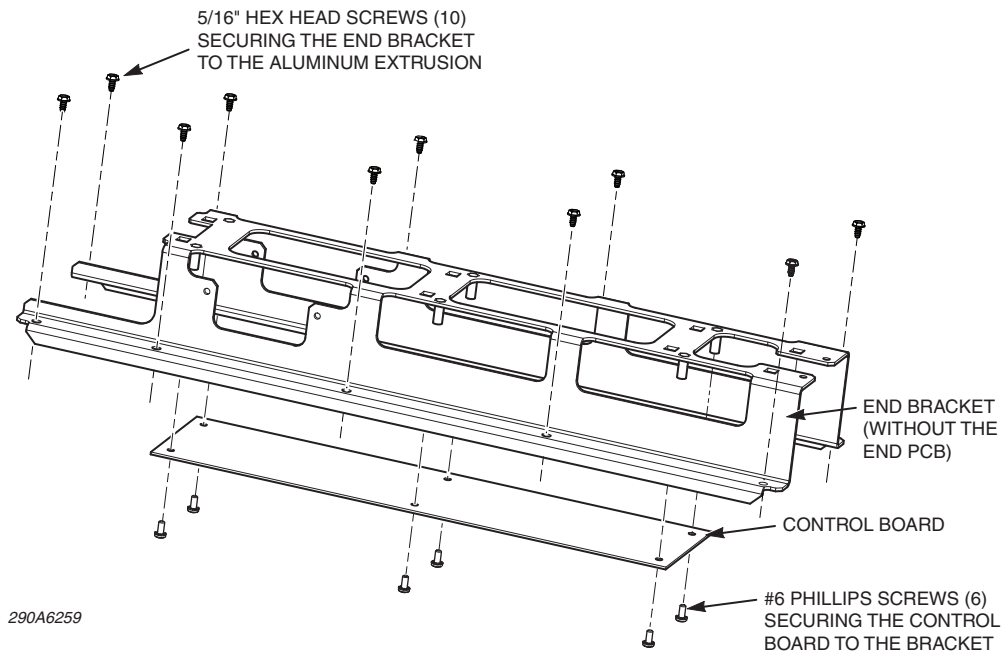


Figure 5.5: Control board removed from bracket

4. Turn the bracket over to expose the control board.
5. Remove the #8-32 Phillips screw securing the black ground wire (GND) to the control board and remove the wire from the board.

NOTE: The colors of the wires connected to the control board are silk screened next to their connectors.
6. Disconnect wires and harnesses from the control board and remove it from the lightbar.
7. Remove the six #6 Phillips screws securing the control board to the end bracket.
8. Remove the control board from the end bracket.

Installing the Control Board

NOTICE

DO NOT OVERTIGHTEN SCREWS/NUTS

To avoid damage to the lightbar, do not overtighten the screws and nuts.

1. Secure the control board to the end bracket with the six #6 Phillips screws.
2. Reattach the black ground wire (GND) to the control board with the #8-32 Phillips screw.

NOTE: The colors of the wires connected to the control board are silk screened next to their connectors.

3. Reconnect the wires and harnesses to the control board and secure them with wires ties.

4. Secure the end bracket to the aluminum extrusion with the ten 5/16" screws.
5. Install the end PCB and end dome as described in "Installing an End Board" on page 29.
6. Reconnect power to the lightbar.

Replacing a Fuse

The control board, which is beneath the passenger-side PCB, has two 15 A automotive mini-blade fuses to protect the lightbar. The fuse in position F3 is for the passenger side of the lightbar and the fuse at F4 is for the driver side, if available in your model, and the driver side of the lightbar. Before replacing a fuse, investigate the cause of the circuit failure.

NOTICE

STATIC SENSITIVE DEVICE

The PCBs can be damaged by an electrostatic discharge (ESD). Follow anti-static procedures while servicing the PCB.

1. Disconnect power to the lightbar.
2. Use a flat-head screwdriver to remove the two 1/4-20 screws that secure the passenger side end dome to the aluminum extrusion and remove the nameplate (*Figure 3.1* on page 16).
3. Slide the dome off the aluminum extrusion.
4. Use a 5/16" nutdriver to remove the ten hex-head screws securing the end bracket to the aluminum extrusion.
5. Turn the bracket over to expose the control board.
6. Use needle-nose pliers to pull the fuse straight out off the board.
7. Insert a new fuse of the same type and amperage into the slots and ensure that it is properly seated.

NOTICE

DO NOT OVERTIGHTEN SCREWS/NUTS

To avoid damage to the lightbar, do not overtighten the screws and nuts.

8. Secure the end bracket to the aluminum extrusion with the ten 5/16" hex head screws.
9. Reinstall the dome.
10. Reconnect power to the lightbar.

Replacing a Center Board

The center board is approximately one third the size of an end board. The 54" JLX has one center board, the 60" JLX has three, and the 72" JLX has four. If the LEDs and halogen lamps on the center board do not light, the fuse at F3 or F3 on the control board is intact, and you have replaced the lamps, the problem may lie with the center board. For additional information, see "Replacing the Halogen Lamps" on page 25, "Replacing the Control Board" on page 31, and "Replacing a Fuse" on page 32.

NOTICE

STATIC SENSITIVE DEVICE

The PCBs can be damaged by an electrostatic discharge (ESD). Follow anti-static procedures while servicing the PCBs.

Removing a Center Board

1. Disconnect power to the lightbar.
2. Use a flat-head screwdriver to remove the two 1/4-20 screws that secure the passenger-side or driver-side end dome to the aluminum extrusion and remove the nameplate (*Figure 3.1* on page 14).
3. Slide the dome off the aluminum extrusion.
4. Slide domes off the lightbar to expose the appropriate center board.
5. Use a 1/4" hex wrench to remove the four hex-head screws securing the board to the end bracket.
6. Remove the #8-32 screw securing the ground wire (GND) to the center board and remove the wire from the board.

NOTE: The colors of the wires connected to the center board are silkscreened next to their connectors.

7. Disconnect wires and harnesses from the center board and remove it from the lightbar.

Installing a Center Board

1. Reconnect the wires and harness to the center board and secure them with plastic ties.

NOTICE

DO NOT OVERTIGHTEN SCREWS/NUTS

To avoid damage to the lightbar, do not overtighten the screws and nuts.

2. Secure the ground wire to the ground connection (GND) on the center board with the #8-32 Phillips screw.
3. Secure the center board to the bracket with the four 1/4" hex head screws.
4. Reinstall the domes.
5. Reconnect power to the lightbar.

Chapter 6: Ordering Parts and Service

Federal Signal Corporation will service your equipment or provide technical assistance with any problems that cannot be handled locally. 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
800-343-9706 (fax)
Email: empserviceinfo@fedsig.com

Ordering Replacement Parts

To order replacement parts, please contact your local dealer/distributor or:

Mobile Systems Customer Support
Federal Signal Corporation
Phone: 1-800-264-3578

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: # _____



2645 Federal Signal Drive, University Park, IL 60484-3167
Tel.: (800) 264-3578 • Fax: (800) 682-8022
www.fedsig.com