



CN SignalMaster™

Installation, Maintenance, and Service Manual

Limited Warranty

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

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



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Safety and Security Systems

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Safety Messages for Installers and Service Personnel

For your safety, read and understand this manual thoroughly before installing, operating, and servicing the CN SignalMaster™. The safety messages presented in this section and throughout the manual are reminders to exercise extreme care at all times. Read and understand the safety instructions to installers (doc. no. 256A692), and keep it close at hand for reference. To download copies of this manual, go to www.fedsig.com or call the Federal Signal Service Department at 1-800-433-9132, 7 a.m. to 5 p.m., Monday through Friday (CT).

⚠ 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. 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's 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 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 that the system works together and meets federal, state, and local standards or guidelines.

Electrical Hazards

- The lighting system components, especially light bulbs, strobe tubes, LEDs, and the outer housing, get hot during operation. Disconnect power to the system and allow the system to cool before handling any components.
- 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 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. Check the vehicle for proper operation after installation.
- 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.
- 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.
- When drilling into a vehicle structure, ensure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes. Ensure that the mounting screws do not cause electrical or mechanical damage to the vehicle.
- Refer to the manual packed with the lighting system for proper electrical connections, additional precautions, and information.

- Tighten adjustment bolts 10 ft-lb to 11 ft-lb to prevent the light bar 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 lenses will reduce the effectiveness of the lighting system. Avoid heavy pressure and use of caustic or petroleum-based products when cleaning the lighting system. Replace any optical components that may have been scratched or crazed during system installation.
- Do not attempt to activate or deactivate the light system control while driving in a hazardous situation.
- Frequently inspect the light system to ensure that it is operating properly and that it is securely attached to the vehicle.
- After installation and testing are complete, provide a copy of these instructions to instructional staff and all operating personnel.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.

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

RETAIN AND REFER TO THIS MESSAGE

Safety Messages for Operators of Warning Lights

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 deactivate the light system control while driving in a hazardous situation.
- Although your warning system is operating properly, it may not be completely effective. People may not see or heed your warning signal. You must recognize this fact and continue to drive cautiously.
- Situations may occur that obstruct your warning signal when natural and man-made objects are between your vehicle and others, such as raising your hood or trunk lid. If these situations occur, be especially careful.
- All effective sirens and horns produce loud sounds that may cause, in certain situations, permanent hearing loss. You and your passengers should consider taking appropriate safety precautions, such as wearing hearing protection.
- 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.
- 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, ensure that the entire warning light system and the siren system are securely attached and operating properly.

Failure to follow these precautions may result in property damage, serious injury, or death.

RETAIN AND REFER TO THIS MESSAGE

An Overview of the CN SignalMaster

The CN SignalMaster™ is a single-level LED light bar with ROC™ (Reliable On-Board Circuitry) and Solaris® LED technologies. ROC eliminates approximately 85 percent of potential failure points by incorporating a printed circuit board (PCB) in one assembly to substantially reduce the number of electrical connections. Solaris S2 LED modules use offset, complex reflector surfaces for accurate beam shaping and the highest optical efficiency. The CN SignalMaster is available in eight-head and four-head models for both front and rear. It is also available in a rear only, split eight-head model, with a 12-foot cable joining two four-head units (CNSM2X4R).

LED Lights, Colors, and Flash Patterns

The light bar's internal microprocessor supplies three priority operational modes and a library of 27 flash patterns. To increase the safety of officers, pedestrians, and motorists, the light bar has standard dimming and intersection warning. Multi-color heads are available with up to three different colored LEDs, eliminating the loss of primary warning colors in takedown and directional warning positions. Individual CN SignalMaster lightheads can flash between red, blue, amber, or white. The light bar operates at a nominal input of 13.6 Vdc (11 Vdc minimum) and an operating temperature range of –30°C to +65°C.

The functions of the SignalMaster are controlled through the CAT5 serial communication cable. The cable connects to either a compatible Federal Signal Serial control head or a Federal Signal Serial Interface Module (P/N 8583446). An internal PCB assembly within the light bar decodes the control data and performs the requested function. With the Serial Interface Module, the light bar can be activated by Federal Signal light bar controllers, SignalMaster controllers, and/or individual low-current switches.

The housing is an anodized aluminum extrusion. The light bar has 15-foot power and ground cables and a 25-foot serial cable. Universal mounting hardware is supplied; vehicle-specific mounting hardware is also available separately.

Installing the CN SignalMaster

After unpacking the CN SignalMaster™, inspect it for damage that may have occurred in transit. If it has been damaged, do not install it. 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. Ensure that the parts listed in Table 1 are included in the package. If you are missing any parts, contact Customer Support at 1-800-264-3578, 7 a.m. to 5 p.m., Monday through Friday (CT).

An installer-supplied control head is also required for controlling the functions of the light bar.

Table 1 Mounting kit contents

Qty.	Description	Part Number
2	Bracket, Mounting, SML	8652180
4	Screw, #10 Type B, Pan 6-Lobe, Blk SS	7011246-06
2	Nut, 1/4-20 Keps®, SS	7058050
1	Grommet, Split	228128

NOTE: The CNSM2X4R includes two mounting kits.

Mounting the CN SignalMaster

⚠ WARNING

LOCATING OPERATOR CONTROLS: *The controls for the light system must be located so that the VEHICLE and CONTROLS can be operated safely under all driving conditions.*

NOTICE

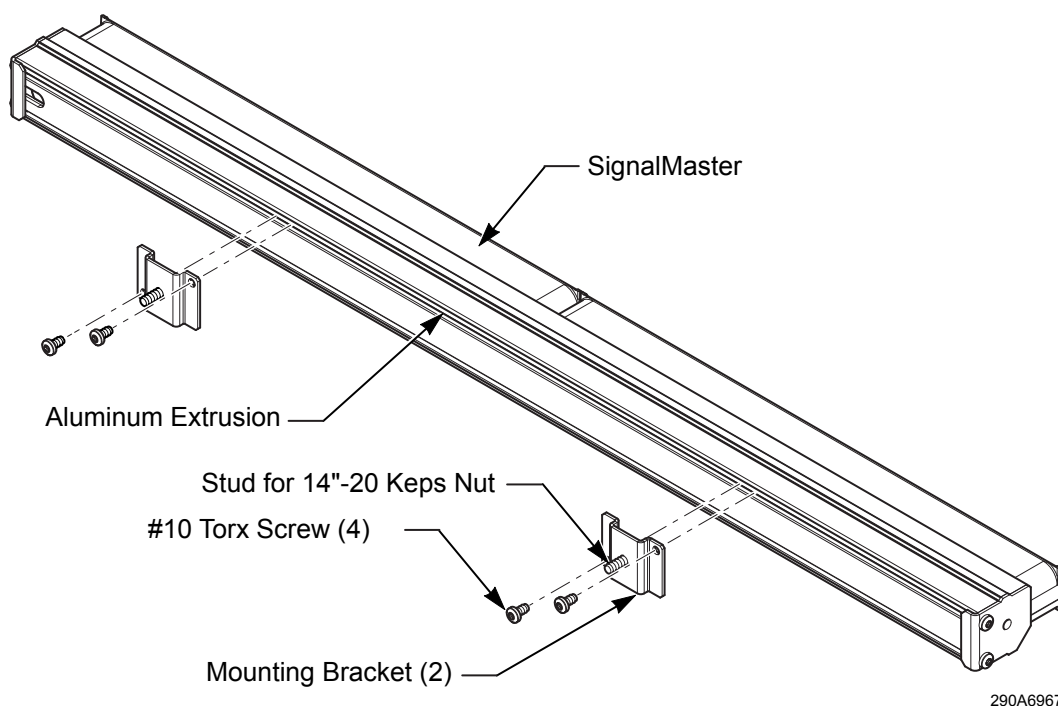
SIGNALMASTER ORIENTATION: *The CN SignalMaster light bar must be oriented correctly for proper operation. Install the assembly with the ROC board on top.*

IMPORTANT: Plan all cable routing before completing the installation. Plan the location of the wire routing hole so that the cables do not have tight bends. For Model CNSM2X4R, ensure that the board to board connection is in a dry interior location.

To mount the light bar:

1. Determine the appropriate spacing of the mounting holes for your application.
2. Install the mounting brackets to the CN SignalMaster with two #10 6-lobe screws per bracket. See Figure 1 on page 10.
3. Mark and drill two 17/64-inch holes for the mounting studs and a 3/4-inch hole for the cables.
4. Install the grommet, route the cables, and then secure the light bar with the 1/4"-20 Keps nuts. Leave slack in the cables behind the panel to ease the removal of the light bar.

Figure 1 Mounting brackets attached to CN SignalMaster



Wiring the CN SignalMaster in the Vehicle

NOTICE

INSTALLATION PRECAUTIONS: The warning system and/or two-way radio system may operate improperly if a two-way radio antenna is installed on or within 18 inches of the light bar. Before permanently installing the light bar or a two-way radio antenna, test the warning system and two-way radio system. Some installations may require the relocation of the two-way radio antenna to the trunk or fender. DO NOT drill holes in the light bar or install auxiliary devices on the light bar, or the warning system may fail.

Before proceeding, ensure that the light bar has been installed inside the vehicle in accordance with the instructions included with the mounting kit.

NOTE: The DIP switch on the light bar's control PCB provides three selectable options. To change DIP switch selections, refer to "Setting Configuration Options" on page 13.

The CN SignalMaster™ is completely wired at the factory and does not require any additional internal wiring. Two 16 AWG power conductors (red and black) and the CAT5 communication cable exit the light bar. The conductors necessary to control the light bar are contained in the CAT5 cable, which connects to a compatible Federal Signal control head or to the Serial Interface Module.

⚠ WARNING

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

⚠ WARNING

SEAT REMOVAL PRECAUTION: If a vehicle seat is temporarily removed, verify with the vehicle manufacturer if the seat needs to be recalibrated for proper airbag deployment.

NOTICE

REVERSE POLARITY/MISWIRING: Reverse polarity may damage the light bar. To avoid damage to the siren/amplifier, ensure that the battery voltage is the same voltage as the rating of the light and that the correct polarity is observed. The light bar must be fused at the source.

To wire the light bar in the vehicle:

1. Ensure that the lines are adequately fused. From the light bar, route the CAT5 control cable into the vehicle's cab or trunk near the planned location of a control head that is compatible with the light bar or Serial Interface Module.

NOTE: An input cable (24-pin harness) is provided with the Serial Interface Module. For connections, see document P/N 2562248.

2. Route and connect the 16 AWG black lead to the vehicle battery's ground (–NEG) terminal.
3. Route and connect the 16 AWG red lead through the user-supplied 15 A fuse at the source to the positive (+BAT) terminal.

Wiring the SignalMaster Function

The SignalMaster directional warning function is configured at the factory and does not require any additional wiring inside the light bar. All conductors necessary for control of the SignalMaster are through the compatible serial communication control head or the Serial Interface Module. For wiring and operation, refer to the instructions included with the control head or document P/N 2562248 included with the Serial Interface Module. The SignalMaster function is not available for front-facing models.

Wiring the Light Bar Controls

Both the Federal Signal serial control head and the Serial Interface Module provide the controls in Table 2 to the light bar. The table shows the corresponding control wires from the Serial Interface Module and their colors. The wire's first color is the predominant color and additional colors are stripes.

For programming options, see the instructions included with the Interface Module or the Federal Signal serial control head.

Table 2 CN SignalMaster controls and wires from the Serial Interface Module

Light Bar Controls	Wire Color	Description
Mode 1	Blue	Lowest priority
Mode 2	Blue/White	Overrides Mode 1
Mode 3	Black/Red	Overrides Modes 1 and 2
Steady Burn	Red/White	One (driver side) or two heads (driver and passenger side) burn steadily when 12 Vdc is applied to the control wire for Steady Burn. See “Setting Configuration Options” on page 13.
Front Cutoff*	Green/White	Turns OFF power to the Front CN SignalMaster.
Rear Enable*	Green/White	Turns ON power to the Rear CN SignalMaster. Not available for Front CN SignalMaster.
Flash Takedown	Red/Black	Flashes the Takedown lights in Modes 1, 2, and 3 with every flash pattern. To have the Takedown lights remain off and flash only when the Flash Takedown wire is activated, see “Setting Configuration Options” on page 13.
Left Alley	Green/Black	Not available for Front or Rear CN SignalMaster.
Right Alley	Orange/Red	Not available for Front or Rear CN SignalMaster.
Takedown	White/Black	Provides white light to the front. Overrides Flash Takedown 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.
Intersection (SW-2 Switch 3 in the up position) Scene Light, Left (SW-2 Switch 3 in the down position)	Blue/Black	Typically a high activity pattern. Overrides all three priority modes. Scene Light, Left is unavailable. Applying 12 Vdc to the Scene Light, Left wire turns on the left half of the CN SignalMaster. Intersection is unavailable.
Light bar Test Pattern (SW-2 Switch 3 in the up position) Scene Light, Right (SW-2 Switch 3 in the down position)	Black/White/Red	Flashes the LEDs sequentially and then flashes the takedown and alley lights. Scene Light, Right is unavailable. Applying 12 Vdc to the Scene Light, Right wire turns on right half of the light bar. Light bar Test Pattern is unavailable.

**See document P/N 2562248 for instructions on setting these options in the Serial Interface Module*

NOTE: If you are installing a Front and Rear CN SignalMaster on the same vehicle, you can use one interface box with a CAT5 splitter (P/N 1751531A).

Setting Configuration Options

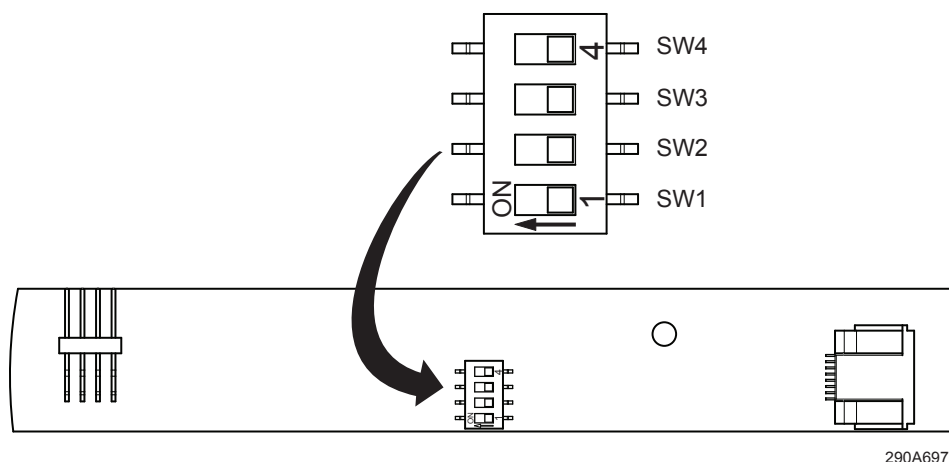
The CN SignalMaster has three configuration options that are selectable with DIP switches on the light bar's control board. Table 3 describes the options. See "Figure 2 DIP switches on the CN SignalMaster controller PCBA" on page 14 for the locations of DIP switches on the controller PCBA in the CN SignalMaster.

Table 3 CN SignalMaster DIP switch settings

DIP Switch Position	Description of Option
SW1	Sets an eight-head (OFF) or six-head (ON) CN SignalMaster with DIP Switch 3 OFF (REAR). With Switch 3 ON (Front), Switch 1 sets the lightheads that turn on when a Steady Burn input is applied. The default position for Switch 1 is OFF for driver side/passenger side Steady Burn (Positions 2, 6) of the Front CN SignalMaster. Turn Switch 1 to ON for driver-side only Steady Burn (Position 2).
SW2	DIP Switch 2 switches between light head colors. To get amber SignalMaster patterns in LED light head assemblies, including White/Amber, Blue/White/Amber, or Red/White/Amber, DIP Switch 2 must be ON. Otherwise, the light bar will flash color combinations that do not include amber.
SW3	Switch 3 has three functions: - Activating a front-mounted or rear-mounted CN SignalMaster - Performing an LED scan to ensure that an LED board flashes the correct colors after it is installed - Changing the Device ID to enable the CN SignalMaster to operate independently of the light bar (available with the SmartSiren Platinum Configuration Software) Choosing to Activate a Front- or Rear-Mounted CN SignalMaster To activate a front-mounted CN SignalMaster, set Switch 3 ON. To activate a rear-mounted CN SignalMaster, set Switch 3 OFF. Performing an LED Scan When an LED board is changed, an LED scan must be done to enable the LED board to flash the correct colors. To perform the scan: - Disconnect the red power (BAT+) wire to the CN SignalMaster and maintain power to the control head. - Change the position of DIP Switch 3 and turn power ON to the CN SignalMaster. The CN SignalMaster emits a short flash to indicate the LED scan is done. - To return DIP Switch 3 to its original function, repeat the scan. Changing the Device ID The default setting for the CN SignalMaster is to respond to light bar commands. For example, if the system includes a light bar and a CN SignalMaster, both devices perform the same functions. The SmartSiren programming software enables you to program the control head to send a set of commands dedicated only to the CN SignalMaster, making its operation independent of the light bar. To reset the control head to the default setting, perform an LED scan as described above.
SW4	Sets the ability to power the network cable for other devices. The default is OFF. DIP Switch 4 should be set only if the main power cables are turned on through an ignition-activated relay. If powering other devices, such as the Six-Button Serial Controller, set DIP Switch 4 to ON. For more information, see the instructions included with the network-powered device.

Figure 2 DIP switches on the CN SignalMaster controller PCBA

For the location of the controller PCB,
see Figure 4 on page 16 and Figure 5 on page 17.



Testing the Light Bar

⚠ WARNING

LIGHT HAZARD: *To be an effective warning device, an emergency warning system 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.*

⚠ WARNING

EXPLOSION HAZARD: *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.*

To check the light bar controls (see “Table 2 CN SignalMaster controls and wires from the Serial Interface Module” on page 12):

1. Connect the 16 AWG black lead from the light bar to the vehicle battery’s ground (–NEG) terminal and the 16 AWG red lead to the positive terminal.
2. Connect the black and black/white wires from the Serial Interface Module to the vehicle battery’s ground (–NEG) terminal
3. Apply 12 Vdc to a control wire and to the ignition wire from the Serial Interface Module.
4. After the installation, check the entire system to verify that the lights are flashing properly and all light system functions are operating properly.

Maintaining and Servicing the CN SignalMaster

This section has instructions for maintaining and servicing the CN SignalMaster, including replacing the light bar PCBs and reflectors. For additional service and support, call the Federal Signal Service Department at 800-433-9132, 7 am to 5 pm, Monday through Friday (Central Time). For a list of common replacement parts, see “Ordering Replacement Parts” on page 19.

Establishing a regular maintenance schedule for the CN SignalMaster extends its life and ensures safety. Periodically ensure that the light bar operates properly and that all mounting hardware is securely fastened to the vehicle. Inspect the reflectors for cracks, crazing (hairline cracks), discoloration, and other defects.

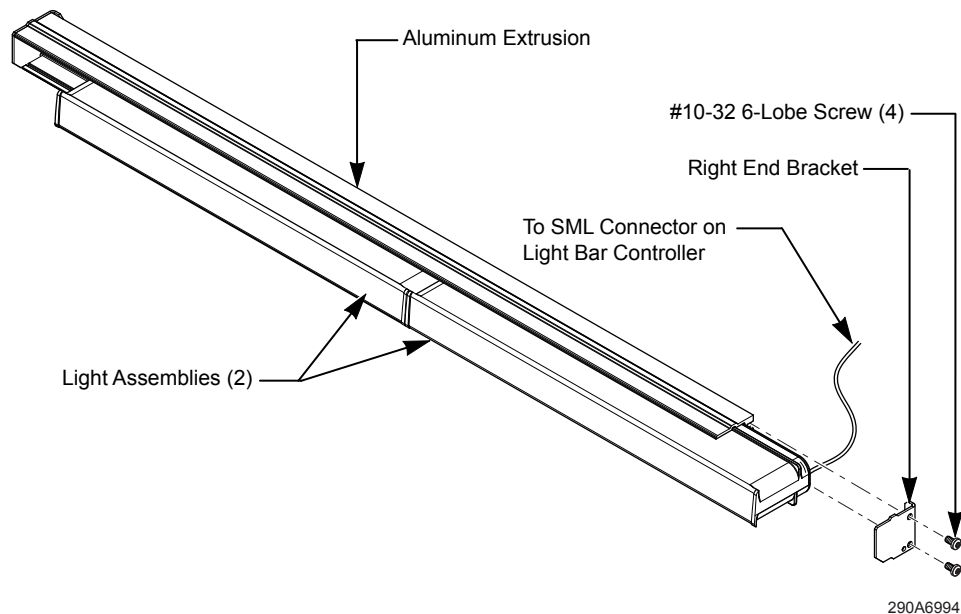
Replacing a PCB

Depending on the installation, it may be necessary to remove the CN SignalMaster from the vehicle

To remove the CN SignalMaster:

1. On the cable exit side, remove the two #10-32 6-lobe screws and the right-end bracket. Holding both light assemblies (the Model CNSM4 has one light assembly), slide them from the aluminum extrusion.

Figure 3 Exploded front view of Model CNSM8



2. Pull the cap(s), seal(s), and ROC board(s) from the lens.
3. Disconnect cables and remove the #6-32 Phillips screw to separate the PCBs.
4. Inspect the lip seal(s) to insure it is not torn, brittle, or damaged. Replace it if necessary. For replacement parts, refer to Table 4 on page page 19. Reassemble the light bar.

Figure 4 Exploded rear view of Model CNSM8

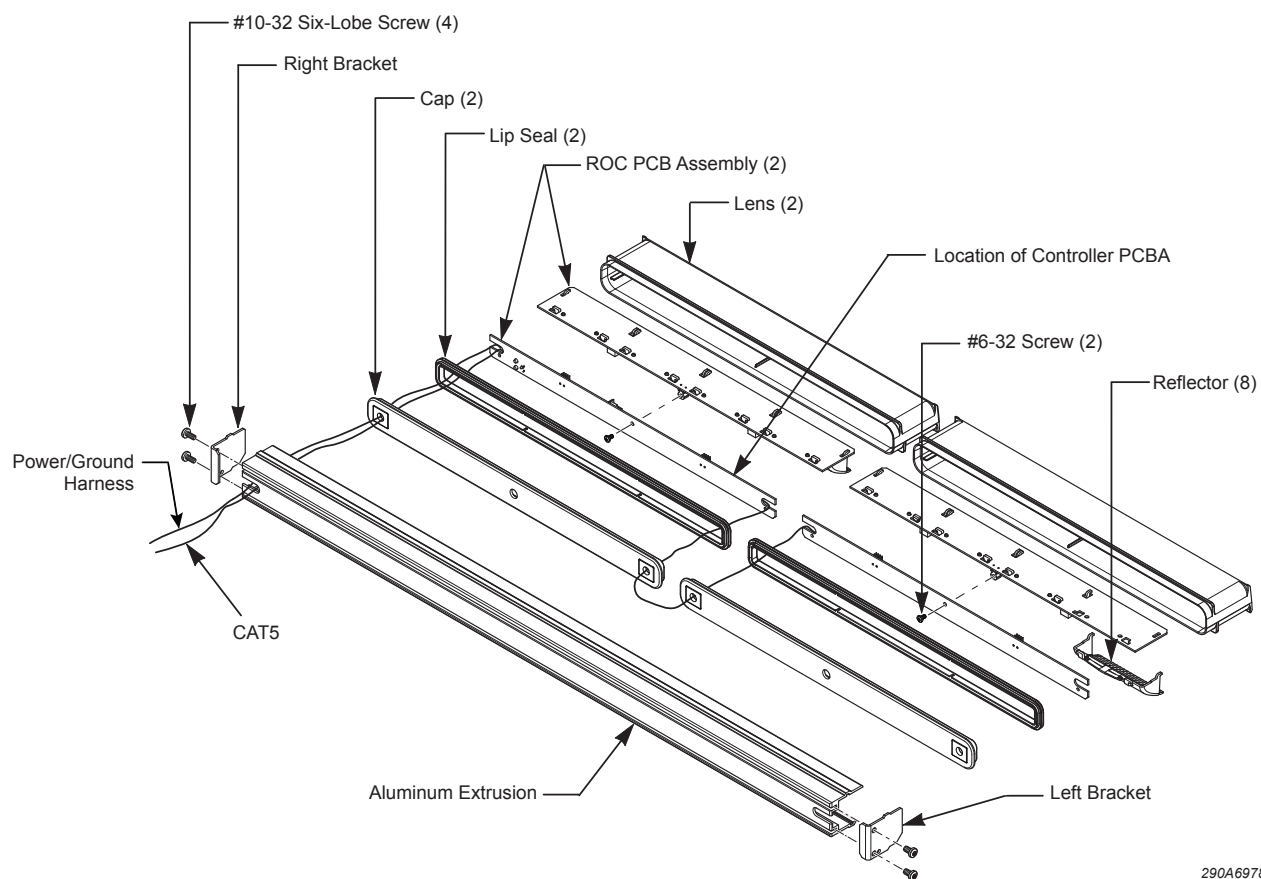


Figure 5 Exploded rear view of Model CNSM4

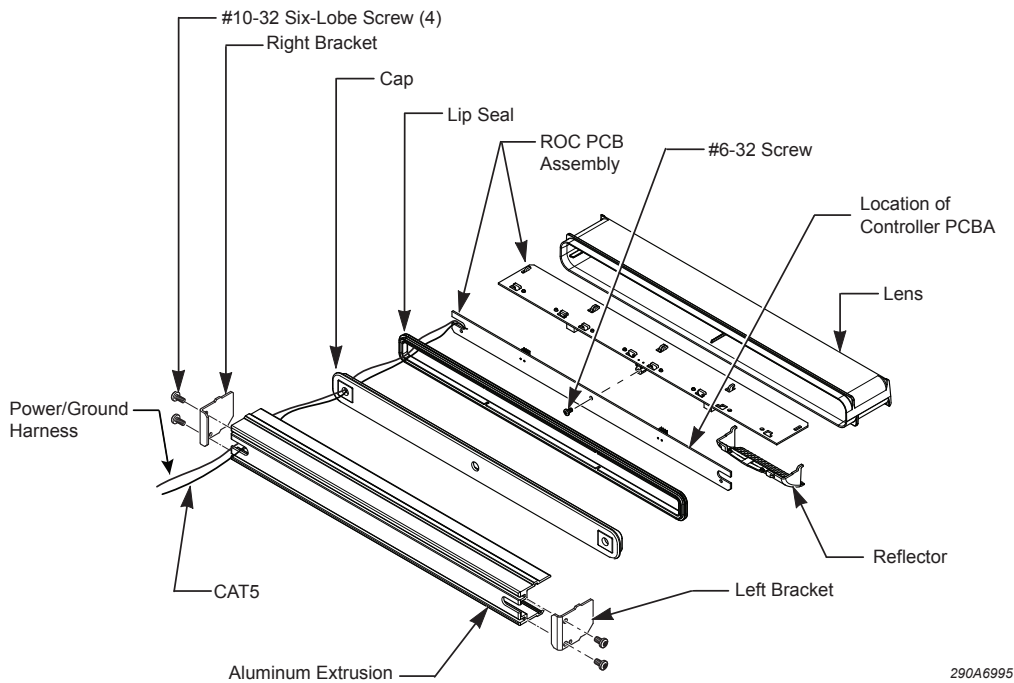
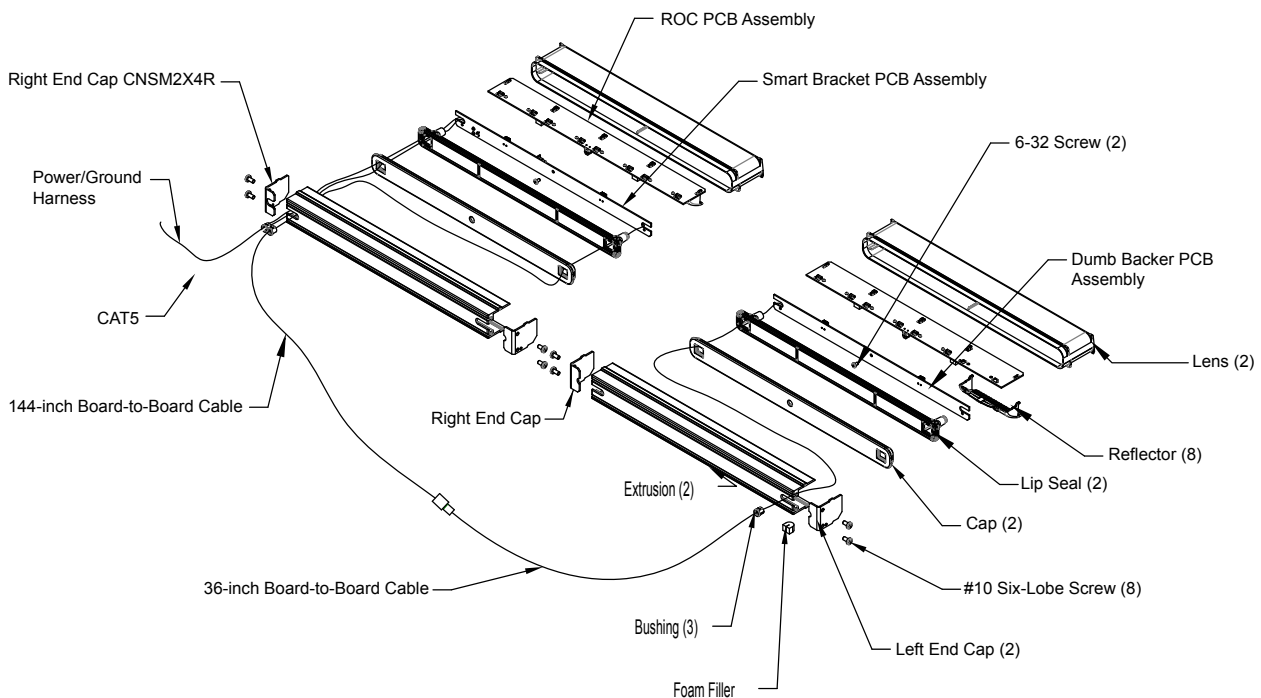


Figure 6 Exploded rear view of Model CNSM2X4R



Replacing a Reflector

⚠ WARNING

CRAZING HAZARD: *Crazed, cracked, or faded domes or reflectors reduce the light output and the effectiveness of the lighting system. Tops or reflectors showing this type of aging must be replaced. Failure to follow this warning may result in bodily injury or death to you or others.*

To replace a reflector:

1. To remove the PCB that holds the reflector, see “Replacing a PCB” on page 15.
2. Use a small Phillips screwdriver to press and release the two round tabs on the reflector from beneath the PCB. Slide the reflector toward the rear of the PCB (Figure 7).
3. Lift the rear of the reflector away from the PCB and remove it.
4. To install the new reflector, insert its front hooks into their slots on the PCB.
5. Bring the rear of the reflector down to insert its rear hooks through the PCB.
6. When the reflector rests on the PCB, make sure the rear hooks are fully inserted and slide the reflector forward until its tabs snap into place.

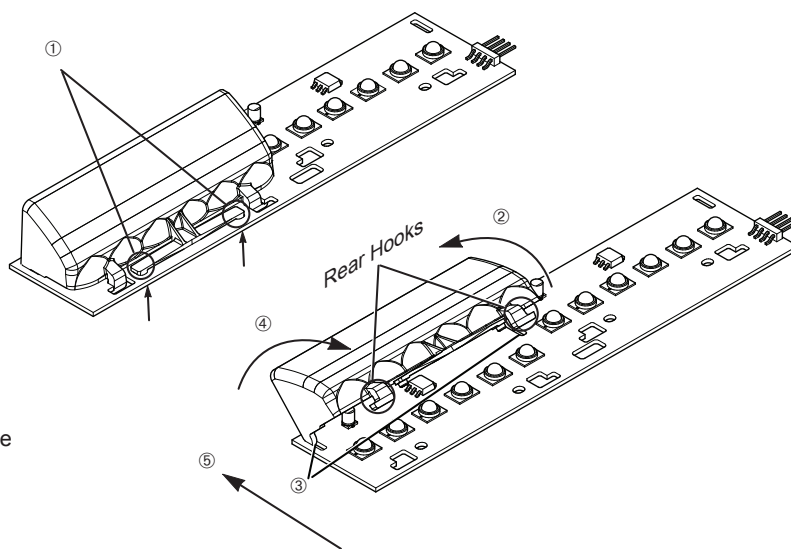
Figure 7 Removing a reflector

Removal:

- ① Press the round tabs from beneath the PCB and slide the reflector back.
- ② Lift the rear of the Reflector to remove it.

Installation:

- ③ Insert the front hooks in the PCB.
- ④ Bring the rear of the reflector down on the PCB and insert the rear hooks into the PCB.
- ⑤ Slide the reflector forward until it snaps into place.



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Getting Technical Support and Service

For technical support and service, please contact:

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

Getting Repair Service

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

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

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

Address all communications and shipments to the following:

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

Ordering Replacement Parts

This section contains a list of common and vehicle-specific replacement parts. To order replacement parts, call Customer Support at 1-800-264-3578, 7 a.m. to 5 p.m., Monday through Friday (CT) or contact your nearest distributor or local dealer.

Table 4 Common replacement parts

Description	Part Number
PCB Assembly	Contact Federal Signal
Cable Assembly, Power, 15 ft	1461816
Cable, Network, 25 ft	1751357-02
Lens	8652133
Seal	865200996



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