

CONVERGENCE
» network «



Model MB1 LED Message Board

Installation, Maintenance, and Service Manual

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Safety Message to Installers and Service Personnel of Warning Lights

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'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 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

- 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.

- 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.
- 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.
- 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.

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

Overview of the Model MB1 LED Message Board

The Federal Signal LED Model MB1 Message Board is a supplemental messaging device. The 1.9 inch by 28.6 inch display is created by 772 blue, high brightness, wide angle LEDs. It operates at a nominal input of 13.6 Vdc (11 Vdc minimum). The functions of the Message Board are controlled through the CAT5 serial communication cable and a special control head. The Message Board and control head use the Federal Signal Convergence Network and can therefore operate alongside other Federal Signal Convergence Network products. For programming and operating instructions, refer to Federal Signal doc. no. 25500056.

The Message Board housing is coextruded polycarbonate with polycarbonate end caps and elastomer seals. It has 30-foot power, ground, and communication cables connected to the Message Board through a single IP67 connector. Mounting hardware is supplied.

The Message Board has an operating temperature range of –30 °C to +65 °C.

Table 1 Dimensions: Model MB1 Message Board

Length:	35.2 in (89.4 cm)
Height:	3.0 in (7.6 cm)
Width:	3.3 in (8.4 cm) – Message Board body 4.8 in (12.2 cm) with standalone bracket
Net Weight:	7.0 lb (3.2 kg)

Table 2 Dimensions: Control Head

Length:	6.8 in (17.3 cm)
Height:	3.3 in (7.6 cm)
Width:	3.3 in (8.3 cm)
	1.6 in (4.1 cm)
Net Weight:	0.8 lb (0.4 kg)
System Shipping Weight:	10.0 lb (4.5 kg)

Unpacking the LED Message Board

After unpacking the LED Message Board, 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. Disposal of all shipping materials must be carried out in accordance with national and local codes and standards. Ensure that the parts listed in kit contents list 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).

Table 3 Standalone kit contents

Qty.	Description	Part Number
4	Bolt, Carriage, 1/4"-20 SS	7004A020-12
2	Bolt, Carriage, 3/8"-16 SS	7004A024-16
4	Nut, Keps, 1/4"-20 SS	7058050
2	Nut, 3/8-16, Hi-Corr. Resistant	7059124
4	Washer, Flat, 1/4", SS	7072A024
2	Washer, Flat, 3/8", SS	7072A035
2	Washer, Flat, 9/16", SS	7072A140
2	Lockwasher, Split, 3/8", SS	7074A046
2	Bracket, Standalone Mt., Msg. Brd B	865200625
2	Screw, 8-32, Thread-Forming, Black	70000143-06

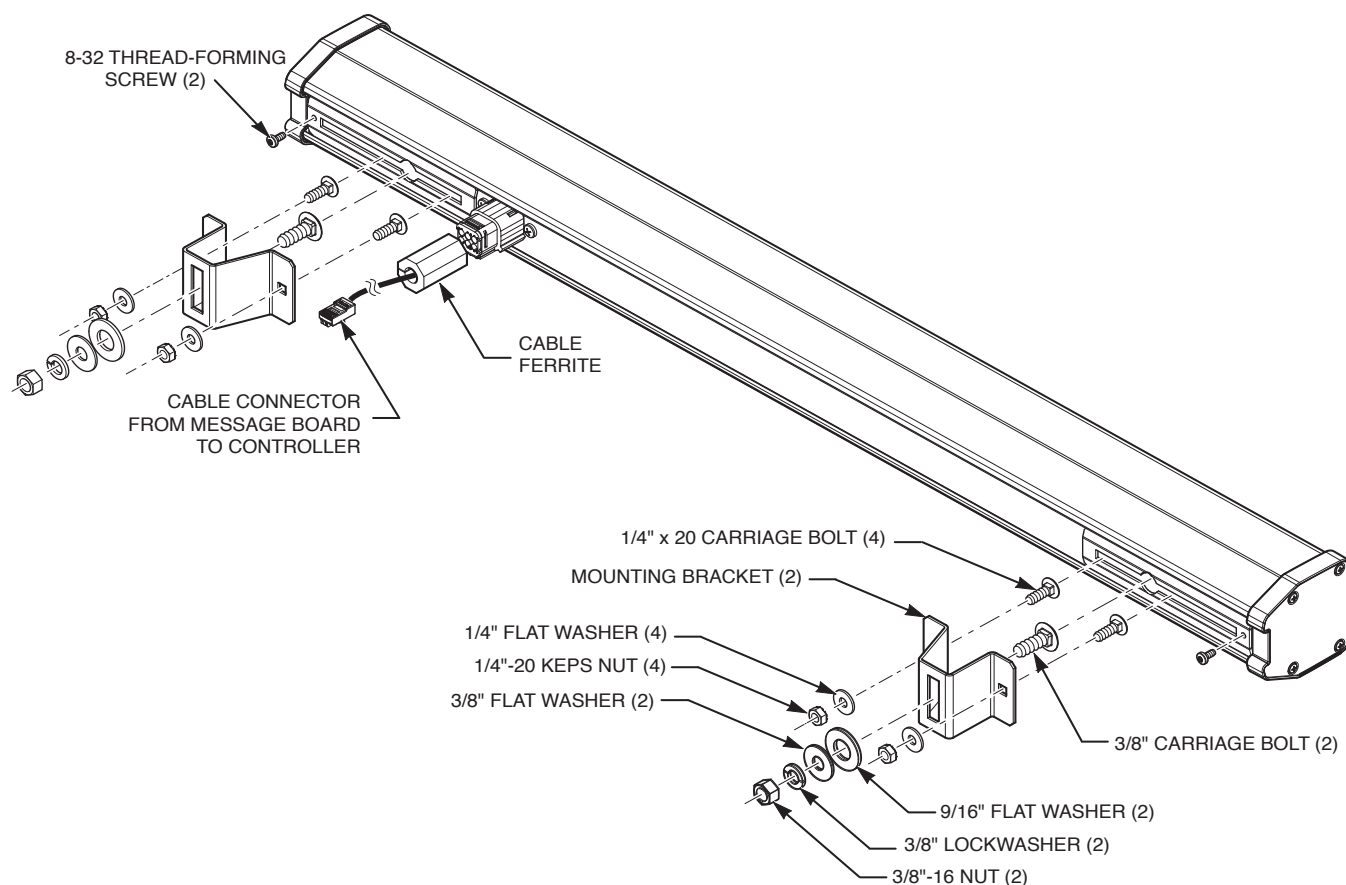
Mounting the LED Message Board

To mount the Message Board to the vehicle:

1. Determine the appropriate spacing for the mounting holes for your application.
2. See Figure 1 on page 9. Adjust the locations of the mounting brackets.
3. Secure the mounting brackets to the Message Board with the 1/4" hardware.
4. Start one 8-32 thread-forming screw in each sliding bracket, in the end most easily accessed. **Do not tighten the screws at this time.**
5. Mark the locations of the 3/8" mounting holes.

6. Drill the marked mounting holes with a 13/32" drill, and drill an appropriate cable hole as needed.
7. If the mounting surface is less than 1/8" thick, use the 9/16" flat washers between the mounting brackets and surface. Loosely assemble both sides with the 3/8" hardware.
8. Route the cable.
9. Level the Message Board and tighten the nuts.
10. Snug the 8-32 thread-forming screws just enough to keep the Message Board from sliding on the mounts. **Do not pierce the polycarbonate housing with the screws.**

Figure 1 LED Message Board with mounting hardware



Wiring the LED Message Board System in the Vehicle

The LED Message Board is completely wired at the factory and does not require any additional internal wiring. It has two 14 AWG power conductors (red and black) and a connection for a Convergence Network communication cable. The conductors necessary to control the Message Board are contained in the Convergence Network cable, which connects to a compatible Federal Signal Message Board Control Head.

⚠ WARNING

TWO-WAY RADIO ANTENNA LOCATION: *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 (47.5 cm) of the Message Board. Before permanently installing the Message Board or a two-way radio antenna, test the warning system and two-way radio system. DO NOT install a two-way radio antenna on the Message Board. Some installations may require relocating the two-way radio antenna to a trunk or fender location.*

⚠ WARNING

LOCATING OPERATOR CONTROLS: *Locate the light system controls so the VEHICLE and CONTROLS can be operated safely under all driving conditions. Failure to observe this warning could result in driver distraction or driver error while operating the vehicle.*

⚠ WARNING

BATTERY EXPLOSION: *To avoid a battery explosion, always disconnect the negative 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 an electrical explosion that could result in vehicle damage and serious injury.*

NOTICE

REVERSE POLARITY / MISWIRING: *Reverse polarity may damage the Message Board and prevent operation. To avoid damage to the Message Board, ensure that the battery voltage is the same as the voltage of the Message Board and that the correct polarity is observed.*

Wiring the Standalone-Mount Message Board

The Message Board draws approximately 50 mA in standby. To avoid excessive battery drain, use an ignition-switch source for the Message Board only.

To wire the Standalone-Mount Message Board:

1. Ensure that the lines are adequately fused (see Figure 2 on page 12). Route the Convergence Network cable from the Message Board into the cab or trunk of the vehicle and to the planned location of the Message Board control head.
2. Route and connect the 14 AWG black lead to the ground (-NEG) terminal of the vehicle battery.
3. Route and connect the 14 AWG red lead through a 20 A fuse at an appropriate circuit in the vehicle that provides +12 V when ignition is activated.

Wiring the Message Board Control Head

For the Message Board to operate properly, the power wires from the control head must be wired directly to battery power and not to a switched power source. Failure to do so may reduce the lifetime of its internal battery required to keep accurate time. The control head also includes an IGN sense wire that, when disengaged, turns off the control head after 15 seconds. If preferred, the control head includes an active-low wire that activates the default message (Message One) when battery ground (-NEG) is applied to it. For the wiring diagrams, see Figures 2 and 3 on page 12.

To wire the Message Board control head:

1. Ensure that the lines are adequately fused.
2. **WITHOUT A FEDERAL SIGNAL SIREN:** See Figure 2. If you are installing the Message Board system without a Federal Signal Convergence Network siren, insert the Convergence Network connector from the Message Board into one of the two modular connectors in the back of the control head.

WITH A FEDERAL SIGNAL SIREN: See Figure 3.
 - a. If you are installing the system in a vehicle with a Federal Signal Convergence Network siren, plug the Convergence Network connector from the Message Board into one of the available modular connectors in the back of the siren
 - b. Carefully route the included 25-foot CAT5 cable from another open connection on the siren through the vehicle to where the control head will be mounted.
 - c. Using the additional modular connector on the back of the Message Board control head, plug in any additional Convergence Network control heads.
3. Route and connect the 22 AWG black lead to the ground (-NEG) terminal of the vehicle battery.
4. Route and connect the 22 AWG red lead through a 5 A fuse at the source to the positive (+BAT) terminal.
5. Route and connect the 22 AWG yellow lead to an appropriate circuit in the vehicle that provides +12 V when ignition is activated.
6. **OPTIONAL:** For default message activation (message number one), route and connect the 22 AWG brown lead through an installer-supplied switch with a capacity of 100 mA to an appropriate circuit in the vehicle that provides battery ground (-NEG) when default message activation is required.

Figure 2 LED Message Board wired to control head

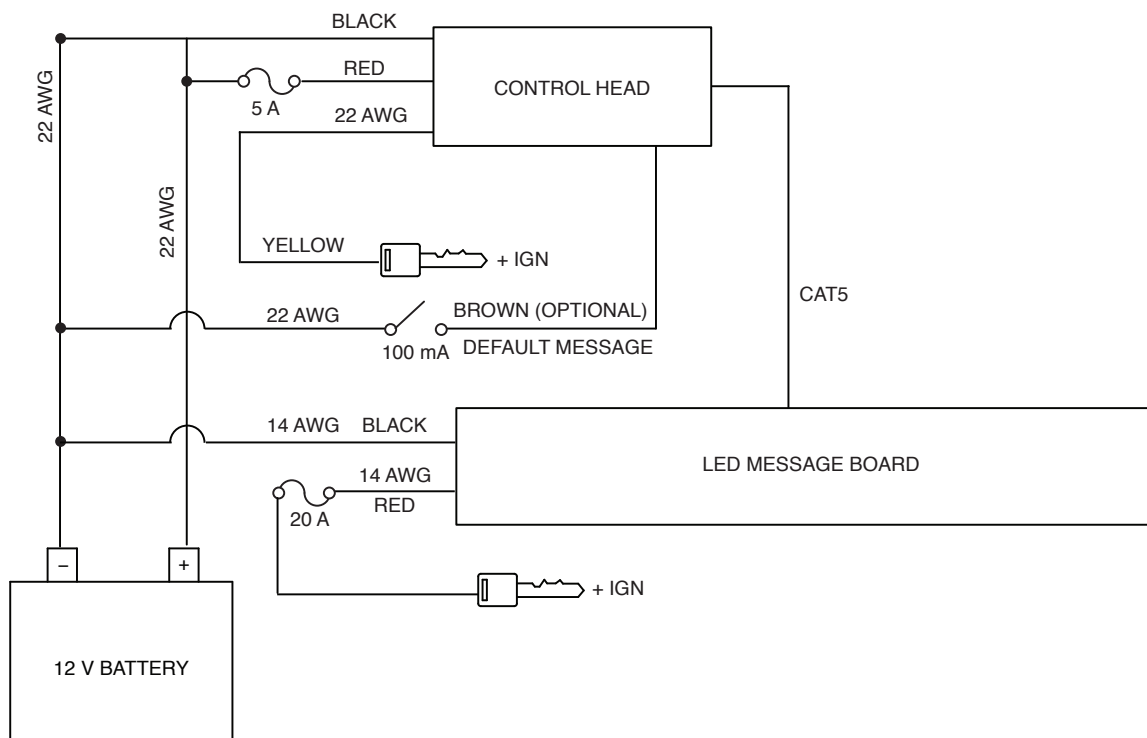
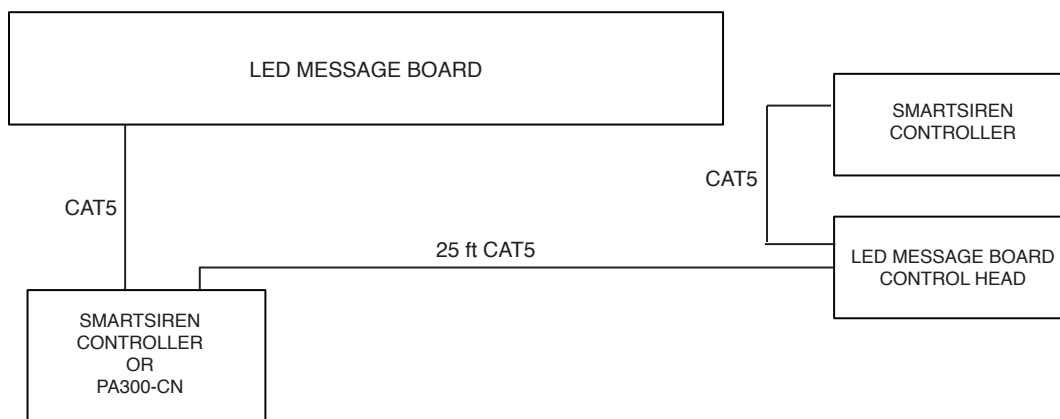


Figure 3 Convergence Network connections with siren



Safety Message to Operators of Warning Light Equipment

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.
- 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 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 these precautions may result in property damage, serious injury, or death.

Operating the LED Message Board Controls

The Message Board is controlled entirely with the control head either through the numeric keypad or by activating wires in the back of the control head. To activate a message, use the numeric keypad to enter a message or use the arrow keys to scroll up or down to select a message, then press **ENT(ER)**. Alternatively, you can activate the default message wire to turn on Message One, the default message.

Testing the Message Board System

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 close range. Do not stare directly into the lights at close range or permanent damage to your eyesight may occur.

To test the Message Board system:

1. Follow all the instructions in “Wiring the LED Message Board System in the Vehicle” on page 10.
2. Cycle IGN and verify that the control head powers up when IGN is activated and turns off after 15 seconds when IGN is deactivated
3. Activate a message by entering a message number through the numeric keypad and press **ENT**. The LCD screen should display the activated message and the Message Board should be displaying the message as well. If there is an error, the LCD screen may notify you.
4. **OPTIONAL:** Verify the default message (Message One) is activated when the default message wire of the control head is activated.
5. After the installation, check the entire system to be sure the lights are flashing properly and all light system functions are operating properly.

Setting Configuration Options

All Message Board settings and options are configured through various menus accessed through the numeric keypad and LCD screen of the control head while it is operational. There are two menus, Standard and Secure, that allow different information to be viewed and configuration options that can be set. To prevent unwanted access and changes to the system the Security Menu is only accessible by a numeric Fleet Password created by the installer during installation of the Message Creation software. (For more information, see “Fleet Password and Security” page 16).

You can navigate menus by using the up/down arrows or simply pressing the number associated with that menu. If you do not press a key within 15 seconds, the menu times out and returns to normal operation.

The Standard Menu has these menu items:

- 0. Adjust Keypad Backlight Level
- 1. Adjust LCD Contrast Level
- 2. View Date & Time
- 3. View Control Head Firmware Version
- 4. View Message Sign Firmware Version
- 5. Enter Security Menu
- 6. Update Messages via USB Flash Drive
- 7. Exit Standard Menu

The Security Menu has these menu items:

- 0. Change Date
- 1. Change Time
- 2. Adjust Message Board Intensity
- 3. Reset Fleet Password
- 4. Update Control Head Firmware
- 5. Exit Security Menu

Entering the Standard Menu

To enter the Standard Menu:

1. Make sure that the control head is powered up and running.
2. Press and hold the **ESC(APE)** key for at least three seconds to enter the menu. The control head beeps once you enter the Standard Menu and display the first menu entry.
3. Use the up/down arrows or press the number associated with that menu to go the menu item you want to view or change.
4. If you can change the menu item, use the keypad to enter your change, and press **ENT** to confirm it.

Entering the Security Menu

To enter the Security Menu:

1. Put the control head in the Standard Menu as described in the previous section.
2. Use the up/down arrows or press the 5 to navigate to the Security Menu option within the Standard Menu.
3. The display notifies you whether the Security Menu is locked or unlocked.
 - If unlocked, press **ENT** to enter the Security Menu.
 - If locked, the display prompts you to enter the numeric Fleet Password created by the installer during installation of the Message Creation software.

You have three attempts to enter the Fleet Password correctly. The fourth attempt lock the menu. battery power will need to be cycled to the control pad to try again. For more information on “Fleet Password and Security” below.

Exiting the Standard or Security Menu

To exit the Standard or Security Menu navigate the **Exit Settings?** Press **ENT** or wait for 15 seconds for the keypad to exit the configuration menus.

Fleet Password and Security

The control head ships from the factory unlocked (i.e., no Fleet Password set) and with a default message set. The control head uses a numeric fleet password to prevent unauthorized message set downloads. When the Message Creation software is installed, a numeric fleet password is created by the installer. The password is stored into every message set created by the installation. If the control head is unlocked, the first message set loaded transfers the numeric Fleet Password to the keypad. Any subsequent message sets loaded need to match the Fleet Password from the original file, otherwise the keypad will not accept the file. The Fleet Password is also used to access the Security Menu to change configuration options.

There are two ways to reset the Fleet Password:

If you know the Fleet Password

Navigate to the Security Menu (see page 16) and use the **Reset Fleet Password** menu option.

If you do not know the Fleet Password

To unlock the control head:

1. Disconnect and apply +12 V (+BAT) on the yellow, blue, and orange wires.
2. Apply ground (-NEG) on the brown and black wires. Finally apply 12 V to the red wire.
3. After a few seconds press **ENT** to confirm resetting the Fleet Password.

Maintaining the Message Board

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

Replacing the Internal 15 A Fuse

The Message Board is protected with an internal 15 A blade fuse on the upper rear corner of the driver-side PCBA (Figure 4 on page 18). To see if the fuse is bad, inspect the horseshoe-shaped wire in it to see if it has burned through and broken the circuit.

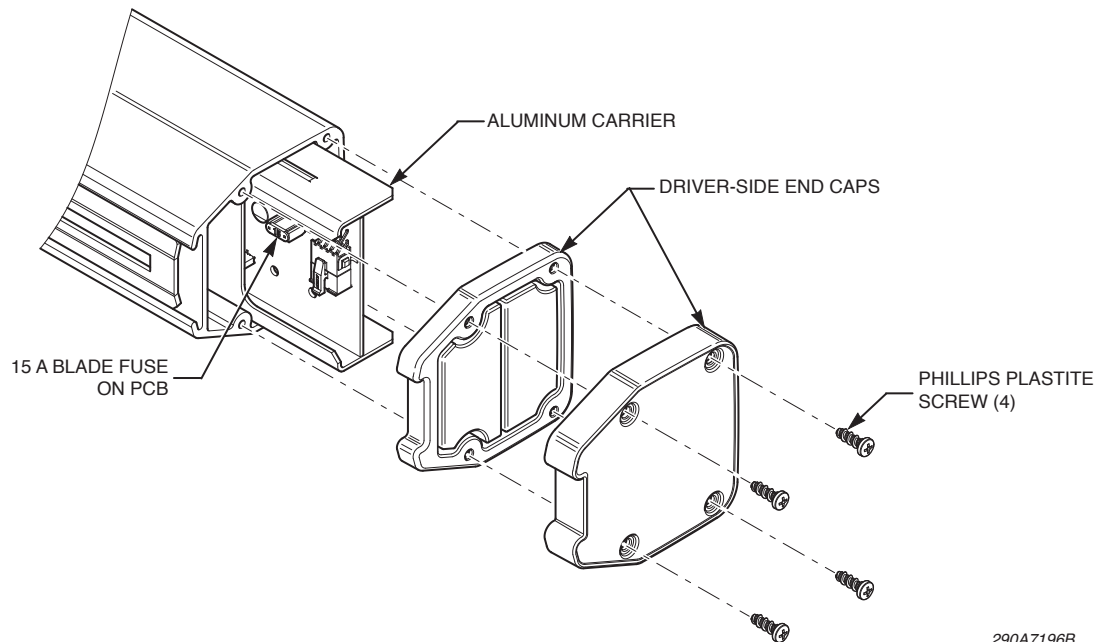
NOTICE

STATIC SENSITIVE DEVICE: *The circuitry of the Message Board can be damaged by electrostatic discharge. Follow antistatic procedures while changing the fuse.*

To replace the fuse:

1. Remove the four Phillips PLASTITE® screws from the driver-side end of the Message Board.
2. Remove the two end caps.
3. To access the fuse, slide the aluminum carrier and PCBs out approximately two inches.
4. Pull the fuse straight out to avoid damaging the connector.
5. Gently press a new fuse of the same type and amperage into the connector. Ensure that all pins are properly seated.
6. Reassemble the Message Board. Use caution to prevent stripping the threads in the polycarbonate housing.

Figure 4 Fuse location on PCB



290A7196B

Getting Technical Support and Service

For technical support and service, please contact:

Service Department
Federal Signal Corporation
Phone: 1-800-433-9132, 1-708-534-3400
Fax: 1-800-343-9706
Email: empserviceinfo@fedsig.com

Ordering Replacement Parts

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

Customer Support
Federal Signal Corporation
Phone: 1-800-264-3578, 1-708-534-3400

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 60486-3167
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