



Battery Charger Retrofit Kit Q-DCCHG1 for DC Cabinet

Retrofit Manual

Limited Warranty

The Alerting and Notification Systems Division of **Federal Signal Corporation (Federal)** warrants each new product to be free from defects in material and workmanship, under normal use and service, for a period of two years on parts replacement and factory-performed labor (one year for Informer, EAS, and Federal software products) from the date of delivery to the first user-purchaser. Federal warrants every 2001-130, Equinox, Eclipse8 and 508-128 Siren (Top of pole only) to be free from defects in material, per our standard warranty, under normal use and service for a period of five years on parts replacement.

During this warranty period, the obligation of Federal is limited to repairing or replacing, as Federal may elect, any part or parts of such product which after examination by Federal, are determined to be defective in material and/or workmanship.

Federal will provide warranty for any unit, which is delivered, transported prepaid, to the Federal factory or designated authorized warranty service center for examination and such examination reveals a defect in material and/or workmanship.

This warranty does not cover travel expenses, the cost of specialized equipment for gaining access to the product, or labor charges for removal and re-installation of the product. The Federal Signal Corporation warranty shall not apply to components or accessories that have a separate warranty by the original manufacturer, such as, but not limited to batteries.

Federal will provide on-site warranty service during the first 60-days after the completion of the installation, when Federal has provided a turn-key installation including optimization and/or commissioning services.

This warranty does not extend to any unit which has been subjected to abuse, misuse, improper installation or which has been inadequately maintained, nor to units which have problems related to service or modification at any facility other than the Federal factory or authorized warranty service centers. Moreover, Federal shall have no liability with respect to defects arising in Products through any cause other than ordinary use (such as, for example, accident, fire, lightning, water damage, or other remaining acts of God).

THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL FEDERAL BE LIABLE FOR ANY LOSS OF PROFITS OR ANY INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY SUCH DEFECT IN MATERIAL WORKMANSHIP.



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Safety Message

⚠ WARNING

Read and understand these procedures before retrofitting. All work should be performed by a properly trained technician or electrician that is qualified to do electrical work. You must follow electrical and ESD precautions. If any of the electronics are handled without static protection, the electronics may be damaged.

Listed below are important safety instructions and precautions you should follow:

Important Notice

Federal Signal reserves the right to make changes to devices and specifications detailed in the manual at any time in order to improve reliability, function or design. The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for any inaccuracies.

Installation and Service

- Electrocutation or severe personal injury can occur when performing various installations and service functions, such as; making electrical connections, drilling holes, or lifting equipment. Therefore, only experienced electricians should install this product in accordance with national, state and any other electrical codes having jurisdiction. Perform all work under the direction of the installation or service crew safety foreman.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings and restrict access to areas near the sirens. Sirens may be operated from remote control points. Whenever possible, disconnect all siren power including batteries before working near the siren.
- After installation or service, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service personnel do not have these warnings and all other instructions shipped with the equipment to refer to, the siren system may not provide the intended audible warning and service personnel may be exposed to death, permanent hearing loss, or other bodily injury. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to new recruits and trainees. Also, give a copy to anyone who is going to service or repair the sirens.

Operation

Failure to understand the capabilities and limitations of your siren system could result in permanent hearing loss, other serious injuries or death to persons too close to the sirens when you activate them or to those you need to warn. Carefully read and thoroughly understand all safety notices in this manual and all operations-related-items in all instruction manuals shipped with equipment. Thoroughly discuss all contingency plans with those responsible for warning people in your community, company, or jurisdiction.

⚠ WARNING

Read and understand the information contained in this manual before attempting to install or service the siren.

Pay careful attention to the following notices located on the equipment.

Notices—Externally Placed

⚠ WARNING

HIGH VOLTAGE

ARCING HAZARD

HIGH TEMPERATURE

AUTHORIZED SERVICE PERSONNEL ONLY.

⚠ WARNING

BATTERIES INSIDE.
AUTHORIZED SERVICE PERSONNEL ONLY.

Notices—Internally Placed

⚠ DANGER EXPLOSIVE GAS CORROSIVE MATERIAL

⚠ WARNING

SIREN TO BE EQUIPED WITH DELCO VOYAGER BATTERIES(#M24MF)WITH THE FOLLOWING SPECIFICATIONS:

BD GROUP SIZE	TERMINAL TYPE	COLD CRANKING AMPS @ 0°F OR -18°C -SAC J5279	RESERVE CAPACITY MINUTES	LOAD TEST AMPS
24	TSM	400	125	200

USE OF UNAPPROVED BATTERIES MAY FAIL TO PROVIDE ADEQUATE SIREN COVERAGE AND MAY VOID SIREN WARRANTY FOR FURTHER INFORMATION, CONTACT FEDERAL SIGNAL CUSTOMER SUPPORT AT (800)548-7229.

⚠ WARNING

IF BATTERY TERMINALS OR TOOL TOUCH METAL CABINET THEY COULD CREATE AN ARC, WHICH COULD CAUSE THE BATTERIES TO EXPLODE!

SLIDE BATTERIES TO FRONT OF CABINET AND TILT SLIGHTLY FORWARD TO PROVIDE BETTER TERMINAL CLEARANCE WHEN REMOVING, OR INSTALLING.

⚡ WARNING **⚠**
HIGH VOLTAGE

UNIT MAY BE CONNECTED TO HIGH VOLTAGE. REMOVE ALL POWER BEFORE SERVICING.

General Description

Introduction

This manual describes how to retrofit a control cabinet with four 8402B073C chargers to a new charger. The older chargers provided individual battery chargers. This new battery charger provides charge voltage across the four batteries as a group. The charger has a built-in 10 Amp fuse, and the charger wire is fused with a 10 Amp fuse within the battery cabinet. The part number for ordering the Battery Charger Retrofit Kit is Q-DCCHG1.

When a single 8402B073C charger fails, Federal Signal recommends changing the entire charging system to this new charger. If there are independent chargers left over, use them as service parts.

The new charger can also be powered from nominal 240 VAC.

NOTE: Load test the batteries and replace batteries as necessary before proceeding.

Qualifications

You must be a properly trained technician or electrician in order to install this product.

Required Equipment

You need the following equipment.

- Ratchet with extension
- 7/16 inch socket
- Digital multimeter (DMM)
- Battery Load Tester

Federal Signal Supplied Equipment

- Charger Assembly: includes PCB 2005305, transformer, and connectors to simplify installation
- Male-ended connectors for capping unused connectors
- Cable with Temperature Sensor

Theory of Operation

You will replace the existing charger assembly with the following charger assembly.

Figure 1 Charger assembly with PCB 2005305

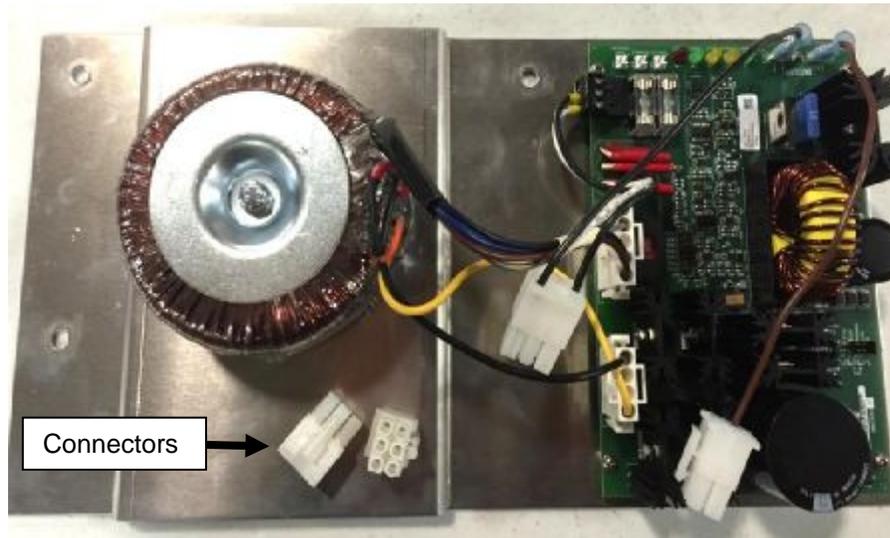


Figure 2 Temperature Sensor Cable



Theory of Operation

Introduction

The charger features a switch mode voltage/current regulator to improve efficiency and reduce heat. The charger incorporates a three-stage charge algorithm to charge four series connected 12 Volt batteries (48 VDC system) without gassing and maintain the batteries at the optimum charge level.

The charger delivers a constant 2 Amp trickle charge until the batteries reach 40 Volts. The charger then raises the charge voltage until the charge current increases to 4 Amps. This is the bulk charge. This is maintained until the batteries' voltage reaches the float voltage.

The charger monitors for faults. If the charger has AC power and is producing charge voltage, and, if no fault is detected, the charge status output will be on. If the charger is in trickle or bulk mode and the charge current is low (not charging) a fault will be detected. If the battery voltage is at least ½ Volt lower than the charger voltage

(blown fuse) a fault will be detected. If the charge voltage is too high (charger regulation failure) a fault will be detected. If a fault is detected the FAULT LED will light and the charge status output will be off.

Features

- Three-stage charger algorithm to charge the battery without gassing for longer battery life
- Temperature compensated charge voltage (requires Temperature Sensor)
- Selectable float voltage
- Efficient switch mode design
- Over-Temperature protection
- Status LEDs: Trickle, Bulk, Ready, and Fault
- Charger Status output
- Voltage and Current regulating

Specifications

Table 1 Electrical

AC Power	108 – 132 VAC, 120 VAC nominal, 2.4 A nom. 216 – 264 VAC, 240 VAC nominal, 1.3 A nom.
Bulk Charge Current, I_{BULK}	4 Amps, +/- 10% at 25°C
Float Charge Voltage, V_{FLOAT}	Jumper Selectable from 52.8 to 55.2 V, +/-0.75%
Trickle Charge Current, I_{TC}	2.0 A, +/- 20%

Table 2 Environmental

Operating Temperature	-30°C to +65°C
Humidity	0-95% Non-Condensing

Table 3 Physical

Size	PCB = 5 in x 7 in
Weight	< 10 lbs

Connectors, Indicators, and Fuses

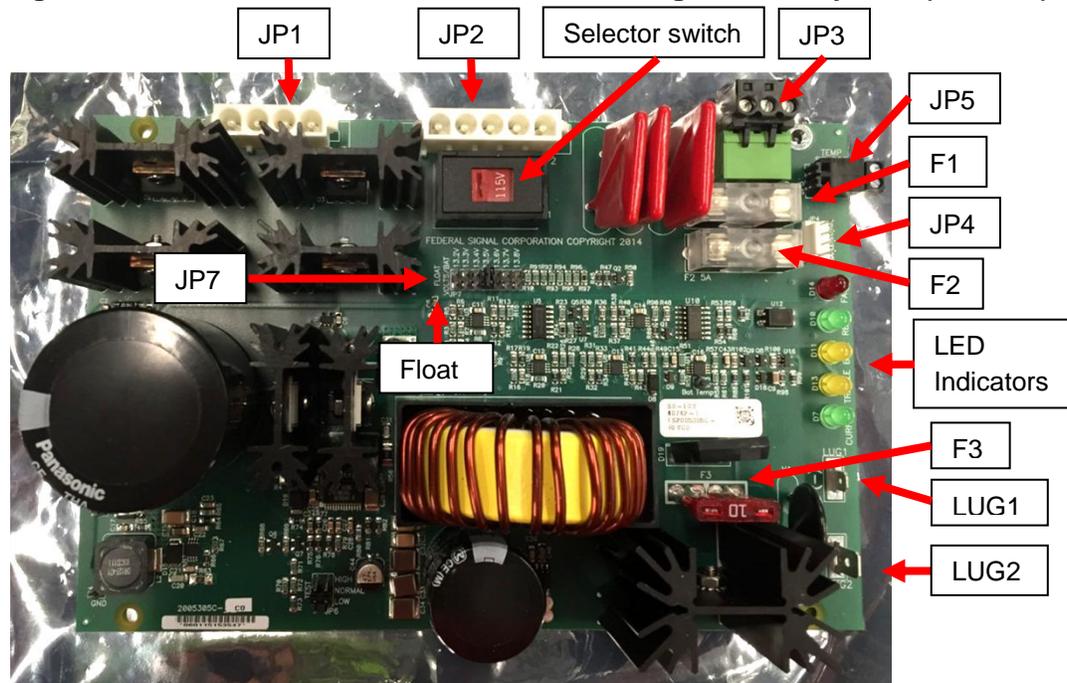
Table 4 Connectors

J1	AC Power Input from transformer secondary
J2	AC Power Output to transformer primary
J3	AC Power Input 1 – L1/Hot 2 – L2/Neutral 3 – Earth Ground
JP4	Charger Disable/Status 1 – Disable input 2 – GND 3 – Status output 4 – Status output
JP5	Two-pin Temperature Sensor
JP6	Test header Do not use – Jumper should be on Normal
JP7	Float Voltage per Battery (total) Selection Jumper pins 1 and 2 for 13.2 V (52.8V) Jumper pins 3 and 4 for 13.3 V (53.2V) Jumper pins 5 and 6 for 13.4 V (53.6V) Jumper pins 7 and 8 for 13.5 V (54.0V) – Default position Jumper pins 9 and 10 for 13.6 V (54.4V) Jumper pins 11 and 12 for 13.7 V (54.8V) Jumper pins 13 and 14 for 13.8 V (55.2V)
LUG 1	Charger Output – Negative terminal
LUG 2	Charger Output – Positive terminal

Table 5 Indicators and fuses

LED D7	CURRENT; Green LED brightness indicates charge current.
LED D13	TRICKLE; Yellow LED turns on during Trickle charge, when battery voltage is less than 40 Volts.
LED D11	BULK; Yellow LED turns on during Bulk charge, when battery voltage is greater than 40 Volts.
LED D10	READY; Green LED turns on when batteries have reached their Float voltage.
LED D14	FAULT; Red LED turns on when a charger fault is detected.
Fuse 1 and 2	5 A 250 VAC Replacement Littlefuse #0218005.HXP
Fuse 3	10 A 32 V Replacement Littlefuse #287010

Figure 3 Position of fuses and connectors on charger assembly PCB (2005305)



NOTE: Fuses F1 and F2 are replaceable 5 Amp fuses. Fuse F3 is a replaceable 10 Amp fuse. Fuses can blow during AC power surges.

Configuring Charger PCB

Prior to installation, do the following:

1. Select AC operating voltage of either 115 V or 230 V. See Figure 3 Position of fuses and connectors on charger assembly PCB (2005305).

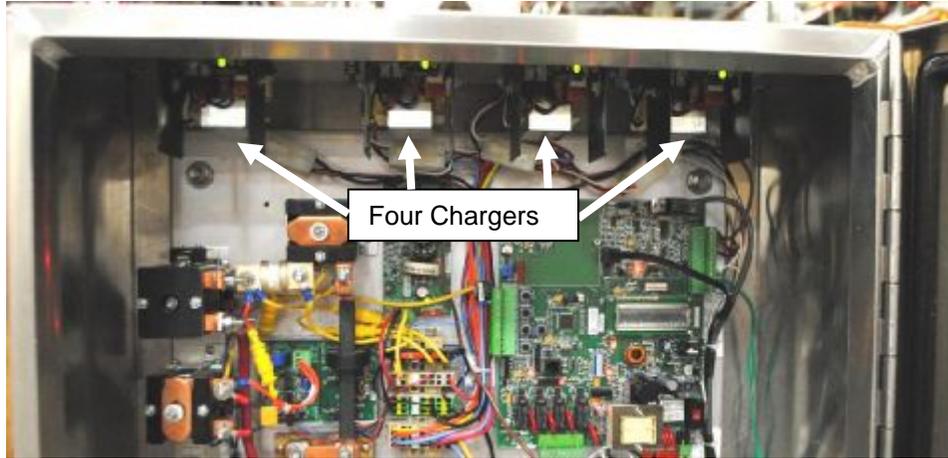
NOTE: Verify that the AC selector switch (S1) is consistent with the AC selector switch on the control board.

2. Use JP7 to select the Float Voltage if other than 13.5 V.

Retrofitting New Battery Charger

The control cabinet with four chargers looks like the following figure.

Figure 4 Control cabinet with four chargers



Turning Power off at the Disconnect Box

To turn off the power at the disconnect box, do the following:

1. Locate the disconnect box.
2. Put the switch in the off position.

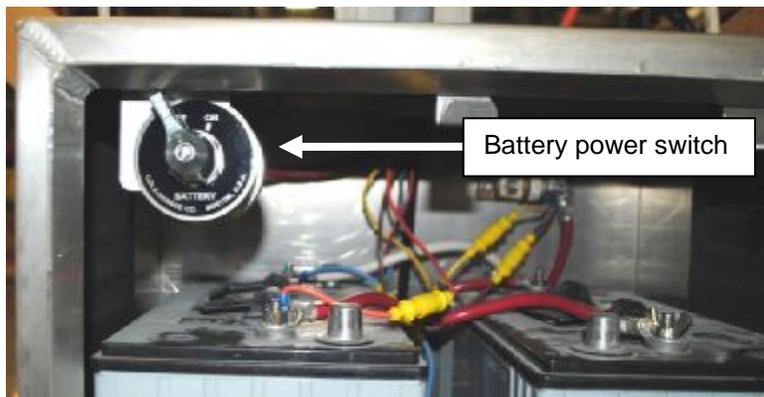
Turning Power off to the Battery Cabinet

To turn off the power at the battery cabinet, do the following:

3. Open the battery cabinet.
4. Turn off the battery power at the battery power switch.

NOTE: Load test the batteries and replace batteries as necessary before proceeding.

Figure 5 Battery power switch



5. Close the battery cabinet.

Verifying Power in the Control Cabinet

To verify power is off in the control cabinet, do the following:

6. Open the control cabinet door.
7. Use a DMM to verify AC voltage is not present.

Verify that no AC voltage is present at TB5. See Figure 6 TB5 Wiring Diagram.

NOTE: If AC voltage is present, verify that the AC disconnect is in the off position.

8. Use a DMM to verify DC voltage from transformer/rectifier or batteries are not present.

With
Transformer/
Rectifier

Verify that no DC voltage is present at K3-2. See Figure 7 K1, K2, and K3 Wiring Diagram.

NOTE: If DC voltage is present, verify that the AC disconnect is in the off position.

Without
Transformer/
Rectifier

Verify that no DC voltage is present at K2-2. See Figure 7 K1, K2, and K3 Wiring Diagram

NOTE: If DC voltage is present, verify that the battery switch is in the off position.

Retrofitting New Battery Charger

Figure 6 TB5 Wiring Diagram

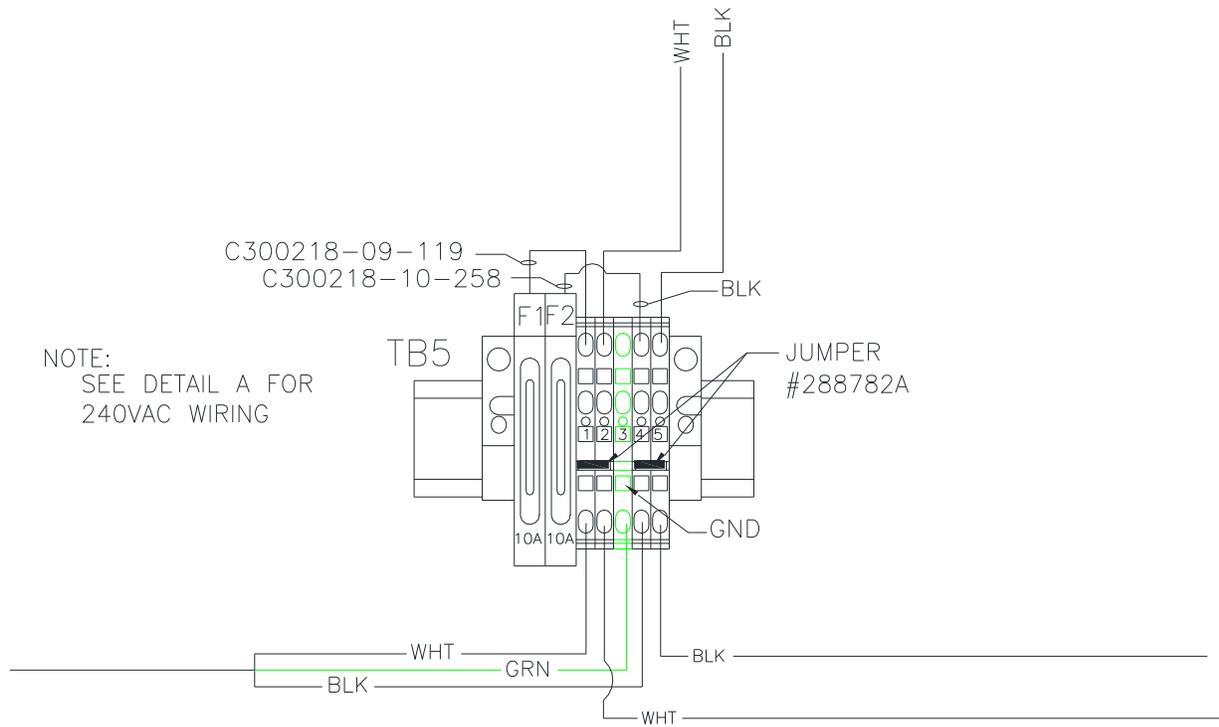
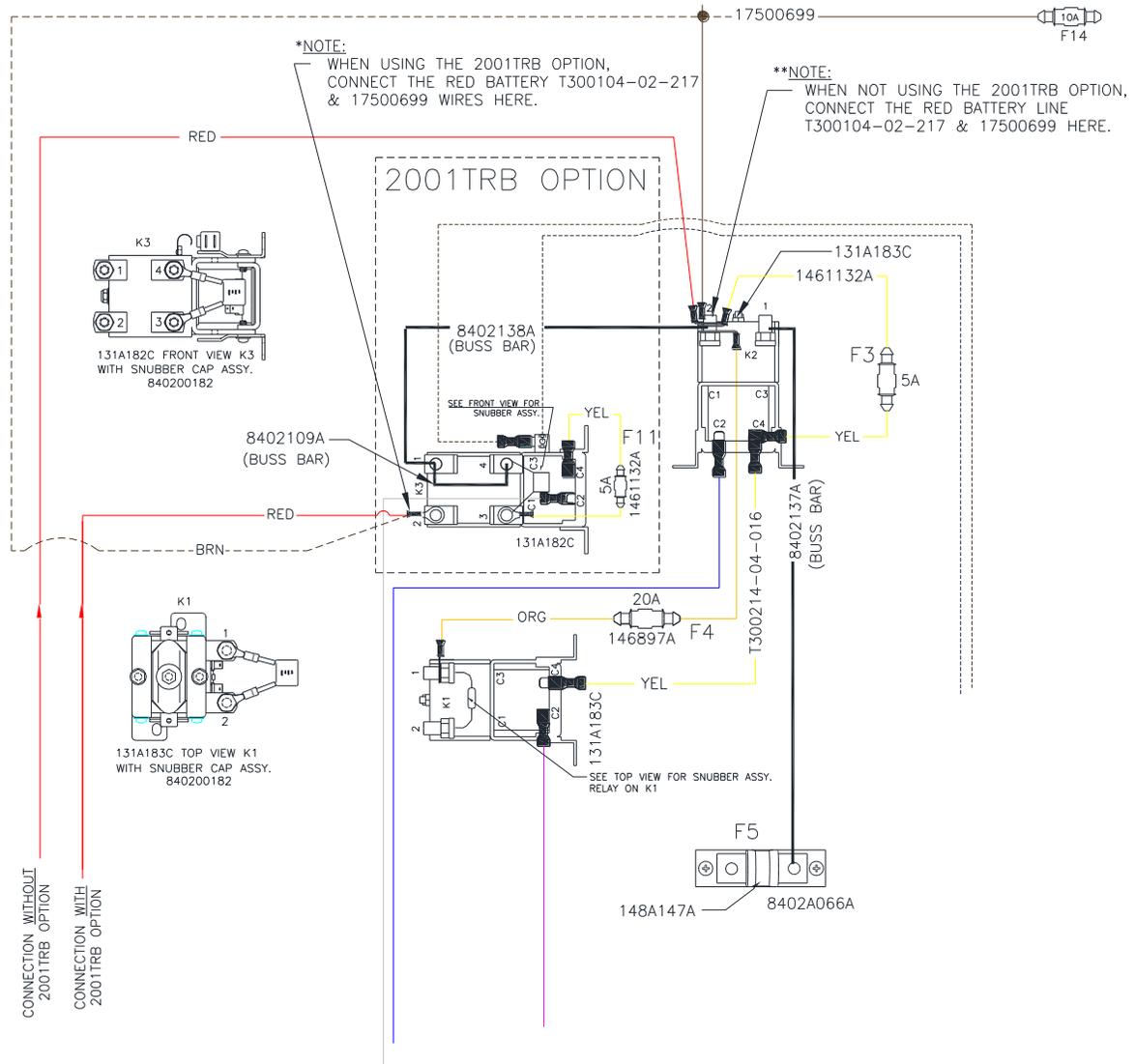


Figure 7 K1, K2, and K3 Wiring Diagram



Removing the Existing Charger Assembly

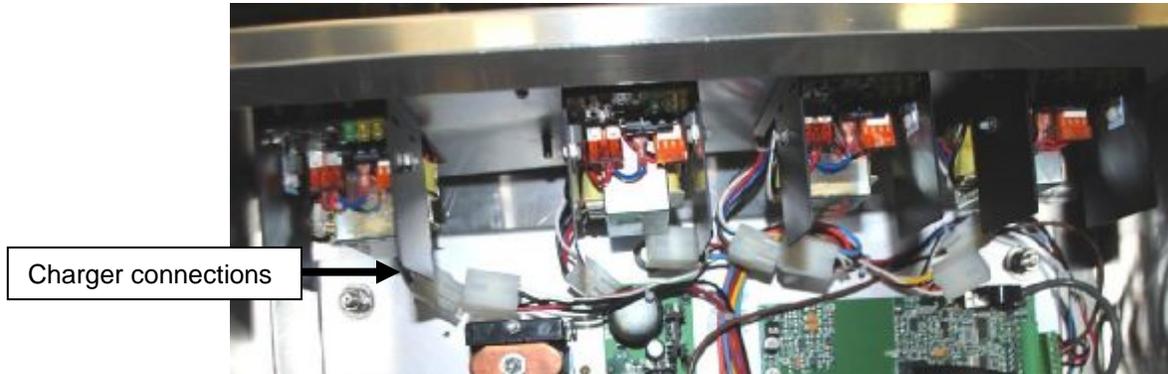
⚠ CAUTION

Charger assembly is heavy. Do not drop.

To remove the existing charger assembly, do the following:

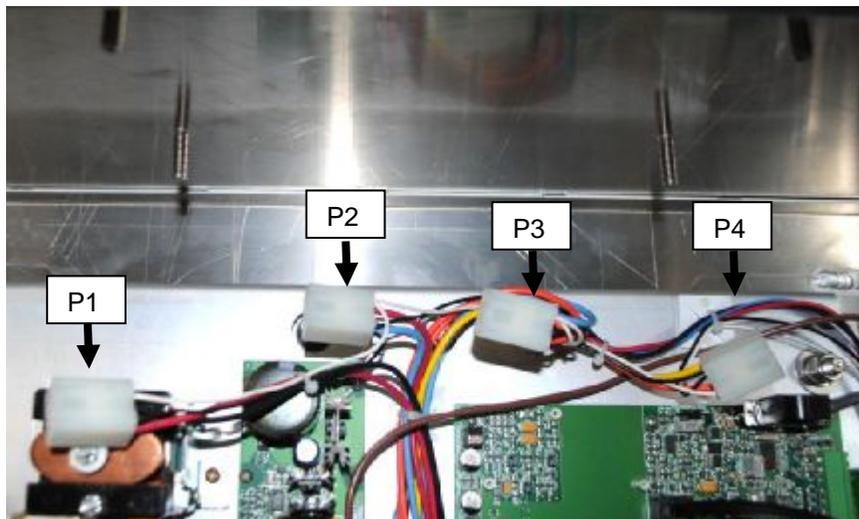
9. Disconnect charger connections P1, P2, P3, and P4.

Figure 8 Disconnected chargers



10. Use a ratchet with extension 7/16 inch socket to loosen the four nuts that are holding charger assembly to the top of the control cabinet.
11. While holding assembly in place with one hand, remove the nuts and lock washers and set aside. (You will reuse the nuts and lock washers.) Remove the charger assembly.

Figure 9 Control cabinet without charger assembly

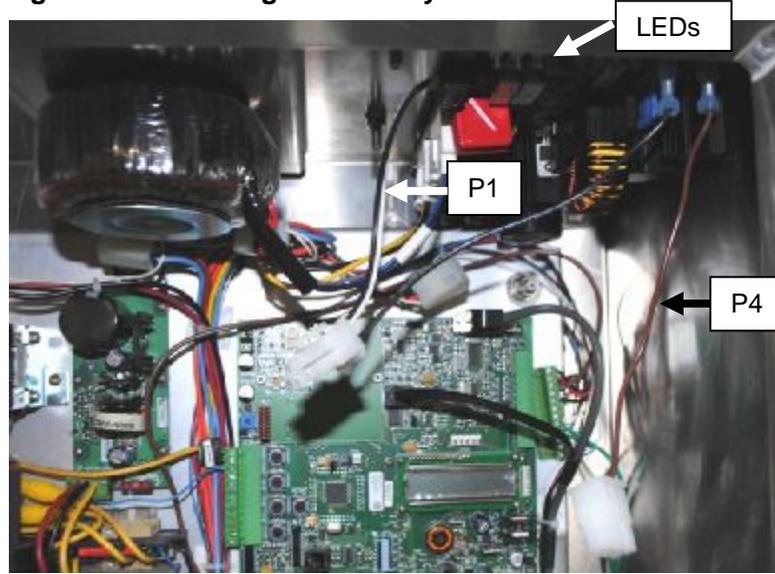


Installing the New Charger Assembly

To install the new charger assembly, do the following:

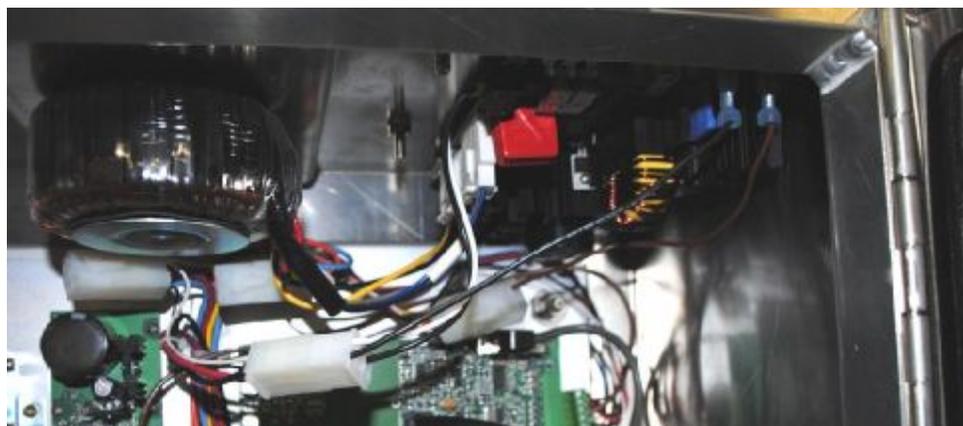
12. Install new charger assembly with PCB LEDs facing outward. Attach the new mounting plate to the top of the cabinet using the nuts and lock washers from the original charger. Use the 7/16 socket wrench to tighten the nuts.

Figure 10 New charger assembly installed



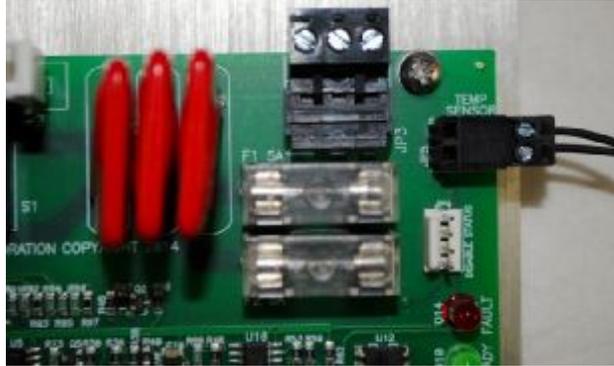
13. Check the surrounding wires. Ensure that no wires are pinched around the assembly, especially around the corners of the PCB.
14. Connect P1 male-ended retrofit wire assembly (white and black) to existing P1 female-ended connection.
15. Connect P4 male-ended retrofit wire assembly (brown) to existing P4 female-ended connection.
16. Attach spare male-ended connectors provided to existing P2 and P3 connections.

Figure 11 Charger connections re-connected



17. Attach Temperature Sensor Cable to JP5, route Temperature Sensor Cable where the thermistor (cable end) is not in contact with any electrical device. Zip tie the thermistor/cable end to a location toward the bottom of the cabinet.

Figure 12 Attached Temperature Sensor Cable



18. Check all wiring connection made.
19. Zip tie any hanging wires and dress to keep wires from rubbing against other parts in the cabinet.

Figure 13 Zip tie hanging wires



20. Close control cabinet door.

Completing Retrofit—Turning Power on and Verification

To complete the retrofit, do the following:

21. Open the battery cabinet door.
22. Turn on the battery power at the battery power switch.
23. Close the battery cabinet.
24. Turn on the AC power to the siren at the AC disconnect switch.
25. Verify charger is operating by viewing charger's LEDs. The red FAULT LED should be off. The CURRENT, TRICKLE, BULK, or READY LEDs should be on depending on battery status.

NOTE: If red FAULT LED is on or if no LEDs are on, verify wiring, AC power, fuses, and battery health.

The cabinet retrofit procedure is now completed. Federal Signal recommends testing the warning system prior to putting back into service.

Testing the Siren

⚠ WARNING

The output sound level of a siren is capable of causing severe hearing discomfort or permanent hearing damage. Therefore, always wear adequate hearing protection and minimize exposure time when performing any testing or maintenance on the siren.

⚠ WARNING

Failure to properly test the siren system before placing into service may prevent the siren from operating in an emergency. Tests and calibrations must be performed by an experienced technician prior to using the siren system.

Obtaining Service

If you are experiencing any difficulties, contact Federal Signal Customer Care at: 800-548-7229 or 708-534-3400 extension 5822 or Technical Support at: 800-524-3021 or 708-534-3400 extension 7329 or through e-mail at: techsupport@fedsig.com. For instruction manuals and information on related products, visit: <http://www.alertnotification.net/>

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