



FEDERAL SIGNAL
Safety and Security Systems

2001-AC

***DC Motor Starters and
Transformer/Rectifier***

***Plus Options: 2001HR (Holding Relay)
Radio Activation***

Installation and Operation 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, Eclipse and 508 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

It is important to follow all instructions shipped with this product. This device is to be installed by trained personnel who are thoroughly familiar with the country electric codes and will follow these guidelines as well as local codes.

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.

Publications

Federal Signal recommends the following publications from the Federal Emergency Management Agency for assistance with planning an outdoor warning system:

- The “Outdoor Warning Guide” (CPG 1-17)
- “Civil Preparedness, Principles of Warning” (CPG 1-14)
- FEMA-REP-1, Appendix 3 (Nuclear Plant Guideline)
- FEMA-REP-10 (Nuclear Plant Guideline).

Planning

- If suitable warning equipment is not selected, the installation site for the siren is not selected properly or the siren is not installed properly, it may not produce the intended optimum audible warning. Follow Federal Emergency Management Agency (FEMA) recommendations.
- If sirens are not activated in a timely manner when an emergency condition exists, they cannot provide the intended audible warning. It is imperative that knowledgeable people, who are provided with the necessary information, are available at all times to authorize the activation of the sirens.
- When sirens are used out of doors, people indoors may not be able to hear the warning signals. Separate warning devices or procedures may be needed to effectively warn people indoors.

Safety Message

- 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 sirens.
- Activating the sirens may not result in people taking the desired actions if those to be warned are not properly trained about the meaning of siren sounds. Siren users should follow FEMA recommendations and instruct those to be warned of correct actions to be taken.
- After installation, service, or maintenance, 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 and operating personnel do not have these instructions 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 siren.

Installation and Service

- Electrocution or severe personal injury can occur when performing various installation 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

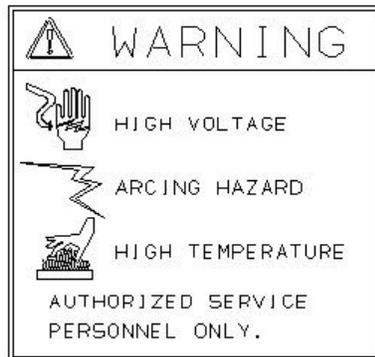
Failure to understand the capabilities and limitations of your siren system could result in permanent hearing loss, other serious injuries or death to persons too close to the sirens when you activate them or to those you need to warn. Carefully read and thoroughly understand all safety notices in this 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

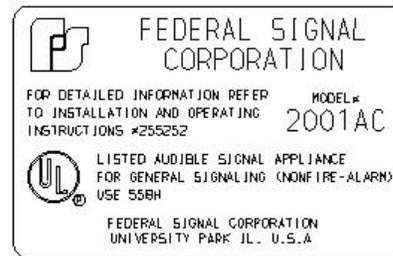
Read and understand the information contained in this manual before attempting to install or service the siren.

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

Notices—Externally Placed



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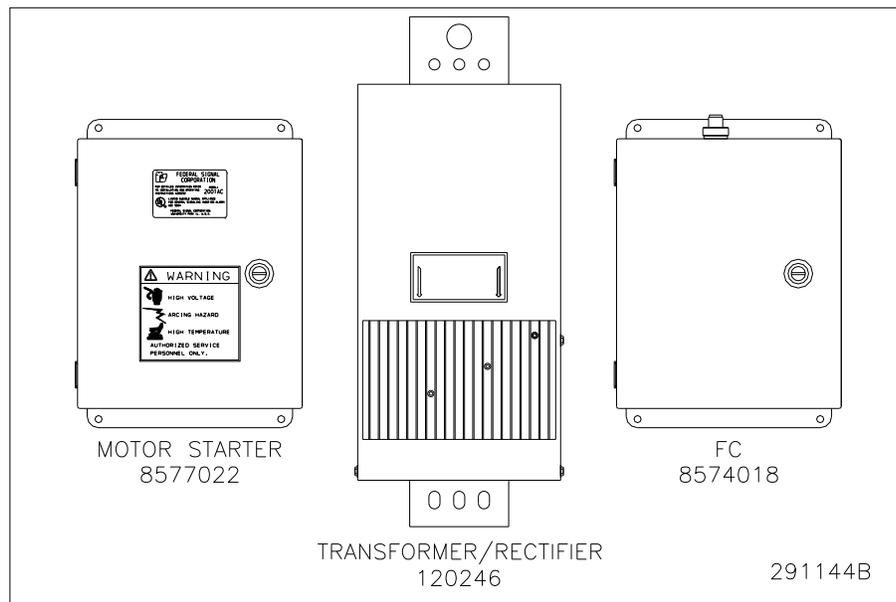
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Characteristics

Introduction

This service manual describes the characteristics, specifications, installation, controls/theory of operation, and service and maintenance of the 2001-AC Motor Starters and Transformer/Rectifier. The 2001-AC converts 208/220/240 VAC to nominal 48 VDC and provides relay contactors to switch 48 VDC to external equipment (such as, a siren).

Figure 1 2001-AC (FC control purchased separately)



Describing the Motor Starter and the Transformer/Rectifier

The 2001-AC consists of two enclosures that you can separately mount for ease of installation. Refer to Figure 1 2001-AC (FC control purchased separately). The 2001-AC consists for the following:

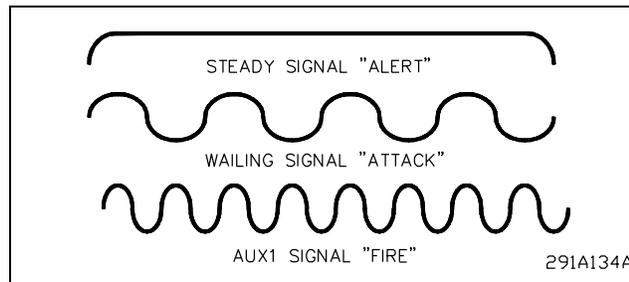
- NEMA4 enclosure with Motor Starter/Contactors
- Transformer/Rectifier

The Motor Starter/Contactors enclosure switches 48 V power to the siren and rotator motors from the Transformer/Rectifier power supply. The Transformer/Rectifier enclosure houses the step-down transformer and rectifier, which provides the 48 VDC for powering the siren.

Describing the Signal

You can control the 2001-AC by any timing device with relay or transistor outputs with a rating of at least 1 Amp, 50 VDC (for example, a FC controller). The signal output timings that the 2001-AC typically uses are a Steady signal, Wailing signal, and Fire signal. The Steady signal is frequently used as a Civil Defense Alert signal. The Wailing signal is often used as a Civil Defense Attack signal. The Fire signal is often used to summon local firemen. These signals are shown graphically in the following figure.

Figure 2 Signal Characteristics



Options

Radio Control

You can remotely activate the Motor Starter by a radio signal when an FC Controller is purchased. Activation by radio control has the advantage that physical control lines are not required. The FC Controllers are capable of both radio and local push button control. These controllers are available in UHF and VHF bands. Landline, cellular, satellite, and IP options are available; contact your local Federal Signal representative for further information at: 800-548-7229 or 708-534-3400 extension 5822.

2001HR

This option enables the control of both of the siren motors from a single contact closure. This feature is typically required for telephone line control systems. The 2001HR is a holding relay, which holds the rotator motor on for 15 seconds after the control contact is released, keeping siren rotation active during Wail signals.

Battery Backup

You can upgrade the 2001-AC to a battery-backed system, which automatically switches from AC primary operation to DC backup operation in the event of a power failure.

Contact your local Federal Signal representative for further information on battery backup systems or contact Federal Signal Customer Care at: 800-548-7229 or 708-534-3400 extension 5822.

Specifications

Transformer/Rectifier

Operating Voltage	208/220/240 VAC (+/- 10%), 50-60 Hz
Current Requirements	30 Amps. (Nom.)
KVA	6.5 primary/9.2 secondary
Fusing	40 Amps., slow blow max.
Output Voltage, DC	48 VDC
Step-down Voltage, AC	115 VAC at 10 Amps
Operating Current	100 Amps. (Nom.)
Fusing	200 Amps (fast)

Contactors

Contact Rating	200 A at 48 VDC
Coil	48 VDC, 110 ohms

General

Continuous Full Output	
Signaling Time	30 minutes
Operating Temperature	-30°C to +65°C
Motor Starter Enclosure	NEMA4
Transformer/Rectifier	NEMA3R
Motor Starter Enclosure	13.50 inches x 9.84 inches x 6.00 inches (HWD)
Transformer/Rectifier	20 inches x 10.25 inches x 8.75 inches (HWD)
Enclosure	
Motor Starter Enclosure	16.0 pounds (7.2 kg.)
Transformer/Rectifier	
Enclosure	150 pounds (68.1 kg.)

Installation Instructions

⚠ DANGER

Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, experienced electricians in accordance with national and local electrical codes, acting under the direction of the installation crew safety foreman, should perform installation.

Location and Installation

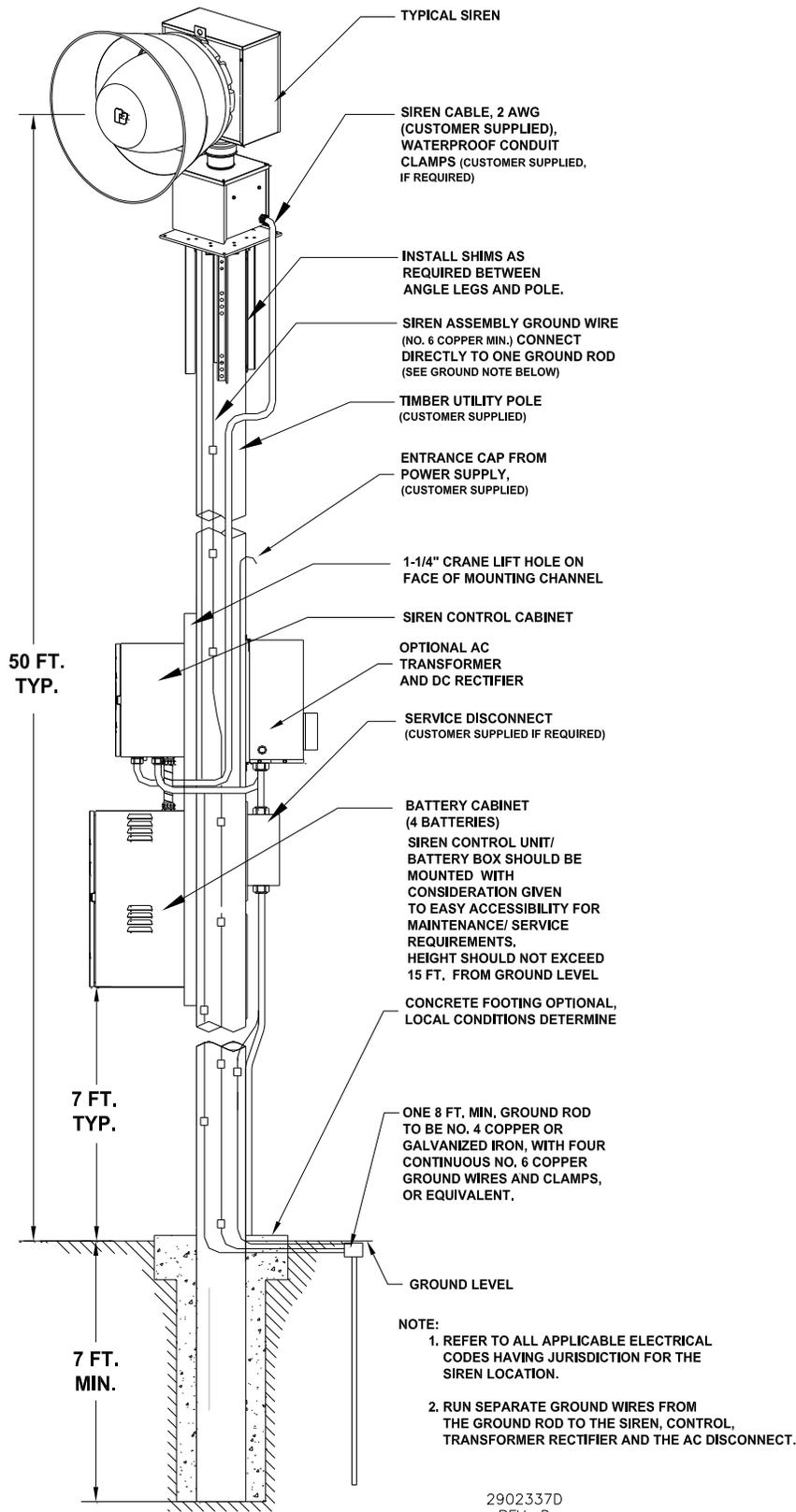
This section provides guidelines for installing the 2001-AC.

Locating the 2001-AC

- Mount the 2001-AC either indoors or outdoors. In order to minimize voltage loss, Federal Signal recommends that you install the 2001-AC within 50 feet of the siren or other equipment being activated. If it is necessary to make a longer cable run, Federal Signal recommends increasing the wire size to 1 AWG or larger. Mount the Motor Starter Enclosure as close as possible to the Transformer/Rectifier. Refer to Figure 3 Typical Siren Installation Drawing to see a typical installation.
- The Motor Starter Enclosure is supplied with a padlock hasp for security.
- The system operates from either 208, 220, or 240 VAC single phase, 50-60 Hz. Do not connect the 2001-AC to any other voltage source.
- Refer to the Specifications section to determine the total weight of the 2001-AC. Ensure that the mounting surface and fasteners can safely sustain the weight.

Installation Instructions

Figure 3 Typical Siren Installation Drawing



Installation Requirements

NOTE: When installing this product, ensure that Local codes and NEC recommendations are followed.

1. The use of galvanized mounting hardware is recommended stainless steel may be required if installed near coastal or other harsh environments. Four ¼ x 3 inches and three ½ x 5 inches lag bolts with washer are typically required for pole mounted installations.
2. Proper lifting equipment capable of safely lifting at least 200 lbs. is needed.
3. Fused AC Disconnect (50 A service) and mounting hardware.
4. Wiring (General Requirements)
 - Approximately 100 feet of 2 AWG wire.
 - Approximately 50 feet of 12 AWG wire.
 - 10 AWG wire (Length depends on AC install).
 - 3 - 2 AWG, 5/16 inch ring terminals.
 - 1 - 2 AWG, ¼ inch ring terminal.
 - 1 - 12 AWG, ¼ inch ring terminal
 - 3 - 10 AWG wire nuts.
 - Approximately 50 feet of 1 inch conduit
 - ½ inch conduit (length depends on install)
 - Ground wiring, rod and/or clamps.

Installation

Pole Mounting

Mount the Motor Starter Enclosure and Transformer/Rectifier separately. There are predrilled mounting holes in each enclosure. To attach the Motor Starter Enclosure and Transformer/Rectifier to the pole, do the following:

1. Use proper lifting equipment to lift the enclosures to the desired height along the pole. Attach the enclosures to the pole at a height that is accessible to service personnel, but discourages vandalism.
2. Use the proper lifting equipment to hold the enclosures against the pole. Using the holes in each enclosure as a template, locate the holes on the pole.
3. Transformer/Rectifier—Drill a 3/8 inch hole at all of the mounting locations. Drill each hole at least 3-1/2 inches (90 mm) deep.

Installation Instructions

4. Attach the Transformer/Rectifier Enclosure to the pole; use three user-supplied $\frac{1}{2}$ x 5 inches lag bolts. Slide a user-supplied $\frac{1}{2}$ inch flat washer onto each bolt before threading the bolt into the pole.

NOTE: Start with the two bottom bolts first, and then hang the Transformer/Rectifier Enclosure.

5. Motor Starter Enclosure—Attach the enclosure to the pole using four user-supplied $\frac{1}{4}$ inch x 3 inches lag bolts. Be careful not to bend the enclosure around a small diameter pole.
6. Mount a user-supplied fused disconnect switch, in accordance with local and national electric codes, on the pole beneath or opposite the Control Unit Transformer/Rectifier assembly in line with the primary AC service.

Flat Surface Mount

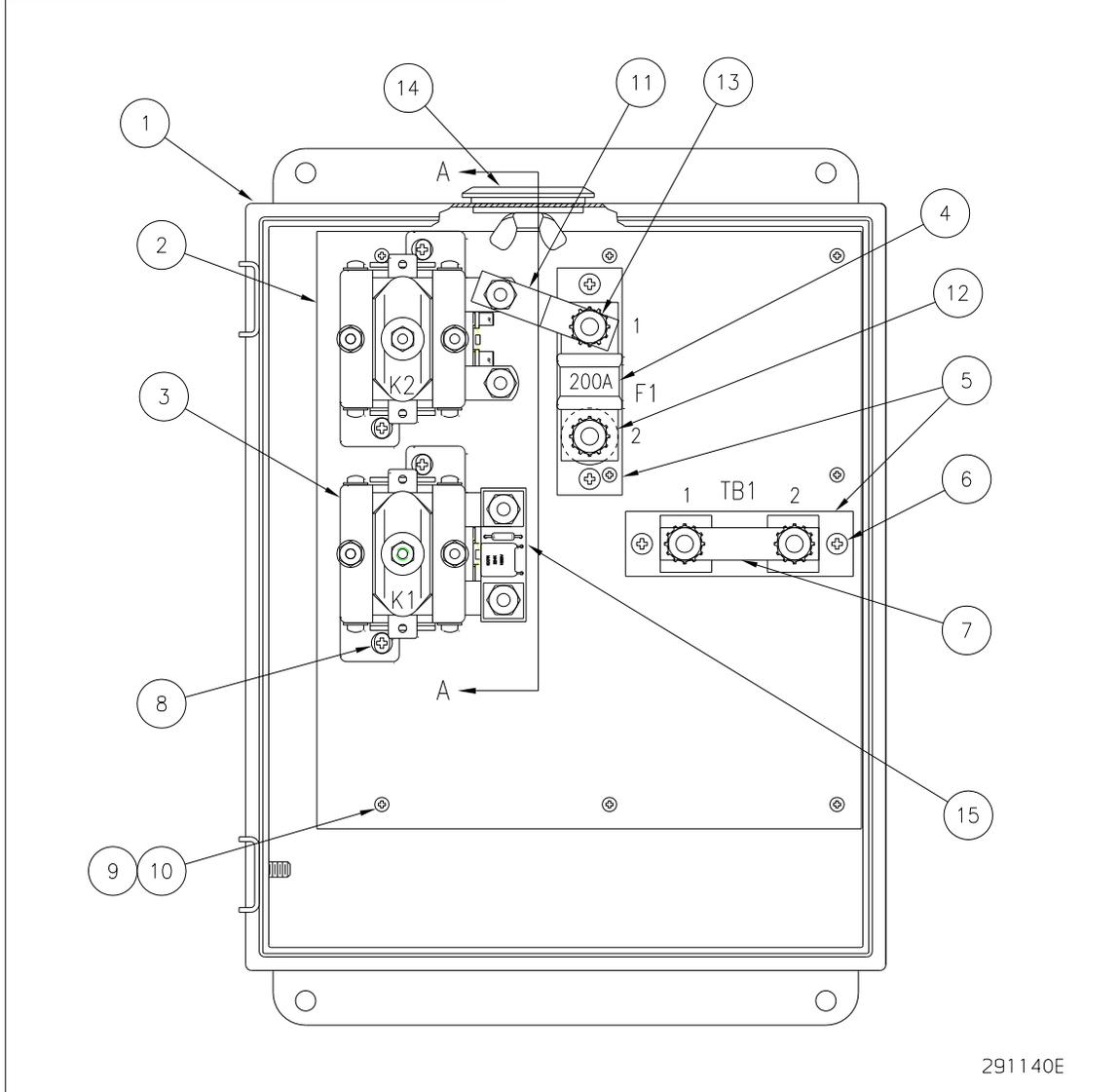
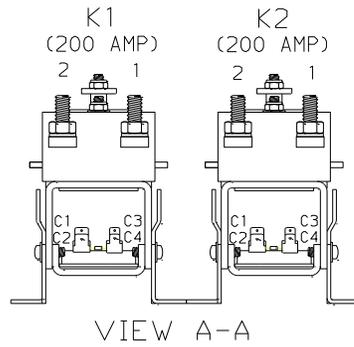
To attach the Motor Starter Enclosure and Transformer/Rectifier to a flat surface, do the following:

1. The 2001-AC enclosures are mounted separately. There are predrilled mounting holes in each enclosure for attaching the enclosures to a wall or other substantial vertical surface. If the siren is installed on the roof of the building, it may be desirable to install the 2001-AC enclosures inside the building, if practical.
2. Install a user-supplied, fused disconnect switch in accordance with National and Local Electrical Codes in line with the primary AC service.

NOTE: Use good mounting practices and consult a structural engineer, if required.

Figure 4 Motor Starter Enclosure Parts List

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	170314A	CBNT, NEMA4
2	1	8574025A	MTG. PLATE
3	2	131A183C	CONTACTDR
4	1	148A147A	FUSE, 200 AMP
5	2	8402A066A	FUSE/TERM BLOCK
6	4	7011A101-12	SCREW, THD FRM, #8
7	1	8402109A	BUSS BAR
8	4	7011A069-06	SCREW, THD FRM, #8
9	6	7000444-05	SCREW, PAN HD, 4-40
10	6	7075A080	INT. TTH. LOCK WASHER
11	1	8402096A	BUSS BAR
12	1	7072A032	WASHER, FLAT
13	4	7058A033	NUT, KEPS, 5/16-18
14	1	231194A-01	PLUG, HOLE, Ø1.38"
15	1	20000216	SNUBBER CAP, PCBA



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Installation Instructions

Figure 5 Motor Starter Wiring Diagram with HR Option

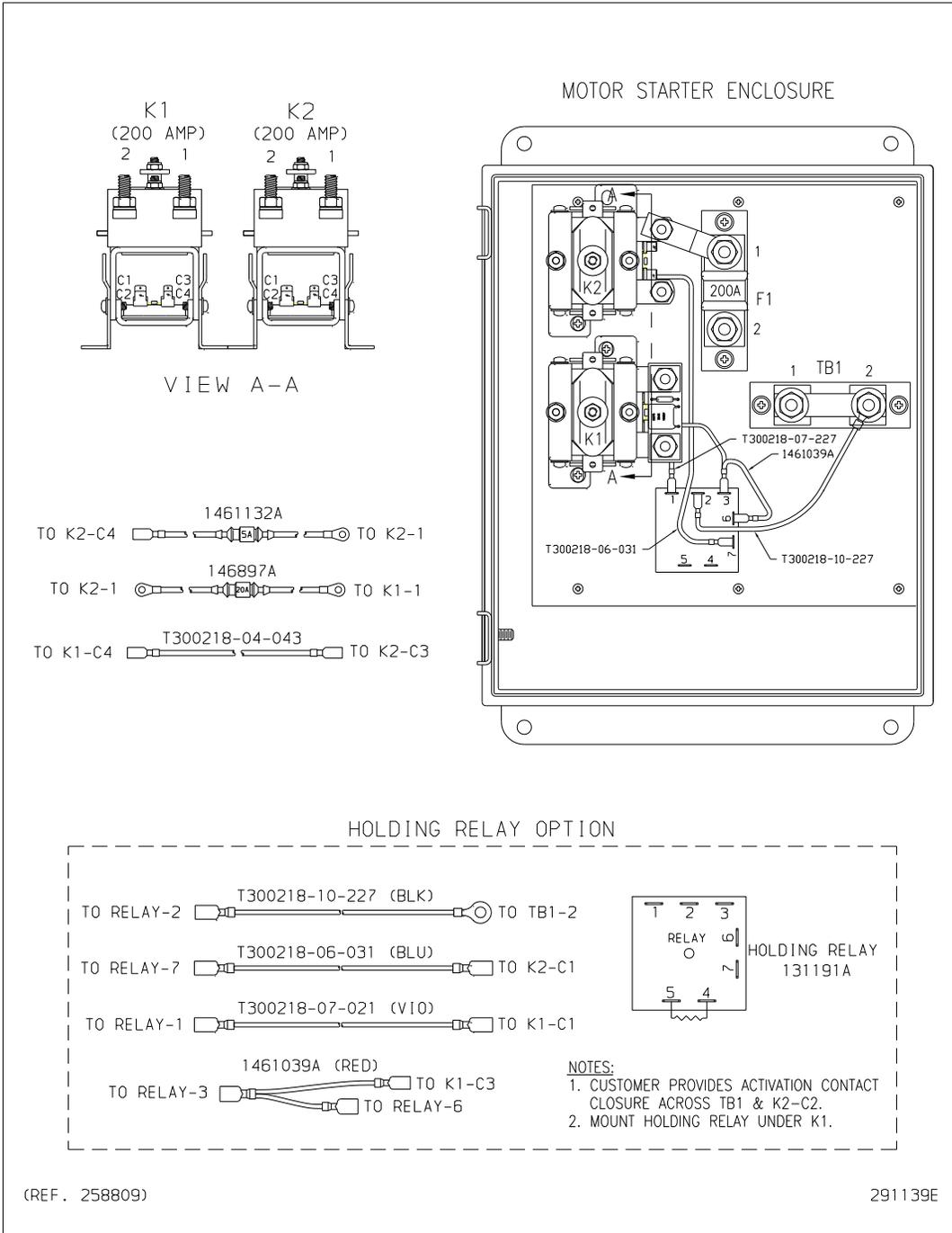
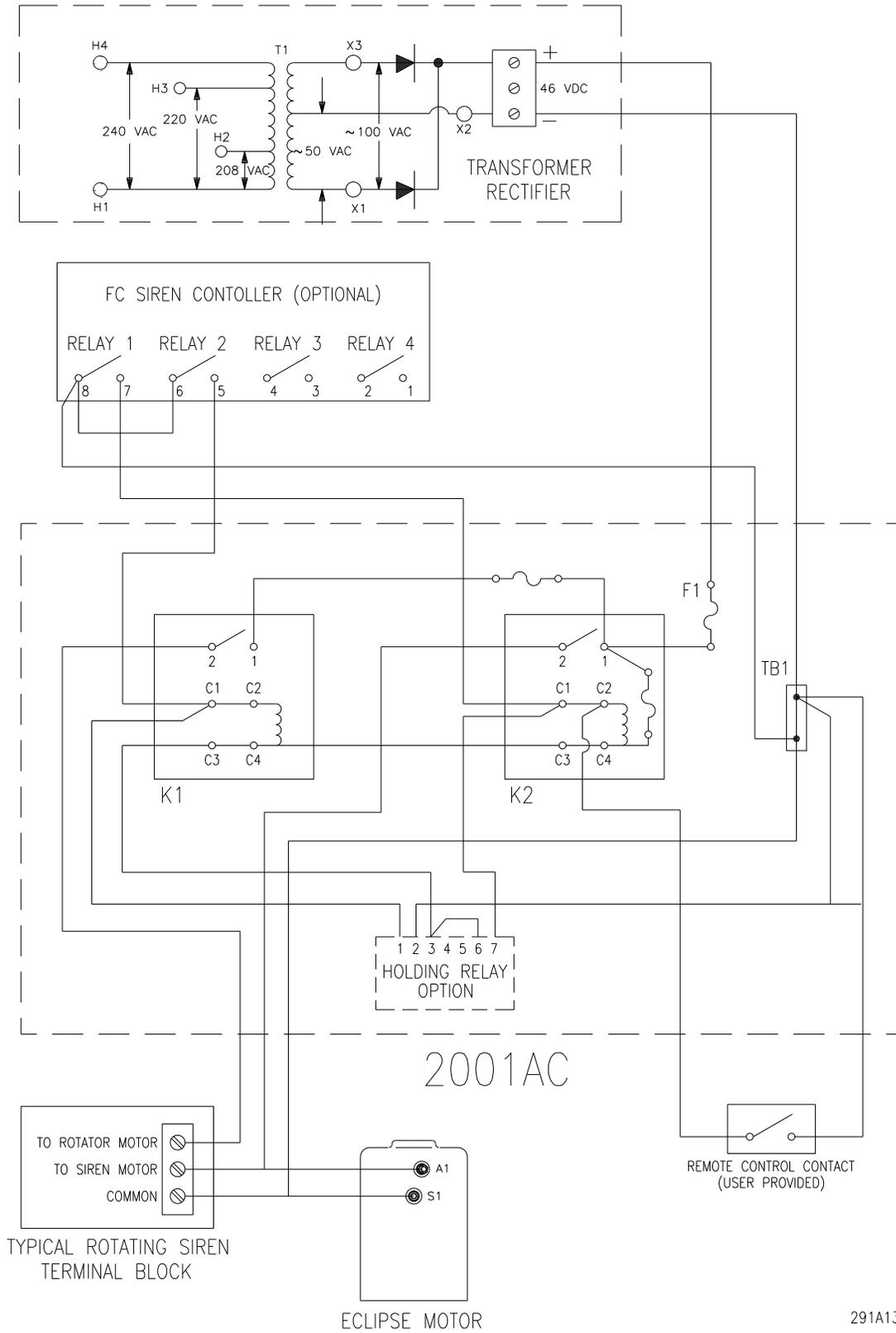


Figure 6 Typical Wiring Diagram



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Electrical Connections

⚠ WARNING

Install the siren electrical system in compliance with local electrical codes and NEC recommendations. Federal Signal also recommends that all user-installed conduit connections enter from bottom of all enclosures.

⚠ CAUTION

Solidly connect siren units and control units to an earth ground. If the siren is installed on a building, ground the system to a metallic object known to be grounded. For pole mounted installations, drive a metal rod or bar at least eight feet into the ground, as close as practical to the base of the pole. For maximum protection, use a separate, continuous 6 AWG or larger wire from the siren frame to ground and from the enclosure of each siren unit to ground.

Connecting the Siren

The 2001-AC parts list and wiring diagrams are shown in Figure 4 Motor Starter Enclosure Parts List, Figure 5 Motor Starter Wiring, and Figure 6 Typical Wiring Diagram.

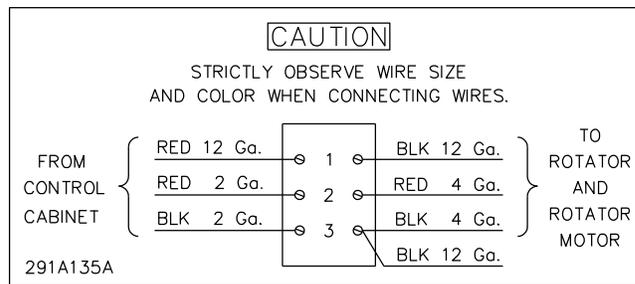
- Typical connections between the siren and control unit are accomplished using user supplied wires. Two 2 AWG wires provide operating power to the siren motor. If required, an additional 12 AWG wire provides operating power to the rotator motor.
- Route the interconnecting cable through conduit between the siren and the Motor Starter Enclosure. There is a three position terminal block (shown in Figure 7 Terminal Block in Rotator Housing) located in the rotator housing of the siren that accepts stripped wire.
- In the Motor Starter Enclosure, the DC GROUND terminal block TB1, accepts user supplied 5/16 inch ring terminals and the relays accept user supplied ¼ inch ring terminals. The Motor Starter coils accept user supplied ¼ inch spade terminals. These points provide convenient locations for making all electrical connections.

Connect the siren to the Motor Starters, as follows:

1. After drilling or punching an appropriate sized hole in the enclosure, install a 1 inch user supplied electrical conduit fitting in the bottom of the enclosure and in the bottom of the siren rotator housing.

2. Install 1 inch user supplied electrical conduit between the conduit fitting in the bottom of the siren rotator housing and the conduit fitting at the bottom of the Motor Starter Enclosure.
3. Route the two 2-AWG siren motor wires and the one 12 AWG rotator motor wire (user-supplied) from the siren rotator housing to the Motor Starter Enclosure through the conduit.
4. Connect the 12 AWG wire (48 VDC) from the terminal block in the rotator housing terminal 1 (see Figure 5 Motor Starter Wiring) to the rotator control relay K1-2 (user supplied ¼ inch ring terminal required - see Figure 4 Motor Starter View A-A).

Figure 7 Terminal Block in Rotator Housing



5. Connect a 2 AWG wire (48 VDC) from the terminal block in the rotator housing terminal 2 to the rotor control relay K2-2 (user supplied ¼ inch ring terminal required).
6. Connect a 2 AWG wire (common) from the terminal block in the rotator housing terminal 3 to TB1-1 in the control box (user supplied 5/16 inch ring terminal required).
7. Tighten all connections securely to provide good electrical connections.
8. Remove any metal shavings or debris from the enclosures.
9. Ground the Siren and 2001-AC enclosure to earth ground.

Connecting the Transformer/Rectifier

⚠ DANGER

Disconnect AC power and make sure transformer is de-energized before making or changing electrical connections.

1. Route 1 inch conduit between the user-supplied fused disconnect switch and the user-supplied conduit fitting in the bottom of the Transformer/Rectifier enclosure.

Installation Instructions

- Route two user-supplied wires through the conduit that was just installed between the Transformer/Rectifier and the fused disconnect switch. Use 10 AWG or larger. Connect the power wires as follows:

H1-H2 for 208 VAC

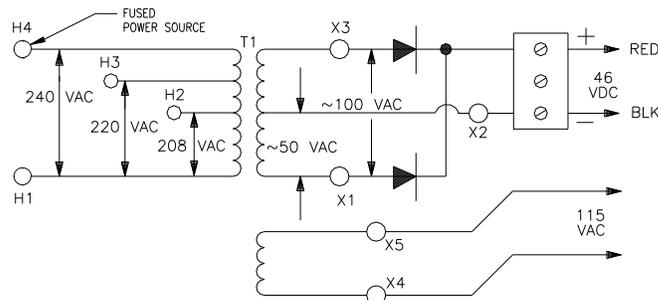
H1-H3 for 220 VAC

H1-H4 for 240 VAC

In the Transformer/Rectifier as shown in Figure 8 Transformer/Rectifier Schematic Diagram using wire nuts. Cap the unused taps.

- Follow the instructions included with the lightning protector (supplied) and install in the AC service disconnect.
- Route 1 inch conduit between the Transformer/Rectifier Enclosure and the Motor Starter Enclosure.
- Route two user-supplied wires through the conduit that was just installed between the Transformer/Rectifier and Motor Starter. Use 3 AWG or larger.
- Connect a red or (+) labeled wire from the transformer/rectifier terminal block (+) to F1-2 of the Motor Starter Enclosure (user provided 5/16 inch ring terminal required). Refer to Figure 5 Motor Starter Wiring Diagram with HR Option.
- Connect a black or (-) labeled wire from the transformer/rectifier terminal block (-) to TB1-2 of the Motor Starter Enclosure (user provided 5/16 inch ring terminal required). Refer to Figure 5 Motor Starter Wiring Diagram with HR Option.
- Remove any metal shavings or debris from the enclosures.
- Ground the Transformer/Rectifier enclosure to earth ground.

Figure 8 Transformer/Rectifier Schematic Diagram



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Control Unit Connections (Optional)

The siren controller (purchased separately) must provide a contact closure between each motor starter (K1 and K2) coil and the DC ground, TB1. K2 controls the main siren motor and can be held on steady or pulsed on and off for various siren sounds. K1 controls the siren rotator motor and must be held on for the duration of the siren signal if siren rotation is required.

Connections to the contactor coils of K1 and K2 are made at the C1 positions of each coil using ¼ inch spade terminals (refer to view A-A in Figure 3 Typical Siren Installation Drawing).

Federal Signal FC series Controllers are recommended. Refer to the *FC Series Siren Controller Manual* part number 255294 for installation instructions.

2001HR (Optional)

If the 2001HR option is purchased, a single contact closure is required to activate the siren. When terminal 7 on the holding relay, (available at K2-C2) is connected to ground (TB1), the siren motor and the rotator motor are activated. When the connection to ground is removed, power to the siren motor is removed and the rotator motor remains on for fifteen (15) seconds to allow a single contact closure to control both Steady and Wail type siren functions.

Pre-Operation Checkout

After the 2001-AC has been completely installed, perform the following checks before putting the siren into service.

▲ WARNING

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

1. Turn off AC power.
2. Visually make sure that all air intakes and sound outlets are not obstructed.
3. Make sure all connections in the Control Unit, Siren, Motor Starter and Transformer/Rectifier are correct and properly tightened.
4. Turn on AC power.
5. Activate the Wail function. Check for proper rotation and sound of siren. After confirming that the installation is complete and it has been established that the siren is operating properly, Federal Signal recommends that all control devices be padlocked to discourage tampering and vandalism.

Service and Maintenance

⚠ WARNING

Qualified personnel familiar with the siren, associated controls, and power sources being used should perform service or maintenance.

The siren has moving parts, high operating currents, and produces high output sound levels, which could cause severe personal injury, electrocution, or death.

Before servicing or maintaining, ensure that remote activation cannot occur and disconnect power to the siren and its controls.

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/>

Preventive Maintenance

Test the 2001-AC for proper operation at least once a month. A daily test at noon, curfew, or other selected time is preferred. This not only enhances the usefulness of the siren, but also instills public confidence in the reliability of the warning system, and provides additional confirmation of it being prepared for operation in an emergency.

In order to minimize the possibility of siren failure, annual inspection and maintenance is desirable. Check all connections and fasteners, tighten if necessary. This schedule is only a suggested guideline. It may be necessary to vary the schedule if the siren is used frequently or if it is used in an extreme climate.

⚠ WARNING

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

1. Turn off AC power.
2. Visually make sure all air intakes and sound outlets are not obstructed.
3. Make sure all connections in the Control Unit Transformer/Rectifier are correct and properly tightened.
4. Turn on AC power.

5. Activate the Wail function. Check for proper rotation and sound output of siren. After confirming that the installation is complete and it has been established that the siren is operating properly, Federal Signal recommends that all control devices be padlocked to discourage tampering and vandalism.

Troubleshooting Checklist



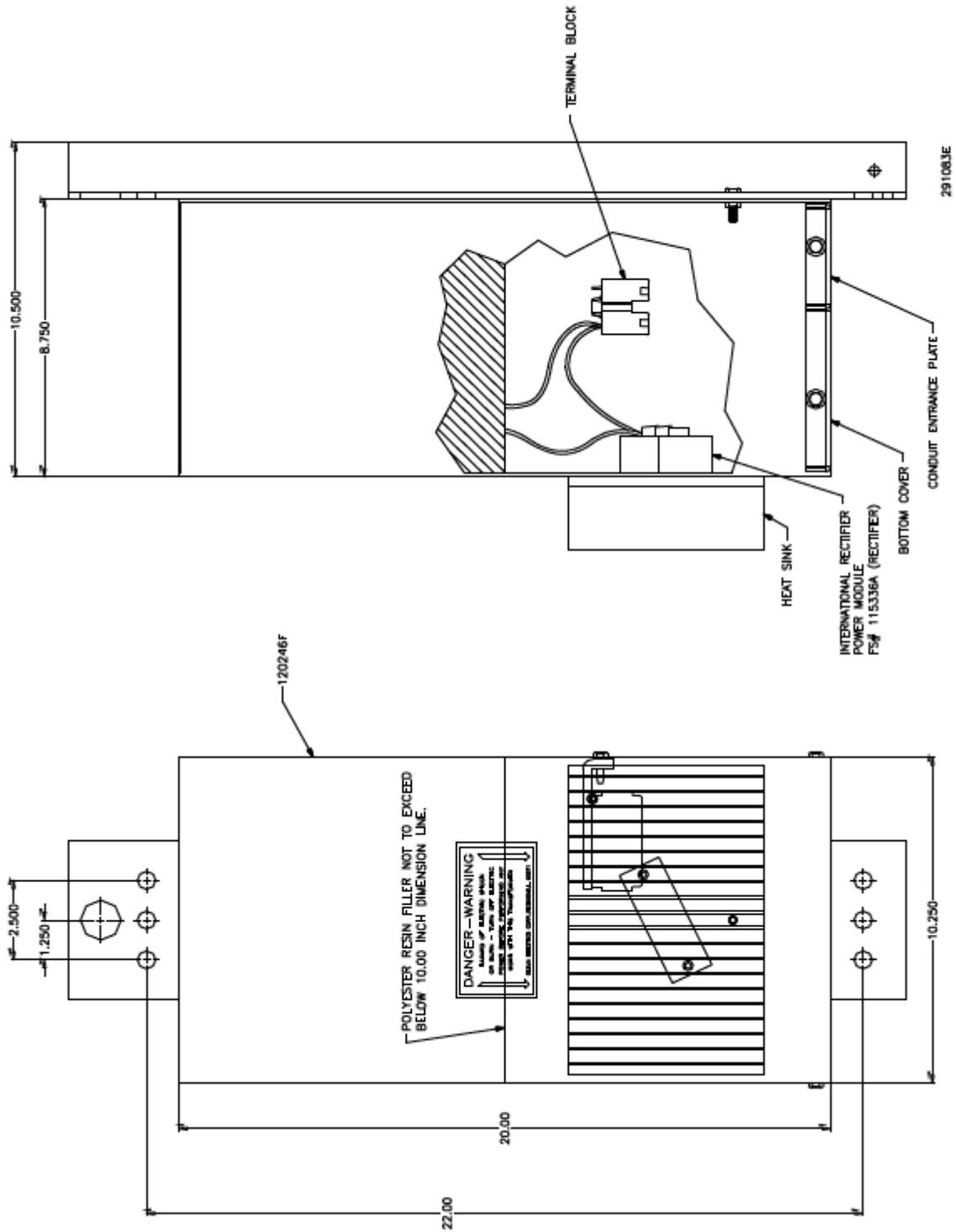
Electrocution or severe personal injury could occur when working on this equipment. Service should only be performed by personnel familiar with 240 VAC power and only after reading this manual.

The following checklist should be completed if the unit fails to operate properly.

Table 1 Troubleshooting Checklist

Check	Questions
	Are there any visible signs of damage?
	What type of control unit is being used? <ul style="list-style-type: none"> • FC • 2001HR • AR • OTHER
	Does the unit operate from the control unit?
	Do K1 and K2 operate?
	Is F1 open?
	Are the main AC breakers tripped?
	What is DC voltage supplied between F1 and TB1?
	What is voltage supplied to the Transformer/Rectifier primary?

Figure 9 Transformer



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Warranty, Limited 2



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