

Models 2001-130, Equinox, and 508-128

High Power, Directional Rotating Siren



Description, Specifications, Installation, 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 Messages

▲ 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's electric codes and will follow these guidelines as well as local codes and ordinances, including any state or local noise-control ordinances.

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 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, be 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 warn people indoors effectively.
- The sound output of sirens can cause permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings, and restrict access to areas near sirens. Review and comply with any local or state noise control ordinances as well as OSHA noise exposure standards, regulations, and guidelines.
- 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 corrective 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 injuries. 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 and qualified electricians should install this product in compliance with national, state, and any other applicable codes, ordinances, and regulations. 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. Review and comply with any local or state noise control ordinances as well as OSHA noise exposure regulations and guidelines.
- 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 and operating personnel do not have these instructions to refer to and are not properly trained, the system may not provide the intended audible warning, and service personnel may be exposed to hazards that could result in death, permanent hearing loss, or other bodily injuries. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to recruits and trainees. Also give a copy to anyone who is going to service or repair the siren.

Operation

Failure to understand the capabilities and limitations of your siren 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 the equipment. Thoroughly discuss all contingency plans with those responsible for warning people in your community, company, or jurisdiction. A well-written contingency plan document is recommended.

Hazard Classification

Federal Signal uses signal words to identify the following:

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

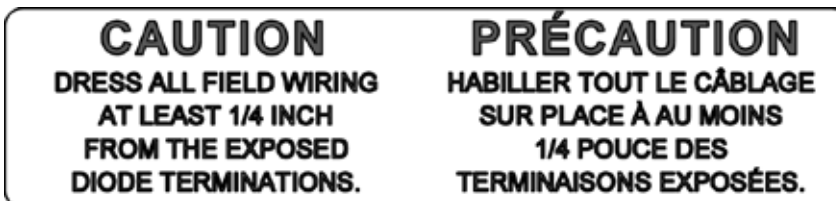
CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

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

Pay careful attention to notices located on the equipment.



General Description

This manual describes the features, specifications, installation, service and maintenance of the 2001-130, Equinox, and 508-128 Sirens.

Models 2001-130, Equinox, and 508-128 Sirens are electromechanical, DC, rotating sirens capable of producing high-intensity warning signals over a large area. A highly efficient design enables the siren to produce a high sound level while making moderate demands on the power source. The Equinox Siren is identical to the Model 2001-130 Siren, except the stator has 8 ports instead of 12 ports.

Each siren is available for use with through-the-pole wiring. Through-the-pole wiring is typically used with concrete, steel, or composite-type poles where wiring can be managed through the center of the pole. This type of mount allows wiring to be brought from the inside of the pole through the bottom of the siren mounting plate up to the wiring box.

To order models that allow wiring through the center of the pole, use the following part numbers: 2001-130-C, Equinox-C, and 508-128-C. See the “Through-the-Pole Mount” on page 19 for more information.

Figure 1 2001-130 and 508-128 Sirens



Siren Description

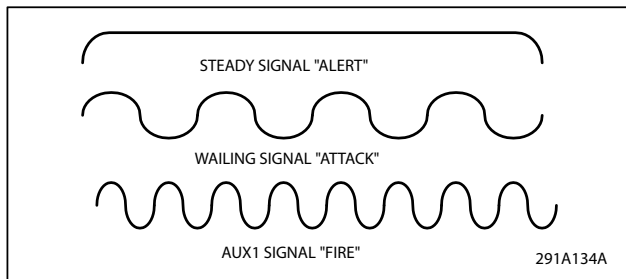
Models 2001-130, Equinox, and 508-128 Sirens are single-tone sirens capable of producing a 130 dB, 125 dB, and 128 dB sound level, respectively, at 100 feet for a minimum of 15 minutes, when using the DCB series Control Cabinet and Battery Cabinet with fully charged, standard, deep-cycle, marine batteries. Up to fifteen minutes of continuous operating time is available with the 2001TRB/2001TRBP option. This option supplies DC current directly to the siren from a 208/220/240 Vac, optionally 480 Vac line.

The sirens use two motors. One is used to create the siren signals, and the other is used to rotate the siren assembly. The first motor, which produces the sound energy, is attached to a stator with a rotor mounted on the motor shaft concentric to the stator. Each rotor and stator contains one row of ports. As the motor rotates the rotor, air is drawn into the rotor and passes through the rotor and stator ports in pulses. These pulses are produced when the rotor alternately opens and closes the stator ports. The pulses of air produce sound at a frequency (pitch) that is dependent upon the motor’s rotational speed and the number of ports in the rotor-stator combination.

Signal Description

The sirens are capable of producing a steady single-frequency signal, a wailing rising and falling frequency signal, and a fast wailing signal. The steady signal is frequently used as a civil defense “Alert” or weather emergency signal. The wailing signal is often used as a civil defense “Attack” signal. The fast wail or fire signal is used as a fire signal to summon the local fire department. You can use any of the signals for any desired application. These signals are shown graphically in the following figure.

Figure 2 Signal Characteristics



Features

The sirens have the following features.

- High-powered rotating siren for maximum coverage
- Three distinct warning signals
- AC or solar-powered with battery operation or battery backup
- Weather-resistant coating
- Radio, IP, Landline, Satellite, and Cellular can be combined to provide a robust alerting solution

Specifications for the 2001-130

Table 1 Specifications for the 2001-130

Power Requirements*	
Siren Motor	48 V (DC or full wave rectified AC) 100 A (nominal)
Rotator Motor	48 V (DC or full wave rectified AC) 1 A (nominal)
Wiring	
Siren Motor	2 AWG minimum, 2 wires
Rotator Motor	14 AWG minimum, 1 wire
Motor Type	
Siren	Series Wound DC 6.5 Hp (nominal)
Rotator	Permanent Magnet DC 1/8 Hp
Dimensions (height x width x depth)	62 x 37 x 41 in (157 x 94 x 104 cm)
Weight	
Siren Weight	420 lb (191 kg)
Shipping Weight	460 lb (209 kg)
Operating Temperature	-30 to +60°C** (-22 to 140°F)
Wind Loading	
EPA at 40 feet	9.5 ft ²
Wind Load (130 mph, 40 feet above ground)	613 lbf

*Power requirements refer to the power supplied by the batteries or optional AC operation with battery backup.

**The siren can operate throughout this temperature range provided the battery temperature is maintained at -18°C (-0.4°F) or higher.

Table 2 Signal Information for the 2001-130

Signal	Frequency Range	Sweep Rate
Steady	790 Hz	N.A.
Wail	470 to 790 Hz	10 seconds
Fast Wail	600 to 790 Hz	3.6 seconds
Signal Duration	3 min. (programmable)	
Sound Output (SPL)	130 dBc +/-1 dBc (on axis) at 100 ft (30.5 m)	
Rotation	3 RPM	
Coverage		
70 dB	Up to 6,500 ft	
60 dB	Up to 13,200 ft	

Actual coverage is dependent on many factors, contact Federal Signal for sound analysis of your specific location.

Specifications for the Equinox

Table 3 Specifications for the Equinox

Power Requirements*	
Siren Motor	48 V (DC or full wave rectified AC) 115 A (nominal)
Rotator Motor	48 V (DC or full wave rectified AC) 1 A (nominal)
Wiring	
Siren Motor	2 AWG minimum, 2 wires
Rotator Motor	14 AWG minimum, 1 wire
Motor Type	
Siren	Series Wound DC 6.5 Hp (nominal)
Rotator	Permanent Magnet DC 1/8 Hp
Dimensions (height x width x depth)	62 x 37 x 41 in (157 x 94 x 104 cm)
Weight	
Siren Weight	390 lb (177 kg)
Shipping Weight	460 lb (209 kg) w/mtg. legs
Temperature	
Operating Temperature	-30 to +60°C** (-22 to 140°F)
Wind Loading	
EPA at 40 feet	9.5 ft ²
Wind Load (130 mph, 40 feet above ground)	613 lbf

*Power requirements refer to the power supplied by the batteries or optional AC operation with battery backup.

** The siren can operate throughout this temperature range provided the battery temperature is maintained at -18°C (-0.4°F) or higher.

Table 4 Signal Information for the Equinox

Signal	Frequency Range	Sweep Rate
Steady	500 Hz	N.A.
Wail	180 to 500 Hz	10 seconds
Fast Wail	300 to 500 Hz	3.6 seconds
Signal Duration	3 min. (programmable)	
Sound Output (SPL)	125 dBc +/-1 dBc (on axis) at 100 ft (30.5 m)	
Rotation	3 RPM	
Coverage		
70 dB	Up to 6,100 ft	
60 dB	Up to 12,200 ft	

Actual coverage is dependent on many factors, contact Federal Signal for sound analysis of your specific location.

Specifications for the 508-128

Table 5 Specifications for the 508-128

Power Requirements*	
Siren Motor	48 V (DC or full wave rectified AC) 120 A (nominal)
Rotator Motor	48 V (DC or full wave rectified AC) 1 A (nominal)
Wiring	
Siren Motor	2 AWG minimum, 2 wires
Rotator Motor	14 AWG minimum, 1 wire
Motor Type	
Siren	Series Wound DC 6.5 Hp (nominal)
Rotator	Permanent Magnet DC 1/8 Hp
Dimensions (height x width x depth)	70.1 x 53.4 x 43.1 in (178.1 x 135.6 x 109.5 cm)
Weight	
Siren Weight	430 lb (195 kg)
Shipping Weight	590 lb (268 kg) w/mtg. legs
Operating Temperature	-30 to +60°C** (-22 to 140°F)
Wind Loading	
EPA at 40 feet	17.4 ft ²
Wind Load (130 mph, 40 feet above ground)	1,104 lbf

* Power requirements refer to the power supplied by the batteries or optional AC operation with battery backup.

**The siren can operate throughout this temperature range provided the battery temperature is maintained at -18°C (-0.4°F) or higher.

Table 6 Signal Information the 508-128

Signal	Frequency Range	Sweep Rate
Steady	500 Hz	N.A.
Wail	180 to 500 Hz	10 seconds
Fast Wail	300 to 500 Hz	3.6 seconds
Signal Duration	3 min. (programmable)	
Sound Output (SPL)	128 dBc +/-1 dBc (on axis) at 100 ft (30.5 m)	
Rotation	3 RPM	
Coverage		
70 dB	7,300 ft Calculated*	
60 dB	14,700 ft Calculated*	

*Actual coverage is dependent on many factors, contact Federal Signal for sound analysis of your specific location.

Installation Instructions

Determining a Suitable Location

⚠ WARNING

SOUND HAZARD: *The output level of a siren is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren location and post warnings where excessive levels may be encountered. Refer to OSHA 29 CFR 1910.95 for safe exposure limits.*

Do not expose personnel to sound levels above 123 dBC.

Careful consideration of the factors affecting the propagation of sound from the siren and the response of the human ear to the sound will optimize the ability of the siren to effectively warn the community. Follow Federal Emergency Management Agency (FEMA) guidelines when designing the warning system.

When choosing a siren installation site, it is important to consider the reduction of signal intensity as the distance from the siren increases and the minimum desired signal level at the fringe of the area to be covered. As the distance from the siren increases, sound level losses accumulate. These losses result from weather conditions, the terrain, obstructions in the sound path, the sound pitch, and the siren's height.

Optimum sound propagation conditions occur when no obstructions exist in the sound path, the terrain is hard and flat, and the air is blowing away from the source. Under these conditions, you can expect a 6 dB loss per distance doubled. A loss per distance doubled of 10 dB is typically experienced because the atmosphere is rarely calm, the terrain may not be flat, and buildings or other obstructions are frequently present in the sound path.

The following table predicts the sound levels of the sirens using a 10 dB per distance doubled loss factor.

Table 7 Sound Levels Predictions

Distance	2001-130	Equinox	508-128
100 feet (30.5 m) the sound level is	130 dB	125 dB	128 dB
200 feet (61 m) the sound level is	120 dB	115 dB	118 dB
400 feet (122 m) the sound level is	110 dB	105 dB	108 dB

FEMA studies indicate typical ambient sound levels vary by location as follows:

- Industrial Areas: 70+ dBC
- Urban Areas: 60 dBC
- Rural Areas: 50 dBC

Assuming a typical 10 dB loss per distance doubled and a 70 dB minimum sound level required to warn a typical urban area, the effective range is as follows:

- Model 2001-130 Siren is approximately 6,400 feet.
- Equinox Siren is approximately 4,525 feet.
- Model 508-128 siren is approximately 5,572 feet.

Optimum warning is obtained when the warning signal is at least 10 dB above ambient. Do not expose personnel to sound levels above 123 dBC.

Wind speed and direction often affect the propagation of sound from the siren. Consequently, the direction of the prevailing wind may be a significant factor to consider when selecting the installation site(s) of a small, one- or two-site siren system. For example, if the prevailing wind is from the west, installing the siren toward the western edge of the area to be covered may be desirable.

Other factors to consider when selecting the installation site(s) include the availability of suitable electrical power, access to and ease of installation and maintenance, the height of surrounding obstructions, and security against vandalism.

Installing the Sirens

⚠ DANGER

ELECTROCUTION HAZARD: Electrocution or severe personal injury can occur when making electrical connections, drilling holes, or lifting equipment. Therefore, experienced electricians should perform installation per national and local electrical codes and ordinances, including any state or local noise-control ordinances.

Most siren installations are of two types: Pole Mount or Flat Surface Mount. These two configurations allow a siren to be installed in almost any situation. If the installations in this manual are unsuitable, modifying one of the configurations may be practical.

A siren is typically installed 40 to 50 feet above the ground. If the installation is located less than 40 feet above the ground, the sound intensity at close range may increase, but at the same time, the effective range of the siren may be reduced. Conversely, if the siren is located more than 50 feet above ground, the effective range of the siren may increase, but the sound may skip over areas closer to the siren. These variables may make it desirable to test the sound coverage of the siren at various heights and locations whenever possible.

Pole Installation

The 2001-130, Equinox, and 508-128 Sirens come standard with mounting hardware for wood pole deployment. Federal Signal also offers models designed for mounting through the center of the pole. Typically, through-the-pole wiring is used with concrete, steel, or composite type poles where wiring can be managed through the center of the pole. To order models that allow wiring through the center of the pole, use the following part numbers: 2001-130-C, Equinox-C, and 508-128-C. See the “Through-the-Pole Mount” on page 19 for more information.

A typical siren pole-mounted installation is shown in “Figure 3 Typical Pole Installation (Model 508-128 shown)” on page 16. The siren is mounted on a Southern Yellow Pine, Douglas Fir or equivalent Class 2 utility pole 40 to 50 feet above the ground. It is attached to the pole using legs as shown in “Figure 4 Siren Leg Assembly” on page 17.

Figure 3 Typical Pole Installation (Model 508-128 shown)

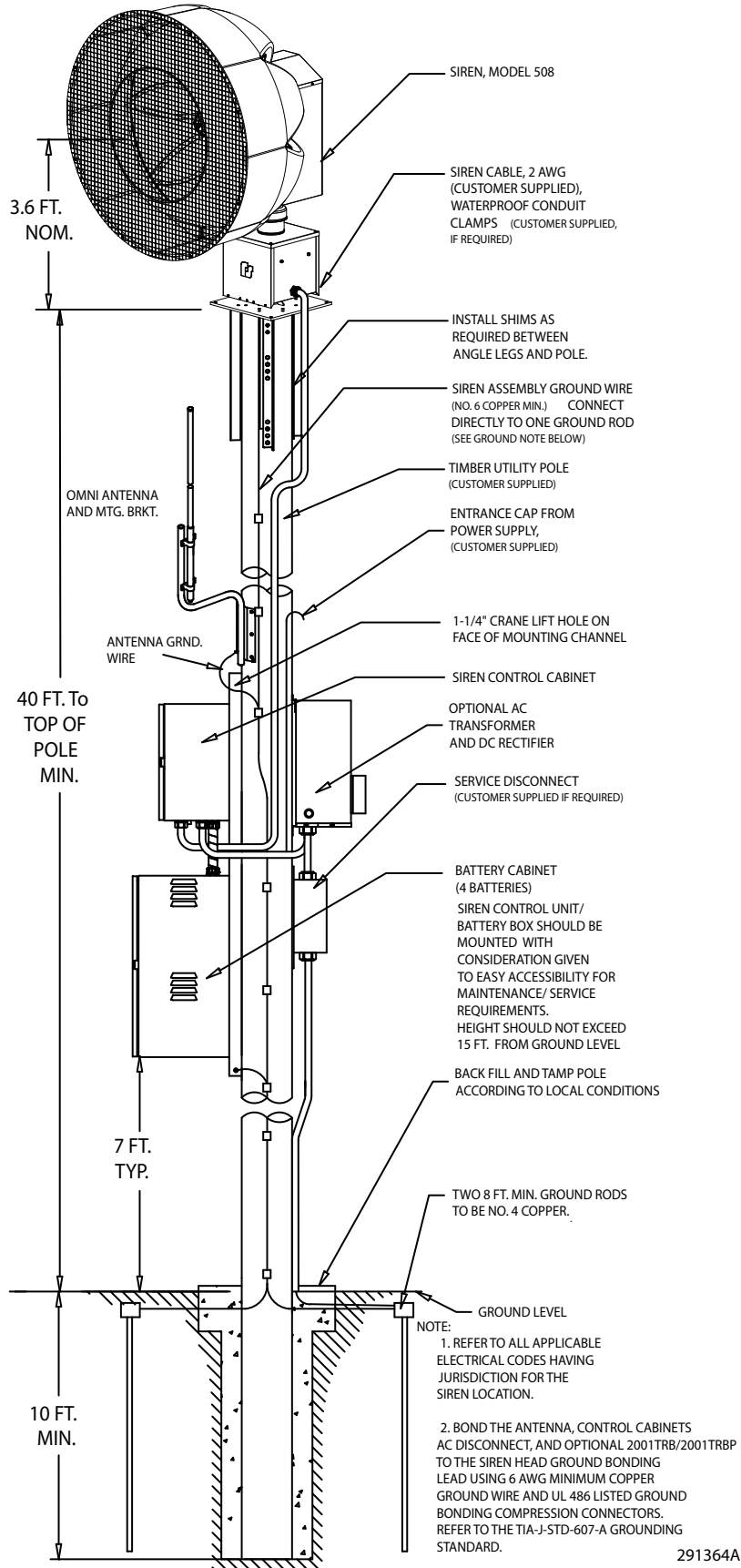
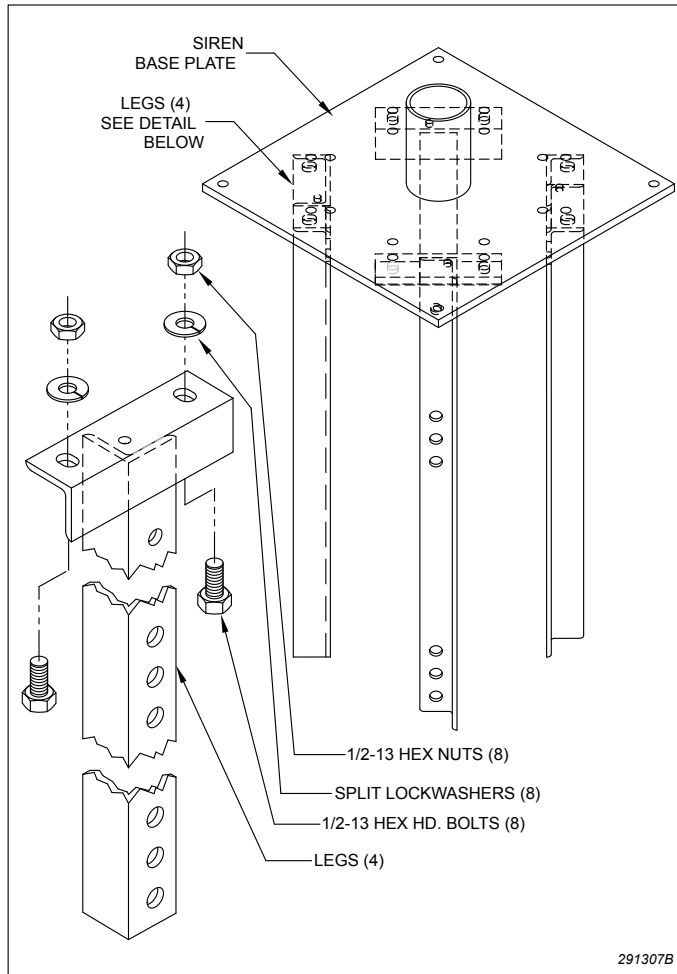


Figure 4 Siren Leg Assembly



Using the 3-foot-long angle iron legs, the siren is mounted on the Class 2 utility pole as follows:

1. Uncrate the siren and remove the nuts that hold the siren on the shipping base.
2. Lift the siren approximately 3-1/2 feet with a crane or hoist.
3. Install the four legs on the siren mounting plate as shown in Figure 4. Use two 1/2-inch bolts, nuts, and lock washers (provided) for each leg. Do not tighten the bolts completely.

CAUTION

INSTALLATION PRECAUTIONS: *The lifting bracket does NOT have sufficient strength to support the combined weight of the siren and a utility pole. Therefore, do NOT attempt to erect the pole and siren together using the bracket as a lifting point.*

4. Erect the utility pole by accepted practices (refer to the warning above). Ensure the pole extends at least 40 feet above the ground.
5. Raise the siren to the necessary height and lower it over the pole.

Installation Instructions

6. Adjust the legs and insert shims, if necessary, between the siren legs and pole. The legs adjust to a diameter between 7.5 and 12.3 inches (Figure 5).
7. Bolt the siren to the pole using two 5/8 inch galvanized lag bolts with washers and split lock washers per leg. At least four inches of lag bolt must be screwed into the pole.
8. Tighten all bolts.

Figure 5 Leg Assembly Diameters

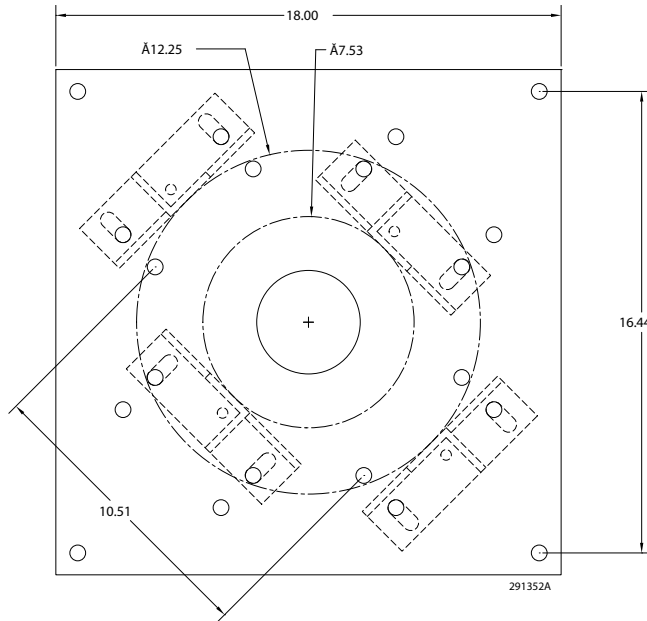
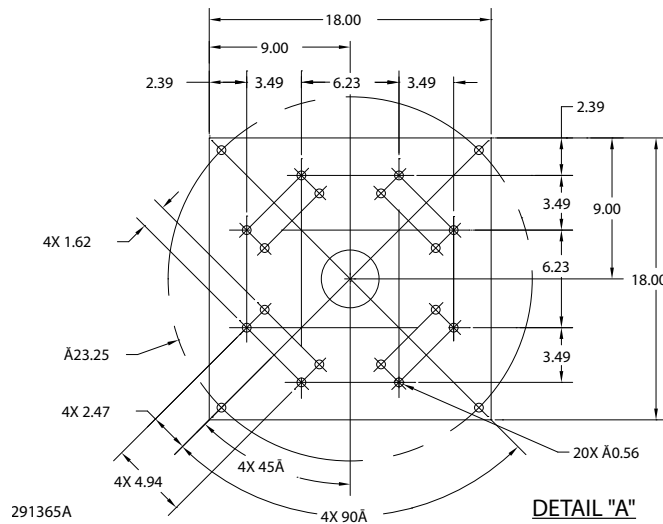


Figure 6 Mounting Plate Dimensions



Through-the-Pole Mount

Through-the-pole mounting allows you to wire through the pole's center and through the siren's bottom plate into the lower box. Typically, through-the-pole wiring is used with concrete, steel, or composite type poles. These models are the 2001-130-C, Equinox-C, and 508-128-C.

NOTE: The siren leg assemblies are not included with the -C version models.

CAUTION

INSTALLATION PRECAUTIONS: *The eyebolt does NOT have sufficient strength to support the combined weight of the siren and a utility pole. Therefore, do NOT attempt to erect the pole and siren together using the eyebolt as a lifting point.*

To install the siren using the through-the-pole mount:

1. Erect the utility pole according to accepted practices and FEMA guidelines.
2. Uncrate the siren. Remove and dispose of any hardware that holds the siren on the shipping base.
3. Lift the siren with a crane or hoist to the necessary height and lower it over the pole. Maintain tension on the lifting chain until all bolts are tightened.

NOTE: When using the through-the-pole modes, the siren cable is run through the center of the mounting plate. However, it can also be preassembled through the center of the bottom mounting plate for a no-conduit installation.

Flat Surface Mount

Flat surface mount installation is practical when the installation site is on a flat-roofed building. A weight distribution mat is often required to distribute the siren's weight safely on the roof. A structural engineer must specify the appropriate method to safely mount the siren on a roof.

Post high sound-level warning signs at all roof entry points, and ensure the siren is not blocked by parapets or other obstructions in the siren's sound path.

Wiring the Siren

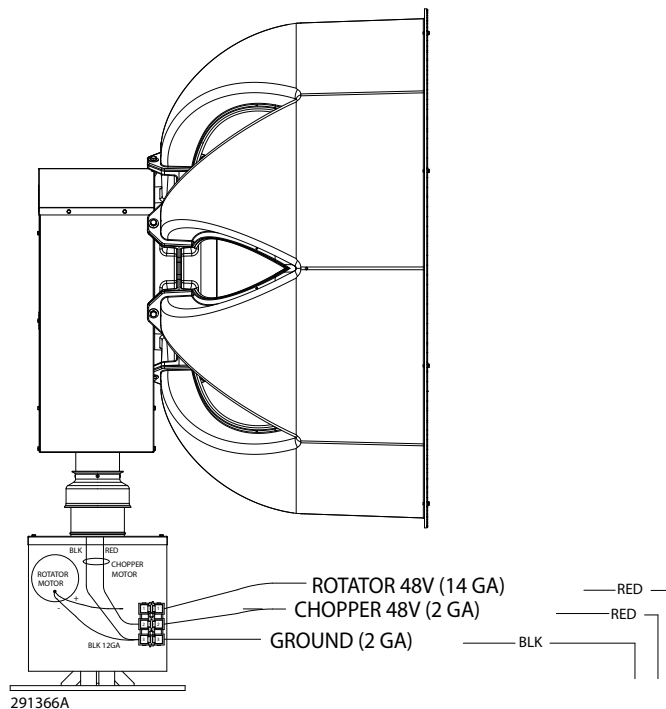
Each siren is predrilled on two sides to connect a 1-inch conduit to either side. The siren enclosure is rain-resistant. To maximize the longevity of the siren, rigid watertight conduit connections are recommended between the siren and the controller.

Three wires are required to operate the siren.

- One #2 AWG red wire from the 48 Vdc chopper control contactor output of the controller provides positive power to the chopper motor.
- One #14 AWG red wire (minimum) from the rotator control contactor output of the controller provides positive power to the rotator motor.
- One #2 AWG black wire provides a common 48 Vdc negative ground between the ground plane of the control cabinet and siren motors.

See Figure 7 for the wire connections in the siren. Consult the manual for the controller being used to connect the wires from the head.

Figure 7 Wiring for Rotator Motor



Treat all wire connections with an anti-oxidant to prevent corrosion from moisture and natural processes. Take care to ensure that all wire connections are firmly tightened. To properly tighten the wire connections in the terminal block, insert the wire, firmly tighten the setscrew, move the wires to loosen, and repeat the process until the wires are securely tightened.

Pre-operation Checkout

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

⚠ WARNING

SOUND HAZARD: *The output level of this siren is capable of causing permanent hearing damage. Therefore, ALWAYS wear hearing protection when performing tests or maintenance on the siren.*

Table 8 Pre-operation Checklist

Check	Action Item
	All air intakes and sound outlets are not obstructed.
	All connections in the Control Cabinet and Battery Cabinet are correct and properly tightened.
	All people and animals are at least 40 feet away from the siren in every direction to avoid hearing damage.
	Activate all siren tones to verify they are operating properly. The siren should remain rotating during all alert tones.
	After 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

⚠ DANGER

ELECTROCUTION HAZARD: *Service should be performed by qualified personnel familiar with the siren, associated controls, and power sources being used. The siren has moving parts, high operating currents, explosive gases, and corrosive materials that 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.*

⚠ WARNING

SOUND HAZARD: *The output level of this siren is capable of causing permanent hearing damage. Therefore, ALWAYS wear hearing protection when performing tests or maintenance on the siren.*

To prevent the siren from sounding or rotating, always turn off the power to the siren at the disconnect switch and remove the 48 Vdc, 4 AWG red wire in the Battery Cabinet before inspecting or maintaining the siren.

Testing and Inspecting the Siren

Test the siren for proper operation at least once a month. A daily test at noon, curfew, or another selected time is preferred. This not only enhances the siren's usefulness but also instills public confidence in the warning system's reliability.

Annual inspection and maintenance are desirable to minimize the possibility of siren failure. Replace batteries approximately every three to five years. This schedule is only a suggested guideline. It may be necessary to vary the schedule if the siren is used frequently or in an extreme climate. Also verify that the Battery Terminal Protector is on the battery terminals.

To inspect the siren:

- 1.** Verify that the siren is rotating and the chopper motor is operating. When operating the siren locally, follow your company's safety guidelines (that is, wear hearing protection).
- 2.** Turn off the AC power to the siren at the disconnect switch. Disconnect the 48 Vdc battery power to the siren (if applicable) by turning off the disconnect switch in the Battery Cabinet.
- 3.** Inspect the siren installation to ensure it is vertically oriented. Take corrective action if a pole-mounted installation is more than five degrees from vertical or a roof or flat surface mount is more than ten degrees from vertical. This will prevent lubrication losses and excessive motor bearing wear.
- 4.** Inspect all electrical and mechanical connections. Make sure that all fasteners are properly tightened.
- 5.** Inspect brushes on the chopper motor for wear and operation. See "Inspecting and Servicing the Chopper Motor Brushes" on page 31.
- 6.** Inspect all painted surfaces and repaint them as necessary.
- 7.** For the 508-128 Siren, inspect and repair the horn screen as required.
- 8.** For Models 2001-130 and Equinox Sirens, remove the back and top housing covers to view the collector housing opening (access hole). Replace the blue plug or tape with a black plug on the collector housing opening, if necessary. See "Replacing the Blue Plug or Tape Over Collector Access Hole" on page 25.
- 9.** Perform a pull test on the horn assembly. Verify 40 to 45 lb. (If you are unable to achieve a minimum of 40 lb, see "Adjusting the Clutch and Alarm Verification" on page 23.)
- 10.** Replace all covers. Turn on the AC power to the siren at the disconnect switch.
- 11.** Verify siren operation.

NOTE: The rotator and siren motors have sealed and pre-lubricated bearings. Therefore, neither of these motors requires any additional lubrication.

Servicing the Siren

This section includes procedures and illustrations to adjust, repair, and replace various siren components.

⚠ WARNING

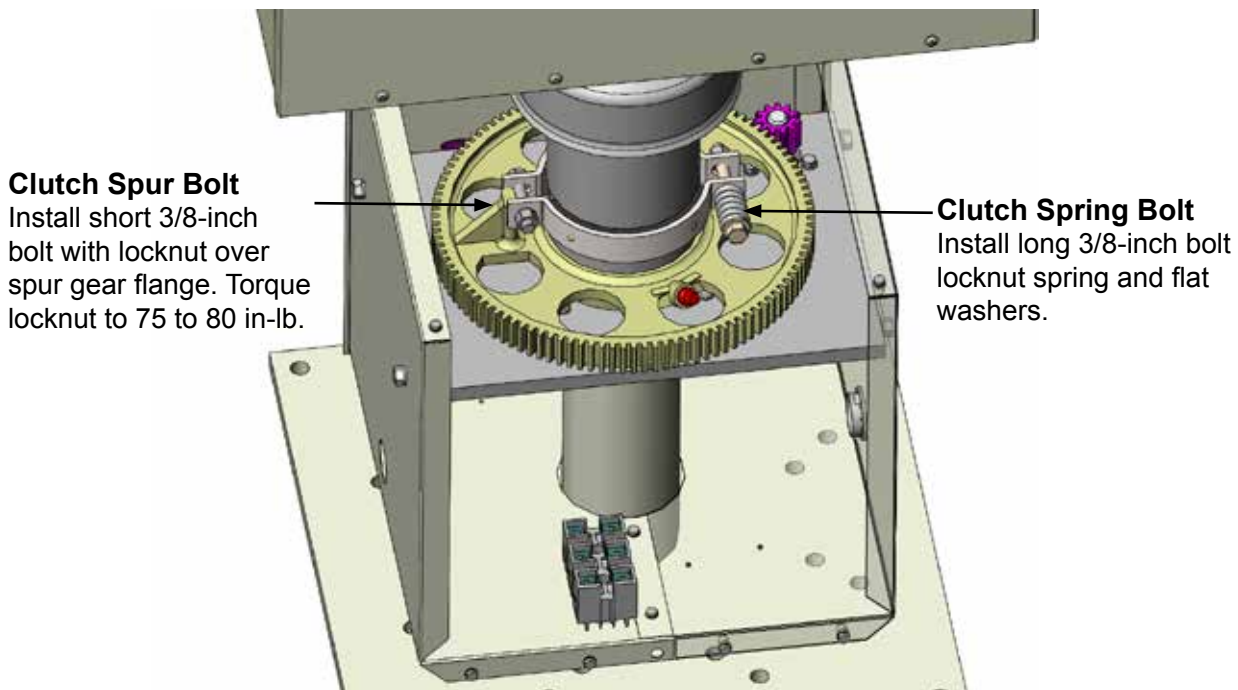
SOUND HAZARD: *To prevent the siren from sounding or rotating, always turn off power at the disconnect switch and disconnect the 48 Vdc, 4 AWG red wire in the Control Cabinet before performing any maintenance on the siren.*

Adjusting the Clutch and Alarm Verification

To adjust the rotation clutch assembly:

1. Turn off the power to the siren at the disconnect switch.
2. Turn off the battery switch in the Battery Cabinet.
3. Remove the 48 Vdc, 4 AWG red wire in the Control Cabinet to stop the chopper from activating.
4. Remove the panels on the rotator housing.
5. Loosen the clutch using the cross bolt with the spring (Figure 8). This allows the siren to rotate freely. If the siren does not rotate freely, attach a spring scale to measure the required rotation force. The force required to rotate the siren is less than 10 pounds. If the force required to rotate the siren is greater than 10 pounds, contact Federal Signal Technical Support for additional information.

Figure 8 Rotator Assembly Interior

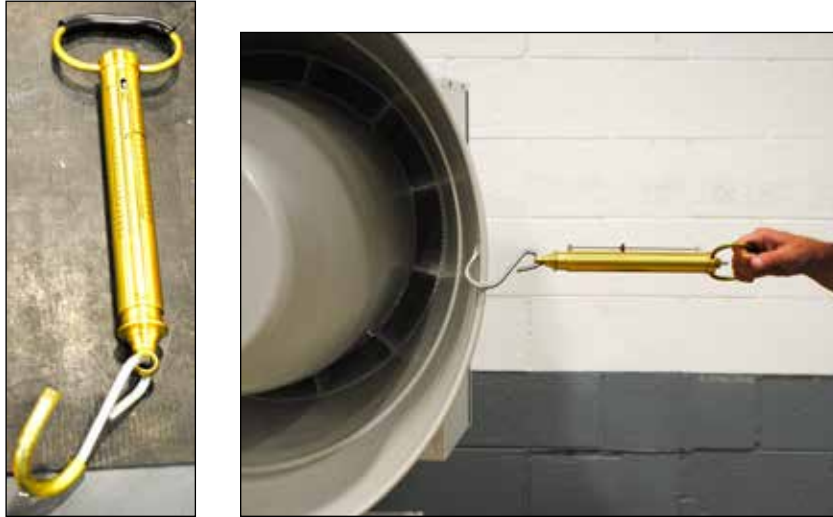


6. Tighten the Clutch Spur Bolt (Figure 8). This requires tightening the Clutch Spur bolt (bolt opposite spring) to 75 to 80 in-lb. This secures the clutch bracket to the gear spur.

7. Attach a spring scale having a capacity of at least 50 pounds (22 kg) to the horn of the siren (Figure 9).

NOTE: When pulling, the spring scale needs to be perpendicular to the front of the siren's horn.

Figure 9 Spring Scale Attachment to Siren



8. Tighten the Clutch Spring Bolt (Figure 8) until the pull test in Figure 9 achieves a minimum of 40 pounds (18 kg). If you cannot tighten the Clutch Spring bolt to reach a minimum of 40 pounds, contact Technical Support. (A possible cause is grease on the clutch bands, or the clutch may require replacement.)

NOTE: To replace the clutch band, order the Clutch Replacement Kit.

9. Replace the panel(s) on the rotator housing.
10. Turn on the power to the siren by reattaching the 48 Vdc, 4 AWG red wire in the Control Cabinet.
11. Turn on the battery switch in the Battery Cabinet.
12. Turn on the power to the siren at the disconnect switch.
13. Activate the rotation of the siren and verify that it is operating correctly. If the siren fails to rotate, contact Technical Support.

Optional test to verify non-rotation alarm (requires two-way rotate sensor)

14. While the siren is rotating, stop the siren horn from rotating by obstructing or holding it. This causes the clutch to slip, causing the rotate motor to draw current above "normal." The current draw above normal causes the system to report a rotation failure. If a failure is not reported, contact Technical Support.

Replacing the Blue Plug or Tape Over Collector Access Hole

To replace the blue plug or tape over the collector housing opening:

1. Remove and discard the blue plug or tape.
2. Scrape off the blue RTV (if applicable) from the collector housing opening (access hole). Degrease the surface with a dry towel and alcohol, alcohol wipes, or a degreaser.
3. Place a rubber plug over the access hole to seal it against water ingress. Place the word UP at the top and DOWN at the bottom (Figure 10).

Figure 10 Placing Rubber Plug Over Access Hole



4. Tighten 1/4"-20 Keps® nut to 11-14 in-lb using a 7/16-inch socket wrench (Figure 11).

Figure 11 Tightening Rubber Plug



5. Rotate the siren head to ensure no noticeable resistance to the rotate siren.

Replacing the Collector Ring, Brush Holder Assemblies, and Black Cover

To replace the brush holder assembly:

1. Remove the cover (if red, discard) from the top of the collector housing.
2. Note the wiring location before removing the wires (Figure 12).

Figure 12 Collector Ring Housing



3. Remove the terminal block inside the collector ring by removing two Keps® nuts using a 7/16-inch nut driver.
4. Remove the four bolts on the side of the collector housing assembly (Figure 13) and remove the brush assembly.

NOTE: Press down on the brush assembly while removing the four bolts. While in position, the brush assembly is under spring tension.

Figure 13 Installation/Removal Brush Assembly



5. Remove the lead wire from the brush holder. Remove the worn brush from the brush holder in the brush holder plate (Figure 14).

Figure 14 Brush Holder Assembly



K-BRSH1

Includes: eight position brush holders, eight brushes, eight brush holders, set-screws, and wires

6. Insert the replacement brush into the brush holder. Connect the lead wires to the brush holder.

Removing the Collector Ring Assembly

To remove the collector ring assembly:

1. Remove the brush assembly as described above.
2. Disconnect the three wires from the terminal block (TB5) inside the rotator housing and begin feeding wires up into the siren shaft (Figure 8).
3. Loosen the rotator drive band to rotate the siren while removing the collector ringbolts.

NOTICE

EQUIPMENT DAMAGE: To prevent damage to the cover assembly, use a piece of wire to secure the cover in an open position before removing the housing's back panel.

4. Remove the back panel to expose the aluminum tape and blue or black plug on the collector housing assembly.
5. Remove the aluminum tape and blue or black plug.

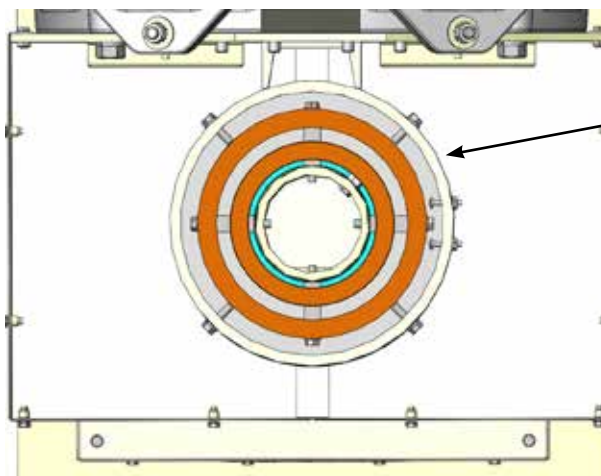
6. Manually rotate the siren and remove each of the four bolts that hold in the collector rings (Figure 15). Access to these bolts can be gained through the access hole.

Figure 15 Collector Housing Opening



7. Remove the collector rings with stand-offs and cables still attached (Figure 16).
8. Reassemble the collector rings, stand-offs, and cables before reinstallation.

Figure 16 Collector Rings



K-COLL1

Includes: Collector ring, four each insulators, miscellaneous hardware and 36-inch red and black wires

9. To replace the collector ring assembly, align the stand-offs before replacing the four bolts removed in step seven above.
10. Ensure that collector rings are concentrically aligned before replacing the brush assembly.
11. Replace the brush assembly.
12. Look through the access hole and ensure that brushes contact the proper collector rings.

13. Install the black plug. Place a rubber plug over the access hole to seal it against water ingress. Place the word UP at the top and DOWN at the bottom (Figure 17).

Figure 17 Placing Rubber Plug Over the Access Hole



14. Tighten a 1/4"-20 Keps® nut to 11-14 in-lb using a 7/16-inch socket wrench (Figure 18).

Figure 18 Tightening the Rubber Plug



15. Rotate the siren head to ensure no noticeable resistance to rotate the siren.

16. Install the black cover by inserting the red and black motor wires through the cover and attaching the wires to the terminal block. Place a 2- to 3-inch bead of RTV Silicone at three locations to secure the black cover to the collector housing. Install and gently tap the cover to the seat on the collector housing (Figure 19).

Figure 19 Installing the New Black Cover



17. Wrap nylon wire ties around each four gauge wire and place firmly against the black cap. Remove excess wire ties. Position the motor wires with drip a configuration as shown in Figure 20.

Figure 20 Wire Ties Around the Four Gauge Wires



18. Replace the back panel.

Inspecting and Servicing the Chopper Motor Brushes

The chopper motor is designed to be maintenance-free. Federal Signal recommends inspecting motor brushes and commutators every three years.

Accessing the Motor

To access the motor on the 2001-130 and Equinox Sirens:

1. Remove the inner cone by removing the four 1/4-20 hex head screws at the back of the cone.
2. Set aside the cone and bolts.

To access the motor on the 508-128 Siren:

1. Remove the rear covers.
2. Set aside the covers and screws.

Inspecting the Chopper Motor Brushes

You need the following equipment.

Table 9 Tools and Parts

	Description
	Compressed Air
	5/16 inch Nut driver
	Scotch-Brite® pad
	Replacement Brushes (includes four brushes) Part Number: K-BRSH2

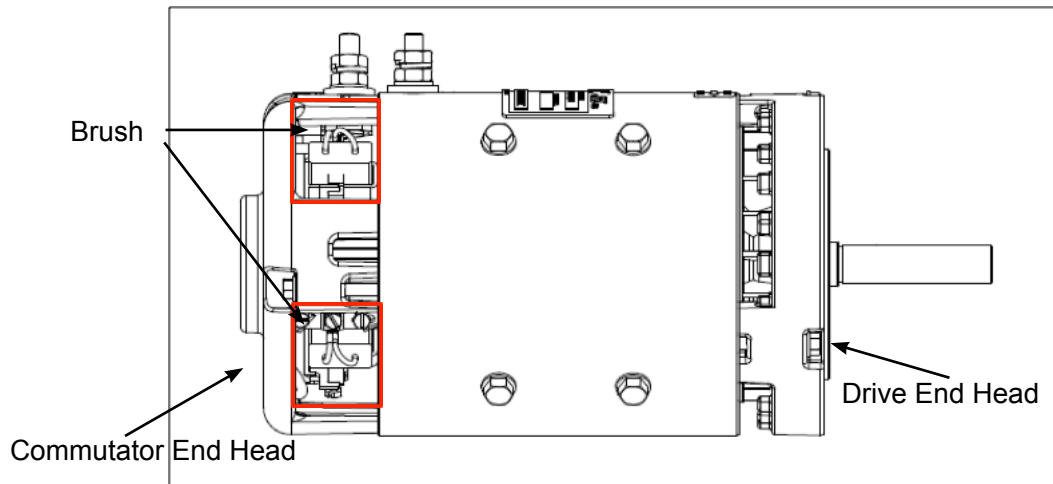
⚠ CAUTION

FLYING PARTICLES HAZARD: Wear appropriate eye protection during any maintenance operation.

To inspect the chopper motor brushes:

1. Refer to Figure 21 and become acquainted with the labeled motor components.

Figure 21 Motor Components



2. Locate the four openings that expose the brushes at the commutator end head of the motor. Figure 21 outlines two of the four openings in the commutator end head in red.
3. Visually inspect the motor at the commutator end head for excess brush dust. If excess dust is seen, use clean, oil-free, compressed air to carefully blow out accumulated brush dust and dirt from the commutator end head, frame, and field assembly.

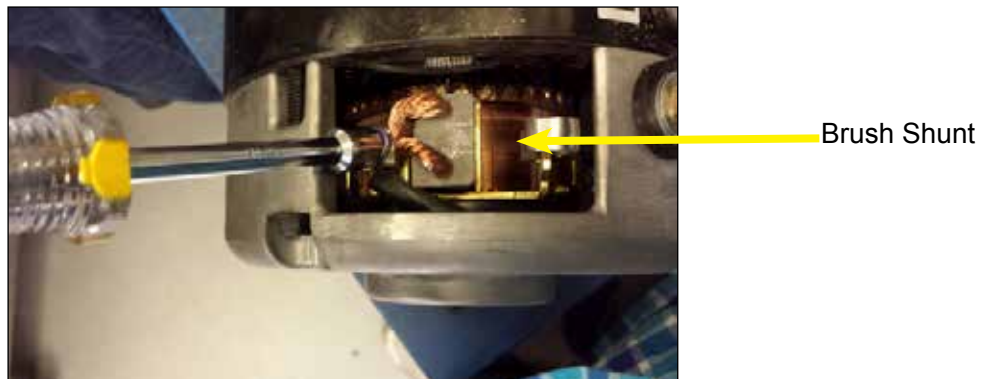
NOTE: Carbon dust inside the motor can be messy when removed with compressed air.

⚠ CAUTION

FLYING PARTICLES HAZARD: *When using compressed air, follow all safety instructions, including wearing eye and respiratory protection.*

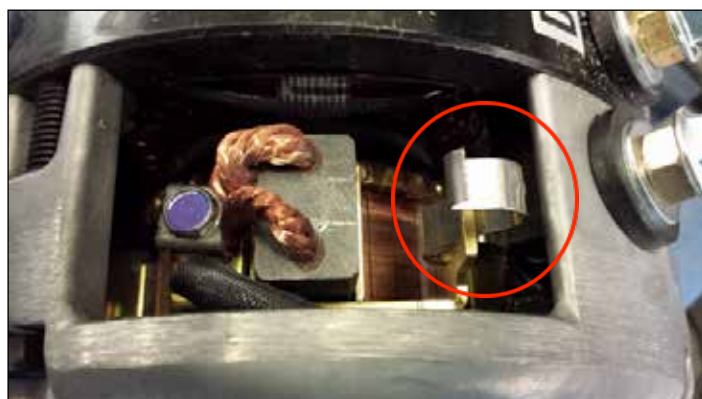
4. Continue using compressed air on the motor at all four openings in the commutator end head until brush dust is no longer visible exiting the motor.
5. After removing dust from the motor, measure the brush length by removing the brush from the motor. Remove all four brushes.
6. To remove the brushes, first remove the 8-32 x 0.5-inch bolt from the back of the brush shunt using a 5/16-inch driver (Figure 22).

Figure 22 Removing Brush Shunt Bolt



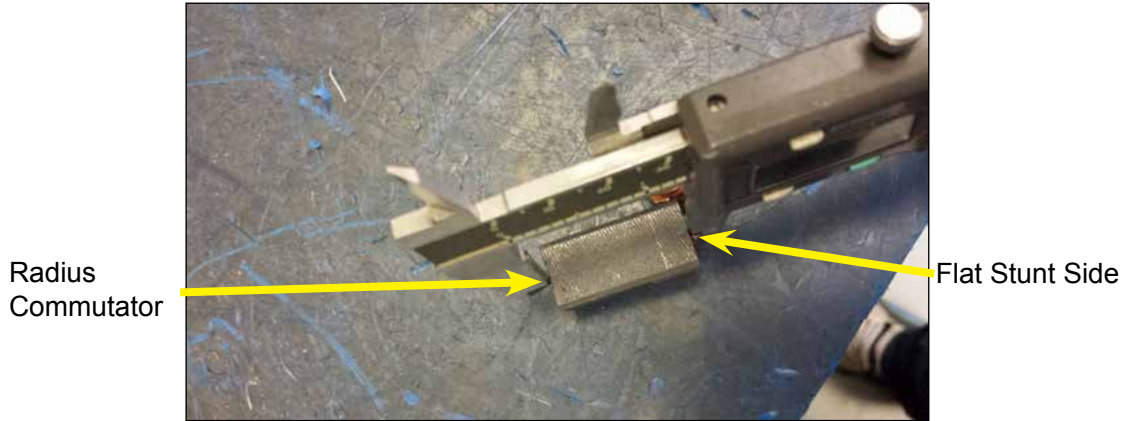
7. After the bolt is removed, pull back the brush spring. Pull the brush spring back and latch it on the post (Figure 23).

Figure 23 Brush Spring Latched on Post



8. Once the brush spring is secured on the post, the brush can be removed and measured.
9. To measure the brush length, use a caliper to measure from the radius of the commutator side of the brush to the flat of the shunt side (Figure 24).

Figure 24 Brush Spring Measurement



10. See minimum brush length in the table below.

Table 10 Brush Length

Maximum Brush Length	1.3 in (33 mm)
Minimum Brush Length	0.6 in (16 mm)

11. If brush lengths are less than the specified minimum length, remove and replace all brushes with new ones.

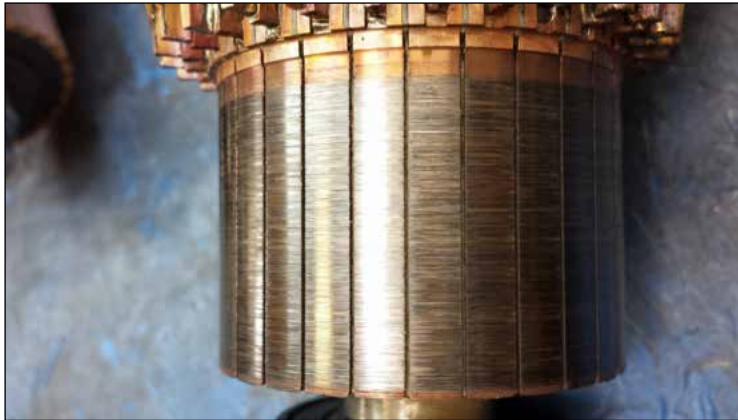
NOTE: If brushes are stuck in the brush holder, attempt to remove them from the brush holder. If you can remove the brushes, continue to inspect the commutator. Federal Signal recommends replacing all four brushes. If it is not possible to remove brushes, contact Technical Support.

Inspecting the Commutator

To inspect the commutator:

1. While the brushes are removed from the motor, visually inspect the commutator.
2. The commutator should have a uniform gray/charcoal colored film covering the copper bars where the brushes make contact.
3. Figure 25 displays an example of an acceptable commutator with uniform wear.

Figure 25 Uniform Brush Film



NOTE: Motors with limited field run time may exhibit streaks in the commutator's film. This is common on newer motors and will eventually become more uniform when the motor has more run time and the brushes become fully seated. Figure 26 depicts a commutator with streaky film due to limited run time.

Figure 26 Streaky Brush Film



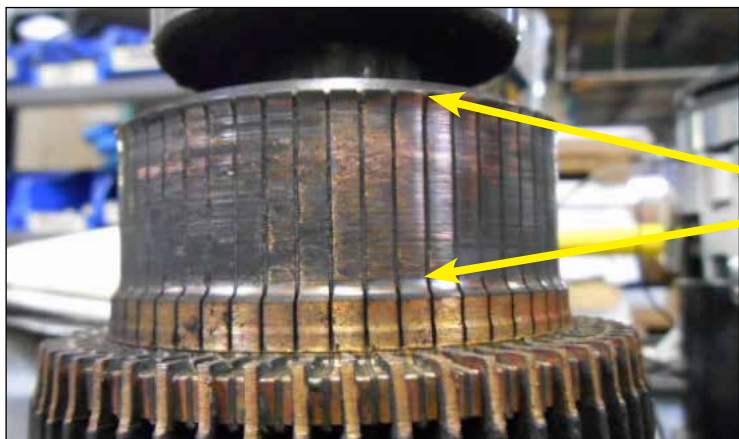
4. Replace commutators that exhibit pitting or excessive wear. Figure 27 shows an example of a commutator with pitting, and Figure 28 shows an example of a commutator with excessive wear.

Figure 27 Pitting on Commutator



The surface shows large amounts of pitting.

Figure 28 Commutator Wear



The commutator will wear within the brush contact area, causing a deep lip at the outer surface.

NOTE: If pitting or wear on the commutator is found, remove the motor from service and have an experienced motor rebuilder or manufacturer inspect and rebuild it.

Installing New Brushes

To install new brushes:

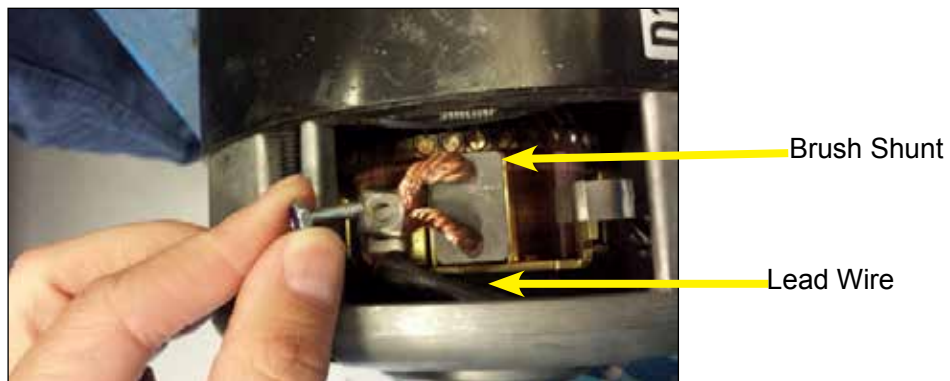
1. After removing each brush from the motor, carefully blow any remaining dust out of the brush holders on the brush box with clean, oil-free, compressed air.
2. Inspect the brush holder for any debris or contamination. If it is contaminated, use a Scotch-Brite® pad to clean it.
3. If you are reusing existing brushes, inspect them for contamination and replace them if they show any signs of contamination.
4. Verify all brush holders are clean and dust-free. Using a brush, ensure that the brushes can move freely in the holder.

⚠ CAUTION

FLYING PARTICLES HAZARD: When using compressed air, follow all safety instructions, including wearing eye and respiratory protection.

5. Blow out the remaining contaminants using clean, oil-free, compressed air.
6. Once the brush holders are clean, install brushes and the bolts that held the original brushes in place.
7. Place one brush into the brush holder.
8. Place one of the bolts through the hole in the brush shunt, the lead wire (if applicable), and the corresponding hole in the brush box (Figure 29).

Figure 29 Replacing Brush Shunt Bolt



9. Tighten the bolt down using a 5/16-inch driver.
10. Unlatch the brush spring from the post to rest on the back of the brush.

NOTE: Center the brush spring between brush shunts. Do not misalign or contact the shunts. This allows the brush to remain in contact with the commutator and wear consistently throughout the motor's lifespan (Figure 30).

Figure 30 Placing the Brush Spring



11. Repeat steps 7-10 with the remaining brushes.
12. Inspect the motor to ensure all brushes are installed, all bolts are present, and all brush springs are engaged.
13. Reinstall all covers and test the operation of the chopper motor.

Replacing the Rotator Motor

To replace the rotator motor:

1. Remove the two rotator housing panels. See “Figure 8 Rotator Assembly Interior” on page 23.
2. Replace the rotator motor (K-GEAR1). An approximately a 1/64-inch gap between the teeth of the two gears is required to avoid binding. Re-tighten the rotator motor bolts to a torque of 45 in-lb.
3. Wire the rotator motor and terminal block as shown in “Figure 7 Wiring for Rotator Motor” on page 20.
4. Grease all gear surfaces with lithium-based grease.
5. Replace the housing panels.

Replacing the Chopper Motor for the Models 2001-130 and Equinox Sirens (K-CHPR1)

To replace the chopper motor:

1. Remove the inner cone by removing the four 1/4-20 hex head screws at the back of the cone.
2. Remove the top housing.
3. Remove the 3/8-inch bolt holding the rotor to the motor shaft.
4. Remove the rotor using a wheel puller.
5. Remove wires from motor terminals.
6. Replace the motor by removing the four 1/4-20 bolts. Secure the motor.
7. Replace wiring, rotor, and housings.

Replacing the Chopper Motor for the Model 508-128 Siren (K-CHPR1)

To replace the chopper motor:

1. Remove the horn screen.
2. Remove the top two housings.
3. Remove the 3/8-inch bolt holding the rotor to the motor shaft.
4. Remove the rotor using a wheel puller or two 3/8-16 screws that are a minimum of 4 inches long.

NOTE: Using the screw method for removal, remove the two short screws from the back of the stator.
5. Remove wires from the motor terminals.
6. Replace the motor by removing the four 1/4-20 bolts. Secure the motor.
7. Replace the wiring, rotor, housings, and short screws on the back of the stator.

Replacing the Screen/Hardware for the 508-128 Siren

In the original Model 508-128 siren head, the brackets holding the screen on the front could become loose or damaged. The initial release had a two-hole design for the brackets that kept the screen attached to the siren head. In February 2013, Federal Signal began shipping all Model 508-128 siren heads with a new three-hole design.

If you have the two-hole design and the hardware becomes damaged or loose, Federal Signal recommends upgrading the screen and kit. The Q-508SCREEN model consists of the following hardware.

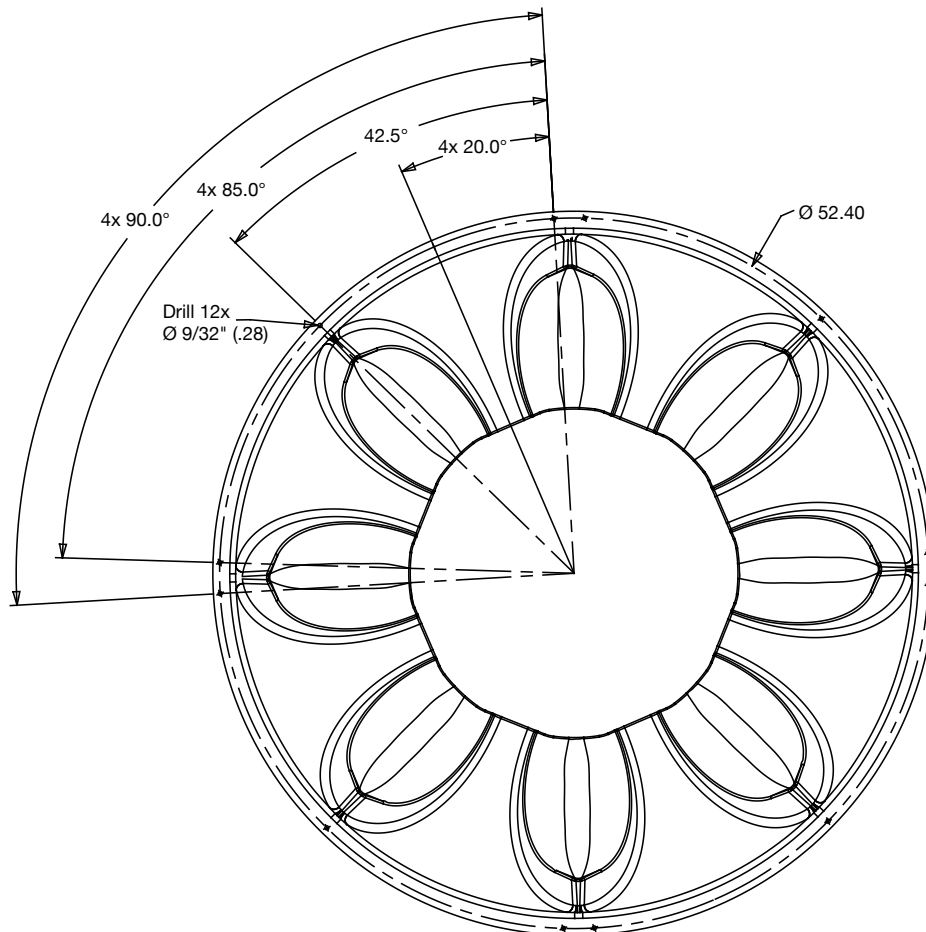
Table 11 Q-508SCREEN Hardware

Qty.	Description	Part Number
4	Brackets	8402224B
12	1/4-20 Stainless Steel screws	7000A345-16
12	Flat washers	7072A024
12	1/4-20 nylon lock nuts	7058A010

To replace the screen and hardware on the Model 508-128 siren:

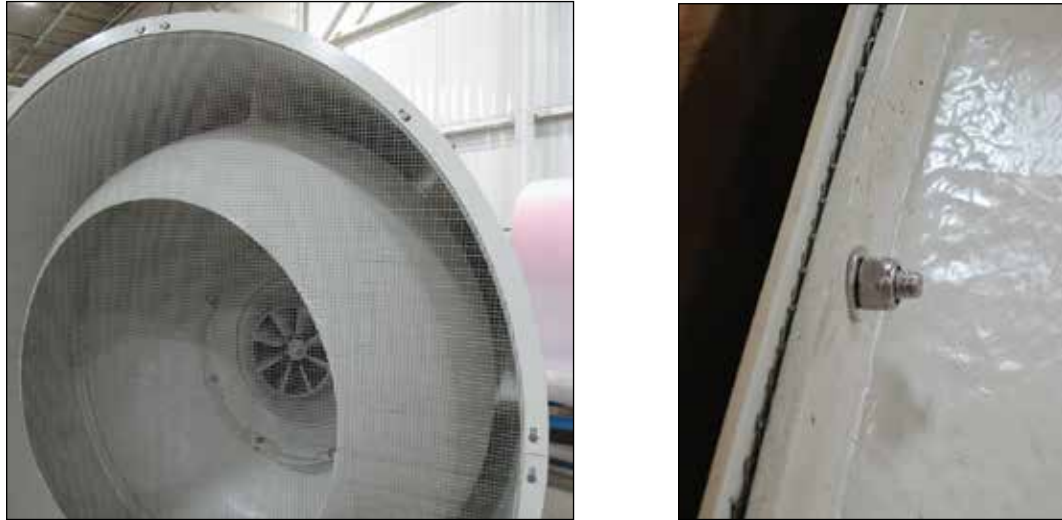
1. When replacing the two-slot pattern retaining bracket with a three-slot pattern retaining bracket (8402224B), drill the horn flange (Figure 31).

Figure 31 Drill Horn Flange for the 508-128 Siren



2. Secure the bracket (8402224B) with C-clamps and mark the drill pattern.
3. Drill new holes using a 9/32-inch drill bit.
4. Attach each of the four (8402224B) brackets against the back side of the fiberglass flange using three supplied 1/4-20 stainless steel screws (7000A345-16), three flat washers (7072A024), and three 1/4-20 nylon lock nuts (7058A010).

Figure 32 New screen installed



Replacement Parts for Siren Head

To order replacement parts, call customer support.

Table 12 Replacement Parts for Siren Head

Description	Part Number
Clutch Replacement Kit	K-CL1
Brush Holder Assembly	K-BRSH1
Collector Ring Assembly	K-COLL1
Rotator Motor	K-GEAR1
Chopper Motor with key	K-CHPR1
Chopper Motor Brushes (Includes 4 brushes)	K-BRSH2
Black Cover	840200276
Black Plug	840200279

Table 13 Replacement Parts for Model 508-128 Siren Head only

Description	Part Number
Screen and hardware	Q-508SCREEN
Screen only	Q-8402220A

Getting Technical Support and Service

For Technical Support, contact:

Federal Signal Technical Support
Phone: 800-524-3021 or 708-534-4790
Email: techsupport@fedsig.com
www.fedsig.com

For Customer Support, contact:

Federal Signal Customer Support
Phone: 800-548-7229 or 708-534-3400 extension 367511
Email: customersupport@fedsig.com
www.fedsig.com