E-Class Series
Electronic Sirens
And Controls

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

EC-1600

EC-3200

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1. AMERICAN SIGNAL CORPORATION LIMITED WARRANTY  Rev. 11/99

AMERICAN SIGNAL CORPORATION warrants electromechanical siren head equipment, including the housing, motor, frame, and any gear or drive assemblies, to be free from defects in materials and workmanship for a period of five (5) years for parts from the date of shipment, provided such equipment is installed, operated, and maintained in accordance with the instructions, manuals and/or recommendations supplied by American Signal Corporation. AMERICAN SIGNAL CORPORATION warrants all other mechanical, electrical/electronic control equipment (except batteries) to be free from defects in materials and workmanship for a period of two (2) years for parts, two (2) year for in-house labor, from the date of shipment, provided such equipment is installed, operated, and maintained in accordance with the instructions, manuals, and/or recommendations supplied by American Signal Corporation. If within such period any such equipment shall be proved to American Signal Corporation's satisfaction to be defective, such equipment shall be repaired or replaced at American Signal Corporation's option. Notwithstanding the foregoing, American Signal Corporation makes no warranties on equipment manufactured by others and supplied by American Signal Corporation, but will extend to the purchaser any warranties associated with such equipment.

EXCLUSIVE WARRANTY/REMEDY

The foregoing is American Signal Corporation's sole obligation and the buyer's exclusive remedy hereunder and shall be conditioned upon American Signal Corporation's receiving written notice of any alleged defect within 30 days after its discovery and, at American Signal Corporation's option, return of such equipment to American Signal Corporation, f.o.b. its factory in Milwaukee, Wisconsin. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER REPRESENTATIONS AND WARRANTIES, EXPRESS OR IMPLIED; AND AMERICAN SIGNAL CORPORATION EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

This warranty does not apply to any equipment which in American Signal Corporation's judgment has been subject to misuse, neglect or accident or damage due to local utility power surges, abuse, alteration, improper installation or application, or negligence in use, storage, transportation or handling, acts of god or nature, or repair by anyone other than American Signal Corporation and its authorized service centers. This warranty does not cover any costs related to transportation for return of equipment or reshipment of any repaired or replaced equipment, or costs associated with installation, removal, or reinstallation of equipment.

LIMITATION OF LIABILITY

Except as otherwise agreed in writing, American Signal Corporation's liability with respect to the equipment and/or services sold hereunder shall be limited to the warranty provided above, and, with respect to other performance of the sales/service contract, shall be limited to the contract price. AMERICAN SIGNAL CORPORATION SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES, WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHER THEORIES OF LAW, WITH RESPECT TO EQUIPMENT SOLD OR SERVICES RENDERED BY AMERICAN SIGNAL CORPORATION, OR ANY UNDERTAKINGS, ACTS OR OMissions RELATING THERETO. Without limiting the generality of the foregoing, American Signal Corporation specifically disclaims any liability for property or personal injury damages, penalties, special or punitive damages, damages for lost profits or revenues, loss of use of equipment or any associated equipment, cost of capital, cost of substitute equipment, facilities or services, down-time, shut-down or slow-down costs, or for any other types of economic loss, or for claims of buyer's customers or any third party for any such damages. AMERICAN SIGNAL CORPORATION SHALL NOT BE LIABLE FOR AND DISCLAIMS ALL CONSEQUENTIAL, INCIDENTAL AND CONTINGENT DAMAGES WHATSOEVER.
2. GENERAL INFORMATION

American Signal Corporation's EC-Series of sirens are battery operated electronic outdoor warning devices. The EC-Series sirens are capable of multiple warning signals and high-powered voice communications both locally and via radio control. Applications include Civil Defense and weather warning, as well as nuclear and chemical accident warning to meet FEMA, NRC, and EPA requirements.

American Signal incorporates a number of innovative engineering advances in emergency warning technology. The siren control circuitry is designed to provide a maximum yield of sound output at a minimum power usage.

A. SIREN DESCRIPTION

The EC-Series sirens consist of three major components: (1) speaker array, (2) amplifier and control unit, and (3) battery supply. American Signal electronic sirens provide a standard set of ten signals (Table 1) and a Public Address feature.

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<thead>
<tr>
<th>Function</th>
<th>Frequency of Operation</th>
<th>Sweep Rate</th>
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<tr>
<td>ALERT</td>
<td>Steady Tone, 670 Hz.</td>
<td>3 Minutes</td>
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<tr>
<td>ATTACK</td>
<td>Wailing Tone, Ramping Up and Down, 740 Hz. / 570 Hz.</td>
<td>6 sec. Up and 6 sec. Down for 3 Minutes</td>
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<tr>
<td>HI/LO</td>
<td>Alternating Tone, 740 Hz. / 570 Hz.</td>
<td>0.75 sec. Hi, 0.75 sec. Low for 3 Minutes</td>
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<tr>
<td>AIR-HORN</td>
<td>Alternating Tone, 740 Hz.</td>
<td>2 sec. On and 2 sec. Off for 3 Minutes</td>
</tr>
<tr>
<td>FIRE</td>
<td>Wailing Tone, Ramping Up and Down, 740 Hz. / 500 Hz.</td>
<td>16 sec. Up and 8 sec. Down for 1.5 Minutes</td>
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<tr>
<td>HAZARD</td>
<td>Alternating Tone, 500 Hz. ramping Up to 850 Hz in 1 sec.</td>
<td>3 Minutes</td>
</tr>
<tr>
<td>CHIME</td>
<td>Alternating Tone, 533 Hz. Tone</td>
<td>Tone Burst On at 2 sec. Intervals for 6 Cycles</td>
</tr>
<tr>
<td>SCREAM</td>
<td>Wailing Tone, 500 Hz. to 850 Hz.</td>
<td>0.8 sec. Up and 0.2 sec. Down for 3 Minutes</td>
</tr>
<tr>
<td>WAIL</td>
<td>Wailing Tone, 850 Hz. to 500 Hz.</td>
<td>0.8 sec. Up and 0.2 sec. Down for 3 Minutes</td>
</tr>
<tr>
<td>SILENT TEST</td>
<td>12.5 KHz Tone, (Non-Audible)</td>
<td>3 Seconds</td>
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TABLE 1
The **PUBLIC ADDRESS (PA)** signal allows the user to broadcast high power voice communication through the speaker array to issue instructions during time of emergency. A noise canceling microphone and volume control is available as an option for use on each control unit.

A **RADIO PA** signal is used in a public address mode that is operated via a radio control decoder package (see Theory of Operation). This allows the user to operate the PA mode from a central dispatch location for systems comprised of one or more warning sirens.

**CUSTOM SIGNALING**- Using the radio input and / or RS232 it is possible to program any number of customer desired signals with the siren controls. Contact American Signal with your signal requirements or application.

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**B. EC SERIES SIRENS SPECIFICATIONS**

1. **ENVIRONMENTAL PARAMETERS**
   - Operating Temp. = -40°F to +140°F/ -40°C to +60°C
   - Storage Temp. = -85°F to +194°F/ -65°C to +90°C
   - Humidity = 0 to 100% non-condensing
   - Wind speed = 100+ mph

2. **ELECTRICAL**
   - AC Input Voltage = 120VAC +/- 10%
   - Battery Charge Voltage Output = 13.8VDC x 2 Chargers
   - Battery Charging Current = 1.5 Amp Max per Charger
   - System Operating Voltage = 24VDC/ 120 VAC
   - Power output four 8-ohm drivers = 400 watts RMS
   - Battery Operating Current (Siren Run):
     - EC-400 = 18 Amps DC (Alert)
     - EC-800 = 36 Amps DC (Alert)
     - EC-1200 = 54 Amps DC (Alert)
     - EC-1600 = 72 Amps DC (Alert)
     - EC-2000 = 90 Amps DC (Alert)
     - EC-2400 = 108 Amps DC (Alert)
     - EC-2800 = 108 Amps DC (Alert)
     - EC-3200 = 144 Amps DC (Alert)

3. **ACOUSTICAL CHARACTERISTICS**
   - Decibel Rating
     - EC-1600 (400-watt) = 121 dB @ 100 ft. on axis
     - EC-3200 (400-watt) = 126 dB @ 100 ft. on axis
   - Frequency Response = 240 - 2,500 ± 3dB
   - Distortion (at 1 KHz Max.) = Less than 2.5%
2. PHYSICAL CHARACTERISTICS

Siren Head Dimensions (L x W x H):
- EC-1600 = 64 x 64 x 20 Inches /163 x 163 x 51 Centimeters
- EC-3200 = 64 x 64 x 40 Inches /163 x 163 x 102 Centimeters

Siren Head Weight:
- Each 400 Watt Horn = 50Lbs. (23Kg.)
- Each 1600Watt Assembly = 255Lbs. (116Kg.)
- EC-1600 Total head weight = 315Lbs. (143Kg.)
- EC-3200 Total head weight = 570Lbs. (259Kg.)

Siren Head Crated Weight (approx.):
- Each 1600Watt Assembly = 355Lbs. (161Kg.)

Siren Head Crate Size EC-1000 thru EC-4000 (L x W x H):
- 56 x 56 x 34 Inches /142 x 142 x 86 Cm

EC-400 thru EC-1600:
- Siren Control Cabinet - Main (L x W x H) = 24 x 24 x 8 Inches /61 x 61 x 20 Centimeters
- Siren Control Cabinet - Battery (L x W x H) = 24 x 24 x 8 Inches /61 x 61 x 20 Centimeters
- Siren Control Crate Size (L x W x H) = 72 x 30 x 18 Inches /182 x 76 x 46 Centimeters
- Siren Control Weight = 200 Lbs. (90 Kg.) Without batteries
- Siren Control Crated Weight (approx.) = 270 Lbs. (122 Kg.) Without batteries

EC-2000 thru EC-3200:
- Siren Control Cabinet - Main (L x W x H) = 36 x 24 x 8 Inches /91 x 61 x 20 Centimeters
- Siren Control Cabinet - Battery (L x W x H) = 24 x 24 x 8 Inches /61 x 61 x 20 Centimeters
- Siren Control Crate Size (L x W x H) = 84 x 30 x 17 Inches /213 x 76 x 43 Centimeters
- Siren Control Weight = 220 Lbs. (100 Kg.) Without batteries
- Siren Control Crated Weight (approx.) = 325 Lbs. (148 Kg.) Without batteries

3. ENVIRONMENT

The air column length of the horn is 4.5 feet with the projector dispersion angles of 120 degrees horizontal and 60 degrees vertical. The EC-Series Sirens design utilizes an advanced spun aluminum re-entrant section to allow multiple speaker drivers to power one reflex projector. This provides a more efficient acoustic design and reduces the size of the speaker array by eliminating the need for more reflex projectors. The smaller overall size of the speaker array presents a much reduced wind load, as installed, providing less susceptibility to wind damage.
C. EC SERIES COMPONENTS

1. ELECTRONIC SIREN SPEAKER ARRAY

The EC-Series Sirens speaker array consists of up to eight high efficiency reflex projectors configured in two banks of up to four projectors each, mounted at 90 degrees about a vertical axis. The reflex projectors are of the wide-angle directional type to provide maximum sound in storm conditions. A minimum Class III 50 foot wood pole is recommended for installation. The back of each speaker is removable for easy access to the speaker driver modules. Each 1600Watt module comes with a junction box and cable for quick field wiring.

2. ELECTRONIC SIREN CONTROL ENCLOSURE

The electronic siren amplifier/control panel is a factory-assembled unit ready for installation at the siren site.

The upper cabinet contains the power amplifiers, siren signal tone generator / voice control with its manual control panel and all terminations to the speaker array. The upper cabinet is a NEMA 4 rated (24” H x 24” W x 8” D) enclosure for a standard steel enclosure (EC Series) and a NEMA 4X for a stainless steel enclosure (IS Series) providing a weather resistant environment for the control / amplifier circuitry.

The lower cabinet contains two maintenance free lead acid deep cycle marine batteries of 12 volts each, connected in series to provide 24-volt DC operation of the siren system and a 12 volt backup battery for the RTU logic board. The lower cabinet is a NEMA 4 and NEMA 4X rated (24” H x 24” W x 8” D) weather resistant enclosure with vent plugs on each side of the enclosure to insure positive venting of the charging gasses from the enclosure. The lower cabinet is separated from the control cabinet because of the corrosive nature of the recharging fumes. This separation maintains the integrity of the amplifier / control circuitry.

The batteries and RTU power supply PCB of the Electronic provide the primary power in the operation of the siren. THIS SYSTEM IS DESIGNED TO OPERATE WITH BATTERY POWER AS THE PRIMARY POWER SOURCE; THE SIREN IS DESIGNED TO OPERATE IN THE EVENT OF AN AC POWER FAILURE for extended periods of time. If the battery equipment is properly maintained, the siren will remain ready for operation for up to two weeks with 5 minutes operating reserve without outside power to charge the batteries, and can provide 30 minutes of steady operation immediately following an AC power failure.

The amplifier/control unit is furnished with a manual control panel for the 6 standard siren signals plus a silent test feature, and operational output indicating LED’s, and a maintenance test switch on each amplifier to allow low output level testing to reduce undue alarming of the public during maintenance testing and inspection. It also has AC Fail and a delayed Door Open indicator LED.
3. INSTALLATION

A. SITE SELECTION AND TYPES OF MOUNTING

Careful consideration must be given in selecting a site or sites for installation. Siren signal coverage should be plotted on local area maps to ensure signal strength is adequate for the area to be covered. Generally, the highest possible site in the selected area is the best location. This might be a building, tower or a hill. Do not mount the siren too high so that the sound goes over the top of the area. Consult the Federal Emergency Management Agency CPG1-17 "Outdoor Warning Systems Guide" for additional setting and planning procedures.

In lieu of a suitable existing structure for mounting, a Class III wood pole, approximately 50 feet long (minimum) and sunken 8 feet deep, is a generally recommended mount. Refer to the illustrated mounting layouts for details. Any tall building, trees, hills or other obstructions will tend to create a barrier, which will produce a deadened area behind the obstruction. For the best sound coverage, the siren horn should be positioned at least 5 feet higher than any building or obstruction within 150 ft. of the siren.

B. ELECTRICAL POWER REQUIREMENTS

Adequate electrical power must be available at each siren site (see SPECIFICATIONS for requirements).

C. INSTALLATION GENERAL INFORMATION

The EC-Series sirens are designed to allow several methods of installation. The pole-mounting version of installation allows the most versatility in site selection by eliminating the need for a structure of suitable strength and height at a location near to the desired coverage area. The pole mount is generally more cost effective by simplifying the wiring, at the site, to the pole itself. However, roof mounting is also a common alternative.

The EC-Series sirens have a recommended mounting height of 40-50 feet above level grade.

Pole mounting can be accomplished either by pre-assembly of the siren and equipment to the pole prior to raising and setting the pole or by assembly after the pole has been raised and set.
D. HORN PRE-ASSEMBLY PROCEDURE

Before beginning either installation procedure, it is best to pre-assemble the Siren Horn units.

1. Unpack the Horn assemblies and Drivers.

2. Screw the four Drivers onto the back of the horn. Attach the Red and Black wires to the Drivers, making sure that the Red wire is attached to the Red terminal as indicated by a Red dot on the back of the Drivers.

3. Secure the strain relief to the back cover and slip the two conductor 12 AWG cable through the strain relief such that the spade lugs and 12 inches of wire are on the inside of the cover. Move the two Driver wires from the center screws to the outside screws as shown. Attach the two wires to the terminal block, matching the wire colors with the Driver wires.

4. Close and secure the back cover such that the wire exit is away from both mounting brackets.

5. Remove the “C” shaped mounting bracket from the horn and save the four screws.

6. Locate the mounting bracket extenders in the Installation Hardware Kit. They are 2.5” x 5” ¼” thick steel bars with 4 holes. Mount one on each horn mounting bracket with the original screws, washers and nuts.

7. Attach the “C” shaped mounting bracket to the extender plate such that it is sticking straight out behind the horn. Secure each side of the bracket with a 3/8” and a 1/2” bolt, washer and nut from the installation Hardware kit.
3. INSTALLATION, Continued

E. GROUND ASSEMBLY

With the Ground Assembly method of installation, all components of the siren system and accessories are attached to the pole while the pole is horizontal, prior to raising and setting. When all of the siren’s components are attached, the siren and pole are raised to the vertical position and placed in the hole.

F. GROUND ASSEMBLY PROCEDURE

Installation of the EC-Series sirens using the Ground Assembly method proceeds in the following steps:

1. Position the pole with the bottom of the pole near the hole location.

2. With the pole lying on the ground, attach the pole setting equipment and the lift cable to the pole at a point two thirds (2/3) of the way from the base of the pole (large diameter end).

3. Lift the pole so that the top end of the pole is approximately three feet off of the ground and place supports under the pole to keep the pole in its raised position. Use supports of sufficient strength to support the pole and the siren components to be attached. Cement blocks or strong steel saw horse is recommended. The base of the pole should also be chocked to prevent the pole from rolling off of the supports installed under the pole.

4. Release the pole setting cable slowly to assure the pole will rest securely on the supporting structure.

5. Remove the pole mount assembly from the shipping crate and position it at the top of the pole. Secure the pole mount to the pole with a come-along winch or similar device.

6. With the pole mount secured, drill or auger through the siren pole using the two pole mount holes as a guide.

7. After completion of drilling, fasten the pole mount to the pole with the two 3/4” threaded rods, flat washers, lock washers and nuts.

8. Remove the bolts from the square siren speaker array mounting bracket and the shipping crate.
F. GROUND ASSEMBLY PROCEDURE, CON’T.

9. Attach the square mounting bracket to the pole mount using the eight (8) one half inch (1/2”) x 1 3/4 in. bolts, lock washers, and nuts provided in the POLE MOUNT HARDWARE KIT.

10. Attach the pre-assembled horns to the center of each square mounting bracket using three (3) one half inch (1/2”) x 1 3/4 in. bolts, lock washers, and nuts provided in the POLE MOUNT HARDWARE KIT.

11. Remove the cover of the junction box that is attached to the square mounting bracket. Attach the 1” flex conduit to the bottom of the junction box.

12. Determine the mounting height of the siren control enclosure on the pole. The bottom of the siren control enclosure should be mounted a minimum of ten feet above ground level to prevent and/or to protect the unit from flooding and tampering. Locate the control enclosure ten feet plus the depth of the hole from the bottom of the siren pole.

13. With the siren control enclosure held in position on the pole, lag the siren control enclosure to the pole with the lag bolts provided.

14. Attach the flex conduit to rigid conduit and secure the rigid conduit down the side of the pole to the control box.

15. Use a second length of flex conduit and the appropriate connectors to form a drip loop from the rigid conduit to the side of the top control cabinet.

16. Fish a 4 AWG common wire along with the supplied 4 conductor cables (1 for 1600watts and 2 for 3200watts) and the Red/Black wires for the optional Strobe through the conduit.

17. Pass each wire from the horn assembly through one of the strain relief’s on the junction box and splice the Red/White wire onto one of the wires of the four conductor cable. Terminate the Black wires onto the 4 AWG Terminal block.

18. Terminate all of the Audio wires inside of the control according to the wiring diagram.

19. Attach the 6 AWG (Minimum) bare stranded copper ground wire to the pole mount using the threaded hole provided for ground connection. Attach the ground wire to the wood pole with wire staples at four foot intervals along side of the rigid conduit.
F. GROUND ASSEMBLY PROCEDURE, CON’T.

20. If applicable, attach the Solar Panel mounting bracket to the pole. Run 1/2” conduit from the panel to the right side of the control cabinet.

21. If applicable, attach the ground wire to the Solar Panel mounting bracket.

22. Attach the 6 AWG ground wire to the siren control enclosure at the ground terminal on the bottom of the mounting channel.

23. If applicable, install the weather head, the service conduit drop, the Meter Base and the AC disconnect at a height as required by national, state, and/or local codes. The conduits between the services disconnect and the siren control enclosure should enter the control enclosure on the right side five inches from the rear of the cabinet and twenty-two inches from the top. Check with local authorities for meter base mounting location.

NOTE: If underground service is used, delete the weather head and service drop. Follow your utility’s requirements for service installation.

24. If applicable, attach the ground wire to the AC Disconnect box.

25. Continue the ground wire down to the base of the pole in preparation for connection to the ground rods.

26. If a ground type butt plate is to be used, it should be lag bolted to the base of the siren pole and the ground wire terminated to the butt plate.

27. The siren is now ready for erection into its vertically installed position. Prior to or during the attachment of the siren accessories to the pole, the hole should be dug or augured in the ground for the siren pole to be set into. If the hole is to be dug prior to the sirens readiness of installation or erection care should be taken to prevent injuries to people or animals straying into the area of the open hole and to prevent the accumulation of rubbish. It is recommended that the hole be dug as closely to the time of installation as feasibly possible. Also, while on the ground, the siren speaker openings should be covered to prevent water from entering the driver assemblies.

A general formula for determining the depth of the installation hole is: pole length x 10% + 2 ft. = depth of hole to be augured. However, soil conditions may vary by location and under certain conditions may require a greater depth or additional support.
F. GROUND ASSEMBLY PROCEDURE, CON’T.

28. Attach the pole setting device and cable to the siren at a point approximately two thirds (2/3) of the way from the base of the pole.

29. Raise the siren pole assembly to a near vertical position and carefully guide the base of the pole into the hole. Lower the base of the siren pole assembly into the hole holding the siren pole assembly vertical; check the installation angle with a plumb bob. (If the siren control enclosure or service is facing the wrong direction, rotate the siren pole with a pole gaff lever to the desired location.)

30. When you are satisfied that the installation angle is correct and the pole is oriented properly, the hole should be filled in six inch lifts and compressed with a tamping device to a point approximately one foot below ground level. The remaining hole is filled to overflowing to a mounded height of one foot above ground level to provide excess fill for settling.

31. The ground rods should be driven into the earth opposite of each other at a distance of four feet from the siren pole. The ground wire is now attached to each ground rod using a method in compliance with national, state, and local codes.

31. The siren installation is now ready for utility power hook up.
G. OVERHEAD INSTALLATION METHOD

The Overhead Installation Technique proceeds as follows:

**Pole Setting**

1. Deliver the pole to the siren site with the bottom of the pole near the location of the hole.

2. Dig the hole for the siren installation to a depth of the pole length x 10% + 2 feet or a similar formula that may be used in your geographic area.

3. Attach the pole setting device and cable to the siren pole approximately two thirds (2/3) of the way from the base of the pole.

4. Raise the pole to a near vertical position and carefully guide the base of the pole into the hole. Lower the pole to the bottom of the hole, holding the pole vertical, and check the installation angle with a plumb bob.

5. When you are satisfied that the installation angle is correct, the hole should be filled in six inch lifts and compressed with a tamping device to a point approximately one foot above ground level to provide excess fill for settling.

6. The pole installation is now complete, and the pole setting crew may now move to the next site.

**Equipment Assembly**

1. Attach the pre-assembled horns to the center of the square mounting bracket using three (3) one half inch (1/2") x 1 3/4 in. bolts, lock washers, and nuts provided in the POLE MOUNT HARDWARE KIT.

2. Remove the cover of the junction box that is attached to the square mounting bracket.

3. Pass each wire from the horn assembly through one of the strain relief’s on the junction box and splice the Red/White wire into one of the wires of the four conductor cable. Terminate the Black wires onto the 8 AWG spider terminals. Refer to the appropriate drawing for specific wiring details.

4. Attach an eye bolt to the top of the square mounting bracket and hoist the speaker array up about four feet above the ground.
G. OVERHEAD INSTALLATION METHOD, CONTINUED

5. Remove the pole mount assembly from the shipping crate and position it below the speaker array.

6. Slowly lower the siren speaker array onto the pole mount platform. Align the eight (8) holes of the speaker array to the eight holes of the pole mount platform and secure them with the eight (1/2") x 1 3/4" inch bolts, nuts, and lock washers provided in the HARDWARE KIT.

7. Raise the siren and pole mount assembly to the top of the pole. Hold the base plate of the pole mount bracket four inches above the top of the pole to allow the access to the mounting bolts so that the siren may be removed with the pole mount installed. Secure the siren and pole mount to the pole with a come-along winch or similar device.

8. With the siren and pole mount secured, drill or auger through the siren pole using the pole mount holes as a guide.

9. After completion of drilling, install the 3/4" threaded through rods with flat washers, lock washers, and nuts.

10. Remove the come-along winch device from the pole and pole mount.

11. Lift the siren control enclosure into position on the pole. Lag the siren control enclosure to the pole with the lag bolts provided at a height of ten feet above ground level to prevent vandalism and/or to protect the unit from flooding.

12. Attach a flex conduit between the siren junction box and a length of rigid conduit. Position the conduit such that it will run down the pole and enter the right side of the control box. Secure the rigid conduit down the side of the pole to the control box.

13. Use a second length of flex conduit and the appropriate connectors to form a drip loop from the rigid conduit to the side of the top control cabinet.

14. Fish a 4 AWG common wire along with the supplied 4 conductor cables (1 for 1600watts and 2 for 3200watts) and the Red/Black wires for the optional Strobe through the conduit.

15. Splice each Siren Red/White wire onto one of the wires of the four conductor cable. Terminate the Black wires onto the 4 AWG Terminal block.
G. OVERHEAD INSTALLATION METHOD, CONTINUED

16. Attach the 6 AWG (Minimum) bare stranded copper ground wire to the pole mount using the threaded hole provided for ground connection. Attach the ground wire to the wood pole with wire staples at four foot intervals along side of the rigid conduit.

17. If applicable, attach the Solar Panel mounting bracket to the side of the pole. Run 1/2” conduit from the Solar Panel to the right side of the control cabinet.

18. If applicable, attach the ground wire to the Solar Panel mounting bracket.

19. Attach the ground wire to the siren control enclosure at the ground terminal lug on the bottom of the mounting channel.

20. If applicable, install the weather head, the service conduit drop, the Meter Base and the AC disconnect at a height as required by national, state, and/or local codes. The conduits between the services disconnect and the siren control enclosure should enter the control enclosure on the right side five inches from the rear of the cabinet and twenty-two inches from the top. Check with local authorities for meter base mounting location.

NOTE: If underground service is used, delete the weather head and service drop. Follow your utility’s requirements for service installation.

21. If applicable, attach the ground wire to the AC Disconnect box.

22. Continue the ground wire down to the base of the pole in preparation for connection to the ground rods.

23. The ground rods should be driven into the earth opposite each other at a distance of four feet from the siren pole. The ground wire is now attached to each ground rod using a method that is in compliance with the National Electrical Code, and state and local codes.

24. Terminate all of the Audio wires inside of the control according to the wiring diagram.

25. The siren installation is now complete and ready for utility power hook up.
4. PRE-OPERATION AND START-UP PROCEDURE

Regardless of the method of installation selected, once installed, the siren and accessories should be inspected and tested in accordance with the following procedure:

1. Install the two (12 VDC) twelve volt DC main batteries provided into the battery enclosure at the bottom of the siren control enclosure. Position the batteries so that the positive terminal (+) is to the left on both batteries. Install the small backup battery into the battery enclosure.

2. As received from shipment, the battery box contains three battery cables and a 2-wire 14-Awg cable. Two cables are pre-attached to the control unit, + and - battery attachments. The third cable is loose and connects between the two batteries. Install this cable to the positive post on the right battery and the negative terminal on the left battery. The 2-wire 14-Awg cable plugs onto the small backup battery with the red wire connecting to the positive terminal of the small battery and the black wire going to the negative of the small battery.

3. Terminate the positive (+) battery cable (cable with the red strip) to the positive (+) post of the left battery.

4. DO NOT install the negative (-) battery cable at this time. Insulate the terminal of the cable and proceed with the check out procedure.

5. Inspect the 120 VAC incoming power connections to TB1. Ground should terminate to the ground lug located on TB1. Line "HOT" should terminate to TB1-Pin 1. Line "NEUTRAL" should terminate to TB1-Pin 2. The additional termination points are provided to allow easy installation of external devices to the power terminal. External devices must not exceed the capacity of the input power circuit.

6. Place the toggle switches located on the power amplifiers in the "LO" position to help prevent hearing damage if the unit accidentally operates. This reduces the output of the amplifiers to two watt each so that no undue alerting of the public results from testing.

7. Install the appropriate fuses in the service disconnect and turn the disconnect switch to the on position. If circuit breakers are used turn the circuit breaker "ON".

8. Place the control power toggle switch on the RTU Power supply to the ON position.

9. The green power lamp of the RTU Logic board will light on this application of power to the siren control.

10. Install the negative (-) battery cable to the negative post of the right battery in the battery enclosure.

11. The siren is now ready for start up testing.

12. The green power LED of the battery charger should be on. These chargers are automatic chargers that will charge a battery to fully charged (approx. 14.2 VDC) and then light the Fully Charged LED on the charger. At this point the charger will turn off, but the fully charged LED
should stay on until the battery voltage goes down to approx. 13.25 VDC. At this point the fully charged LED will turn off, and the charger should start charging again with the battery voltage again rising up to 14.2 VDC. Note: This whole cycle may take quite awhile (up to a full day) to happen if the batteries are weak.

13. Momentarily press one of the siren signal buttons. The siren control will operate the appropriate signal until the Cancel button is depressed.

14. Electronic sirens of the rotational type will rotate during signal operation.

15. Insert the hand held microphone male plug end into the audio input receptacle (If purchased). Operate the microphone by depressing the switch. The microphone is of the noise canceling type and should be held against your top lip when speaking into it. With the microphone switch held in the depressed position, speak clearly into the microphone and adjust the volume level to obtain the best operation.

16. Return the toggle switches on the power amplifiers to the "HIGH" position.

17. The siren is now ready for full output operation.

**CAUTION: Use ear protection before proceeding to step 18. Failure to do so can cause hearing damage.**

18. Depress one of the six siren signal buttons. The siren will now operate at full output. Verify the full output of each of the power amplifiers by visually observing the four red lamps lighted next to the power switch. These lamps are labeled "SPKR" (speaker) and are only lit when the power amplifier and speaker driver are fully operational.

19. Information on the installation and operation of any control devices or accessories is not within the scope of this manual. Refer to the manual provided by the manufacturer of the equipment.
5. THEORY OF OPERATION

A. GENERAL

The siren’s charging system is powered by 120 VAC service. The batteries are two 12-volt lead acid cells that are connected in series to provide a 24-volt operating system.

The siren’s RTU is powered by the 120 VAC service and has battery backup, at all times, with the charging system providing cycling and/or float charging to the battery operating system.

Positive 24 VDC is provided only to the audio amplifier modules when the siren is running, through the main contactor RLY1 to provide minimal current draw during the system readiness mode.

When a local button is depressed, P.A. announcements are made, or a remote input closure occurs, the RTU board operates. The RTU board creates an audio signal to the audio power amplifiers, and a switched output to power the power amplifiers. Audio from the RTU board is fed to up to the power amplifiers where the audio signal is increased up to 1600+ watts of power (on EC-4000 model). The amplified audio signal is fed to the speaker drivers to produce the high intensity warning signals.

B. RTU LOGIC BOARD CIRCUIT

Siren signals are operated via the local buttons or high going signals on the remote inputs of J102-1 through J102-Pin 8 (refer to drawing #080-0105C). J101-Pin 4 is a +12 VDC connection. A closure of J101-Pin 4 to the appropriate pin of J102 will provide one of several signals. The operation of a signal initiates an audio oscillator of proper frequency and duration to the signal selected.

The audio oscillator is fed to a dual tone offset oscillator to create a second frequency offset which follows the first oscillator to get approximately -150 Hz offset. The two audio oscillators provide these signals through an audio enable circuit to the preamplifier outputs of the RTU Logic board. The square wave produced in one of the two oscillators is output to the main power amplifiers. This RTU Logic board also provides two switched closures. One to power the main contactor which in turn powers up the main power amplifiers and a second to provide power to the rotation motor on the rotational sirens, or for the use of a strobe light.

In the P.A. mode or radio mode the audio enable circuit disables the tone generator and offset generator output. The voice audio supplies the preamplifier inputs and provides audio output to the power amplifier stage.

The voice input via the manual P.A. mode is adjustable by means of a volume control through the face of the RTU Logic board (VR1).

The RTU Logic Board is modular in design and can be easily removed via two (2) Nylock fasteners and four (4) wing nuts, which fasten the faceplate to the siren control after removal of the board’s connectors.

C. POWER AMPLIFIER MODULE
The power amplifier modules are powered only during siren signaling, radio input, or P.A. operation. At that time, audio information is supplied from the two (2) preamplifiers of the RTU board. Audio input to U1 is split to provide phase-inverted inputs to the differential amplifier comprised of U1 and U2 (refer to schematic 080-0117B and 080-0118B).

The audio is further amplified in the second stage differential amplifier Q1-Q4 and output transformer T1.

Output transformer T1 has four (4) output taps. All four outputs are across the full output winding providing 100 watts RMS into one 11-Ohm speaker driver load each.

The output of T1 is isolated and provides no ground reference. This is designed to eliminate ground paths for transients or lightning and protects the audio circuitry.

Over the output leads of T1 there are four (4) coils, CT1 through CT4. These coils provide current to light the lamps LED 1 through LED4 when high intensity audio is passed from T1 to the speaker driver. When test switch SW1 is in the low position, there is not sufficient drive in the output of T1 to light these lights when the amplifier is in operation.

The use of LED 1 through LED 4 provides a "visual" diagnostics of the amplifier operation. During proper operation at full output (test switch SW1 in the "HI" position) all lamps are lit. If an amplifier failure occurs, or a speaker driver fails the lamp or lamps which are connected to the faulty component will extinguish to indicate the component of failure.

The power supplied to the power amplifier module is 22-28 VDC and is protected by a 30-Amp fuse, F1.

D. POWER SUPPLY AND CHARGING CIRCUIT

Two (2) 12-Volt DC series connected deep cycle lead acid batteries to provide a 24 Volt DC operating system provide power for the EC series sirens. Charging current is provided by the battery chargers and is automatically governed by the charger itself. The charger does not require adjustment. Servicing of the unit should be by unit replacement.

The batteries supply a switched +24VDC to the amplifiers through the main contactor via the positive bus.

When in operation, the RTU Logic Board energizes the coil of the DC contactor RYL1. Contactor RYL1 closes, supplying +24 VDC to the +B switched power bus. The power amplifier modules are connected to the positive bus and are individually supplied when the +B bus is energized.

The 120 VAC input power from TB1 is fused on the power supply board (refer to drawing #080-0157) and at the main disconnect.

A duplex receptacle is provided for test instruments or accessories. Accessories should not exceed 15 amps total.
An enclosure heater circuit is employed in the design to stabilize humidity in the enclosure. The heaters are two (2) 25-watt resistor-type heaters connected at 120 VAC to provide a total of 50 watts of heating to the enclosure. A thermostat that is factory set at about 60 degrees Fahrenheit (15 degrees Celsius) controls the heaters. No maintenance is required of this feature.

E. RADIO PA

This signal is similar to PA above, but is controlled through the radio control decoder on sirens so equipped. PA in this mode also has priority over siren signals in operation to allow instructional information to be given.

F. CUSTOM SIGNALING (VIA RADIO)

Using the radio input or interface, any number of custom signals may be interfaced to the siren control. Contact American Signal field representatives with your application requirement.
6. MAINTENANCE

The electronic siren is designed to provide error free operation and ease in scheduled maintenance. Should repair become necessary, all components can be replaced in a modular fashion to eliminate costly labor and heavy lifting.

Scheduled maintenance is limited to lubrication of moving parts, inspection and tightening electrical connections, normal battery maintenance, and periodic testing of the siren system to assure system readiness at all times.

Diagnostic options greatly enhance the maintenance of the system and further reduce labor requirements to service the system.

The following is a recommended guideline to maintain siren readiness, which has been broken into categories. Each category describes the service to be performed and the procedure of that service.

A. MONTHLY MAINTENANCE

On a monthly basis, American Signal recommends that the siren be tested at least once.

If the siren is equipped with FSK two-way option, the site should be visited to check the status indicators. If the siren is not equipped with the American Signal FSK two-way option, spotters should be employed to verify operation on the day(s) of testing.

B. SIX-MONTH MAINTENANCE

It is recommended that the siren site be inspected every six months to determine the condition of the siren and accessories. The inspection should include the following:

1. Speaker Array Appearance
2. Siren Control Enclosure Appearance (inside and out)
3. Battery Connections and Condition
4. Check Fuses and Connectors
5. Perform an Operational Test of All Functions

1. Speaker Array Appearance

The speaker array should be visually inspected from the ground for vandalism or damage from tree limbs or debris. Foreign objects should be removed prior to continued use.

2. Siren Control Enclosure Appearance

The siren control enclosure should be inspected for vandalism and/or damage. The doors of the battery enclosure and siren control enclosure should be inspected for water leakage into the enclosures. Talcum powder should be applied to the door gaskets, as needed, to keep them soft and operable. Any source of water leakage should be found and eliminated. Remove any debris, which has accumulated in the vent plugs of the battery enclosure.
3. Battery Connections and Condition

The batteries should be inspected for corrosion or leakage. Care should be taken in maintaining tight connections to the battery terminals. The terminals of the batteries cable connector should be cleaned and re-tightened to assure a good connection. The terminals should then be coated with a nonconductive grease or battery terminal lacquer to protect them from moisture. If lead acid wet cell batteries are employed, the water level should be checked.

4. Check Fuse and Connectors

Inspect the siren control for loose connections and tighten as required. Inspect the fuses of the AC power, battery charger, power amplifier, and tone generator and control box.

5. Perform an Operational Test of All Functions

To test the operation of the siren system, refer to preoperational and start-up procedure. Any optional accessories to the siren will have their own testing procedure and will be found in the option supplements to this manual.
7. TROUBLE SHOOTING GUIDE

Symptom: Siren does not operate remotely or locally, no lights on the RTU board.

Cause/Remedy: No AC power and/or no DC power. Check fuse (2 amp) on Power Supply Board, check incoming AC power and DC power supply. Check power connections.

Symptom: Siren does not operate remotely or locally, light on RTU board lit.

Cause/Remedy: Faulty RTU board - replace.
- Blown fuses on power amps - replace.
- Faulty wiring to DC contactor or +B switch Bus. - Inspect and repair.
- Faulty speaker drivers - replace.

Symptom: Siren does not operate remotely or locally, lights on RTU board, DC contactor K1 activates when control is operated.

Cause/Remedy: Faulty fuses on power amplifier - replace.
- Faulty speaker drivers - replace.

Symptom: Siren does not sound when activated, P.A. inactive also.

Cause/Remedy: Faulty RTU board - replace.
- Faulty fuses on power amps - replace.
- Faulty power amps - replace.
- Faulty speaker drivers - replace.

Symptom: Siren does not sound when activated, P.A. operational.

Cause/Remedy: Faulty RTU board - replace.

Symptom: Siren sounds when activated, no P.A. operation.

Cause/Remedy: Faulty RTU board - replace.
- Faulty microphone - replace.


Cause/Remedy: Faulty fuses on power amps - replace as needed.
- Faulty power amplifier - replace as needed.
- Faulty speaker driver(s) - replace as needed.

Symptom: Siren sounds when activated, P.A. operational, low sound output.

Cause/Remedy: Partial power amplifier failure - replace.
- Faulty fuses on power amps - replace.
- Power amplifiers set in test "LO" - set switch to "HI"

Symptom: Siren sound when activated, P.A. operational, sound is garbled or noisy.

Cause/Remedy: Faulty RTU board - replace.
- Faulty power amp - replace.
- Low battery - charge and test battery.
SECTION A-A
TOPO-UP VIEW OF BOXES ON POLE

1' FLEX CONDUIT BETWEEN CONTROL AND RIGID CONDUIT FROM HEAD
ANTENNA CABLE WITH DRAIN LOOP

FUSED AC DISCONNECT
CONTROL AND BTU
1/2' CONDUIT FROM DISCONNECT

ALL CONDUIT SHOULD ENTER BOTTOM OR LOWER SIDES OF BOXES *** ONLY ***
HIRING BETWEEN BOXES AND TO HEAD SHALL BE IN CONDUIT
(ANTENNA CABLE IS EXCEPTION WHERE CODES PERMIT)
NO ALUMINUM WIRE SHALL BE USED
INSTALLATION SHALL BE IN ACCORDANCE WITH NEC, FEDERAL, STATE AND LOCAL CODES

CONTRACTOR SUPPLIED PARTS
POLE CLASSE AND LENGTH TO BE DETERMINED PER CONTRACT
2 - 10' COPPER GROUNDING RODS AND CLAMPS
75' - #8 BRAID STRANDED COPPER GROUNDING WIRE (APPROX.)
CONDUIT STRAPS FOR CONDUIT AND ANTENNA COAX
CONDUITS AND CONDUIT FITTINGS

ALL CONDUIT AND INTERCONNECTION WIRE (APPROXIMATE)
16' - 1' FLEX CONDUIT
50' - 1' RIGID CONDUIT
10' - 1/2' FLEX CONDUIT
18' - 1/2' RIGID CONDUIT
25' - #8 AWG BLACK
25' - #8 AWG RED
69' - #8 AWG BLACK (IF STRONGS ARE REQUIRED)
69' - #8 AWG RED (IF STRONGS ARE REQUIRED)

SIREN HEAD JUNCTION BOX DETAIL
12 AWG TO EACH HORN
BUS BAR
4 AWG
4 CONDUCTOR 12 AWG CABLE
1' CONDUIT TO CONTROL

AMERICAN SIGNAL CORPORATION
E-CLASS SOLAR SIREN - INSTALL DRAWING
EC1600-EC-3200 SIREN
DRAWN BY: JAH DATE: 07/28/95 DRAWING NO.: 34-0103A REVISION: A
APPROVED BY: DATE: SHEET 1 OF 1

EC-SERIES SOLAR INSTALLATION DRAWING
10. SIREN CONTROL DIAGRAMS

EC-1 thru EC-4 STANDARD CONTROL COMPONENT LAYOUT DIAGRAM

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EC-1 HAS 1 AMP
EC-2 HAS 2 AMPS
EC-3 HAS 3 AMPS
EC-4 HAS 4 AMPS

AMERICAN SIGNAL CORPORATION
EC-1 -> EC-4 STANDARD SIREN CONTROL Component Layout Diagram

DRAWN BY: JEL DATE: 4/02/98 DRAWING NO.: 83-0599 REVISION: A
APPROVED DATE: SHEET 1 OF 1
EC-1 thru EC-4 STANDARD CONTROL WIRING DIAGRAM
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* = REGULATOR PART NUMBER VARIES DEPENDING UPON SIZE OF SOLAR ARRAY.
ASC 12/8 = 086-0038
ASC 12/12 = 086-0042

EC-1 HAS 1 AMP
EC-2 HAS 2 AMPS
EC-3 HAS 3 AMPS
EC-4 HAS 4 AMPS

AMERICAN SIGNAL CORPORATION
EC-1 -> EC-4 SOLAR SIREN CONTROL Component Layout Diagram
DRAWN BY: JEL DATE: 04/02/96 DRAWING NO: 83-0604
APPROVED DATE: 04/02/96 SHEET: 1 OF 1
EC-5 thru EC-8 SOLAR CONTROL COMPONENT LAYOUT DIAGRAM

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</tbody>
</table>

* = REGULATOR PART NUMBER VARIES DEPENDING UPON SIZE OF SOLAR ARRAY.
ASC 12/8 = 086-0038
ASC 12/12 = 086-0042

AMERICAN SIGNAL CORPORATION
EC-5 -> EC-8 SOLAR SIREN CONTROL Component Layout Diagram

DRAWN BY: JEL DATE: 04/02/00 ORIGIN NO: REVISION: A
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EC-5 HAS 5 AMPS
EC-6 HAS 6 AMPS
EC-7 HAS 7 AMPS
EC-8 HAS 8 AMPS
EC-5 thru EC-8 SOLAR CONTROL WIRING DIAGRAM
11. SUB-COMPONENT SCHEMATIC DIAGRAMS

COMPULERT™ 3 RTU LOGIC PCB