

WHELEN[®]

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Installation Guide: Epsilon™ 2S9 Siren Amplifier

DANGER! Sirens produce extremely loud emergency warning tones! Exposure to these tones without proper and adequate hearing protection, could cause ear damage and/or hearing loss! The Occupational Safety & Health Administration (www.osha.gov) provides information necessary to determine safe exposure times in Occupational Noise Exposure Section 1910.95. Until you have determined the safe exposure times for your specific application, operators and anyone else in the immediate vicinity should be required to wear an approved hearing protection device. Failure to follow this recommendation could cause hearing loss!

Warnings to Installers

Whelen's emergency vehicle warning devices must be properly mounted and wired in order to be effective and safe. Read and follow all of Whelen's written instructions when installing or using this device. Emergency vehicles are often operated under high speed stressful conditions which must be accounted for when installing all emergency warning devices. Controls should be placed within convenient reach of the operator so that they can operate the system without taking their eyes off the roadway. Emergency warning devices can require high electrical voltages and/or currents. Properly protect and use caution around live electrical connections. Grounding or shorting of electrical connections can cause high current arcing, which can cause personal injury and/or vehicle damage, including fire. Many electronic devices used in emergency vehicles can create or be affected by electromagnetic interference. Therefore, after installation of any electronic device it is necessary to test all electronic equipment simultaneously to insure that they operate free of interference from other components within the vehicle. Never power emergency warning equipment from the same circuit or share the same grounding circuit with radio communication equipment. All devices should be mounted in accordance with the manufacturer's instructions and securely fastened to vehicle elements of sufficient strength to withstand the forces applied to the device. Driver and/or passenger air bags (SRS) will affect the way equipment should be mounted. This device should be mounted by permanent installation and within the zones specified by the vehicle manufacturer, if any. Any device mounted in the deployment area of an air bag will damage or reduce the effectiveness of the air bag and may damage or dislodge the device. Installer must be sure that this device, its mounting hardware and electrical supply wiring does not interfere with the air bag or the SRS wiring or sensors. Mounting the unit inside the vehicle by a method other than permanent installation is not recommended as unit may become dislodged during swerving; sudden braking or collision. Failure to follow instructions can result in personal injury. Whelen assumes no liability for any loss resulting from the use of this warning device. PROPER INSTALLATION COMBINED WITH OPERATOR TRAINING IN THE PROPER USE OF EMERGENCY WARNING DEVICES IS ESSENTIAL TO INSURE THE SAFETY OF EMERGENCY PERSONNEL AND THE PUBLIC.

Warnings to Users

Whelen's emergency vehicle warning devices are intended to alert other operators and pedestrians to the presence and operation of emergency vehicles and personnel. However, the use of this or any other Whelen emergency warning device does not guarantee that you will have the right-of-way or that other drivers and pedestrians will properly heed an emergency warning signal. Never assume you have the right-of-way. It is your responsibility to proceed safely before entering an intersection, driving against traffic, responding at a high rate of speed, or walking on or around traffic lanes. Emergency vehicle warning devices should be tested on a daily basis to ensure that they operate properly. When in actual use, the operator must ensure that both visual and audible warnings are not blocked by vehicle components (i.e.: open trunks or compartment doors), people, vehicles, or other obstructions. It is the user's responsibility to understand and obey all laws regarding emergency warning devices. The user should be familiar with all applicable laws and regulations prior to the use of any emergency vehicle warning device. Whelen's audible warning devices are designed to project sound in a forward direction away from the vehicle occupants. However, because sustained periodic exposure to loud sounds can cause hearing loss, all audible warning devices should be installed and operated in accordance with the standards established by the National Fire Protection Association.

Safety First

This document provides all the necessary information to allow your Whelen product to be properly and safely installed. Before beginning the installation and/or operation of your new product, the installation technician and operator must read this manual completely. Important information is contained herein that could prevent serious injury or damage.

⚠ WARNING: This product can expose you to chemicals including Methylene Chloride which is known to the State of California to cause cancer, and Bisphenol A, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

- Proper installation of this product requires the installer to have a good understanding of automotive electronics, systems and procedures.
- Whelen Engineering requires the use of waterproof butt splices and/or connectors if that connector could be exposed to moisture.
- Any holes, either created or utilized by this product, should be made both air- and watertight using a sealant recommended by your vehicle manufacturer.
- Failure to use specified installation parts and/or hardware will void the product warranty.
- If mounting this product requires drilling holes, the installer MUST be sure that no vehicle components or other vital parts could be damaged by the drilling process. Check both sides of the mounting surface before drilling begins. Also de-burr the holes and remove any metal shards or remnants. Install grommets into all wire passage holes.
- If this manual states that this product may be mounted with suction cups, magnets, tape or Velcro®, clean the mounting surface with a 50/50 mix of isopropyl alcohol and water and dry thoroughly.
- Do not install this product or route any wires in the deployment area of your air bag. Equipment mounted or located in the air bag deployment area will damage or reduce the effectiveness of the air bag, or become a projectile that could cause serious personal injury or death. Refer to your vehicle owner's manual for the air bag deployment area. The User/Installer assumes full responsibility to determine proper mounting location, based on providing ultimate safety to all passengers inside the vehicle.
- For this product to operate at optimum efficiency, a good electrical connection to chassis ground must be made. The recommended procedure requires the product ground wire to be connected directly to the NEGATIVE (-) battery post (this does not include products that use cigar power cords).
- If this product uses a remote device for activation or control, make sure that this device is located in an area that allows both the vehicle and the device to be operated safely in any driving condition.
- It is recommended that these instructions be stored in a safe place and referred to when performing maintenance and/or reinstallation of this product.
- FAILURE TO FOLLOW THESE SAFETY PRECAUTIONS AND INSTRUCTIONS COULD RESULT IN DAMAGE TO THE PRODUCT OR VEHICLE AND/OR SERIOUS INJURY TO YOU AND YOUR PASSENGERS!

**ACTIVATION OF THIS
SIREN MAY DAMAGE
UNPROTECTED EARS!**



CAUTION

Loud siren noise can cause hearing damage and/or loss. Refer to OSHA Section 1910.95 prior to putting ANY siren into service!

Congratulations on selecting the Epsilon™ 2S9 Siren. This siren offers a unique and distinctive collection of features designed to allow the user to customize the operation of this siren to suit their individual needs. Features include:

- Speaker diagnostic indicator
- 200 watts of output power
- Scan-Lock™ siren tone programming
- Hands Free operation
- 9 Lighting control outlets
- LED Backlighting
- 7 position rotary switch function selector
- Compact design
- Programmable outlets
- Harmonically rich composite air horn tones
- Title 13 compliant profiles
- Non-destructive short circuit protection.
- Horn ring control inputs
- PA Override

Mounting:

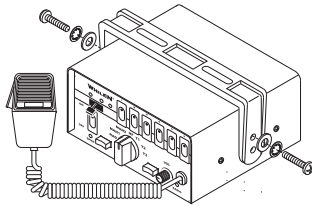
This siren is designed to be mounted directly onto the dash or other surface through the use of a bail-strap mounting bracket. The unit may also be mounted into your vehicle's console (if so equipped).

WARNING: Regardless of the style selected, be sure to observe the air-bag warning on the cover of this manual.

WARNING: Mounting this unit will require drilling. It is absolutely necessary to make sure that no other vehicle components could be damaged in the process. Check both sides of the mounting surface before starting. If damage is likely, select a different location.

Bail-strap mount:

1. Position bail strap in selected mounting location and drill mounting holes, then secure the bail strap to the vehicle.
2. Secure the siren to the bail strap as shown. Tighten the screws firmly.



Console Mount:

Console manufacturers offer mounting kits that include all the necessary hardware and brackets required to mount this unit into their console. The console mount brackets are secured onto the unit the same way the bail bracket is. Please refer to the manual included with your console.

Microphone Clip:

A microphone clip is included. Secure with provided hardware.

WARNING: Refer to the Air Bag Warning before installing this clip.

Wiring:

Siren Input Connector - RED: Power - BLACK: Ground

WARNING: All customer supplied wires that connect to the positive terminal of the battery must be sized to supply at least 125% of the maximum operating current and FUSED at the battery to carry that load. DO NOT USE CIRCUIT BREAKERS WITH THIS PRODUCT!

1. Extend the RED and BLACK wires toward the vehicle battery. To pass the RED and BLACK wires through, you may have to drill a hole in the firewall. Insert a grommet to protect the wires.
2. Route the RED and BLACK wires along the factory harness towards the battery and install a fuse block (user supplied) on the end of the RED wire.

TABLE 1 Wire Gauge / AWG

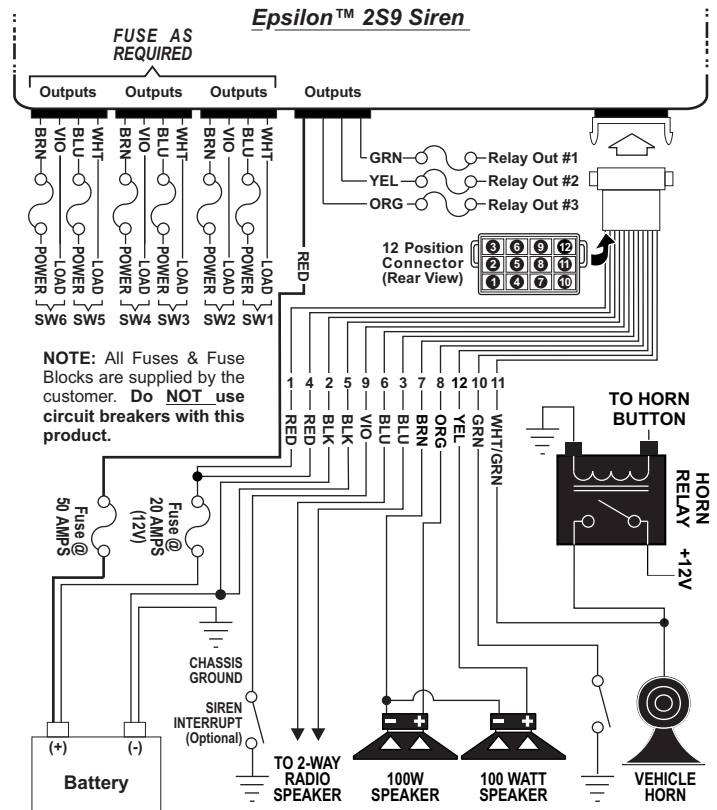
| Current Draw / AMPS | 12 | 10 | 8 | 6 | 4 | 2 |
|---------------------|------|------|------|------|------|------|
| | 20 | 15.5 | 24.5 | 39 | 62 | 98.5 |
| 30 | 10.5 | 16.5 | 26 | 41.5 | 66 | 104 |
| 40 | 7.5 | 12.5 | 19.5 | 31 | 49.5 | 78.5 |
| 50 | 6 | 10 | 15.5 | 25 | 39.5 | 63 |
| 60 | 5 | 8 | 13 | 20.5 | 33 | 52.5 |
| 70 | 4.5 | 7 | 11 | 17.5 | 28 | 45 |
| 80 | 4 | 6 | 10 | 15.5 | 24.5 | 39 |

Distance is shown in feet.

- Remove fuse before connecting any wires to battery.**
3. Connect fuse block wire to POSITIVE terminal on battery. There must not be more than 2 feet of wire between fuse block and battery. The wire between the fuse and battery is "unprotected", do not allow it to chafe and short to ground.
 4. Connect the BLACK wires to the factory chassis ground.

YELLOW, ORANGE & BROWN - Speaker Wires

1. Route the YELLOW, ORANGE and BROWN wires toward vehicle siren speakers, along factory wire harness and through firewall at the same point as the RED and BLACK wires.
2. Connect the YELLOW wire to the POSITIVE terminal on SPEAKER #1. Connect the ORANGE wire to the positive terminal on speaker #2 and the BROWN wire to NEGATIVE connection on the speaker.



WHITE/GREEN - Horn Ring Wires:

1. Route WHITE/GREEN wire along factory wire harness and through firewall at the same point as the RED and BLACK wires.
2. Route WHITE/GREEN wires to vehicle's horn relay. If possible, follow the factory wire harness to this relay.
3. Locate the wire that connects the vehicle horn to the horn relay.
4. Connect the WHITE/GREEN wire to the wire that runs from the horn relay to the horn.

GREEN - Aux Override:

This wire is activated by switching it to ground (See Page 3 for operation).

VIOLET - Siren Interruption:

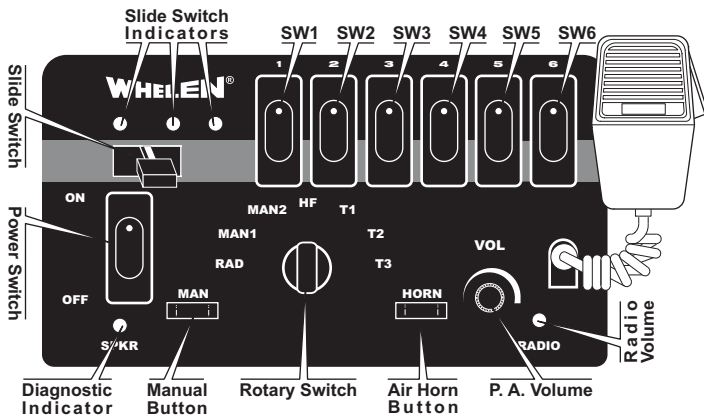
Grounding the VIOLET wire will deactivate the siren. Removing ground from the VIOLET wire will not reactivate the siren. The operator must reset the siren by placing the rotary switch into one of the standby positions (HF, MAN1, MAN2).

Two BLUE wires - Radio Re-Broadcast (optional):

The 2 remaining blue wires are used to connect your 2-way radio's external speaker for radio re-broadcast (optional connection).

NOTE: If your remote speaker is amplified (speaker has power amp circuit), radio re-broadcast will not work and should not be used.

1. Locate the 2 wires that connect the external speaker to the 2-way radio, cut one of them and splice one of the blue wires into this circuit.
2. Cut the remaining speaker wire and splice the other BLUE wire into this circuit.



| Slide Position | Indicator | Active Outputs (wires) |
|----------------|-----------|------------------------|
| OFF | None | None |
| 1 | GREEN | GREEN |
| 2 | YELLOW | GREEN, YELLOW |
| 3 | ORANGE | GREEN, YELLOW, ORANGE |

Power Switch

This switch has two positions. Down - Off & Up - On. When this switch is off, siren functions are disabled.

Rotary Switch

The Rotary Switch controls the siren functions of the *Epsilon*™ 2S9. There are 7 positions to select from (See "Rotary Switch Operations").

Volume Knob

The Volume Knob controls the volume of Public Address function. Volume is increased by rotating the knob in a clockwise direction. Rotating the volume knob in a counter-clockwise direction decreases the volume produced by these features. The volume knob has no effect on siren tones.

MAN Button

The Manual button generates a variety of tones, depending on what position the rotary knob is in (See "Rotary Switch Operations").

HORN Button

Whenever the siren is ON, pressing the HORN button will generate a simulated airhorn tone regardless of the ROTARY SWITCH position.

Diagnostic Indicator:

While this siren is under normal use the diagnostic indicator is used to indicate fault conditions with your siren system. The following section lists the type of fault and indicators response. If the indicator is on steady while a tone is in use, this implies that there is no fault with the speaker output.

Fault Condition Diagnostic Indicators Response

Speaker Short Circuit: The speaker LED will be in a single flash mode (LED is on and off an equal amount of time) and siren tones won't operate.

Speaker Undercurrent: Speaker LED will be off. All tones will continue to operate.

Microphone:

Whenever the siren is on, activating the microphone (pressing the switch on the side of the mic.) will shut down any other siren functions and enable public address operation regardless of the rotary switch position or any other switch or input.

Power distribution switches:

The power distribution switches include the slide switch and the six rocker switches. The slide switch having one off position and three active positions combined with the six rocker switches makes a total of nine switch positions. For each of the four rocker switches there are a set of corresponding WHITE and BLUE or VIOLET and BROWN wires in the back of the unit (See wiring diagram).

To obtain proper operation of the LED indicator with the switches, connect the BROWN or BLUE wire to power through a user supplied fuse and connect the load to the WHITE or VIOLET wire (See wiring diagram).

The slide switch controls three relays. The normally open contact of the relays are extended through the back panel with the GREEN, YELLOW and ORANGE wires. The 10 AWG RED wire is connected to the input side of all the relays

The slide switch can be programmed so that any of the three active positions can activate any combination of the relay outputs (See Slide Switch Programming). The factory default operation is as follows:

Rotary Switch Operations:

This section will outline the operation of the siren in the **factory default configuration**. Refer to "Programming the Epsilon™ 2S9 Siren" for information on how to customize the operation of this siren.

RAD - Radio Repeat: With the rotary switch in the RAD position, any signal that is received by the 2-way radio will be simultaneously broadcast over the vehicles loudspeaker (The unit must be connected to the 2-way radio as outlined in this manual).

With the Rotary Switch in this Position:

Pressing the MAN button or activating either the HORN RING or AUX OVERRIDE input will produce the AIRHORN tone. The AIRHORN tone will stop when the input is released.

MAN 1 - Manual Siren #1: With the rotary switch in this position the siren is on standby. No tones will be activated until an action is taken by the operator.

With the Rotary Switch in this Position:

Pressing the MAN button or activating either the AUX ENABLE or HORN RING input will produce a WAIL tone. The WAIL tone will ramp up to peak frequency, then ramp back down and stop when the input is released.

MAN 2 - Manual Siren #2: With the rotary switch in this position the siren is in standby. No tones will be activated until an action is taken by the operator.

With the Rotary Switch in this Position:

Pressing the MAN switch or activating either the HORN RING or AUX OVERRIDE input will produce a WAIL tone. This tone will ramp up to peak frequency and stop when the input is released.

HF - Hands Free Operation - When the rotary knob is in the HF position, the siren functions are placed in a stand-by mode. Siren tones are activated by a single tap on the MAN button or a single tap on the vehicle's steering wheel horn ring (if the vehicle's horn has been wired to the HORN RING input). The first tap produces a WAIL tone (a steady rise and fall tone). A second tap produces a YELP tone (a fast rise and fall tone). A third tap produces a piercer tone (an extremely fast rise and fall tone). The next tap returns the siren to a wail tone and the cycle repeats itself. Two quick successive taps will stop the siren.

With the Rotary Switch in this Position:

Pressing the MAN button or activating either the HORN RING or AUX OVERRIDE input will produce the HF cycle.

T1 - Tone #1: When the rotary knob is in the T1 position, a steady, rise and fall tone (WAIL) is produced.

With the Rotary Switch in this Position:

Pressing the MAN button or activating either the HORN RING or AUX OVERRIDE will change the siren tone to a YELP pattern (fast rise and fall tone). Activating the input a second time returns the tone back to WAIL.

T2 - Tone #2: When the rotary knob is in the T2 position, a fast, rise and fall tone (YELP) is produced.

With the Rotary Switch in this Position:

Pressing the MAN button or activating either the HORN RING or AUX OVERRIDE input will produce the PIERCER tone. Pressing the MAN button a second time returns it back to YELP.

T3 - Tone #3: When the rotary knob is in the T3 position, an extremely fast, rise and fall tone is produced.

With the Rotary Switch in this Position:

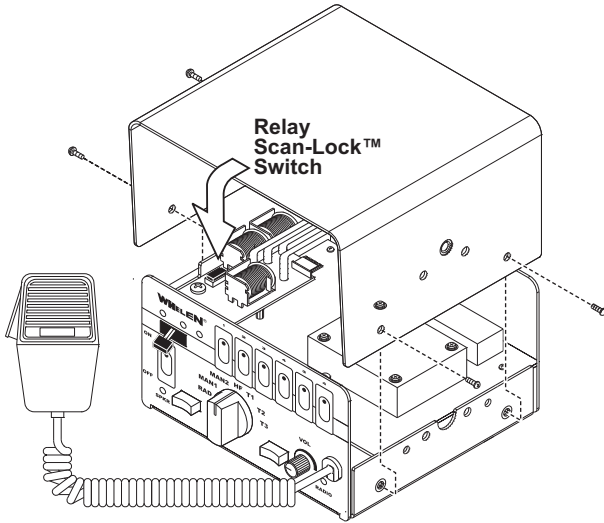
Pressing the MAN button or activating the HORN RING or AUX OVERRIDE input will result in the AIRHORN tone until the input is released.

Programming the Epsilon™ 2S9 Siren: Slide Switch Programming:

The Epsilon™ 2S9 has the ability to reconfigure the slide switch so that any of the three active switch positions can activate any combination of the relay outputs.

WARNING: Never try to program the siren while it is wired to the vehicle. The siren must be removed from the vehicle before programming. A low level audio device is built into the siren so that siren tones can be heard during programming. For programming, connect positive (+) battery and ground only.

To Configure the Slide Switch's Outputs:

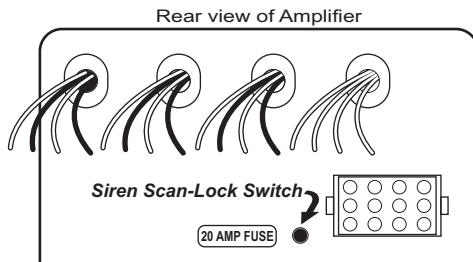


1. Remove the cover of your Epsilon™ 2S9 by removing the 4 screws on the sides of the unit .
2. Place the slide switch in the position you wish to reconfigure. The indicators will display the active position of the slide switch.
3. Press and release the Scan-Lock™ switch located on the relay board. (The indicators will now display the wire colors of the relay outputs programmed to activate in this position)
4. Continue to Press and release the Scan-Lock™ switch to cycle through the relay outputs. Stop when the indicator lights equal the desired output pattern.
5. Return the Slide Switch to the off position. (The output pattern for that lever position has now been saved.)

To configure other switch positions, start at step 2.

Siren Tone Programming Procedures:

With Scan-Lock™ the tonal operation of the siren can be customized to fit your needs. Scan-Lock™ is used to change the default siren tones as shown below. The Siren Scan-Lock™ switch is located in the rear of the unit.



To change the primary tone for rotary switch positions T1, T2, & T3: Put the rotary switch in the position that you wish to change. Press and release the Scan-Lock™ switch. Each time the Scan-Lock™ switch is pressed and released, the next available tone will be broadcast. When the desired tone is generated, it is automatically saved for that rotary switch position.

| | |
|------------|-----------|
| • TONE OFF | • HI/LOW |
| • WAIL* | • PIERCER |
| • YELP* | • Y-249* |

* = Title 13 Compliant Tones

To change the override tone for rotary switch positions T1, T2, & T3: Put the rotary switch in the position that you wish to change. Press and hold the MAN button on the front panel on the siren. Press and release the Scan-Lock™ switch. Each time the Scan-Lock™ switch is pressed and released, the next available tone will be broadcast. When the desired tone is present, it will automatically be saved as the override tone for that rotary switch position. Release the MAN button.

| | |
|------------|------------|
| • TONE OFF | • HI/LOW |
| • WAIL* | • B-WAIL |
| • YELP* | • B-YELP |
| • PIERCER | • B-HI/LOW |
| • Y-249* | |

* = Title 13 Compliant Tones

To change one of the tones in the hands free cycle. (See "Hands Free Operation"): Put the rotary switch in the HF position. Using the MAN button on the front panel on the siren, advance to the tone that you wish to change. Press and release the Scan-Lock™ switch. Each time the Scan-Lock™ switch is pressed and released, the next available tone will be broadcast. When the desired tone is generated, it will automatically be saved for that hands-free cycle position.

| | |
|------------|------------|
| • TONE OFF | • HI/LOW |
| • WAIL* | • AIRHORN |
| • YELP* | • B-WAIL |
| • PIERCER | • B-YELP |
| • Y-249* | • B-HI/LOW |

* = Title 13 Compliant Tones

To change the tone for rotary switch positions MAN1 or MAN2:

Put the rotary switch in the position that you wish to change. Press and hold the MAN button on the front panel on the siren. Press and release the Scan-Lock™ switch. Each time the Scan-Lock™ switch is pressed and released, the next available tone will be broadcast. When the desired tone is generated, it will automatically be saved for that rotary switch position. Release the MAN button.

| | |
|-----------|------------|
| • WAIL* | • HI/LOW |
| • YELP* | • B-WAIL |
| • PIERCER | • B-YELP |
| • Y-249* | • B-HI/LOW |

* = Title 13 Compliant Tones

To change the override tone for rotary switch position RAD:

Put the rotary switch in the RAD position. Press and hold the MAN button on the front panel on the siren. Press and release the Scan-Lock™ switch. Each time Scan-Lock™ is pressed and released, the next available tone will be broadcast. When the desired tone is generated, it will automatically be saved for that rotary switch position. Release the MAN button.

| | |
|------------|-----------|
| • TONE OFF | • AIRHORN |
|------------|-----------|

Title 13 Operation:

Airhorn will not override primary tones. To put the siren into Title 13 operation mode:

1. Turn the POWER switch OFF.
3. Place the ROTARY SWITCH into the MAN1 position.
4. Hold Scan-Lock™ switch in while turning power on. A set of Title 13 compliant tones have been programmed for use. Turn power off, then on to activate changes.

Re-Setting Factory Defaults:

To restore siren tones to the factory defaults:

1. Turn the POWER switch OFF.
3. Place the ROTARY SWITCH into the MAN2 position.
4. Hold Scan-Lock™ switch in while turning power on. Turn power off, then back on to activate the changes.

Epsilon™ 2S9 Specifications:

| | |
|-----------------------|------------------------------------|
| Input Voltage | 12.8 VDC ±20% |
| Input Current | @15 VDC @ 5.5 OHMS 16 AMPS MAX. |
| Input Fuse | 20 AMPS |
| Speaker Impedance | 5.5 OHMS MIN. |
| Operating Temperature | -30° C. TO +60° C. |
| Storage Temperature | -40° C. TO +70° C. |
| Humidity | .99% (NON CONDENSING) |
| Output Voltage | @ 15 VDC @ 11 OHMS 34 V RMS MAX. |
| Output Power | @ 15 VDC @ 11 OHMS 105 WATTS MAX. |
| Lighting Switches | 20 AMPS MAX |
| Relay Outlets | 20 AMPS MAX / 50 AMPS COMBINED MAX |