WAVE Siren™
WIRELESS AUDIBLE VISUAL ENUNCIATOR

WAVE Siren Station
Version 2

USER'S GUIDE

Wireless Audio-Visual Enunciator Siren Station for remote notification.

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Warranty Summary

Wxline, LLC warrants that the products it distributes, and sells will be free from defects in materials and workmanship for a period of one year from the date of receipt by the end-user. If a product proves defective within the respective period, Wxline, LLC will provide timely repair or replacement of the product. The effectiveness of the Strike Guard and WAVE system is dependent on proper design, installation, monitoring, and maintenance for each unique facility.

Wxline, LLC makes no warranty of any kind, express or implied, except that the goods sold under this agreement shall be of the standard quality of Wxline, LLC and the buyer assumes all risk and liability resulting from the use of the goods, whether used singly or in combination with other goods. Wxline, LLC neither assumes nor authorizes any person to assume for Wxline, LLC any other liability in connection with the sale or use of the goods sold and there are no oral agreements or warranties collateral to or affecting this agreement.

CHAPTER 1
INTRODUCTION

The WAVE family of products introduce industrial strength equipment to the field of audio and visual alerts and pro-active asset protection in emergency situations and adverse weather. The WAVE product line presents fully automated audible and visual lightning notifications and protection of critical assets. WAVE products utilize radio and fiber optics for communication to operate in noisy environments and over challenging terrain.

Several products including the WAVE Siren Station, the WAVE Transmitter and the WAVE Sequencer are part of the family. This is the User's Guide for the WAVE Siren Station.

The WAVE Siren station utilizes receives digitally encoded radio messages from the WAVE Transmitter and activates high-pressure audio alerts and high-intensity strobe lamps to alert humans from danger in critical times.
The WAVE Sequencer is part of a control system that isolates connections to critical equipment during alarm conditions. The Sequencer receives digitally encoded radio messages from the WAVE Transmitter, or senses relay contact transitions at its Control Input to initiate the automatic orderly protection of critical industrial systems or to initiate remote sequenced events.

The WAVE Transmitter controls the actions of the Siren Station remotely. The Transmitter accepts contact-closure signaling for automated triggering during programmable hours of operation or is operated manually. This provides almost instantaneous alert capabilities to an unlimited number of Siren Stations in range. The WAVE Transmitter transmits messages to provide automated warning of electrical storms, as well as electrical isolation of sensitive equipment when interfaced with the Strike Guard Lightning warning system.

The Strike Guard Lightning warning system is typically directly connected to the WAVE Transmitter through an isolated control cable.

The intelligent design of the Strike Guard Lightning Warning System and WAVE products make for an unbeatable combination of innovation and value.
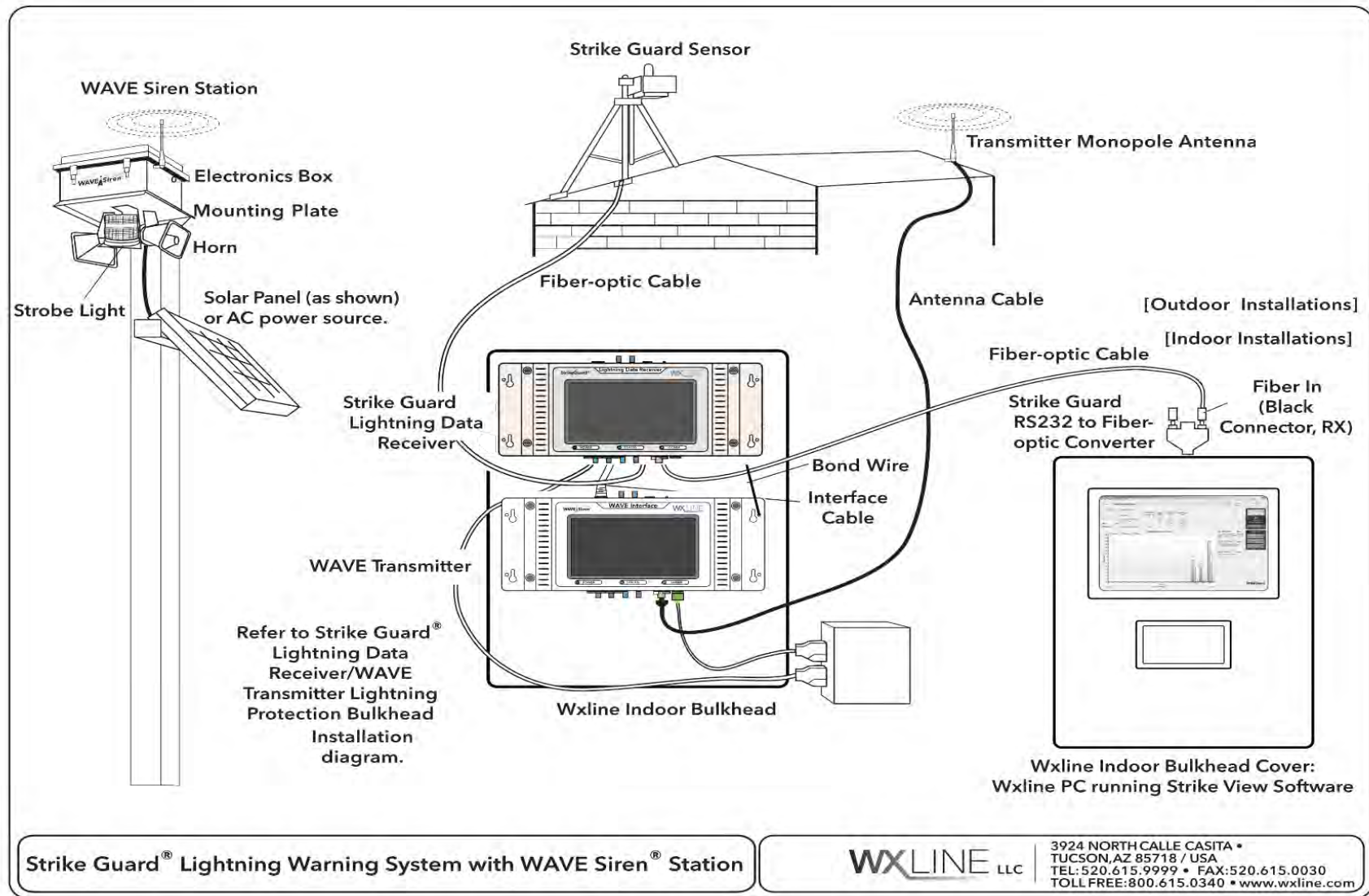
Figure 1: System overview

CHAPTER 2
DESIGN PHILOSOPHY FOR INSTALL

The Siren Station comes standard with an Antenna, Battery, external AC cable (if AC powered unit) and Mounting Plate with lag bolts or U-bolts. The Siren Station comes programmed from the factory, built to order. Also included are the appropriate number of horns, strobe lamps or high-visibility sign(s), usually in a separate box. The Siren Station's internal power, horn, signage and strobe lamp cables are installed and tested before shipping.

The Siren Station standard installation utilizes a Wxline Mounting Plate which can be mounted on a wooden post or mast, on the side of a building, or on a tripod mount. The Siren Station is designed to be mounted in an elevated position, twelve or more feet above ground level. Installation sites are often in places that can be hard to access or see. In these instances, creative installation solutions may be employed such as installing the horns on the outside of an attic and the Siren Station on the inside.

The Siren Station employs a NEMA 4x rated enclosure. The battery needs to be checked and changed for normal maintenance, so consider the ease of access. The latches on the outside of the box ensure that water and other particles do not penetrate the electronics inside. The metal plate on the inside of the lid enhances the ground plane for the antenna.

NOTE | Do not modify the enclosure.

Figure 2: WAVE Siren Station Electronics Enclosure v2

Figure 3: WAVE Siren Station with Strobe lamp, Solar Power and two Horns.

When choosing locations for Siren Stations, the following should be considered:

Audible Range: from what distance must the Siren Station

be heard. Radio Reception: factors limiting radio communication.

Visibility: optimal placement for the strobe lamp.

AUDIBLE RANGE

A properly mounted Siren Station horn has a rated sound pressure level (SPL) of 130 dB at 3 meters. Generally, the maximum range of the horn is where the measured SPL drops to 80 dB. The following graph shows this range for the WAVE horn in yards.
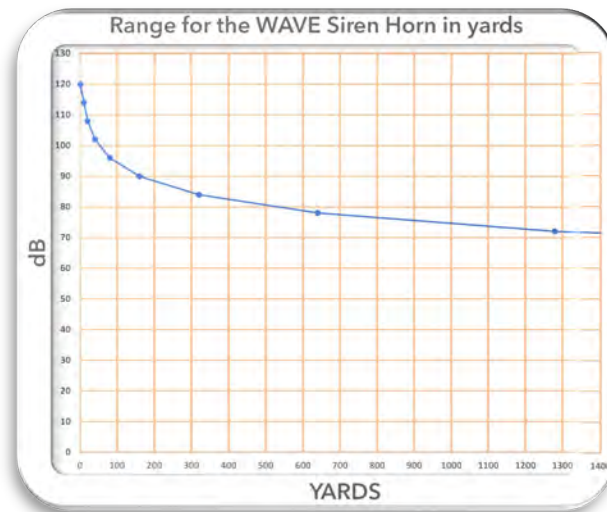
Figure 4: WAVE Siren Station Sound Level Range

The sound drops below conversation level at around 1,000 yards.

Each Siren Station can operate up to four horns, and each Siren Station horn can be mounted to face a specific direction. Each horn covers an angle of between 90 and 120 degrees. Therefore, a single Siren Station configured with four horns, located in a site with minimal obstructions provides an audible signal over a circular area with a radius 1000 yards, depending on conditions. Place markers on a scaled map layout for the area of interest to identify potential locations for the Siren Stations. Keep in mind that any significant obstructions at a potential site, such as buildings or thick groves of trees blocks or attenuates the audio signal. Wind and other noise sources such as highways, airports, and mine equipment may reduce the effective range to 800 yards.

RADIO RECEPTION

Potential remote Siren Station sites should be evaluated for radio reception. Ideal radio reception is realized with a clear line-of-sight between the WAVE Transmitter antenna and the Siren Station antenna. The WAVE Transmitter outputs a signal with a nominal range of 2 miles. However, terrain, vegetation and building structures at potential sites reduce this range by some degree.

Chose each potential site by minimizing the number of structures and thick vegetation between the Transmitter and Siren Station. The Siren Station is equipped with a standard antenna. For Siren Station sites with marginal reception, an optional high-gain antenna with an extension cable is available. The Transmitter antenna may also be enhanced to increase the signal range.

VISIBILITY

For those cases where someone may not recognize the Siren Station horn sounding because they are in a noisy environment, or within the shelter of a building when the alarm signal is sounded, a visible warning is recommended. The Siren Station strobe lamp produces continuous high intensity flashes for the duration of the alarm state.

The Siren Station strobe lamp should be mounted such that the strobe lamp is plainly visible to personnel who are the most likely to miss hearing the audible warning. Mounting the strobe lamp above and behind the Siren Station can provide 360-degree viewing.

NOTE	The strobe lamp generates a high intensity optical pulse which can interfere with the Strike Guard Sensor. Never mount the strobe lamp such that it is visible to the Strike Guard Sensor.

Figure 5: WAVE Siren Station - high intensity Strobe light

CHAPTER 3
INSTALLATION

The WAVE Siren Station is designed for ease of installation and includes all the necessary hardware. However, the customer will need to prepare the site for the electrical and ground connections for the Siren Station, beforehand. The following text assumes that the mounting post and external power source have already been installed.

NECESSARY TOOLS AND EQUIPMENT

Ladder: to access location for mounting the Siren Station

Wrench 1/2":   to secure Horns and Strobe lamps to Mount Plate and secure Mount Plate to wooden post

Cordless Drill: to make pilot holes for lag screws Nutdriver ½": to secure Mount

Plate to wooden post

ORDER OF INSTALLATION

1. Prepare wooden post (minimally 4"x4" pressure treated) for the Siren Station Mount Plate; make 0.25" pilot holes using the Mount Plate as a template.
2. Secure Siren Station Mount Plate to wooden post with the four 5/16 x 2.5" lag screws, provided.
3. Remove the wingnuts from the bottom of the Siren Station and set the Siren Station onto the Mount Plate, guiding the wires through the plate and the four protruding bolts from the bottom of the Siren Station into the four holes in the top of the Mounting Plate. Use the wingnuts provided to secure the Siren Station to the Mounting Plate.
4. Secure horns and strobe lamp to Siren Station Mount Plate, with 5/16-18 hex nuts, or secure to the wooden post.
5. Connect the horns and strobe lamp cables to the Siren Station using the keyed quick-connects provided.
6. Connect external AC power cable to the Siren Station using the keyed 3-pin quick connects provided or complete the solar panel connection.
7. Insert the green terminal connector into the plug on the back of the main electronic cage that connects the battery into the Siren Station.
8. Open vacuum sealed desiccant bag and install humidity strip and desiccant behind the battery inside of Velcro strap.

VERIFY OPERATION

The battery is installed inside the box, with the leads attached to a green two-position male plug, which plugs into the two-position female jack closest to the battery on back of the electronic cage. If the unit is configured to accept AC power, then the black rocker switch on the power entry module must be in the on position. The AC power entry module is present unless the WAVE Siren Station is configured for solar power only. Once the power input connections are complete turn on the internal DC charging switch. The external LED flashes green after a normal power-up sequence without errors.

With the Transmitter fully installed, activate the Siren Station via radio commands from the Transmitter. There are three basic methods to activate Radio commands for Siren Station tones:

1. Automatically, via the Control Input
2. Manually, by the Transmitter keyswitch
3. Manually, by the Transmitter menu

1. During normal automated operation, the Strike Guard Lightning warning system is interfaced with the WAVE Transmitter. The Strike Guard Lightning Data Receiver's relay outputs connect to the Transmitter control input with the interface cable provided. Lightning conditions are automatically transmitted to the WAVE Siren Station activating horns and strobe lamps as configured.

2. Radio messages for Siren Station tones are activated manually at the Transmitter via the keyswitch and the Manual Select four-position switch. One of four possible tones is selected via the Manual Select switch. The keyswitch is then rotated a ¼ turn momentarily to transmit the selected Siren Station message. Release the key the moment the transmit light illuminates.

3. Radio messages to control the strobe lamp and the WAVE Sequencer are available via menus in the Transmitter's multi-purpose screen. Please refer to the Transmitter User Guide to control the strobe lamp and remote WAVE Sequencers.

MANUAL TEST

To activate test Mode, press and hold the small red button on the back of the electronics cage while simultaneously holding down the blue directional down arrow button, then let go of the red button first, then the blue button.

The display shows "LO" or you can scroll to "HI" by pressing the blue directional arrow up button.

"HI" mode activates all the horn outputs and then strobe lamp outputs despite Siren Station configuration. It sounds all the horns sequentially at full volume. "LO" mode activates only the horn and strobe lamp outputs the Siren Station has been configured for, and it sounds the horns sequentially at a low volume.

After selecting either LO or HI, pressing the white enter button starts the test. The Siren Station sounds each horn going through each channel one-by-one with a short burst of sound. Immediately after the horns sound, the strobe lamp light activates for a few seconds.

The HI setting is appropriate for outdoor testing and sounding of horns. The LO setting is appropriate for indoors.

Figure 6: WAVE Siren electronics cage

NOTE | The noise level of the Siren Station horn is 130 dB at 3 meters at full volume; hearing protection is required at close distance.

REF #	DESCRIPTION
1	EXTERNAL LED INDICATOR
2	HORN CONTROL
3	HORN INTERFACE
4	BATTERY INTERFACE
5	AC MAIN IN/OUT
6	DC MAIN / DC SOLAR
7	STROBE RELAY OUT
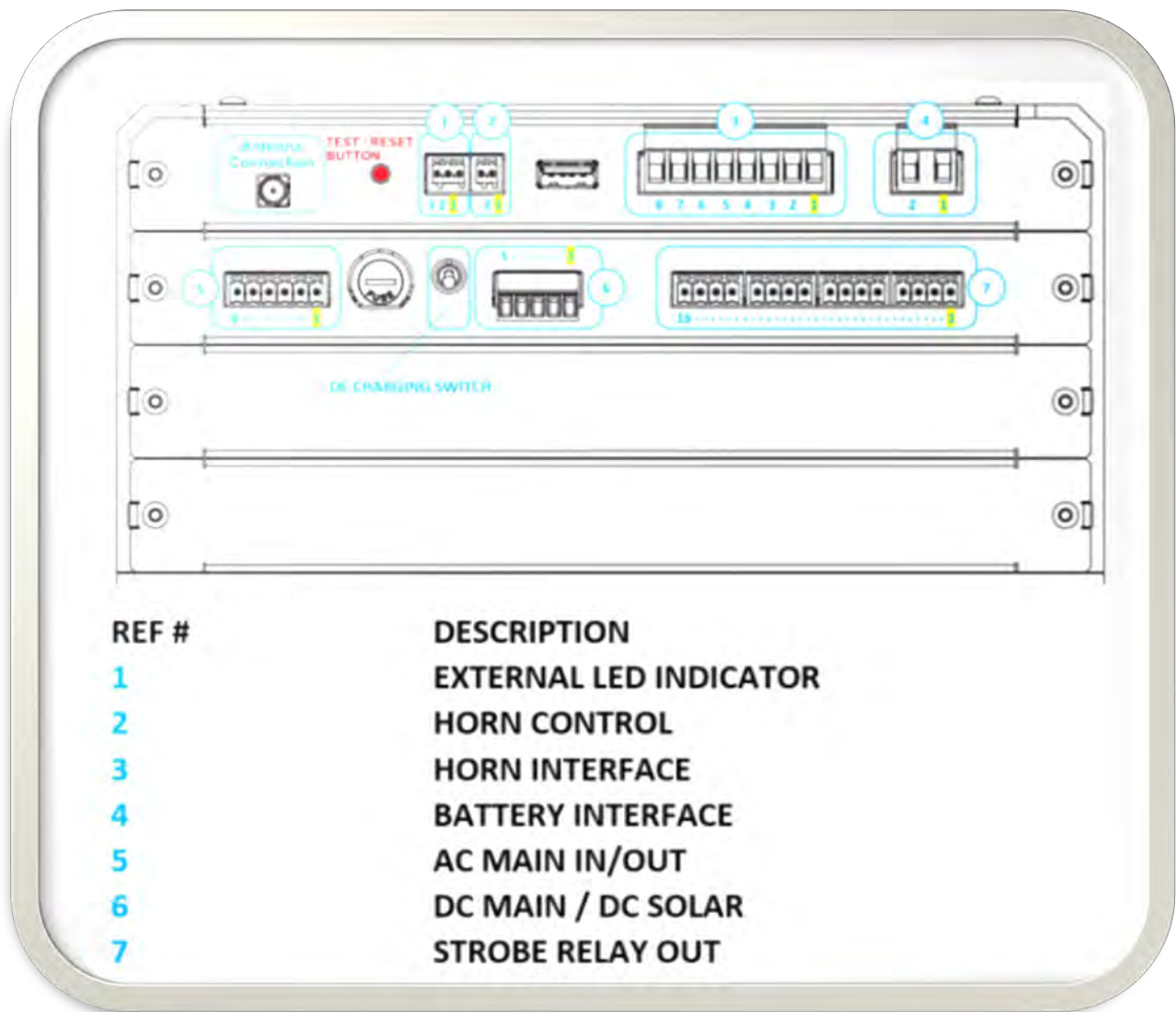
Figure 7: External connectors to electronic cage

CHAPTER 4

SIREN STATION FEATURES

EXTERNAL LED

An external LED indicates the general status of the WAVE Siren Station. During normal operation, the LED flashes green. To signal an error the LED flashes red. A digital read-out inside the unit provides specific error codes to assist in diagnosing problems.

NOTE	When receiving a valid radio command from the WAVE Transmitter, the external LED illuminates as yellow for about fifteen seconds and then returns to flashing either green or red to indicate the Siren Station's general status. This indicator is useful when verifying the Siren Station's radio reception.

EXTERNAL ANTENNA

An external antenna enables radio reception from the WAVE Transmitter. The standard antenna is provided. (For Siren Stations with marginal reception, an optional extended-range antenna and mounting hardware is available.) The antenna attaches to the Siren Station via a PL-259 connector. Hand-tighten the antenna.

EXTERNAL CONNECTORS

The cable connections for power, the horns and strobe lamp allow for a quick, easy connection during the installation. Connectors are keyed to prevent the Siren Station from being mis-wired and have a locking mechanism and are weatherized for reliable outdoor service. The connectors simplify removal of the Siren Station, should it become necessary to move the Siren Station or return it for service.

INTERNAL DC CHARGING POWER SWITCH

The metal toggle switch on the back of the main unit turns the DC charging ON and OFF. The up position is the 'on' position.

NOTE	The Siren Station powers-on when connected to battery power.

DIAGNOSTIC DIGITAL READ-OUT

The multi-purpose digital display serves to indicate radio signal strength, battery

voltage level, power input levels, volume setting for the horns, errors via internal diagnostics, number of strobe lamps, number of horns and status of the manual test, when it is activated.

Figure 8: Interface panel and diagnostic digital read-out

CONFIGURATION SWITCHES

Three banks of 8-position DIP switches under the top cover allow the user to configure the Siren Station in a variety of ways: the number of horns, the type and duration of horn tones and the source of external power. DIP switch functions are defined in Section 7, Theory of Operation. (SW8, SW10 & SW11)

RADIO ADDRESS SWITCHES

The radio address switches are configured using two banks of 8-position DIP switches which are located adjacent to the configuration switches. Please see diagram 5 on page 16 for location of radio address switches.

Figure 9: DIP switches under front cover of Siren Station

| NOTE | A corresponding pair of DIP switches reside in the WAVE Transmitter, under the front cover. The switch pattern for each Siren Station must match with that of the Transmitter to communicate properly. |

CHAPTER 5
OPERATING THE SIREN STATION

The Siren Station is designed to be controlled remotely by the WAVE Transmitter. A complete functional test of the Siren Station includes the WAVE Transmitter. Four distinct audible tones are activated manually by radio messages via the Transmitter keyswitch. The strobe lamps are activated manually by radio messages via the Transmitter menu.

INTERFACE PANEL

There are 5 buttons on the interface panel, four blue directional buttons and the center white "enter" button. The panel has a digital read-out that is used to communicate with the user the internal measurements of the Siren Station and the settings.

When the Siren Station is in rest mode (on and external LED flashing green) pushing any button awakens the display. The blue LED indicator light on the display on the left illuminates to indicate which reading or setting is shown in the digital readout. Using the blue directional arrow scroll left or right to see the settings or readings on the Siren Station.

Battery: Battery health is shown in two sets of data, the first number is the volts and the second is the 100ths of a Volt. So, if the first set of numbers is 13. and the second 18, then it shows a battery reading of 13.18 Volts.

Power: Displays the incoming DC voltage converted from the incoming AC power.

Solar: Displays the incoming DC voltage coming in from the Solar panel.

Volume: Displays the volume setting for the horns.

Error: An error code corresponds to an error in the system. Please see the corresponding error in Chapter 8, Troubleshooting.

Radio: This selection gives you two separate readings.

- When the blue indicator light is solid blue, the value shown in the digital display shows the real-time background noise and signal.
  Pushing the blue right direction arrow button switches the display to show the other reading.

- When the blue indicator light is flashing, a value between 0-99 indicating the signal strength of the last message received from the Transmitter (99 is the strongest reading) is displayed. Pushing the white "ENTER" button resets the radio board signal strength indicator.

This feature is useful for testing the signal strength from the Transmitter and seeing possible interference.

Fiber: Has not been implemented on this version.

Horn: The first number shown displays the number of horns that the Siren Station is configured to sound, and the second number shown is the number of seconds each horn sounds for.

Strobe: Displays the number of strobe lamps the Siren Station is configured for.

STROBE LAMP FUNCTION

A strobe lamp provides visual warning during an alarm state. The Siren Station may be configured to activate horns plus a strobe lamp, or to operate a strobe lamp without any horns. The Siren Station drives the strobe lamp with the 12 VDC battery voltage.

When activated, the strobe lamp flashes at a rate between 60 – 70 times per minute. Voltage is continuously available to the strobe lamp during the alarm period. However, the strobe lamp only draws current as necessary to create momentary flashes in the xenon lamp.

Test: Light is illuminated when the test is activated. See page 10 for more detail.

CONFIGURATION SWITCHES
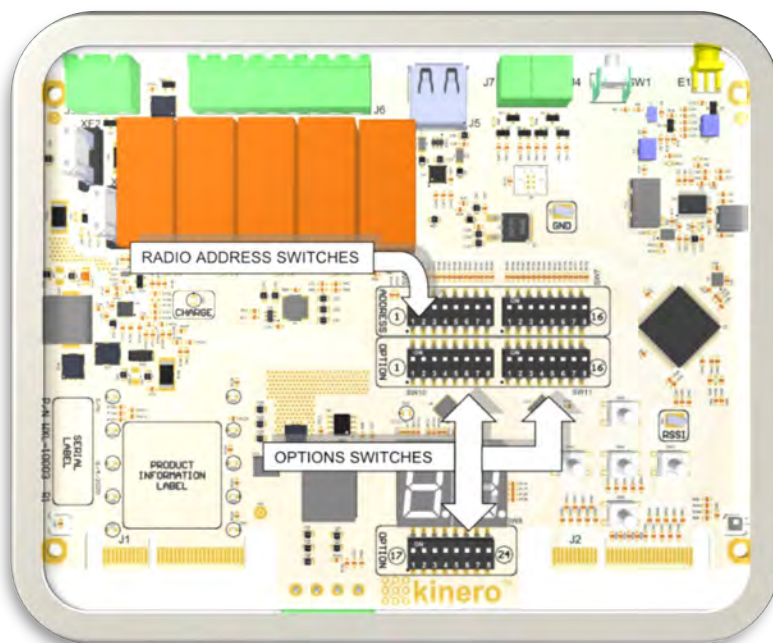
Siren Station config-uration is done via three DIP switch banks (SW8, SW10, SW11) located under the top cover.

Figure 10: Main system board that is under the interface panel.

CHAPTER 6
MAINTENANCE

General maintenance and inspection should be done periodically, and once per year prior to the onset of storm season.

NOTE	Follow all site-specific safety requirements and standards including lock-out and tag-out when working with electronics.

BATTERY

In general, the battery should be replaced annually. Note that battery life varies according to the number of discharge cycles and the amount of time it is subjected to extreme temperatures.

DESICCANT

The Siren Station is shipped with three bags of desiccant and a humidity indictor in a vacuum sealed bag. The desiccant needs to be removed from the plastic and installed in the Velcro strap behind the battery. The desiccant bag should be replaced every year. Because the Siren Station enclosure has a membrane vent, desiccant keeps the electronics dry.

The WAVE Siren Station v2 is equipped with built-in humidity monitoring technology that monitors humidity levels. If the WAVE Siren Station indicates a high humidity condition the external LED flashes red, see errors listed in the troubleshooting section 8.

NOTE	Do not run the Siren Station without desiccant!

CABLES FOR HORN AND STROBE LAMP

Inspect the cables and interconnects between the Siren Station, the horns and strobe lamp. Connectors or cables that are damaged should be repaired or replaced. Contact Wxline to service the affected components.

HORNS

Inspect Siren Station horns for obstructions in the bell and nose cone areas for insects, leaves, etc.; clean, as necessary.

| NOTE | The noise level of the Siren Station horn is 130 dB at 3 meters; power-down the Siren Station and disconnect the battery to protect hearing while inspecting and cleaning the horns. |

Figure 11: WAVE Siren Station - Dual Horn with High-visibility sign

HIGH-VISIBILITY LIGHTNING SIGN

High-visibility billboard-like sign displays "LIGHTNING – ALARM" condition via high-intensity LED lights. Sign is added to WAVE Siren Station through quick connect (6 ft. cable).

| NOTE | Multi-sign and various color options are available for the WAVE Siren Station v2. CONTACT WXLINE FOR CUSTOM DESIGNS. |

CHAPTER 7
THEORY OF OPERATION

The WAVE Siren Station consists of three main components:

- The Main System Board: Has an integrated radio used to decode messages from the WAVE Transmitter, also handles battery management including temperature compensated charging, controls horn switching along with horn and strobe lamp configuration options. The main board also performs continuous self-diagnostics.

- Audio Amplifier: When activated, drives the horns to provide the audible signals at a sound pressure level of 130 dB at 3 meters.

- Battery: Provides backup power for the Siren Station and the bulk of power for the audio amplifier during horn activation.

RADIO RECEIVER

The Radio Receiver provides reliable reception of broadcast messages from the WAVE Transmitter. The Transmitter sends digitally encoded messages that are decoded at the Siren Station and acted upon based on Siren Station configuration.
Each Radio Receiver has a configurable radio address set to match that of the WAVE Transmitter for a given system. Two banks of DIP switches allow for 65,536 possible address settings. Several different WAVE systems within transmission range may operate near one another without conflict.

The System Board's built-in Radio Receiver is configured at the Wxline factory to indicate a communication error if the Siren Station fails to register a valid message from the WAVE Transmitter within four hours. Note that the WAVE Transmitter broadcasts a test message once per hour.

Relative RF signal strength is measured in the field via the digital read- out. Upon reception of an RF message, the signal strength measurement is given. The WAVE Siren Station uses a scale from 0-99 with ninety-nine being a very strong signal and one being a very weak signal. A signal strength reading of 40 or higher is desired when determining efficient signal reception.
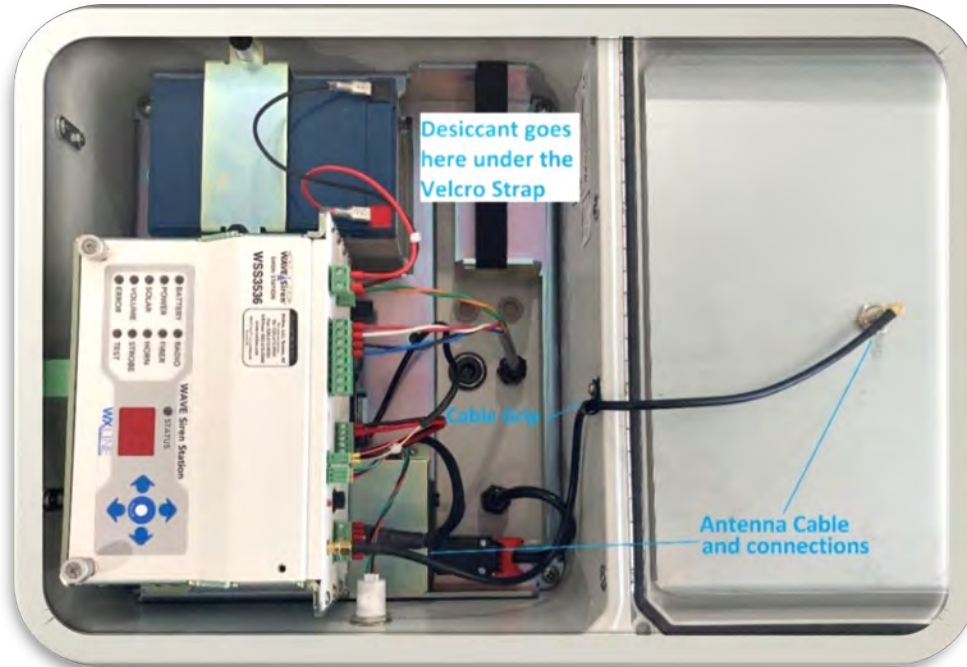
Figure 12: The Radio Receiver antenna connection is shown below.

The Radio Receiver is connected to an external antenna via a short length of RG-174 coax cable and an SO-239 (UHF female) connector. The standard antenna mates directly to the UHF connector on the lid of the WAVE Siren Station enclosure. For installations with marginal radio reception, a higher gain antenna with an extension cable is available for improved performance.

The Radio Receiver is integrated into the Main System Board located under the top cover and is accessed by unscrewing the silver thumbscrews on the top and swinging the top up.

AUDIO AMPLIFIER

The audio amplifier generates the Siren Station tones and drives the horns to a pressure level of 130 dB at 3 meters. The amplifier is managed by the Main System Board which controls DC power to the amplifier, the type and duration of Siren Station tone, and the sequential activation of each horn. To conserve power, the amplifier is normally OFF; the amplifier is only ON when Siren Station tones are generated, including during a test. The amplifier is mounted under the main electronics cage / enclosure.

The 12 Volt battery supplies the bulk of the current to the audio amplifier when driving the Horns and must be connected during normal operation.

The audio amplifier's input power and audio output are connected to the Main System Board via a 4-pin connector beneath the audio amplifier. Activation of Siren Station tones are made via the black amplifier cable, which is tied to the Main System Board via a small, 2-conductor screw terminal block near the 12 Volt battery.

PROCESSOR BOARD

The Main System Board is the main control board of the Siren Station, managing the battery charger, the audio amplifier, sequential activation of the horns, the strobe lamps, and internal diagnostics. The Main System Board reads and interprets messages from the integrated Radio and then takes the appropriate action to control the horns and the strobe lamps.

Siren Station configuration is set via three DIP switch banks (SW8, SW10, SW11) located under the top cover. Switch configurations are assigned as follows:
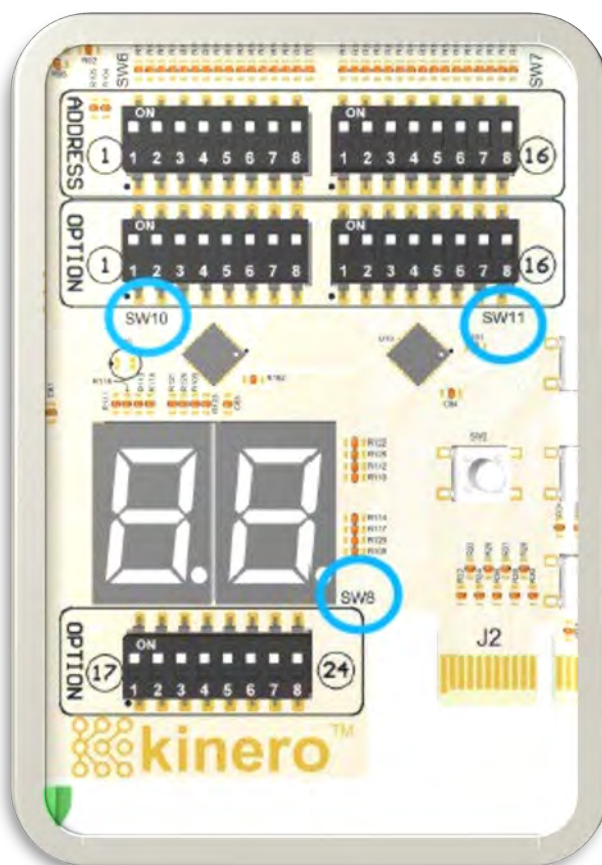

Figure 13: Highlights the labels on the board showing where the configuration switches are located.

CONFIGURATION

Siren Station configuration is done via three DIP switch banks: SW8, SW10 and SW11.

Switches for <u>SW8</u> are assigned as follows:

SW8							
1	2	3	4	5	6	7	8
Multiple Address Selection		AC Power	Solar Power	In Development			

(Switch # labels the row of numbers)

SW8, Switch 1 and 2
Switches 1 and 2 combined configure the Siren Station for the number of valid radio addresses that it responds to.

SW8
Switch #

		Description
1	2	Multiple Address selection
Off	Off	1 Valid Address
On	Off	3 Valid Addresses
On	On	All Addresses Valid

SW8, Switch 3

Switch 3 is turned ON if the Siren Station is accepting AC power it is turned OFF if the Siren Station is not.

SW8, Switch 4

Switch 4 is turned ON if the Siren Station is accepting Solar power. It is turned OFF if the Siren Station is not.

NOTE	The WAVE Siren Station can be configured to accept either AC, Solar power, or both. This configuration is set at the factory.

SW8, Switches 5, 6, 7, and 8

These switches are reserved for future use.

Switches for <u>SW10</u> are as assigned as follows:

SW10							
1	2	3	4	5	6	7	8
Horn Duration		Horn Quantity		Factory Use only			Attenuation

Switch # is labeled to the left of the row containing 1–8.

SW10, Switches 1 and 2
When the Siren Station receives a command to activate the horns, it activates each horn, one at a time, in sequence. The duration that each horn sounds is determined by Switches 1 and 2 of the SW10 DIP switch bank. The options are 0, 5, 10, and 15 seconds per horn. The following table shows the relative switch positions for the respective horn durations.

SW10 Switch #

1	2	Description
1	2	Horn Duration
Off	Off	0 Seconds
On	Off	5 Seconds
Off	On	10 Seconds
On	On	15 Seconds

SW10, Switches 3 and 4
Switches 3 and 4 combined, configure the Siren Station for the number of horns to be driven. The Siren Station drives from one to four horns, with the switches set as follows:

SW10 Switch #

3	4	Description
3	4	Horn Quantity
Off	Off	1 Horn
On	Off	2 Horns
Off	On	3 Horns
On	On	4 Horns

SW10, Switches 5, 6 and 7
These switches are reserved for factory use only, do not change the configuration.

SW10, Switch 8
Switch 8 enables the Attenuation. When this switch is in the ON position, the volume of the horns is attenuated. This setting may be desirable for pools, courtyards, tennis courts, admin buildings, etc.

Switches for <u>SW11</u> are as assigned as follows:

SW11							
1	2	3	4	5	6	7	8
Alarm Tone		Tone 2		Tone 3		All Clear Tone	

(Row label: Switch #)

SW11 switches control which tones are sounded on the WAVE Siren Station when it receives a valid message from the WAVE Transmitter. The WAVE Transmitter has four distinct radio commands for activating the Siren Station horns via a manual keyswitch operation and are designated as: Alarm, Tone 2, Tone 3 and Clear.

Switches 3, 4, 5 and 6 define how a particular Siren Station responds to the radio commands with respect to the Alarm, Tone 2, Tone 3 and Clear, as follows:

SW11
Switch #

1	2	Description
		Alarm Tone
Off	Off	Horn-Siren-Horn-Siren
On	Off	Horn Intermittent
Off	On	Horn Continuous
On	On	Siren Wail

SW11
Switch #

3	4	Description
		Tone 2
Off	Off	Police Siren
On	Off	Ramping to Continuous
Off	On	Siren Intermittent Fast
On	On	Horn Intermittent Fast

SW11
Switch #

5	6	Description
		Tone 3
Off	Off	Police Siren
On	Off	Ramping to Continuous
Off	On	Siren Intermittent Fast
On	On	Horn Intermittent Fast

SW11 Switch #			Description
	7	8	Clear Tone
	Off	Off	Horn-Siren-Horn-Siren
	On	Off	Horn Intermittent
	Off	On	Horn Continuous
	On	On	Siren Wail

NOTE | You can preview the tones at wxline.com/wave-siren.

NOTE | It is recommended that the Alarm and All Clear tones be distinct from each other. Verify that the switch pattern for Switches 1 and 2 are different from the pattern for Switches 7 and 8.

The default for SW11 are switches # 3 & # 7 in the 'on' position.

SIREN STATION STATUS

An external LED indicates the general status of the Siren Station by flashing green for normal condition and red when an error is encountered. Upon receiving a valid radio message, the external LED flashes yellow for fifteen seconds.

BATTERY / SOLAR PANEL

The 12V sealed lead-acid battery provides the bulk of the power for the audio amplifier when driving the horns and serves as backup power for the Siren Station when external power is interrupted. External power provides DC power to the low power circuitry in the Siren Station and for recharging the battery. External power also complements the battery when driving the horns.

A switch setting configures the Main System Board for either solar or AC external power. A Siren Station configured for AC power indicates an error when external power is lost. A Siren Station configured for solar power will not indicate such an error, since loss of external power is normal for solar power during the night. Instead, a solar- powered Siren Station flashes the external LED at a lower duty-cycle of once per 7.5 seconds to indicate loss of solar charge and to conserve battery power.
The battery is fused to protect the audio amplifier and Main System Board in the case of a short-circuit fault.

Solar power units use a solar panel model that is between 50 and 60 watts and provides between 15- and 22-Volts DC to the Siren Station's Processor Board.

NOTE	New batteries normally measure between 12.75 – 13.10 VDC. A battery that has been left idle for several weeks before being installed may measure lower than 12.75 VDC. In this case, the battery should be charged for a minimum of four hours prior to testing it with the horns.

The Siren Station recharges the battery when connected to external power. Take care not to drop the battery or short out the terminals.

CHAPTER 8
TROUBLESHOOTING

EXTERNAL LED FLASHES RED

Self-diagnostic tests are done at power-up and periodically thereafter. If an error is encountered during the tests, an error code is recorded, while the external bi-color LED changes from flashing green to flashing red. Use the digital readout to scroll to the error code and refer to the table below to identify the problem.

Error Code	Error Description
01 -- Switches not set	AC / Solar option switches not set. At least one switch must be turned on
02 -- AC option switch conflict	Valid MAIN DC voltage detected despite AC switch being OFF
03 -- Solar option switch conflict	Valid SOLAR DC voltage detected despite Solar switch being OFF
04 -- DC main failure	Valid MAIN DC voltage is not detected
05 -- AC surge protection	At least one MOV is blown
06 -- MAIN DC supply failed	AC-DC supply failure
07 -- SOLAR DC supply failed	Solar switch is set, but no solar activity detected for 16 hours
08 -- Charging Malfunction	No voltage is going to charging circuit when valid charging conditions are present
09 -- Battery not ready, charging	Battery is not ready, system is charging, operating in reduced output mode
10 -- Battery not ready, not charging	Battery is not ready, system is not charging, outputs disabled
11 -- Battery Not Healthy	Battery needs replacement (assertion may take several minutes)
12 -- Battery Not Present	Battery is not present (assertion may take several minutes)
13 -- Comm Error	No message has been received from Transmitter in 4 hours
14 -- Temp Limit	Temperature is too high; amplifier is disabled but strobe lamp operation remains
15 -- Humidity Limit	Condensation in the system is 90% RH or above, all out puts are disabled
16 -- Hardware Failure	One or more system components failed diagnostic test at runtime

NO HORNS, NO STROBE LAMP

Check that all cable connections are sound, physical inspection of the box is needed. Check that the Siren Station is turned on. This includes the antenna, horn, strobe lamp, and power cables.

RADIO CONFIGURATION

The Radio of the WAVE Siren Station has a configurable RF address, which <u>must</u> be set to agree with the address on the WAVE Transmitter. Verify the address switch settings of the WAVE Transmitter and Siren Station agree with each other.

RADIO ADDRESS SWITCH SETTING

The most common cause for a communication error is an RF address setting in the Siren Station that is set differently from that of the WAVE Transmitter. Verify that the RF address switches are set to agree with each other. In a system with multiple Siren Stations, all Siren Stations must be set to agree with the RF address of the Transmitter.

NOTE	Follow all site-specific standards for lock-out and tag-out, follow all safety requirements for working with electronics.

RADIO SIGNAL RECEPTION

Weak RF signal strength may cause the Siren Station to miss messages from the WAVE Transmitter. Signal strength can be measured in the field by reading the digital readout on the inside of the Siren Station.

COMMUNICATION ERROR

The Radio Receiver and the Main System Board are configured at the Wxline factory to indicate a communication error if the Siren Station fails to register a valid message from the WAVE Transmitter within four hours. Note that the WAVE Transmitter broadcasts a test message once per hour.

FAULT AT WAVE TRANSMITTER

A communication error can be caused by a weak radio signal from the Transmitter. A common fault is in the antenna cable of the Transmitter, or more rarely, in the Transmitter Radio Board. Verifying and troubleshooting the WAVE Transmitter are covered in more detail in the Transmitter User Guide.

BLOCKED OR ATTENUATED RADIO SIGNAL

The radio signal may be blocked or attenuated by buildings or vegetation. Attenuation is also a function of the distance from the Transmitter. An attenuated signal may be overcome using an extended range antenna on the Siren Station.

The standard antenna for the Siren Station provides adequate reception for most sites within one mile of the Transmitter. An optional, extended range antenna enhances the Siren Station's radio reception. The antenna is normally mounted within 10 feet of the Siren Station.

If the Siren Station radio reception is effectively shaded or blocked from the WAVE Transmitter, the Siren Station can be moved to an alternate location with a less obstructed view of the Transmitter. In general, good radio communication for the WAVE Siren Station requires a relatively clear line-of-sight between the Siren Station and Transmitter.

NOTE	Optional extended range antennas are available to meet the demands of the specific environments.

TESTING AND DIAGNOSTICS

After attempting to clear up the communication error, the Siren Station should be tested to verify the repair was effective. Using the Transmitter to send messages to the Siren Station is a great way to test the full system. The following messages can be manually sent via the Transmitter. Please see page 35 and/or the WAVE Interface User's Guide for more detail on test messages.

- Test Mode: Test Message
- Horns: Alarm, Tone 2, Tone 3, All Clear
- Strobe lamp: ON, OFF
- Sequencer: ON, OFF

CHAPTER 9
SPECIFICATIONS

Power Requirements: 90 – 264 VAC (standard)
                                 15 – 21 VDC
(solar option) Carrier Frequency: 27.255 MHz

RF Sensitivity: -115 dBm (or better)

RF Selectivity: 8 KHz

RF Modulation: FSK Antenna Impedance: 50 ohms

RF Addresses: 65,536

Range: Standard antenna: up to 1 mile
                                 High gain antenna: up to 5 miles
                                 Ultra-High gain antenna: up to 10 miles

Audible Sound Level: 130 dB at 3 meters

Strobe Flash Intensity: 270 (effective candle power)

Strobe Flash Rate: 60 – 70 flashes / minute

Strobe Current: 760 mA @ 12 VDC (average)

Strobe Lamp: Xenon bulb

Figure 14: Excerpt from WAVE Interface User's Guide

WXLINE

Call us to discuss your specific application needs and to locate an Authorized Distributor in your area.

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WAVE Siren™

Specifications are subject to change.