

Universal Controller

Two-Way Siren Controller
Models: UCT-WLN Series



Description, Specifications, Installation, Operation, and Service Manual

Limited Warranty

This product is subject to and covered by a limited warranty, a copy of which can be found at www.fedsig.com/SSG-Warranty. A copy of this limited warranty can also be obtained by written request to Federal Signal Corporation, 2645 Federal Signal Drive, University Park, IL 60484, email to info@fedsig.com or call +1 708-534-3400.

This limited warranty is in lieu of all other warranties, express or implied, contractual or statutory, including, but not limited to the warranty of merchantability, warranty of fitness for a particular purpose and any warranty against failure of its essential purpose.



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Safety Messages

⚠ WARNING

It is important to follow all instructions shipped with this product. This device is to be installed by trained personnel who are thoroughly familiar with the country electric codes and will follow these guidelines as well as local codes and ordinances, including any state or local noise-control ordinances.

Listed below are important safety instructions and precautions you should follow:

Important Notice

Federal Signal reserves the right to make changes to devices and specifications detailed in the manual at any time to improve reliability, function, or design. The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for any inaccuracies.

Publications

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

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

Planning

- If suitable warning equipment is not selected, the installation site for the siren is not selected properly, or the siren is not installed properly, it may not produce the intended optimum audible warning. Follow Federal Emergency Management Agency (FEMA) recommendations.
- If sirens are not activated in a timely manner when an emergency condition exists, they cannot provide the intended audible warning. It is imperative that knowledgeable people, who are provided with the necessary information, be available at all times to authorize the activation of the sirens.
- When sirens are used out of doors, people indoors may not be able to hear the warning signals. Separate warning devices or procedures may be needed to warn people indoors effectively.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings, and restrict access to areas near sirens. Review and comply with any local or state noise control ordinances as well as OSHA noise exposure standards, regulations, and guidelines.
- Activating the sirens may not result in people taking the desired actions if those to be warned are not properly trained about the meaning of siren sounds. Siren users should follow FEMA recommendations and instruct those to be warned of corrective actions to be taken.

- After installation, service, or maintenance, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service and operating personnel do not have these instructions to refer to, the siren system may not provide the intended audible warning, and service personnel may be exposed to death, permanent hearing loss, or other bodily injuries. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to recruits and trainees. Also give a copy to anyone who is going to service or repair the siren.

Installation and Service

- Electrocution or severe personal injury can occur when performing various installation and service functions, such as making electrical connections, drilling holes, or lifting equipment. Therefore, only experienced electricians should install this product per national, state, and any other electrical codes having jurisdiction. Perform all work under the direction of the installation or service crew safety foreman.
- The sound output of sirens is capable of causing permanent hearing damage. To prevent excessive exposure, carefully plan siren placement, post warnings, and restrict access to areas near the sirens. Sirens may be operated from remote control points. Whenever possible, disconnect all siren power, including batteries, before working near the siren. Review and comply with any local or state noise control ordinances as well as OSHA noise exposure regulations and guidelines.
- After installation or service, test the siren system to confirm that it is operating properly. Test the system regularly to confirm that it will be operational in an emergency.
- If future service personnel do not have these warnings and all other instructions shipped with the equipment to refer to, the siren system may not provide the intended audible warning, and service personnel may be exposed to death, permanent hearing loss, or other bodily injuries. File these instructions in a safe place and refer to them periodically. Give a copy of these instructions to recruits and trainees. Also give a copy to anyone who is going to service or repair the sirens.

Operation

Failure to understand the capabilities and limitations of your siren could result in permanent hearing loss, other serious injuries, or death to persons too close to the sirens when you activate them or to those you need to warn. Carefully read and thoroughly understand all safety notices in this manual and all operations-related items in all instruction manuals shipped with the equipment. Thoroughly discuss all contingency plans with those responsible for warning people in your community, company, or jurisdiction. A well-written contingency plan document is recommended.

Hazard Classification

Federal Signal uses signal words to identify the following:

DANGER

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

WARNING

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

CAUTION

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

NOTICE

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

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

Pay careful attention to notices located on the equipment.

General Description

Overview

The Universal Controller (UCT-WLN) series of siren controllers allow third-party devices and sirens from other manufacturers to be controlled and monitored from Federal Signal SS2000+, Commander®, CommanderOne®, and CommanderOne-LE siren control products. The UCT-WLN model series are optimized to seamlessly integrate Whelen® Vortex, Omni, Hornet, and WPS Series sirens with the advanced features of Federal Signal's siren control and status monitoring systems to provide full control and status monitoring capability.

Communication options are available for conventional High Band, UHF, 800 MHz, Digital P25, and 4G cellular networks. Federal Signal's FSloT unique cellular multi-carrier communications platform uses AT&T®, Verizon®, and T-Mobile® with automatic carrier selection to dynamically optimize reliability and performance. In addition to multi-carrier redundancy, additional communications redundancy can be obtained by combining cellular and RF communication options within the Universal Controller.

The UCT-WLN controller and communication devices are housed in a lockable NEMA 4 enclosure, rated for indoor/outdoor use. A small Interface PCB mounts in the Whelen siren controller to minimize external field wiring by using an I²C buss instead of discrete wiring, simplifying installation.

Features

The UCT-WLN controller has the following features:

- Optional two-way radio transceiver (VHF, UHF, or 800 MHz)
- Optional FSloT 4G cellular modem
- Radio PA audio output
- Four individually programmable output relays with selectable N.O. or N.C. contacts
- Four contact closure inputs for remote landline activation
- Two RS232 Serial/Programming Ports and I²C Buss
- Eight remote sensor inputs and a built-in monitor for AC voltage
- Local display of function counters and incoming decoded signals
- 24 Vdc Operation
- Two-Tone, DTMF, POCSAG, and MSK Decoders
- Configurable control of any six Whelen® siren control functions plus SI-TEST and Cancel
- Status Monitoring: AC Power, DC Voltage, Intrusion, Communication Status, Amplifier Status, Rotation (optional), Local Activation, Last Function (time/date)
- Compatible with SS2000+, Commander, and CommanderOne siren control systems

Ordering Products

For special orders, contact Federal Signal. See “Getting Technical Support and Service” on page 36 for contact information. The following tables list the standard UCT-WLN models.

Table 1 UCT Models

FC Model	Description
UCT-WLN-H	UCT controller with High-Band (136-174 MHz) radio transceiver
UCT-WLN-U	UCT controller with UHF (400-470 MHz) radio transceiver
UCT-WLN-FSIOT	Controller with 4G cellular modem (AT&T®, Verizon®, or T-Mobile®) with cabinet mounted antenna
UCT-WLN-H-FSIOT	Redundant High-Band and cellular combination
UCT-WLN-U-FSIOT	Redundant UHF and cellular combination

Table 2 Optional Accessories

Part Number	Description
SFCD-10, SFCD-25, SFCD-255, SFCD-512	Commander® Siren Control and Status Monitoring Software (up to 10, 25, 255, and 512 sirens sites respectively)
COMMANDER1-S, COMMAND-ER1-P, COMMANDER1-E, COMMANDER1-LE	CommanderOne® Subscription (Standard, Pro, Enterprise, and Limited Edition) LE is for the SS2000+ one-way control.
PBS-4	Outdoor-rated NEMA 4 button panel
CP-FS1	FSIoT Annual plan (multi-carrier AT&T, Verizon, or T-Mobile)
CP-FSSETUP	FSIoT, one-time setup fee

Table 3 Antenna

Model	Description
OMNI-Bxx	Omni directional antenna (VHF, UHF, and 800 MHz models available)
YAGI-xx	Directional antenna (VHF, UHF, and 800 MHz models available)
CELL-ANT1	4G cellular 9 dB gain antenna

NOTE: Standard antenna connections are Type N.

Parts List

The following figure and table lists the parts included. If you are missing any parts, contact Customer Support. See “Getting Technical Support and Service” on page 36.

Figure 1 Parts List

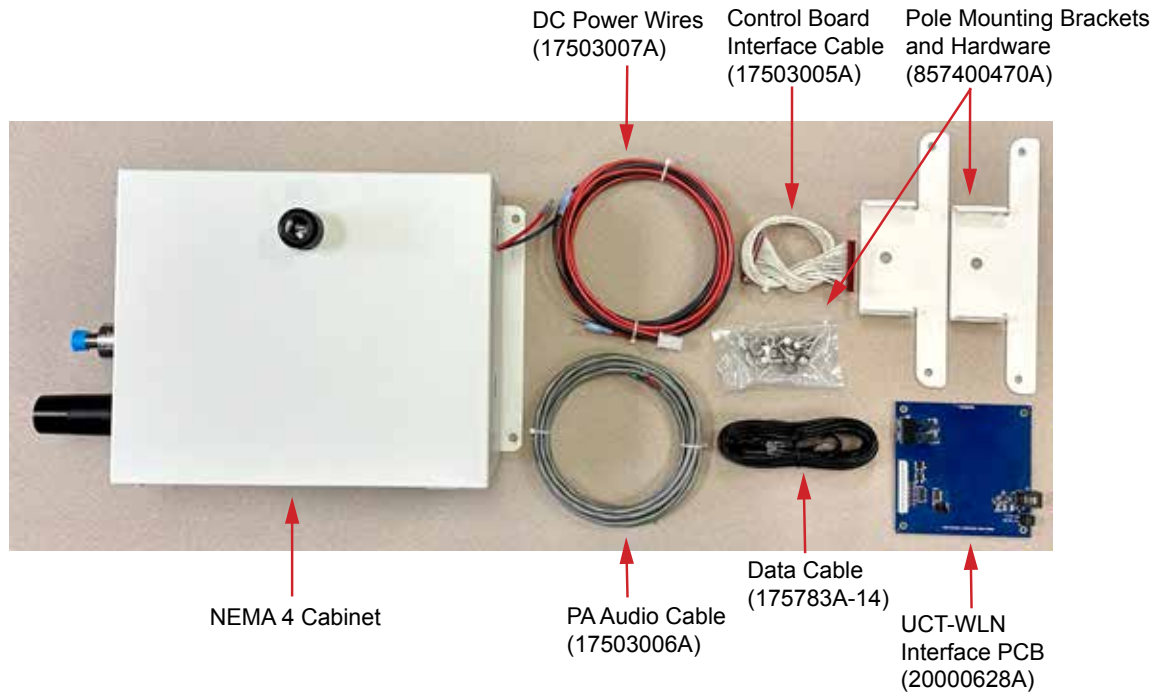


Table 4 Contents

Description	Part Number
DC Power Wires	17503007A
Control Board Interface Cable	17503005A
Pole Mounting Brackets and Hardware	857400470A
PA Audio Cable	17503006A
Data Cable	175783A-14
UCT-WLN Interface PCB	20000628A

Specifications

UCT-WLN Control Cabinet Specifications

Table 5 Environmental and Dimensions

Environmental	
Operating Temperature	-22°F to 149°F (-30°C to +65°C)
Humidity	0-98% non-condensing
Dimensions	
Dimensions (H x W x D)	13.5 x 10 x 6 inches (34.3 x 25.4 x 15.3 cm)
Net Weight	18 lb (8.1 kg) includes transceiver
Shipping Weight	20 lb (9 kg) includes transceiver

Control Board Specifications

Table 6 Specifications

Electrical Requirements	
24 Vdc Input Voltage	15-75 Vdc
Current draw	184 mA maximum at 24 Vdc
Serial Communications	
Serial Port Configuration	RS232C 1200,N,8,1,DCE (JP8 and JP16)
I ² C Port	JP32

Table 7 Signaling Formats

Two-Tone Sequential Frequency range Tone timing	282-3000 Hz First tone: 0.5 seconds minimum Second tone: 0.25 seconds minimum 8 seconds maximum for both
Inter-tone Gap Tone Accuracy Tone Spacing	400 ms maximum +/- 1.5% 5.0% preferred, 3% minimum
Single Tone Frequency range Tone timing Tone Accuracy Tone Spacing	282-3000 Hz 0.5-8 seconds maximum +/- 1.5% 5.0% preferred, 3% minimum
DTMF String length Mark/Space timing: Decoder Minimum Decoder Maximum Encoder Space between Stacked codes	All timings in milliseconds 3-12 standard DTMF characters 50 ms/50 ms (below 50/50 consult factory) 800 ms total mark/space timing per character 50 ms/50 ms mark/space timing minimum 1.25 seconds
NOTE: Wildcard options for each of the DTMF strings via programming software. Optional fast DTMF 40 ms/20 ms with jumper JP29 shorted.	

FSK	
Baud rate	1200 bps
Modem type	MSK (minimal shift key)
Mark frequency	1200 Hz
Space frequency	1800 Hz
Error checking	16 bit CRC

Table 8 Inputs and Outputs

Relay Outputs	
Four relay outputs	Normally Open or Normally Closed
Contact Rating	8 A at 120/240 Vac 5 A at 24 Vdc
Audio Output (Optional)	
Output Voltage	3 V _{p-p} maximum
Maximum Load	8 ohms
Total Harmonic Distortion	< 10% at 1 kHz sine wave
Remote Activation Inputs	
Quantity	4
Input Type	Dry contact closure <1 kΩ (Requires >1 second closure)

DC-DC Converter (2005173) Board Specifications

Table 9 Converter Board Specifications

DC Input Voltage	20-75 Vdc
DC Input Current	300 mA (nominal) Standby, 8 A maximum Transmit
Output Voltage	13.5 +/-5%
Output Current	13 A maximum

Table 10 Connections

JP1-1	Ground to shutdown output
JP1-2	13.5 V output
JP1-3	Ground
JP1-4	20 to 75 Vdc input
JP1-5	Ground
JP2-1	Ground
JP2-2	13.5 V output

UCT-WLN Interface PCB (20000628) Specifications

Table 11 Converter Board Specifications

DC Input Voltage	4.8-5.1 Vdc
DC Input Current	< 60 mA
Relay Outputs	Two, Form C, 2 A/30 V
Digital Outputs	Eight, 0-12 Vdc, 6.8 mA sink/source each
Digital Inputs	Six, High = 3.5 V, Low = 1.5 V

Table 12 Connections

JP1	Whelen® Interface Connections
JP2	External Audio Inputs
JP3	I ² C Address Selection
JP4	I ² C Connections
JP5-1	Relay 1 Common
JP5-2	Relay 1, N.O.
JP5-3	Relay 1, N.C.
JP5-4	Relay 2 Common
JP5-5	Relay 2, N.O.
JP5-6	Relay 2, N.C.

Installation

⚠ DANGER

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

⚠ WARNING

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

To prevent the siren from sounding, always turn off the power to the siren at the disconnect switch and remove any DC power being supplied by the battery box before inspecting or maintaining the siren.

NOTICE

PROPERTY DAMAGE: *Federal Signal recommends padlocking all control devices to discourage tampering and vandalism.*

NOTICE

STATIC-SENSITIVE DEVICE *When servicing the board, avoid Electrostatic discharge by properly grounding yourself and the board.*

Electrical Code Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

⚠ CAUTION

INSTALLATION PRECAUTIONS: Changes or modifications not expressly approved by Federal Signal could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used per the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio technician for help.

Preliminary

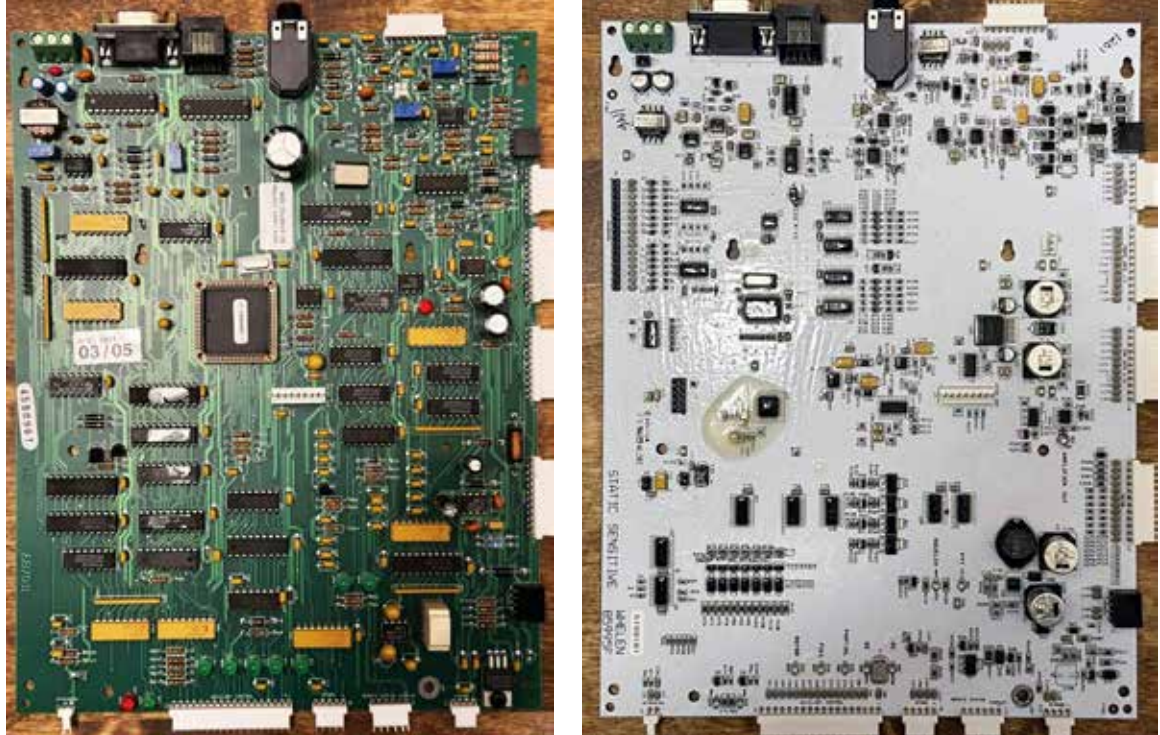
Carefully inspect the unit for signs of damage that may have occurred in transit. Should there be any evidence of physical damage to the unit or components, notify the carrier immediately stating the extent of the damage.

There are numerous methods to use to mount the controller. In all cases, the installation must be rigid, secure, free from physical shock or vibration, and within six feet of the siren control cabinet.

If the controller is to be used in extremely hot climates, locate it out of the direct path of the sun. If the antenna is to be mounted directly to the controller cabinet, make sure the cabinet is mounted on the side of the pole facing the base station antenna.

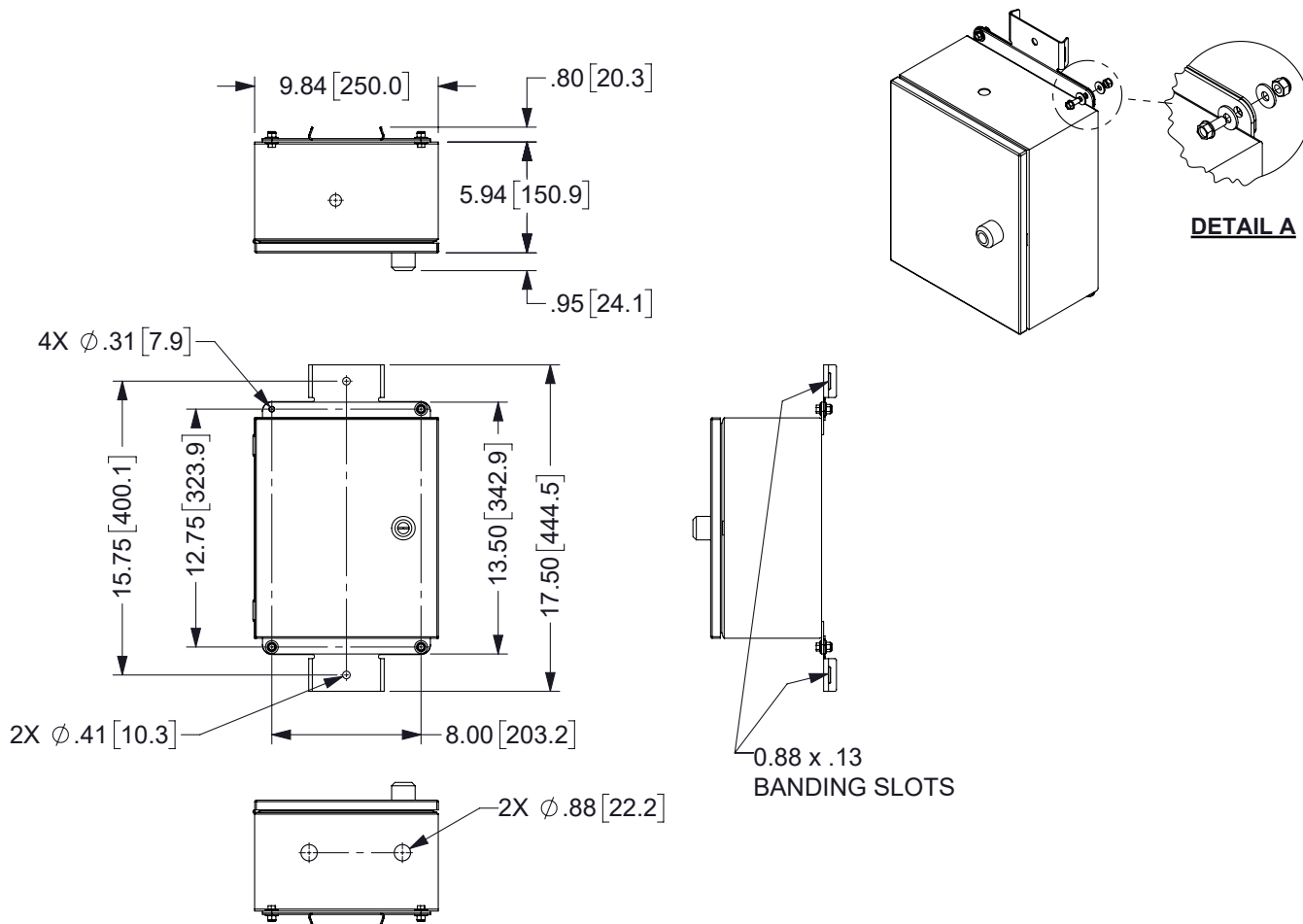
The UCT-WLN series siren controllers are designed to be compatible with the Whelen® model 2020 or 2023 Control Logic boards manufactured after 2001. The two types of compatible control boards are shown below. Verify that the existing siren controller has one of the two compatible boards before installing the new UCT-WLN controller.

Figure 2 Compatible Control Logic Boards



The UCT-WLN cabinet has four 5/16-inch mounting holes located on both the top and bottom mounting flanges that can be used to mount to a wall or other horizontal structure. Two pole mounting brackets are provided for pole mount installations. Two 1/2-inch conduit fitting holes are provided for conduit connections on the bottom of the UCT-WLN cabinet.

Figure 3 UCT-WLN Cabinet Dimensions with Pole Mounting Brackets



General Mounting Guidelines

NOTICE

INSTALLATION PRECAUTIONS: Use good installation methods and follow local ordinances for mounting cabinet.

These general installation instructions are pertinent to all installations. Specific mounting methods and required installation materials are described in the next section.

- The UCT-WLN cabinet has four 5/16-inch mounting holes located on both the top and bottom mounting flanges that can be used to mount to a wall or other horizontal structure. Two pole-mounting brackets are provided for wood, concrete, or steel pole mounting.
- The total weight of the UCT-WLN controller cabinet is listed in the Specifications section. It is important that the mounting surface and mounting method selected can safely sustain the weight of the assembly with maximum wind loading.

- Prepare the mounting surface for hanging the cabinet by predetermining the location of the mounting holes. Attach the cabinet to a wall or other substantial vertical surface.

If the mounting surface is not flat, the cabinet may require shimming to keep the cabinet square.

- Guidelines for various attachment methods to accommodate different wall types are described in the following section. Make provisions for spacing behind the cabinet when mounting to an exterior wall that is susceptible to condensation or other surface moisture.
- Lift the cabinet to the desired mounting height and lag to the wall using the prepared holes and anchors.

Installation Material List and Installation Guidelines

The following material lists and guidelines describe basic installation details required to install the cabinet. This list varies depending on mounting methods, other options, local and national electrical codes, etc. Use the lists as reference guidelines only.

Pole Mount Guidelines

To mount the cabinet on a pole:

1. Connect the pole mount brackets to the UCT-WLN controller top and bottom mounting flanges using the supplied washers and nuts.
2. For wooden poles, use two 3/8-inch lag screws with flat washers to mount the UCT-WLN cabinet to the pole using the pole mount bracket mounting holes.
3. For steel poles, band the pole mounting bracket to the pole or attach weather-resistant Unistrut® brackets to create a flat mounting surface for the UCT-WLN cabinet and bolt the UCT-WLN cabinet to the Unistrut.

Concrete or Filled Cement Block Wall Mounting Guidelines

Table 13 Concrete or Filled Cement Block Wall Mounting Materials

Material Description	Purpose	Qty
1/4 in x 2 in Pin/Sleeve/ Lock Washer/Nut Style Anchors	Anchor Bolts	4

To mount the cabinet on a concrete or filled cement block wall:

1. Mark the mounting hole locations on the wall for the cabinet.
2. Install the anchor bolts for the four cabinet corners according to the manufacturer's instructions.
3. Mount the cabinet to the wall.
4. Proceed to the following section.

NOTE: If the wall is not straight, use shims to ensure the enclosure maintains square and structural integrity.

Hollow Block Wall Mounting Guidelines

Table 14 Hollow Block Wall Mounting Materials

Material Description	Purpose	Qty
1/4 in x 2 in Heavy Duty Toggle Bolts	Anchor Bolts	4

To mount the cabinet on a hollow block wall:

1. Mark the mounting hole locations on the wall for the cabinet.
2. Install the anchor bolts for the four cabinet corners according to the manufacturer’s instructions.
3. Mount the cabinet to the wall.
4. Proceed to the following section.

Wood Stud Wall Mounting Guidelines

Table 15 Wood Stud Wall Mounting Materials

Material Description	Purpose	Qty
1/4 in x 1 in Lag bolts	Backboard and cabinet mounting bolts	8
2 ft x 2 ft x 3/4 in B/C or better plywood	Mounting backboard	1
Construction adhesive	Mounting backboard attachment	1

To mount the cabinet on a wood stud wall:

1. Locate the wall studs for attaching the mounting backboard to the wall. Attach the backboard to at least two studs.
2. Mark the wall stud location on the mounting backboard and drill four pilot holes for the lag bolts.
3. Apply construction adhesive to the back of the mounting backboard.
4. Attach the mounting backboard to the wall with four lag bolts.
5. Locate the mounting position of the cabinet on the mounting backboard.
6. Drill pilot holes for the lag bolts.
7. Mount the cabinet to the mounting backboard.
8. Proceed to the following section.

Metal Stud Wall Mounting Guidelines

Table 16 Metal Stud Wall Mounting Materials

Material Description	Purpose	Qty
1/4 in x 2 in lag bolts	Cabinet mounting bolts	4
2 ft x 2 ft B/C or better plywood	Mounting backboard	1
#14 x 2 in metal stud screws	Backboard mounting	12
Construction adhesive	Backboard mounting	1

To mount the cabinet on a metal stud block wall:

1. Locate the wall studs for attaching the Mounting Backboard to the wall.
2. Mark the wall stud location on the mounting backboard and drill pilot holes for the #14 metal stud screws. Place three screws in each stud evenly spaced apart.
3. Apply construction adhesive to the back of the mounting backboard.
4. Attach the mounting backboard to the wall with #14 metal stud screws.
5. Locate the mounting position of the cabinet on the mounting backboard.
6. Drill pilot holes for the 1/4-inch lag bolts.
7. Mount the cabinet to the mounting backboard.
8. Proceed to the following section.

Electrical Connections

⚠ WARNING

INSTALLATION PRECAUTIONS: *Install the siren electrical system in compliance with local electrical codes and NEC recommendations. Federal Signal also recommends that all user-installed conduit connections enter from the bottom of the cabinet. Disconnect all power and read all warnings at the beginning of this manual and before making connections.*

⚠ CAUTION

INSTALLATION PRECAUTIONS: *The siren and control system must be solidly connected to an earth ground. If the siren is installed in a building, ground the system to a metallic object known to be grounded.*

For pole mount installation, drive two ground rods separated by at least eight feet and into the ground by at least eight feet. Use a separate, continuous 6 AWG or larger wire from the siren frame to ground and from the cabinet of each siren control system to ground.

Qualifications

You must be a properly trained technician or electrician to install this product.

Recommended Equipment

Federal Signal recommends having the following installer-supplied equipment.

Table 17 Recommended Equipment

Check	Material Description	Purpose
	1/2-inch seal-tight conduit and fittings	Electrical conduit from UCT-WLN to siren control cabinet.
	Metal ground connectors	Equipment ground connections
	Ground lead	Solid 6 AWG from UCT-WLN lightning arrestor to earth ground
	Screws/bolts/banding or appropriate for the mounting surface	UCT-WLN mounting
	Antioxidant paste	Coating to protect ground bonds
	Self-fusing waterproof silicone rubber tape	Sealant for antenna connections
	Plastic wire ties	Dress wiring in the siren control cabinet

Siren Controller Installation

To install the siren controller:

1. Disconnect the AC power to the siren controller. Open the siren control cabinet and turn the battery disconnect switch off.

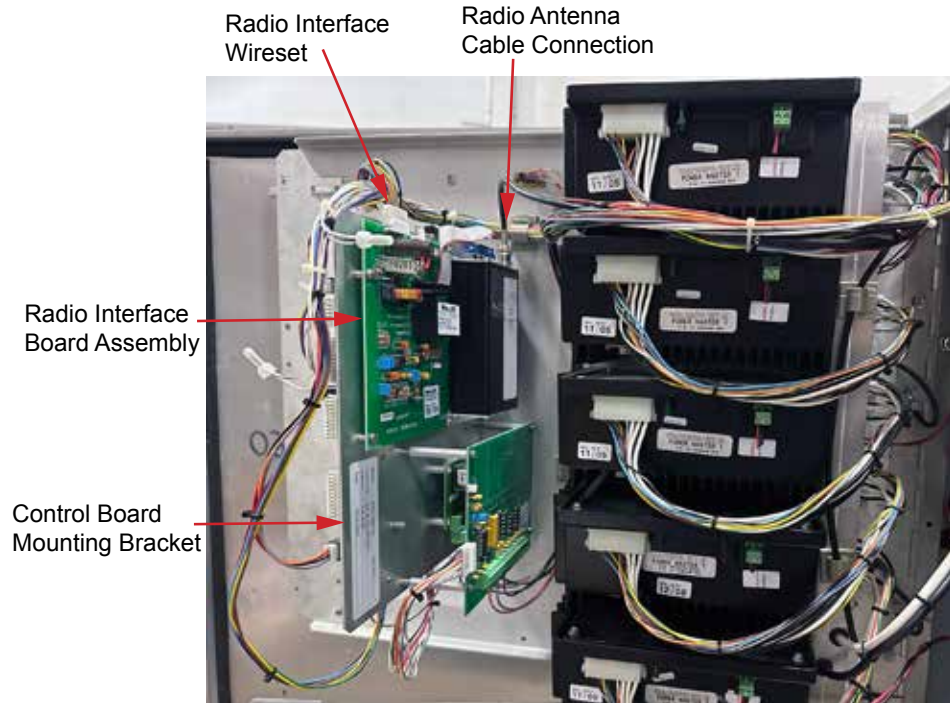
Figure 4 Battery Disconnect Switch



2. The UCT-WLN will be connected to the 24 Vdc power supply in the siren control cabinet. Run 1/2-inch sealed NEMA 4 conduit between the UCT-WLN control and siren control cabinet using one of the conduit entrances in the bottom of the UCT-WLN cabinet.

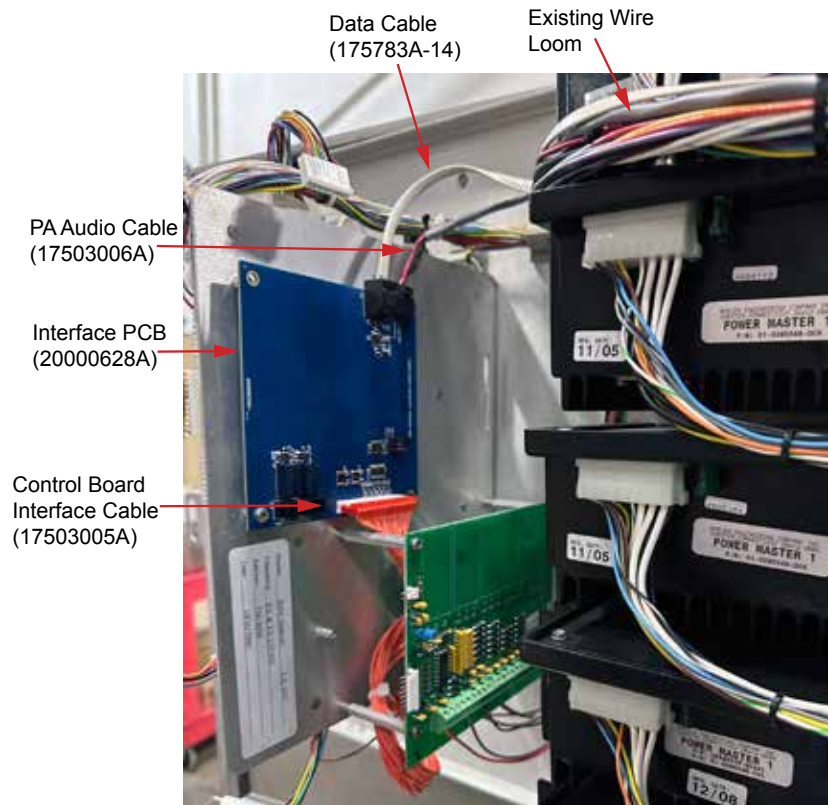
3. See Figure 4 for equipment locations. Separate the Control Board Mounting Bracket from the swing frame to provide access to the radio interface.
4. Disconnect the Radio Antenna Cable Connection. Keep the mounting screws and discard the Radio Interface Board Assembly and the Radio Interface Wireset.

Figure 5 Original Equipment Locations



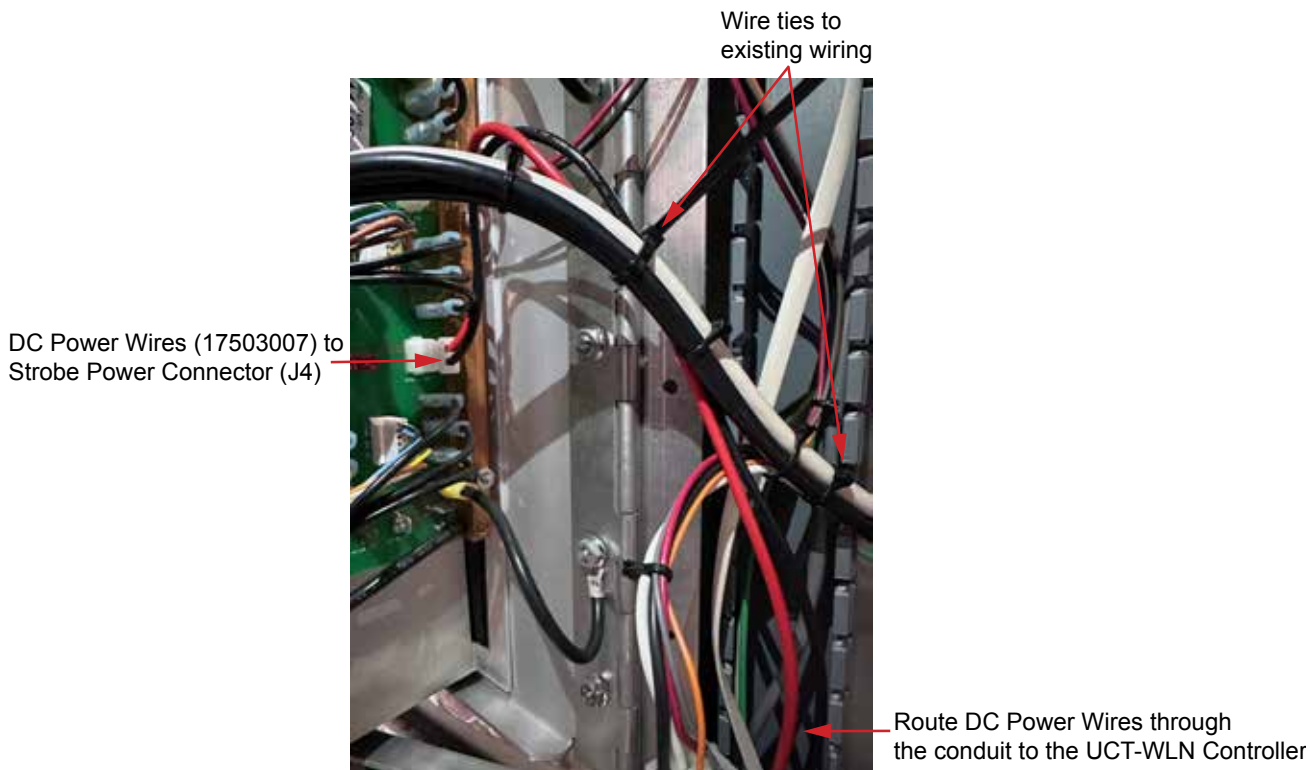
5. Mount the UCT-WLN Interface PCB (20000628) at the Radio Interface Board Assembly location using the screws removed from the radio interface board. (See Figure 6.)
6. Install the Data Cable (175783A-14) and PA Audio cable (if PA over radio will be used). Leave some slack and wire tie the new cables to the existing wire loom as shown in Figure 6. Follow the existing loom and route the wires into the plastic wire raceway. Connect the Control Board Interface Cable (17503005A) to J6 on the Whelen® control board.

Figure 6 New Equipment Locations



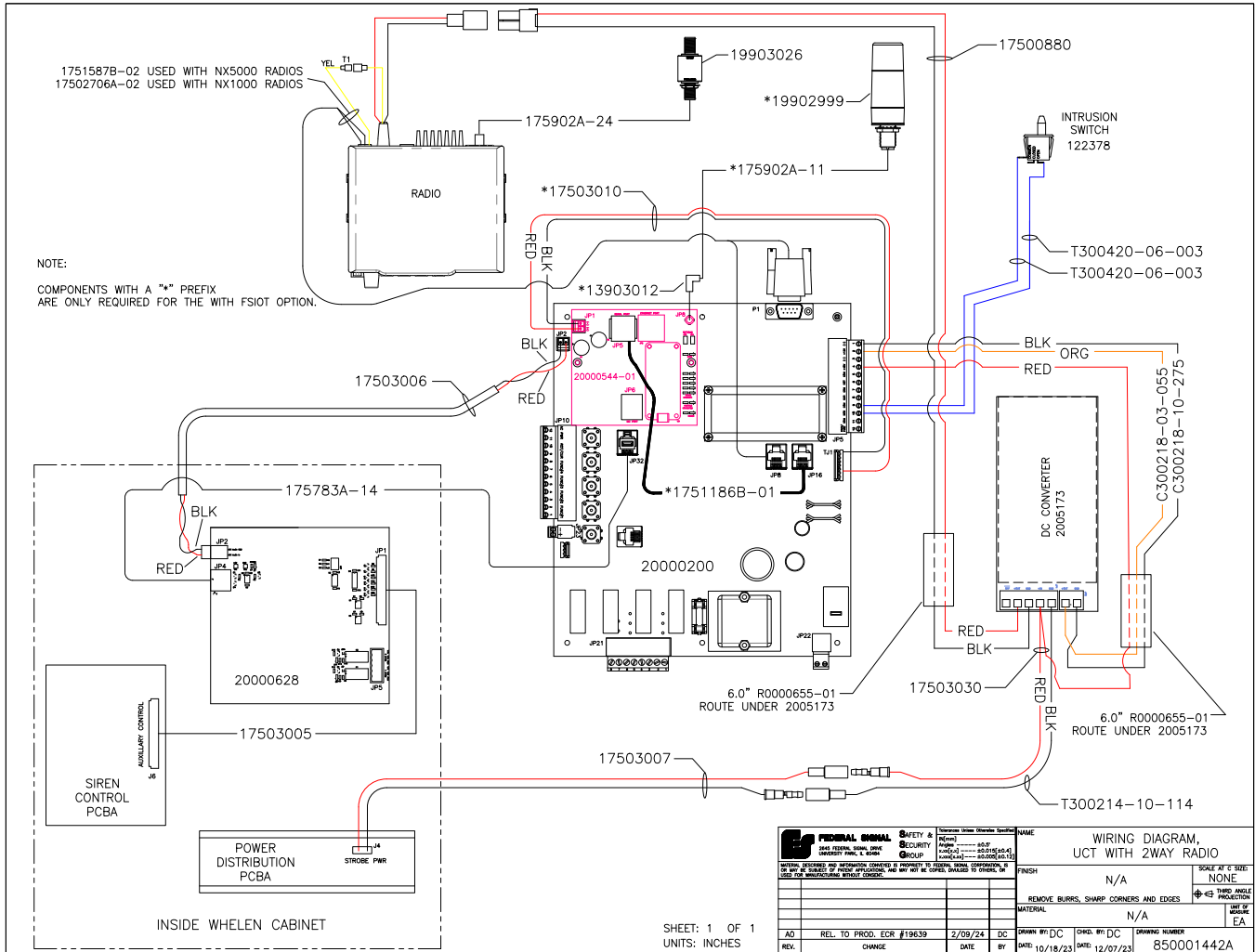
7. Connect the 24 Vdc power cable to the Strobe Power connector, J4, on the Whelen® power distribution board as shown below. Use plastic wire ties to secure the Power Wires (17503007) to the existing black and white power wires and run into the control cabinet.

Figure 7 Wiring



8. Fish the power wires, Data Cable (175783A-14), and optional PA audio and intrusion wiring through the conduit into the UCT-WLN control box. See “Figure 8 UCT-WLN Wiring Diagram” on page 25.
9. Plug the Data Cable (175783A-14) into the UCT-WLN control board (20000200) I²C port JP32.
10. If radio PA audio is required, connect the PA Audio cables (17503006A) between JP2 on the 20000200 control board and JP2 on the 20000628 interface board (pin 1-1 and 2-2).
11. Connect the 24 Vdc Power Wires (17503007A) 14 AWG red wire to the red 14 AWG wire with a male barrel connector (connected to the 2005173 DC-DC convertor PCB). Connect the black 14 AWG wire to the black 14 AWG wire with the female barrel connector.
12. Bundle and tie wrap the excess length of cable in the siren control cabinet.

Figure 8 UCT-WLN Wiring Diagram



Installing the Antenna

⚠ DANGER

ELECTROCUTION HAZARD: To prevent electrocution or severe personal injury, install the antenna away from power lines and install it with proper grounding. Refer to section 810 of the National Electrical Code, ANSI/NAPA No. 70.

A factory-installed, internally wired, antenna bulkhead adaptor is provided on the top side of the Controller Cabinet for ease of antenna cable interface. The bulkhead adapter requires the installation of a male Type N connector on the antenna cable for correct interface. It is essential that the installer follow all tuning (if applicable), weatherproofing, installation, grounding, and safety instructions provided by the antenna's manufacturer.

For installation instructions on the Yagi and Omni Antennas, go to the Federal Signal's website.

Bond the UCT-WLN antenna bulkhead connector(s) to earth ground using a 6 AWG bonding wire with 1/4-inch ring terminal and bonding connector.

NOTE: Route the bonding conductor directly toward earth ground without sharp or upward wire bends.

Factors Affecting Radio Reception and Antenna Connection

⚠ WARNING

CALIBRATION PRECAUTIONS: If the radio system is not installed and calibrated properly, the controller may not receive the activation signals. This may cause the siren to fail and not operate in an emergency, resulting in extensive property damage or death.

⚠ CAUTION

ACTIVATION CODE WARNING: Other local siren sites may have the same activation code. Take appropriate precautionary measures.

NOTICE

CONNECTION WARNING: All antenna connections must be properly sealed.

The radio network (transmitter, receiver, and decoder) is the vital link to proper controller operation. Consider the following during installation.

- Individually evaluate all controller installations. Contact Federal Signal to discuss a suitable controller site location, the proper type and location of the antenna and transmission line, and to ask any questions regarding the installation.
- Distance from the transmitter is not necessarily the only factor determining signal quality. The effects of terrain and structures can result in weak or variable reception at a given siren site.
- It is desirable to evaluate each proposed site under various weather conditions using a portable receiver. Elevation and distance changes of a few hundred feet can often make a significant difference in signal strength.
- Connect the antenna or antenna cable to the N bulkhead connector.

- Mount the antenna on the side of the pole facing the base station location. Mount as high as possible. When possible, the tip of the antenna should be no closer than three feet from any metal siren mounting brackets.

NOTE: For installation instructions on the Yagi and Omni Antennas, go to the Federal Signal's website.

- In general, use a gain antenna if a site must be located in a known weak signal area.
- The following paragraphs pertain to the operation of the transmitter, tone-generating equipment, and other equipment used at the base station.
 - Tone-generating equipment used in a siren system requires frequency stability within $\pm 1\%$ and a total distortion of less than 5%. Tone duration must be compatible with the siren tone-timing scheme selected by the user.
 - It is important to arrange the base station keying circuitry so that the microphone is disconnected when the tones are transmitted to prevent microphone noise from distorting the signal.
 - To ensure good frequency response, the output of the tone encoder must be properly matched to the transmitter. Adjust the transmitter according to the manufacturer's instructions to provide the proper level of deviation. The typical deviation level for narrowband is 1.5 kHz; and if using PL/DPL, add 375 Hz. If using wideband, such as EAS (NOAA), the modulating deviation is 3 kHz.

Operations

UCT-WLN Controller Board Indicators

The following table provides a description of LED indicators on the UCT-WLN controller board.

Table 18 FC Controller Board Indicators

Component Number	Description	Indication
D25	CPU LED	Microprocessor Heartbeat
D12	RECEIVE LED	RF Carrier Indicator on with carrier
D18	TRANSMIT LED	Transmit
D60	RELAYS ARMED	Power to relays on
D62	RELAY #1 LED	Relay #1 closed
D63	RELAY #2 LED	Relay #2 closed
D65	RELAY #3 LED	Relay #3 closed
D66	RELAY #4 LED	Relay #4 closed, or PA mode
D20	PRESSURE LED	Pressure Sensor input
D21	INTRUSION LED	Intrusion Sensor input
D19	CURRENT LED	Current Sensor input
D22	ROTATION LED	Rotation Sensor input
D23	LOW BATTERY LED	Low Battery Sensor (internal)
D24	AC POWER FAIL LED	AC Power Fail Sensor (internal)
D26	POWER LED	12 V Operating Power
D79	ISO 12V	Isolated 12 V power
D77	ISO 5V	Isolated 5 V power
U18	LCD Display	Displays Function Counters, Decodes, and Software Revision

Connectors, Selections, and Switches for the UCT-WLN Controller Board

The following tables provide descriptions of the UCT-WLN controller board connectors, selections, and switches.

Table 19 Configuration Jumpers on the Control Board

JP1	Future Use
JP2	<p>Test Speaker/Audio Out (See R76 for output level adjustment)</p> <p>1 0 to 3 V_{P-P} Audio Source: Receiver Audio during PA functions Siren Audio during Electronic Siren functions</p> <p>2 Ground</p> <p>Speaker Output. Passes radio audio or generates warning sounds, which are routed to the speaker output JP2</p>
JP3	<p>Short For VOX Carrier Detect</p> <p>1 and 2 Short together for VOX carrier detect</p> <p>Jumper 1 and 2 to provide VOX carrier detect for radios that do not provide carrier detect.</p>
JP4	<p>Test Speaker</p> <p>1 and 3 Short pins 1 and 3 to give priority to the external transceiver 2 and 4 Short pins 2 and 4 to give priority to the internal receiver.</p> <p>With no shorting jumper, the first carrier detect has priority. Short both sides when using the SINAD board along with JP1.</p> <p>Receiver Priority (For use with two-way systems.) Jumper JP4 sets the priority if an external transceiver and an on-board receiver are both used. The receiver with priority can interrupt the other receiver, and its audio passes through to the rest of the circuits in the controller. The receiver with priority cannot be interrupted. If neither receiver is given priority, then whichever receiver asserts carrier detect first will pass through, and the other receiver will not be able to interrupt it.</p> <p>If the EXT side is jumpered, then the external transceiver has priority.</p> <p>If the INT side is jumpered, then the on-board receiver has priority.</p> <p>If both sides of JP4 are jumpered, then the two receive audio signals are mixed together. This is done if the SINAD option is used as it allows receive audio from the external transceiver jack to pass through to the on-board receiver connector to feed the SINAD option board. JP1 must also be jumpered when the SINAD option is installed.</p>

JP5	<p>Sensor Inputs (#1 at left edge)</p> <p>1 Pressure sensor input, dry Contact closure < 1 K (Not used with UCT-WLN models.)</p> <p>2 ISO Ground</p> <p>3 Intrusion sensor input, dry Contact closure < 1 K</p> <p>4 ISO Ground</p> <p>5 Current sensor input, dry Contact closure < 1 K (Not used with UCT-WLN models.)</p> <p>6 ISO Ground</p> <p>7 Rotation sensor input, dry Contact closure < 1 K (Not used with UCT-WLN models.)</p> <p>8 ISO Ground</p> <p>9 48 Volt input, 15-75 Vdc</p> <p>10 Ground</p> <p>11 12 Volt input, 11-15 Vdc</p> <p>12 Ground</p>
JP6	<p>Speaker Mute gate bypass</p> <p>1 and 2 Short pins 1 and 2 to bypass speaker mute gate, allow monitoring of the radio channel with a local speaker</p> <p>The receiver audio coming out of JP2 is normally kept turned off until an activation signal has been received. Jumpering JP6 turns the receiver audio on all of the time. Jumper if you want to listen to the receive channel all the time.</p>
JP7	<p>Receiver Module for a one-way receiver (Not used with UCT-WLN models.)</p>
JP8	<p>Serial and FLASH programming Port</p> <p>The RS232 serial port is used to transfer new code into the UCT-WLN controller and configure the FC controller's activation codes and functions.</p>
JP9	<p>LEDs on with Intrusion</p> <p>1 and 2 Short pins 1 and 2 to disable LEDs when the Intrusion switch is closed</p> <p>When JP9 is shorted, the LED lights on the board turn off when the door is closed to reduce the current draw.</p> <p>Uses less power for Solar powered systems.</p> <p>Intrusion switch is only present on two-way systems.</p>

JP10	<p>Remote Activation and Sensor Inputs (#1 at left edge of connector)</p> <p>1 Spare Sensor Input #2, dry Contact closure < 1 K NOTE: Typically used for transformer rectifier or AC sensor.</p> <p>2 ISO Ground</p> <p>3 Spare Sensor Input #1, dry Contact closure < 1 K NOTE: Typically used for rotation sensor.</p> <p>4 ISO Ground</p> <p>5 Remote Activation Input #4, Activates Functions under code 4, dry Contact closure < 1 K</p> <p>6 ISO Ground</p> <p>7 Remote Activation Input #3, Activates Functions under code 3, dry Contact closure < 1 K</p> <p>8 ISO Ground</p> <p>9 Remote Activation Input #2, Activates Functions under code 2, dry Contact closure < 1 K</p> <p>10 ISO Ground</p> <p>11 Remote Activation Input #1, Activates Functions under code 1, dry Contact closure < 1 K</p> <p>12 ISO Ground</p> <p>You can activate the first four pre-programmed functions locally through the buttons on the UCT-WLN controller board or remotely by grounding one of the landline activation inputs at JP10 for at least one second. The remote inputs are protected by limiting diodes and cannot exceed 5.1 volts. JP10 is four contact closure activation inputs with two spare sensor inputs.</p>
JP11	<p>Used for special software applications</p> <p>1 and 2 Normally Jumpered</p> <p>3-8 Not used</p> <p>9 and 10 Normally Jumpered</p>
JP12	<p>SINAD Connector for engineering use only JP12 is used in special applications only.</p>
JP13	<p>CTCSS Encoder/Decoder (FS-PL1) (Not used with UCT-WLN models.)</p>
JP14	<p>Force Carrier Detect (Not used with UCT-WLN models.) 1 and 2 Short to force carrier detect on Some radios do not provide a carrier detect signal to inform the UCT-WLN controller that a receive signal is coming through. Jumpering JP14 forces the carrier detect to be active all of the time, allowing the UCT-WLN controller to monitor the receive audio.</p>
JP15	<p>Short To Set Deviation 1 and 2 Short causes unit to transmit for setting deviation Shorting JP15 causes the UCT-WLN controller to transmit a tone for setting the deviation of the transmitter attached.</p>
JP16	<p>I²C Port</p>

JP21	<p>Relay Outputs (#1 at left edge of connector)</p> <p>1 Relay 1, Common</p> <p>2 Relay 1, Normally Open Contact</p> <p>3 Relay 2, Common</p> <p>4 Relay 2, Normally Open Contact</p> <p>5 Relay 3, Common</p> <p>6 Relay 3, Normally Open Contact (Normally Closed when JU1 is shorted, default)</p> <p>7 Relay 4, Common</p> <p>8 Relay 4, Normally Open Contact (Normally Closed when JU2 is shorted)</p> <p>There are four relay outputs on the UCT-WLN controller board, which are controlled by the microprocessor. The relays provide isolation and are spike protected to prevent voltage spikes from affecting the unit. As the relay coil is energized, the outputs close and the associated LED lights. The UCT-WLN controller board comes standard with four DPST relays.</p>
JP22	AC Power Input (Not used with UCT-WLN models.)

Switches

Switches provide local activation via on-board button, master reset, site address, and AC voltage selection.

Table 20 Switches

S1	<p>Local Activation #4</p> <p>Press and hold for 1/2 second, Activates Functions under code 4</p>
S2	<p>Local Activation #2</p> <p>Press and hold for 1/2 second, Activates Functions under code 2</p>
S3	<p>Local Activation #3</p> <p>Press and hold for 1/2 second, Activates Functions under code 3</p>
S4	<p>Site Address Switch</p> <p>Sets units site number</p>
S5	Processor Reset
S6	<p>Local Activation #1</p> <p>Press and hold for 1/2 second, Activates Functions under code 1</p>
S7	120/240 Vac Selector switch (Not used with UCT-WLN models.)

Speaker Output

You can use the speaker output at JP2 to monitor received audio, route remote PA or provide a signal out when the tone generator option is used. You can adjust speaker output up to 2.0 V_{p,p} into an 8-ohm load using R76.

Table 21 Speaker Output

R76	Test Speaker output level set
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Radio Adjustment

If a two-way radio is connected to the Transceiver Interface Connector P1, radio deviation level adjustments must be completed using the potentiometers listed below. For the radio deviation level adjustment procedure, see the DCUCT-WLNTB manual.

Table 22 Radio Adjustment

R27	External transceiver receive audio set to $1 V_{P-P}$ at TP6
R58	MSK modem transmit deviation level set
R63	DTMF transmit deviation level set

Assigning Site Address (S4)

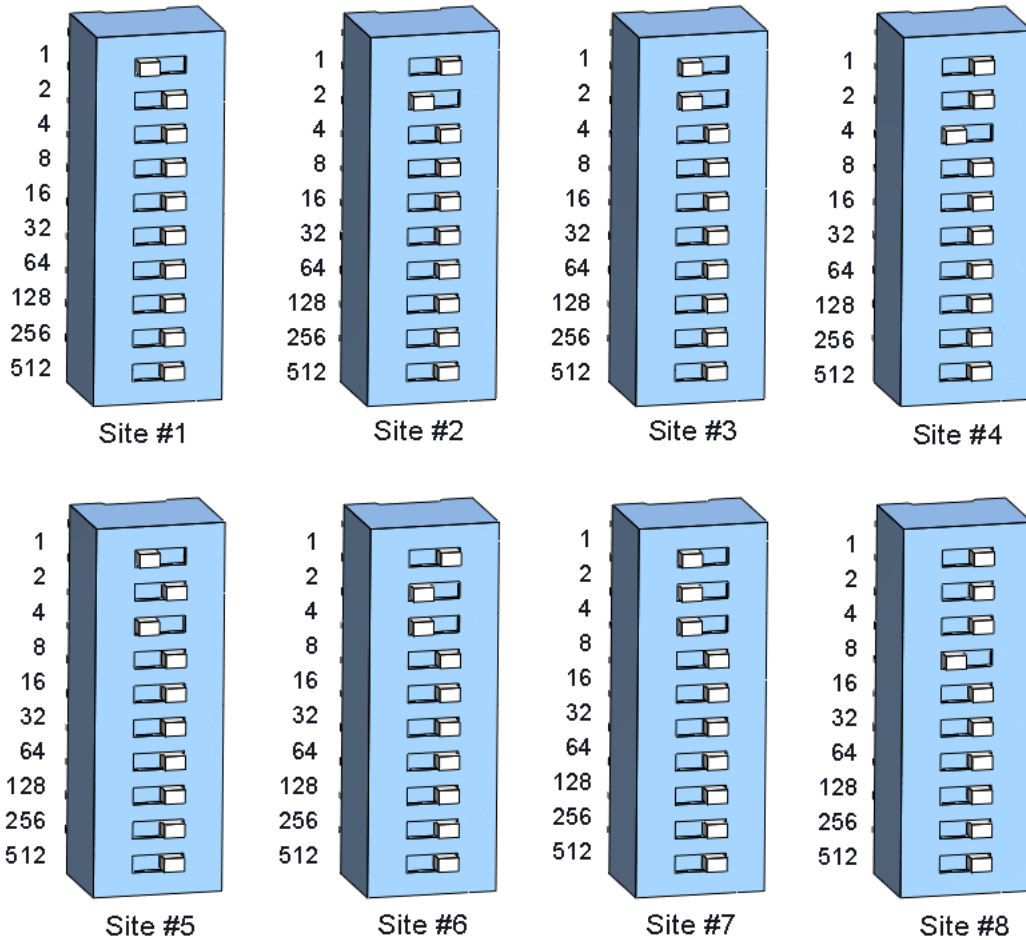
The site address switch gives each UCT-WLN controller in a two-way system its unique unit number.

For use with Commander®: For the siren to report back with its identity, define the site address by setting DIP switches located on the board. The DIP switches have values of 1, 2, 4, 8, 16, 32, 64, 128, 256, and 512. Add appropriate DIP switch values to define the site number address.

Example

To define the board for Site #1, toggle the first DIP switch to the left. All other DIP switches are to the right. For Site #2, toggle the second DIP switch to the left. For Site #3, toggle the first and second DIP switch to the left. For Site #4, toggle the third DIP switch to the left. For Site #5, toggle the first and third DIP switch to the left. Continue this method to define other site number addresses.

Figure 9 Setting the Switch Number Example



Switch number	1	2	3	4	5	6	7	8	9	10
Binary number	1	2	4	8	16	32	64	128	256	512

Example: Switch numbers 1, 2, and 3 are binary numbers 1, 2, and 4.

Add $1 + 2 + 4 = 7$; 7 is the unit address.

NOTE:

- Set the site address to one to program controller card with firmware (HEX code).
- To program a non-digital unit using FSPWARE Software, set the site address to one. When programming is completed, change the DIP switch setting to the actual site address.
- The site address is stored at power-up of the controller. If the site address is changed, cycle all power to the card (battery and AC).
- For DTMF, Two Tone Sequential Systems, and MOSCAD only: The unit address is defined in the programming; therefore, all DIP switches shall be positioned all to the right.

Connectors and Jacks for optional RF Receiver

For the UCT-WLN and UCT-WLNU units.

Table 23 Jacks

J1	Shield ground
	Center antenna RF Input
J2	Radio to UCT-WLN controller connector

Table 24 Squelch Controls

R1	Squelch control The squelch control adjusts the squelch threshold level.
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Programming

Turn the siren controller battery disconnect switch on and apply AC power to the Whelen® siren controller. Verify the UCT-WLN boards' LEDs are on.

Configure the UCT-WLN as an Omni or Rotating siren type, then program the siren controller with the siren functions. All functions of the UCT-WLN controller are programmable from a computer with an RS232 port using Federal Signal's Commander® programming software. The software allows the configuration, uploading, and downloading of control programs.

Any six (6) existing Whelen® functions may be programmed into the controller in addition to Federal Signal Quiet Test, which is mapped Si-Test® Cancel. If live radio PA is used, it must be placed in function #1. See the Commander Software Reference Manual for additional programming information.

Configuration programs are stored in nonvolatile memory to ensure retention even during a complete power failure.

The Function Counter values, last decoded signal, and current software revision are scrolled across the built-in LCD display.

Testing

Perform the following testing:

- Verify the UCT-WLN controller responds to poll requests from Commander® on all configured communications channels.
- Test all functions to ensure all configured siren tones, DV Messages, and PA functions are operational.
- Test all status indicators to ensure pass/fail conditions are detected.

Maintenance

Testing

Federal Signal recommends periodic testing of these systems to ensure they are operating as expected. Users should define the appropriate schedule for testing. Consult FEMA guidelines for recommended best practices for periodic testing requirements.

Inspection

To inspect the controller:

- Check the integrity of the installation. Ensure the mounting, conduit, antenna, and connections are secure and sealed.
- Check the enclosure for signs of water entry or corrosion. Seal any leaks and repaint any flaws in the painted finish.
- Confirm the CPU is flashing. (D48) If the LED is not flashing, the control board may be defective or missing power.
- Test the controller for proper operation. Test all functions of the controller locally and via radio when applicable.
- Verify that all sensors are operational.
- If the controller is not operating properly, check the power supply.
- Check the power supply and AC for proper voltage.

Getting Technical Support and Service

For technical support, contact:

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

For customer support, contact:

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