

# INSTALLATION AND MAINTENANCE MANUAL

## HYPERSPIKE® ENCOMPASS SYSTEM



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# 1. Overview

## 1.1. Model Numbers

The following Encompass cabinet model numbers are covered in this manual:

90240A-801	for MA-Micro
90240A-802	for MA-1, 1-sided
90240A-803	for MA-1, 2-sided / MA-2, 1-sided
90240A-804	for MA-1, 3-sided
90240A-805	for MA-1, 5-sided
90240A-806	for MA-2, 2-sided
90240A-807	for MA-2, 3-sided
90240A-808	for MA-2, 5-sided

## 1.2. Description

The Encompass System is designed to power the HyperSpike® line of mass notification loudspeakers. Depending on the specific application, it is capable of outputting up to 320W through each of its ten channels and automatically switching over to an optional battery backup should AC power fail. To interface with other equipment, the Encompass System features audio line-in, a user activate input, and 8 sets of dry contact outputs that give feedback about equipment status. A customer interface panel is also installed to which customer-provided communication electronics can be mounted. Backed-up system power is available to supply customer equipment.

The Encompass System is designed to self-protect should limited performance become necessary to avoid system failure. Diminished output power may be observed due to low input AC voltage and/or elevated cabinet temperature. Consult Section 1.6 and product's specification sheet for more detailed information.

## 1.3. Included with the Package / Optional Accessories

INCLUDED WITH ENCOMPASS UNIT		
PART NUMBER	DESCRIPTION	QUANTITY
90240A-MAN-ENCOMPASS	USER MANUAL	1.00
90240A-INTC	INTERCONNECT DIAGRAM	1.00
N/A	MOUNTING/SEALING HARDWARE	1.00

OPTIONAL ACCESSORIES INSTALLED ON-SITE	
PART NUMBER	DESCRIPTION
72538B-801	FLOOR MOUNT KIT
72539B-801	WALL MOUNT KIT
72540B-801	POLE MOUNT KIT
72551B-801	25/70/100V TRANSFORMER KIT
92012A-803	CB STYLE MICROPHONE

## 1.4. Identification

To aid future troubleshooting and support, please record the following specifics about your installation:

Cabinet Model Number: \_\_\_\_\_

Cabinet Serial Number: \_\_\_\_\_

Cabinet Purchase Date: \_\_\_\_\_

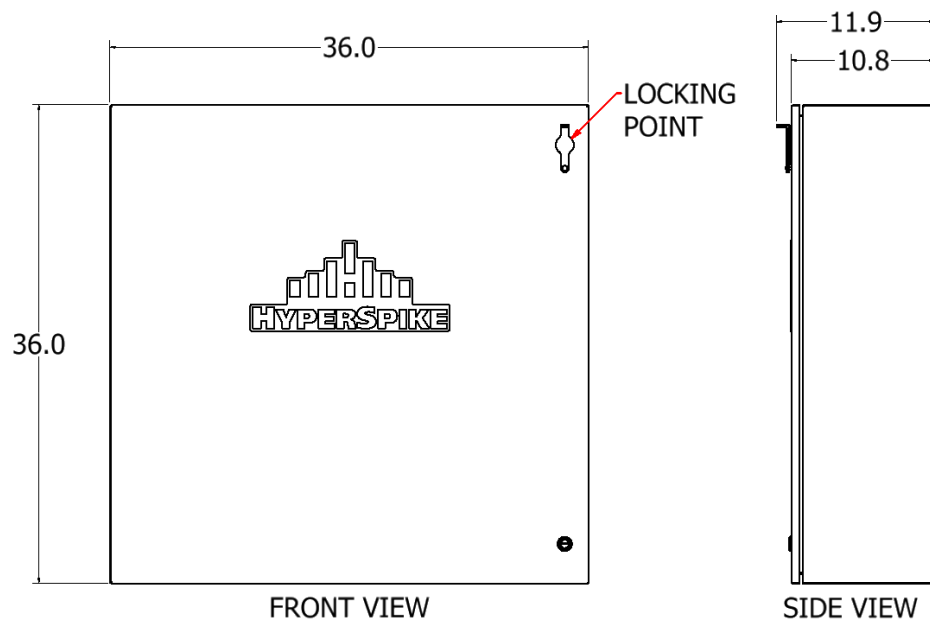
Speaker Model Number: \_\_\_\_\_

Speaker Serial Number: \_\_\_\_\_

Speaker Purchase Date: \_\_\_\_\_

## 1.5. Features

The Encompass cabinet comes standard in a NEMA 4 enclosure. A NEMA 4x option is also available. The cabinet has  $\frac{1}{4}$  turn latches. One latch can be secured with a padlock.



**Figure 1 – Encompass Cabinet**

The inside of the cabinet contains a sophisticated system to power the specified HyperSpike® mass notification speaker, using AC power or backup batteries when needed (if installed). All external connections should be made on the left side of the cabinet as shown in the diagram below (line out, line input, activate/status, and AC power input). When drilling into the cabinet, use precaution to catch or remove metal shavings from drilling. Also refer to the interface drawing 90240A-INT.

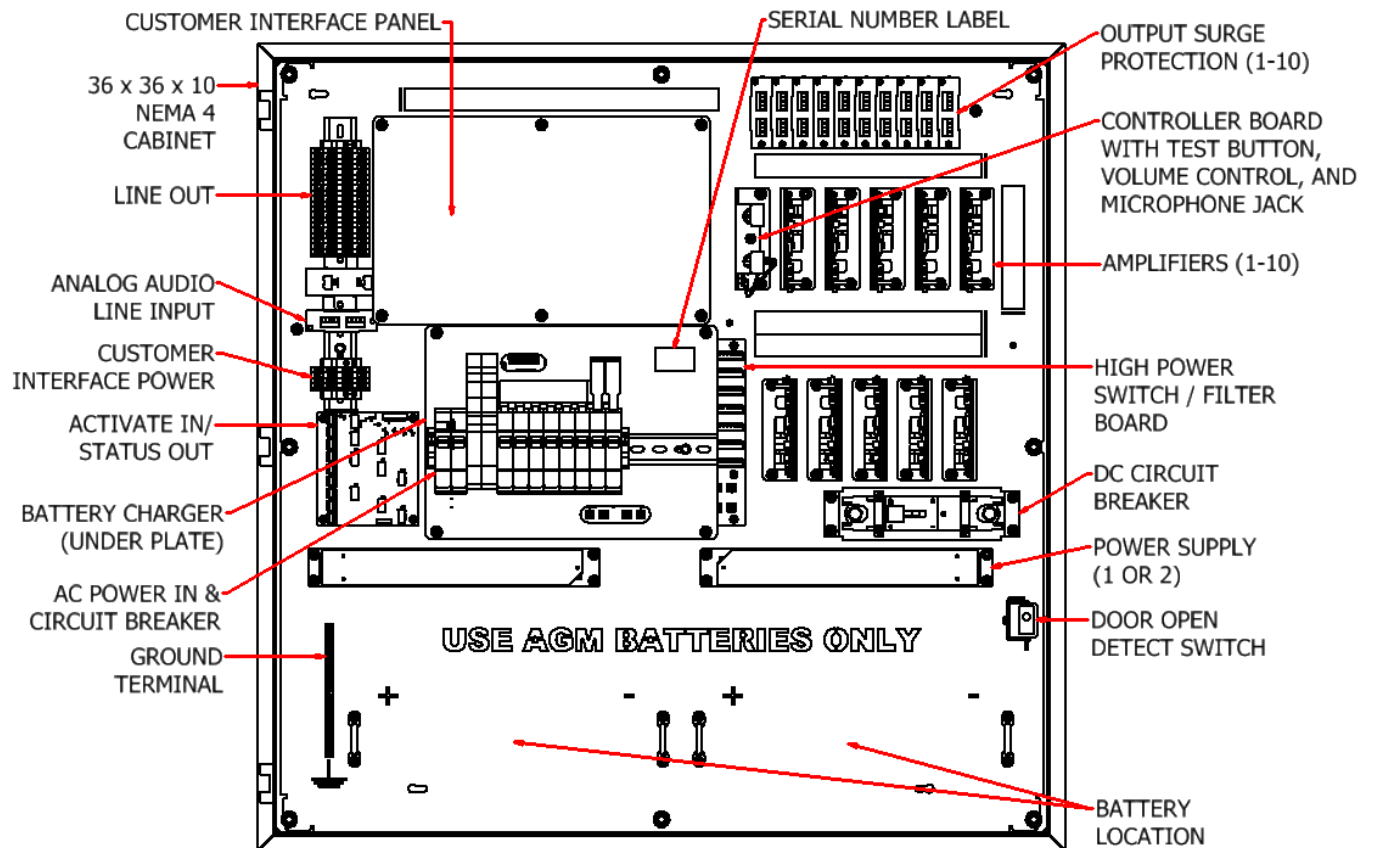


Figure 2 – Internal Cabinet Detail

## 1.6. Specifications

**Table 1 – Specifications**

<b>Dimensions</b>	36"W x 36"H x 12"D
<b>Enclosure</b>	NEMA 4 (NEMA 4X optional)
<b>Weight without Batteries</b>	155 lbs (for NEMA 4 90240A-808)
<b>Temperature Range</b>	-20°C to 60°C <sup>1</sup>
<b>Compatible Speakers</b>	HyperSpike® MA-Micro, Multi-channel MA-1 and Multi-channel MA-2
<b>Self-Protection</b>	Automatic Independent Thermal Foldback for each Output Channel <sup>4</sup> ; Automatic Total Output Power Limiting <sup>1,2,3</sup> ; Line-in, Activate, and Status Isolation; Line-in and Output Transient Suppression; AC Surge Suppression; Circuit Breakers and Fuses
<b>Line-in Isolation</b>	> 250 V
<b>Activate and Status Dry Contact Isolation</b>	> 1 KV
<b>Line-in Transient Suppression</b>	5 A at 9 V
<b>Output Transient Suppression</b>	10 A at 65 V
<b>AC Input Voltage</b>	110 – 240 VAC <sup>2</sup>
<b>AC Input Current (max)</b>	30 A
<b>AC Efficiency (max)</b>	80%
<b>Battery Backup Voltage</b>	24 VDC nominal (20.3 – 29.4 VDC) <sup>3</sup>
<b>Battery Backup Current (max)</b>	180 A
<b>Battery Backup Efficiency (max)</b>	85%
<b>Customer Power Voltage</b>	19.5 – 29.4 VDC
<b>Customer Power Current (max)</b>	2 A
<b>Output Voltage (max)</b>	40 VAC <sup>4</sup>
<b>Output Voltage (peak)</b>	60 V
<b>Output Power (average)</b>	320 W/channel
<b>Output Power (peak)</b>	640 W/channel
<b>Line-in Voltage</b>	1 Vrms (25/70/100 Vrms service kit available)
<b>Line-in Input Impedance</b>	> 10 kΩ
<b>Activate Voltage (min)</b>	20 VDC
<b>Activate Voltage (max)</b>	30 VDC
<b>Activate Current (nom)</b>	10 mADC
<b>Test Tone</b>	1 kHz
<b>Output Bandwidth</b>	EQ specific to the speaker-configuration ordered Nominally 150 Hz – 8 kHz

<sup>1</sup>Total Output Power Limited for >50° C internal case temperature

<sup>2</sup>Total Output Power Limited for 110-200 VAC input

<sup>3</sup>Total Output Power Limited for 20.3-21.5 VDC input (and no AC present)

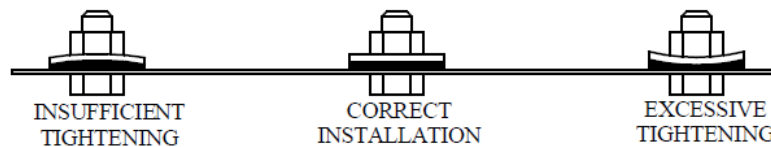
<sup>4</sup>Individual Channel Output Voltage Limited for >70°C amplifier internal temperature

## 2. Mounting the Encompass Cabinet

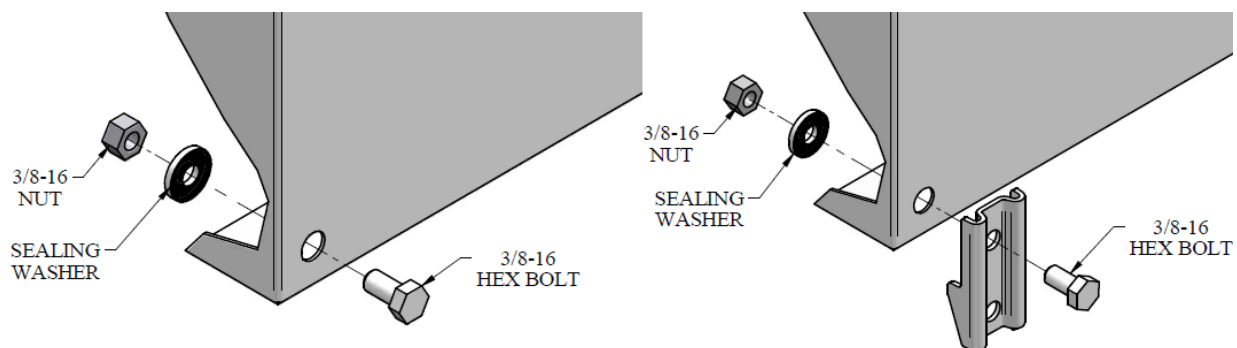
Optional floor mount, wall mount and pole mount accessories are available for the Encompass cabinet.

### 2.1. Sealing the Cabinet

For outdoor installations, the Encompass cabinet mounting systems will require existing holes to be covered with the seal washers that come with the cabinet or that come with the mount kits. It is important that the washer be installed correctly to achieve a proper seal. The washer should be installed on the inside of the cabinet with the rubber side against the enclosure and tightened until it is flat.



**Figure 3 – Correct Seal Washer Installation**



**Figure 4 – Examples of Correct Mounting Hardware Assembly**

Any additional holes or openings created during installation of conduit and other hardware must be sealed appropriately and in accordance with local codes in order to maintain a NEMA environmental rating.

### 2.2. Location

The Encompass system will self-protect if the temperature inside the cabinet gets too high. It does this by reducing the power output. Messages will still be transmitted, but the effective coverage area may be reduced. The Encompass cabinet will perform best if located inside a climate-controlled building. If the cabinet must be located outside, a location out of direct sunlight is recommended. Cold temperatures may negatively affect battery run time.



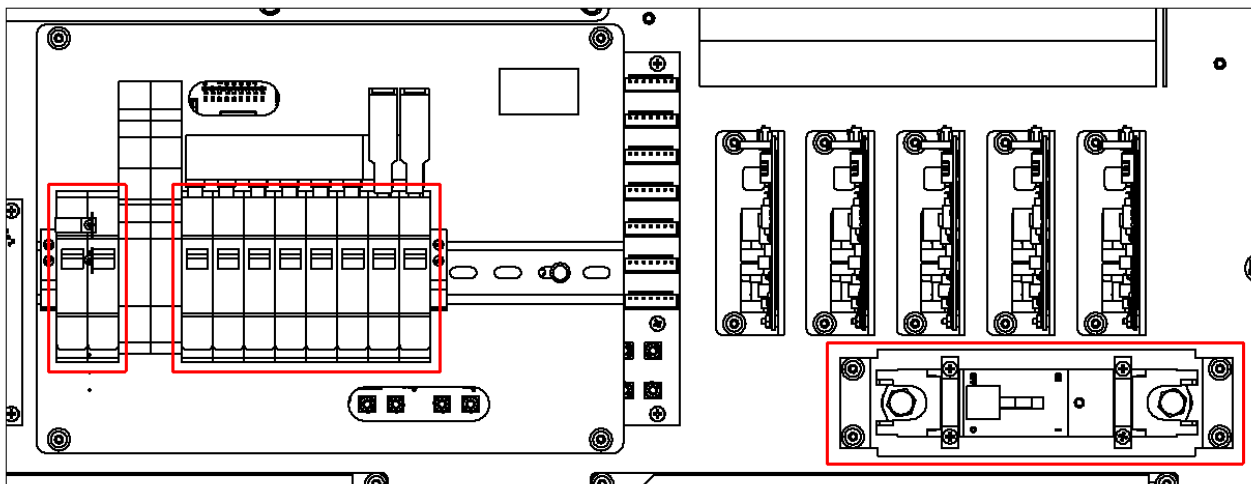
### 3. Making Connections

The Encompass Cabinet was configured such that connections are made through the left side of the cabinet. Although connection could be made in other locations, appropriate space and wire routing mechanisms are not provided when routing into other locations. **It is highly recommended that connections are made on the left side.**



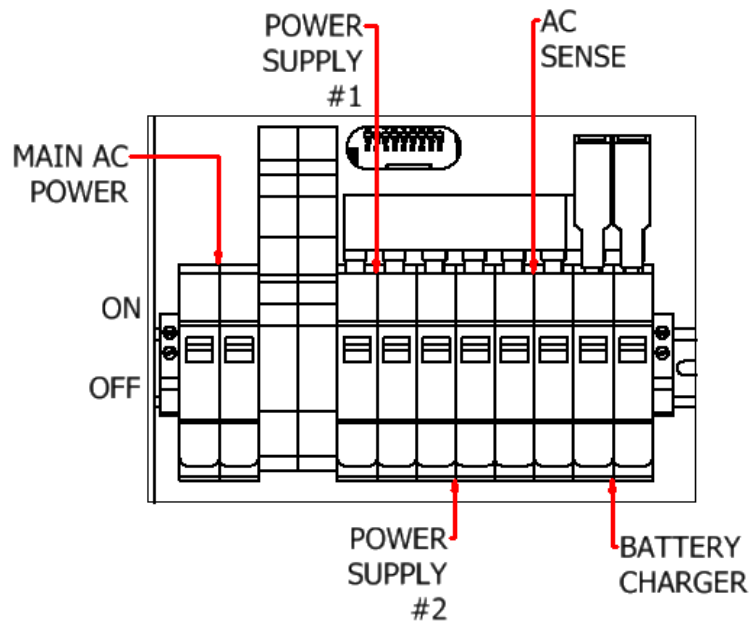
**CAUTION: WHEN MAKING OUTSIDE CONNECTIONS, ENSURE PROPER PROTECTION AND DAMAGE PREVENTION ACTIONS ARE TAKEN TO AVOID IMPACTING INTERNAL COMPONENTS. TOOLS MAKING INADVERTENT IMPACT WITH INTERNAL COMPONENT OR METAL SHAVINGS COULD RESULT IN FUNCTIONAL ISSUES VOID OF PRODUCT WARRANTY.**

#### 3.1. Circuit Breakers

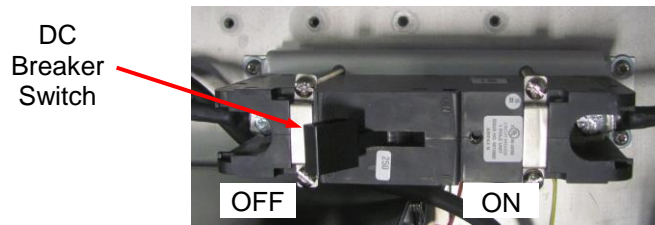


**Figure 5 – Circuit Breaker Locations**

Before making any connections, become familiar with the installed circuit breakers and disengage all of them.

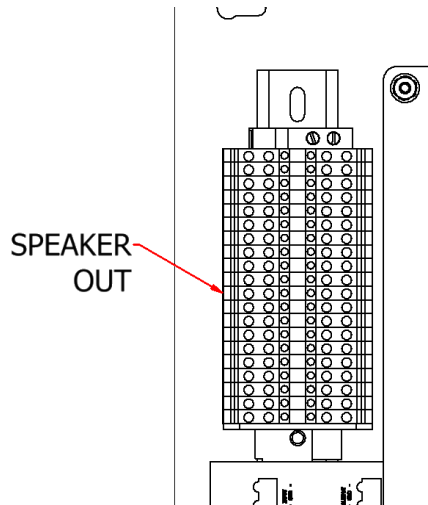
**Figure 6 – AC Circuit Breakers**

**Note:** The breaker for Power Supply #2 will be installed even if your cabinet only has one power supply.

**Figure 7 – DC Circuit Breaker**

### 3.2. Connecting HyperSpike® Speakers

**Note:** If you would like to test the cabinet without sounding the emitter, skip this section and do not connect emitter at this time. After powering on cabinet and testing amplifier outputs, power down cabinet and return to this section for proper emitter head wiring.



**Figure 8 – Speaker Terminal Block**

The Encompass cabinet comes pre-configured to connect with a specific HyperSpike® mass notification speaker. The table below indicates which Encompass system is designed to power each speaker type.



**IMPORTANT: BEFORE INSTALLING THE CABINET AND EMITTER, ENSURE THE PART NUMBER OF THE ENCOMPASS CABINET MATCHES THE SPEAKER SYSTEM IT IS BEING CONNECTED TO. THIS WILL ENSURE OPTIMAL SYSTEM PERFORMANCE AND RELIABILITY.**

**Table 2 – Speaker and Encompass System Combinations**

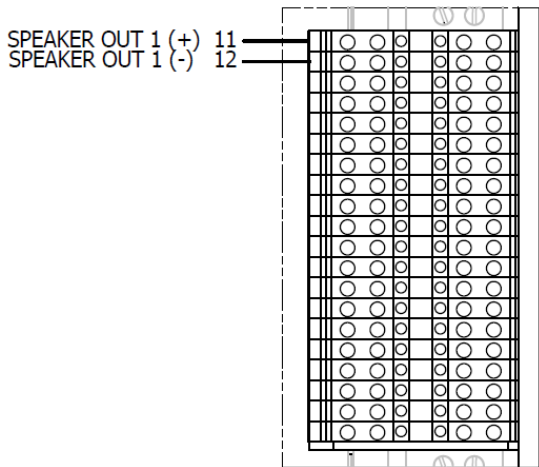
Encompass Part Number	HyperSpike® Speaker System	
90240A-801	MA-Micro	90145A-801
90240A-802	MA-1 1-Sided	90223A-804
90240A-803	MA-1 2-Sided	90223A-803
	MA-2 1-Sided	90224A-804
90240A-804	MA-1 3-Sided	90223A-802
90240A-805	MA-1 5-Sided	90223A-801
90240A-806	MA-2 2-Sided	90224A-803
90240A-807	MA-2 3-Sided	90224A-802
90240A-808	MA-2 5-Sided	90224A-801

**Note:** Only multi-channel MA-1 and MA-2 systems are supported.

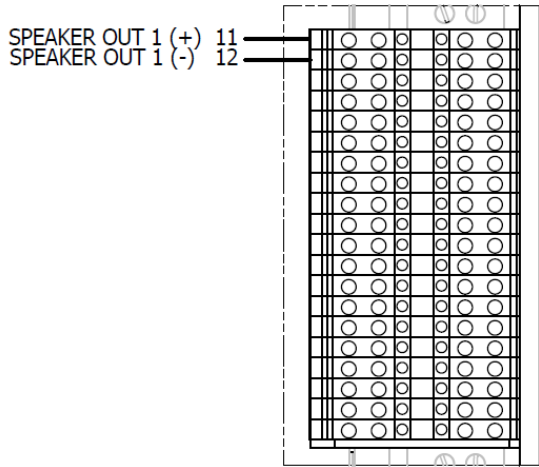
All cabinets have 10 pair of speaker output terminal blocks identified with numbers 11 through 30. The terminal blocks are present in all systems, but not all are active. The following diagrams show which terminal blocks to use for each system. The terminal blocks will accept wire gauge 22 to 10 AWG.



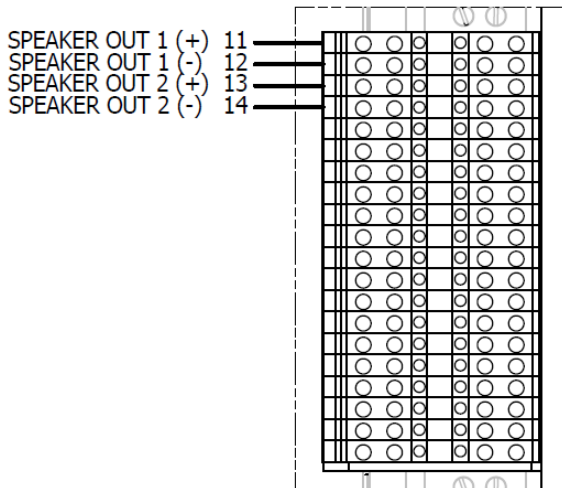
**IMPORTANT: ENSURE WIRES ARE INSTALLED WITH PROPER POLARITY:  
RED = POSITIVE, BLACK = NEGATIVE. IMPROPER POLARITY BETWEEN  
VARIOUS CHANNELS WILL NEGATIVELY IMPACT SPEAKER PERFORMANCE.**



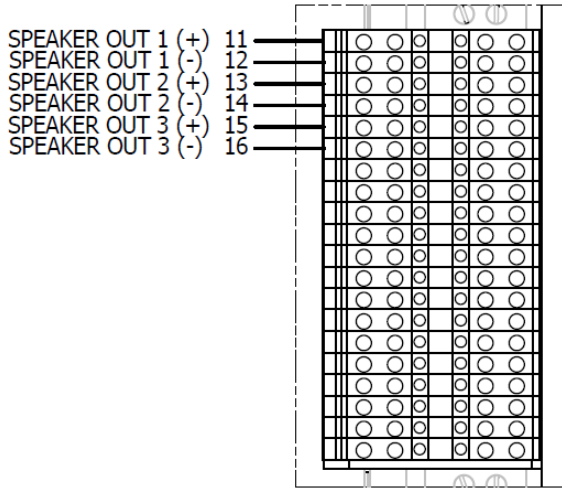
SPEAKER OUT  
90240A-801  
MA-MICRO



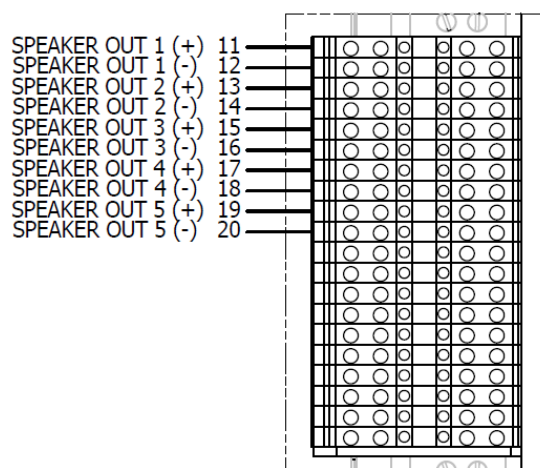
SPEAKER OUT  
90240A-802  
1 SIDED MA-1



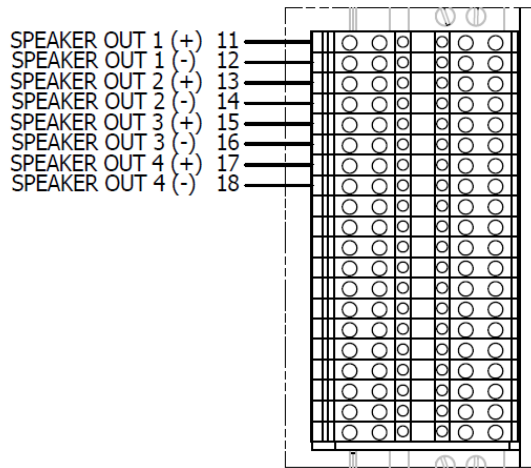
SPEAKER OUT  
90240A-803  
2 SIDED MA-1 / 1 SIDED MA-2



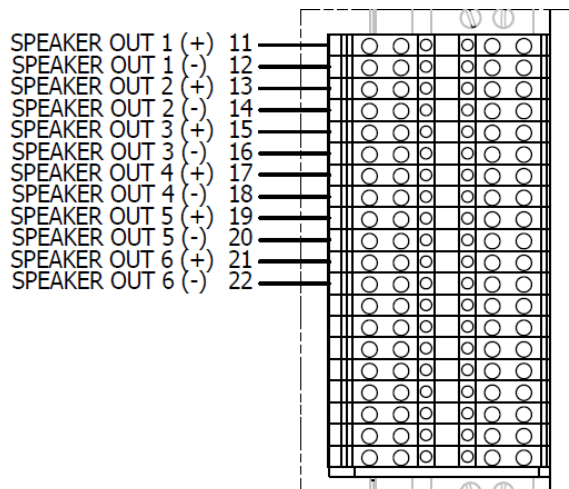
SPEAKER OUT  
90240A-804  
3 SIDED MA-2



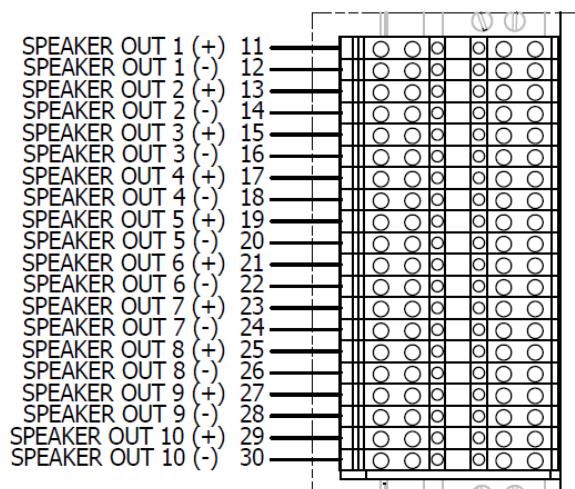
SPEAKER OUT  
90240A-805  
5 SIDED MA-1



SPEAKER OUT  
90240A-806  
2 SIDED MA-2



SPEAKER OUT  
90240A-807  
3 SIDED MA-2



SPEAKER OUT  
90240A-808  
5 SIDED MA-2

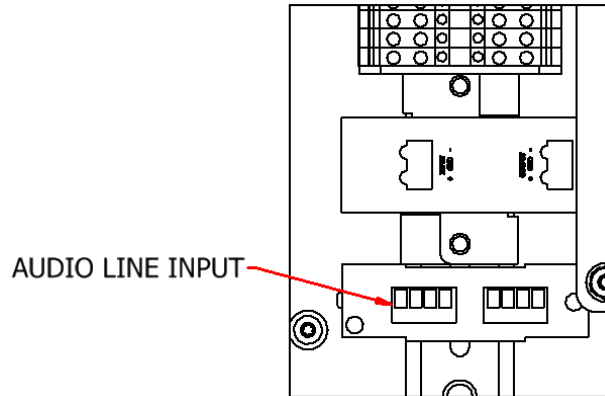
Table 3 provides recommended maximum wire lengths for a given wire gauge. Although multiple wire lengths are shown, a maximum of 1 dB loss is highly recommended in order to maintain maximum system performance.

**Table 3 – SPL Loss vs. Speaker Wire Length**

SPL Loss (dB):	0.5	1	1.5	2	2.5	3
Wire Gauge (AWG)	Max Wire Length (ft)					
16	50	100	150	200	275	350
14	75	150	250	350	450	**500
12	125	250	400	**500	**500	**500
10	200	400	**500	**500	**500	**500

\*\*Wire runs longer than 500 ft are not recommended.

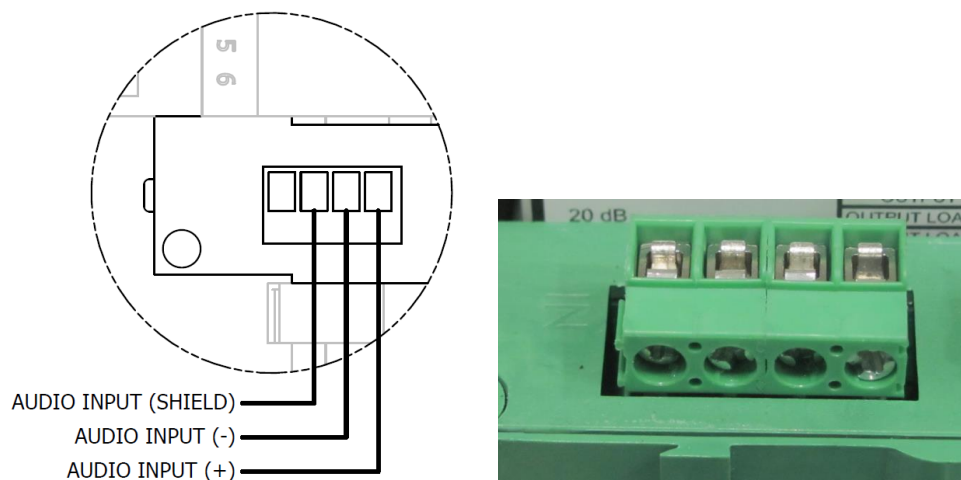
### 3.3. Connecting Audio Line Input

**Figure 9 – Line Input Connection**

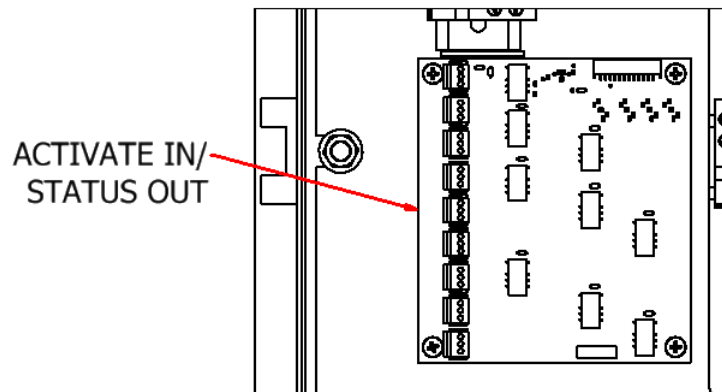
The cable carrying a mono input signal should be a shielded, two-conductor cable with 18-22 AWG wire. Connect this cable to the input surge protector according to the diagram below.



**IMPORTANT: LINE LEVEL AUDIO-IN SHOULD BE BETWEEN 250mVRMS AND 1 VRMS FOR OPTIMAL PERFORMANCE (2 V-pk maximum).**

**Figure 10 – Audio Line Input Wiring**

### 3.4. System Activate and Monitoring



**Figure 11 – System Activate and Monitoring**

The Activation Input allows the system to enable. Once the system is enabled, it will accept the line level input and broadcast it from the speaker output. Without a 24 V activation signal, the system will not activate from a line-input signal. This prevents unwanted electrical noise from the audio line input wire from being broadcast during times of inactivity.

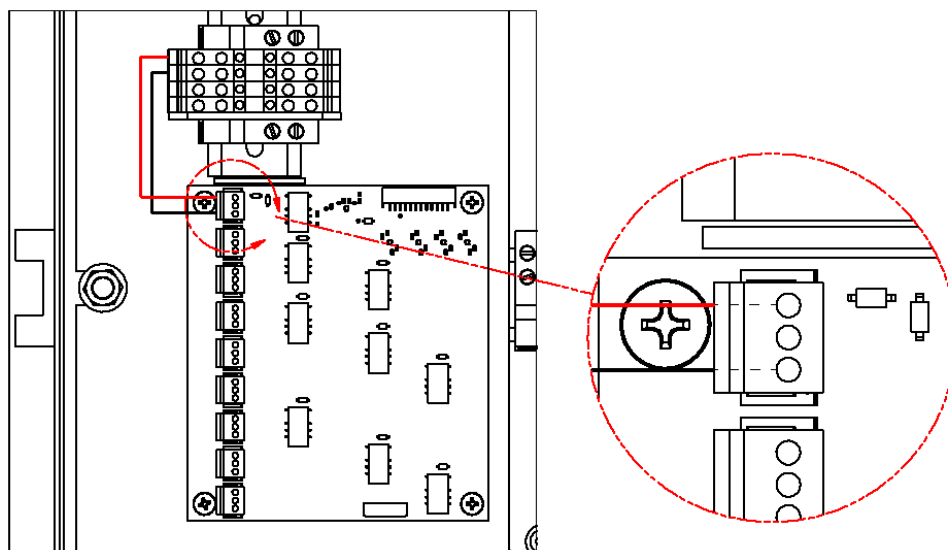


**IMPORTANT: THE CABINET REQUIRES A 24DC ACTIVATION SIGNAL TO ENABLE THE SYSTEM TO ACCEPT THE AUDIO INPUT.**

If an external activate input is not available, the 24V auxiliary power can be used to permanently enable the system as shown in Figure 12.

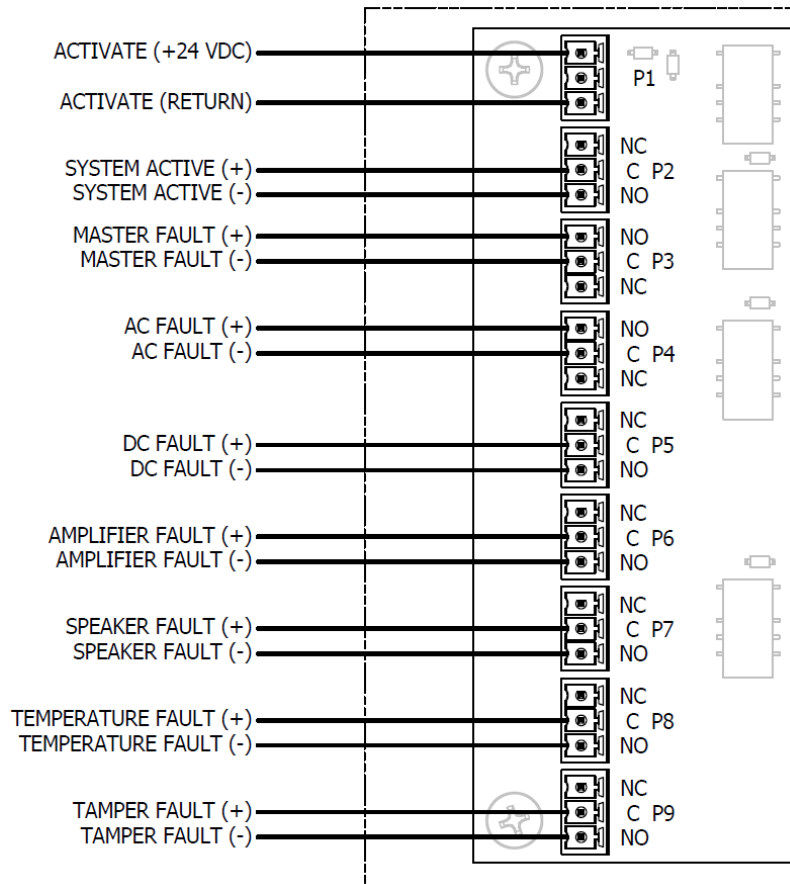


**IMPORTANT: PERMANENTLY ENABLING THE AUDIO INPUT MAY RESULT IN ELECTRICAL NOISE BEING BROADCAST. ENSURE INPUT WIRING IS PROPERLY SHIELDED AND EXTERNAL SOURCES DO NOT SUPPLY UNINTENDED NOISE.**



**Figure 12 – Activate Alternate Wiring**

The Encompass cabinet is equipped with form C output dry contacts for monitoring system status. Connect the relays according to Figure 13 using 18-22 AWG wire. Connectors come pre-installed but can be removed to aid in the wiring process.



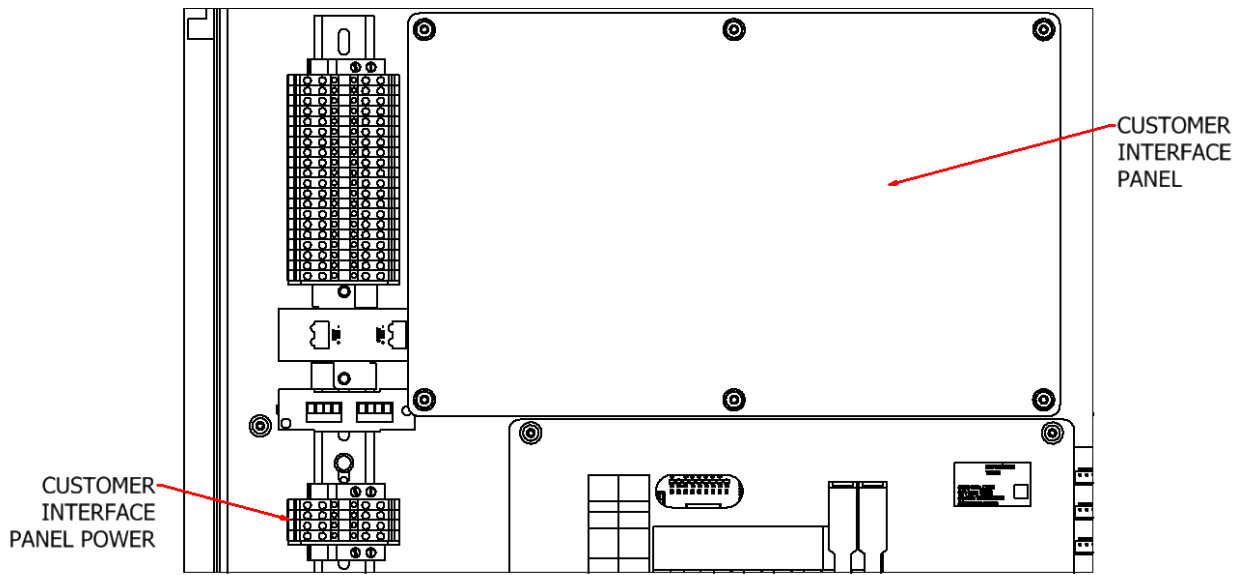
**Figure 13 – Dry Contact Connections**

A description of each relay connection can be found in Table 6. All contacts are outputs with the exception of the Activate input. Wiring as shown in Figure 13 will provide open circuits when the system is in a normal state (no faults). If short-circuits are desired for normal operation, each circuit should be wired between the “C” and “NC” outputs.

Refer to Section 5 for more details about fault conditions.



### 3.5. Customer Interface Panel



**Figure 14 – Customer Interface Panel Location**

A 15 X 9 ¼ inch user interface panel is provided for user-installed components such as communication equipment, audio over Ethernet devices, monitoring systems, etc. Components that are mounted to the user interface panel must be less than 5" tall.



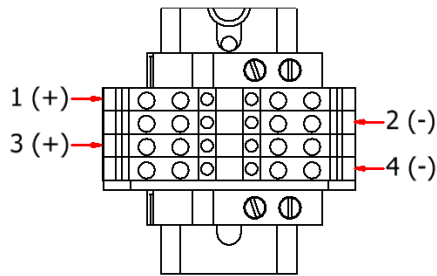
**IMPORTANT: REMOVE THE PANEL FROM THE CABINET BEFORE MODIFYING TO AVOID DAMAGE TO OTHER INTERNAL COMPONENTS AND PREVENT METAL SHAVINGS INSIDE THE CABINET THAT COULD DAMAGE AND SHORT INTERNAL ELECTRONICS.**

When removing or installing the user interface panel, hold the standoffs with a wrench to prevent them from turning. When tightening the nuts, apply no more than 19 in-lb torque.

Two terminal blocks located as shown in the lower right of Figure 14 are available to provide power to user equipment. Refer to Section 1.6 for voltage range and allowable current.



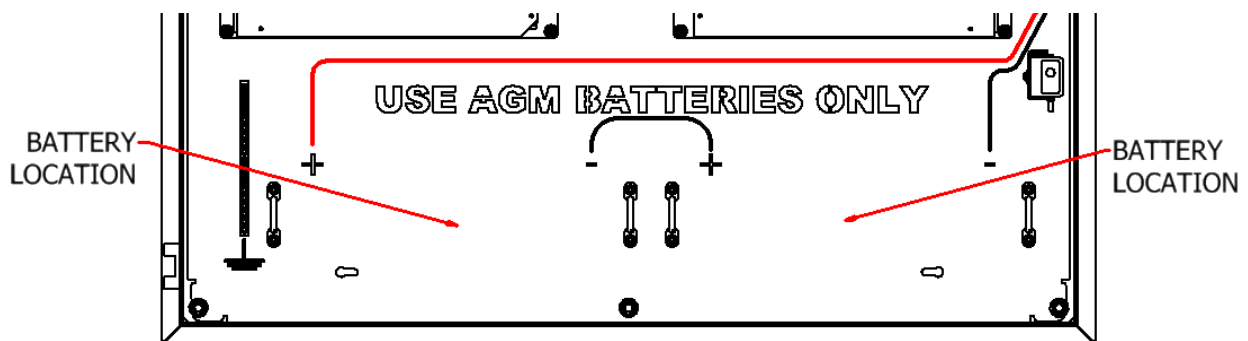
**IMPORTANT: USER-SUPPLIED INPUT/CONTROL DEVICES MUST BE POWERED OFF OF 24V DC IN ORDER TO FUNCTION IN THE EVENT AC POWER IS LOST.**



**Figure 15 – Customer Interface Panel Power Connections (Nominal 24VDC)**

### 3.6. Batteries

The backup batteries in the Encompass System are stored in the bottom of the cabinet as shown below. In the event of a power failure, the Encompass cabinet will seamlessly switch to DC power if it is available. The DC power comes from two user-supplied AGM (Absorbent Glass Mat) batteries. AGM batteries do not vent like lead acid batteries and are more tolerant to high temperatures.



**Figure 16 – Battery Backup Location**

#### 3.6.1. Battery Selection



**IMPORTANT: ONLY INSTALL AGM BATTERIES IN THE ENCOMPASS CABINET.**

The maximum battery size, including terminal bolts, is 12.9 W x 10.0 H x 7.6 D (inches). The terminal bolts must be size M10 (Ø.394) or smaller. If your preferred battery is handed, choose the hand that has the positive (+) terminal on the left when the terminals are closest to you.

When choosing a battery, select a 12 Volt, deep cycle, AGM with the highest capacity that does not exceed the maximum dimensions. If the cabinet will be exposed to low temperatures, select one where the capacity does not significantly drop in cold temperatures. Do not mix batteries from different manufacturers or with differing capacities. The list below shows some suggestions as of the time of this writing.

**Table 4 – Suggested AGM Batteries**

Manufacturer	Part Number
Trojan Battery Company	24-AGM
Lifeline	GPL-24T
Centennial	CB12-105
Centennial	CB12-115

### 3.6.2. Battery Sizing Equations

If the required runtime of the system while on battery backup is known, the following equations can be used to determine the minimum AH capacity ( $C_{Min}$ ) of each battery installed in the Encompass cabinet. First, determine the necessary runtime in Hours of the system while in each mode of operation – Standby ( $H_S$ ), Playing Tone ( $H_T$ ), and Playing Voice ( $H_V$ ).

Using the following equations, and the corresponding variable from the table, determine the energy required in each state.

$$E_S = (1.4 + S) \times H_S$$

$$E_T = (1.4 + T) \times H_T$$

$$E_V = (1.4 + V) \times H_V$$

**Table 5 – Battery Capacity Chart**

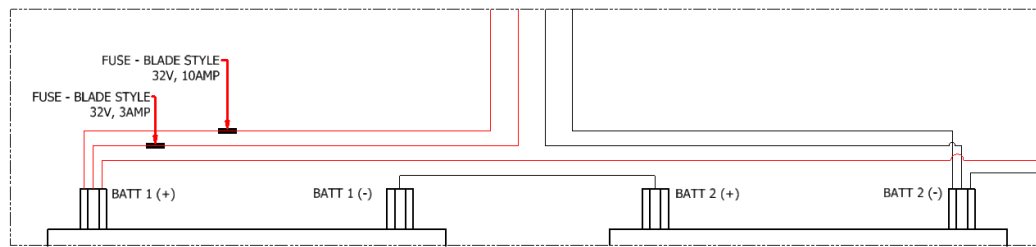
USSI Part Number	S	T	V
90240A-801	1.7	286	71
90240A-802	1.7	286	71
90240A-803	3.4	572	142
90240A-804	5.1	858	213
90240A-805	8.5	1430	355
90240A-806	6.8	1144	284
90240A-807	10.2	1716	426
90240A-808	17	2860	710

Finally, use the following equation to determine the minimum capacity of each battery.

$$C_{Min} = \frac{E_S + E_T + E_V}{24}$$

### 3.6.3. Connecting the Batteries

Before making terminal connections, strap each battery into position in the bottom of the cabinet using the straps provided. Batteries should be installed with the terminals nearest to the door.



**Figure 17 – Battery Connections**

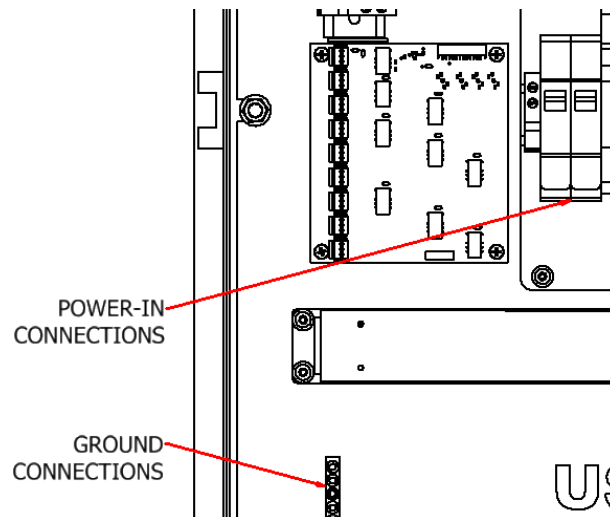
Carefully make the battery connections as shown above with the 8 AWG cables provided.

The positive (+) battery charger wire and positive (+) battery sense lead have in-line blade fuses. Connect these two 18 AWG wires and the 4 AWG red battery power cable to the left battery's positive (+) terminal.

Connect the short 4 AWG battery power cable from the left battery's negative (-) terminal to the right battery's positive (+) terminal.

Connect the 18 AWG black battery charger negative (-) wire, 18 AWG black battery sense negative (-) wire, and 4 AWG black battery power cable to the right battery's negative (-) terminal.

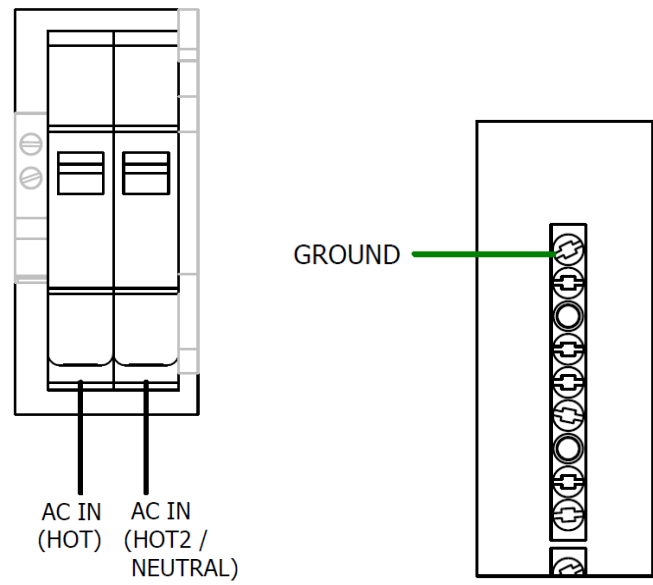
### 3.7. Connecting AC Power and Ground



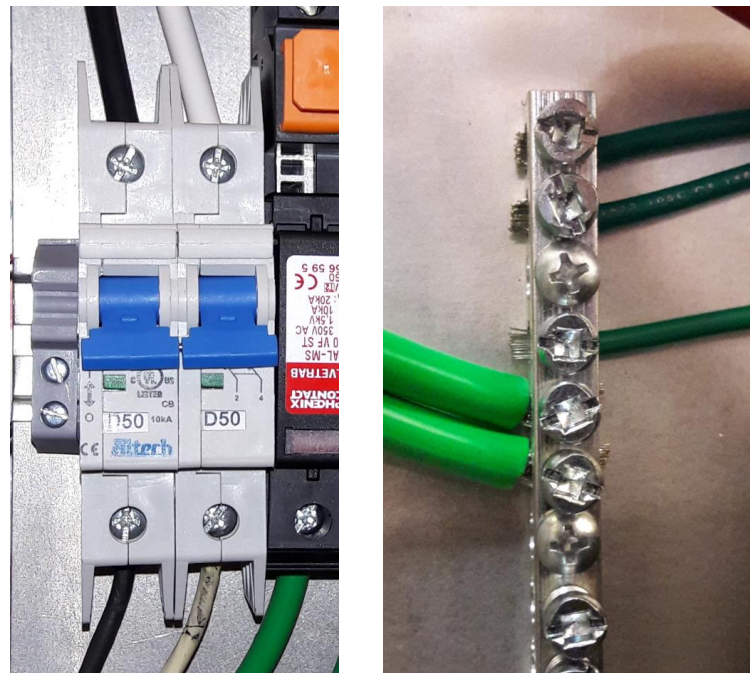
**Figure 18 – AC Power Locations**

Run conduit from the AC power source to the left side of the Encompass cabinet. Conduit should never enter through the top of the cabinet.

The Encompass System will operate on 120-240 VAC (50/60 Hz). It is recommended to use the highest voltage available within this range. This will guarantee maximum power output from the system. The breakers and ground bar will accept wire from 4 to 14 AWG.



**Figure 19 – AC Power Wiring**



**Figure 20 – AC Power Wiring Photos**

## 4. Commissioning

### 4.1. Post Installation System Check

1. Check to ensure all wiring connections are secure:
  - a. AC input wiring
  - b. Battery wiring
  - c. Audio input wiring
  - d. I/O control and monitoring wiring
  - e. Speaker wiring (check polarity of each speaker connection)
2. If installed, check wiring to customer power terminal blocks.
3. Play full-scale 1 kHz tone from audio source and verify voltage into cabinet meets specification (250 mVRMS-1 VRMS).

### 4.2. Power-up Sequence

1. Pull door tamper switch outward, into service position.
2. Ensure feeder circuit power is enabled.
3. Turn on AC breaker. Ensure power supply fans turn on.
4. Turn on DC breaker.
5. As system initializes, amplifiers will power up in sequence. Full system initialization may take up to 2 minutes.
6. Once system has fully initialized, all fault LEDs should extinguish. Refer to Section 3.4 for clarification of fault LEDs.
7. To verify battery operation, turn off main AC breaker. Wait for power supply fans to completely disable and verify that system is still running. Fault LEDs should indicate “AC FAULT” and “MASTER FAULT”.

### 4.3. Amplifier Output Verification/Adjustment

If cabinet is to be tested without emitter, ensure speaker wires are disconnected before proceeding.

1. Turn volume knob fully clockwise.
2. Depress push-to-test button and measure output of each amplifier channel.
3. Outputs for MA-Micro emitters should measure 31 VRMS +/- 3 VRMS.

4. Outputs for MA-1 and MA-2 emitters should measure 40 VRMS +/- 4 VRMS.
5. The volume knob can be adjusted to turn the output level down if desired. The reduction in output SPL can be calculated using the following formula:  $\text{dB reduction} = 20 \times \text{Log}(\text{Set Volume Voltage} / \text{Full Volume Voltage})$ . Setting the volume knob to the 9 o'clock position (approximate knob midpoint) will set the output to approximately 12 dB down from full power.

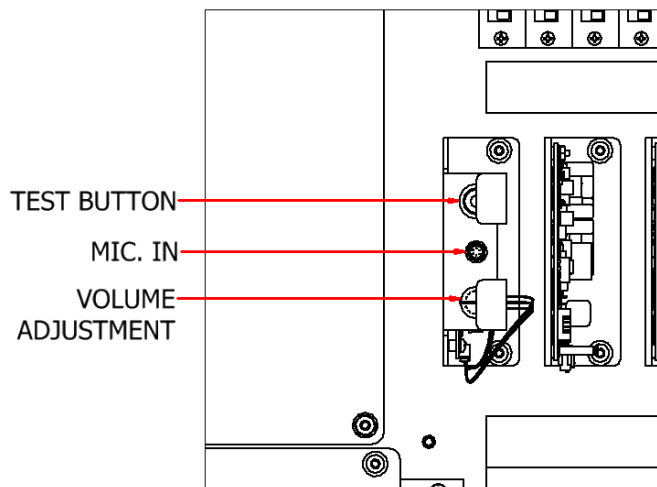
Turn off main AC and DC breakers. Wait until system is fully powered down (all LEDs inside cabinet will extinguish). Hook up speaker wires to terminal blocks per Section 3.3. Follow power-up sequence to bring system back online.

#### 4.4. Testing and Adjusting



#### **CAUTION: SOUND LEVEL CAN EXCEED 120 dBA.**

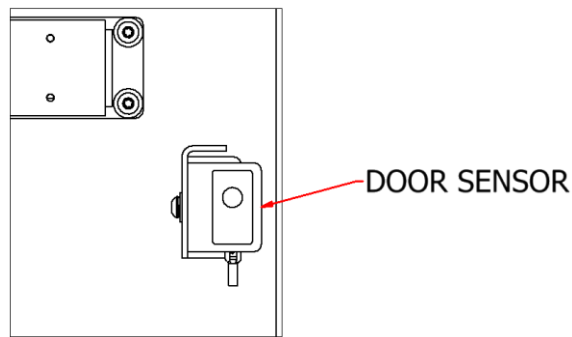
A push-to-test (PTT) button and a microphone input are provided in the Encompass cabinet to allow for system testing independent of other audio input devices. The push-to-test button outputs a 1 KHz sinusoidal tone. The microphone input can be utilized by purchasing a separate microphone kit. The microphone functions in a record and playback mode to avoid feedback if directly below the cabinet. The system will record audio from the microphone while its PTT is being depressed. Upon release, the amplifiers will enable and the message will be played back.



**Figure 21 – Test Button and Volume Adjustment**

The volume knob is intended to allow installers to adjust the output level during installation and also to limit the overall output to less than full power if desired.

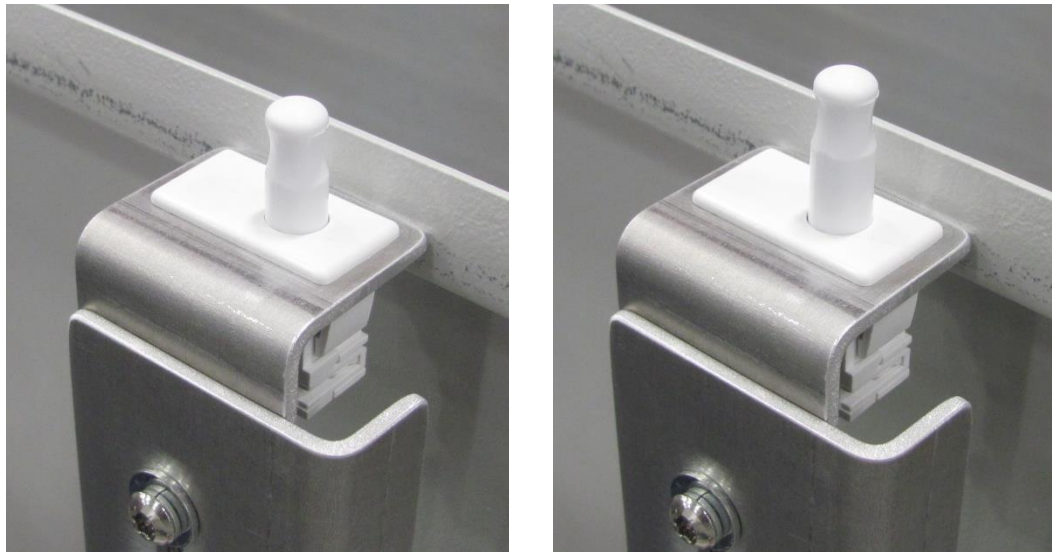
## 4.5. Door Sensor Switch



**Figure 22 – Door Sensor**

The door sensor switch is used for controlling the Tamper Fault indicator relay. When the door is opened, the switch plunger extends and triggers the tamper fault.

The switch has a Service position which allows the door to remain open without triggering the fault. Pulling the switch plunger out until it stops will put the switch into Service Mode. Closing the door will retract the plunger and take the sensor out of Service Mode.



**Figure 23 – Door Sensor Plunger Positions – Standard (Left), Service (Right)**



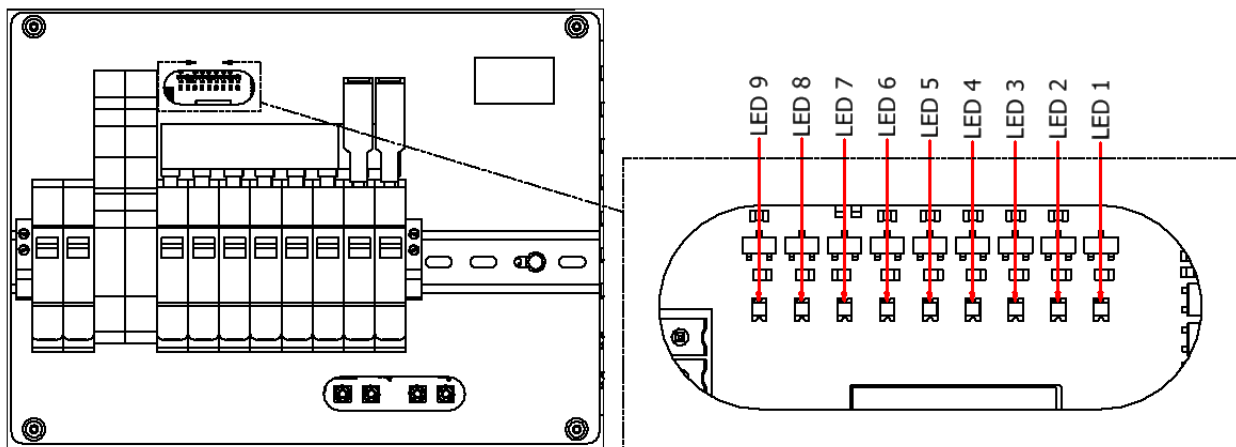
## 5. Health and Status Monitoring

**Note:** AC Fault and Master Fault will indicate faults even if the cabinet is de-energized. This ensures that a total system failure will indicate these faults at a minimum.

**Table 6 – Fault Descriptions**

Operation	ID	Description
<b>Activate (Input)</b>	P1	Apply +24 VDC to activate the system. The test button will function without this being active.
<b>System Activated</b>	P2	Contact closure indicates that the activate input has been recognized as active by the system.
<b>Master Fault</b>	P3	This indicates that one or more of the following faults is active.
<b>AC Fault</b>	P4	Indicates an AC failure. This could indicate a lack of AC supply voltage, or the malfunction of one of the power supplies.
<b>DC Fault</b>	P5	Indicates a DC failure. This could indicate a lack of DC supply voltage or a system fault on the internal DC bus.
<b>Amplifier Fault</b>	P6	Indicates that one of the amplifiers is not functioning properly. The faulted amplifier will have a red LED lit.
<b>Speaker Fault</b>	P7	Indicates that one of the speakers or its associated wiring is not functioning properly. The amplifier indicating a faulted speaker connection will have a red LED lit.
<b>Temperature Fault</b>	P8	Indicates that the internal temperature of the cabinet is outside of its safe operating range. The cabinet may still operate but at a reduced output level.
<b>Tamper Fault</b>	P9	Indicates that the door is open.

### 5.1. Power/Switch Board Status



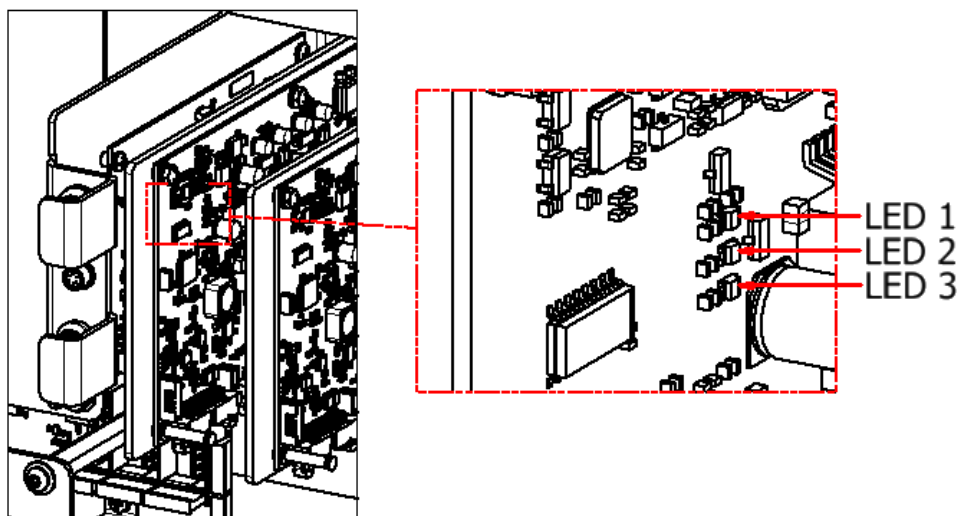
**Figure 24 – Power/Switch Board Status LEDs**

The Power/Switch circuit board has 9 red status LEDs. These LEDs provide information about the system's status.

**Table 7 – Power/Switch Board LED Mapping to Faults**

LED Number	Indicates
1	AC Fault
2	Battery Fault
3	Amp Fault
4	Temperature Fault
5	Tamper Fault
6	Speaker Fault
7	Activation Input Signal Present
8	Master Fault
9	System Active

## 5.2. Amplifier Status

**Figure 25 – Amplifier Status LEDs**

Each amplifier circuit board has 3 status LEDs. If an amplifier fault exists or you suspect an amplifier problem, check the LEDs.

**Table 8 – Amplifier Status LED Definitions**

LED Number	Color	Indicates
1	Green	Enable – The amplifier circuit is enabled.
2	Red	Fault – There is an amplifier system or speaker fault.
3	Green	Power – The circuit board is powered on.

When the system is functioning properly and idle, the green power LED should be illuminated. When the amplifiers are active, the Enable LED will also illuminate. If the red LED is illuminated, there is a fault within the amplifier or speaker.

## 6. Maintenance and Troubleshooting Guide

### 6.1. Recommended Maintenance

On a regular basis, check the system:

- Check cabinet for vandalism or natural damage.
- If an outdoor application, verify that all seals are in place.
- Check speaker wiring for frays, cuts, and kinking.
- Perform an operational test.
- For batteries, follow the battery manufacturer's maintenance schedule.

### 6.2. Wiring Diagram

A printed copy of the Encompass wiring diagram is located in the door pocket of the cabinet. The wiring diagram is also shown on the next page.

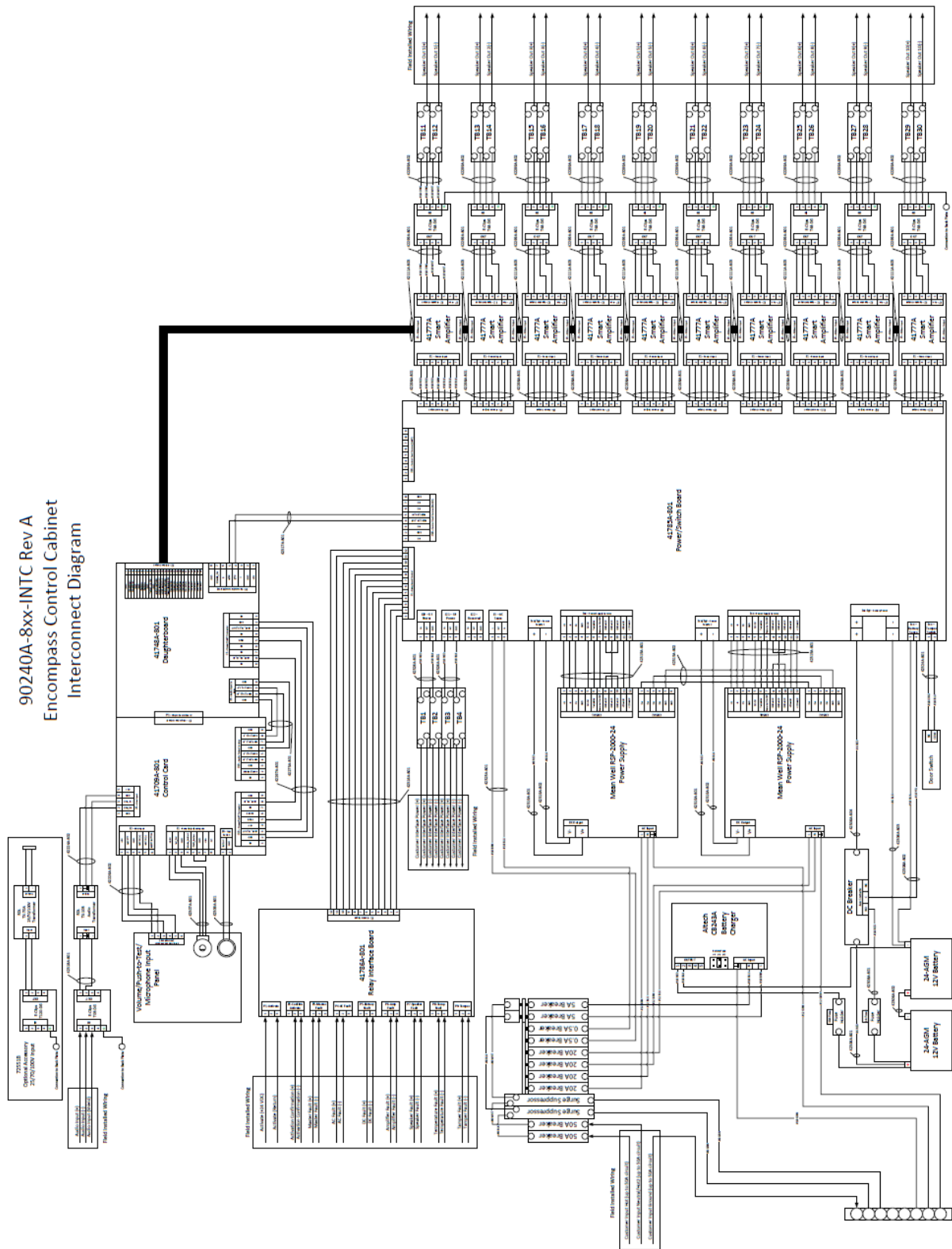


Figure 26 – Wiring Diagram

### 6.3. Troubleshooting Guide

Diagnose problems with the Encompass cabinet with the following table. Find the effect being experienced in the left-most column and eliminate possible causes using the troubleshooting steps. Start at the top of the list of possible causes for the effect being observed and move down. If the problem is not listed below or persists after following the instructions listed below, contact your dealer or service center.

For accurate and expedient customer service, please have the following information readily available when contacting Ultra Electronics – USSI: Model Number, Serial Number, and Purchase Date for both the cabinet and the speaker. The cabinet model and serial number can be found on the label that is attached to the breaker plate inside the cabinet and all this information can be recorded at the beginning of this manual.

**Table 9 – Troubleshooting Guide**

Observed Effect	Possible Cause	Troubleshooting Steps
No Output	Volume at minimum	Verify system output while increasing the volume while the test tone button is pressed.
	Record-Play microphone connected and PTT is depressed	Verify the problem still exists with the microphone disconnected.
	AC Fault	Verify an AC Fault is present. See AC Fault to troubleshoot.
	DC Fault	Verify a DC Fault is present. See DC Fault to troubleshoot.
	Temp Fault	Verify a Temperature Fault is present. See Temp Fault to troubleshoot.
	Amp Fault	Verify an Amp Fault is present. See Amp Fault to troubleshoot.
	Speaker Fault	Verify a Speaker Fault is present. See Speaker Fault to troubleshoot.
	Activate signal not active	Verify voltage at P1 connection is within activation range and has correct polarity
	Relay board not powered	Verify the cable between the relay board and switch board is connected. Verify relay board fuse intact. Verify customer power fuse intact (if used for activation signal).
	Line-in signal of insufficient voltage	Verify AC voltage across input to transient suppressor greater than 250mVrms.
	Line-in signal stereo	Verify AC voltage across input to transient suppressor greater than 250mVrms.
	Line Input Transient protection fuse blown	Verify AC voltage across the output of the line-in transient suppressor is within 100mV of the voltage across its input and is greater than 250mVrms. If voltage is present at the input to the transient suppressor but is not at its output, the transient suppressor is faulty. Contact HyperSpike® Customer Service to obtain a replacement line-in transient suppressor.
	Speaker Output Transient protection fuse(s) blown	For each speaker output transient suppressor, verify AC voltage across its output is within 100mV as that across its input. If voltage is present at the input to a transient suppressor but is not at its output, that transient suppressor is faulty. Contact HyperSpike® Customer Service to obtain a replacement speaker output transient suppressor.

Observed Effect	Possible Cause	Troubleshooting Steps
	Faulty activate relay	1. Verify Activate LED on switch board lights when activated 2. If the activation signal voltage and polarity is correct and the relay board cable is connected but the Activate LED still does not light when the activate signal is active, the Activate relay may be faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board. 3. Verify Confirm Activate LED on switch board lights or Confirm Activate Signal is transmitted when activated. If not, contact HyperSpike® Technical Support for further troubleshooting steps.
	Battery power terminals loose/disconnected	Verify neither the battery power nor the sense leads have intermittent, corroded, or otherwise poor connection to the batteries.
Reduced Speaker Output/Cuts Out in Loud Portions of Audio	AC Fault	In a system with 2 power supplies, loss of one will cause an AC Fault only if both power supply data cables remain connected to the switch board. In such an AC Fault the system will continue to operate with reduced performance. Without backup batteries the system may cut out at sudden transitions from quiet to loud. Verify an AC Fault is present. See AC Fault to troubleshoot.
	DC Fault	Verify a DC Fault is present. See DC Fault to troubleshoot.
	Temp Fault	The system will operate at internal cabinet temperatures above 60C, but will throw a Temp Fault and have decreased performance. Verify a Temperature Fault is present. See Temp Fault to troubleshoot.
	Amp Fault	Verify an Amp Fault is present. See Amp Fault to troubleshoot.
	Speaker Fault	Verify a Speaker Fault is present. See Speaker Fault to troubleshoot.
	Thermal foldback	Self-protection can turn down individual channel volume and/or volume for the whole cabinet. Disable amplification and allow the cabinet internal temperature to decrease to below 40C. Consider shading the cabinet if it is installed outdoors.
	AC Line Voltage at cabinet too low	Verify the AC voltage at the output of the AC Sense breaker is within 100mVAC of the voltage at the input to the master AC breaker. Verify less than 100mVAC voltage drop across all AC breakers and the AC surge suppressors. Verify the AC supply wire gauge is sufficient for the rated current for your cabinet. <b>Note:</b> the output power of the cabinet is limited for loaded AC Line voltage less than 180VAC and will turn off at 100VAC.
	Speaker wiring too long/small	The power lost in the wiring between the cabinet and speaker is dependent on the size and length of that wiring. Refer to Table 3 for how much SPL is lost from the speaker for a given length and gauge of wiring.
	Speaker wiring out of phase	Verify the positive outputs of each channel are wired to the positive speaker leads.
	Amp ribbon cable disconnected	Verify the ribbon cables that connect the amplifier cards to each other are all present, fully seated, and do not show obvious damage.
	Line Input wiring impedance too high	Verify line input voltage at cabinet is within 500mV of the voltage at the source that is driving the line input signal.

Observed Effect	Possible Cause	Troubleshooting Steps
	Battery power terminals loose/disconnected	Verify neither the battery power nor the sense leads have intermittent, corroded, or otherwise poor connection to the batteries.
	DC Breaker damaged	Verify battery voltage is present at the switch board with the breaker switch in the closed position. Verify that voltage does not sag more than 5VDC relative to the voltage at the battery terminals with the system active. If there is no voltage or excessive sag, contact HyperSpike® Customer Service for a replacement DC Breaker.
	Power supply data cable disconnected	In a system with 2 power supplies, loss of one will cause an AC Fault only if both power supply data cables remain connected to the switch board. If a power supply data cable is disconnected from the switch board, the system will not throw an AC Fault and will operate with reduced performance. Without backup batteries the system may cut out at sudden transitions from quiet to loud. See AC Fault to troubleshoot.
Works on AC but not DC	DC Fault	Verify a DC Fault is present. See DC Fault to troubleshoot.
	DC Breaker damaged	Verify battery voltage is present at the switch board with the breaker switch in the closed position. Verify that voltage does not sag more than 5VDC relative to the voltage at the battery terminals with the system active. If there is no voltage or excessive sag, contact HyperSpike® Customer Service for a replacement DC Breaker.
	Batteries not charging	Verify charger LED is blinking. If not see Batteries Not Charging to troubleshoot.
	Batteries beyond usable life	Verify the batteries can still take a charge and deliver at least 200A when fully charged. If not replace the batteries.
Works on DC but not AC	AC Fault	Verify an AC Fault is present. See AC Fault to troubleshoot.
	Faulty Power Supply	Verify the LED near the power connections on the power supply is lit green. If not, and no AC Fault is reported, contact HyperSpike® Customer Service to obtain a replacement Power Supply.
	Switch Board damaged AC branch of ideal diode broken	Verify none of the above apply, the amplifiers remain unpowered when only AC power is connected to the system, and the Switch Board LED indicating DC Fault is lit. If so, contact HyperSpike® Customer Service to obtain a replacement Switch Board.
Batteries Not Charging	AC Fault	Verify an AC Fault is present. See AC Fault to troubleshoot.
	Charger breaker off	Verify the breaker that feeds AC to the charger is closed and not tripped.
	Charger fuse blown	Verify the in-line fuse from the charger to the battery is present and intact.
	Batteries beyond usable life	Verify the batteries can still take a charge and deliver at least 200A when fully charged. If not replace the batteries.
	Battery terminals loose/disconnected/wired incorrectly	Verify the battery charging leads do not have intermittent, corroded, or otherwise poor connection to the batteries and that they are connected to the battery with the correct polarity.
	Charger output cable disconnected	Verify the charger output cable is connected to the charger.



Observed Effect	Possible Cause	Troubleshooting Steps
	Faulty charger	Attach batteries, close the DC Breaker, and disable the power supply and charger breakers. Measure and record the battery voltage with the charger disabled. Close the charger and master AC breakers (not the power supply breakers). Wait 1 minute, then measure and record the battery voltage. Verify the battery voltage with the charger enabled is at least 100mV greater than with the charger disabled. If not, contact HyperSpike® Customer Service to obtain a replacement charger.
No Customer Power	AC Fault	Verify an AC Fault is present. See AC Fault to troubleshoot.
	Battery voltage too low	While the system will turn off once the battery backup has been fully depleted, it cannot prevent customer equipment from continuing to draw power from the battery backup. Once the battery backup can no longer meet the needs of the customer equipment, that equipment will cease functioning. <b>Note:</b> this may have a detrimental impact on the life of the batteries.
	Customer power fuse blown	Verify the customer power fuse is intact. The fuse limits customer power to 2A.
	Customer power disconnected	Verify the customer power terminal blocks are connected to the Switch Board connectors near the customer power fuse.
Master Fault	Other faults exist	Troubleshoot other faults to resolve master fault
	No other indicated faults	Verify the LED on Switch Board also indicates master fault is active. If not, the master fault relay is faulty; contact HyperSpike® Customer Service to obtain a replacement Relay Board. Otherwise contact HyperSpike® Technical Support for continued troubleshooting support.
AC Fault	Feeder circuit breaker open	Verify the breaker in the panel feeding AC power to the cabinet is closed and not tripped.
	AC Sense Breaker open	Verify the AC Sense breaker is closed and not tripped.
	AC Sense Fuse blown	CAUTION: AC Line Voltage is present at both ends of the fuse; only remove the protective boot once line voltage has been disconnected from the circuit. Verify the AC Sense fuse is intact.
	Power supply breaker open	Verify the power supply breakers are closed and not tripped.
	Master AC breaker open	Verify the master AC breaker is closed and not tripped.
	System not powered	Verify AC Fault LED on Switch Board is lit. If not, the system is not powered.
	Power supply data cable disconnected	Verify a 12-pin cable is connected between each power supply and the Switch Board.
	Power supply non operational	CAUTION: Exposed AC Line Voltage will be present during the next step, USE EXTREME CAUTION. Verify the AC voltage at the input to the power supply is greater than 100VAC. Verify the LED(s) near the power connections on (each) power supply is lit green. If it is not lit at all, contact HyperSpike® Customer Service to obtain a replacement Power Supply.



Observed Effect	Possible Cause	Troubleshooting Steps
	Switch Board damaged	Verify the LED near the power connections on (each) power supply is lit. If the LED is lit red, turn off the master AC and DC breakers for 10 minutes and allow the cabinet internal temperature to return to less than 40C. If the LED continues to be red after turning the master AC breaker back on, disconnect the 12-pin cable from the power supply. If the LED turns green when the cable is disconnected, contact HyperSpike® Customer Service to obtain a replacement Switch Board. Otherwise, contact HyperSpike® Customer Service to obtain a replacement Switch Board.
	Faulty relay	Verify the LED on Switch Board also indicates AC fault is active. If not, the AC fault relay is faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board.
DC Fault	Battery sense fuse blown	Verify the in-line fuse on the battery sense lead is intact.
	Battery breaker off	Verify the DC breaker is closed and not tripped.
	DC Breaker damaged	Verify battery voltage is present at the switch board with the breaker switch in the closed position. Verify that voltage does not sag more than 5VDC relative to the voltage at the battery terminals with the system active. If there is no voltage or excessive sag, contact HyperSpike® Customer Service for a replacement DC Breaker.
	Battery terminals loose/disconnected	Verify neither the battery power nor the sense leads have intermittent, corroded, or otherwise poor connection to the batteries.
	Batteries not charging	Verify charger LED is blinking. If not see Batteries Not Charging to troubleshoot.
	Batteries wired incorrectly	Verify battery input to the Switch Board is 26VDC +/- 3VDC and the polarity is correct per Section 3.6.3.
	Battery current above 150A	Verify the system is active and an AC Fault is present (to prove the batteries are supplying the power). This fault indicates the batteries are nearly depleted.
	Batteries depleted - voltage too low	Verify battery voltage is greater than 23.0VDC with system inactive, or greater than 21.5VDC with system active.
	Switch Board damaged	Verify none of the above apply, the amplifiers remain unpowered when only battery power is connected to the system, and the AC Fault LED is lit on the Switch Board. If so, contact HyperSpike® Customer Service to obtain a replacement Switch Board.
	Faulty relay	Verify the LED on Switch Board also indicates DC fault is active. If not, the DC fault relay is faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board.
Temp Fault	Internal cabinet temp out of range	Verify the internal cabinet temperature is less than 60C and greater than -20C.
	Faulty relay	Verify the LED on Switch Board also indicates Temp fault is active. If not, the Temp fault relay is faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board.
	Switch Board damaged	After verifying none of the above are the cause of the fault, contact HyperSpike® Customer Service to obtain a replacement Switch Board.

Observed Effect	Possible Cause	Troubleshooting Steps
Amp Fault	CAUTION: This step will expose the troubleshooter to AC Line voltage; USE EXTREME CAUTION. Observe the inside of the cabinet with power supplied as under normal operating conditions. The faulted amplifier will either display a red fault LED or will be the first amplifier without any LEDs lit (follow the ribbon cables from the control card to determine the order of the amplifiers).	
	Amp fuse blown	Verify all the amplifier fuses on the Switch Board are intact.
	Temporary condition	If a red LED is lit on one of the amplifier boards, verify the Amp Fault is cleared on a subsequent activation of the system.
	Amp ribbon cable disconnected	Verify the ribbon cables that connect the amplifier cards to each other are all present, fully seated, and do not show obvious damage.
	Shorted amp output wiring	Disconnect the speaker wiring and verify a short does not exist between the amplifier outputs for the faulted channel. Reconnect the speaker wiring.
	Shorted speaker wiring	Disconnect the speaker wiring and verify a short does not exist between the speaker wires for the faulted channel. Reconnect the speaker wiring.
	Faulty relay	Verify the LED on Switch Board also indicates Amp fault is active. If not, the Amp fault relay is faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board.
Speaker Fault	CAUTION: This step will expose the troubleshooter to AC Line voltage; USE EXTREME CAUTION. Observe the inside of the cabinet with power supplied as under normal operating conditions. The amplifier for the channel connected to the speaker fault will display a red fault LED .	
	Shorted amp output wiring	Disconnect the speaker wiring and verify a short does not exist between the amplifier outputs for the faulted channel. Reconnect the speaker wiring when troubleshooting is complete.
	Shorted speaker wiring	Disconnect the speaker wiring and verify greater than 4 Ohms exists between the speaker wires for the faulted channel. This measurement can be effected by wind on the speaker. Reconnect the speaker wiring when troubleshooting is complete.
	Open in speaker wiring	Disconnect the speaker wiring and verify less than 40 Ohms exists between the speaker wires for the faulted channel. This measurement can be effected by wind on the speaker. Reconnect the speaker wiring when troubleshooting is complete.
	Output Transient protection fuse blown	CAUTION: This step will expose the troubleshooter to AC Line voltage; USE EXTREME CAUTION. With the cabinet powered as normal and active, verify the voltage measured across the input to the faulted channel's speaker output transient suppressor is greater than 1VAC and within 100mVAC of the voltage measured across the output of the same suppressor.
	Faulty relay	Verify the LED on Switch Board also indicates Speaker fault is active. If not, the Speaker fault relay is faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board.
	Speaker failure	Verify the impedance of each channel of the emitter head is similar to the others. The channel with different impedance is likely the failed channel. Contact HyperSpike® Customer Service to obtain a replacement transducer kit.

Observed Effect	Possible Cause	Troubleshooting Steps
Tamper Fault	Door Open	Verify the door is not open and the door switch is positioned and adjusted such that it is depressed when the door is closed.
	Door Switch/Switch Wiring Failure	Verify at the terminals of the door switch that the switch is a short when depressed or pulled out and an open when the plunger is sprung out. Verify the wiring to the switch is connected at the switch and to the switch board.
	Faulty relay	Verify the LED on Switch Board also indicates Tamper fault is active. If not, the Tamper fault relay is faulty. Contact HyperSpike® Customer Service to obtain a replacement Relay Board.
Amp Fuse Blown	Amp power shorted	For the channel with the blown fuse: verify the red wires in the wiring harness between the switch board and the amplifier are intact, have sound connection to the connectors at each end, and are not damaged. Verify no other conductor is shorting to the amplifier board.
	Shorted amp output wiring	Disconnect the speaker wiring and verify a short does not exist between the amplifier outputs for the faulted channel. Reconnect the speaker wiring when troubleshooting is complete.
	Shorted speaker wiring	Disconnect the speaker wiring and verify greater than 4 Ohms exists between the speaker wires for the faulted channel. This measurement can be effected by wind on the speaker. Reconnect the speaker wiring when troubleshooting is complete.
	Normal degradation	If none of the above apply, replace the fuse with the same type and size and apply power to the system. If the fuse continues to blow, contact HyperSpike® Technical Support for assistance.

## 7. Warranty

Ultra Electronics – USSI warrants its products to be free from defects in material and workmanship for a period of one (1) year from the date of shipment from USSI's facility. This warranty is extended to the original purchaser and all subsequent owners, provided a copy of the original dated bill of sale is presented when service is requested under warranty.

If your product should require service, write, phone, fax, or e-mail Ultra Electronics – USSI at:

**Ultra Electronics – USSI**

**4868 East Park 30 Drive**

**Columbia City, IN 46725**

**Phone: 260-248-3665**

**Fax: 260-248-3510**

**E-mail: [ServiceDepartment@ultra-ussi.com](mailto:ServiceDepartment@ultra-ussi.com)**

**URL: [www.ultra-HyperSpike.com](http://www.ultra-HyperSpike.com)**

We will either direct you to a local service agency or provide you with a Return Material Authorization (RMA) number so that you can ship the product to our factory. Do not ship the product to us without first obtaining an RMA number. Place the RMA number on all boxes returned to the factory to prevent equipment from being lost or mishandled. Merchandise returned to us for service under warranty must be accompanied by a copy of the original bill of sale, and shipped prepaid. You are responsible for transporting your product to our factory. We will pay the return shipping charges on all products repaired under warranty.

### 7.1. Failures Not Covered by This Warranty

This warranty covers manufacturing defects. The warranty **DOES NOT** cover:

- 1) Damage caused by accident, misuse, abuse, product modification, or neglect.
- 2) Damage incurred during shipment (you must claim these damages from the carrier).
- 3) Damage resulting from failure to operate the product in accordance with the instruction manual.
- 4) Damage resulting from attempted repairs by unauthorized personnel.
- 5) Claims based on any perceived agreement not explicitly stated in this warranty such as conversations with service personnel or sales representatives.

### 7.2. Limitation of Implied Warranties

All implied warranties, including warranties of merchantability, are limited in duration to a period of one (1) year from the date of shipment from Ultra Electronics – USSI.

### 7.3. Exclusion of Certain Damages

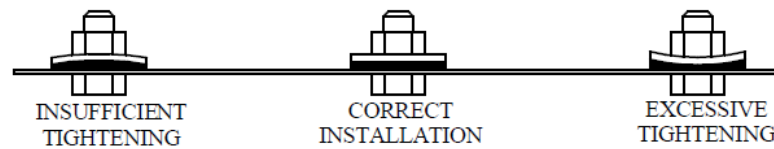
Ultra's liability is limited to the repair or replacement, at our option, of any defective product, and shall in no event include incidental or consequential commercial damages of any kind. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the preceding limitation or exclusion may not apply to you.

For further information regarding this warranty, parts, or service, please contact Ultra Electronics – USSI through one of the methods listed at the beginning.

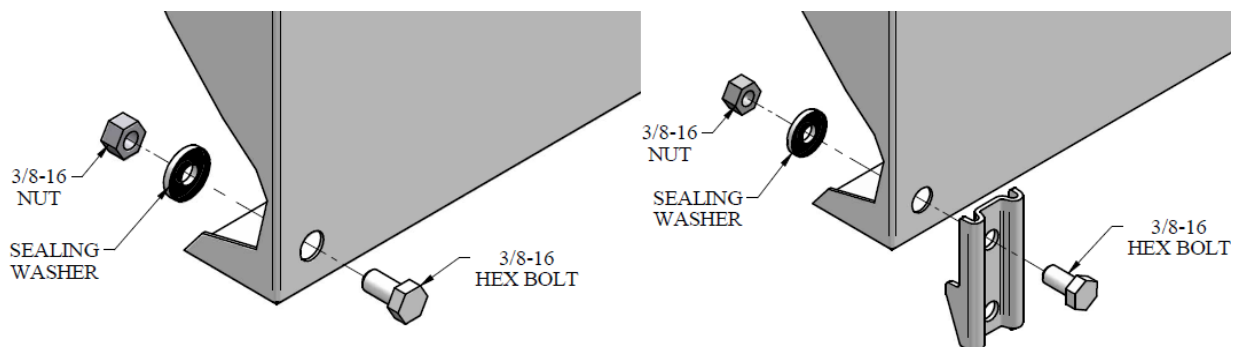
## Appendix A: Mounting Instructions

### 1. General Outdoor Installation

For outdoor installations, the Encompass Cabinet mounting systems will require existing holes to be covered with the seal washers supplied with the cabinet or supplied with referenced mount kits. It is important that the washer be installed correctly to achieve a proper seal. The washer should be installed on the inside of the cabinet with the rubber side against the enclosure and tightened until it is flat.



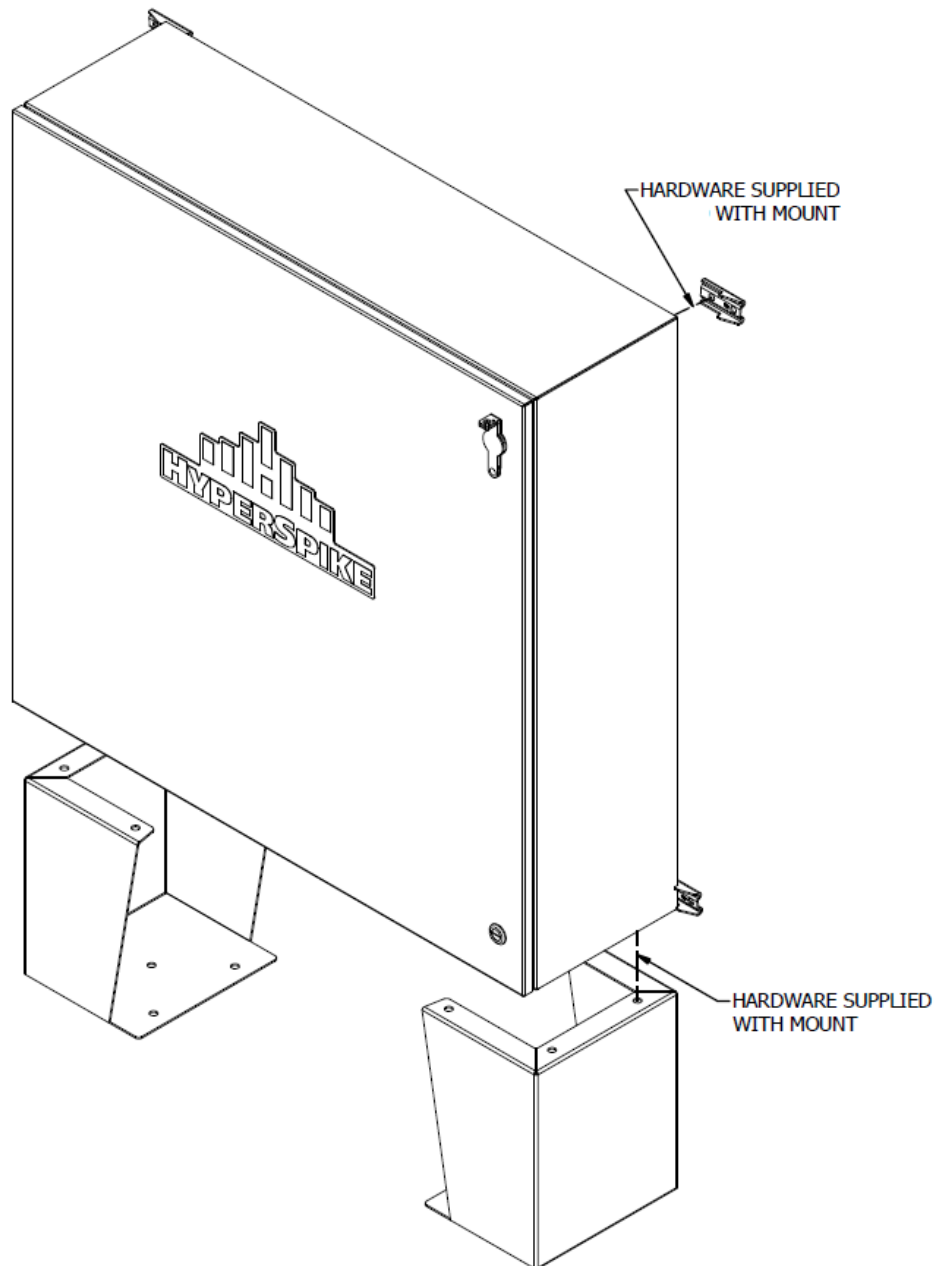
**Figure 1 – Correct Seal Washer Installation**



**Figure 2 – Examples of Correct Mounting Hardware Assembly**

## 2. Floor Mount Kit

The Floor Mount Kit raises the cabinet 12" off the floor. The kit comes with hardware for fastening the cabinet to the wall or the cabinet can be fastened to the floor. See installation included with Floor Mount Kit.



**Figure 3 – Cabinet Floor Mount**

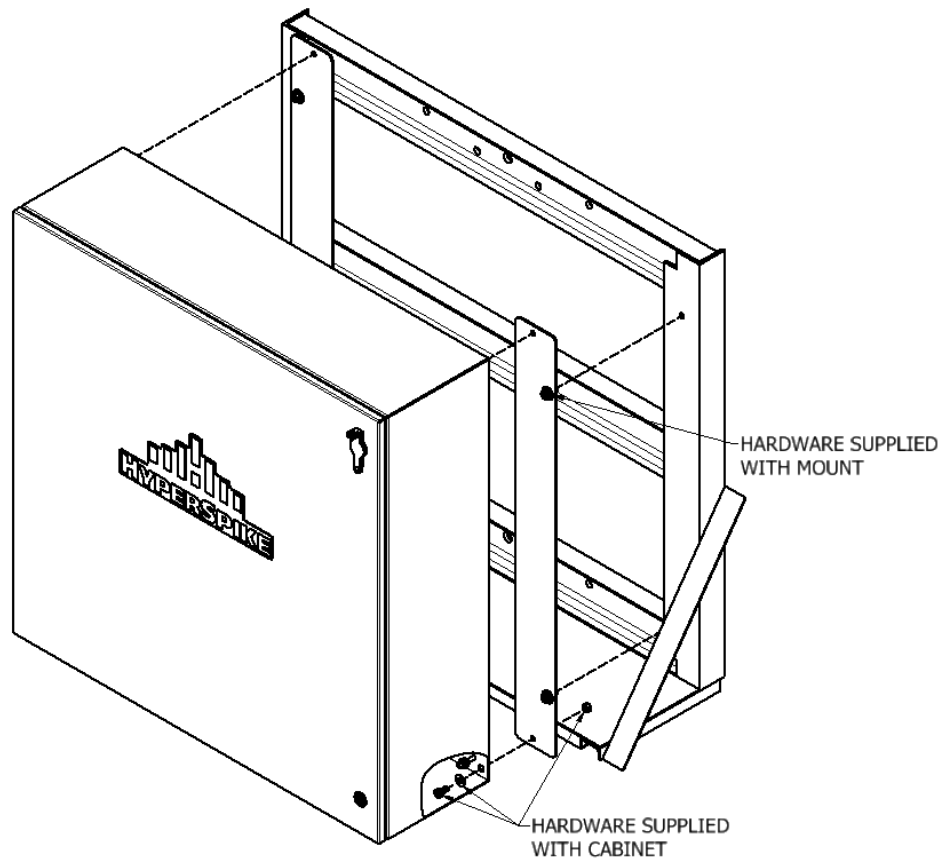
### 3. Wall Mount Kit

The Wall Mount Kit allows the cabinet to be fastened to a wall at any height. The mount is designed with a shelf so it can be mounted to the wall before attaching the cabinet.



**IMPORTANT:** The Encompass Cabinet with batteries and wall mount can weigh up to 450 Lb. Wall structures can vary greatly. Add strengthening members as needed to support the weight and follow appropriate local codes.

1. Install mount to wall with appropriate hardware for your installation (hardware not included).
2. Attach Adapter Plates to cabinet using the supplied sealing hardware from cabinet. Be sure to follow the general mounting instructions when installing hardware.
3. Install cabinet with adapter plates onto mount using the supplied hardware.



**Figure 4 – Cabinet Wall Mount**

## 4. Pole Mount Kit

The Pole Mount Kit is designed to mount to the Wall Mount Kit (72539B-801). The mount accepts an 8- to 14-inch diameter pole. The mount is designed with a shelf so it can be mounted to a pole before attaching the cabinet.



**The Encompass Cabinet with batteries and pole mount can weigh 500 Lb. Verify that the pole can support this amount of weight. Wind loading can add to the stress on the pole. Follow appropriate local codes regarding pole mounting.**

Required customer-supplied hardware:

- 12X 5/8" – 11 Grade 8 Bolt (See Table 1 for recommend length)
- 24X 5/8" Flat Lock Washer
- 12X 5/8" Split Lock Washer
- 12X 5/8" – 11 Hex Nut

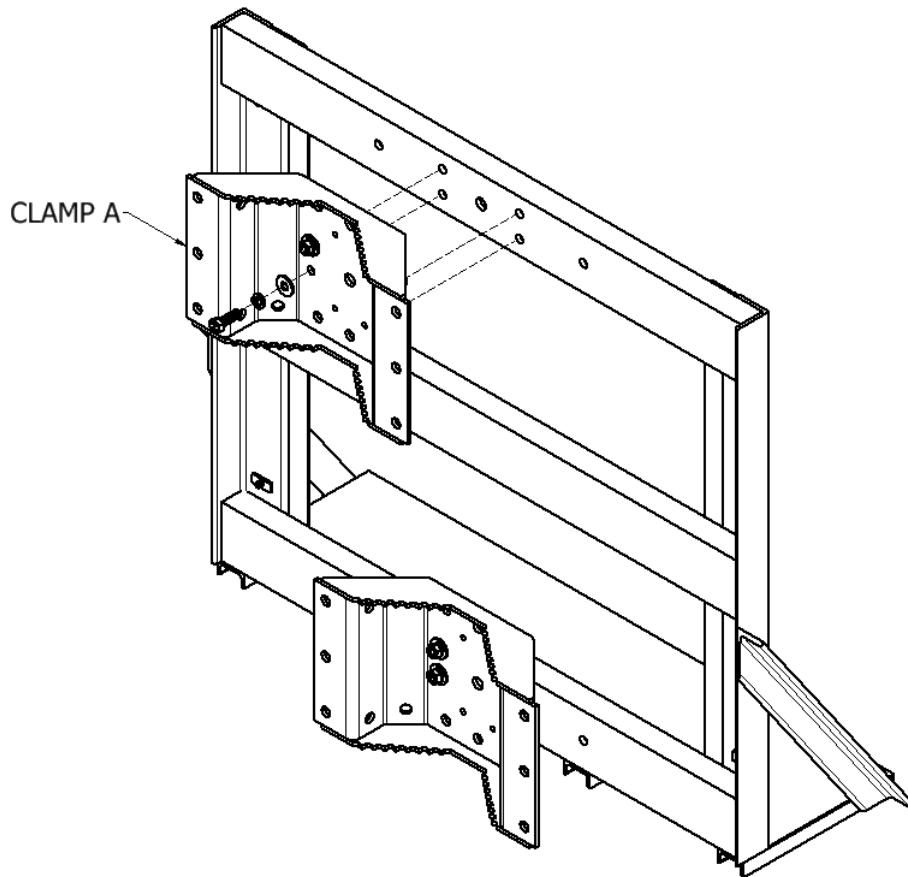
Zinc plated / coated steel hardware is recommended.

MINIMUM BOLT LENGTH	
POLE DIAMETER	BOLT LENGTH (L)
14.0	11.0
13.0	10.0
12.0	8.5
11.0	7.5
10.0	6.0
9.0	5.0
8.0	3.5

**Table 1 – Pole Mount Minimum Bolt Length**

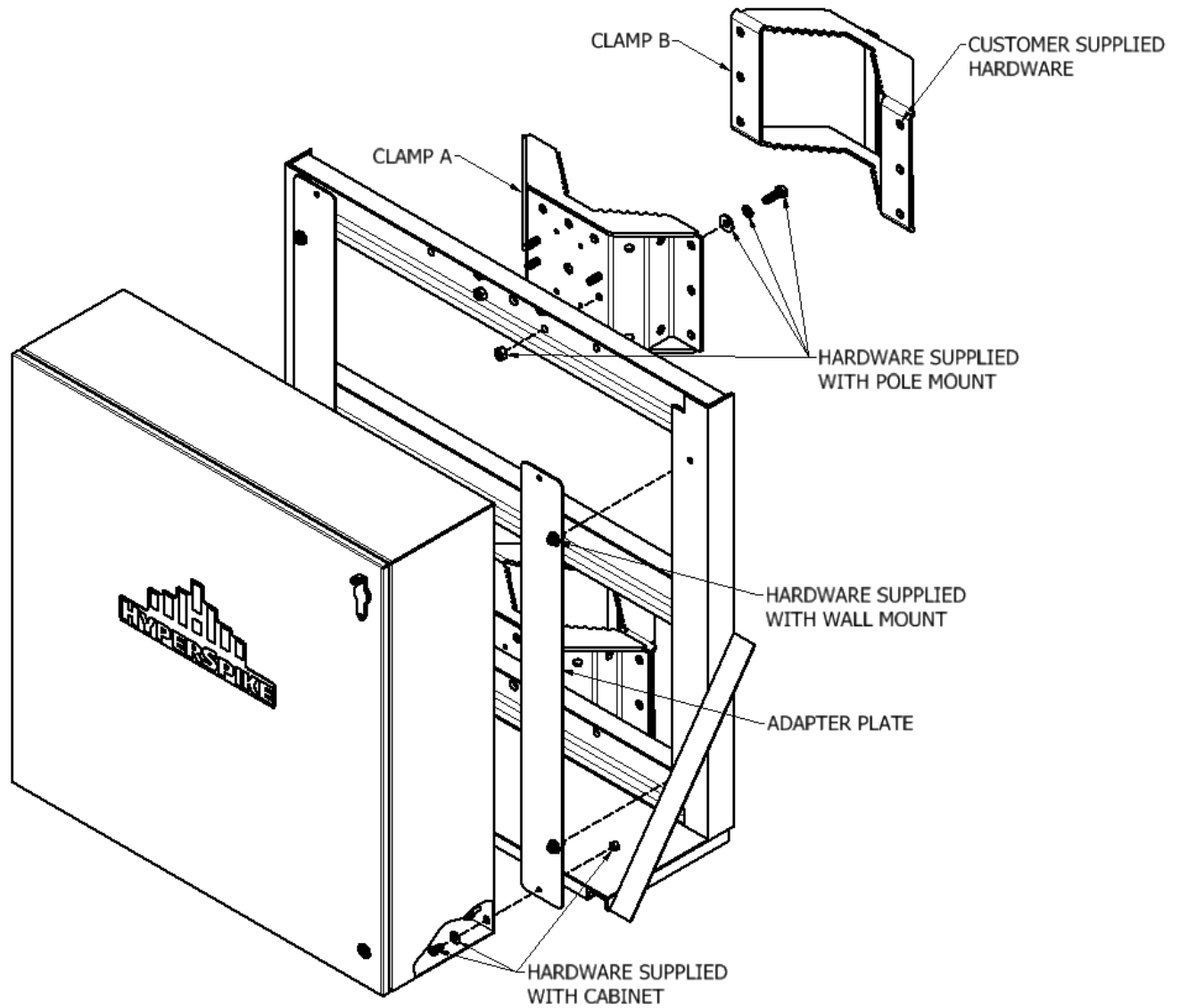


1. Install 2x Clamp A to Wall Mount Kit with 1/2-13 hardware supplied with Pole Mount Kit.



**Figure 5 – Wall Mount Kit with Clamps**

2. Tighten Clamps A and B around the pole using the customer-supplied hardware.
3. Attach Adapter Plates from Wall Mount Kit to cabinet using the supplied sealing hardware from cabinet. Be sure to follow the general mounting instructions when installing hardware.
4. Install cabinet with adapter plates onto wall mount using the supplied hardware from the Wall Mount Kit.



**Figure 6 – Cabinet Pole Mount**



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