TRIGA

ECS Series
Emergency Communication System

Manual

Document LS10262-002TR-E
9/21/2022 Rev: B
P/N LS10262-002TR-E:B • ECN 3637

Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel (FACP) with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. This document can be found at http://www.systemsensor.com/appguides/. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or "smoke" from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, chimneys, even wet or humid areas may inhibit particle or smoke flow.
- Smoke particles may become "cold," stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets, such as air conditioning vents.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of "smoke" present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions (caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, compromising its ability to report a fire.

Audible warning devices such as bells, horns, strobes, speakers and displays may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol, or medication. Please note that:

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A life safety system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Alarm Signaling Communications:

- **IP connections** rely on available bandwidth, which could be limited if the network is shared by multiple users or if ISP policies impose restrictions on the amount of data transmitted. Service packages must be carefully chosen to ensure that alarm signals will always have available bandwidth. Outages by the ISP for maintenance and upgrades may also inhibit alarm signals. For added protection, a backup cellular connection is recommended.
- **Cellular connections** rely on a strong signal. Signal strength can be adversely affected by the network coverage of the cellular carrier, objects and structural barriers at the installation location. Utilize a cellular carrier that has reliable network coverage where the alarm system is installed. For added protection, utilize an external antenna to boost the signal.
- **Telephone lines** needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup alarm signaling connections are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled as required by National and/or local fire codes and should be performed by authorized professional life safety system installers only. Adequate written records of all inspections should be kept.

Limit-F-2020

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until manuals are read and understood.

CAUTION - System Re-acceptance Test after Software Changes: To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Re-acceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring. All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0-49º C/32-120º F and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27º C/60-80º F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, or printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Over-tightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components. Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Units with a touchscreen display should be cleaned with a dry, clean, lint free/microfiber cloth. If additional cleaning is required, apply a small amount of Isopropyl alcohol to the cloth and wipe clean. Do not use detergents, solvents, or water for cleaning. Do not spray liquid directly onto the display.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

Precau-D2-11-2017

FCC Warning

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual may cause interference to radio communications. It has been tested and found to comply with the limits for class A computing devices pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when devices are operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user will be required to correct the interference at his or her own expense.

Canadian Requirements

This digital apparatus does not exceed the Class A limits for radiation noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

Software Downloads

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments or suggestions about our online Help or printed manuals, you can email us.

Please include the following information:

- Product name and version number (if applicable)
- Printed manual or online Help
- Topic Title (for online Help)
- Page number (for printed manual)
- Brief description of content you think should be improved or corrected
- Your suggestion for how to correct/improve documentation

Send email messages to:

info@trigaglobal.com

or call +1 330-577-5199

This symbol (shown left) on the product(s) and / or accompanying documents means that used electrical and electronic products should not be mixed with general household waste. For proper treatment, recovery and recycling, contact your local authorities or dealer and ask for the correct method of disposal.

Electrical and electronic equipment contains materials, parts and substances, which can be dangerous to the environment and harmful to human health if the waste of electrical and electronic equipment (WEEE) is not disposed of correctly.

Table of Contents

Section 1: Overview

The Emergency Communication System Packages are a combination of the addressable fire alarm control panel and voice integration control all in one package. The general idea of the Emergency Communication System is to activate a message giving building occupants instructions about an emergency event. This manual contains information on how to install and operate the following Emergency Communication System Packages:

Model Number	Consists of These Part Numbers
TR-2100ECS	TR-2100 FACP
	ECS-NVCM (Network Voice Control Module)
TR-LOC2100	ECS-RVM (Remote Voice Module)
	TR-RD2G/TR-RD2R (Remote Annunciator)

1.1 Compatible ECS Series Equipment

This manual also contains information on how to install the following compatible equipment with the ECS series control panels.

Model Number	Description	Compatible With
TR-SW24	Adds 24 additional switches to the ECS-NVCM or ECS-RVM to manually select various voice output groups for emergency announcements from the onboard microphone.	TR-2100ECS
TR-50W	50 watt amplifier with 4 separate audio circuits.	TR-2100ECS
TR-125W	125 watt amplifier with 4 separate audio circuits.	TR-2100ECS
TR-CE4	Provides four additional audio circuits for each TR-50W or TR-125W.	TR-50W and TR-125W
ECS-NVCM	Network Voice Control Module (part of control panel)	TR-2100ECS
ECS-RVM	Remote Voice Module (part of TR-LOC2100; not sold separately)	TR-2100ECS
TR-LOC2100	Local Operating Console	TR-2100ECS
TR-DUAL50W	Dual 50W Amplifier	TR-2100ECS
TR-50WBU	Internal Backup Amplifier (Daughter card)	TR-2100ECS
TR-INT50W	50 watt internal amplifier	TR-2100ECS

1.2 ECS Features

- Single enclosure for both Fire and Emergency Control System components
- Onboard supervised microphone
- Supports 25 Vrms or 70.7 Vrms speaker circuits using TR-50W, TR-INT50W, or TR-DUAL50W. Supports 25 Vrms using TR-125W
- Network Voice Control Module (ECS-NVCM)
  - TR-2100ECS supports one ECS-NVCM.
  - Built-in Digital Message Repeater
  - 15 one-minute ECS Messages
- TR-2100ECS systems support dual-channel and backup audio using the TR-DUAL50W amplifier and TR-50WBU backup amplifier.
- SBUS Addressable Amplifiers
  - TR-2100ECS has support for up to 16 TR-50W, TR-125W, TR-INT50W, or TR-DUAL50W amplifiers for a maximum of 2000 watts per system.
- Local Operator Console (LOC)
  - TR-2100ECS systems can support up to 15 TR-2100LOC consoles.
- Mappable Speaker Circuits
  - TR-2100ECS systems can support up to 128 mappable speaker circuits using a combination of the TR-50W, TR-125W, TR-DUAL50W, and TR-INT50W amplifiers, and TR-CE4 expanders.
- Backup Amplifier
  - TR-DUAL50W amplifiers are capable of providing 50 watts of backed up audio power with the addition of the TR-50WBU.
- ECS messages can be selected as priority over fire.
- Programmable trigger inputs from an external source to the TR-NVCM, TR-RVM, TR-5880, any SLC input module, or Flexput module.

1.3 Terms Used in this Manual

The following terminology is used with the this system:

Term	Description
ECS	Emergency Communication System: The features of the control panel and accessories that provide Mass Notification functionality as described in UL standard 2572.
FACP	Fire Alarm Control Panel

Term	Description
LOC	Local Operator's Console: The user interface for a Mass Notification System. In the Triga Series product line, this would be the interface provided by the TR-2100ECS or TR-LOC2100
Mass Notification	A way of protecting life by relaying specific event information to a building or site including voice and/or audible and visual signals.
ECS Series	When this is used in a statement, it would indicate the that statement applies to the TR-2100ECS control panel.
ECS Device	A TR-5880 module that is programmed as an ECS device. These are used as inputs for triggering the ECS on aTR-2100ECS.
ECS Control	ECS Control is a mode that all LOC units must enable to change the current state of the ECS system. ECS Control is requested by using the ECS Control Button on LOC stations.
ECS Point	An input point that is programmed to trigger an ECS event on the TR-2100ECS.
ECS LOC Priority	The priority level which is programmed for every ECS LOC. In order from lowest to highest, they are: Low, Normal, High.
ECS Super User	A user profile provided option that allows the user to override all ECS Control rules and gain ECS Control.
VBUS	The VBUS is an analog voice bus that carries the recorded voice messages from the ECS-NVCM to the TR-50W, TR-125W, or TR-DUAL50W, or the voice messages generated from a system microphone to the TR-50W, TR-125W or TR-DUAL50W.
Module	The term *module* is used for all hardware devices except for SLC addressable devices and notification appliances.
Main control panel	Refers to the TR-2100ECScontrol panel in the ECS Series cabinet.
Input Point	An addressable sensing device, such as a smoke or heat detector or a contact monitor device.
Input Zone	A protected area made up of input points.
Output Point (or Output Circuit)	A notification point or circuit for notification appliances. Relay circuits and auxiliary power circuits are also considered output points. The output group can be specifically defined as an output group to be used for voice evacuation circuits.
Audio Circuits	Are output groups that are defined as voice output groups.
Group (or “Output Group”)	A group of output points. Operating characteristics are common to all output points in the group.
Output (or “Cadence”) Pattern	The pattern that the output will use, for example, Constant, March Code, ANSI 3.41. Applies to zones and special system events.
Mapping	Mapping is the process of specifying which outputs are activated when certain events occur in the system.

1.4 Related Documentation

Refer to the following documents for more information.

Title	Document Number
TR-2100ECS Manual	LS10143-003TR-E
SLC Wiring Manual	LS10179-000TR-E
Device Compatibility Document	LS10167-006TR-E
ECS-RVM Install Sheet	151451
TR-SW24 Install Sheet	LS10264-002TR-E
TR-CE4 Install Sheet	LS10263-002TR-E
TR-INT50W Install Sheet	LS10119-003TR-E
TR-RPU Install Sheet	LS10152-003TR-E
ECS-NVCM Install Sheet	LS10169-001SK-E
TR-LOC2100 Install Sheet	LS10188-003TR-E
ECS-EMG Install Sheet	LS10191-001SK-E

Table 1.1 Related Documentation

Section 2: Agency Listings, Approvals, and Requirements

2.1 Federal Communications Commission (FCC)

1. The following information must be provided to the telephone company before the FACP can be connected to the phone lines:

Manufacturer:	Triga
Model Number:	TR-2100ECS
FCC registration number:	AC6USA-34758-AL-E, AC6USA-23901-AL-E or AC6AL11B6820
Ringer equivalence:	0.8B
Type of jack:	RJ31X
Facility Interface Codes:	Loop Start: 02LS2
Service Order Code:	9.0F

2. This device may not be directly connected to coin telephone or party line services.
3. This device cannot be adjusted or repaired in the field. In case of trouble with the device, notify the installing company or return to:
   Triga Life Safety Systems
   7600 Olde Eight Rd.
   Hudson, OH 44236-1057
   +1-330-577-5199
   www.trigaglobal.com
4. If the FACP causes harm to the telephone network, the telephone company will notify the user in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify the user as soon as possible. Users have the right to file complaints, if necessary, with the Federal Communications Commission.
5. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice to allow you to make the necessary modifications to maintain uninterrupted service.

WARNING: FCC PART 15

THIS DEVICE HAS BEEN VERIFIED TO COMPLY WITH FCC RULES PART 15. OPERATION IS SUBJECT TO THE FOLLOWING CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE RADIO INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

2.2 Underwriters Laboratories (UL)

2.2.1 Requirements for All Installations

General requirements are described in this section. When installing an individual device, refer to the specific section of the manual for additional requirements. The following subsections list specific requirements for each type of installation (for example, Central Station Fire Alarm systems, Local Protected Fire Alarm systems, and so on). See the Operation Mode Behavior Section of the manual for information on releasing operations.

- ✓ All field wiring must be installed in accordance with NFPA 70 National Electric Code.
- ✓ Use the addressable smoke detectors specified in the *SLC Wiring Manual* and/or conventional detectors listed in the *Device Compatibility Document*.
- ✓ Use UL listed notification appliances compatible with the FACP from those specified in the *Device Compatibility Document*.
- ✓ A full system checkout must be performed any time the panel is programmed.

Restricted Options

- The loss of AC signal is defaulted to 3 hours however the system allows settings from 0 - 3 hours. For UL certified installations this number must be set from 1 to 3 hours.
- The system allows the use of non-latching spot type smoke detectors. This feature may not be used in commercial applications whereby a general alarm is sounded. It is intended for elevator recall, door holding applications, and hotel/motel room applications.
- The system allows the Alarm Verification time to be set from 60 to 255 seconds. For UL certified installations the setting must be a minimum of 60 seconds.
- The system allows the Auto-resound time to be set to 24 or 4 hours. For UL certified installations that are utilizing SWIFT devices, the value must be set to 4 hours.
- Call forwarding shall not be used.
- When two count is used detector spacing shall be cut in half, you shall not use the alarm verification feature, and no delay shall be used.
- P.A.S (positive alarm sequence) feature shall be used only with automatic detectors.

2.2.2 Requirements for Central Station Fire Alarm Systems

- ✓ Use both phone lines. Enable phone line monitors for both lines.
- ✓ You must program a phone number and a test time so that the FACP shall automatically initiate and complete a test signal transmission sequence to its associated receiver at least once every 6 hrs.
- ✓ The AC Loss Hours option must be set from 1-3 hours.
- ✓ If using wired Ethernet, you must program the corresponding account/subscriber ID and a test time so that the FACP shall automatically initiate a test signal transmission sequence to its associated receiver at least once every 6 hrs.

2.2.3 Requirements for Local Protected Fire Alarm Systems

At least one UL listed supervised notification appliance must be used.

2.2.4 Requirements for Remote Station Protected Fire Alarm Systems

Minimum system requirements are one Honeywell Silent Knight addressable initiating device and either a 5220, Keltron 3158, or the built-in Digital Alarm Communicator Transmitter (DACT).

- ✓ Do not exceed the current load restrictions shown in Section 3 of FACP manual.
- ✓ The AC Loss Hours option must be set from 1-3 hours.

2.2.5 Requirements for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment, NFPA 72

When using carbon monoxide detection, the system must be monitored by a Supervising Station with emergency response, both aspects meeting the Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment, NFPA 72.

Section 3: Installation

This section of the manual is intended to help you plan your tasks to complete the installation. Please read this section thoroughly, especially if you are installing a ECS Series control panel for the first time.

3.1 Environmental Specifications

It is important to protect the ECS panel from water. To prevent water damage, the following precautions should be followed when installing the units:

- Mount in indoor, dry environments only.
- Do not mount directly on exterior walls, especially masonry walls (condensation).
- Do not mount directly on exterior walls below grade (condensation).
- Protect from plumbing leaks.
- Protect from splash caused by sprinkler system inspection ports.
- Do not mount in areas with humidity-generating equipment (such as dryers, production machinery).

When selecting a location to mount the control panel, the unit should be mounted where it will NOT be exposed to temperatures outside the range of 0°C-49°C (32°F-120°F) or humidity outside the range of 10%-93% at 30°C (86°F) non-condensing.

3.2 Wiring Specifications

Induced noise (transfer of electrical energy from one wire to another) can interfere with telephone communication or cause false alarms. To avoid induced noise, follow these guidelines:

- Isolate input wiring from high current output and power wiring. Do not pull one multi-conductor cable for the entire panel. Instead, separate the wiring as follows:

High voltage	Relay circuits
SLC loops	AC power Terminals
Audio input/output	Phone line circuits
Notification circuits	NAC1 through NAC8
SBUS	

- Do not pull wires from different groups through the same conduit. If you must run them together, do so for as short a distance as possible or use shielded cable. Connect the shield to earth ground at the panel. You must route high and low voltages separately.
- Ground fault and wire to wire short impedance to any terminal is 0Ω.
- Route the wiring around the inside perimeter of the cabinet. It should not cross the circuit board where it could induce noise into the sensitive microelectronics or pick up unwanted RF noise from the high speed circuits. Refer to the FACP manual for wire routing examples.
- High frequency noise, such as that produced by the inductive reactance of a speaker or bell, can also be reduced by running the wire through ferrite shield beads or by wrapping it around a ferrite toroid.

NOTE: All circuits are power limited except the battery and AC cabling. Maintain 0.25 inch spacing between high and low voltage circuits and between power-limited and non-power limited circuits.

3.3 Cabinet Mounting

Refer to the appropriate FACP manual for cabinet mounting instructions and wire routing examples. See Section 1.4 for a list of related documentation.

3.4 Electrical Specifications

Module	Voltage	Standby Current	*Alarm Current (fully loaded system)
TR-50W 25V	240V 50/60 Hz	200 mA	600 mA
TR-50W 70V	240V 50/60 Hz	200 mA	600 mA

Table 3.1 TR-50W AC Current Draw

Module	Voltage	Standby Current	*Alarm Current (fully loaded system)
TR-125W 25V	240V 50 Hz	250 mA	1250 mA

Table 3.2 TR-125W AC Current Draw

Module	Voltage	Standby Current	*Alarm Current (fully loaded system)
TR-DUAL50W 25V	240V 50/60 Hz	260 mA	1525 mA
TR-DUAL50W 70V	240V 50/60 Hz	260 mA	1600 mA

Table 3.3 TR-DUAL50W AC Current Draw

Section 4: ECS Device Installation

4.1 Connecting AC Power and Batteries

Refer to the *FACP Manual* for proper AC and battery power connections. See Section 1.4 on page 8 for reference documentation.

4.2 Installing the ECS-NVCM

This section provides information on the ECS-NVCM, Network Voice Control Module. The ECS-NVCM is compatible with the TR-2100ECS FACP.

For more information on how to install or remove the ECS-NVCM Network Voice Control Module, see installation sheet PN LS10169-001SK-E.

4.2.1 ECS-NVCM Board Layout

The following is description of the ECS-NVCM voice control module components.

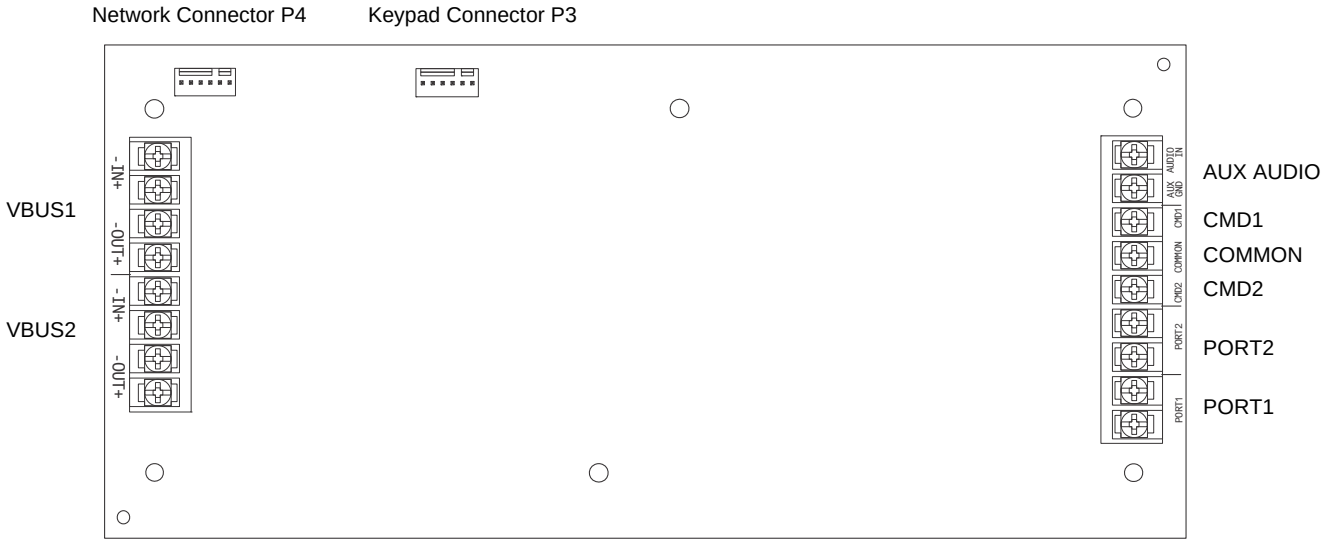


Figure 4.1 Front View of ECS-NVCM

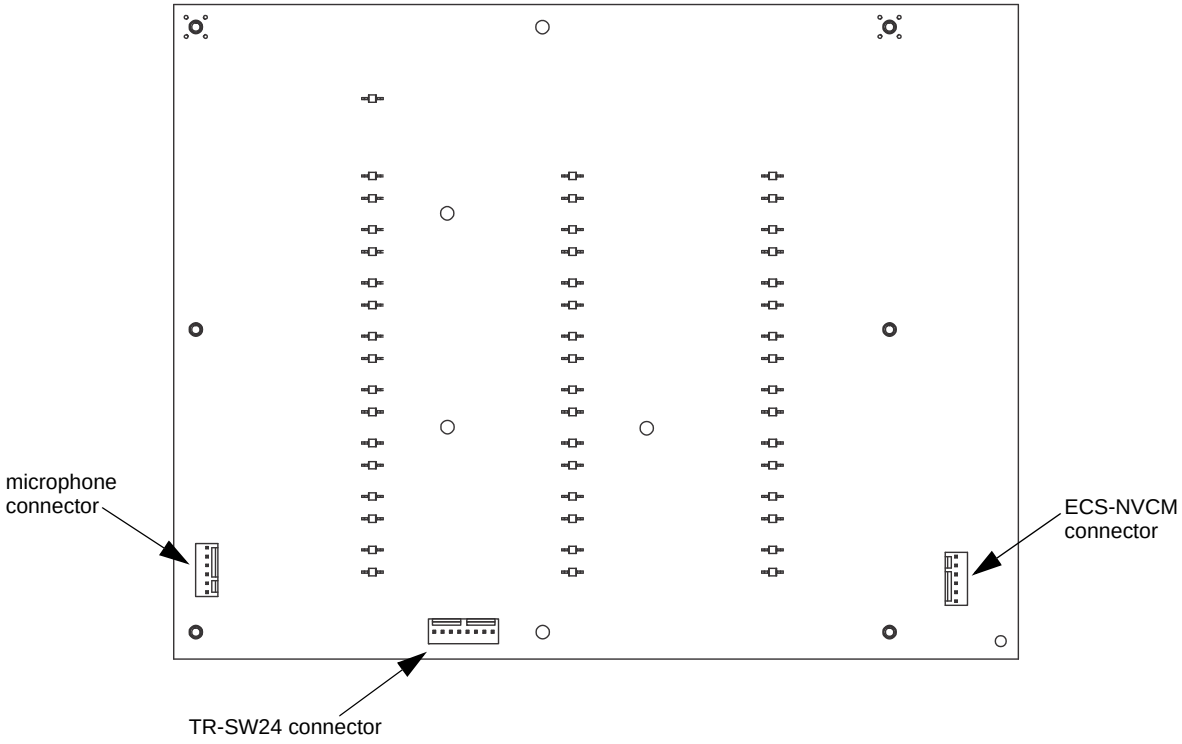


Figure 4.2 Back View of ECS-EMG Keypad

4.2.2 Installing the ECS-NVCM

1. Remove AC power from the FACP.
2. Open the cabinet.
3. Align the ECS-NVCM over the mounting studs below the FACP board and secure with six supplied nuts/lockwashers. Refer to the figure below for mounting locations.

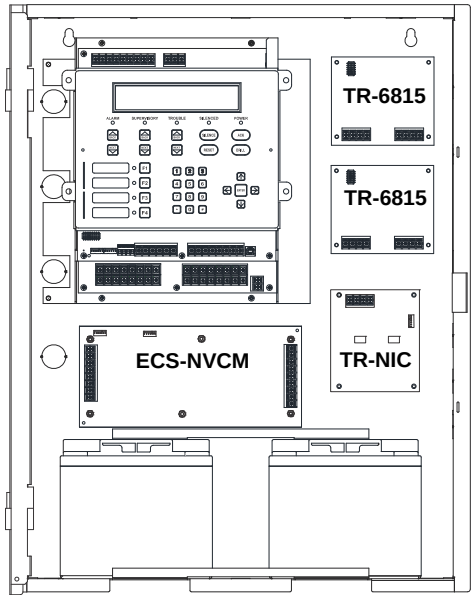


Figure 4.3 ECS-NVCM Mounting Location Inside TR-2100

4.2.3 Installing and Connecting the ECS-EMG to the TR-SW24

The TR-SW24 adds 24 switches to the TR-2100ECS controls for a total of 40, with the 16 non-ECS switches on the ECS-EMG.

Follow these steps to install and connect the TR-SW24:

1. Open Cabinet door and dead front panel.
2. Remove AC power from the main control panel.
3. Disconnect the backup batteries.
4. Install the TR-SW24 on the six mounting studs located on the inside of the dead front panel. See Figure 4.4 for TR-2100ECS.
5. Connect one end of the wiring harness (PN 130398 supplied) to the ECS-EMG and the other end to the P4 connector on the ECS-NVCM. If two TR-SW24 modules are used, connect one TR-SW24 to the other TR-SW24. See Figure 4.4.
6. Secure the switch expander(s) to the dead front panel using the supplied six 0.25” hex nuts.
7. Restore AC power.
8. Reconnect backup batteries.

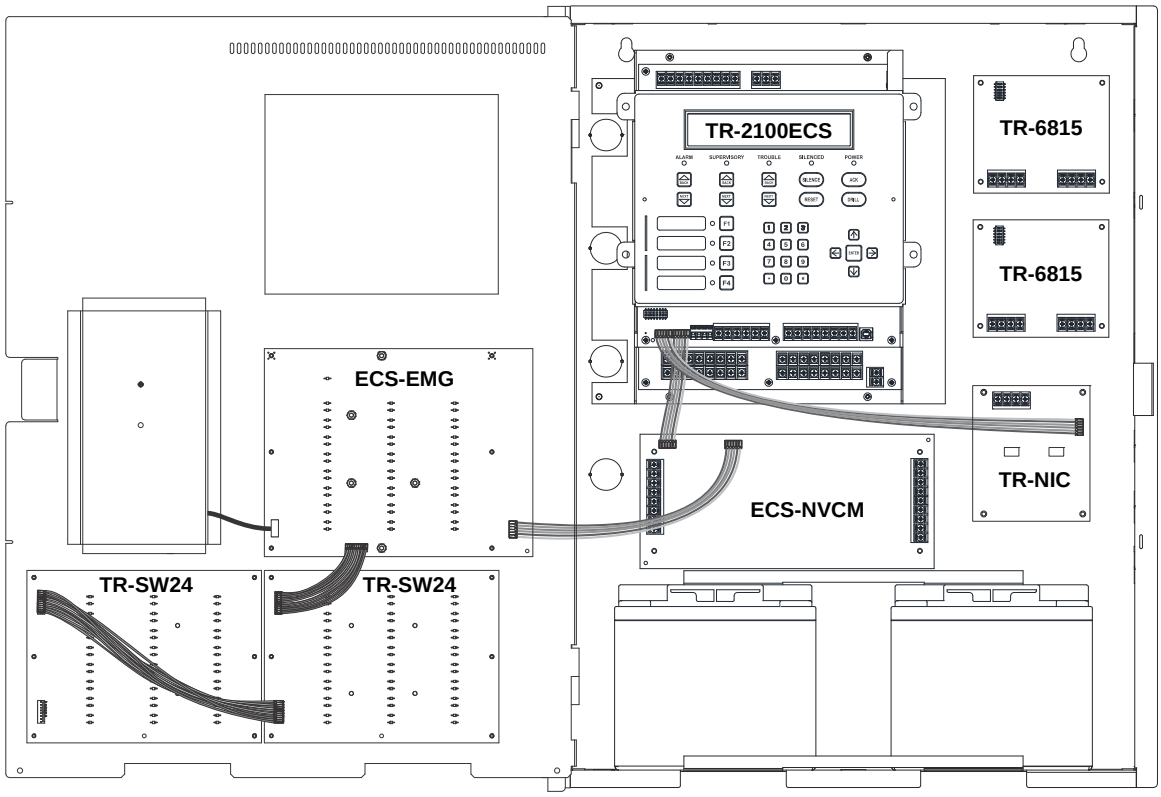
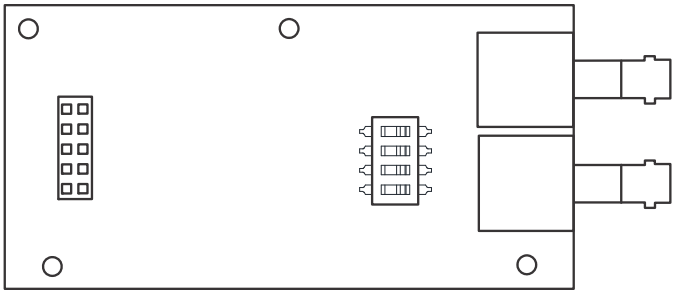


Figure 4.4 Wiring Harness Connections Between the ECS-EMG/TR-SW24 and the TR-2100ECS

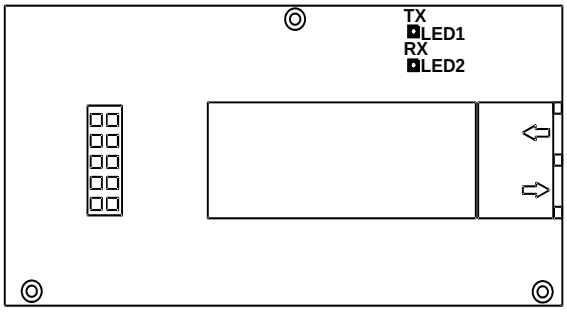
4.2.4 ECS-NVCM Fiber Modules

The ECS-NVCM supports two types of fiber-option modules to convert wire to fiber. For more information see Installation sheet PN LS10178-003TR-E.

- TR-FML (Fiber-Optic Multi-Mode, Receiver)



- TR-FSL (Fiber-Optic Single-Mode, Transmitter)



4.2.5 Installing the Microphone

To install the microphone follow these steps:

1. Hang the microphone onto the microphone clip.

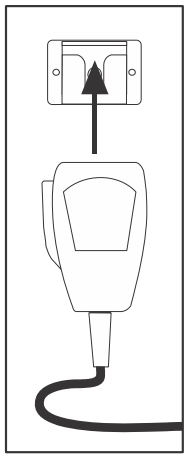


Figure 4.5 Hang Microphone onto Microphone Clip

2. Insert microphone cord through hole at the bottom of the dead front panel.

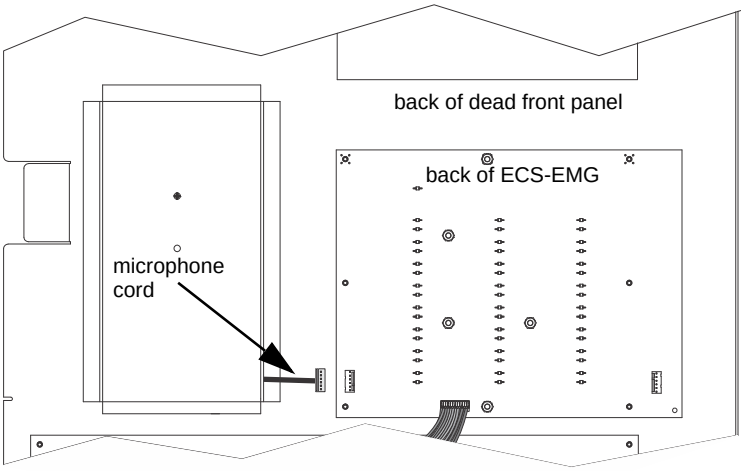


Figure 4.6 Inserting Microphone Cord Through Dead Front Panel Hole

3. Attach strain relief clip to microphone cord. The strain relief clip should have about 2.75” of microphone cord through it.

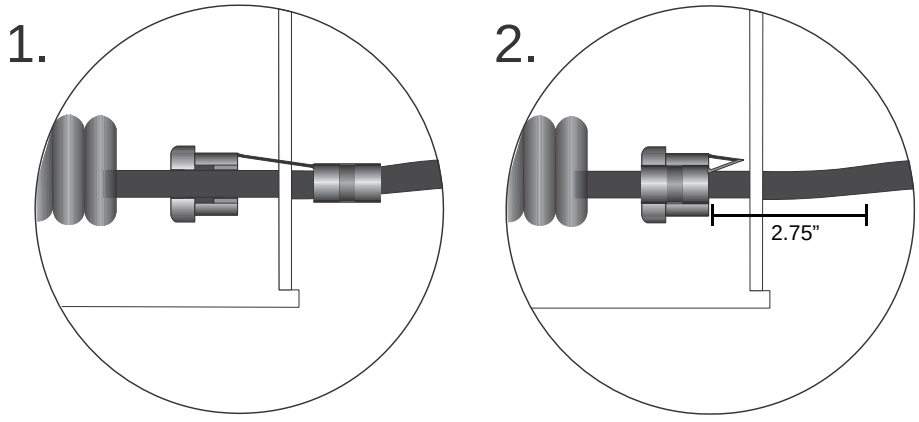


Figure 4.7 Installing Strain Relief Clip

4. Push the strain relief into the hole in the dead front panel.
5. Connect microphone to connector on ECS-EMG.

4.3 Installing the TR-50W

This section provides information on how to install the TR-50W for use with the ECS Series products.

4.3.1 TR-50W Board Layout

Figure 4.8 shows the location of terminals, DIP switches, and expander connection, used in the installation of the TR-50W.

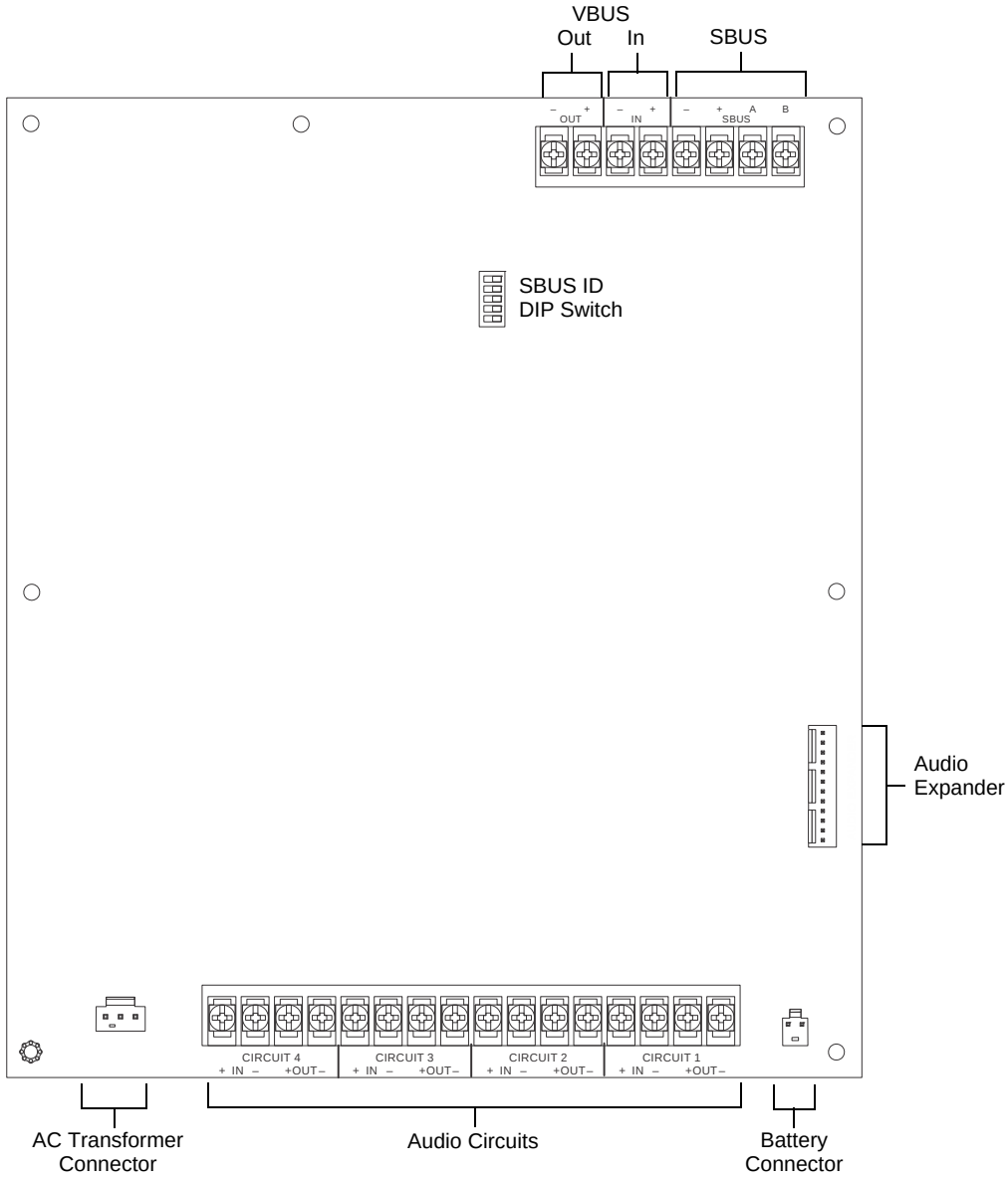


Figure 4.8 Components Layout of TR-50W

4.3.2 Mounting the TR-50W

The TR-50W is equipped with a separate enclosure. Refer to Section when selecting a mounting location for the TR-50W.

The panel should be accessible to main drop wiring runs. It should be mounted as close to the center of the building as possible and located within a secured area, but should be accessible for testing and service.

Mount the control panel cabinet so it is firmly secured to the wall surface. When mounting on concrete, especially when moisture is expected, attach a piece of ¾” plywood to the concrete surface and then attach the cabinet to the plywood. Also mount any other modules to the plywood.

The cabinet can be surface or flush-mounted. If you will be flush-mounting the cabinet, the hole for the enclosure should be 14.5" W x 24.75” H x 3.44” D (36.8cm W x 62.9cm H x 8.7cm D). Do not flush-mount in a wall designated as a fire break. The outside dimensions of the cabinet are 16" W x 26.5” H x 4.125” D (40.6cm W x 67.3cm H x 10.5cm D).

Follow these steps to properly mount the cabinet.

1. Mark and pre-drill hole in the wall for the center top keyhole mounting bolts using the dimensions below.

2. Install center top fastener in the wall with the screw head protruding.
3. Place backbox over the top screw, level and secure.
4. Mark and drill the lower mounting holes.
5. Install remaining fasteners and tighten.

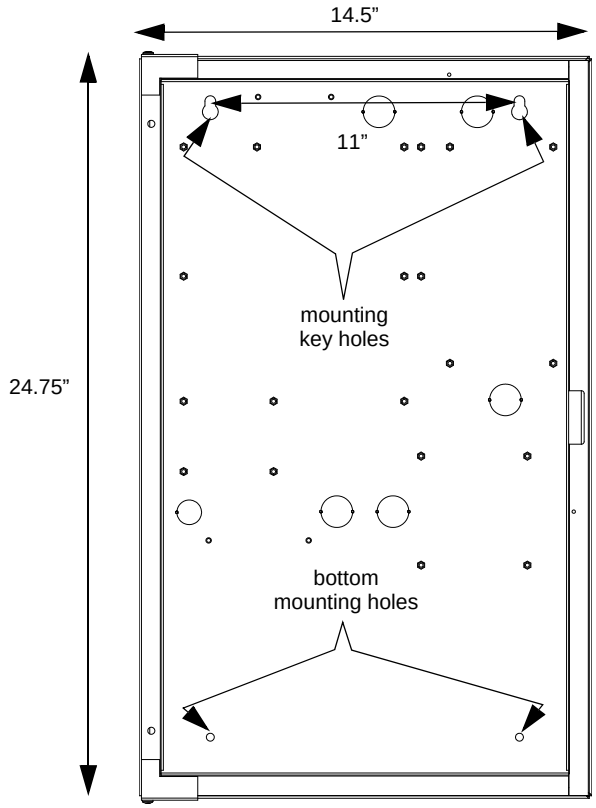


Figure 4.9 Amplifier Cabinet Flush-Mount Dimensions and Mounting Hole Locations

4.3.3 Mounting the ECS-50WBD Board Only

NOTE: Installation and wiring of this device must be done in accordance with NFPA 72 and local ordinance

1. Ensure AC and DC power have been removed from the panel.
2. If this module is a replacement for an existing TR-50W, remove the seven screws which secure the board to the enclosure.
3. Align the mounting holes over the PEM standoffs in the back of the cabinet.
4. Secure the board to the enclosure with the screws removed in step 2.

5. Restore AC power and reconnect the backup batteries.

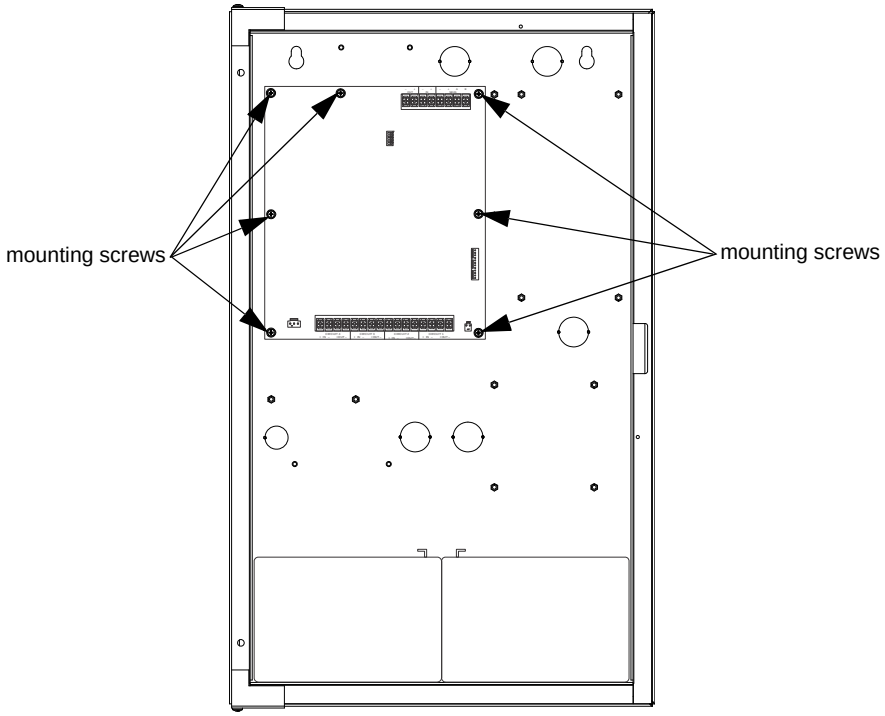


Figure 4.10 ECS-50WBD In Enclosure

4.3.4 Wiring Specifications

All wiring and devices installed in the system must meet the standards described in National Electrical Code (NFPA 70), NFPA Standard 72, and Life Safety Code (NFPA 101).

To avoid induced noise (transfer of electrical energy from one wire to another), keep input wiring isolated from high-current output and power wiring. Avoid pulling one multi-conductor cable for the entire panel.

Separate wiring as follows:

Maintain 0.25” spacing between each of these circuit types; as well as between power-limited and non power-limited circuits.	Input/Output Type:	Wiring
	Non Power-Limited:	AC power, Standby batteries
	Power-Limited:	SBUS, VBUS
	Audio:	Speaker

DO NOT pull wires from different groups through the same conduit.

Twisted, shielded wire is recommended for all audio circuits to provide the maximum protection against EMI and AFI emission and susceptibility.

If using shielded cable, attach the shield to earth ground on the control panel.

For the same reasons, wiring within the cabinet should be routed around the perimeter of the cabinet. It should not cross the printed circuit board where it could induce noise into the sensitive microelectronics or pick up unwanted RF noise from the high speed circuits.

High frequency noise, such as that produced by the inductive 2 reactance of a speaker or bell, can also be reduced by running the wire through ferrite beads or by wrapping it around a ferrite toroid core. Figure 4.11 provides an example.

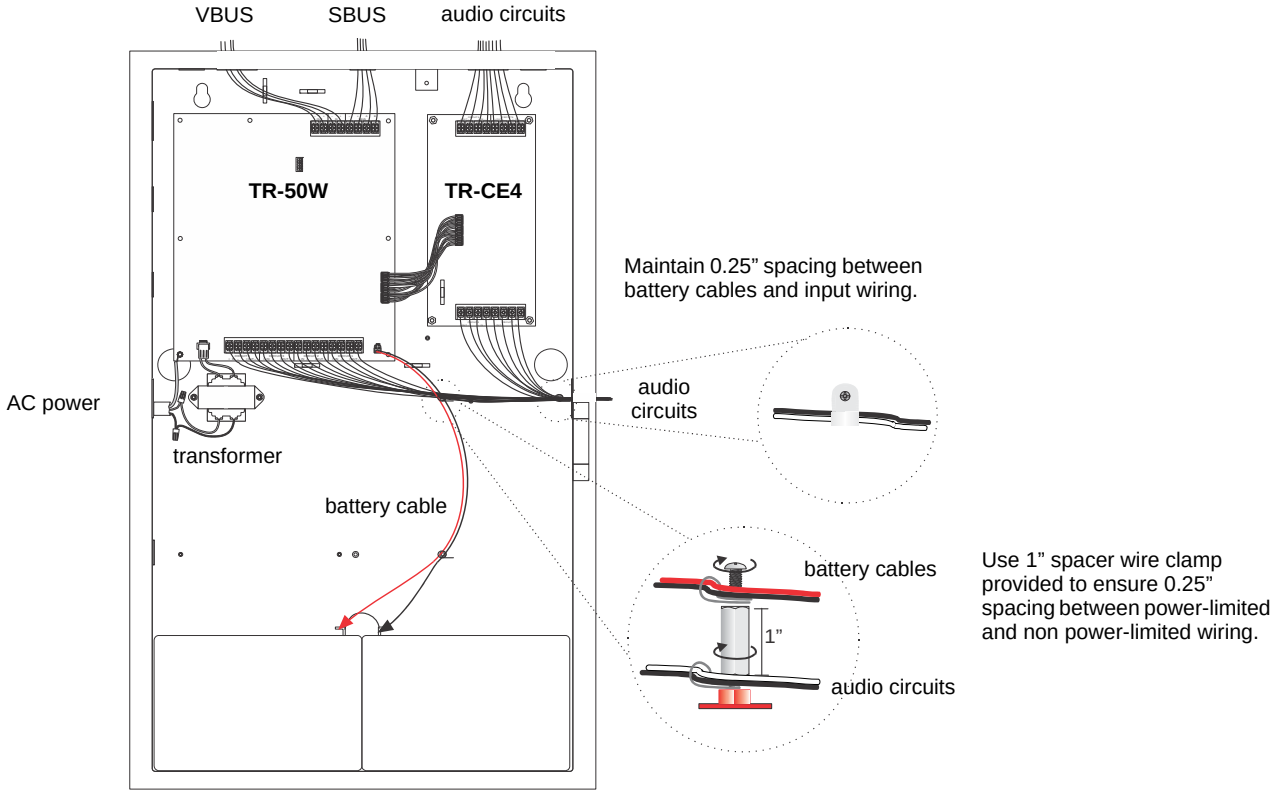


Figure 4.11 Wire Routing Example for the TR-50W

4.3.5 Speaker Wiring

Each TR-50W supplies four NAC (Notification Appliance Circuit) for speaker connection. The speaker circuit can be supervised and wired Class B or Class A. The speaker circuit is capable of 50 watts of power at 25 Vrms or 70.7 Vrms.

Wiring Lengths

Number Of Speakers		Total Load		Wire Distance in Feet			
@1/2 W	@1 W	Vrms	Watts	18 AWG	16 AWG	14 AWG	12 AWG
10	5	25Vrms	5W	3900	6200	9860	15680
		70Vrms		25000	39700	63200	100520
20	10	25Vrms	10W	2125	3380	5375	8540
		70Vrms		15200	24150	38400	61100
30	15	25Vrms	15W	1460	2320	3690	5870
		70Vrms		11000	17500	27800	44200
40	20	25Vrms	20W	1100	1750	2780	4420
		70Vrms		8500	13510	21500	34175
52	26	25Vrms	26W	760	1200	1920	3050
		70Vrms		6100	9700	15400	24520
80	40	25Vrms	40W	550	875	1390	2200
		70Vrms		4100	6500	10360	16480
100	50	25Vrms	50W	450	715	1130	1800
		70Vrms		3500	5560	8850	14070

NOTE: The above table assumes a uniform distribution of the speakers, and that a max of 20% voltage drop on the last speaker is allowed

Class B Speaker Configuration

Figure 4.12 illustrates how to wire speakers to the control panel using Class B supervision.

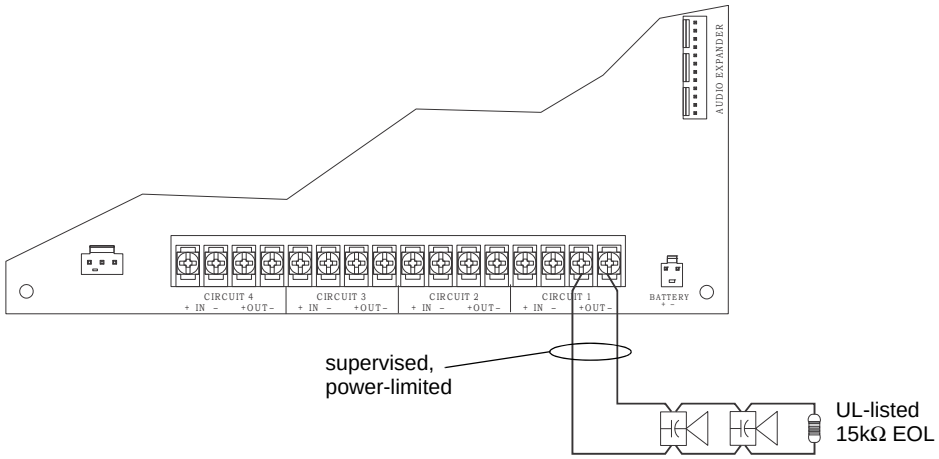


Figure 4.12 Class B Speaker Configuration

Class A Speaker Configuration

Figure 4.13 illustrates how to wire speakers to the control panel using Class A wiring.

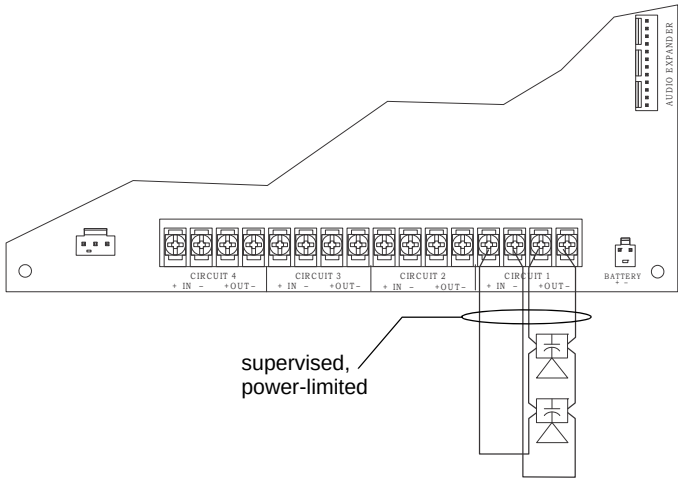


Figure 4.13 Class A Speaker Configuration

4.3.6 VBUS Wiring

The VBUS is an analog voice bus that carries the recorded voice messages from the ECS-NVCM to the TR-50W, or the voice messages generated from a system microphone to the TR-50W. The maximum resistance on the VBUS is 20Ω.

Connect the VBUS from the ECS-NVCM as shown in Figure 4.14.

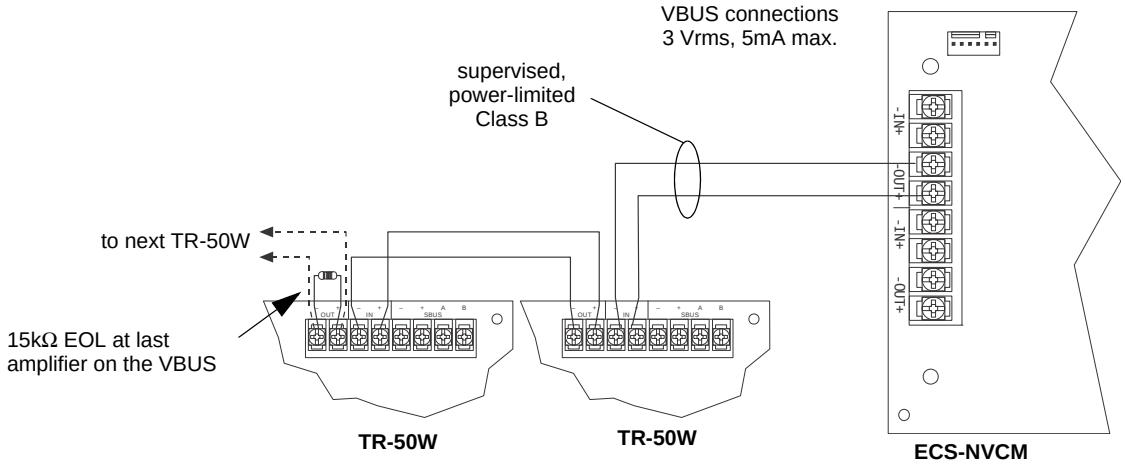


Figure 4.14 VBUS Wiring for the ECS-NVCM to the TR-50W

4.3.7 SBUS Wiring

This section contains information on how to connect up to 16 TR-50W amplifiers onto the main control SBUS. Refer to the FACP manual for SBUS specifications. Wire the SBUS as shown in Figure 4.15.

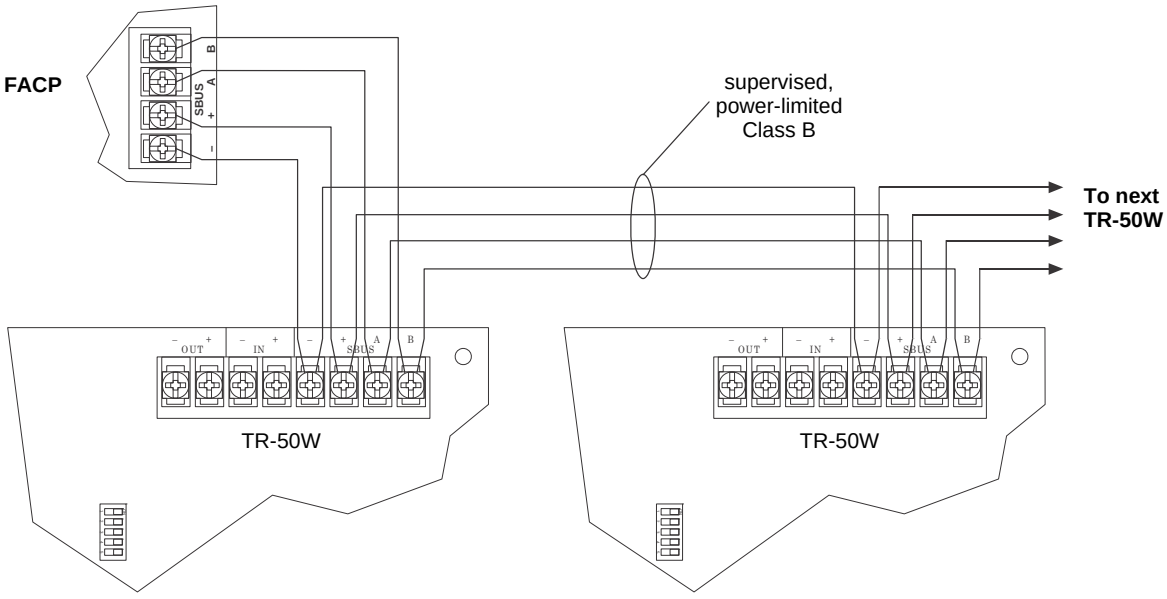


Figure 4.15 Connecting TR-50W Amplifiers to the SBUS

See Section 4.10 for information on setting SBUS addresses.

4.3.8 Connecting AC Power

The AC inputs are rated as 240 VAC, 50/60 Hz (transformer P/N 29201).

To install the AC transformer into the TR-50W cabinet follow these steps:

1. Open the cabinet door.
2. To access cabinet interior, open the dead-front panel by removing the upper screw and the mid-door retaining screw.

3. Mount the transformer onto the threaded cabinet transformer mounting studs using the supplied locking hex nuts as shown in Figure 4.16.

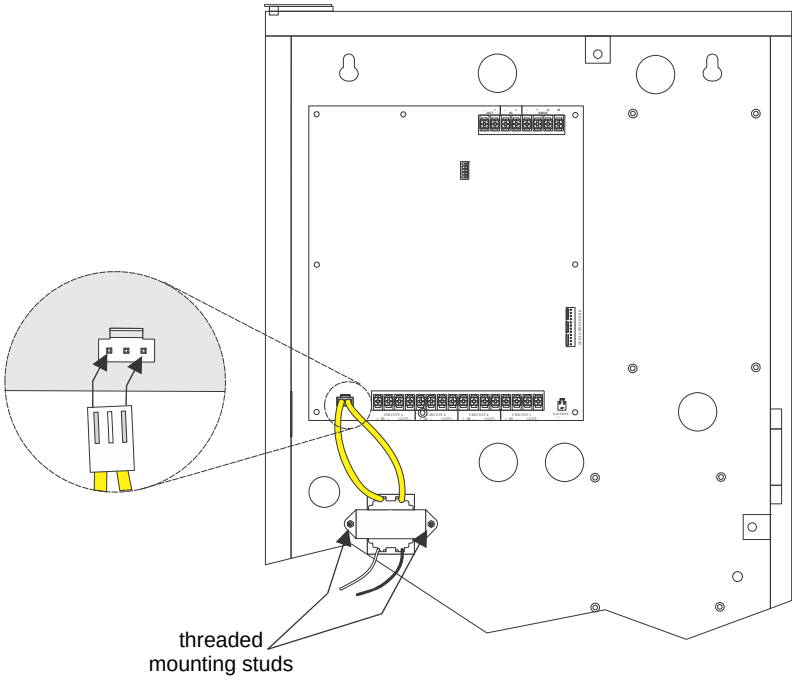


Figure 4.16 Transformer Mounting

4. Connect AC power to the transformer as shown in Figure 4.17.
5. Plug the transformer output to the AC connector on the control panel as shown below.

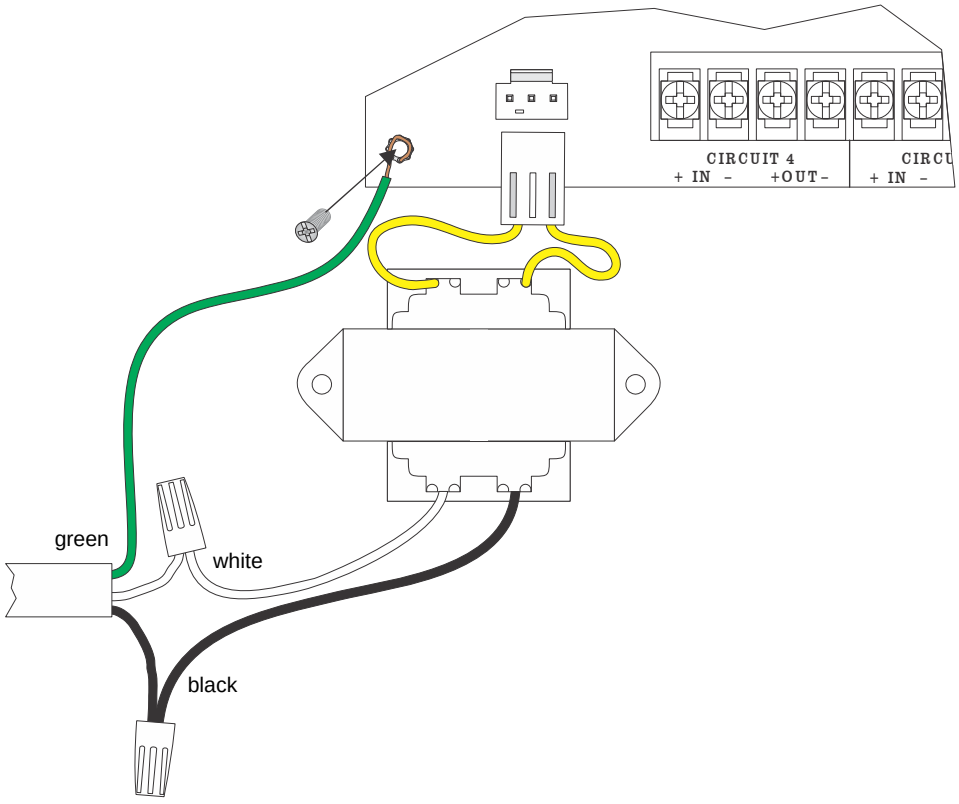


Figure 4.17 AC Connections

4.3.9 Backup Battery for TR-50W

The following steps explain how to connect the batteries (refer to Figure 4.18):

1. Connect the black wire of the battery harness to the (-) side of the battery #2.
2. Connect the jumper wire provided form the positive (+) side of battery #2 to the negative side of battery #1.
3. Connect the red wire from the battery harness to the positive (+) side of battery #1.

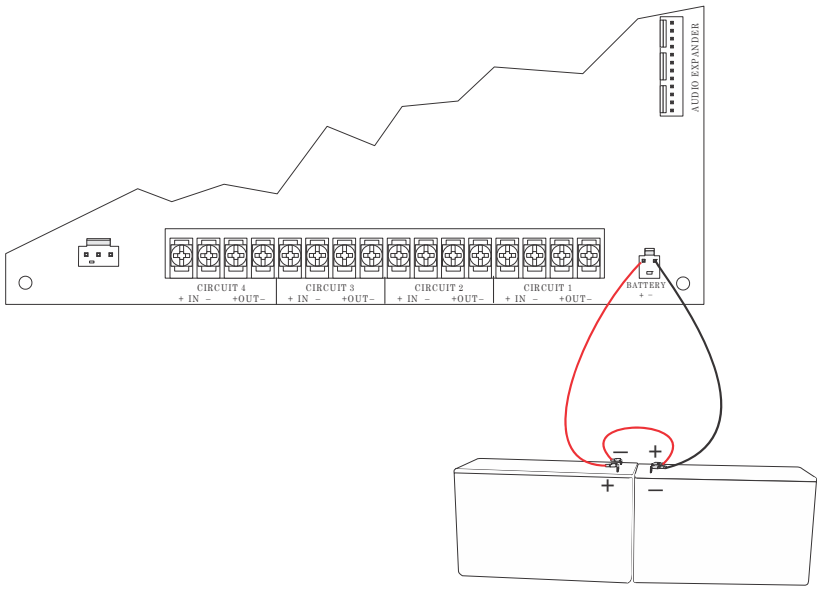


Figure 4.18 Battery Connections to the TR-50W

4.3.10 Calculating Current Draw and Standby Battery

This section helps you determine the current draw and standby battery needs for your installation (18 ampere hours max. will fit in cabinet). These capacities have a built-in 20% derating factor. Complete the remaining instructions in Table 4.1.

Batteries larger than 18 AH will not fit in the main control cabinet, and must be housed in the RBB Accessory Battery Cabinet. The system supports a maximum of 33 AH batteries.

	Device	No. of Devices	Current Per Device	Standby Current	Alarm Current
	TR-50W 25V	1	Standby: 85 mA	85 mA	
			Alarm: 525 mA		525 mA
	TR-50W 70.7V	1	Standby: 100 mA	100 mA	
			Alarm: 580 mA		580 mA
	TR-CE4	0 or 1	Standby: 20 mA	20mA	
			Alarm (All Channels): 180 mA		180 mA
A	Current Subtotals:			mA	mA
	Notification Devices	Refer to device manual for number of devices and current ratings.			
B	Current Subtotals:			mA	mA
C	Total current rating of all devices in system (Line B) X 0.001			A	A
D	Number of standby hours (24 or 60 for NFPA 72)			H	
E	Multiply line C (standby current) and D: **Total standby AH**			AH	
F	Alarm sounding period in hours (For example, 5 minutes = 0.0833 hours):				H
G	Multiply line C (alarm current) and F: **Total alarm AH**				AH
H	Add lines E and G (AH = Ampere Hours): **Total AH required**			AH	

Table 4.1 Current Draw TR-50W and TR-CE4

4.4 Installing the TR-INT50W

This section provides information on how to install the TR-INT50W for use with the ECS Series products. The TR-INT50W Internal Amplifier can fit inside the TR-2100 cabinet with the ECSTR-AMPMT mounting kit (sold separately). It is used to amplify the audio message for distribution throughout the facility for the Emergency Communication System.

4.4.1 Board Layout & Mounting

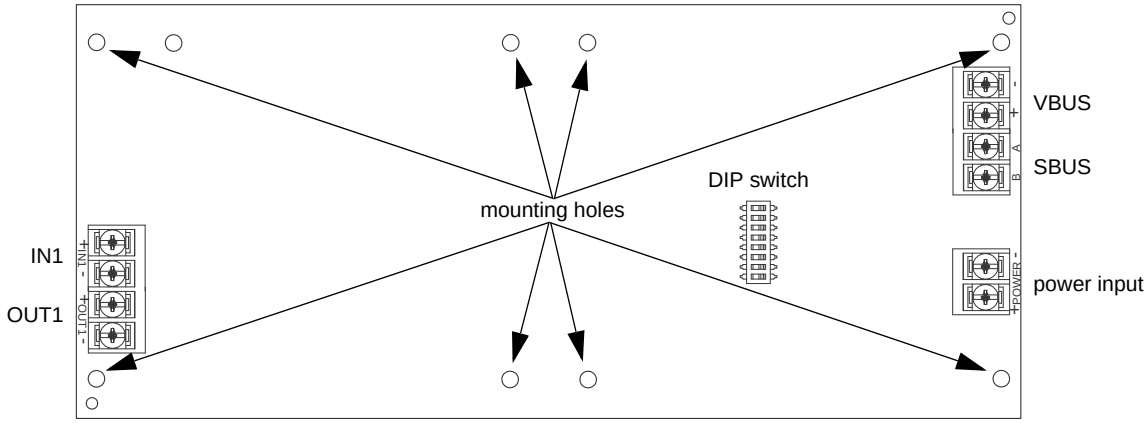


Figure 4.19 TR-INT50W Board Layout

Mounting the TR-INT50W

1. Remove AC power and disconnect the backup batteries from the main control panel.
2. To mount the TR-INT50W inside the FACP cabinet below the main board, align the board with the mounting holes and secure the board to the enclosure with the eight supplied screws.

When mounting the TR-INT50W in the ECS cabinet that contains an ECS-NVCM, it is necessary to mount the TR-INT50W on the right side of the control board. To do this, you will need the ECS-AMPMT mounting kit (ordered separately).

1. Mount the ECS-AMPMT plate into the cabinet using the six supplied screws. Orient with “Top” side up.

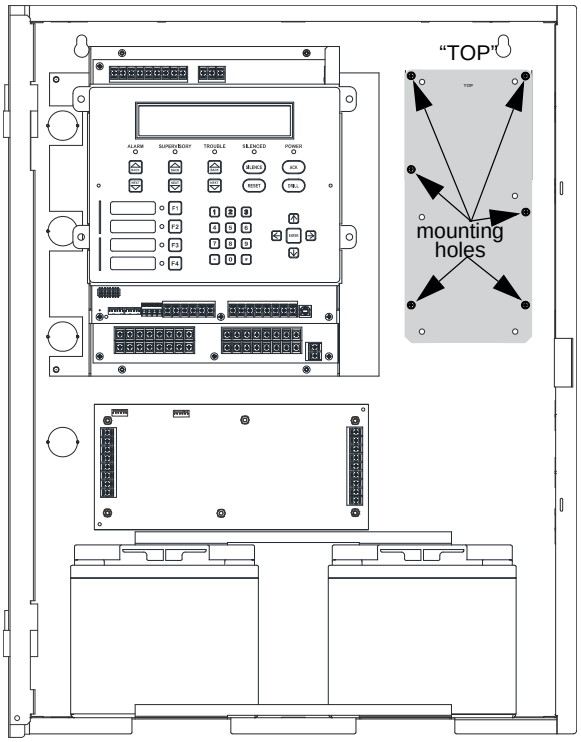


Figure 4.20 ECS-AMPMT installed in Cabinet

2. Secure the TR-INT50W onto the six PEM studs on the mounting plate with six supplied screws. Ensure the side with only one terminal block is at the top of the ECS-AMPMT. See the figure below.

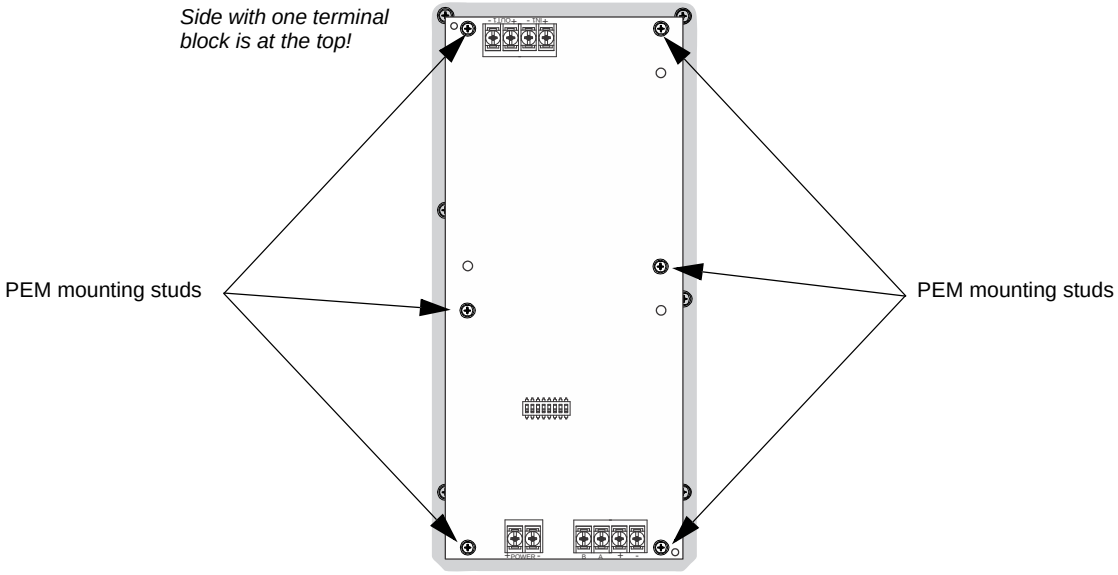


Figure 4.21 TR-INT50W Installed Using the ECS-AMPMT

4.4.2 Wiring to an FACP

See Figure 4.22 to properly wire the SBUS and power of the TR-INT50W to the FACP.

The internal amplifier must be powered by either a NAC programmed as constant auxiliary power or by an auxiliary power supply UL-listed for fire protective signaling. Refer to the FACP installation manual for more information.

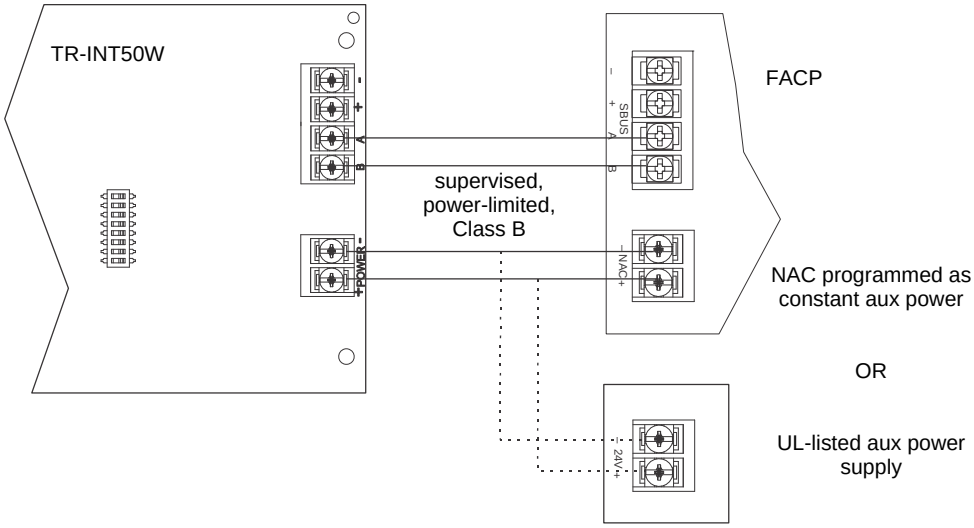


Figure 4.22 Wiring the TR-INT50W to the FACP

4.4.3 VBUS Wiring

The VBUS is an analog voice bus that carries the recorded voice messages from the ECS-NVCM to the TR-INT50W amplifiers, or the voice messages generated from a system microphone to the TR-INT50W.

The maximum resistance on the VBUS is 20Ω.

Connect the VBUS from the ECS-NVCM to the TR-INT50W as shown in Figure 4.23.

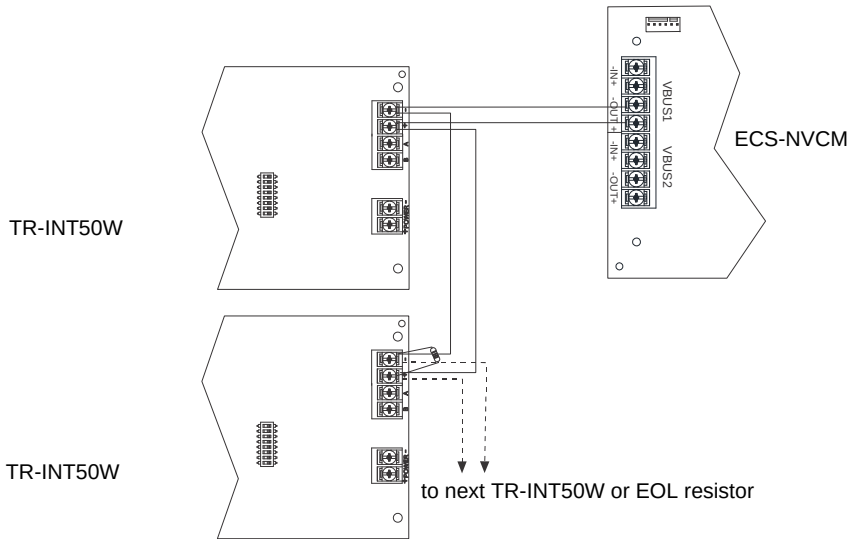


Figure 4.23 VBUS Wiring for ECS-NVCM to TR-INT50W

4.4.4 Setting the Device Address

Use the onboard DIP switches to select an ID number for the TR-INT50W. Refer to Figure 4.58 on page 49 to set the DIP switches for the desired ID number.

Once the ID number is set, add the TR-INT50W to the system through programming.

NOTE: The TR-INT50W is powered by a NAC on the FACP or by an auxiliary power supply. It will not be found using JumpStart AutoProgramming.

4.4.5 Speaker Wiring

Each TR-INT50W supplies one circuit for speaker connection. The speaker circuit can be supervised and wired Class B or Class A. The speaker circuit is capable of 50 watts of power at 25 Vrms or 70.7 Vrms. See Section 4.3.5 for wire lengths.

4.4.6 Calculating Current Draw and Standby Battery

This section helps to determine the current draw and standby battery needs for your installation. These capacities have a built-in 20% derating factor. Complete the remaining instructions in Table 4.2.

Batteries larger than 18 AH will not fit in the main control cabinet, and must be housed in the RBB Accessory Battery Cabinet. The system supports a maximum of 33 AH batteries.

	Device	No. of Devices	Current Per Device	Standby Current	Alarm Current
	TR-INT50W 25V	1	Standby: 52 mA	52mA	
			Alarm: 275 mA		275mA
	TR-INT50W 70V	1	Standby: 52 mA	52mA	
			Alarm: 310 mA		310mA
A	Current Subtotals:			mA	mA
	Notification Devices	Refer to device manual for number of devices and current ratings.			
B	Current Subtotals:			mA	mA
C	Total current rating of all devices in system (Line B) X 0.001			A	A
D	Number of standby hours (24 or 60 for NFPA 72)			H	
E	Multiply line C (standby current) and D: **Total standby AH**			AH	
F	Alarm sounding period in hours (For example, 5 minutes = 0.0833 hours):				H
G	Multiply line C (alarm current) and F: **Total alarm AH**				AH
H	Add lines E and G (AH = Ampere Hours): **Total AH required**			AH	

Table 4.2 Current Draw Calculations

4.5 Installing the TR-125W

This section provides information on how to install the TR-125W for use with Triga ECS series products.

4.5.1 TR-125W Board Layout

Figure 4.24 shows the location of terminals, DIP switches, and expander connections used in the installation of the TR-125W.

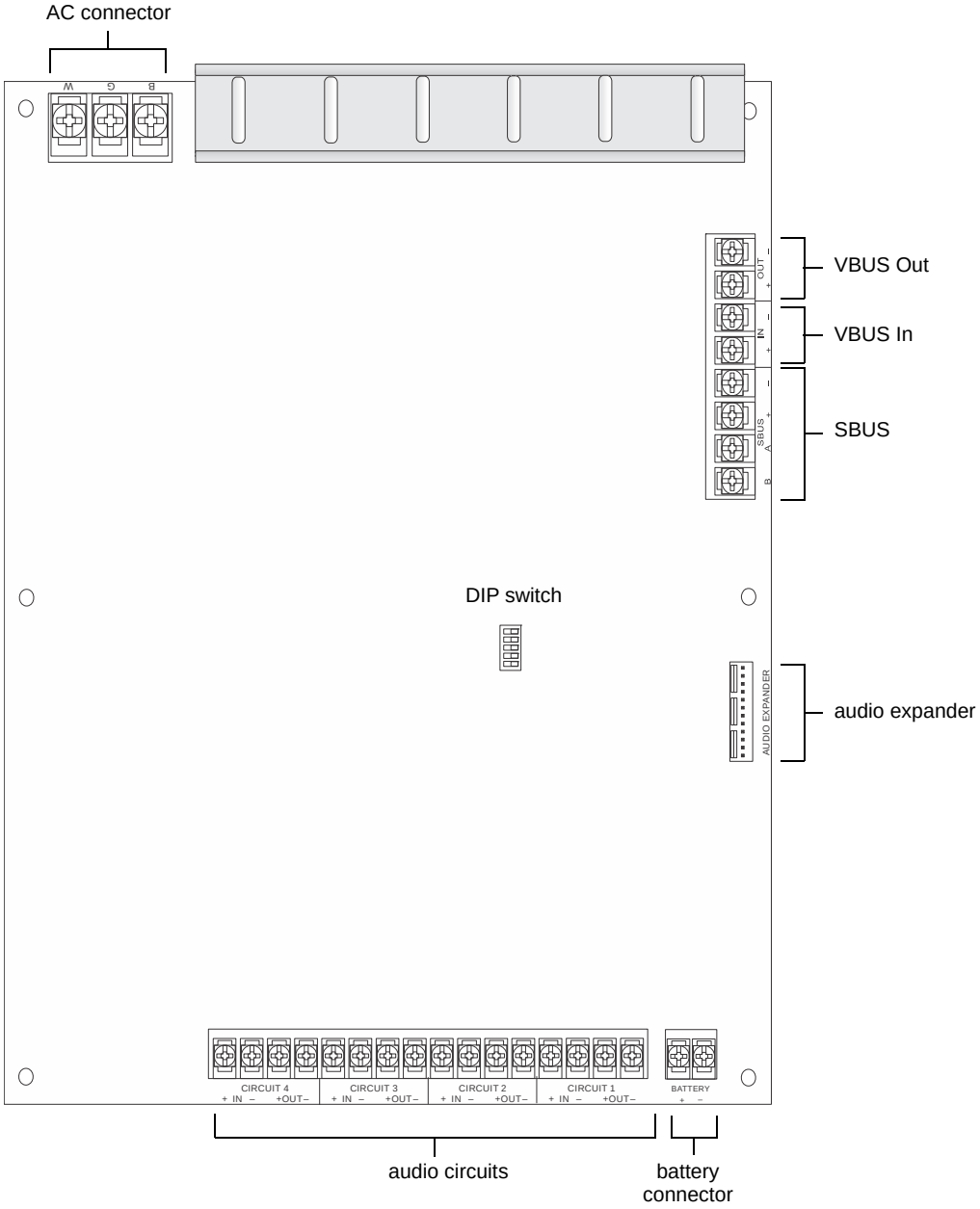


Figure 4.24 TR-125W Board Layout

4.5.2 Mounting the TR-125W

The TR-125W is equipped with a separate enclosure. Refer to Section 3.1 when selecting a mounting location for the TR-125W.

The panel should be accessible to main drop wiring runs. It should be mounted as close to the center of the building as possible and located within a secured area, but should be accessible for testing and service.

Mount the control panel cabinet so it is firmly secured to the wall surface. When mounting on concrete, especially when moisture is expected, attach a piece of ¾-inch plywood to the concrete surface and then attach the cabinet to the plywood. Also, mount any other modules to the plywood.

The cabinet can be surface or flush-mounted. For flush-mounting the cabinet, the hole for the enclosure should be 14.5" W x 24.75" H x 3.44” D (36.8cm W x 62.9cm H x 8.7cm D). Do not flush-mount in a wall designated as a fire break. The outside dimensions of the cabinet are 16" W x 26.25” H x 4.125” D (40.6cm W x 66.7cm H x 10.5cm D).

Follow these steps to properly mount the cabinet.

1. Mark and pre-drill hole in the wall for the center top keyhole mounting bolts using the dimensions below.
2. Install center top fastener in the wall with the screw head protruding.
3. Place backbox over the top screw, level and secure.
4. Mark and drill the lower mounting holes.
5. Install remaining fasteners and tighten.

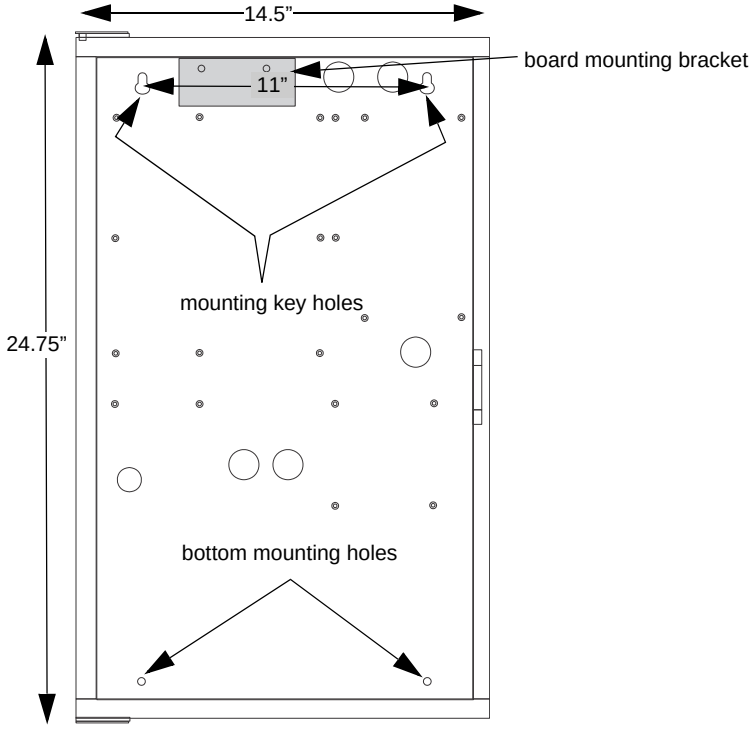


Figure 4.25 Cabinet Flush-Mount Dimensions and Mounting Hole Locations

4.5.3 Mounting the ECS-125WBD Board Only

NOTE: Installation and wiring of this device must be done in accordance with NFPA 72 and local ordinance

1. Ensure AC and DC power have been removed from the panel.
2. If this module is a replacement for an existing TR-125W, remove the screws which secure the board to the enclosure.

3. Secure the supplied “L-shaped” bracket to the top mounting bracket on the ECS-125WBD with the two mounting screws.

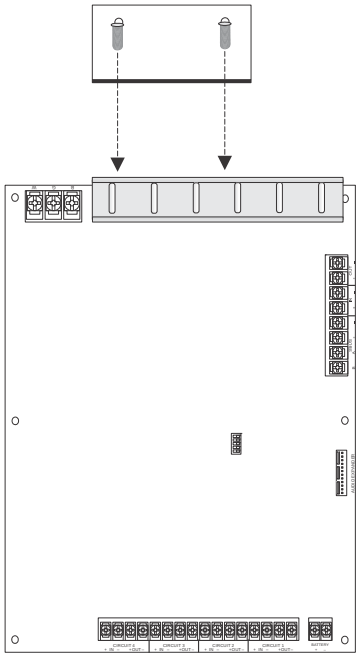


Figure 4.26 ECS-125WBD Mounting Bracket

4. Align the mounting holes on the bracket with the enclosure.
5. Secure the board to the enclosure.
6. Restore AC power and reconnect the backup batteries.

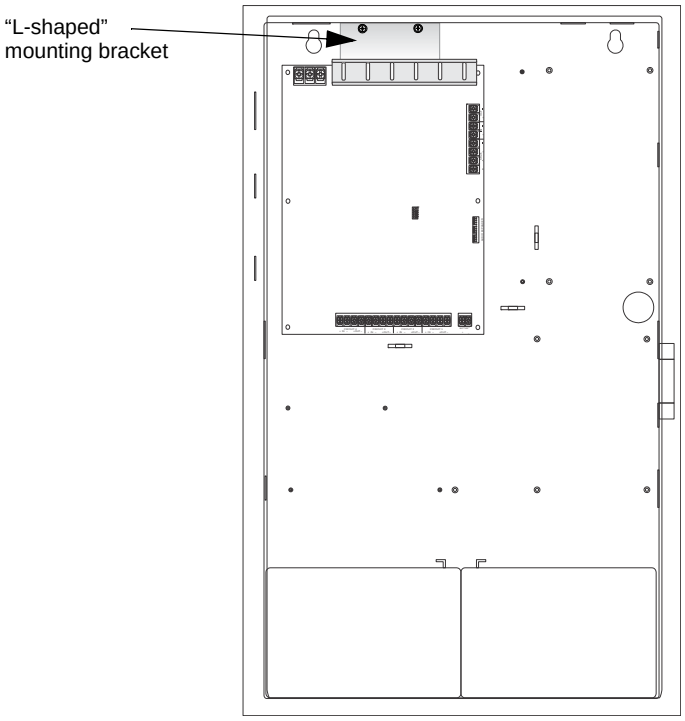


Figure 4.27 ECS-125WBD In Enclosure

4.5.4 Wiring Specifications

All wiring and devices installed in the system must meet the standards described in National Electrical Code (NFPA 70), NFPA Standard 72, and Life Safety Code (NFPA 101).

To avoid induced noise (transfer of electrical energy from one wire to another), keep input wiring isolated from high-current output and power wiring. Avoid pulling one multi-conductor cable for the entire panel.

Separate wiring as follows:

Maintain 0.25” spacing between each of these circuit types; as well as between power-limited and non power-limited circuits.	Input/Output Type:	Wiring
	Non Power-Limited:	AC power, Standby batteries
	Power-Limited:	SBUS, VBUS
	Audio:	Speaker

DO NOT pull wires from different groups through the same conduit.

Twisted, shielded wire is recommended for all audio circuits to provide the maximum protection against EMI and AFI emission and susceptibility.

If using shielded cable, attach the shield to earth ground on the control panel.

For the same reasons, wiring within the cabinet should be routed around the perimeter of the cabinet. It should not cross the printed circuit board where it could induce noise into the sensitive microelectronics or pick up unwanted RF noise from the high speed circuits.

High frequency noise, such as that produced by the inductive reactance of a speaker or bell, can also be reduced by running the wire through ferrite beads or by wrapping it around a ferrite toroid core. Figure 4.28 provides an example.

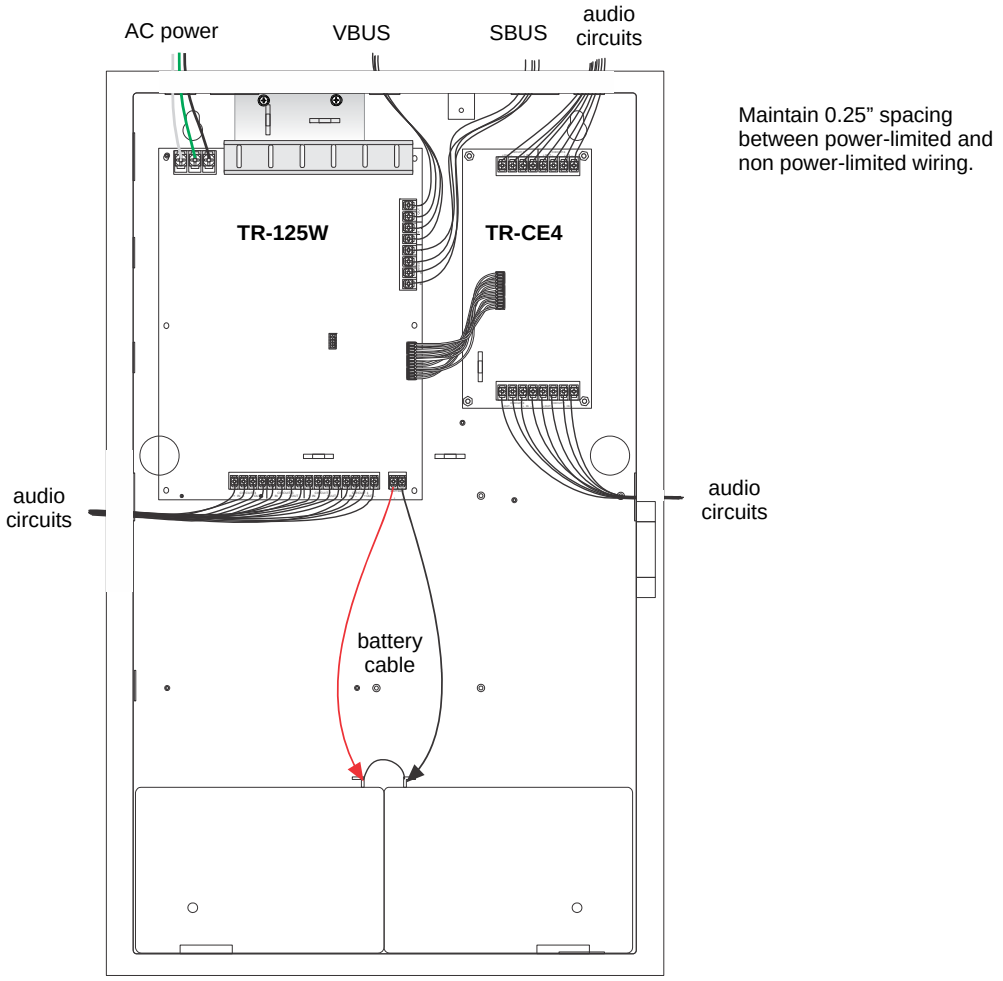


Figure 4.28 Wire Routing Example for the TR-125W

4.5.5 Speaker Wiring

Each TR-125W supplies four NACs (Notification Appliance Circuits) for speaker connection. The speaker circuit can be supervised and wired Class B or Class A. Speaker circuit 1 is capable of 100 watts of power at 25 Vrms. Speaker circuit 2-4 are capable of 50 watts (each) at 25 Vrms.

Wiring Lengths

Number Of Speakers		Total Load		Wire Distance in Feet			
@1/2 W	@1 W	Vrms	Watts	18 AWG	16 AWG	14 AWG	12 AWG
10	5	25Vrms	5W	3900	6200	9860	15680
20	10	25Vrms	10W	2125	3380	5375	8540
30	15	25Vrms	15W	1460	2320	3690	5870
40	20	25Vrms	20W	1100	1750	2780	4420
52	26	25Vrms	26W	760	1200	1920	3050
80	40	25Vrms	40W	550	875	1390	2200
100	50	25Vrms	50W	450	715	1130	1800
150	75	25Vrms	75W	300	476	753	1200
200	100	25Vrms	100W	225	357	565	900
250	125	25Vrms	125W	180	285	452	720

Table 4.3 TR-125W Wire Lengths

NOTE: The above table assumes a uniform distribution of the speakers, and that a max of 20% voltage drop on the last speaker is allowed.

Class B

Figure 4.29 illustrates how to wire speakers to the control panel using Class B supervision.

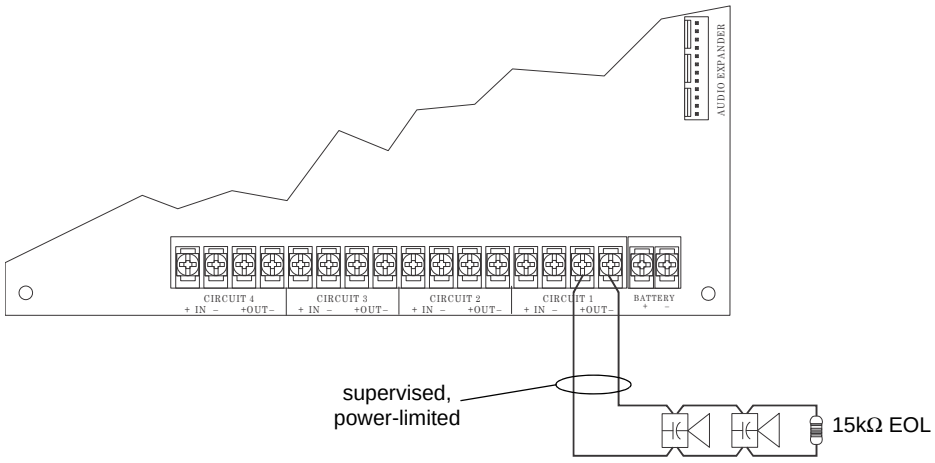


Figure 4.29 Class B Speaker Configuration

Class A

Figure 4.30 illustrates how to wire speakers to the control panel using Class A wiring.

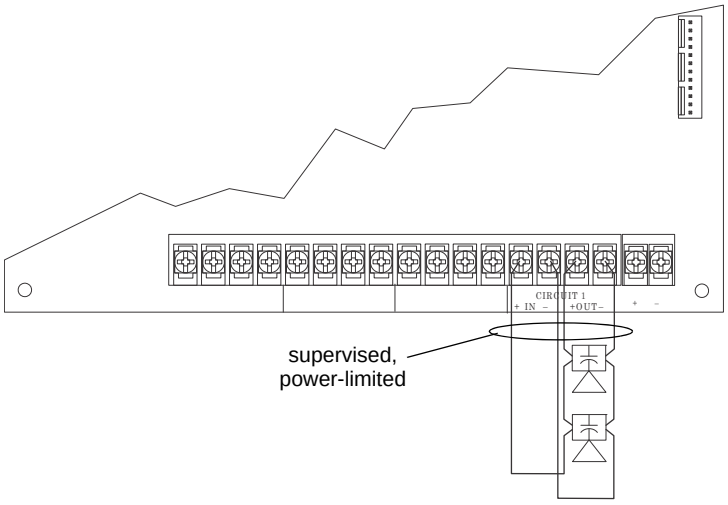


Figure 4.30 Class A Speaker Configuration

4.5.6 VBUS Wiring

The VBUS is an analog voice bus that carries the recorded voice messages from the ECS-NVCM to the TR-125W or the voice messages generated from a system microphone to the TR-125W. The maximum resistance on the VBUS is 20Ω.

Connect the VBUS from the ECS-NVCM to the TR-125W as shown in Figure 4.31.

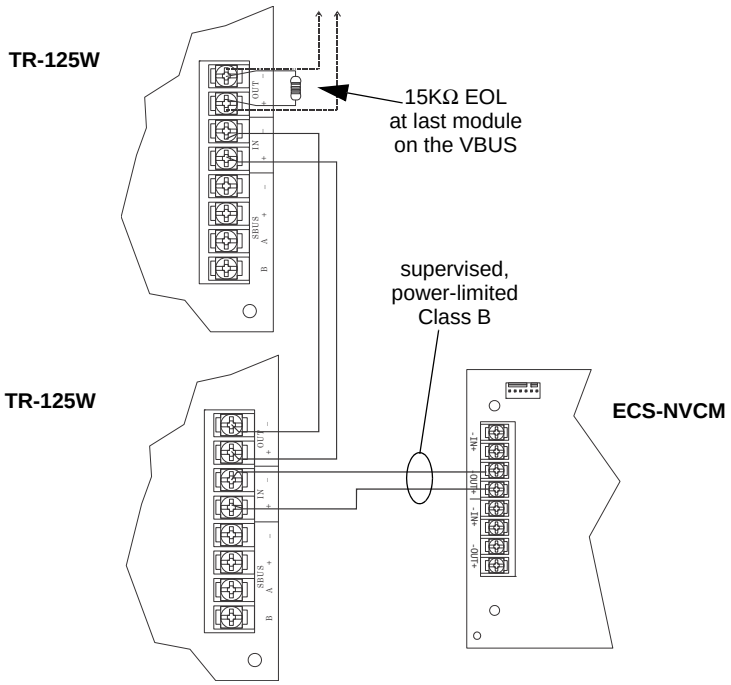


Figure 4.31 VBUS Wiring for ECS-NVCM

4.5.7 SBUS Wiring

This section contains information on how to connect TR-125W amplifiers (up to 16 for TR-2100ECS) onto the main control SBUS. Refer to Section 4 of the FACP Installation manual for SBUS specifications. Wire the SBUS as shown in Figure 4.32 using the ECS-NVCM.

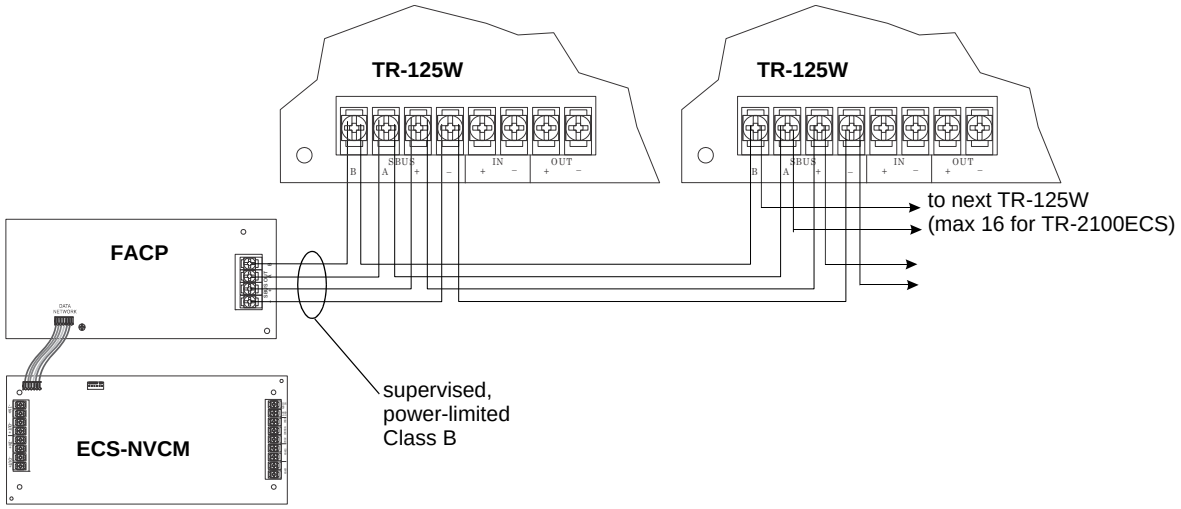


Figure 4.32 Connecting TR-125W Amplifiers to the SBUS using the ECS-NVCM

See Section 4.10 for information on setting SBUS addresses.

4.5.8 Connecting AC Power

Connect the AC terminals to the power source as shown in Figure 4.33. It may be necessary for a professional electrician to make this connection.

The AC terminals are rated as 240VAC, 50Hz.

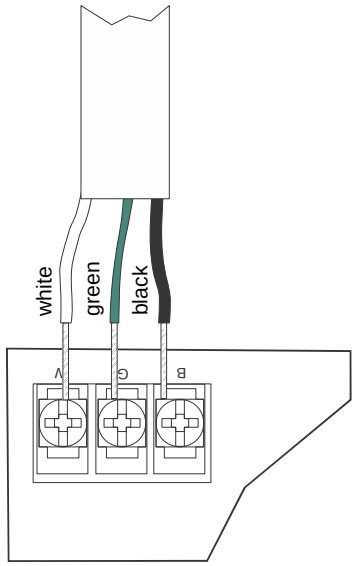


Figure 4.33 AC Connection

4.5.9 Backup Battery for TR-125W

The following steps explain how to connect the batteries (refer to Figure 4.34):

1. Connect the black wire of the battery harness to the (-) side of the battery #2.
2. Connect the jumper wire provided form the positive (+) side of battery #2 to the negative side of battery #1.
3. Connect the red wire from the battery harness to the positive (+) side of battery #1.

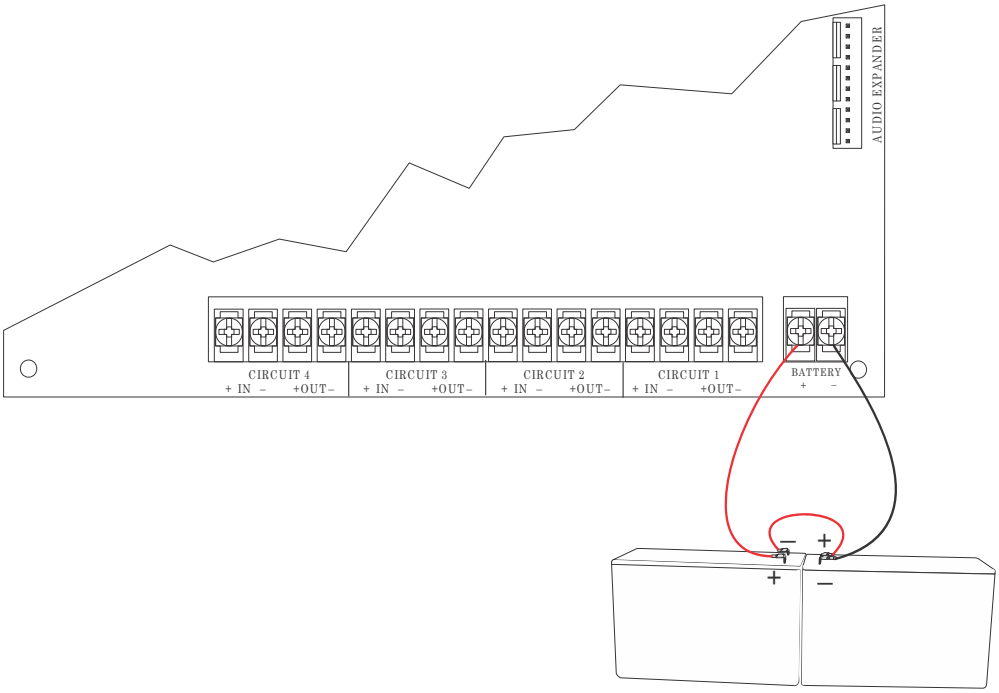


Figure 4.34 Battery Connection to TR-125W

4.5.10 Calculating Current Draw and Standby Battery

This section helps you determine the current draw and standby battery needs for your installation (18 Ampere Hours maximum will fit in cabinet). These capacities have a built-in 20% derating factor. Complete the remaining instructions in Table 4.4.

Batteries larger than 18 AH will not fit in the main control cabinet, and must be housed in the RBB Accessory Battery Cabinet. The system supports a maximum of 35 AH batteries.

	Device	No. of Devices	Current Per Device	Standby Current	Alarm Current
	TR-125W	1	Standby: mA	mA	
			Alarm: mA		mA
	TR-CE4	0 or 1	Standby: 20 mA	20mA	
			Alarm (All Channels): 180 mA		180mA
A	Current Subtotals:			mA	mA
	Notification Devices	Refer to device manual for number of devices and current ratings.			
B	Current Subtotals:			mA	mA
C	Total current rating of all devices in system (Line B) X 0.001			A	A
D	Number of standby hours (24 or 60 for NFPA 72)			H	
E	Multiply line C (standby current) and D: **Total standby AH**			AH	
F	Alarm sounding period in hours (For example, 5 minutes = 0.0833 hours):				H
G	Multiply line C (alarm current) and F: **Total alarm AH**				AH
H	Add lines E and G (AH = Ampere Hours): **Total AH required**			AH	

Table 4.4 Current Draw TR-125W

4.6 Installing the TR-DUAL50W

This section provides information on how to install the TR-DUAL50W for use with the TR-2100ECS.

4.6.1 TR-DUAL50W Board Layout

Figure 4.35 shows the location of terminals, DIP switches and expander connection used in the installation of the TR-DUAL50W.

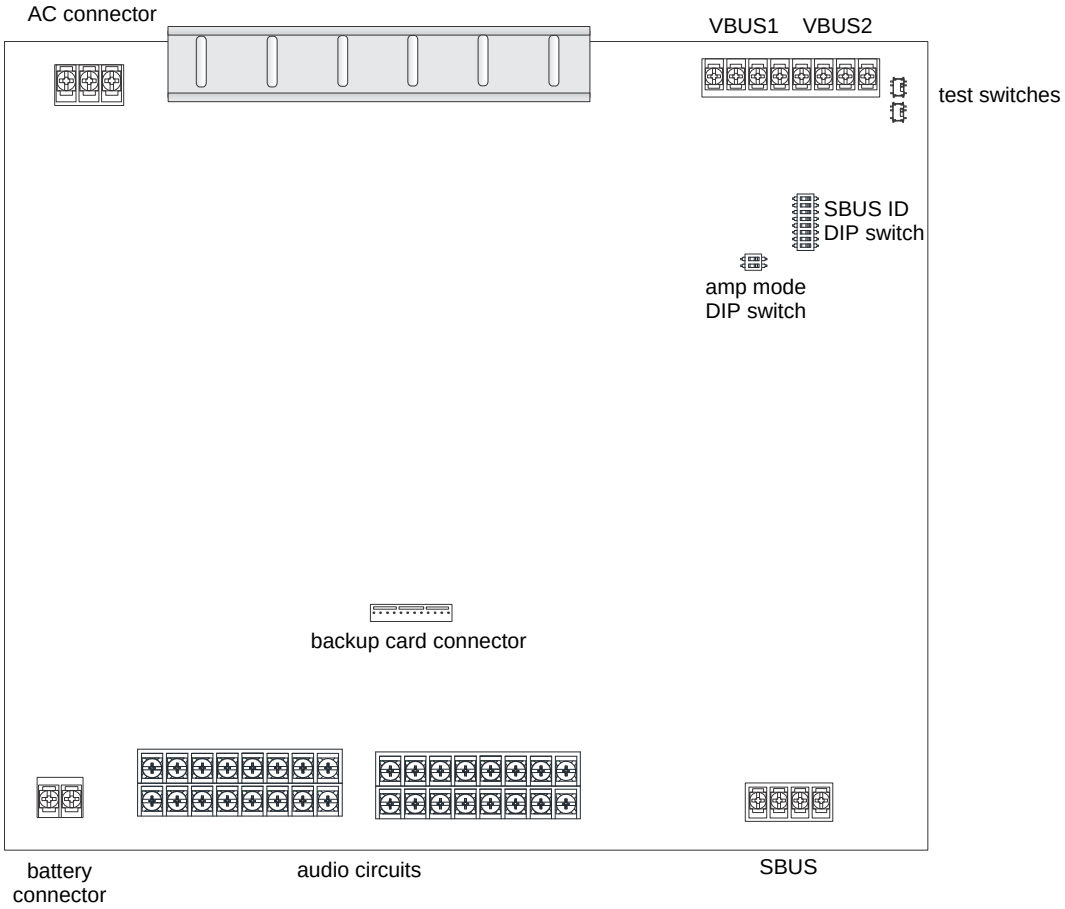


Figure 4.35 Components Layout for TR-DUAL50W

4.6.2 Mounting the TR-DUAL50W

The TR-DUAL50W is equipped with a separate enclosure. Refer to Section 3.1 when selecting a mounting location for the TR-DUAL50W.

The panel should be accessible to main drop wiring runs. It should be mounted as close to the center of the building as possible and located within a secured area, but should be accessible for testing and service.

Mount the control panel cabinet so it is firmly secured to the wall surface. When mounting on concrete, especially when moisture is expected, attach a piece of ¾” plywood to the concrete surface and then attach the cabinet to the plywood. Also mount any other modules to the plywood.

The cabinet can be surface or flush-mounted. If you will be flush-mounting the cabinet, the hole for the enclosure should be 14.5" W x 24.75" H x 3.4375” D (36.8cm W x 62.9cm H x 8.7cm D). Do not flush-mount in a wall designated as a fire break. The outside dimensions of the cabinet are 16.1" W x 26.5” H x 4.125” D (40.9cm W x 67.3cm H x 10.5cm D).

Follow these steps to properly mount the cabinet.

Follow these steps to properly mount the cabinet.

1. Mark and pre-drill hole in the wall for the center top keyhole mounting bolts using the dimensions below.
2. Install center top fastener in the wall with the screw head protruding.
3. Place backbox over the top screw, level and secure.
4. Mark and drill the lower mounting holes.
5. Install remaining fasteners and tighten.

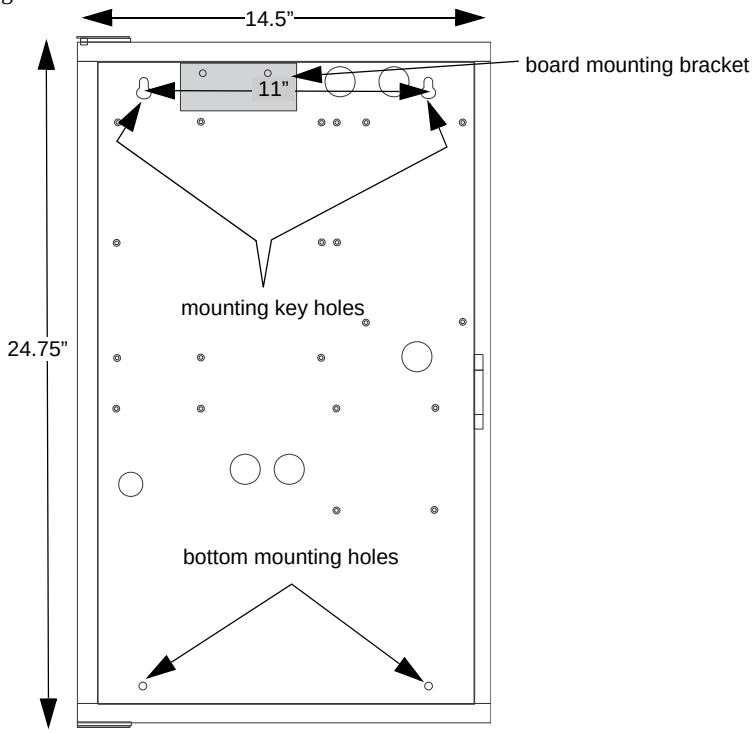


Figure 4.36 Cabinet Flush-Mount Dimensions and Mounting Hole Locations

4.6.3 Mounting the ECS-DUAL50WBD Board Only

NOTE: Installation and wiring of this device must be done in accordance with NFPA 72 and local ordinances.

1. Ensure AC and DC power have been removed from the panel.
2. If this module is a replacement for an existing TR-DUAL50W, remove the screws which secure the board to the enclosure.

3. Secure the supplied “L-shaped” bracket to the top mounting bracket on the ECS-DUAL50WBD with the two mounting screws. See Figure 4.37.

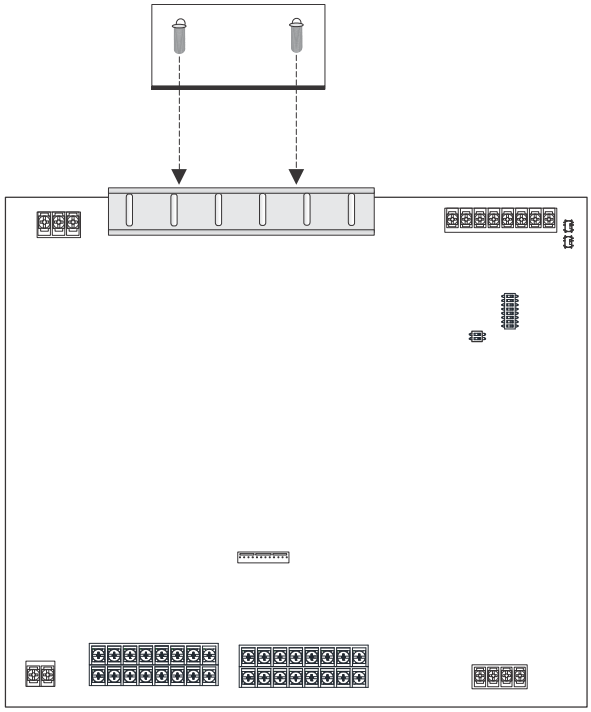


Figure 4.37 ECS-DUAL50WBD Mounting Bracket

4. Align the mounting holes on the bracket with the enclosure.
5. Secure the board to the enclosure.
6. Restore AC power and reconnect the backup batteries.

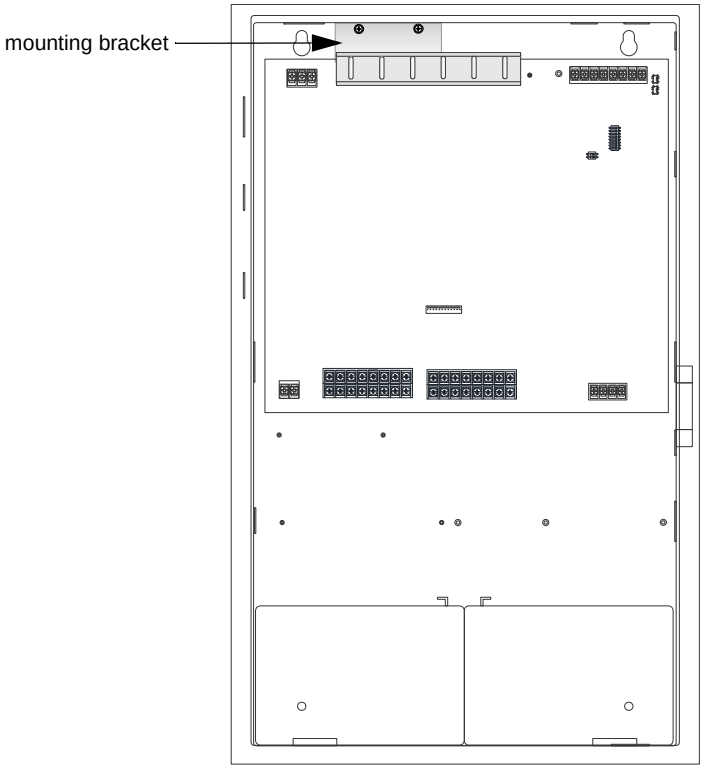


Figure 4.38 ECS-DUAL50WBD in Enclosure

4.6.4 Wiring Specifications

All wiring and devices installed in the system must meet the standards described in National Electrical Code (NFPA 70), NFPA Standard 72, and Life Safety Code (NFPA 101).

To avoid induced noise (transfer of electrical energy from one wire to another), keep input wiring isolated from high-current output and power wiring. Avoid pulling one multi-conductor cable for the entire panel.

Instead, separate the wiring as follows:

Maintain 0.25” spacing between each of these circuit types; as well as between power limited and non power-limited circuits.	Input/Output Type:	Wiring
	Non Power-Limited:	AC power, Standby batteries
	Power-Limited:	SBUS, VBUS
	Audio:	Speaker

DO NOT pull wires from different groups through the same conduit.

Twisted, shielded wire is recommended for all audio circuits to provide the maximum protection against EMI and AFI emission and susceptibility.

If using shielded cable, attach the shield to earth ground on the control panel.

For the same reasons, wiring within the cabinet should be routed around the perimeter of the cabinet. It should not cross the printed circuit board where it could induce noise into the sensitive microelectronics or pick up unwanted RF noise from the high speed circuits.

NOTE: Ground Fault Impedance to any Terminal is 0Ω.

High frequency noise, such as that produced by the inductive reactance of a speaker or bell, can also be reduced by running the wire through ferrite beads or by wrapping it around a ferrite toroid core.

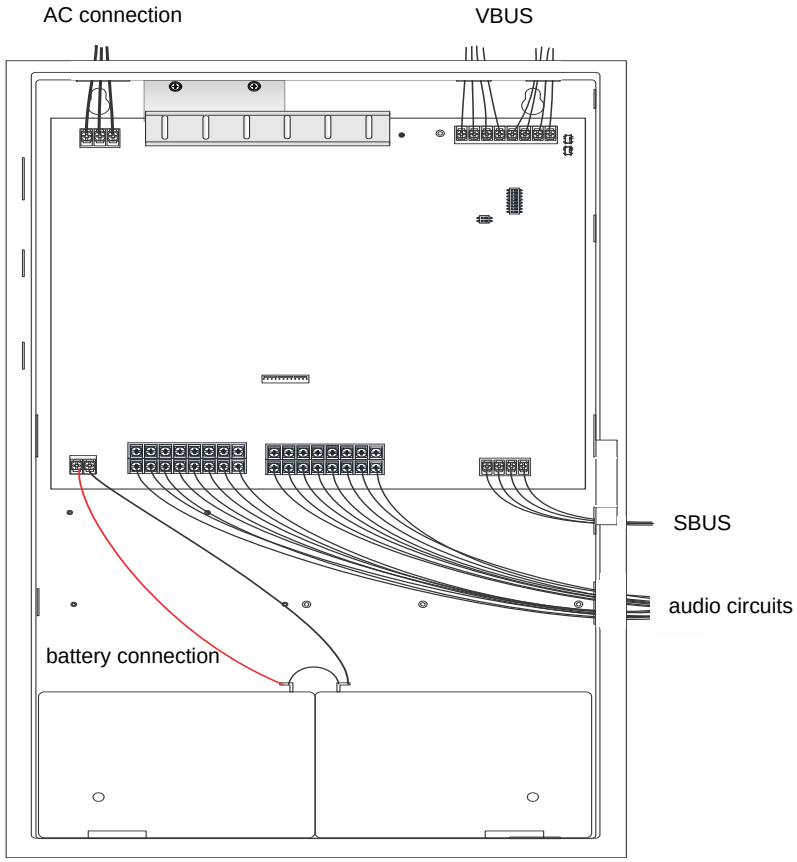


Figure 4.39 Wire Routing Example for TR-DUAL50W

4.6.5 Speaker Wiring

Each TR-DUAL50W supplies eight NACs for speaker connection. The speaker circuit can be supervised and wired Class B or Class A. The speaker circuits are capable of 50 watts (each) at 25 Vrms or 70.7 Vrms.

Wiring Lengths

Number Of Speakers		Total Load		Wire Distance in Feet			
@1/2 W	@1 W	Vrms	Watts	18 AWG	16 AWG	14 AWG	12 AWG
10	5	25Vrms	5W	3900	6200	9860	15680
		70Vrms		25000	39700	63200	100520
20	10	25Vrms	10W	2125	3380	5375	8540
		70Vrms		15200	24150	38400	61100
30	15	25Vrms	15W	1460	2320	3690	5870
		70Vrms		11000	17500	27800	44200
40	20	25Vrms	20W	1100	1750	2780	4420
		70Vrms		8500	13510	21500	34175
52	26	25Vrms	26W	760	1200	1920	3050
		70Vrms		6100	9700	15400	24520
80	40	25Vrms	40W	550	875	1390	2200
		70Vrms		4100	6500	10360	16480
100	50	25Vrms	50W	450	715	1130	1800
		70Vrms		3500	5560	8850	14070

Table 4.5 Wire Lengths

NOTE: The above table assumes a uniform distribution of the speakers, and that a max of 20% voltage drop on the last speaker is allowed

Class B Speaker Configuration for TR-DUAL50W

Figure 4.40 illustrates how to wire speakers to the control panel using Class B supervision.

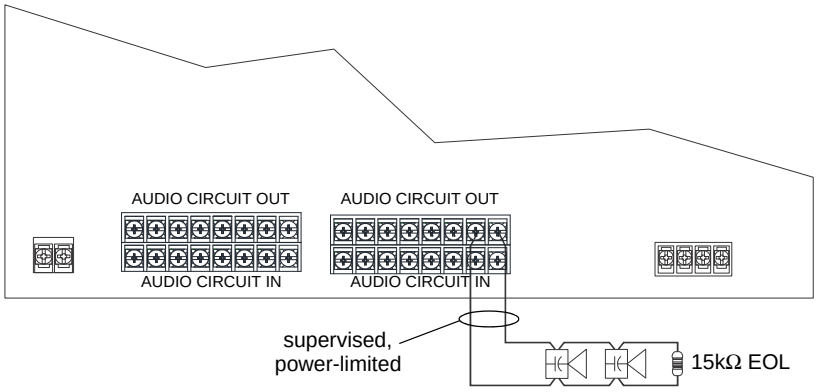


Figure 4.40 Class B Speaker Configuration

Class A Speaker Configuration for TR-DUAL50W

Figure 4.41 illustrates how to wire speakers to the control panel using Class A wiring.

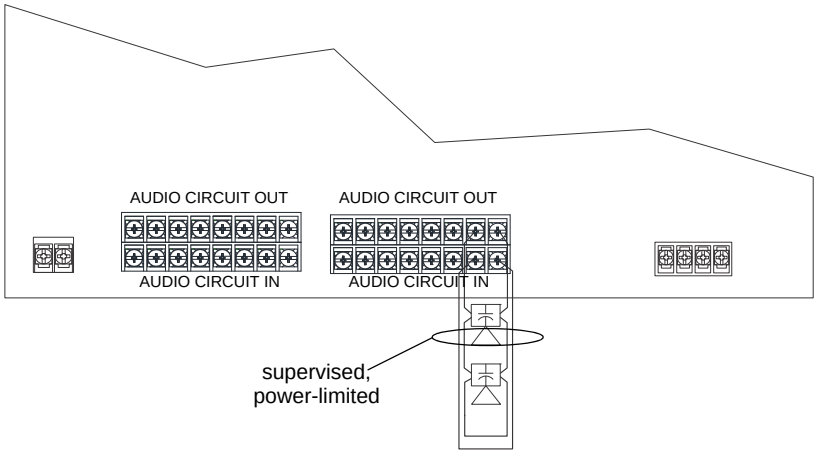


Figure 4.41 Class A Speaker Configuration

4.6.6 VBUS Wiring

The VBUS is an analog voice bus that carries the recorded voice messages from the ECS-NVCM to the TR-DUAL50W amplifiers, or the voice messages generated from a system microphone to the TR-DUAL50W amplifiers. The maximum resistance on the VBUS is 20Ω.

The TR-DUAL50W supports two VBUS channels. The wiring method is the same for both channels. VBUS1 and VBUS2 should never be wired together.

Connect the VBUS from the Figure 4.42 and Figure 4.43 for ECS-NVCM.

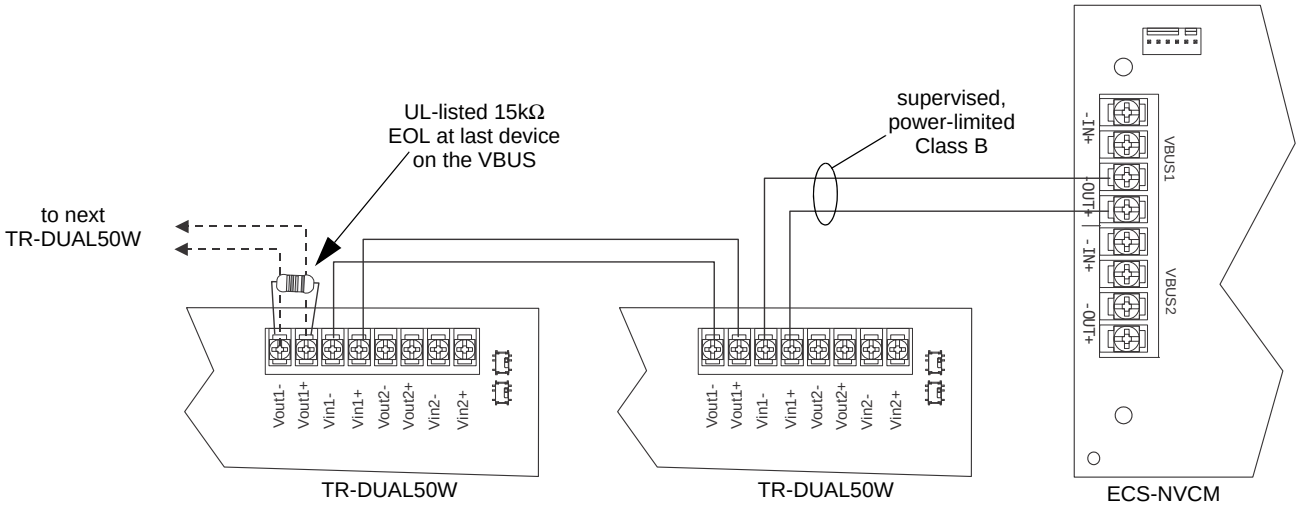


Figure 4.42 VBUS Wiring for Single Channel for ECS-NVCM

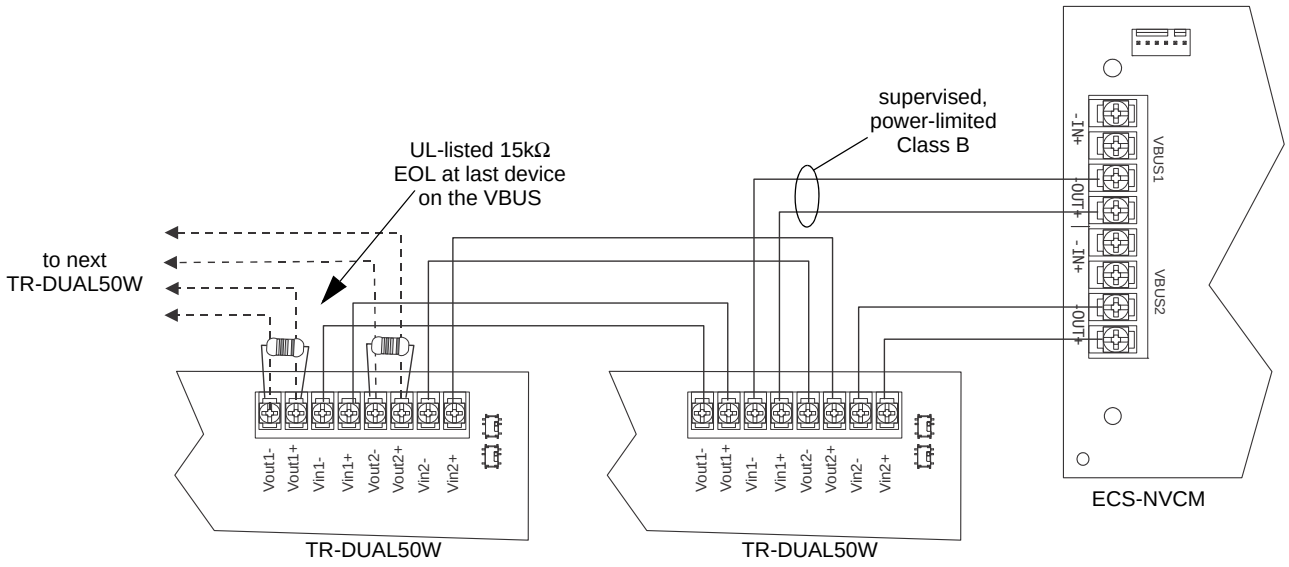


Figure 4.43 VBUS2 Wiring for Dual Channel for ECS-NVCM

4.6.7 SBUS Wiring

This section contains information on how to connect TR-DUAL50Ws (up to 16 for the TR-2100ECS) onto the main control SBUS. Refer to Section 4 of the FACP Installation manual for SBUS specifications. Wire the SBUS to the FACP as shown in Figure 4.44.

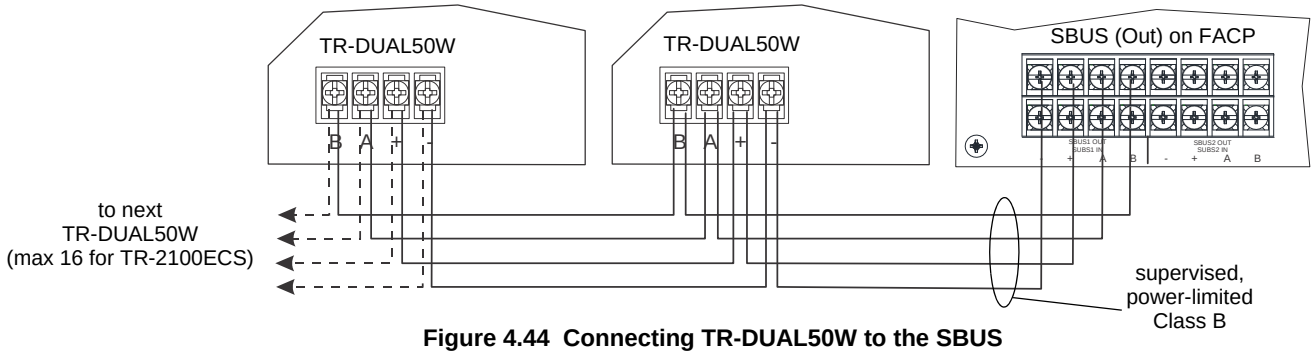


Figure 4.44 Connecting TR-DUAL50W to the SBUS

See Section 4.10 for information on setting SBUS addresses.

4.6.8 Setting the TR-DUAL50W Backup Mode

When the TR-DUAL50W is connected to a TR-2100ECS, the mode is set using the HFSS Programming Tool and the DIP switch mode selector is ignored.

If the TR-DUAL50W is connected to a TR-2100ECS system and configured to operate in a dual channel setup, Amp A and/or Amp B is not restricted to which audio circuits it can power. However, both can never power the same audio circuit.

4.6.9 Test Switches

See Figure 4.35 on page 35 for the location of the Test slide switches.

SW1 - AMP A

Switch should be moved to the “ON” position for normal operation. Move this switch to the “Test” position to test backup amplifier.

SW2 - AMP B

Switch should be moved to the “ON” position for normal operation. Move this switch to the “Test” position to test backup amplifier.

NOTE: Allow up to 3 minutes for backup amplifier to engage.

4.6.10 Connecting AC Power

At installation, connect the AC terminals to the power source as shown in Figure 4.45. It may be necessary for a professional electrician to make this connection.

The AC terminals are rated as 240VAC, 50/60 Hz.

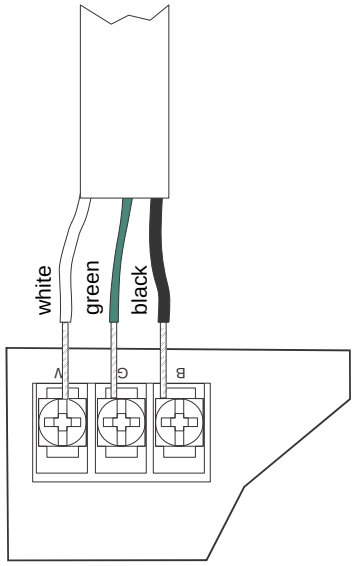


Figure 4.45 AC Connection

4.6.11 Backup Battery for TR-DUAL50W

The following steps explain how to connect the batteries (refer to Figure 4.46):

1. Connect the black wire of the battery harness to the (-) side of the battery #2.
2. Connect the jumper wire provided form the positive (+) side of battery #2 to the negative side of battery #1.
3. Connect the red wire from the battery harness to the positive (+) side of battery #1.

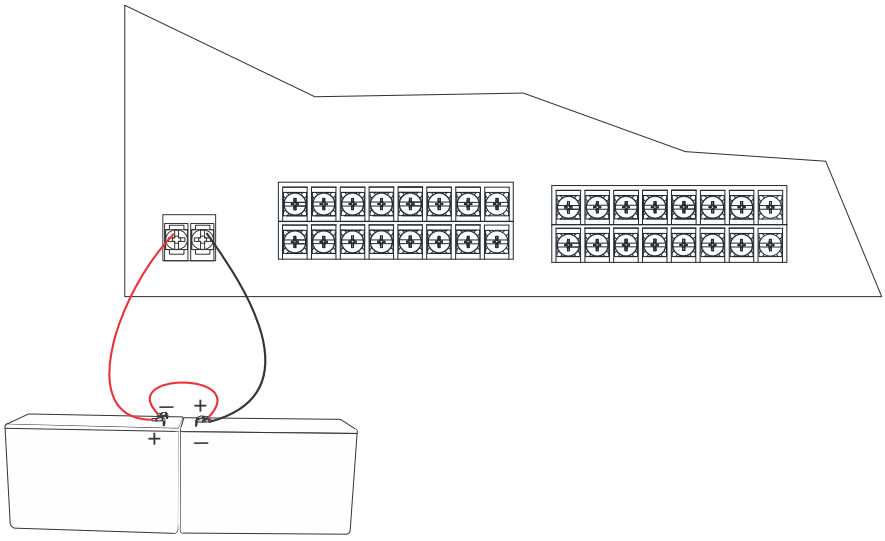


Figure 4.46 Battery Connection to TR-DUAL50W

4.6.12 Calculating Current Draw and Standby Battery

This section helps determine the current draw and standby battery needs for your installation (18 AH maximum will fit in cabinet). Complete the remaining instructions in Table 4.6.

Batteries larger than 18 AH will not fit in the main control cabinet, and must be housed in the RBB Accessory Battery Cabinet. The system supports a maximum of 35 AH.

	Device	No. of Devices	Current Per Device	Standby Current	Alarm Current
	TR-DUAL50W 25V	1	Standby: 110 mA	110 mA	
			Alarm: 1.2 A		1.2 A
	TR-DUAL50W 70.7V	1	Standby: 110 mA	110 mA	
			Alarm: 1.4 A		1.4A
	TR-50WBU	1	Standby: 40 mA	40 mA	
			Alarm: 110 mA		110 MA
A	Current Subtotals:			mA	mA
	Notification Devices	Refer to device manual for number of devices and current ratings.			
B	Current Subtotals:			mA	mA
C	Total current rating of all devices in system (Line B) X 0.001			A	A
D	Number of standby hours (24 or 60 for NFPA 72)			H	
E	Multiply line C (standby current) and D: **Total standby AH**			AH	
F	Alarm sounding period in hours (For example, 5 minutes = 0.0833 hours):				H
G	Multiply line C (alarm current) and F: **Total alarm AH**				AH
H	Add lines E and G (AH = Ampere Hours): **Total AH required**			AH	

Table 4.6 Current Draw TR-DUAL50W

4.7 Installing the TR-50WBU

The TR-50WBU provides backup capability when operating the TR-DUAL50W in the 100 watt with backup mode for both single and dual channel setups. The TR-50WBU mounts on the TR-DUAL50W board on the standoffs provided.

4.7.1 TR-DUAL50W Board Layout

Figure 4.47 shows the location of the TR-50WBU on the TR-DUAL50W board.

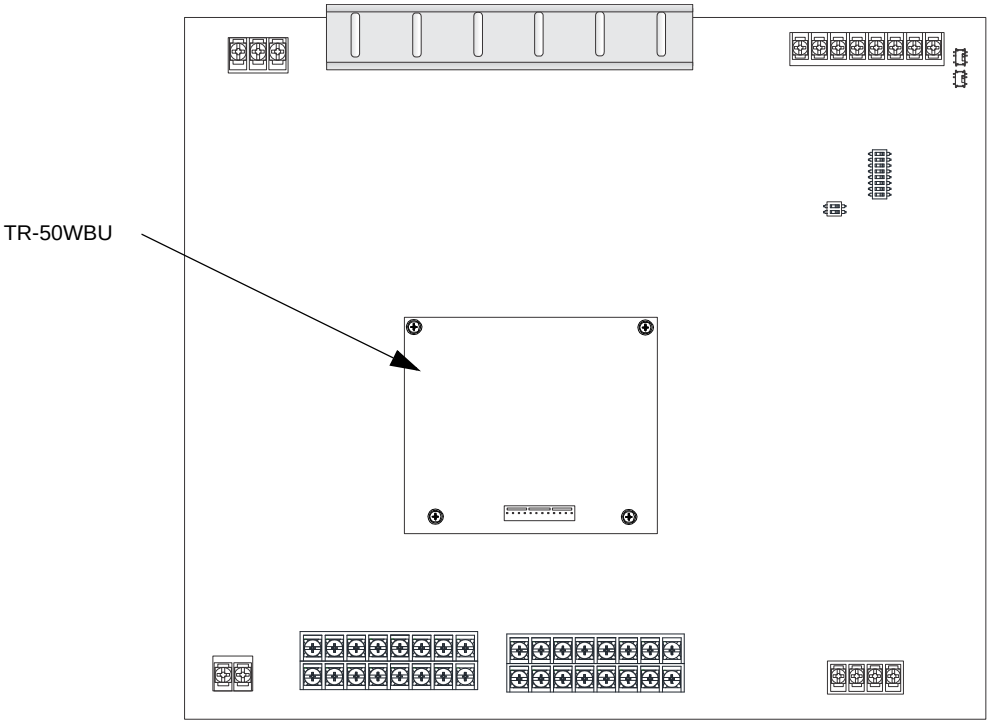


Figure 4.47 TR-50WBU Mounting Location

4.7.2 Installing the TR-50WBU

Follow these steps to install the TR-50WBU.

1. Ensure all power supplied to the TR-DUAL50W is removed.
2. Secure the four standoffs supplied with the TR-DUAL50W to the board as shown in Figure 4.48.
3. Connect the backup amplifier cable harness (P/N 50116775-001) from the connector labeled “Backup Amplifier” on the TR-DUAL50W to the connector on the TR-50WBU.
4. Using the four supplied screws, secure the TR-50WBU to the standoffs.

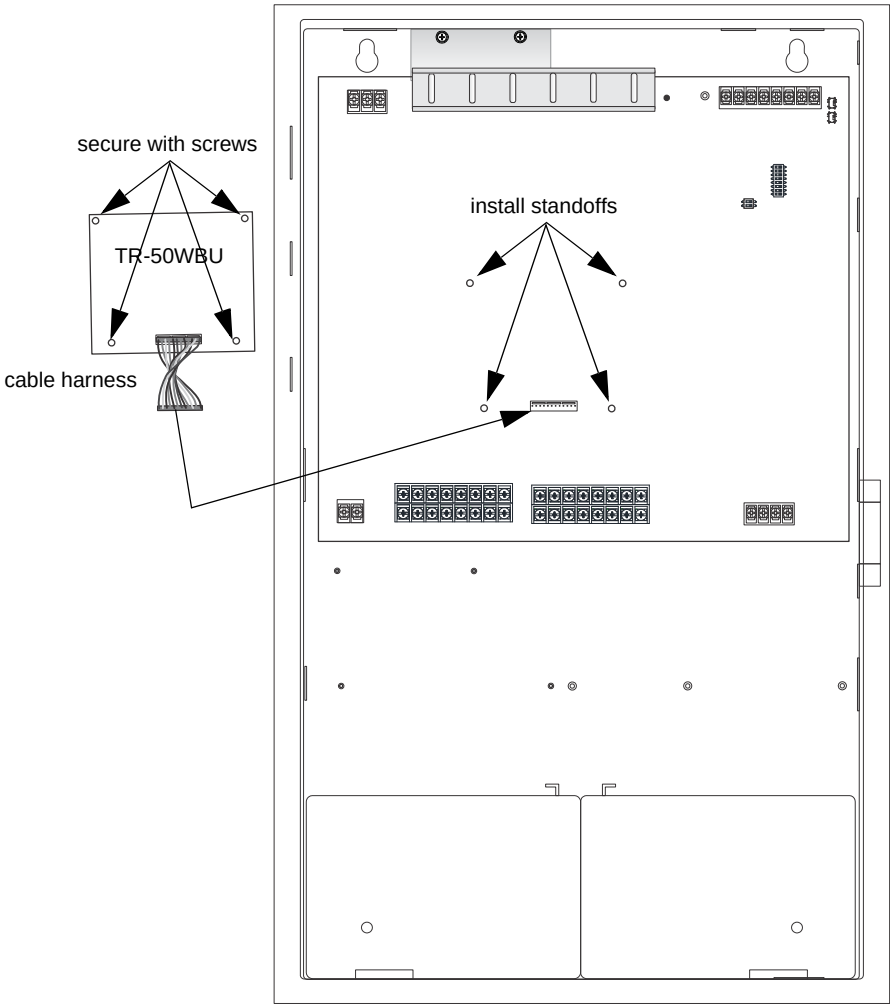


Figure 4.48 Mounting the TR-50WBU

4.8 Installing the TR-CE4

The TR-CE4 adds four audio circuits to the TR-50W and TR-125W. The TR-CE4 mounts inside the TR-50W or TR-125W cabinet.

Follow these steps to install the TR-CE4.

1. Align the TR-CE4 over the PEM studs on the backbox.

2. Secure the TR-CE4 to the backbox using the four supplied screws as shown in Figure 4.49.

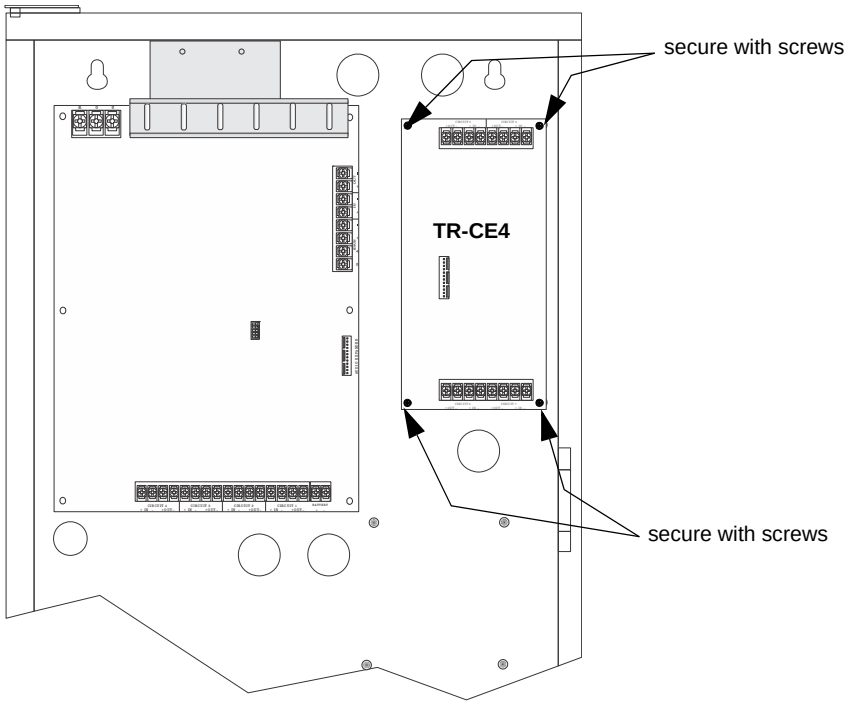


Figure 4.49 Mounting the TR-CE4

3. Connect the audio expander cable harness (P/N 130426) from the connector labeled “Audio Expander” on the TR-50W or TR-125W to the connector on the TR-CE4 as shown in Figure 4.50.

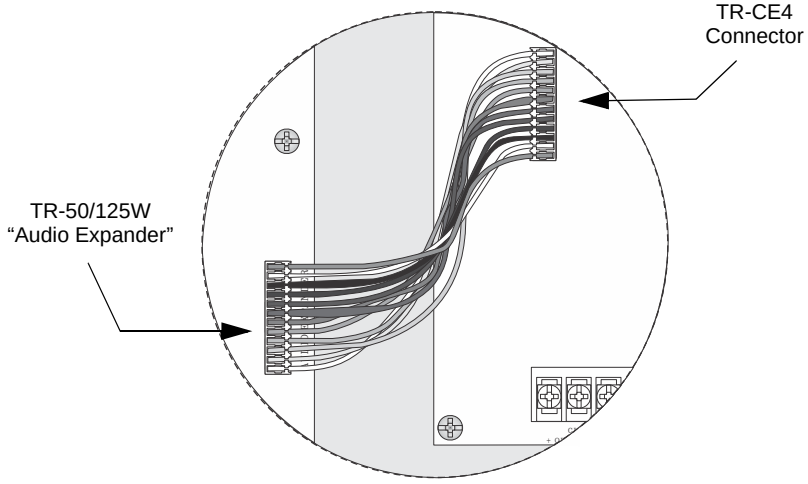


Figure 4.50 Audio Expander Wire Harness Connections

4. Wire audio circuits as shown in “Speaker Wiring” on page 20.

4.9 Installing the ECS-RVM

The ECS-RVM Remote Voice Module is contained within the TR-LOC2100 Local Operator Console. It provides a supervised microphone for live communication and an interface for the Emergency Communication System.

4.9.1 ECS-RVM Board Layout

The following is description of the ECS-RVM remote voice module components.

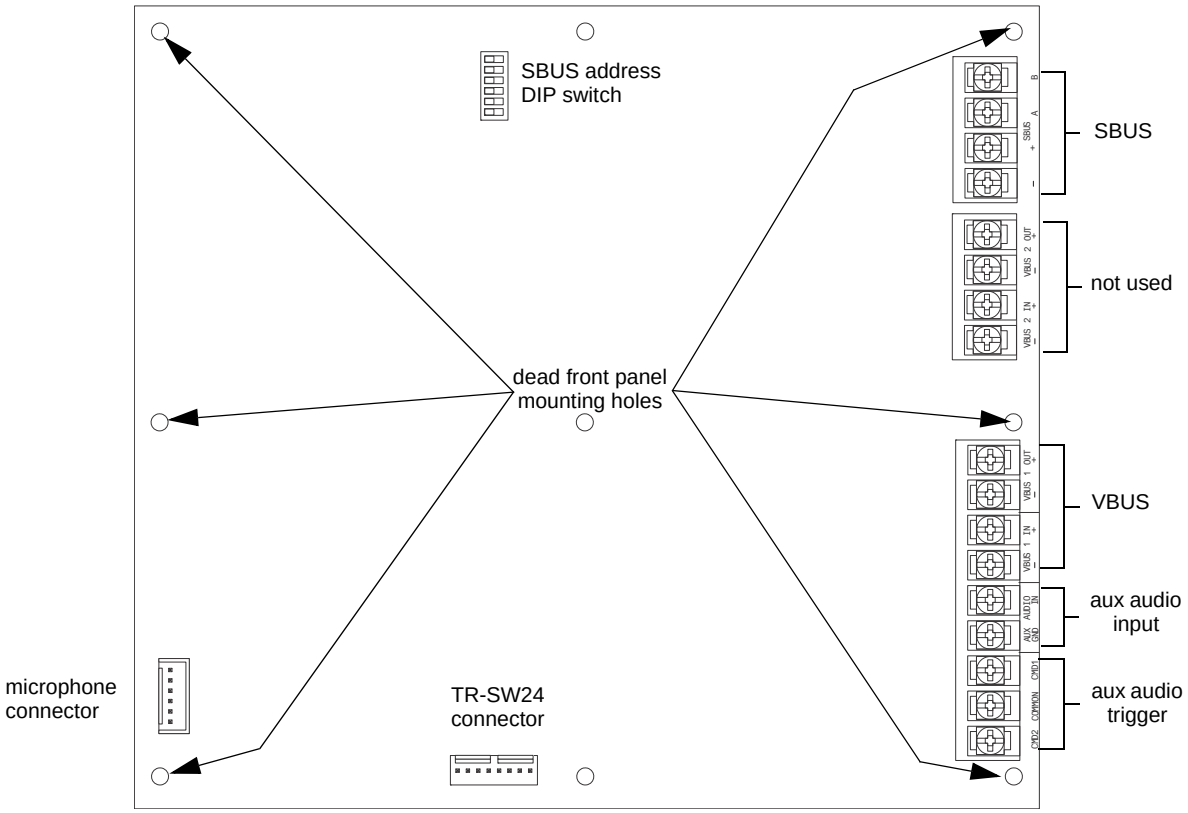


Figure 4.51 Back View of ECS-RVM

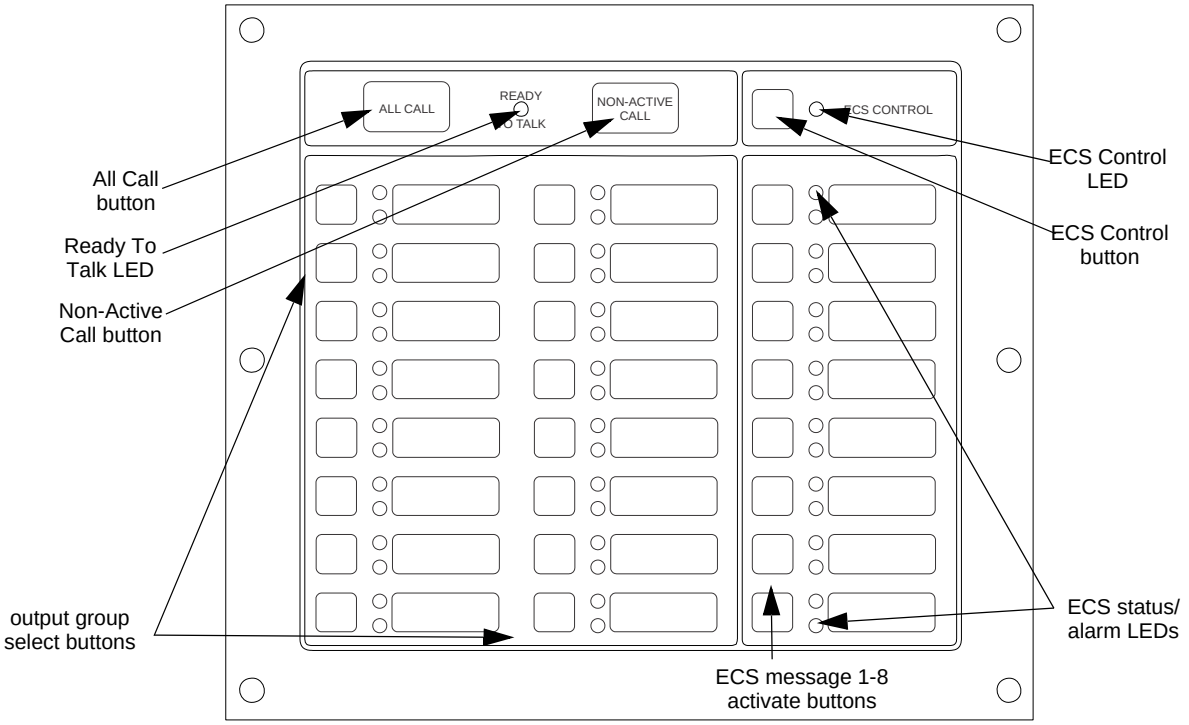


Figure 4.52 Front View of ECS-RVM

4.9.2 Wiring the ECS-RVM

1. Refer to Figure 4.53 to properly connect the ECS-RVM to the FACP's SBUS.

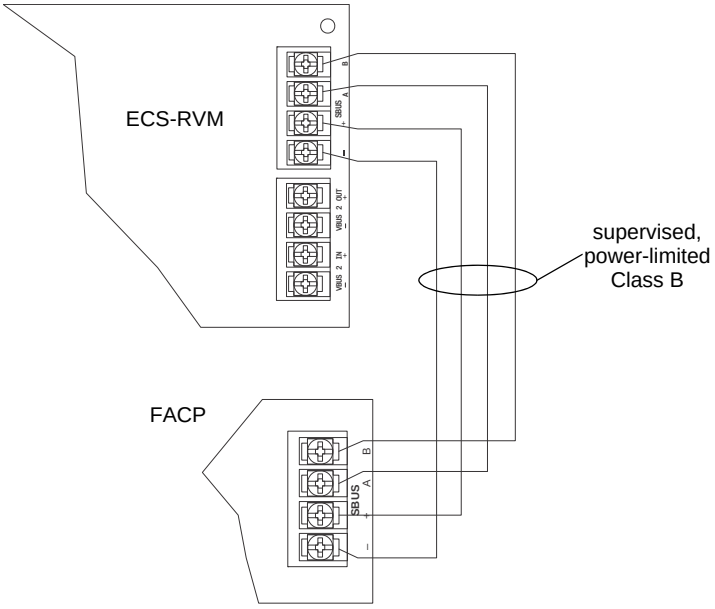


Figure 4.53 ECS-RVM SBUS Connections

2. Connect the SBUS to the annunciator and ECS-RVM. See Figure 4.54.

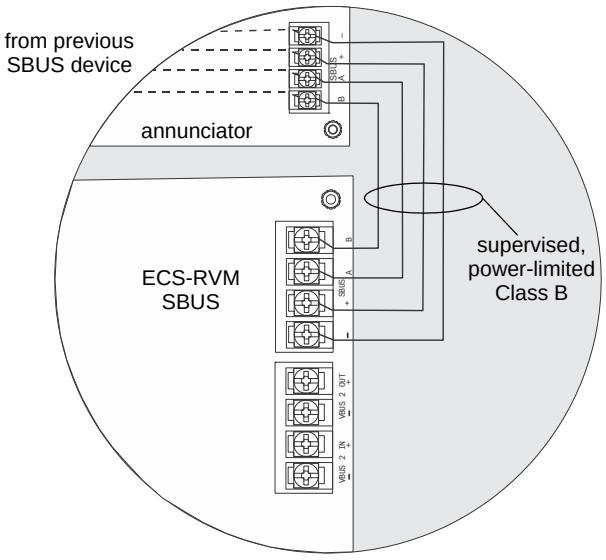


Figure 4.54 SBUS wiring for ECS-RVM

3. Set the SBUS address on the annunciator and the ECS-RVM board. See Section 4.10 for more information.
4. Connect the ECS-RVM to the VBUS, TR-125W, and ECS-NVCM as shown in Figure 4.55.

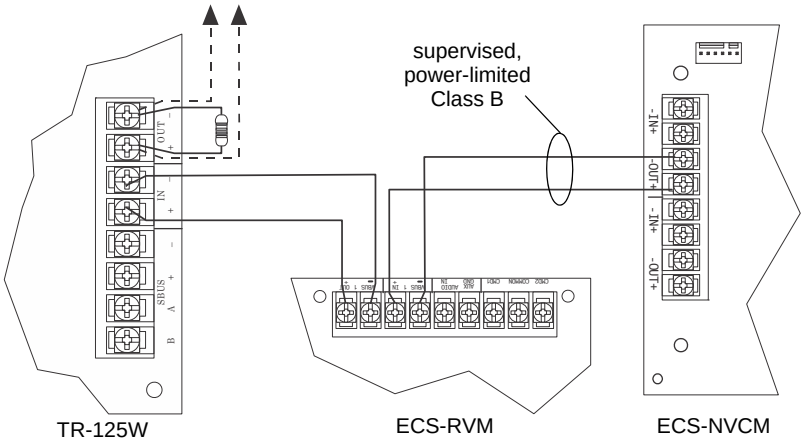


Figure 4.55 VBUS and TR-125W Wiring for ECS-RVM using the ECS-NVCM

4.9.3 Installing the Microphone

To install the microphone follow these steps:

1. Clip the microphone onto the microphone clip.
2. Insert microphone cord through hole at the bottom of the dead front panel. See Figure 4.56.

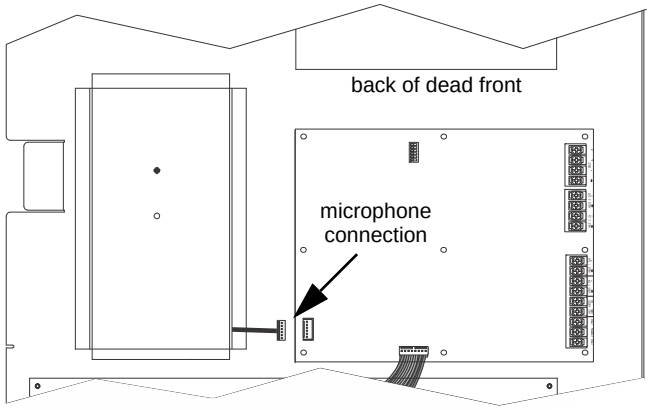


Figure 4.56 Microphone Cord Inserted Through Dead Front Panel Hole

3. Attach strain relief clip to microphone cord. The strain relief clip should have about 2.75” of microphone cord through it. .

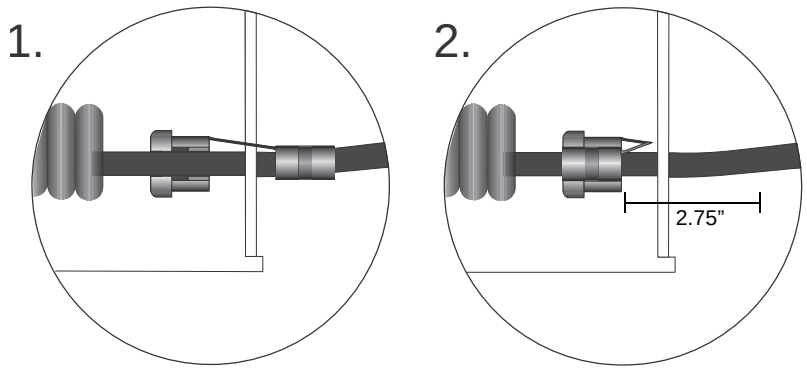


Figure 4.57 Installing Strain Relief Clip

4. Push the strain into the hole in the dead front panel.

4.9.4 To Remove the ECS-RVM

To remove the ECS-RVM follow these steps:

1. Remove AC power and disconnect batteries from the main control panel.
2. Disconnect the SBUS connections from the SBUS terminals on the ECS-RVM. Refer to Figure 4.54.
3. Disconnect any devices connected to the VBUS. Refer to Figure 4.55.
4. Unplug the microphone from the microphone connector. See Figure 4.56.
5. Remove the six 0.25” hex nuts that hold the -RVM in place.
6. Lift the ECS-RVM off of the dead front panel.

4.10 Addressing SBUS Devices

When installing a hardware module (such as TR-6815, TR-5824, TR-RD1G, TR-RD1R, TR-RD2G, TR-RD2R, TR-RPS1, TR-5865-3 or TR-5865-4, TR-50W, TR-125W, TR-DUAL50W, ECS-NVCM and ECS-RVM), use the DIP switches on the module to assign an ID# to the module.

Figure 4.58 shows all possible DIP switch positions and their correlation to a numerical ID. For example, to select ID 2, place DIP switch 2 in the up position.

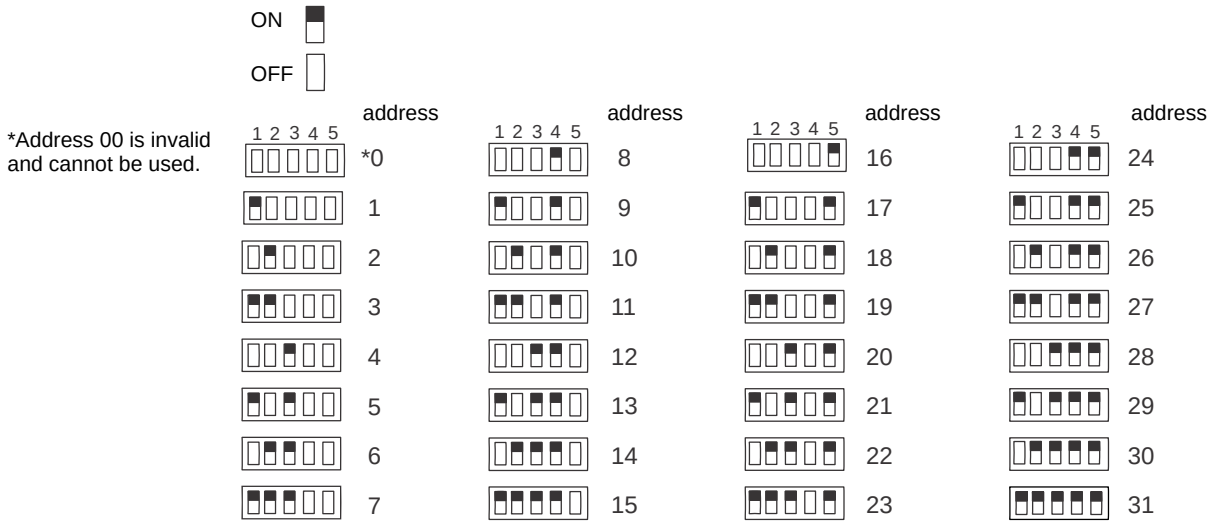


Figure 4.58 Possible Module Addresses

Panel Security

Panel installation / maintenance security checklist

System Description: _____

System Location: _____

Installer: _____ Date: _____

Complete the following cyber security tasks for each panel installation.

- ✓ Install the panel in a secure location considering both software and hardware vulnerabilities.
- ✓ Change the default password to a unique password.
- ✓ Securely configure networks and firewalls.
- ✓ Assess security risks.
- ✓ Develop a Disaster and Recovery Plan.
- ✓ Develop a Backup and Recovery Strategy.
- ✓ Install, configure and keep anti virus software updated on all computers which access the panel
- ✓ Keep operating system updated on all computers which access the panel.
- ✓ Deliver all required system information upon delivery to the system owner.
- ✓ Train end-users on security maintenance tasks upon system delivery.
- ✓ For decommissioning, dispose of data securely.
- ✓ Ensure the Ethernet cable is removed from the FACP when not being utilized for configuration or for reporting purposes.

Security and Data Protection

Communication Security - Level 1

Stored Data Security - Level 0

Physical Security - Level 1

Access Control Security - Level 1

TRIGA Life Safety Systems, LLC
7600 Olde Eight Rd.
Hudson, OH 44236-1057
Telephone: +1-330-577-5199
www.trigaglobal.com