FIRE·LITE® ALARMS

PN: 51244:B ECN 01-506

Distributed Audio Panel
FC-25/50DA

Document	#51244	B
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Fire Alarm System Limitations

While a fire alarm system may lower insurance rates, it is not a substitute for fire 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 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.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise 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. 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, or chimneys 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.
- 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, crippling its ability to report a fire.

Audible warning devices such as bells 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:

- 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 or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercise 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 fire alarm 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. It is essential to use only equipment listed for service with your control panel.

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 radio transmission systems are recommended.

The most common cause of fire alarm malfunction is inadequate maintenance. To keep the entire fire alarm 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 Chapter 7 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 monthly or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers only. Adequate written records of all inspections should be kept.

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 this manual is read and understood.

CAUTION - *System Reacceptance Test after Software Changes.* To ensure proper system operation, this product must be tested in accordance with NFPA 72 Chapter 7 after any programming operation or change in site-specific software. Reacceptance 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 0-49° C/32-120° F and at a relative humidity of 85% RH (non-condensing) at 30° C/86° 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 all peripherals be installed in an environment with a nominal room temperature of 15-27° C/60-80° 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 interferences, 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, and 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.

Though designed to last many years, system components can fail at any time. 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.

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 by authorized personnel.

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 device pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when 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 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.

Notes

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This control panel has been designed to comply with standards set forth by the following regulatory agencies:

- Underwriters Laboratories Standard UL 864
- NFPA 72 National Fire Alarm Code

Before proceeding, the installer should be familiar with the following documents.

NFPA Standards

NFPA 72 National Fire Alarm Code

Note: Audible signal appliances used in public mode applications, are required to have minimum sound levels of 75 dBA at 10 feet (3 meters) and a maximum level of 120 dBA at the minimum hearing distance from the audible appliance.

To ensure that the appliance is clearly heard, the audible appliance sound level must be at least 15 dBA above the average ambient sound level or 5 dBA above the maximum sound level with a duration of at least 60 seconds, depending on which level is greater, with the sound level being measured 5 feet (1.5 meters) above the floor.

Underwriters Laboratories Documents:

UL 38 Manually Actuated Signaling Boxes
UL 217 Smoke Detectors, Single and Multiple Station
UL 228 Door Closers–Holders for Fire Protective Signaling Systems
UL 268 Smoke Detectors for Fire Protective Signaling Systems
UL 268A Smoke Detectors for Duct Applications
UL 346 Waterflow Indicators for Fire Protective Signaling Systems
UL 464 Audible Signaling Appliances
UL 521 Heat Detectors for Fire Protective Signaling Systems
UL 864 Standard for Control Units for Fire Protective Signaling Systems
UL 1481 Power Supplies for Fire Protective Signaling Systems
UL 1638 Visual Signaling Appliances
UL 1711 Amplifiers for Fire Protective Signaling Systems
UL 1971 Signaling Devices for Hearing Impaired

Other:

NEC Article 250 Grounding
NEC Article 300 Wiring Methods
NEC Article 760 Fire Protective Signaling Systems
Applicable Local and State Building Codes
Requirements of the Local Authority Having Jurisdiction (LAHJ)

Fire•Lite Documents

Fire•Lite Device Compatibility Document	Document #15384
Fire•Command•25/50X Manual	Document #51604
FCPS-24F(E) Field Charger/Power Supply	Document #50079
CHG-120F Charger Manual	Document #50888
MS-9200(C)/E Manual	Document #51003

CHAPTER 1 *Product Description*

The FC-25/50DA distributed audio panel is a dual-channel, 25 watt, 25 V_{RMS}, emergency voice evacuation panel which is designed to interface directly to the FC-25/50X (Fire•Command•25/50X) panel. The distributed audio panel can be used to distribute voice evacuation audio over a building's speaker system. The audio riser input provides automatic gain control (AGC) which compensates for any audio signal loss due to circuit loading or cable length, ensuring that a full output signal is delivered to the speakers. An optional FC-MGM message generator is available with standard pre-recorded message or programmable message capability (up to sixty seconds). A separate custom power supply module with battery charger is included. An optional second audio amplifier is available for backup purposes or to provide an additional channel of 25 watts. 70 V_{RMS} conversion modules are also available as options for installations where 70.7 V_{RMS} speakers are to be installed or already exist. The modular design allows for ease-of-serviceability.

The distributed audio panel Master Command Bus input is designed to activate on polarity reversal. This allows connection of the FC-25/50DA to the FC-25/50X Master Command Bus output for 'All Call' paging applications. Two Command Input circuits can be independently field programmed for activation by an FACP Notification Appliance Circuit reverse polarity or by closure of a supervised normally open contact. Terminals are provided for NAC input and output to allow installation of the FC-25/50DA anywhere along the NAC being used for activation. Options via the Command Inputs allow for audio from the audio riser input, tone generator or audio from the optional message generator, to be simultaneously routed to both speaker circuits.

Significant technological enhancements set the FC-25/50DA apart from other audio panels. *These enhancements include full supervision in both active (alarm or music) and standby conditions*. Supervision is provided for:

- ✓ amplifier outputs
- ✓ field wiring (shorts and opens)
- ✓ optional message generator (FC-MGM)
- ✓ all tone generators

If the the audio riser input fails, the distributed audio panel can be programmed to switch to the built-in tone generator or optional FC-MGM Message Generator. If the FC-MGM fails or is not installed, the tone generators on the main circuit board can be automatically switched in as backups.

Power is fed independently to each amplifier so that a short circuit in one amplifier will not shut down the other. Full output power of 25 watts per amplifier is generated while in a low battery condition. Power is not diminished when the 70 V_{RMS} option is installed. Audio is amplified from modern integrated circuits as opposed to transformer technology. This provides for very low signal distortion resulting in crystal clear audio.

The FC-25/50DA is designed to interface directly to addressable or conventional FACPs (Fire Alarm Control Panels).

1.1 Inventory

When the FC-25/50DA shipment is received, check to make certain that all parts have been included in the shipment. The base configuration consists of one of each of the following:

- ✓ FC-SCB Slave Command Board - main circuit board
- ✓ FC-PSM2 Power Supply Module
- ✓ FC-AAM25X Audio Amplifier Module
- ✓ Cabinet which includes backbox and door

1.2 Product Features and Options

- 25 watts (25 V_{RMS}) audio power (expandable to 50 watts)
- Automatic gain control (AGC) circuit ensures an unattenuated audio signal on the audio riser input
- Backup amplifier (FC-AAM25X) for 25 watt systems
- Modular design for maximum flexibility and easy system expansion
- Unobstructed module access and removable terminal blocks for ease of servicing and module replacement
- Master Command Bus Input circuit designed to be activated by a reverse polarity signal
- Dual Command Input circuits which are field selectable to be activated from 12 VDC or 24 VDC NACs (reverse polarity) or contact closure
- Single Style Y or Z speaker circuit (expandable to two circuits in 50 watt application)
- Two channel input, single output zone operation
- Optional FC-MGM Message Generator Module with standard, prerecorded message:

  "May I have your attention please. May I have your attention please. The signal you have just heard indicates a report of a fire in this building. Please proceed to the nearest exit and leave the building. Do not reenter the building unless directed to do so by the proper authorities."
- Field-selectable message capability and custom message field recording capability using optional FC-MGM module's audio input RCA jack or mini Audio jack for connection to a personal computer
- Record/playback control switches on optional FC-MGM
- One 60-second custom message on optional FC-MGM
- Optional FC-LPS local playback speaker
- Optional FC-RMM Remote Microphone Module (requires FC-MIM Microphone Interface Module) - refer to FC-RMM Product Installation Document #51247.
- Integral tone generators field selectable for steady, temporal, slow-whoop, high-low or chime tones
- Background music is available, with prior approval of Local Authority Having Jurisdiction (LAHJ)
- Powered by FC-PSM2 power supply and battery charger module which provides up to 18 amp hours for systems requiring 24 hours backup
- Optional CHG-120F Battery Charger may be installed for systems requiring up to 60 hours backup (refer to the CHG-120F Manual)
- Optional 70.7 V_{RMS} conversion module available for each amplifier
- Optional FCDA-BRKT bracket for mounting two control and/or monitor modules in the FC-25/50DA cabinet
- Independent Form-C trouble relay
- 35 mA auxiliary (Specific Application) power output for addressable control modules (when interfaced with the MS-9200(C)/E or equivalent) and End-of-Line power supervision relay
- System LEDs (visible with cabinet door open):
  - ✓ 24 VDC Power ON (green)
  - ✓ System Trouble (yellow)
  - ✓ Alarm (red)
  - ✓ Tone Generator Trouble (yellow)
- Other System LEDs (located on modules)
  - ✓ Message Generator Trouble (yellow) - on optional FC-MGM Message Generator Module
  - ✓ Record (green) - on optional FC-MGM Message Generator Module
  - ✓ Playback Active (green) - on optional FC-MGM Message Generator Module
  - ✓ Ground Fault (yellow) - FC-PSM2 Power Supply Module
  - ✓ Battery Trouble (yellow) - FC-PSM2 Power Supply Module
  - ✓ AC On (green) - FC-PSM2 Power Supply Module
  - ✓ Amplifier Supervision (green) - FC-AAM25X Amplifier Module
  - ✓ Wiring Fault/Amplifier Fail (yellow) - FC-AAM25X Amplifier Module

FIGURE 1-1: Main Board with Supplied Power Supply

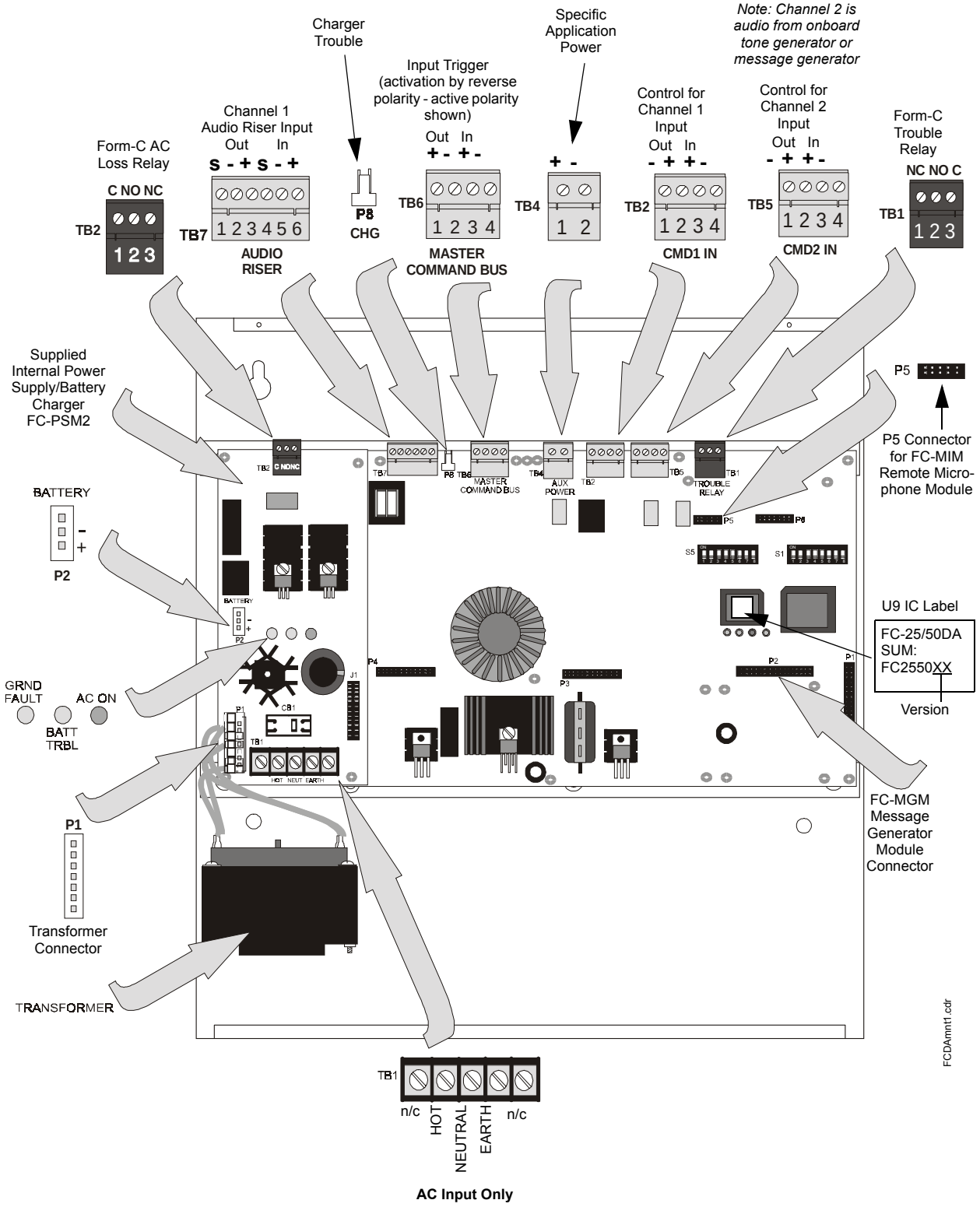
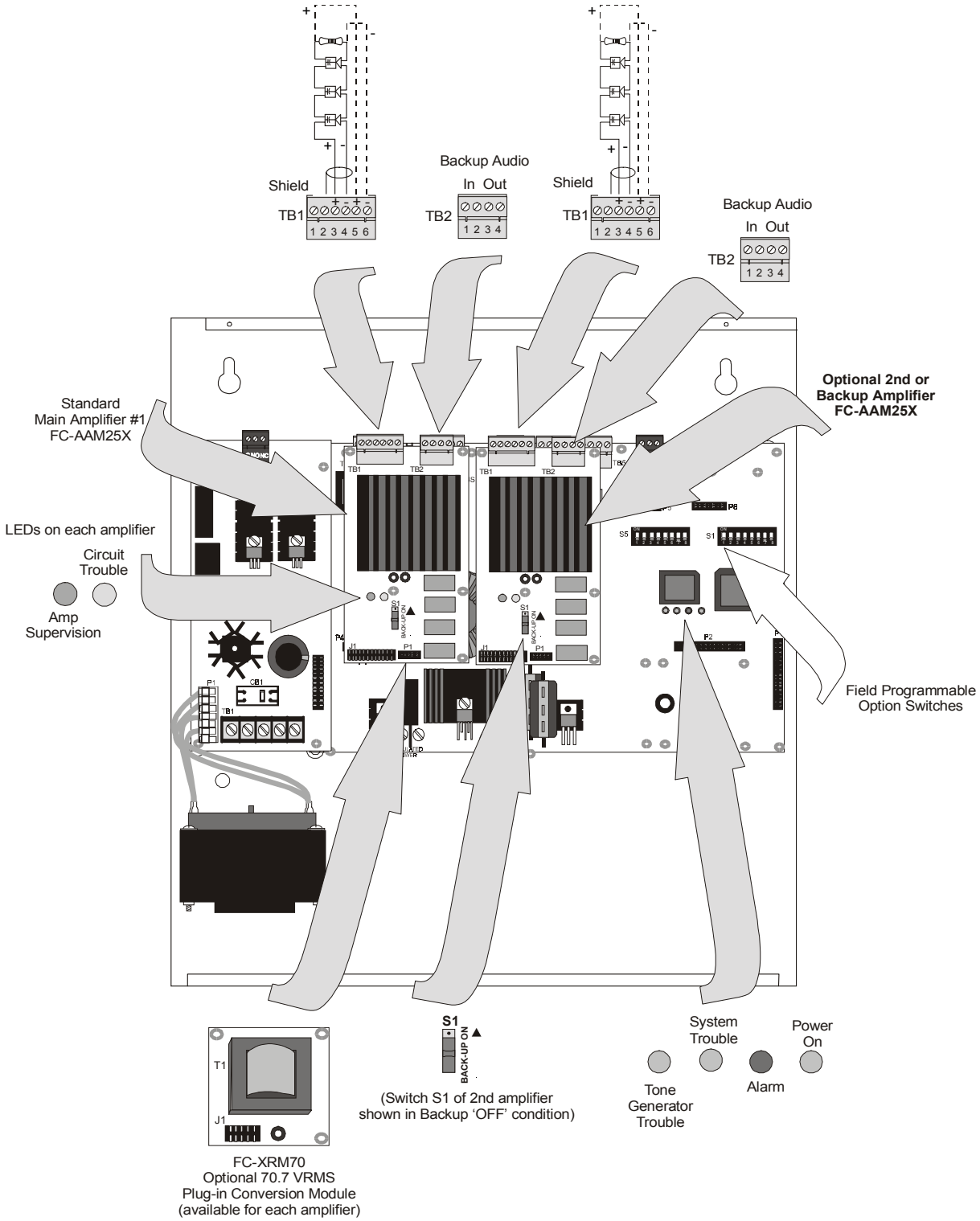


FIGURE 1-2: Main Board With Amplifiers

CAUTION: Match proper polarity connections to field wiring and speakers. Polarity shown is in the standby and alarm conditions.



1.3 Specifications

Internal Power Supply/Battery Charger FC-PSM2 included - Plugs into P7 of the main circuit board

AC Power - TB1 of FC-PSM2 Power Supply/Battery Charger Module

FC-PSM2 Power Supply/Battery Charger Module: 120 VAC, 60 Hz, 2.8 amp.
Wire size: minimum #14 AWG (2.00 mm^2) with 600 V insulation.

AC Loss Relay - TB2 of FC-PSM2 Power Supply/Battery Charger Module

Operation: Relay transfers on loss of AC power to the Power Supply/Battery Charger Module for independent monitoring by DACT.

TB2 AC Loss relay contact rating: 2.0 amps @ 30 VDC (resistive), 0.6 amps @30 VAC (resistive)

Battery (sealed lead acid only) - P2 of FC-PSM2 Power Supply/Battery Charger Module

Maximum Charging Circuit: Normal Float Charge - 27.6V @ 2.3 amp

Maximum Charger Capacity: 18 amp hour batteries (minimum 7 amp hour batteries)
FC-25/50DA cabinet holds maximum of two 18 amp hour Batteries. Larger batteries require CHG-120F Battery Charger and an external UL listed battery cabinet.

Note: If a CHG-120F is being used to charge the batteries, make certain to disable the transponders FC-PSM2 charger and enable the CHG-120F charger by setting S5 DIP switch 4, which is located on the main circuit board, to the ON position (refer to "S5 DIP Switch Settings on Main Circuit Board" on page 18).

IMPORTANT: The battery charger turns off when the battery voltage drops too low (below 15 VDC). A battery with a higher voltage must be installed to turn the charger back on.

Master Command Bus- TB6 Terminals 3(+) & 4(-) In and 1(+) & 2(-) Out (polarity shown to activate input)

Master Command Bus

Supervised and power-limited circuitry

Operation: activates amplifiers on polarity reversal

Normal Operating Voltage: 10.5 VDC to 29 VDC (UL tested range: -15%, +10%)

Reverse Polarity Current: 60 mA maximum.

Command Input Circuits - TB2 Terminals 3(+) & 4(-) and TB5 Terminals 3(+) & 4(-)

CMD1 and CMD2 Command Input Circuits on Terminals 3 and 4. Terminal 1(-) and 2(+) are output terminals which provide feed-through of the NAC circuits to NAC devices downstream

Power-limited and supervised circuitry

Operation: Both circuits independently field programmable to activate amplifiers on NAC polarity reversal or contact closure

Normal Operating Voltage: 10.5 VDC - 29 VDC (UL tested range: -15%, +10%)

NAC Reverse Polarity Current: 1.6 mA maximum

Contact Closure Operation Current (requires 4.7K, ½ watt End-of-Line Resistor P/N 71245): 6.6 mA maximum

Ferrite Bead: wiring to each Command Input requires a ferrite bead (refer to "CMD1 and CMD2" on page 31)

FC-AAM25X Audio Amplifier Module

- Primary Amplifier (FC-AAM25X) plugs into P4 of main circuit board
- Optional Secondary Amplifier (FC-AAM25X) plugs into P3 of main circuit board - may be used to increase speaker power to 50 watts or as backup for primary amplifier in a 25 watt system

❒ **FC-AAM25X Backup Audio - TB2, In Terminals 1 & 2, Out Terminals 3 & 4**

Operation in 25 watt system: secondary amplifier provides backup to primary amplifier. Switch S1 on the backup amplifier must be 'ON' and jumpers installed (refer to "Application Examples" on page 43)

✓ from backup amplifier TB2 Terminal 3 to primary amplifier TB2 Terminal 1

✓ from backup amplifier TB2 Terminal 4 to primary amplifier TB2 Terminal 2.

Operation in 50 watt system: No backup amplifier is available when configured for 50 watt application

❒ **FC-AAM25X Speaker Circuit - TB1 Terminals 3(+) & 4(-) Style Y, 5(+) & 6(-) Style Z, 1 & 2 Shield (Standby and Alarm Polarity Shown)**

Power-limited circuitry

Operation: Circuit can be wired Style Y or Style Z

Normal Operating Voltage: 25 V_{RMS} (70.7 V_{RMS} operation possible by plugging optional FC-XRM70 conversion module into P1 of audio amplifier).

Output Power: 25 watts (20 watts with background music setting).

Maximum total capacitance for each speaker circuit: 250 uF.

End-of-Line Resistor for Style Y circuit: Model R-4.7K, 1 watt P/N 75470.

Auxiliary (Specific Application) Power - TB4 Terminals 1(+) & 2(-)

Up to 35 mA @ 24 VDC is available for powering control modules and associated End-of-Line power supervision relays.

Power-limited circuitry. Refer to Device Compatibility Document for a list of compatible devices

Form-C Trouble Relay - TB1

TB1 Form-C relay contact rating: 2.0 amps @ 30 VDC (resistive), 0.6 amps @ 30 VAC (resistive).

External Audio Inputs - Optional FC-MGM Message Generator Module

1. RCA Jack Input (female connector)
   Input Impedance: 3K ohms maximum
   Input Voltage: 700 mV_{RMS} maximum
   Input Current: 1 mA maximum @ 700 mV
   Requires preamplifier output: mates to RCA phono 'plug' - 3mm diameter, 10mm length, 9mm shell diameter.
2. Mini 3.5 mm Stereo Jack (female connector)
   Input Impedance: 150K ohms maximum
   Input Voltage: 700 mV_{RMS} maximum
   Input Current: 1 mA maximum @ 700 mV
   Requires a preamplifier output
   Compatible with personal computer sound card output
3. Microphone Connector for optional Fire•Lite standard microphone P/N: FC-MICROPHONE

Audio Riser - TB7

Magnetically isolated input utilizes signals up to 70.7 V_{RMS} with a frequency range of 400 Hz to 4 KHz.

Note: If background music is enabled, the maximum input signal to the riser:

- *with a 20 watt speaker load per circuit cannot exceed 25 V_{RMS}*
- *with a 25 watt speaker load per circuit cannot exceed 20 V_{RMS}*

1.4 Indicators

LEDs Located on Circuit Boards:

- 24 VDC Power On - green LED on main circuit board (FC-SCB Slave Command Board)
- System Trouble - yellow LED on main circuit board (FC-SCB Slave Command Board)
- Alarm - red LED on main circuit board (FC-SCB Slave Command Board)
- Tone Generator Trouble - yellow LED on main circuit board (FC-SCB Slave Command Board)
- Ground Fault - yellow LED [FC-PSM2] Power Supply/Battery Charge Module)
- Battery Trouble - yellow LED [FC-PSM2] Power Supply/Battery Charge Module)
- AC On - green LED [FC-PSM2] Power Supply/Battery Charge Module)
- Amplifier Supervision - green LED (FC-AAM25X Audio Amplifier Module)
- Circuit Trouble - yellow LED (FC-AAM25X Audio Amplifier Module)
- Message Generator Trouble - yellow LED (on optional FC-MGM Message Generator Module)
- Record LED (REC) - green LED (on optional FC-MGM Message Generator Module)
- Playback Active LED (PLAYBACK) - green LED (on optional FC-MGM Message Generator Module)

1.5 Circuits

Input Circuits - Master CMD Input

- The Master Command Bus Input is configured to activate the amplifiers on a reverse polarity signal. The circuit is power-limited and supervised. The normal operating voltage is 24 VDC filtered with a reverse polarity current of 35 mA max.
- Battery Charger Trouble Input is a contact closure input used for identification of troubles on the optional CHG-120F Battery Charger

CMD1 and CMD2 Input Circuits

- The two input circuits are independently field programmable to accept Notification Appliance Circuits or normally open contacts. Terminals are provided to allow feed-through of the NACs, allowing placement of the panel anywhere along a Notification Appliance Circuit. A trouble on the audio distribution panel will cause relay contacts at the out terminals of CMD1 to open, causing an NAC circuit trouble at the FACP. *Note: The FC-25/50DA will not open the out terminals while in alarm. Monitoring panel troubles while in alarm requires use of independent trouble relay at TB1.*
- Programming CMD1 and/or CMD2 for activation on contact closure will allow activation of the amplifiers on a normally open contact transfer to the closed condition. Contact wiring is supervised for open conditions. A short will cause amplifier activation (contact closure). *Note: Ferrite beads must be installed on the wiring at each Command Input (refer to "CMD1 and CMD2" on page 31)*

Audio Jacks (located on optional FC-MGM Message Generator Module)

- RCA Jack provides convenient connection to an audio source, such as a tape player, for recording a new digital message
- Mini Jack provides connection to a personal computer sound card output for recording a new digital message
- Microphone Jack provides connection for a standard Fire•Lite microphone

Output Circuits

- Auxiliary (Specific Application) Power Output, 35 mA @ 24 VDC
- Power Supply/Battery Charger FC-PSM2 module provides power for the main circuit board in standby and alarm at maximum power
- The FC-PSM2 module also provides a 24 Volt Battery Charger (up to 18 AH batteries) @ 800 mA max.

Notification Appliance Circuits

- One NAC Speaker Circuit Style Y or Style Z with each FC-AAM25X amplifier module

Relays

- One Form-C Trouble Relay on main circuit board. Contacts are rated 2.0 amps @ 30 VDC (resistive) and 0.6 amps @ 30 VAC (resistive)
- The Power Supply/Battery Charger module provides one Form-C AC Loss relay. Contacts are rated 2.0 amps @ 30 VDC (resistive) and 0.6 amps @ 30 VAC (resistive)

FC-MIM Microphone Interface Module

- The optional FC-MIM Microphone Interface Module can be mounted to the P5 connector on FC-25/50DA main circuit board. This allows the connection of the FC-RMM Remote Microphone Module which can be used for remote paging.

P6 Connector (not used)

Local Speaker

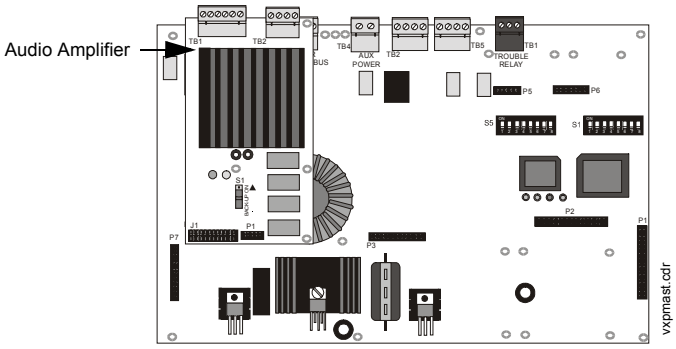
- The removable local speaker P/N: FC-LPS can be mounted on the FC-25/50DA main circuit board and connected to the FC-MGM module, to be used for reviewing the digital message without broadcasting over the system speakers. The local speaker must be installed to take advantage of the Playback feature. (The FC-LPS must be removed after use).

1.6 Basic Components

Main Circuit Board

The FC-25/50DA main circuit board (FC-SCB) contains the system's microcontroller, memory, tone generators, auxiliary 35 mA output, DIP switches for field programmable features, other primary components and wiring interface components. One amplifier module is supplied with the basic equipment. Optional modules can be plugged in and mounted to the main circuit board.

FIGURE 1-3: Main Circuit Board



FC-AAM25X Audio Amplifier Module

One Audio Amplifier Module is supplied standard with the FC-25/50DA and must be mounted to the main circuit board. The amplifier provides 25 watts of power at 25 V_{RMS}. A second optional FC-AAM25X can be installed as a backup to the primary or to expand speaker power to 50 watts. An optional module (FC-XRM70) converts the 25 V_{RMS} output to 70.7 V_{RMS}. One fully supervised and power-limited speaker circuit is provided on each amplifier module. The circuit can be wired for Style Y (Class B) or Style Z (Class A) operation.

LEDs are provided to indicate Amplifier Supervision (illuminated green LED indicates amplifier is functional) and Circuit Trouble (illuminated yellow LED indicates field wiring fault or amplifier fault). The LEDs are only visible with the panel door open.

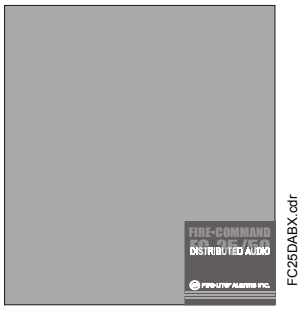
FC-PSM2 Power Supply/Battery Charger Module

This module, which is supplied standard, plugs into connector P7 located in the lower left corner of the main circuit board thus allowing the FC-25/50DA to be powered from its own internal power supply. The distributed audio panel is supplied with the FC-PSM2 module, which is powered by 120 VAC, 60 Hz, 1.0 amp primary power. An integral battery charger is capable of charging up to 18 amp hour batteries. Primary AC power to the FC-PSM2 is constantly monitored. Upon loss of AC power or AC brownout, the AC Loss Relay contacts change state and the AC ON LED extinguishes. A switch option (S1) may be used to select immediate or 6 hour delay of AC Loss Relay transfer.

Cabinet

The cabinet is red with a navy blue overlay, measures 23.0" (584 mm) x 15.5" (393.7 mm) x 4.25" (107.9 mm) and provides space for two batteries (up to 18 amp hours).

FIGURE 1-4: Cabinet



Batteries

The cabinet provides space for two 18 Amp Hour batteries. If larger than 18 Amp Hour batteries are to be installed, use the CHG-75 or CHG-120F Battery Charger and separate battery cabinet. *If a CHG-75 or CHG-120F is being used to charge the batteries, make certain to disable the FC-PSM2 charger and enable the external charger by setting S5 DIP switch 4, which is located on the main circuit board, to the ON position (refer to "S5 DIP Switch Settings on Main Circuit Board" on page 18).*

1.7 Optional Modules

FC-AAM25X Audio Amplifier Module

The primary amplifier is connected to P4 on the main circuit board and an optional second amplifier is connected to P3. The optional second amplifier provides an additional 25 watts of power at 25 V_{RMS} and can therefore be used to expand system power to 50 watts (providing dual 25 watt speaker circuits) or it can be used as a backup amplifier. An FC-XRM70 option module can also be used to convert the 25 V_{RMS} output of each amplifier to 70.7 V_{RMS}.

Note: For ease of access, all wiring should be connected to the terminals on the main circuit board terminal blocks TB2, TB4, TB5 and TB6 prior to installing the second Audio Amplifier Module.

FC-XRM70 Transformer Module 70.7 V_{RMS}

This optional module plugs into connector P1 of the Audio Amplifier Module and provides conversion from 25 V_{RMS} to 70.7 V_{RMS} at full rated 25 watts output power.

FC-MGM Message Generator Module

This module provides custom message recording capabilities and system audio backup. The custom message may be recorded from an alternate audio source connected to the integral audio jacks. In addition, built-in tone generators, which are located on the main circuit board, provide tones before and after the message as well as backup on message failure.

FC-LPS Local Playback Speaker

This optional speaker module is mounted on the FC-25/50DA main circuit board and connects to the optional FC-MGM module. This unit allows reviewing of the digital message locally without broadcasting it over the system speakers. The optional module must be installed in order to take advantage of the Playback feature. It may be temporarily used to test recorded messages. A mounting kit is included for this purpose. The FC-LPS cannot be permanently mounted in the enclosure and must be removed after use.

FC-RMM Remote Microphone Module

The optional microphone module, which can be installed in a CAB-RMR, provides paging capabilities for an audio system. The FC-MIM Microphone Interface Module must be installed in the audio panel for connection to the FC-RMM (refer to the FC-RMM Product Installation Document #51247 for installation information).

FCDA-BRKT Module Mounting Bracket

The optional FCDA-BRKT can be used to mount two control and/or monitor modules in the FC-25/50DA cabinet. The modules are mounted to the bracket before mounting the bracket in the lower half of the cabinet. Note that the bracket can be used with either 12 or 18 Amp Hour batteries installed in the cabinet.

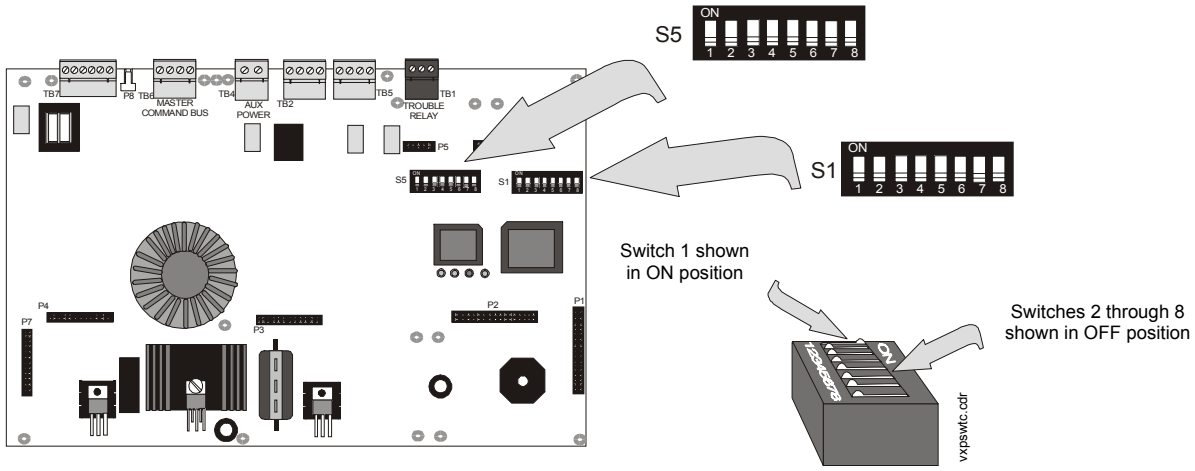
CHAPTER 2 *Switch Settings*

The FC-25/50DA can be field programmed using option DIP switches S1 and S5 located in the upper right side of the main circuit board and SW1 and SW2 on the optional FC-MGM Message Generator Module. It is recommended that tone selection and message repeat cycles be reviewed and approved by the local AHJ. Refer to the following illustrations for switch settings and details on DIP switch placement in the ON and OFF positions. For convenience and to ensure easy accessibility, it is recommended that DIP switches be configured prior to installation.

In order to minimize risk of damage to any circuits, do not use conductive tools when configuring DIP switches.

2.1 S1 DIP Switch Settings on Main Circuit Board

FIGURE 2-1: Field Programming DIP Switches on Main Circuit Board



- Switch 1 - Temporal pattern generated per ANSI S3.41 when Switch 1 is ON and Switches 2 and 3 are OFF

  OFF = No temporal pattern - tone generated as selected by Switches 2 and 3 (factory default setting).

  ON = Temporal pattern generated on steady tone. Switches 2 and 3 must be in the OFF position.
- Switches 2 and 3 - used to determine what tone will be transmitted over the speakers. Refer to Table 2-2 on page 18 for selection of the tone generator and "Operation" on page 39 for audio riser operation.

TABLE 2-1: Switch Settings for Tones

Switch 2	Switch 3	Tone Transmitted Before and After Optional Digital Voice Message
OFF	OFF	STEADY
OFF	ON	SLOW WHOOP (factory default)
ON	OFF	Hi-Lo
ON	ON	CHIME

- Switches 4, 5, 6, 7 and 8 - not used

2.2 S5 DIP Switch Settings on Main Circuit Board

- Switch 1 - Not used
- Switch 2 - Not used
- Switch 3 - Background music

  ON = Background music enabled (requires Fire•Command•25/50X as audio source)
  OFF = Background music disabled (factory default)
- Switch 4 - Charger selection

  ON = CHG-120F being used as battery charger
  OFF = FC-PSM2 being used as battery charger (factory default)
- Switch 5 - used to determine what will activate the Command Input #1

  OFF = Activation on NAC polarity reversal (factory default settings)

  ON = Activation on contact closure
- Switch 6 - used to determine what will activate the Command Input #2

  OFF = Activation on NAC polarity reversal (factory default setting)

  ON = Activation on contact closure
- Switch 7 - Not used
- Switch 8 - Riser Audio Loss Backup, used to enable local generation of evacuation tone and/or voice when FC-MGM is installed if audio riser fails for more than 30 seconds

  ON = Local generation of evacuation tone
  OFF = Disable local generation of evacuation tone (factory default)

2.3 Audio Source Selection

The selection of the source of the audio which will be transmitted by the amplifier in a 25 watt system (both amplifiers in a 50 watt system) is determined by three factors:

- ✓ DIP switch settings as detailed in “S5 DIP Switch Settings on Main Circuit Board” on page 18
- ✓ activation of CMD1 and/or CMD2 Command Inputs
- ✓ installation of the optional FC-MGM message generator module

The following table details which audio sources will be transmitted depending on the conditions stated above. A *0* entry indicates that the CMD input is Off (not active) while a *1* entry indicates that the CMD input is On (active).

TABLE 2-2: Command Input Control

CMD1 Input	CMD2 Input	FC-MGM Option Module Installed	Amplifier Output(s)
0	0	NO	No Audio Output
0	1	NO	Audio from Tone Generator (channel 2)
1	0	NO	Audio from Riser (channel 1)
1	1	NO	Audio from Riser (channel 1)
0	0	YES	No Audio Output
0	1	YES	Audio from FC-MGM Message Generator (channel 2)
1	0	YES	Audio from Riser (channel 1)
1	1	YES	Audio from Riser (channel 1)

2.4 Switch SW1 on FC-AAM25X Audio Amplifier Module

When the amplifier is mounted in the secondary location (connector P3) on the main circuit board, switch S1 on the FC-AAM25X is used to configure the amplifier for backup applications. Positioning switch S1 to the Up (Backup On) position sets the amplifier to act as a backup to the primary amplifier installed in the system. Positioning switch S1 to the Down position configures the amplifier to act as an additional system amplifier. See "Standard Audio Amplifier Module (FC-AAM25X)" on page 34, for the location of the switch on the FC-AAM25X board and "One Speaker Circuit With Backup" on page 45, for details on wiring the amplifiers for backup applications.

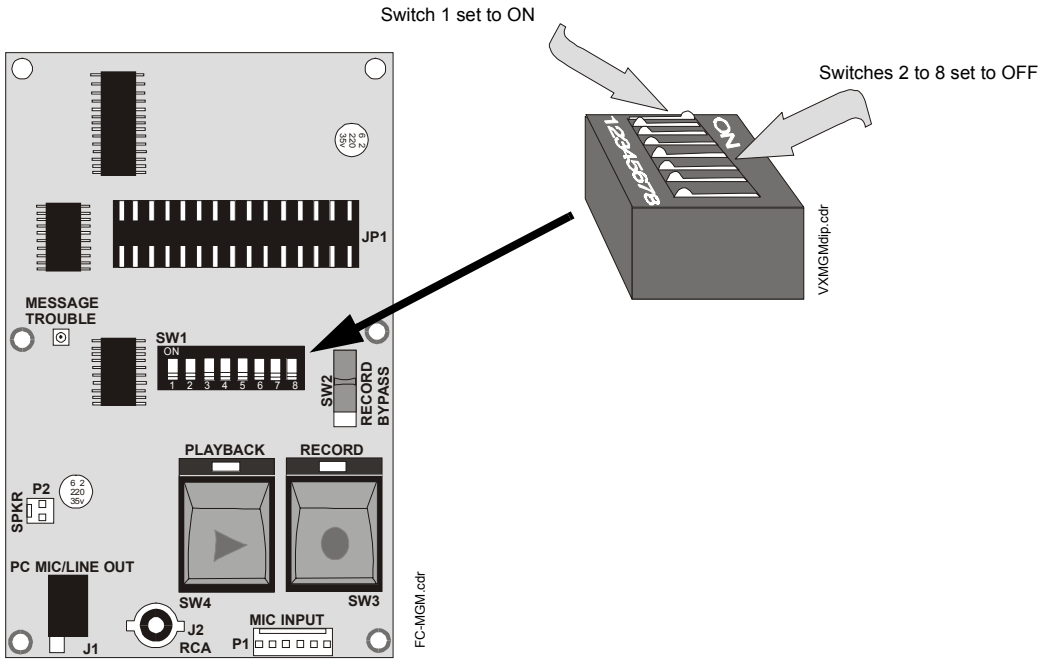
2.5 Switch S1 on FC-PSM2 Power Supply Module

Switch S1 is used to enable or disable a reporting delay on AC loss. Positioning the switch to the left will disable any reporting delay which means that an AC loss will be immediately reported to a monitoring service (if connected to the system). Positioning the switch to the right will enable the AC loss reporting delay which will delay, for six hours, the transmission of an AC loss report to the monitoring service. See "Power Supply/Battery Charger Module FC-PSM2" on page 27, for the location of the switch on the FC-PSM2 board.

2.6 Switch SW1 Settings on FC-MGM Module

SW1 - DIP Switch Settings

FIGURE 2-2: Field Programming Switches on FC-MGM Module



Custom messages can be recorded from four different audio sources:

- ✓ PC microphone
- ✓ PC line out
- ✓ Fire•Lite microphone (P/N:FC-MICROPHONE)
- ✓ RCA jack connected to an audio source

Note: Only <u>one</u> of the four audio sources can be connected at a time.

FC-MGM SW1 DIP switch settings are as follows:

- Switch 1 - used to select an input for digital voice message recording:

  ON = select alternate sources for message recording

  OFF = select RCA Jack for message recording (factory default)
- Switch 2 - used to configure the mini Audio Jack for digital voice message recording from either a PC microphone or a PC audio output card:

  ON = select PC line out for message recording

  OFF = select PC microphone for message recording (factory default)
- Switch 3 - used to enable recording of digital voice message:

  OFF = disable recording of message (factory default)

  ON = enable recording of message
- Switch 4 - used to determine if a tone will be generated before the message is transmitted:

  OFF = No tone before message

  ON = Tone before message (factory default setting)
- Switch 5 - used to determine if a tone will be generated after the message is generated:

  OFF = No tone after message

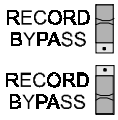
  ON = Tone after message (factory default setting)
- Switch 6, 7 and 8 - used to determine the number of times the voice message will repeat.

TABLE 2-3: Switch Settings for Message Repeat

SWITCH 6	SWITCH 7	SWITCH 8	NUMBER OF TIMES TO REPEAT DIGITAL VOICE MESSAGE
ON	OFF	OFF	3
OFF	ON	OFF	4
ON	ON	OFF	6 (factory default)
OFF	OFF	ON	8
ON	ON	ON	INFINITE (until FACP NAC is reset)

SW2 - Record Bypass Switch (on optional FC-MGM Module)

This switch, when placed in the down position, prevents accidental erasure of stored voice messages. See “Operating Instructions” on page 39 for additional information.



- UP Position = The stored digital voice message may be overwritten with a new one.
- Down Position = The stored digital voice message can not be overwritten (factory default setting).

2.7 Message Recording

2.7.1 Record Push Button (on optional FC-MGM Module)

The switch labeled Record is used for recording a customized message.

Recording Instructions

Recording a custom message into the distributed audio panel requires that the voice message be input via a Fire•Lite microphone (P/N: FC-MICROPHONE) connected to P1 on the FC-MGM, PC microphone, PC audio out connected to J1 on the FC-MGM or another audio source connected to RCA jack J2. Switch settings in this section are for the FC-MGM module SW1 DIP switch.

1. Enable recording by setting SW1 switch 3 on the FC-MGM module to the ON position. The Record button is now ready to be used in record operation.
2. Select the record input source by setting SW1 switch 1 on the FC-MGM module to the OFF position if recording via the RCA jack, or to the ON position if recording via other sources.
3. Configure the mini audio jack, if being used, by setting SW1 switch 2 on the FC-MGM module to the ON position if recording via PC line out or to the OFF position if recording via PC microphone.
4. Slide the Record Bypass switch SW2 on the FC-MGM module to the UP position to enable the message storage device.
5. Press the button labeled 'Record' to begin recording. The green LED on the Record button will begin to flash at a one second rate. Recording of the message should begin as soon as the LED remains illuminated. After initially flashing for five seconds, the Record LED will be on steady throughout the record operation and then begin flashing again to signal that there are five seconds of record time remaining. *Note that the system Trouble LED will be on while recording. The trouble relay will turn on.*
6. At the end of recording, the Record button must be pressed again to signal the end of the recorded message. Avoid long pauses at the end of the message by promptly pressing the Record button when the voice message input has stopped. *Note that it is not necessary to fill the entire 60 second record time. The time limit represents the maximum time allotted. If the Record button is not pressed to signal the end of the voice recording, the unit automatically ends the message at the time out period.*
7. Disable recording by setting SW1 switch 3 to the OFF position.
8. Playback the recorded messages for accuracy. This may be done via the 'Playback" key or by creating an alarm or evacuate condition. The Playback feature allows for reviewing the message locally via the FC-LPS option module without generating the message through the amplifiers.

CAUTION! *Be certain to slide the Record Bypass switch SW2 to the Down position when recording is completed. This will prevent accidental rerecording or deletion of the stored message. It is not possible to record with the SW2 Record Bypass switch in the Down position.*

2.7.2 Playback Button

The Playback button can be used to review the stored voice message. By connecting the optional Local Playback Speaker Module, the message can be heard without transmitting it over the system speakers. Pressing the Playback button will cause the following:

- The green LED on the Playback button will be illuminated.
- The message will play until the end or until the Playback button is pressed a second time.

Note that the voice message will repeat according to the SW1 DIP switch 6, 7 and 8 settings.

CHAPTER 3 *Installation*

3.1 Cabinet Mounting Options

FIGURE 3-1: Cabinet

The cabinet may be surface or semi-flush mounted. The door is removable during the installation period by opening and lifting it off the hinges. The cabinet mounts using two key slots at the top of the backbox and two additional 0.250" diameter holes located at the bottom.

Carefully unpack the system and check for shipping damage. Mount the cabinet in a clean, dry, vibration-free area where extreme temperatures are not encountered. The area should be readily accessible with sufficient room to easily install and maintain the panel. Locate the top of the cabinet approximately five feet above the floor. Determine the number of conductors required for the devices to be installed. Sufficient knockouts are provided for wiring convenience. Select the appropriate knockout(s) and pull the required conductors into the box. All wiring should be in accordance with the National and/or Local codes for fire alarm systems.

3.2 Backbox Installation

Surface Mounting

- ✓ Open the door and lift the door off the pin hinges
- ✓ Mark and predrill holes for the top two backbox keyhole mounting bolts using the dimensions shown in Figure 3-2 on page 23. The top of the backbox should be approximately five feet above the floor.
- ✓ Install two upper fasteners in the wall with the screw heads protruding.
- ✓ Using the upper 'keyholes', mount the backbox over the two screws.
- ✓ Mark and drill the lower two holes.
- ✓ Install the remaining fasteners and tighten all fasteners to complete backbox mounting.

Draw wires through the respective knockout locations.

FIGURE 3-2: Cabinet Dimensions & Knockout Locations

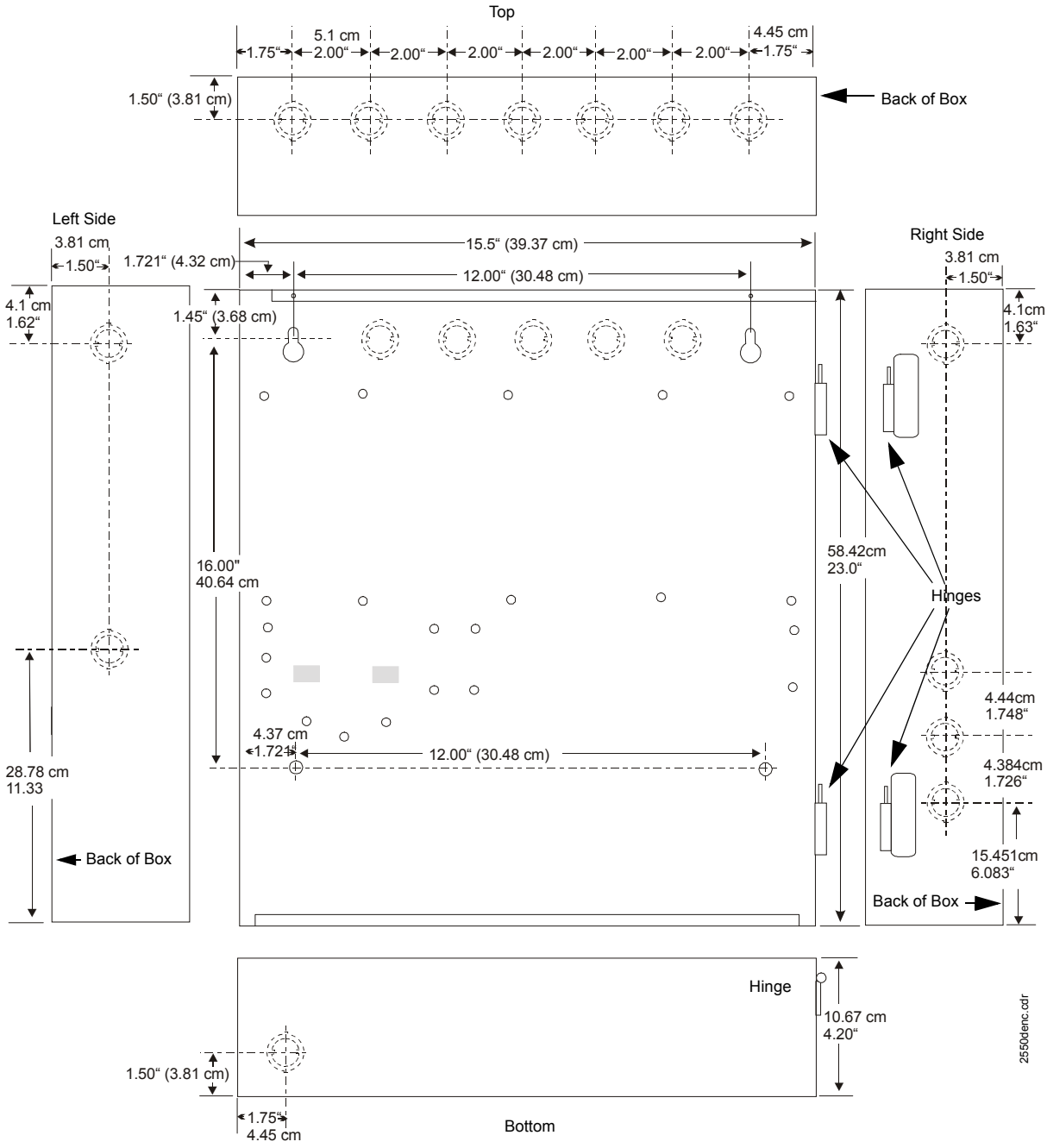
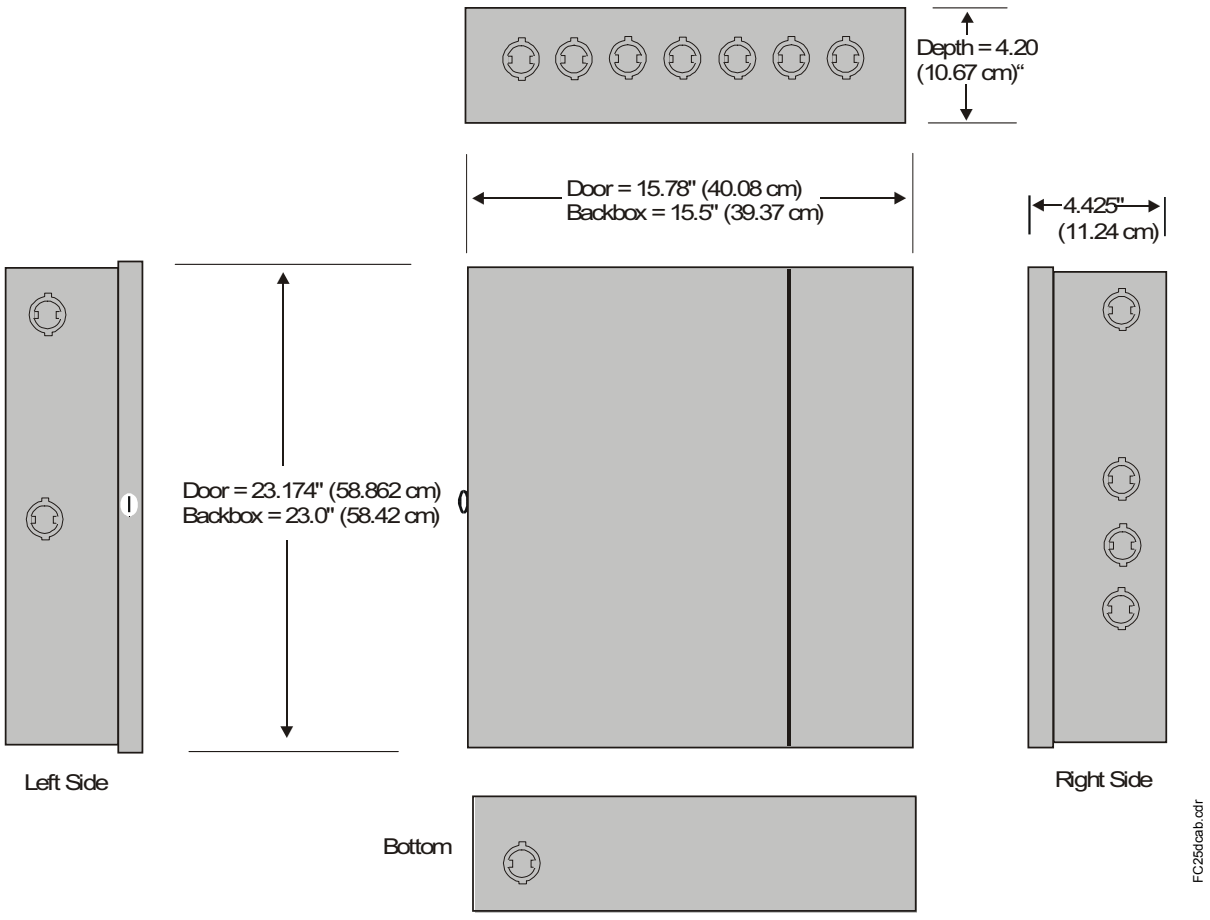


FIGURE 3-3: FC-25/50DA Backbox



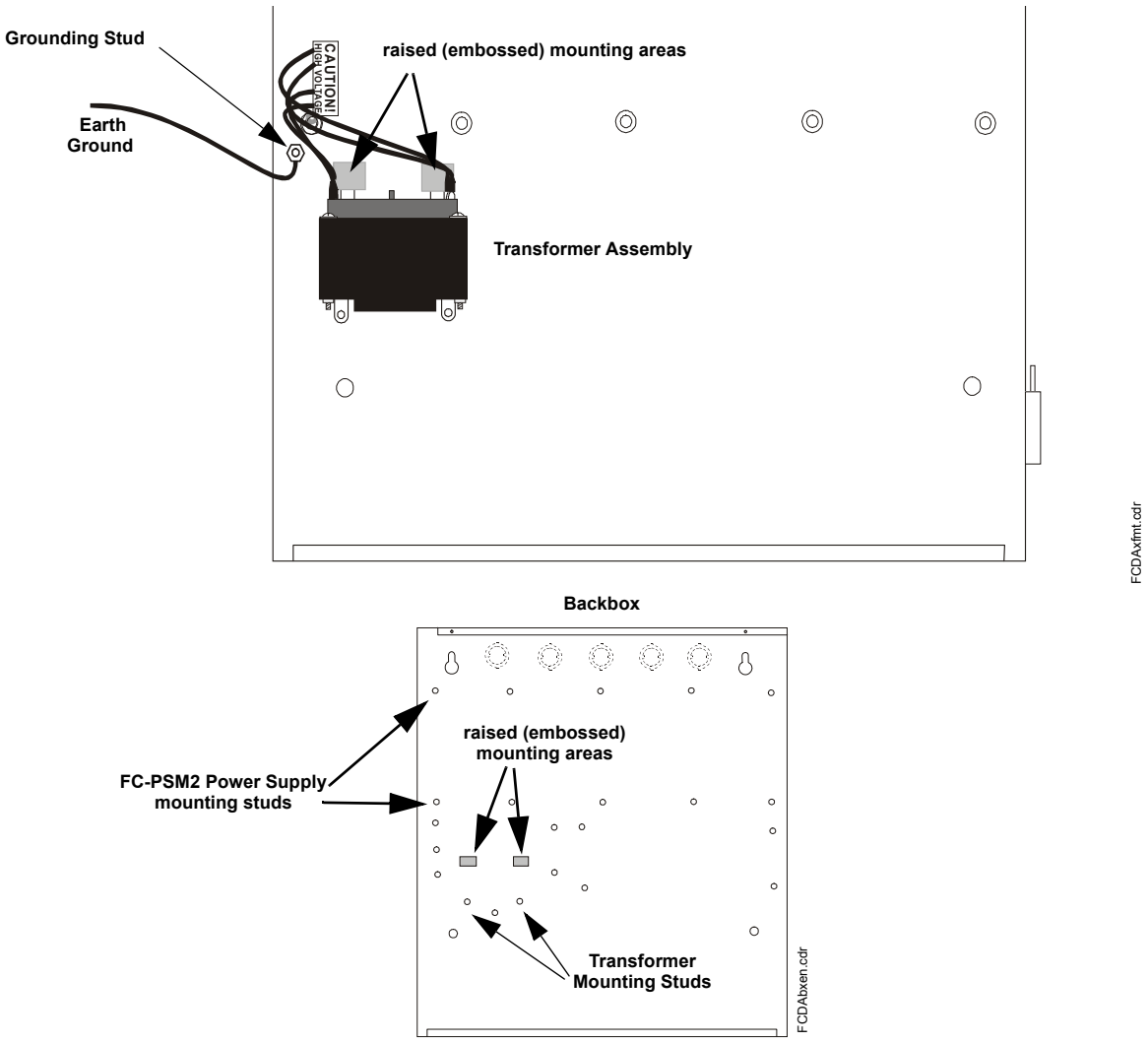
3.3 Transformer Installation

For ease of installation, the transformer should be mounted in the cabinet before the main circuit board.

Caution: *Before installing any modules or cables, make certain all power (AC and DC) has been removed.*

1. Locate two slots under the raised areas and the two threaded mounting studs in the bottom left corner of the backbox (refer to backbox illustration below).
2. Position the two Transformer Assembly top mounting brackets in the slots under the raised areas, with cable assembly oriented to the top as illustrated below.
3. Position the two Transformer Assembly bottom mounting brackets on the two mounting studs as referenced in the following illustration
4. Secure the Transformer to the studs with the two supplied nuts.
5. Connect a wire from a solid earth ground to the grounding stud and tighten the nut. This connection is necessary in order to provide proper lightning and transient protection for the panel.

FIGURE 3-4: Installation of Power Supply Transformer



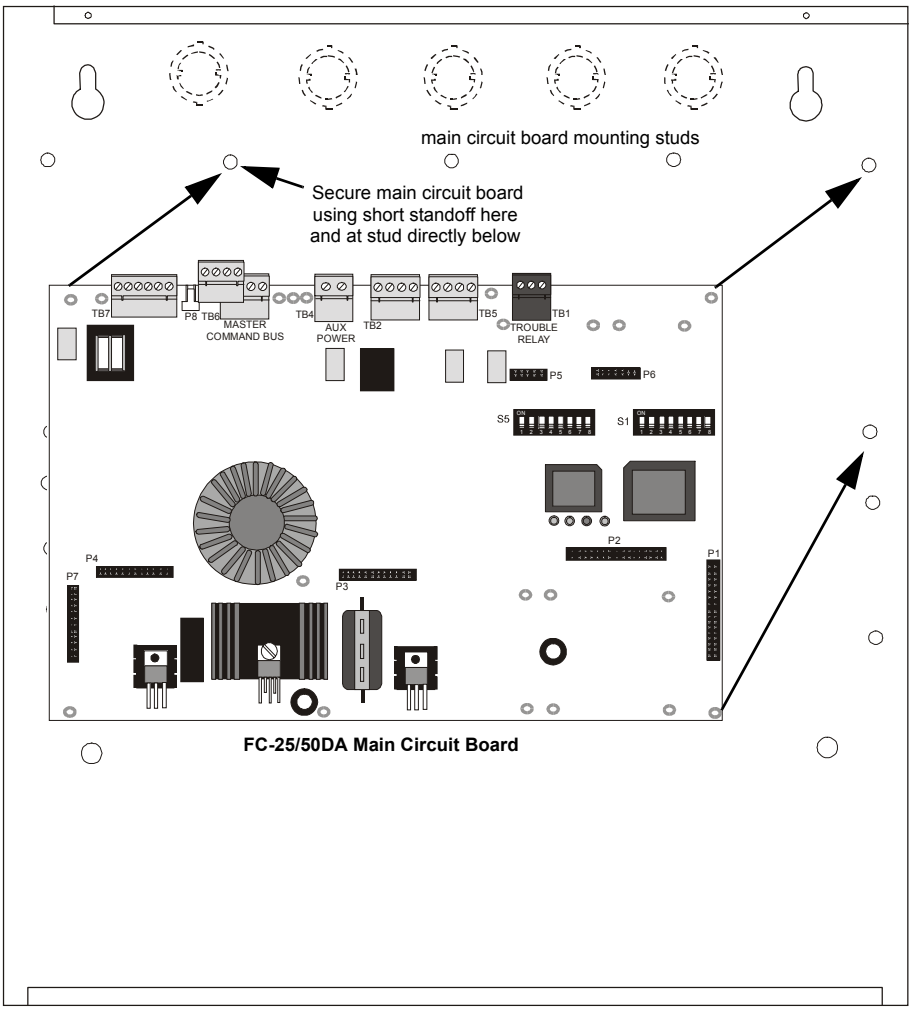
3.4 Main Circuit Board Installation

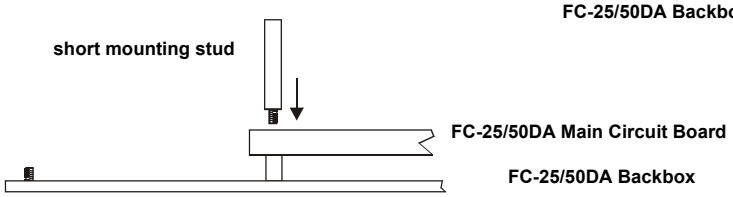
Caution: *Before installing any modules or cables, make certain all power (AC and DC) has been removed.*

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

1. Position the main circuit board so that the top right corner and lower right corner mounting holes are over the two mounting studs which are located to the far right in the backbox
2. Secure the main circuit board to the backbox mounting studs with the six supplied screws and two standoffs **Important!** Use the two supplied short metal standoffs (one threaded male end and one threaded female end) instead of screws to secure the top left and bottom left holes of the main circuit board. These standoffs are used to mount the FC-PSM2 Power Supply Module in the cabinet. Refer to the FC-PSM2 mounting instructions for information on installing the Power Supply Module

FIGURE 3-5: Main Circuit Board Installation





3.5 Power Supply/Battery Charger Module FC-PSM2

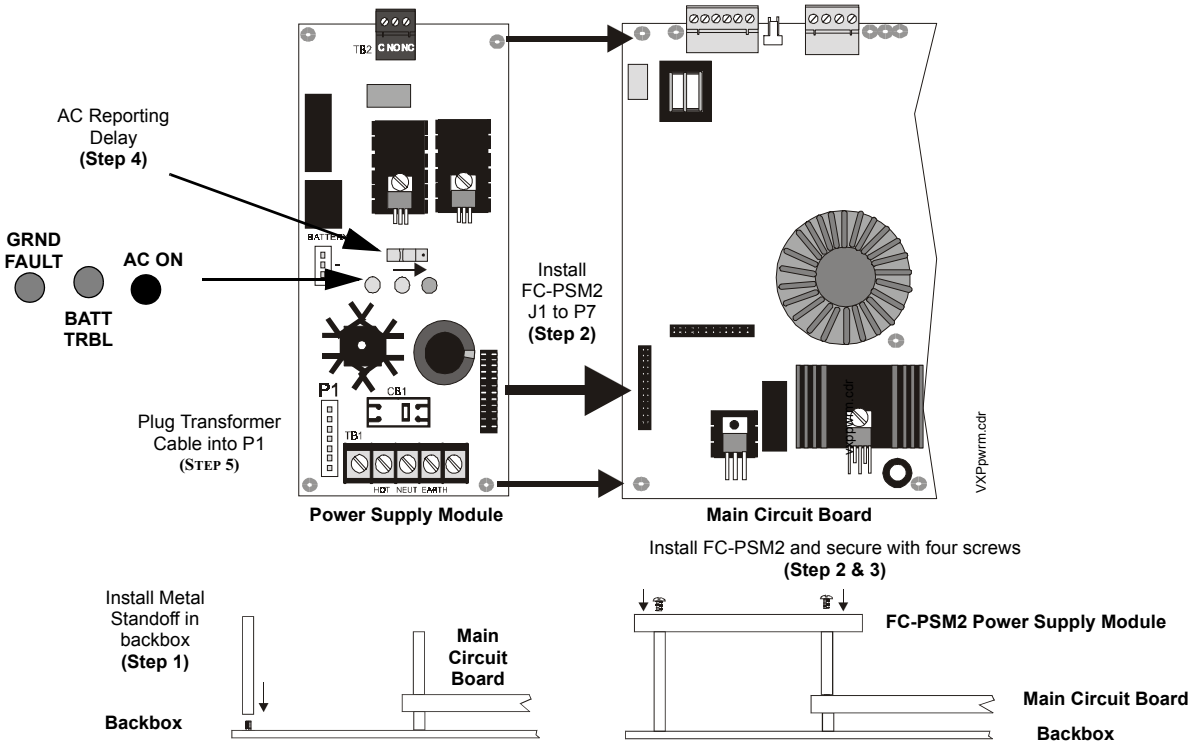
The included Power Supply/Battery Charger Module can be used to provide stand-alone power to the distributed audio panel. The FC-PSM2 module is powered by 120 VAC. In addition to supplying operating power, the module is capable of charging 7 AH to 18 AH batteries. LEDs on the module indicate AC On (green), Battery Trouble (yellow) and Ground Fault (yellow). S1 is the AC Fail Delay switch. When positioned to the right, in the AC Fail Delay position, the panel will delay for six hours the deactivation of the AC Power Fail relay for independent monitoring by a DACT. Connector J1 of the Power Supply module plugs into connector P7 located in the lower left corner of the main circuit board.

TB2 provides AC power fail relay contacts which transfer on loss of AC power. Batteries can be connected to the P2 connector on the Power Supply Module. Up to two 18 AH batteries can be installed in the cabinet. Greater than 18 AH require the use of the CHG-120F battery charger and an external UL listed battery cabinet.

Caution: *Before installing any modules, make certain all power (AC and DC) has been removed.*

1. Install the two supplied long metal standoffs (two threaded female ends) by screwing them onto the threaded mounting studs on the top left and bottom left of the backbox. Refer to Figure 3-4 Backbox illustration.
2. Carefully align connector J1 on the FC-PSM2 Module with connector P7 on the main circuit board and press the FC-PSM2 securely into place being certain not to bend or break any connector pins.
3. Secure the FC-PSM2 Module to the two standoffs in the backbox and two standoffs on the main circuit board, using the four supplied screws. The metal screws must be used to help protect against electrical transients.
4. Position switch S1 to the left for no reporting delay on AC loss or to the right to delay reporting for 6 hours.
5. Plug Transformer cable assembly into connector P1 which is located in the lower left corner of the FC-PSM2 Module. Note that the Transformer cable connector is keyed to prevent incorrect connection.
6. Complete the installation by connecting the AC power wires to Hot, Neutral and Earth terminals of TB1 on the FC-PSM2 Module. Install the terminal cover on TB1.
7. Apply power to the panel after completing the installation.
8. If batteries are being used, connect the batteries (18 AH maximum) to connector P2 located to the left center of the FC-PSM2 Module.

FIGURE 3-6: Installation of Power Supply/Battery Charger Module



3.6 Optional FCDA-BRKT Mounting Bracket

The optional FCDA-BRKT can be used to install up to two addressable monitor and/or control modules in the FC-25/50DA cabinet.

Caution: *Before installing any modules or cables, make certain all power (AC and DC) has been removed.*

Installation of Addressable Modules on Bracket

1. Position FCDA-BRKT bracket on flat surface with mounting studs facing up
2. Place addressable module(s) on mounting studs with addressing switches and terminals facing down
3. Secure module(s) to mounting studs with supplied nuts.

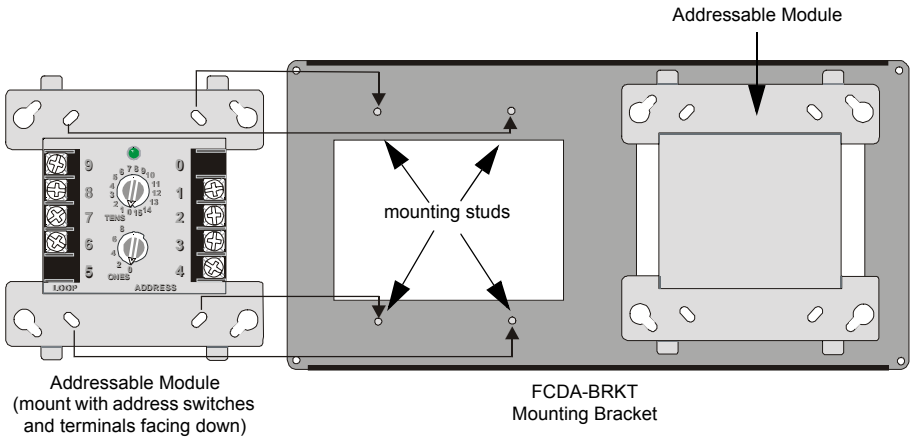


FIGURE 3-7: Module Mounting

FCDA-BRKT Bracket Installation in Backbox

1. Install four supplied standoffs in bottom section of backbox as indicated in Figure 3-8
2. Complete addressable module wiring and addressing as required by host FACP
3. Position the FCDA-BRKT bracket on the standoffs with the module addressing switches and terminals facing toward the front of the cabinet
4. Secure the bracket to the standoffs with the supplied screws

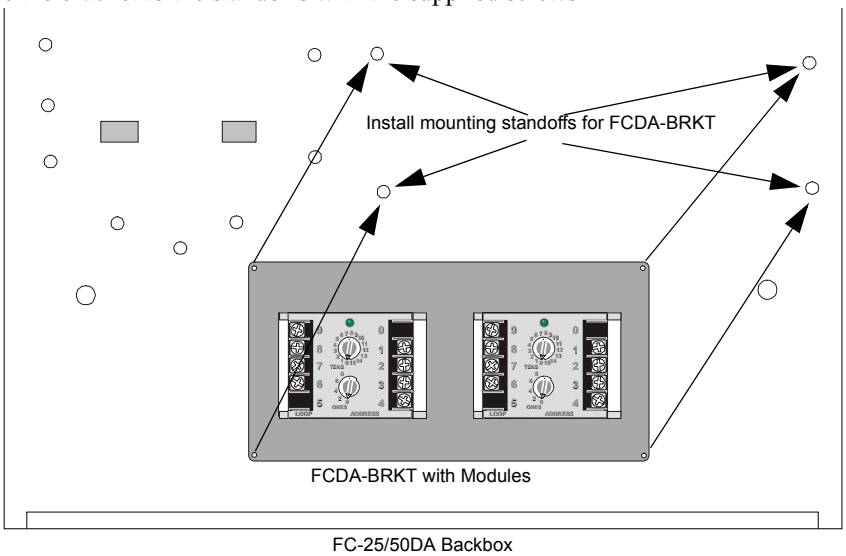


FIGURE 3-8: FCDA-BRKT Installation

3.7 Operating Power

***CAUTION**: Several different sources of power can be connected to this panel. Disconnect all sources of power before servicing. The panel and associated equipment may be damaged by removing and/or inserting cards, modules or interconnecting cables while this unit is energized.*

Internal Power Supply/Battery Charger FC-PSM2

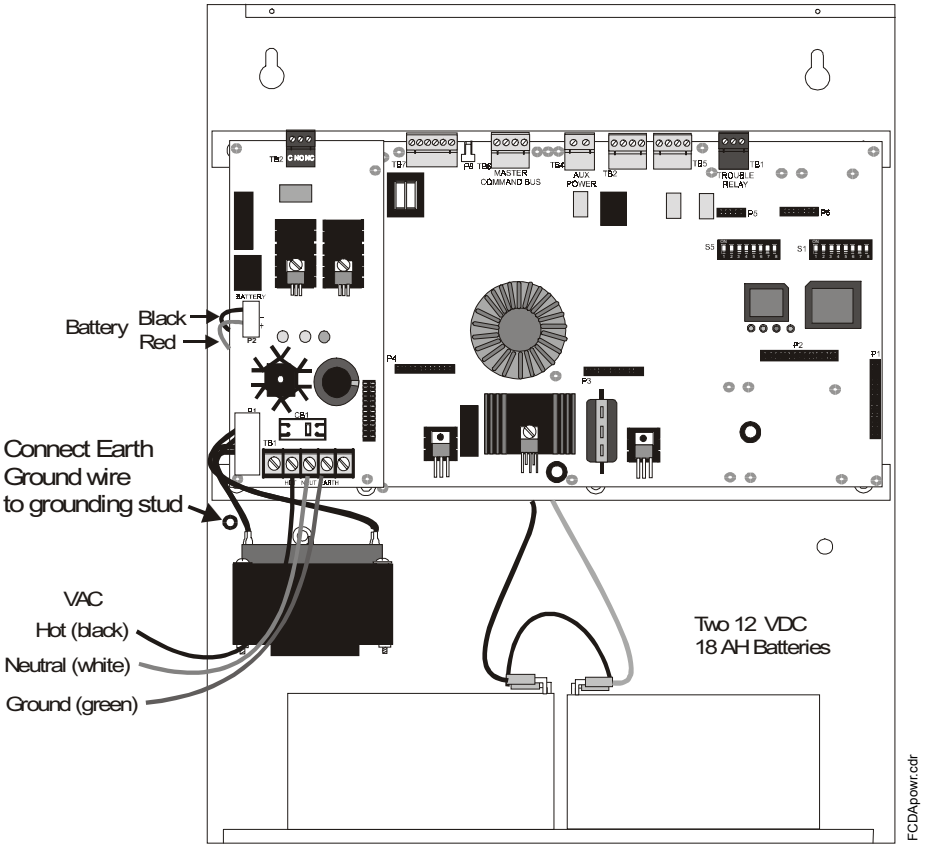
An internal power supply is provided with the FC-25/50DA to allow stand-alone capabilities. AC power connections are made to the FC-PSM2 Power Supply/Battery Charger. Primary power source is 120 VAC, 60 Hz, 1.0 amp. Run a pair of wires (with ground conductor) from the protected premises main breaker box to TB1 of the FC-PSM2. As per National Electric Code, use 14 AWG (1.6 mm O.D.) or heavier gauge wire with 600 volt insulation. No other equipment may be connected to this circuit. In addition, this circuit must be provided with overcurrent protection and may not contain any power disconnect devices. A separate Earth Ground connection must be made to ensure proper panel operation and lightning and transient protection. Connect the Earth Ground wire (minimum 14 AWG) to the backbox grounding stud. Do not use conduit for the Earth Ground connection since this does not provide reliable protection.

Secondary Power Source (Batteries)

Observe polarity when connecting the battery. Connect the battery cable to P2 on the FC-PSM2 module using the plug-in connector and cable provided. The battery charger is current-limited and capable of recharging sealed lead acid type batteries (See Figure 3-9 for battery orientation). The charger shuts off when the system is in alarm and when the battery voltage drops too low (15 VDC or less). See "Power Supply Calculations" on page 51 for calculation of the correct battery rating.

CAUTION: *Battery contains sulfuric acid which can cause severe burns to the skin and eyes, and can destroy fabrics. If contact is made with sulfuric acid, immediately flush the skin or eyes with water for 15 minutes and seek immediate medical attention.*

FIGURE 3-9: Operating Power Connections

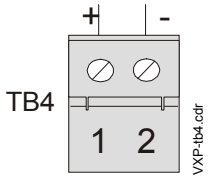


3.8 Auxiliary DC Power Output Connections

The specific application power output is power-limited.

FIGURE 3-10:Specific Application Power Connection

Specific Application Power (35 mA @ 24 VDC) is nonresettable power suitable for powering control modules and End-of Line Power supervision relays.



3.9 Input Circuits

3.9.1 Master Command Bus

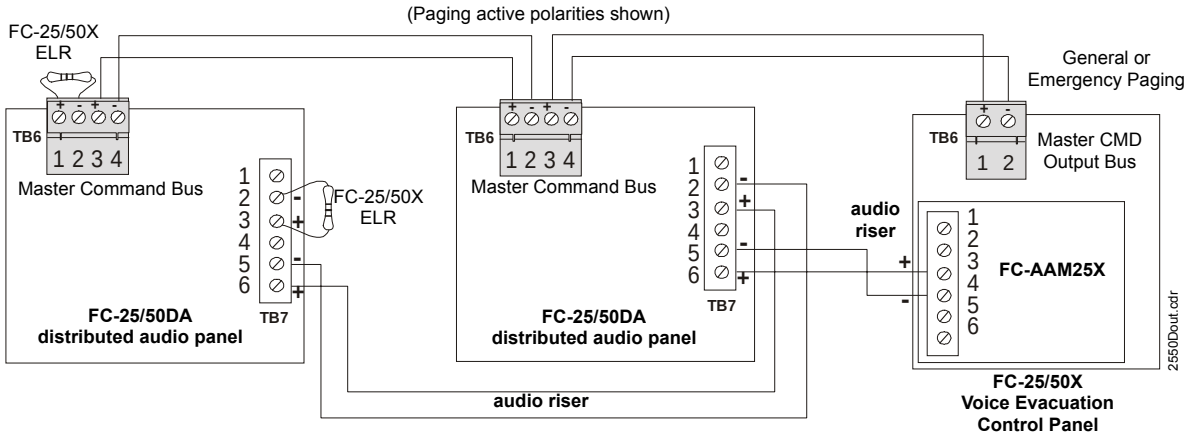
The Master Command Bus Input circuit, when used with the FC-25/50X (Fire•Command•25/50X), can be used to add paging flexibility. All field wiring for each circuit is power-limited and supervised for opens and ground faults.

The Master Command Bus Input circuit is triggered by a reverse polarity signal such as the one from the Master Command Output Bus on the FC-25/50X. Master Command input and output terminals are provided to allow connection to additional audio distribution panels.

When connecting the Master Command Output of FC-25/50X to the Master Command Bus Input of distributed audio panels, the wiring must be supervised by a 4.7K EOL resistor connected across the out terminals of Master Command Bus Input on the last panel.

In Example 1 illustrated below, the Master Command bus is activated during paging, which routes paging audio from the riser to the FC-25/50DA speakers.

FIGURE 3-11:Example 1 - Activating Multiple FC-25/50DAs with Master CMD Output Bus



The maximum line resistance from the main FC-25/50X to the last FC-25/50DA is 130 ohms (65 ohms per conductor).

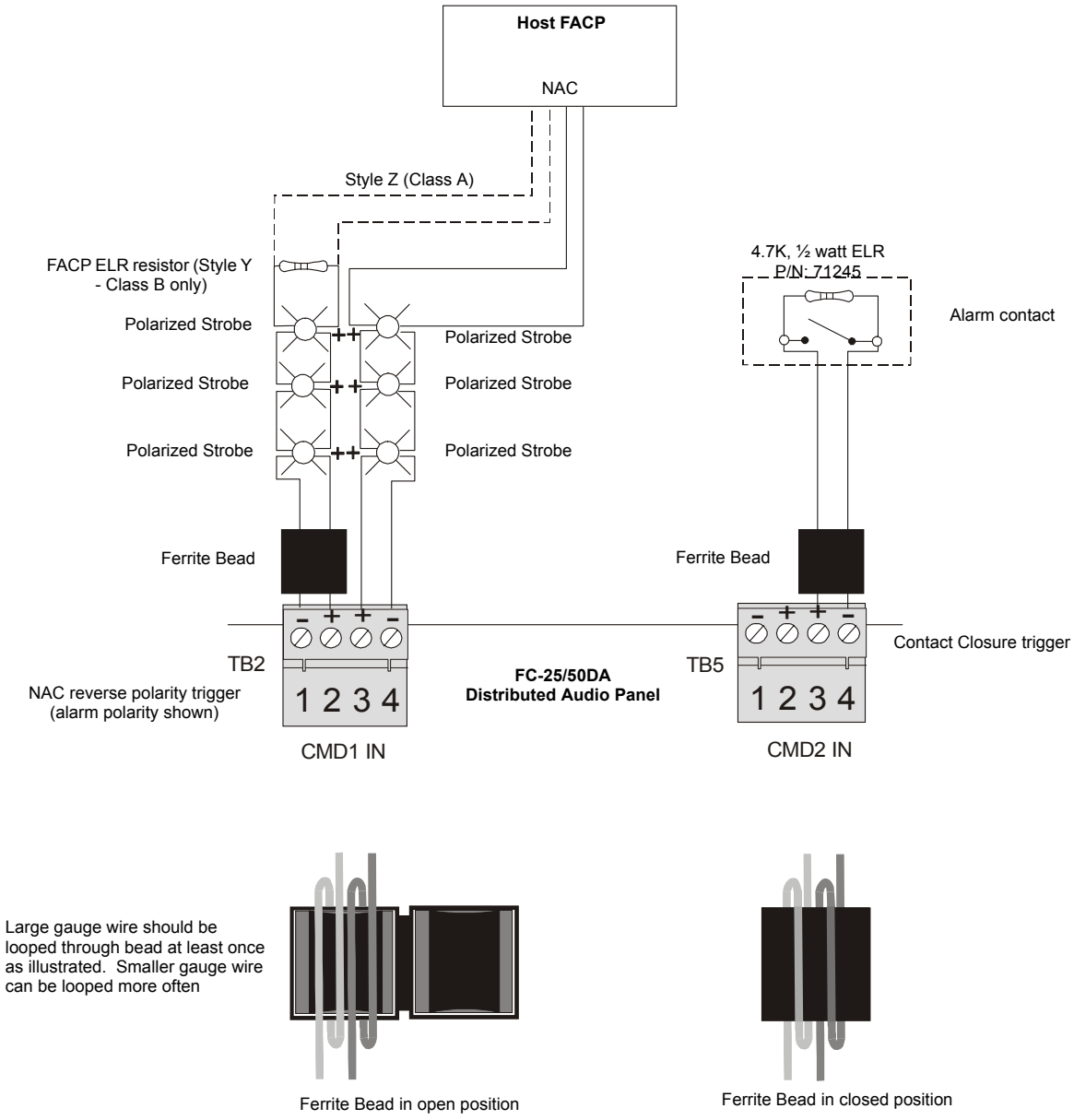
3.9.2 CMD1 and CMD2

The FC-25/50DA has two Command Input circuits, CMD1 and CMD2, which are used to activate the panel amplifiers which, in turn, transmit an audio signal over the system speakers. All field wiring for each circuit is power-limited and supervised for opens and ground faults. Each Command Input requires a ferrite bead for the input wiring as illustrated in Figure 3-12.

Each CMD input circuit can be independently field programmed to be triggered by a contact closure or by the reverse polarity of a Notification Appliance Circuit. CMD input and output terminals are provided to allow placement of the FC-25/50DA anywhere along a Notification Appliance Circuit, allowing nondedicated use of host FACP NACs for triggering. CMD1 has relay contacts (maximum current 2.0 amps) before the out terminals which will open the outgoing NAC during an FC-25/50DA trouble condition. This causes an NAC trouble at the host FACP.

Note that the Command Input Circuit configurations can be independently set so that both circuits are triggered by the same type of input or by different types of inputs as illustrated in the following figure.

FIGURE 3-12: Command Input Circuits

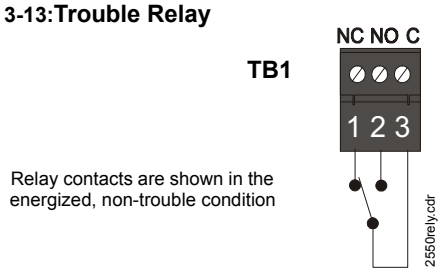


3.10 Output Circuits

Trouble Relay - TB1

The main circuit board provides a Form-C Trouble relay, for independent monitoring, rated for 2.0 amps @ 30 VDC (resistive) and 0.6 amp @ 30 VAC (resistive). This relay is 'fail safe', meaning that it is normally energized. Should system power via FC-PSM2 shut off, this relay will deenergize, transferring its contacts.

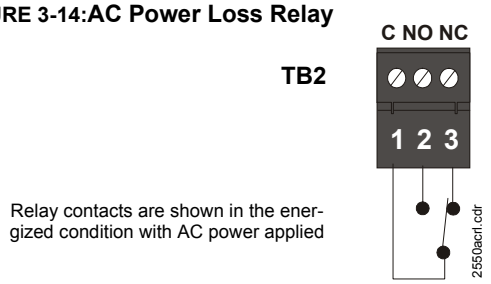
FIGURE 3-13:Trouble Relay



AC Power Loss Relay - TB2

The FC-PSM2 internal Power Supply/Battery Charger Module provides a Form-C AC Power Loss relay rated for 2.0 amps @ 30 VDC (resistive) and 0.6 amps @ 30 VAC (resistive).

FIGURE 3-14:AC Power Loss Relay

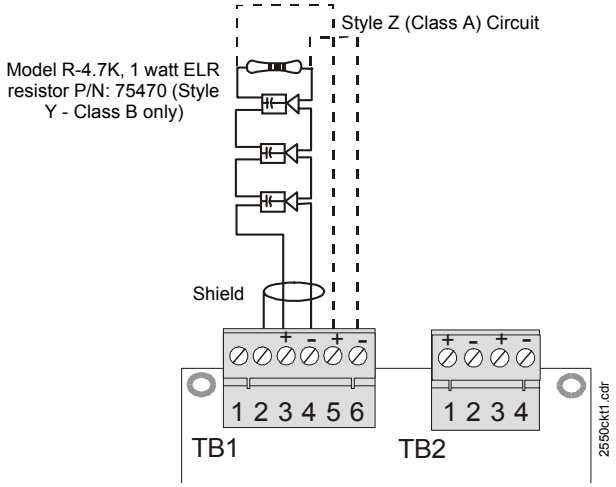


Notification Appliance Circuit (Speakers)

Each Amplifier Module provides one Notification Appliance Circuit for speakers. The circuit can be wired Style Y (Class B) or Style Z (Class A). Each supervised and power-limited circuit is capable of 25 watts of power. The maximum total capacitance for each speaker circuit cannot exceed 250 uF. Refer to the Fire•Lite Device Compatibility Document for a listing of compatible speakers.

CAUTION: *Match proper polarity connections to field wiring and speakers. Polarity shown is in the standby and alarm conditions.*

FIGURE 3-15:Speaker Circuit Connections

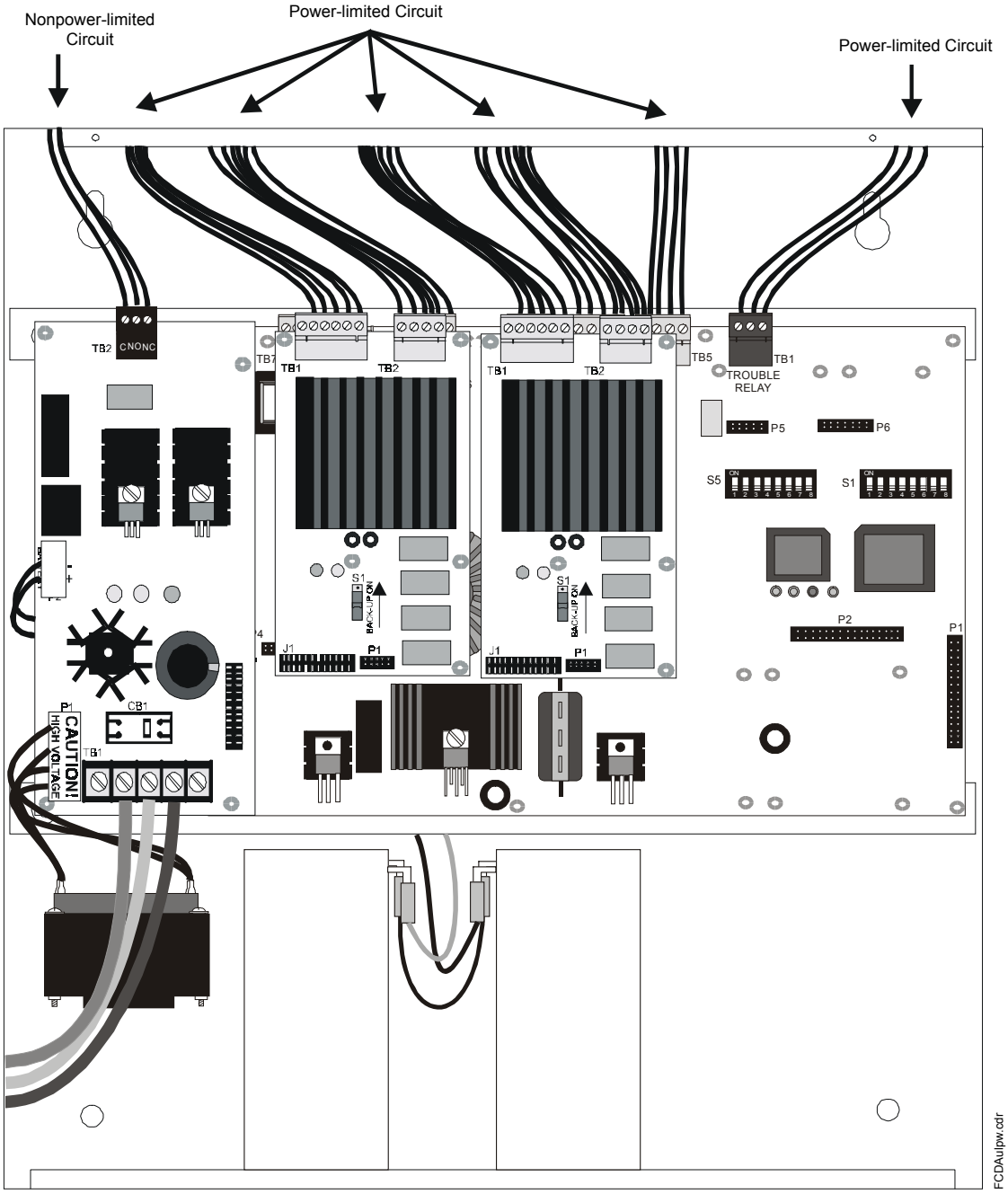


Shielded cable is not required, however, shielded cable will reduce RFI/EMI emissions and susceptibility. For additional information, refer to "Wiring Requirements" on page 56.

3.11 UL Power-limited Wiring Requirements

Power-limited and nonpower-limited circuit wiring must remain separated in the cabinet. All power-limited circuit wiring must remain at least 0.25" away from any nonpower-limited circuit wiring. Furthermore, all power-limited and nonpower-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits. A typical wiring diagram for the distributed audio panel is shown below.

FIGURE 3-16:Typical Wiring Diagram for UL Power-limited Requirements



AC power wiring to TB1 must be from power-limited source and enter/exit the cabinet through the lower left corner.

3.12 Installation of Modules

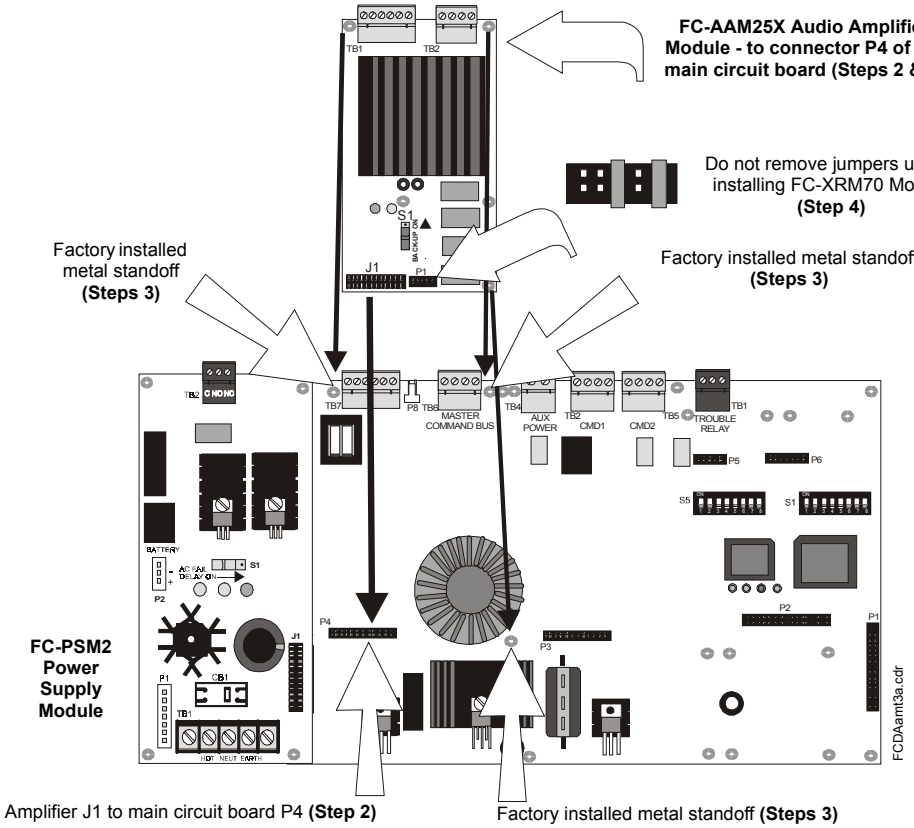
3.12.1 Standard Audio Amplifier Module (FC-AAM25X)

The standard audio amplifier module is provided with the factory standard panel configuration. It provides a 25 watt speaker circuit. LEDs on the amplifier module are for Amp Supervision (green - indicates amp functional) and Circuit Trouble (yellow - indicates wiring fault or amplifier fail). Connector J1 of the FC-AAM25X plugs into connector P4 located near the bottom left of the main circuit board.

Caution: *Before installing any modules, make certain all power (AC and DC) has been removed. See "Operating Power" on page 29.*

1. For ease of access, all wiring should be connected to the terminals on the main circuit board terminal blocks TB6 and TB7 prior to installing the Audio Amplifier Module.
2. Install the Audio Amplifier Module by carefully aligning the amplifier's J1 connector with the P4 connector on the main circuit board. Press Module securely into place making certain not to bend or break any pins.
3. Secure the Audio Amplifier Module to the factory installed metal standoffs with the supplied screws. It is important to secure the module with the metal screws in order to help protect against electrical transients.
4. Check to make certain the factory installed jumpers are in place on P1 of the Audio Amplifier Module(s). *Do not remove unless installing the FC-XRM70 Transformer Module. Refer to Figure 3-19 on page 36.*
5. Connect field wiring to newly installed amplifier. Refer to Figure 3-15 on page 32 for illustration of speaker connections.

FIGURE 3-17: Installation of Audio Amplifier



3.12.2 Second Audio Amplifier Module (FC-AAM25X)

The optional audio amplifier module is identical to the module provided with the factory standard panel configuration. It can be used to provide a second 25 watt speaker circuit, increasing the total distributed audio panel power to 50 watts, or it can be used as a backup amplifier for a 25 watt system. LEDs on the amplifier module are for Amp Supervision (green - indicates amp functional) and Circuit Trouble (yellow - indicates wiring fault or amplifier fail). Connector J1 of the optional audio amplifier module plugs into connector P3 located near the bottom center of the main circuit board.

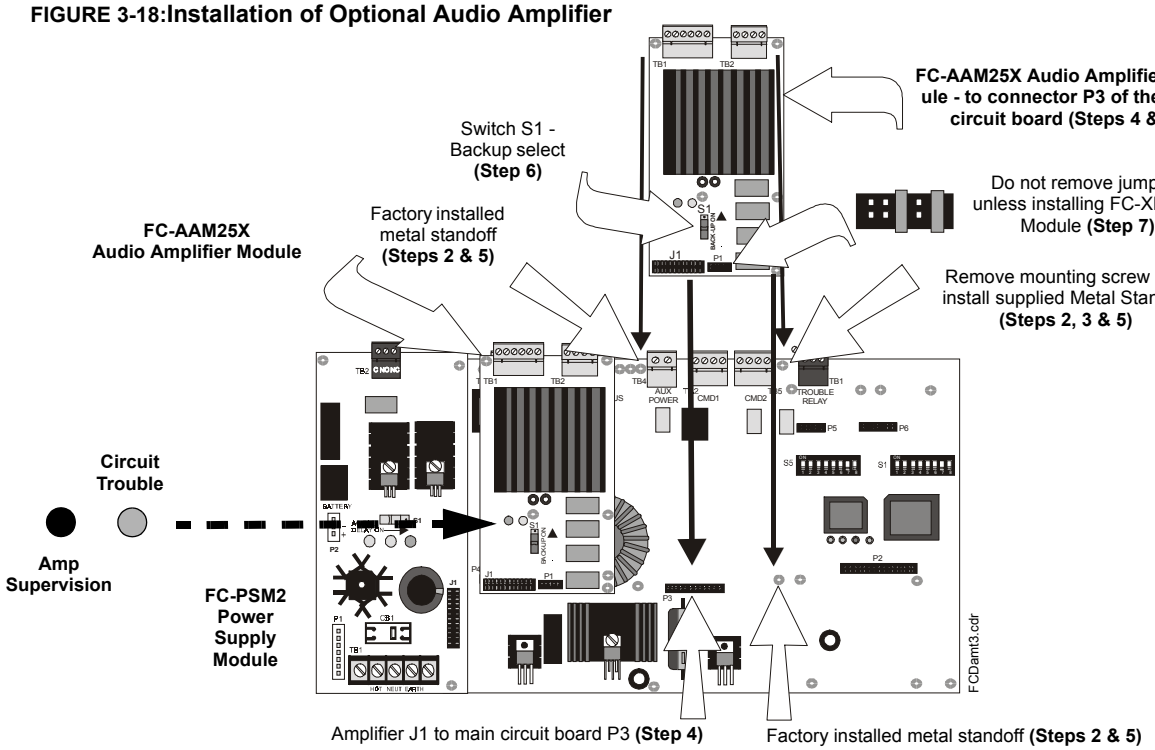
Caution: *Before installing any modules, make certain all power (AC and DC) has been removed. See "Operating Power" on page 29.*

1. For ease of access, all wiring should be connected to the terminals on the main circuit board terminal blocks TB2, TB4, TB5 and TB6 prior to installing the Audio Amplifier Module.
2. Remove mounting screw from the main circuit board and save (refer to illustration below for location).
3. Install one supplied metal standoff in location from which mounting screw was removed in Step 2.
4. Install the Audio Amplifier Module by carefully aligning the amplifier's J1 connector with the P3 connector on the main circuit board. Press Module securely into place making certain not to bend or break any pins.
5. Secure the Audio Amplifier Module with the supplied screws and standoff plus the screw removed in Step 2. It is important to secure the module with the metal screws in order to help protect against electrical transients.
6. Configure the FC-AAM25X for primary or backup amplifier operation by setting switch S1 on the amplifier:

   1) Position switch S1 in the DOWN position for primary operation which adds the new amplifier's 25 watts to total system power (50 watts total).

   2) Position switch S1 in the UP 'Backup On' position to configure the amplifier as a backup in the event the primary amplifier fails.
7. Check to make certain the factory installed jumpers are in place on P1 of the Audio Amplifier Module(s). *Do not remove unless installing the FC-XRM70 Transformer Module. Refer to Figure 3-19 on page 36.*
8. Connect field wiring to newly installed amplifier. Refer to Figure 3-15 on page 32 for illustration of speaker connections if amplifier is being used to expand system power to 50 watts (i.e. providing dual 25 watt speaker circuits). Refer to Figure 5-3 on page 45 for illustration of connections if amplifier is being used as a backup.

FIGURE 3-18: Installation of Optional Audio Amplifier



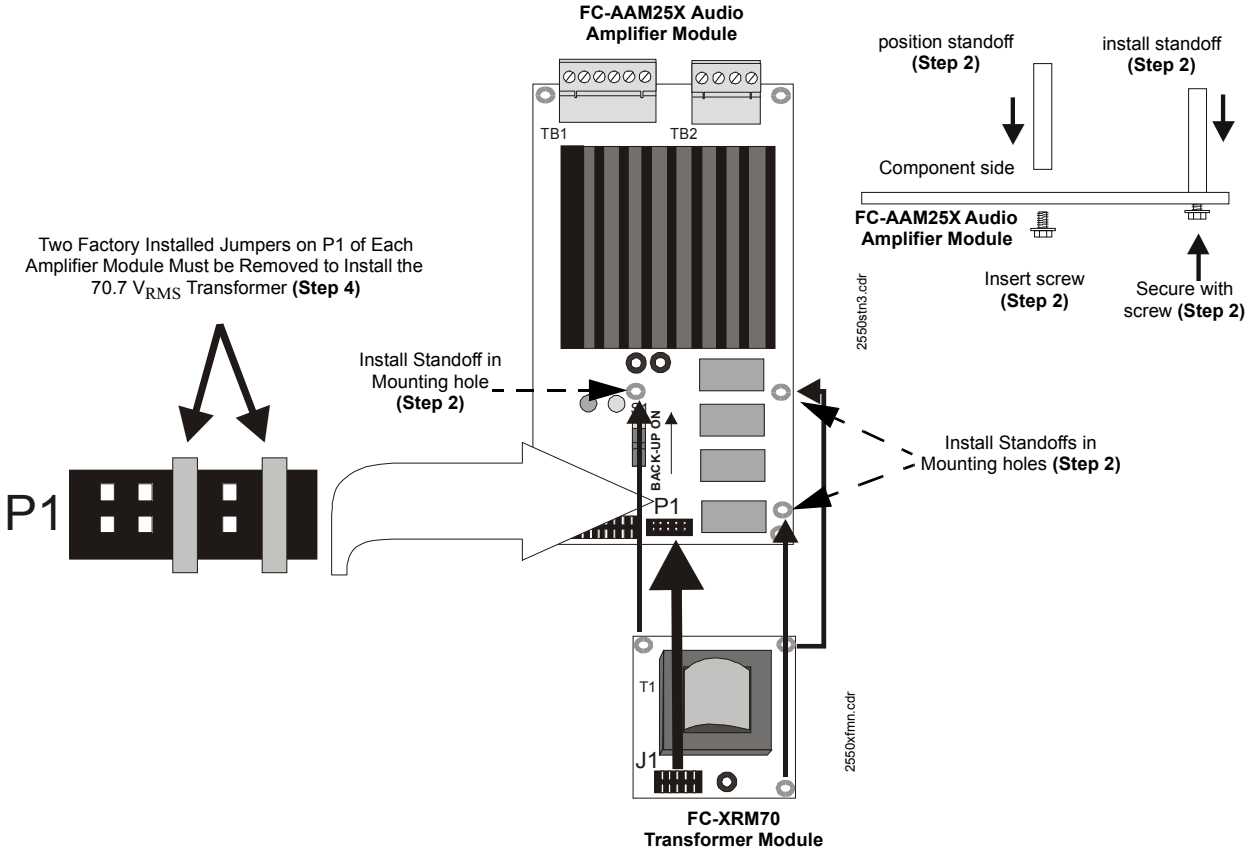
3.12.3 70.7 V_{RMS} Transformer Module (FC-XRM70)

The 70.7 V_{RMS} Transformer Module can be used to convert the 25 V_{RMS} amplifiers for installations where 70.7 V_{RMS} speakers already exist or are to be installed. Transformer connector J1 connects to amplifier connector P1.

Caution: *Before installing any modules, make certain all power (AC and DC) has been removed. See "Operating Power" on page 29.*

1. Carefully remove the FC-AAM25X Audio Amplifier Module(s) from the main circuit board. Refer to Figure 3-18 on page 35 for installation procedures and reverse the steps.
2. Install the three standoffs supplied with the FC-XRM70 Module by inserting each supplied screw into the three holes on the solder side of the FC-AAM25X Audio Amplifier Module(s). Secure each standoff in place with the screws. Refer to Figure 3-19 for the location of the mounting holes.
3. Reinstall the Audio Amplifier Module(s) following the procedure accompanying Figure 3-18.
4. Remove the two factory installed jumpers from connector P1 of the Audio Amplifier Module(s). Refer to the illustration in Figure 3-19.
5. Carefully align the J1 connector on the FC-XRM70 Transformer Module(s) with the P1 connector on the Audio Amplifier Module and press securely into place. Make certain the pins are properly aligned to prevent bending or breaking of pins.
6. Secure the FC-XRM70 Transformer Module(s) to the Audio Amplifier Module(s) with the supplied screws. It is important that the supplied metal screws be used in order to help protect against electrical transients.

FIGURE 3-19:70.7 V_{RMS} Transformer Module Installation



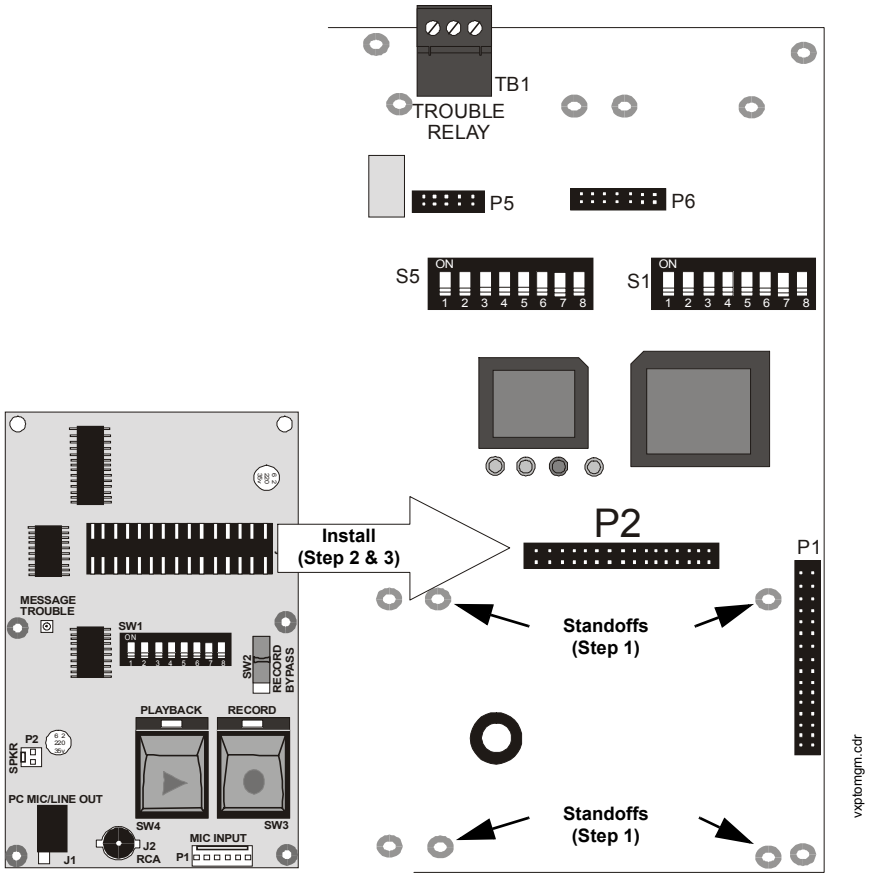
3.12.4 FC-MGM Message Generator Module

The optional FC-MGM Message Generator Module connects to the distributed audio panel by plugging JP1 into connector P2 which is located in the lower right section of the main circuit board. The FC-MGM provides local primary or backup message capabilities. The factory programmed voice evacuation message can be changed in the field by connecting a microphone, a tape player to the RCA Jack or a personal computer audio card output to the mini Jack resident on the FC-MGM. In addition, built-in tone generators can be programmed to provide a tone before and after the message or as backup on message failure. DIP switches on the main circuit board and FC-MGM module are used to program and configure the evacuation message and/or tones. Refer to "Switch SW1 Settings on FC-MGM Module" on page 19, "S1 DIP Switch Settings on Main Circuit Board" on page 17 and "S5 DIP Switch Settings on Main Circuit Board" on page 18.

Caution: *Before installing any modules, make certain all power (AC and DC) has been removed.*

1. Carefully align connector JP1 on the FC-MGM module with the pins of connector P2 on the main circuit board
2. Press the FC-MGM module firmly into place on connector P2, being careful not to bend any pins
3. Make certain the module is properly seated on the standoffs which were installed in step 1
4. Secure the FC-MGM with the supplied screws

FIGURE 3-20:FC-MGM Module Installation



FC-MGM Module FC-25/50DA Main Circuit Board

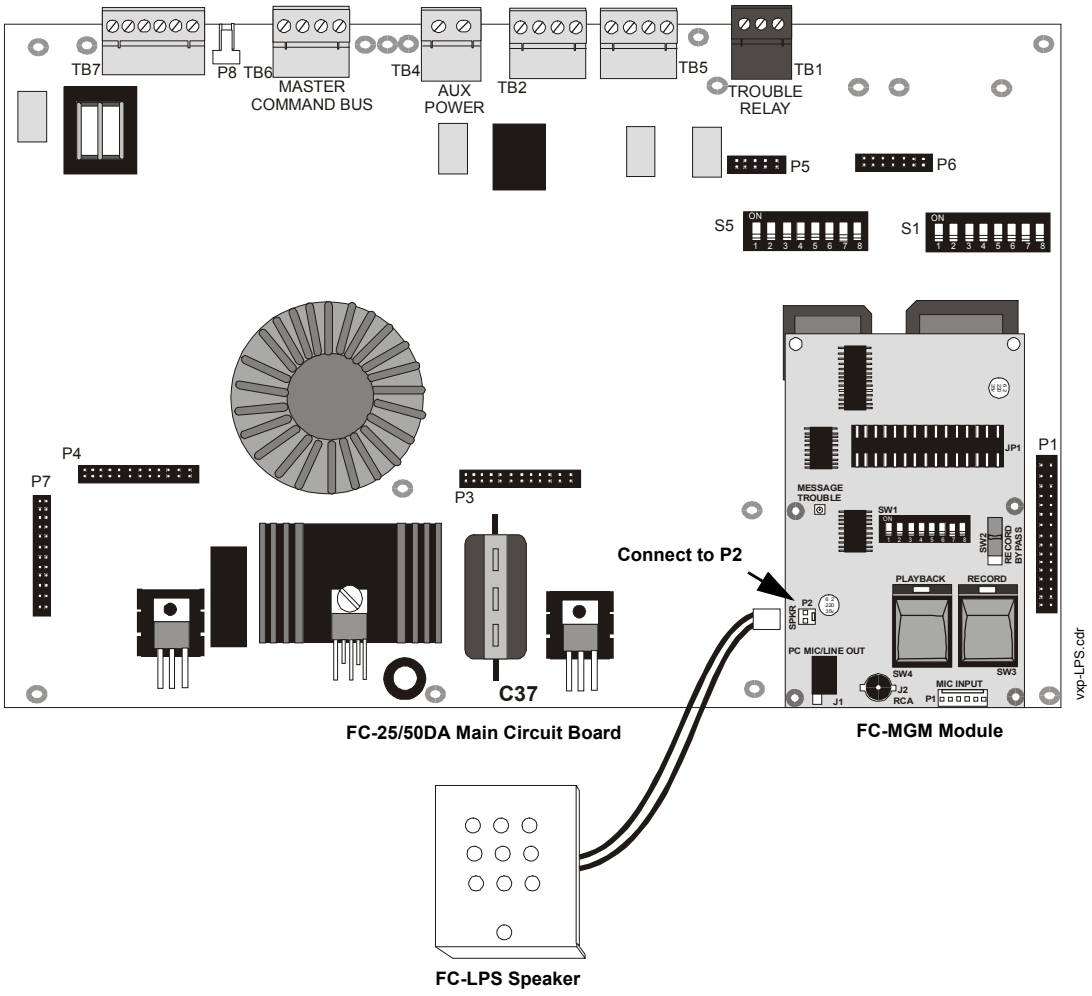
3.12.5 FC-LPS Local Playback Speaker Module

The Local Playback Speaker Module can be used to monitor the recorded digital message without transmitting the message over the system speakers. The speaker module mounts to the audio distribution panel main circuit board and plugs into FC-MGM circuit board. This optional module is necessary to take advantage of the Playback feature.

The Speaker Module is connected by simply plugging the module connector into P2 of the FC-MGM module. The Speaker Module may be installed during the test period by using the supplied mounting hardware.

1. Remove the main circuit board mounting screw located to the left of the large capacitor C37.
2. Install the supplied metal standoff in the mounting hole just vacated in Step 1 and screw standoff into place.
3. Position the FC-LPS mounting bracket hole over the standoff and secure with screw removed in Step 1.
4. Plug the FC-LPS Local Playback Speaker Module's polarized connector into connector P2 on the FC-MGM circuit board. When testing is completed, remove the FC-LPS and standoff and reinstall the screw. The FC-LPS is not approved for permanent connection.

FIGURE 3-21:FC-LPS Installation



CHAPTER 4 *Operating Instructions*

4.1 LED Indicators

24 VDC Power On

A green LED that remains on while the DC power source is within correct limits. *If this indicator fails to light under normal conditions, service the system immediately.*

System Trouble

This yellow LED turns on steady to indicate that a fault or abnormal condition exists and that the distributed audio panel may be inoperative.

Alarm

A red LED that turns on steady when distributed audio panel is activated in alarm.

Tone Generator Trouble

This yellow LED turns on steady when one of the supervised tone generators fail or fall below acceptable levels.

Message Generator Trouble (FC-MGM)

This yellow LED turns on steady when the supervised digital message generator fails or falls below acceptable levels.

Record - (FC-MGM)

This green LED pulses once every second when ready to record the 60 second message. It turns on steady while recording and then pulses when five seconds of recording time remains. The LED shuts off when recording time has terminated.

PLAYBACK ACTIVE - (FC-MGM)

This green LED turns on steady when the FC-MGM message generator is outputting a message.

AMP SUPR - Supervision (Audio Amplifier Module)

This green LED (one on each amplifier), when on steady, indicates that the amplifier is fully functional. The distributed audio panel constantly tests the amplifier to verify proper operation.

Circuit Trouble (Audio Amplifier Module)

This yellow LED (one on each amplifier) turns on steady when a trouble is detected in the amplifier or to indicate an open or short circuit on the field wiring attached to the amplifier output terminals.

Ground Fault (Power Supply/Battery Charger Module)

This yellow LED turns on steady when a ground fault condition is detected on the system.

Battery Trouble (Power Supply/Battery Charger Module)

This yellow LED turns on steady when the battery is disconnected or battery voltage drops below an acceptable level.

AC ON (Power Supply/Battery Charger Module)

This green LED remains on while AC power is within correct limits. *If this indicator fails to light under normal conditions, service the system immediately.*

Remote Microphone Trouble (FC-MIM Microphone Interface Module)

This yellow LED turns on steady when a remote microphone trouble is detected from the FC-RMM or wiring.

4.2 Operation

The distributed audio panel continuously monitors system status. When no system alarm or local trouble conditions exist, all LEDs are off except the 24 VDC Power On LED, the amplifier supervision LED(s) and the AC ON LED located on the Power Supply/Battery Charger Module. The Notification Appliance Circuit speakers are off (unless background music is enabled) and all relays are in their normal state. Alarm and local troubles are annunciated by the distributed audio panel's LEDs.

4.2.1 Fire Alarm

The distributed audio panel will, upon detection of an alarm condition:

- ✓ Turn on the Alarm LED steady
- ✓ Turn on the appropriate Notification Appliance Circuit speakers, depending on CMD1 and CMD2 states. Refer to Table 2-2 on page 18
- ✓ Turn on the appropriate Audio Amplifier
- ✓ Route audio riser or tone/message to appropriate speaker circuit. Refer to Table 2-2 on page 18

4.2.2 Fire Alarm Restoral

- ✓ Turn off the Alarm LED
- ✓ Turn off the Notification Appliance Circuits
- ✓ Turn off the Audio Amplifiers
- ✓ Turn off the digital voice message or tone at its present point in transmission

4.2.3 Remote Microphone Option

The optional microphone module, which can be installed in a CAB-RMR, provides emergency paging capabilities through the remote microphone for an audio system. Announcements can be broadcast over the speaker circuits by pressing the Remote Microphone keyswitch. The FC-MIM Microphone Interface Module must be installed in the audio panel for connection to the FC-RMM (refer to the FC-RMM Product Installation Document #51247 for installation information).
Note: All Call Paging operations initiated from the Fire•Command•25/50X main panel will override the remote microphone installed in the FC-25/50DA.

4.2.4 Trouble Condition Response

All trouble conditions will cause the following to occur (Note: All trouble conditions fully supervised in standby and alarm unless otherwise noted):

- ✓ Deactivate the trouble relay
- ✓ Turn on the system Trouble LED
- ✓ Open the CMD1 input, ONLY if CMD1 is <u>not</u> in the alarm state

In addition to the above trouble responses, the following troubles will cause the specific responses noted:

AC Loss

- Turn off the AC ON LED on the FC-PSM2 module
- The 24 VDC Power On LED on the front panel remains on if battery power is supplied
- Deactivate the AC Loss Relay on the FC-PSM2 (immediate or 6 hour delay depending on S1 position)

Battery Trouble (low or no battery)

- Turn on the Battery Trouble LED on the FC-PSM2 module

  IMPORTANT! If the battery voltage drops to 15 VDC or less, the battery charger will turn off and the Battery Trouble LED will turn on. A battery with a higher voltage must be installed in order to turn the charger back on.

Ground Fault

- Turn on the Ground Fault LED on the FC-PSM2 module

Tone Generator Fault

- Turn on the Tone Generator Trouble LED

Message Generator Trouble (optional FC-MGM)

- Turn on the Message Generator Trouble LED

CMD1 or CMD2

- Both inputs are supervised for open circuit condition when unit is programmed for Normally-Open contacts

Background Music

- When background music option is enabled via DIP switch S5 switch 3, the FC-25/50DA will constantly monitor the audio riser signal. A fault condition will occur after 75 seconds if the internal electronics of the FC-25/50DA has failed. Both amplifiers and speaker wiring continue to be fully supervised* when background music is output from the FC-25/50DA. Note that when AC power is lost, the panel will shut off background music to conserve batteries. Background music requires installation of the FC-PSM2 module.

  **Note that when the 70.7 V_{RMS} Transformer Module is installed, the speaker wiring is not supervised while in alarm or when background music is playing. Local Authority Having Jurisdiction must approve use of background music with 70.7 V_{RMS} Transformer Module installed.*

Amplifier Fault

- Both amplifiers are constantly monitored for proper functionality. Should either amplifier fail, the AMP SUPR LED will turn off and the circuit Trouble LED will turn on. When the system is configured for backup, failure of the primary amplifier will cause the backup amplifier to be switched in.

NAC (Speaker) Output

- The wiring to each amplifier is supervised for opens and shorts at all times in standby and while in alarm or when background music is enabled*. A wiring fault will cause the circuit Trouble LED located on each amplifier module to turn on. It should be noted that the green AMP SUPR LED may remain on for wiring faults.

  **Note that when the 70.7 V_{RMS} Transformer Module is installed, the speaker wiring is not supervised while in alarm or when background music is playing. Local Authority Having Jurisdiction must approve use of background music with 70.7 V_{RMS} Transformer Module installed.*

Internal Power Supplies

- Power fed to the amplifiers from the main circuit board is fully supervised. Should standby or alarm power feeds to either amplifier fail, the unit will go into trouble.

  Note that a power trouble on one amplifier will not affect the power to the other amplifier.

Remote Microphone

- The FC-RMM Remote Microphone Module and associated wiring are supervised for faults by the panel. The Trouble LED located on the FC-MIM Microphone Interface Module, which is mounted in the panel, will illuminate to indicate a trouble condition. Refer to the FC-RMM Product Installation Document #51247 for a description of possible fault conditions.

4.2.5 Trouble Condition Restoral

All trouble condition restorals will cause the following to occur:

- ✓ Reactivate the trouble relay
- ✓ Turn off the system Trouble LED

In addition to the above trouble condition restorals, the following specific restorals will occur:

AC restoral

- Turn on the AC ON LED on the FC-PSM2 module
- The 24 VDC Power On LED remains on
- Reactivate the AC Loss Relay on the FC-PSM2

Battery restoral

- Turn off the Battery Trouble LED on the FC-PSM2 module

Ground Fault cleared

- Turn off the Ground Fault LED on the FC-PSM2 module

Tone Generator restoral

- Turn off the Tone Generator Trouble LED

Message Generator restoral (optional FC-MGM)

- Turn off the Message Generator Trouble LED

Amplifier restoral

- The AMP SUPR LED will turn on and the circuit Trouble LED will turn off. When the system is configured for backup, restoral of the amplifier in trouble will cause the backup amplifier to be switched out

NAC (Speaker) Output restoral

- The wiring to each amplifier is supervised for opens and shorts at all times in standby and while in alarm or when background music is enabled*. A restoral of a wiring fault will cause the circuit Trouble LED located on each amplifier module to turn off. It should be noted that the green AMP SUPR LED is on

  **Note that when the 70.7 V_{RMS} Transformer Module is installed, the speaker wiring is not supervised while in alarm or when background music is playing. Local Authority Having Jurisdiction must approve use of background music with 70.7 V_{RMS} Transformer Module installed..*

Internal Power Supplies restoral

- Power fed to the amplifiers from the main circuit board is fully supervised. Restoral of standby or alarm power feeds to either amplifier will cause the unit to clear the trouble indications

Remote Microphone restoral

- Turn off the Remote Microphone Trouble LED located on the FC-MIM module

CHAPTER 5 *Application Examples*

The FC-25/50DA is a distributed audio panel which can be used along with a Fire•Command•25/50X for audio riser input. It can be used with a variety of Fire Alarm Control Panels to provide emergency audio messages. This Chapter contains a few application examples and is not meant to provide a comprehensive list of all possible FC-25/50DA applications.

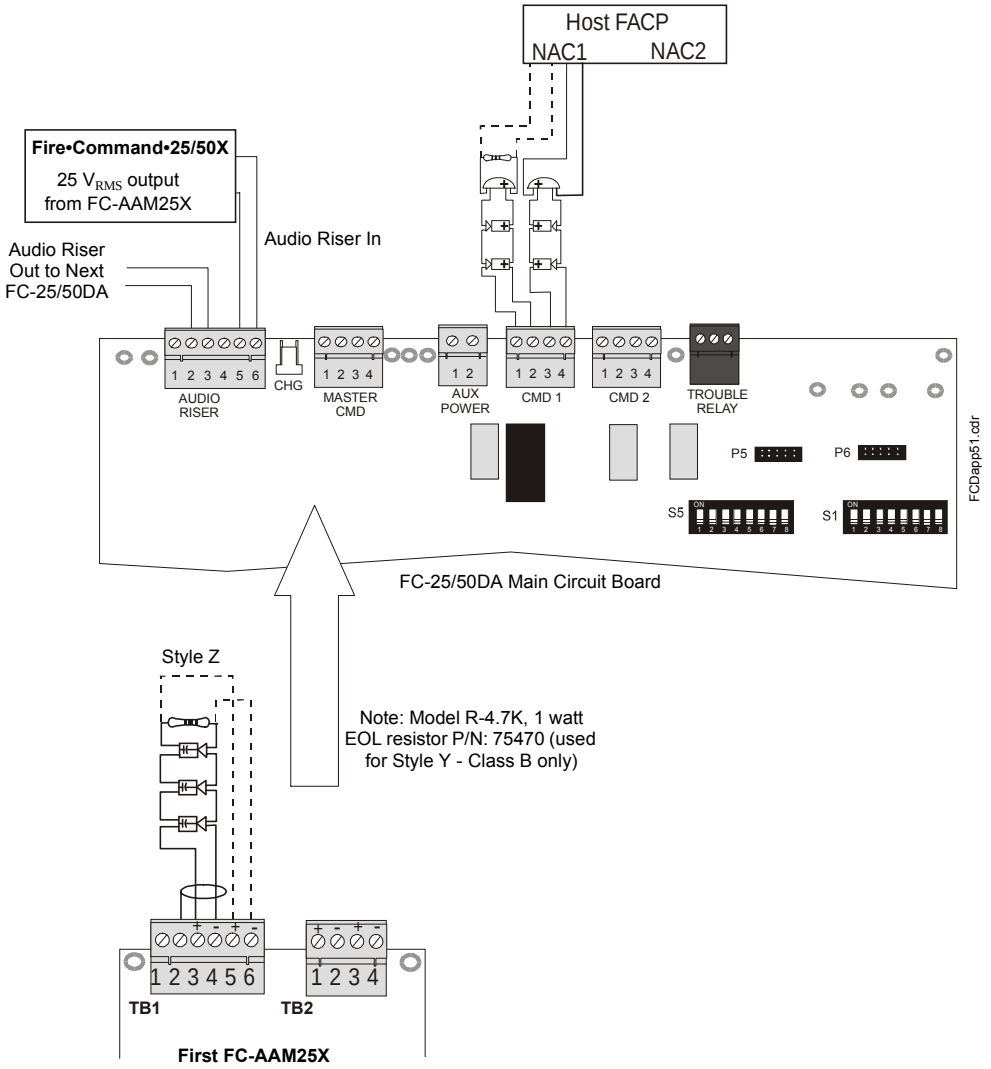
5.1 One Speaker Circuit

The base configuration of the FC-25/50DA utilizes a single 25 watt speaker circuit.

5.1.1 Single Channel

In this application, single channel audio from the riser input is routed to the FC-25/50DA speaker circuit. This is accomplished by using only the CMD1 input for activation.

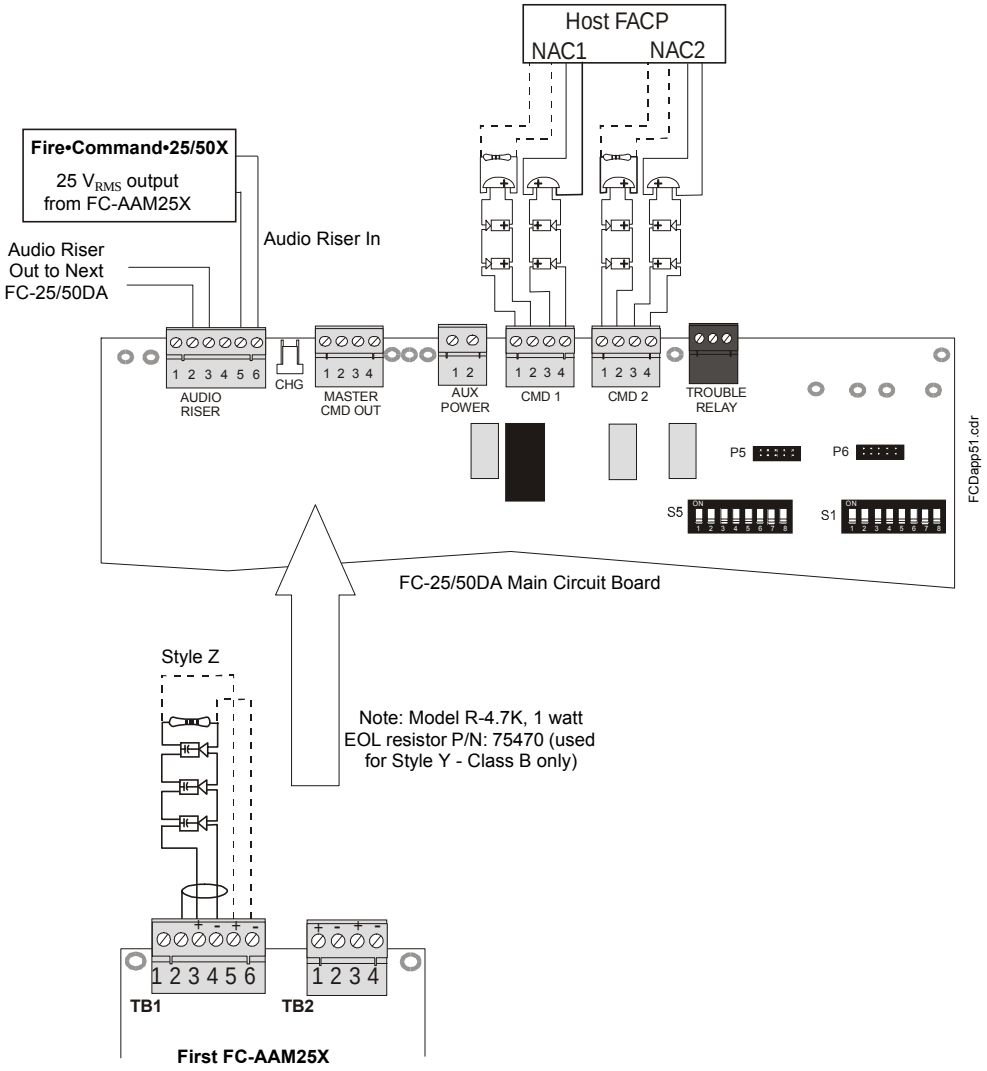
FIGURE 5-1: One 25 Watt Speaker Circuit - Single Channel



5.1.2 Dual Channel

This application provides two channels of input audio that can be directed to the FC-25/50DA speaker circuit. The FACP can control the CMD1 and CMD2 inputs on the FC-25/50DA to route riser audio from the Fire•Command•25/50X or select the FC-25/50DA's onboard tone/message to be routed to the speaker circuit.

FIGURE 5-2: One 25 Watt Speaker Circuit - Dual Channel



5.2 One Speaker Circuit With Backup

Another application consists of one distributed audio panel with one amplifier and a single speaker circuit. A second amplifier can be installed as a backup if desired. This configuration is suitable for small area requiring no more than 25 watts of output power.

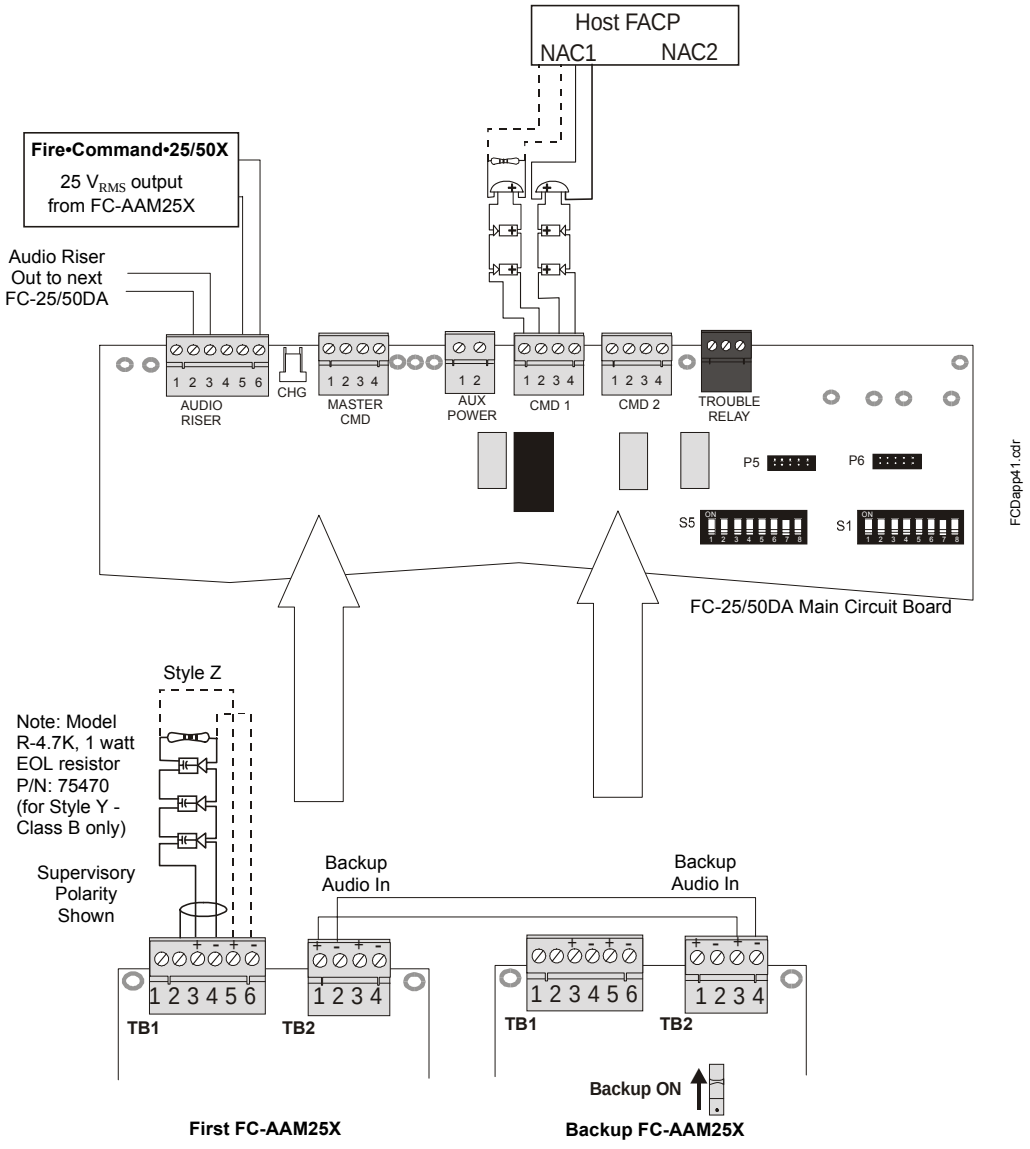
Backup Amplifier switch S1 is set to the 'Backup ON' position. 18 AWG or larger jumpers connect the Backup Amplifier TB2 Terminal 3 and Main Amplifier TB2 Terminal 1 as well as Backup Amplifier TB2 Terminal 4 and Main Amplifier TB2 Terminal 2. Upon failure of the first or main amplifier, the audio from the backup amplifier will be switched out to the speakers.

Note that in the optional 70.7 VRMS configuration, only the amplifier is backed-up; the FC-XRM70 coupling transformer is not. For this reason, it is not necessary to install an FC-XRM70 transformer module on the backup amplifier.

5.2.1 Single Channel

In this application, single channel audio from the riser input is routed to the FC-25/50DA speaker circuit. This is accomplished by using only the CMD1 input for activation.

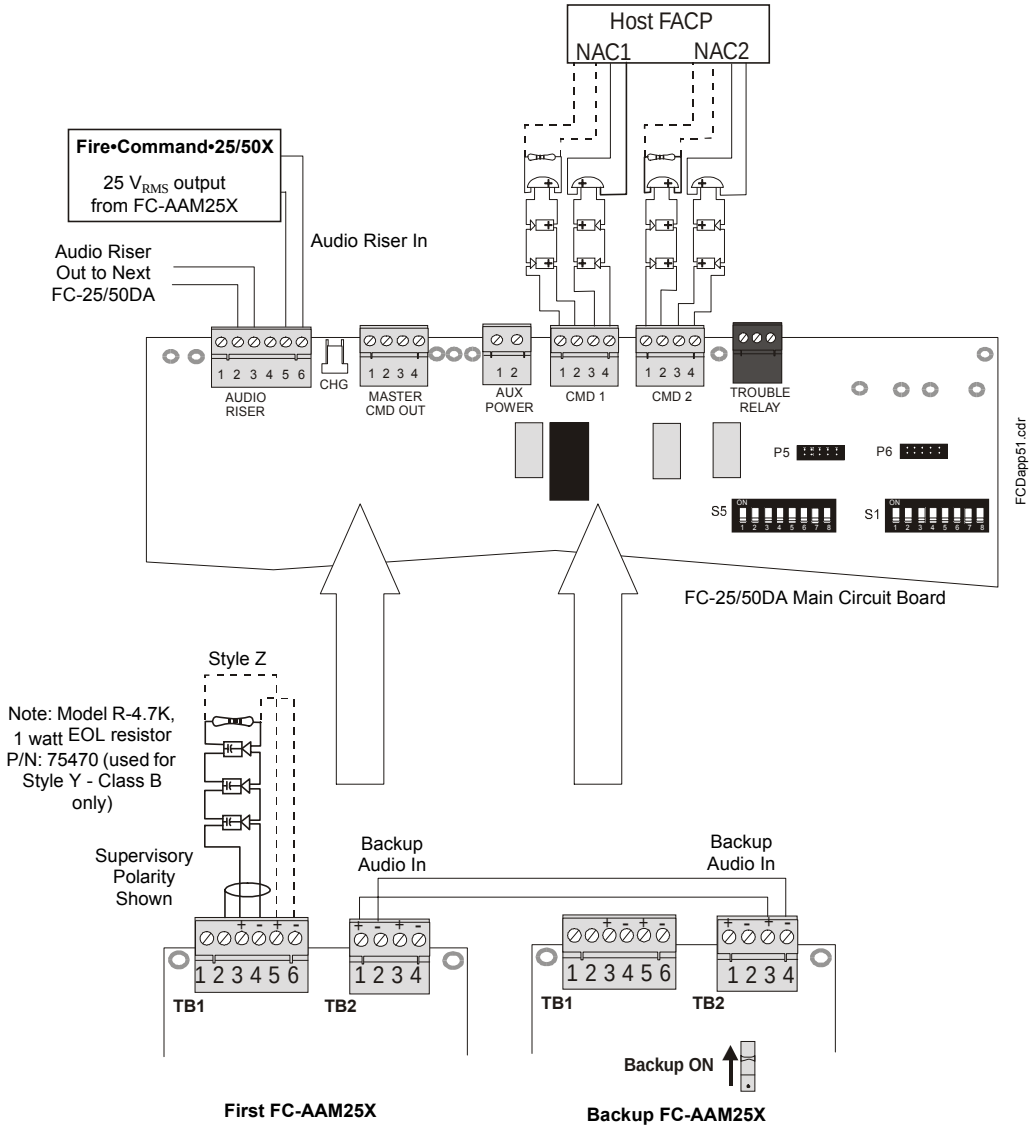
FIGURE 5-3: One 25 Watt Speaker Circuit With Backup - Single Channel



5.2.2 Dual Channel

This application provides two channels of input audio that can be directed to the FC-25/50DA speaker circuit. The FACP can control the CMD1 and CMD2 inputs on the FC-25/50DA to route riser audio from the Fire•Command•25/50X or select the FC-25/50DA's onboard tone/message to be routed to the speaker circuit.

FIGURE 5-4: One 25 Watt Speaker Circuit With Backup - Dual Channel

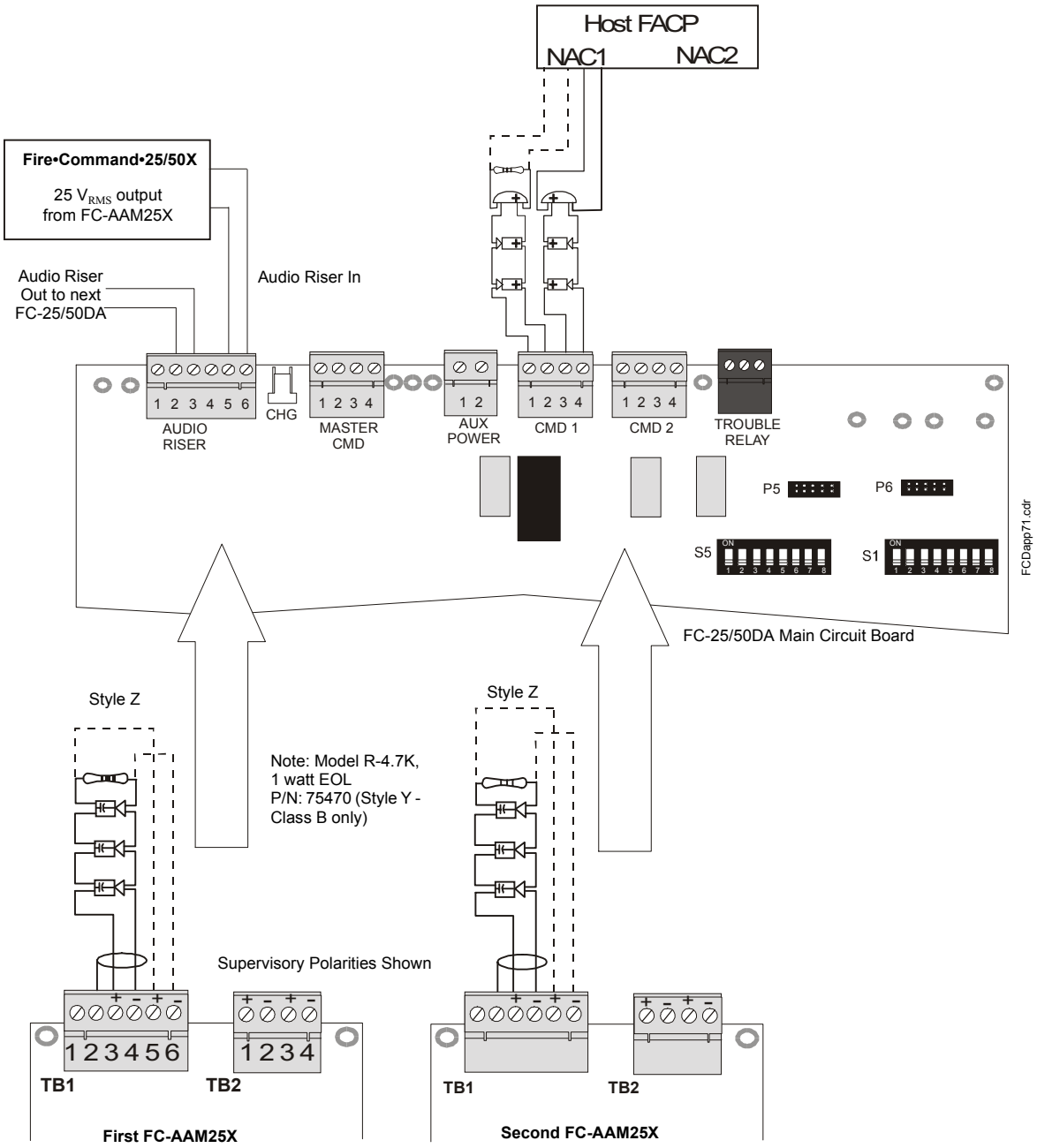


5.3 Two Speaker Circuits

5.3.1 Single Channel

In this application, single channel audio from the riser input is routed to both speaker circuits on the FC-25/50DA. This is accomplished by using only the CMD1 input for activation.

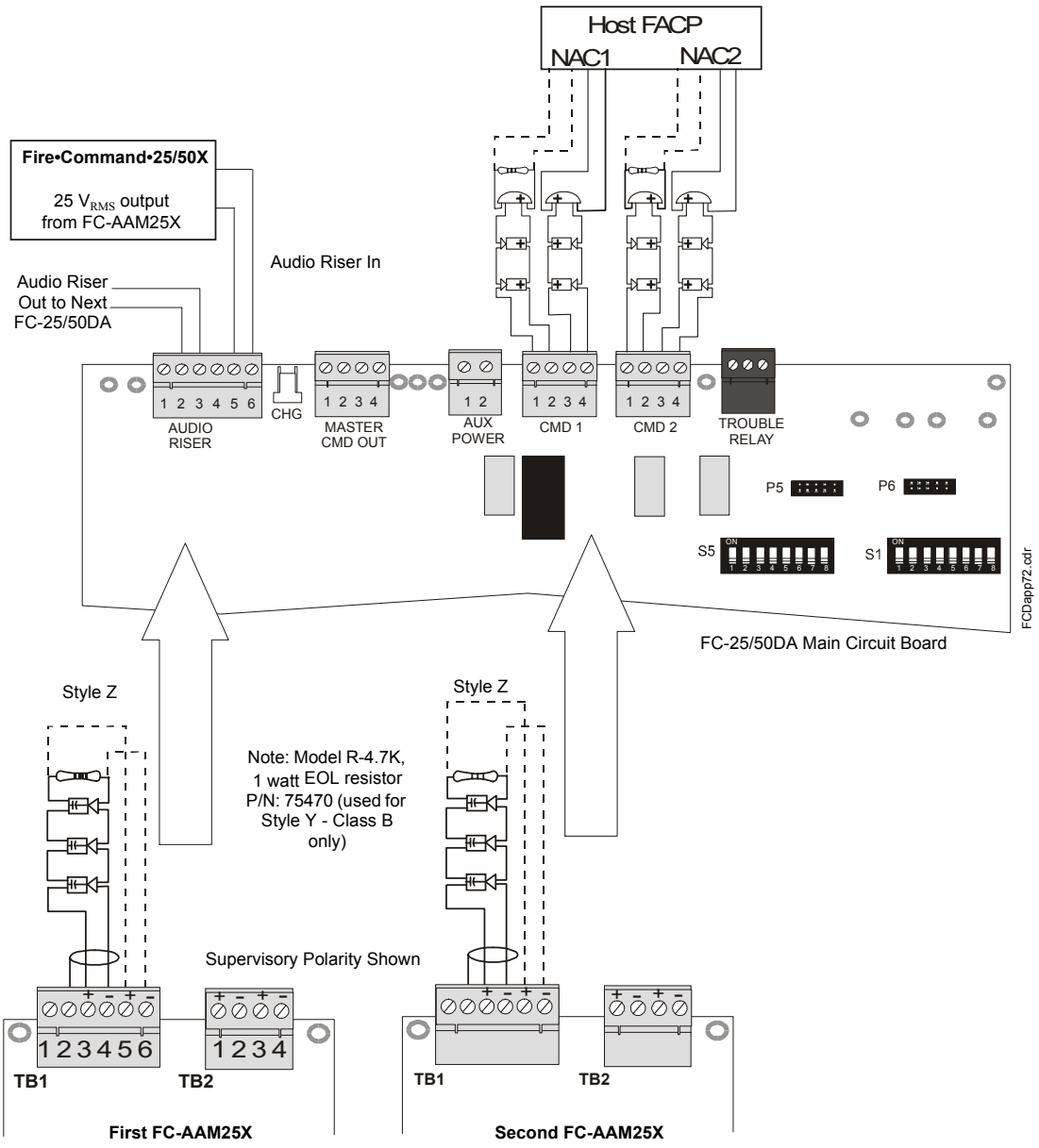
FIGURE 5-5: Two Speaker Circuits - Single Channel



5.3.2 Dual Channel

This application provides two channels of input audio that can be directed to the both FC-25/50DA speaker circuits. The FACP can control the CMD1 and CMD2 inputs on the FC-25/50DA to route riser audio from the Fire•Command•25/50X or select the FC-25/50DA's onboard tone/message to be routed to the speaker circuit.

FIGURE 5-6: Two Speaker Circuits - Dual Channel

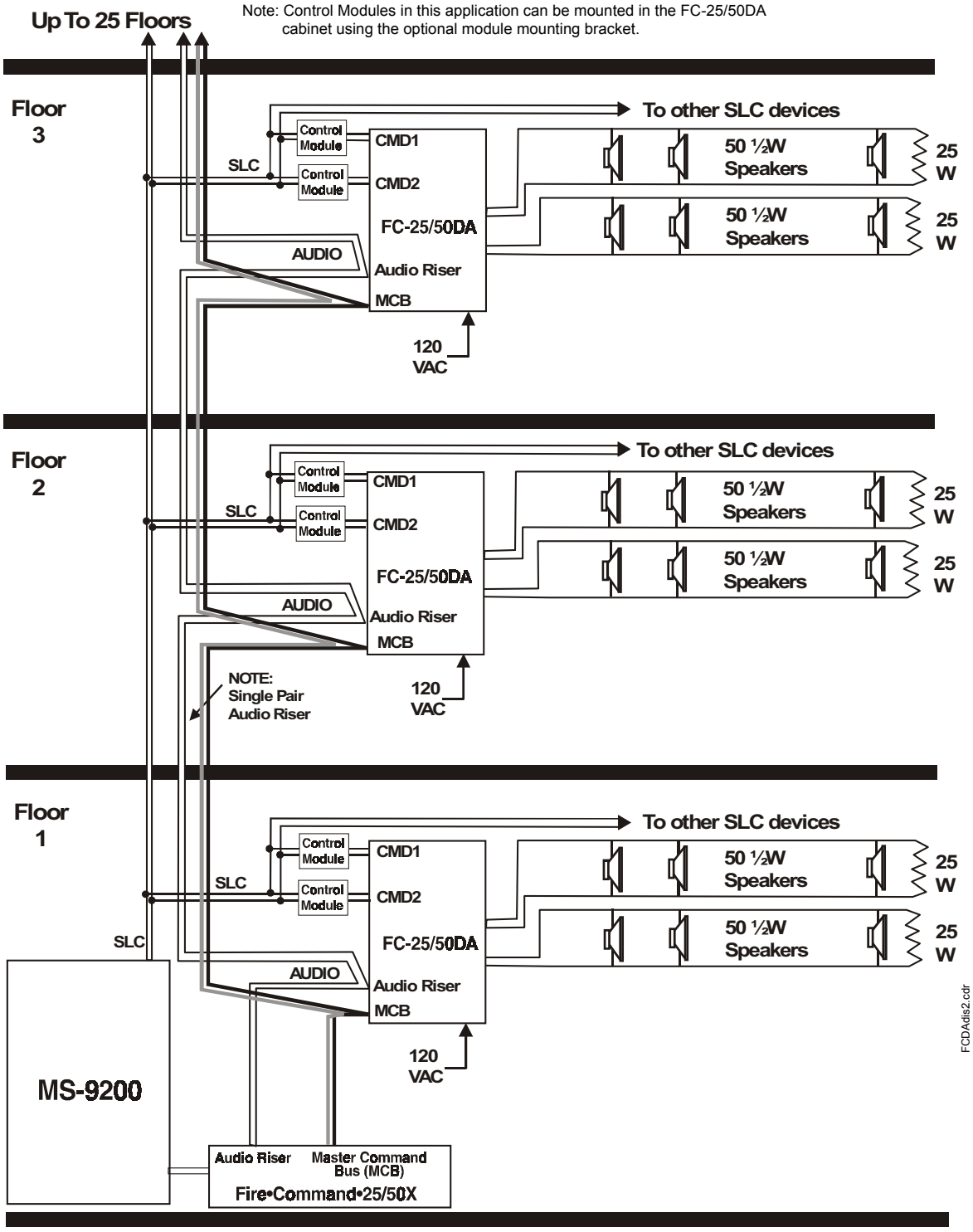


5.4 FC-25/50DA High-Rise Examples

The FC-25/50DA panel provides *distributed* message generators:

- Each area of the building can have different voice evacuation instructions
- Only a single voice riser pair is required, even with two simultaneous channels
- Failure of a message generator affects only one FC-25/50DA

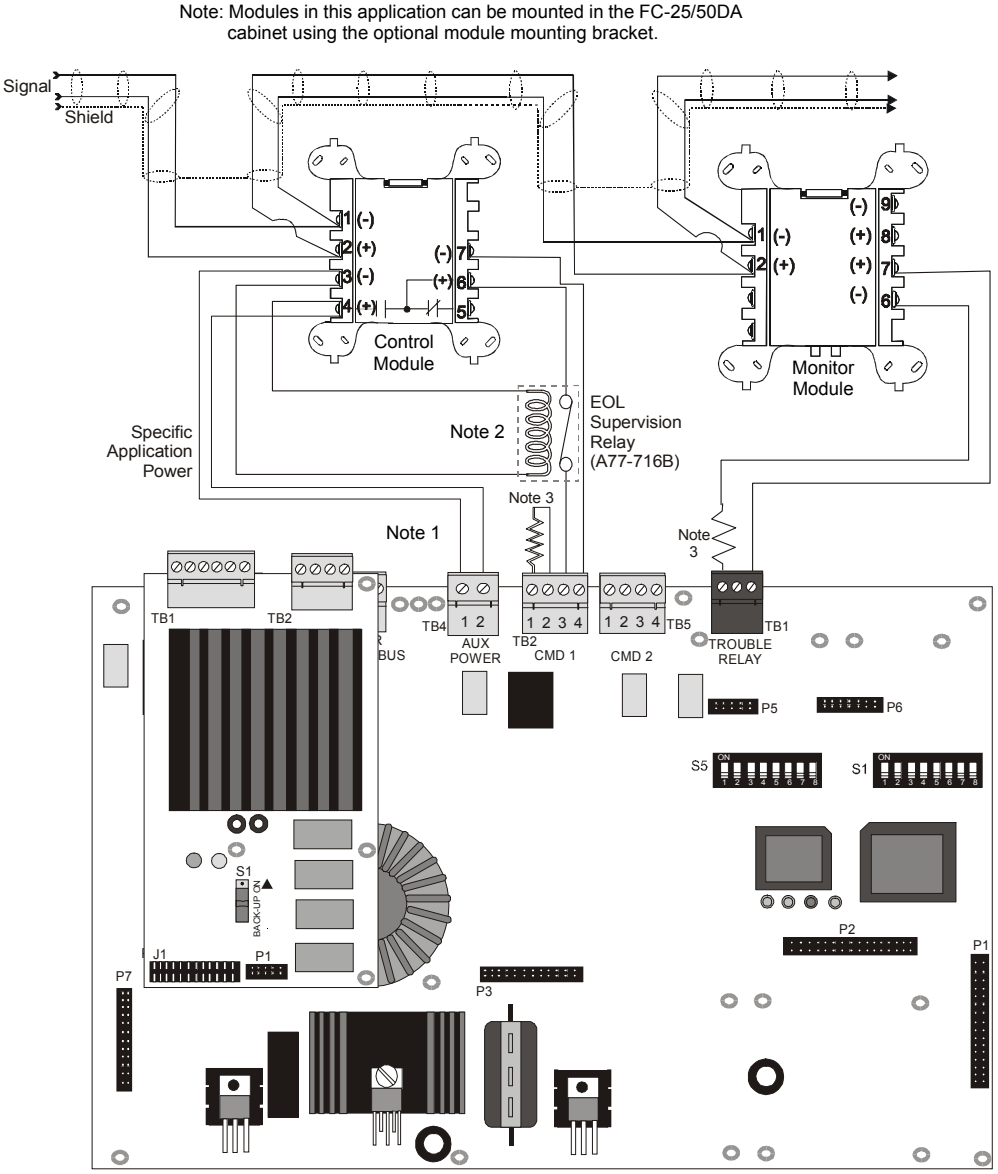
FIGURE 5-7: Dual Channel High-Rise



5.5 Addressable Module Connections

When configured with an addressable FACP such as the MS-9200(C)/E, the FC-25/50DA may be triggered by the FACP main NAC output or from addressable control modules. Figure 5-8 illustrates CMD1 triggered by an addressable control module. The addressable control module may trigger the FC-25/50DA via reverse polarity (shown) or relay contact. The FACP monitors the FC-25/50DA for faults while in the standby or alarm state by wiring a monitor module to the trouble contacts as shown. Activation of the addressable control module is controlled by the FACP. Refer to the MS-9200(C)/E manual for additional information.

FIGURE 5-8: Addressable Module Connections



Notes:

1. Auxiliary Power terminal for special application power only. Wiring must remain in the room
2. Supervise the wiring between the FC-25/50DA Auxiliary Power output and the control module with an EOL relay (A77-716B)
3. End-of-Line Resistor supplied with modules

CHAPTER 6 *Power Supply Calculations*

6.1 Overview

This section contains instructions and tables for calculating power supply currents in alarm and standby conditions. This is a four-step process, consisting of the following:

1. Calculating the total amount of AC branch circuit current required to operate the system
2. Calculating the power supply load current for non-fire and fire alarm conditions and calculating the secondary (battery) load
3. Calculating the size of batteries required to support the system if an AC power loss occurs
4. Selecting the proper batteries for your system

6.2 Calculating the AC Branch Circuit

The audio distribution panel requires connection to a separate, dedicated AC branch circuit, which must be labeled **FIRE ALARM**. This branch circuit must connect to the line side of the main power feed of the protected premises. No other non-fire alarm equipment may be powered from the fire alarm branch circuit. The branch circuit wire must run continuously, without any disconnect devices, from the power source to the transponder. Overcurrent protection for this circuit must comply with Article 760 of the National Electrical Codes as well as local codes. Use 14 AWG (2.00 mm^2) wire with 600 volt insulation for this branch circuit.

Use Table 6-1 to determine the total amount of current, in AC amperes (A), that must be supplied to the system.

TABLE 6-1: 120 VAC Branch Circuit Requirements

Device Type	Number of Devices		Current Draw (amps)		Total Current per Device
FC-25/50DA	1	X	1.00	=	1.00
CHG-120F	[ ]	X	2.00	=	
Sum Column for AC Branch Current Required				=	

6.3 Calculating the System Current Draw

6.3.1 Overview

The secondary power source (batteries) must be able to power the system during a primary power loss. To calculate the non-fire alarm load on the secondary power source, use Calculation Column 1 in Table 6-3 . The audio distribution panel must support a larger load current during a fire alarm condition and primary power loss. To calculate the fire alarm load on the secondary power source, use Calculation Column 2 in Table 6-3 .

When calculating current draw and the battery size, note the following:

- 'Primary' refers to the main power source for the audio panel
- 'Secondary' refers to the audio panel's backup batteries
- All currents are given in amperes (A). Table 6-2 shows how to convert milliamperes and microamperes to full amperes

TABLE 6-2: Converting to Full Amperes

To convert....	Multiply	Example
Milliamperes (mA) to amperes (A)	mA x 0.001	3 mA x 0.001 = 0.003 A
Microamperes (μA) to amperes (A)	μA x 0.000001	300 μA x 0.000001 = 0.0003 A

6.3.2 How to use Table 6-3 to calculate system current draws

1. Enter the quantity of devices in both columns
2. Enter the current draw where required. Refer to the Fire•Lite Device Compatibility Document for compatible devices and their current draw
3. Calculate the current draws for each in both columns
4. Sum the total current for each column
5. Copy the totals from Column 1 and Column 2 to Table 6-4

Following are the types of current that can be entered into Table 6-3 :

- ✓ **Calculation Column 1** - The standby current load that the audio panel must support (from the batteries) during a non-fire alarm condition and a loss of AC power.
- ✓ **Calculation Column 2** - The alarm current draw that the audio panel must support (from the batteries) during a fire alarm condition and a loss of AC power

Table 6-3 contains two columns for calculating current draws. For each column, calculate the current and enter the total (in amps) in the bottom row. When finished, copy the totals from Calculation Column 1 and Calculation Column 2 to Table 6-4 .

TABLE 6-3: System Current Draw Calculations

Device Type	Calculation Column 1 Secondary, Non-Fire Alarm Current (amps)			Calculation Column 2 Secondary, Fire Alarm Current (amps)		
	Qty	X [current draw] =	total	Qty	X [current draw] =	total
Basic System consisting of: Main Circuit Board, one FC-AAM25X Audio Amplifier and FC-PSM2 Power Supply	1	X [0.240]	0.240	1	X [2.240]	2.240
FC-AAM25X Audio Amplifier Module [3]	[ ] (1 max.)	X [0.030]		[ ]	X [2.00]	
FC-MGM Message Generator Module	[ ] (1 max.)	X [0.005]		[ ]	X [0.005]	
FC-RMM Remote Microphone Module with FC-MIM Microphone Interface Module	[ ] (1 max.)	X [0.006]		[ ]	X [0.030]	
Power Supervision Relays	[ ]	X [ ]		[ ]	X [ ]	
CHG-120F Battery Charger	[ ]	X [0.065]		[ ]	X [0.065]	
Additional Current Draw from TB4 Auxiliary Power Output (0.035 amps maximum)	[ ]	X [ ]		[ ]	X [ ]	
Miscellaneous Devices	[ ]	X [ ]		[ ]	X [ ]	
Sum each column for totals	Secondary non-alarm:			Secondary alarm:		

Notes:

1. The FC-XRM70 Transformer Module draws no current in standby or alarm
2. The FC-LPS Local Playback Speaker Module draws no current in standby or alarm
3. In backup configurations, the optional FC-AAM25X draws no current in alarm
4. The FC-25/50DA will shut off the background music in the event AC power is lost in order to conserve battery power
5. Refer to the Fire•Lite Device Compatibility Document for compatible devices and their current draws

6.4 Calculating the Battery Size

Use Table 6-4 to calculate the total Standby and Alarm load in ampere hours (AH). This total load determines the battery size (in AH), required to support the audio distribution panel under the loss of AC power. Complete Table 6-4 as follows:

1. Enter the totals from Table 6-3 Calculation Columns 1 and 2 where shown
2. Enter the NFPA Standby and Alarm times (refer to 'NFPA Battery Requirements' below)
3. Calculate the ampere hours for Standby and Alarm, then sum the Standby and Alarm ampere hours
4. Multiply the sum by the derating factor of 1.2 to get the proper battery size (in AH)
5. Write the ampere hour requirements on the Protected Premises label located inside the cabinet door

Table 6-4: Total Secondary Power Requirements at 24 VDC

Secondary Standby Load (total from Table 6-3 Calculation Column 1) [ ]	Required Standby Time (24 or 60 hours) [ ]	= AH
Secondary Alarm Load (total from Table 6-3 Calculation Column 2) [ ]	Required Alarm Time (for 5 min., enter 0.084, for 10 min., enter 0.168 for 15 min., enter 0.250) [ ]	= AH
Sum of Standby and Alarm Ampere Hours		= AH
Multiply by the Derating Factor		X 1.2
Battery Size, Total Ampere Hours Required		= AH

6.4.1 NFPA Battery Requirements

- NFPA 72 Local and Remote Station Fire Alarm Systems require 24 hours of standby power followed by 5 minutes in alarm
- NFPA 72 Central Station, Auxiliary and Remote Station require 60 hours of standby power followed by 5 minutes in alarm. Batteries installed in a system powered by a generator need to provide at least 4 hours of standby power
- NFPA requires 24 hours of standby plus 15 minutes activation for audio systems. The total ampere hours required cannot exceed 18 AH with an internal charger

6.4.2 Selecting and Locating Batteries

Select batteries that meet or exceed the total ampere hours calculated in Table 6-4 . The audio panel can charge batteries in the 7 AH to 18 AH range. The FC-25/50DA can house up to two 18 AH batteries. Larger than 18 AH batteries require the CHG-120F battery charger and an external UL listed battery cabinet.

Appendix A FC-MGM Digital Voice Messages

The distributed audio panel digital message generator provides a 60 second record time which allows for field programming of a single fire message. Refer to "Record Push Button (on optional FC-MGM Module)" on page 21. The distributed audio panel is provided with a factory recorded message which can be changed in the field. The prerecorded message (female voice) is:

> "May I have your attention please. May I have your attention please. The signal you have just heard indicates a report of a fire in this building. Please proceed to the nearest exit and leave the building. Do not reenter the building unless directed to do so by the proper authorities."

New message can be recorded in the field. Be certain to get the approval of the Local Authority Having Jurisdiction prior to recording a new message. Following are some examples of messages which may be recorded in the field:

- "May I have your attention please. May I have your attention please. There has been a fire reported on your floor. There has been a fire reported on your floor. Please proceed to the stairways and exit the building. Do not use the elevators."
- "May I have your attention please. May I have your attention please. There has been a fire alarm reported in the building. There has been a fire alarm reported in the building. Please proceed to the stairways and exit the building. Do no use the elevators, but proceed to the stairways and exit the building."
- "May I have your attention please. May I have your attention please. A tornado warning has been issued for this area. A tornado warning has been issued for this area. Please take all appropriate safety actions at this time."
- "May I have your attention please. May I have your attention please. A hurricane warning has been issued for this area. A hurricane warning has been issued for this area. Please take all appropriate safety actions at this time."
- "May I have your attention please. May I have your attention please. An emergency condition exists on this floor. An emergency condition exists on this floor. Please proceed to the stairways and exit the building. Do not use the elevators."
- "May I have your attention. This is an emergency. Please walk to the nearest exit and go to your assembly areas and await further instructions. This is an emergency."
- "Your attention please. The fire alarm in this building has been activated. Please cease operations immediately and proceed into the nearest fire exit. Descend to street level and leave the building. Do not use the elevator."
- "There has been a Fire Emergency reported in this building. Proceed calmly to fire stairs. Do not use elevators. Do not contact the front desk unless evacuation assistance is required. Proceed directly to fire stairs. Fire personnel will assist disabled and elderly from the fire stairs. Floor Wardens report status by fire phone."
- "May I have your attention please. There has been a Fire Emergency reported in the building. While this is being verified, please leave the building by the nearest exit or exit stairway."
- "Attention. Your attention please. The building emergency condition has been cleared. You may return to your normal activities. The building emergency has been cleared. You may return to your normal activities."
- "Your attention please. A severe weather warning has been received. Please walk to the nearest safe area and wait for further instructions. Elevator lobbies, stairwells, bathrooms and auditoriums are designated safe areas in the event of severe weather. Stay away from windows and glass. Do not use the elevators."

Appendix B *Wiring Requirements*

Connecting external system accessories to the distributed audio panel main circuits must be carefully considered to ensure proper operation. It is important to use the correct type of wire, wire gauge and wire run length per each circuit. Refer to the following table to specify wire requirements and limitations.

TABLE B-1: Distributed Audio Panel Wiring Requirements

AC Power FC-PSM2 Module TB1 (nonpower-limited)	Primary Power Input to FC-PSM2 Module, AC Voltage	See Note[1]	Power Supplied must be 120 VAC, 50/60 HZ, 1.0 amps (see Note[1])	Terminals Support 12-18 AWG (see Note[1])
Audio Output FC-AAM25X Module TB1 (power-limited)	Notification Appliance Circuit	See Note[2] Untwisted, unshielded or twisted, shielded	See Note[3]	12 - 18 AWG
CMD1 and CMD2 Main Board TB2 and TB5 (nonpower-limited)	Triggers FC-25/50DA	See Note[1] Untwisted unshielded or twisted, shielded	Depends on Output (trigger) Circuit 9 - 32 VDC, 1.6 mA for polarity reversal, relay must be rated at 0.5 amp, 24 VDC	12 - 18 AWG
Main Board TB6 Master Command Bus Reverse Polarity (power-limited)	Triggers FC-25/50DA	Untwisted, unshielded	130 ohms maximum	12 - 18 AWG
Trouble Relay Main Board TB1 (nonpower-limited)	Trouble Output	Maximum Current 2 amps	Depends on Input Circuit	12 - 18 AWG
AC Loss Relay FC-PSM2 Module TB2 (nonpower-limited)	AC Loss Output	Maximum Current 2 amps	Depends on Input Circuit	12 - 18 AWG
AC Power CHG-120F (nonpower-limited)	Primary Power to CHG-120F AC Voltage	See Note [1]	120 VAC, 60 Hz, 2 amps See Note [1]	12 - 18 AWG

1. Refer to NEC Standards.
2. Twisted, shielded wire is recommended for maximum protection against EMI and AFI emissions and susceptibility.
3. Must also meet NFPA 72 Standards for minimum and maximum sound levels.

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Limited Warranty

The manufacturer warrants its products to be free from defects in materials and workmanship for eighteen (18) months from the date of manufacture, under normal use and service. Products are date-stamped at time of manufacture. The sole and exclusive obligation of the manufacturer is to repair or replace, at its option, free of charge for parts and labor, any part which is defective in materials or workmanship under normal use and service. For products not under the manufacturer's date-stamp control, the warranty is eighteen (18) months from date of original purchase by the manufacturer's distributor unless the installation instructions or catalog sets forth a shorter period, in which case the shorter period shall apply. This warranty is void if the product is altered, repaired, or serviced by anyone other than the manufacturer or its authorized distributors, or if there is a failure to maintain the products and systems in which they operate in a proper and workable manner. In case of defect, secure a Return Material Authorization form from our customer service department. Return product, transportation prepaid, to the manufacturer.

This writing constitutes the only warranty made by this manufacturer with respect to its products. The manufacturer does not represent that its products will prevent any loss by fire or otherwise, or that its products will in all cases provide the protection for which they are installed or intended. Buyer acknowledges that the manufacturer is not an insurer and assumes no risk for loss or damages or the cost of any inconvenience, transportation, damage, misuse, abuse, accident, or similar incident.

THE MANUFACTURER GIVES NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR OTHERWISE WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. UNDER NO CIRCUMSTANCES SHALL THE MANUFACTURER BE LIABLE FOR ANY LOSS OF OR DAMAGE TO PROPERTY, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF THE USE OF, OR INABILITY TO USE THE MANUFACTURER'S PRODUCTS. FURTHERMORE, THE MANUFACTURER SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY OR DEATH WHICH MAY ARISE IN THE COURSE OF, OR AS A RESULT OF, PERSONAL, COMMERCIAL, OR INDUSTRIAL USE OF ITS PRODUCTS.

This warranty replaces all previous warranties and is the only warranty made by the manufacturer. No increase or alteration, written or verbal, of the obligation of this warranty is authorized.

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