



by Honeywell



# **E3 Series<sup>®</sup> Broadband Emergency Voice Evacuation System Installation/Operation Manual**

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## Important 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 panel 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 are made available at no charge to all installing dealers. These documents can be found at <http://www.systemsensor.co/html/applict.html>. 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 panel. 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 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.

## Installation Precautions

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

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

**CAUTION - System Re-acceptance Test after Software Changes:** To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. 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 93% ± 2% RH (non-condensing) at 32° C ± 2° C (90° F ± 3° F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27° 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.

**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.

## FCC Warning

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

## Survivability Clause

Per the National Fire Alarm Code, NFPA 72, all circuits necessary for the operation of the notification appliances shall be protected until they enter the evacuation signaling zone that they serve. Any of the following methods shall be considered acceptable as meeting these requirements:

- 1) A 2-hour rated cable or cable system
- 2) A 2-hour rated enclosure
- 3) Performance alternatives approved by Authority Having Jurisdiction (AHJ)

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

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

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

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

**This system contains static-sensitive components.**

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

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## 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 présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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## Software Downloads

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

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# Section 1: General Description

The E3 Series<sup>®</sup> Broadband Networked fire alarm control panel and the E3 Series<sup>®</sup> Broadband Emergency Voice Evacuation Systems are peer-to-peer, self-regenerating, token ring passing networks consisting of two (2) to sixty-four (64) nodes. The E3 Series<sup>®</sup> System is of modular design. This design allows a wide range of configurations to provide four (4) basic sub-assemblies to form an integrated, distributed fire alarm system that can also include audio evacuation and fire command capability. The network communication conveys all fire alarm, audio evacuation, voice paging, and fire fighter communications over a single pair of wires or fiber-optic cable.

Wire can be run up to 3,000 feet between each node while fiber-optic cable can tolerate up to 8 dB loss between each node. A node can consist of the following:

- An E3 Series or Model 7100 Series Fire Alarm Control Panel:

## **E3 Series**

An E3 Series Fire Alarm Panel can comprise the following sub-assemblies:

- ILI-MB-E3/ILI95-MB-E3/ANX
- LCD-E3
- PM-9/PM-9G
- RPT-E3-UTP or RPT-E3-FO

## **7100 Series**

A 7100 Series Fire Alarm Panel can comprise the following sub-assemblies:

- an Intelligent Network Interface sub-assembly for unshielded, twisted-pair (INI-7100-UTP)
- a fiber-optic cable (INI-7100-FO)

For additional information, refer to the *E3 Series<sup>®</sup> Installation/Operating Manual, P/N 9000-0574* or the *7100 Series Fire Alarm Control Installation/Operation Manual P/N: 9000-0447*.

- An Intelligent Network Command Center (INCC) can comprise the following:
  - Intelligent Network Interface-Voice Gateway (INI-VGC) sub-assembly
  - one, (1) Network Graphic Annunciator (NGA)
  - one (1) to sixteen (16), fully programmable Addressable Switch sub-assemblies (ASM-16)
  - LED Driver sub-assemblies (ANU-48)
  - a microphone for paging and a telephone handset for fire fighter communications (See “The INI-VGC-FO or INI-VGC-UTP” Section)
- An Intelligent Network Transponder (INX or INX CAB-B) can comprise the following:
  - Intelligent Network Interface-Voice Gateway (INI-VGX)
  - nine (9) amp power supply sub-assembly (PM-9/PM-9G)
  - one (1) to six (6) fully Programmable Addressable Switch sub-assemblies (ASM-16)
  - LED Driver sub-assemblies (ANU-48)
  - one (1) to four (4), AM-50 Series amplifiersEach amplifier provides either 25 V<sub>RMS</sub> or 70.7V<sub>RMS</sub> audio output.  
(See “The INI-VGX-FO or INI-VGX-UTP” Section)

The E3 Series<sup>®</sup> Broadband Emergency Voice Evacuation System is designed and tested to comply with the following:

- NFPA 13- Installation of Sprinkler Systems
- NFPA 16 Deluge Foam - Water Sprinkler Systems
- NFPA 72- National Fire Alarm Code
- NFPA 70- National Electrical Code
- NFPA 92A Smoke Control Systems Utilizing Barriers and Pressure Differences
- NFPA 101- Life Safety Code
- Americans with Disabilities Act (ADA)
- UL Standard 864, 9th Edition
- UL 1711 Standard for Amplifiers for Fire Protective Signaling Systems
- UL Listed for Dedicated and Non-Dedicated Smoke Control Applications (applies to ILI-MB-E3/ILI95-MB-E3 FACP only)
- California State Fire Marshal
- New York City MEA

## 1.1 E3 Series® Broadband Equipment

### 1.1.1 Intelligent Network Command Center (INCC)

The Command and Control Center is comprised of one (1), INI-VGC-FO or INI-VGC-UTP, one or more NGA Network Graphic Annunciators, ANU-48 remote LED Driver or ASM-16 programmable switch sub-assemblies for speaker, telephone, and auxiliary control functions. Optional assemblies include a system voice paging microphone and fire fighter's handset.

### 1.1.2 Intelligent Network Transponder (INX and INX CAB-B)

The INX and the INX CAB-B cabinet enclosures house the distributed audio amplifier assembly comprised of the following:

- PM-9/PM-9G
- INI-VGX-FO or INI-VGX-UTP
- one (1) to four (4), AM-50 Series amplifiers (50 watt amplifiers)
  - three (3), main amplifiers maximum with one back-up, each amplifier providing either  $25V_{RMS}$  or  $70.7V_{RMS}$  audio output
- standby batteries up to 55 A/H capacity.



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**NOTE:** The cabinet will accommodate batteries up to 12 A/H.

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## 1.2 E3 Series® Broadband Sub-Assemblies

### 1.2.1 Intelligent Network Interface-Voice Gateway, (INI-VGC)

The Intelligent Network Interface-Voice Gateway sub-assembly is factory programmed in two basic versions, each available for fiber-optic/copper wire combination.

- A. The INI-VGC-FO (copper-wire or fiber-optic) or INI-VGC-UTP (copper-wire only).
- B. INI-VGX-FO (copper-wire or fiber-optic) or INI-VGX-UTP (copper-wire only).

#### The INI-VGC-FO or INI-VGC-UTP

This sub-assembly is the E3 Network interface for the Voice Evacuation Command Center (INCC). Installed in the INCC command center, it:

- Provides connection to the system's microphone and fire fighter's handset
- Monitors and controls up to sixteen (16), ANU-48 or ASM-16 sub-assemblies for a total of 256 fully programmable control switches, and one (1), NGA.
- Includes one (1), Style 4 (Class B) signaling line circuit with a capacity of up to sixteen (16), AOM-TELF (fire fighter's communication circuit) sub-assemblies.
- Occupies one node on the E3 Series® Broadband network.

#### The INI-VGX-FO or INI-VGX-UTP

This sub-assembly is the Network interface for the distributed audio amplifier sub-assemblies installed in the INX or the INX CAB-B cabinet enclosure. When the INX-VGX-FO or the INI-VGX-UTP is installed in the INX or the INX CAB-B cabinet enclosure, this sub-assembly does the following:

- Monitors and controls up to six (6), ANU-48 or ASM-16 sub-assemblies for a total of 96 fully programmable control switches.
- Monitors and controls up to four (4), AM-50 Series amplifiers:
  - configured 3 main amplifiers maximum with 1 standby
  - 2 main amplifiers with 2 standbys
  - 1 main amplifier with 1 standby
  - 1, 2, or 3 main amplifiers with no standby
- Includes one (1), Style 4 (Class B) signaling line circuit with a capacity of up to sixteen (16), AOM-TELF (fire fighter communication circuit) and thirty-two (32), AOM-2SF (single-channel speaker circuits).  
MMO-6SF six-circuit single-channel speaker circuits modules are also supported, but each MMO-6SF takes up six addresses on the SLC.
- Provides one fire fighter communications riser.
- Stores up to sixteen (16), custom digital tones/messages with a combined, total length of three minutes.
- Occupies one node on the E3 Series Broadband network.

### 1.2.2 Addressable Switch Sub-Assembly (ASM-16)

The ASM-16 is a configurable switch input sub-assembly with sixteen (16), switches and forty-eight (48), status LEDs. Each switch address is fully programmable to serve as:

- A System Control Switch, Reset, Silence, Alarm and Trouble Acknowledge, etc.
- A Voice Evacuation Speaker Circuit control switch
- A Fire Fighter Communication Circuit control switch
- An Auxiliary Control Circuit switch
- A status indicating LED, (red, green, and yellow)

### 1.2.3 AM-50 Series Amplifiers

The AM-50 Series amplifiers include either an AM-50-25 or an AM-50-70 amplifier. Each AM-50 Series amplifier includes two (2), supervised channel outputs and an auxiliary audio input that can be used for a backup amplifier connection. The amplifiers provide 50 watts of audio transmitted through two (2), integral Class A/B speaker circuits. Each amplifier's supervised output can drive up to 50 watts. The following describe each amplifier.

- The AM-50-25 amplifier is a 50-watt Class D switching audio output amplifier with a standard voltage for audio output of  $25V_{RMS}$ .
- The AM-50-70 amplifier is a 50-watt Class D switching audio output amplifier with a standard voltage for audio output of  $70.7V_{RMS}$ .

Each INX and INX CAB-B Transponder cabinet can accommodate up to four (4), AM-50 Series amplifiers configured as two main amplifiers. Each cabinet includes its own back-up amplifier, or the amplifiers can be configured as three (3), main amplifiers sharing a single, common back-up amplifier.



**NOTE:** 50 watts max. per AM-50-25 or AM-50-70 sub-assembly.

### 1.2.4 PM-9/PM-9G Power Supply Sub-Assembly- 9 Amperes

The PM-9/PM-9G is a 9 ampere regulated power supply with a battery charger that provides operating power to the distributed amplifier assembly installed in the INX or the INX CAB-B cabinet enclosure. The battery charger can maintain batteries up to 55 A/H (with an external battery cabinet). (Batteries not furnished).

### 1.2.5 Command Center Enclosure (INCC-E)

This enclosure houses the following:

- INI-VGC Series
- Fire Fighter Telephone Emergency Microphone
- NGA LCD Display
- one ASM-16 Switch Input
- ANU-48 Annunciator sub-assembly

### 1.2.6 Command Center Expander Enclosure (INCC-Ex)

This enclosure can be interconnected with others to provide added capacity for larger applications. It can accommodate up to six (6), ASM-16 sub-assemblies.

### 1.2.7 Transponder Enclosure (INI-X)

This enclosure houses the INI-VGX, PM-9/PM-9G, one (1) to four (4), AM-50 Series amplifiers, and batteries up to 12 A/H.

### 1.2.8 Remote LED Driver Sub-Assembly (ANU-48)

This sub-assembly provides output for up to forty-eight (48), remote LEDs. It mounts either in the INCC or INX enclosures or in a remote UL Listed annunciator.

### 1.2.9 LCD Display Annunciator Sub-Assembly (NGA)

The NGA sub-assembly occupies one node on the network. This sub-assembly mounts in the INCC enclosure and provides an LCD display of system events, together with system status indicating LEDs and the following touch-screen switches:

- Alarm Acknowledge
- Trouble Acknowledge
- Signal Silence
- System Reset

## 1.3 7100 Series Fire Alarm Control Panel Equipment

### 1.3.1 7100 Series Fire Alarm Control Panel Features

The 7100 Series is shipped unassembled. The shipping carton includes the 7100 Series Installation/Operating Manual, P/N: 9000-0447. The 7100 Series analog, addressable fire alarm control panel provides the following standard features:

- Two (2) Class B, Style 4 Signaling Line Circuits (SLC)
- Two (2) Class B, Style Y Notification Appliance Circuits (NAC)
- Alarm and Trouble Form “C” dry contacts
- Accommodates 99 Gamewell-FCI Approved, UL Listed compatible analog, addressable sensors per SLC (198 total per 7100 System)
- Accommodates 98 Gamewell-FCI Approved, UL Listed compatible addressable monitor and control modules per SLC (196 total per 7100 System)
- 80-character alphanumeric display with password protected system access functions and system diagnostic LEDs
- 280 Event History Log (4100 events when the NGA is installed in the system), non-volatile
- Resettable and non-resettable external power outputs rated 1A @ 24 VDC
- Alarm Verification and Positive Alarm Sequence
- Multi-level Alarm Processing
- NAC coding
- Programmable Trouble Reminder
- Integral RS-232 Port
- Power Limited Circuits




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**NOTE:** In systems that do not use an INCC, NGA or INX node, a single 7100 node must be configured as the Fire Alarm Command / Control Center, by programming in the CAMWorks™ application programming tool. Also, the appropriate label or suitable indication must identify this node as the Control Center.

---

In addition, the optional features include the following:

- Class A Optional Module (CAOM) with Disconnect Switches for System NACs and SLCs
- Digital Alarm Communicator Transmitter (DACT) built-in to Model FC7100-2D
- Municipal Circuit Optional Module (MCOM)
- LCD-7100 Remote 80-character alphanumeric display (up to 5 per 7100 FACP)
- LDM-7100 LED Display Driver providing 33 outputs (up to 5 per 7100 FACP)

Each 7100 fire alarm control panel converts into an E3 network node by the addition of an INI-7100 UTP or INI-7100 FO (see Section 1.3.2 or Section 1.3.3).

### 1.3.2 INI-7100 UTP, Intelligent Network Interface, Unshielded, Twisted-Pair

E3 Broadband Network interface to the 7100 FACP using copper wire network terminations only. It occupies one node on the E3 Broadband network.

### 1.3.3 INI-7100 FO, Intelligent Network Interface, Fiber-optic

E3 Broadband Network interface to the 7100 FACP using either fiber-optic cable or copper wire network terminations. It occupies one node on the E3 Broadband network.




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**NOTE:** The Network Graphical Annunciator (NGA) is required when networking more than seven (7), 7100 Series panels. An RPT-E3 or INI-VG Series board is required for this configuration. Additional cabinets apply.

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## 1.4 E3 Series Fire Alarm Control Panel Equipment

The E3 Series Fire Alarm Control Panel includes the following equipment:

- ILI-MB-E3, ILI95-MB-E3 or ANX
- LCD-E3
- PM-9 or PM-9G
- RPT-E3-UTP or RPT-E3-FO

### 1.4.1 E3 Series Fire Alarm Control Panel Features

- Two (2), Class A, Style 6, 7\* or Class B, Style 4 Signaling Line Circuits
- Two (2), Class A, Style Z or Class B, Style Y Notification Appliance Circuits, 2.0 amp each
- Alarm, Trouble and Supervisory dry contacts
- Accommodates 159 Gamewell-FCI Approved, UL Listed compatible analog sensors per signaling line circuit
- Accommodates 159 Gamewell-FCI Approved, UL Listed compatible addressable monitor/control devices per signaling line circuit
- Accommodates 126 Gamewell-FCI Approved, UL Listed compatible sensors/modules (ILI95-E3 Series)
- 80-character alphanumeric LCD display (40 characters user-defined)
- 4100 event history buffer (non-volatile)
- Power-limited
- Resettable/non-resettable 1.0 amp @ 24 VDC power output each
- Alarm verification
- Walk test
- Multi-level alarm processing
- Positive Alarm Sequence (PAS) operation
- NAC coding
- Trouble reminder
- Integral RS-232 port
- ANX network interface communicates between the E3 Series fire alarm control panel and the FocalPoint Graphic Workstation

\*Style 7 operation requires System Sensor, M500X Isolator Modules (ILI-MB-E3 or ILI-S-E3) or XP95-LI Line Isolator and XP95-LIB Line Isolator Base (ILI95-MB-E3 or ILI95-S-E3).

#### Optional Features

- Remote DACT-E3 Digital Alarm Communicator Transmitter
- Remote ANU-48 Remote LED Driver
- Remote ASM-16 Addressable Switch Sub-assembly
- Remote NGA Network Graphic Display
- LCD-7100 Remote LCD Display

### 1.4.2 Repeater (RPT-E3)

The RPT-E3 sub-assembly provides a remote interface between the ILI-MB-E3/ILI95-MB-E3, ANX and the Broadband Network. It can also be used with the NGA. The unit can be used with unshielded, twisted-pair wire or fiber-optic cable with the Model (RPT-E3-FO). The Model (RPT-E3-UTP) is used with unshielded, twisted-pair wire only.

## Section 2: Installation

### 2.1 Installation Requirements

All components of the E3 Series<sup>®</sup> Broadband System should be located per the following requirements:

- Installations are to be indoors only protected from rain, water, and rapid changes in temperature that could cause condensation. Equipment must be securely mounted on rigid, permanent walls
- Temperature shall not exceed the range of 32° - 120° F (0° - 49° C)
- Operating humidity not to exceed with 93% non-condensing at 90° F (32° C)
- There should be adequate space around the installation to allow easy access for operation and servicing.
- All E3 Series assemblies and components are to be installed in conformance to local and national codes.
- All installation field wiring shall be connected in conformance to local and national codes.

For information on the installation of the E3 Series cabinets, refer to the *E3 Series<sup>®</sup> Expandable Emergency Evacuation System Installation/Operating Manual (Part Number: 9000-0574)*.

### 2.2 INCC Command Center

The INCC Command Center must be mounted close-nipped to a UL Listed 24 VDC power supply Listed for Fire use such as the E3 Series<sup>®</sup> System or the Gamewell-FCI Model 7100 Listed per UL Standard 864, 9th Edition.

#### 2.2.1 Special Provisions for Multiple Command Center Applications

When more than one Command Center is implemented in a system, provisions must be made to indicate the “Active” or primary Command Center per the NFPA requirements. Only the “Active” primary Command Center is enabled to manually control system functions. Other Command Center(s) will act as an annunciator only when they are not in the “Active mode of operation.

#### 2.2.2 Indication of the “Active” Command Center

The Active Command Center must have a suitable indication that it is currently enabled to control system functions. These methods include the following:

- Lighted signage controlled by an output module.
- An indicator light appears that is driven by an ANU-48 as part of a graphic annunciator.
- An indicator light provided by an ASM-16.
- A text message displayed on an NGA if the system is so equipped.

Each of these methods requires custom CAM programming to light/extinguish the Command Center “Active” status indicator method implemented.

### **2.2.3 Transferring Command Center Active Status to a Secondary Command Center**

If required, the “Active” status of a primary Command Center may be transferred to an alternate or secondary Command Center through a variety of programmable methods. An ASM-16 switch, ANU-48 switch input from a toggle switch, a key switch, a monitor module, or any other suitable method can be implemented to serve as a Command Center Active selector switch input that has been configured, for this purpose, with the CAMWorks™ Application Programming tool.

## **2.3 Unpacking and Inspecting Components**

All components of the E3 Series Broadband are shipped disassembled. Remove all sub-assemblies and accessories from their shipping carton to access the enclosure. Remove and inspect the enclosure for shipping damage. Inspect all electronic sub-assemblies for damage without removing them from their anti-static protective bags. If any pieces are found damaged, notify the shipping carrier immediately. Report missing components to Gamewell-FCI Customer Service.

## 2.4 INCC-E Backbox (Single Backbox Application)

1. Prepare the mounting site by pre-drilling for fasteners as needed using the dimensions shown in Figure 2.4.1. Mounting hardware should be #10 to ¼" in diameter.  
Fasteners must be anchored into solid materials unless backed by studs or equivalent support. Mountings to concrete walls should be backed by plywood to insulate the equipment from possible condensation.
2. Position the enclosure so that the keyhole-shaped mounting holes at the top of the enclosure can pass through the fastener heads.
3. Insert the top fasteners halfway and hang the backbox on the fasteners.
4. Insert the two (2) bottom fasteners and tighten all four (4) fasteners to complete the installation.

For additional information, refer to the *INCC-E Installation Instructions, P/N 9000-0547*.

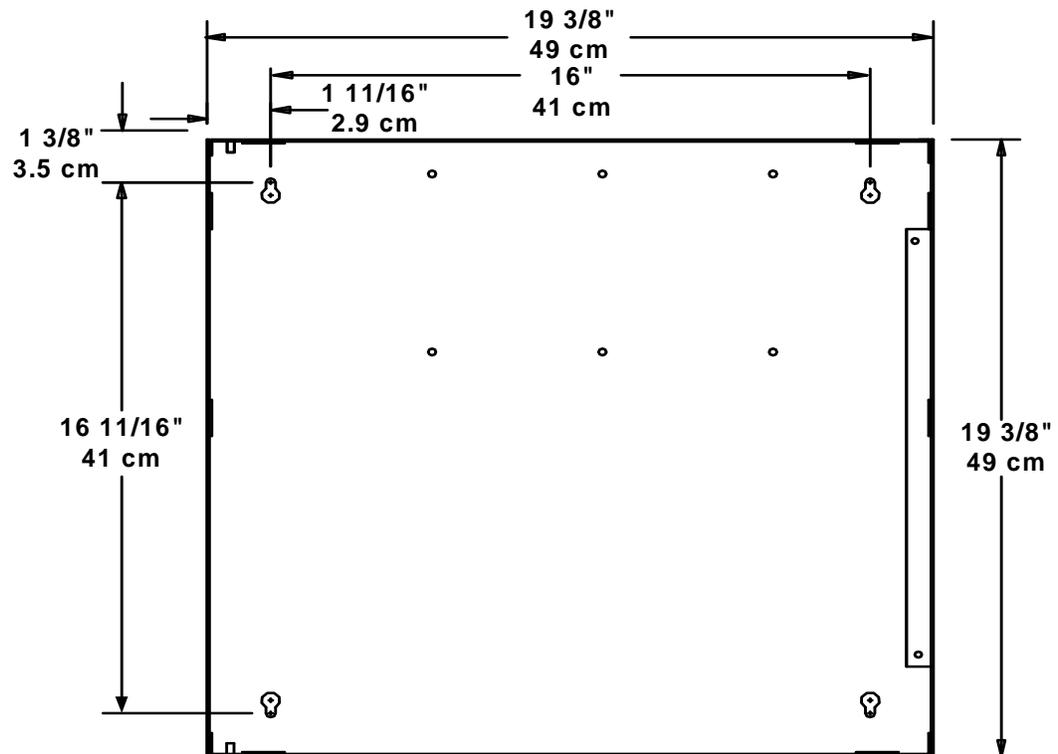


Figure 2.4.1 E3 Series Broadband Backbox

## 2.5 INCC-E Backbox (Multiple Backbox Application)

1. When two or more INCC-E enclosures are required, the first backbox is installed per the instructions in Section 2.4. Additional backboxes require a separation of  $\frac{3}{4}$ " between adjacent enclosures to ensure clearance for the doors.
2. Remove the 1  $\frac{1}{4}$ " diameter knockouts from adjacent boxes prior to mounting to permit wiring from box to box and to peripheral devices in the field. Refer to Figure 2.5.1 and Figure 2.5.2.

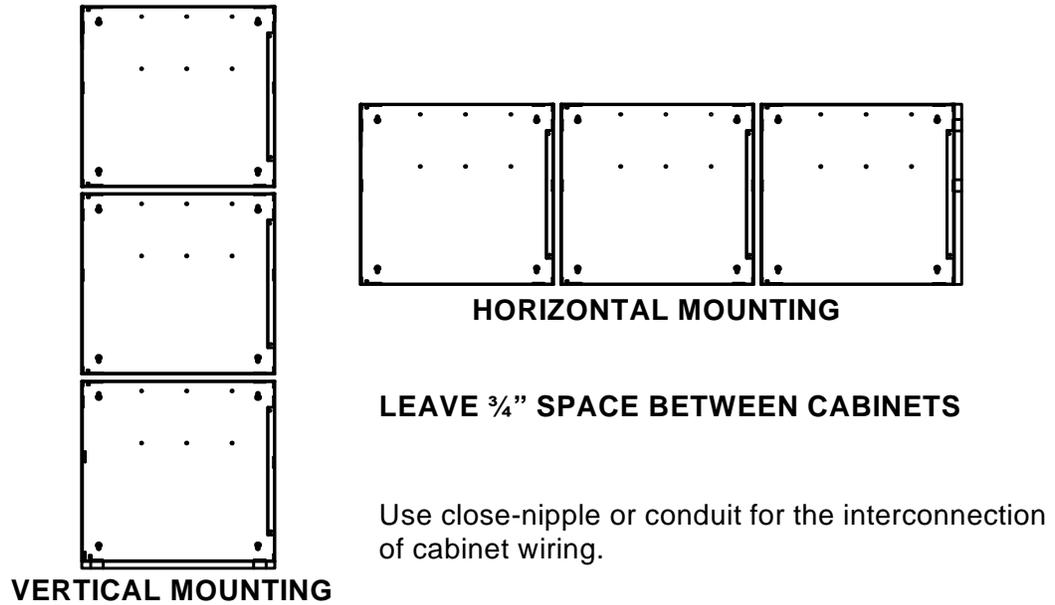


Figure 2.5.1 INCC-E Backbox Installation

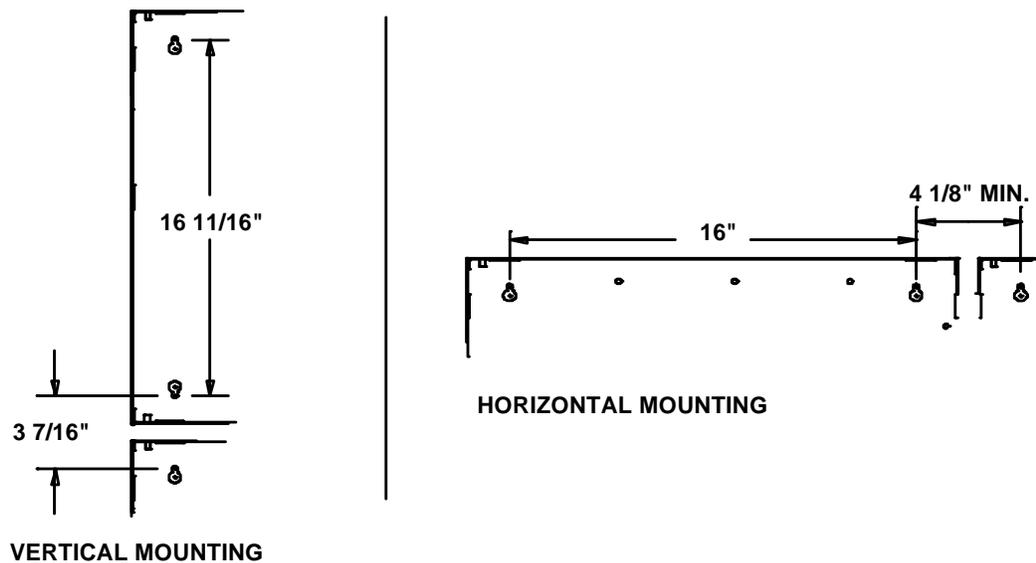


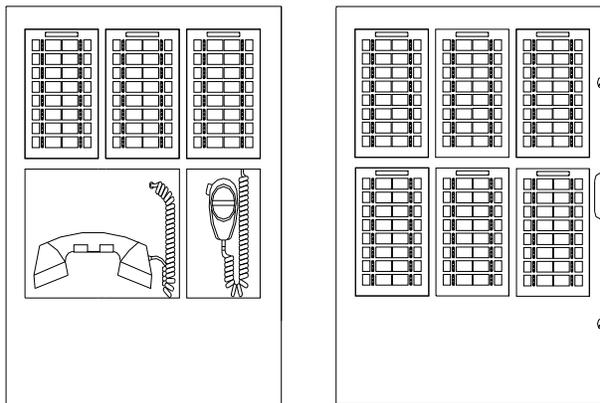
Figure 2.5.2 INCC-E Backbox Installation

## 2.6 E3 Series Broadband Intelligent Network Command Center Assembly (INCC)

### General

The INCC Intelligent Network Command Center uses a modular approach. Consequently, the contents of an INCC assembly will vary depending upon the project's specific requirements. It occupies one (1), node on the network without an NGA installed, and occupies two (2), nodes with an NGA installed. The following list the INCC assembly options:

- At a minimum, an INCC assembly must include the following:
  - one (1), INI-VGC-FO or INI-VGC-UTP
  - one (1), ASM-16 switch sub-assembly
  - one (1), backbox
  - one (1), INCC inner door
  - one (1), INCC outer full plexiglas door
- The standard INCC inner door provides six (6), bays to accommodate up to six (6), ASM-16 or ANU-48 sub-assemblies or one (1) NGA.
- Each INI-VGC-FO or INI-VGC-UTP can support up to sixteen (16), NGA, ASM-16, or ANU-48 sub-assemblies. These additional sub-assemblies can be mounted in extra backboxes. Unused bays can be covered with blank faceplates.
- An optional voice-paging microphone assembly occupies one standard bay in place of an ASM-16/ANU-48.
- An optional fire fighter's telephone handset assembly occupies two (2), standard bays and requires the use of the INCC-T inner door, which combines two bays to accommodate the telephone assembly. See Figure 2.6.1



**Figure 2.6.1 Typical INCC Command Center**

## 2.6.1 Intelligent Network Interface (INI-VG Series)

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**CAUTION: STATIC SENSITIVE EQUIPMENT**

THIS SUB-ASSEMBLY IS A STATIC SENSITIVE, ELECTRONIC DEVICE. TO MINIMIZE THE POSSIBILITY OF DAMAGE, ALWAYS USE A GROUNDED WRIST STRAP OR MAINTAIN CONTACT WITH GROUND WHILE HANDLING THIS EQUIPMENT.

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1. Unpack the INI-VG Series sub-assembly from its shipping carton and remove it from its anti-static bag.
2. Locate the six (6), mounting standoffs at the top center of the INCC-E backbox. Use the six (6), screws provided to secure the subassembly to the backbox at each corner, top center, and bottom center.
3. Position the sub-assembly so that the component side is facing up, the four (4), ST fiber-optic cables are positioned to the lower left, and the four 4-pin terminal blocks run down the right side of the board.

For additional information, refer to the *INI-VG Series Installation Instructions*, P/N 9000-0549.

## 2.6.2 Inner Door (INCC)

For information on the installation of the INCC inner door, refer to the *E3 Series® Expandable Emergency Evacuation Installation/Operating Manual*, P/N 9000-0574 or the *INCC Installation Instructions*, P/N 9000-0546.

### 2.6.3 Addressable Switch Sub-assembly (ASM-16)

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**CAUTION: STATIC SENSITIVE EQUIPMENT**

THIS SUB-ASSEMBLY IS A STATIC SENSITIVE, ELECTRONIC DEVICE. TO MINIMIZE THE POSSIBILITY OF DAMAGE, ALWAYS USE A GROUNDED WRIST STRAP OR MAINTAIN CONTACT WITH GROUND WHILE HANDLING THIS EQUIPMENT.

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1. Unpack the ASM-16 sub-assembly from its shipping carton. For new installations, temporarily remove the INCC inner door from the INCC-E backbox and place the sub-assembly face down on a flat surface.
2. It is recommended that the switch label be prepared and inserted between the ASM-16 faceplate overlay and the back plate at this time.  
Any subsequent alterations to the switch labels will require the ASM-16 be removed from the inner door assembly to gain access to the label.
3. Place the ASM-16 sub-assembly in position in the desired location in the inner door.
4. Fasten the sub-assembly in place by installing a Kep nut over the mounting studs located at each corner. Do not tighten the nuts until all adjacent assemblies have been set in place.  
Refer to the *ASM-16 Installation Instructions* for this sub-assembly, P/N 9000-0550.
5. Plug the RS-485 interconnect ribbon cable into the INI-VG Series sub-assembly Connector J3. Plug the other end of the ribbon cable into J2 of the first ASM-16 (or ANU-48). Continue the RS-485 bus between each additional ASM-16 as needed.
6. Extend the RS-485 bus as needed to sub-assemblies in adjoining expansion cabinets.



**NOTE:** For wiring details, see the ASM-16 or ANU-48 Wiring Connections (Table 2.6.4.1 and Figure 2.6.4.1).

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## 2.6.4 ASM-16 or ANU-48 Wiring Connections

For the ASM-16, ANU-48, INI-VG Series, ILI-MB-E3/ILI95-MB-E3, LCD-E3, or remote enclosure installations, Table 2.6.4.1 use the wiring connections in, and refer to Notes A-F in Figure 2.6.4.1 for the ribbon cable and hardwire locations.

| ASM-16 or ANU-48 to ASM-16 or ANU-48 Wiring                                |        |                      |   |
|--|--------|----------------------|---|
| Designation  |        | Description          | Designation   |
| From ASM-16 or ANU-48  |        | Ribbon Cable         | To ASM-16 or ANU-48   |
| J1   |        | Ribbon Cable         | Connect To:   |
|  |        |                      | J1 - LCD-E3   |
|  |        |                      | J1,J2 - ANU-48  |
|  |        |                      | J3 - INI-VGC, INI-VGX, INI-VGE                                |
|  |        |                      | J1,J2,J3 - ASM-16   |
| J2   |        | Ribbon Cable         | Connect To:   |
|  |        |                      | J1 - LCD-E3   |
|  |        |                      | J1,J2 - ANU-48  |
|  |        |                      | J3 - INI-VGC, INI-VGX, INI-VGE                                |
|  |        |                      | J1,J2,J3 - ASM-16   |
| J3   |        | Ribbon Cable         | Connect To:   |
|  |        |                      | J1 - LCD-E3   |
|  |        |                      | J1,J2 - ANU-48  |
|  |        |                      | J3 - INI-VGC, INI-VGX, INI-VGE                                |
|  |        |                      | J1,J2,J3 - ASM-16   |
| J4   |        | Emulator             | Factory Use Only  |
| J5   |        |                      | Factory Use Only  |
| JMP1   |        | Termination          | Install Jumper only if the last device is on RS-485 bus.      |
| <b>Note:</b> See Note A in Figure 2.6.4.1 for the ribbon cable connection. |        |                      |   |
| ASM-16 or ANU-48 to ASM-16 or ANU-48 Wiring                                |        |                      |   |
| From ASM-16 or ANU-48  |        |                      | RS-485 COM A from previous device/to next device. Connect To: |
| TB1-1  | COMM A | Single Discrete Wire | TB3-1 ILI-MB-E3/ILI95-MB-E3                                   |
|  |        |                      | TB6-3 INI-VGC, INI-VGX, INI-VGE                               |
|  |        |                      | TB1-3 DACT-E3   |
|  |        |                      | TB1-1 ASM-16, ANU-48  |
|  |        |                      | TB1-5 LCD-E3  |
|  |        |                      | TB1-1 LCD-7100  |
| TB1-2  | COMM B | Single Discrete Wire | RS-485 COM B from previous device/to next device. Connect To: |
|  |        |                      | TB3-2 ILI-MB-E3/ILI95-MB-E3                                   |
|  |        |                      | TB6-2 INI-VGC, INI-VGX, INI-VGE                               |
|  |        |                      | TB1-4 DACT-E3   |
|  |        |                      | TB1-2 ASM-16, ANU-48  |
|  |        |                      | TB1-6 LCD-E3  |
|  |        |                      | TB1-2 LCD-7100  |
| TB1-3  | +24V   | Single Discrete Wire | Connect To:   |
|  |        |                      | TB1-3 +24V  |
|  |        |                      | TB3-6 ILI-MB-E3/ILI95-MB-E3                                   |
|  |        |                      | TB6-1 INI-VGC, INI-VGX, INI-VGE                               |
| TB1-4  | GND    | Single Discrete Wire | Connect To:   |
|  |        | Common               | TB1-4 GND   |
|  |        |                      | TB3-5 or TB3-7 ILI-MB-E3/ILI95-MB-E3                          |
|  |        |                      | TB6-4 INI-VGC, INI-VGX, INI-VGE                               |
| <b>Note:</b> See Note B in Figure 2.6.4.1 for the hardwire connection.     |        |                      |   |
|  |        |                      |   |
|  |        |                      |   |
|  |        |                      |   |

**Table 2.6.4.1 ASM-16 or ANU-48 Wiring Connections**

| <b>INI-VGC, INI-VGX or INI-VGE Wiring</b>                            |        |                      |                       |        |
|--|--------|----------------------|-----------------------|--------|
| From INI-VGC, INI-VGX or INI-VGE                                     |        |                      | To ASM-16 or ANU-48   |        |
| J3 RS-485 Local  |        | Ribbon Cable         | J1, J2 or J3          |        |
| Note: See Note C in Figure 2.6.4.1 for the ribbon cable connection.  |        |                      |                       |        |
| From INI-VGC, INI-VGX or INI-VGE                                     |        |                      | To ASM-16 or ANU-48   |        |
| <b>ASM-16 or ANU-48 to ASM-16 or ANU-48 Wiring</b>                   |        |                      |                       |        |
| <b>Designation</b>   |        | <b>Description</b>   | <b>Designation</b>    |        |
| TB6 RS-485 Remote  |        |                      | ASM-16 or ANU-48 TB-1 |        |
| TB6-1  | +24V   | Single Discrete Wire | TB1-3                 | +24V   |
| TB6-2  | COMM B | Single Discrete Wire | TB1-2                 | COMM B |
| TB6-3  | COMM A | Single Discrete Wire | TB1-1                 | COMM A |
| TB6-4  | GND    | Single Discrete Wire | TB1-4                 | GND    |
| Note: See Note D in Figure 2.6.4.1 for the hardwire connection.      |        |                      |                       |        |
| <b>ILI-MB-E3/ILI95-MB-E3 Wiring</b>                                  |        |                      |                       |        |
| From ILI-MB-E3/ILI95-MB-E3   |        |                      | To ASM-16 or ANU-48   |        |
| TB3-1  | COMM A | Single Discrete Wire | TB1-1                 | COMM A |
| TB3-2  | COMM B | Single Discrete Wire | TB1-2                 | COMM B |
| TB1-3  | +24V   | Single Discrete Wire | TB1-3                 | +24V   |
| TB1-4  | GND    | Single Discrete Wire | TB1-4                 | GND    |
| Note: See Note E in Figure 2.6.4.1 for the hardwire connection.      |        |                      |                       |        |
| <b>From LCD-E3</b>   |        |                      |                       |        |
| From LCD-E3  |        |                      | To ASM-16 or ANU-48   |        |
| J1   |        | Ribbon Cable         | J1, J2, or J3         |        |
| Note1: See Note F in Figure 2.6.4.1 for the ribbon cable connection. |        |                      |                       |        |
| <b>Note2:</b>  |        |                      |                       |        |
| JMP1 - Termination leave out.  |        |                      |                       |        |
| JMP2 - Factory Programming leave in.                                 |        |                      |                       |        |
| JMP3 - Factory programming leave in.                                 |        |                      |                       |        |
| JMP4 - External Buzzer Connector.                                    |        |                      |                       |        |

**Table 2.6.4.1 ASM-16 or ANU-48 Wiring Connections (Continued)**

## 2.6.4 ASM-16 and ANU-48 Wiring Connections (Continued)

Figure 2.6.4.1 illustrates the ASM-16 and ANU-48 wiring connections.

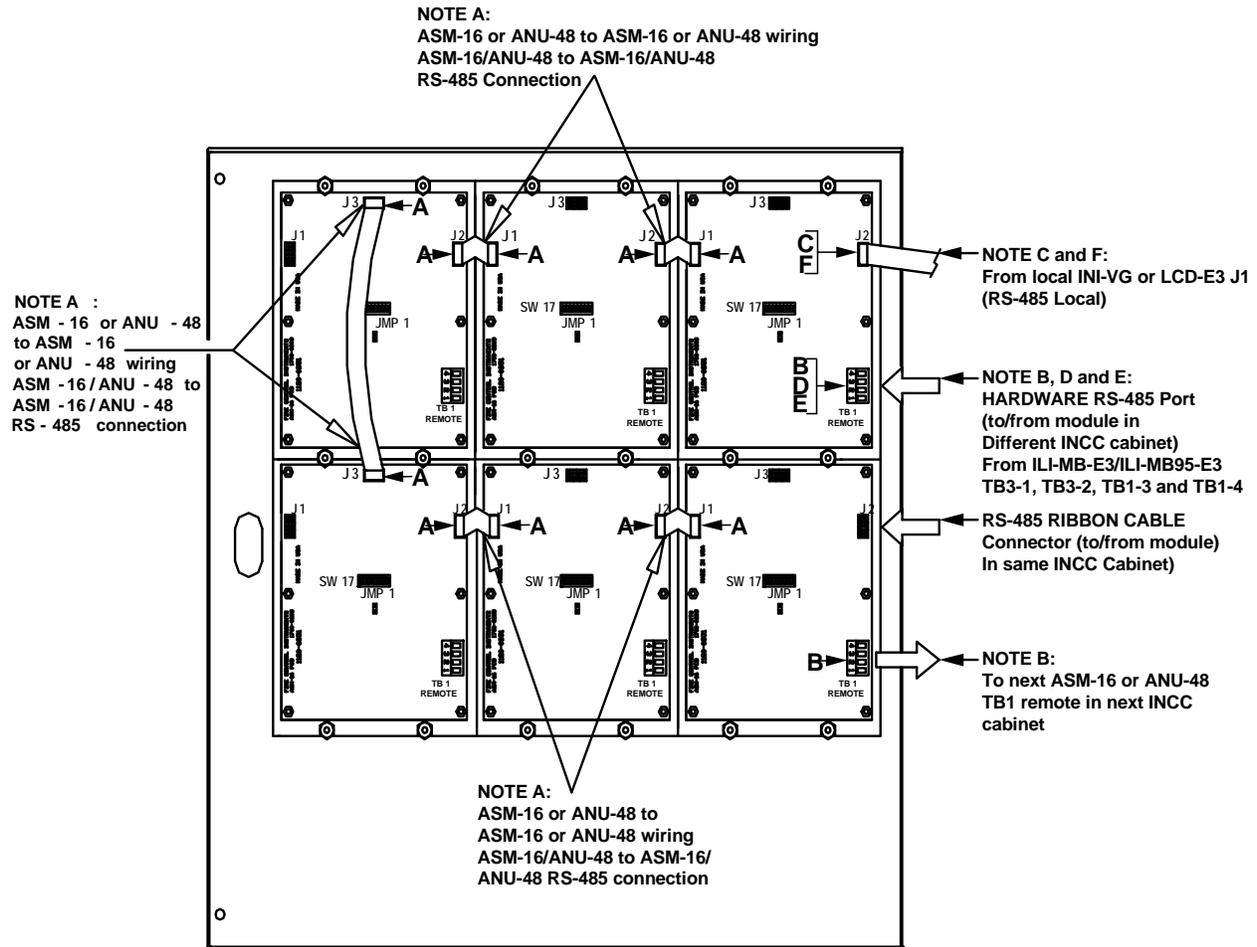


Figure 2.6.4.1 ASM-16 and ANU-48 Wiring Diagram



**NOTE:** For additional information on the ASM-16 wiring connections, refer to the *E3 Series® Expandable Emergency Evacuation System Installation/Operating Manual (P/N 9000-0574)*.

## 2.6.5 ANU-48 Remote LED Driver Wiring Connections



### CAUTION: STATIC SENSITIVE EQUIPMENT

THIS SUB-ASSEMBLY IS A STATIC SENSITIVE, ELECTRONIC DEVICE. TO MINIMIZE THE POSSIBILITY OF DAMAGE, ALWAYS USE A GROUNDED WRIST STRAP OR MAINTAIN CONTACT WITH GROUND WHILE HANDLING THIS EQUIPMENT.

1. Unpack the ANU-48 sub-assembly from its shipping carton. Remove the unit from its static-shielded bag, observing proper static protection measures.



**NOTE:** For new installations, temporarily remove the INCC Inner Door from the INCC-E backbox and place it face down on a flat surface.

2. Place the ANU-48 sub-assembly in position in the desired location in the inner door.
3. To fasten the assembly in place, install the nuts (provided in the Hardware Kit) over the mounting studs located at each corner. Do not tighten the nuts until all adjacent assemblies have been set in place.

For additional information, refer to the *ANU-48 Installation Instructions, P/N 9000-0564*.

4. Plug the RS-485 interconnect ribbon cable into the INI-VG Series sub-assembly connector J3. Plug the other end of the ribbon cable into J1 of the first ANU-48.

Install the ribbon cables from J2 of the first ANU-48 board to J1 of the next, and continue.

5. Extend the RS-485 bus as needed to sub-assemblies in the adjoining expansion cabinets.

**Note 1:** The annunciator may be located up to 3,000 feet from the panel and up to fifteen (15), additional annunciators can be connected, configured identically with the first. See Table 2.6.5.1 for resistance limitations for the connecting circuit.

**Note 2:** If more than four (4), ANU-48 modules are installed, an external regulated and power-limited power supply Listed for use with fire protective signaling units is required.

**Note 3:** For wiring details, see the ASM-16 and ANU-48 Wiring Connections Table 2.6.4.1 and Figure 2.6.4.1).

|   |    |    |    |    |
|---|----|----|----|----|
| Quantity of ANU-48 modules  | 1  | 2  | 3  | 4  |
| Max resistance of 24 VDC power circuit (ohms) to most distant ANU | 40 | 20 | 14 | 10 |

**Table 2.6.5.1 Resistance Limitations**

For additional information on the ASM-16 wiring connections, refer to the *E3 Series® Expandable Emergency Evacuation System Installation/Operating Manual (P/N 9000-0574)*.

## 2.6.6 Voice Paging Microphone Assembly (Optional)

1. Unpack the pre-assembled Voice Paging Microphone assembly from its shipping carton.



**NOTE:** For new installations, temporarily remove the INCC inner door from the INCC-E backbox and place it face down on a flat surface.

2. The Microphone assembly occupies one bay of the inner door. Place the Microphone assembly in position in the desired location in the inner door.
3. Fasten the assembly in place by installing a nut (provided with the Hardware Kit) over the mounting studs located at each corner.



**NOTE:** Do not tighten the nuts until all adjacent assemblies are set in place.

4. Remove the jumpers that are installed on the INI-VGC J15 header.
5. Connect the six-pin connector of the coiled cord to J15 on the INI-VGC, labeled "Microphone."



**NOTE:** Be sure to position the connector so that the gray jumper spans the top two pins on the INI-VGC J15 (Pins 6 and 5 counting from the top down). See Figure 2.6.6.1 for details.

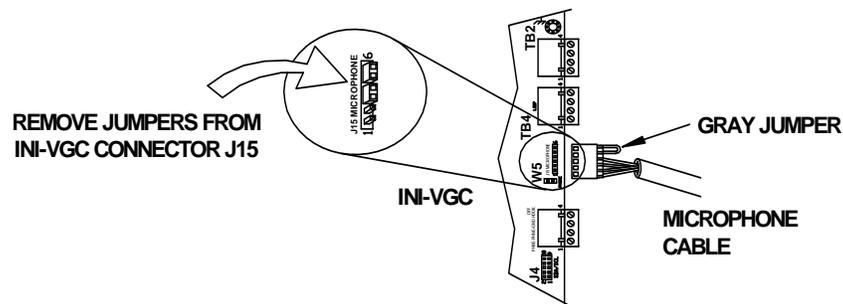


Figure 2.6.6.1 INI-VGC Wiring Connections

## 2.6.7 Fire Fighter's Intercom Handset Assembly (Optional)

1. Unpack the handset assembly from its shipping carton. Be sure to use the INCC-T inner door to accommodate the assembly.



**NOTE:** For new installations, temporarily remove the inner door from the INCC-E backbox and place it face down on a flat surface.

2. The handset assembly occupies two bays of the INCC-IDT inner door. Place the handset assembly in position on the inner door.
3. To fasten the assembly in place, install a Kep nut over the mounting studs that are located at each corner. Do not tighten the nuts until all the adjacent sub-assemblies have been set in place.
4. Plug the pre-assembled four-pin terminal block that terminates the phone cable into the INI-VGC TB5. Remove INI-VGC jumper W5 to enable the local handset connection, see Figure 2.6.7.1.

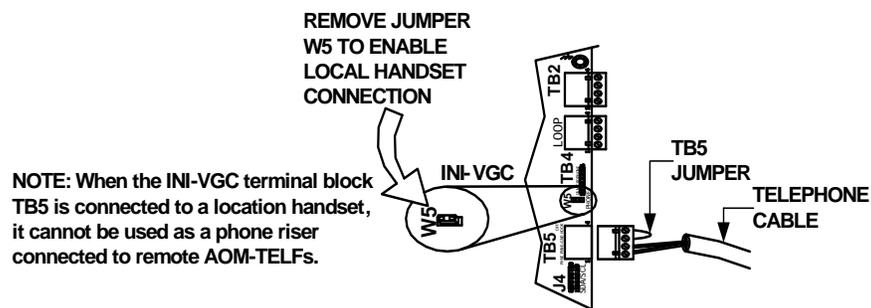


Figure 2.6.7.1 INI-VGC Wiring

## 2.6.8 NGA LCD Annunciator Sub Assembly

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**CAUTION: STATIC SENSITIVE EQUIPMENT**

THIS SUB-ASSEMBLY IS A STATIC SENSITIVE, ELECTRONIC DEVICE. TO MINIMIZE THE POSSIBILITY OF DAMAGE, ALWAYS USE A GROUNDED WRIST STRAP OR MAINTAIN CONTACT WITH GROUND WHILE HANDLING THIS EQUIPMENT.

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1. Unpack the NGA sub-assembly from its shipping carton. Remove the unit from its static-shielded bag, observing proper static protection measures. For new installations, temporarily remove the INCC inner door from the INCC-E backbox and place it face down on a flat surface.
2. Place the NGA sub-assembly in position in the upper left opening in the inner door.
3. To fasten the assembly in place, install the nuts (provided with the Hardware Kit) over the mounting studs that are located at each corner.



**NOTE:** Do not tighten the nuts until all adjacent assemblies have been set in place.

---

For additional information, refer to the *NGA Installation Instructions, P/N 9000-0568*.

4. Plug the ARCNET interconnect ribbon cable into the INI-VG Series sub-assembly Connector J7.

Alternatively, the NGA may be connected to the network via the RPT-E3. See Section 3.3.3 in this document for details.

---

**CAUTION: WIRING RESTRICTION**

**DO NOT CONNECT TO J3!**

---

5. Plug the other end of the ribbon cable into J4 of the NGA.

## 2.7 E3 Series® Broadband Intelligent Network Transponder (INX and INX CAB-B)

### General

The INX and the INX CAB-B Intelligent Network Transponder cabinet enclosures can house one (1) to four (4), 50-watt, AM-50 Series amplifiers. These amplifiers can be configured in either of the following ways:

- one, two, or three main amplifiers with or without a common shared redundant standby amplifier
- two (2), primary amplifiers each amplifier with its own standby amplifier

Power for the INX, the INX CAB-B and/or INCC cabinet assembly is provided by a PM-9/PM-9G power supply. The PM-9/PM-9G is a 9 amp supply that has an integral battery charger that can maintain and supervise batteries up to 55 A/H (with an external battery cabinet).



**NOTE:** 12 A/H batteries will fit inside the INX and the INX CAB-B cabinet. Use a BC-1 battery cabinet for larger batteries.

Interface to the E3 Series® Broadband network is through an INI-VGX sub-assembly. This sub-assembly supervises and controls the AM-50 Series amplifier sub-assemblies and PM-9/PM-9G power supply. It stores up to sixteen (16), custom digital tones/messages with a combined, total length of three minutes. There is one Signaling Line Circuit (SLC) to support up to sixteen (16), AOM-TELF fire fighter intercom circuits and thirty-two (32), AOM-2SF (single-channel speaker circuits). MMO-6SF six-circuit single-channel speaker circuits modules are also supported, but each MMO-6SF takes up six addresses on the SLC.

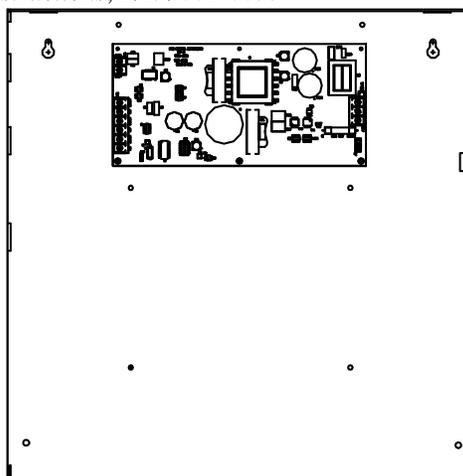
For additional information, refer to the *INX and the INX CAB-B Installation Instructions, P/N 9000-0545*.

### 2.7.1 PM-9/PM-9G Power Supply Sub-assembly

1. Unpack the PM-9/PM-9G from its shipping carton and remove it from its static shield bag.
2. Align the sub-assembly with the six (6), mounting standoffs located at the top of the INX or the INX CAB-B backbox as shown in Figure 2.7.1.
3. To secure the sub-assembly, use the six (6), screws provided.

For additional information on the PM-9/PM-9G, refer to the following documents:  
*PM-9 Installation Instructions, P/N 9000-0548*

*PM-9G Installation Instructions, P/N 9001-0055*



**Figure 2.7.1 PM-9/PM-9G Sub-Assembly**

4. Install the 10-pin ribbon cable supplied with the PM-9/PM-9G into J1.

Do not connect the batteries or apply 120/240 VAC power until the INX or the INX CAB-B cabinet enclosure has been completely assembled and all the cable connections have been made. See Section 3.7 for details regarding AC power connection. See Section 3.7.1 for details regarding back-up battery connections.

## 2.7.2 Intelligent Network Interface, Voice Gateway (INI-VGX)

**CAUTION: STATIC SENSITIVE EQUIPMENT**

THIS SUB-ASSEMBLY IS A STATIC SENSITIVE, ELECTRONIC DEVICE. TO MINIMIZE THE POSSIBILITY OF DAMAGE, ALWAYS USE A GROUNDED WRIST STRAP OR MAINTAIN CONTACT WITH GROUND WHILE HANDLING THIS EQUIPMENT.

The INI-VGX sub-assembly is installed in an INX or an INX CAB-B cabinet enclosure. To install the INI-VGX sub-assembly in the INX or the INX CAB-B cabinet enclosure, do the following:

1. Unpack the INIX-VGX sub-assembly from its shipping carton and remove it from its anti-static bag.
2. Position the INI-VGX sub-assembly over the six (6), mounting studs on the top of the sub-chassis mounting plate.
3. To secure the INI-VGX sub-assembly to the sub-chassis mounting plate, use six (6), screws (provided in the Hardware Kit).
4. Place the sub-chassis mounting plate over the mounting studs above the PM-9/PM-9G in the INX or the INX CAB-B backbox and secure the sub-chassis mounting plate with the screws.
5. Connect the 10-pin ribbon cable leading from PM-9/PM-9G J1 to INI-VGX-FO or INI-VGX-UTP J4 (SDA/SCL).
6. Connect the 20-pin ribbon cable provided to J16 (Signals In/Out) of the INI-VGX-FO or the INI-VGX-UTP.

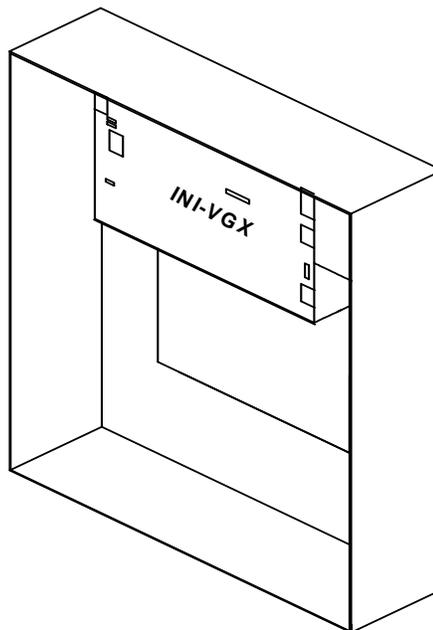


Figure 2.7.2.1 INI-VGX Installation

## 2.7.3 AM-50 Series, 50 Watt Amplifier Sub-Assembly

Each INX or INX CAB-B cabinet enclosure can house four (4), AM-50 Series amplifier sub-assemblies. The first and second amplifiers mount directly on the INX or the INX CAB-B sub-chassis mounting plate. If required, the third and fourth amplifiers can be stacked over the first pair of amplifiers using 1/4" (3.2 cm) standoffs.

For additional information on the AM-50 Series sub-assemblies, refer to the *AM-50 Series Installation Instructions*, P/N 9000-0544.



### CAUTION: STATIC SENSITIVE EQUIPMENT

THIS SUB-ASSEMBLY IS A STATIC SENSITIVE, ELECTRONIC DEVICE. TO MINIMIZE THE POSSIBILITY OF DAMAGE, ALWAYS USE A GROUNDED WRIST STRAP OR MAINTAIN CONTACT WITH GROUND WHILE HANDLING THIS EQUIPMENT.

#### 2.7.3.1 Single AM-50 Series Amplifier Ribbon Cable Installation

If one AM-50 Series amplifier is required, install the one AM-50 Series amplifier to the INX or the INX CAB-B Mounting Plate and do the following:

1. Unpack the AM-50 Series amplifier from its shipping carton and remove it from its anti-static bag.
2. Position the AM-50 Series amplifier on the INX or the INX CAB-B Mounting Plate located directly below the INI-VGX sub-assembly.
3. To install the AM-50 Series amplifier to the INX or the INX CAB-B Mounting Plate, secure the four (4), screws (4-40 x 1/4" (.635 cm) L SEMS PHPD) (provided in the Hardware Kit) in the four-hole mounting pattern.
4. Connect the 20-pin ribbon cable leading from J16 of the INI-VGX to J1 of the AM-50 Series amplifier.

Figure 2.7.3.1.1 illustrates the AM-50 Series single amplifier ribbon cable connection.

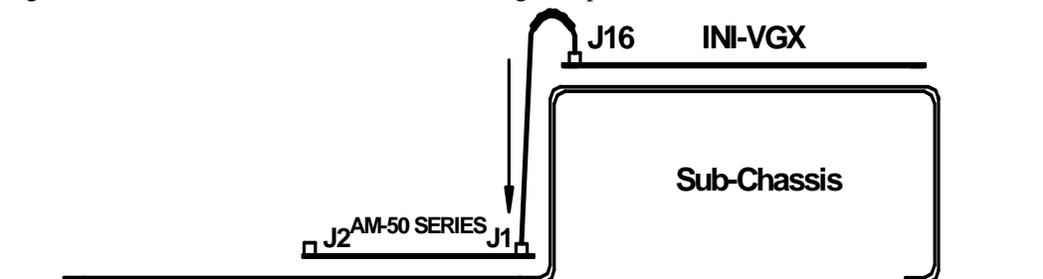


Figure 2.7.3.1.1 AM-50 Series - Single Amplifier Ribbon Cable Connection

#### 2.7.3.2 Two AM-50 Series Amplifiers - Ribbon Cable Installation

If two AM-50 Series amplifiers are required, install the two AM-50 Series amplifiers to the INX or the INX CAB-B Mounting Plate, and do the following:

1. Mount the first amplifier per the instructions in Section 2.7.3.1.
2. Position the second AM-50 Series amplifier directly below the first amplifier on the INX or the INX CAB-B Mounting Plate, and secure the second amplifier to the INX or the INX CAB-B Mounting Plate, using the four (4), screws (4-40 x 1/4" (.635 cm) SEMS PHPD) (provided in the Hardware Kit) in the four-hole mounting pattern.
3. Connect the 20-pin ribbon cable leading from J16 of the INI-VGX to J1 of the first amplifier.
4. Connect the 20-pin ribbon cable leading from J1 of the second amplifier to J2 of the first amplifier.

Figure 2.7.3.2.1 illustrates the AM-50 Series two amplifiers ribbon cable connection.

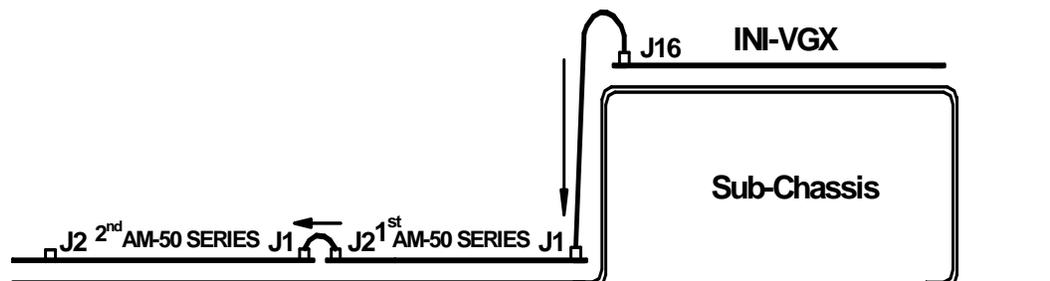


Figure 2.7.3.2.1 AM-50 Series - Two Amplifiers Connection

### 2.7.3.3 Three AM-50 Series Amplifiers - Ribbon Cable Installation



**NOTE:** It is recommended that after the first two amplifiers are connected, install the ribbon cables before proceeding.

Always attach the ribbon cable of the first AM-50 Series amplifier from J1 to the J16 cable leading from the INI-VGX.

If three AM-50 Series amplifiers are required, install the three AM-50 Series amplifiers to the INX or the INX CAB-B Mounting Plate, and do the following:

1. Position the second amplifier directly below the INX-VGX on the INX or the INX CAB-B Mounting Plate, and secure the second amplifier using the four (4) standoffs (1/4" (.635 cm) HEX, 4-40 x 1 3/8") (provided in the Hardware Kit) to the four (4), mounting studs on the INX or the INX CAB-B Mounting Plate.
2. Position the third amplifier directly below the second amplifier on the INX or the INX CAB-B Mounting Plate, and secure the third amplifier using the four (4) standoffs (1/4" (.635 cm) HEX, 4-40 x 1 3/8") to the four (4), mounting studs on the INX or the INX CAB-B Mounting Plate.
3. Place the first amplifier above the second amplifier and secure the first amplifier to the standoffs, using the four (4), screws (4-40 x 1/4" (.635 cm) SEMS PHPD).
4. Place the fourth amplifier above the third amplifier and secure the fourth amplifier to the standoffs using the four (4), screws (4-40 x 1/4" (.635 cm) SEMS PHPD).
5. Connect a 20-pin ribbon cable leading from J16 of the INI-VGX to J1 of the first amplifier. Connect another 20-pin ribbon cable leading from J1 of the second amplifier to J2 of the first amplifier.
6. Connect the 20-pin ribbon cable leading from J2 of the second amplifier to J1 of the third amplifier.
7. Connect the 20-pin ribbon leading from J2 of the third amplifier to J1 of the fourth amplifier.

Figure 2.7.3.3.1 illustrates the AM-50 Series three amplifiers ribbon cable connection.

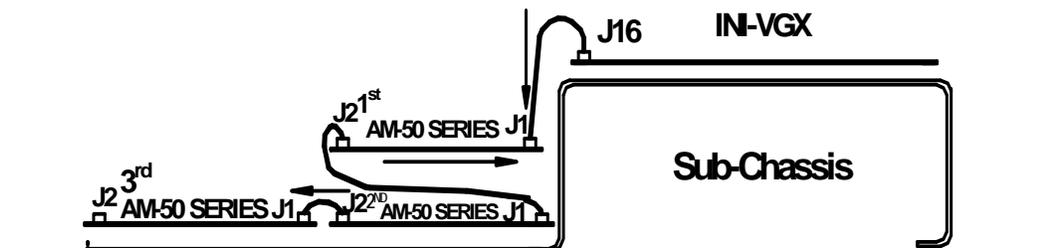


Figure 2.7.3.3.1 AM-50 Series - Three Amplifiers Ribbon Cable Connection

### 2.7.3.4 Four AM-50 Series Amplifiers - Ribbon Cable Installation



**NOTE:** It is recommended that after the first two amplifiers are connected, install the ribbon cables before proceeding.

Always attach the ribbon cable of the first AM-50 Series amplifier from J1 to the J16 cable leading from the INI-VGX.

If four AM-50 Series amplifiers are required, install the four AM-50 Series amplifiers to the INX or the INX CAB-B Mounting Plate, and do the following:

1. Position the second amplifier directly below the INX-VGX on the INX or the INX CAB-B Mounting Plate, and secure the second amplifier using the four (4) standoffs (1/4" (.635 cm) HEX, 4-40 x 1 3/8") (provided in the Hardware Kit) to the four (4), mounting studs on the INX or the INX CAB-B Mounting Plate.
2. Position the third amplifier directly below the second amplifier on the INX or the INX CAB-B Mounting Plate, and secure the third amplifier using the four (4) standoffs (1/4" (.635 cm) HEX, 4-40 x 1 3/8") to the four (4), mounting studs on the INX or the INX CAB-B Mounting Plate.
3. Place the first amplifier above the second amplifier and secure the first amplifier to the standoffs, using the four (4), screws (4-40 x 1/4" (.635 cm) SEMS PHPD).
4. Place the fourth amplifier above the third amplifier and secure the fourth amplifier to the standoffs using the four (4), screws (4-40 x 1/4" (.635 cm) SEMS PHPD).
5. Connect a 20-pin ribbon cable leading from J16 of the INI-VGX to J1 of the first amplifier. Connect another 20-pin ribbon cable leading from J1 of the second amplifier to J2 of the first amplifier.
6. Connect the 20-pin ribbon cable leading from J2 of the second amplifier to J1 of the third amplifier.
7. Connect the 20-pin ribbon leading from J2 of the third amplifier to J1 of the fourth amplifier.

Figure 2.7.3.4.1 illustrates the AM-50 Series four amplifiers ribbon cable connection.



**NOTE:** The fourth amplifier can serve only as a standby amplifier.

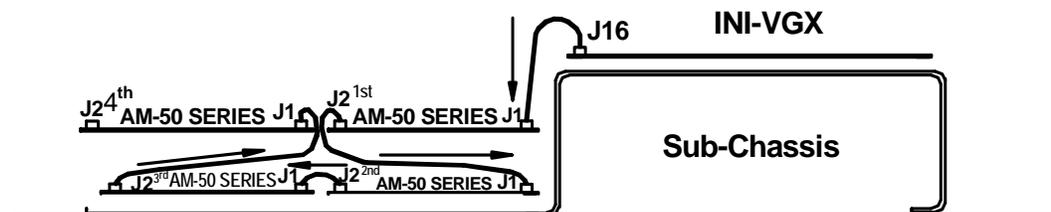


Figure 2.7.3.4.1 AM-50 Series - Four Amplifiers Ribbon Cable Connection

## Section 3: Wiring

### 3.1 Power Connections

Connection of the power supply to the 120 VAC power source must be made in compliance with the National Electrical Code, NFPA 70, Article 760, the applicable NFPA Standards, and according to the requirements of the Authority Having Jurisdiction. Such requirements include:

- Connections must be made to a dedicated branch circuit.
- Connections must be mechanically protected.
- All means of disconnecting the circuit must be clearly marked: "FIRE ALARM CIRCUIT CONTROL."
- Connections must be accessible only to authorized personnel.

### 3.2 Intelligent Network Interface (INI-7100)

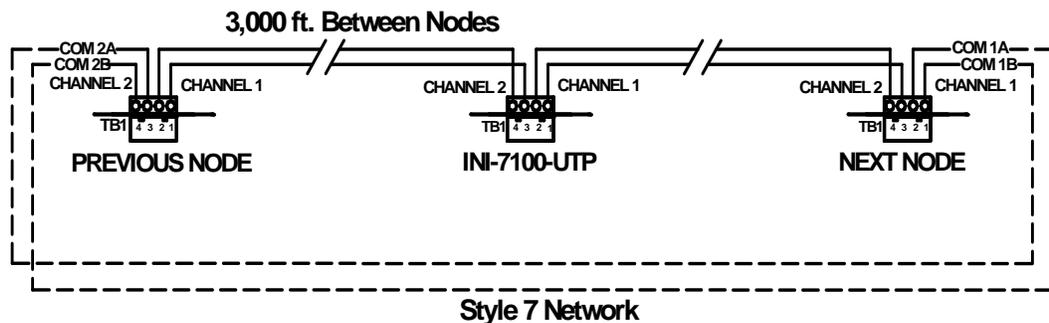
The 7100 BSM Basic System sub-assembly must be equipped with either an INI-7100 UTP or an INI-7100 FO sub-assembly in order to act as a node on the E3 Series<sup>®</sup> Broadband Network.

#### 3.2.1 INI-7100 UTP

The INI-7100 UTP provides terminal block connections for a twisted, unshielded pair of wires. Figure 3.2.1 illustrates the typical wiring between nodes. Table 3.2.1 lists the INI-7100-UTP wiring.



**NOTE:** Note the maximum distance of 3,000 feet between each node. Refer to Table 3.2.1 for specific wiring connections.



**Figure 3.2.1 INI-7100 UTP Wiring Connections**

| Designation From INI-7100   | Designation to INI-7100                      |
|---|--|
| INI-7100 TB1-1 (Com 1B) to:   | Next INI-7100 TB1-3 (Com 2A) or Network Node |
| INI-7100 TB1-2 (Com 1A) to:   | Next INI-7100 TB1-4 (Com 2B) or Network Node |
| Use:  |  |
| West Penn 60991B, 16 AWG  |  |
| Or equivalent non-shielded, twisted-pair- 3,000 ft. maximum between nodes |  |

**Table 3.2.1 Wiring Schedule: INI-7100 UTP**



**NOTE:** The use of fiber-optic cable is not permitted in New York City.

### 3.2.2 INI-7100 FO

The INI-7100 FO adds four (4) standard ST connectors for the fiber-optic cable while retaining the capacity to accommodate copper wire.

Connecting the INI-7100 sub-assemblies in consecutive order of addressing allows the fastest network communication. No star configurations or T-tapping on the E3 Series network is permitted. Figure 3.2.2.1 illustrates a typical fiber-optic network.

Consult Table 3.2.2.1 for specific fiber-optic cable connections between the nodes.

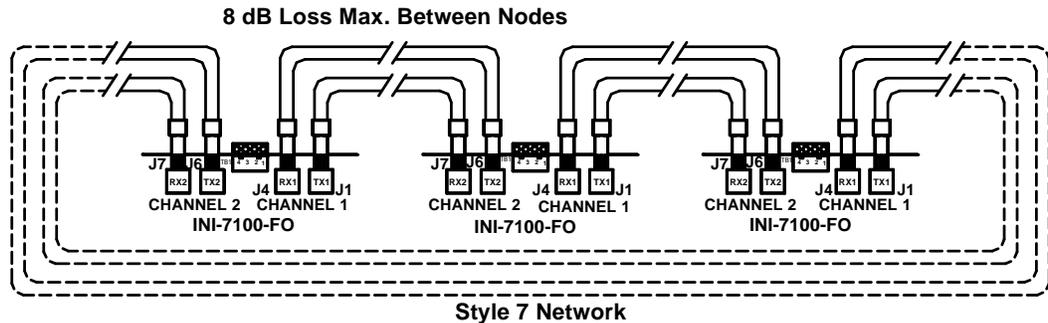


Figure 3.2.2.1 INI-7100 Fiber-Optic Network Configuration

| Designation from INI-7100  | Designation to INI-7100                          |
|--|--|
| INI-7100 Connector J1 (TX1) to   | Next INI-7100 Connector J7 (RX2) or Network Node |
| INI-7100 Connector J4 (RX1) to   | Next INI-7100 Connector J6 (TX2) or Network Node |
| Fiber-optic cable specifications:  |  |
| Up to 200 microns (optimized for 62.5 / 125 microns), Standard ST Connectors |  |
| Up to 8 dB loss max. between nodes   |  |

Table 3.2.2.1 Fiber-Optic Connections: INI-7100 FO

The INI-7100 FO can accommodate both fiber-optic cable connections and copper wire as shown above. This feature is useful for applications where the E3 Series network encompasses multiple buildings. The E3 Series wiring within a building can be run on copper wire. Connections between buildings can be run on fiber-optic cable for the best protection against transients and ground fault conditions. See Figure 3.2.2.2 for an example of a network using both types of connections.

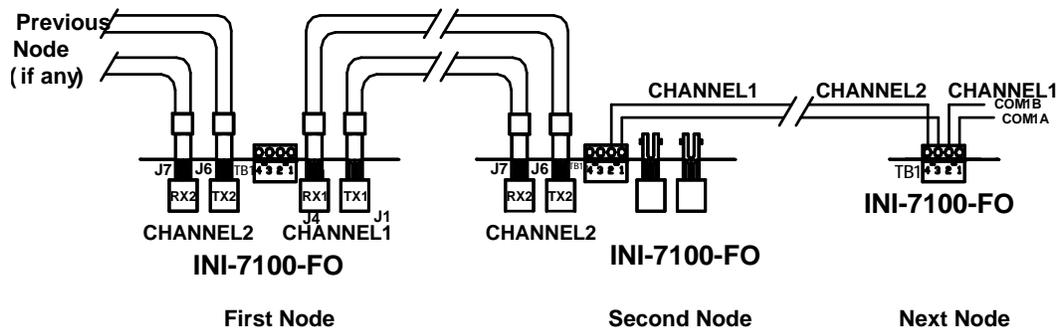


Figure 3.2.2.2 INI-7100 FO Connections



**NOTE:** The use of fiber-optic cable is not permitted in New York City.

## 3.3 Repeater (RPT-E3)

The RPT-E3 sub-assembly provides a remote interface between the ILI-MB-E3/ILI95-MB-E3, ANX and the Broadband Network. It can also be used with the NGA. The unit can be used with unshielded, twisted-pair wire or fiber-optic cable with Model (RPT-E3-FO). The Model (RPT-E3-UTP) is used with the unshielded, twisted-pair wire only.

### 3.3.1 RPT-E3-FO

The RPT-E3-FO communicates to the network by the means of either fiber-optic cable or copper, unshielded, twisted-pair wire.

### 3.3.2 RPT-E3-UTP

The RPT-E3-UTP connects to the network by the means of unshielded, twisted-pair copper wire. It is similar to the RPT-E3-FO with the exception that the connectors U4, U5, U6 and U7 are omitted.

| Designation | Description                      | Comments  |
|-------------|----------------------------------|---|
| TB1-1       | ARCNET PORT 1A                   | Broadband Network (See Note 1)  |
| TB1-2       | ARCNET PORT 1B                   | Broadband Network (See Note 1)  |
| TB1-3       | ARCNET PORT 2A                   | Broadband Network (See Note 1)  |
| TB1-4       | ARCNET PORT 2B                   | Broadband Network (See Note 1)  |
| TB2         | Earth Ground                     | Local Differential ARCNET (See Note 2)  |
| TB3-1       | Com A IN                         | Local Differential ARCNET (See Note 3)  |
| TB3-2       | Com B IN                         | Local Differential ARCNET (See Note 3)  |
| TB3-3       | Com A OUT                        | Local Differential ARCNET.<br>Connect to NGA TB1-3. (See Note 3)  |
| TB3-4       | Com B OUT                        | Local Differential ARCNET.<br>Connect to NGA TB1-4. (See Note 3)  |
| TB4-1       | + 24V IN                         | Do not use, if J10 is used.<br>(+24VDC IN from TB3-6 ILI-MB-E3/ILI95-MB-E3/ANX)   |
| TB4-2       | Common – IN                      | Do not use, if J10 is used.<br>(-GND IN from TB3-7 ILI-MB-E3/ILI95-MB-E3/ANX)   |
| TB4-3       | + 24 V OUT                       | Do not use, if J10 is used.   |
| TB4-4       | Common – OUT                     | Do not use, if J10 is used.   |
| J10         | ARCNET                           | Connector to ILI-MB-E3, ILI95-MB-E3 or ANX  |
| U5          | Fiber Port 2 IN                  | (See Note 4)  |
| U7          | Fiber Port 2 OUT                 | (See Note 5)  |
| U4          | Fiber Port 1 IN                  | (See Note 5)  |
| U6          | Fiber Port 1 OUT                 | (See Note 5)  |
| J1          | ARCNET Term                      | Short when using the Local Differential ARCNET wiring to Terminal TB3. This is the last device on the local net.<br>Note: If the first and last devices are SHORT, then the device between the two must be OPEN. If the ILI-E3, ILI95-E3 Series or ANX is the first device and the NGA is the last device, then the J1 would be OPEN. |
| J2          | GFI                              | GFI must be shorted to enable Ground Fault Detection on the ARCNET Network when using copper wiring.  |
| J3          | GND FLT                          | Short to enable Ground Fault Detection when remotely connected to a Listed power source that does not provide earth detection.<br>OPEN when connected to DC power supplied from an ILI-MB-E3/ILI95-MB-E3/ANX, PM-9/PM-9G or INI-7100.   |
| J4          | Transmitter Light Output Control | Comm port 1 fiber-optic transmitter drive current Jumper contributes to drive current when SHORT.<br>Contributes 12.5% of maximum drive<br>J4, J5 & J6 OPEN - minimum drive, 12.5% of maximum.<br>J4, J5 & J6 SHORT - maximum drive, 100%<br>To match drive used on INI boards: SHORT J4, J5 and J6.                                  |

**Table 3.3.2.1 Repeater-E3 Wiring Connections**

| Designation   | Description                      | Comments   |
|---|----------------------------------|--|
| J5  | Transmitter Light Output Control | Comm port 1 fiber-optic transmitter drive current<br>Jumper contributes to drive current when SHORT.<br>Contributes 25% of maximum drive<br>J4, J5 & J6 OPEN - minimum drive, 12.5% of maximum.<br>J4, J5 & J6 SHORT - maximum drive, 100%<br>To match drive used on INI boards: SHORT, J4, J5 and J6.   |
| J6  | Transmitter Light Output Control | Comm port 1 fiber-optic transmitter drive current<br>Jumper contributes to drive current when SHORT.<br>Contributes 50% of maximum drive<br>J4, J5 & J6 OPEN - minimum drive, 12.5% of maximum.<br>J4, J5 & J6 SHORT - maximum drive, 100%<br>To match drive used on INI boards: SHORT, J4, J5 and J6.   |
| J7  | Transmitter Light Output Control | Comm port 1 fiber-optic transmitter drive current<br>Jumper contributes to drive current when SHORT.<br>Contributes 12.5% of maximum drive.<br>J7, J8 & J9 OPEN - minimum drive, 12.5% of maximum.<br>J7, J8 & J9 SHORT - maximum drive, 100%<br>To match drive used on INI boards: SHORT J7, J8 and J9. |
| J8  | Transmitter Light Output Control | Comm port 2 fiber-optic transmitter drive current<br>Jumper contributes to drive current when SHORT.<br>Contributes 25% of maximum drive.<br>J7, J8 & J9 OPEN - minimum drive, 12.5% of maximum.<br>J7, J8 & J9 SHORT - maximum drive, 100%<br>To match drive used on INI boards: SHORT J7, J8 and J9.   |
| J9  | Transmitter Light Output Control | Comm port 2 fiber-optic transmitter drive current<br>Jumper contributes to drive current when SHORT.<br>Contributes 50% of maximum drive.<br>J7 J8 & J9 OPEN - minimum drive, 12.5% of maximum.<br>J7, J8 & J9 SHORT - maximum drive, 100%<br>To match drive used on INI boards: SHORT J7, J8 and J9.    |
| <b>NOTE 1:</b> TB1 - RPT-E3 UTP Network Connections using unshielded, twisted-pair 18 AWG min. 3,000' (914.4 m) maximum between the following nodes:  |                                  |  |
| – RPT-E3 TB1-1 (COM1A) to: INI-7100 TB1-3 INI-VG TB1-3 or another RPT-E3 TB1-3  |                                  |  |
| – RPT-E3 TB1-2 (COM1B) to: INI-7100 TB1-4 INI-VG TB1-4 or another RPT-E3 TB1-4  |                                  |  |
| – RPT-E3 TB1-3 (COM2A) to: INI-7100 TB1-1 INI-VG TB1-1 or another RPT-E3 TB1-1  |                                  |  |
| – RPT-E3 TB1-4 (COM2B) to: INI-7100 TB1-2 INI-VG TB1-2 or another RPT-E3 TB1-2  |                                  |  |
| <b>NOTE 2:</b> TB2 must be used when the RPT-E3 is used remotely from a main system cabinet such as in a remote network display. Connect to a local cold water earth or via an additional conductor connected to TB3-7 of the ILI-MB-E3, ILI95-MB-E3 or ANX or Terminal TB4-4 of an INI-7100. |                                  |  |
| <b>NOTE 3:</b> Use TB3 (differential ARCNET) to connect an NGA to the RPT-E3.   |                                  |  |
| <b>NOTE 4:</b> When J10 is used to connect the RPT-E3 to the ILI-MB-E3, ILI95-MB-E3 Series or the ANX, do not use TB4.  |                                  |  |
| <b>NOTE 5:</b> U4, U5, U6 and U7 are omitted on the RPT-E3-UTP.   |                                  |  |
| U5, U7, U4 & U6 - RPT-E3 FO Network Connections using standard ST connector fiber-optic cable, multi-mode, up to 200 $\mu$ (optimized for 62.5/125 $\mu$ ). Signal loss up to 8 dB maximum between the following nodes:   |                                  |  |
| – RPT-E3 U6 (TX1) to: INI-7100 J7 (RX2) INI-VG J8 (RX2) or another RPT-E3 U5 (RX2)  |                                  |  |
| – RPT-E3 U4 (RX1) to: INI-7100 J6 (TX2) INI-VG J6 (TX2) or another RPT-E3 U7 (TX2)  |                                  |  |
| – RPT-E3 U7 (TX2) to: INI-7100 J4 (RX1) INI-VG J5 (RX1) or another RPT-E3 U4 (RX1)  |                                  |  |
| – RPT-E3 U5 (RX2) to: INI-7100 J1 (TX1) INI-VG J2 (TX1) or another RPT-E3 U6 (TX1)  |                                  |  |
| Network Connections using fiber-optic cable (available on RPT-E3 FO only). The RPT-E3 FO can support both unshielded, twisted-pair and fiber-optic network connections.   |                                  |  |

Table 3.3.2.1 Repeater-E3 Wiring Connections

### 3.3.3 RPT-E3 to NGA Wiring

The RPT-E3 provides a terminal block connection for the unshielded, twisted-pair connection to the NGA.



**NOTE:** The RPT-E3 must be installed with the remote NGA. Either un-shielded twisted-pair cable (RPT-E3-FO or RPT-E3-UTP) or a pair of fiber-optic cable (RPT-E3-FO only) should be used to connect the RPT-E3 at the remote NGA to the Broadband Network.

| Designation From RPT-E3   | Designation To NGA    |
|---|-----------------------|
| RPT-E3 TB3-1 (COM 2B) to:   | NGA TB1-3 (COM1A)     |
| RPT-E3 TB3-2 (COM 2A) to:   | NGA TB1-4 (COM1B)     |
| RPT-E3 TB4-3 (+24V OUT) to:   | NGA TB1-1 (+24V IN)   |
| RPT-E3 TB4-4 (Common OUT) to:   | NGA TB1-2 (Common IN) |
| <b>NOTE:</b> NGA Revision PCB Boards Rev 1 through 4 will require a jumper across pins 13-14 on J4 for this type of connection. |                       |

**Table 3.3.3.1 RPT-E3 to NGA Wiring Connections**

When connecting the NGA to the RPT-E3, the following terminals on the NGA should also be connected:

- TB1-1 - +24 V supply
- TB1-2 - System Common

J4 should not be used when connecting the NGA to the RPT-E3.

## 3.4 Intelligent Network Interface, Voice Gateway (INI-VG Series)

There are two types of the INI-VG Series in the E3 Series<sup>®</sup> Broadband System.

- The INI-VGC-FO (fiber-optic and unshielded, twisted-pair wires) or INI-VGC-UTP (unshielded, twisted-pair wires only) are the network interface sub-assembly used only with the INCC Voice Command Center.
- The INI-VGX-FO and INI-VGX-UTP are the network interface sub-assemblies used with the distributed amplifier assembly. These sub-assemblies are installed in the INX or the INX CAB-B cabinet enclosures.

### 3.4.1 INI-VGC-FO or INI-VGC-UTP

In the INCC enclosure, the INI-VGC sub-assembly connects to the system microphone and the Fire Fighter Telephone handset. The INI-VGC supervises and controls one (1) NGA, and up to sixteen (16), ASM-16/ANU-48 sub-assemblies. Figure 3.4.2.1 shows all connections available on the INI-VGC and their functions. The INI-VGC contains the following:

- one (1) NGA
- up to sixteen (16), ASM-16 or ANU-48 sub-assemblies
- up to sixteen (16), AOM-TELEFA telephone modules
- one Class B, Style 4, signaling line circuit



### 3.4.2 INI-VGC Wiring Connections (Continued)

Table 3.4.2.1 includes the power consumption calculations for the INI-VGC-FO or INI-VGC-UTP.

| Qty  | Sub-Assembly               | Description                                      | Supv. Current             | Alarm Current             | Total Supv. Current | Total Alarm Current |
|--|----------------------------|--|---------------------------|---------------------------|---------------------|---------------------|
|  | INI-VGC-FO or INI-VGC-UTP  | Intelligent Network Voice Gateway-Command Center | 0.150 A                   | 0.150 A                   |                     |                     |
|  | ASM-16<br>(See Note 1)     | Addressable Switch Sub-assembly                  | 0.011 A †<br>(See Note 2) | 0.011 A ‡<br>(See Note 3) |                     |                     |
|  | ANU-48<br>(See Note 1)     | Remote LED driver Sub-assembly                   | 0.011 A †<br>(See Note 2) | 0.011 A ‡<br>(See Note 3) |                     |                     |
|  | NGA<br>(See Note 1)        | LCD Display Sub-assembly                         | 0.200 A*<br>(See Note 4)  | 0.200 A                   |                     |                     |
|  | Telephone<br>(See Note 1)  | Fire Fighter's Telephone Handset                 | 0.020 A                   | 0.020 A                   |                     |                     |
|  | Microphone<br>(See Note 1) | Voice Paging Microphone                          | 0.001 A                   | 0.001 A                   |                     |                     |
|  | AOM-TELF<br>(See Note 1)   | Addressable Output Module-Telephone              | 0.002 A                   | 0.065 A                   |                     |                     |
|  |                            |  |                           | <b>Total:</b>             |                     |                     |
| <b>NOTES:</b>  |                            |  |                           |                           |                     |                     |
| <p><b>NOTE 1:</b> The total supervisory and alarm currents determined above must be added to the standby battery calculations for the power supply providing the operating voltage to the INCC. Typically, this is a PM-9/PM-9G power supply.</p>  |                            |  |                           |                           |                     |                     |
| <p><b>NOTE 2:</b> † Add 0.003 A for each LED that is to be lit for alarm, trouble or supervisory conditions.</p>   |                            |  |                           |                           |                     |                     |
| <p><b>NOTE 3:</b> ‡ Add .003 A for each LED to be lit for any condition when powered internally. When powered externally, each driver circuit provides a maximum of .050 amp with a maximum of 2.4 amps per ANU-48 module (48 circuits). This must be added to the calculations for the external power supply batteries.</p> |                            |  |                           |                           |                     |                     |
| <p><b>NOTE 4:</b> * During a power failure, the supervisory current is 0.045 A, and the alarm current is 0.200 A. (Back lighting is extinguished during a power failure and operates only in alarm).</p>   |                            |  |                           |                           |                     |                     |

**Table 3.4.2.1 INI-VGC-FO or INI-VGC-UTP Power Consumption Calculation Chart**

### 3.4.3 INI-VGX-FO or INI-VGX-UTP

In the INI-VGX, this sub-assembly supervises the internal PM-9/PM-9G power supply, supervises and controls up to four (4), AM-50 Series, 50-watt amplifiers and stores up to sixteen (16), programmable messages and tones.

The INI-VGX has one (1), Signaling Line Circuit (SLC) wired Style 4 (Class "B") only. This SLC supports the following:

- Up to sixteen (16), AOM-TELF Fire Fighter Intercom circuits
- Up to thirty-two (32), AOM-2SF (single-channel speaker circuits)
- MMO-6SF six-circuit single-channel speaker circuit modules are also supported, but each MMO-6SF takes up to six (6) addresses on the SLC

The following optional modules may be used with the INI-VGX:

- One (1), NGA
- Up to six (6), ASM-16/ANU-48 modules

### 3.4.4 INI-VGX Wiring Connections

Figure 3.4.4.1 illustrates the wiring connections for the INI-VGX sub-assembly.

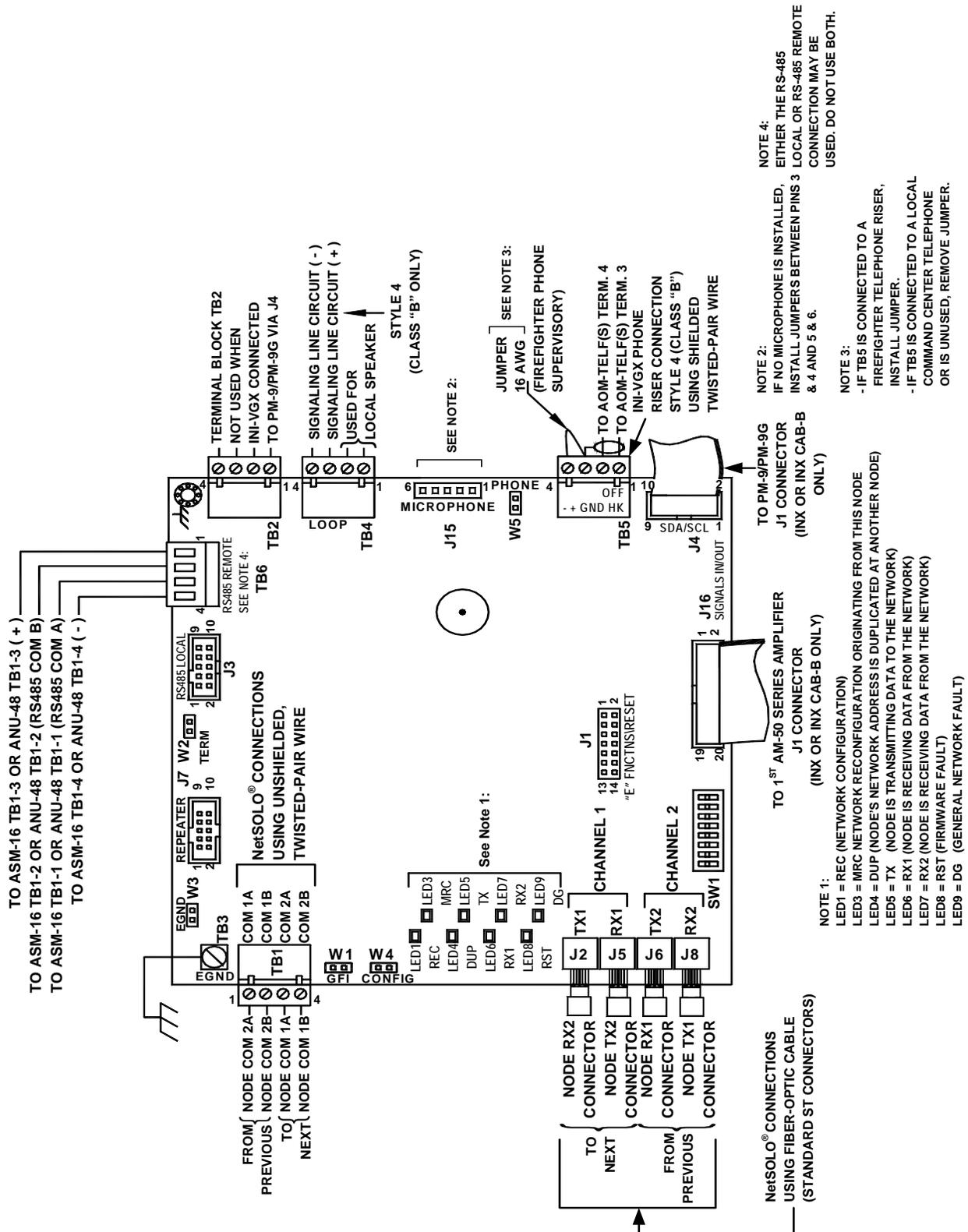


Figure 3.4.4.1 INI-VGX Wiring Diagram

### 3.4.5 INI-VG Series Wiring Connections

Table 3.4.5.1, Table 3.4.5.2 and Table 3.4.5.3 list the field wiring connections for the INI-VG Series.

| Designation  | Comments   |
|--|--|
| <b>Terminal Block 1- Network connection- using 16-18 AWG unshielded, twisted-pair</b>  |  |
| TB1-1  | COM 1A connection  |
| TB1-2  | COM 1B connection  |
| TB1-3  | COM 2A connection  |
| TB1-4  | COM 2B connection  |
| <b>Terminal Block 2- External Power Connection INI-VGC only</b>  |  |
| TB2-1  | 24 VDC ( + ) power input from external power supply or PM-9/PM-9G TB-4-1, TB4-3, TB4-5   |
| TB2-2  | GND ( - ) power input from external power supply or PM-9/PM-9G TB4-2, TB4-2, TB4-6   |
| TB2-3  | ( + ) Power Out terminal-wiring terminal only, not a source of power   |
| TB2-4  | ( - ) Power Out terminal-wiring terminal only, not a source of power   |
| TB3-1  | Earth Ground   |
| <b>Terminal Block 4- Signaling Line Circuit Connections (See Notes 1, 2 and 3)</b>   |  |
| TB4-1  | Local Speaker (INCC, INX or INX CAB-B only) or Connect to ACT-1 ( - ) Terminal (INI-VGE only)  |
| TB4-2  | Local Speaker (INCC, INX or INX CAB-B only) or Connect to ACT-2 ( + ) Terminal (INI-VGE only)  |
| TB4-3  | Signaling Line Circuit ( + ), Style 4, Class "B"   |
| TB4-4  | Signaling Line Circuit ( - ), Style 4, Class "B"   |
| <b>Terminal Block 5- Fire Fighter Handset or Fire Fighter Phone riser connection (INI-VG)</b>  |  |
| TB5-1  | Fire Fighter Phone ( - ): Plugs into local Fire Fighter Handset INI-VGC<br>Phone riser field wiring connection to AOM-TELF Term 3- INI-VGX and INI-VGE   |
| TB5-2  | Fire Fighter Phone ( + ): Plugs into local Fire Fighter Handset- INI-VGC.<br>Phone riser field wiring connection to AOM-TELF Term 4- INI-VGX and INI-VGE |
| TB5-3  | Telephone Plug Supervisory Loop (Connects to TB5-4). Connect only if the INI-VG Series Firmware is V2.0-006 or later.                                    |
| TB5-4  | Telephone Plug Supervisory Loop (Connects to TB5-3). Connect only if the INI-VG Series Firmware is V2.0-006 or later.                                    |
| <b>Terminal Block 6- RS-485 Remote Connection to ASM-16/ANU-48 in Separate Cabinet</b>   |  |
| TB6-1  | + 24 VDC Supply - connects to remote ASM-16/ANU-48 TB1-3   |
| TB6-2  | RS-485 COM B - connects to remote ASM-16/ANU-48 TB1-2  |
| TB6-3  | RS-485 COM A - connects to remote ASM-16/ANU-48 TB1-1  |
| TB6-4  | System Common ( - ) connects to remote ASM-16/ANU-48 TB1-4   |
| <b>NOTE 1:</b> The INI-VGC Signaling Line Circuit supports the AOM-TEL and the AOM-TELF Telephone Modules.   |  |
| <b>NOTE 2:</b> The INI-VGX Signaling Line Circuit supports the AOM-TEL, the AOM-TELF Telephone Modules and the AOM-2S, AOM-2SF, MMO-6S, MMO-6SF Speaker Circuit Control Modules. |  |
| <b>NOTE 3:</b> The INI-VGE Signaling Line Circuit supports the AOM-TEL, AOM-2SF, MMO-6SF Control Modules.  |  |

**Table 3.4.5.1 INI-VG Series Field Wiring Connections**

### 3.4.5. INI-VG Series Wiring Connections (Continued)

Table 3.4.5.2 lists the INI-VG Series jumpers and cable connections. Table 3.4.5.3 lists the INI-VG Indicating and Diagnostic LEDs.

| Designation | Description                  | Comments  |
|-------------|------------------------------|---|
| J1          | "E" FNCTNS/RESET             | Factory use   |
| J2          | Fiber-Optic ST Channel 1 TX1 | Connects to next node RX2 ST connector.   |
| J3          | RS-485 Local                 | Connects to 1st Local ASM-16/ANU-48 Connector J2.   |
| J4          | SDA/SCL                      | Connects to PM-9/PM-9G Connector J1 in the INX or the INX CAB-B   |
| J5          | Fiber-Optic ST Channel 1 RX1 | Connects to the next node TX2 ST connector.   |
| J6          | Fiber-Optic ST Channel 2 TX2 | Connects from the previous node RX1 connector   |
| J7          | Repeater                     | Network Backplane. Connect to J4 on NGA sub-assembly (optional) or J4 on ILI-E3 Series or ANX (optional).<br>For optimum ILI95-E3/ILI-E3 Series or ANX network communication, run this cable underneath the PM-9/PM-9G. |
| J8          | Fiber-Optic ST Channel 2 RX2 | Connects from previous node TX1 connector.  |
| J15         | Microphone                   | Connectors to microphone cable.<br>If no microphone is installed, jumpers must be installed between pins 3 and 4, and 5 and 6.  |
| J16         | Signals In/Out               | Connects to 1st AM-50 Series Amplifier Connector J1 in the INX or the INX CAB-B only.   |
| W1          | GFI                          | IN for ground fault indication<br>Install the jumper to supervise for ground faults on network wiring between this INI-VG Series and any other nodes that are directly connected to this INI-VG Series.                 |
| W2          | Termination                  | Install if the last ASM-16 or ANU-48 is connected to the RS-485 bus has JMP1 installed. Otherwise, do not install.  |
| W3          | EGND                         | IN to enable earth ground reference circuit<br>Jumper should only be installed if the INI-VG Series is being powered by a power supply that does NOT supervise for ground faults.                                       |
| W4          |                              | Factory use. Do not install.  |
| W5          |                              | Phone Filter Bypass.<br>If TB5 is connected to a fire fighter telephone riser, install the jumper.<br>If TB5 is connected to a local command center telephone or is unused, remove the jumper.                          |

**Table 3.4.5.2 INI-VG Series Jumpers and Cable Connections**

| Designation | Description | Comments  |
|-------------|-------------|---|
| LED 1       | REC         | Network is reconfiguring                                |
| LED 3       | MRC         | This node is initiating a network reconfiguration       |
| LED 4       | DUP         | Duplicate node address or address switch error          |
| LED 5       | TX          | The sub-assembly is transmitting network data           |
| LED 6       | RX1         | The sub-assembly is receiving network data on Channel 1 |
| LED 7       | RX2         | The sub-assembly is receiving network data on Channel 2 |
| LED 8       | RST         | Firmware fault  |
| LED 9       | DG          | Trouble condition                                       |

**Table 3.4.5.3 INI-VG Series Indicating & Diagnostic LEDs**

### 3.4.6 INI-VG Series Power Connections

The INI-VGC serving as the network interface and the control unit of an INCC Command Center connects to its operating power via Terminal Block TB1.

The INI-VGX serves as a network interface and control sub-assembly for the distributed amplifier assembly and is installed in the INX or the INX CAB-B cabinet enclosures. It connects to its own dedicated PM-9/PM-9G power supply via the supplied ribbon cable connecting between J4 of the INI-VGX-FO or INI-VGX-UTP and J1 of the PM-9/PM-9G.

Table 3.4.6.1 lists the INI-VG Series Power Connections.

| Designation  | Comments  |
|--|---|
| <b>INI-VGC-FO or INI-VGC-UTP, or (INI-VGX-FO or INI-VGX-UTP if J4 is not used)</b> |   |
| TB2-1  | +24 VDC IN - from power supply or TB4-5 of PM-9/PM-9G   |
| TB2-2  | GND ( - ) IN – from power supply or TB4-2 of PM-9/PM-9G |
| TB2-3  | +24 VDC OUT   |
| TB2-4  | GND ( - ) OUT   |
| <b>INI-VGX-FO or INI-VGX-UTP</b>   |   |
| J4   | SDA/SCL – to PM-9/PM-9G power supply J1                 |

**Table 3.4.6.1 INI-VG Series Power Connections**

### 3.4.7 E3 Series® Broadband Network Connections

The INI-VG Series can be connected to the E3 Series® Broadband System using an unshielded, twisted-pair of wires, fiber-optic cable, or a combination of the two. Figure 3.4.7.1 illustrates the INI-VG Series connections to the E3 Series Broadband System.

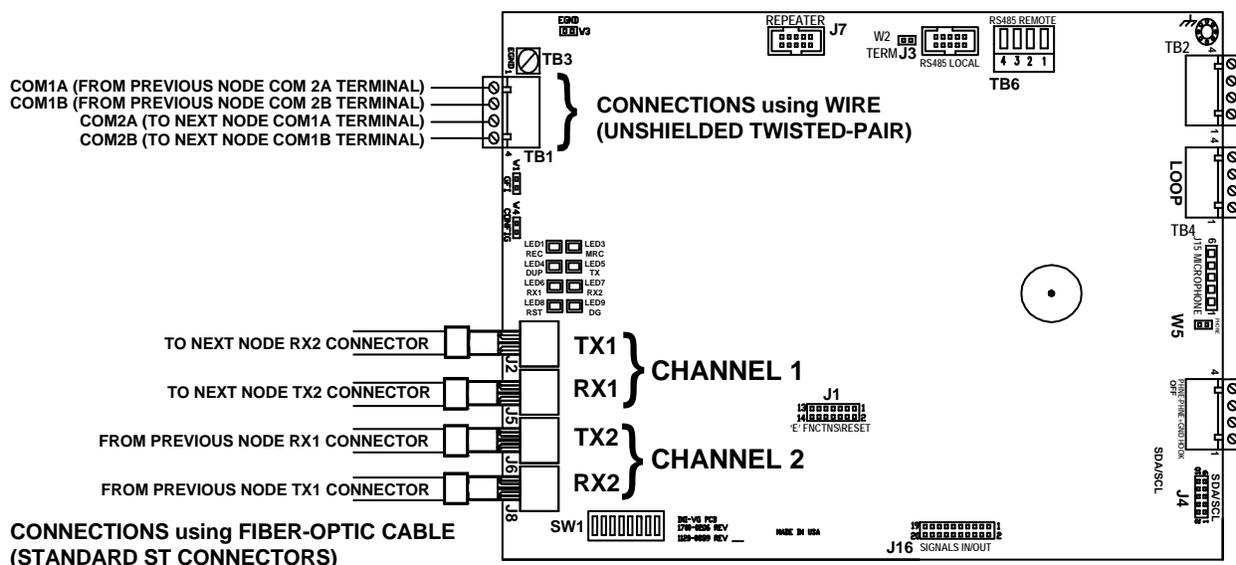


Figure 3.4.7.1 INI-VG Series Connections to the E3 Series Broadband System

| Designation  | Description | Comments                            |
|--|-------------|-------------------------------------|
| TB1-1  | COM 1A      | To next node's TB1-3 (COM 2A)       |
| TB1-2  | COM 1B      | To next node's TB1-4 (COM 2B)       |
| TB1-3  | COM 2A      | From previous node's TB1-1 (COM 1A) |
| TB1-4  | COM 2B      | From previous node's TB1-2 (COM 1B) |
| Use 16-18 AWG unshielded, twisted-pair up to 3,000 feet (915 m) between nodes. |             |                                     |

Table 3.4.7.1 Network Wire Terminations

| Designation from Channels 1/2   | Designation to ST Connectors               |
|---|--|
| ST Connector J2 Channel 1 TX1   | To next node's ST Connector J8 (RX2)       |
| ST Connector J5 Channel 1 RX1   | To next node's ST Connector J6 (TX2)       |
| ST Connector J6 Channel 2 TX2   | From previous node's ST Connector J5 (RX1) |
| ST Connector J8 Channel 2 RX2   | From previous node's ST Connector J2 (TX1) |
| Fiber-optic cable: up to 200 microns (optimized for 62.5/ 125 microns)<br>Up to 8 dB loss max. between nodes. |  |

Table 3.4.7.2 Network Fiber-Optic Cable Connections



**NOTE:** The use of fiber-optic cable is not permitted in New York City.

### 3.4.7 E3 Series<sup>®</sup> Broadband Network Connections (Continued)

Figure 3.4.7.2 illustrates the multiple network connections for the E3 Series Broadband panel.

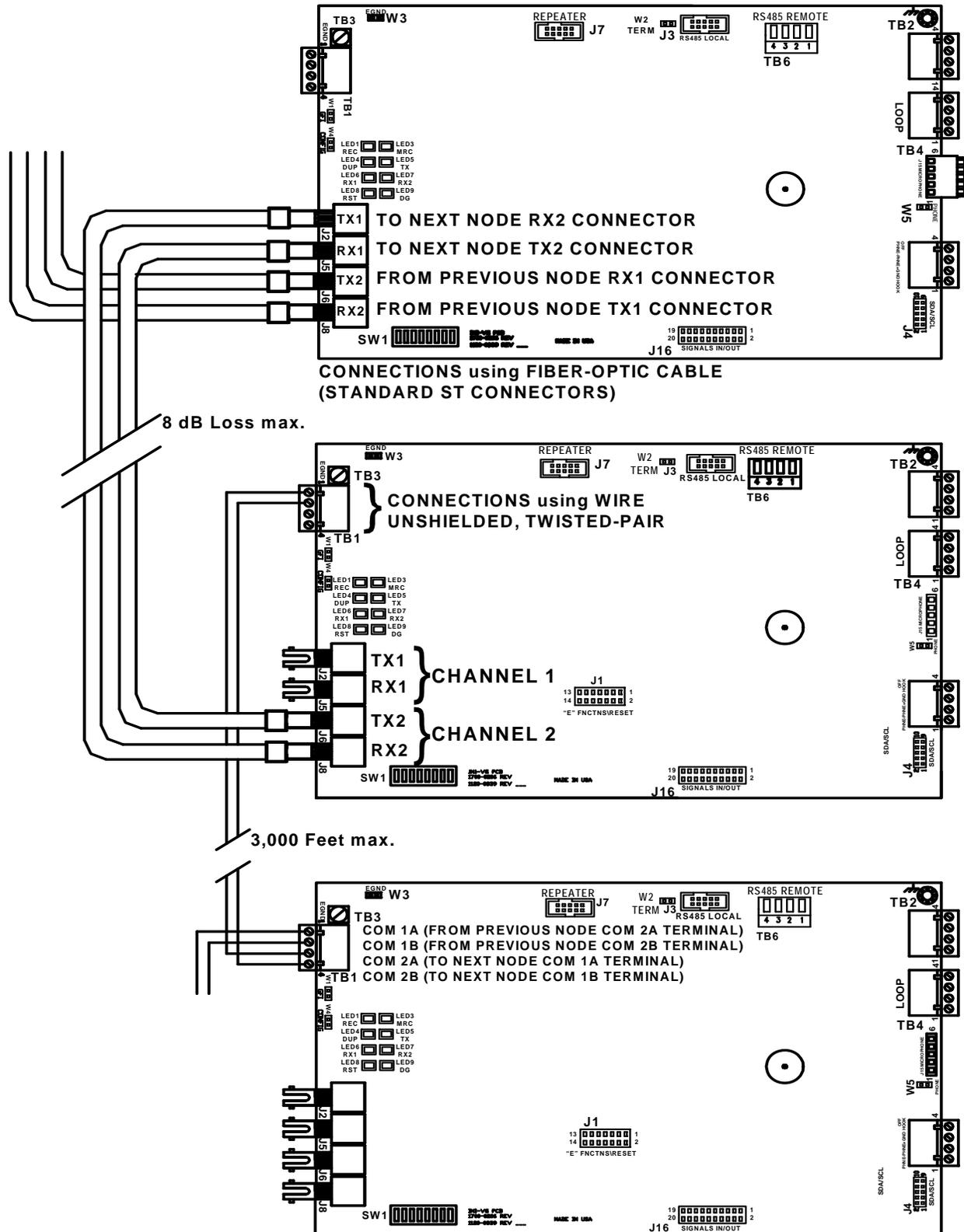


Figure 3.4.7.2 Multiple Network Connections

### 3.4.8 INI-VGX Signaling Line Circuit (INX only)

The INI-VGX sub-assembly is installed in the INX or the INX CAB-B, and provides one (1), Style 4 (Class B) Signaling Line Circuit (SLC). Up to sixteen (16), AOM-TELF Fire Fighter Intercom circuits and thirty-two (32), AOM-2SF Single-Channel speaker circuits can be connected to this SLC.

Figure 3.4.8.1 illustrates the INI-VGX Signaling Line Circuit connections.

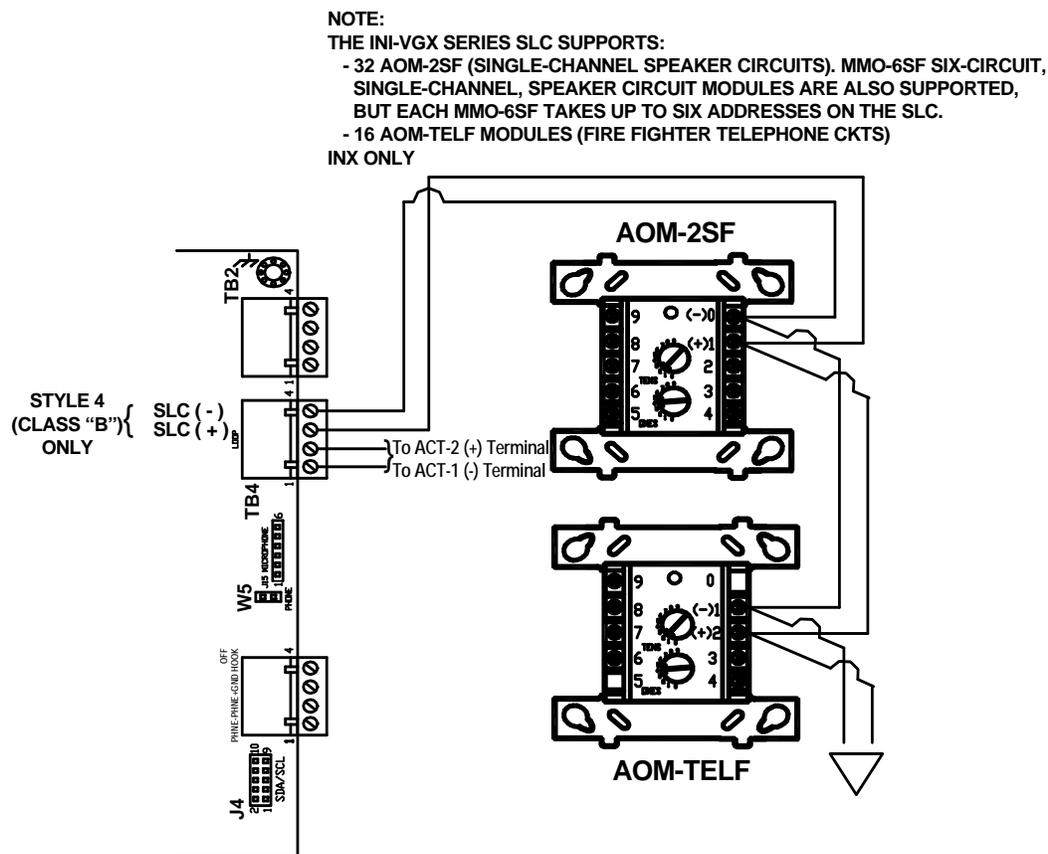


Figure 3.4.8.1 INI-VGX Signaling Line Circuit Connections

#### 3.4.8.1.INI-VGX Signaling Line Circuit Specifications:

- 24 VDC nominal, power-limited and supervised
- 40 ohms max. wire resistance
- 0.5  $\mu$ F max. circuit capacitance
- 0.070 amp max. current

Use twisted unshielded wire, 18 AWG min.

### 3.4.9 INI-VGX Fire Fighter Intercom Riser Connections

The INI-VGX sub-assembly is installed in an INX or an INX CAB-B Transponder cabinet enclosure. It provides a phone riser circuit on Terminal Block TB5 Terminals 3 and 4 that connects to the AOM-TELF Fire Fighter Phone circuit Terminals 3 and 4. Up to sixteen (16), AOM-TELFs can be connected to each INI-VGX phone riser. The INI-VGX uses Terminal Block TB5 Terminals 1 and 2 to connect to the main Fire Fighter handset located in the INCC cabinet.

The INI-VGX uses Terminal Block TB5 Terminals 1 and 2 to connect to the main Fire Fighter handset located in the INCC cabinet.

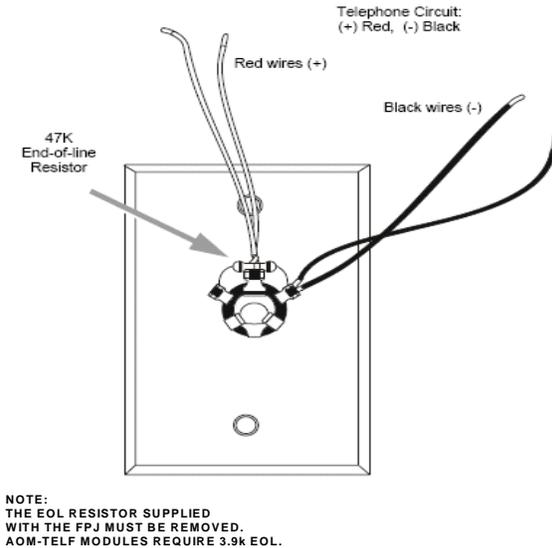


Figure 3.4.9.1. FPJ Series Firefighter's Phone Jack Wiring Connections

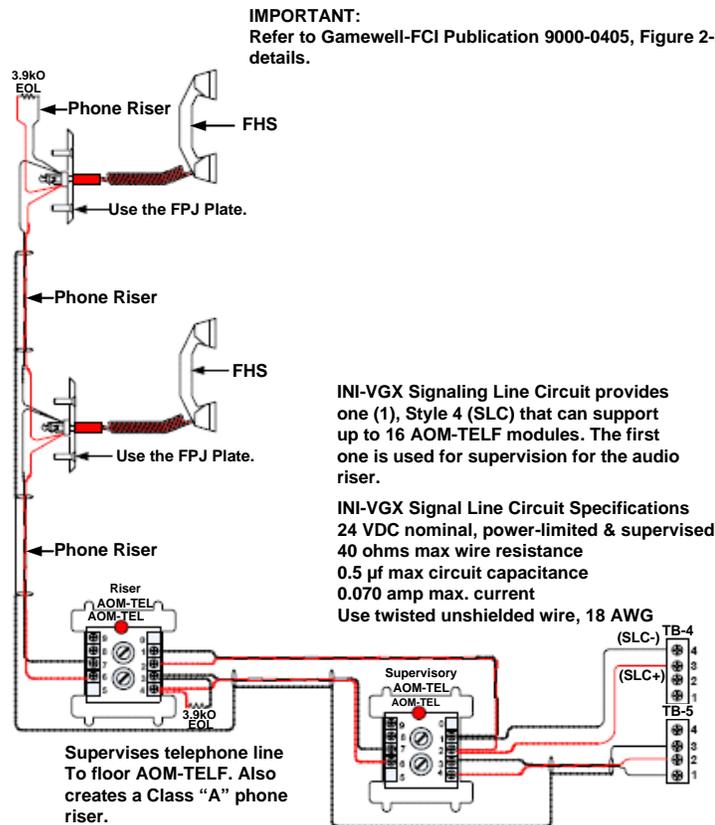


Figure 3.4.9.2 INI-VGX Intercom Riser Connections

### 3.4.10 INI-VGC Connections to Remote ASM-16 or ANU-48 Sub-Assemblies

An INI-VGC installed in an INCC Command Center assembly can support up to a total of sixteen (16), ANU-48 or ASM-16 sub-assemblies. The INCC cabinet has space for up to six (6), ASM-16/ANU-48 sub-assemblies (three (3) spaces are available, if a microphone and a fire fighter handset are included). The INI-VGC-FO or INI-VGC-UTP TB6 provide a hardwire connection between the INI-VG Series and any ASM-16/ ANU-48 mounted in a different cabinet.

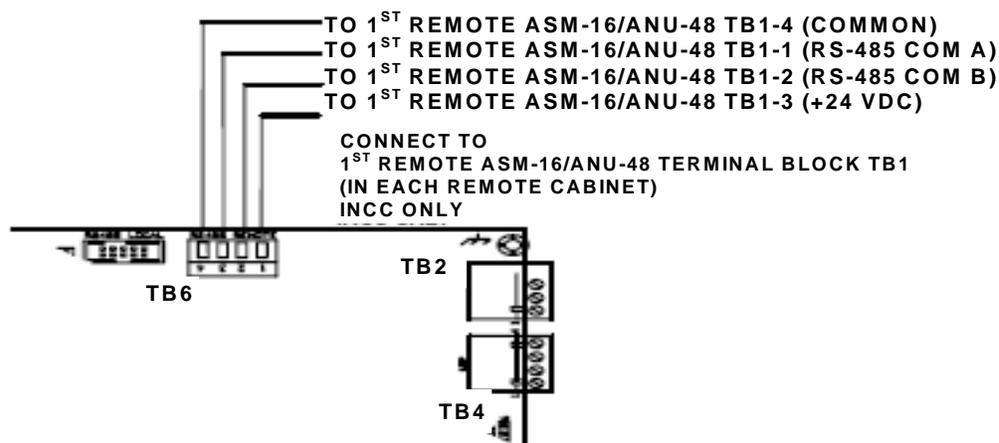


**NOTE:** For wiring details, see the ASM-16 or ANU-48 Wiring Connections (Table 2.6.4.1 and Figure 2.6.4.1).

The ASM-16/ANU-48s mounted in the same cabinet as the INI-VGC Series can be connected directly by a ribbon cable (See Section 2.6.3).

| Designation from INI-VGC            | Designation to Remote ASM-C Series or ANU-48 |
|-------------------------------------|--|
| INI-VGC Series TB6-1 (+ 24 VDC)     | 1st Remote ASM-16/ANU-48 TB1-3               |
| INI-VGC Series TB6-2 (RS-485 COM B) | 1st Remote ASM-16/ANU-48 TB1-2               |
| INI-VGC Series TB6-3 (RS-485 COM A) | 1st Remote ASM-16/ANU-48 TB1-1               |
| INI-VGC Series TB6-4 (Common)       | 1st Remote ASM-16/ANU-48 TB1-4               |

Table 3.4.10.1 INI-VGC-FO or INI-VGC-UTP to Remote ASM-16/ANU-48s



**NOTE:**  
 EITHER THE RS-485 LOCAL OR  
 RS-485 REMOTE CONNECTION  
 MAY BE USED. DO NOT USE BOTH.

Figure 3.4.10.1 INI-VGC Connections to Remote ASM-16 or ANU-48 Panels

### 3.4.11 INI-VG Series Earth Ground Connection

Connect the INI-VG Series TB3 to earth ground for full protection against transient voltages, power surges and to conform to the National Electrical Code, NFPA 70, Article 760. Use a cold water pipe or a ground-driven rod to ensure proper bonding. Panel neutral or conduit ground is not acceptable. Use 14 AWG min. wire.

### 3.4.12 INI-VG Series Program Address Switch Settings

Use the INI-VG Series DIP Switch SW-1 to set the address that the sub-assembly will occupy on the network. Do not duplicate addresses with other sub-assemblies on the network. Figure 3.4.12.1 illustrates the INI-VG Series programming address switch settings.

For the fastest communication between nodes, set the addresses in consecutive order.

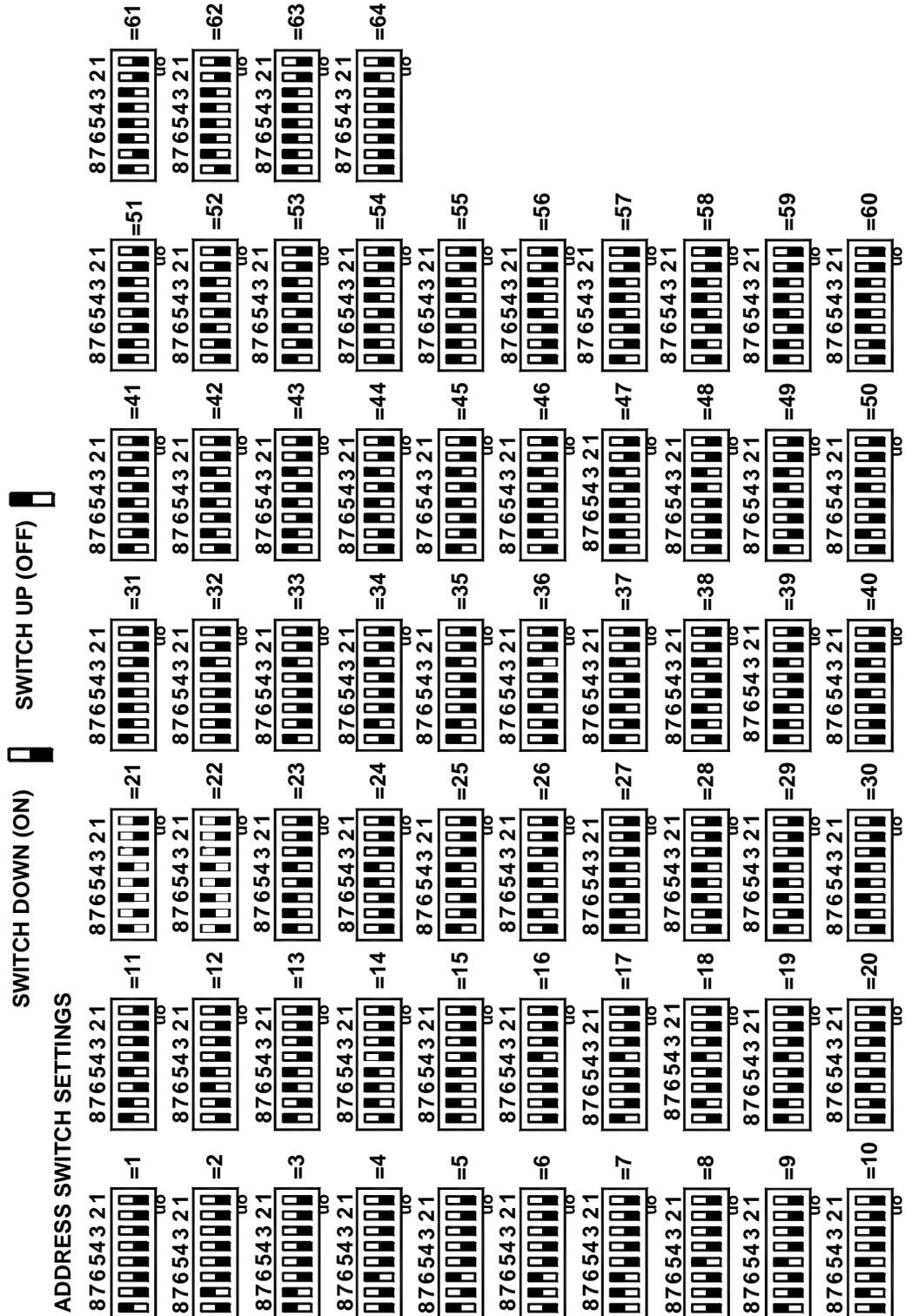


Figure 3.4.12.1 INI-VG Series Address Switch Settings

### 3.5 PM-9 Power Supply Wiring Connections

The PM-9 Power Supply sub-assembly is used to provide the operating voltage to an INX or an INX CAB-B Transponder cabinet enclosure assembly. The INX and the INX CAB-B enclosure assembly is comprised of an INI-VGX-FO or INI-VGX-UTP and up to four (4), AM-50 Series amplifier sub-assemblies. In addition, the PM-9 is capable of maintaining and supervising batteries up to 55 A/H. The INX or the INX CAB-B cabinet will accommodate batteries up to 12 A/H. (Batteries not furnished) Figure 3.5.1.1 illustrates the PM-9 sub-assembly.

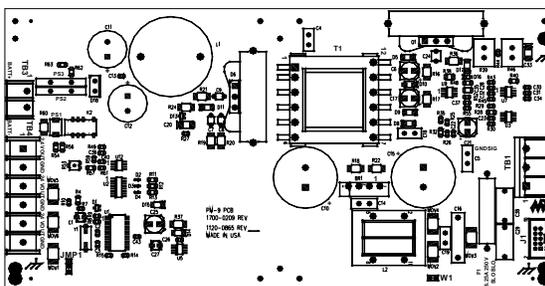


Figure 3.5.1.1 PM-9 Sub-Assembly

| Designation  | Description | Comments  |
|--|-------------|---|
| TB1-1  | HOT/BLK     | Connect to hot, 120VAC, 60Hz - Non Power-limited  |
| TB1-2  | GND/GRN     | Connect to ground and isolated earth ground - Non Power-limited   |
| TB1-3  | NEUT/WHT    | Connect to neutral 120VAC, 60Hz   |
| TB3-1  | BATT+       | Battery positive input - Non Power-limited  |
| TB3-2  | BATT -      | Battery negative input - Non Power-limited  |
| TB4-1  | 24VOUT      | +24 VDC FWR Output to AM-50 Series amplifiers or ILI95-E3/ILI-E3 Series or ANX, TB1-2 used to power two (2), AM-50 Series amplifiers or the ILI95-E3/ILI-E3 Series or ANX           |
| TB4-2  | GND         | GND (-) Output to AM-50 Series amplifiers or ILI95-E3/ILI-E3 Series or ANX, TB1-1 used to power two (2), AM-50 Series amplifiers or the ILI95-E3/ILI-E3 Series or ANX               |
| TB4-3  | 24VOUT      | +24 VDC FWR Output to AM-50 Series amplifiers or ILI95-E3/ILI-E3 Series or ANX, TB1-2 used to power 2nd pair of AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series or ANX, and INI-VGC |
| TB4-4  | GND         | GND (-) Output to AM-50 Series amplifiers or ILI95-E3/ILI-E3 Series or ANX: TB1-1: to 2nd pair of AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series or ANX, and INI-VGC               |
| TB4-5  | 24VOUT      | +24 VDC FWR Output to other sub-assemblies: INI-VGC, ILI95-E3/ILI-E3 Series or ANX  |
| TB4-6  | GND         | GND (-) Output to INI-VGC, ILI95-E3/ILI-E3 Series or ANX  |
| JMP1   |             | IN for GND Fault Detection (See Note 1)   |
| J1   |             | 10-PIN Ribbon Cable Connect to the ILI95-MB-E3, ILI-MB-E3 or ANX Connector J1, or INI-VGC Connector J4 (See Note 2)   |
| JMP2   |             | Factory Use Only  |
| LED 2  | Green       | Lights to indicate AC power   |
| LED 3  | Yellow      | Lights to indicate no or low battery fault  |
| LED 4  | Yellow      | Lights to indicate ground fault   |
| <b>NOTE:</b> AC "Brown Out" condition indicated by:  |             |   |
| LED 2 (grn) OFF  |             |   |
| LED 3 (yel) LIT  |             |   |
| LED 4 (yel) LIT  |             |   |
| <b>NOTE 1:</b> Must be IN (Enabled) when J1 is connected to an INI-VG Series node. Must be OUT (Disabled) when J1 is connected to an ILI-MB-E3 or an ILI95-MB-E3 node. |             |   |
| <b>NOTE 2:</b> Connect J1 to the INI-VG Series J4 when the PM-9 is supplying power to both the INI-VG Series and ILI-MB-E3 or the ILI95-MB-E3 node types (See Note 1). |             |   |

Table 3.5.1.1 PM-9 Terminals, Jumpers, & LEDs

Table 3.5.1.2 lists the details for the Ground Fault supervision and settings.

| Designation   | Description                          | Comments                         |
|---|--------------------------------------|----------------------------------|
| Ground Fault Supervision  | Jumper Settings                      | CAMWorks™ Settings               |
| ILI-MB-E3/ILI95-MB-E3/ANX   | W9 shorted on ILI, JMP1 Open on PM-9 | ILI Supervision of PM-9 enabled. |
| INI-VGX   | JMP1 shorted on PM-9, W9 Open on ILI | VGX Supervision of PM-9 enabled  |
| Only one node connected to a PM-9 (by Ribbon Cable) must have "Supervision of the PM-9" Enabled in CAMWorks. All additional Nodes powered from a common PM-9 are to have their Ground Fault jumpers open or disabled and the supervision of the PM-9 disabled in CAMWorks™. |                                      |                                  |

Table 3.5.1.2 Ground Fault Supervision

### 3.6 PM-9G Power Supply Wiring Connections

The PM-9G Power Supply sub-assembly is used to provide the operating voltage to an INX or an INX CAB-B Transponder cabinet enclosure assembly. The INX and the INX CAB-B enclosure assembly are comprised of an INI-VGX-FO or INI-VGX-UTP and up to four (4), AM-50 Series amplifier sub-assemblies. In addition, the PM-9G is capable of maintaining and supervising batteries up to 55 A/H. The INX and the INX CAB-B cabinets will accommodate batteries up to 12 A/H. (Batteries not furnished) Table 3.6.1.1 illustrates the PM-9G sub-assembly.

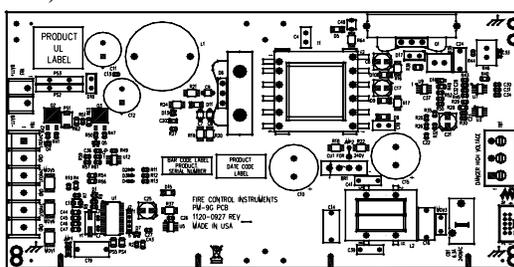


Figure 3.6.1.1 PM-9G Sub-Assembly

| Designation   | Description | Comments   |
|---|-------------|--|
| TB1-1   | HOT/BLK     | Connect to hot, 240 VAC, 50Hz/60Hz - Non Power-limited   |
| TB1-2   | GND/GRN     | Connect to ground and isolated earth ground - Non Power-limited  |
| TB1-3   | NEU/WHT     | Connect to neutral 240 VAC, 50Hz/60Hz  |
| TB3-1   | BATT+       | Battery positive input - Non Power-limited   |
| TB3-2   | BATT -      | Battery negative input - Non Power-limited   |
| TB4-1   | 24VOUT      | +24 VDC FWR Output to AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series or ANX, TB1-2 used to power two (2) AM-50 Series amplifiers, the ILI95-E3/ILI-E3 Series or ANX               |
| TB4-2   | GND         | GND (-) Output to AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series or ANX, TB1-1 used to power two (2), AM-50 Series amplifiers, the ILI95-E3/ILI-E3 Series or ANX                  |
| TB4-3   | 24VOUT      | +24 VDC FWR Output to AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series or ANX, TB1-2 used to power 2nd pair of AM-50 Series amplifiers, ILI-95-E3/ILI-E3 Series, or ANX and INI-VGC |
| TB4-4   | GND         | GND (-) Output to AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series or ANX: TB1-1 to second pair of AM-50 Series amplifiers, ILI95-E3/ILI-E3 Series, ANX, and INI-VGC                |
| TB4-5   | 24VOUT      | +24 VDC FWR Output to other sub-assemblies: INI-VGC, ILI95-E3/ILI-E3 Series or ANX   |
| TB4-6   | GND         | GND (-) Output to INI-VGC or ILI95-E3/ILI-E3 Series or ANX   |
| JMP1  |             | IN for GND Fault Detection (See Note 1)  |
| J1  |             | 10-PIN Ribbon Cable Connect to the ILI95-MB-E3, ILI-MB-E3 or ANX Connector J1, or INI-VGC Connector J4 (See Note 2)  |
| JMP2  |             | Factory Use Only   |
| LED 2   | Green       | Lights to indicate AC power  |
| LED 3   | Yellow      | Lights to indicate no or low battery fault   |
| LED 4   | Yellow      | Lights to indicate ground fault  |
| <b>NOTE:</b> AC "Brown Out" condition indicated by:   |             |  |
| LED 2 (grn) OFF   |             |  |
| LED 3 (yel) LIT   |             |  |
| LED 4 (yel) LIT   |             |  |
| <b>NOTE 1:</b> Must be IN (Enabled) when J1 is connected to an INI-VG Series node. Must be OUT (Disabled) when J1 is connected to an ILI-MB-E3 or an ILI95-MB-E3 node.  |             |  |
| <b>NOTE 2:</b> Connect J1 to the INI-VG Series J4 when the PM-9 is supplying power to both the INI-VG Series and the ILI-MB-E3 or ILI95-MB-E3 node types. (See Note 1). |             |  |

Table 3.6.1.1 PM-9G Terminals, Jumpers and LEDs

Table 3.6.1.2 lists the details for the Ground Fault supervision and settings.

| Designation   | Description                           | Comments                          |
|---|---------------------------------------|-----------------------------------|
| Ground Fault Supervision  | Jumper Settings                       | CAMWorks™ Settings                |
| ILI-MB-E3/ILI95-MB-E3/ANX   | W9 shorted on ILI, JMP1 Open on PM-9G | ILI Supervision of PM-9G enabled. |
| INI-VGX   | JMP1 shorted on PM-9G, W9 Open on ILI | VGX Supervision of PM-9G enabled  |
| Only one node connected to a PM-9G (by Ribbon Cable) must have "Supervision of the PM-9G" Enabled in CAMWorks. All additional Nodes powered from a common PM-9G are to have their Ground Fault jumpers open or disabled and the supervision of the PM-9G disabled in CAMWorks™. |                                       |                                   |

Table 3.6.1.2 Ground Fault Supervision

## 3.7 PM-9/PM-9G AC Connections

The following power source connections must be made in compliance with the National Electrical Code, NFPA 70, Article 760, the applicable NFPA Standards, and according to the requirements of the Authority Having Jurisdiction (AHJ).

- PM-9 connection of 120 VAC, 60 Hz
- PM-9G connection of 240 VAC, 50/60 Hz

Such requirements include:

- Connections must be made to a dedicated branch circuit.
- Connections must be mechanically protected.
- All means of disconnecting the circuit must be clearly marked: "FIRE ALARM CIRCUIT CONTROL"
- Connections must be accessible only to authorized personnel.

### PM-9

The PM-9 can draw up to 4.6 amps max. @ 120 VAC 60 Hz when under full load. See Figure 3.7.1.1 for the AC wiring and ground connections. See Table 3.5.1.1 for AC input and battery connections. See Table 3.5.1.2 for ground fault options and programming.

### PM-9G

The PM-9G can draw up to 2.4 amps max. @ 240 VAC 50/60 Hz when under full load. Figure 3.7.1.2 illustrates the PM-9G AC power connection. See Table 3.6.1.1 for AC input and battery connections. See Table 3.6.1.2 for ground fault options and programming.



**NOTE:** Always apply AC power first, then connect the batteries.

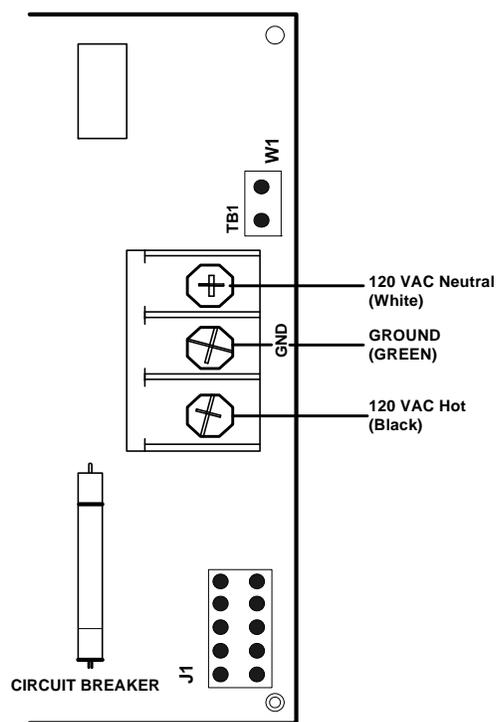


Figure 3.7.1.1 PM-9 AC Power Connection

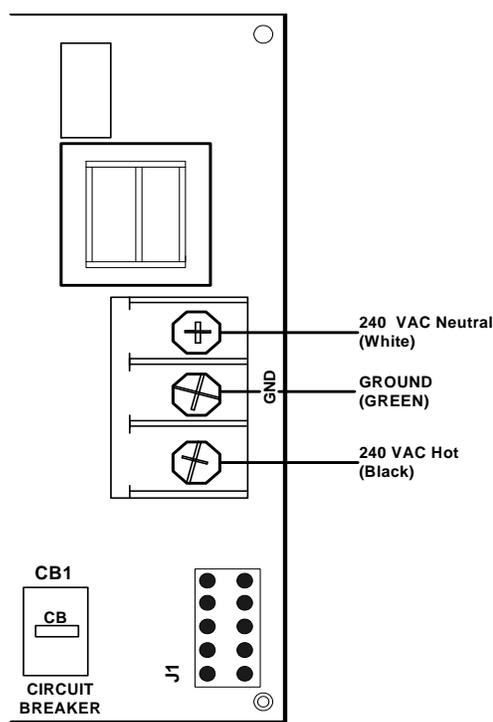


Figure 3.7.1.2 PM-9G AC Power Connection

### 3.7.1 PM-9/PM-9G Battery Connections

Connect a pair of 12 VDC batteries in series to PM-9/PM-9G TB3.

- TB3-1 (top) is Battery Positive (For PM-9, see Table 3.5.1.1 and for PM-9G, see Table 3.6.1.1)
- TB3-2 (bottom) is Battery Negative (For PM-9, see Table 3.5.1.1 and for PM-9G, see Table 3.6.1.1)

Be sure to observe polarity. Check connections before applying battery power.

Apply the AC power first, then the battery power. When you remove the power, remove the batteries first, then the AC power.

The PM-9/PM-9G has a battery charging circuit that is capable of maintaining batteries up to 55 A/H (with an external battery cabinet). The INX cabinet will accommodate batteries up to 12 A/H. Table 3.7.1.1 lists the PM-9/PM-9G calculations in the Standby Battery Calculation Chart.

| Qty  | Sub-Assembly   | Description   | Supv. Current                        | Alarm Current                           | Total Supv. Current | Total Alarm Current |
|--|--|---|--------------------------------------|---|---------------------|---------------------|
|  | PM-9<br>(See Notes 5 & 6)  | Power Supply  | 0.050 A                              | 0.050 A                                 |                     |                     |
|  | PM-9G<br>(See Notes 5 & 6)   | INX Power Supply Sub-assembly, 9 amp                  | 0.027                                | 0.050                                   |                     |                     |
|  | INI-VGX  | Intelligent Network, Voice Gateway                    | 0.150                                | 0.150                                   |                     |                     |
|  | AM-50-25V <sub>RMS</sub>   | Amplifier Sub-assembly, 50 Watt, 25V <sub>RMS</sub>   | 0.086<br>normal standby              | 2.206<br>alarm @ 50 W<br>max. output    |                     |                     |
|  | AM-50-70V <sub>RMS</sub>   | Amplifier Sub-assembly, 50 Watt, 70.7V <sub>RMS</sub> | 0.049 amp<br>normal standby          | 2.30 amp<br>alarm @ 50 W<br>max. output |                     |                     |
|  | ASM-16   | Addressable Switch Sub-assembly                       | 0.011<br>(See Note 1)                | 0.011<br>(See Note 1)                   |                     |                     |
|  | ANU-48   | Remote LED driver Sub-assembly                        | 0.011<br>(See Note 2)                | 0.011<br>(See Note 2)                   |                     |                     |
|  |  | <b>Addressable Modules:</b>                           |                                      |   |                     |                     |
|  | AOM-TELF   | Addressable Output Module-Telephone                   | 0.0024                               | 0.0065                                  |                     |                     |
|  | AOM-2SF  | Addressable Output-Supervised Control Module          | 0.00035 Clip<br>0.000375<br>Velociti | 0.0065                                  |                     |                     |
|  | MMO-6SF  | Addressable Output Module                             | 0.0022                               | 0.035                                   |                     |                     |
|  |  | <b>TOTALS:</b>  |                                      |   |                     |                     |
| A  | Total supervisory current (See Note 4)                                       |   |                                      |   |                     |                     |
| B  | Enter number of standby hours required                                       |   |                                      |   |                     |                     |
| C  | Multiply Line A by hours in Line B   |   |                                      |   |                     |                     |
| D  | Total alarm current  |   |                                      |   |                     |                     |
| E  | Enter alarm sounding period in hours ** (0.25 hr)                            |   |                                      |   |                     |                     |
| F  | Multiply Line D by Line E  |   |                                      |   |                     |                     |
| G  | Add Line C & Line F  |   |                                      |   |                     |                     |
| H  | Multiply Line G by 1.2 to arrive at total ampere/hours required (See Note 3) |   |                                      |   |                     |                     |
| <b>NOTE 1:</b> Add .003 amp for any LED to be lit for any condition when powered internally.   |  |   |                                      |   |                     |                     |
| <b>NOTE 2:</b> Add .003 amp for any LED to be lit for any condition when powered internally. When powered externally, a max. output current of .050/point is available for a max. total output of 2.4 amps/ANU-48.   |  |   |                                      |   |                     |                     |
| <b>NOTE 3:</b> For Emergency Voice/Alarm Communication service, the system shall be capable of operating the system for 24 hours under a maximum normal load and then operating the system during an alarm condition for a period of 2 hours. Fifteen (15) minutes of evacuation alarm operation at maximum alarm load shall be considered the equivalent of 2 hours of alarm operation. |  |   |                                      |   |                     |                     |
| <b>NOTE 4:</b> Use the next size battery with a capacity greater than required.<br>(Use only Gamewell-FCI Models B-1, B-7R, B-17R, B-55R, BAT-1270, BAT-12120, BAT-12260 or BAT-12550 batteries). When using 55 A/H batteries (with an external battery cabinet, the maximum standby current for 60 hours is .560 A. The system batteries must be replaced as a set.                     |  |   |                                      |   |                     |                     |

**Table 3.7.1.1 PM-9/PM-9G Standby Battery Calculation Chart**

| Qty  | Sub-Assembly | Description | Supv. Current | Alarm Current | Total Supv. Current | Total Alarm Current |
|--|--------------|-------------|---------------|---------------|---------------------|---------------------|
| <p><b>NOTE 5:</b> Continuous standby loads in excess of .560 Amps up to 5 Amps may require a Generator Backup or load shedding during an AC power failure.</p> |              |             |               |               |                     |                     |
| <p><b>NOTE 6:</b> Continuous standby loads in excess of .560 Amps up to 4 Amps may require a Generator Backup or load shedding during an AC power failure.</p> |              |             |               |               |                     |                     |

Table 3.7.1.1 PM-9/PM-9G Standby Battery Calculation Chart (Continued)

### 3.7.2 PM-9/PM-9G Power Connections to AM-50 Series Amplifiers (Non Power-Limited)

The PM-9/PM-9G Power Supply provides the operating voltage for the AM-50 Series amplifiers installed in the INX or the INX CAB-B Transponder assembly. Up to four (4), amplifiers can be powered by one PM-9/PM-9G. Terminal Block TB4 provides two sets of power outputs. Each power output is intended to connect to two (2), amplifiers.

Figure 3.7.2.1 illustrates the PM-9/PM-9G power connections to the AM-50 Series amplifiers.

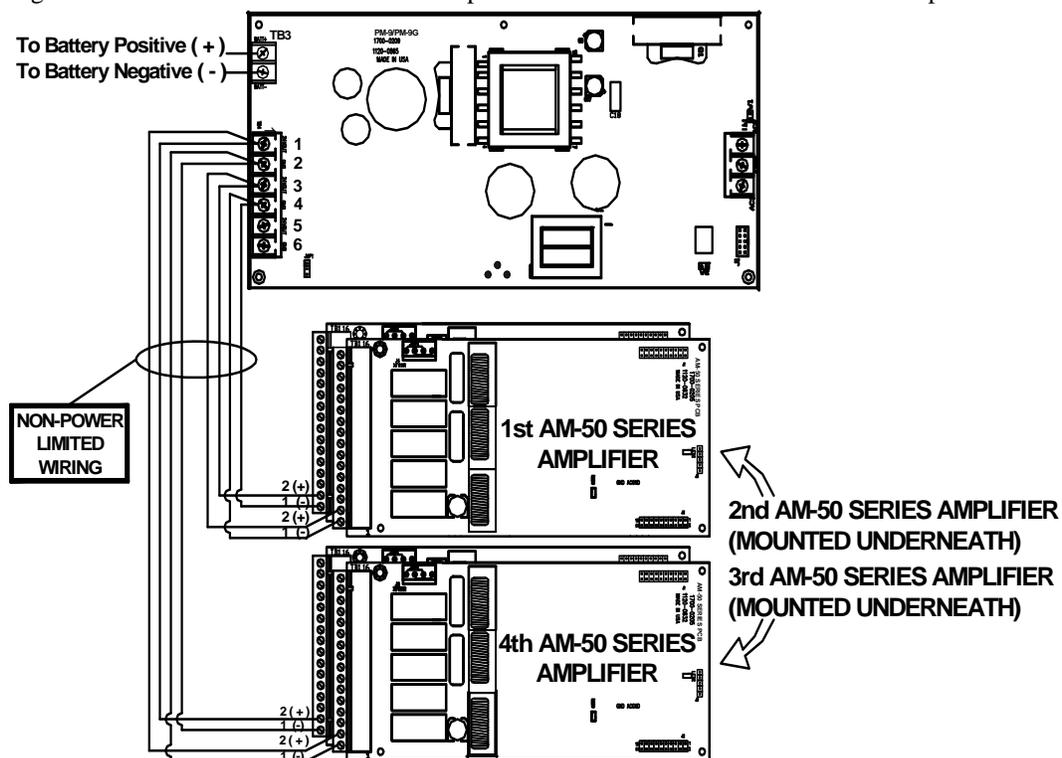


Figure 3.7.2.1 PM-9/PM-9G Power Connections to the AM-50 Series Amplifiers

Table 3.7.2.1 lists the PM-9/PM-9G to the AM-50 Series amplifier power connections.

| Designation for the Power Supply | Designation for the AM-50 Series Amplifiers |
|----------------------------------|---|
| PM-9/PM-9G TB4-2GND (-)          | 3rd AM-50 Series amplifier TB1-1 (-)        |
| PM-9/PM-9G TB4-1 24 OUT (+)      | 3rd AM-50 Series amplifier TB1-2 (+)        |
| PM-9/PM-9G TB4-4 GND (-)         | 1st AM-50 Series amplifier TB1-1 (-)        |
| PM-9/PM-9G TB4-3 24 OUT (+)      | 1st AM-50 Series amplifier TB1-2 (+)        |
| PM-9/PM-9G TB4-2 GND (-)         | 4th AM-50 Series amplifier TB1-1 (-)        |
| PM-9/PM-9G TB4-1 24 OUT (+)      | 4th AM-50 Series amplifier TB1-2 (+)        |
| PM-9/PM-9G TB4-4 GND (-)         | 2nd AM-50 Series amplifier TB1-1 (-)        |
| PM-9/PM-9G TB4-3 24 OUT (+)      | 2nd AM-50 Series amplifier TB1-2 (+)        |

Table 3.7.2.1 PM-9/PM-9G to AM-50 Series Amplifiers Power Connections

### 3.8 AM-50 Series Amplifier Sub-Assemblies

The AM-50 Series amplifiers include two (2), fully supervised, individually activated speaker circuits wired Class B or Class A. Each circuit is capable of supplying up to 50 watts of power. The AM-50 Series amplifiers include the following sub-assemblies.

#### AM-50-25

The AM-50-25 is a 50-watt switching audio output amplifier, with a standard output of 25VRMS.

#### AM-50-70

The AM-50-70 is a 50-watt switching audio amplifier, with a standard output of 70.7VRMS.

Figure 3.8.1.1 illustrates the AM-50 Series amplifier connections. Table 3.8.1.1 lists the AM-50 Series amplifier wiring connections.

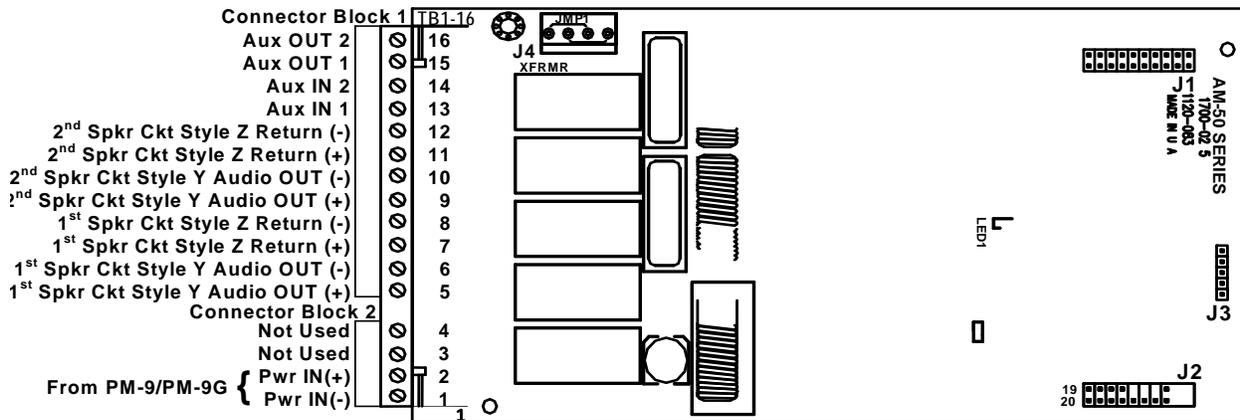


Figure 3.8.1.1 AM-50 Series Amplifier Sub-Assembly

| Designation  | Description                     | Comments  |
|--|---------------------------------|---|
| TB1-1  | Ext Pwr IN ( - )                | Connect to PM-9/PM-9G TB4 "GND" terminal                      |
| TB1-2  | Ext Pwr IN ( + )                | Connect to PM-9/PM-9G TB4 "24OUT" terminal                    |
| TB1-3  |                                 | Not used  |
| TB1-4  |                                 | Not used  |
| TB1-5  | 1st Spkr Ckt Audio OUT (+)      | 1st Speaker Ckt audio output, Style Y, Class B                |
| TB1-6  | 1st Spkr Ckt Audio OUT (-)      | 1st Speaker Ckt audio output, Style Y, Class B                |
| TB1-7  | 1st Spkr Ckt Style Z Return (+) | 1st Speaker Ckt audio output, Style Z, Class A return         |
| TB1-8  | 1st Spkr Ckt Style Z Return (-) | 1st Speaker Ckt audio output, Style Z, Class A return         |
| TB1-9  | 2nd Spkr Ckt Audio OUT (+)      | 2nd Speaker Ckt audio output, Style Y, Class B                |
| TB1-10   | 2nd Spkr Ckt Audio OUT (-)      | 2nd Speaker Ckt audio output, Style Y, Class B                |
| TB1-11   | 2nd Spkr Ckt Style Z Return (+) | 2nd Speaker Ckt audio output, Style Z, Class A return         |
| TB1-12   | 2nd Spkr Ckt Style Z Return (-) | 2nd Speaker Ckt audio output, Style Z, Class A return         |
| TB1-13   | Aux IN 1                        | Connect to back-up amplifier TB1-5 or 9                       |
| TB1-14   | Aux IN 2                        | Connect to back-up amplifier TB1-6 or 10                      |
| TB1-15   | Aux OUT 1                       | Connect to next main amplifier TB1-13 (if any)<br>(See Note)  |
| TB1-16   | Aux OUT 2                       | Connect to next main amplifier TB1-14 (if any)<br>(See Note)  |
| J1   |                                 | Connect to INI-VGX J16 of 1st amp or J2 of previous amplifier |
| J2   |                                 | Connect to J1 of next amplifier (if any)                      |
| J3   |                                 | Factory use   |
| J4   |                                 | Factory use   |
| LED 1  | (green)                         | Lights steady upon activation                                 |
| LED 2  | (green)                         | Speaker Circuit Active Indicating LED                         |
| LED 3  | (green)                         | AM-50 Series amplifiers Standby Indicating LED                |
| <b>NOTE:</b> If there are no additional main amplifiers to be backed-up, then either install an EOL resistor across TB1-15 and 16 or connect back to the back-up amplifier's Style Z return (for the channel used) to provide aux audio input. |                                 |   |

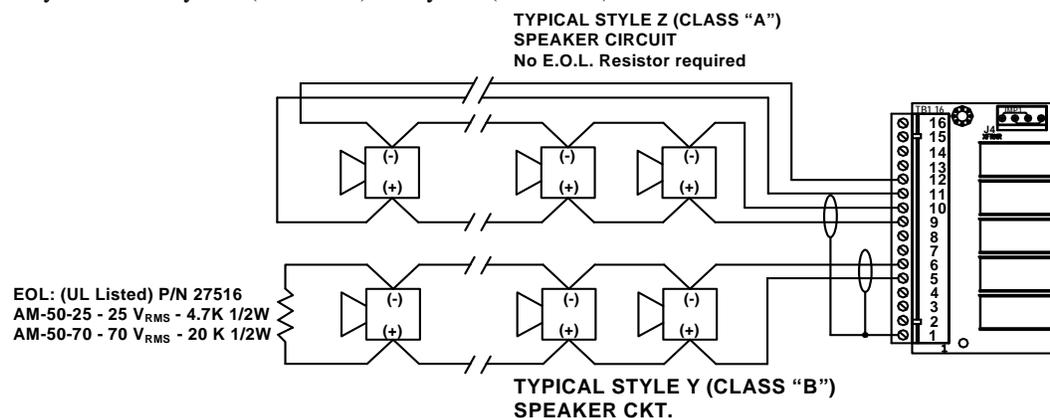
Table 3.8.1.1 AM-50 Series Amplifier Terminations

### 3.8.1 AM-50 Series Amplifier Power Connections

The AM-50 Series amplifiers obtain the operating voltage from the PM-9/PM-9G power supply mounted in the same cabinet. Refer to Section 3.7.2 of this manual for details. Use only the power output of the PM-9/PM-9G sub-assembly as detailed in this manual.

### 3.8.2 AM-50 Series Amplifier Speaker Circuit Connections

Each AM-50 Series amplifier provides two (2), separately programmable, loudspeaker circuits that may be wired Style Y (Class "B") or Style Z (Class "A").



**Figure 3.8.2.1 AM-50 Series Amplifier Speaker Circuit Connections**

#### Circuit Ratings

|                    |   |
|--------------------|---|
| <b>Voltage:</b>    | 1.2 VDC (Supervisory)<br>25 V <sub>RMS</sub> (Alarm), power-limited<br>70.7V <sub>RMS</sub> (Alarm) |
| <b>Current:</b>    | 0.001 amp (Supervisory)<br>2 amp RMS (Alarm)<br>0.001 amp (Short)                                   |
| <b>Resistance</b>  | 100 ohms (max.)   |
| <b>Capacitance</b> | 250 μF max.   |

Use twisted, SHIELDED pair, 18 AWG. min. Make sure the shield is run continuously through the speaker circuits with no segments of the shield left floating.

Do not tie the shield to the conduit or the junction boxes in the field. Terminate the drain wire back at the panel's location to system negative. Use the AM-50 Series amplifiers, TB1-1 for a convenient termination point. Style Z circuits do not require an end-of-line resistor. This is included on the AM-50-25 and on the AM-50-70 amplifier.



**NOTE:** Strobe notification appliances should be connected to the notification appliance circuits of an associated, UL Listed supplementary notification appliance extender panel.

### 3.8.2 AM-50 Series Amplifier Speaker Circuit Connections (Continued)

#### AM-50-25 Speaker Circuit Wiring

Table 3.8.2.1 can be used as a guide to determine the wire requirements for each 25- $V_{RMS}$  speaker circuit.

|                               |           |           |           |           |           |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|
| <b>Wire Gauge (AWG)</b>       | 18        | 16        | 14        | 12        | 10        |
| <b>Cable Ohms @ 1,000 ft.</b> | 12.8      | 8         | 5.1       | 3.2       | 2         |
| <b>Load Power Watts</b>       | <b>ft</b> | <b>ft</b> | <b>ft</b> | <b>ft</b> | <b>ft</b> |
| 50                            | 55        | 87        | 138       | 218       | 349       |
| 25                            | 109       | 173       | 275       | 436       | 697       |
| 10                            | 272       | 433       | 688       | 1090      | 1741      |

**Table 3.8.2.1 AM-50-25 Speaker Circuit Wiring Requirements**

#### AM-50-70 Speaker Circuit Wiring

Table 3.8.2.2 can be used as a guide to determine the wire requirements for each 70- $V_{RMS}$  speaker circuit.

|                               |           |           |           |           |           |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|
| <b>Wire Gauge (AWG)</b>       | 18        | 16        | 14        | 12        | 10        |
| <b>Cable Ohms @ 1,000 ft.</b> | 12.8      | 8         | 5.1       | 3.2       | 2         |
| <b>Load Power Watts</b>       | <b>ft</b> | <b>ft</b> | <b>ft</b> | <b>ft</b> | <b>ft</b> |
| 50                            | 462       | 737       | 1170      | 1855      | 2962      |
| 25                            | 924       | 1472      | 2340      | 3710      | 5924      |
| 10                            | 2310      | 3680      | 5848      | 9274      | 14808     |

**Table 3.8.2.2 AM-50-70 Speaker Circuit Wiring Requirements**

### 3.8.3 Connections between Main and Standby Amplifiers

The INX or the INX CAB-B Transponder cabinet assembly can be configured to include two main AM-50 Series amplifiers. Each AM-50 Series amplifier includes its own standby amplifier; or the assembly can be configured as three main amplifiers where all amplifiers share a common standby amplifier. Figure 3.8.3.1 illustrates the connections between the main AM-50 Series amplifiers and standby amplifier.

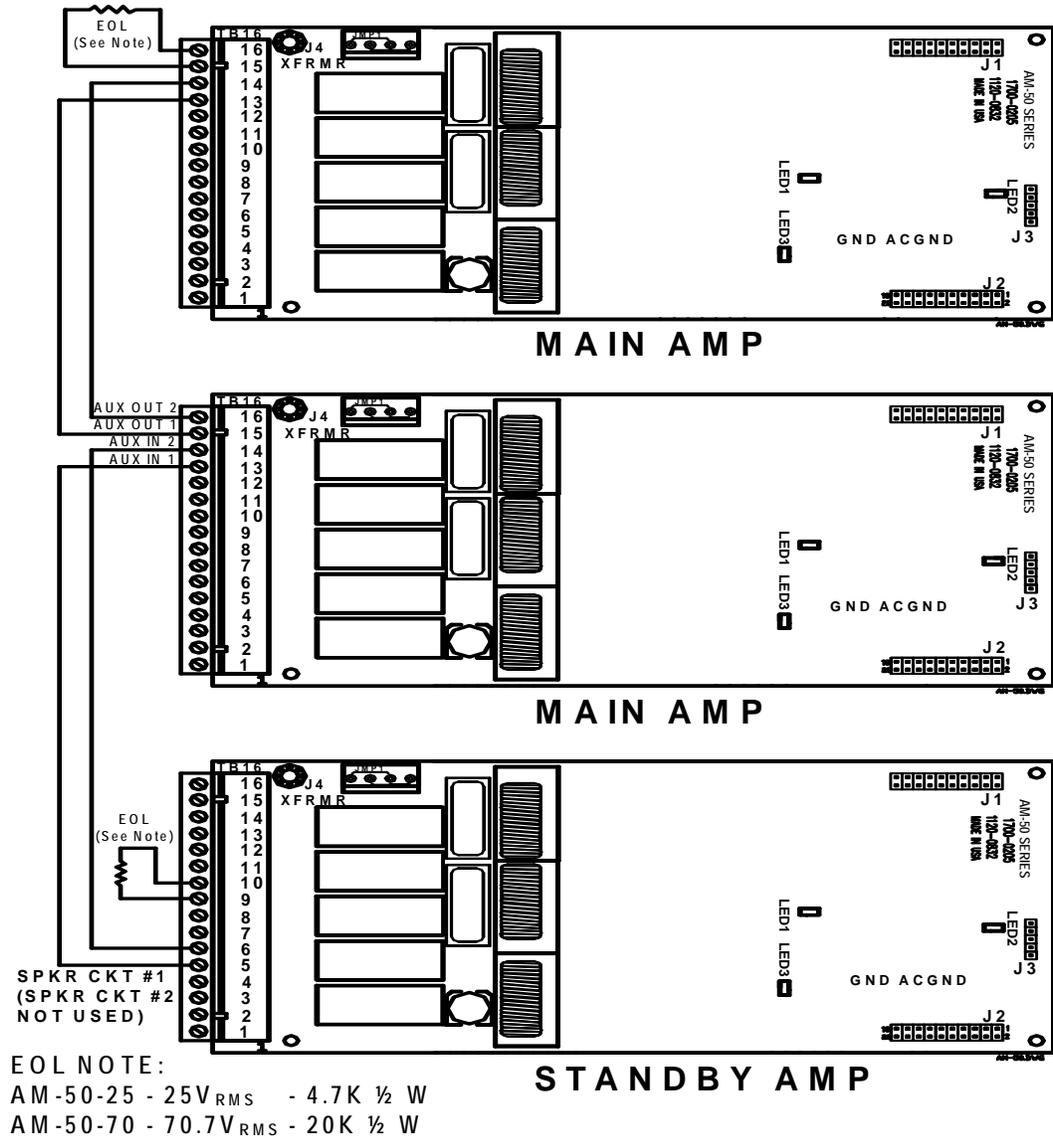


Figure 3.8.3.1 AM-50 Series Amplifier Main and Standby Connections

## Section 4: System Operation



**NOTE:** The evacuation system is programmed to provide a 1KHz default evacuation tone. Figure 4.1.1 illustrates the NGA Screen.

### 4.1 NGA LED Indicators

The NGA LED indicators are optional for applications consisting of fewer than eight (8) 7100 nodes or a network that also includes one or more ILI-MB-E3/ILI95-MB-E3/ANX nodes.

Table 4.1.1 lists the LEDs on the NGA.

| LED    | Description    |
|--------|----------------|
| Green  | Power On       |
| Red    | Alarm          |
| Yellow | Supervisory    |
| Yellow | System Trouble |
| Yellow | Ground Fault   |

**Table 4.1.1 NGA LEDs**

Table 4.1.2 lists the Diagnostic LEDs on the circuit board.

| Designation | Description | Comments  |
|-------------|-------------|---|
| LED1        | REC         | Network is reconfiguring                          |
| LED2        | MRC         | This node is initiating a network reconfiguration |
| LED3        | DUP         | Duplicate node address or switch error            |
| LED4        | TX          | The sub-assembly is transmitting network data     |
| LED5        | RX          | The sub-assembly is receiving network data        |
| LED6        | RST         | Firmware fault                                    |
| LED7        | DG          | Trouble condition                                 |

**Table 4.1.2 Diagnostic LEDs**



**Figure 4.1.1 NGA Screen**

## 4.2 NGA Switches

These touch-screen switches are used to control the E3 Series Broadband panel. Access to these keys is enabled by unlocking the key switch. The switches are listed as follows:

- System Reset
- Acknowledge Alarm Events
- Silence System Outputs
- Trouble / Supervisory Off-Normal Acknowledge

## 4.3 System Reset

To reset the system, do the following:

1. Turn the key switch to the “Unlock” position to open access to the system controls.
2. Press the System Reset switch for five seconds until the alphanumeric display shows "Resetting..."
3. Release the System Reset Switch.

## 4.4 Acknowledge Alarm Events

To activate the Acknowledge Alarm, do the following:

1. Turn the key switch to the “Unlock” position to open access to the system controls.
2. Press the Alarm Acknowledge Switch once to silence the audible sounder.  
The flashing red Alarm indicating LED will light steadily.



---

**NOTE:** The E3 Series Broadband is designed to acknowledge one alarm event at a time. Repeat this process for every alarm event on the system.

---

## 4.5 Silence System Outputs

To activate the Silence System outputs, do the following:

1. Turn the key switch to the “Unlock” position to open access to the system controls.
2. Press the Signal Silence Switch ONCE to silence all outputs programmed to be silenceable.



---

**NOTE:** Be sure to observe the status of the System Silence indicating LED.

---

- If it is OFF, press the System Silence switch to SILENCE.
- If it is ON, press the System Silence switch to UNSILENCE.

The subsequent alarm event will re-sound already silenced system outputs.

3. Press the System Silence switch again to silence.

## 4.6 Trouble / Supervisory Off-Normal Acknowledge

To activate the Trouble/Supervisory Off-Normal Acknowledge, do the following:

1. Turn the key switch to the “Unlock” position to open access to the system controls.
2. Press the Trouble Acknowledge Switch to silence the audible sounder. The flashing yellow Trouble indicating LED will light steadily.



---

**NOTE:** Subsequent trouble and off-normal events will re-sound the audible sounder. Operate the Trouble Acknowledge Switch again to acknowledge new events.

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## 4.7 NGA Wiring Connections

Table 4.7.1 and Figure 4.8.1 illustrate the NGA electrical connections.

| Designation | Description  | Comments  |
|-------------|--------------|---|
| TB1-1       |              | NGA TB1-1 24 VDC IN (+) from ILI/ILI95-MB TB3-6 or RPT-E3 TB4-3                 |
| TB1-2       |              | NGA TB1-2 SYS GND IN (-) from ILI/ILI95-MB TB3-7 or RPT-E3 TB4-4                |
| TB1-3       |              | NGA TB1-3 Differential ARCNET COM A IN from RPT-E3 TB3-3 or ANX TB2-3           |
| TB1-4       |              | NGA TB1-4 Differential ARCNET COM B IN from RPT-E3 TB3-4 or ANX TB2-4           |
| TB1-5       |              | 24 VDC OUT (+) to next device   |
| TB1-6       |              | SYS GND OUT (-) to next device  |
| TB1-7       |              | Differential ARCNET COM A OUT to next device                                    |
| TB1-8       |              | Differential ARCNET COM B OUT to next device                                    |
| TB1-9       | RxD          | RxD to computer DB9 PIN 3, Printer DB25 PIN 2, or RS-232 RxD GRN download cable |
| TB1-10      | Supervision  | SUPV to computer DB9 PIN 9, Printer DB25 PIN 20, or R-S232 Supv download cable  |
| TB1-11      | TxD          | TxD to computer DB9 PIN 2, Printer DB25 PIN 3, or RS-232 TxD BLK download cable |
| TB1-12      | GND          | GND to computer DB9 PIN 5, Printer DB25 PIN 7, or RS-232 GND RED download cable |
|             |              |   |
| J1          | Internal use | To overlay  |
| J2          |              | Factory use only  |
| J3          | Program      | Factory use only  |
| J4          | RS-485       | Connects to J7 of INI-VG  |
| J5          | Internal use | To overlay  |
| J6          | Internal use |   |
| J7          | Internal use |   |
|             |              |   |
| W1          |              | Factory use only  |
| W2          |              | Factory use only  |
| W3          |              | Factory use only  |
| W4          |              | ARCNET TERM OFF   |
| W5          |              | RS-485 TERM OFF   |

**Table 4.7.1 NGA Wiring Connections**



## Section 5: Transient Over Voltage Protection

### 5.1 Routing of Power-Limited Field Wiring Circuits

UL Standard 864, (Control Units for Fire Protective Signaling Systems), requires that a minimum of 1/4 inch separation be maintained between power-limited circuits and non power-limited circuits. The control unit is designed so the required separation between these circuits (power-limited vs. non power-limited) is maintained at the field wiring terminals.

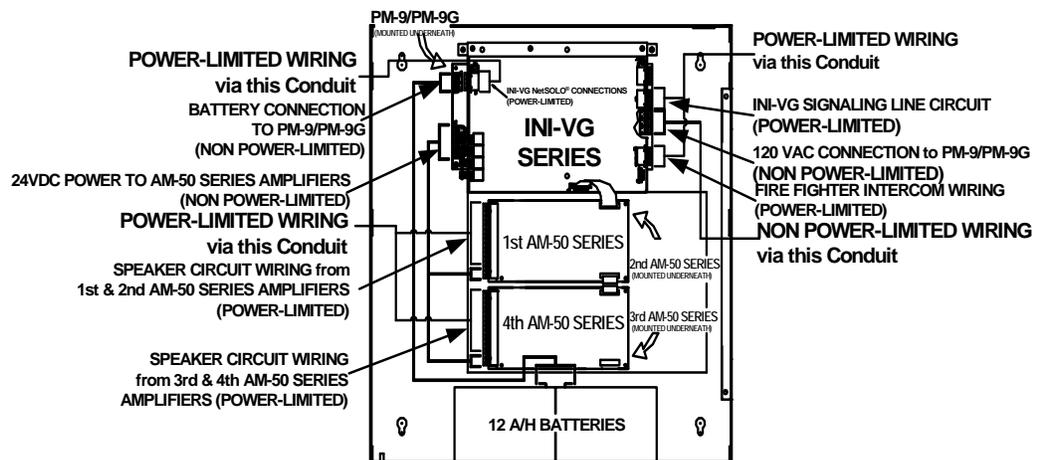
To fully comply with the intent of these requirements, however, the minimum 1/4 inch separation must also be maintained between the field wiring conductors of power-limited circuits and non power-limited circuits. This may be accomplished by routing the field wiring as shown in the following diagram.

Unless otherwise indicated on the unit, all field wiring circuits are power-limited except:

- AC power circuits
- Standby battery circuit
- Power supply output
- Municipal box (auxiliary) circuit



**NOTE:** Route all field wiring to maintain a minimum of 1/4 inch separation between power-limited and non power-limited circuit types. Additional conduit connections may be made in the respective power-limited and non power-limited areas of the enclosure if needed to maintain this required minimum separation.



Power-limited and non power-limited circuit wiring must remain separated in the cabinet. All power-limited circuit wiring must remain at least 0.25" (.64 cm) away from any non power-limited wiring. All power-limited and non power-limited wiring must enter and exit the cabinet through different knockouts and/or conduits. Power-limited wire must be type FPL, FPLR or FPLP according to Article 760 of the National Electrical Code.

Figure 5.1.1 Power-Limited Field Wiring

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