JOHNSON CONTROLS

Fire Alarm Control Panel
IFC-640

Installation Manual

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Fire Alarm System Limitations

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

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control 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 is made available at no charge to all installing dealers. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

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

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

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

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

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

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

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

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

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

- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond or comprehend the meaning of the signal. It is the property owner's responsibility to conduct fire drills and other training exercise to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

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

Equipment used in the system may not be technically compatible with the control 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 or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers only. Adequate written records of all inspections should be kept.

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Installation Precautions

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

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

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

This system meets NFPA requirements for operation at 0-49º C/32-120º F and at a relative humidity (non condensing) of 85% at 30°C (86°F) per NFPA, and 93% ± 2% at 32°C ± 2°C (89.6°F ± 1.1°F) per ULC. However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27º C/60-80º F.

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

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

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

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

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

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

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.

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FCC Warning

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

Canadian Requirements

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

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

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Table of Contents

Section 1: About This Manual

1.1 Standards and Other Documents

■ This Fire Alarm Control Panel complies with the following NFPA standards:

- NFPA 12 CO_2 Extinguishing Systems
- NFPA 12A Halon 1301 Extinguishing Systems
- NFPA 13 Sprinkler Systems
- NFPA 15 Water Spray Systems
- NFPA 16 Foam/Water Deluge and Foam/Water Spray Systems
- NFPA 17 Dry Chemical Extinguishing Systems
- NFPA 17A Wet Chemical Extinguishing Systems
- NFPA 72-1999 Central Station Fire Alarm Systems (Automatic, Manual and Waterflow) Protected Premises Unit (requires Notifier UDACT).
- NFPA 72-1999 Local (Automatic, Manual, Waterflow and Sprinkler Supervisory) Fire Alarm Systems.
- NFPA 72-1999 Auxiliary (Automatic, Manual and Waterflow) Fire Alarm Systems (requires TM-4).
- NFPA 72-1999 Remote Station (Automatic, Manual and Waterflow) Fire Alarm Systems
- NFPA 72-1999 Proprietary (Automatic, Manual and Waterflow) Fire Alarm Systems (Protected Premises Unit).
- NFPA 2001 Clean Agent Fire Extinguishing Systems

■ The installer should be familiar with the following documents and standards:

- NFPA 72-1999 Initiating Devices for Fire Alarm Systems
- NFPA 72-1999 Inspection, Testing and Maintenance for Fire Alarm Systems
- NFPA 72-1999 Notification Appliances for Fire Alarm Systems

Underwriters Laboratories

- UL 38 Manually Actuated Signaling Boxes
- UL 217 Smoke Detectors, Single and Multiple Station
- UL 228 Door Closers - Holders for Fire Protective Signaling Systems
- UL 268 Smoke Detectors for Fire Protective Signaling Systems
- UL 268A Smoke Detectors for Duct Applications
- UL 346 Waterflow Indicators for Fire Protective Signaling Systems
- UL 464 Audible Signaling Appliances
- UL 521 Heat Detectors for Fire Protective Signaling Systems
- UL 864 Standard for Control Units for Fire Protective Signaling Systems
- UL 1481 Power Supplies for Fire Protective Signaling Systems
- UL 1971 Visual Signaling Appliances
- UL 1076 Proprietary Burglar Alarm Systems
- UL 60950 Safety of Information Technology Equipment

Underwriters Laboratories of Canada (ULC)

- Standard CAN/ULC-S527-M99
- CAN/ULC-S524-M91 Standard for the Installation of Fire Alarm Systems

Other

- EIA-485 and EIA-232 Serial Interface Standards
- NEC Article 300 Wiring Methods
- NEC Article 760 Fire Protective Signaling Systems
- Applicable Local and State Building Codes
- Requirements of the Local Authority Having Jurisdiction
- C22.1-98 The Canadian Electrical Code, Part 1

1.2 Supplemental Documentation

Table 1.1 below provides a list of documents referenced in this manual, as well as documents for selected other compatible devices. The document series chart (DOC-JCI) provides the current document revision. A copy of this document is included in every shipment.

Compatible Conventional Devices (Non-addressable)	**Document Number**
Device Compatibility Document Device Compatibility Technical Bulletin	51922 LIT-445180
Fire Alarm Control Panel (FACP) and Main Power Supply Installation	**Document Number**
IFC-640 Installation, Operations, and Programming Manuals	51864, 51865, 51866
Johnson Controls Voice Alarm System Manual	51869
Johnson Controls SLC Wiring Manual	51870
Note: For individual SLC Devices, refer to the *SLC Wiring Manual*	
Off-line Programming Utility	**Document Number**
VeriFire™ Tools CD help file	JVERIFIRE-TCD
Cabinets & Chassis	**Document Number**
CAB-3/CAB-4 Series Cabinet Installation Document	15330
Battery/Peripherals Enclosure Installation Document	50295
Power Supplies, Auxiliary Power Supplies & Battery Chargers	**Document Number**
ACPS-2406 Installation Manual	51304
APS-6R Instruction Manual APS-6R Auxiliary Power Supply Technical Bulletin	50702 LIT-445205
CHG-120 Battery Charger Manual CHG-120 Battery Charger Technical Bulletin	50641 LIT-445210
FCPS-24 Field Charger/Power Supply Manual Field Charger/Power Supply FCPS-24 Technical Bulletin	50059 LIT-445111
FCPS-24S Field Charger/Power Supply Manual (Sync)	51977
Networking	**Document Number**
Noti•Fire•Net Manual, Network Version 4.0 & Higher	51584
NCM-W/F Installation Document	51533
IFW Intelligent Fire Workstation Manual, Network Version 4.0 & Higher	52028
System Components	**Document Number**
Annunciator Control System Manual	15842
Annunciator Fixed Module Manual	15048
AFM-16A Annunciator Fixed Module Manual	15207
ACM-8R Annunciator Control Module Manual ACM-8R Annunciator Control Module Technical Bulletin	15342 LIT-445125
LCD-80 Manual LCD-80 Liquid Crystal Display Technical Bulletin	15037 LIT-445151
LCD-80TM Manual	51082
FDU-80 Remote Annunciator Manual	51264
LDM Series Lamp Driver Annunciator Manual LDM Lamp Driver Modules Technical Bulletin	15885 LIT-445161
JNCA Network Control Annunciator Manual	51868

Table 1.1 Reference Documentation (Sheet 1 of 2)

SCS Smoke Control Manual (Smoke and HVAC Control Station)	15712
DPI-232 Direct Panel Interface Manual	51499
TM-4 Installation Document (Reverse Polarity Transmitter)	51490
UDACT Manual (Universal Digital Alarm Communicator/Transmitter)	50050
ACT-2 Installation Document ACT-2 Audio Coupling Transformer Technical Bulletin	51118 LIT-445225
VEC 25/50 Manual	50686
RM-1 Series Remote Microphone Installation Document RM-1 Series Remote Microphone Technical Bulletin	51138 LIT-445212
RA400Z Remote LED Annunciator Installation Document	I56-508
RFX Wireless Interface Manual	51012
UZC-256 Universal Zone Coder Manual	15216
UZC-256 Programming Manual	15976
XP Transponder Manual XP Transponder Technical Bulletin	15888 LIT-448180
XP10-M Installation Document	I56-1803
XP5 Series Manual XP5 Series Transponders Technical Bulletin	50786 LIT-445230
XP6-C Installation Document	I56-1805
XP6-MA Installation Document	I56-1806
XP6-R Installation Document	I56-1804
XPIQ Audio Transponder Manual XPIQ Quad Intelligent Audio Transponder Technical Bulletin	51013 LIT-445235

Table 1.1 Reference Documentation (Sheet 2 of 2)

1.3 Cautions and Warnings

This manual contains cautions and warnings to alert the reader as follows:

CAUTION:
Information about procedures that could cause programming errors, runtime errors, or equipment damage.

WARNING:
Indicates information about procedures that could cause irreversible damage to the control panel, irreversible loss of programming data or personal injury.

Notes

Section 2: System Overview

2.1 System Description

The IFC-640(E) control panel is a modular, intelligent fire alarm control panel (FACP) with an extensive list of powerful features. The control panel integrates a central processing unit (CPU), a 6 amp power supply, and a battery charger. This is combined with a mounting chassis and cabinet to create a complete fire alarm control system. The panel supports FlashScan protocol and has network capabilities. A single SLC loop is supported with the basic equipment package; a second SLC loop can be added by attaching an optional loop expander module (LEM-320).

Modular devices mount to the chassis to provide additional output circuits, including voice and telephone modules to form a complete voice evacuation system. Five cabinet options for enclosing system components are available.

The control panel has the capacity for installing up to 636 addressable points; 159 detectors and 159 monitor/control modules per SLC (Signaling Line Circuit).

2.1.1 Standard Features

- Uses the VIEW® early warning fire detection and the FlashScan® or Classic Loop Interface Protocol (CLIP) families of detectors and modules
- Four standard Notification Appliance Circuits (NAC), Class A or B
- Alarm, Trouble, Supervisory and Security relays
- Support for 32 annunciator addresses, with 10 special annunciator groups
- Supports Style 4, Style 6, Style 7 SLC loops
- Connections to easily mount an expander board to add a second SLC loop
- Releasing service using on-board NACs or M300CJ modules
- Logic Equations
- Display scroll selection
- Alarm verification supervisory indication (NYC)
- Supervisory duct detectors
- Supports Advanced Warning Addressable Combustion Sensing (AWACS) algorithms
- Network operation
- Battery charger supports 12-55 amp hour sealed lead-acid batteries
- EIA-485 connections for wiring ACS annunciators (including LDM custom graphic annunciators), TM-4 transmitter
- EIA-232 connections for printer, CRT, printer/CRT, or network operation
- Autoprogram feature for faster programming of new devices
- The control panel provides 6.0 amps of usable output power in an alarm condition; it provides 3.0 amps of usable output power in normal or continuous operating conditions
- Diagnostic LEDs and switches
- Ground fault detection
- Battery and battery-charger supervision, voltage-monitoring, and current-monitoring
- Panel circuit modules support up to 64 circuits
- Programmable for strobe synchronization

2.1.2 Options

Refer to Section 2.2 “System Components” for descriptions of the various optional modules.

- QWERTY silicone-rubber keypad with a 2x40 LCD display and eight indicator LEDs
- Optional LEM-320 provides a second SLC loop that is electrically identical to the one on the main board
- Optional devices include: UDACT Universal Digital Alarm Communicator/Transmitter, ACM-8R remote relay module to increase point capacity, audio and voice components, and panel circuit modules
- Optional LCD-80 connected through an EIA-485 interface allows monitoring the system—up to 6,000 feet (1,829 meters) from the control panel

2.1.3 System Limitations

System expansion must take into consideration the following:

1. The physical limitations of the cabinet configuration.
2. The electrical limitations of the system power supply.
3. The capacity of the secondary power source (standby batteries).

2.2 System Components

2.2.1 Basic Equipment Required

A basic IFC-640 system requires at least the following components:

1. The control panel. JCPU-640 (120V operation) or JCPU-640E (240V operation).
   This printed circuit board is the "control panel" itself and the heart of the system. It also includes an expander cable for connecting panel modules, a grounding cable, battery interconnect cables, and document kit.
2. One or more chassis. CHS-M2 mounts the JCPU-640/JCPU-640E.
   To mount additional rows of optional equipment, order one or more chassis from this list: CHS-M2, CHS-4N (included in shipkit CHS-4MB), CHS-4L.
3. A primary display. Generally this is a KDM-2 keypad/display, a DP-DISP dress panel, and two BMP-1 blank module panels. For information on using JNCA as primary display instead of KDM-2, see Section 3.5.2 "Using JNCA as Primary Display" and the *JNCA Manual*.
4. A backbox and door:
   SBB-A4 and JDR-A4 (one row of equipment) or
   SBB-B4 and JDR-B4 (two rows of equipment) or
   SBB-C4 and JDR-C4 (three rows of equipment) or
   SBB-D4 and JDR-D4 (four rows of equipment)
   (For a solid-metal door add "B" to the part number; for a red door add "R".)
5. A battery dress panel BP-4
6. Batteries (Refer to Appendix A.3 "Calculating the Battery Requirements" for system current-draw calculations; CAB-4 series backboxes holds batteries up to 24 AH maximum.)

2.2.2 Control Panel Circuit Board

The control panel electronics are contained on one four-layer printed circuit board (PCB) that incorporates a 6 amp power supply with battery charger, a signaling line circuit (SLC) and the central processing unit. A keypad/display unit can be installed over the power supply as shown Figure 2.1.

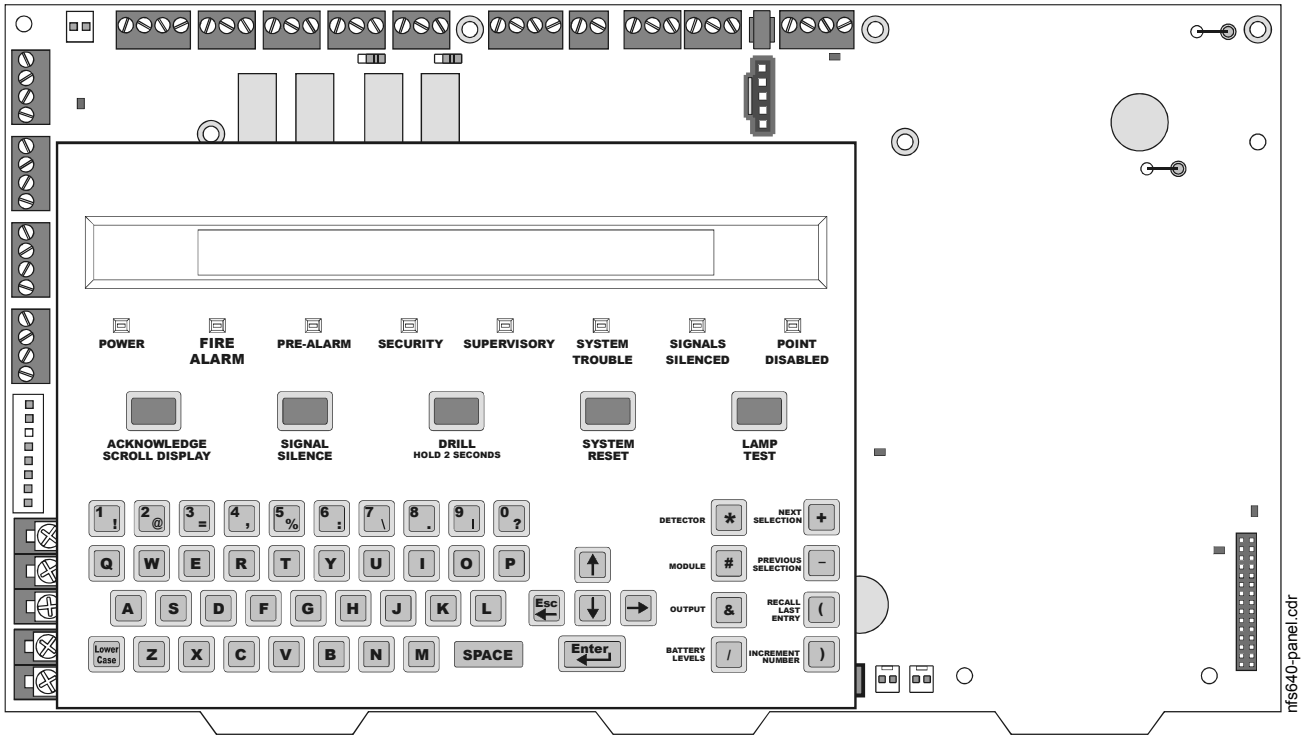


Figure 2.1 IFC-640 Control Panel with Optional Keypad/Display Unit Installed

2.2.3 Main Power Supply

The main power supply is an integral part of the control panel's circuit board. It provides a total of 3 A (6 A in alarm) and contains an integral battery charger. This can be used for many functions including:

- Powering the IFC-640
- Powering a variety of UL-listed 24 VDC notification appliances from four built-in NAC outputs
- Providing up to 1.25 A of resettable power for four-wire smoke detectors
- Providing up to 1.25 A of non-resettable power for external devices such as the TM-4 Transmitter Module.

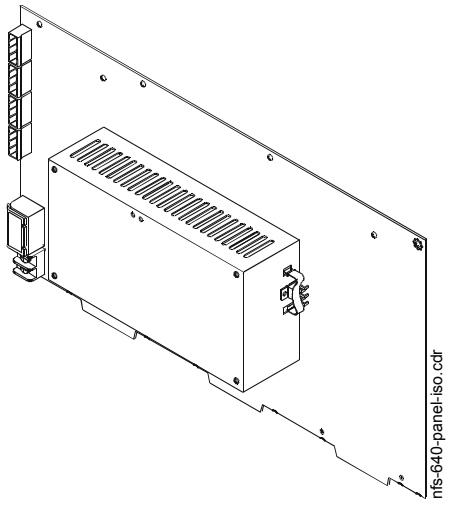


Figure 2.2 Main Power Supply on Control Panel

2.2.4 Circuit Board Components

The following two figures illustrate the location of the various connections, switches, jumpers and LEDs on the circuit board. Figure 2.3 shows wiring connections. Figure 2.4 shows jumpers, LEDs and switches. See Section 3 "Installation" for more details.

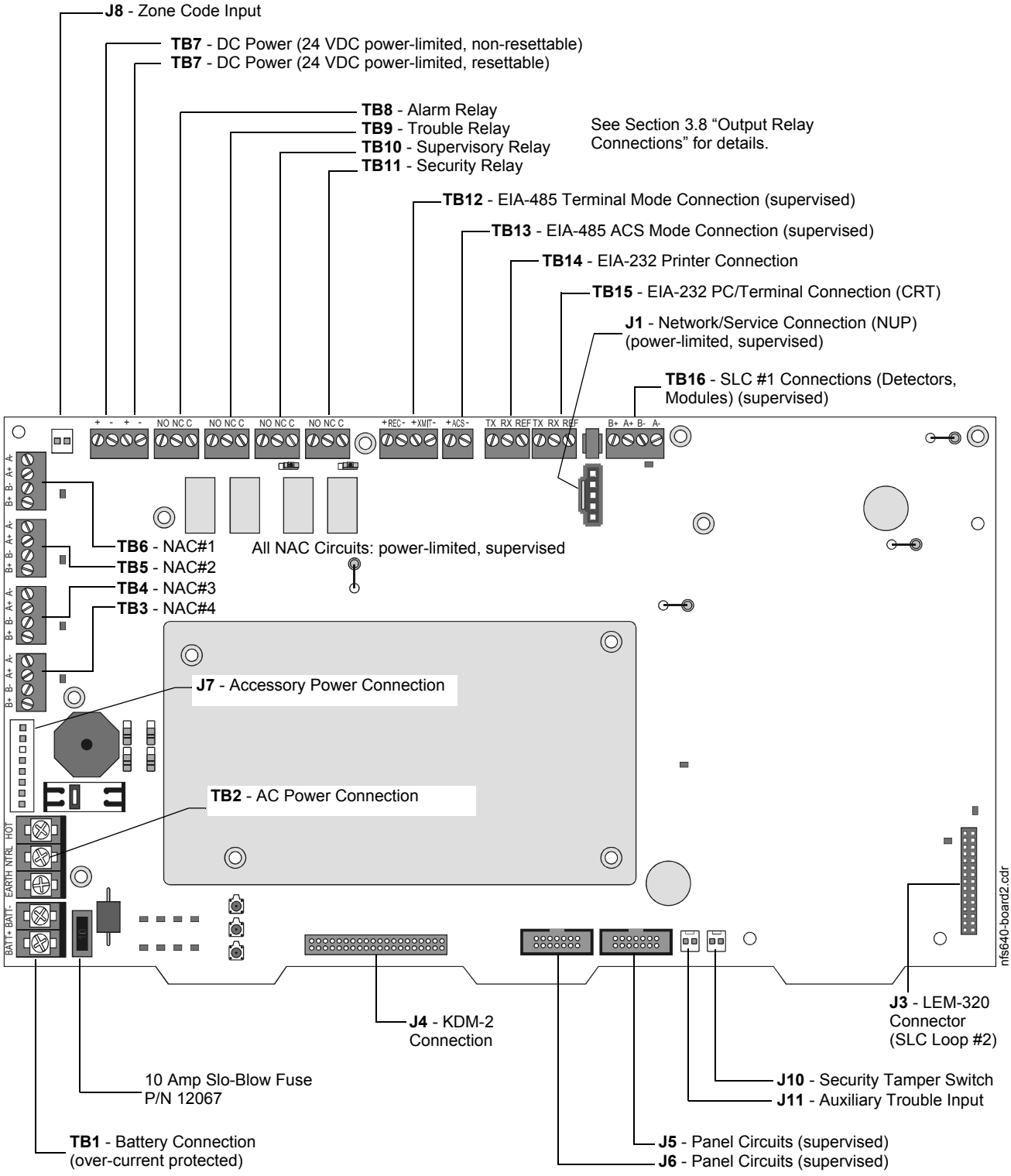


Figure 2.3 Circuit Board Components: Wiring Connections

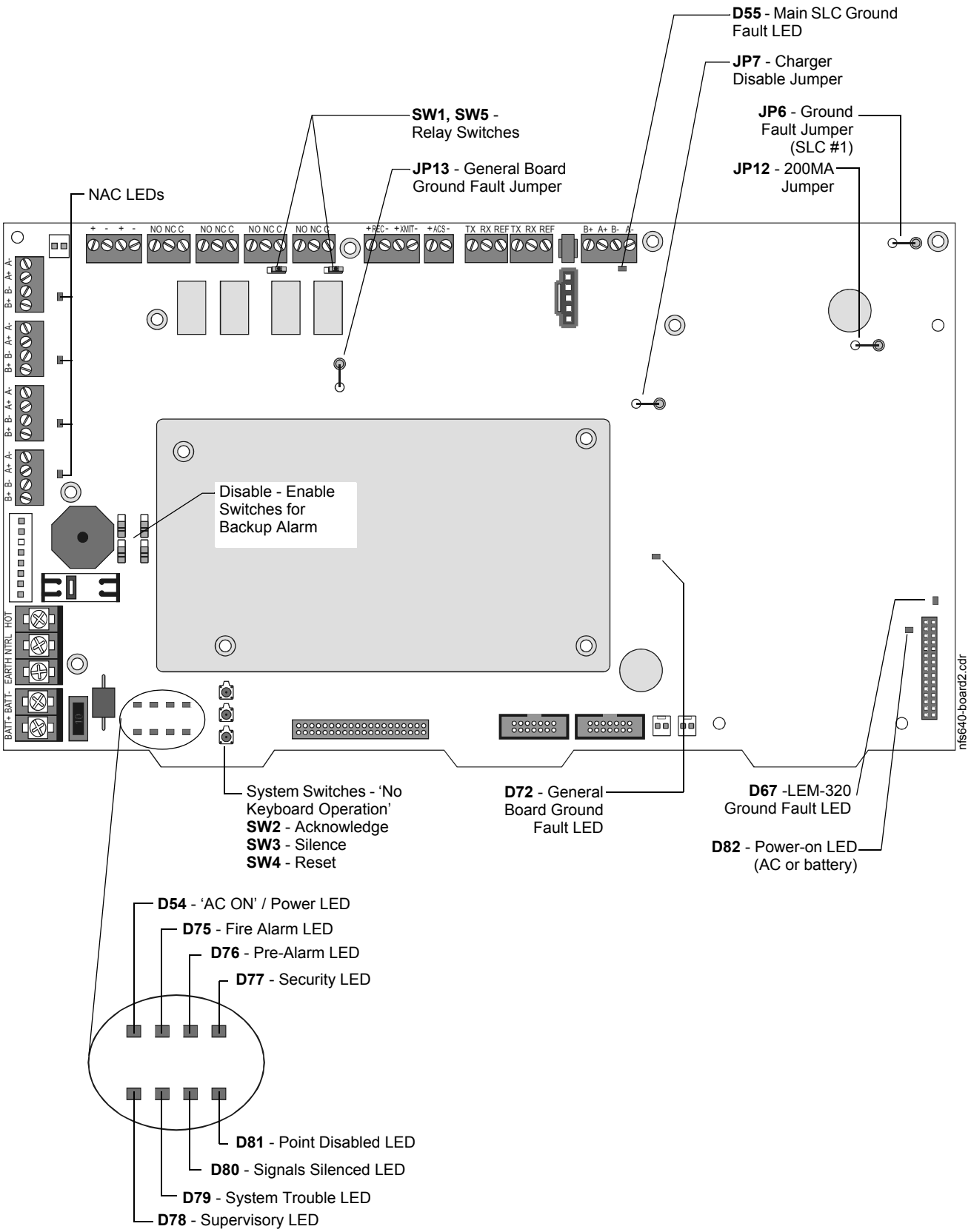


Figure 2.4 Circuit Board Components: Jumpers, LEDs and Switches

2.3 System Cabinets

The control panel and modules are installed in a CAB-4 series backbox. There are four different sizes available, holding from one to four rows of equipment plus batteries (up to two 25AH batteries). Backboxes are ordered separately from doors. The doors can be mounted on the left or the right side of the cabinet; reversible hinges are provided so that this choice can be made in the field. Doors open a full 180 degrees and have locks. Mounting methods include surface-mounting or semi-flush mounting on a wall between 16 inch (40.64 cm) on-center studs. A trim ring option is available for semi-flush mounting.

External measurements for each backbox are provided below; door dimensions are larger. Refer to *CAB-3/CAB-4 Series Cabinet Installation Document* (shipped with the cabinet) for specific mounting drawings and door dimensions.

A-size backbox (one row)	24.00 in (60.96 cm) wide 20.00 in (50.8 cm) tall 5.218 in (13.254 cm) deep Uses optional trim ring TR-A4	**Optional trim ring TR-A4** Opening: 24.062 in (61.118 cm) wide; 20.062 in (50.881 cm) tall. Molding width: 1.375 in (3.493 cm)
B-size backbox (two rows)	24.00 in (60.96 cm) wide 28.5 in (72.39 cm) tall 5.218 in (13.254 cm) deep Uses optional trim ring TR-B4	**Optional trim ring TR-B4** Opening: 24.062 in (61.118 cm) wide; 28.562 in (72.548 cm) tall. Molding width: 1.375 in (3.493 cm)
C-size backbox (three rows)	24.00 in (60.96 cm) wide 37.125 in (94.297 cm) tall 5.218 in (13.254 cm) deep Uses optional trim ring TR-C4	**Optional trim ring TR-C4** Opening: 24.062 in (61.118 cm) wide; 37.187 in (94.455 cm) tall. Molding width: 1.375 in (3.493 cm)
D-size backbox (four rows)	24.00 in (60.96 cm) wide 45.75 in (1162.05 cm) tall 5.218 in (13.254 cm) deep Uses optional trim ring TR-D4	**Optional trim ring TR-D4** Opening: 24.062 in (61.118 cm) wide; 45.812 in (114.775 cm) tall. Molding width: 1.375 in (3.493 cm)
Trim Rings: When using trim rings, mount backbox with at least 1 inch (2.54 cm) between wall surface and front of backbox, to allow door to open fully past the trim ring.		

The control panel and adjacent first-row modules mount in chassis CHS-M2, typically in the first/top row of the backbox. Additional rows of modules can be mounted in chassis CHS-4N and/or CHS-4L.

NOTE: If using the new CHS-M2 in a CAB-3 series backbox or in a CAB-4 series backbox manufactured before October 2002, verify stud height and cut any stud that exceeds 0.375 in. (9.525 mm) if a CPU is being mounted above it. See warning and instructions in Section 3.5.1 “Control Panel Circuit Board & Keypad/Display Unit”. In retrofit applications, the CAB-3 series backbox may be used, but a DR-4 series door is required.

Some additional components available in the CAB-4 series include:

DP-DISP An Inner Dress Panel for covering the backbox area surrounding display panels and various modules (required for Canadian installations).

NOTE: For use with JNCA, KDM-2, and primary displays.

BMP-1 Blank Module Plate for covering an unused dress-panel position. Provides another option for mounting modules such as TM-4, NCM-W, or NCM-F.

BP-4 Battery dress panel

VP-2B or MP-1B (with DP-1B) For covering top row(s) of backbox if control panel is mounted in a lower row. MP-1B is also used to mount panel circuit modules.

2.4 Optional Devices

Several optional components can be installed within the IFC-640 system. This list provides only a sample of common equipment; for a complete list of what is available, refer to Appendix C "Compatible Equipment" and for a list of conventional equipment, refer to the *Device Compatibility Chart*.

Network Control Annunciator - JNCA. Provides a text-based, 24 VDC powered, display and control device for Noti•Fire•Net. It incorporates a large LCD display and a silicone-rubber QWERTY keypad. It will display all events from the system.

Network Control Module - NCM-W/F. The NCM is an interface between the panel and Noti•Fire•Net. It comes in two models: wire and fiber-optic cable. Refer to the *NCM-W/F Installation Document* for more information and installation instructions.

Loop Expander Module - LEM-320. The LEM plugs into the control panel, expanding the board's function to control two Signaling Line Circuits (SLCs). Each IFC-640 can have one LEM. Refer to Section 3.5 "Installing the Control Panel" for installation instructions.

Auxiliary Power Supply - APS-6R. The optional Auxiliary Power Supply is a 150W cabinet-mounted power supply, designed to power devices that require filtered, non-resettable power, such as XP Transponder modules, NAC modules, and addressable Johnson Controls appliance circuit modules. The APS-6R provides three 24 VDC output circuits (6 A total in alarm, 4 A continuous): two power-limited circuits (3 A each) and one non-power-limited circuit (6 A). Refer to the *APS-6R Instruction Manual* for further information and installation instructions.

Addressable Charger/Power Supply - ACPS-2406. The optional ACPS-2406 is an addressable loop-based power supply and battery charger. This cabinet-mounted unit provides four individually addressable Notification Appliance Circuits. In addition, each circuit can provide notification appliance synchronization without an additional module. The unit charges 7 to 25 AH batteries with full supervision. The ACPS-2406 provides up to four 24 VDC (filtered) output circuits (2.5 A max each, 5.0 A total continuous, 6.0 A during a fire alarm). Refer to the *ACPS-2406 Instruction Manual* for further information, installation instructions, and battery calculations.

Batteries and Battery Boxes. The control panel uses only sealed lead-acid batteries for standby power. Maximum battery capacity is 55 AH (ampere-hour). Minimum battery capacity depends upon the system configuration; absolute minimum is 12 AH. CAB-4 Series backboxes provide space for two 25 AH (or smaller) batteries. Use external battery boxes if the installation requires larger capacity batteries. Battery boxes mount directly below the main cabinet. Battery box model JCI-LBB holds batteries up to 55 AH. Refer to Section 4.2 "NFPA 72-1999 Central or Remote Station Fire Alarm System (Protected Premises Unit)" and Section A.3 "Calculating the Battery Requirements" for further information. See *Battery/Peripherals Enclosure* document for backbox measurements and installation instructions.

Universal Digital Alarm Communicator/Transmitter (UDACT). Transmits system status to UL-listed Central Station Receivers over a public switched telephone network. Mounting is in a CAB-4 Series backbox or remotely in the ABS-8R enclosure. The unit connects to the EIA-485 annunciator port and 24 VDC (nominal) power. Refer to the *UDACT Instruction Manual* for further information and installation instructions.

Transmitter Module - TM-4. The TM-4 includes three reverse polarity outputs and a Fire Municipal Box Trip in a single module. It provides a means for the FACP to control Alarm, Trouble, and Supervisory reverse polarity outputs (15 mA, 24 VDC nominal) or a Fire Municipal Box Trip output. All output circuits are supervised. The Transmitter Module communicates over

the standard EIA-485 connection like an ACS device and mounts easily in standard module locations within the cabinet or external boxes. Refer to the *Transmitter Module TM-4* installation document for further information and installation instructions.

Universal Zone Coder - UZC-256. A circuit board, used for NAC coding applications, that provides three NAC output circuits and up to 256 zone codes. Refer to the *UZC-256 Universal Zone Coder* and *UZC-256 Programming* manuals for further information and installation instructions.

Field Charger/Power Supply - FCPS-24, FCPS-24S6, FCPS-24S8. Compact, cost-effective remote power supply and battery charger with a filtered, 24 VDC output that can drive up to four Notification Appliance Circuits (NACs). The FCPS-24S6/FCPS-24S8 can also synchronize the NACs. Refer to the *FCPS-24 Field Charger/Power Supply Manual* or the *FCPS-24S Field Charger/Power Suppply Manual* for further information and installation instructions.

Battery Charger - CHG-120. Designed to charge lead-acid batteries that provide emergency standby power for a Fire Alarm Control Panel. Provides two (2) output circuits for connection to multiple loads. Can be mounted into the CAB-4 Series backbox or the JCI-LBB Battery Box. Refer to the *CHG-120 Battery Charger* manual for further information and installation instructions.

Liquid Crystal Display - LCD-80. An alphanumeric display module that is an ancillary device which has two basic modes of operation. In *Terminal Mode* it acts as a display interface and in *ACS Mode* as an alphanumeric annunciator. The **LCD-80TM** is also available and provides *Terminal Mode* only. Refer to the *LCD-80* or *LCD-80TM Liquid Crystal Display* manuals for further information and installation instructions.

Remote Fire Annunciator - FDU-80. An 80-character LCD that displays all panel information remotely. Refer to the *FDU-80 Manual* for further information and installation information.

SCS-8 Series Smoke Control System. The Smoke Control Station (SCS-8) module uses eight groups of four annunciator points for fan shutdown control or other heating, ventilation or air conditioning functions. The Smoke Control Expander (SCE-8) is used to expand the SCS-8 by an additional eight groups of four annunciator points. Only one expander can be used per SCS-8. The Smoke Control Lamp Driver Station (SCS-8L) module uses eight groups of four annunciator points for fan shutdown control or other heating, ventilation or air conditioning functions. Must be mounted in custom graphic annunciator panel. The Smoke Control Expander (SCE-8L) is used to expand the SCS-8L by an additional eight groups of four annunciator points. Only one expander can be used per SCS-8L. Must be mounted in custom graphic annunciator panel. For more details on the SCS Smoke Control System, refer to the *SCS Manual*.

2.5 Intelligent Detectors

■ Introduction

Intelligent, addressable detectors provide analog information to the control panel on a Signaling Line Circuit (SLC). This allows the control panel to continually process this information to determine the status (alarm, trouble, maintenance, or normal) of each detector. Each detector responds to an SLC address that is set in the detector head using built-in rotary switches. Each SLC loop can support up to 159 detectors. The sensitivity of each intelligent detector can be programmed (refer to Appendix C in the *IFC-640 Programming Manual* for details).

NOTE: A blinking LED on an intelligent detector indicates communication between the detector and the control panel.

■ Detectors

The **FlashScan®** algorithm provides high-speed communication between analog intelligent devices, by polling in groups unless new information is reported. If one of the devices within the group has new information, the control panel stops the group poll and concentrates on single points. CLIP (Classic Loop Interface Protocol) is standard polling of each intelligent devices.

2951TMJ (Acclimate™) Intelligent detector that combines a photoelectric sensing chamber and fixed temperature heat detection (135°F/57.2°C). FlashScan capable.

FSB-200S Addressable, intelligent, single-ended beam smoke detector with built-in sensitivity testing. The **FSB-200** is the same except that it does not provide sensitivity testing. Both models support FlashScan and CLIP mode.

1951J Addressable, intelligent smoke detector that incorporates an ionization sensing chamber. Designed to provide open area protection. FlashScan capable.

2951J Analog, addressable intelligent smoke detector that uses a photoelectric sensing chamber. Listed for use in ducts. Designed to provide open area protection. FlashScan capable. The **2951TJ** adds thermal sensors that will alarm at a fixed temperature of 135°F (57°C).

5951J Intelligent thermistor sensing circuit for fast response. Designed to provide open area protection with 50 foot spacing capability. A fixed temperature sensor with 135°F fixed temperature alarm. FlashScan capable. The **5951RJ** incorporates a thermal rate of rise of 15°F (9.4°C). FlashScan capable. The **5951HJ** is a high temperature sensor with 190°F (87.8°C) fixed temperature alarm.

1351J Analog, addressable, low profile intelligent smoke detector that incorporates an ionization sensing chamber. Designed to provide open area protection.

2351J Same as 1351J, but uses a photoelectric sensing chamber. The **2351TJ** adds thermal sensors that will alarm at a fixed temperature of 135°F (57°C). Designed to provide open area protection.

5351J Intelligent thermistor sensing circuit for fast response. Designed to provide open area protection with 50 foot (15.24 m) spacing capability. The **5351RJ** incorporates a thermal rate of rise of 15°F (9.4°C).

DH300P Photoelectric Duct Detector. The **DH300RP** includes an alarm relay. The **DH300PL** and **DH300RPL** are low-flow detectors.

FTX-P1J (HARSH™) A special smoke detector that provides early warning smoke detection in hostile environments where traditional smoke detectors are not practical. CLIP mode only.

FTX-P2J (HARSH™) A special smoke detector that provides early warning smoke detection in hostile environments where traditional smoke detectors are not practical. FlashScan capable.

3251J A microprocessor-based intelligent smoke detector that uses a combination of photoelectric, ionization, and thermal sensing technologies. CLIP mode only.

2351TMJ Acclimate™ is a Combination Photoelectric/Heat Detector. This intelligent, addressable, multi-sensing, low-profile detector can automatically adjust its sensitivity. It uses a combination of photoelectric and thermal sensing technologies that are designed to increase immunity to false alarms.

7251J Early detection laser detector, similar to the 7351J VIEW®, but limited to CLIP mode operation only.

7351J VIEW® Low Profile Laser Detector An advanced intelligent photoelectric detector that uses a laser diode, special optics, and signal processing to obtain extremely high sensitivity. FlashScan capable.

■ Bases

Several bases, to which the detectors are affixed, are available:

B210LPJ Standard U.S. Low-Profile base

B501J Standard European flangeless base

B501BH, B501BHT Sounder base, includes B501J Sounder base with temporal sounder

B224RB Low Profile Intelligent relay base

B224BI Low Profile Intelligent isolator base

B510B-FTXJ HARSH™ base.

■ Accessories

RA400Z A Remote Single LED Annunciator that can be wired directly off of an addressable detector for annunciation of that detector's alarm status.

2.6 Addressable Modules

Control Modules and Monitor Modules provide an interface between the control panel and conventional notification and initiating devices. Each module can be set to respond to an address with built-in rotary switches with the ability to select up to 159 addresses. An LED will blink on a monitor module to indicate communication between the module and the control panel.

NOTE: For a list of approved notification and initiating devices, refer to the *Device Compatibility Document*.

Monitor and Zone Interface Modules - M300MJ, M302MJ & M300DJ Addressable monitor modules for monitoring conventional initiating devices. The M300MJ is used for normally open contact alarm initiating devices, such as manual pull stations, four-wire smoke detectors, heat detectors, waterflow, and supervisory devices. Use the M302MJ for interface to two-wire smoke detectors in addition to normally open contacts. The M300DJ provides two independent 2-wire Initiating Device Circuits (IDCs) at two separate, consecutive addresses. Wire supervised IDCs as NFPA Style B (Class B) or Style D (Class A) circuits. The modules come with a thermoplastic cover for mounting to a 4-inch (10.16 cm) square mounting box.

Monitor Module - M301MJ An addressable module that is functionally similar to the M300MJ Monitor Module—but offered in a smaller package for mounting directly in the electrical box of the device being monitored. (Class B input circuit only.)

Control Module, NAC - M300CJ Addressable Control Module used as Notification Appliance Circuits (NACs) to power and supervise compatible, UL-listed notification appliances. Wired supervised NACs as NFPA Style Y (Class B) or Style Z (Class A). The modules come with a thermoplastic cover for mounting to a 4-inch (10.16 cm) square mounting box.

Control Module, Relay - M300RJ Similar to the M300CJ except used as a Form-C control relay module.

Fault Isolator Module - M500XJ This module is not addressable, but listed here due to its use in an SLC. Protects the system against wire-to-wire short circuits on the SLC. It should be placed between groups of sensors in a Style 6 or Style 7 SLC to isolate short- and open-circuit problems and protect the rest of the loop so it can continue to operate normally.

Pull Station - JBG-12LX An addressable manual pull station with key-lock reset feature. The addressable module is housed within the pull station.

Transponder - XP5-M Supervises five Class-B addressable Initiating Device Circuits each with a maximum loop resistance of 1,200 ohms. These circuits monitor normally open contact initiating devises (manual pull stations, heat detectors, four-wire smoke detectors, security contacts,

etc.). One XP5-M occupies five consecutive addresses on the signaling line circuit (SLC). Each circuit has one red LED status indicator that blinks when it is not active, and produces a steady glow when active. For more information see the *XP5 Series Transponder Manual.*

Transponder - XP5-C Each of the five circuits of the XP5-C can act as a notification appliance/speaker/telephone circuit (Class B only) or a Form-C relay. A push-button switch changes the circuit to a Form-C relay. One XP5-C occupies five consecutive addresses on the SLC. Each circuit has one green LED status indicator that blinks when it is not active, and produces a steady glow when active. For more information see the *XP5 Series Transponder Manual.*

Quad Intelligent Audio Transponder - XPIQ The XPIQ is an integrated audio amplification and distribution subsystem that can direct up to four low-level audio signals through four audio amplifiers to integrated, continuously supervised speaker circuits. An on-board power supply charges and supervises battery backup.

Multi-Input/Output Modules - XP6-C, XP6-R, XP10-M, XP6-MA FlashScan capable multi-input/output modules are available for use on the SLC loop. All are FlashScan capable.

- XP6-C controls six NAC or speaker/telephone circuits. Applications are equivalent to those for XP5-C set as a notification appliance/speaker/telephone circuit. (Not listed for use in releasing applications.)
- XP6-R controls six Form-C relays. Applications are equivalent to those for XP5-C set as a Form-C relay.
- XP10-M supervises ten Class-B addressable Initiating Device Circuits (IDC) which monitor normally open contact initiating devices. Applications are equivalent to those for XP5-M.
- XP6-MA enables an intelligent alarm system to monitor six zones of conventional two-wire detectors.

For installation instructions, refer to the documentation provided with the modules.

2.7 Annunciation Modules

■ Introduction

This section contains brief descriptions and model numbers of annunciator modules that can be connected to the control panel. Communication between the control panel and annunciators takes place over a two-wire serial interface connected to the control panel's EIA-485 ACS Mode connection. Section 2.8 "Annunciators" contains more detailed information.

■ Description

Below are descriptions of the Annunciator Modules and Expander Modules used with the control panel.

Annunciator Control Module - ACM-8R Provides the control panel with a mappable relay control module. Relays can be selected for mapping anywhere in the system memory (in groups of eight). Provides eight Form-C relays with 5 A @ 125 VAC (resistive) or 5 A @ 30 VDC (resistive) or 2 A @ 125 VAC (inductive) contacts. Tracks any group of eight zones within the system.

Refer to *ACM-8R Annunciator Control Module* manual for more information.

Lamp Driver Annunciator Module - LDM-32 Provides 32 alarm lamp driver outputs for connection to a custom graphic annunciator. DIP switch selectable for 32 alarm outputs or 16 alarm/16 trouble outputs, and 16 switch inputs for control of system control functions as Signal Silence and System Reset.

Refer to the *LDM Series Lamp Driver Annunciator Modules* manual for more information.

Lamp Driver Annunciator Expander Module - LDM-E32 Expands the LDM-32 by 32 system points, to a maximum of 64 points.

Lamp Driver Relay Expander Module - LDM-R32 Provides the LDM-32 or LDM-E32 with 32 dry Form-A (normally open) contacts.

2.8 Annunciators

The Annunciator Control System provides the control panel with 32 remote annunciators. The number of points a particular annunciator can support is reflected in the part number. For example, an ACM-24AT has 24 points and an ACM-48A has 48 points. The number of points on an Annunciator Expander Module must match the number of points on the Annunciator Control Module it is expanding. One Annunciator Fixed Module can also be used per system. Connections are through an EIA-485 ACS Mode connection on the Control Panel.

NOTE: The IFC-640 can only support 64 points per annunciator address regardless of the model used.

Brief descriptions follow of specific modules used with the control panel. For detailed information, refer to the specified product manual.

2.8.1 Annunciators with 24- and 48-Point Capacity

For specific installation information, refer to the *Annunciator Control Module* manual. For Canadian requirements, see Appendix D “Canadian Applications”.

Annunciator Control Module - ACM-24AT A one-channel Class-B unit with 24 switch controlled annunciator points. Each point is controlled by a silicone-rubber switch with indicator LED. Multi-color LEDs can be programmed to produce one of three colors: red, green or yellow.

Annunciator Expander Module - AEM-24AT An expander board for the ACM-24AT that provides an additional 24 points and is identical in size and appearance. Up to three expanders can be used with an ACM-24AT.

NOTE: An AEM-24AT cannot be used to expand an ACM-48A.

Annunciator Control Module - ACM-48A A one-channel Class- B unit with 48 annunciator points for indicating current system status. Each annunciator point has a red LED for alarm, and a green LED for normal; each module has a yellow unit-trouble LED at the top.

Annunciator Expander Module - AEM-48A An expander board for the ACM-48A that provides an additional 48 points and is identical in size and appearance. One expander can be used with an ACM-48A.

NOTE: An AEM-48A cannot be used to expand an ACM-24AT.

2.8.2 Annunciators with 16- and 32-Point Capacity

Models with several other LED color combinations are available for use in areas with specific color requirements. Refer to the *Annunciator Control System* manual for detailed information. For Canadian requirements, see Appendix D “Canadian Applications”.

Annunciator Control Module - ACM-16AT Provides features for audible and visual indication of alarm and trouble conditions at each annunciator point. They include:16 red alarm LEDs, 16 yellow trouble LEDs, 16 momentary touch-pad switches for controlling each point, System trouble LED, Online/Power LED, Local sounder, Silence/Acknowledge switch, and Remote functions.

Annunciator Expander Module - AEM-16AT Expands the ACM-16AT by 16 system points and is identical in size and appearance. Three expander modules are supported by one control module providing a maximum of 64 system points.

NOTE: An AEM-16AT cannot be used to expand an ACM-32A.

Annunciator Control Module - ACM-32A Provides features for audible and visual indication of alarm and trouble conditions at each annunciator point. They include: 32 red alarm LEDs, System trouble LED, Online/Power LED, Local sounder, and Silence/Acknowledge switch.

Annunciator Expander Module - AEM-32A Expands the ACM-32A by 32 system points and is identical in size and appearance. One expander module is supported by the control module providing a maximum of 64 system points.

NOTE: An AEM-32A cannot be used to expand an ACM-16AT.

2.8.3 Annunciator Fixed Modules

■ Introduction

Provide the control panel with discrete display and control points. Fixed modules turn their LEDs on and off as directed by the control panel, and also report switch activations to the control panel for action. You can only use one fixed module in a system. Each annunciator's address is fixed at address 1.

Refer to the *Annunciator Fixed Module* manual for further information.

■ Description

Annunciator Fixed Module - AFM-16AT Contains 16 red alarm and 16 yellow trouble LEDs, a system trouble LED, an Online/Power LED, and a local sounder, and switches for control panel Acknowledge, Alarm Silence, and System Reset. Use the AFM-16AT for systems that require 16 or fewer annunciation points.

Annunciator Fixed Module - AFM-32A Contains 32 red alarm LEDs, a system trouble LED, an ON LINE/POWER LED, and a local panel sounder with a silence/acknowledge switch. The AFM-32A is fixed at address 1, and will not accept expander modules.

2.9 Peripheral Displays and Printers

The control panel is compatible with the following printers and display devices:

- PRN Series Printer
- Keltron Remote Printer VS4095
- CRT-2 Display Terminal

All EIA-232 devices must be located in the same room within 50 feet (15.24 m) of the control panel.

Printer - PRN Series Printer The PRN is an optional printer that connects directly to the control panel through an EIA-232 interface (TB14) and can be located up to 50 feet (15.24 m) from the control panel. It creates a printed record (80 columns of data on standard 9" x 11" tractor-feed paper) of all system events (alarm, trouble) and status changes within the system. The printout is time-stamped with the current time-of-day and date.

Keltron Remote Printer The VS4095 is a two-color (red/black), 40-column, 24 VDC printer that can print 50 messages in 90 seconds. This printer connects to the control panel through an EIA-232 interface (TB14) and mounts in a separate cabinet next to the control panel. The VS4095 meets UL fire and security requirements for an ancillary device.

For more information, contact the manufacturer (Keltron Corp., Waltham, MA)

Display Terminal - CRT-2 This optional display terminal connects to the control panel through an EIA-232 interface (TB15). The terminal can control and view events, points and history reports, control the system (Acknowledge, Alarm Silence, and System Reset). The terminal displays 26 lines by 80 columns and can be located up to 50 feet (15.24 m) from the control panel within the same room.

NOTE: The CRT cannot be connected at the same time as the network.

2.10 Panel Circuit Modules

■ Introduction

The control panel supports the following modules to control external circuits and relays:

- Indicating Circuit Module (ICM-4RK) & Indicating Circuit Expander (ICE-4)
- Control Relay Module (CRM-4RK) & Control Relay Expander (CRE-4)
- Auxiliary Relay Module (ARM-4)
- Voice Control Module (VCM-4RK), Dual Channel Module (DCM-4RK) & Voice Control Expander (VCE-4)

Up to eight of these modules (in any combination) can be controlled by the panel. Below are brief descriptions of the modules; for a description of VCM-4RK and DCM-4RK, see Section 2.11 “Voice Alarm System”.

Indicating Circuit Module - ICM-4RK Provides four (4) NACs for Style Y (Class B) or Style Z (Class A) operation. Circuits are field-programmable to respond to a single initiating zone, a group of zones, or all initiating zones. Maximum signaling current is 3 A per circuit or 6 A per module, limited by the power supply.
An Auxiliary Power Harness (P/N 71091) is provided. **Note:** ICM-4RK is not listed for use with IFC-640 in releasing applications.

Indicating Circuit Expander - ICE-4 An attaching circuit board that expands the ICM-4RK to a total of eight Style Y (Class B) or Style Z (Class A) NAC’s. Maximum signaling current is 3 A per circuit or 6 A per module, limited by the power supply. An Auxiliary Power Harness (P/N 71091) is provided.

Control Relay Module - CRM-4RK Provides four (4) standard dry Form-C relay contacts. Each relay is field-programmable to respond to a single initiating device circuit, a group of circuits, or all initiating device circuits. Each relay features manual On/Off control switches and can be disabled or enabled. Contacts rated for 5 A at 120 VAC or 28 VDC (resistive). **Note:** CRM-4RK is not listed for use with IFC-640 in releasing applications.

Control Relay Expander - CRE-4 An attaching circuit board that expands the capacity of the Control Relay Module (CRM-4RK) to eight (8) Form-C alarm relays. May also be used to expand the ICM-4RK to provide four (4) Form-C control relays. Contacts rated for 5 A at 120 VAC or 28 VDC (resistive).

Auxiliary Relay Module - ARM-4 Provides four (4) auxiliary Form-C relays that can be controlled by a CRM-4RK or CRE-4 relay module. Normally-open contacts rated for 20 A and the normally-closed contacts are rated for 10 A at 125 VAC and 30 VDC (resistive). An Auxiliary Power Harness (P/N 71092) is provided.

2.11 Voice Alarm System

■ Introduction

Voice Alarm equipment provides a manual or automatic supervised paging system for transmitting voice messages (information, instructions, directions) on a selective or all call basis. For more information and installation instructions refer to the *Voice Alarm System* manual.

■ Configuration

JVCC-1B Voice Control Center Basic equipment package for single-channel audio evacuation system that includes: AMG-1 Audio Message Generator (with microphone), CHS-4L Chassis, DPSW-1B Single-well Dress Panel, and Cable assemblies required to connect to control panel.

JVTCC-1B Voice/Telephone Control Center Basic equipment package for single-channel audio evacuation system employing a Fire Fighter's Telephone system that includes: FFT-7 Fire Fighter's Telephone, AMG-1 Audio Message Generator (with microphone), CHS-4L Chassis, DPDW-1B Double-well Dress Panel, and Cable assemblies required to connect to control panel.

JTCC-1B Telephone Control Center Basic equipment package for a Fire Fighter's Telephone system with no voice evacuation or paging capabilities that includes: FFT-7 Fire Fighter's Telephone, CHS-4L Chassis, TBP-1B Blank Panels (2), DPDW-1B Double-well Dress Panel, and Cable assemblies required to connect to control panel.

■ Descriptions

Audio Message Generator (AMG-1 & AMG-E) Provides a variety of tones and a built-in microphone allows for paging through speaker circuits. Optionally, you can install up to four digitally-recorded voice messages into the AMG-1: two factory prerecorded voice messages, two user-defined messages. You can create both user-defined messages through the AMG-1 built-in microphone, or download messages from a standard audio cassette recorder.
The AMG-E is an AMG-1 without a microphone. It is used for applications that require multiple Audio Message Generators.

Fire Fighters Telephone (FFT-7 and FFT-7S) Provides the Voice Alarm System with fire fighter's telephone capability. With these units, up to seven telephones can be used to hold a simultaneous conversation. The FFT-7S does not provide paging capability.

Voice Control Module (VCM-4RK) Provides the system with up to four (4) Style Y (Class B) or Style Z (Class A) speaker circuits, or up to four Style Y (Class B) telephone circuits. Moving a jumper on the module configures it for driving FFT-7 circuits. When configured for telephone circuits, the VCM-4RK accepts its signal directly from a Fire Fighters Telephone. Add an optional Voice Control Expander (VCE-4) to the back of the module to provide four additional telephone or speaker circuits.

Dual Channel Module (DCM-4RK) Provides the system with the capability to select one of two types of audio sources for switching to a specified speaker circuit. The module provides up to four circuits.

Audio Amplifiers The control panel uses three types of audio amplifiers with an installed Voice Alarm System:

- AA-30 – Provides up to 30 watts of audio power for driving 25 Vrms speaker circuits.
- AA-100 – Provides 100 watts of audio power for driving 25 Vrms and 70.7 Vrms speaker circuits.
- AA-120 – Provides 120 watts of audio power for driving 25 Vrms speakers.

Each AA amplifies the audio signal coming in from an Audio Message Generator (AMG-1 or AMG-E).

Audio Coupling Transformer ACT-1 Couples low-level audio to audio amplifiers or other audio inputs, such as the AMG-1 Audio Message Generator. Provides Common Mode Noise Rejection (CMNR), greatly reducing crosstalk from the SLCs. For more information and installation instructions refer to the *Voice Alarm System* manual.

Audio Coupling Transformer ACT-2 When used with an AMG-1/-E, RM-1 and AA-30 this unit provides a means to drive thousands of amplifiers in large audio system applications. The ACT-2 provides electrical isolation between its input & output and attenuates the signal from high-level audio to low-level audio. For more information and installation instructions refer to the *ACT-2 Product Installation Drawing*.

■ Additional Devices

The following devices are not part of the Voice Control System, but are listed here for continuity.

Remote Microphone (RM-1 and RM-1SA) Provides paging capabilities to speaker systems driven by the low level audio source of the AMG-1. The RM-1 assembly can be installed in a CAB-4 Series backbox, while the RM-1SA is installed in a CAB-RM cabinet. For more information and installation instructions see the *RM-1 Series Remote Microphone* installation document.

Quad Intelligent Audio Transponder - XPIQ See product description on page 23.

Section 3: Installation

3.1 Preparing for Installation

Choose a location for the fire alarm system that is clean, dry, and vibration-free with moderate temperature. The area should be readily accessible with sufficient room to easily install and maintain it. There should be sufficient space for cabinet door(s) to open completely.

Carefully unpack the system and inspect for shipping damage. Count the number of conductors needed for all devices and find the appropriate knockouts. (Refer to Section 3.11 “UL Power-limited Wiring Requirements” for selection guidelines.)

Before installing the fire alarm system, read the following:

- Review the installation precautions at the front of this manual, including temperature and humidity limits for the system (Page 3).
- All wiring must comply with the National and Local codes for fire alarm systems.
- Do not draw wiring into the bottom 9 inches (22.86 cm) of the cabinet except when using a separate battery cabinet; this space is for internal battery installation.
- Review installation instructions in Section 3.2 “Installation Checklist”.

CAUTION:
Make sure to install system components in the sequence listed below. Failure to do so can damage the control panel and other system components.

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

3.1.1 Standards and Codes

In addition, installers should be familiar with the following standards and codes:

- NEC Article 300 Wiring Methods.
- NEC Article 760 Fire Protective Signaling Systems.
- Applicable Local and State Building Codes.
- Requirements of the Local Authority Having Jurisdiction.
- C22.1-98 The Canadian Electrical Code, Part 1.
- CAN/ULC-S5524-01 Standard for the Installation of Fire Alarm Systems.

3.2 Installation Checklist

Table 3.1 provides an installation checklist for installing, wiring, and testing the IFC-640 system. It has references to installation information included in manuals listed in Section 1.2 “Supplemental Documentation”.

Seq	Task	Refer to
1.	Mount the cabinet backbox to the wall.	Section 3.3 “Mounting a Cabinet”
2.	Install all required chassis in cabinet.	Section 3.5 “Installing the Control Panel”
3.	Install control panel onto chassis.	Section 3.5.1 “Control Panel Circuit Board & Keypad/ Display Unit”
4.	Optional: Install auxiliary power supply and/or external battery charger	Auxiliary power manuals
5.	Calculate the proper battery rating.	Appendix A “Power Supply Calculations”
6.	Connect AC wiring, place batteries into backbox without connecting them, and run cable to optional power supplies, DC power outputs, NACs, and relays. **CAUTION: Do not apply AC or DC power at this time.**	Section 3.6 “Connecting the Power Cables”
7.	Set switches for backup alarm (SW6-SW9).	Section 3.9 “Backup-Alarm Switches”
8.	Optional: Install and wire Auxiliary Relay Module (ARM-4).	Section 3.13 “Auxiliary Relay Module (ARM-4): Product-Specific Details”
9.	Optional: Install Panel Circuit Modules (ICM-4RK, CRM-4RK, VCM-4RK, DCM-4RK) and Voice Alarm System components (AMG-1, FFT-7, Audio Amplifiers)	Section 3.12 “Installing Panel Circuit Modules”, and *Voice Alarm System Manual*
10.	Optional: Install output devices such as a printer, or CRT terminal.	Section 3.14 “Installing Remote Printers and/or CRT”
11.	Optional: Install JNCA or IFW.	JNCA *Manual* or *IFW Manual*
12.	Secure any unused mounting holes in control panel circuit board.	Figure 3.4
13.	Wire the Signaling Line Circuits.	Section 3.15 “Wiring a Signaling Line Circuit (SLC)”
14.	Connect wire shielding as instructed.	SLC Wiring Manual
15.	Apply AC power to the control panel by placing the external circuit breaker to the ON position. **Do NOT connect batteries**.	
16.	Check AC power.	Table 3.3 in Section 3.6 “Connecting the Power Cables”
17.	Connect the batteries using interconnect cable, P/N 75560 and 75561.	
18.	Install the CAB-4 series door.	CAB-3/CAB-4 Series Cabinet Installation Document
19.	Program the control panel.	*IFC-640 Programming Manual.*
20.	Field test the system.	Section 5 “Testing the System”

Table 3.1 Installation Checklist

3.3 Mounting a Cabinet

This section provides instructions for mounting an CAB-4 Series backbox to a wall. Follow these guidelines when mounting the backbox:

- Locate the backbox so that the top edge is 66 inches (1.6764 m) above the surface of the finished floor.
- Allow sufficient clearance around cabinet for door to swing freely. (See Section 2.3 “System Cabinets”.)
- Use the four holes in the back surface of the backbox to provide secure mounting. (See Figure 3.1.)
- Mount the backbox on a surface that is in a clean, dry, vibration-free area.

CAUTION:
Unless you are familiar with the placement of components within this backbox, only use the knockout locations provided for conduit entry.

Follow the instructions below.

1. Mark and pre-drill holes for the top two keyhole mounting bolts (0.25 inch, 0.635 cm). Use mounting hardware appropriate for the mounting surfaces; see UL 2017 Pull-Test Requirements.
2. Select and punch open the appropriate knock-outs. (For selection guidelines, see Section 3.11 "UL Power-limited Wiring Requirements".)
3. Using the keyholes, mount the backbox over the two screws.
4. Mark the location for the two lower holes, remove the backbox and drill the mounting holes.
5. Mount the backbox over the top two screws, then install the remaining fasteners. Tighten all fasteners securely.
6. Feed wires through appropriate knockouts.
7. Install control panel and other components according to Section 3.5 "Installing the Control Panel" before installing hinges and door according to *CAB-3/CAB-4 Series Cabinet Installation Document.*

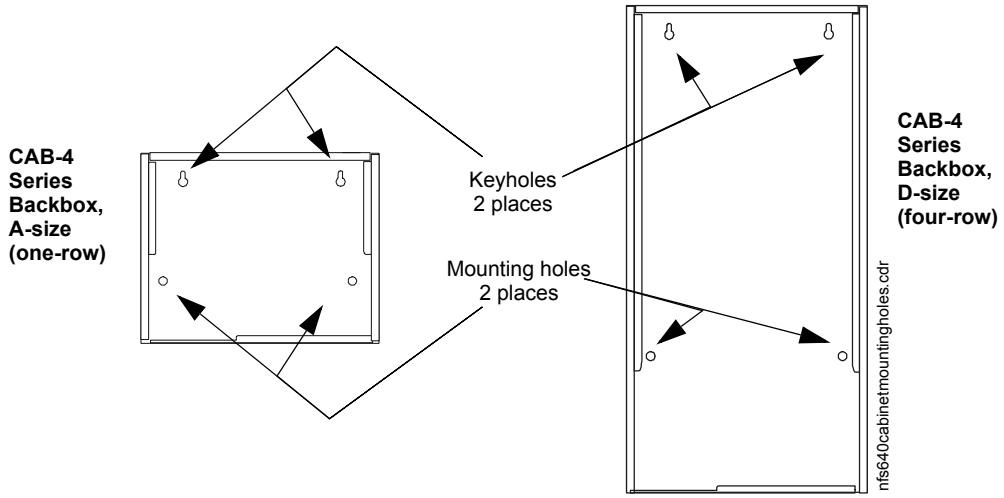


Figure 3.1 Mounting Holes of a Backbox

3.4 Laying Out Equipment in Cabinet and Chassis

The IFC-640 allows for flexible system design. Follow these guidelines when deciding where to locate equipment in the backbox.

The first row of equipment mounts in chassis CHS-M2. Mount second, third, or fourth rows of equipment in chassis CHS-4N (panel circuit modules, see Section 3.12 "Installing Panel Circuit Modules"), or in chassis CHS-4L (voice components, see the *Voice Alarm System Manual*). Some equipment, such as the JNCA and annunciators, may be door-mounted; refer to the equipment's documentation for instructions.

There are four basic positions available on a chassis (side-by-side); the number of modules that can be mounted in each position depends on the chassis model and the module size.

The CHS-M2 accepts four layers of equipment, including the control panel. The control panel fills three positions in the first-installed layer, its integral power supply occupies two positions in the next two layers, and the optional display occupies the two left-most slots in the fourth layer (flush with the door). Panel circuit modules and other modules of the same sizing can be mounted in several layers, depending on the desired configuration; see Table 3.2 to determine hardware. Some equipment, such as the JNCA, may be door-mounted directly in front of the control panel. The BMP-1 Blank Module Plate covers unused positions in a dress-panel, providing another mounting location for some modules, such as TM-4 (see *BMP-1 Product Installation Drawing* for details).

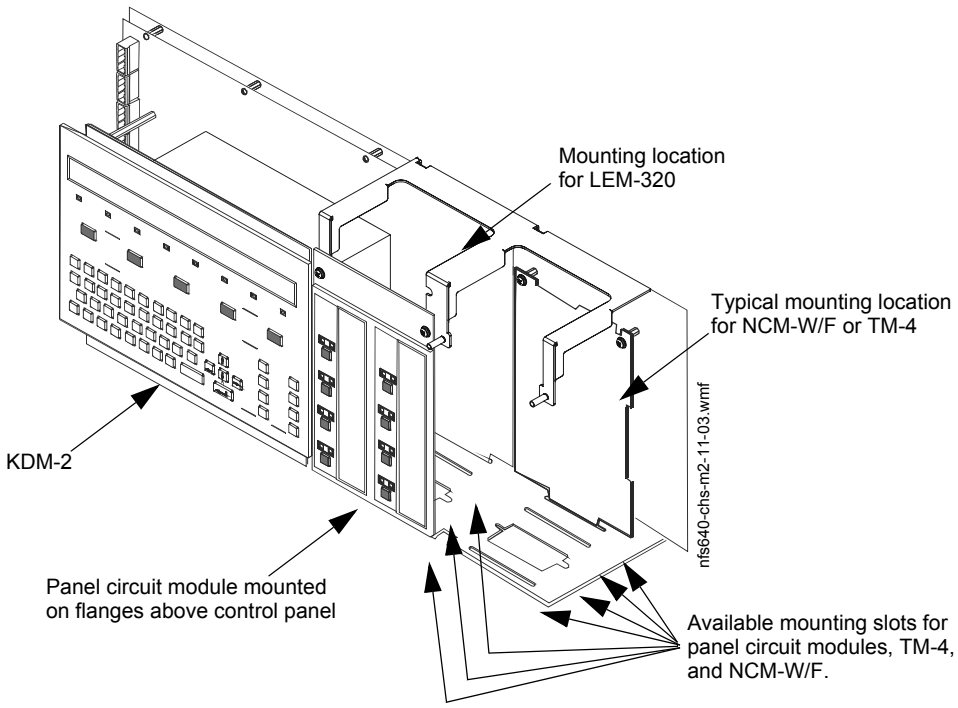


Figure 3.2 Equipment Mounting Locations (First-Row Chassis CHS-M2)

NOTE: When designing the cabinet layout, consider separation of power-limited and non-power-limited wiring as discussed in Section 3.11 “UL Power-limited Wiring Requirements”.

From…	To…	Required Stand-off or Hardware
Chassis CHS-M2	Control panel or module on first layer	Not applicable; integral to the chassis.
Control panel or Option board, 1st layer	Option board, 2nd layer (includes LEM-320)	4 male-female stand-offs of length 0.937 inch (23.8 mm) P/N 42166.
Option board, 2nd layer	Option board, 3rd layer	4 male-female stand-offs of length 0.937 inch (23.8 mm) P/N 42166.
Chassis	Option board, 4th layer (flush with door)	Attaches directly to flanges on chassis. (Screws provided with option boards & panel circuit modules)
Chassis	Panel circuit module (flush with door)	Attaches directly to flanges on chassis. (Screws provided with option boards & panel circuit modules)
Control panel	KDM-2 (upper edge)	2 stacks of male-female stand-offs: P/N 42185 (2.0 inch, 50.8 mm) and P/N 42186 (1.312 inch, 33.33 mm)
Chassis rail	KDM-2 (lower edge)	2 male-female stand-offs of length 0.937 inch (23.8 mm) P/N 42166.
Dress panel DP-DISP or ADP-4B	JNCA	Attaches directly to dress panel. (Nuts provided with JNCA.)
Dress panel DP-DISP or ADP-4B	Option board	BMP-1 attaches to dress panel; option module attaches to BMP-1 (screws provided with option module).
Note: The initial release of chassis CHS-M2 used L-brackets and stand-offs of different lengths than the current model; refer to Doc. 51864, Rev A.		

Table 3.2 Stand-off Lengths

3.5 Installing the Control Panel

3.5.1 Control Panel Circuit Board & Keypad/Display Unit

The control panel mounts in chassis CHS-M2, which is usually positioned in the top row of the backbox. The control panel's CPU occupies three positions at the back of the chassis; the KDM-2 occupies two positions flush with the door. The JNCA may be door-mounted directly in front of the control panel if no KDM-2 is being used; see the *JNCA Manual* for details and restrictions.

NOTE: For initial release of IFC-640, mounting instructions were different. Refer to the installation manual shipped with the panel (Rev A).

1. Verify height of the mounting stud in the backbox. In older backboxes, the stud **must** be shortened to prevent damage to the JCPU-640. All electronics must be removed from the backbox before shortening. See instructions in the warning below.

WARNING:
For retrofit applications, verify the height of the backbox's mounting stud on left side under CPU, as shown in Figure 3.3 below. Stud height must not exceed 0.375 in. (9.525 mm). Early versions of the CAB-4 Series backboxes and all CAB-3 Series backboxes have studs that require shortening. Failure to shorten this 0.625 in. (15.875 mm) mounting stud will cause damage to the control panel's CPU. Remove electronics from backbox, permanently mount empty CHS-M2 chassis to backbox, apply nut to mounting stud to protect threading, then cut stud to proper length. Reinstall electronics as discussed in the steps below.

WARNING:
Do not cut without washers and nuts in place to protect threading. Wear protective eye covering.

If using a new CHS-M2 in a CAB-3 series backbox or in a CAB-4 series backbox manufactured before October 2002, verify stud height and cut any stud that exceeds 0.375 in. (9.525 mm) as per Step 1 above if a CPU is being mounted above it. Reinstall electronics as discussed in the steps below.

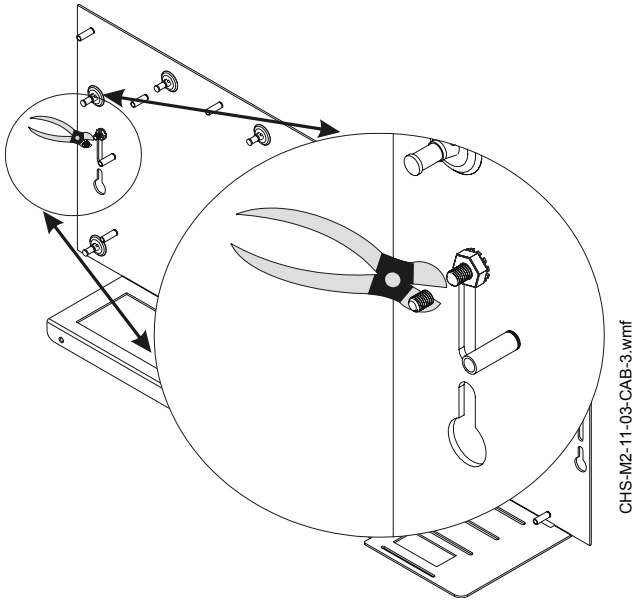


Figure 3.3 Using the Redesigned CHS-M2 with Older Backboxes

2. Screw chassis to the backbox.
3. Attach JCPU-640 to the chassis. Slide control-panel tabs into slots on chassis and lay the board onto stand-offs so that mounting holes line up with those on the chassis. Secure with six (6) screws (four across the top of the board, and two to the left of the power supply) provided with the chassis. (See Figure 3.4.)

4. If installing KDM-2, install the stand-offs included with the keyboard kit. (See Figure 3.4.)

- The upper edge of the keyboard mounting plate rests on two stacked pairs of male-female stand-offs. Connect P/N 42185 (2.0 inch, 50.8 mm) to P/N 42186 (1.312 inch, 33.33 mm).
- Thread the stacked pairs of stand-offs through mounting holes on the control panel as shown in Figure 3.4.
- Thread two P/N 42166 (0.937 inch, 23.8 mm) male-female stand-offs through mounting holes in the chassis rail.
- Attach ribbon cable from keypad to J4 connector on control panel. (See Figure 2.3.)
- Align the keypad with the stand-offs and screw it down.

5. If using the JNCA instead of the KDM-2, refer to Section 3.5.2 “Using JNCA as Primary Display” and the *JNCA Installation Manual*.
6. If not using an LEM-320, secure the last 4 mounting holes with screws.

CAUTION:
It is critical that all mounting holes of the IFC-640 are secured with a screw or standoff to insure continuity of Earth Ground.

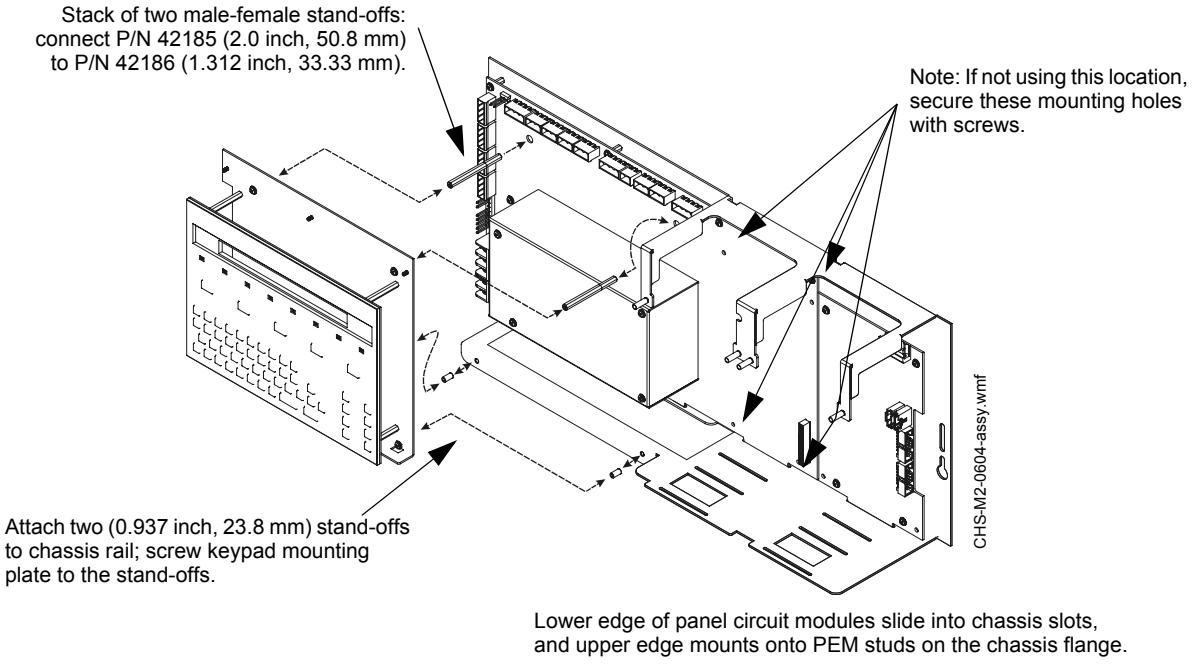


Figure 3.4 Locating and Aligning Stand-offs for Keypad/Display and Panel Circuits (Chassis CHS-M2 shown)

3.5.2 Using JNCA as Primary Display

The IFC-640 can be set up to use a JNCA instead of a KDM-2. In this system design, connect the network/service port on the IFC-640 (J1) directly to the network/service port on the JNCA (J3); see the *JNCA Manual* for specific instructions.

NOTE: This system design is required in Canadian stand-alone applications.

If the IFC-640 and JNCA are being used as a stand-alone pair, each device must be programmed separately using VeriFire Tools in its off-line programming mode. Because the VeriFire Tools computer also uses the network/service port, IFC-640 and JNCA must be temporarily disconnected

for programming. If the IFC-640 with JNCA is connected to a network, there are two additional options for programming: either connect the VeriFire Tools programming PC to the network port on the NCM board, or program the IFC-640 through another network node. (See VeriFire Tools on-line help for details.)

3.5.3 Loop Expander Module

Installing a Loop Expander Module adds a second SLC loop to the control panel. Refer to the Figure 3.6 for connector illustrations.

1. Thread four (4) 0.937 inch (23.8 mm) stand-offs through indicated holes in the JCPU-640 board.
2. Plug stacker-connector into J3 on the JCPU-640.
3. Lay the LEM onto the standoffs and connect the Loop Expander Module (LEM) into the stacker-connector attached to J3.
4. Attach LEM using screws provided with the module.
5. After LEM is mounted on the control panel, connect the SLC loops to TB1 on the LEM and TB16 on the JCPU-640. This system supports either FlashScan or CLIP mode devices. Refer to the SLC loop manual for wiring requirements and specific details.

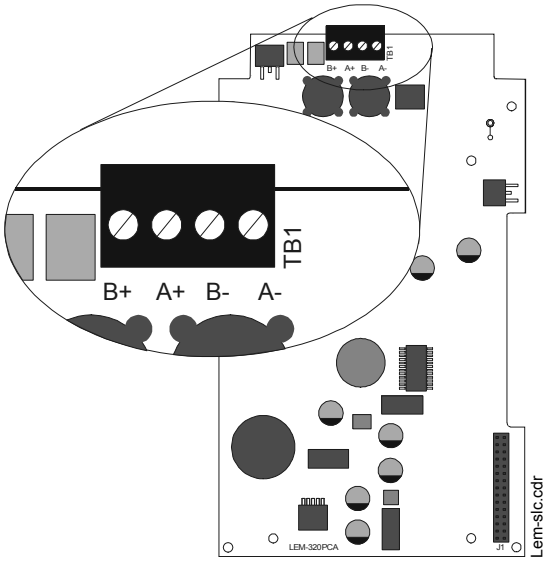
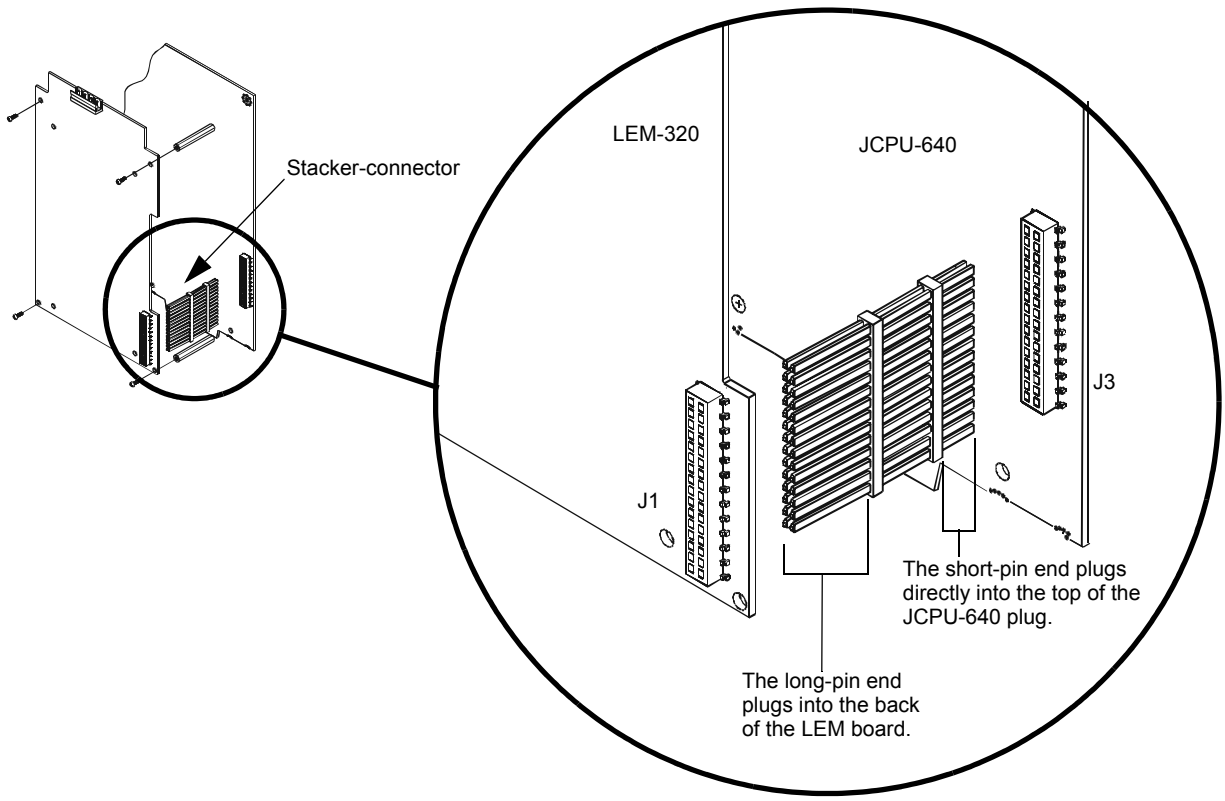


Figure 3.5 SLC Connections for LEM-320



CAUTION:
If the stacker-connector is installed incorrectly, the short-pin end of the plug can fail to make a secure connection when plugged through the back of the LEM.

Figure 3.6 Mounting LEM-320 with the Stacker-connector

3.5.4 Network Control Module

If networking two or more control panels (including JNCAs), each unit requires a Network Control Module (NCM); wire and fiber versions are available. The NCM-W/F can be installed in any panel circuit module position (see Section 3.5.5 “Panel Circuit Modules and Other Option Boards”); the default position is immediately to the right of the control panel.

1. Mount the NCM in the selected position. If another board is going to be mounted in the slot immediately in front of it, use stand-offs provided with the next board to secure it in place. Otherwise use the screws provided with the NCM.
2. Connect J1 on the control panel to J3 on the NCM using the network cable provided (P/N 75556) as described in the *NCM Installation Document*. Do not connect two NCMs via NUP ports (aka NUP to NUP).
3. Connect Channel A and/or Channel B as described in the *NCM Installation Document*.

NOTE: See the *Noti•Fire•Net Manual* and *NCM Installation Document* for wiring diagrams and system configuration information. See the *BMP-1 Product Installation Drawing* if considering mounting the module behind blank module plate in a dress plate or annunciator backbox.

3.5.5 Panel Circuit Modules and Other Option Boards

If installing option boards into a CAB-4 Series backbox, mount and connect those boards at this time. General instructions follow; the sections about individual option boards contain any module-specific instructions. Option boards can be mounted in the front (fourth) layer of CHS-M2 (see flanges as shown in Figure 3.4), or in any position on the other row(s) of equipment, using 0.937" (23.8 mm) standoffs between layers.

NOTE: An option board can be mounted above a Loop Expander Module or Network Control Module; for ease of access, be sure to complete installation of those devices before mounting a second layer.

1. Slide the tabs at the bottom of the option board into slots on the chassis as shown in Figure 3.7.
2. Lay the board back onto the flanges so that the studs line up with mounting holes on the option board.
3. Attach the option board using screws provided with the module.

NOTE: See the *BMP-1 Product Installation Drawing* for details if considering mounting the module behind blank module plate in a dress plate or annunciator backbox. This dress plate is suitable for modules that do not need to be visible or accessible when the door is closed.

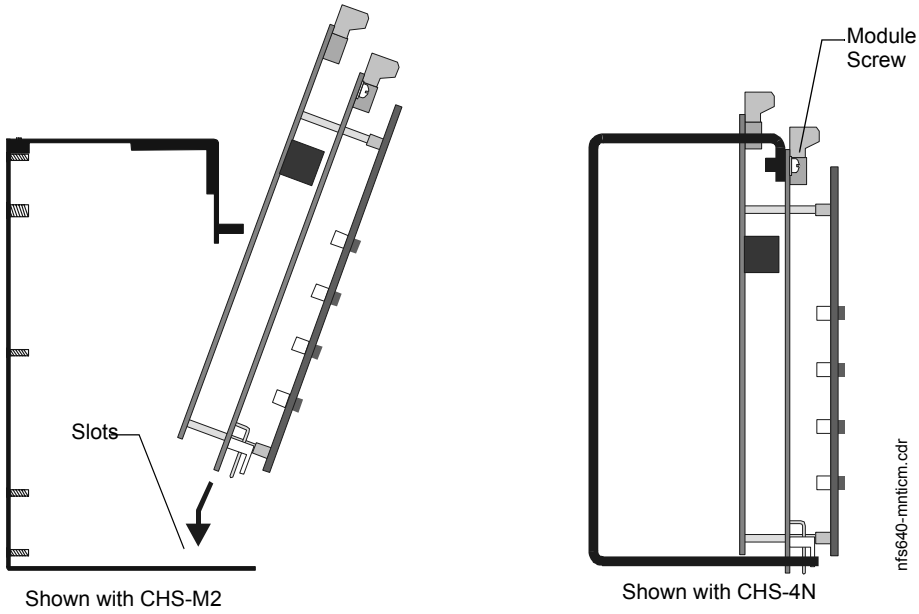


Figure 3.7 Inserting a Module into a Chassis

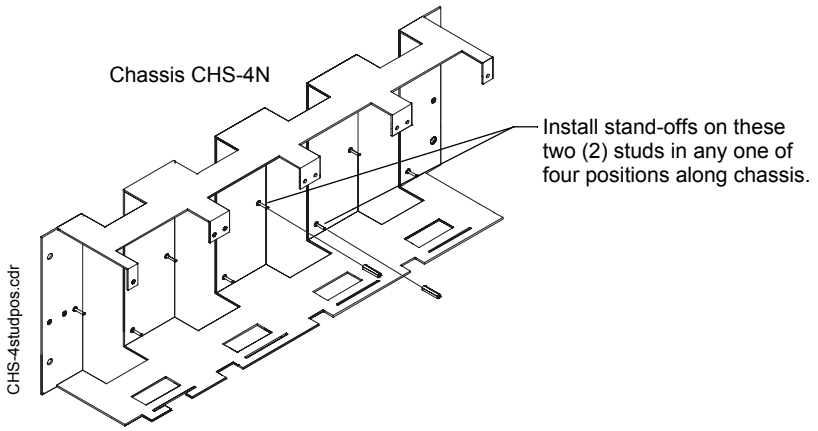


Figure 3.8 Location of Stand-offs on Module Chassis

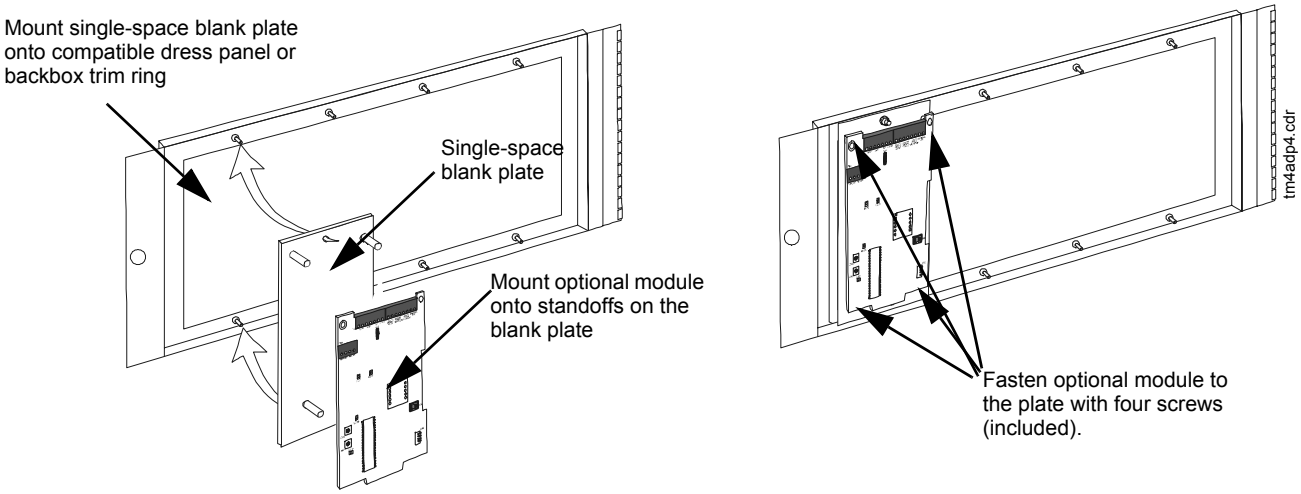


Figure 3.9 Mounting Single-space Blank Plate with Optional Module

3.6 Connecting the Power Cables

WARNING:
Remove all power sources to equipment while connecting electrical components. Leave the external, main power breaker OFF until installation of the entire system is complete.

WARNING:
Several sources of power can be connected to the control panel. Before servicing the control panel, disconnect all sources of input power *including the battery*. While energized, the control panel and associated equipment can be damaged by removing and/or inserting cards, modules, or interconnecting cables.

3.6.1 Overview

Complete all mounting procedures and check all wiring before applying power. Electrical connections include the following:

- Primary AC power source – 120 VAC, 50/60 Hz, 3.0 A (IFC-640E uses 240 VAC, 50/60 Hz, 1.5 A) from line voltage source. Overcurrent protection for this circuit must comply with

Article 760 of the National Electrical Code (NEC) and/or local codes. Use 12 AWG (3.1 mm^2) wire (maximum) with a 600-volt rating.

- Secondary power source – 24 VDC from batteries, installed in the control panel (or in an optional battery cabinet). Secondary (battery) power is required to support the system during loss of primary power.
- External power sources – 24 VDC power for Smoke Detectors (4 wire), NACs, and Annunciators.

See Appendix B "Electrical Specifications" for details and overall installation guidelines.

3.6.2 Connecting the Control Panel to AC Power

Connect primary power as follows (see Figure 3.10 below):

1. Turn off the circuit breaker at the main power distribution panel.
2. Remove the plastic insulating cover from TB2.
3. Connect the service ground to terminal marked EARTH.
4. Connect the primary neutral line to terminal marked NEUTRAL and the primary Hot line to terminal marked HOT.
5. Reinstall the plastic insulating cover over TB2.

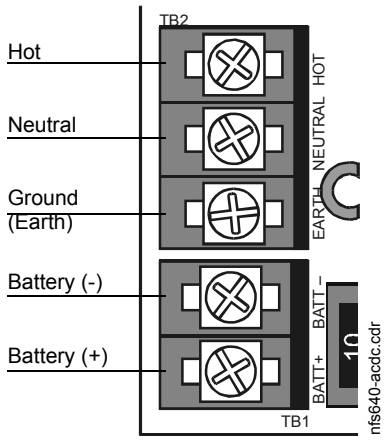


Figure 3.10 AC & DC Power Connections

3.6.3 Checking AC Power

Table 3.3 contains a checklist for checking the system with AC power applied:

CAUTION:
While checking AC power, make sure batteries are not connected.
Follow the sequence of steps in Section 3.2 "Installation Checklist", Table 3.1; this is Step 16.

Component	Status
Control panel circuit board	The green AC Power indicator on; the system Trouble indicator on because batteries are not connected.
Each panel circuit module	The yellow Trouble indicator may come on for approximately 10 seconds after applying AC power. (This only applies to an unconfigured system.)
Each auxiliary power supply	The yellow Trouble indicator comes on because batteries are not connected.

Table 3.3 AC Power Checklist

3.6.4 Installing and Connecting the Batteries

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

WARNING:
Do not connect the Battery Interconnect Cables (P/N 75560 and 75561) at this time. Make this connection AFTER initial system primary powerup. Follow sequence of steps in Section 3.2 "Installation Checklist", Table 3.1; this is Step 17.

Batteries (2) are installed in the control panel cabinet or in a separate battery cabinet which can be mounted below the control panel or up to 20 feet (6.096 m) away from the control panel, in the same room.

Connect the battery as follows (see Figure 3.10 above):

1. Install batteries (2) into bottom of cabinet or into separate battery cabinet.
2. Connect the red cable from TB1(+) on the control panel to the positive (+) terminal of one battery.
3. Connect the black cable from TB1(–) on the control panel to the negative (–) terminal of the **other** battery.
4. Connect the remaining cable between the negative (-) terminal on the first battery to the positive (+) terminal on the second battery.

3.6.5 APS-6R Auxiliary Power Supply Connections

If an optional APS-6R power supply is installed in the cabinet, connect it with no power applied; follow sequence of steps in Section 3.2 "Installation Checklist", Table 3.1; this is Step 4. For all information pertaining to these connections see the *APS-6R Instruction Manual*.

3.6.6 External DC Power Output Connections

Terminal TB7 provides two (2) power outputs, resettable and non-resettable. Each output is power-limited. Follow sequence of steps in Section 3.2 "Installation Checklist", Table 3.1; this is part of Step 6.

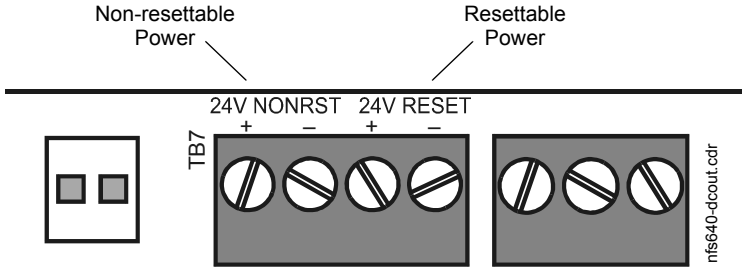


Figure 3.11 Power Supply DC Outputs - TB7

24 VDC Resettable Power Circuit (Four-Wire Smoke Detectors). The power supply provides a single 24 VDC filtered, power-limited, resettable power circuit for devices that require resettable power (such as four-wire smoke detectors). This circuit is power-limited, but must be supervised. To provide supervision, install a UL-listed end-of-line power supervision relay (such as the EOLR-1) after the last device. Connect the power supervision relay normally open contact in

series with an Initiating Device Circuit (IDC). The four-wire power circuit energizes the power supervision relay. When you reset the system, the control panel removes power from these terminals for approximately 15 seconds.

Connect external field wires to the power supply terminals TB7 RESET(+) and (–) to provide up to 1.25 A of current for powering four-wire smoke detectors. See Figure 3.11 above.

24 VDC Non-resettable Power Circuit. The power supply provides one 24 VDC filtered, power-limited, non-resettable power output, capable of up to 1.25 A. Use this circuit to power devices that require low-noise 24 VDC power (such as annunciators or the TM-4).

Connect external field wires to power supply terminals TB7 NONRST(+)and(–) to provide up to 1.25 A of non-resettable current for powering external devices such as annunciators. See Figure 3.11 above.

CAUTION:
During system reset, power remains at terminals TB7 NONRST(+)and(–).

3.7 NAC Connections & Releasing Circuits

The control panel provides four NAC terminals as shown in Figure 3.12. Each can be configured as Style Y (Class B) or Style Z (Class A) as shown in Figure 3.13. Each circuit can provide 2.5 A of current, but the total current drawn from the main power supply cannot exceed 6.0 A in alarm condition (refer to Table A.2). NAC circuits are supervised and power-limited. Use UL-listed 24 VDC notification appliances only (refer to the *Device Compatibility Document*).

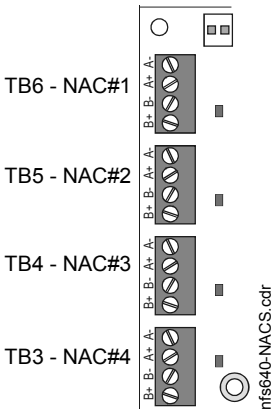


Figure 3.12 NAC Terminals

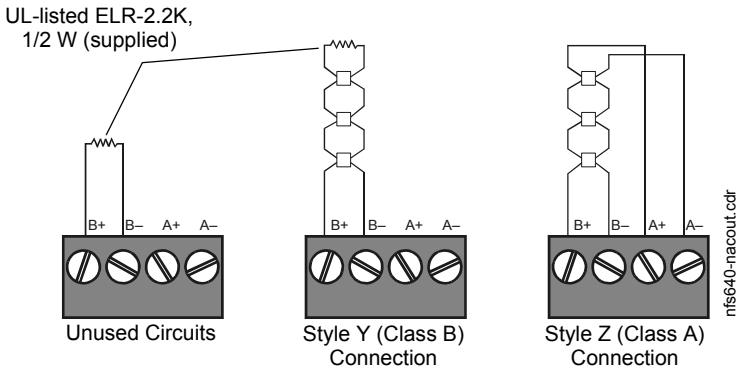


Figure 3.13 Notification Appliance Circuit Connections

NOTE: Any NAC can be programmed as a releasing circuit, but only one releasing device per circuit is allowed. For more information, refer to Section 4.5 “Releasing Applications” in this manual and the *IFC-640 Programming Manual*. Refer to the *Device Compatibility Document* for UL-listed compatible releasing devices. Sample connections for NAC terminals are shown in Figure 3.13. Follow sequence of steps in Section 3.2 “Installation Checklist”, Table 3.1; this is part of Step 6.

3.8 Output Relay Connections

The panel provides a set of Form-C relays. These are rated for 2.0 A at 30 VDC (resistive):

- Alarm - TB8
- Trouble - TB9
- Supervisory - TB10
- Security - TB11

The Supervisory and Security contacts can also be configured as Alarm contacts by setting switches SW1 and SW5 away from the factory default positions shown in Figure 3.14. Follow sequence of steps in Section 3.2 “Installation Checklist”, Table 3.1; this is part of Step 6.

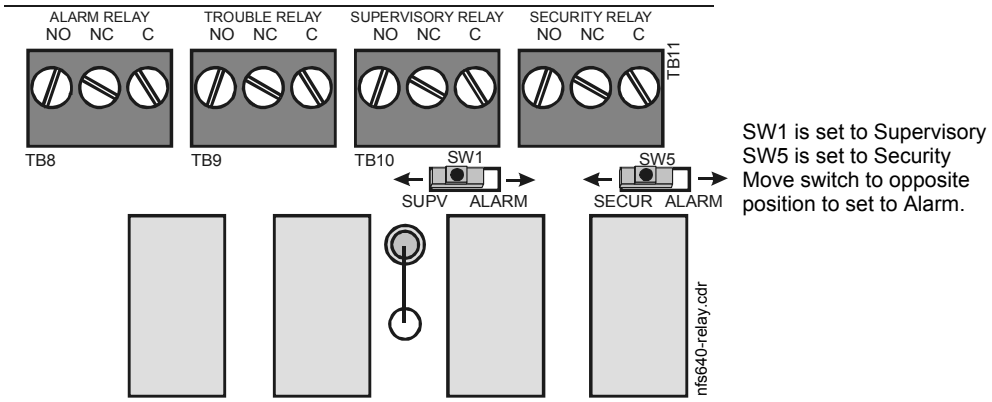


Figure 3.14 Form-C Relay Connections

3.9 Backup-Alarm Switches

WARNING:
Do not enable the BACKUP option switch for any of the four Notification Appliance Circuits (NACs) if they are used for releasing functions!

Backup alarm switches are provided that enable NACs and the alarm relay to activate during a backup alarm condition. If the main board’s microcontroller fails and an alarm is reported by any detector or a monitor module that has backup reporting enabled, the NAC will turn on if the corresponding switch was enabled. The alarm will activate during microcontroller failure regardless of the settings of Switch 6-9.

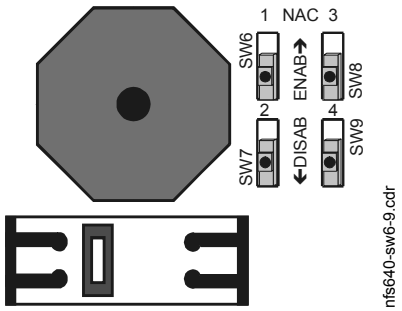


Figure 3.15 Backup Alarm Switches

- Switch 6 - NAC#1
- Switch 7 - NAC#2
- Switch 8 - NAC#3
- Switch 9 - NAC#4

So, for example, if Switch 6 and Switch 8 were enabled at the time of an alarm during microcontroller failure, NAC#1 and NAC#3 would activate. Follow sequence of steps in Section 3.2 “Installation Checklist”, Table 3.1; this is Step 7.

3.10 Installing a Transmitter Module TM-4

TM-4 is power-limited. Connections are on TB7 nonresettable output and TB13 EIA-485 ACS Mode. Refer to the *Transmitter Module TM-4* installation document for installation details.

3.11 UL Power-limited Wiring Requirements

Power-limited and nonpower-limited circuit wiring must remain separated in the cabinet. All power-limited circuit wiring must remain at least 0.25 inches (6.35 mm) from any nonpower-limited circuit wiring. All power-limited and nonpower-limited circuit wiring must enter and exit the cabinet through different knockout and or conduits. To maintain separation, group non-power limited modules together, i.e., group modules on the same side of the enclosure or in separate rows.

Figure 3.16 shows one configuration that meets these UL requirements. The first two rows of modules are configured with at least a 0.25 inch (6.35 mm) separation between power-limited and nonpower-limited wiring; AC and battery wiring is routed away from power-limited wiring.

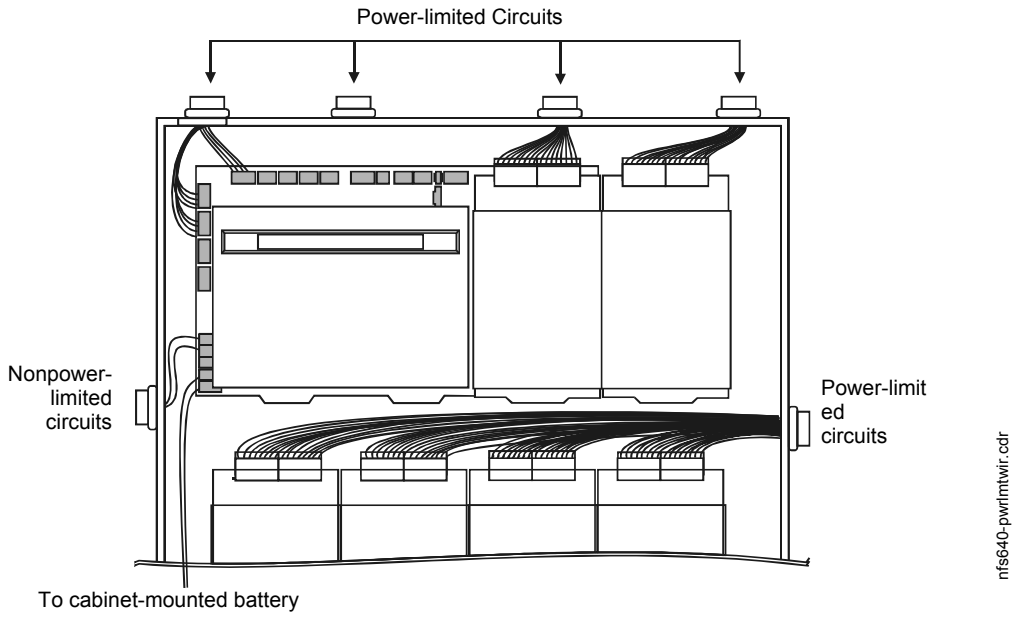


Figure 3.16 Typical Wiring for UL Power-limited Wiring Requirements

NOTE: AC and battery wiring are not power-limited. Maintain at least 0.25 inches (6.35 mm) between power-limited and non power-limited circuit wiring. Install tie wraps and adhesive squares to secure the wiring. Use a power-limited source for relay output on terminals TB8 – TB11.

3.11.1 Labeling Modules and Circuits

At the time of installation, each nonpower-limited circuit connected to ACM-8R, ARM-4, CRM-4RK, CRE-4, and LDM-R32 modules must be identified in the space provided on the cabinet door label when connected to a non-power-limited source of power.

The label lists all compatible power-limited modules and circuits; also see Figure 2.3 at the start of this manual.

The following devices are power-limited only when connected to power-limited sources: ARM-4, CRM-4RK, CRE-4, LDM-R32. When one of these devices is connected to a non-power-limited source, the power-limited marking must be removed.

3.12 Installing Panel Circuit Modules

3.12.1 Overview

Installation of a panel circuit module is divided into five (5) operations:

- Mounting an optional expander board to the module (e.g. mounting ICE-4 onto an ICM-4RK).
- Connecting communication ribbon cables from Control Panel to the module.
- Installing the module onto a chassis.
- Connecting modules to the power supply.
- Field wiring the module.

Refer to Section 2.10 “Panel Circuit Modules” for a complete list of modules and their expanders.

3.12.2 Mounting Expander Boards

Expander Board Modules, such as ICE-4 or CRE-4, need to be mounted onto their respective modules (ICM-4RK, CRM-4RK) prior to installation onto a chassis. Figure 3.17 illustrates the steps to mount an Expander Module:

1. Remove one module support screw and set it aside for later use.
2. Replace the module support screw with one module stand-off.
3. Repeat Steps 1 and 2 for the three remaining module support screws.
4. Insert pins on the front of the expander board into connector on the back of the module. Make sure the pins are in line; then, press the two units together until they snap into place.
5. Install the four module support screws (removed earlier) through the back of the expander board and into the stand-offs. Tighten securely.

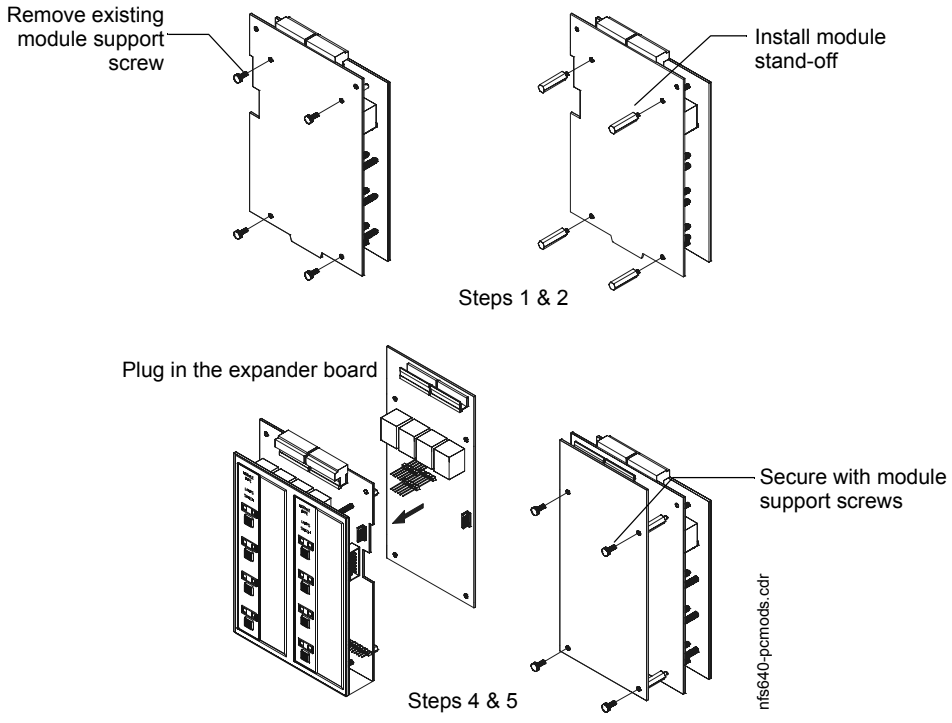


Figure 3.17 Expander Module Installation

3.12.3 Connecting Ribbon Cables for a CAB-4 Series Backbox

Expander Row Ribbon Cables connect panel circuit modules to the Control Panel.

Figure 3.18 shows a typical wiring setup using two Expander Row Ribbon Cables (P/N 71088) to connect the control panel to two rows of four (4) panel circuit modules each below the Control Panel in a CAB-4 Series backbox.

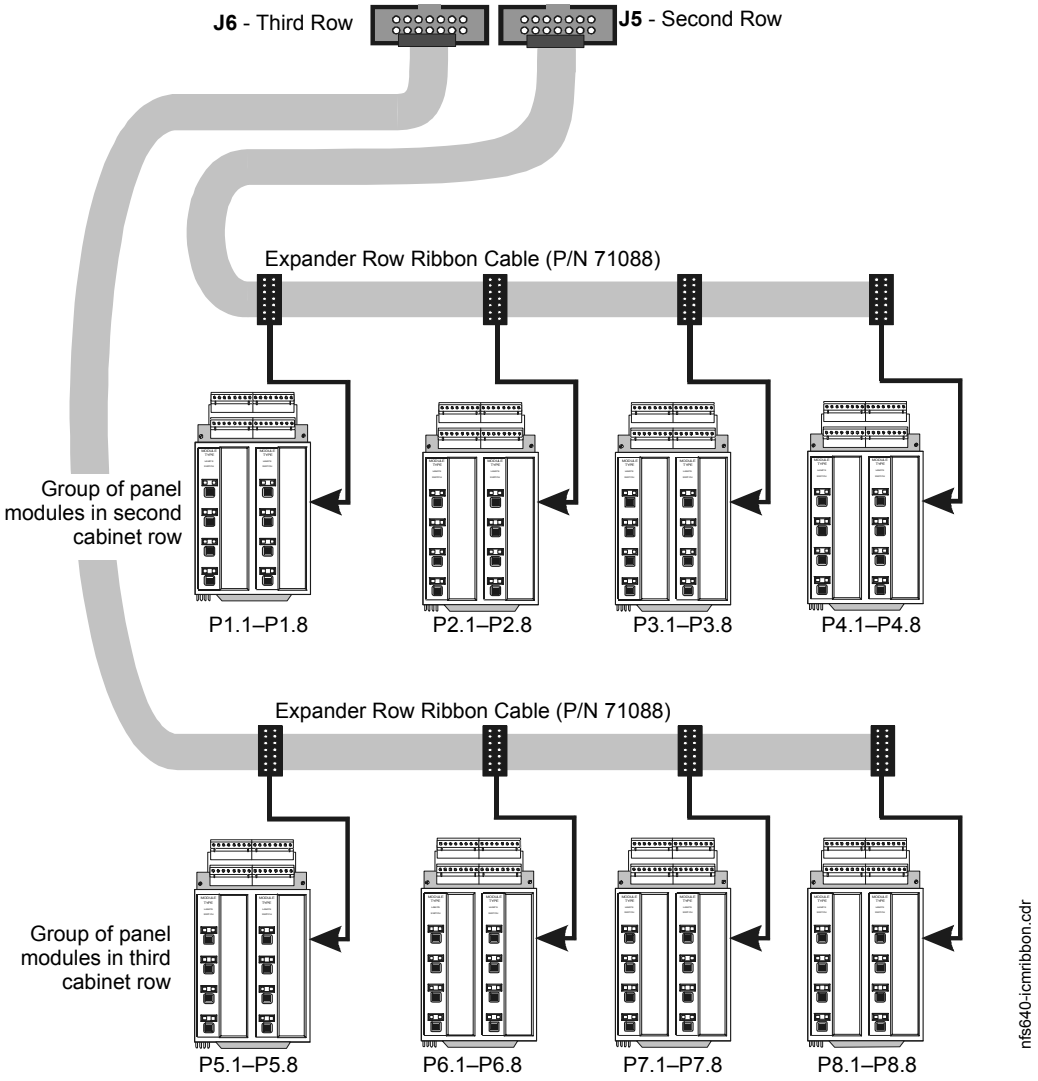


Figure 3.18 Expander Row Ribbon Cable Setup

3.12.4 Installing the Panel Circuit Modules

To install a panel circuit module such as a ICM-4RK or CRM-4RK into the chassis:

1. Angle the module into the chassis so that the lower board edge slips into the chassis slots as shown in Figure 3.7.
2. Push the upper end of the module into the upper opening in the chassis.
3. Secure the module to the chassis with the two module screws (provided with the module). Tighten securely.
4. Connect the Ribbon Cable to the module.

3.12.5 Connecting ICM-4RK and ICE-4 Modules

The total current available for any group of Notification Appliance Circuits (NACs), other than the four NACs on the control panel, cannot exceed the following:

- 6.0 A when powered from the APS-6R
- 1.25 A when powered from a IFC-640 DC power output terminal

Figure 3.19 shows the wire connectors on the bottom of the ICM-4RK and the ICE-4 modules.

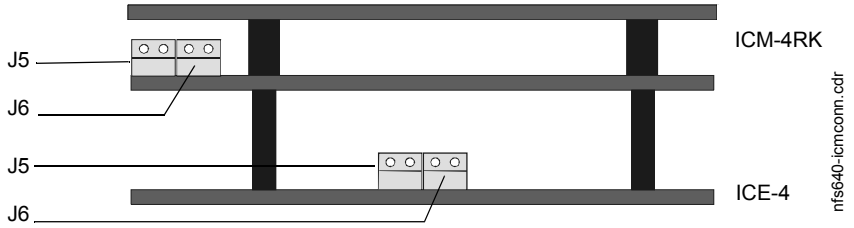


Figure 3.19 ICM-4RK/ICE-4 Connectors

Power Supply Connections

Figure 3.20 illustrates typical connections from main power supply.

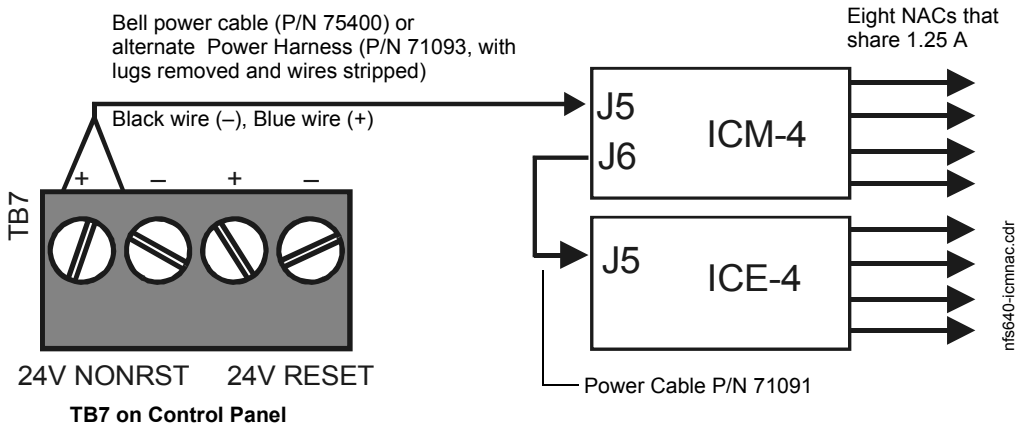


Figure 3.20 Main Power Supply Connection

Multiple Power Supplies

Cut JP1 and JP2 on ICM-4RK when supplying 24V power from two separate sources to the ICM-4RK. ICM-4RK circuits 1-2 will receive their power from J5; ICM-4RK circuits 3-4 will receive their power from J6.

Cut JP1 and JP2 on ICE-4 when supplying power from separate sources to expander circuits 5-8. ICM-4RK circuits 5-6 will receive power from J5 on the ICE-4 and ICM-4RK circuits 7-8 will receive power from J6 on the ICE-4.

See Figure 3.21 for jumper locations.

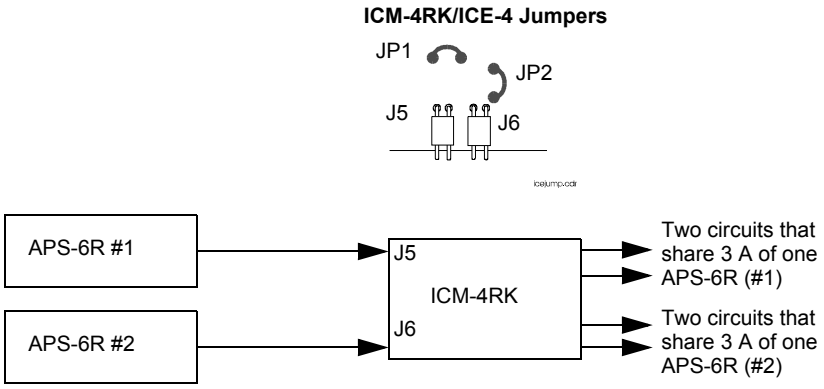


Figure 3.21 Sample ICM-4RK Configuration for Multiple Power Supplies

3.12.6 Field-Wiring the ICM-4RK and ICE-4 (NFPA Style Y or Z)

Guidelines for field-wiring:

- Notification Appliance Circuits (NACs) are supervised, power-limited, and can connect to an energy-limited cable.
- Use only the compatible, UL-listed notification appliances listed in the Device Compatibility Document.
- Wire notification appliances according to the manufacturer's instructions.
- Maximum current per circuit is 3.0 A. Maximum current per module depends on the type of power supply (standard or auxiliary).
- Canadian installations require model N-ELR End-of-Line Resistor Assembly (Style Y only).
- Size NAC wiring so the voltage drop does not exceed the minimum rated voltage of the notification appliance used as the last device on the circuit.
- For zone coded applications, refer to the *UZC-256 Universal Zone Coder* manual.
- The ICM-4RK is California Code programmable (microprocessor P/N 34077 Rev. B or higher). To program for California Code, cut diode D35 as shown in Figure 3.23. (See appendix section of the Programming Manual for more detail.)

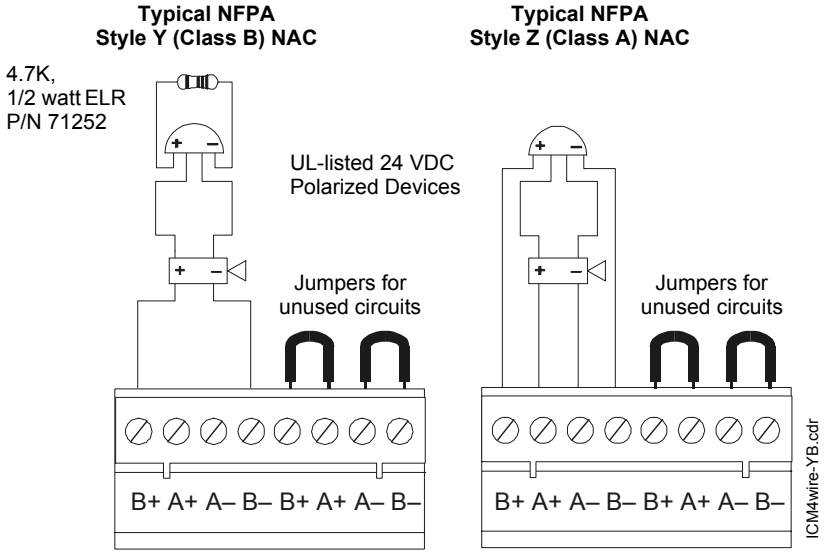


Figure 3.22 Field-Wiring an ICM-4RK/ICE-4

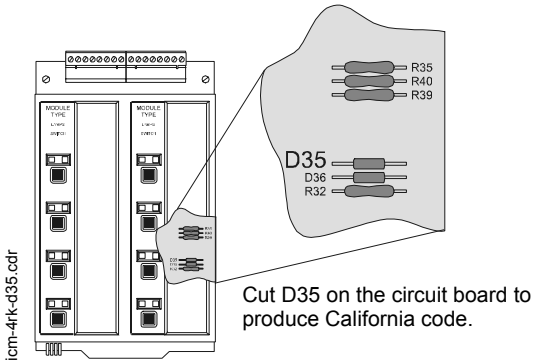


Figure 3.23 Location of D35 on ICM-4RK Circuit Board

3.12.7 Connecting CRM-4RK/CRE-4 Modules

Guidelines for field-wiring the CRM-4RK and the CRE-4:

- Form-C relay contacts (silver alloy) used for medium duty switching or pilot duty.
- Terminals will accept wire sizes from 12 AWG to 18 AWG (3.1 to 0.78 mm^2).
- Activation of a module or expander relay occurs automatically when an alarm is detected on a programmed IDC.
- UL contact ratings are 5 A at 125 VAC (resistive) or 30 VDC (resistive) and 2 A at 125 VAC (inductive).
- For more information, refer to Section 3.11 “UL Power-limited Wiring Requirements”.
- For typical field-wiring connections, refer to Figure 3.24.

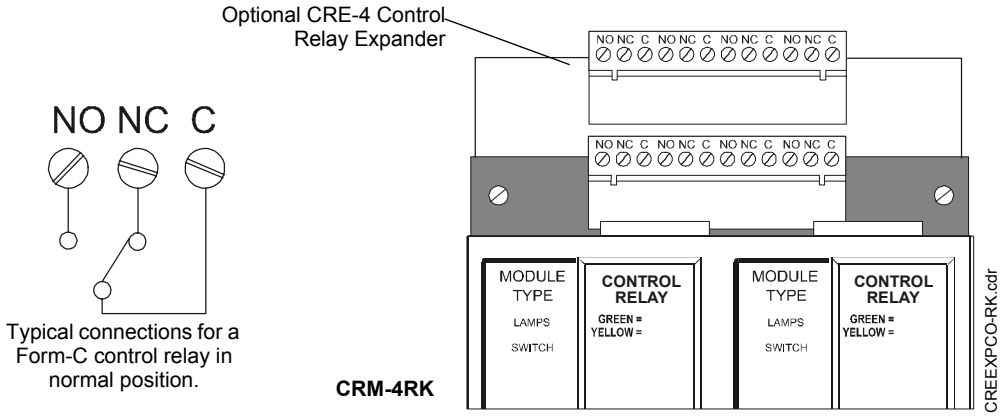


Figure 3.24 Field-Wiring a CRM-4RK or CRE-4 Module

3.13 Auxiliary Relay Module (ARM-4): Product-Specific Details

3.13.1 Overview

If a CRM-4RK/CRE-4 is to be incorporated into the control panel and an ARM-4 is being driven by it, note the following:

- Each ARM-4 must be supported by one CRM-4RK or one CRE-4.
- If using ARM-4's for both modules, mount two ARM-4's in separate positions.
- If mounted in FACP enclosure keep all non-power limited wiring separate from power limited wiring.

For ease of installation, service, and wiring mount the ARM-4 module in a position on the chassis that will not have any other module or expander board in front of it. However, you can install the ARM-4 directly behind the CRM-4RK or CRE-4.

ARM-4 mounts in the second, third or fourth row of a CAB-4 series backbox, against the back of a chassis CHS-4 or CHS-4L. The ARM-4 may be mounted in any of the 8 adjacent backbox positions the cable can reach.

3.13.2 Installation

To install the Auxiliary Relay Module in the chassis:

- Select a mounting position for the module on the chassis.
- Install two (2) mounting stand-offs onto the studs of the chassis, at the selected location, as shown in Figure 3.8 on page 38 and Figure 3.25. Tighten securely.
- Install three (3) support stand-offs, with screws, onto the PC board in the locations shown in Figure 3.8 or in the two right-hand positions on the first row. Tighten securely.
- Position module over the stand-offs on the chassis; fasten the module to the chassis with the two (2) retaining screws. Tighten securely.
- Connect one end of the Cable (P/N 71092) to plug P1 on the ARM-4.
  Note: The other end of the cable is connected to jumper JP5 on the CRM-4RK or CRE-4.
- Connect all available external wiring at this time. Refer to Section 3.13.3 "Field Wiring an Auxiliary Relay Module".

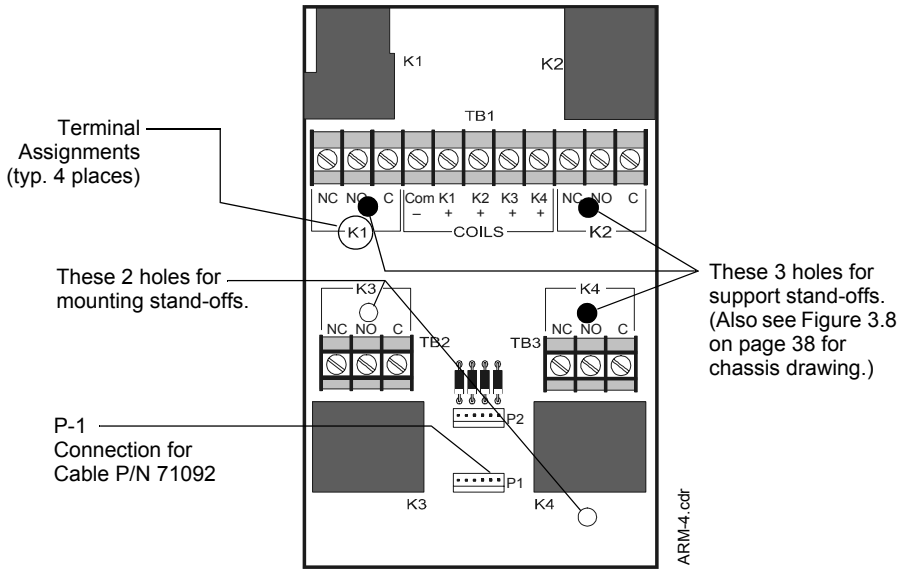


Figure 3.25 ARM-4 Stand-off and Terminal Locations

3.13.3 Field Wiring an Auxiliary Relay Module

The figure above shows terminal assignments for ARM-4 module control relays K1-K4, which control nonpower-limited circuits. Power-limited and nonpower-limited circuit wiring must remain separated by at least 0.25 inch (6.35 mm) within the cabinet and exit the cabinet through different knockouts, conduits, or both.

NOTE: For more information, refer to Section 3.11 “UL Power-limited Wiring Requirements”.

The table contains contact ratings for relays K1-K4 on the ARM-4 module:

Resistive Load	Contacts Normally Open (N.O.)	Normally Closed (N.C.)
125 VAC	20 A	10 A
30 VDC	20 A	10 A

Table 3.4 Contact Ratings for K1-K4 on the ARM-4 Module

3.14 Installing Remote Printers and/or CRT

3.14.1 Custom Cable Fabrication

A custom cable needs to be fabricated to connect the PRN Printer, Keltron Printer or the CRT-2 Monitor to the system. Length of the cable will vary with each installation, but should not exceed a maximum length of 50 feet (15.24 meters). Printer must be installed in the same room as panel. Construct cable as follows:

1. Using overall foil/braided-shield twisted-pair cable, properly connect one end to the DB-25 Connector using the wiring specifications shown in the table below. (Custom cable kit P/N 90106 is provided.)
2. Tighten clamp on connector to secure cable.

DB-25 Connector (Custom cable kit 90106)	TB14 on Control Panel
Pin 3	TX
Pin 2	RX
Pin 7	REF

3.14.2 Installing and Configuring the PRN Series Printer

When connected to the Control Panel via an EIA-232 interface, the PRN prints a copy of all status changes within the control panel and time-stamps the printout with the time of day and date the event occurred. It provides 80 columns of data on standard 9" by 11" tractor-feed paper.

NOTE: You can also use the EIA-232 printer interface with UL-listed information technology equipment, such as personal computers, to monitor the control panel for supplementary purposes.

This section contains information on connecting a printer to the control panel and for setting the printer options.

Connecting a Remote PRN Series Printer

Remote printers require a 120 VAC, 50/60 Hz primary power source. If required for the fire alarm system configuration (for example, a Proprietary Fire Alarm System), a remote printer requires a secondary power source (battery backup). Because a secondary power source is not provided, use a

separate Uninterruptable Power Supply (UPS) that is UL-listed for Fire Protective Signaling. You may use your building emergency power supply, so long as it meets the power continuity requirements of NFPA 72. Refer to NFPA 72 for further details.

Connect the remote printer to the Control Panel as follows:

1. Connect the three (3) open leads of the custom cable to the TB14 terminal block on the control panel as shown in Figure 3.26.
2. Plug the DB-25 connector end of the custom cable into the EIA-232 port of the remote printer. Tighten securely.

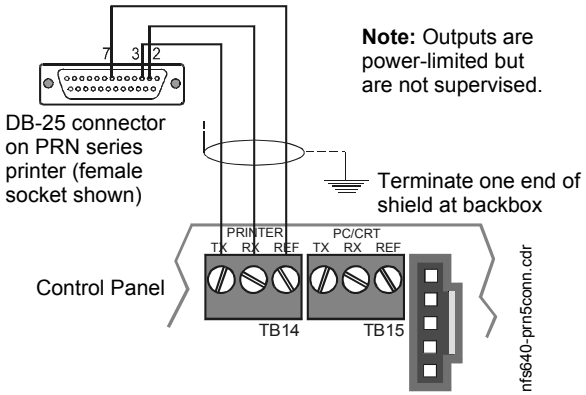


Figure 3.26 Remote Printer Connections

Setting Printer Options

Refer to the documentation supplied with the PRN series printer for instructions on using the printer menu controls. Set the printer options (under the menu area) according to the settings listed in Table 3.5.

Option	Setting	Option	Setting
Font	HS Draft	CPI	10 CPI
LPI	6 LPI	Skip	0.5
ESC Character	ESC	Emulate	Epson FX-850
Bidirectional Copy	ON	I/O	
CG-TAB	Graphic	Buffer	40K
Country	E-US ASCII	Serial	
Auto CR	OFF	Baud	9600 or 2400
Color Option	Not Installed	Format	7 Bit, Even, 1 Stop
Formlen		Protocol	XON/XOFF
Lines	6LPI=60	Character Set	Standard
Standard	Exec 10.5	Sl.Zero	On
		Auto LF	Off
		PAPER	
		BIN 1	12/72"
		BIN 2	12/72"
		SINGLE	12/72"
		PUSH TRA	12/72"
		PULL TRA	12/72"
		PAP ROLL	12/72"

Table 3.5 PRN Setup Options

3.14.3 Installing and Configuring a Keltron Printer

Connect the remote printer to the Control Panel as follows:

1. Connect the three (3) open leads of the custom cable to the TB14 terminal block on the control panel as shown in Figure 3.27.
2. Connect DC power from TB7 terminal block on the control panel as shown in Figure 3.27.
3. Plug the DB-25 connector end of the custom cable into the EIA-232 port of the Keltron printer. Tighten securely.

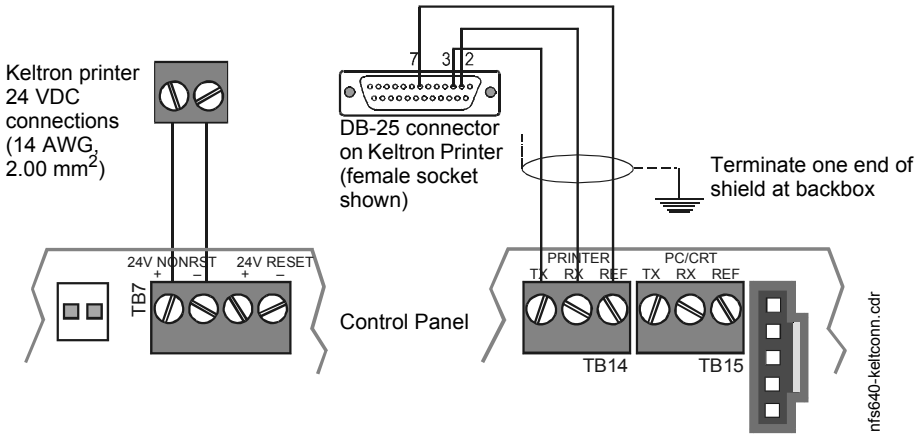


Figure 3.27 Keltron Printer Connections

Setting up the Keltron Printer

Set up a Keltron printer as follows:

1. The printer communicates using the following protocol:
   • Baud Rate: 9600 • Parity: Even • Data bits: 7
2. Set the printer DIP switches SP1 and SP2 according to settings in Table 3.6.

SP1	On	Off
1		X
2		X
3		X
4	X	
5		X
6	X	
7	X	
8		X

SP2	On	Off
1		X
2		X
3		X
4	X	
5		X
6		X
7	X	
8		X

Table 3.6 Keltron DIP Switch Settings

3.14.4 Installing and Configuring a CRT-2

A CRT-2 can only be used in a non-networked application when used with the IFC-640. For further details on setting up the CRT-2, refer to the *IFC-640 Operations Manual.*

Connect a CRT-2 to the Control Panel as follows:

1. Connect the three (3) open leads of the custom cable to the TB15 terminal block on the control panel as shown in Figure 3.28.
2. Plug the DB-25 connector end of the custom cable into the EIA-232 port of the CRT-2. Tighten securely.
3. Set parameters as discussed in Table 3.28.

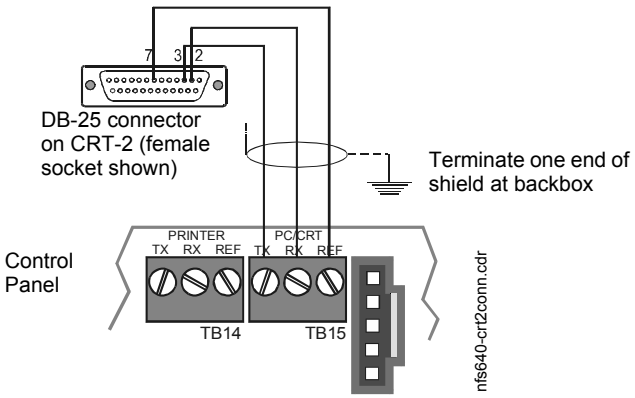


Figure 3.28 Connecting a CRT-2

Setting CRT-2 Parameters

The CRT-2 communicates with the control panel through a protocol defined by thirteen groups of parameters. To access a parameter group, press the corresponding function key (F1-F12) as shown in Table 3.7 below. You can then program parameters in each group.

Enter the CRT-2 setup menu by pressing and holding the <Ctrl> key while pressing the <Scroll Lock> key. Use arrow keys to move through the selections in each setup group; press the space bar to view the options for each parameter. When finished programming all setup groups, press the <Pause> key. To save all changes, press <Y>.

Table 3.7 shows the standard settings for using the CRT-2 with the IFC-640; for one instance where these settings may change slightly see Section 3.14.6 “Connecting Multiple Printers, CRTs, or CRT/PRN Combination”. The basic settings for using the CRT-2 with IFC-640 are:
• Baud Rate 9600 • Data format 8 1 N • Protocol xon/off.

NOTE: This section covers installation only; for information on how the CRT-2 functions as part of the fire alarm system, see the *IFC-640 Operations Manual*.

Function Key	CRT-2 Parameters		
F1: Quick (“Read Status” key)	Emulation=CRT-2 Comm Mode=Full Duplex Enhanced=On	EIA Baud Rate=9600 Aux Baud Rate=9600 Language=U.S.	EIA Data Format=8/1/N Aux Data Format=8/1/N Host/Printer=EIA/Aux
F2:Genrl (“Alter Status” key)	Emulation=CRT-2 Auto Font Load=On Monitor Mode=Off Host/Printer=EIA/Aux	Enhanced=On Auto Page=Off Bell Volume=09	Auto Wrap=Off Auto Scroll=On Warning Bell=On
F3: Displ (“Prog” key)	Page Length=24 Display Cursor=On Columns=80 Scroll=Jump	Screen Length=26 Lines Cursor=Blink Line Width Change Clear=Off Refresh Rate=60 Hz	Screen Video=Normal Auto Adjust Cursor=On Speed=Normal Overscan Borders=Off
F4: Kybd (“Spl Funct” key)	Language=U.S. Keyclick=Off Key Lock=Caps	Char Set Mode=ASCII Key Repeat=Off Keyboard Present=Yes	Key Mode=ASCII Margin Bell=Off
F5: Keys (“Prior” key)	Enter Key=<CR> Alt Key=Meta Pound Key=U.S.	Return Key=<CR> Disconnect=Pause	Backspace=<BS>/<DEL> Desk Acc=Disabled
F6: Ports (“Next” key)	EIA Baud Rate=9600 Aux Baud Rate=9600 EIA Xmt=Xon-Xoff Aux Xmt=Xon-Xoff EIA Break=Off Aux Break=Off	EIA Data Format=8/1/N Aux Data Format=8/1/N EIA Recv=Xon-Xoff(XPC) Aux Recv=Xon-Xoff(XPC) EIA Modem Control=Off Aux Modem Control=Off	EIA Parity Check=On Aux Parity Check=On EIA Xmt Pace=Baud Aux Xmt Pace=Baud EIA Disconnect=2 sec Aux Disconnect=2 sec

Table 3.7 Standard CRT-2 Settings for Use with IFC-640 (Sheet 1 of 2)

Function Key	CRT-2 Parameters		
F1: Quick (“Read Status” key)	Emulation=CRT-2 Comm Mode=Full Duplex Enhanced=On	EIA Baud Rate=9600 Aux Baud Rate=9600 Language=U.S.	EIA Data Format=8/1/N Aux Data Format=8/1/N Host/Printer=EIA/Aux
F7: Host (“Auto Step” key)	Comm Mode=Full Duplex Recv <DEL>=Ignore Send Block Term=<CR>	Local=Off Send ACK=On Null Suppress=On	Recv <CR>=<CR> Send Line Term=<CR><LF>
F8: Print (“Activ Signal” key)	Prnt Line Term=<CR><LF>	Prnt Block Term=<CR>	Secondary Recv=Off
F9: Emul	Attribute=Page WPRT Intensity=Dim WPRT Blink=Off Status Line=Off	Bright Video=Off WPRT Reverse=Off Display NV Labels=Off Fkey Speed=Normal	Page Edit=Off WPRT Underline=Off Save Labels=On
F10	Setup Group F10 does not affect communications with the control panel.		
F11	Setup Group F11 does not affect communications with the control panel.		
F12: Prog (“Ack Step” key)	Program the function keys as follows: F1 ~A F2 ~B F3 ~C F4 ~D F5 ~E F6 ~F F7 ~G F8 ~H F9 ~I F10 ~J F11 ~K F12 ~L F13 ~M F14 ~N F15 ~O F16 ~P Shift F13 ~Q		

Table 3.7 Standard CRT-2 Settings for Use with IFC-640 (Sheet 2 of 2)

3.14.5 Connecting a PC

A PC can be hooked up to the Control Panel EIA-232 port (J1) to allow the VeriFire Tools programming utility to upload and download the operating program of the control panel. Refer to the insert in the VeriFire Tools CD and to the program’s on-line help function for instructions.

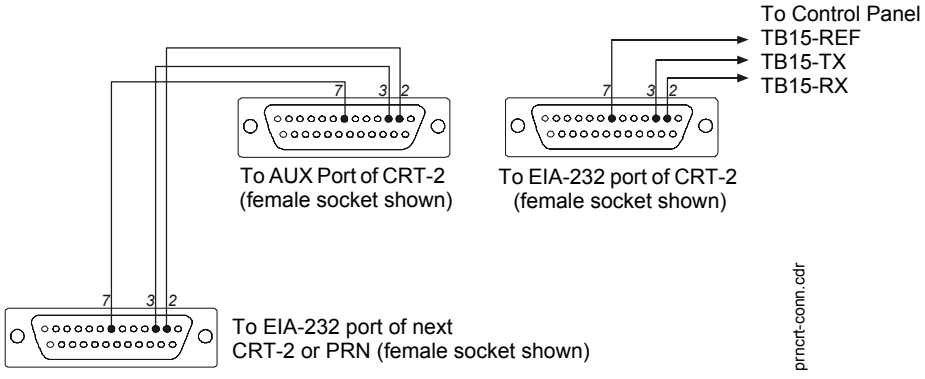
NOTE: Download operations that change the basic program of the control panel must be performed by responsible service personnel in attendance at the control panel. After downloading a program, test the control panel in accordance with NFPA 72-1999.

3.14.6 Connecting Multiple Printers, CRTs, or CRT/PRN Combination

Connecting multiple devices requires changing the CRT-2 setup using the F1(Quick) menu:

- Set Host/Printer=EIA/AUX.
- Set EIA Data Format=8/1/N.
- If the AUX device is a printer, set the Printer and AUX Data Format=7/1/E.
- If the AUX device is a second CRT-2, set the AUX Data Format=8/1/N.

Connect multiple devices as shown in Figure 3.29.



Note: For wire requirements, see Table B.1 in Appendix B “Electrical Specifications”.

Figure 3.29 Connecting Multiple Devices on the EIA-232 Circuit

3.15 Wiring a Signaling Line Circuit (SLC)

■ Overview

Communication between the control panel and intelligent and addressable initiating, monitor, and control devices takes place through a Signaling Line Circuit (SLC). You can wire an SLC to meet the requirements of NFPA Style 4, Style 6, or Style 7 circuits. This manual provides requirements and performance details specific to this control panel; for installation information and general information, refer to the *SLC Wiring Manual.*

■ Wiring

Maximum wiring distance of an SLC using 12 AWG (3.1 mm^2) wire is 12,500 feet (3810 meters) total twisted-pair for Style 4, Style 6 and Style 7 circuits.

■ Capacity

The IFC-640 provides one (1) SLC, with a total capacity of 318 intelligent/addressable devices:

- 01-159 intelligent detectors
- 01-159 monitor and control modules

An optional expander board provides one (1) additional SLC, with the same capacity.

■ Installation

This control panel supports one or two SLC loops; a second SLC loop is obtained by installing an LEM-320 module. SLC loop #1 connects to TB16 on the control panel; SLC loop #2 connects to TB1 on the LEM-320. For details on designing, installing and configuring SLC loops, see the *SLC Wiring Manual*.

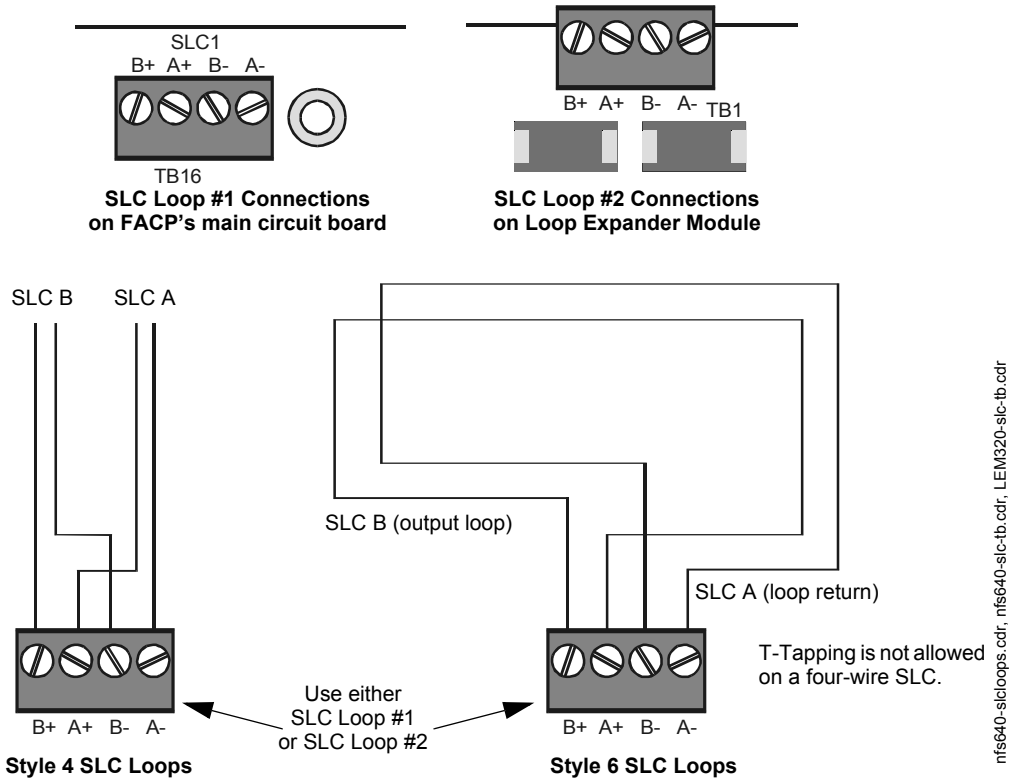


Figure 3.30 SLC Loop Connections and Wiring

Notes

Section 4: Applications

4.1 Overview

Chapter	Covers the following topics
Section 4.2 “NFPA 72-1999 Central or Remote Station Fire Alarm System (Protected Premises Unit)”	How to install UDACT with the control panel for use as a NFPA Central or Remote Station Fire Alarm System (Protected Premises Unit)
Section 4.3 “NFPA 72-1999 Proprietary Fire Alarm Systems”	How to set up a Protected Premises Unit to communicate with a listed compatible Protected Premises Receiving Unit.
Section 4.4 “Fire/Security Applications”	How to use the control panel as a combination Fire/Security system, including the following: • Installing a Security Tamper Switch into the cabinet • Circuit Wiring
Section 4.5 “Releasing Applications”	How to install the following releasing applications: • Releasing Device to the Control Panel (NAC integral circuits) • Releasing Device to the M300CJ Module • NBG-12LRA Agent Release-Abort Station

Municipal Box (Auxiliary)

Municipal Box applications require a TM-4 Transmitter module. Refer to the *Transmitter Module TM-4* installation document for installation details.

4.2 NFPA 72-1999 Central or Remote Station Fire Alarm System (Protected Premises Unit)

Figure 4.1 shows typical wiring diagram for a NFPA 72-1999 Central Station Fire Alarm System (Protected Premises Unit) or a Remote Station Fire Alarm System (Protected Premises Unit) using the Universal Digital Alarm Communicator/Transmitter (UDACT) and control panel. This provides typical wiring only; connect and program the UDACT according to the directions given in the *UDACT Instruction Manual*.

NOTE: An NFPA 72-1999 Central Station requires 24 hours of standby power; an NFPA 72-1999 Remote Station requires 60 hours of standby power.

NOTE: This application can also be done with the TM-4 Transmitter; refer to the Transmitter Module TM-4 document for more details.

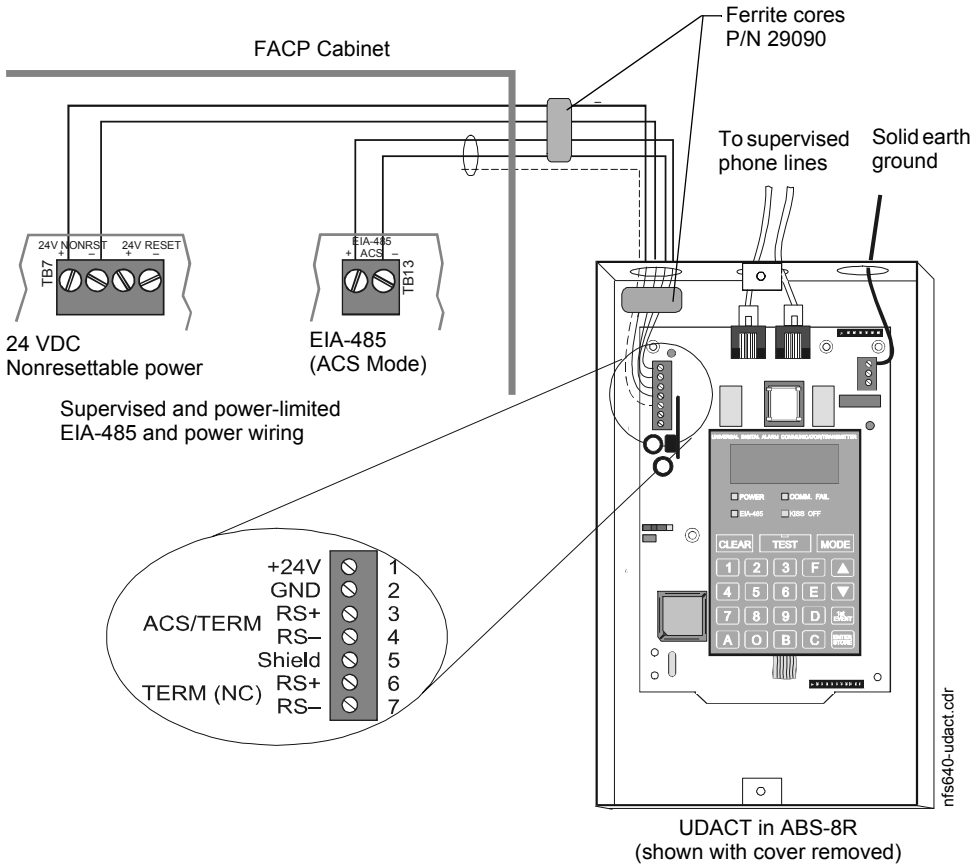


Figure 4.1 Typical Wiring Diagram for a Central Station Fire Alarm System

NOTE: Install a UL-listed 120 ohm End-of-Line resistor (P/N 71244) UDACT TB1 terminals 3 and 4 if this is the last or only device on EIA-485 line.

4.3 NFPA 72-1999 Proprietary Fire Alarm Systems

When connected and configured as a protected premises unit with UDACT, the IFC-640 will automatically transmit General Alarm, General Trouble, and General Supervisory signals to a listed compatible Protected Premises Receiving Unit. See the *UDACT Manual* for compatible receiving units. A simplified drawing of connections between a receiving unit and an IFC-640 protected premises unit is shown in Figure 4.2.

Connect the receiving unit to the protected premises unit as shown in Section 4.2 “NFPA 72-1999 Central or Remote Station Fire Alarm System (Protected Premises Unit)”.

For information on installing and programming the Receiving unit, refer to the documentation for that control panel.

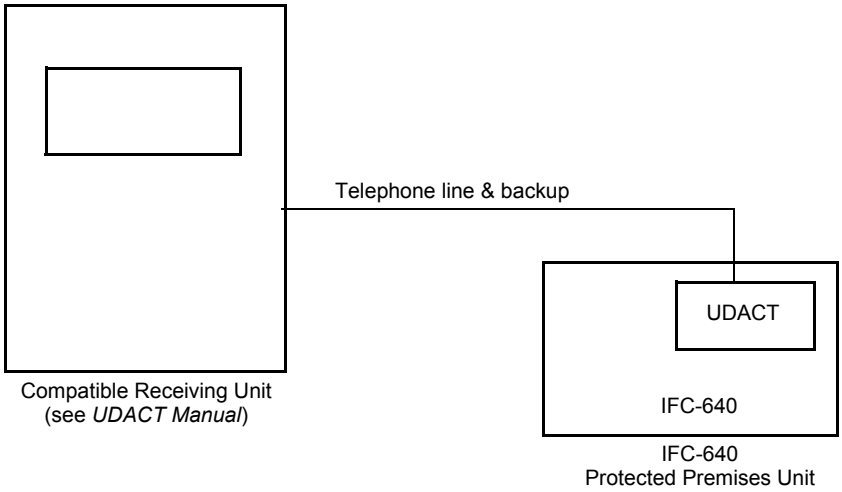


Figure 4.2 Typical Proprietary Fire Alarm Systems Wiring Connections

4.4 Fire/Security Applications

NOTE: IFC-640 is not approved for use in security applications in Canada.

4.4.1 General Operation

The control panel can be used as a combination Fire/Security system when installed and operated according to the instructions in this section.

For security applications, program one or more monitor modules (listed for security applications) with the SECURITY Type Code, and wire as shown in Figure 4.4. Activating this type of module lights the SECURITY LED, and displays a security alarm condition on the control panel LCD display. The panel sounder will sound until the Security alarm is acknowledged. You can also program additional sounders or output devices to activate with the security alarm initiating device. The SECURITY Type Code is designed to indicate an alarm as follows: (a) on an open or short circuit; or (b) on a ±50% change in resistance value from the End-of-Line resistor value.

A tamper switch installed in the cabinet door will indicate a door tamper condition whenever the door is open. If the control panel indicates a Security alarm, you can acknowledge, silence, and reset the condition from the control panel.

When the system resets, a 30-second exit timer starts. During this time the tamper switch and all Security alarms are ignored. There is no entrance delay timer.

For bypass of security zones, use the DISABLE routine (covered in the *Status Change* section of the *IFC-640 Operations Manual*) for Security type devices.

WARNING:
Damage can result from incorrect wiring connections.

4.4.2 Installing a Security Tamper Switch

To wire the cabinet with a Security Tamper Switch kit model STS-1, refer to Figure 4.3:

1. Install the STS-1 Tamper Switch onto the side of the backbox opposite the door hinge, pushing the switch through the opening until it snaps into place.
2. Install the magnet on the same side of the cabinet door as the lock. Push the magnet through the opening in the door until it snaps into place.
3. Connect the STS-1 connector to J10 (Tamper) on the Control Panel.

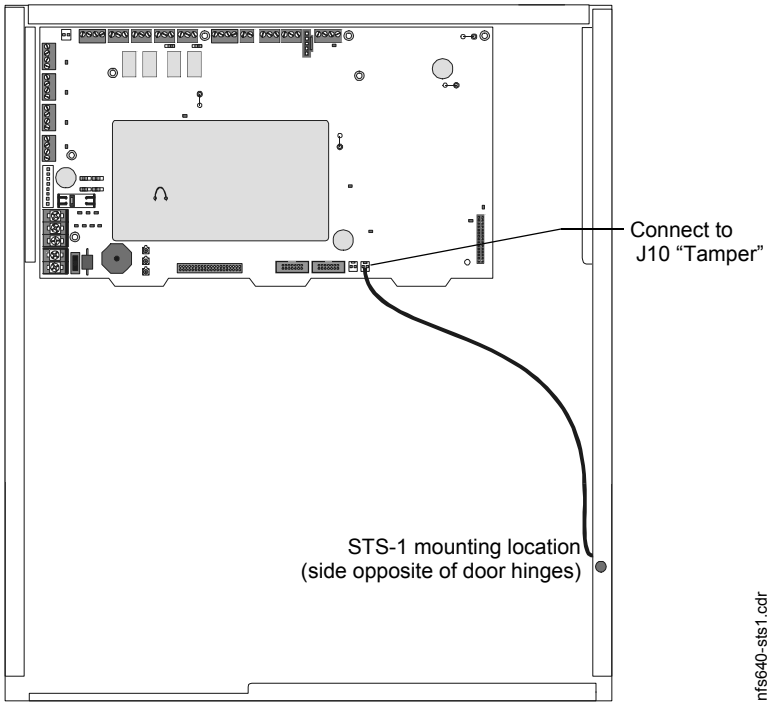


Figure 4.3 Installing the STS-1 Security Tamper Switch

4.4.3 Receiving Unit

For applications requiring transmission of security alarm information to a central receiving unit, the control panel may be connected via a UDACT to a compatible receiving unit (see the *UDACT Manual*). For information on configuring the Receiving unit for Combination Fire/Security applications, refer to the documentation for that control panel.

4.4.4 Programming

The control panel can communicate with any number of security devices. To do so, program the points as follows:

1. Select the address of the module(s) to be used for security.
2. Select the Type Code SECURITY.

NOTE: For detailed instruction on programming Type Codes, refer to the *IFC-640 Programming Manual.*

4.4.5 Wiring for Proprietary Security Alarm Applications

Table 4.4 shows typical wiring for proprietary security alarm applications with M300MJ modules or XP5-M modules. Note the following:

- The module is programmed with software SECURITY Type Code.
- Supplementary use only applies to UL-listed systems.
- NAC devices used for security cannot be shared with fire NAC devices.
- Refer to the *Device Compatibility Document* for compatible NAC devices.
- All monitor modules used for security application must be installed in the IFC-640 cabinet with STS-1 Security Tamper Switch.

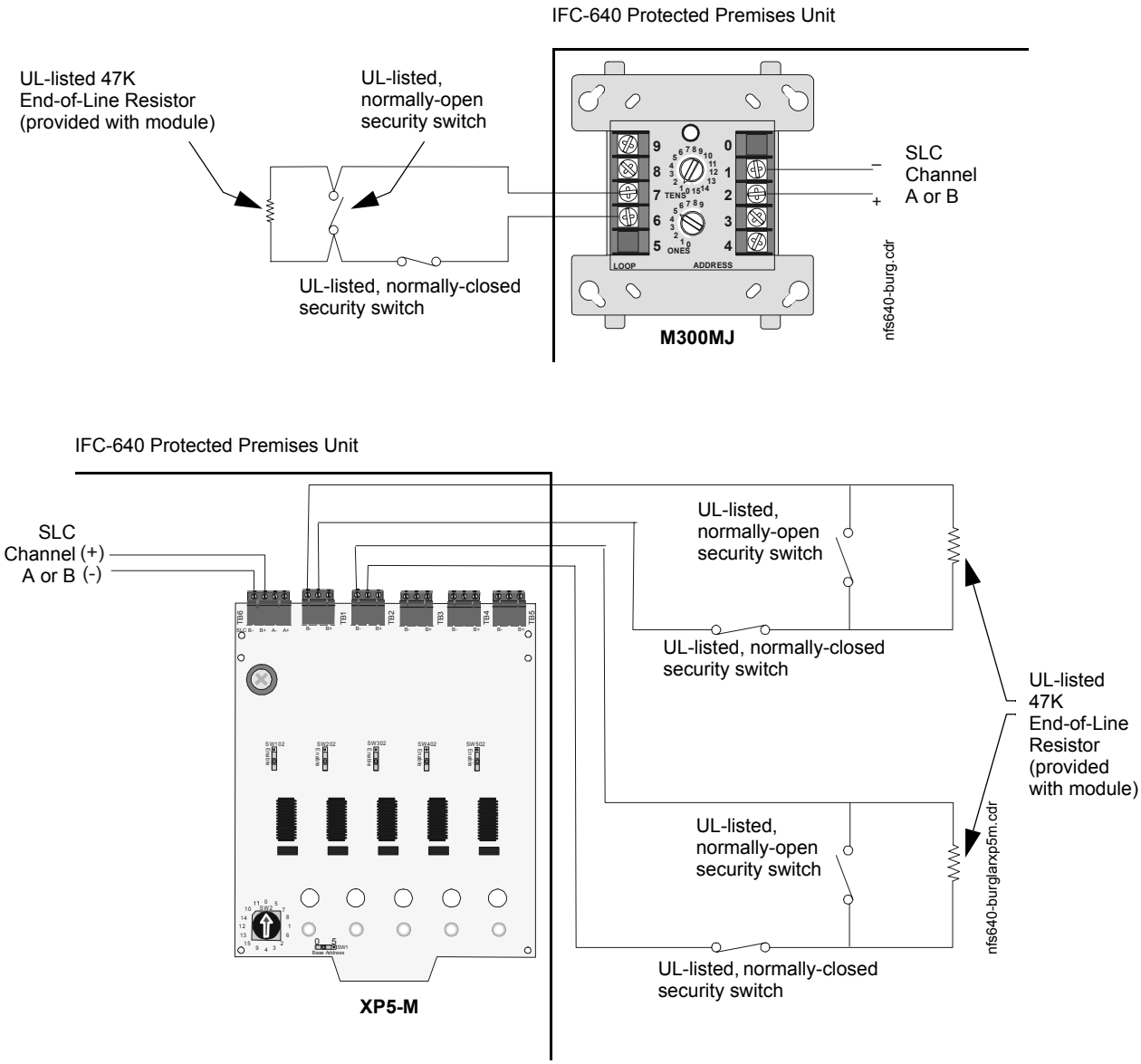


Figure 4.4 Wiring Diagram for Proprietary Security Alarm Applications

4.5 Releasing Applications

WARNING:
When used for CO_2 releasing applications, observe proper precautions as stated in NFPA 12. Do not enter the protected space unless physical lockout and other safety procedures are fully completed. Do not use software disable functions in the panel as lockout.

WARNING:
Do not enable the BACKUP option switch for any of the four Notification Appliance Circuits (NACs) if they are used for releasing functions!

4.5.1 Overview

This control panel can be used for agent release or preaction/deluge control applications. In a properly configured system with compatible, listed actuating and initiating devices, this control panel complies with the following NFPA standards for installation in accordance with the acceptable standard:

Standard	Covers
NFPA 12	CO_2 Extinguishing Systems
NFPA 12A	Halon 1301 Extinguishing Systems
NFPA 13	Sprinkler Systems
NFPA 15	Water Spray Systems
NFPA 16	Foam-Water Deluge and Foam-water Spray Systems
NFPA 17	Dry Chemical Extinguishing Systems
NFPA 17A	Wet Chemical Extinguishing Systems
NFPA 2001	Clean Agent Fire Extinguishing Systems

Table 4.1 NFPA Standards for Releasing Applications

4.5.2 Programming

The control panel supports up to ten releasing software zones. You can map these zones to activate Control Panel releasing outputs and M300CJ modules. Program the M300CJ module for the appropriate type code according to the chart below:

Type Code: RELEASE CKT	Type Code: REL CKT ULC
• For use in UL applications. • Do not use REL device at the solenoid. • Cannot use power-limited wiring. • Supervised for open circuit only. • Supervised for power loss with power-supervision relay.	• For use in UL or ULC applications. • Requires REL device at solenoid. • Power-limited wiring. • Supervised for open circuit and shorts. • Supervised for power loss with power-supervision relay.

For more information, refer to the *IFC-640 Programming Manual*.

4.5.3 Wiring

References to wiring diagrams for releasing applications:

To connect	Refer to
A releasing device to the control panel.	Section 4.5.4 “Connecting a Releasing Device to the Control Panel”.
A releasing device to the M300CJ Module.	Section 4.5.5 “Connecting a Releasing Device to the M300CJ Module”.
An NBG-12LRA Agent Release-Abort Station.	Section 4.5.6 “Connecting an NBG-12LRA Agent Release-Abort Station”.

4.5.4 Connecting a Releasing Device to the Control Panel

Use TB3 (NAC#4), TB4 (NAC#3), TB5 (NAC#2), or TB6 (NAC#1) on the control panel for NAC/Releasing Circuits. Only one listed, compatible releasing device can be installed per NAC.

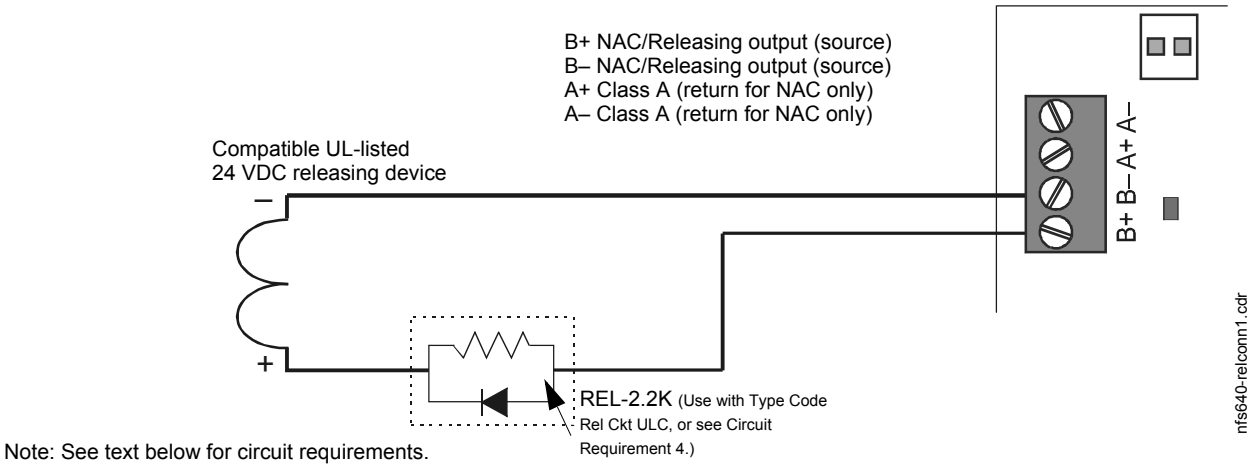


Figure 4.5 Typical Style 4 Connection of a Releasing Device to Control Panel

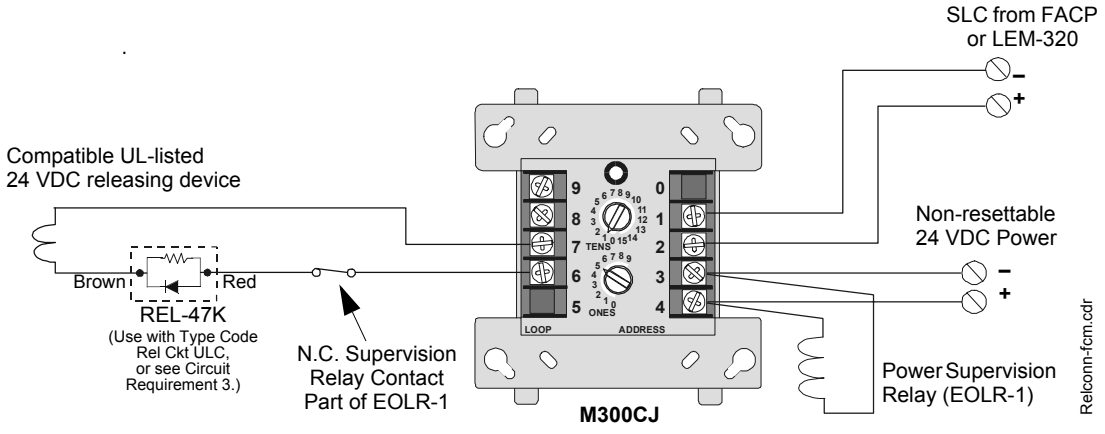
WARNING:
Do not enable the BACKUP option switch for any of the four Notification Appliance Circuits (NACs) if they are used for releasing functions!

Circuit Requirements. When connecting a releasing device, note the following:

1. The control panel provides four NAC/Releasing Circuits (Style Y or Z). Each circuit can provide 2.5 A. Total current drawn from the power supply cannot exceed 6 A in an alarm condition (refer to Table A.2, "System Draw Current Calculations," on page 71). Use compatible UL-listed 24 VDC appliances only. For more information on compatible appliances, refer to the *Device Compatibility Document*.
2. Refer to the *IFC-640 Programming Manual* for instructions on setting the Soak Timer.
3. For applications using power-limited circuits:
   a) Use an End-of-Line device (P/N REL-2.2K) with control panel releasing circuits. Connect the End-of-Line device as shown in Figure 4.5.
   b) Program the releasing circuit for Type Code REL CKT ULC.
   c) Circuits are supervised against opens and shorts.
4. For applications <u>not requiring power-limited circuits</u> –
   a) If the application does not require supervising the releasing device against shorts, End-of-Line devices (P/N REL-2.2K) are not required.
   b) In non-power-limited applications, program the releasing circuit for Type Code RELEASE CKT.
   c) Limited energy cable cannot be used to wire a non-power-limited releasing device circuit
   d) Maintain a 0.25 inch (6.35 mm) spacing between the non-power-limited releasing circuit device wiring and any power-limited circuit wiring.)
5. The releasing circuit must be programmed with a releasing type code listed in the *IFC-640 Programming Manual*.

4.5.5 Connecting a Releasing Device to the M300CJ Module

The module can control 1 A of current. Make sure to keep total system current within the limits of the power supply. You can power the module from the power supply of the Control Panel or any UL -listed 24 VDC regulated power-limited power supply for Fire Protective Signaling. For more information, refer to the *Device Compatibility Document*.



Note: See text for circuit requirements.

Figure 4.6 Typical Connection of a 24 VDC Releasing Device to the M300CJ Module

Circuit Requirements. When connecting a releasing device to the M300CJ module, note the following:

1. Refer to the *IFC-640 Programming Manual* for instructions on setting the Soak Timer.
2. For applications using power-limited circuits:
   a) Use an in-line supervisory device (P/N REL-47K) with the M300CJ module. Connect the in-line supervisory device as shown in Figure 4.6.
   b) Program the releasing circuit for Type Code REL CKT ULC.
   c) Circuits are supervised against opens and shorts.
3. For applications not requiring power-limited circuits:
   a) in-line supervisory devices (P/N REL-47K) are not required; however, the releasing device circuit is not supervised against shorts.
   b) In non-power-limited applications, program the releasing circuit for Type Code RELEASE CKT.
   c) Limited energy cable cannot be used to wire a non-power-limited releasing device circuit.
   d) Maintain a 0.25 inch (6.35 mm) spacing between the non-power-limited releasing circuit device wiring and any power-limited circuit wiring.

4.5.6 Connecting an NBG-12LRA Agent Release-Abort Station

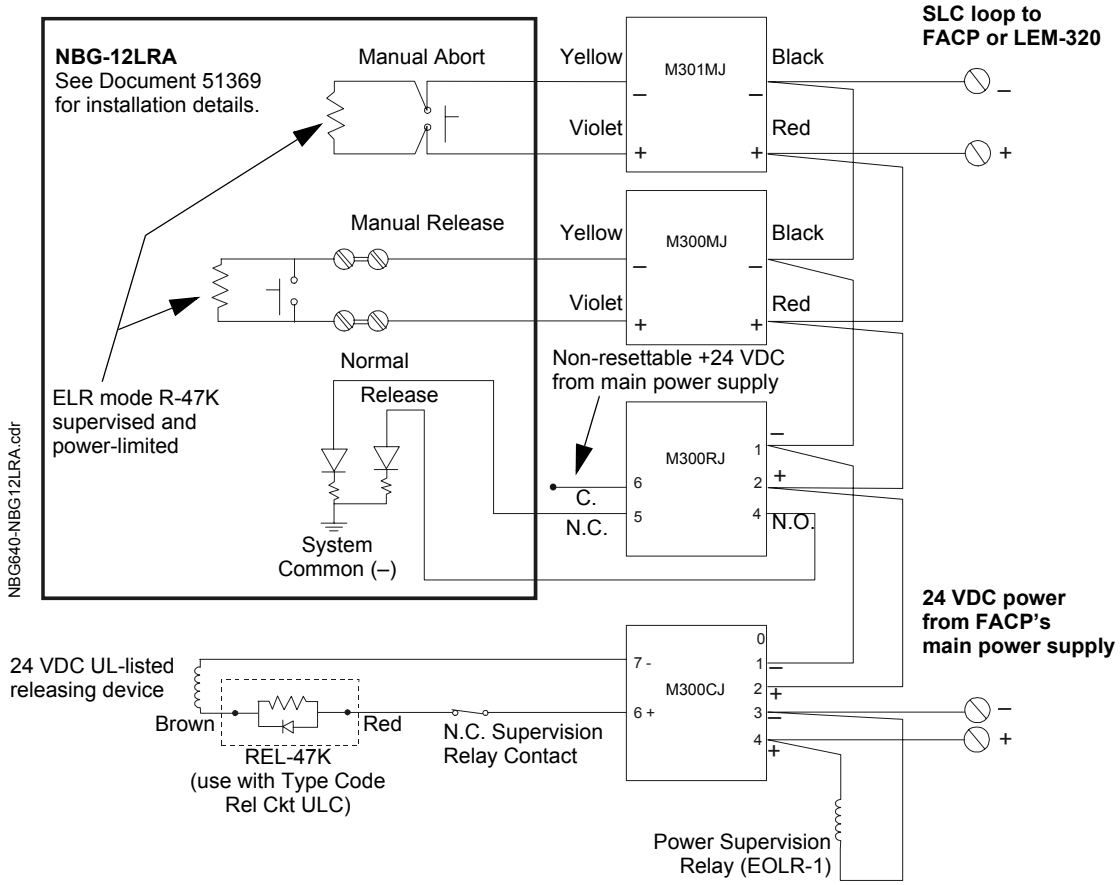


Figure 4.7 Typical Connections for an NBG-12LRA Agent Release-Abort Station

NOTE: If using the on-board NACs, see Circuit Requirements for Section 4.5.4 “Connecting a Releasing Device to the Control Panel” on page 64. If using M300CJ, see Circuit Requirements for Section 4.5.5 “Connecting a Releasing Device to the M300CJ Module” on page 65.

Section 5: Testing the System

5.1 Acceptance Test

When finished with the original installation and all modifications, conduct a complete operational test on the entire installation to verify compliance with applicable NFPA standards. Testing should be conducted by a factory-trained fire alarm technician in the presence of a representative of the Authority Having Jurisdiction and the owner's representative. Follow procedures outlined in NFPA Standard 72-1999, Chapter 7, *Inspection, Testing and Maintenance*.

5.2 Periodic Testing and Service

Periodic testing and servicing of the control panel, all initiating and notification devices, and any other associated equipment is essential to ensure proper and reliable operation. Test and service the control panel according to the schedules and procedures outlined in the following documents:

- NFPA Standard 72-1999, Chapter 7, *Inspection, Testing and Maintenance*.
- Service manuals and instructions for the peripheral devices installed in the system. Correct any trouble condition or malfunction immediately.

5.3 Operational Checks

Between formal periodic testing and servicing intervals, the following operation checks should be performed monthly, or more frequently when required by the Authority Having Jurisdiction.

☐ Before proceeding: a) notify the fire department and the central alarm receiving station if transmitting alarm conditions; b) notify facility personnel of the test so that alarm sounding devices are disregarded during the test period; and c) when necessary, disable activation of alarm notification appliances and speakers to prevent their sounding.

☐ Disconnect all releasing devices to prevent accidental activation.

WARNING:
Do not rely on disable/enable software settings to lockout releasing devices.

☐ Check that the green POWER LED lights.

☐ Check that all status LEDs are off.

☐ Press and hold the LAMP TEST key. Verify that all LEDs and all LCD display segments work.

☐ Activate an Initiating Device Circuit using an alarm initiating device or an addressable initiating device on the SLC and check that all programmed active notification appliances function. Reset the alarm initiating device, the control panel, and any other associated equipment. In voice alarm applications, confirm that the proper tone(s) and/or messages sound during alarm conditions. Select the paging function and confirm that the message can be heard in the affected fire zones. Repeat the above step with each Initiating Device Circuit and each addressable device.

☐ On systems equipped with a fire fighter's telephone circuit, make a call from a telephone circuit and confirm a ring tone. Answer the call and confirm communication with the incoming caller. End the call and repeat for each telephone circuit in the system.

☐ Remove AC power, activate an Initiating Device Circuit through an alarm initiating device or an addressable initiating device on the SLC, and check that programmed active notification appliances sound, and alarm indicators illuminate. Measure the battery voltage with

Continued on next page...

notification appliances active. Replace any battery with a terminal voltage less than 21.6 VDC and reapply AC Power.

NOTE: The battery test requires fully charged batteries. If batteries are new or discharged due to a recent power outage, allow the batteries to charge for 48 hours before testing.

- ☐ Return all circuits to their pretest condition.
- ☐ Check that all status LEDs are off and the green POWER LED is on.
- ☐ Notify fire, central station and/or building personnel when you finish testing the system.

5.4 Battery Checks and Maintenance

Maintenance-free sealed lead-acid batteries used in the system do not require the addition of water or electrolyte. These batteries are charged and maintained in a fully charged state by the main power supply's float charger during normal system operation. A discharged battery typically charges at 1.5–1.8 A and reaches the float voltage of 27.6 VDC within 48 hours.

Follow the local AHJ and manufacturer recommendations for battery replacement intervals. Minimal replacement battery capacity appears on the control panel marking label. Immediately replace a leaking or damaged battery. You can get replacement batteries from the manufacturer.

WARNING:
Batteries contain Sulfuric Acid which can cause severe burns to the skin and eyes and damage to fabrics.

- If a battery leaks and contact is made with the Sulfuric Acid, immediately flush skin and/or eyes with water for at least 15 minutes. Water and household baking soda provides a good neutralizing solution for Sulfuric Acid.
- If Sulfuric Acid gets into eyes, seek immediate medical attention.
- Ensure proper handling of the battery to prevent short circuits.
- Take care to avoid accidental shorting of the leads from uninsulated work benches, tools, bracelets, rings, and coins.

WARNING:
Shorting the battery leads can damage the battery, equipment, and could cause injury to personnel.

On-board Memory-Backup Battery

A snap-in lithium battery on the CPU provides backup of the CPU's on-board memory during power loss. The expected shelf-life for this battery is 10+ years. However if battery connections are damaged or the battery does lose power, a system trouble message will appear: "Bat. Backup RAM".

Appendix A: Power Supply Calculations

Calculations must be done to determine standby and alarm DC current loads. Ampere-hour requirements must be calculated as well to determine battery size.

The on-board power supply provides filtered 24VDC power that may be used for operating external devices. Use Table A.2 to determine if external loading is within the capabilities of the power supply.

A.1 Calculating AC Branch Circuit Current

Use Table A.1 below to determine the total amount of current, in AC amperes, that a 120 VAC, 50/60 Hz service must be able to supply to the fire alarm system. Devices rated for 240 VAC operation will draw approximately one-half the current listed in Table A.1.

Device Type	No. of Devices		Current (amps)		Total Current
Main Power Supply	[1]	X	3.0	=	3.0
AA-30	[ ]	X	1.00	=	
AA-120	[ ]	X	1.85	=	
ACPS-2406	[ ]	X	2.7*	=	
APS-6R	[ ]	X	2.5	=	
CHG-120	[ ]	X	2.0	=	
Sum column for AC Branch Current required=amps					

Table A.1 120 VAC Fire Alarm Circuit

* Separate calculations are required for any devices powered by the ACPS-2406. It has its own integral battery charger and batteries can be connected directly to it. Refer to the *ACPS-2406 Installation Manual* for its battery calculations.

AC Branch Circuit Installation

For guidelines on wiring the AC branch circuit current, see “Operating Power: AC Branch Circuit” on page 77 in Appendix B.1 “Electrical Specifications”.

A.2 Calculating the System Current Draws

The control panel’s main power supply must be able to power all internal system devices (and several types of external devices) continuously during non-fire alarm conditions. Use column 1 in Table A.2 to calculate the Non-Fire Alarm Load on the power supply regulator when applying primary power. The main power supply must also provide a finite amount of additional current during a fire alarm condition. Use column 2 in Table A.2 to calculate the additional current needed during fire alarms. The requirements for non-fire alarm and fire alarm current loads cannot exceed the capabilities of the power supply as listed below:

- 3 A at 24 VDC during Standby; and
- 6 A at 24 VDC during Alarm.

How to Use the Calculating Tables

As used in this section, “Primary” refers to the control panel’s on-board power supply, its primary source of AC power. “Secondary” refers to the control panel’s backup batteries (or any other 24 VDC power supply listed for Fire Protective Signaling and connected in place of the batteries). The term “standby” refers to the output current required when no fire alarm is present. The term “alarm” refers to the output current required when a fire alarm is present.

The Primary Power Source Non-Alarm Current and Alarm Current columns are DC current calculations. These calculations confirm that the power supply can provide enough current to support the system during Primary Non-Fire Alarm and Fire Alarm conditions.

Quantities List the number of devices powered by the Panel Output (TB2) and the Accessories Output (TB6). Devices powered by the Accessories Output draw current directly from the panel. Devices powered by the Panel Output draw current through the fire panel's connection to the power supply. Use these quantities to calculate total current draw of each set of devices in calculation columns 1, 2, and 3.

Calculation Column 1 (Primary, Non-Fire Alarm Current in amps) Add the contents of calculation column 1 to get the current drawn from the power supply during a non-alarm condition, with AC power applied. This current draw cannot exceed 3 A without an auxiliary power supply.

Calculation Column 2 (Primary, Fire Alarm Current in amps) Calculation column 2 lets the system designer determine the current load that the power supply must support during a fire alarm. The total current draw during a fire alarm cannot exceed 6 A without an auxiliary power supply.

Typically, a system should contain capacity to activate all output circuits and relays, and support fire alarms on no less than 10% of Initiating Device Circuits, subject to the requirements of the Authority Having Jurisdiction (AHJ).

The Control Panel provides power for Notification Appliance Circuits. Refer to the Device Compatibility Document for 24 VDC notification appliances that are UL- and ULC-listed for fire alarm systems.

Calculation Column 3 [Secondary (Battery) Non-Alarm Current] Column 3 lets the system designer calculate the non-fire alarm current drawn from the secondary source in a non-fire alarm condition during AC power loss.The non-fire alarm current is required to complete the standby battery calculations. After summing all current draws, insert the total in Table A.3.

Category	Calculation Column 1 Primary, Non-Fire Alarm Current (amps)			Calculation Column 2 Primary, Fire Alarm Current (amps)			Calculation Column 3 Secondary, Non-Fire Alarm Current (amps)		
	Qty	X [current draw]=	Total	Qty	X [current draw]=	Total	Qty	X [current draw]=	Total
JCPU-640/E	1	x [0.230] =		1	x [0.230] =		1	x [0.230] =	
KDM-2	[ ]	x [0.094]=		[ ]	x [0.094]=		[ ]	x [0.040]=	
LEM-320	0 / 1	x [0.100]=		0 / 1	x [0.100]=		0 / 1	x [0.100]=	
SLC loop*:	0/1/2			0/1/2			0/1/2		
with jumper JP12 cut on CPU		x [0.200]=			x [0.200]=			x [0.200]=	
or without jumper JP12 cut on CPU		x [0.400]=			x [0.400]=			x [0.400]=	
JNCA (back light on)	[ ]	x [0.400]=		[ ]	x [0.400]=		[ ]	x [0.400]=	
NCM-W, NCM-F	[ ]	x [0.110]=		[ ]	x [0.110]=		[ ]	x [0.110]=	
TM-4	[ ]	x [0.110]=		[ ]	x [0.175]=		[ ]	x [0.110]=	
DPI-232 (Refer to Doc. 51499)	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
APS-6R							[ ]	x [0.025]=	
ACPS-2406							[ ]	x [0.0013]=	
ICM-4RK, ICM-4, CRM-4, CRM-4RK	[ ]	x [0.007]=		[ ]	x [0.072]=		[ ]	x [0.007]=	
ICE-4	[ ]	x [0.001]=		[ ]	x [0.065]=		[ ]	x [0.001]=	
CRE-4		N/A			x [0.065]=			N/A	
DCM-4RK, DCM-4	[ ]	x [0.008]=		[ ]	x [0.080]=		[ ]	x [0.008]=	
VCE-4	[ ]	x [0.001]=		[ ]	x [0.040]=		[ ]	x [0.001]=	
VCM-4RK, VCM-4	[ ]	x [0.007]=		[ ]	x [0.040]=		[ ]	x [0.007]=	
ARM-4 Auxiliary Relay				[ ]	x [0.146]=				
AA-30							[ ]	x [0.045]=	
AA-100, AA-120							[ ]	x [0.050]=	
ACM-24AT	[ ]	x [0.016]=		[ ]	x [0.070]=		[ ]	x [0.016]=	
ACM-48A	[ ]	x [0.016]=		[ ]	x [0.070]=		[ ]	x [0.016]=	
AEM-24AT	[ ]	x [0.002]=		[ ]	x [0.056]=		[ ]	x [0.002]=	
AEM-48A	[ ]	x [0.002]=		[ ]	x [0.056]=		[ ]	x [0.002]=	
Maximum number of LEDs illuminated on these annunciators during non-fire conditions:	[ ]	x [0.0054]=					[ ]	x [0.0054]=	
AFM-16AT, AFM-32A	[ ]	x [0.040]=		[ ]	x [0.056]=		[ ]	x [0.040]=	
ACM-16AT, ACM-32A	[ ]	x [0.040]=		[ ]	x [0.056]=		[ ]	x [0.040]=	
AEM-16AT, AEM-32A	[ ]	x [0.002]=		[ ]	x [0.018]=		[ ]	x [0.002]=	
AFM-16A	[ ]	x [0.025]=		[ ]	x [0.065]=		[ ]	x [0.025]=	
LCD-80, LCD-80TM	[ ]	x [0.100]=		[ ]	x [0.100]=		[ ]	x [0.050]=	
ACM-8R (refer to Doc. 15342)	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
LDM (refer to Doc. 15885)	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
UZC-256	[ ]	x [0.035]=		[ ]	x [0.085]=		[ ]	x [0.035]=	
FDU-80	[ ]	x [0.0643]=		[ ]	x [0.0643]=		[ ]	x [0.0643]=	
AMG-1, AMG-E	[ ]	x [0.060]=		[ ]	x [0.060]=		[ ]	x [0.060]=	
FFT-7, FFT-7S	[ ]	x [0.060]=		[ ]	x [0.120]=		[ ]	x [0.060]=	
RM-1	[ ]	x [0.020]=		[ ]	x [0.020]=		[ ]	x [0.020]=	
M302MJ, M502MJ	[ ]	x [0.0094]=		[ ]	x [0.090]=		[ ]	x [0.0094]=	
XPIQ (Refer to Doc. 51013)	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
RPT-W, RPT-WF, RPT-F RPT-485W, RPT-485WF	[ ]	x [0.017]=		[ ]	x [0.017]=		[ ]	x [0.017]=	
RFX (Refer to Doc. 51012)	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
UDACT Communicator	[ ]	x [0.040]=		[ ]	x [0.100]=		[ ]	x [0.040]=	
VEC-25/50	[ ]	x [0.215]=		[ ]	x [1.215]=		[ ]	x [0.215]=	
with optional FC-AAM25	[ ]	x [0.245]=		[ ]	x [2.215]=		[ ]	x [0.245]=	
Four-Wire Smoke Detectors†	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
Power Supervision Relay EOLR-1 or A77-716B	[ ]	x [0.020]=		[ ]	x [0.020]=		[ ]	x [0.020]=	
Notification Appliance powered from Main Power Supply‡				[ ]	x [ ]=				
				[ ]	x [ ]=				
DHX-501, DH300RP, DH300RPL (Duct Detectors with internal relays) Refer to installation document	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
CHG-120 Battery Charger							[ ]	x [0.060]=	
Local Energy Municipal Box				[ ]	x [ ]=				
Compatable Devices not listed above**	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
	[ ]	x [ ]=		[ ]	x [ ]=		[ ]	x [ ]=	
Sum each column for totals	Primary, non-alarm:			Primary, alarm:			Secondary, non-alarm:		

Table A.2 System Draw Current Calculations

* Value represents an SLC's maximum current draw. Refer to device datasheets for individual current draws. If jumper JP12 is cut, total device current cannot exceed 200 mA; if jumper JP12 is not cut, total device current cannot exceed 400 mA.

† The total regulated load current supplied to four-wire smoke detector and power supervision relays cannot exceed 1.25 A.

‡ Enter the total notification appliance draw from the Main Power Supply, excluding the current from APS-6R supplies. Refer to Device Compatibility Document.

** Refer to manual and/or Device Compatibility Document.

A.2.1 Calculating the Maximum Secondary Power Fire Alarm Current Draw

Use Table A.3 below to determine the maximum current requirements of secondary power source during fire alarm conditions. The result obtained is the amount of current that the batteries must be able to supply to the fire alarm system. Use the result in Table A.4 to determine the size of the batteries needed for the fire alarm system.

Results taken from Table A.3 below assume that, while in a fire alarm condition, batteries must feed the main power supply (and any additional supplies such as the APS-6R and AA-30) with the maximum rated power each supply can provide.

Device	Quantity		Current (in amps)		Total Current/Type
Alarm Current, from Table A.2, col 2				=	
APS-6R*	[ ]	X	6	=	
AA-30†	[ ]	X	3	=	
AA-120[2]	[ ]	X	7.3	=	
Sum Column for Secondary Fire Alarm Load				=	

Table A.3 Maximum Secondary Power Fire Alarm Current Draw

* Actual load current may be used in place of maximum rated supply current. To calculate actual load current, sum the current draws for each appliance connected to APS-6R supplies.

† Exclude Amplifiers that are employed for backup.

NOTE: The Secondary Fire Alarm Load cannot exceed the following:
- 9 A with BAT-12120 batteries (12 V, 12 AH).
- 12 A with BAT-12250 batteries (12 V, 26 AH).
- 20 A with BAT-12550 batteries (12 V, 55 AH).

A.3 Calculating the Battery Requirements

A.3.1 Calculating the Battery Capacity

Use this table to determine the battery capacity needed for the system:

Current (amps)	**X**	**Time (hours)**	**=**	**AH**
Secondary Non-Fire Alarm Current (from column 3 in Table A.2) _____	X	Required Secondary Non-Fire Alarm Standby Time (24 or 60 hours) _____	=	_____AH
APS-6R Standby Load Current _____	X	Required Secondary Non-Fire Alarm Standby Time (24 or 60 hours) _____	=	_____AH
Secondary Fire Alarm Load (from Table A.3) _____	X	Required Fire Alarm Standby Time: (for 5 minutes, enter 0.084; for 15 minutes, enter 0.25) _____	=	_____AH
Sum Column for Total Secondary Amp Hours calculated			=	_____AH
Multiply by the derating factor x 1.2 (see Note 7)			=	_____AH
Battery Size – Total Secondary Amp Hours Required			=	_____AH

1. NFPA 72-1999 Local, Proprietary, and Central Station systems requires 24 hours of standby power followed by 5 minutes in alarm.
2. NFPA 72-1999 Auxiliary and Remote Station Systems require 60 hours or standby power followed by 5 minutes in alarm.
3. Batteries installed in a system powered by an automatic starting engine generator need to provide at least 4 hours of standby power.
4. Factory Mutual requires 90 hours of standby for deluge-preaction systems.
5. Emergency voice/alarm communications systems require 2 hours of operation in the alarm condition. Due to the sporadic nature of voice operation, however, NFPA 72-1999 permits 15 minutes of operation at a maximum connected load to equal 2 hours of normal use.
6. If the total exceeds 25 AH, the system requires a separate JCI-LBB battery enclosure for two BAT-12550, 55 AH batteries in a separate JCI-LBB enclosure. If the total exceeds 55 AH, the system requires an auxiliary battery charger with sufficient amp-hour capacity; this charger must be UL-listed for Fire-Protective Signaling. If CHG-120 battery charger is used, it requires a second JCI-LBB enclosure.
7. The following battery derating factors must be used for Canadian installations using IFC-640 charger:
   • For a 12 AH battery, use derating factor of 1.2
   • For a 25 AH battery, use derating factor of 1.5
   • For a 55 AH battery, use derating factor of 1.8
   When batteries are charged by CHG-120 charger use a derating factor of 1.2 for 25 AH and 55 AH batteries.

Table A.4 Secondary Power Standby and Fire Alarm Load

A.3.2 Calculating the Battery Size

Use this table to choose the battery size, in amp-hours, needed to support the fire alarm system. Select batteries that meet or exceed the Total Amp-Hours calculated in Table A.4 and that are within the acceptable battery charger range (12-55 AH). Write the amp-hours requirements on the Protected Premises label.

Battery Size	Voltage Rating	Number Required	Part Number	Backbox Size
12 AH	12 volts	two	BAT-12120	SBB-A4*, SBB-B4*, SBB-C4*, SBB-D4*
25 AH	12 volts	two	BAT-12250	SBB-A4*, SBB-B4*, SBB-C4*, SBB-D4*
55 AH	12 volts	two	BAT-12550	JCI-LBB*
* Red version available; add “R” to part number listed here				

Table A.5 Selecting the Battery Size

Appendix B: Electrical Specifications

B.1 Electrical Specifications

AC Power

Component	Values
Main Power Supply	120 VAC, 50/60 Hz, 3.0 A; or 240 VAC, 50/60 Hz, 1.5 A
Wire size	Maximum 12 AWG (3.1 mm^2) with 600 VAC insulation

NOTE: If using an auxiliary power supply such as APS-6R, ACPS-2406, or audio amplifiers, refer to the documentation for that equipment.

Batteries

The control panel uses only sealed lead-acid batteries for secondary standby power. Maximum battery capacity for the control panel's integral main power supply is 55 AH. Batteries larger than 25 AH require the JCI-LBB or other UL-listed battery cabinet. The table below contains specifications for batteries that can be used with the control panel; see also Appendix A.3.2 "Calculating the Battery Size":

Charger	Description	Specifications
Main Power Supply	An internal battery charger for 12 AH to 55 AH	Dual Rate: High Charge: 29.1 VDC Normal Float Charge: 27.6 VDC Charging Current: 2.0 A max (1.5 A typical)
CHG-120 Battery Charger	An external battery charger designed to charge lead-acid batteries between 25 AH and 120 AH	Dual Rate: High Charge: 28.1 VDC Normal Float Charge: 27.6 VDC Charging Current: 4.5 A
ACPS-2406 Auxiliary Charger/ Power Supply	An internal battery charger for 7AH to 25 AH	Normal Float Charge: 27.6 VDC Charging Current: 1.1 A max (0.750 A typical)

Signaling Line Circuit (SLC)

Item	Value
Voltage	24 VDC nominal, 27.6 VDC maximum
Maximum length	12,500 ft. (3810 m) per channel (NFPA Style 4) or 10,000 ft. (3048 m) total loop or circuit length (NFPA Style 6 and 7) **Note:** Refer to Appendix B.2 “Wire Requirements” for limitations.
Maximum current	400 mA peak, 200 mA average (max short circuit; circuit will shut down until short is fixed)
Maximum resistance	50 ohms (supervised and power-limited)

Notification Appliance Circuits & Releasing Circuits

Item	Value
Max. wiring voltage drop	2 VDC (except M510CJ which is 1.2 VDC)
Nominal operating voltage	24 VDC
Current for all external devices connected to the control panel’s power supply	6.0 A in alarm (3 A continuous)
Optional ACPS-2406	Total 6 A in alarm (5 A continuous)
Optional APS-6R	Total 6 A in alarm (4 A continuous)
Maximum signaling current/ circuit per NAC	2.5 A Note: Some devices have maximum draws less than this; refer to the device’s documentation.
End-of-Line Resistors (ELRs)	Control Panel NACs (TB3, TB4, TB5, TB6): 2.2K, 1/2 watt ICM-4RK, ICE-4, VCM-4RK, VCE-4, and DCM-4RK: 4.7K, 1/2 watt (2 watts on 70 Vrms audio) XP5-C, XP6-C, M300CJ Modules: 47K, 1/2 watt

Output Relays

Output relays for Alarm, Trouble, Supervisory, and Security are available on power supply terminals TB8, TB9, TB10, and TB11 respectively.

Contact ratings: 2.0 A @ 30 VDC (resistive)

Four-wire Smoke Detector Power

Control Panel terminals TB7 RESET (+) and (–) supply filtered, low-noise power for four-wire smoke detectors. Specifications are:

- Nominal voltage: 24 VDC
- Maximum rated current: 1.25 A DC
- Maximum ripple voltage: 176 mVrms

Refer to the *Device Compatibility Document* for compatible 24 VDC detectors.

Power Output

Control Panel terminals TB7 NONRST (+) and (–) supply one (1) power-limited circuit available to power external devices, such as notification appliances and annunciators.

- Nominal voltage: 24 VDC
- Maximum rated current: 1.25 A DC
- Maximum ripple voltage: 176 mVrms

Refer to the *Device Compatibility Document* for compatible devices and notification appliances.

NOTE: The Control Panel provides a total of 6.0 A of power in alarm (3 A in standby), shared by all internal circuitry and external provisions (24 V resettable and non-resettable). For power requirements, refer to the power supply calculation tables in Appendix A.

Operating Power: AC Branch Circuit

The control panel requires connection to a separate dedicated AC branch circuit. Follow these guidelines when connecting the AC branch circuit:

- Label the branch circuit “Fire Alarm”. This must be a separate dedicated AC fire alarm circuit.
- Connect the branch circuit to the line side of the main power feed of the protected premises.
- Do not power other equipment from the fire alarm branch circuit.
- Run the AC branch circuit wire continuously, without any disconnect devices except for overcurrent protection, from the power source to the fire alarm control panel.
- Overcurrent protection for the AC branch circuit must comply with Article 760 of the National Electrical Codes, as well as local codes.
- Use 12 AWG (3.1 mm^2) wire with 600 VAC insulation for the AC branch circuit.

Connect the ground terminal (TB2-Earth) to a solid earth ground (a metallic, cold water pipe may be suitable in some installations). This connection is vital to maintaining the control panel's immunity to unwanted transients generated by lightning and electrostatic discharge.

Operating Power: Secondary Power Source (Batteries)

The battery charger is current-limited and can recharge sealed lead-acid type batteries. The battery charger shuts off when the control panel is in alarm.

B.2 Wire Requirements

Each type of circuit within the Fire Alarm Control System requires use of a specific wire type to ensure proper circuit operation. The wire gauge of a particular circuit depends on the length of that circuit and the current traveling through it. Use Table B.1 below to determine the specific wiring requirements for each circuit.

Compliance with the Federal Communications Commission (FCC) and Canadian Department of Communication regulations on electrical energy radiation requires the following: Use twisted-pair shielded wire for any non-SLC-loop wiring entering or exiting the cabinet that is not enclosed in conduit. Use twisted-pair unshielded wiring for SLC-loop wiring.

NOTE: If running an SLC in conduit with Notification Appliance Circuits, you can reduce problems by exclusively using electronic sounders (such as the Spectralert or MA/SS-24 Series) instead of more electronically noisy notification appliances (such as electromechanical bells or horns).

Circuit Type	Circuit Function	Wire Requirements	Distance (feet/meters)	Typical Wire Type*
SLC (power limited)	Connects to intelligent and addressable modules.	Twisted-unshielded pair, 12 to 18 AWG (3.1 to 0.78 mm^2). 50 ohms maximum per length of Style 6 & 7 loops. 50 ohms per branch maximum for Style 4 loop.	12,500 ft. (3,810 m) 9,500 ft. (2,895.6 m) 6,000 ft. (1,828.8 m) 3,700 ft. (1,127.76 m)	12 AWG (3.1 mm^2) 14 AWG (2.00 mm^2) 16 AWG (1.30 mm^2) 18 AWG (0.78 mm^2)
	or	Untwisted, unshielded wire, in conduit or outside of conduit. **Note:** Maximum total capacitance of **all** SLC wiring (both between conductors and from any conductor to ground) should not exceed 0.5 mircofarads.	1,000 ft. (304.8 m)	12 to 18 AWG (3.1 to 0.78 mm^2)
EIA-485 (power limited)	Connects to LCD-80, ACS modules, or TM-4 Transmitter	Twisted-shielded pair with a characteristic impedance of 120 ohms. 18 AWG (0.78 mm^2) minimum.	6,000/1829 (max)	16 AWG (1.30 mm^2)
EIA-232 (power limited)	Connects to Printers, CRT, or PC.	Twisted-shielded pair. 18 AWG (0.78 mm^2) minimum.	50/15.24 (without modem)	16 AWG (1.30 mm^2)
IDC Initiating Device Circuit	M300MJ, M301MJ, XP5-M, XP10-M, XP6-MA (power limited)	12-18 AWG (3.1 to 0.78 mm^2). Maximum circuit resistance is 20 ohms.		12 to 18 AWG (3.1 to 0.78 mm^2)
NAC Notification Appliance Circuit	XP5-C, M300CJ, XP6-C (power limited)	12-18 AWG (3.1 to 0.78 mm^2). At alarm current level, no more than a 1.2 V drop at the end of the circuit, or sized to provide the minimum rated operating voltage of the appliances used.	To meet 1.2 V drop, or sized to provide the minimum rated operating voltage of the appliances used.	12 to 18 AWG (3.1 to 0.78 mm^2)
24 VDC Power Runs (power-limited)	To TM-4 Transmitter, Annunciator and M300CJ modules	12-18 AWG (3.1 to 0.78 mm^2). Size wire so that no more than 1.2 V drop across wire run from supply source to end of any branch.	To meet 1.2 volt drop	12 to 18 AWG (3.1 to 0.78 mm^2)
CHG-120	External battery charger	12 AWG (3.1 mm^2) in conduit	20/6.1 (max)	12 AWG (3.1 mm^2)

Table B.1 Wire Requirements

* Notifier brand cable is recommended; see the product catalog available from Paige Electric.

NOTE: Lightning arresters required on circuits extending between buildings; 999 meter length maximum to meet UL 1459.

Appendix C: Compatible Equipment

These are the most common devices at time of publishing; the most complete list of compatible intelligent SLC loop devices is provided in the *SLC Wiring Manual*; for conventional non-addressable equipment see the *Device Compatibility Documen*t.

Johnson Controls and Notifier Equipment

AA-30 30-Watt Audio Amplifier
AA-100 100-Watt Audio Amplifier
AA-120 120-Watt Audio Amplifier
JABF-1B Annunciator Flush Box
JABF-1DB Annunciator Flush Box with Door
JABF-2B Annunciator Flush Box
JABF-2DB Annunciator Flush Box with Door
JABF-4B Annunciator Flush Box
ABF-4DB Annunciator Flush Box with Door
ABM-16AT Annunciator Blank Module
ABM-32A Annunciator Module Blank
JABS-1TB Annunciator Surface Box
ABS-1B Annunciator Surface Box
ABS-2B Annunciator Surface Box
JABS-4B Annunciator Surface Box
ABS-8R Annunciator Backbox for ACM-8R
ACM-16AT Annunciator Control Module
ACM-24AT Annunciator Control Module
ACM-32A Annunciator Control Module
ACM-48A Annunciator Control Module
ACM-8R Annunciator Control Module
ACPS-2406 Auxiliary Charger/Power Supply
ACT-1 Audio Coupling Transformer
ACT-2 Audio Coupling Transformer
ADP-4B Annunciator Dress Panel
AEM-16AT Annunciator Expander Module
AEM-24AT Annunciator Expander Module
AEM-32A Annunciator Expander Module
AEM-48A Annunciator Expander Module
AFM-16A Annunciator Fixed Module
AFM-16AT Annunciator Fixed Module
AFM-32A Annunciator Fixed Module
AKS-1B Annunciator Key Switch
APJ-1B Annunciator Phone Jack
AMG-1 Audio Message Generator
AMG-E Audio Message Generator
APS-6R Auxiliary Power Supply
ARM-4 Auxiliary Relay Module
AVL-1 Audio Voice Link *(Not ULC-listed)*
BGX-101L Addressable Manual Pull Station
BMP-1 Blank Module Plate
BP-4 Battery Dress Plate
BX-501 Intelligent Detectors/Sensors Base
B501J Intelligent base
B501BH Sounder base
B210LPJ Intelligent detector base
CAB-4 Series Mounting Hardware (Doors and backboxes are ordered separately. Black unless "R" is added to the P/N)
Doors (Add B to the P/N for blank door)
JDR-A4 A-sized door, 1 row of equipment
JDR-B4 B-sized door, 2 rows of equipment
JDR-C4 C-sized door, 3 rows of equipment
JDR-D4 D-sized door, 4 rows of equipment
Backboxes (For red, add "R" to the P/N)
SBB-A4 A-sized backbox
SBB-B4 B-sized backbox
SBB-C4 C-sized backbox
SBB-D4 D-sized backbox

Trim Rings
TR-A4 A-sized trim ring
TR-B4 B-sized trim ring
TR-C4 C-sized trim ring
TR-D4 D-sized trim ring
CCM-1 Communication Converter Module
CHS-4L Chassis for voice equipment
CHS-M2 Chassis for 1st row (included in basic equipment package)
CHS-4MB Assembly: CHS-4N with MP-1B
CHS-4N Chassis for 2nd, 3rd, 4th rows
CHG-120 Battery Charger
CMX-1 Addressable Control Module
M510CJ Addressable Control Module
JCPU-640 control panel circuit board
1551J Ionization Smoke Detector
1251J Intelligent Ionization Smoke Detector
CRE-4 Control Relay Expander
CRM-4RK Control Relay Module
CRT-2 Video Display Monitor with Keyboard
DCM-4RK Dual Channel Module
DP-1B Blank Dress Plate
DP-DISP Display Dress Plate
DPDW-1B Double Well Dress Plate
DPSW-1B Single Well Dress Plate
DPI-232 Direct Panel Interface
M300CJ NAC Module
FCPS-24 Field Charger Power Supply
5551J Intelligent Thermal Sensor
FDU-80 Remote Fire Annunciator
FFT-7 Fire Fighters Telephone
FFT-7S Fire Fighters Telephone
FHS Fireman's Handset
M300MJ Monitor Module
M301MJ Mini Monitor Module
FSB-200S Single-ended beam smoke detector with sensitivity testing
FSB-200 Single-ended beam smoke detector.
DH300P Photoelectric Duct Detector
DH300RP Photoelectric Duct Detector with alarm relay
DH300PL Low-flow DUCT Detector
DH300RPL Low-flow Duct Detector with alarm relay
DHX-501, DHX-502 Duct Detectors
1351J Ion Detector
Acclimate™ 2351TMJ Combination Photoelectric/Heat Detector
FTX-P2J HARSH™ Smoke Detector
FTX-P1J Intelligent HARSH™ Detector
7351J VIEW® Low Profile Laser Detector
M300SMJ Pull Station Monitor Module
FPJ Firefighter's Phone Jack
M300RJ Relay Module
2351J Photo Detector
2351TJ Photo/Thermal Detector

continued…

5351J Thermal Detector
5351RJ Thermal Detector (rate of rise)
High Temperature Detector
M500FPJ Telephone Module
M302MJ Monitor and Zone Interface Module
M300DJ Dual Monitor Module
ICE-4 Indicating Control Expander
ICM-4RK Indicating Control Module
3251J Advanced Multi-Sensor Intelligent Detector
M500XJ Loop Fault Isolator Module
KDM-2 Keypad/Display Unit
L20-300-BX Enclosure; recessed mount
L20-310-BX Enclosure; surface mount
LCD-80 Liquid Crystal Display Module
LCD-80TM Terminal Mode LCD Annunciator
LDM-32 Lamp Driver Module
LDM-E32 Lamp Driver Module
LDM-R32 Lamp Driver Module
LEM-320 Loop Expander Module
7251J VIEW® Low Profile Laser Detector (CLIP mode)
M500MJ Addressable Monitor Module
M502MJ Addressable Monitor Module
M501MJ Addressable Mini Monitor Module
MP-1B Panel Module Dress Plate
NBG-12LRA Agent Release-Abort Station
JBG-12 Series Manual Pull Station
JBG-12LX Addressable Manual Pull Station
JNCA Network Control Annunciator
NCM-F Network Control Module (Fiber)
NCM-W Network Control Module (Wire)
IFW Intelligent Fire Workstation
N-ELR Assortment ELR Pack with Mounting Plate
JCI-LBB Battery Box
JCI-LBBR Red Battery Box
P-40 Keltron Printer
P40-KITB Dress plate for Keltron Printer
PRN Series 80-Column Printers (**PRN-4, PRN-5, PRN-6)**
PS-12120 Battery 12-volt, 12 amp-hour
PS-12180 Battery 12-volt, 18 amp-hour
PS-12250 Battery 12-volt, 25 amp-hour
PS-12550 Battery 12-volt, 55 amp-hour
PS-12600 Battery 12-volt, 60 amp-hour
R-120 120 Ohm End-of-Line Resistor
R-2.2K 2.2K End-of-Line Resistor
R-27K 27K End-of-Line Resistor
R-470 470 End-of-Line Resistor
R-47K 47K End-of-Line Resistor
RA400 Remote Annunciator
RA400Z Remote Annunciator with diode
RFX Wireless Transmitter (version 2.0 and higher): SDRF-751 Wireless Photo/Thermal Smoke Detector; 5817CB Wireless Monitor Module
RPJ-1 Fireman's Phone Jack
RPT-485F EIA-485 Repeater (Fiber)
RPT-485W EIA-485 Repeater (Wire)
RPT-485WF EIA-485 Repeater (Wire/Fiber)
RM-1 Remote Microphone
RM-1SA Remote Microphone
SCS-8, SCE-8 Smoke Control Station
SCS-8L, SCE-8L Smoke Control Lamp Driver
2551J Intelligent Photoelectric Detector
2251J Intelligent Photoelectric Detector
STS-1 Security Tamper Switch
TM-4 Transmitter Module
UDACT Universal Digital Alarm Communicator Transmitter
UZC-256 Universal Zone Coder
VCE-4 Voice Control Expander
VCM-4RK Voice Control Module
VeriFire™ Tools Upload/Download Software
VP-2B 2" Filler Dress Plate
XP5-C Transponder Control Module
XP5-M Transponder Monitor Module
XPC-8 Transponder Control Module
XPDP Transponder Dress Panel
XPIQ Quad Intelligent Audio Transponder
XPM-8 Transponder Monitor Module
XPM-8L Transponder Monitor Module
XPP-1 Transponder Processor
XPR-8 Transponder Relay Module
XP6-C Supervised Control Module
XP6-R Six Relay Control Module
XP6-MA Six Zone Interface Module
XP10-M Ten Input Monitor Module

System Sensor Equipment

A2143-00 End of Line Resistor Assembly
EOLR-1 End-of-Line Resistor Assembly
FSB-200, FSB-200S Beam Detectors

Appendix D: Canadian Applications

D.1 Standalone Application

D.1.1 IFC-640 with KDM-2

If using KDM-2 as the primary display for IFC-640, an ACS series annunciator must be mounted adjacent to the panel or within IFC-640 enclosure.

D.1.2 IFC-640 with JNCA

Network Control Annunciator (JNCA) with 640-character, multi-line display complies with ULC requirements when used as the primary display for IFC-640.

D.2 Local Network Application

To meet ULC requirements, the network's Manual Controls may only be operated from one location at any given time. When panels are networked (using NCM Network Control Modules), employ AKS-1 Key Switch on each panel's Primary Annunciator to enable its functions. JNCA may be a Primary Annunciator when AKS-1B is installed. Refer to the *JNCA Manual* for more information.

A JNCA or Intelligent Fire Workstation (IFW) may be employed as a Display and Control Center. In the event that communication fails between the panels and the Control Center, the panels will continue to function in local/standalone mode.

D.3 Automatic Alarm Signal Silence

If selecting this feature for a system requiring annunciators, consult the Authority Having Jurisdiction.

D.4 Annunciator Applications

1. In Canada, the ACM series annunciator modules must be used to annunciate the fire alarm input points/zones only, if no multi-line sequential display is installed.
2. For Canadian applications, the following LED colors must be employed:
   - Red must be used to indicate active alarm inputs.
   - Yellow must be used to indicate supervisory, burglary or trouble signals.
   - Green must be used to indicate the presence of power or an activated output.

D.5 Releasing Devices

Supervision for shorts is required; use REL devices and type code REL CKT ULC.
(With on-board NACs, use REL-2.2K; with M300CJ modules use REL-47K. Refer to Section 4.5 "Releasing Applications" for details.

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