# NOTIFIER FIRE SYSTEMS

**A PITTWAY COMPANY**

**AFP-200**
INTELLIGENT FIRE DETECTION AND ALARM SYSTEM

AFP-200
ANALOG FIRE PANEL
ALL SYSTEMS NORMAL
11:00    MON  9/27/93

○ AC POWER
○ FIRE ALARM
○ PRE-ALARM WARNING
○ SUPERVISORY
○ ALARM SILENCE
○ SYSTEM TROUBLE

ALARM SILENCE

DRILL

NOTIFIER
A Pittway Company

Afp200cb

# AFP-200
# ANALOG FIRE PANEL

## INSTRUCTION MANUAL RELEASE 2

# Installation Precautions

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

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

**CAUTION -** *System Reacceptance Test after Software Changes:* To ensure proper system operation, this product must be tested in accordance with NFPA 72-1993 Chapter 7 after any programming operation or change in site-specific software. Reacceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring.

All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

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

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

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

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

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

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

**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.

# Fire Alarm System Limitations

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

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

**Any fire alarm system** may fail for a variety of reasons:

**Smoke detectors** may not sense fire where smoke cannot reach the detectors such as in chimneys, in walls, or 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. Furthermore, all types of smoke detectors - both ionization and photoelectric types, have sensing limitations. No type of smoke detector can sense every kind of fire caused by carelessness and safety hazards like smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches, or arson.

**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.

**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.

**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.

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

**Telephone lines** needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled.

**The most common cause** of fire alarm malfunctions, however, is inadequate maintenance. All devices and system wiring should be tested and maintained by professional fire alarm installers following written procedures supplied with each device. System inspection and testing should be scheduled monthly or as required by National and/or local fire codes. Adequate written records of all inspections should be kept.

# FCC Warning

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

*Canadian Requirements*

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

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

# CONTENTS

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# 1. System Overview

## 1.1  Agency Standards and Compliance

*This Fire Alarm Control Panel complies with the following NFPA standards*

NFPA 12 CO2 Extinguishing Systems (High Pressure Only)
NFPA 12A Halon 1301 Extinguishing Systems
NFPA 12B Halon 1211 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 72-1993 Central Station Fire Alarm Systems Protected Premises Unit (requires Notifier DACT).
NFPA 72-1993 Local Fire Alarm Systems.
NFPA 72-1993 Auxiliary Fire Alarm Systems (requires 4XTM or RTM-8).
NFPA 72-1993 Remote Station Fire Alarm Systems (requires 4XTM or Notifier 911ACDACT).
NFPA 72-1993 Proprietary Fire Alarm Systems (Protected Premises Unit).
NFPA 2001 Clean Agent Fire Extinguishing Systems

*Marine Approvals (Require CAB-AM)*

United States Coast Guard – Fire Protection System*
Lloyd's Register – Marine, Offshore and Industrial Category ENV1 and ENV2*

*The installer should be also familiar with the following documents and standards*

NFPA 72-1993 Initiating Devices for Fire Alarm Systems
NFPA 72-1993 Inspection, Testing and Maintenance for Fire Alarm Systems
NFPA 72-1993 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

*Underwriters Laboratories of Canada (ULC)*

Standard CAN/ULC-S527-M87

*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

*\*Approval does not apply to optional 911ACDigital Alarm Communicator/Transmitter or optional UDACT Universal Digital Alarm Communicator/Transmitter.*

## 1.2   Related Documentation

To obtain a complete understanding of AFP-200 specific features or to become familiar with related functions in general, refer to the documentation listed in **Table 1.2-1** below.  The Notifier document (DOC-NOT) chart provides the current document revisions.

| Document Title | Part Number |
|---|---|
| The LDM Series Annunciator | 15885 |
| The LCD-80 Liquid Crystal Display | 15037 |
| The NIB-96 Network Interface Board | 15666 |
| The ACM-8R Annunciator Control Relay Module | 15342 |
| The ACS Series Annunciators | 15842 |
| The AFM-16A Annunciator | 15207 |
| The AM2020/AFP1010 Fire Control Panel | 15088 |
| The UDACT Universal Digital Alarm Communication Transmitter | 50050 |
| The Off-Line Programming Utility | 15529 |
| The Notifier Device Compatibility Document | 15378 |
| The INA Intelligent Network Annunciator | 15092 |
| The NRT Network Reporting Terminal | 15090 |
| The Network Adapter Module (NAM-232) | 50038 |
| NOTI FIRE NET | 50257 |
| 911A Digital Alarm Communicator Transmitter | 74-06200-005 |
| N-ARA-10 Agent Release Pull Station | 15453 |
| MMX-2 Installation Instructions | M500-03-00 |
| The EIA-232D Protocol and Data Formats for the AFP-200/400 FACP | 50078 |
| The Telephone/Panel Interface TPI-232 | 50372 |

**Table 1-1   Documents Associated with the AFP-200**

## 1.3   General Description

The AFP-200 is a compact, cost-effective, intelligent fire alarm control panel with an extensive list of powerful features.  The power supply and all electronics are contained on a single circuit board, providing a complete fire control system for most applications.  Optional modules which plug into the main circuit board are available for special functions.

## 1.4   AFP-200 Features

- Single standard communication (SLC) loop, meets NFPA Style 4, 6, or 7 requirements
- 198 intelligent device capacity
- Overall 301 point capability
- Four Notification Appliance Circuits standard
- Optional eight-zone relay module with transmitter
- Optional 911ACDigital Alarm Communicator/Transmitter
- Optional UDACT Universal Digital Alarm Communicator/Transmitter
- LCD-80 liquid crystal display, mounts up to 6,000 feet from panel
- ACS annunciators, including LDM custom graphic annunciators
- ACM-8R remote relay module, increases point capacity
- Printer interface
- Real time clock, with European format option
- History file with 650 event capacity
- Intelligent features
    - Sensitivity display in percent
    - Manual sensitivity adjustment
    - Day/Night automatic sensitivity adjustment
    - Drift compensation (U.S. patent pending)
    - Auto detector test (meets NFPA 72E)
    - Maintenance Alert
    - Pre-Alarm (AWACS – 2 levels)
    - LED blink control
- Releasing features
    - Four independent hazards
    - Cross zone (three methods)
    - Delay timer
    - Soak  timer
    - Abort – four options

- Manual release
- Waterflow (non-silenceable) selection per module point
- Supervisory selection per point with separate LED
- Alarm Verification
- Walk Test
- Positive alarm sequence (PAS) pre-signal per NFPA 72-1993
- Silence Inhibit timer option
- Auto silence timer option
- March time/temporal code
- Two-stage option for Canada
- California code
- Tornado warning code
- Remote Ack/Silence/Reset/Drill via MMX Monitor Modules
- Automatic time control functions, with holiday exceptions
- Autoprogram (learn mode) reduces installation time
- Password- and key-protected nonvolatile memory.
- Programmable from a PC using the  PK-200 programming utility
- Rapid poll algorithm for manual stations (U.S. patent pending)
- Operates up to 1,000 ft. with untwisted, unshielded wire (U.S. Patent 5,210,523)
- Operates sounder base on Action Pre-Alarm level with general evacuation on alarm level.
- Burglar alarm point option.
- Critical process monitoring
- Read status on program via modem using dial-up phone lines.
- Marine cabinet option (CAB-AM)

*Note: Unless otherwise notated, general terms are used throughout this manual to reference the specific part numbers shown in the table below:*

| General Term | Specific Part Number(s) |
|---|---|
| CMX | CMX-1 or CMX-2 |
| CRT | CRT-2 |
| MMX | MMX-101, MMX-1, or MMX-2 |
| PRN | PRN-4 |

## 1.5    Controls and Indicators

### 1.5.1  Membrane Panel

The AFP-200 membrane panel includes windows for the Liquid Crystal Display (LCD) and six LEDs.  The control panel has 21 keys, including a 12-key alphanumeric pad, similar to a telephone keypad.  Slide-in labels for the six LEDs and the four main operator switches are included.   Refer to Figure 1 for the location of switches and LEDs.

**LED Indicators**
- AC Power (green)
- System Alarm (red)
- Pre-Alarm Warning (yellow)
- Supervisory/Security (yellow)
- Alarm Silence (yellow)
- System Trouble (yellow)

**Operational switches**
- Acknowledge/Step
- Alarm Silence
- Drill
- System Reset (lamp test)

**Service/program switches**
- Twelve-key pad with 0-9, *, #
- Four cursor keys (Up, Down, Right, Left)
- ENTER key

### 1.5.2  Local Sounder

The piezo sounder provides unique sounds for alarm, trouble and supervisory/security conditions.

### 1.5.3  Output Circuits

The AFP-200 output circuits consist of four Class B (Style Y) Notification Appliance Circuits (NACs) or releasing circuits (fully programmable).

### 1.5.4  Relays

The control panel includes three dry contact relays for system alarm, system trouble, and supervisory. Contacts are rated 2 A at 30 VDC and 0.5 A at 30 VAC (resistive).
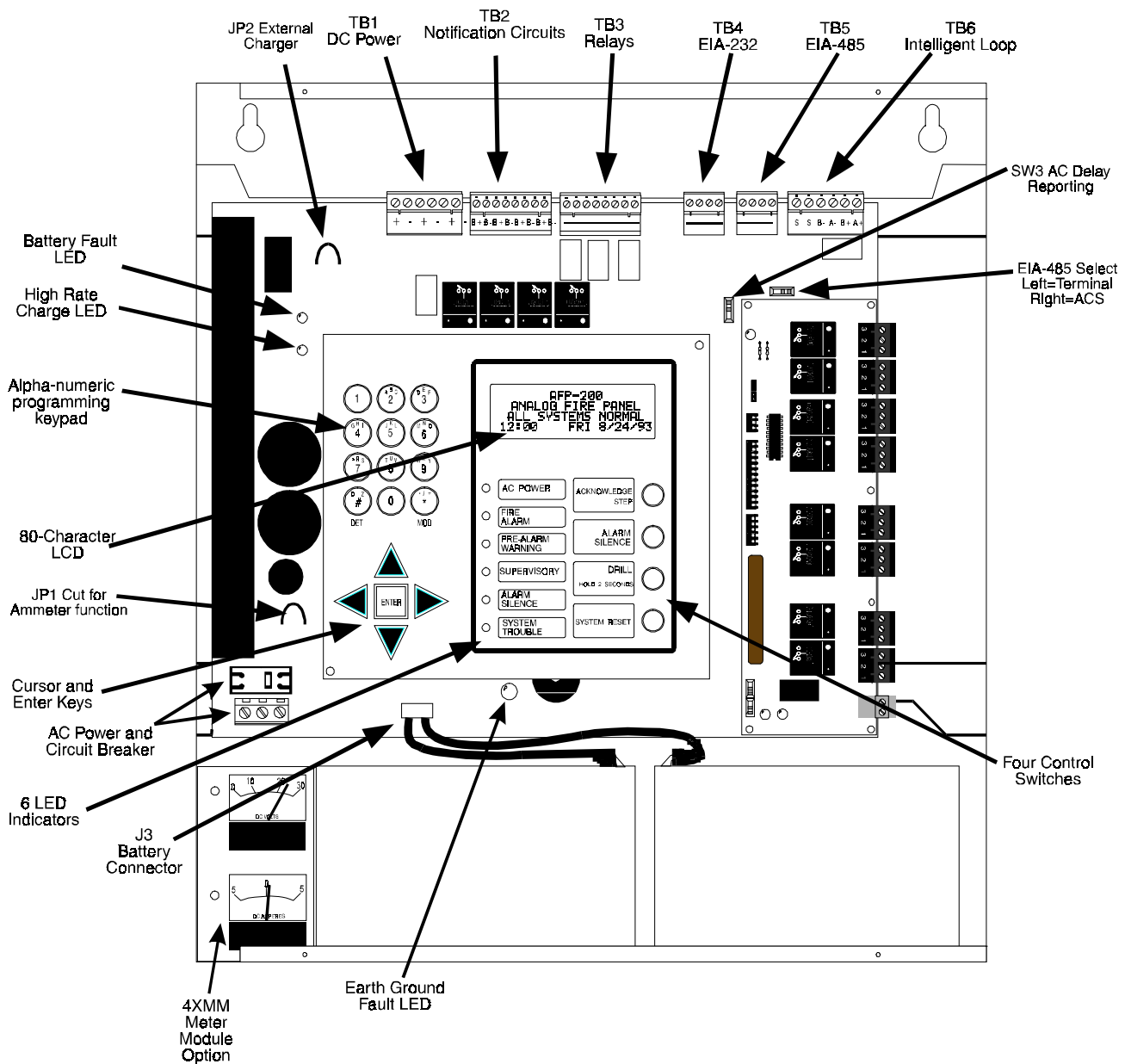
**Figure 1: Connections and Controls**

*(shown with dress panel removed)*

Labels around the figure:

- JP2 External Charger
- TB1 DC Power
- TB2 Notification Circuits
- TB3 Relays
- TB4 EIA-232
- TB5 EIA-485
- TB6 Intelligent Loop
- SW3 AC Delay Reporting
- EIA-485 Select Left=Terminal Right=ACS
- Battery Fault LED
- High Rate Charge LED
- Alpha-numeric programming keypad
- 80-Character LCD
- JP1 Cut for Ammeter function
- Cursor and Enter Keys
- AC Power and Circuit Breaker
- 6 LED Indicators
- J3 Battery Connector
- 4XMM Meter Module Option
- Earth Ground Fault LED
- Four Control Switches

LCD display text:
```
AFP-200
ANALOG FIRE PANEL
ALL SYSTEMS NORMAL
12:00      FRI 8/24/93
```

Control panel indicators:
- AC POWER
- FIRE ALARM
- PRE-ALARM WARNING
- SUPERVISORY
- ALARM SILENCE
- SYSTEM TROUBLE
- ACKNOWLEDGE STEP
- ALARM SILENCE
- DRILL HOLD 2 SECONDS
- SYSTEM RESET

## 1.6 Components

### Circuit Board

At the heart of the AFP-200 control panel, the circuit board contains the system's central processing unit (CPU), power supply, and other primary components. It is delivered pre-mounted in the cabinet (*see below*).
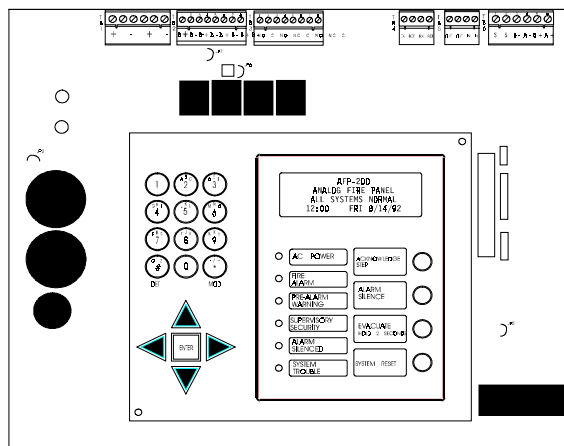


### Cabinet

The circuit board mounts in a compact (16.125" x 14.5" x 5.5") cabinet with a Lexan® front dress plate. The cabinet provides space for two batteries (up to 12 AH).
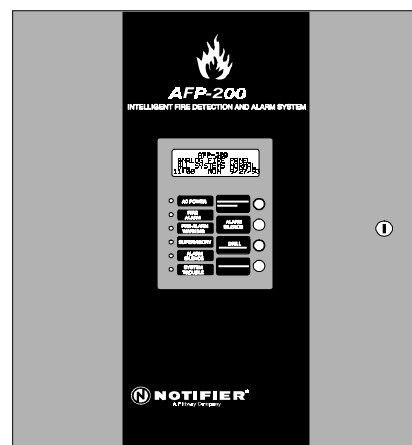


### LCD Display

The control panel uses an 80-character LCD display (4 X 20 characters). The display includes a long-life LED backlight that remains illuminated unless AC power is lost while the system is not in alarm.
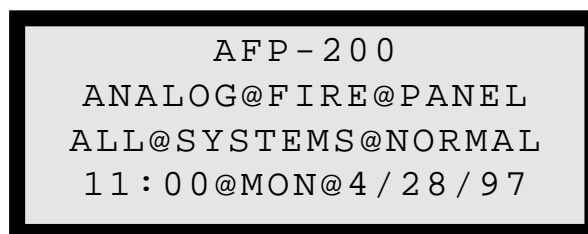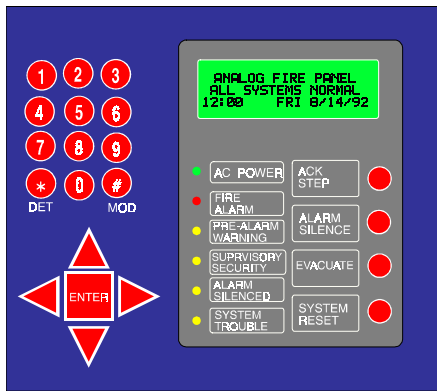
## Membrane Switch Panel

The membrane switch panel provides LED indicators and operational switches (ACKNOWLEDGE, SILENCE, DRILL, RESET).  The operational switches and LEDs are visible with the cabinet door closed.  The programming switches are visible only with the door open. Slide-in labels are provided for switch and LED description.
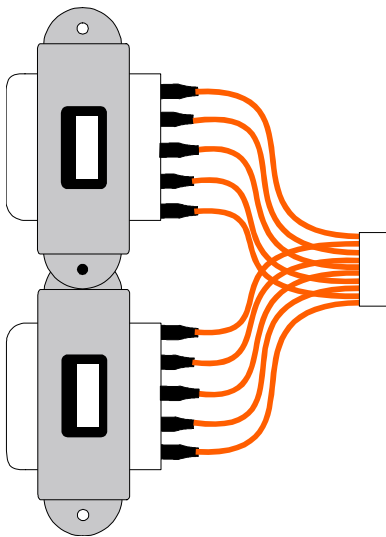
## Transformer Assembly

Two 100 VA transformers and connector.
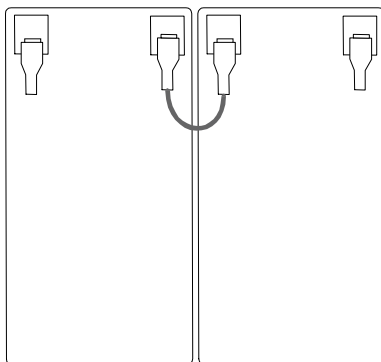
## Batteries

The cabinet provides space for 7 AH or 12 AH batteries (for 17 AH batteries use the BB-17 battery box).   Batteries must be ordered separately.

## 1.7    Optional Devices

### 1.7.1   Digital Communicator

The 911AC Digital Alarm Communicator/Transmitter mounts in a separate enclosure (Figure B-1) and connects to the control panel.  The 911AC transmits three zones of information (System Alarm, System Trouble, Supervisory) to the central station or remote station receiver.  Fully UL-Listed for fire operation (NFPA 72-1993), the 911AC requires two standard dial-up telephone lines to operate.  For details, refer to the 911AC Manual, Document 74-06200-005.

### 1.7.2   UDACT

The Universal Digital Alarm Communicator/Transmitter (UDACT) can be used with the control panel.  The UDACT transmits system status to UL-listed Central Station Receivers via the public switched telephone network.  The UDACT mounts externally in a separate enclosure.   EIA-485 annunciator communications bus and 24 VDC  (nominal) connections are required.  The UDACT is capable of reporting the status of 89 zones when used with the AFP-200.  The AFP-200 requires software PN 73609 or higher when using a UDACT.  Refer to Appendix B of this manual and the UDACT Manual for additional information.

### 1.7.3   Option Slot

The circuit board includes an option module slot located on the right side of the board.  When an option module is installed, jumper JP5 located to the right of the membrane switch panel must be cut.  The option slot supports one of the modules described below.

#### 4XTM Transmitter module

This module provides municipal box and remote station transmitters meeting NFPA 72-1993 Auxiliary and Remote Station requirements.   Disable switch and indicator are included.

#### RTM-8 Relay Module

The relay/transmitter Module (RTM-8) module provides eight Form-C relays (5A contacts).  These relays track Software Zones 1 through 8.  The RTM-8 also provides Municipal Box and Remote Station transmitters.  Equipped with an RTM-8, the AFP-200 meets NFPA 72-1993 (Auxiliary) and NFPA 72-1993 (Remote Station) requirements.  In remote station applications, the RTM-8 transmits alarm only and does not transmit trouble or supervisory status.   Disable switches and indicators are included.



#### Meter Module

The 4XMM Meter Module provides a voltmeter to measure voltage across the batteries and an ammeter to measure charging current to the batteries.  A single assembly containing both meters mounts in the lower left-hand corner of the AFP-200 cabinet.
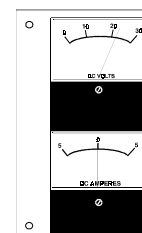
#### Trim Ring

The TR-4XG gray trim ring is available for semi-flush mounting of the control panel cabinet.

#### Battery Box

The BB-17 battery box may be used to mount two 17 AH batteries.  The box mounts directly below the control panel cabinet.
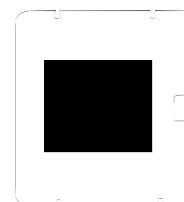


#### Dress Panel

A dead front dress panel (DP-AFP200) is available as an option (required for Canadian installations).

#### Expansion Power Supply

Power supply model AVPS-24/AVPS-24E provides an additional 3 A of notification appliance power.  Refer to the Device Compatibility Document for compatible notification appliances.



#### Marine Cabinet

Cabinet CAB-AM is required for applications requiring United States Coast Guard or Lloyd's Register approvals.

## 1.7.4   Optional Devices – Intelligent Detectors
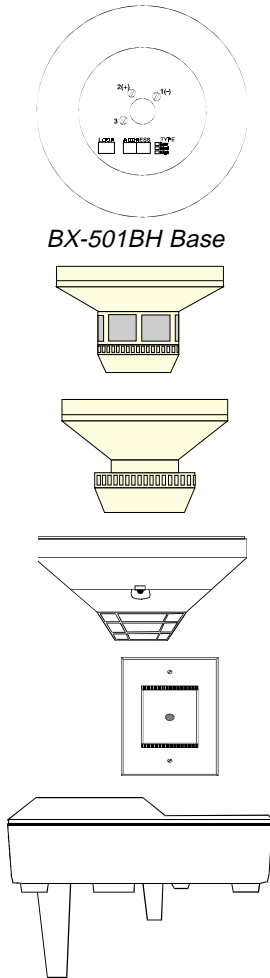
These intelligent, addressable detectors provide analog information to the AFP-200 control panel, which continually processes this information to determine the alarm, maintenance, or normal status of each device.  Each detector head mounts to a B501 Flangeless Base, BX-501BH Base (illustrated at left) or BHX-501 Sounder Base for ease of installation and replacement.  The sensitivity of each detector can be set by the programmer at the control panel to one of three levels (low, medium, or high).  Each detector responds to an address that is set in the head by adjusting built-in rotary decimal switches.

*BX-501BH Base*

### SDX-551/SDX-551TH*/SDX-751

These Intelligent Photoelectric Smoke Detectors provide analog measurements of the optical smoke level in the detector chamber to the control panel.  The detectors are available as the SDX-551TH* with 135° thermostat and as the SDX-751 low profile photoelectric detector.

### CPX-551/CPX-751

These Intelligent Ionization Smoke Detector measure the level of combustion products in the detector chamber using the ionization principle and report this measurement to the control panel.  Also available as CPX-751 low profile detector.

### FDX-551

An Intelligent Thermal Sensor (140°F fixed temperature), which is also available as an FDX-551R* which is a combination 135°F fixed and 15°F per minute rate of rise.

### RA-400/RA400Z

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

### DHX-501, DHX-502

These are duct housings for the SDX-551 and CPX-551.  When used in duct applications, the CPX-551 must be set to high sensitivity.

### B501BH SOUNDER BASE

Sounder base for intelligent detectors.

*The SDX-551TH and the FDX-551R are not approved by U.S. Coast Guard or Lloyd's Register.*

## 1.7.5   Optional Devices:  Addressable Modules

The CMX Series Control Modules and the MMX Series Monitor Modules provide an interface between the AFP-200 control panel and conventional initiating and notification devices.  All module types respond to an address that is set by the installer with built-in rotary decimal switches.  A flashing LED indicates power is applied.  A thermoplastic cover is provided with each module for mounting to a four-inch square mounting box.

### MMX-1/MMX-2

These are Addressable Monitor Modules that can be used to monitor conventional initiating devices.  The MMX-1 is used for normally open contact alarm initiating devices, such as manual pull stations, four-wire smoke detectors, heat detectors, waterflow, security contacts, and supervisory devices.  The MMX-2 may be used for two-wire smoke detectors in addition to normally open contacts.  Supervised circuit can be wired NFPA Style B or Style D.

### CMX-1/CMX-2

These are Addressable Control Modules that can be used as Notification Appliance Circuits for powering and supervising compatible, UL-listed notification appliances.  Supervised circuits can be wired NFPA Style Y or Style Z.  By breaking the two built-in tabs, the CMX can be used as a Form-C control relay.  The CMX-2 is rated for higher voltage applications (70.7 V).

**ISO-X**

The ISO-X Loop Isolator Module is an automatic switch which opens the circuit voltage to a communications loop branch whenever a fault is detected on that circuit. The remainder of the communications loop leading up to the ISO-X will continue to operate, unaffected by the fault.
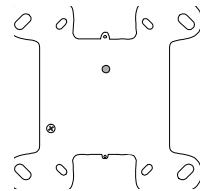
**MMX-101**

The MMX-101 Addressable Module is functionally similar to an MMX-1 Monitor Module (Style B circuits only), but offered in a smaller package for mounting directly in the electrical box of the device being monitored.  It does not include a blinking LED or a magnetic test switch.
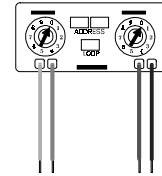
**BGX-101L**

An Addressable Manual Pull Station featuring a key-lock reset.  The pull station responds to an address set by the installer with built-in rotary decimal switches and includes a key.
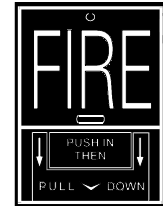
## 1.7.6 Other Optional Devices

**System Sensor (SSD) A2143-00**

The 47K End-Of-Line Resistor Assembly is used in the supervision of MMX-1 or MMX-101 Monitor and CMX Control Module circuits and is included with each module. *Note: MMX-2 Monitor Module requires a UL-listed 3.9K ELR.*

**N-ELR**

The  N-ELR Resistor Assortment is required for use in Canada.  Resistors can be used for the supervision of an MMX Monitor Module or CMX Control Module circuit.

**N-ARA-10 Agent Release Pull Station**

Refer to Document 15453 for more information.

**REL-4.7K for use with panel outputs**
**REL-47K for use with CMX modules**

Polarizing devices used in conjunction with releasing circuits.
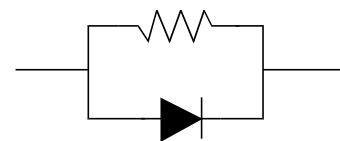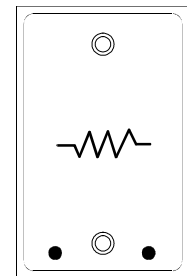
## 1.7.7 Optional Devices – Annunciators

This section contains brief descriptions of annunciators that can be used with the AFP-200.  For detailed information, refer to Appendix C and appropriate annunciator manuals for detailed wiring requirements.

### ACM-16AT/AFM-16AT

The Annunciator Control Module-16AT or AFM-16AT contains 16 red alarm and 16 yellow trouble LEDs, a system trouble LED, an ON LINE/POWER LED, and a local piezo sounder with switches for control panel ACKNOWL-EDGE, SILENCE, RESET, and DRILL. The AFM-16AT is fixed at address "1," and will not accept expanders.
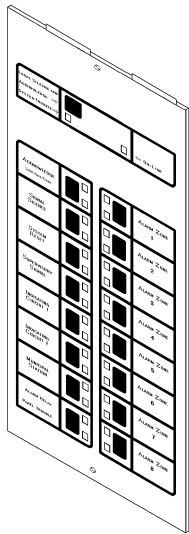
### AEM-16AT

The Annunciator Expander Module-16AT expands the ACM-16AT by 16 system points.  The ACM-16AT supports up to three expanders, providing a maximum of 64 points of annunciation.

### AFM-16A

The Annunciator Fixed Module-16A is intended for use in systems that require 16 annunciation points or less.  Multiple annunciators may be used by setting all annunciators to Receive Only, except the last AFM-16A in line.  Each annunciator's address is internally fixed at "1."

### The LDM-32

The LDM-32 Lamp Driver Annunciator Module provides 32 alarm lamp driver outputs for connection to a custom graphic annunciator.  The LDM-32 can be  alternately selected via a DIP switch for 16 alarm, 16 trouble, and 16 switch inputs for control of such system functions as signal silence and system reset.

### The LDM-E32

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

### The LDM-R32

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

### The ACM-32A/AFM-32A

The Annunciator Control Module-32A/AFM-32A contains 32 red alarm LEDs, a system trouble LED, an ON LINE/POWER LED, and a local piezo sounder with a silence/acknowledge switch. The AFM-32A is fixed at address "1," and will not accept expanders.
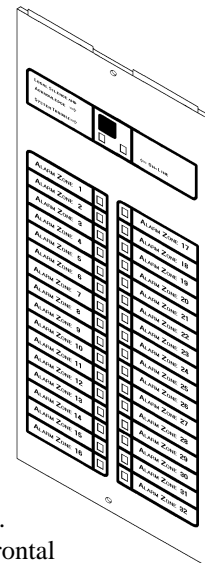
### AEM-32A

The Annunciator Expander Module-32A expands the ACM-32A by 32 system points. The AEM-32A is identical in frontal appearance to the ACM-32A.  One expander module can be supported by an ACM-32A, providing a maximum of 64 points.

### ACM-8R

The ACM-8R Annunciator Control Module provides eight Form-C relays with 5 A contacts, which can be used to track any group of eight zones within the system.
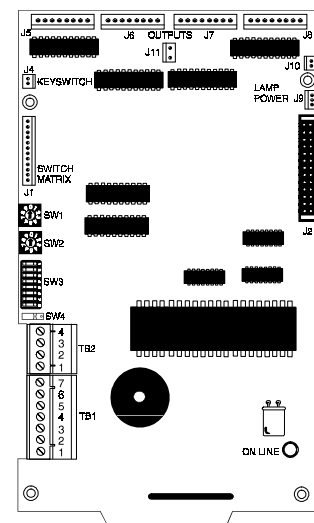
## 1.7.8 Optional Devices – Alphanumeric Display

### LCD-80

This alphanumeric display module is an ancillary device used by the control panel. It has two modes of operation. In Terminal mode, it acts as a display repeater and in ACS mode it acts as an alphanumeric annunciator.

The display module features an 80-character LCD display that is backlit under normal and alarm conditions. It contains control switches for Acknowledge, Signal Silence and System Reset, a Time/Date display field, and a local piezo sounder with alarm/trouble resound. The LCD-80 can be mounted up to 6,000 feet from the AFP-200 control panel in an ABF-1 package. Up to four of these annunciators can be installed on a system (observe power limitations).

**ACS Mode** provides a remote or local digital display and a printer interface for the control panel. In addition, this mode offers the following features:

- General status banner.
- 40 character custom label.
- Alarm/trouble count.
- Custom "normal" message.
- First alarm/last alarm/alarm count (European option).
- Field-programmable messages (foreign language versions).
- STEP DISPLAY and TIME/DATE SET switches.
- Field programmable, nonvolatile memory in two options (128 points, 40-character labels or 256 points, 20-character labels).
- Internal nonvolatile clock.

**Terminal Mode** offers the following features:

- Device type identifiers from control panel.
- Device and zone custom alphanumeric labels from control panel.
- Time/date and device address from control panel.

This mode is usually preferred over ACS mode because no programming is necessary.
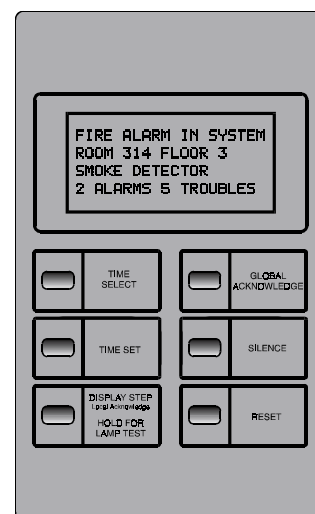
## 1.7.9 Optional Devices – EIA-232 Port

### PRN Remote Printer

This printer provides a printout of all status changes within the system and time-stamps the printout with the current time and date. The PRN provides 80 columns of data on standard 9" x 11" tractor-feed paper.

### Keltron 90 series Printer Model Number VS4095/5 S2

This two-color, 40-column printer meets UL fire and security requirements. The printer mounts in a separate cabinet next to the control panel. Since it uses 24 V power from the control panel, a UPS system is not necessary. For more information on this printer, contact the manufacturer (Keltron Corp., Waltham, MA ).

### CRT Terminal

The CRT terminal provides a video display of status and a full keyboard for access to status information.
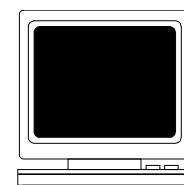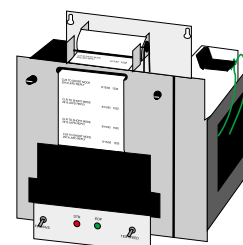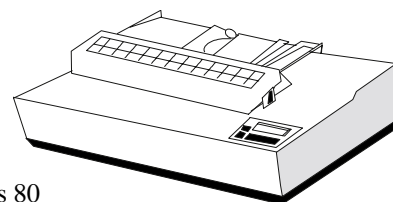
# 1.8   Specifications

**Primary AC Power**
- For the AFP-200:  120 VAC, 50/60 Hz, 3.0 A.
- For the AFP-200E:  220/240 VAC, 50/60 Hz, 1.5 A.
- Wire size: minimum 14 AWG with 600 VAC insulation.

**Battery (lead-acid only)**
- **Maximum Charging Circuit** – Dual Rate High Charge is 29.1 V @ 0.7 A; Normal Flat Charge is 27.6 V @ 0.5 A.
- **Maximum Battery Capacity**  – 17 AH. (Batteries larger than 12 AH require a BB-17 or other UL-listed battery cabinet.)

**Communication (SLC) Loop**
- 24 VDC nominal, 27.6 VDC max.
- Maximum length is 10,000 ft. per channel (NFPA Style 4) or 10,000 ft. total twisted-pair length (NFPA Style 6 and 7).
- Maximum loop current is 250 mA (max short circuit) or 100 mA (normal).
- Maximum loop resistance is 40 ohms.
- Supervised and power-limited.

**Notification Appliance and Releasing Circuits**
- Power-limited circuitry.
- Max. wiring voltage drop: 2 VDC.
- Normal Operating Voltage: 24 VDC.
- NAC circuit 1 = 2.5 A
- NAC circuits 2-4 = 2.5 A shared total
- Current for all external devices: 5.0 A.
- Optional AVPS-24/AVPS-24E: additional 3.0 A of notification appliance power (see Appendix J).
- Max. signaling current/circuit:  2.5 A.
- End-of-line resistor: 4.7K, 1/2-Watt (PN 71252 UL-listed) for Notification Appliance Circuits.
- REL-4.7K for releasing circuits (REL-47K for use with CMX).

**Alarm, Trouble, and Supervisory Relays**

Power-limited circuits only.  Contact ratings:

- 2.0 A @ 30 VDC (resistive), 0.5 A @ 30 VAC  (resistive).
- Alarm and Trouble: Form-C.
- Supervisory: Form-A.

**Four-wire Smoke Detector Power (24 VDC ± 5%) – TB1 terminals 5 and 6**
- Max. ripple voltage:  10 mVrms.
- Up to 500 mA is available for powering four-wire smoke detectors[1,2].

**Non-resettable Regulated 24 V Power (24 VDC ± 5%) – TB1 terminals 3 and 4**
- Max. ripple voltage: 10 mVrms.
- Total DC current available from this output is up to 500 mA (subtracted from four-wire smoke power)[2].

**High Ripple Regulated 24 V Power (24 VDC ±10%) – TB1 terminals 1 and 2**
- Max. ripple voltage: 2 $V_{RMS}$
- Total DC current available for powering external devices is 1.0 A standby and 1.5 A alarm[2].
- This power is _not_ recommended for  LCD-80 or ACS annunciators except for ACM-8R.

[1]*For power supply calculations, refer to Appendix A.*

[2]*Total current for regulated power, non-resettable power, four-wire smoke power, and four Notification Appliance Circuits must not exceed 5 A or 8 A if using an AVPS-24 (refer to Appendix J).  Total external system current in excess of 2.5 A requires 12 AH or 17 AH batteries—not 7 AH.*

## 1.9   Cabinet Dimensions

### 1.9.1  Surface Mount with BB-17 Battery Box

Door = 14.625"
Backbox = 14.5"

Depth = 5.5"

Door = 16.125"
Backbox = 16.0"

Battery Box = 8.25"
(Optional BB-17)

Depth = 4.75"

Battery Box = 14.5"
(Optional BB-17)

### 1.9.2  Semi-flush Mount

Trim Ring = 17.62"

1.5" typical for 4" wall

**TR4XG Trim Ring**  Follow instructions supplied with ring for mounting.

Trim Ring = 19.12"
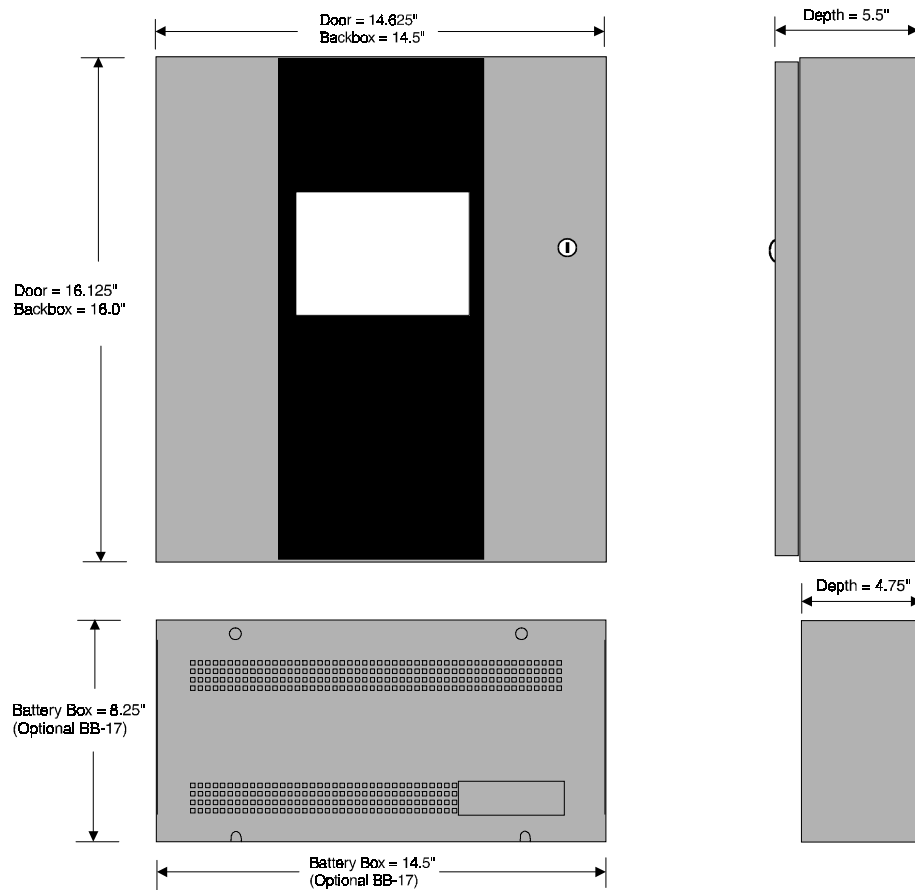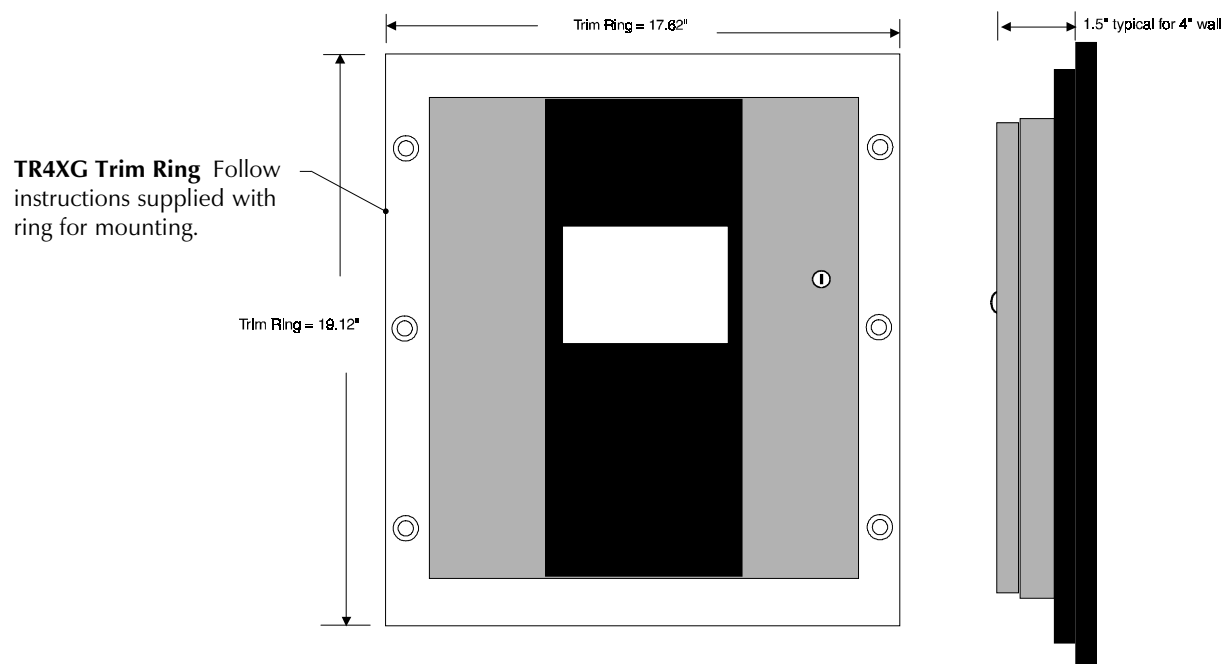
# Notes

# 2. Installation

## 2.1 Installation Overview

Carefully unpack the AFP-200 system and check for shipping damage. Mount the cabinet in a clean, dry, vibration-free area where extreme temperatures are not encountered. The area should be readily accessible with sufficient room to easily install and maintain the control panel. Locate the top of the AFP-200 cabinet approximately 60 inches above the floor with the hinge mounting on the left. Determine the number of conductors required for the devices to be installed. Pull the required conductors into the box through the knockouts provided. All wiring should be in accordance with the national and/or local codes for fire alarm systems.

## 2.2 Backbox Mounting

1. Remove the main circuit board assembly by unscrewing the four screws in the corners of the board. Set the board aside in a safe, clean place. Avoid static discharge which may damage the board.
2. Mark and predrill the four mounting bolts using dimensions shown in Figure 2.
3. Install two upper fasteners in wall with screw heads protruding.
4. Using upper "keyholes," mount the backbox over the two screws. Tighten the screws.
5. Install the lower two screws.
6. When location is dry and free of construction dust, reinstall the main circuit board.
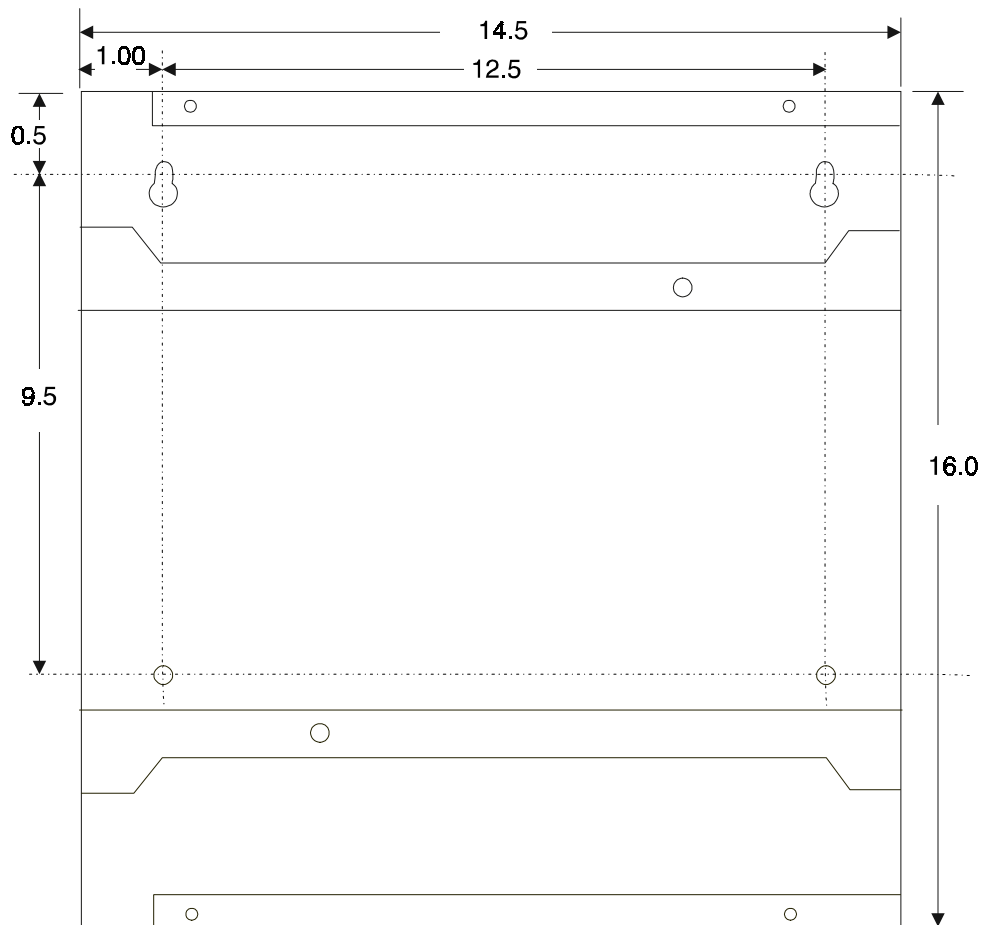


**Figure 2-1  Cabinet Dimensions**

## 2.3 Power

⚠ *CAUTION:* Several different sources of power can be connected to the AFP-200. Disconnect all sources of power before servicing. The control panel and associated equipment may be damaged by removing and/or inserting cards, modules, or connecting cables while this control panel is energized.

**High Ripple Regulated Power**
24 VDC power for notification appliances. TB1 terminal 1 (+) and 2 (–). Note: This power is unsuitable for all EIA-485 annunciation devices, except the ACM-8R.

**Non-resettable Power**
24 VDC filtered, regulated, non-resettable power can be drawn from TB1 terminals 3 (+) and 4 (-).

**Four-wire Smoke Detector Power** 24 VDC filtered, regulated, resettable power for four-wire smoke detectors can be obtained from TB1 terminals 5 (+) and 6 (–).
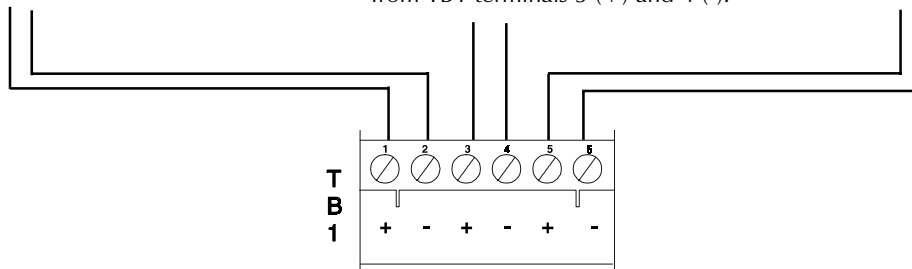
**Figure 2-2  DC Power Output Connections**

(All DC power outputs are power-limited)

### AC Power connections

Primary power required for the AFP-200 is 120 VAC, 50/60 Hz, 3 A and primary power required for the AFP-200E is 220/240 VAC, 50/60 Hz, 1.5 A. Overcurrent protection for this circuit must comply with Article 760 of the National Electrical Code (NEC) and/or local codes. Use 14 AWG or larger wire with 600 VAC rating.

### Battery Power

Observe polarity when connecting battery. Connect the battery cable to J3 on the main circuit board using the plug-in connector provided. Refer to Appendix A for instructions on calculating the correct battery rating.

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

### AVPS-24/AVPS-24E Optional Power Expansion

(Refer to Appendix J)
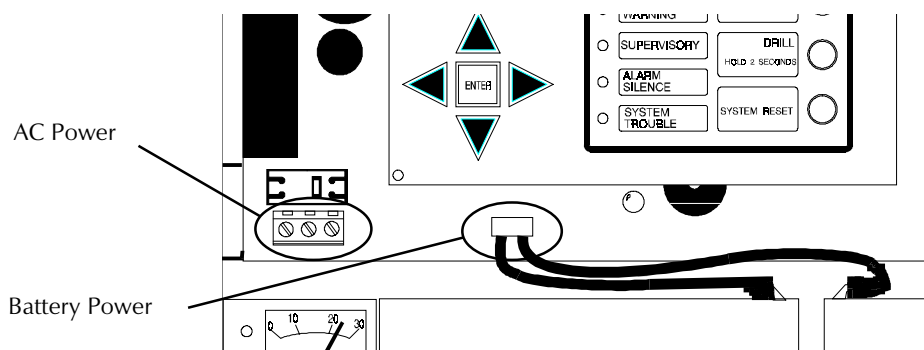
**Figure 2-3  AC and Battery Power Connections**

## 2.4    Output Circuits

**Notification Appliance Circuits**

The AFP-200 control panel provides four Notification Appliance Circuits (Style Y).  Each circuit can supply up to  2.5 A of current.  Total current drawn from these as well as DC power outputs cannot exceed 5.0 A.  An additional 3.0 A are available when using an AVPS-24/AVPS-24E (see Appendix J).  Use UL-listed 24 VDC notification appliances only.  Circuits are supervised and power-limited.   Refer to the Device Compatibility Document for a list of compatible notification appliances.

**Releasing Circuits**

Any or all of these circuits may be used as a releasing circuit by programming it for **RELEASE CKT**.  Refer to the  Device Compatibility Document for a list of compatible releasing devices.
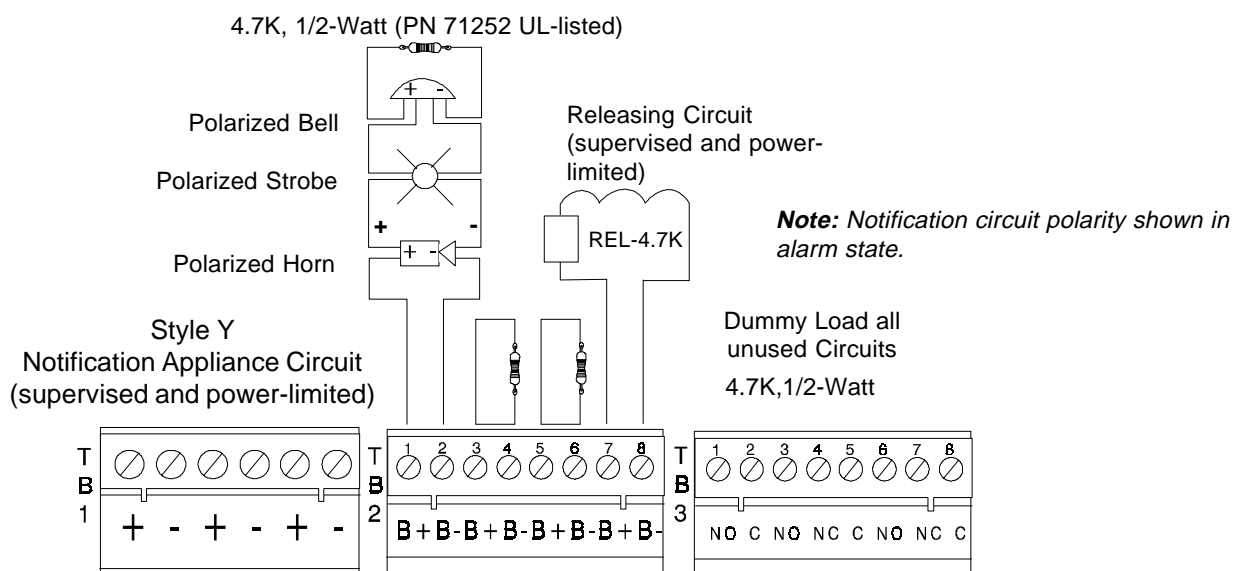


**Figure 2-4  Circuit Connections**

## 2.5    Standard Relays

The AFP-200 control panel provides a set of Form-C alarm and a set of Form-C trouble contacts rated for 2.0 A @ 30 VDC (resistive). The control panel also provides a Form-A supervisory contact rated for 2.0 A @ 30 VDC (resistive).
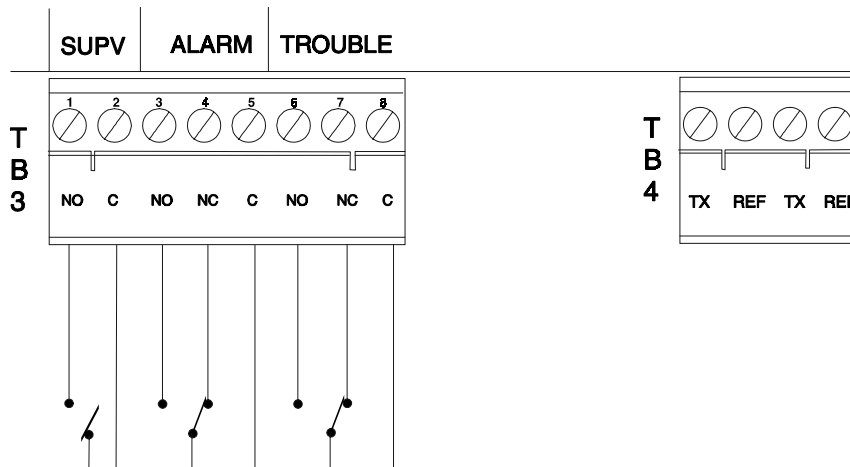


**Figure 2.-5   Relay Connections**

## 2.6 Remote Printers/CRT

The PRN-4 remote printer provides a hard-copy printout of all status changes within the system and time-stamps the printout with the current time and date. The PRN-4 provides 80 columns of data on standard nine-inch by eleven-inch tractor-feed paper.

### Installation

Remote printers require 120 VAC, 50/60 Hz primary power. A secondary power source (battery backup) is not provided. The use of a separate uninterruptable power supply (UPS), UL-listed for Fire Protective Signaling is recommended.

Connection between the control panel and the PRN-4 is via an EIA-232 interface. A custom cable must be assembled for connection to the printer's EIA-232 port.

### Printer Configuration

Refer to the documentation supplied with the PRN-4 for instructions on the printer's menu controls. Set the printer's options as listed in Figure 2-6.

| OPTION | SETTING |
|---|---|
| L/R ADJUST | 0 |
| FONT | HS DRAFT |
| LPI | 6 CPI |
| ESC CHARACTER | ESC |
| BIDIRECTIONAL COPY | ON |
| CG-TAB | GRAPHIC |
| COUNTRY | E-USE ASCII |
| AUTO CR | 1S |
| COLOR OPTION | NOT INSTALLED |
| FORMLEN: LINES STANDARD | 6 LIP-60 EXECUTIVE 10.5" |
| CPI | 10 CPI |
| SKIP | 0.5" |
| EMULATE | EPSON |
| I/O: BAUD FORMAT PROTOCAL | 36k 2400 7 BIT, EVEN, 1 STOP XON/XOFF |
| CHARACTER SET | STANDARD |
| S1. ZERO | ON |
| AUTO LF | OFF |
| MENLOCK | ALL |
| PAPER: BIN 1 BIN 2 SINGLE PUSH TRA PULL TRA PAP ROLL PAPORT | 12/72" 12/72" 12/72" 12/72" 12/72" 12/72" NO |

**Figure 2-6  PRN-4 Remote Printer Options**



Plug the DB-9 or DB-25 connector into the EIA-232 port of the printer.

*Note: The EIA-232 printer interface may also be used with EDP-listed equipment, such as personal computers, to monitor the control panel for supplementary purposes.*

**DB-25 Connections:**
Connect TX (Pin 3) to TB4 terminal 1
Connect REF (Pin 7) to TB4 terminal 2
Connect RX (Pin 2) to TB4 terminal 3

**DB-9 Connections:**
Connect TX (Pin 2) to TB4 terminal 1
Connect REF (Pin 5) to TB4 terminal 2
Connect RX (Pin 3) to TB4 terminal 3
*Note: If also using a DB-9 connector for upload/downlload connect a jumper between pin 4 and pin 6.*

**Figure 2-7   Remote Printer Connections**

## 2.6    Remote Printers/CRT, continued



**Keltron Printer**
Model number VS4095/5
(see note 3)

Plug this DB-25 connector into the
EIA-232 Port of the printer.

Keltron Remote Printer

DC IN+        DC IN-

24VDC (14 AWG)

TB1          TB2          TB3                    TB4      TB5        TB6
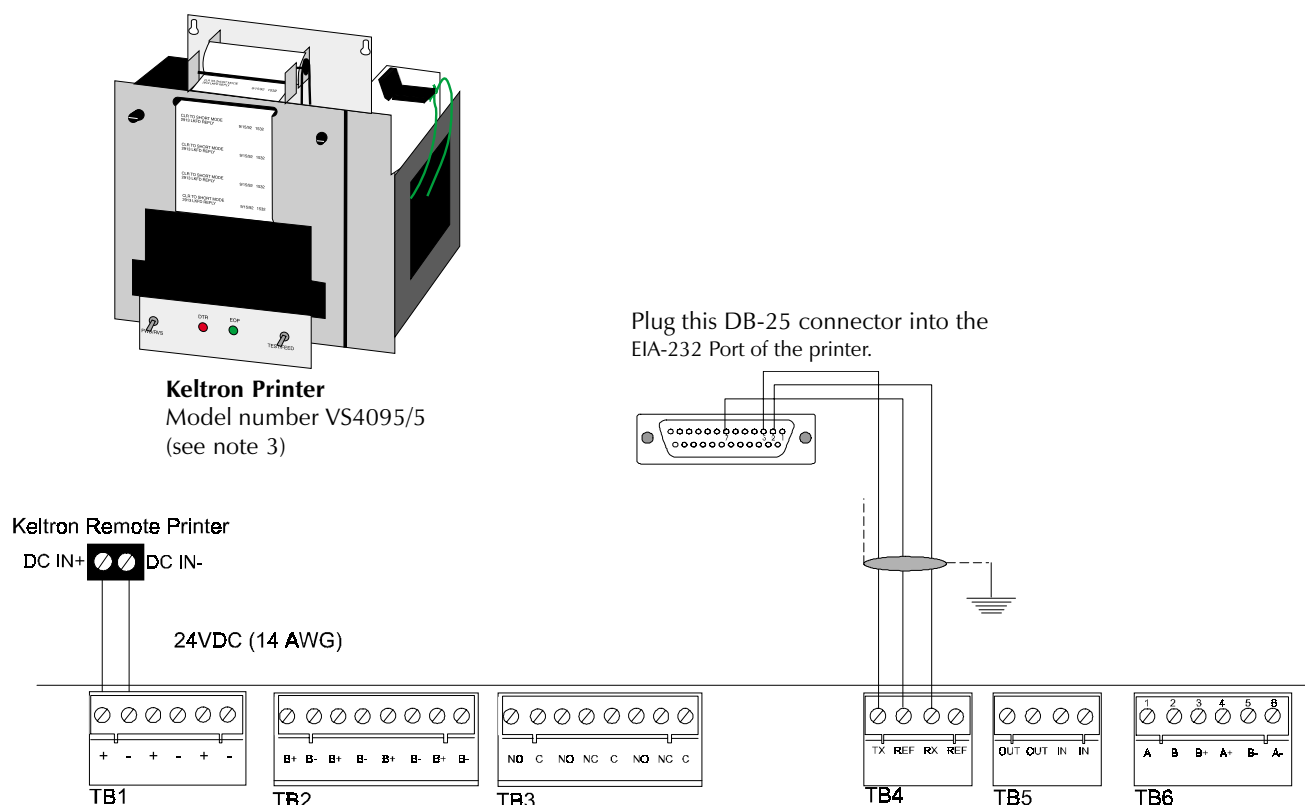
**Figure 2-8   Keltron Printer Connections**

**Notes:**

1) Outputs are power-limited, but are not supervised.

2  Connections must be made with overall foil/braided-shield twisted paired cable suitable for EIA-232 applications.  Typically, 50 feet is the maximum recommended wiring distance between printer and control panel.

3) The printer communicates using the following protocol:

| | |
|---|---|
| Baud rate | 2400 |
| Parity | Even |
| Data Bits | Seven |

4) Set the DIP switches as follows:

| | | | | |
|---|---|---|---|---|
| *SP1-1:* OFF | *SP1-2:* ON | *SP1-3:* OFF | *SP1-4:* ON | *SP1-5:* OFF |
| *SP1-7:* ON | *SP1-8:* OFF | *SP2-1:* OFF | *SP2-2:* OFF | *SP2-3:* OFF |
| *SP2-4:* OFF | *SP2-5:* OFF | *SP2-7:* ON | *SP2-8:* OFF | |

# 2.6 Remote Printers/CRT, continued

Plug this DB-25 connector into the EIA-232 port of the CRT.

CRT

Connect TX (Pin 3) to TB4 terminal 1
Connect REF (Pin 7) to TB4 terminal 2
Connect RX (Pin 2) to TB4 terminal 3

TB4    TB5    TB6
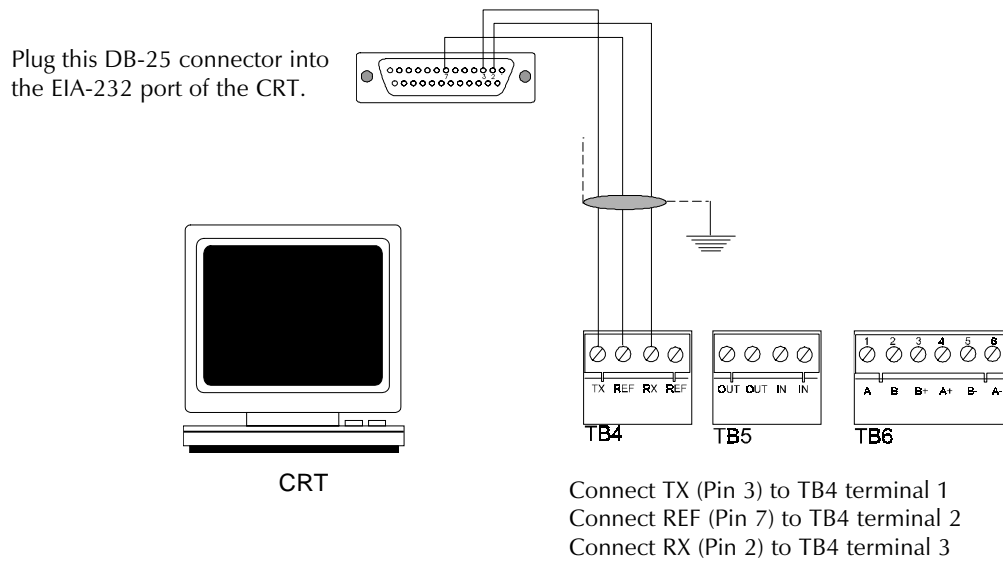
**Figure 2-9   CRT Connections**

Twisted Pair

To TB4-2
To TB4-1

To TB4-3

To AUX Port of CRT

To EIA Port of CRT with keyboard

*Note: This configuration requires that the copy parameter of the CRT setup be changed to BCOPY (Refer to CRT configuration in Appendix I.)*

To EIA Port of next CRT or PRN
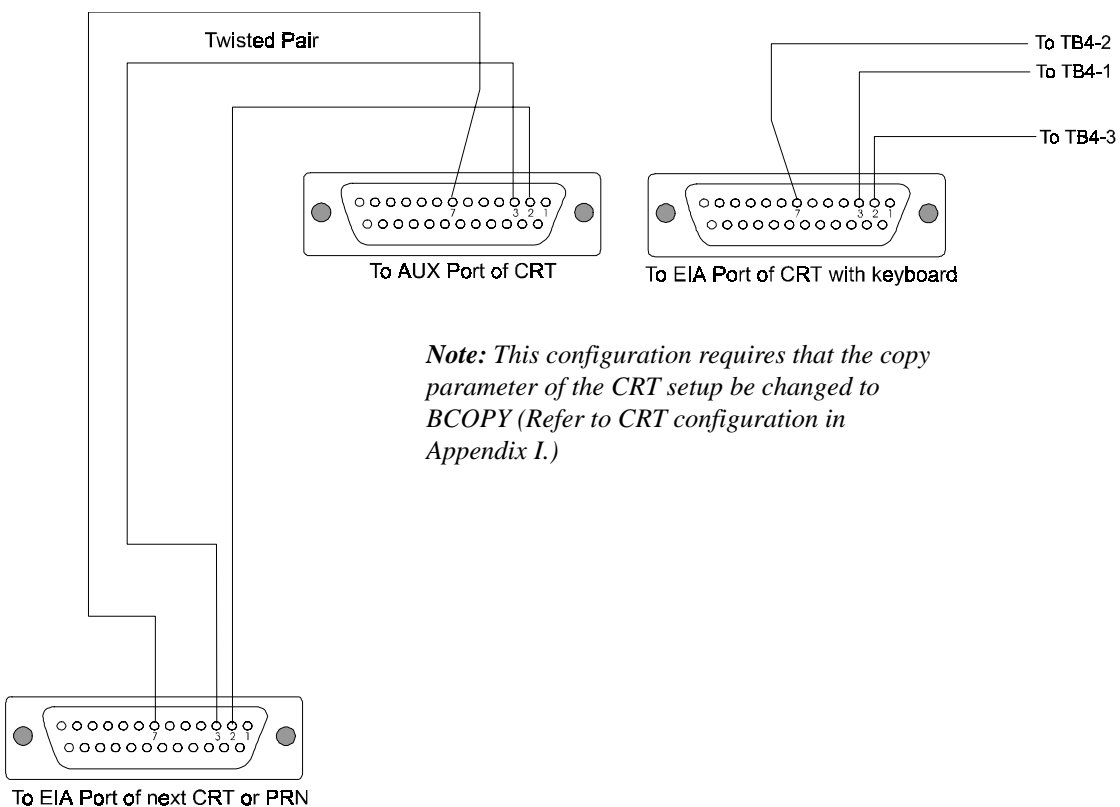
**Figure 2-10   Connections For Multiple CRT units or CRT/PRN Combination**

*Note: For terminal interface and protocol information, refer to Appendix I.*

## 2.7    Wiring the Signaling Line Circuit

Communication with intelligent and addressable initiating monitor and control devices occurs through a signaling line circuit (SLC) loop, often referred to as the communications loop.  This SLC loop can be wired to meet the requirements of  NFPA Style 4 (see Figure 2-12), Style 6 (see Figure 2-13) or Style 7 (see Figure 2-14).

### Isolator Modules

Isolator Modules (ISO-X) permit a zone of detectors and modules to be electrically isolated from the remainder of the communications loop, allowing critical loop components to function in the event of a circuit fault (see the figures on the following three pages).   Isolator modules are required to meet the requirements of NFPA Style 7.

### Monitor Modules

Addressable Monitor Modules (MMX Series) allow the control panel to monitor entire circuits of conventional, alarm initiating devices, such as manual pull stations, smoke detectors, heat detectors, waterflow and supervisory devices.  A type of Monitor Module, the addressable MMX-101 provides point annunciation of manual pull stations.

### Control Modules

Through addressable control modules (CMX Series), the control panel can selectively activate Notification Appliance Circuits or Form-C output relays.

### Intelligent Detectors

Through the communications loop, the control panel communicates with intelligent ionization, photoelectric, and thermal detectors.

### Device Capacity

AFP-200 capacity includes up to 99 intelligent detectors and an additional combination of up to 99 addressable pull stations, control modules, and Monitor Modules.  In addition, the control panel also supports four Notification Appliance Circuits and up to 99 programmable relays. *Note: Refer to Appendix A and installation drawings supplied with each loop device for rating and specification information.*

|  | Single Open on Loop | Single Ground on Loop | Shorted Loop | Loop Shorted and Opened | Loop Shorted and Grounded | Loop Opened and Grounded | Communications Loss |
|---|---|---|---|---|---|---|---|
| Style 4 (2 wire) Loop Operation (Meets NFPA 72 Style 4 Requirements) | Trouble,, | Alarm Capability Trouble† | Trouble | Trouble | Trouble | Trouble | Trouble |
| Style 6 (4 wire) Loop Operation (Meets NFPA 72 Style 6 Requirements) | Alarm Capability Trouble | Alarm Capability Trouble | Trouble | Trouble | Trouble | Alarm Capabiliity Trouble | Trouble |
| Style 7 (4 wire) Loop Operation‡ (Meets NFPA 72 Style 7 Requirements) | Alarm Capability Trouble | Alarm Capability Trouble | Alarm Capability Trouble | Trouble | Alarm Capability Trouble | Alarm Capability Trouble | Trouble |

**Figure 2-11  Communications Loop Performance**

[1] *Trouble indicates a trouble signal will be generated at the control panel during the abnormal condition.*

[2]*Alarm Capability indicates an alarm signal can be transmitted to the control panel during the abnormal condition.*

[3]*Loop operation meeting Style 7 requirements isolates entire physical zones on the communications loop from faults that occur within other areas of the loop.*

## 2.7 Wiring the Signaling Line Circuit, continued
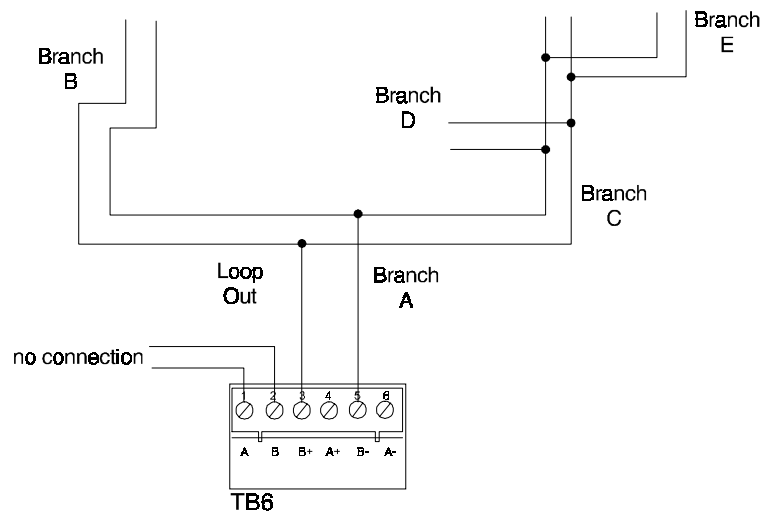


For each loop, add the lengths of all the branches on one loop. This sum cannot exceed 10,000 feet (12 AWG).

```
   (Branch A)
+  (Branch B)
+  (Branch C)
+  (Branch D)
+  (Branch E)
= 10,000 feet or less
```
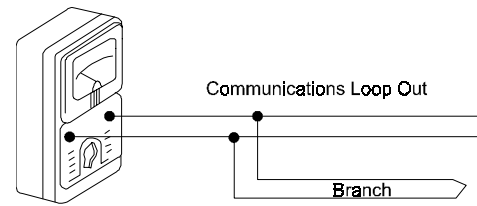
**Branch Resistance**
Short the termination point of one branch at a time and measure DC resistance *from the beginning of the loop to the end of that particular branch*. The total DC resistance from panel to branch end cannot exceed 40 ohms. Repeat this procedure for all remaining branches.

For detailed wiring requirements, refer to Appendix F.

**Figure 2-12  Wire Requirements – Two Wire SLC Circuit**
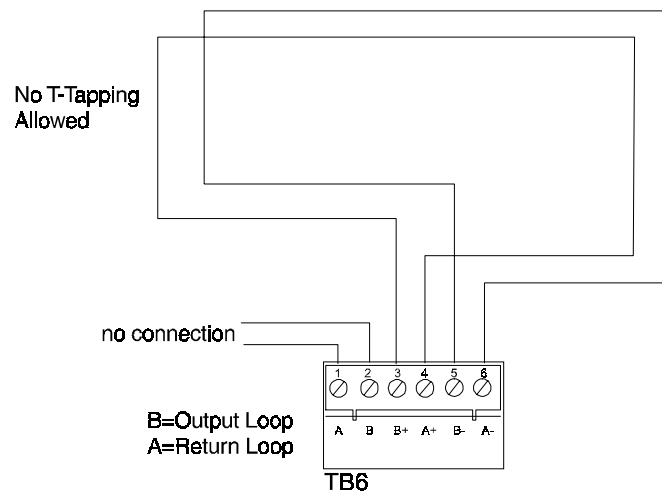


Total length of the communications loop pair cannot exceed 10,000 feet (12 AWG).
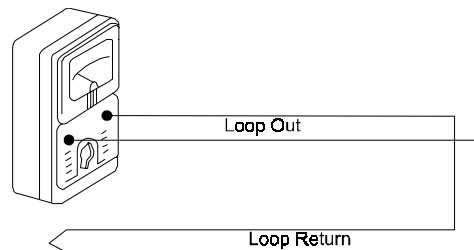
**DC Resistance of the Communications Loop pair cannot exceed 40 ohms.**
Measure by disconnecting loop out and return at the control panel, shorting the two leads of communications loop return, and metering loop out.

For detailed wiring requirements, refer to Appendix F.

**Figure 2-13   Wire Requirements – Four Wire SLC Circuit**

## 2.7 Wiring the Signaling Line Circuit, continued
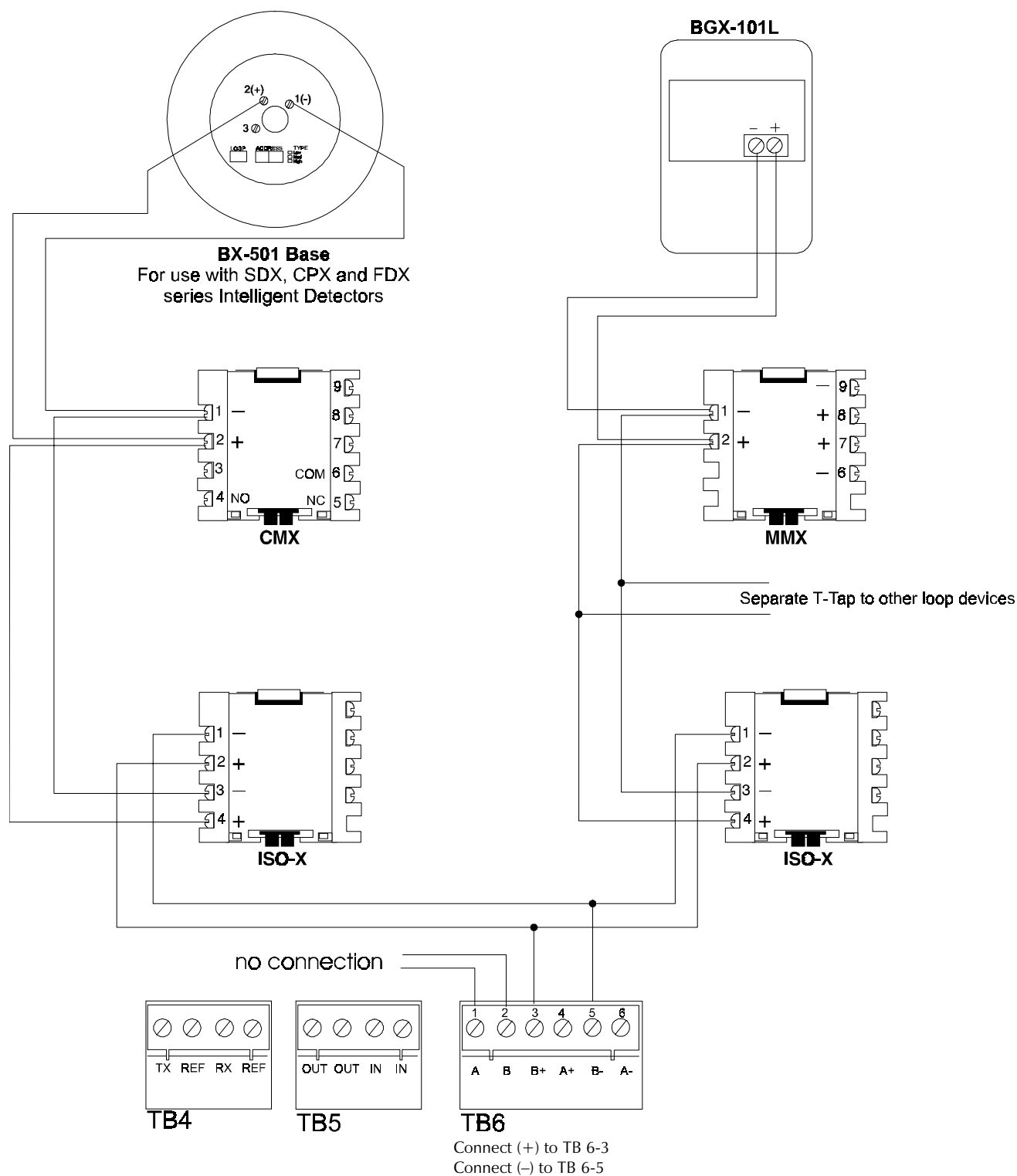


**Figure 2-14  Two Wire SLC Communications Loop**

(Supervised and power-limited – meets NFPA 72-1993 Style 4 requirements)

*Note:  The maximum number of devices between isolator modules is 25.  ISO-X devices are not required to meet NFPA Style 4.*

## 2.7    Wiring the Signaling Line Circuit, continued



Connect Loop Out to TB 6-3 (+) and TB 6-5 (–).
Connect Loop Return to TB 6-4 (+) and 6-6 (–).
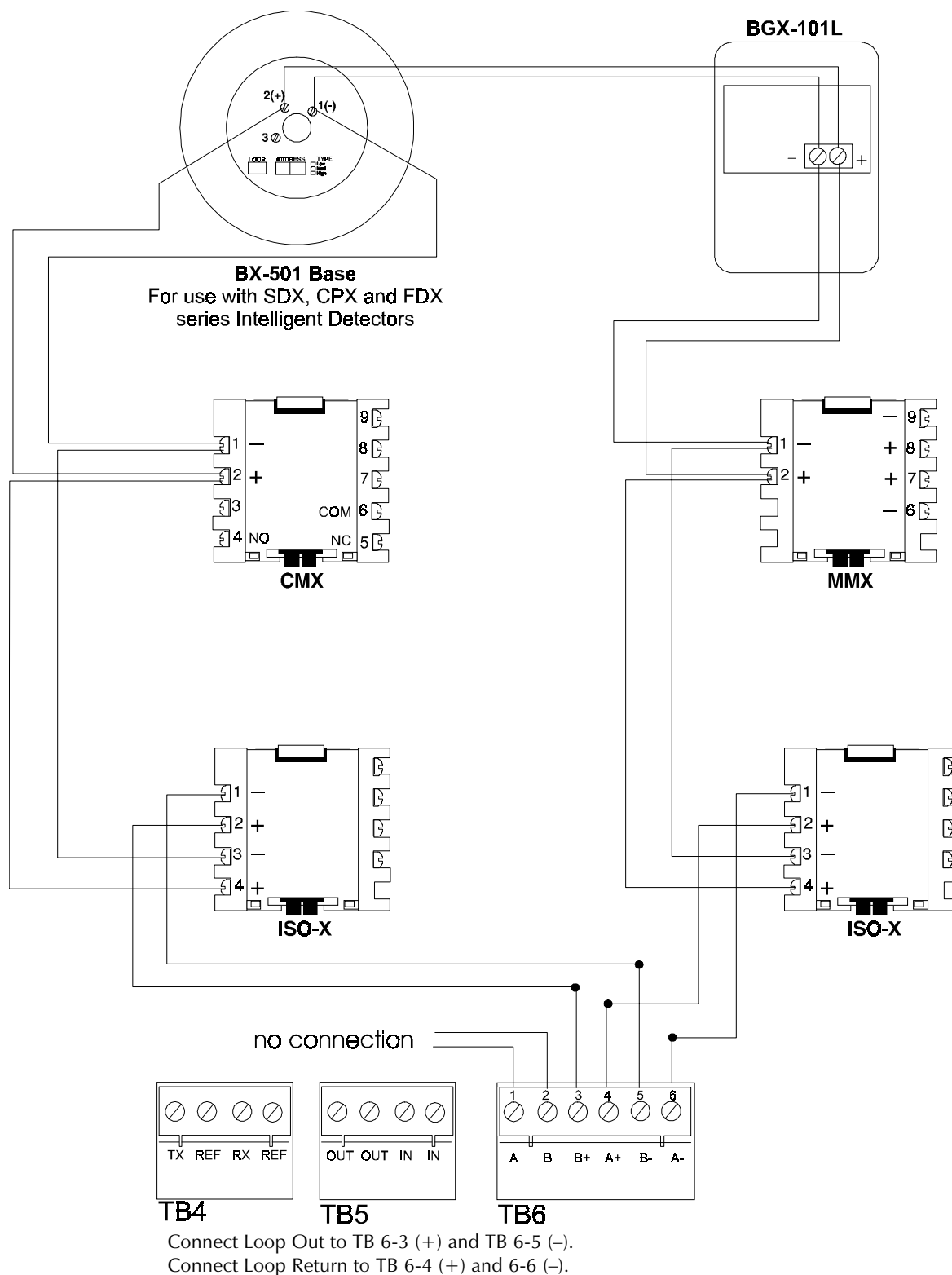
**Figure 2-15  Four-Wire SLC Communications Loop**

(Supervised and power-limited – meets NFPA 72-1993 Style 6 requirements)

*Note:  The maximum number of devices between isolator modules is 25.  ISO-X devices are not required to meet
NFPA Style 4.*

## 2.7 Wiring the Signaling Line Circuit, continued
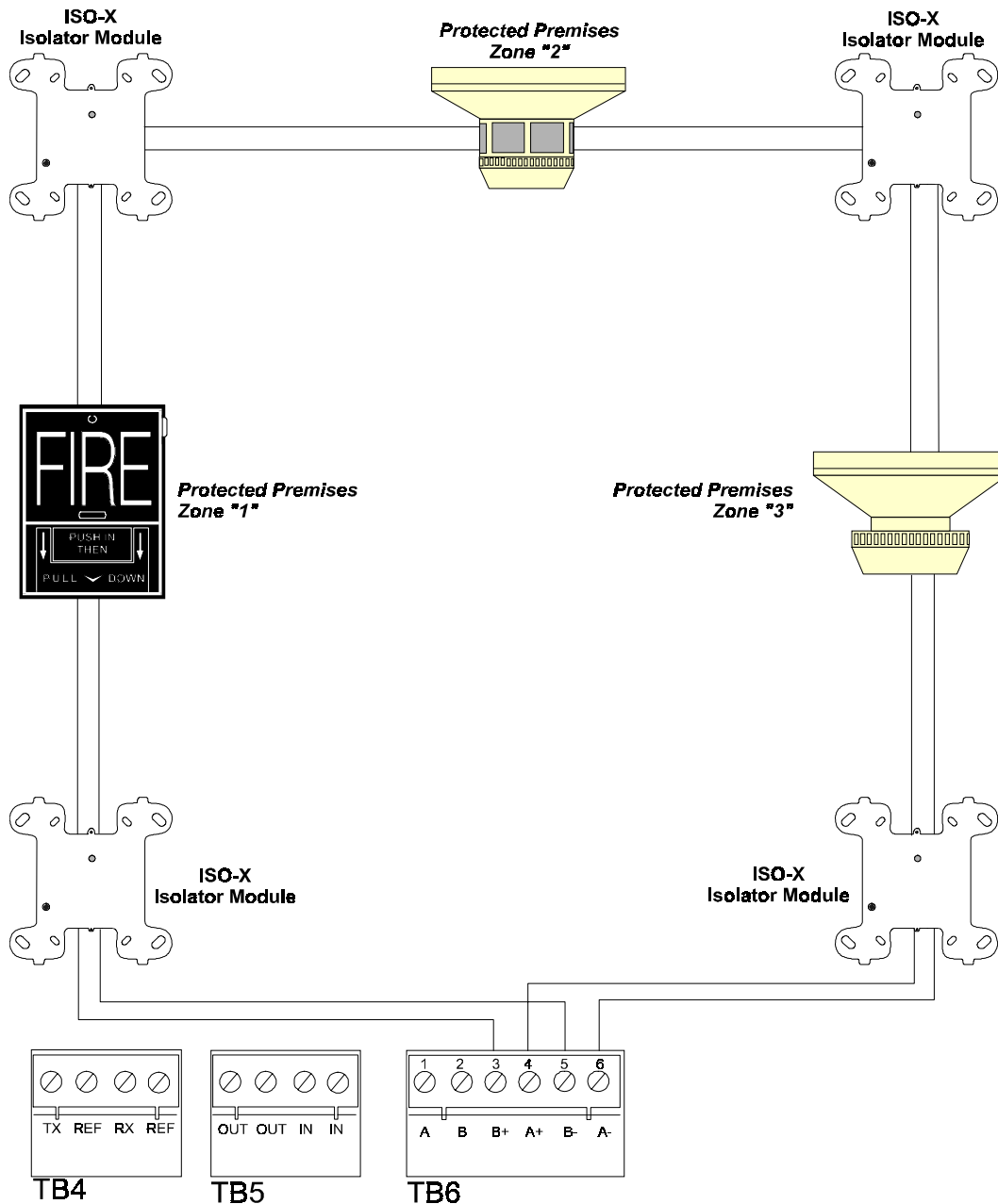


Connect Loop Out to TB 6-3 (+) and TB 6-5 (–).
Connect Loop Return to TB 6-4 (+) and TB 6-6 (–).

**Figure 2-16  Four Wire SLC Communications Loop**

(meets NFPA 72-1993 Style 7 requirements)

**Operation**

By "flanking" each communications loop device with a pair of ISO-X isolator modules, each device is protected from short circuit faults that may occur on other devices.  For example, a fault on Zone 2 will not affect Zones 1 and 3.   The isolator modules on either side of Zone 2 will open the communications loop.   Zone 1 will still operate from power on loop out and Zone 3 will operate from loop return.   Because the control panel will no longer be able to communicate with Zone 2, a trouble signal(s) will be generated for that device.

No T–tapping or branching is allowed on this circuit.   The ratings and characteristics are the same as for a four-wire circuit meeting NFPA Style 6 requirements.

## 2.7 Wiring the Signaling Line Circuit, continued

Shield Drain Wire

Cabinet

Loop +

Loop -
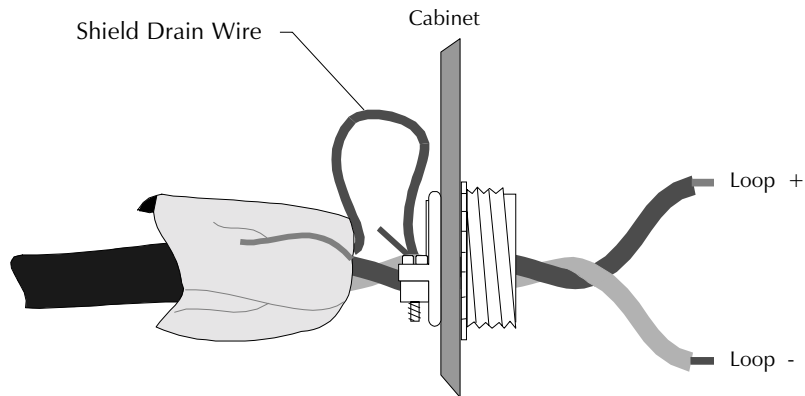
Do not allow the shield drain wire to enter the system cabinet. Connect the drain wire to the outside of the cabinet via a BX-type connector. **Note:** *scrape paint away from cabinet to make good electrical connection.*

**Figure 2-17  Shield Termination in No Conduit**
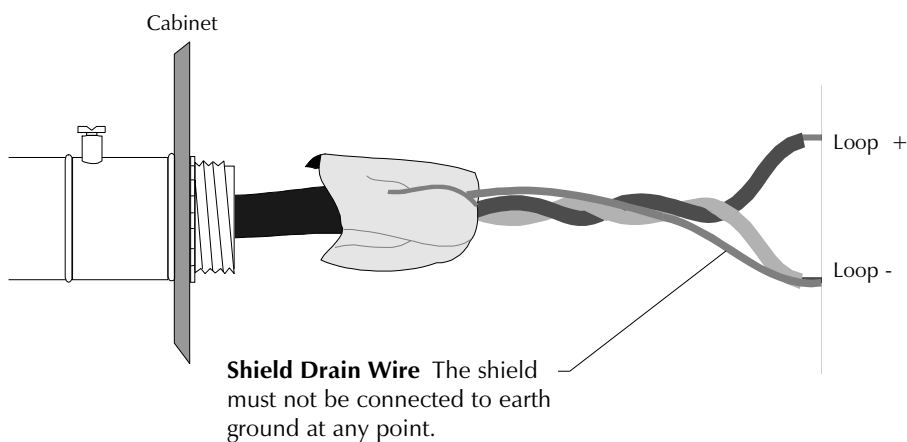
Cabinet

Loop +

Loop -

The shield drain wire must be connected to the negative (–) side of the loop.  Do not allow the shield drain wire or the shield foil to touch the system cabinet. **Note:** *For Style 6 or Style 7 field wiring of the Communications Loop, connect each end of the shield to the negative side of the respective channel.*

**Shield Drain Wire** The shield must not be connected to earth ground at any point.

**Figure 2-18  Shield Termination in Full Conduit**

Shield Drain Wire

Must employ metal conduit and a metal box.
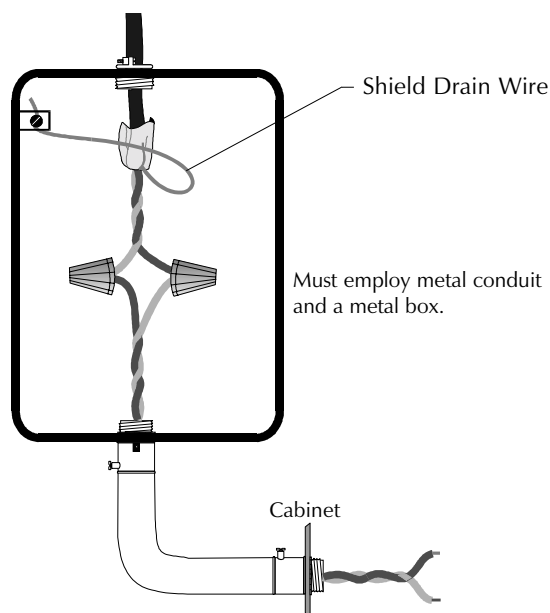
Cabinet

Do not allow the shield drain wire to enter the system cabinet or the conduit.  Connect the drain wire to the termination point of the conduit run. **Note:** *The conduit cannot be longer than 20 feet.*

**Figure 2-19  Shield Termination in Partial Conduit**

## 2.7.1 The Isolator Module

The loop isolator module (ISO-X) is used to protect critical elements of the communications loop from faults on other branches or sections of the loop. The ISO-X continuously monitors the circuit connected to terminals 3 (–) and 4 (+). Upon power-up, an integral relay is latched on. The ISO-X periodically pulses the coil of this relay. A short circuit on the loop resets the relay. The ISO-X sees this short and disconnects the faulted branch by opening the positive side of the loop (terminal 4). This effectively isolates the faulted branch from the remainder of the loop. Once the fault is removed, the ISO-X automatically reapplies power to the communications loop branch. **Figure 2-20** illustrates the use of an ISO-X on a two wire communications loop meeting NFPA Style 4 requirements; **Figure 2-16** shows a four wire loop meeting NFPA Style 7 requirements.

Loop In (–)
Loop In (+)      ISO-X
Loop Out (–)
Loop Out (+

*Note: The maximum number of devices that can be connected to an isolator module is 25. During a fault condition, the control panel will register a trouble condition for each zone mapped to the isolated loop branch.*

Shorts on this branch of an isolated communications loop meeting NFPA Style 4 requirements, will be isolated from all devices installed both upstream of the ISO-X and on the continuation of the  loop (shown as dotted line).

**Figure 2-20   Isolating Two Wire SLC Communications Loops**

## 2.7.2 The Monitor Module

The MMX-1/MMX-2 Monitor Module is an addressable module that monitors conventional, alarm initiating devices. It includes a magnetic test switch located near the center front of the module. The supervised MMX circuit can be wired as an NFPA Style B or Style D Initiating Device Circuit. Refer to **Figures 2-22 and 2-24** for MMX-1 wiring diagrams. The MMX-2 addressable module monitors conventional, two-wire smoke detectors. Refer to **Figures 2-23 and 2-25**.

### Communications Loop Connections
Connect the communications loop to MMX terminals 1 (–) and 2 (+). The MMX occupies one module address on the loop. Use the rotary switches on the MMX to set the module to the required loop address.

### NFPA Style B Initiating Device Circuit
Connect as shown in **Figure 2-22 and 2-23**.

### NFPA Style D Initiating Device Circuit
Connect as shown in **Figure 2-24 and 2-25.**

### Power
The MMX-2 requires the additional connection of 24 VDC filtered, regulated and resettable power on MMX-2 terminals 3 (–) and 4 (+).

## 2.7.2 The Monitor Module, continued

### The MMX-101 Monitor Module

The MMX-101 Monitor Module is an addressable module that is functionally and electrically identical to an MMX-1 Monitor Module (Style B circuits only), but offered in a smaller package for mounting directly in the electrical box of the contact-type device being monitored.
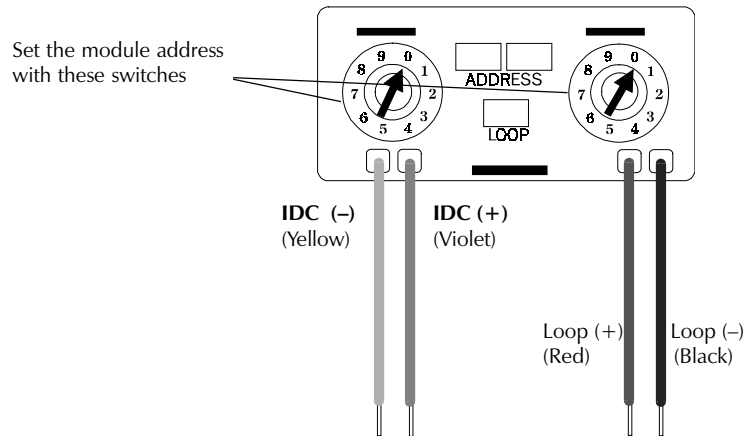


**Figure 2-21  NFPA Style B Initiating Device Circuit**

Terminate with a SSD A2143-00 ELR (N-ELR in Canada).

### Notes on the MMX-1 and MMX-101 Monitor Modules

1. The Initiating Device Circuit is supervised and current limited to 210 μA @ 24 VDC (nominal).

2. The Initiating Device Circuit provides the following services (do not mix):
   - Fire Alarm Service.
   - Automatic/Manual Waterflow Alarm Service with normally open contact devices.
   - Sprinkler Supervision with normally open contact devices.
   - Security Service.

3. Due to wiring, the maximum loop resistance is 20 ohms.

### The MMX-2 Monitor Module

The MMX-2 Monitor Module is an addressable module used to monitor a single Initiating Device Circuit of two-wire smoke detectors. The monitored circuit may be wired an NFPA Style B (Class B) or Style D (Class A).

### MMX-2 Compatible Smoke Detectors

Reference the Device Compatibility Document for compatible two-wire smoke detectors.

## 2.7.2 The Monitor Module, continued
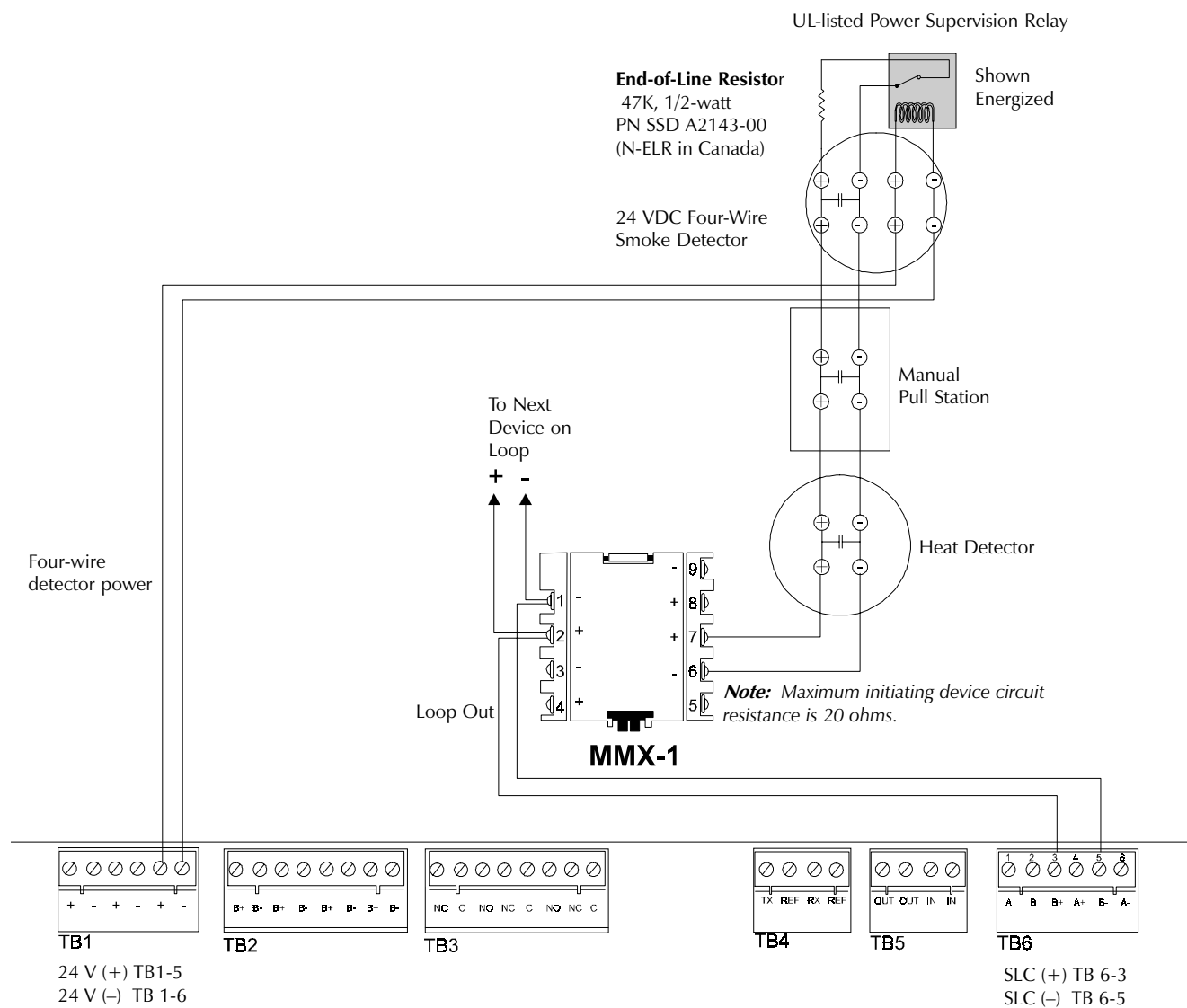


**Figure 2-22  NFPA Style B Initiating Device Circuit with an MMX-1 Module**

(supervised and power-limited)

## 2.7.2  The Monitor Module, continued
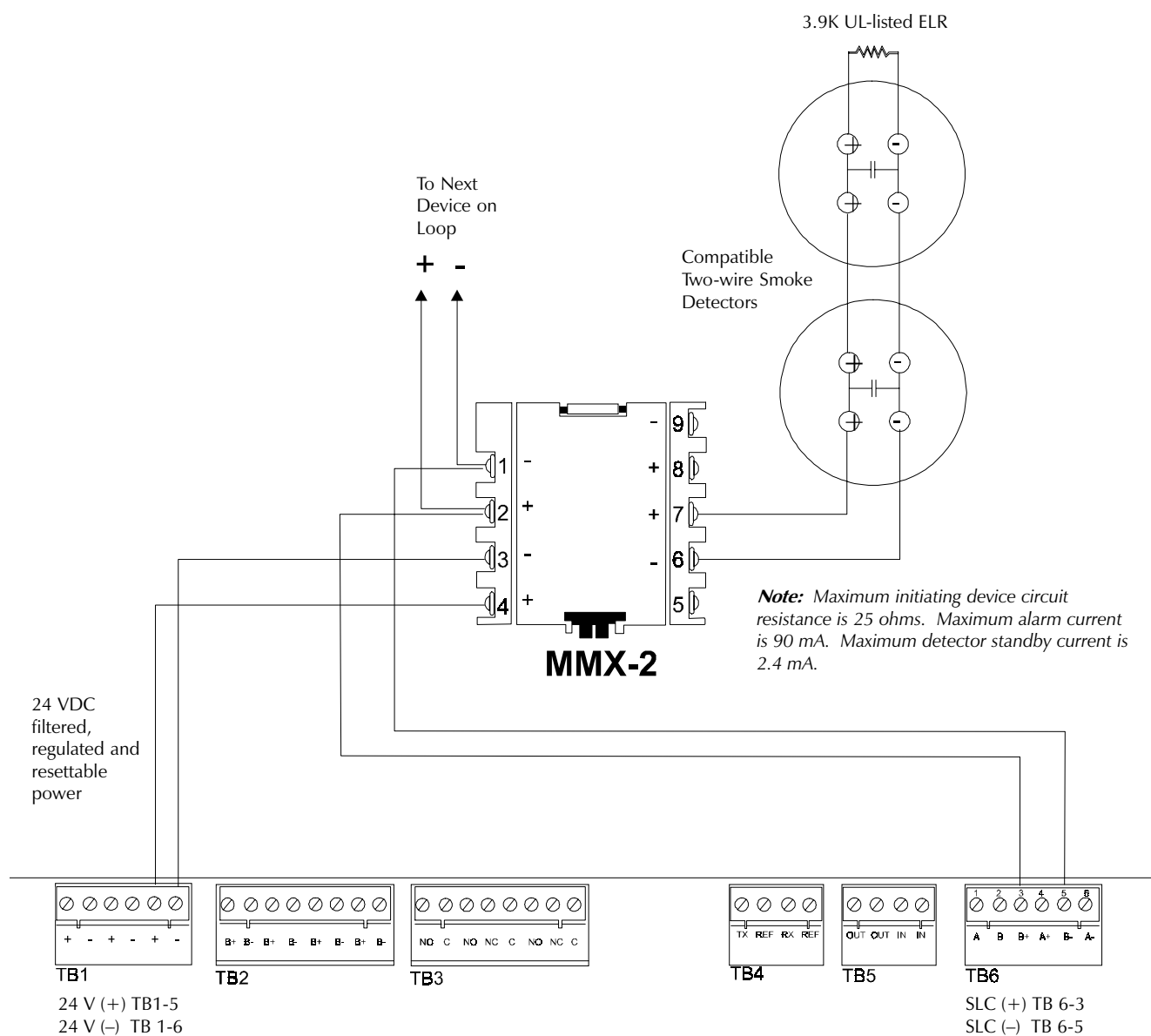


**Figure 2-23  NFPA Style B Initiating Device Circuit with an MMX-2 Module**

*Supervised and Power-limited*


*Note:*  *For more information, refer to the MMX-2 Installation Instructions, Document M500-03-00.   For a list of compatible devices, reference the Device Compatibility Document.*

UL-listed Power Supervision Relay

Shown
Energized

24 VDC
Four-Wire
Smoke
Detector

Manual
Pull
Station

To next
device on
Loop

**+ -**

Heat
Detector

- 9
+ 8
+ 7
- 6
5

**Note:** *Maximum initiating device circuit resistance is 20 ohms.*

1
2
3
4

**MMX-1**

24 VDC
filtered,
regulated and
resettable
power

**LOOP
OUT**

TB1
+ - + - + -

24 V (+) TB1-5
24 V (–) TB 1-6

TB2
B+ B- B+ B- B+ B- B+ B-

TB3
NO C NO NC C NO NC C

TB4
TX REF RX REF

TB5
OUT OUT IN IN

1 2 3 4 5 6
TB6
A B B+ A+ B- A+

SLC (+) TB 6-3
SLC (–) TB 6-5
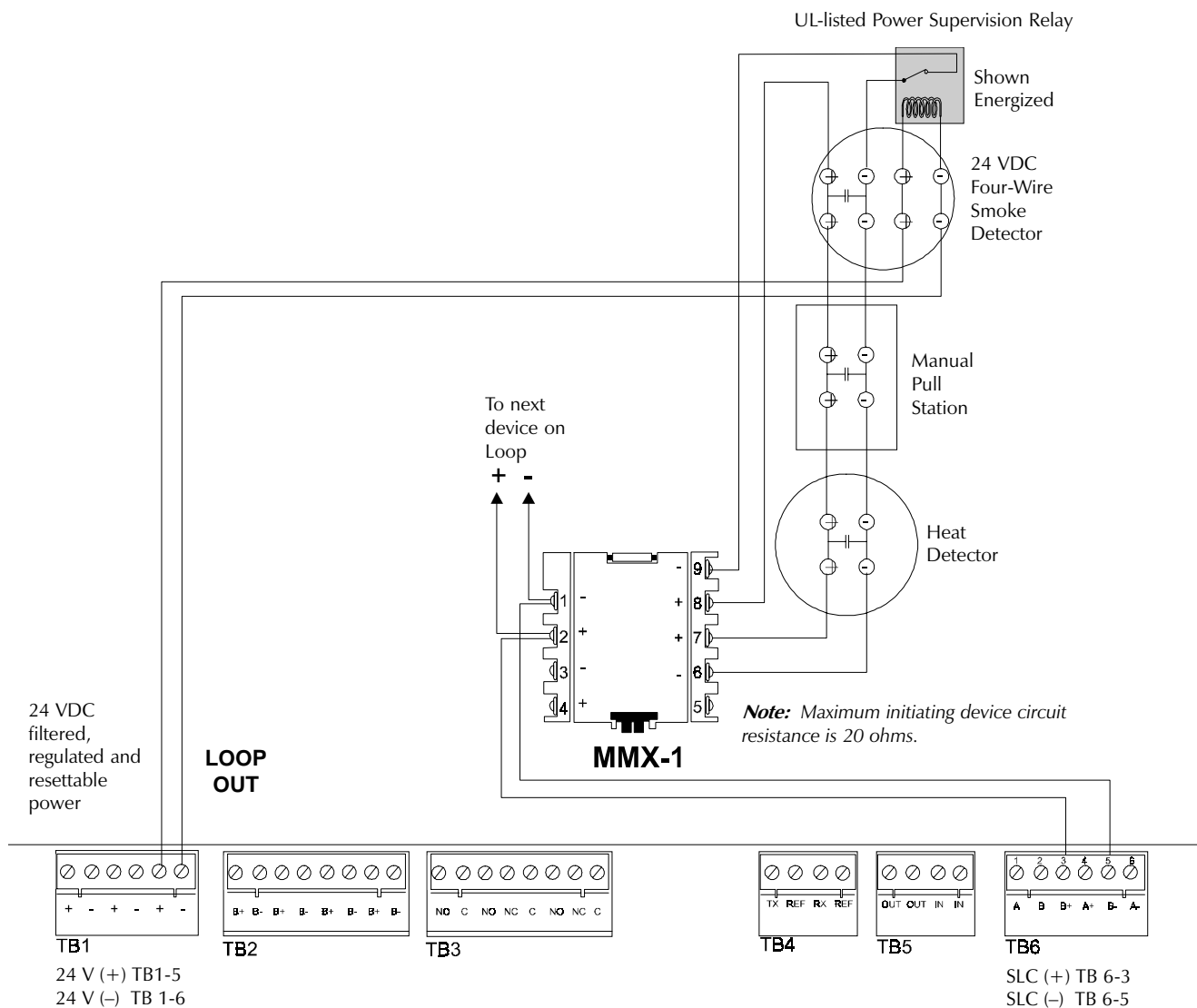
**Figure 2-24 NFPA Style D Initiating Device Circuit with an MMX-1 Module**

(supervised and power-limited)

## 2.7.2  The Monitor Module, continued

To next
device on
Loop

**+   -**

3.9K UL-listed ELR

Compatible
Two-wire Smoke
Detectors

**MMX-2**

- 9
+ 8
+ 7
- 6
5

- 1
+ 2
- 3
+ 4

**Note:** *Maximum initiating device circuit resistance is 25 ohms.  Maximum alarm current is 90 mA.  Maximum detector standby current is 2.4 mA.*

24 VDC
filtered,
regulated and
resettable
power

| + | - | + | - | + | - |
|---|---|---|---|---|---|

**TB1**

24 V (+) TB1-5
24 V (–)  TB 1-6

| B+ | B- | B+ | B- | B+ | B- | B+ | B- |
|----|----|----|----|----|----|----|----|

**TB2**

| NC | C | NO | NC | C | NO | NC | C |
|----|---|----|----|---|----|----|---|

**TB3**

| TX | REF | RX | REF |
|----|-----|----|-----|

**TB4**

| OUT | OUT | IN | IN |
|-----|-----|----|----|

**TB5**

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| A | B | B+ | A+ | B- | A- |

**TB6**

SLC (+) TB 6-3
SLC (–)  TB 6-5
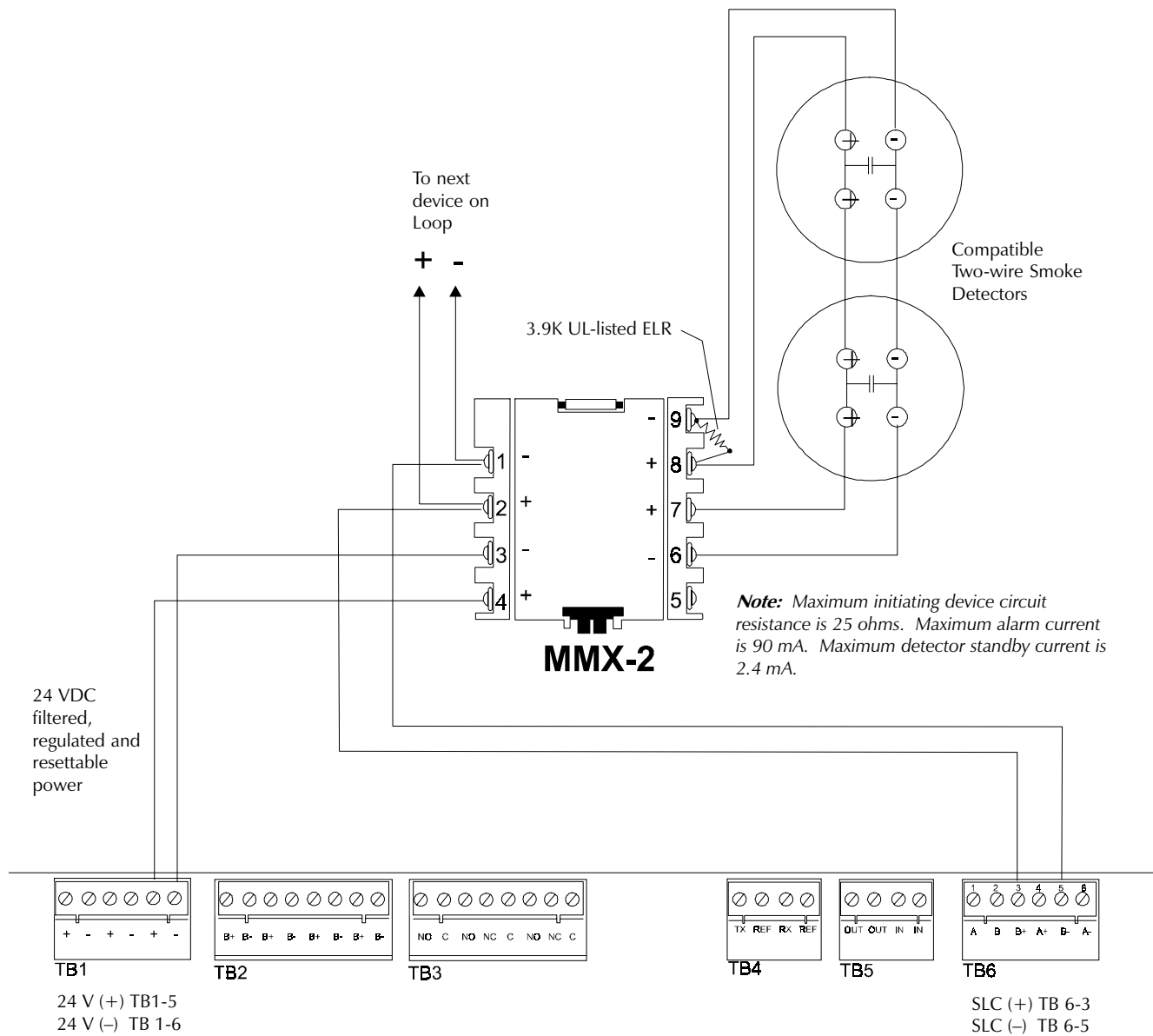
### Figure 2-25  NFPA Style D Initiating Device Circuit

(supervised and power-limited)

**Note:** *For more information, refer to the MMX-2 Installation Instructions, Document M500-03-00.  For compatible devices, reference the Device Compatibility Document.*

## 2.7.3  The Control Module

The CMX control module is an addressable module that supervises and switches power to a Notification Appliance Circuit.  The CMX-1 and CMX-2 are identical except that the CMX-2 has a higher voltage rating (70.7 V) at full current.  The CMX circuit can be wired as an NFPA Style Y or Style Z Notification Appliance Circuit.  Alternately, the CMX can be used as a Form-C control relay.
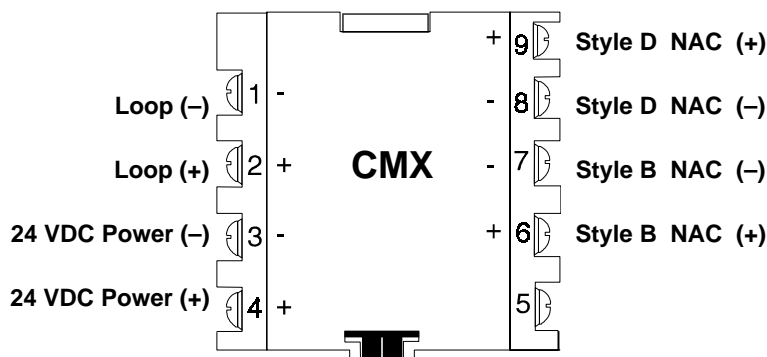


**Figure 2-26  The CMX Control Module (Alarm polarity shown)**

### Communications (SLC) Loop Connections

Connect the communications loop to CMX terminals 1 (–) and 2 (+).  The CMX occupies one module address on the loop.  Set the rotary switches on the CMX to the particular loop address required.

### NFPA Style Y Notification Appliance Circuit

Connect polarized alarm notification appliances to a single two-wire circuit.  This circuit cannot be T-tapped or branched in any fashion, and must be terminated across the last device by a 47K, 1/2-watt ELR (PN A2143-00).  Connect the circuit to CMX terminals 6 (+) and 7 (–).  See **Figure 2-28**.

### NFPA Style Z Notification Appliance Circuit

Connect polarized alarm notification appliances to a single two-wire circuit.  This circuit cannot be T-tapped or branched in any fashion.  No external ELR is required for Style Z wiring.  Connect the four-wire circuit to CMX terminals 6 (+) and 9 (+), then 7 (–) and 8 (–).  See **Figure 2-29**.

### Notification Appliance Power

Connect notification appliance power to CMX terminal 3 (common) and terminal 4 (+ 24 VDC).  This power must be supervised by a UL-listed power supervision relay, wired as shown in **Figure 2-28 and 2-29**.

### Test switch

The CMX includes a magnetic test switch located near the center front of the module.  Activation of this switch will cause a short circuit indication for the Style B/D loop.

## 2.7.3 The Control Module, continued
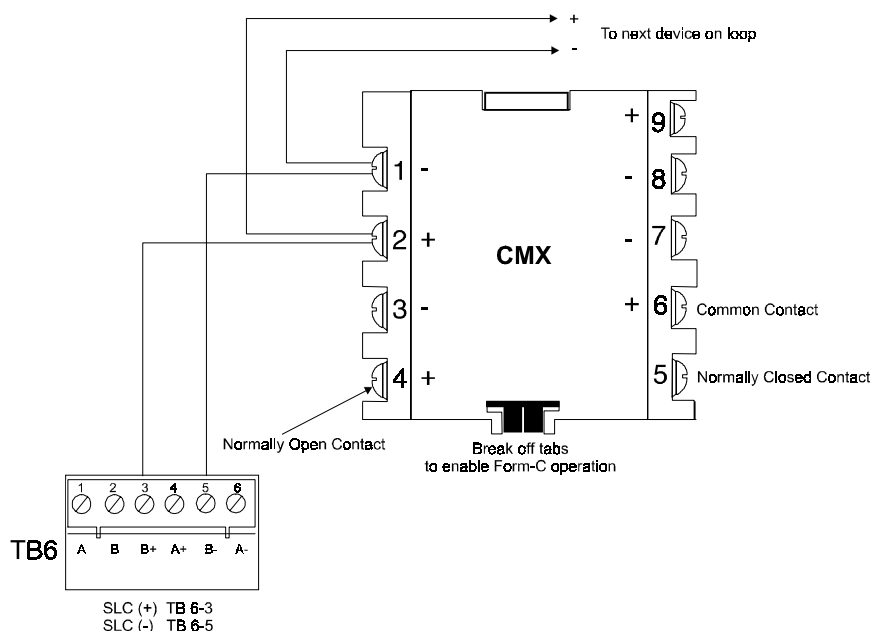


**Figure 2-27  The CMX Control Module (Form-C Relay)**

**Break Tabs**

To configure a CMX as a Form-C relay, the two tabs must be broken off of the module.  Use a pair of needle-nose pliers to break off each tab.

**Communications (SLC) Loop Connections**

Connect the communications loop to CMX terminals 1 (–) and 2 (+).  The CMX occupies one module address on the loop. Set the rotary switches on the CMX to the particular loop address required.

**Contact Connections**

Wire the common and the normally-open or normally-closed contacts to the CMX as required.

**Contact Ratings**

*Note: Contacts are not rated for motor loads.*

|  | **CMX-1** | **CMX-2** |
|---|---|---|
| **Resistive:** | 2 A @ 30 VDC | 2 A @ 30 VDC |
| **Inductive:** | 1 A @ 30 VDC (0.6 pf) | 1 A @ 30 VDC (0.6 pf) |
|  | 0.3 A @ 120 VDC (0.35 pf) | Pilot Duty: 0.6 A @ 30 VDC (0.35 pf) |

## 2.7.3   The Control Module, continued

UL-listed Power Supervision Relay

*Note: If more than one CMX Notification Appliance Circuit is provided, install the power supervision relay after the last CMX.*

PN SSD A2143-00
**(N-ELR in Canada)**
End-of-Line Resistor 47K, 1/2-watt

*Note:  Maximum initiating device circuit resistance is 20 ohms.*

24 VDC Notification Appliances

To next device
on  Loop

+   -

**CMX**

LOOP  OUT

**Note**:  Do not loop wiring under any terminals. Break
wire run to maintain supervision.

TB1
24 V (+) TB1-1
24 V (–)  TB 1-2

TB2

TB3

TB4

TB5

TB6
SLC (+) TB 6-3
SLC (–)  TB 6-5

**Figure 2-28  NFPA Style Y Notification Appliance Circuit**

(All circuits are supervised and power-limited.)

## 2.7.3 The Control Module, continued

For a list of compatible notification appliances, reference the Device Compatibility Document.

To next device
on Loop

24 VDC
Notification
Appliances

LOOP OUT

CMX

UL-listed Power
Supervision Relay

**Note:** *Do not loop wiring under any terminals. Break wire
run to maintain supervision.*

TB1

+ − + − + −

TB2

B+ B− B+ B− B+ B− B+ B−

TB3

NO C NO NC C NO NC C

TB4

TX REF RX REF

TB5

OUT OUT IN IN

TB6

A B B+ A+ B− A−

24 V (+) TB1-1
24 V (−) TB 1-2

SLC (+) TB 6-3
SLC (−) TB 6-5
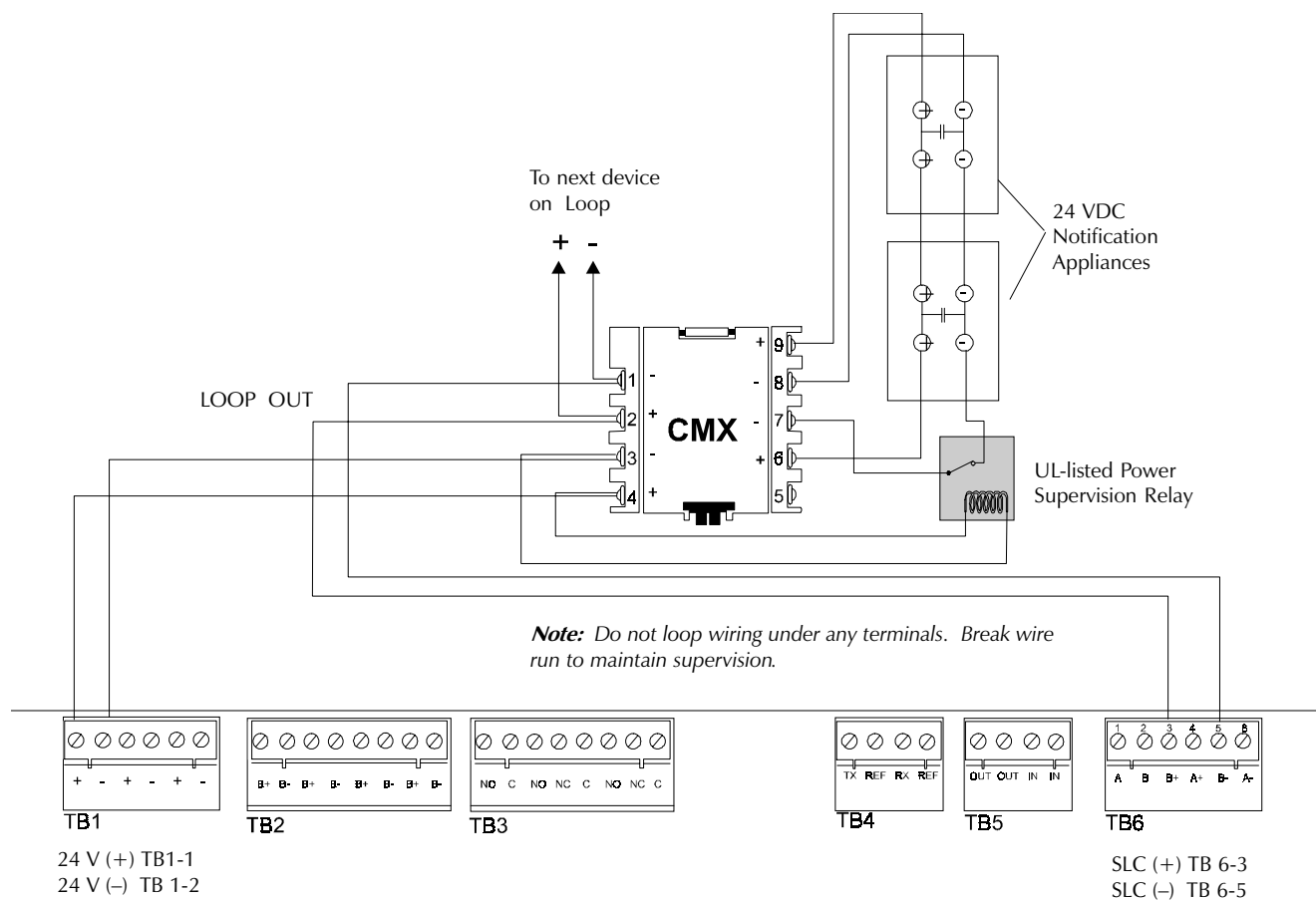
**Figure 2-29 NFPA Style Z Notification Appliance Circuit**

(All circuits are supervised and power-limited.)

### 2.7.4 The Addressable Manual Pull Station

The BGX-101L is an addressable manual pull station with a key-lock reset feature.

**Installation**

1. Connect the communications loop to terminal screws (+) and (–).

2. The BGX-101L is factory preset with address 00. Set the address for the BGX-1010L by using a screw-driver to turn the rotary address switches on the MMX-101 to the desired address settings.
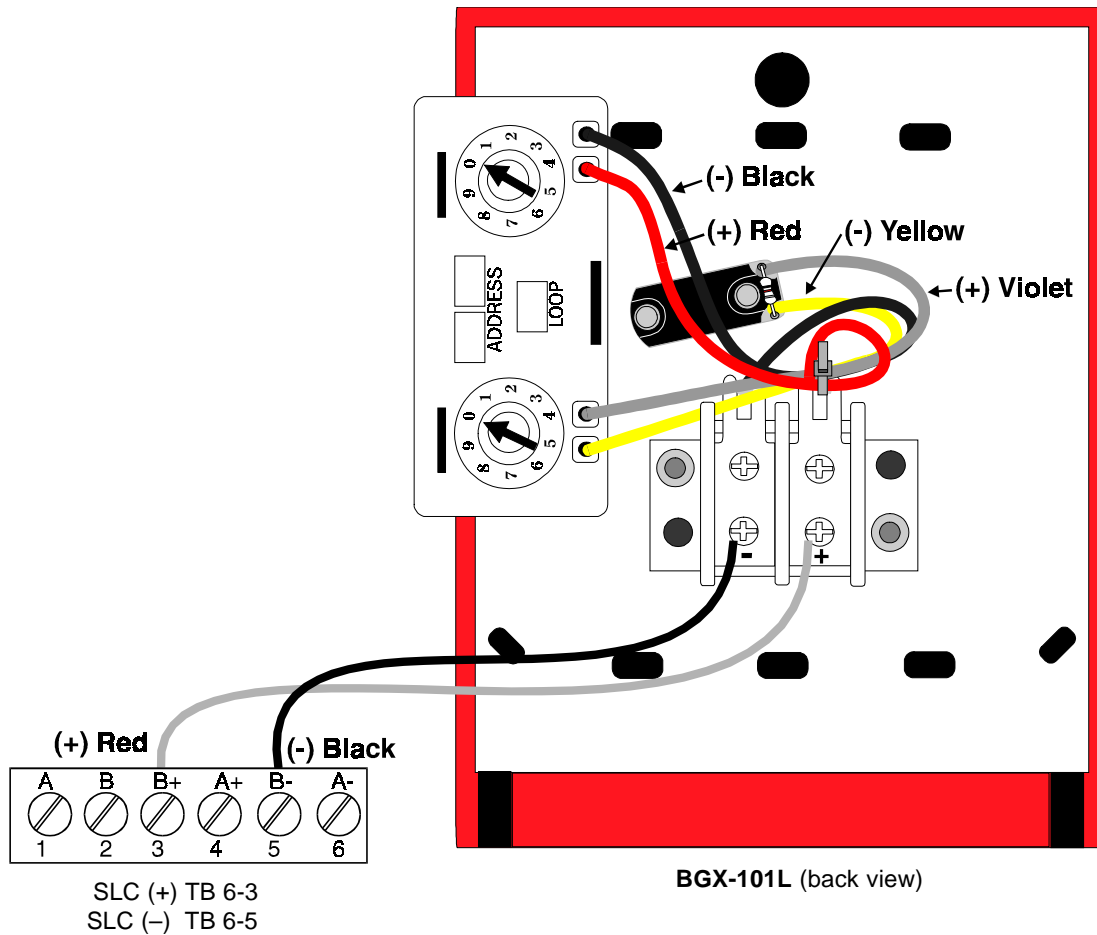


**Figure 2-30  Wiring Addressable Manual Pull Stations**

## 2.7.5 The Intelligent Detector

The BX-501 base provides the connection between the communications loop and SDX–551, SDX-551TH, CPX-551, FDX-551R and FDX-551 intelligent detectors.

### INSTALLATION

1. Connect the communications loop to terminal 1 (–) and terminal 2 (+) on the BX–501.

2. If using an RA400Z remote LED annunciator, connect the RA400Z positive terminal to BX-501 terminal 3 and the negative terminal to BX-501 terminal 1.

3. Before installing the appropriate intelligent detector head, set the detector's address on the detector head with a small slotted screwdriver.  Mark this address on the detector base and on the detector head.
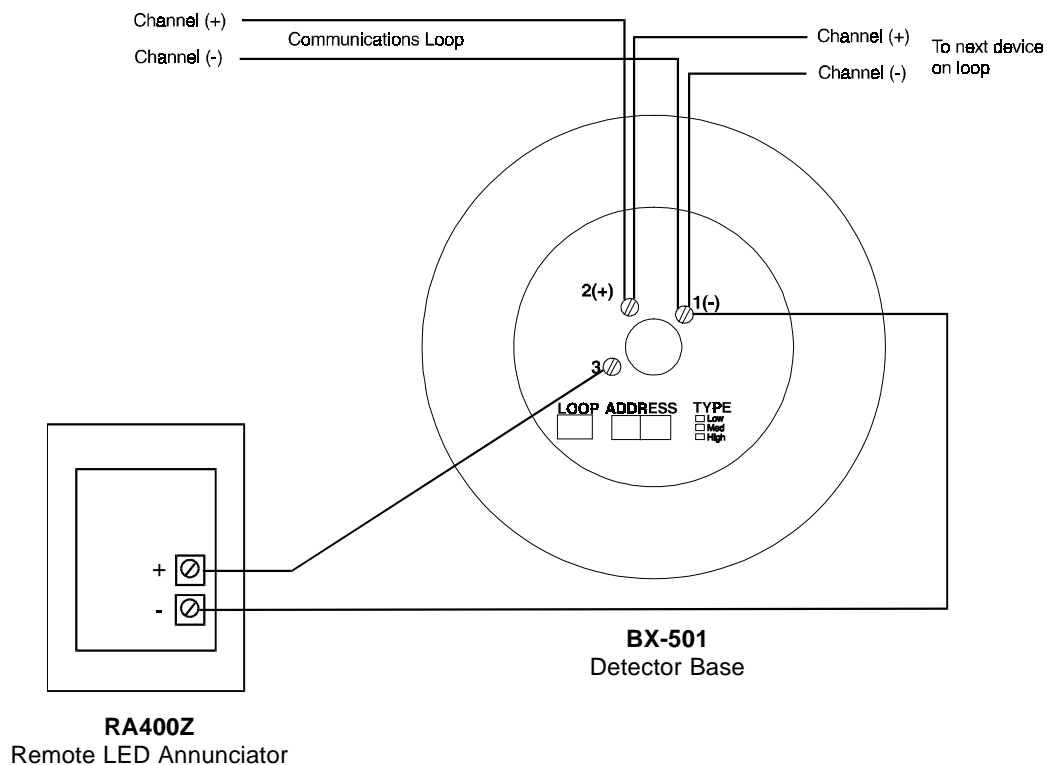


**Figure 2-31  Wiring the BX-501 Detector Base**

## 2.7.6 Optional Modules

The AFP-200 control panel has an option module slot, using locations J6, J7, and J8 on the circuit board.  There are two optional modules available for the control panel, the 4XTM Transmitter Module and the RTM-8 Relay Module.  Jumper JP5 must be cut before installation of an optional module to enable module supervision.
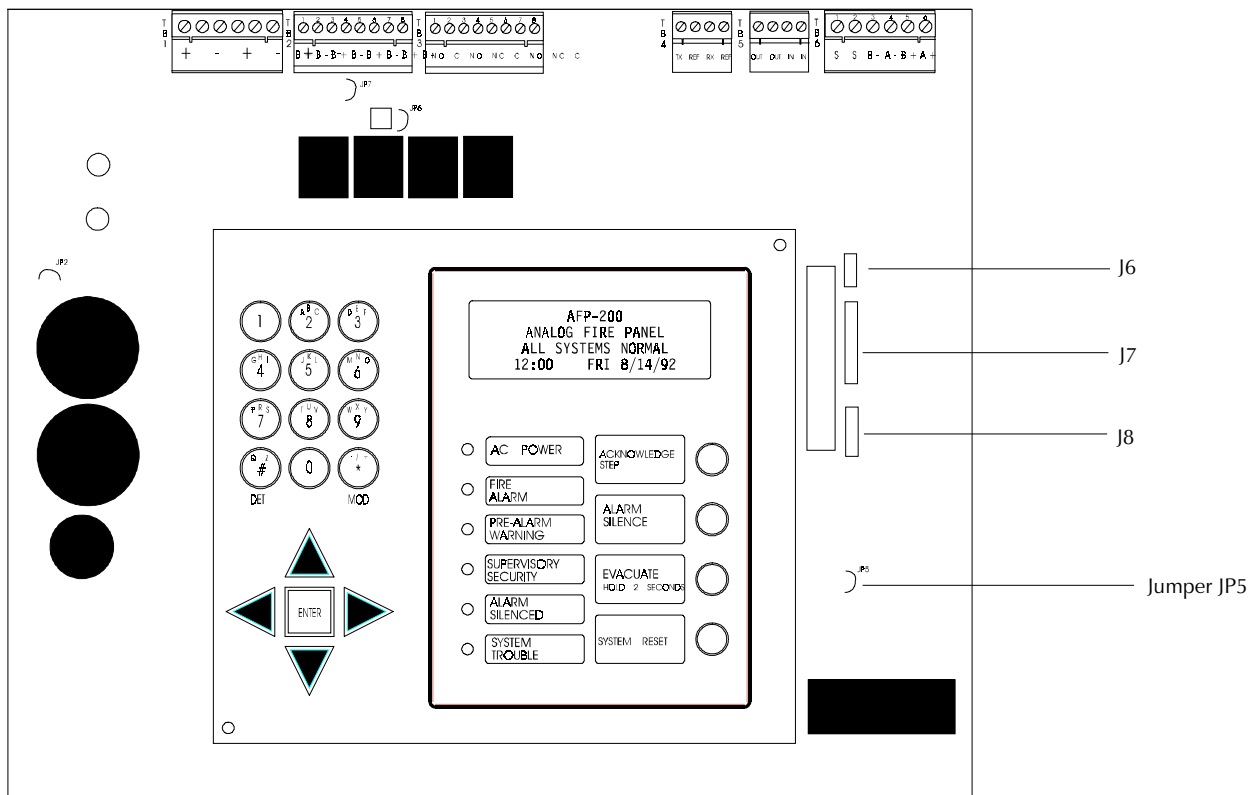


**Figure 2-32  Optional Module Location**

## 2.7.6 Optional Modules, continued

**Installation**

Insert the two nylon standoffs (provided) into the holes located on the right-side edge of the main circuit board (refer to **Figure 2-33**). Carefully align the pins on the circuit board with the connector on the option board. Press firmly on the option board until it locks in place on the standoffs. Affix the terminal identification labels provided with the option modules.

**For RTM-8 Option Module**

Use the screw supplied to fasten the module to the main circuit board using the hole on the upper right-hand corner of RTM-8 (when the board is in place for installation) and the corresponding hole on the main circuit board.

Standoffs

4XTM Option Board                          Main Board

Insert screw here

Standoffs

RTM-8 Option Board                         Main Board

Use metal screw and
standoff here
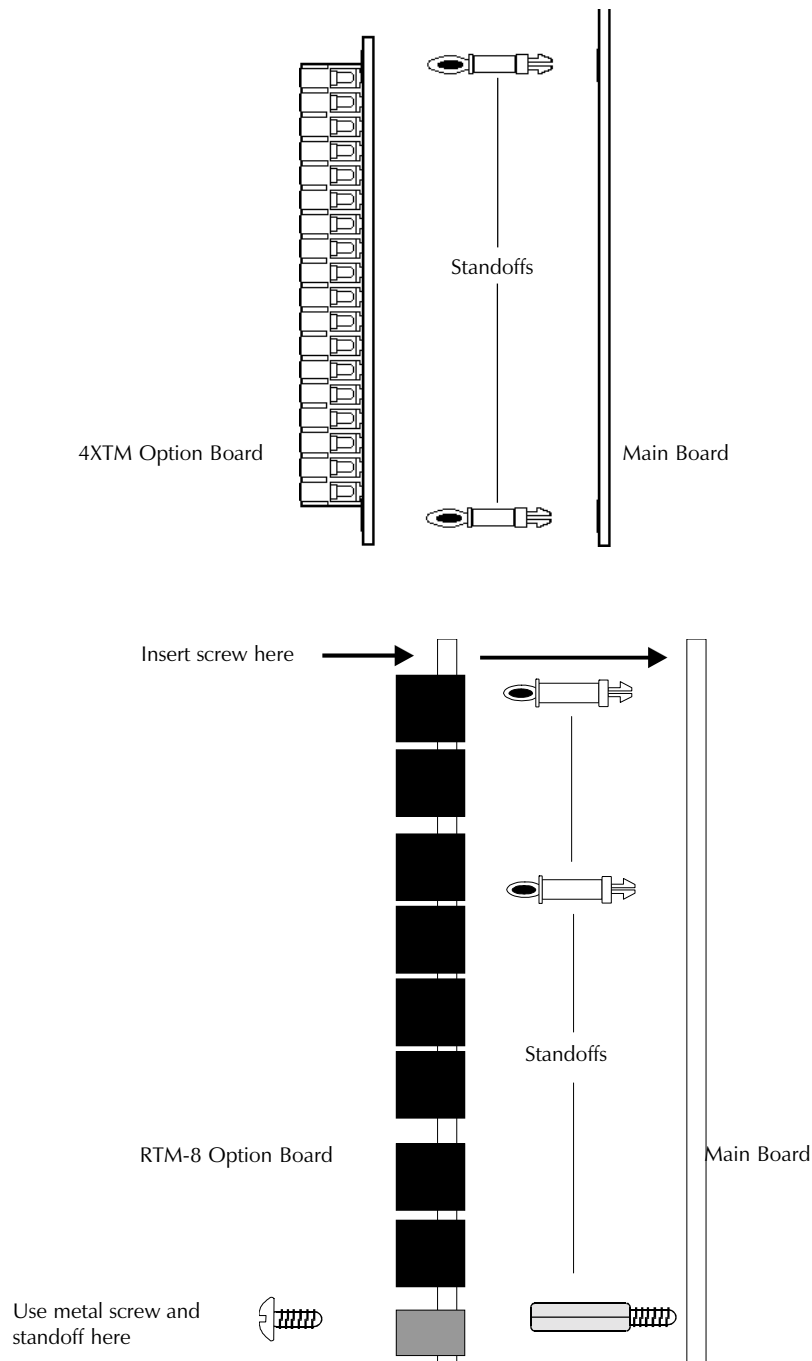
**Figure 2-33  Optional Module Installation**

## 2.7.6  Optional Modules, continued

Push the disconnect switch down to prevent unwanted activation of the municipal box during testing of the control panel (see **Figure 2-34**).  The Disconnect LED will remain illuminated while the municipal box is disconnected.  The System Trouble LED will indicate disconnected and/or open circuit conditions on the municipal box.   During trouble conditions, it is possible to obtain the circuit condition on the alarm reverse-polarity output.  If this operation is desired, cut the TBL jumper (shown in **Figure 2-34**).
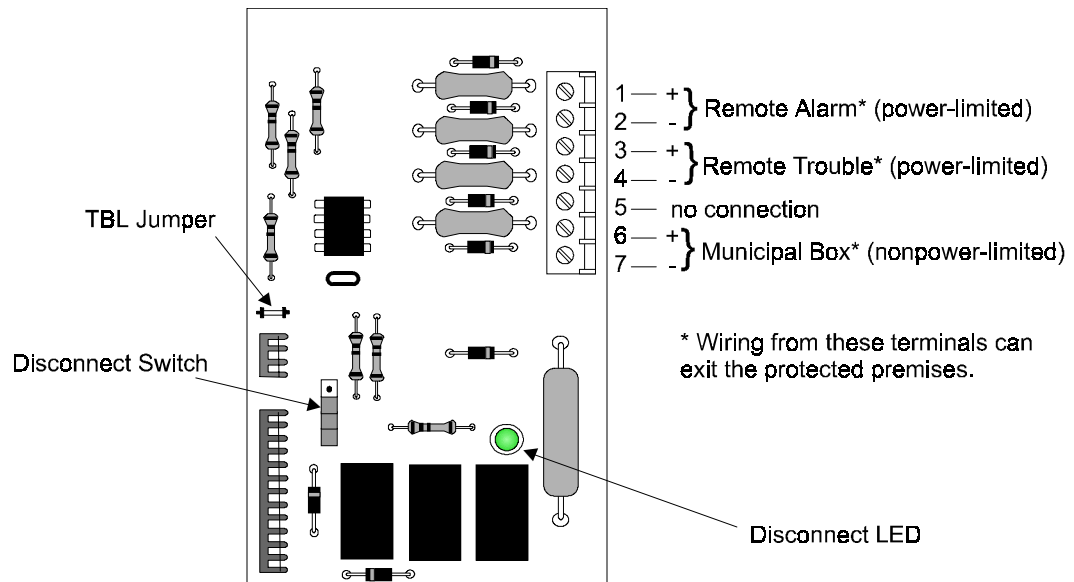


**Figure 2-34  4XTM Transmitter Module**

(Polarities are shown in activated positions.)

## 2.7.6 Optional Modules, continued

Local Energy Municipal Box LED (yellow)

JP1 - Cut for polarity reversal remote station operation

JP2 - Transmitter Module Select

**Jumper Settings**

☐ Alarm/Trouble Polarity Reversal
○ Remote Station
○ JP1 must be cut

○ Alarm only Polarity Reversal
☐ Remote Station
○ JP1 must be cut

○ Local Energy Municipal Box
☐ *Jumper JP1 is optional*
○

**Switch Settings**

☐ Disconnected

☐ Normal

**Typical Form-C Relay Configuration**

3 — C
2 — NO
1 — NC

Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8

Transmitter Output
(-) normal
(+) normal

Relay Disconnect Switch
Transmitter Disconnect Switch

Transmitter Disabled LED (yellow)
Relay Disabled LED (yellow)

**Figure 2-35  RTM-8 Relay Transmitter Module**

### Notes on the RTM-8

1. **Zone Relay Contact Ratings** – Maximum switched power: 170 W or 1800 VA.  Maximum switched current: 6 A.  Maximum switched voltage:  30 VDC or 300 VAC.  UL Rating: 6 A @ 28 VDC or 120/300 VAC. 1/8HP @120/240 VAC (100,000 CYC)1.5/0.8 A at 120/240 VAC, Pilot Duty 30,000 CYC.  Contact Material: Silver Nickel, gold-plated

2. Refer to the power-limited label located on the AFP-200 cabinet door.  Make a notation on the label for each circuit used as a nonpower-limited circuit.  (Refer to the example on the label).

3. **Polarity Reversal Output**  – 24 VDC (nominal), 10 mA maximum rated current.  Internal resistance: 1200 ohms (nominal).  Intended for connection to the polarity reversal circuit of a remote station receiving circuit (Fire·Lite RS-82) having compatible ratings. *The RTM-8 is not suitable for separate transmission of both alarm and trouble signals to remote station.*  Output is power-limited.  Wiring can exit the protected premises.

4. **Municipal Box output** – Supervised for open circuit.  Nonpower-limited.  Maximum short current circuit: 0.6 A.  Maximum open circuit voltage: 27.6 V.  Maximum wire resistance: 3 ohms.  Wiring can exit the protected premises.

# 3. Programming and Status Change

The AFP-200 control panel is completely field-programmable and requires no special software skills.   Programming may be done in one of two ways:

1. **Using the Autoprogram feature and the control panel keypad**. is a convenient way to quickly bring the system on-line and to make changes to an existing system program. This chapter provides detailed instructions for programming the control panel using the keypad.

2. **Using the Off-Line Programming Utility** lets you create site-specific programming information using a DOS-based computer and is the preferred method for programs requiring a large amount of data entry.  This chapter only provides instructions for uploading and downloading programs created off-line.  For detailed instructions, refer to the Off-Line Programming Utility manual.

## 3.1    Program/Status Change Entry

Press the Enter key to enter programming mode and the display shows the Programming Entry screen:

```
1=PROGRAMMING
2=READ@STATUS@ENTRY
(BACKSPACE@TO@ABORT)
```

To program the password, press 1. The LCD displays the following screen:.

```
ENTER@PROG@OR@STATUS
PASSWORD,@THEN@ENTER.
(BACKSPACE@TO@ABORT)
```

### Passwords

There are two passwords, **Program Change** and **Status Change**.  The Program Change password is factory set at 00000, and Status Change is factory set at 11111. Passwords are user-definable and a method exists for the identification of a forgotten password.  If an invalid password is entered, the display shows, **INVALID PASSWORD** and an error code number.  By contacting the manufacturer, the error code can be deciphered to identify the true password that exists in the machine.  To exit from Program Change or Status Change operations at any time, press the Backspace key repeatedly, or press System Reset.

## 3.2    Program Change Operation

If the correct programming password is entered, the control panel will enter Program Change mode.  In Program Change mode, the trouble relay is activated, the piezo is off,  and the System Trouble LED flashes (and cannot be made steady).   The LCD displays the following screen:

```
0=CLR@1=AUTO@2=POINT
3=PASSWD@4=MESSAGE
5=ZONES@6=SPL@ZONES
7=SYS@8=CHECK@PRG
```

At this point, a numeric key (0-8) must be pressed.  Pressing the Backspace key will abort the operation.

### 3.2.1 Clear (0)

Pressing 0 will clear all programming information from the nonvolatile memory of the control panel. Before executing the Clear command, the display will prompt the user for verification of the command before the system actually clears all programming data. The Clear command is typically used to clear data from the control before autoprogramming the control panel for the first time.

### 3.2.2 Autoprogram (1)

The autoprogram feature **(1=AUTO)** identifies all installed devices, determines if new (unprogrammed) devices are installed, and displays any new devices to the user for editing and acceptance. Autoprogramming also loads default program information for new devices. When autoprogramming is first used, it sets up default values for all system parameters. While this is happening the display shows the screen to the right.

```
AUTOPROGRAM
PLEASE@WAIT
```

Autoprogram only displays devices to the LCD that do not match the program (not same address and type). Devices matching the existing program in memory do not change and do not display on the LCD.

**New Detectors**

For each new detector, the autoprogram feature selects default program values and displays the information on the LCD. A typical example is shown on the sample LCD display to the right, with descriptions of each item below:

```
PROGRM@SMOKE(PHOTO)
DETECTOR@ADDRESS@01
Z03@Z@@@Z@@@Z@@@Z@@
2.0%@@@@@@*P*@@@@D01
```

- **SMOKE(PHOTO)** is the actual type code of the detector found at address 01.

- **DETECTOR ADDRESS 01** is the default custom label.

- **Z03** is the default zone selection. Zone 01 is the default for heat detectors, Zone 02 for ionization detectors, and Zone 03 for photo detectors. In addition to changing this selection, the user may add four more zones for each detector's program.

- **2.0%** obscuration per foot is the sensitivity setting (ion detectors show **HIGH, MED,** or **LOW**). *Note: If this is a CPX-551 Ionization detector used in a duct application, the sensitivity must be set to **HIGH.***

- **P** indicates that the AWACS Pre-Alarm function is operational (the default setting is Alert level at 70% of alarm level). To deselect, press the * key. See Appendix G for more information).

- **"*"** Indicates drift compensation and Alarm Verification options set, respectively. Make sure to record detectors programmed for verification on the Protected Premises Label located inside the unit door. To select the drift compensation option, position the cursor over the first * and press the D (3) key. To select Alarm Verification, position the cursor over the second * and press the V (8) key.

After a new detector displays, press Enter to accept the default program or do the following: press the left cursor (the triangle to the left of Enter) to reject the autoprogram information and not enter it into memory. In most cases, edit the point program using the procedure described in the next paragraphs.

The control panel leads you through the program editing process. A blinking cursor moves through the fields as you press the right cursor key (the triangle to the right of Enter). After moving into other fields, you may return to a previous field by pressing the left cursor or move directly down to the next lower line by pressing the down cursor. Change the blinking fields by pressing the up cursor key or by pressing the appropriate numeric key.

**Alphanumeric Operation of the Keypad**

The alphanumeric operation of the keypad changes a blinking letter in the custom label field. For example, to enter the letter R, press the 7 key to step through 7, P, R and S. Stop on R and then press the right cursor key (not Enter). The custom labels are 19 characters long (the last character is forced to blank).

## Programming Hint

The control panel includes a special recall function to display the last 19-character label used, which can save many keystrokes. When the blinking cursor is over the first letter of the label field, press the zero key twice to display the label entered for the previous point. If the last character of the label is a number, pressing the zero key a third time will increment this number. Once the label is recalled, you can edit the each character of the label.

To load the point's program into memory at any time, press Enter. After pressing Enter, the autoprogram routine displays the next new detector.

If a detector exists in the control panel program, but is missing (no answer), the display shows the screen to the right.

```
PROGRM@SMOKE(PHOTO)
FLOOR1@MAIN@LOBBY
DEVICE@NOT@ANSWERING
DELETE@FROM@MEM?@D01
```

If you press Enter, the control panel deletes the device from memory and autoprogram displays the next new device. If you press the left cursor, the program remains unchanged, and the next new device displays.

When autoprogram finishes displaying all new detectors, autoprogram displays the first new module with the lowest address.

## Monitor Module Autoprogram

Monitor module autoprogram is similar to detector autoprogram. A sample LCD display of a typical Monitor Module autoprogram screen appears to the right.

```
PROGRM@MONITOR
MODULE@ADDRESS@01
ZO4@Z@@@@Z@@@@Z
@@@@@@@@@@@@@@@@M01
```

The major program editing for Monitor Modules is the selection of the type code on the first line. To change this selection, use the up and down cursor keys as the entire field blinks. The default selection is "Monitor," as shown in the screen to the right. *Note: Selection of a type code may change the functional operation of that point.* **Figure 3-1** contains a list of Monitor Module type codes.

| TYPE CODE LABEL | SPECIAL FUNCTION |
|---|---|
| MONITOR | None (default) |
| PULL STATION | None |
| SMOKE DETECT | None |
| HEAT DETECT | None |
| Blank | None, select when no other type code applies |
| WATERFLOW | Causes a Non-Silenceable Alarm |
| SUPERVISORY | Becomes a Supervisory Point (See Operation Chapter) |
| TAMPER | Becomes a Supervisory Point (See Operation Chapter) |
| NON FIRE | Special non-Alarm Point (see Operation Chapter) |
| HAZARD ALERT | Special non-Alarm Point (see Operation Chapter) |
| FIRE CONTROL | Special non-Alarm Point (see Operation Chapter) |
| ABORT SWITCH | Aborts Release Zone (see Appendix D) |
| MAN RELEASE | Overrides Abort (see Appendix D) |
| SILENCE | Functions like Silence Switch |
| SYSTEM RESET | Functions like Reset Switch |
| EVACUATE | Functions like Drill Switch |
| PAS INHIBIT | Overrides Presignal (see Appendix H) |
| TROUBLE MON | Short = Trouble (see Operation Chapter) |
| BURGLAR ALA | Causes Security Alarm on Open Short (see Appendix E) |

**Figure 3-1  Monitor Module Type Codes**

**Figure 3-2** contains the default zone selection for Monitor Modules.

| Monitor Module Address | Zone Default |
|---|---|
| 01 through 19 | Z04 |
| 20 through 39 | Z05 |
| 40 through 59 | Z06 |
| 60 through 79 | Z07 |
| 80 through 99 | Z08 |

**Figure 3-2  Monitor Module Default Zone Selection**

This first default zone as well as the other three zones may be changed for each Monitor Module in the same manner as detectors.  When autoprogram displays a new Monitor Module, press Enter to accept the default program.  To reject the default autoprogrammed information, press the left cursor.  To edit the fields, press the right cursor key (the triangle to the right of Enter) and a blinking cursor moves through the fields.  Change the blinking fields by pressing the up cursor key, or by pressing a numeric key.

### Control Module Autoprogramming

A sample LCD display of a typical control module autoprogram screen appears to the right.

```
PROGRM@CONTROL
MODULE@ADDRESS@08
Z00@Z@@Z@@Z@@Z
@@@@@@@@@@@@@S*M08
```

Control modules are similar to Monitor Modules, except that the default zone is always Zone 00 (general alarm).  A silenceable selection is required (default is S) and the Walk Test selection is required (default is NO; change * to W if desired).

Selection of control module type codes may change their function.  **Figure 3-3** contains descriptions of the control module type codes type codes.

| Type Code Label | Special Function |
|---|---|
| CONTROL | None (default) |
| RELAY | Ignore Open Circuit |
| STROBE CKT | None |
| BELL | None |
| HORN CIRCUIT | None |
| AUDIBLE CKT | None |
| blank | None, select when no other type code applies. |
| RELEASE CKT | Short = Normal (Nonpower-limited, see Appendix D) |
| REL CKT ULC | Short = Trouble (Supervised and power-limited, see Appendix D) |
| RELEA FROM_C | Contacts operated upon release |

**Figure 3-3  Control Module Type Codes**

*Note: A release circuit is always non-silenceable.*

### Notification Appliance Circuit (NAC) Programming

NAC program functions and type codes are similar to control modules.  Because the four NACs are always installed, autoprogram does not need to display NACs.  A sample edit screen for NAC point programming appears to the right.  To edit an NAC point, access this screen in Program Change mode (refer to **Section 3.2.3**), so you can select zoning, silencing, type code, and Walk Test features.

```
PROGRM@BELL@CIRCUIT
PANEL@CIRCUIT@NO.@1
Z00@Z@@@@Z@@@Z@@@Z
@@@@@@@@@@@@SW@BO1
```

NACs are similar to control modules, except for the default type code, and the default label. Note the "B" instead of "M" in the address. The default zone selection is ZOO (general alarm). Walk Test is selected by default. **Figure 3-4** contains type code selections for the four Notification Appliance Circuits:

| Type Code Label | Special Function |
|---|---|
| BELL CIRCUIT | None (default) |
| STROBE CKT | None |
| HORN CIRCUIT | None |
| AUDIBLE CKT | None |
| | None (blank label) |
| RELEASE CKT | Short = Normal (Nonpower-limited, see Appendix D) |
| REL CKT ULC | Short = Trouble (Supervised and power-limited, see Appendix D) |

**Figure 3-4  Notification Appliance Circuit Type Codes**

### System Function Autoprogramming

The autoprogram feature automatically selects default system functions during initial programming of the control panel. Subsequent autoprogramming will not change previous editing of these functions. **Figure 3-5** contains default system functions and parameters.

| System Function | Default Parameter |
|---|---|
| Zone 00 | Label = "GENERAL ALARM ZONE" |
| Zones 01 through 89 | Label is blank |
| Zone 90 | Label = "PRESIGNAL/PAS DELAY", DELAY=180,PAS=N |
| Zones 91-94 | Label = "RELEASE ZONE 91", DELAY=00, ABORT=ULI, CROSS=N, SOAK=00 |
| Zones 95 and 96 | Label = "TIME CONTROL ZONE 95," ON=00:00, OFF=00:00, DAYS=SMTWTFSH |
| Zone 97 | Label = "HOLIDAY ZONE 97", all days are 00/00 |
| Zone 98 | Label = all blanks, CODE TYPE=MARCH TIME |
| Zone 99 | Label = "PRE-ALARM ZONE 99", ALERT=70% OF ALARM, ACTION=00% OF ALARM |
| System Parameters | SILINH=000, AUTO=000, VERIFY=00, USA TIME, ANNUN=NON SUPV, rem T BLINK=Y, ST=4, AVPS=N |
| Passwords | PROGRAM CHANGE 00000, STATUS CHANGE 11111 |
| All Systems Normal Custom Message | Label = 40 Blanks |

**Figure 3-5  Default Parameters for System Functions**

## 3.2.3  Point Programming (2)

Selecting **2=POINT** from the Program Change menu, lets you edit the program for any detector, module, or Notification Appliance Circuit. The display to the right shows a sample Point Edit screen.

```
POINT@PROG.ENTER:
DETECTOR=*,AA,E
MODULE=#,AA,E
BELLCKT=*#,A,E
```

From the Point Edit screen, you can select a detector address for program editing by a) pressing the **∗** key, b) pressing the numeric keys that represent the detector address (1-99), then c) pressing Enter. To select a module address for program editing, a) press the **#** key, b) press the numeric keys that represent the module address (1-99), then c) press Enter. To select a Notification Appliance Circuit address for program editing, a) press the **∗** key, b) press the **#** key, c) press the numeric key which represents the circuit address (1-4), then d) press Enter. If the selected point number is not installed, the control panel displays the next higher installed point. After making point changes and pressing Enter, the LCD display returns to the Point Edit screen.

*Note: Rather than reentering the next point number, you can press the up or down key to display the next lower or higher existing point.*

The point display format and the method of editing are described in Section 3.2.2, *Autoprogramming.*

### 3.2.4 Password Change (3)

From the Program Change screen, you can display the Password Change screen by selecting **3=PASS-WORD**. Select the password to change by typing * or #, then enter the new password. As the new Program or Status password is entered it displays on the fourth line. To save the new password and return to the Program Change screen, press Enter. To return to the Program Change screen without changing the password, press Backspace.

```
CHANGE@PASSWORD
*,NNNNN,E=PROGRAM
#,NNNNN,E=STATUS
```

### 3.2.5 Message Change (4)

From the Program Change screen, you can display the Message Change screen by selecting **4=MES-SAGE.** The Message Change screen lets you change the 40-character "All Systems Normal" message. The screen to the right shows a sample Message Change screen display.

```
SYS@NORMAL@MESSAGE
```

The first character on the third line blinks and may be changed to any alphabetic character by using the keypad, then pressing the right cursor. When all characters are entered (up to 40), press Enter. Type a blank space in character position 20 or 21 so the words do not run together on an 80-character printer.

### 3.2.6 Zone Change (5)

From the Program Change screen, you can display the Change Zone Label screen by selecting **5=ZONES**. The Change Zone Label screen lets the user change the custom label assigned to Zones 1-89. The screen to the right shows a sample Change Zone Label screen.

```
CHANGE@ZONE@LABEL
SELECT@ZONE@01-89:
ENTER@UP@TO@19@CHAR:
```

Select a zone to change by entering the zone number (01-99) in character positions 19 and 20 on the second line. For single digit numbers, enter a leading zero before the digit (for example, enter 07 for zone 7). The existing (if any) zone label displays on line 4 of the LCD display, characters 2 through 20. Character 1 on line 4 is blank to force a space between the device and zone labels when they are linked on the printer. Enter or change the zone label, then press Enter to change the zone label in memory and return to the Change Zone Label screen. If the zone is out of range, the software ignores the Enter key. Pressing the left cursor key returns to the Program Change screen.

### 3.2.7 Special Zone Change (6)

The selection **6=SPL ZONES** lets you change the program for special Zones 90 through 99. From the Program Change screen, select **6=SPL ZONES** to display the Special Zone Change screen. The display to the right shows a sample Special Zone Change screen.

```
SPECIAL@ZONE@PROGRAM
90=PRESIG@91-94=REL
95-96=TIME@97=HOL
98=CODING@99=PREALM
```

From the Special Zone Change screen, enter a number in the range of 90 through 99.

If selecting Software Zone 90 (pre-signal), the typical display is shown to the right. You can change the delay time or the PAS selection. Refer to Appendix H for a detailed explanation of pre-signal and PAS.

```
PRG@SOFTWARE@ZONE
PRESIGNAL@DELAY
DELAY=180  PAS=YES
Z90
```

If selecting Software Zone 91, 92, 93, or 94 (releasing), you can change delay times (**0-60** seconds), abort type (**ULI, IRI, NYC or AHJ**), cross zoning (**NO,YES, HEAT,** or **ZONE**) or soak time (**00, 10-15** minutes). Refer to Appendix D for a detailed explanation of releasing functions.

```
PRG@SOFTWARE@ZONE
RELEASE@@@CONTROL
DELAY=00@@ABORT=ULI
CROSS=Y@@@SOAK=00Z91
```

If selecting Software Zone 95 or 96 (time control), you can change the start time, stop time, or days of week (Refer to Appendix H).

```
PRG@SOFTWARE@ZONE
TIME@CONTROL
ON=08:00@@@OFF=17:00
DAYS=SMTWTFSH@@@@@@@Z95
```

If selecting Software Zone 97 (holiday), you can select up to nine holiday dates. Any device programmed to Software Zone 97 will be active on the holiday dates listed. A typical display screen might be like the one to the right.

```
PRG@HOLIDAY@ZONE97
01/01@@04/10@@05/26
07/04@@09/07@@11/26
11/27@@12/24@@12/25
```

If selecting Software Zone 98 (code type), you can select one of four code types: March Time, Temporal, California, or Two Stage. Selection of coding only has an effect if one or more Notification Appliance Circuits call out Zone 98.

```
PRG@SOFTWARE@ZONE
CODE@TYPE:
MARCH@TIME
                 Z98
```

If selecting Software Zone 99, you can program the Alert and Action Pre-Alarm. Refer to Appendix G for a detailed explanation of the Pre-Alarm function.

### 3.2.8 System Function Programming (7)

From the Program Change screen, selecting **7=SYS-TEM** (General System Functions) displays the System Function screen. The sample screen to the right shows a typical System Function screen. The following details each item on the System Function screen:

```
SIL@INH=060@AUTO=600
VERIFY=30@@@USA@TIME
ANNUN=ACS(1+2)@@LocT
BLINK=Y@ST=4@AVPS=N
```

**SIL INH** (Silence Inhibit) may be set from 0 to 300 seconds.

**AUTO** (Auto Silence) may be set from 600 to 900 seconds, or to zero (none).

**VERIFY** (Alarm Verification time) may be set from 0 to 30 seconds (for systems with Software Release 1.2). Verification times of 0 to 60 seconds were permitted in systems with Software Releases 1.0 and 1.1 only).

**USA TIME** may be changed to **EUR TIME** with the up/down cursor keys. The default is **USA TIME**. Selecting **EUR Time** does the following: changes to 24-hour time, places day before month, provides **FAULT** instead of **TROUBL**, and **ISOLAT** instead of **DISABL** in the display status field.

**ANNUN=ACS(1+2)** indicates two ACS type annunciators. ANNUN may be changed to **ANNUN=ACS ADDR 1** for a single ACS annunciator, to **ANNUN=LCD-80(T)** for use with an LCD-80 in terminal mode, to **ANNUN= UDACT** for use with a UDACT Digital Communicator, or to **ANNUN=NON SUPV** for no annunciator.

**LocT** may be selected meaning that there is a local CRT terminal in the same room as the control panel that is allowed to Acknowledge, Silence, Drill and Reset the control panel. It may also be set to LocM (local monitor only) or RemM (remote terminal status monitor only). The default setting is RemM (refer to Appendix I).

**BLINK=Y** (device LED blink) may be changed to **BLINK=N** (no blink) using the up/down cursor keys.

*Note: When **BLINK=N**, a detector only blinks when the detector is tested (every three to four hours) but does not blink each time it is polled.*

**ST=4** (Style four communications loop wiring) may be changed to **ST=6** (Style 6 loop wiring).

**AVPS=N** (AVPS-24/AVPS-24E not installed) may be changed to **AVPS=Y** (AVPS-24/AVPS-24E is installed). Refer to Appendix J for detailed information.

### 3.2.9 Upload/Download

An upload/download of the control panel may be done at any time by connecting a personal computer to the EIA-232 port and running the off-line programming routine. Refer to the PK-200 Off Line Programming Utility manual for more information.

### 3.2.10 Check (8)

From the Program Change screen, selecting **8=CHECK** directs the control panel to check the control program as follows:

- Search for output points that are mapped to a zone with no inputs mapped to it.
- Search for input points that are mapped to a zone with no output points mapped to it (including Z00 outputs).
- Search to see if releasing zones (91, 92, 93, and 94) have an input device but no RELEASE CKT; or have a RELEASE CKT but no input device mapped to them.

*Note: If multiple devices fail the check, use the up/down keys to step through the devices. To correct any errors detected by the Check routing, return to point programming and correct the program errors.*

## 3.3　Status Change Operation

Status Change is used to change operating parameters of the control panel—but not its basic configuration or control program.  Because Status Change allows change of functions that are less critical than those controlled by the programming password, the Status Change password can be provided to an individual with a less training than that required for application programming.  From the Program Entry screen, enter the correct Status Change password and the LCD displays the Status Change screen (sample to the right).

```
STATUS@CHANGE@PRESS:
1=DISABLE@2=SENS/COMP
3=CLR@VER@4=CLR@HIST
5=TIME@6=WALK@TEST
```

Status Change operations (except for Walk Test) have a two-minute timer.  If no keys are pressed for this period, the control panel exits to normal operation.  The Walk Test feature has a one-hour timer.

### 3.3.1　Disable/Enable (1)

From the Status Change screen, pressing **1** displays the Disable/Enable screen (sample to the right).  Enter the type of point to be disabled/enabled (* for detectors, # for modules or *# for Notification Appliance Circuits) followed by the two-digit address; then, press Enter.  The point displays on the screen similar to a read status display, but with the status banner blinking  (The status banner could show

```
DISABLE/ENABLE
DETECTOR=*,AA,E
MODULE=#,AA,E
BELL@CKT=*#,AA,E
```

NORMAL, TROUBL, DISABL, etc.). The status banner can be changed to DISABL or back to its present status by pressing the up or down cursor keys.  The disable status is changed in memory by pressing Enter, and the display returns to the above screen.  The operator can then enter a new point number, press the up cursor to go to the next address point, or press the down cursor to go to the previous address point.  The software will not disable initiating devices that are in alarm or control points that are on.

### 3.3.2　Detector Sensitivity (2)

From the Status Change screen, pressing **2** displays the Detector Sensitivity screen (sample to the right).  Enter a valid detector address and the control panel displays information for the detector on a screen similar to a detector Read Status display, but with the sensitivity setting blinking.  If an FDX detector or other invalid address is entered, the display returns to

```
DET.@SENS/COMP
ENTER@POINTS:@AA,E
```

the above menu. The sensitivity can be changed and drift compensation enabled, by using the cursor keys, followed by Enter. Photoelectric detectors may be set for **2.0, 1.5,** or **1.0** percent obscuration per foot.  Ionization detectors may be set for **HIGH, MED,** or **LOW** sensitivity.  Ionization detectors used in duct applications *must* be set to **HIGH** sensitivity.

*Note: The operator may then press the up/down cursor to bring up the next lower or higher existing address smoke detector for sensitivity change.*

### 3.3.3　Clear Verification Counters (3)

From the Status Change screen, pressing **3** displays the screen to the right.

Press Enter to clear all verification tally counters.  Backspace returns to the Status Change screen.

```
PRESS@ENTER@TO@CLEAR
VERIFICATION@COUNTS
OR@BACKSPACE@TO
ESCAPE
```

### 3.3.4 Clear History (4)

From the Status Change screen, pressing **4** displays the screen to the right.

Press Enter to clear the entire history file.

```
PRESS@ENTER@TO@CLEAR
HISTORY@FILE
OR@BACKSPACE@TO
ESCAPE
```

### 3.3.5 Set Time/Date (5)

From the Status Change screen, pressing **5** displays the screen to the right.

The first digit of the hours flashes and can be changed with the numeric pad. Pressing the right cursor moves to the next digit, and so on. Pressing Enter changes the time and date in the clock chip and returns to the Status Change screen.

```
CHANGE@TIME/DATE



09:45A@MON@10/31/97
```

### 3.3.6 Walk Test (6)

From the Status Change screen, pressing **6** displays the Walk Test screen (shown to the right).

To enter Walk Test mode, press Enter—the second line goes blank, and the control panel goes into Walk Test mode. To stop Walk Test mode at any time, press Backspace and the control panel returns to the Status Change screen. A one-hour timer automatically returns the control panel to normal operation.

```
WALK@TEST@PRESS
ENTER@TO@START
BACKSPACE@TO@STOP
```

Walk Test allows a single person to test the entire system without returning to the control panel to press system reset. When in Walk Test mode, the control panel accepts each new alarm and activates its programmed control points—if those control points are programmed for Walk Test activation. The control panel also stores each alarm in the history file and sends each alarm to the printer with a "TEST XX" status banner (XX is a count of the number of times a device with this address is tested). All outputs automatically shut off after a few seconds. Normal Walk Test procedure is to activate all devices in a planned sequence using a magnet tool. Upon completion of the test, the history file can be checked against this expected test sequence.

If a new trouble occurs, all control modules programmed for Walk Test are activated for a longer period (about 8 seconds) and the control panel sends a trouble banner ("TEST T") to the history file and optional printer.

While in Walk Test, the trouble relay is on, and the System Trouble LED flashes (as in all of program and Status Change operations). The alarm relay is not activated.

⚠ *CAUTION: Fire protection is not active while in the Walk Test mode. Ensure that the building is secure before entering Walk Test mode and be sure to exit Walk Test immediately upon completion of testing.*

If you want to do a "silent" Walk Test, do not select any of the output modules to participate in Walk Test when programmed (refer to *Control Module Programming*).

*Note: The "TEST XX" message may be used to find installation errors. After walk testing the entire system and setting each device into alarm once, if two devices are set to the same address, a "TEST 02" will be reported for that address. The installer should verify that no "TEST 02" or higher entries exist in the history file.*

# 4. Operating Instructions
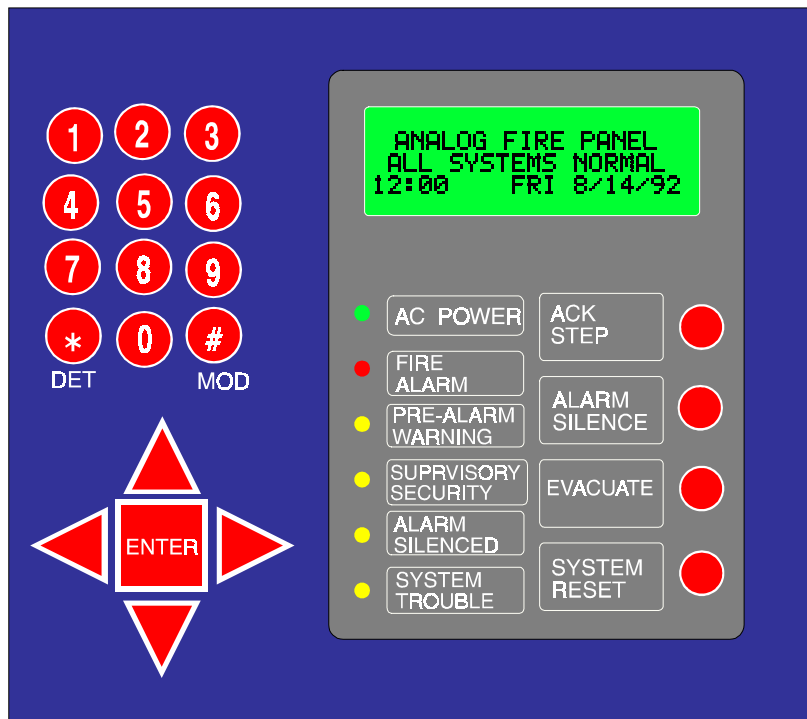


**Figure 4-1  The Membrane Switch Panel**

## 4.1    Switch Functions

### Acknowledge/Step

The **Acknowledge/Step** switch silences the piezo sounder and changes all flashing conditions to steady.  Only one key press is necessary regardless of the number of new alarms, troubles or supervisory signals.  If the piezo sounder is silenced, the control panel sends an acknowledge message to the printer and history file.  Acknowledge also automatically sends a special command to the  LCD-80 and ACS annunciators to silence their piezo sounders.

If more than one event exists, the control panel advances the LCD display to the next item and holds there for 20 seconds, or until the Acknowledge/Step switch is pressed again (Step function).

### Alarm Silence

Pressing the **Alarm Silence** switch performs all functions of the Acknowledge/Step switch.  In addition, if an alarm exists, the control panel turns off all silenceable circuits and lights the Alarm Silence LED. The control panel sends an alarm silenced message to the printer and the history file.

*Note: A subsequent new alarm will resound the system.*

### Drill

The control panel waits for the **Drill** switch to be held for two seconds (to prevent accidental activations), then turns on all silenceable circuits (all CMX modules and Notification Appliance Circuits that are programmed as silenceable) and turns off the Alarm Silence LED.  The control panel sends a "Manual Evacuate" message to the LCD display, LCD-80, printer, and history file.

### System Reset

Pressing the **System Reset** switch turns off all CMX modules and Notification Appliance Circuits, breaks resettable power to four-wire detectors, and sends an "All Systems Normal" message to LCD display,  LCD-80, printer, and history file.  It also turns on all LEDs, piezo, and LCD display segments for as long as the System Reset is held (lamp test).  Any alarm or trouble that exists after System Reset will resound the system.

## 4.2    LED Indicators

### AC Power

The AC Power green LED lights if AC power is applied to the control panel.

The AC Power LED flashes when one or more alarms occur.  The Fire Alarm LED lights  steadily when you press the Acknowledge/Step switch and turns off when you press the System Reset switch.

### Pre-Alarm Warning

The Pre-Alarm Warning yellow LED flashes when a Pre-Alarm threshold is reached.  The LCD display indicates if it is an Alert or Action Pre-Alarm.

### Supervisory

The Supervisory yellow LED flashes when one or more supervisory conditions occur, such as a sprinkler valve tamper condition.  The Supervisory LED also lights steadily when you press the Acknowledge/Step switch and turns off when you press the System Reset switch.  The Supervisory LED is used for security functions in a combination fire/security protective signaling application.  For details, refer to Appendix E.

### Alarm Silence

The Alarm Silence yellow LED lights after an alarm condition occurs, and the Alarm Silence switch is pressed.  The Alarm Silence LED  turns off when you press the Drill switch or the System Reset switch.

### System Trouble
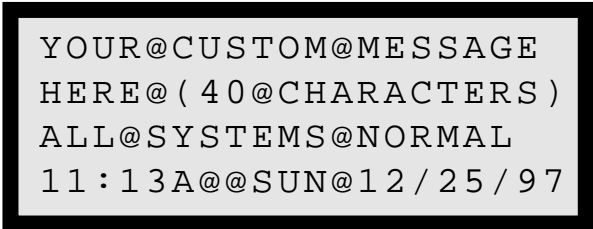
The System Trouble yellow LED flashes when one or more troubles occur and goes steady-on when you press the Acknowledge/Step switch.  The System Trouble LED turns off when all trouble conditions are cleared.  This LED will also light if the microprocessor watchdog timer fails (CPU FAIL).

## 4.3    Normal Operation

When no alarms or troubles are in the system, the LCD display shows the "All Systems Normal" message.  A typical example is shown to the right.

```
YOUR@CUSTOM@MESSAGE
HERE@(40@CHARACTERS)
ALL@SYSTEMS@NORMAL
11:13A@@SUN@12/25/97
```

The control panel does the following functions at regular intervals when in normal mode:

- Polls all loop devices and the four Notification Appliance Circuits, checking for valid replies, alarms, troubles, etc.
- Checks for power supply troubles and batteries every 10 seconds.
- Sends a supervisory query on the LCD-80 interface and verifying proper response.
- Refreshes the LCD and LCD-80 display and updating time.
- Scans the keypad for System Reset or Enter.
- Auto tests  detectors.
- Tests system memory.

## 4.4    Trouble Operation

When no alarm conditions exist, the detection of a trouble in the system will cause the piezo to sound, the System Trouble LED to flash, and the trouble relay to activate.  The display to the right shows a typical message that could occur on the LCD display during a trouble condition.  The same message is sent to the LCD-80, printer, and history file.

```
TROUBL@PULL@STATION
WEST@HALLWAY@FLR@5
Z05@OPEN@CIRCUIT
11:13A@12/25/97@M37
```

The first line lists the type of event (trouble) and the type of device (pull station).  The second line is a 19-character custom descriptor for this device location.  The third line is the software zone to which it is assigned (zone 5), and the type of trouble that exists (open circuit). The last line is the time and date, plus the point address.  For example, in the sample display above, the M37 address represents module number 37.  If the device in trouble was a detector, the "M" of address M37 is replaced with a "D".

Pressing the Acknowledge/Step switch causes the piezo sounder to silence and the System Trouble LED to go steady.  This occurs regardless of the number of troubles, alarms, and supervisory signals in the system (block acknowledge). When pressing the Acknowledge/Step switch and at least one new alarm or trouble exists in the system, an acknowledge message is sent to the printer and history file.

If the trouble clears before or after an acknowledge, the clear trouble message is sent to the printer.  The following is an example of a clear trouble message sent to the printer:

**CLR@TB@PULL@STATION@WEST@HALLWAY@FLR@5@Z05@OPEN@CIRCUIT@11:13A@12/25/97@M37**

If all troubles clear and no supervisory or fire conditions exist in the system, the control panel returns to a normal operation status, and sends an  "All Systems Normal" message to the LCD display, LCD-80, history file, and printer. This trouble restore occurs even if the troubles were never acknowledged (auto restore).

Pressing the Alarm Silence switch when only troubles exist, produces the same effect as pressing the Acknowledge/Step switch. The Alarm Silenced LED does not light unless an alarm also exists in the system.

*Note:  CMX modules report both open and short circuit messages.*

If multiple trouble conditions exist in the system, the LCD and LCD-80 display steps through each trouble automatically at a two-second rate.  If you press the Acknowledge/Step switch, the display stops on the current trouble for 1 minute, or until you press the Acknowledge/Step switch again.  As you press the Acknowledge/Step switch, events display in the following order:

1. Alarms, in order of address.
2. Supervisory, in order of address, or security alarms.
3. Troubles, in order of address.

## 4.5    Alarm Operation

Alarm operation is similar to trouble operation, but with the following differences:

• The piezo is a steady sound, not pulsed.
• The System Alarm LED flashes.
• The Display Status banner is "ALARM:".
• The LCD display third line is the label of the first zone.
• Alarms latch and are not allowed to clear.
• Alarms cause recalculation of all Control-by-Event.
• Timers (Silence Inhibit, Auto Silence) start.
• Alarms activate the general alarm relay and zone Z00.

```
ALARM:@PULL@STATION
WEST@HALLWAY@FLR@5
FLR@05@MAIN@BUILDING
11:13A@12/25/97@M37
```

A typical alarm display is shown in the screen to the right.

## 4.6　Supervisory Operation

Supervisory operation is similar to alarm operation, but with the following differences:

- The piezo sounds a warbling tone.
- The Supervisory LED flashes.
- The LCD display status banner is ACTIVE.
- Silenced alarms do not resound.
- Timers do not start
- The Supervisory relay activates.
- The Alarm relay does not activate.

A typical supervisory event display is shown in the screen to the right.

Note that, like alarms, supervisory signals latch and may have their own Control-by-Event. They do not cause resound of alarms or reactivation of silenced alarm CBE. Supervisory circuits may also open circuit troubles, which operate like any other trouble.

```
ACTIVE@TAMPER
SPRINKLER@VALVE@105
FLR@5@MAIN@BUILDING
11:13A@12/25/97@M37
```

If the event is a security point activation, this LED will operate the same as a supervisory, but the LCD display will show the security type code. Refer to Appendix E for further information on security alarms.

## 4.7　Non-Alarm Point Operation

Non-alarm points are MMX modules that activate CBE but do not activate the System Alarm LED or the piezo sounder. These points are tracking and have three type codes:

- **Non fire** codes send a message to the LCD, history file, printer, or LCD-80, *except when the system is in alarm*. They are generally used for energy management or other non-fire situations.
- **Hazard Alert** codes send a message to the LCD, history file, printer, and LCD-80 (status is **ACTIVE**), and activate the four Notification Appliance Circuits steadily, regardless of the coding selection in Zone 98. These points may be used for monitoring critical processes or other hazardous situations, such as a tornado.
- **Fire Control** codes send messages to the LCD, history file, printer and LCD-80, *regardless of the state of the control panel*. These codes are generally used for air handler shutdown and are intended to override automatic fire functions.

## 4.8　Trouble Monitor Point Operation

Trouble monitor-type MMX modules monitor remote power supplies or other external equipment. Operation is similar to trouble operation but with the following differences:

- The display status banner is **ACTIVE**.
- The type code is **TROUBLE MON**.
- The modules latch.
- The modules may have control-by-event.

## 4.9    Notification Appliance Circuit Operation

The four Notification Appliance Circuits have Control-by-Event and trouble functions similar to CMX modules on the communications loop.  The circuits differ from CMX modules in the following ways:

- Addresses (last three digits in LCD field ) are B01, B02, B03 or B04.
- The default type code field is "BELL CIRCUIT."
- Circuits may be used for March Time, California Code, Temporal, and Two Stage coded functions. (CMX modules may not be used for these functions.)

## 4.10   Control-By-Event Operation

Control-by-event (CBE) is done through 99 software zones.  Each system point (detector, MMX, CMX or Notification Appliance Circuit) may list up to five zones in its program information.  A general alarm zone (Z00) may be listed for output (control) points, but is not necessary to list for input points.   Z00 is not activated by non-alarm or supervisory points.

If any input device (detector or MMX) becomes active and it is not disabled, it activates all software zones in its list.  An output device (CMX module or Notification Appliance Circuit) that is not disabled is turned on if any of the software zones in its list are active.  This is basically an "OR" functionality.   Zones 90 through 99 are reserved for special functions such as cross-zoning (Refer to the Programming section).

## 4.11   Releasing Functions

Zones 91, 92, 93, and 94 are reserved for special releasing functions.  This allows for up to four simultaneous release operations (quad hazard).   Each zone includes the following:

- **Cross Zone** will activate only if two or more fire type input points are activated that list this zone.   In addition, there are two other types of cross-zones  One cross zone requires that the two devices reside in different zones; and the other requires that the two devices are a smoke detector plus a heat detector.
- **Delay timer** allows the selection of a 0 to 60 second delay before the zone can activate.
- **Abort** switch-type code in a given zone is used to abort activation of the zone.
- **Manual Release** overrides the abort function, cross-zone function, and delay timer, and activates the zone immediately.
- **Soak Timer** automatically shuts off the releasing device.  Select 10 through 20 minutes (or zero for no timer).

A hazard is protected by assigning one of the four zones to each initiating device, Abort Switch, Manual Release Switch, and Release Solenoid.   Refer to Appendix D for detailed information about releasing applications.

## 4.12   Intelligent Detector Functions

### Analog Display
The control panel reads and displays analog information from the 99 analog detectors.  The display is in percent obscuration per foot for photoelectric detectors and percent of the alarm threshold for ionization detectors.

### Sensitivity Adjust
Alarm levels for the intelligent detectors may be manually set within the UL range.   There are three selections: High, medium, or low for ionization detectors; and 2.0%, 1.5% or 1.0% obscuration per foot for photoelectric detectors.  **Ionization detectors used in duct applications must be set to high sensitivity.**

### Day/Night Sensitivity Operation
The system can be programmed to automatically force the smoke detectors to their minimum sensitivity (2.0%) during the "day."  For more information, refer to Section 4.13, Time Functions.

## 4.12 Intelligent Detector Functions, continued

### Drift Compensation

Intelligent detector drift compensation provides accurate and stable readings of smoke, counteracting long-term drift caused by dust contamination and other long term environmental factors.  Drift compensation permits a detector to remain within performance specifications throughout its life span, quickly detecting true fires, yet rejecting false signals.  The drift compensation  algorithm uses three measurements from each ionization or photoelectric detector.  Drift compensation can be selected on a per-detector basis (refer to Programming).

- **Long-term measurement of location's clear air.**  This is an average reading which moves slowly.  It adjusts to gradual buildup of dust contamination, unaffected by true smoke, even from smoldering fires.

- **Alarm test level measurement**.  This uses special electronics in the detector and panel software to periodically command each detector to simulate an alarm level reading from the sensing chamber.

- **Present chamber reading.**  Under normal conditions, this will be close to the stored air clear value.  If smoke occurs, it will begin to move toward the alarm test level.

The control panel's software converts the present reading to percent per foot obscuration or percent of alarm, based on its position between the known clean air and test values. The accuracy of this measurement method is sufficient to meet the NFPA 72E requirements as a calibrated smoke test instrument.

### Maintenance Alert

When the compensation reaches the limit of the amount of drift compensation that may safely be applied, a special trouble condition is reported. This condition will also be activated if the detector remains at very high or very low levels for extended periods of time.

### Automatic Test Operation

The control panel performs an automatic test of each detector every 2 hours.  Failure to meet the test limits causes an **AUTO TEST FAIL** trouble type.  Pressing the System Reset switch clears this trouble.

### Type Code Supervision

The control panel monitors hardware device type codes (CPX, SDX, FDX, MMX and CMX) at slow intervals.  Mismatch of type compared to the program will cause a point trouble.  The trouble label is **INVALID TYPE**.

### LED Control Operation

The control panel includes a global program selection to prevent blinking of detector LEDs during normal conditions.  This is often desired in sleeping areas where a flashing light may be objectionable.  As a standard function, the control panel allows up to 99 LEDs to turn on in alarm.

### Alarm Verification and Counter Operation

The control panel performs Alarm Verification on CPX and SDX intelligent smoke detectors.  Selection of detectors for Alarm Verification is described in the Programming section.  Alarm  Verification time is a global programming selection of 0 to 30 seconds.  Each detector includes a verification counter which displays the number of times a detector enters  verification but does not time-out to alarm.  The counter counts to 99 and holds.

### Pre-Alarm Operation/Advanced Warning Addressable Combustion Sensing (AWACS)

If an SDX or CPX detector exceeds the programmed Alert level, it causes an Alert Pre-Alarm situation. When this occurs, the piezo is activated, Zone 99 is activated, and the Pre-Alarm LED is illuminated.  The typical message displayed to the right is sent to the LCD, LCD-80, printer and history file.

```
PREALM@SMOKE(PHOTO)
ROOM@5024
50%,@1.0%,@ALERT
11:13A@12/25/97@D66
```

In the example to the right, the detector is programmed for alarm at 1.00% per foot of obscuration (High level), and has now reached the Alert level programmed for 50% of that, or 0.50% per foot.  The 50% is a real-time display and may change. Alert Pre-Alarms automatically restore.

### 4.12 Intelligent Detector Functions, continued

An Action Pre-Alarm is indicated if a detector exceeds the Action level threshold. When this occurs, all functions of the Alert level occur, plus a special Action software zone (5th zone) may be activated if programmed. Action Pre-Alarms latch until reset. A typical Action Pre-Alarm display is shown to the right.

```
PREALM@SMOKE(PHOTO)
ROOM@5024
72%@1.0%@ACTION
11:25A@12/25/97@D66
```

## 4.13 Time Functions

### Real Time Clock Operation
The control panel includes a crystal time base clock that provides time, date, and day of week. The clock includes its own lithium battery backup. Time is normally displayed as 12 hour time with month/day/year, but may be programmed for European time format, displayed as 24-hour time with day/month/year.

### Time Control Command Operation
Zones 95 and 96 are reserved for control-by-time functions. These special zones may be programmed to activate at a specific time and deactivate at another time and may do so for only certain days of the week. Any control point may be turned on and off (lighting control, setback thermostat, etc.) by using one of these zones. These functions are intended for ancillary (non-fire) applications.

### Day/Night Sensitivity Adjust Operation
If a CPX or SDX detector calls Zone 95 or 96, it will set the detector sensitivity to the minimum 3.0% (low) setting when activated. When the zone deactivates, the sensitivity returns to its programmed setting. For day/night sensitivity use, 95 and 96 may be thought of as "DAY" zones.

### Holiday Operation
Zone 97 is reserved for setting holidays (up to 9 dates) and can be used for special day-of-year control. You can also use Zone 97 as the "8th day" in the programming of Zones 95 and 96. When the current date matches any of the 9 dates, the zone activates.

## 4.14 Coding Operation (NAC only)

Zone 98 is reserved for coding functions which are only used by NACs B01-B04 including Zone 98 in their CBE list. If Zone 98 is called out for CMX modules, it has no effect. Only one of the following types of code may be selected:

- **MARCH TIME**  Pulses at 120 ppm.
- **TEMPORAL CODE**  0.5 sec. on, 0.5 sec. off, 0.5 sec. on, 0.5 sec. off, 0.5 sec. on, 1.5 sec. off.
- **CALIFORNIA CODE**  10 sec. on, 5 sec. off.
- **TWO STAGE**  Pulses at 20 ppm for 5 min., then changes to steady on.

*Note: If an alarm occurs, and an NAC is programmed for two stage, and it is not activated by any other zone, it pulses 20 PPM. After five minutes, the Notification Appliance Circuit changes to steady on unless Acknowledge is pressed. The Drill function will change the NAC to steady.*

## 4.15 Pre-signal/PAS Operation

Zone 90 is reserved for pre-signal functions and is used to delay control points for human verification. If zone 90 is included in a CMX or Notification Appliance Circuit CBE list, it inhibits all other CBE. Detectors and Monitor Modules must call out Zone 90 in their program to be included in the pre-signal/PAS operation.

When any alarm occurs and no PAS inhibit type MMX is activated, Zone 90 activates. If a second alarm activates, or the Drill switch is pressed, Zone 90 goes false. If PAS is selected, and the Acknowledge switch is not pressed within 15 seconds, Zone 90 goes false. At the first alarm, a programmable 000 to 180 second timer is started. If signal silence occurs, the timer is frozen. If the timer expires, Zone 90 goes false. The alarm relay and transmitter are delayed if PAS is selected, but are not delayed for pre-signal operations.

## 4.16  Special System Timers

**Silence Inhibit Timer (0-300 seconds)**

The Silence Inhibit timer starts at the first alarm and restarts with each new alarm. It prevents the Alarm Silence switch from functioning.

**Auto Silence Timer (0=no timer, 600-900 seconds)**

If the Auto Silence Timer is selected and times out, it performs the same function as pressing the Alarm Silence switch. Pressing the Drill switch starts the timer.

**Alarm Verification Timer (0-30 seconds)**

If a smoke detector (CPX or SDX) is selected for Alarm Verification, its alarm is ignored for the Alarm Verification time. If an alarm from another point occurs while timing, it dumps the timer and activates the alarm. If time-out and alarm still exists, it performs all standard functions. If time-out and alarm no longer exists, the control panel increments the verification counter for this device (stops at 99) and returns to normal.

**Waterflow Circuits Operation**

If an alarm exists from a MMX point that has a waterflow type code, the Alarm Silence switch will not function.

**Disable/Enable Operation**

Input points which are disabled do not cause an alarm or any CBE activity. Disabled output points are held in the off state. All disabled points are treated as if they were in trouble except the status banner is **DISABL**.

## 4.17  Style 6 Operation

If the communication loop is wired and programmed for Style 6 or Style 7, and a single fault occurs, the control panel will detect the fault and drive both ends of the line, fully recovering from the fault. The control panel latches the trouble and displays it until System Reset. The LCD display shows **STYLE 6** trouble type. Style 7 requires use of the ISO-X isolator modules (refer to Chapter 2).

## 4.18 Read Status

The Read Status function lets you read the current status of all points and zones. Read Status functions do not require a password. In read status mode, the control panel continues to provide fire protection. You can enter Read status with the control panel in alarm or trouble. If a new alarm or trouble occurs during a Read Status function, the Read Status is aborted to prevent confusion.

### 4.18.1 Read Status Entry

When you press the Enter key, the LCD display shows the screen to the right.

```
1 = P R O G R A M
2 = R E A D @ S T A T U S
( B A C K S P A C E @ T O @ A B O R T )
```

Press 2 for Read Status, the LCD display shows the screen to the right.

To perform the Read Point function, identify the first detector or module number you wish to read; then, press Detector (* key) or Module (# key) followed by the address (two numeric digits), followed by Enter.

```
R E A D @ P O I N T = * / # , A A , E
P R I N T @ P O I N T S = 1 , E
R E A D @ H I S T O R Y = 2 , E
P R I N T @ H I S T O R Y = 3 , E
```

To Print Points, press the 1 key, then press Enter.

To Read History, press the 2 key, then press Enter.

To Print History, press the 3 key, then press Enter.

*Note: Refer to Section 4.19 for explanation of history operation.*

When you enter Read History, the LCD displays the most recent event. To display earlier or later events, press the up cursor or down cursor keys. The time displayed is the time that the event happened. During all Read Status operations—except print operations—a two-minute timer starts. If no key is pressed during the two-minute timer, the LCD returns to the previous display. Each key press restarts the two-minute timer. Pressing the left cursor (backspace) deletes the previous entry. If there is no entry, the control panel aborts the Read Status operation and returns to the previous display. You can also abort Read Status by pressing the System Reset switch.

### 4.18.2 Read Point

Read Point operations display point status on the LCD display, but the status is not sent to the serial ports or the history file. After a point is read, you can press the down key to read the next point in sequence, or press the up key read the prior point in sequence. The sequence of points is detector points 01-99, module points 01-99, Notification Appliance Circuits 01-04, system parameters, and then software zones 01-99. Refer to the following pages for examples of the Read Status display.

## 4.18.2 Read Point, continued

### Point Status

A typical Read Status display example for a point read is shown to the right.

```
NORMAL@SMOKE(PHOTO)
WEST@HALLWAY@FLR@5
Z05@ZO1@Z15@Z87@Z90
15%@1.0%@DPV08@D13
```

- **NORMAL** is the present status. Status can be ALARM, TROUBL, DISABL, etc.
- **SMOKE(PHOTO)** is the device type. Device types include SMOKE [ION], PULL STATION, HORN CIRCUIT, etc.
- **WEST HALLWAY FLR 5** is the custom label programmed for this device.
- **Z05 Z01 Z15 Z87 Z90** is a list of assigned software zones (if less than five are programmed, some are blank).
- **15%** is the current reading of percent of alarm, 15% of 1.0% would be 0.15% obscuration per foot (does not exist for modules).
- **1.0%** is the alarm threshold selection (does not exist for modules).
- **D** indicates drift compensation is enabled.
- **P** indicates Pre-Alarm is enabled.
- **V** indicates that the detector is programmed for Alarm Verification. The **08** is a verification tally and indicates that this device entered the verification cycle eight times since the counter last cleared. *Note: The verification field does not exist if this device is a module. If the device is a control module or Notification Appliance Circuit, an "S" or "W" may appear in this area, indicating that the module is programmed for Silenceable or Walk Test activation.*
- **D** indicates that this device is a detector and the detector address is **13**. *Note: M is for a module, B is for a Notification Appliance Circuit, and Z is for a software Zone.*

If the point is not installed, a Read Status command to that point will result in a **NOT INSTALLED** message on the display.

### Software Zones 01-89

The typical display shown to the right is used to show the status of Zones 01-89.

```
OFF@SOFTWARE@ZONE
FLR@5@MAIN@BUILDING
        @@@@@@@Z20
```

- **OFF** is the zone status (status can be ON or OFF)
- **FLR 5 MAIN BUILDING** is the custom label programmed for this zone.
- **Z20** is the zone number.

*Note: To read the status of a zone directly, press *, press * again, then enter the zone two digit number and **Enter**. To read the system parameters, press *, * , **Enter**.*

### Software Zone 90

The typical display shown to the right shows the status of software zone 90 (Pre-signal Delay control).

```
OFF@SOFTWARE@ZONE
PRESIGNAL@DELAY
DELAY=180
PAS=YES  @@@@@@@Z90
```

- **DELAY=180** indicates the programmed pre-signal delay in seconds.
- **PAS=YES** (could be NO) indicates that Positive Alarm Sequence operation is selected in the program.

## 4.18.2 Read Point, continued

**Software Zones 91, 92, 93, and 94**

The typical display shown to the right  shows the status of Software Zones 91, 92, 93, or 94 (Releasing control zones).

```
OFF@SOFTWARE@ZONE
RELEASE@CONTROL
DELAY=30@ABORT=ULI
CROSS=Y@SOAK=10@Z91
```

- **DELAY=30** indicates programmed delay time in seconds.
- **ABORT=ULI** indicates the abort function, if an abort switch is mapped to this zone (ULI, IRI, NYC, or AHJ).
- **CROSS=Y** indicates that cross zoning is used (must have two or more detectors programmed to this zone in alarm to activate the zone).
- **SOAK**  indicates the soak timer (automatic shut off) value in minutes (00 = no soak timer).

**Software Zones 95 or 96**

The typical display to the right shows the status of Zones 95 or 96 (time control zones).  In addition to automatic activation of non-fire control points, this zone may be used for detector day/night sensitivity select.  If day/night sensitivity is desired for a smoke detector, it must call out Zone 95 or 96 in its program. When the fire control is active, it forces the detector sensitivity to the low setting (2.0 % per foot obscuration for photoelectric detector).

```
OFF@SOFTWARE@ZONE
TIME@CONTROL
ON=7:00@OFF=18:00
DAYS=@MTWTF@H@@@@Z95
```

- **ON=7:00  OFF=18:00** indicates the programmed times that this zone will automatically turn on and off each day.  The times are in 24-hour (military) format.
- **DAYS= MTWTF H** indicates the programmed days of week that the on/off times are effective.  **H** is a holiday, which is defined by Zone 97.

**Software Zone 97**

The typical display to the right shows the status of Software Zone 97 (Holiday zone).  The day/month numbers are user-programmed holidays of the year.

```
OFF@HOLIDAY@ZONE@97
01/01@04/10@05/26
07/04@09/07@11/26
11/27@12/24@12/25
```

**Software Zone 98**

The typical display to the right is used to show the status of Software Zone 98 (coders).

**MARCH TIME** indicates the type of coding that will be applied to each of the four panel Notification Appliance Circuits if mapped to Zone 98.  Zone 98 does not affect addressable control modules.  Other possible program selections are Temporal, California, and Two-stage.  Refer to *Coding Operation* in this chapter for more information.

```
OFF@SOFTWARE@ZONE
CODE@TYPE:
MARCH@TIME
     @@@@@@      Z98
```

**Software Zone 99**

The typical display shows the status of Software Zone 99 (Pre-Alarm).  This zone turns on if any detector reaches it's Pre-Alarm threshold to indicate an incipient alarm, or the need for detector maintenance. Zone 99 can be mapped to any control point.

```
OFF@SOFTWARE@ZONE
ALERT=50%@OF@ALARM
ACTION=70%@OF@ALARM
          @@@@@Z99
```

### 4.18.2 Read Point, continued

**System Parameters**

The typical display to the right shows System Parameters. *Note: To read the System Parameters directly, press \* twice, then press Enter.*

```
SIL@INH=060@AUTO=600
VERIFY=30@USA@TIME
ANNUN=ACS(1+2)@LocT
BLINK=Y@ST=4@AVPS=N
```

- **SIL INH=060** is the Silence Inhibit time in seconds, required in Canada and some areas of the Unites States (SIL INH=000 indicates the timer is not selected).

- **AUTO=600** is the automatic silence timer in seconds (000=not selected).

- **VERIFY=30** is the Alarm Verification timer in seconds (00=not selected).

- **USA TIME** may be **EUR TIME** if European time/date display format is selected.

- **ANNUN=ACS(1+2)** indicates that the EIA-485 port (TB5) is programmed to use point annunciation (ACS family) and that both Addresses 1 and 2 are used.  Other selections include **ANNUN=ACS(ADDR 1), ANNUN=LCD80 (T)**, **ANNUN=NON SUPV** and **ANNUN=UDACT**.  **NON SUPV** is terminal mode and is selected if no annunciation of any type is used.

- **LocT** indicates that a local terminal (CRT-1, CRT-2) is connected and can be used for Acknowledge, Signal Silence, Drill, and Reset functions. *Note: For LocT, the terminal must be in the same room as the control panel.*

- **BLINK=Y** refers to the LEDs on intelligent devices.  The blink may be suppressed for certain applications.

- **ST=4** refers to the NFPA wiring style desired for the communications loop.  It can be set to Style 4 or Style 6. The 6 setting is used for both Style 6 and Style 7 operation.

- **AVPS=N** indicates that there is no AVPS-24/AVPS-24E expansion power supply installed (refer to Appendix J).

## 4.19 History Operation

The control panel maintains a history file of the last 650 events.  These events include all alarms, troubles, and operator actions such as Acknowledge, Reset, Signal Silence, Manual Evacuate (Drill), and Walk Test.  Programming entry is also stored, along with a number indicating the programming submenu that was entered (0-9). All events are time and date stamped.  To clear the history file refer to Section 3.3.4.   For information on reading or printing the history file, refer to Section 4.18.

The control panel also has a *non-erasable* "shadow history" file that always contains the last 650 events in time. To read this file:  press 8; then, press Enter.  To print this file:  press 9; then, press Enter.

# Appendix A – Power Supply Calculations

## A.1 Overview

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

1) Calculating the total amount of AC branch circuit current required to operate the system.

2) Calculating the power supply load current for non-fire and fire alarm conditions and calculating the secondary (battery) load.

3) Calculating the size of batteries required to support the system if an AC power loss occurs.

4) Selecting the proper batteries for your system.

## A.2 Calculating the AC Branch Circuit

The control panel requires connection to a separate, dedicated AC branch circuit (120 VAC for AFP-200 and 220/240 VAC for AFP-200E), which must be labeled **FIRE ALARM.** This branch circuit must connect to the line side of the main power feed of the protected premises. No other equipment may be powered from the fire alarm branch circuit. The branch circuit wire must run continuously, without any disconnect devices, from the power source to the fire alarm control panel. Overcurrent protection for this circuit must comply with Article 760 of the National Electrical Codes as well as local codes. Use 14 AWG wire with 600-volt insulation for this branch circuit.

Use **Table A-1** and **Table A-2** to determine the total amount of current, in AC amperes (A), that must be supplied to the system.

| Device Type | Number of Devices | | Current Draw (amps) | | Total Current per Device |
|---|---|---|---|---|---|
| AFP-200 | 1 | X | 3.0 | = | 3.0 |
| AVPS-24 | [ ] | X | 1.0 | = | |
| Sum Column for AC Branch Current Required | | | | = | A |

**Table A-1  120 VAC Branch Circuit Requirements**

| Device Type | Number of Devices | | Current Draw (amps) | | Total Current per Device |
|---|---|---|---|---|---|
| AFP-200E | 1 | X | 1.5 | = | 1.5 |
| AVPS-24E | [ ] | X | 0.5 | = | |
| Sum Column for AC Branch Current Required | | | | = | A |

**Table A-2  220/240 VAC Branch Circuit Requirements**

## A.3    The Main Power Supply

The control panel's main power supply can supply a total of 5.0 A in alarm and 1.0 A in standby (non-alarm condition). The current available for powering external devices, however, is subject to lower limits as shown in Figure A-1 and Figure A-2.

### A.3.1    Current Limitations in Standby

Current for operating an external device in standby (non-alarm) is subject to the following limitations:

1. Non-resettable power (TB1, terminals 3 and 4) and resettable power (TB1, terminals 5 and 6) are limited to a combined total of 0.5 A. Using Table A-3, Calculation Column 1, verify that the combined subtotal of rows 4 and 5 is less that 0.5 A.

2. The total power supply load is limited to 1.0 A.  Using Table A-3, verify that the total of Calculation Column 1 is less than 1.0 A.
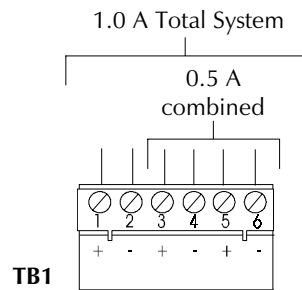


**Figure A-1  TB1 Standby Current Limitations**

### A.3.2    Current Limitations in Alarm – System operation on primary power

Current for operating external devices in alarm is subject to the following limitations:

1. High ripple power (TB1, terminals 1 and 2) is limited to 1.5 A. Using Table A-3 Calculation Column 2, verify that the subtotal of row 3 is less than 1.5 A.

2. Non-resttable power (TB1, terminals 3 and 4) and resettable power (TB1, terminals 5 and 6) are limited to a combined total of 0.5 A.  Using Table A-3 Calculation Column 2, verify that the subtotal of rows 4 and 5 combined is less than 0.5 A.

3. The maximum load on NAC #1 (TB1, terminals 1 and 2) cannot exceed 2.5 A.  Using Table A-3 Calculation Column 2, verify that the subtotal of row 6 is less than 2.5 A.

4. The maximum combined load on NAC #2, NAC #3, and NAC #4 (TB2, terminals 3–8) cannot exceed 2.5 A.  Using Table A-3 Calculation Column 2, verify that the subtotal of row 7, 8, or 9 is less than 2.5 A.

5. The total power supply load is limited to 5.0 A.  Using Table A-3, verify that the subtotal for Calculation Column 2 is less than 5.0 A.
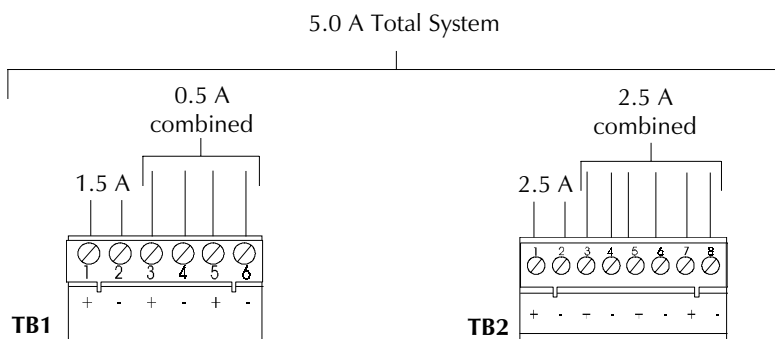


**Figure A-2  TB1 and TB2 Alarm Current Limitations**

# A.4    Calculating the System Current Draw

## Overview

The control panel must be able to power all internal and external devices continuously during the non-fire alarm condition.  To calculate the non-fire alarm load on the system power supply when primary power is applied, use Calculation Column 1 in Table A-3.  The control panel must support a larger load current during a fire alarm condition.  To calculate the fire alarm load on the power supply, use Calculation Column 2 in Table A-3.  The secondary power source (batteries) must be able to power the system during a primary power loss.  To calculate the non-fire alarm load on the secondary power source, use Calculation Column 3 in Table A-3.

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

• "Primary" refers to the main power source for the control panel.

• "Secondary" refers to the control panel's backup batteries.

• All currents are given in amperes (A).  Figure A-3 shows how to convert milliamperes and microamperes to full amperes.

| To convert.... | Multiply | Example |
|---|---|---|
| Milliamperes (mA) to amperes (A) | mA x .001 | 3 mA x .001= .003 A |
| Microamperes (µA) to amperes (A) | µA x .000001 | 300 µA x .000001= .0003 A |

**Figure A-3 Converting to Full Amperes**

## How to Use Table A-3 to calculate system current draws

Use Table A-3 to calculate current draws as follows.

1) Enter the quantity of devices in all three columns.

2) Enter the current draw where required.  Refer to the Notifier Device Compatibility Document for compatible devices and their current draw.

3) Calculate the current draws for each in all columns.

4) Sum the total current for each column.

5) Copy the totals from column 2 and column 3 to Table A-4.

Figure A-4 shows the types of current that you enter into Table A-3:

**Calculation Column 1** – The primary supply current load that the control panel must support during a non-fire alarm condition, with AC power applied.  This current draw cannot exceed 1.0 A.

**Calculation Column 2** – The primary supply current load that the control panel must support during a fire alarm condition, with AC power applied.  This current draw cannot exceed 5 A.

**Calculation Column 3** – the standby current drawn from the batteries in a non-fire alarm condition during a loss of AC power.



**Figure A-4 Calculating the System Current Draws**

# Calculating the System Current Draw, continued

Table A-3 contains three columns for calculating current draws. For each column, calculate the current and enter the total (in amps) in the bottom row. When finished, copy the totals from Calculation Column 2 and Calculation Column 3 to Table A-4. Notes referenced in Table A-3 are listed on the next page.

| Row | 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 |
| 1 | Basic System | N/A | N/A | N/A | N/A | N/A | N/A | 1 | x [0.10] | 0.10 |
| 2 | AVPS-24 | | | | | | | [ ] | x [0.009]= | |
| 3 | High ripple power TB1 terminals 1 and 2 Notification appliances via CMX Notification appliances via CMX Releasing devices via CMX Other compatible devices (Note 1) | N/A N/A N/A [ ] | N/A N/A N/A x [ ]= | N/A N/A N/A | [ ] [ ] [ ] [ ] | x [ ]= x [ ]= x [ ]= x [ ]= | | N/A N/A N/A [ ] | N/A N/A N/A x [ ]= | N/A N/A N/A |
| 4 | Non-resettable power TB1 terminals 3 and 4 AFM-16AT/AFM-32A Series ACM-16AT/ACM-32A Series AEM-16AT/AEM-32A Series AFM-16A LCD-80, LCD-80TM (Note 2) ACM-8R (refer to Doc. 15342) LDM (refer to Doc. 15885) UDACT Communicator Other compatible devices | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | x [0.040]= x [0.040]= x [0.002]= x [0.025]= x [0.100]= x [ ]= x [ ]= x [0.040]= x [ ]= | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | x [0.056]= x [0.056]= x [0.018]= x [0.065]= x [0.100]= x [ ]= x [ ]= x [0.100]= x [ ]= | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | x [0.040]= x [0.040]= x [0.002]= x [0.025]= x [0.050]= x [ ]= x [ ]= x [0.040]= x [ ]= | |
| 5 | Resettable Power Four-wire smoke detector Two-wire smoke detector connected to MMX-2 A77-716B Relay Other compatible devices (Note 1) | [ ] [ ] [ ] [ ] | x [ ]= x [ ]= x [0.020]= x [ ]= | | [ ] [ ] [ ] [ ] | x [ ]= x [ ]= x [0.020]= x [ ]= | | [ ] [ ] [ ] [ ] | x [ ]= x [ ]= x [0.020]= x [ ]= | |
| 6 | NAC #1 (Note 1) TB2 terminals 1 and 2 Notification Appliance Releasing Solenoid | | | | [ ] [ ] | x [ ]= x [ ]= | | | | |
| 7 | NAC #2 (Note 1) TB2 terminals 3 and 4 Notification Appliance Releasing Solenoid | | | | [ ] [ ] | x [ ]= x [ ]= | | | | |
| 8 | NAC #3 (Notes 1 and 3) TB2 terminals 5 and 6 Notification Appliance Releasing Solenoid | | | | [ ] [ ] | x [ ]= x [ ]= | | | | |
| 9 | NAC #4 (Notes 1 and 3) TB2 terminals 7 and 8 Notification Appliance Releasing Solenoid | | | | [ ] [ ] | x [ ]= x [ ]= | | | | |
| 10 | SLC Communication Loop TB6 terminals 3–6 SDX-551, CPX -551, CPX-751 & FDX-551, SDX-551TH SDX-751 MMX-1, MMX-101, BGX-101L CMX MMX-2 (see Doc. M500-03-00) B601BH B501BH (Horn in base) DHX-501, DHX-502 (see data sheet) ISO-X | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | x [0.00020]= x [0.00029= x [0.00030]= x [0.00030]= x [ ]= x [0.00100]= x [0.00100]= x [ ]= x [0.00045]= | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | x [0.00020]= x [0.00029]= x [0.00043]= x [0.00030]= x [ ]= x [0.00100]= x [0.01500]= x [ ]= x [0.00045]= | | [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | x [0.00020]= x [0.00029]= x [0.00030]= x [0.00030]= x [ ]= x [0.00100]= x [0.00100]= x [ ]= x [0.00045]= | |
| 11 | Optional modules RTM-8 (Note 4) 4XTM Municipal Box (Note 5) Reverse Polarity Outputs used | [ ] [ ] [ ] | x [ 0.0010]= x [ 0.0110]= N/A x [ 0.0050]= | | [ ] [ ] [ ] [ ] | x [ 0.160]= x [ 0.020]= x[ ]= x [ 0.0050]= | | [ ] [ ] [ ] | x [ 0.0010]= x [ 0.0110]= N/A x [ 0.0050]= | |
| 12 | Sum each column for totals | Primary non-alarm: (1.0 A max.): | | | Primary alarm (5.0 A max): Copy to Table A-4 "Secondary Alarm Load" | | | Secondary alarm: Copy to Table A-4 "Secondary Standby load" | | |

**Table A-3   System Current Draw Calculations**

## Calculating the System Current Draw, continued

Notes for Table A-3:

1)  Refer to the Notifier Device Compatibility Document for compatible devices and their current draws.

2)  For non-English language systems, the LCD-80TM (Terminal Mode) standby current is 0.100 A.

3)  Do not enter current for NAC #3 and NAC #4 in Table A-3 if powering these circuits from an AVPS-24. For more information on the AVPS-24, refer to Appendix J.

4)  The RTM-8 alarm current is based on all eight alarm relays being activated. The alarm current can be reduced by 0.019 A for each zone (between zone 1 and zone 8) that is not used by the system.

5)  Enter the current from the Municipal Box data sheet into Calculation Column 2.

6)  The Reverse Polarity Output values apply to the RTM-8, 4XTM, and Municipal Box.

## A.5  Calculating the Battery Size

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

1)  Enter the totals from Table A-3 Calculation Columns 2 and 3 where shown.

2)  Enter the NFPA Standby and Alarm times (refer to "NFPA Battery Requirements" below.)

3)  Calculate the ampere hours for Standby and Alarm; then, sum the Standby and Alarm ampere hours.

4)  Multiply the sum by the derating factor of 1.2 to get the proper battery size (in AH).

5)  Write the ampere-hour requirements on the Protected Premises label located inside the cabinet door.

| | | |
|---|---|---|
| *Secondary Standby Load* (total from Table A-3 Calculation Column 3) [                    ] | *Required Standby Time* (24 or 60 hours) x [                ] | = AH |
| *Primary Alarm Load* (total from Table A-3 Calculation Column 2) [                    ] | *Required Alarm Time* (For 5 min., enter 0.084, for 10 min., enter 0.168) x [                ] | = AH |
| *AVPS-24 Alarm Load* (if using AVPS-24, enter 3.0 A) [                    ] | *Required Alarm Time* (For 5 min., enter 0.084, for 10 min., enter 0.168) x [                ] | = AH |
| *Sum of Standby and Alarm Ampere Hours* | | = AH |
| *Multiply by the Derating Factor* | x 1.2 | |
| *Battery Size, Total Ampere Hours Required* | = AH | |

**Table A-4 Total Secondary Power Requirements at 24 VDC**

**NFPA Battery Requirements**

•  NFPA 72-1993 Local and NFPA 72-1993 Remote Station Fire Alarm Systems require **24 hours** of standby power followed by **5 minutes** in alarm.

•  NFPA 72-1993 Central Station, NFPA 72-1993 Auxiliary, and 72-1993 Remote Station require **60 hours** of standby power followed by **5 minutes** in alarm.  Batteries installed in a system powered by a generator need to provide at least 4 hours of standby power.

•  NFPA 12, 12A, 12B require **24 hours** plus **5 minutes** activation.  The total ampere hours required cannot exceed 17 AH with an internal charger.

## A.6　Selecting and locating Batteries

Select batteries that meet or exceed the total ampere hours calculated (from Table A-4).  The control panel can charge batteries in the 7 AH to 17 AH range.  Table A-5 contains information, such as the battery size and location, for the batteries required to power the control panel if an AC power loss occurs.

Note: 15 AH to 17 AH batteries require the BB-17 or other UL-listed external battery cabinet.

| Battery Size | Voltage Rating | Number Required | Part Number | Location |
|---|---|---|---|---|
| 7 AH | 12 volts | two | PS-1270 | In panel |
| 12 AH | 12 volts | two | PS-12120 | |
| 17 AH | 12 volts | two | PS-12170 | BB-17 Battery Box |

**Table A-5 Battery Size and Location**

# Appendix B – NFPA Standards

## Specific Requirements

The control panel is designed for use in commercial, industrial, and institutional applications and meets the requirements for service under the National Fire Protection Association (NFPA) Standards outlined in this Appendix. The minimum system components required for compliance with the appropriate NFPA standard are listed below.

- **AFP-200 Control Panel** containing the main circuit board, cabinet (backbox and door), main supply transformer and power supply.
- **Batteries** (refer to Appendix A for standby power requirements).
- **Initiating Devices** connected to one of the control panel's initiating device circuits.
- **Notification Appliances** connected to the control panel's Notification Appliance Circuit or via a CMX module.

The following additional equipment is needed for compliance with the NFPA standards listed below:

- **NFPA 72-1993  Central Station Fire Alarm Systems (Protected Premises Unit)**

    UDACT Universal Digital Alarm Communicator/Transmitter or Notifier 911ACDACT for connection to a compatible UL-listed Central Station DACR or Protected Premises Receiving Unit. This unit must be installed as outlined in Figure B-1.

- **NFPA 72-1993  Auxiliary Fire Alarm System**

    RTM-8 Relay Transmitter Module or 4XTM Transmitter Module for connection to a compatible UL-listed Local Energy Municipal Box. This unit must be installed as outlined in Figure B-3.

- **NFPA 72-1993 Remote Station Fire Alarm System**

    RTM-8 Relay Transmitter Module or 4XTM Transmitter Module for connection to the Fire•Lite RS82 Remote Station Receiver. See Figure B-5 for installation instructions for this unit

    **OR**

    UDACT Universal Digital Alarm Communicator/Transmitter or Notifier 911AC DACT for connection to a compatible UL-listed remote station DACR. This unit must be installed as outlined in Figure B-1 and B-2.

- **NFPA 72-1993 Proprietary Fire Alarm System**

    Notifier NIB-96 Network Interface Board. See Figure B-6 for installation instructions for this unit. The NIB-96 must be installed in the receiving system (AM2020/AFP1010). For more information on the NIB-96, refer to the NIB-96 Manual, Document 15666

**Notifier 911AC** – for connection to a Central Station Receiver or Protected Premises Receiving Unit. This unit must be installed as shown in Figure B-1. For additional information on the 911AC, refer to Document 74-06200-005. Because the 911AC does not mount in the control panel backbox, all connections must be in conduit, less than 20 ft. in length in the same room.



NotiFire 911AC
Digital Communicator

To Central Station
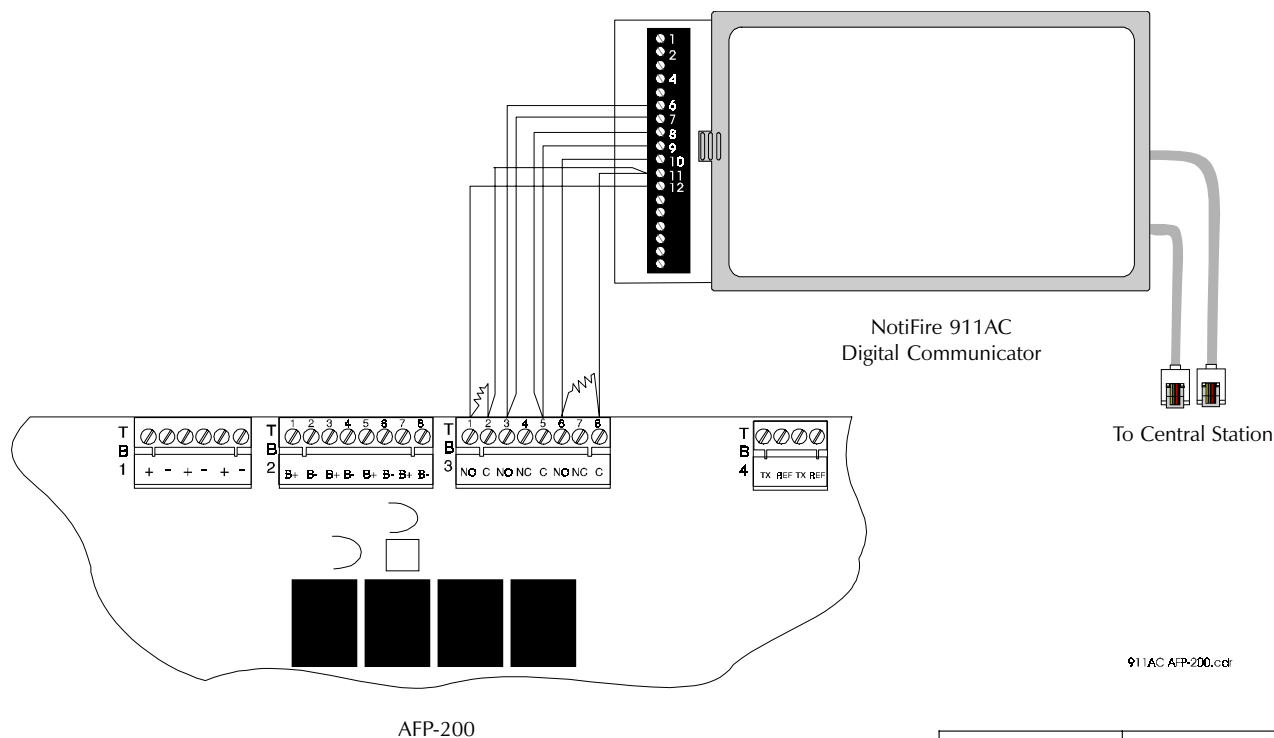
AFP-200

| | AFP-200 | 911AC |
|---|---|---|
| **Alarm** normally open contacts | TB3 Term. 3 | 6 and 7 |
| | TB3 Term. 5 | 8 and 9 |
| **Trouble** normally open contacts | TB3 Term. 6 | 10 |
| | TB3 Term. 8 | 11 |
| **Supervisory** normally open contacts | TB3 Term. 1 | 12 |
| | TB3 Term. 2 | 11 |

**Figure B-1    NFPA 72-1993 Signaling Systems for Central Station Service *(Protected Premises Unit)* and Remote Station Protective Service**

*Notes:*

1.  Set SW3 on the control panel circuit board to 'TBL LESS AC' (downward) position. This delays the reporting of an AC fail condition for approximately 8 hours, to comply with the 1993 UL standards. SW3 is located on the right center of the main circuit board.

2.  All input and output connections are inherently low voltage and power-limited. Use UL-listed, power-limited cable only.

Figure B-2   NFPA 72-1993 Central Station Fire Alarm System – UDACT
(Protected Premises Unit)

Connect the Universal Digital Alarm Communicator/Transmitter (UDACT) according to the directions given in the UDACT Manual.  Check the following items before powering the UDACT or control panel:

*   **Is the UDACT connected to the control panel correctly?**  Powered from the non-resettable 24 VDC, [TB1, terminal 3 (+) and terminal 4 (–)] with correct polarity.  Connected to the EIA-485 port, [TB5, terminal 1 (+) and terminal 2 (–)] with correct polarity.

*   **Is the UDACT configured correctly?**  ACS/TERMINAL switch on the UDACT must be in the ACS (left) position.  The Start Monitor Address must be set to 1 and the Stop Monitor Address must be set to 2.

*   **Is the control panel configured and programmed correctly?**  ACS/TERMINAL switch (SW2) on the control panel must be in the ACS (right) position. The control panel must be programmed for 'ANNUN-UDACT'.  The UDACT current must be included in the control panel Supply Calculations.

*   **Is the system software compatible?**  A UDACT must have software PN 73624 or higher and a control panel must have software PN 73609 or higher.

*   **Is the control panel configured for proper supervision?**  If the system does not have an annunciator, configure the UDACT for Receive/Transmit. If the system has an annunciator, configure the UDACT for Receive Only and the annunciator for Receive/Transmit.  Supervise the UDACT via the COMM FAIL output (refer to *Monitoring for UDACT Trouble* in the UDACT Manual).

*Note:  If the annunciator does not require remote control capabilities (Reset, Acknowledge, Silence, etc.), 'COMM FAIL' monitoring is not required provided the UDACT is configured for Receive/Transmit and the annunciator is configured for Receive Only.  Wiring to the annunciator will be supervised if the power and the EIA-485 circuits are wired sequentially, with the UDACT connected to the end of the circuits, allowing the UDACT to function as an end-of-line device (the control panel connects to the annunciator and the annunciator connects to the UDACT).*

Municipal Box connected to RTM-8 Relay Transmitter Module

Jumper JP2 must be in the *LE MUNCPL BOX* position for use in this application

FIRE

+

Municipal Box Circuit

−

Gamewell
Model M34-56
Local Energy
Municipal Box

Polarities shown in alarm condition

+

−

Municipal Box connected to 4XTM

FIRE

+

Municipal Box Circuit

+

−

6

7

−

Gamewell
Model M34-56
Local Energy
Municipal Box

4XTM Transmitter Module
(activated position shown)

**Figure B-3   NFPA 72-1993 Auxiliary Fire Alarm System**

All connections are nonpower-limited and supervised. This application is not suitable for separate transmission of sprinkler supervisory or trouble conditions.

*Notes:*

1. *Maximum loop resistance allowed for wiring from control panel to Municipal Box.*

2. *Cut JP5 on control panel circuit board.*

AFP-200  Instruction   PN 15511:F2   10/11/99

The NFPA Remote Station Fire Alarm System standard is intended for connection to a polarity reversal circuit of a remote station receiving unit having compatible ratings. All connections are power-limited and supervised with the exception of the reverse polarity loop. Loop supervision is the responsibility of the receiver.



Fire•Lite RS82 Remote Station Receiver UL-listed. Refer to Fire•Lite Alarms, Inc., Instruction Manual for Remote Station Receiver Model RS-82

1 — Remote Alarm
2
3 — Remote Trouble
4

**Remote Station Connection Using 4XTM Module**
(polarity shown is for normal standby)

4XTM
Transmitter Module
(activated polarities shown)
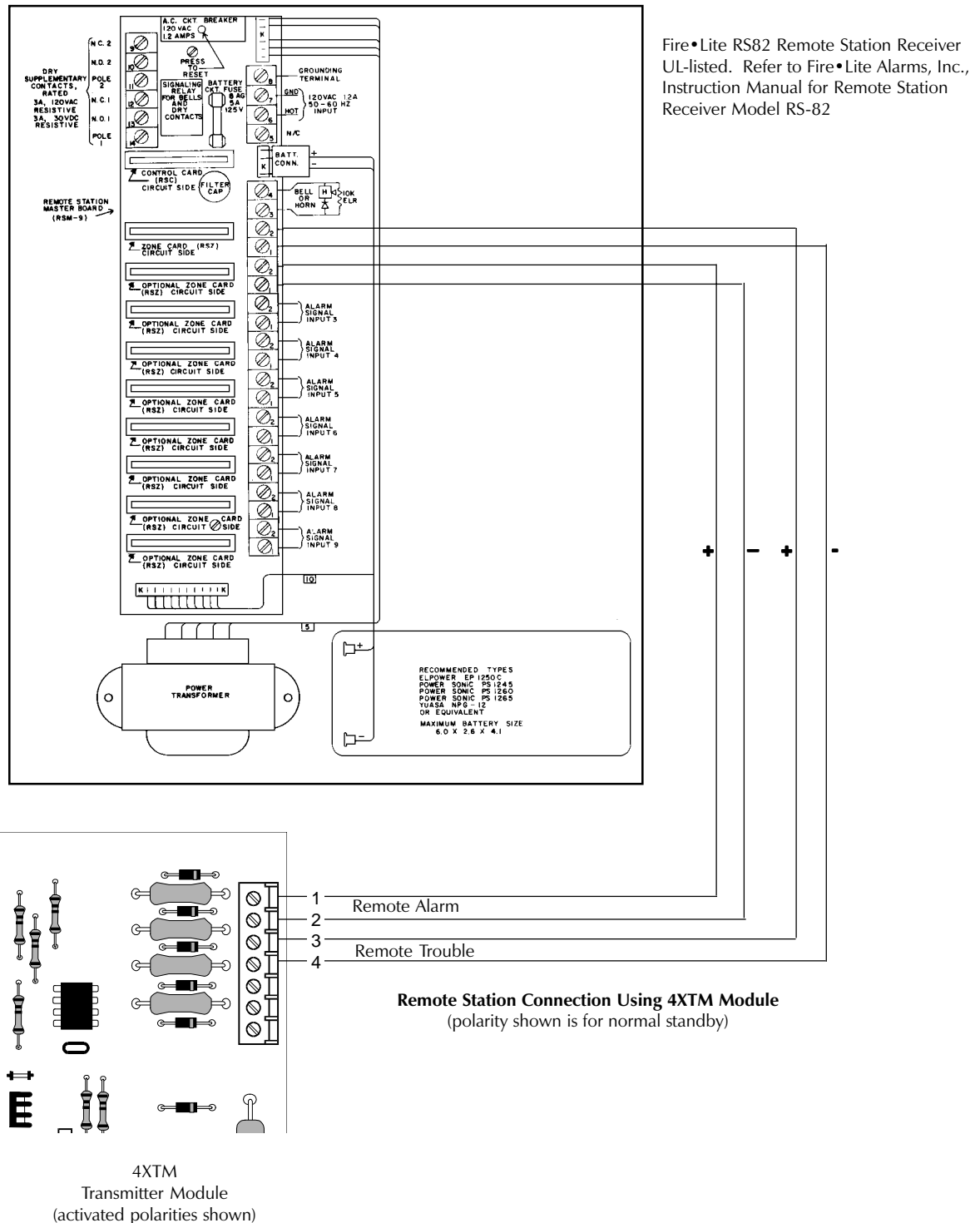
**Figure B-4  NFPA 72-1993 Remote Station Fire Alarm System**

*Note: Cut Jumper JP5 on the control panel circuit board.*

Fire•Lite RS82 Remote Station Receiver
UL-listed. Refer to Fire•Lite Alarms, Inc.,
Instruction Manual for Remote Station
Receiver Model RS-82

+ − Polarity Shown is Non-alarm

Cut JP1

Jumper JP2 must be in
position AL/TR REV. POL.
for use in alarm and
trouble transmission
or AL ONLY for alarm
transmission only

RTM-8 Relay Transmitter
Module
(not suitable for separate
transmission of both alarm
and trouble signals to
Remote Station)

**Jumper Settings:**

Alarm/Trouble Polarity
Reversal
Remote Station
JP1 must be cut

Alarm only Polarity
Reversal
Remote Station        JP1
must be cut

− +

**Figure B-5   Remote Station Connection Using RTM-8 Module**

*Note: Cut Jumper JP5 on control panel circuit board.*

AM2020/AFP1010 Receiving Unit

AFP-200 Protected Premises Unit

EIA-485 Loop two-wire (Style 4) Twisted Pair Power-limited Supervised

NIB-96

TB3

MPS-24A

System Common

Cut Jumper JP9 to disable ground fault in the AFP-200.  The AM2020 will detect all ground faults.

|  | NIB-96 | AFP-200 | MPS-24A |
|---|---|---|---|
| **EIA-485 (+)** | P4 Term. 5 | TB5 Term. 1 |  |
| **EIA-485 (-)** | P4 Term. 3 | TB5 Term. 2 |  |
| **System** Common |  | TB1 Term. 6 | TB3 Term. 6 |

**Wiring Connections**

## Figure B-6   NFPA 72-1993 Proprietary Fire Alarm Systems

The AFP-200 must be programmed for ACS annunciation mode and must have the switch (SW2) on the main circuit board set for ACS mode.  The ACS interface will automatically transmit General Alarm, General Trouble and General Supervisory signals and will receive Acknowledge, Silence, and Reset commands automatically from the AM2020/AFP1010 control panel.  Zone alarm and zone trouble information may be transmitted by programming the AFP-200 points to software zones 1 through 88.   Up to ten AFP-200 Protected Premises Units may be monitored by one AM2020/AFP1010 Receiving Unit using ten SLC loops and ten NIB-96 modules.  The ground fault circuit in the AFP-200 must be disabled by cutting jumper JP9 since the AM2020/AFP1010 performs ground fault protection for the control panel circuits.

*Note:  If the RPT-485W isolating repeater module is connected between the AM2020/AFP1010 and the control panel, a common connection does not need to be made between the two panels.  However, a system common connection must be made from the AFP-200 to RPT-485W and the AFP-200 ground fault jumper JP9 should not be cut.*

*For Receiving Unit installation and programming, refer to the AM2020/AFP1010 Manual, Document 15088 and the NIB-96 Manual, Document 15666.*

# Appendix C – Annunciators

## Terminal Mode (LCD-80) Annunciation Interface (TB5 on CPU)

In terminal mode, the control panel annunciates all point information to remote LCD-80 displays. Each LCD-80 mirrors the front panel display and includes Acknowledge, Silence, and Reset switches. An LCD-80 will display all 198 intelligent points without being programmed. Switch SW2 on the circuit board must be set for TERM and the control panel must be programmed for terminal mode.

## ACS Annunciation Interface (TB5 on CPU)

In ACS mode, the control panel annunciates its 99 software zones. The use of software zones allows the user to freely map any number of modules or detectors to a single LED. The ACS connection uses a standard EIA-485 interface, capable of two-way, high speed communications with multiple annunciators located up to 6,000 ft. from the control panel.

## Modules Supported

When programmed for ACS mode, the control panel will support the following ACS-compatible modules:

**Point annunciators**

- ACM-8R
- ACM-16AT, AEM-16AT
- ACM-32A, AEM-32A
- AFM-16A, AFM-32A, AFM-16AT
- LDM-32, LDM-E32, LDM-R32

**LCD-80**

The LCD-80 must be set to ACS mode (refer to the LCD-80 manual).

**ACM-8R**

This module may be used to increase the relay capacity of the control panel by providing mappable dry contact relays. The control panel can support 99 detectors, 99 modules, four Notification Appliance Circuits, eight internal relays, and 99 external relays, for a total of over 300 points. The ACM-8R may be powered by the regulated/high-ripple notification appliance power from the control panel. For detailed information, refer to ACM-8R manual.

*Note: Similar point capacity extension is possible using the LDM-R32, but the LDM-32 series must use filtered, regulated power and is therefore more limited than the ACM-8R.*

## Annunciator Capacity

ACS annunciation displays the 99 software zones of the control panel plus 8 system points, for a total of 107. Information is transmitted using annunciator addresses 1 and 2. The EIA-485 interface will allow up to 32 annunciators (all but two must be in receive-only mode), over distances of up to 6,000 ft. (check power limitations).

## Data Formats — Address 1

The use of a UDACT Universal Digital Alarm Communicator/Transmitter and an ACM, AFM or LDM Series Annunciator on the same control panel will alter the assignments of the yellow LEDs on ACS Points 3, 4, 5, 6, 7 and 8.  Assignments with the UDACT are Point 3=Program Mode, Point 4=Supervisory, Point 5=Bell Trouble, Point 6=Prealarm/Maintenance Alert, Point 7=Low Battery and Point 8=AC Fail.

| ACS Point # | I/O | RED LED | YELLOW LED | YELLOW LED (with UDACT) | SWITCH | COMMENTS |
|---|---|---|---|---|---|---|
| 1 | Input | System Alarm | System Trouble[1] | System Trouble[1] | Acknowledge | See Note 1 |
| 2 | Output | Not Used | Signals Silenced | Signals Silenced | Signal Silence | |
| 3 | Output | Not Used | Not Used | Program Mode | System Reset | |
| 4 | Output | Not Used | Not Used | Supervisory | Drill | |
| 5 | Input | Not Used | Supervisory | Bell Trouble | Not Used | Panel Supv LED On |
| 6 | Input | Not Used | Prealarm | Prealarm/ Maint. Alert | Not Used | Trouble |
| 7 | Input | Not Used | Panel Trouble | Low Battery | Not Used | Trouble |
| 8 | Input | Not Used | AC Fail | AC Fail | Not Used | Batt/Earth Trouble |
| 9 | Input | Z1 Active | Z1 Trouble | | Not Used | |
| 10 | Input | Z2 Active | Z2 Trouble | | Not Used | |
| 11 | Input | Z3 Active | Z4 Trouble | | Not Used | |
| 12 | Input | Z4 Active | Z4 Trouble | | Not Used | |
| 13 | Input | Z5 Active | Z5 Trouble | | Not Used | |
| 14 | Input | Z6 Active | Z6 Trouble | | Not Used | |
| 15 | Input | Z7 Active | Z7 Trouble | | Not Used | |
| 16 | Input | Z8 Active | Z8 Trouble | | Not Used | |
| 17 | Input | Z9 Active | Z9 Trouble | | Not Used | |
| 18 | Input | Z10 Active | Z10 Trouble | | Not Used | |
| 19 | Input | Z11 Active | Z11 Trouble | | Not Used | |
| 20 | Input | Z12 Active | Z12 Trouble | | Not Used | |
| 21 | Input | Z13 Active | Z13 Trouble | | Not Used | |
| 22 | Input | Z14 Active | Z14 Trouble | | Not Used | |
| 23 | Input | Z15 Active | Z15 Trouble | | Not Used | |
| 24 | Input | Z16 Active | Z16 Trouble | | Not Used | |
| 25 | Input | Z17 Active | Z17 Trouble | | Not Used | |
| 26 | Input | Z18 Active | Z18 Trouble | | Not Used | |
| 27 | Input | Z19 Active | Z19 Trouble | | Not Used | |
| 28 | Input | Z20 Active | Z20 Trouble | | Not Used | |
| 29 | Input | Z21 Active | Z21 Trouble | | Not Used | |
| 30 | Input | Z22 Active | Z22 Trouble | | Not Used | |
| 31 | Input | Z23 Active | Z23 Trouble | | Not Used | |
| 32 | Input | Z24 Active | Z24 Trouble | | Not Used | |
| 33 | Input | Z25 Active | Z25 Trouble | | Not Used | |
| 34 | Input | Z26 Active | Z26 Trouble | | Not Used | |
| 35 | Input | Z27 Active | Z27 Trouble | | Not Used | |
| 36 | Input | Z28 Active | Z28 Trouble | | Not Used | |
| 37 | Input | Z29 Active | Z29 Trouble | | Not Used | |
| 38 | Input | Z30 Active | Z30 Trouble | | Not Used | |
| 39 | Input | Z31 Active | Z31 Trouble | | Not Used | |
| 40 | Input | Z32 Active | Z32 Trouble | | Not Used | |
| 41 | Input | Z33 Active | Z33 Trouble | | Not Used | |
| 42 | Input | Z34 Active | Z34 Trouble | | Not Used | |
| 43 | Input | Z35 Active | Z35 Trouble | | Not Used | |
| 44 | Input | Z36 Active | Z36 Trouble | | Not Used | |
| 45 | Input | Z37 Active | Z37 Trouble | | Not Used | |
| 46 | Input | Z38 Active | Z38 Trouble | | Not Used | |
| 47 | Input | Z39 Active | Z39 Trouble | | Not Used | |
| 48 | Input | Z40 Active | Z40 Trouble | | Not Used | |
| 49 | Input | Z41 Active | Z41 Trouble | | Not Used | |
| 50 | Input | Z42 Active | Z42 Trouble | | Not Used | |
| 51 | Input | Z43 Active | Z43 Trouble | | Not Used | |
| 52 | Input | Z44 Active | Z44 Trouble | | Not Used | |
| 53 | Input | Z45 Active | Z45 Trouble | | Not Used | |
| 54 | Input | Z46 Active | Z46 Trouble | | Not Used | |
| 55 | Input | Z47 Active | Z47 Trouble | | Not Used | |
| 56 | Input | Z48 Active | Z48 Trouble | | Not Used | |
| 57 | Input | Z49 Active | Z49 Trouble | | Not Used | |
| 58 | Input | Z50 Active | Z50 Trouble | | Not Used | |
| 59 | Input | Z51 Active | Z51 Trouble | | Not Used | |
| 60 | Input | Z52 Active | Z52 Trouble | | Not Used | |
| 61 | Input | Z53 Active | Z53 Trouble | | Not Used | |
| 62 | Input | Z54 Active | Z54 Trouble | | Not Used | |
| 63 | Input | Z55 Active | Z55 Trouble | | Not Used | |
| 64 | Input | Z56 Active | Z56 Trouble | | Not Used | |

[1] System Trouble excludes AC power fail.

## Data Formats — Address 2

Notes:

1. The National Standard of Canada (CAN/ULC-5527) requires a dedicated display to use yellow visual indicators to show the status of supervisory inputs. Notifier annunciators intended for Canadian Supervisory Service are: ACM-16ATCS4, ACM-16ATCS, ACM-16ATY, ACM-32ACS8, ACM-32ACS, and ACM-32AY.

2. On address 2, LED number = point number – 56.

| ACS POINT # | I/O | RED LED | YELLOW LED | SWITCH | COMMENTS |
|---|---|---|---|---|---|
| 1 | Input | Z57 Active | Z57 Trouble | Not Used | |
| 2 | Input | Z58 Active | Z58 Trouble | Not Used | |
| 3 | Input | Z59 Active | Z59 Trouble | Not Used | |
| 4 | Input | Z60 Active | Z60 Trouble | Not Used | |
| 5 | Input | Z61 Active | Z61 Trouble | Not Used | |
| 6 | Input | Z62 Active | Z62 Trouble | Not Used | |
| 7 | Input | Z63 Active | Z63 Trouble | Not Used | |
| 8 | Input | Z64 Active | Z64 Trouble | Not Used | |
| 9 | Input | Z65 Active | Z65 Trouble | Not Used | |
| 10 | Input | Z66 Active | Z66 Trouble | Not Used | |
| 11 | Input | Z67 Active | Z67 Trouble | Not Used | |
| 12 | Input | Z68 Active | Z68 Trouble | Not Used | |
| 13 | Input | Z69 Active | Z69 Trouble | Not Used | |
| 14 | Input | Z70 Active | Z70 Trouble | Not Used | |
| 15 | Input | Z71 Active | Z71 Trouble | Not Used | |
| 16 | Input | Z72 Active | Z72 Trouble | Not Used | |
| 17 | Input | Z73 Active | Z73 Trouble | Not Used | |
| 18 | Input | Z74 Active | Z74 Trouble | Not Used | |
| 19 | Input | Z75 Active | Z75 Trouble | Not Used | |
| 20 | Input | Z76 Active | Z76 Trouble | Not Used | |
| 21 | Input | Z77 Active | Z77 Trouble | Not Used | |
| 22 | Input | Z78 Active | Z78 Trouble | Not Used | |
| 23 | Input | Z79 Active | Z79 Trouble | Not Used | |
| 24 | Input | Z80 Active | Z80 Trouble | Not Used | |
| 25 | Input | Z81 Active | Z81 Trouble | Not Used | |
| 26 | Input | Z82 Active | Z82 Trouble | Not Used | |
| 27 | Input | Z83 Active | Z83 Trouble | Not Used | |
| 28 | Input | Z84 Active | Z84 Trouble | Not Used | |
| 29 | Input | Z85 Active | Z85 Trouble | Not Used | |
| 30 | Input | Z86 Active | Z86 Trouble | Not Used | |
| 31 | Input | Z87 Active | Z87 Trouble | Not Used | |
| 32 | Input | Z88 Active | Z88 Trouble | Not Used | |
| 33 | Input | Z89 Active | Z89 Trouble | Not Used | |
| 34 | Input | Z90 Active | Z90 Trouble | Not Used | Presignal Time Run |
| 35 | Input | Z91 Active | Z91 Trouble | Not Used | Time Started/Release |
| 36 | Input | Z92 Active | Z92 Trouble | Not Used | Time Started/Release |
| 37 | Input | Z93 Active | Z93 Trouble | Not Used | Time Started/Release |
| 38 | Input | Z94 Active | Z94 Trouble | Not Used | Time Started/Release |
| 39 | Input | Z95 Active | Z95 Trouble | Not Used | Time Ctl Active |
| 40 | Input | Z96 Active | Z96 Trouble | Not Used | Time Ctl Active |
| 41 | Input | Z97 Active | Z97 Trouble | Not Used | Holiday Active |
| 42 | Input | Z98 Active | Z98 Trouble | Not Used | Tornado Active |
| 43 | Input | Z99 Active | Z99 Trouble | Not Used | Prealarm Active |
| 44 | Input | Not Used | Not Used | Not Used | |
| 45 | Input | Not Used | Not Used | Not Used | |
| 46 | Input | Not Used | Not Used | Not Used | |
| 47 | Input | Not Used | Not Used | Not Used | |
| 48 | Input | Not Used | Not Used | Not Used | |
| 49 | Input | Not Used | Not Used | Not Used | |
| 50 | Input | Not Used | Not Used | Not Used | |
| 51 | Input | Not Used | Not Used | Not Used | |
| 52 | Input | Not Used | Not Used | Not Used | |
| 53 | Input | Not Used | Not Used | Not Used | |
| 54 | Input | Not Used | Not Used | Not Used | |
| 55 | Input | Not Used | Not Used | Not Used | |
| 56 | Input | Not Used | Not Used | Not Used | |
| 57 | Input | Not Used | Not Used | Not Used | |
| 58 | Input | Not Used | Not Used | Not Used | |
| 59 | Input | Not Used | Not Used | Not Used | |
| 60 | Input | Not Used | Not Used | Not Used | |
| 61 | Input | Not Used | Not Used | Not Used | |
| 62 | Input | Not Used | Not Used | Not Used | |
| 63 | Input | Not Used | Not Used | Not Used | |
| 64 | Input | Not Used | Not Used | Not Used | |

# Terminal Mode EIA-485 Connections

*Note: The LCD-80s require connection of operating power! Connect 24 V power to the AFP-200 TB1 terminal 3 (+) and TB1 terminal 4 (–). Power connections are supervised and power-limited.*

- Power-limited and supervised.
- Maximum of four LCD-80s may be connected to this circuit when powered by the control panel.
- If LCD-80s are powered by a separate UL-listed power supply, up to 32 may be connected.
- 6,000 feet maximum distance (16 AWG) between the control panel and the first or last LCD-80 and between each LCD-80.
- Use overall foil/braided-shield twisted pair cable suitable for EIA-485 applications.
- EIA-485 circuit rated 5.5 VDC max., 60 mA max.
- See the LCD-80 Manual for additional information.
- Set SW2 on the control panel to the TERM position. (Set the Switch in the left position.)
- Set SW 4 and 5 on the LCD-80 to the TERM position: SW1-7 ON.
- For non-English language systems, LCD-80 standby current is the same as the alarm current (100 mA).
- Each LCD-80 must have R-120 resistors installed across the in and out terminals as shown below.

**First LCD-80**
(must set DIP Switch SW3-1 AND SW3-2 "OFF" on all LCD-80 's except the last one)

**P2**

(-) EIA-485 IN    4
(-) EIA-485 OUT   3
(+) EIA-485 IN    2
(+) EIA-485 OUT   1

**EIA-485 Out**

**Last LCD-80**
(SW3-1 and SW3-2 must be set ON on the last LCD-80)

**EIA-485 Return**

**P2**

(-) EIA-485 IN    4
(-) EIA-485 OUT   3
(+) EIA-485 IN    2
(+) EIA-485 OUT   1

Shielded Twisted Pairs

Out (+)

TB4   TX REF RX REF
TB5   OUT OUT IN IN
TB6   A B B+ A+ B- A-

TB5-1 (+)
TB5-2 (–)
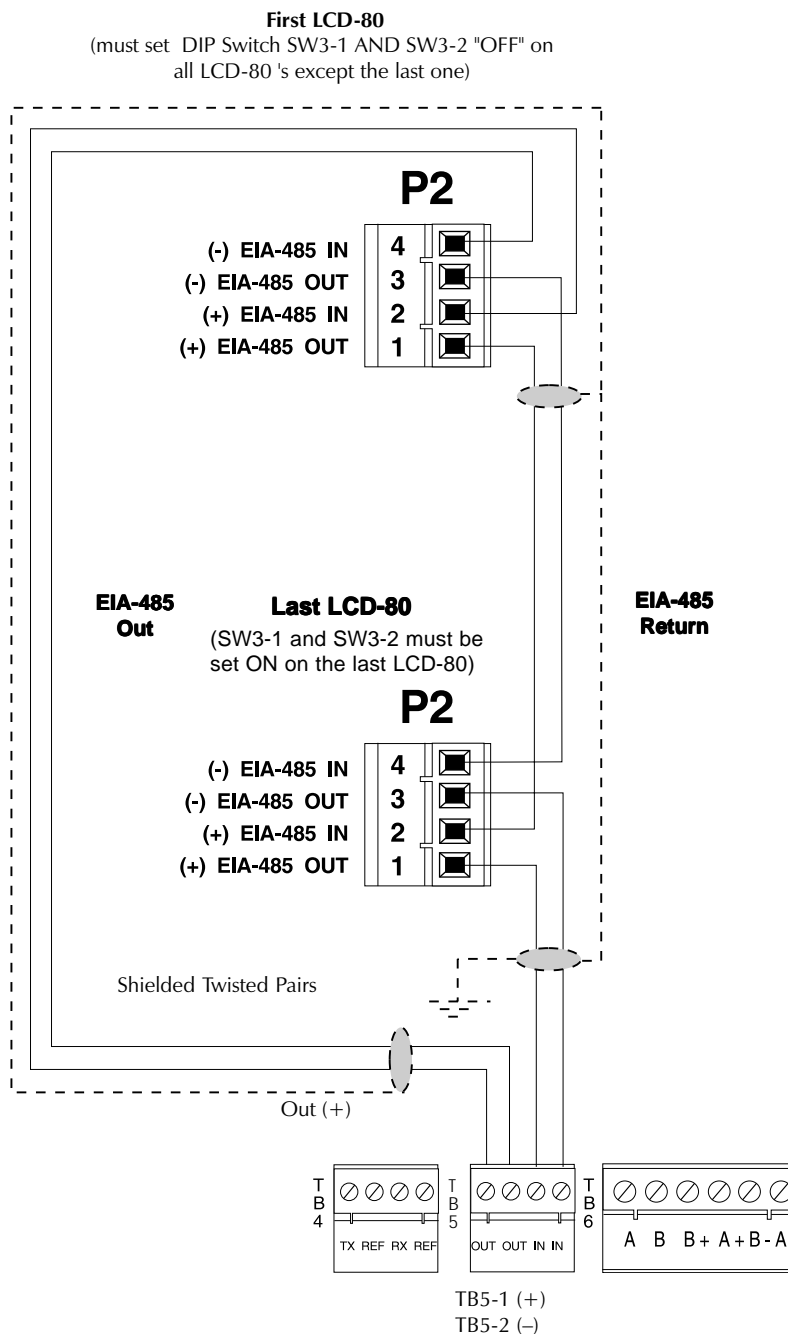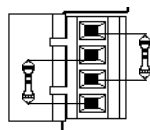
**Figure C-1   Terminal Mode EIA-485 Connection**

# LCD-80 ACS Mode EIA-485 Connections



- Power-limited and supervised.

- Maximum of four LCD-80s may be connected to this circuit when powered by the control panel.

- If LCD-80s are powered by a separate UL-listed power supply, up to 32 may be connected.

- 6,000 feet maximum distance (16 AWG) between the control panel and the first or last LCD-80 and between each LCD-80.

- Use twisted pair cable with a characteristic impedance of approximately 120 ohms.

- EIA-485 circuit rated 5.5 VDC max., 60 mA max.

- See the LCD-80 Manual for additional information.

- Set SW2 on the control panel to the "ACS" position. (Set the switch to the right position.)
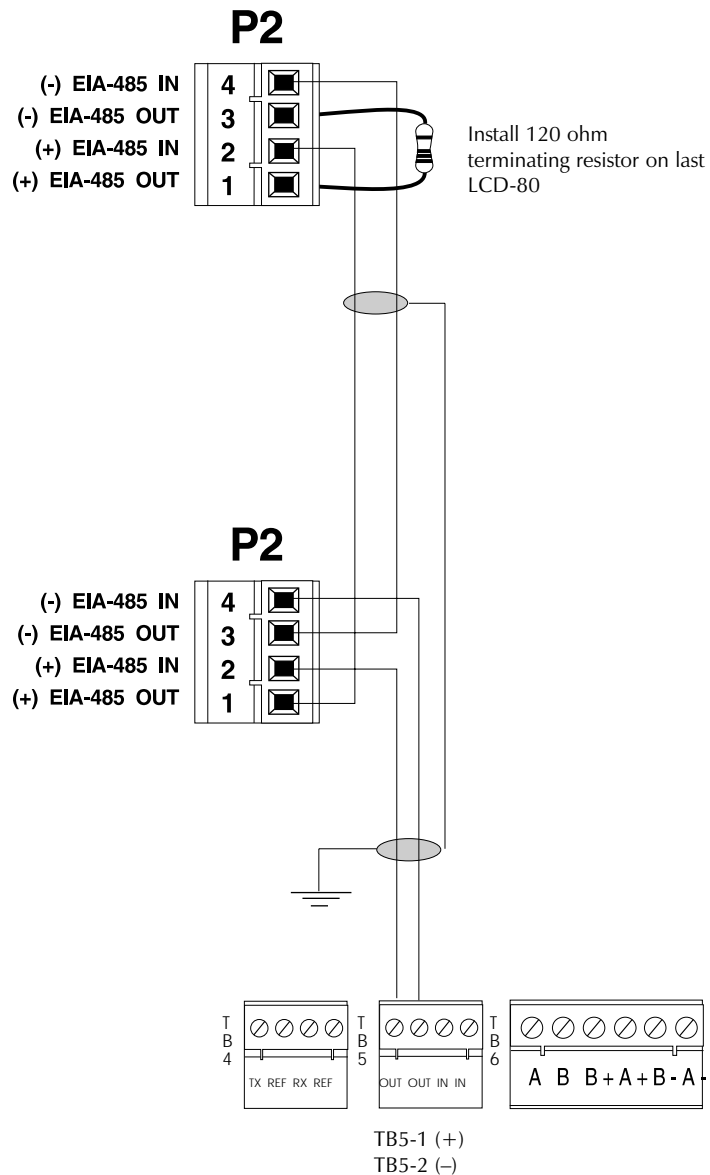
**Figure C-2   LCD-80 ACS Mode EIA-485 Connection**

Notes:

1)  LCD-80s require connection of operating power! Connect 24 VDC power to TB1 terminal 3 (+) and TB1 terminal 4 (–).  Power connections are supervised and power-limited.

2)  The LCD-80 start address must be set to address 01.  Switch SW2 must be set to "1", and SW3-1 and SW3-2 must be set to "OFF".  Set the LCD-80 to a size of 128 points.  To use a 40-character display; set SW5 OFF and SW6 ON.  To use a 20-character display; set SW5 ON and SW6 OFF.

# Power Connections for LCD, ACS type Annunciators

- Connections are power-limited.
- The power run to the LCD-80 or ACS Annunciator does not require a Power Supervision Relay because the loss of power is inherently supervised through communication loss.
- The maximum LCD-80 current draw from power supply is 500 mA.



**Providing power to ACS and LDM-type Annunciators**

terminals 6 and 7 do not exist on the ACM-8R

| 7 | N.C. Trouble |
| 6 | Inputs |
| 5 | Common In (-) |
| 4 | Common Out (-) |
| 3 | Power In (+24VDC) |
| 2 | Power Out (+24VDC) |
| 1 | Earth Ground |

TB1-3 (+)
TB1-4 (−)

**P1**

| | 7 | EIA-232 Transmit |
| EIA-232 Reference | 6 | |
| - System Common OUT | 5 | |
| - System Common IN | 4 | |
| +24 VDC OUT | 3 | |
| +24 VDC IN | 2 | |
| EIA-232 Receive | 1 | |

**Providing power to the LCD-80**

**P1**

| EIA-232 Transmit | 7 | |
| EIA-232 Reference | 6 | |
| System Common OUT | 5 | |
| - System Common IN | 4 | |
| +24 VDC OUT | 3 | |
| +24 VDC IN | 2 | |
| EIA-232 Receive | 1 | |

TB1-3 (+)
TB1-4 (−)

**Figure C-3   Power Connections for LCD, ACS type Annunciators**

# ACS and LDM Series EIA-485 Connections

- Connections are power-limited and supervised.

- A maximum of 10 devices may be connected to this circuit (ACM, LDM, AFM, etc.).

- 6,000 feet is the maximum recommended distance (16 AWG) between the control panel and the furthest annunciator.

- Use twisted-pair cable with a characteristic impedance of approximately 120 ohms.

- The EIA-485 circuit is rated 5.5 VDC max., 60 mA max.

- Refer to the ACS Manual and the LDM Manual for additional information.

- Set SW2 on the control panel to the "ACS" position.
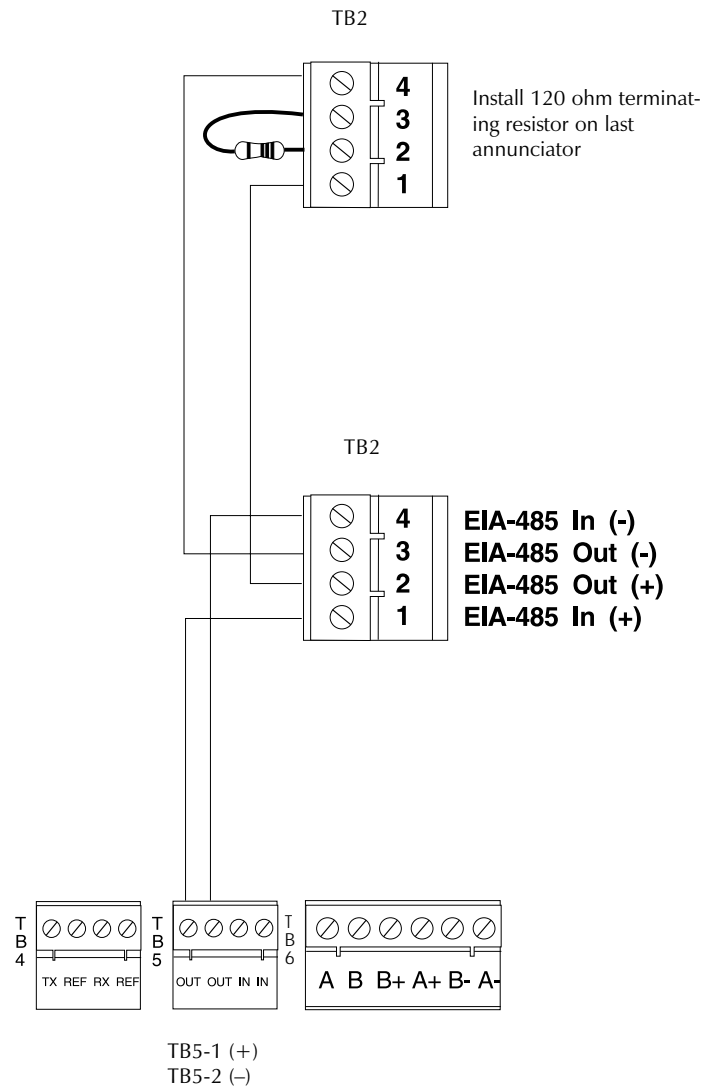


**Figure C-4   ACS and LDM Series EIA-485 Connection**

# Appendix D – Releasing Applications

## Standards

The control panel can be used as a control panel for agent release or pre-action/deluge control applications. When used with compatible, UL-listed actuating and initiating devices, the system meets the requirements of the following standards:

NFPA 12               CO2 Extinguishing Systems (high pressure only)
NFPA 12A          Halon 1301 Extinguishing Systems
NFPA 12B          Halon 1211 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 Extinguishing systems

## Programming

The control panel includes four software zones (zones 91, 92, 93 and 94) that are used to control releasing functions. Each zone operates independently, and is fully programmable. The LCD display called up during READ STATUS or SPL ZONE programming for zones 91-94 is shown to the right.

```
PRG@SOFTWARE@ZONE
RELEASE@CONTROL
DELAY=XX@ABORT=XXX
CROSS=N@SOAK=XX@Z91
```

**Delay** is the programmed time from alarm activation of an initiating device mapped to this zone, until activation of all output devices mapped to this zone. If cross-zoning is selected, the delay timer starts when *two or more* devices are in alarm (see below for details). The timer "XX" values may be set from 0 seconds to 60 seconds. If abort or manual release type MMX modules are mapped to this zone they affect the timer operation as defined below.

**Abort** is the type of abort algorithm used by the zone. It may be one of four types, ULI, IRI, NYC or AHJ, defined in the table below.

| **ULI** | **IRI** | **NYC** | **AHJ** |
|---|---|---|---|
| **Standard UL-type delay timer** which continues to count down upon ABORT, and stops and holds at 10 seconds until release of the ABORT switch. Upon release of the ABORT switch, the timer resumes the countdown at 10 seconds. | **IRI-type delay timer** which functions the same as the UL-type timer with the exception that the ABORT will function only if pressed and held before 2nd zone goes into alarm. | **NYC-type delay timer.** Pressing ABORT, once an alarm exists, changes timer value to the time selected plus 90 seconds. The timer will not start as long as the ABORT switch is held. | **Local Jurisdiction delay timer.** Once the timer has started, pressing ABORT restores timer to its full time. The timer will not start as long as ABORT is held. Release of the ABORT switch continues the countdown, whereas pressing ABORT again will restore the timer to its full value. |
| | These modes are the only ones that comply with UL Standard 864. | | |

*Note: ABORT timer will not operate when timer is set for "NO DELAY".*

**Cross**   **N** = No Cross zoning of any type.
           **Y** = Cross zone activation will occur after two or more devices mapped to the same zone activate.
           **Z** = Requires the activation of two initiating devices mapped to two different zones.
           **H** = Requires the activation of at least one smoke detector and at least one heat detector.

**Soak** is used to automatically shut off the releasing solenoids for a user-defined time after the zone turns them on. It may be programmed for zero (no soak timer), or 10 to 15 minutes. Use in NFPA 16 applications only.

## Special Module Types

The following module type codes, which have special releasing functions, can be programmed into the control panel. Special releasing device type codes are listed below.

**"ABORT SWITCH"** – A type code assigned to an MMX Monitor Module which performs the abort functions described above. The MMX is connected to a UL-listed abort station such as the Notifier ARA-10. All wiring is fully supervised, following the wiring instructions for the MMX modules described earlier in this document. Multiple Abort Switch modules may be installed and they will provide a logical "OR" function, similar to multiple conventional abort switches on a single conventional zone.

**"MAN. RELEASE"** – A type code assigned to an MMX Monitor Module which performs a manual release function. The MMX is connected to a UL-listed manual station such as the Notifier ARA-10 or NBG-10. It will override all Abort Switch modules that are active and programmed to the same releasing zone. All wiring is fully supervised, following the wiring instructions for the MMX modules described earlier in this document. Multiple MAN. RELEASE modules may be installed, and they will provide a logical "OR" function, similar to multiple conventional release switches on a single conventional zone.

**"REL CKT ULC"** – A type code assigned to a CMX control module, or one of the four Notification Appliance Circuits on the control panel, which activates a releasing solenoid or other releasing device. All wiring to the release device, and the release device itself, is fully supervised and suitable for use with limited energy cable. The release device activates when an initiating device programmed to the same zone activates (two devices if cross-zoning selected); and the delay timer (if used) expires; and no Abort Switch (if used) is active. You can program multiple Release CKT types to the same releasing zone, and they all activate when the zone becomes active.

**"RELEASE CKT"** – This type code operates similar to **"REL CKT ULC"** but the release device circuit is supervised for open circuits and ground faults only (not short circuits). You cannot use this type code for applications requiring ULC Listing or with limited energy cable.

Do not use REL-4.7K (panel output) or REL-47K (CMX module) with this type code.

## Initiating Devices

Initiating devices may be FDX intelligent heat detectors, SDX or CPX intelligent smoke detectors, or may be conventional detection devices which are UL-listed for the purpose and connected to MMX modules. Several of these initiating devices may be used for the same releasing hazard by mapping them to the same releasing zone. Factory Mutual and certain local authorities having jurisdiction (LAHJ) require that redundant wiring (NFPA 72 Style 6 or Style D) be used for the initiating devices in releasing applications.

## Warning Sounders

Warning sounders are connected to any of the four Notification Appliance Circuits or to CMX module circuits as described earlier in this document. Multiple Notification Appliance Circuits may be activated by the same releasing hazard.

To activate when the delay timer is started, and/or the releasing device is activated, the CMX module should be mapped to the releasing hazard zone (91, 92, 93 or 94). Note that if cross zoning is selected, this sounder will only activate when two zones are in alarm. Also note that, unlike the release solenoids, the sounders do not wait for the delay timer.

To activate immediately when any one of the initiating devices are activated, the CMX should be mapped to a separate zone (not 91, 92, 93 or 94) that is also mapped to all initiating devices of the hazard.

*Note: If coded sounds are required for warning sounders, they must use one of the four panel Notification Appliance Circuits, not a CMX circuit.*

## Auxiliary Control Functions

If control relays are required for release application, CMX modules set for dry contact operation may be used. They may be programmed for different functions the same as warning sounders described above. Control functions may also be provided by use of the RTM-8 module or the ACM-8R remote relay module mapped to the software zones of the control panel.

## ACS Annunciation

ACS point annunciation of releasing functions can be done by annunciating any of the software zones described above, including zones 91, 92, 93 and 94. ACS annunciation of individual detectors may be achieved by assigning each detector to a separate software zone and annunciating the zone.

## Deluge/Pre-Action Release

When using this configuration for Deluge and/or Pre-Action Services, wiring must be configured to maintain a minimum voltage on releasing circuits. Calculation of maximum allowable resistance:

$$R_{MAX} = \frac{V_D}{I_S}$$

Where $R_{MAX}$ = maximum allowable resistance of wiring, $I_s$ = solenoid current, and $V_D$ = allowable voltage drop.

*Notes:*

- *Factory Mutual requires 90 hours of standby power, Style D (Class A) wiring on all Initiating Device Circuits and $V_D = 0.2$ volts.*
- *For NFPA 13 and 15 applications, the soak timer must be disabled.*
- *For NFPA 16 applications, the soak timer may be set to 10 or 15 minutes.*
- *For UL-listed and FM approved Solenoid Release Valves, refer to the Device Compatibility Document.*

**Compatible Solenoid Valves**
For a list of compatible solenoid valves, refer to the Device Compatibility Document.

Terminate all unused circuits with a 4.7K ELR

TB1

+ − + − +  −

TB2

B+  B−  B+  B−  B+  B−  B+  B−

TB3

NO  C  NO  NC  C  NO  NC  C
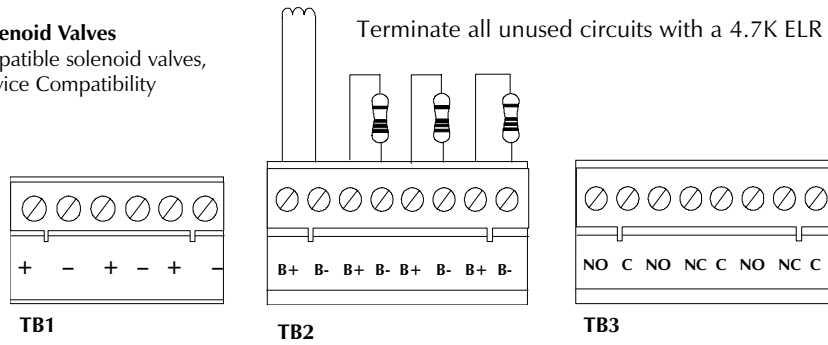
**Figure D-1   Notification/Releasing Connections**

24 VDC power
from AFP-200

REL-4.7K

TB2-1 (+)

Red

Brown

Releasing Device
(UL-listed) 24 VDC

TB2-2 (−)
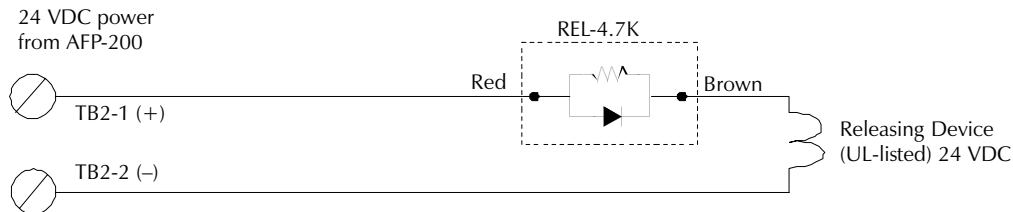
**Figure D-2   Typical Connection of Releasing Device to Panel**

SLC Loop to
AFP-200

TB6-5 (−)

TB6-3 (+)

24 VDC power
from AFP-200

TB1-2 (−)

TB1-1 (+)

CMX

1
2
3
4

7

6

Alarm polarity shown

N.C. Supervised
Relay Contact

Red

REL-47K

Brown

Releasing Device
(UL-listed) 24 VDC

Power Supervision Relay
A77-716-02
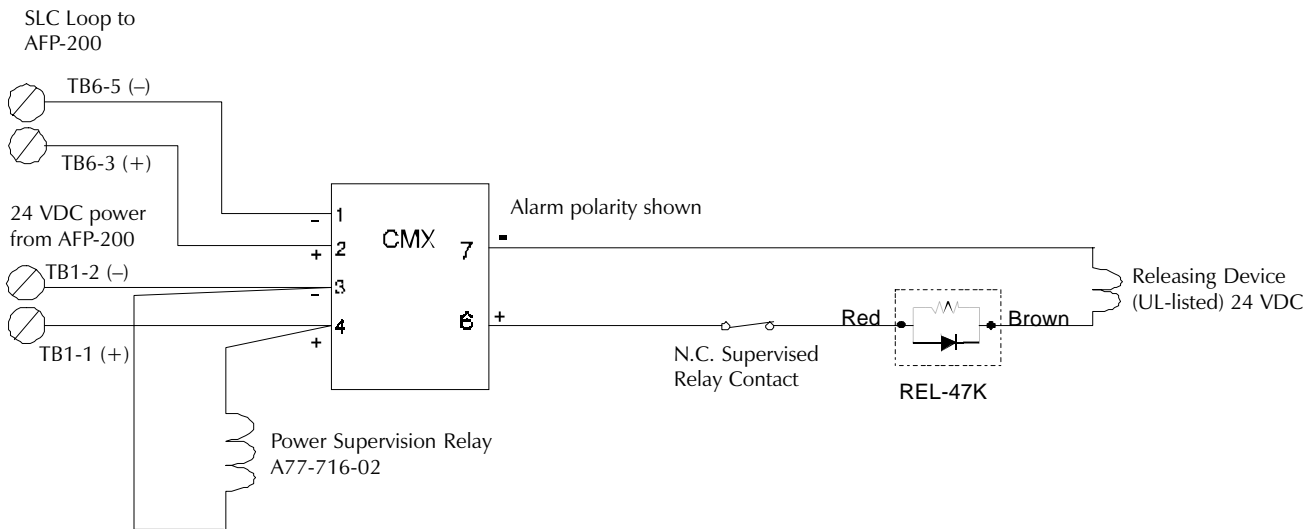
**Figure D-3   Typical Connection of Releasing Device to CMX**
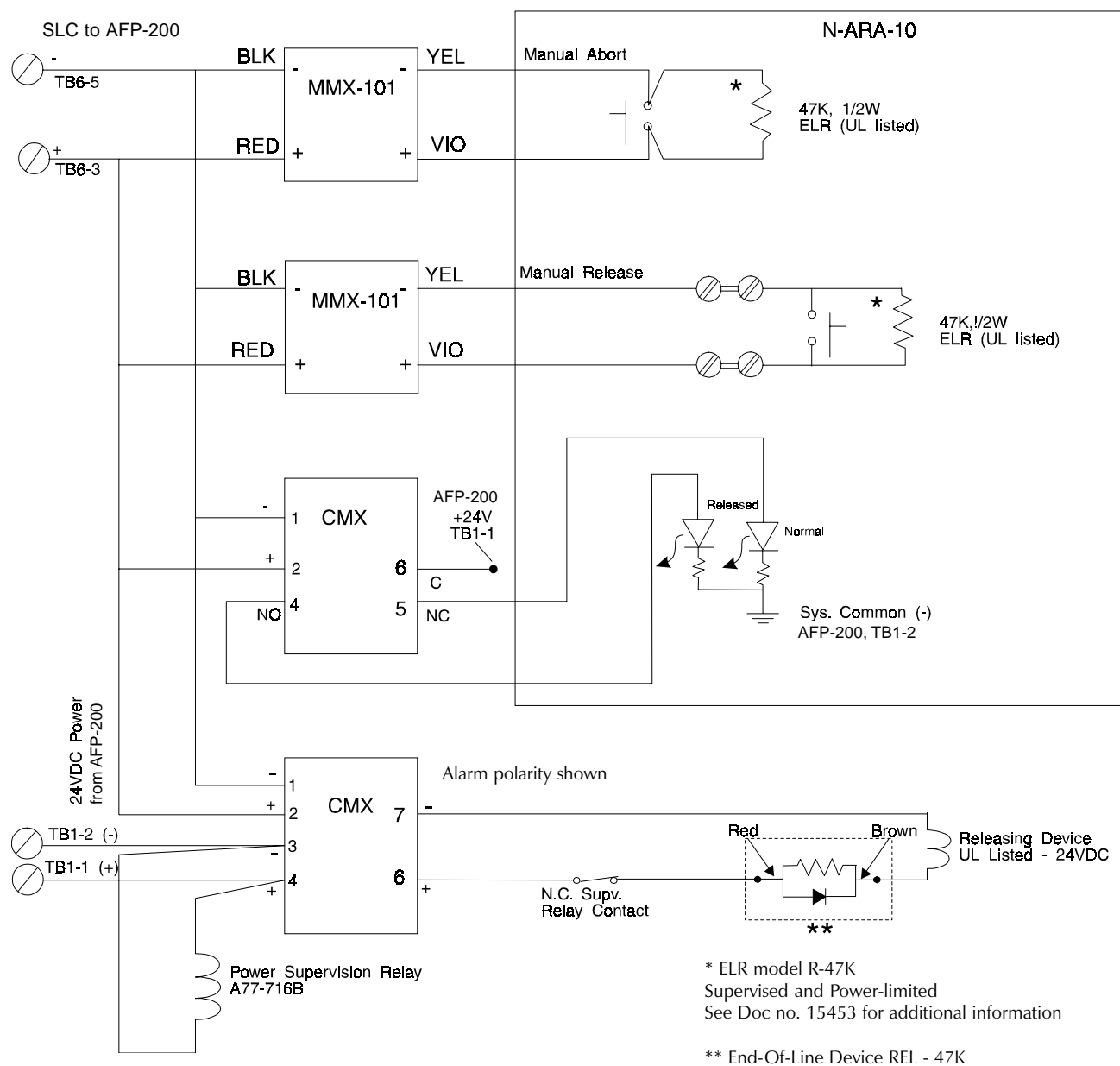
**Figure D-4   Employing N-ARA-10 Agent Release-Abort Station**

Notes:

1. For releasing applications use an end-of-line device (part number REL-47K) with the CMX module.  Use an end-of-line device (part number REL-4.7K) with the control panel releasing circuit (one of the four NACs).

2. All wiring for releasing circuits is supervised against open and shorts.

3. Connect the end-of-line device as shown in Figure D-4.

4. Program the module or NAC for REL CKT ULC type code.

# Appendix E – Combination
# Fire/Burglary Applications

The control panel can be used as a combination Fire/Burglary and Burglary system when operated according to the requirements in this appendix.

 **Note:** The control panel uses the same trouble input connector for the door tamper switch (STS-200) and the AVPS-24 power supply expander.   Therefore, the control panel cannot be used in Fire/Burglary applications if an AVPS-24 is installed and programmed.

## General Operation

For security applications, one or more Monitor Modules must be programmed with the "BURGLAR ALA" type code and must be wired as described in this appendix.  Activation of such a Monitor Module will light the yellow Security LED and the control panel LCD display will indicate a burglar alarm condition.  The piezo will sound until acknowledged.  Additional sounders or output devices may be programmed to activate with the burglar alarm initiating device.  The Burglar Alarm type circuit is designed to indicate an alarm on an open or short circuit, or a resistance change of 50% (plus or minus) from the end-of-line resistor value.  A tamper switch installed in the cabinet will also indicate a security alarm whenever the door is opened.

The BURGLAR ALA or DOOR TAMPER indication may be acknowledged, silenced, or reset from the control panel.

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

For instructions on bypassing security zones for Burglar alarm type devices, refer to the Disable/Enable section in Chapter 3, Programming.

## Tamper Switch

The cabinet must be wired with the STS-200 security tamper switch kit as shown in Figure E-1.
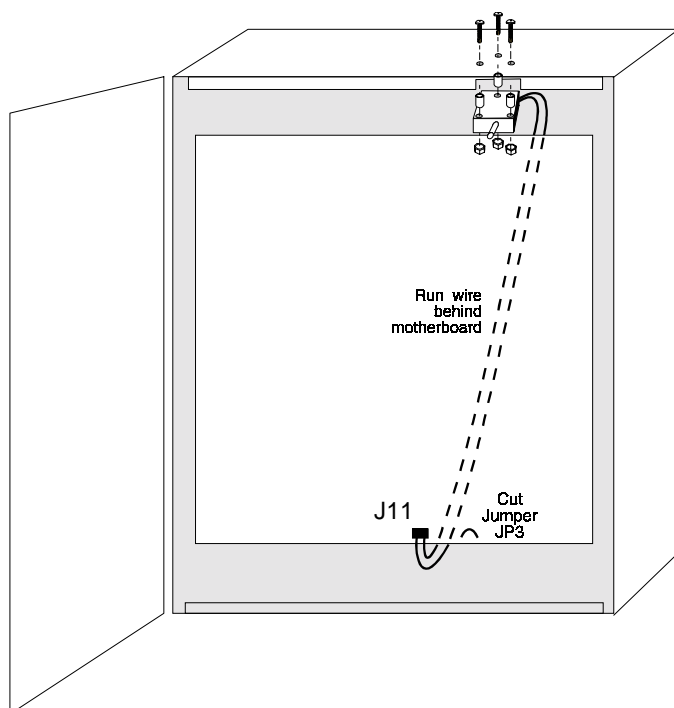


**Figure E-1  Typical Wiring of an STS-200 Tamper Switch**

# Combination Fire/Burglary Applications

## Receiving Unit

For applications requiring transmission of burglary alarm information to a central receiving unit, the control panel may be connected to an AM2020 or AFP1010 provided with a NIB-96 network interface board (for wiring information, refer to Appendix B). The AM2020/AFP1010 must be configured for Combination Fire/Security applications as defined in Installation section of the AM2020/AFP1010 manual. Burglar alarm zones are reported to the AM2020/AFP1010 through the NIB-96 Network Interface Board. The AM2020/AFP1010 networked monitor points must be programmed as SARM type code (security alarm).

## Programming

The control panel may select any number of Burglar Alarm type code devices using the programming menu and point submenu. Select the address of an MMX Monitor Module used for security, and set the MMX type code to BURGLAR ALA.

## Circuit Wiring

Wire security monitoring zones as shown in Figure E-2, "Typical Protected Premises Wiring for Central Station and Proprietary Burglar Alarm Applications."

## LED Indicators

The AFP-200 is supplied with a unique security keypad slide-in label for combination fire/burglary applications. This security label is identical to the standard slide-in label, except the fourth label position shows **Security** rather than **Supervisory**. (Combination fire/burglary listing does not include supervisory service.) On any burglar alarm, the Supervisory LED, as well as normally-open contacts on TB3 terminal 1 and TB3 terminal 2, will activate.

# Combination Fire/Burglary Applications

**AFP-200**
**Protected Premises Unit**

SLC Loop
Channel A or B
(−)
(+)

UL-listed, normally-
open security switch

47K
End-of-Line
Resistor
(A2143-00)*

MMX-1

MMX-1 modules
programmed with software type
code "BURGLAR ALA."

UL-listed, normally-closed
security switch

UL-listed, normally-open
security switch

47K
End-of-Line
Resistor
(A2143-00)*

MMX-1

UL-listed, normally-
closed security switch

To next
device

47K
End-of-Line
Resistor
(A2143-00)*

+24 VDC UL-listed
Notification Appliance

## CMX

Configured as an Notification Appliance
Circuit (do not break tabs) and programmed
in the Protected Premises Unit. Supplemen-
tary use only in UL-listed Systems.
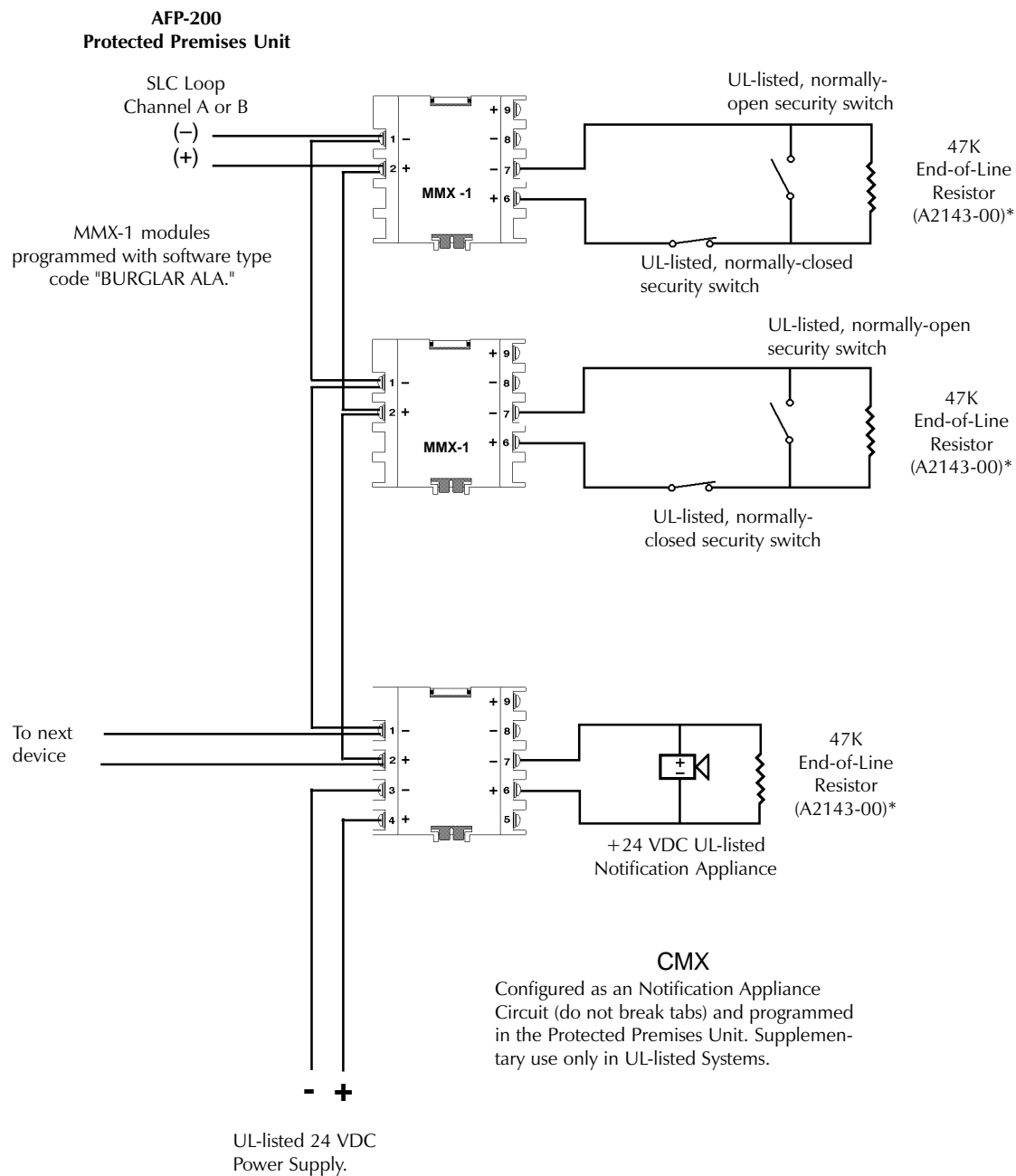
- +

UL-listed 24 VDC
Power Supply.

**Figure E-2  Typical Protected Premises Wiring for Central Station and Proprietary Burglar Alarm Applications**

# Appendix F – Wire Requirements

Each type of circuit within the fire alarm control system has a specific type of wire that must be used to ensure proper operation.  In addition, the wire gauge of a particular circuit depends on the length of that circuit.  Use the table below to determine the specific wiring requirements for each circuit.

**Note:** If the communications loop is to be run in conduit with Notification Appliance Circuits, the risk of encountering problems can be greatly reduced by exclusively employing electronic sounders (such as the MA/SS-24I) instead of more electronically noisy notification appliances (such as electromechanical bells or horns).

| Circuit Type | Circuit Function | Wire Requirements | Distance (feet) | Typical Wire Type |
|---|---|---|---|---|
| SLC Loop (power-limited) | Connects to intelligent and addressable modules | Twisted-shielded pair, 12 to 18 AWG. 40 ohms maximum per length of Style 6 and 7 loops. 40 ohms per branch maximum for Style 4 loops | 10,000 8,000 4,875 3,225 | 12 AWG  Belden 9583  WPW 999 14 AWG  Belden 9581  WPW 995 16 AWG  Belden 9575  WPW 991 18 AWG  Belden 9574  WPW 975 |
| | | Untwisted, unshielded wire, in conduit or outside of conduit | 1,000 | 18-12 AWG |
| EIA-485 (power limited) | Connects to LCD-80 or to Annunciator Control System Modules | Twisted-shielded pair  with a Characteristic Impedance of 120 ohms    18 AWG minimum | 6,000 (max) | Belden 9860 (16 AWG) |
| EIA-232 (power-limited) | Connects to PRN or P40 Remote Printers and to a DOS-based  personal computer | Twisted-shielded pair    18 AWG minimum. | 50 (without modem | Belden 9860 (16 AWG) |
| MMX-1, MMX-101 (power-limited) | Initiating Device Circuit (IDC) | 12-18 AWG    Maximum loop wire resistance is 20 ohms | To meet 20 ohms | 12-18 AWG |
| CMX (power-limited) | Notification Appliance Circuit (NAC) | 12-18 AWG. MPS-24A: At alarm current level, no more than a 1.2 V drop at the end of the circuit | To meet 1.2 V drop | 12-18 AWG |
| 24 VDC Power Runs (power-limited) | To annunciators and CMX | 12-18 AWG. 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 V drop | 12-18 AWG |
| NR45-24 | Remote secondary power source | 12 AWG in conduit | 20 (max) | 12 AWG |

# Appendix G – Pre-Alarm (AWACS™) Applications

## General

The control panel includes a facility to give early warning of incipient or potential fire conditions (U.S. Patent Pending). This is a two level Pre-Alarm function called AWACS™ (Advance Warning Addressable Combustion Sensing). The two levels are Alert and Action.

## Alert Level Pre-Alarm Operation

The control panel software, in addition to checking for alarm levels, will check for Pre-Alarm thresholds for each ionization or photo smoke detector (not analog thermal detectors). If a level is reached that exceeds the programmed Alert threshold, the Alert condition is indicated. As an example, a typical display is shown to the right.

```
PREALM@SMOKE(PHOTO)
WEST@HALLWAY@FLR@5
50%@2.0%@ALERT
12:00P@12/25/97@D13
```

**PREALM** is the Pre-Alarm status banner.

**ALERT** indicates that the Alert level is reached.

**50%** is the reading of smoke in approximate percent of alarm. This is a real-time display which is updated every few seconds to show the current reading of this detector. In this case, assume that zone 99 is programmed to ALERT= 40% OF ALARM. This means Alert will occur at measured smoke levels that exceed .40 x 2.0% per foot obscuration (low) = 0.80% per foot obscuration. In the example above, the reading is at 50% of alarm, therefore the control panel is in Alert condition.

**2.0%** is the programmed alarm threshold (2.0% per foot obscuration is the low sensitivity setting).

The following functions are performed at Alert level:

- The above message is sent to the history file and (if they are installed) to the LCD-80 and printer. The message is sent (and time stamped) only at the time that it first occurred. This historical data could provide valuable information about the progress of a fire.
- The Pre-Alarm LED flashes and the piezo sounder pulses until acknowledged.
- Zone 99 is activated. Not activated are Zone 00 (general alarm) or any other zone, or trouble relay or alarm relay.
- The Pre-Alarm indication for this detector will restore automatically to normal if its sensitivity drops below Alert level. Zone 99 clears automatically when no Pre-Alarm conditions exist.
- A subsequent alarm, or an Action level condition for this detector will clear the Alert indication.

## Action Level Pre-Alarm Function

If a detector reaches a level that exceeds the programmed Action threshold, an Action condition is indicated. The display shown to the right appears if a detector is in Action level.

**ACTION** indicates that the Action level is reached.

**70%** is the real-time approximate obscuration reading. Suppose Zone 99 was programmed for ACTION = 60% OF ALARM. Any measurement over .60 X 2.00% = 1.20% would cause an Action Pre-Alarm.

```
PREALM@SMOKE(PHOTO)
WEST@HALLWAY@FLR@5
70%@2.0%@ACTION
12:00P@12/25/97@D13
```

The following functions are performed at Action level:

• The message is sent to the LCD-80, printer, and history file.

• The Pre-Alarm LED and piezo sounder pulse until acknowledged.

• Zone 99 is activated. Zone Z00 (general alarm) is not activated, nor are trouble and alarm relays.

• The fifth zone programmed (not the first four) for this detector is activated. The fifth zone is the right-most entry on line three of the point programming screen. This zone may be used to control functions of a detector or group of detectors on Action level. The fifth zone activations will also allow ACS annunciation by a detector or group of detectors in Action Pre-Alarm state.

• The Pre-Alarm condition and the zone programmed will latch until System Reset, even if the sensitivity drops below the Action or Alert level.

• A subsequent alarm condition for this detector will clear the Action indication from the LCD display and keypad LED, but will not reset the fifth zone (the fifth zone is also on the alarm list).

## Pre-Alarm Programming

You can adjust the setting of the two Action and Alert levels as desired. The Special Zone 99 display is shown to the right.

**ALERT=70% OF ALARM** means that every photo and ion detector will give an Alert indication when its present sensitivity reaches 70% of its alarm level. The "ACTION=00% OF ALARM" means that there will be no Pre-Alarm Action level in the system.

```
PRE-ALARM@ZONE@99
ALERT=70%@OF@ALARM
ACTION=00%@OF@ALARM
```

The numbers **70%** and **00%** are default values, and may be adjusted in the range from 00% to 99%. ACTION=00% means no Pre-Alarm, therefore the default is no Action level. The control panel's software ensures that the Action level is higher than the Alert level (or the Action level is zero) and that both are below 100%.

The Alert and Action program levels are global settings, meaning they apply to all SDX or CPX detectors. However, different Pre-Alarm Action can be selected for each detector by using different alarm levels. For example, if the Alert level is set at 50% of alarm, and detector D13 is set to alarm at 2.00%, D13 will Pre-Alarm at 1.00%, while if detector D14 is set to alarm at 1.00%, it will Pre-Alarm at 0.50% per foot obscuration.

There are applications where only one level of Pre-Alarm function is necessary, but the Pre-Alarm must be latching. This can be done by programming ALERT=00% and only using the Action level. Also, if non-latching operation is desired, ACTION=00% can be selected to allow use of Alert level only. *Note: Only the Action level will provide ACS point annunciation.*
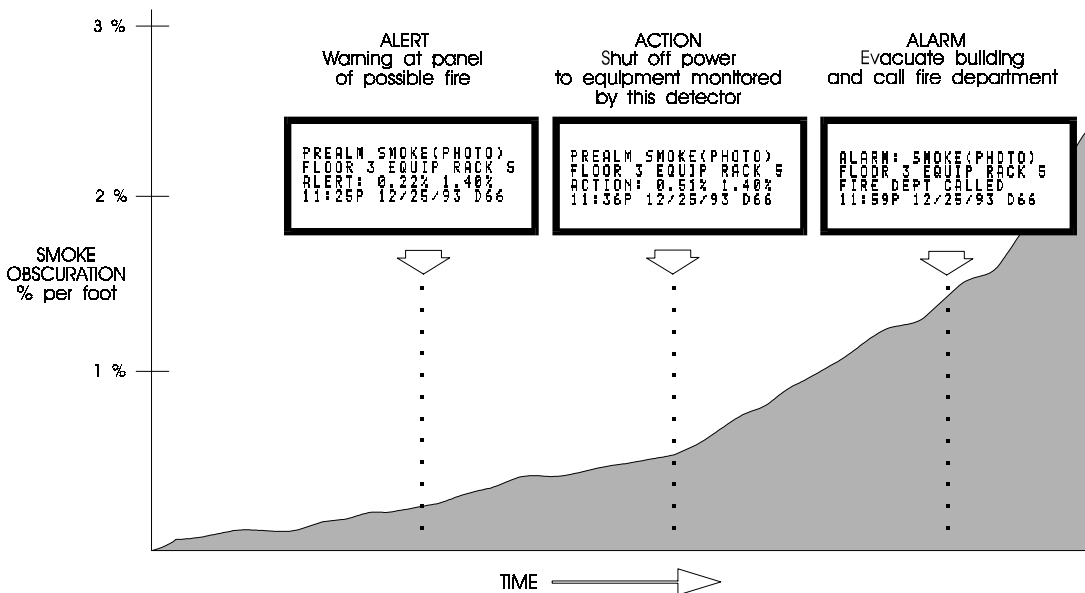
**Figure G-1   Typical AWACS Application Threshold Levels**

## Self-Optimizing Pre-Alarm Function

The control panel software (PN 73609 or higher) includes a Self-Optimizing Pre-Alarm selection, where the control panel determines the highest practical Pre-Alarm sensitivity for each detector.  Statistical methods and special software filters are used to automatically set the optimal Pre-Alarm sensitivity.  The software compensates for electrical noise transients, dust buildup, and other environmental factors.

When a detector senses smoke above the calculated optimal Pre-Alarm level, the control panel will latch into an Action Level Pre-Alarm.  The Action Level Pre-Alarm Function was described earlier in this appendix.

Applications include computer rooms, electrical equipment rooms, and telecommunication facilities where environments are clean and stable and early warning is very important.  It is not recommended for applications where false smoke indications could exist, such as cigarette smoking.

Self-Optimizing Pre-Alarm mode will only operate with SDX-551 or SDX-751 photoelectric detector.  Ionization detectors will not Pre-Alarm when Self-Optimizing is selected.

Self-Optimizing is selected by programming Special Zone 99 for ALERT=00 and ACTION=01.  Select "P" on the point programming screen for all photoelectric detectors for which Pre-Alarm is desired.  The control panel will determine the optimal Pre-Alarm Action Level sensitivity after approximately 10 minutes of data sampling.

## Sounder Base Applications for AWACS

The B501BH sounder base may be used with AWACS to give a local audible warning before general evacuation.  This may be used to reduce the impact of false alarms from cooking, smoking, etc. in a multiple unit housing application.  An individual in the apartment would receive advanced audible warning and could eliminate the source of the pending false alarm.

 **Note:** The control panel will activate the LEDs on the SDX or CPX detectors on a Pre-Alarm condition (Alert level or Action level).  The detectors LEDs are used to drive the sounder base.   When the LEDs on the detector light steadily for 10 seconds the sounder base will activate.   If latching operation of the sounder base is desired, program the control panel for Action Pre-Alarm.   If non-latching (self-restoring) operation is desired, program the system for Alert Pre-Alarm operation.   If all sounder-bases are to activate on alarm, wire the power for these bases through two CMX relay contacts that will reverse the polarity to the B501BH bases on alarm.

# Appendix H – Pre-signal/Positive Alarm Sequence (PAS), Coding, and Time Control

## Pre-signal and PAS

Activation of outputs that contain Z90 in their Control-by-Event (CBE) equation will be delayed for all alarm initiating devices that also contain Z90 in their CBE equation. A subsequent alarm will abort the delay and control-By-event equations will be executed. Do not include Z90 in the CBE equation for a releasing device. Pressing the Alarm Silence switch before the delay has expired will abort circuit activation.

## Pre-signal

The Pre-signal delay time can be set between 60 and 180 seconds. The Pre-signal delay will not apply to the system alarm relay, 4XTM polarity reversal alarm output, 4XTM municipal box, and any RTM-8 output.

## Positive Alarm Sequence (PAS)

Selected outputs are delayed for 15 seconds. Pressing Acknowledge within the 15-second delay will increase the delay to the full value programmed (60 to 180 seconds). The system alarm relay, 4XTM Polarity Reversal Alarm output, 4XTM Municipal Box output and the RTM-8 Transmitter output will delay when the alarm is from an initiating device that contains Z90 in its CBE equation. Do not include Z90 in the CBE equation for any Monitor Module that connects to a device other then an automatic fire detector. PAS will not delay the RTM-8 relay outputs. NFPA-72 requires the installation of a PAS inhibit switch. This can be done by using a Monitor Module programmed to type code "PAS INHIBIT."

## Time Control

All outputs that contain Z95 (or Z96) in their CBE equation will activate between the times specified for the days of the week listed in Z95 (or Z96). All smoke detectors that contain Z95 (or Z96) in their CBE equation will switch to their lowest sensitivity (3.0%) between the times specified for the day-of-week listed in Z95 (or Z96). Time control is active for all day-of-week selections listed in Z95 (or Z96). Holidays listed in Z97, however, are excluded unless "H" is listed in the day-of-week selection. Enter time in 24-hour format with the Off time greater than On time. When using time control, always press the System Reset switch when making programming changes.

**Note:** Active time control outputs turn off momentarily when programming or resetting the control panel.

## Coding

Control panel NACs that contain Z98 in their CBE equation are coded when activated by a fire alarm. However, the NACs are steady if activated by a Hazard Alert only. Do not include Z98 in the CBE equation if using these NACs for releasing applications. Select coded type on a system base, via zone 98. Coding selections are:

**MARCH TIME (DEFAULT):** 120 PPM (Pulses Per Minute)
**TWO STAGE:** Alert signal—20 PPM; General alarm signal: Steady on*
**CALIFORNIA:** 10 sec. on, 5 sec. off, repeats
**TEMPORAL:** 0.5 on, 0.5 off, 0.5 on, 0.5 off, 0.5 on, 1.5 off, repeats

**Note:** An Alert signal is automatically sent to any of the four NACs that are not mapped to the alarm signal but are mapped to Z00 and Z98. After 5 minutes without an Acknowledge or Alarm Silence, the Alert signal becomes steady.

# Appendix I – Terminal Interface Protocol

## General Description

The control panel can communicate with a remote terminal or computer connected to its EIA-232 port (TB4), as described in Section 2.6 of this manual. Refer to the EIA-232D Protocol And Data Formats for the control panel, Document 50078, for a complete description of the remote terminal or computer. The EIA-232 port can be configured for interactive operation or for monitoring only. Interactive operation requires that all equipment be listed under UL Standard for Safety UL864 and be installed/configured as directed under Local Terminal Mode (LocT) or Local Monitor Mode (LocM). EDP-listed equipment is permitted for ancillary system monitoring when the system is installed/configured as directed under Remote Monitor Mode (RemM). Use of EDP-listed equipment is also permitted for system servicing or programming.

The EIA-232 ports on some terminals/computers, including the CRT, are not isolated from earth ground. These devices should be connected to the control panel via isolation modems, since their direct connection would introduce a ground fault.

There are three different operating modes for the EIA-232 port; **Local Terminal, Local Monitor, and Remote Monitor**. The operating mode is selected during panel programming, under the system parameters section (7=SYSTEM). The operation of each mode is described below.

## Modes of Operation

### Local Terminal Mode (LocT)

Local Terminal Mode operation lets you perform Read Status and Alter Status operations from the terminal. In addition you can also do Acknowledge, Signal Silence, System Reset, and perform a Drill functions from the CRT. A user-definable password is required to perform the Alter Status function. The functions described below are available when operating in Local Terminal Mode. The Terminal must be mounted in a UL-864 listed enclosure, a Notifier Rack-51, Rack-67 or arranged to provide equivalent protection against unauthorized use.

- **Read Status**

  Display the status of an individual point (detector, module, panel circuit, or zone)

  Display a list of all the points in alarm or trouble

  Display a list of all programmed points in the system

  Step through the history buffer event by event

  Display the entire history buffer

- **Alter Status**

  Disable/Enable an individual point

  Change the sensitivity of a detector

  Clear the verification counter of all detectors

  Clear the entire history buffer

  Set the AWACS Alert and Action levels

- **Control Functions**

  Acknowledge

  Signal Silence

  System Reset

  Drill

### Local Monitor Mode (LocM)

Local Monitor mode operation allows the same functions as Local Terminal mode with the exception that a password is required to perform Acknowledge, Alarm Silence, System Reset, and Drill. Because of this password security feature, the terminal does not need to be enclosed in a rack to prevent unauthorized use.

## Remote Monitor (RemM)

Remote Monitor mode operation only permits the user to perform the Read Status function.  This mode can be used with UL EDP listed terminals, including personal computers using *Notifier PK-200 release 2.0 software* or terminal emulation software.  It is also intended for terminals that are connected through modems connected through a public switched telephone network, such as the Notifier TP1-232 modem.

## CRT-2 Operation

### Read Status

To perform the Read Status function from the CRT, the operator simply presses the Read Status function key (F1).  The control panel responds with a menu which displays a number of options.

**User presses**                           **Control panel displays on CRT:**

[READ STATUS]

```
Read Point=0   Alm/Tbl Status=1   Read All Points=2   History Step=3/All=4
```

*Read Point* enables the operator to read the status of any point in the system (detectors, modules, panel circuits, software zones, and system parameters).

[0] [ENTER]

```
Enter D(Det.) / M(Mod.) / B(Bell) / Z(Zone),AA or S(system params.)
```

Enter the number of the detector, module, panel circuit or zone that you wish to read the status of.

[D] [2] [9]

[ENTER]

```
NORMAL SMOKE(PHOTO) DETECTOR ADDRESS 29 Z91Z  Z  Z  Z  0.00/2.00% *P*  D29
```

Pressing the PRIOR (F5) or NEXT (F6) function keys allows the user to step forward or backward through a list of devices.

[NEXT]

```
TROUBL SMOKE(PHOTO) DETECTOR ADDRESS 30 Z91 Z  Z  Z  Z  0.00/1.50% *P* D30
```

*Alm/Tbl Status* display a list of all the devices in the system that are either in alarm or trouble.

[1] [ENTER]

```
TROUBL HEAT(ANALOG) DETECTOR ADDRESS 06 Z91 INVALID REPLY   08:10A 08/20/97 D06
TROUBL SMOKE(PHOTO)DETECTOR ADDRESS 29 Z12 DEVICE DISABLED 08:10A 08/20/97 D29
TROUBL CONTROL         MODULE ADDRESS  21 Z00 OPEN CIRCUIT   08:10A 08/20/97 M21
```

*Read All Points* displays a list of all points programmed in the system. This list will display the status of all addressable detectors, modules, panel circuits, system parameters and software zones.

```
2   ENTER

NORMAL HEAT(ANALOG) DETECTOR ADDRESS 32 Z32 Z   Z   Z   08:10A 08/20/97 D06
NORMAL MONITOR        MODULE ADDRESS 02   Z01 Z   Z  Z   Z   08:10A 08/20/97 M02
OFF    BELL CIRCUIT PANEL CIRCUIT NO.3  Z00  Z   Z  Z   Z   08:10A 08/20/97 M02
```

*History-Step* allows the user to step through the history buffer using the PRIOR and NEXT keys. The first event displayed is the most recent event.

```
2   ENTER

SYSTEM  RESET                                      3:17A  Fri  08/20/97
```

Pressing the PRIOR key allows the operator to step back in time, one event at a time.

```
PRIOR

ACKNOWLEDGE                                        3:16A Fri  08/20/97
```

```
PRIOR

ALARM: SMOKE(PHOTO)  DETECTOR ADDRESS 29  ZONE 01       3:15A  08/20/97 D29
```

*History-All* sends the entire history buffer to be the CRT, from oldest event to newest.

```
4   ENTER

****************************** EVENT HISTORY START**************************
ALARM: HEAT(ANALOG)     DETECTOR ADDRESS 55  ZONE 55    3:10A  04/20/97 D55
ALARM: SMOKE(PHOTO)     DETECTOR ADDRESS 29  ZONE 01    3:15A  04/20/97 D29
ACKNOWLEDGE                                             3:16A  Fri  04/20/97
SYSTEM  RESET                                          3:17A Fri  04/20/97
***************************** EVENT HISTORY END ***************************
```

**Alter Status**

The Alter Status function allows the operator to enable or disable points, change detector sensitivity, globally clear the detector verification counters, clear the history buffer, and set AWACS Alert and Action levels. After pressing the Alter Status key, the following menu will appear:

**ALTER STATUS**

```
Enter Status Change Password or Escape to Abort
```

The Status Change Password must now be entered. The factory default Status Change Password is 11111. The password does not display on the CRT, five asterisks will display in place of the password.

**1** **1**
**1** **1** **1**
**ENTER**

```
*****
```

```
1=Disable 2=Sensitivity 3=Clear Verification 4=Clr History 5=Set Action/Alert
```

*Disable* allows the operator to enable or disable detectors, modules, or panel circuits.

**1** **ENTER**

```
Disable/Enable D(Det.) / M(Mod.) / B(Bell ckt.), AA
```

Enter the number of the detector, module, or bell circuit you wish to disable or enable. Example Notification Appliance Circuit (NAC) number 1.

**B** **0** **1**
**ENTER**

```
B01
```

```
B01 Now Enabled, Enter E(Enable) / D(Disable) or Esc. to Abort
```

*Sensitivity* allows the operator to change the sensitivity of any addressable detector in the system.

| 2 | ENTER |

Det. Sensitivity    Enter point: AA, E

Now enter the address of the detector you wish to change. *Example Detector 57.*

| D | 5 | 7 |

| ENTER |

D57 now Low sens. Enter H, M, or L to change, Esc. to Abort

*Clear Verification* enables the operator to clear the verification counter for all the addressable detectors in the system.

| 3 | ENTER |

Press Enter to Clear Verification Counts or Esc. to Abort

*Clear History* allows the operator to clear the entire history buffer.

| 4 | ENTER |

Press Enter to Clear History or Esc. to Abort

*Set Action/Alert* enables the operator to set the AWACS Alert and Action levels.

| 5 | ENTER |

Set % of Alarm: Alert(T) and Action(N)    Format:  TxxNxx    then
Enter

Enter the Alert and Action AWACS levels. *Example: Alert level=50% and the Action level=70%*

| T | 5 | 0 |

| N | 7 | 0 |

T50N70

| ENTER |

## CRT-2 Configuration

The CRT-2 must be set up to communicate with the control panel using the proper protocol. To enter the setup menu on the CRT-2, hold down the CTRL button while pressing the SCROLL LOCK key. There are thirteen groups of parameters that must be set. Each of these thirteen groups is reached by pressing the corresponding function key (F1 – F13). Use the arrow key to move through each setup group and use the space bar to view the options for each parameter.

**F1**

| | | |
|---|---|---|
| Emulation=Wyse-50+ | Comm Mode=Full Duplex | EIA Baud Rate=2400 |
| Aux Baud Rate=2400 | Enhanced=On | EIA Data Format=7/1/E |
| Aux Data Format=7/1/E | Language=U.S. | Sessions=One |
| Host/Printer=EIA/Aux | | |

**F2**

| | | |
|---|---|---|
| Emulation=Wyse-50+ | Enhanced=On | Auto Wrap=Off |
| Auto Font Load=On | Auto Page=Off | Auto Scroll=On |
| Monitor Mode=Off | Screen Saver=Off | Bell Volume=09 |
| Warning Bell=On | Host/Printer=EIA/Aux | Sessions=One |

**F3**

| | | |
|---|---|---|
| Page Length=24 | Screen Length=26 Lines | Screen Video=Normal |
| Display Cursor=On | Cursor=Blink Block | Auto Adjust Cursor=On |
| Columns=80 | Width Change Clear=Off | Speed=Normal |
| Scroll=Jump | Refresh Rate=60 Hz | Overscan Borders=Off |

**F4**

| | | |
|---|---|---|
| Language=U.S. | Char Set Mode=PC | Key Mode=ASCII |
| Keyclick=Off | Key Repeat=Off | Margin Bell=Off |
| Key Lock=Caps | | |

**F5**

| | | |
|---|---|---|
| Enter Key=<CR> | Return Key=<CR> | Backspace=<BS>/<DEL> |
| Alt Key=Meta | Desk Acc=Disabled | Pound Key=U.S. |

**F6**

| | | |
|---|---|---|
| EIA Baud Rate=2400 | EIA Data Format=7/1/E | EIA Parity Check=On |
| Aux Baud Rate=2400 | Aux Data Format=7/1/E | Aux Parity Check=On |
| EIA Xmt=Xon-Xoff | EIA Recv=Xon-Xoff(XPC) | EIA Xmt Pace=Baud |
| Aux Xmt=Xon-Xoff | Aux Recv=Xon-Xoff(XPC) | Aux Xmt Pace=Baud |
| EIA Break=Off | EIA Modem Control=Off | EIA Disconnect=2 sec |
| Aux Break=Off | Aux Modem Control=Off | Aux Disconnect=2 sec |

**F7**

| | | |
|---|---|---|
| Comm Mode=Full | Duplex  Local=Off | Recv <CR>=<CR> |
| Recv <DEL>=Ignore | Send ACK=On | Send Line Term=<US> |
| Send Block Term=<CR> | Null Suppress=Off | |

**F8**

Prnt Line Term=<CR><LF>        Prnt Block Term=<CR>        Secondary Recv=On

**F9**

| | | |
|---|---|---|
| Page Edit=Off | WPRT Intensity=Dim | WPRT Reverse=Off |
| WPRT Underline=Off | WPRT Blink=Off | Display NV Label=Off |
| Save Labels=On | Status Line=Off | |

**F10 and F11**

*Note: No functions in setup groups F10 and F11 will affect communications with the control panel.*

**F12**

The function keys on the CRT-2 should be programmed 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 | |

Upon the completion of programming of all the setup groups, press the **Pause** key, then press Y (yes) to save all changes.

## Upload/Download

The EIA-232 port of the control panel may also be used to upload and download the operating program of the control panel. The operation of the upload/download software (PK-200) is described in the PK-200 Off Line Programming Utility manual. Download operations which change the basic program of the control panel must be done with responsible service personnel in attendance at the control panel. After a program is downloaded, the control panel must be tested is accordance with NFPA 72-1993.

# Appendix J – AVPS-24 Power Expansion

## General Description

The notification appliance power available from the control panel can be increased by three amperes when adding an AVPS-24/AVPS-24E to the system. The AVPS-24/AVPS-24E must be mounted in the battery compartment of the cabinet and the batteries must be relocated to the BB-17 Battery Box. The AVPS-24/AVPS-24E supplies a maximum of 3.0 A to the notification appliances connected to circuits three and four combined, however the maximum current from any one circuit is limited to 2.5 A. Since the AVPS-24/AVPS-24E supplies special purpose (unfiltered, unregulated) power, only compatible notification appliances listed in the Device Compatibility Document can be connected to circuits three and four.

## AC Power

AC power required for the AVPS-24 is 120 VAC, 50/60 Hz, 1.0 A and AC power required for the AVPS-24E is 220/240 VAC, 50/60 Hz, 0.5 A.

## Programming

The control panel must be programmed to supervise the AVPS-24/AVPS-24E. To program supervision for an AVPS-24/AVPS-24E, enter a "Y" in the SYSTEM screen after "AVPS=". A control panel programmed for an AVPS-24/AVPS-24E cannot be used in a combination Fire/Burglary application, since the AVPS-24/AVPS-24E trouble input is the same input used to monitor the door tamper switch (STS-200).

Programming menu selection **#7 SYSTEM**

| | |
|---|---|
| SIL INH=000 | AUTO=000 |
| VERIFY=00 | USA TIME |
| ANNUN=NONE | SUPV LocM |
| BLINK=Y    ST=4 | **AVPS=Y** |

## Supply Calculations

Supply calculations for systems with an AVPS-24/AVPS-24E are as follows.

- Add 1.0 A for the AVPS-24 and 0.5 A for the AVPS-24E to the AC branch circuit current in **Table A-1**
- Do not include the load current on bell circuits 3 and 4 in the 5.0 A limitation in Table A-4 notes.
- Include the load current on bell circuits 3 and 4 in the 5.0 A limitation in Table A-6 notes.

System alarm current limitations with an AVPS-24/AVPS-24E installed follow:

- TB1, terminals 1 and 2 = 1.5 A
- TB1, terminals 3 and 4 = 0.5 A
- TB1, terminals 5 and 6 = 0.5 A
- TB1, terminals 3 and 4 combined with terminals 5 and 6 = 0.5 A
- All circuits on TB1 combined with TB2 terminals 1, 2, 3, and 4 = 5.0 A
- TB2, terminals 5, 6, 7 and 8 combined (bell circuits (NACs) 3 and 4) = 3.0 A
- TB2, any one circuit = 2.5 A

## Installation

1. Mount the AVPS-24/AVPS-24E as shown in Figure J1.
2. Connect the AVPS-24/AVPS-24E and the control panel as follows:
   Earth Ground (green): AVPS-24/AVPS-24E, TB1 terminal 6 connects to control panel TB7 terminal 3.
   AC Hot (black): AVPS-24/AVPS-24E , TB1 terminal 5 connects to control panel TB7 terminal 1.
   AC Neutral (white): AVPS-24/AVPS-24E, TB1 terminal 4 connects to control panel TB7 terminal 2.
   Battery (–): Black wire from the battery cable connects to AVPS-24/AVPS-24E  TB1 terminal 3.
   Battery (+): Red wire from the battery cable connects to AVPS-24/AVPS-24E TB1 terminal 2.

3. Connect AVPS-24/AVPS-24E output to control panel Notification Appliance Circuits 3 and 4 as follows:

   Cut jumpers JP6 and 7, located in the top center of the control panel circuit board.

   Plug the bell power cable, PN 71093 into plug J10. Plug J10 is located in the top center of the control panel circuit board.

   Connect J10 (–) to TB2 terminal 2 on the AVPS-24/AVPS-24E.

   Connect J10 (+) to TB2 terminal 1 on the AVPS-24/AVPS-24E.

4. Connect the AVPS-24/AVPS-24E trouble output to the control panel as follows:

   Cut jumper JP3, located in the bottom right center of the control panel circuit board.

   Plug the gray trouble cable, PN 71033 into Plug J11 with the wires exiting the connector on top. Plug J11 is located in the bottom right center of the control panel circuit board.

   Plug the other end of the cable into P1 with the wires exiting from the bottom.

5. Primary power is connected to the AVPS-24/AVPS-24E as follows:

   Connect earth ground to TB1 terminal 6, connect AC hot to TB1 terminal 5, and connect AC neutral to TB1 terminal 4.

6. Battery Connections:

   Connect the battery (–) to AVPS-24/AVPS-24E TB1 terminal 3. Connect the battery (+) to AVPS-24/AVPS-24E TB1 terminal 2.
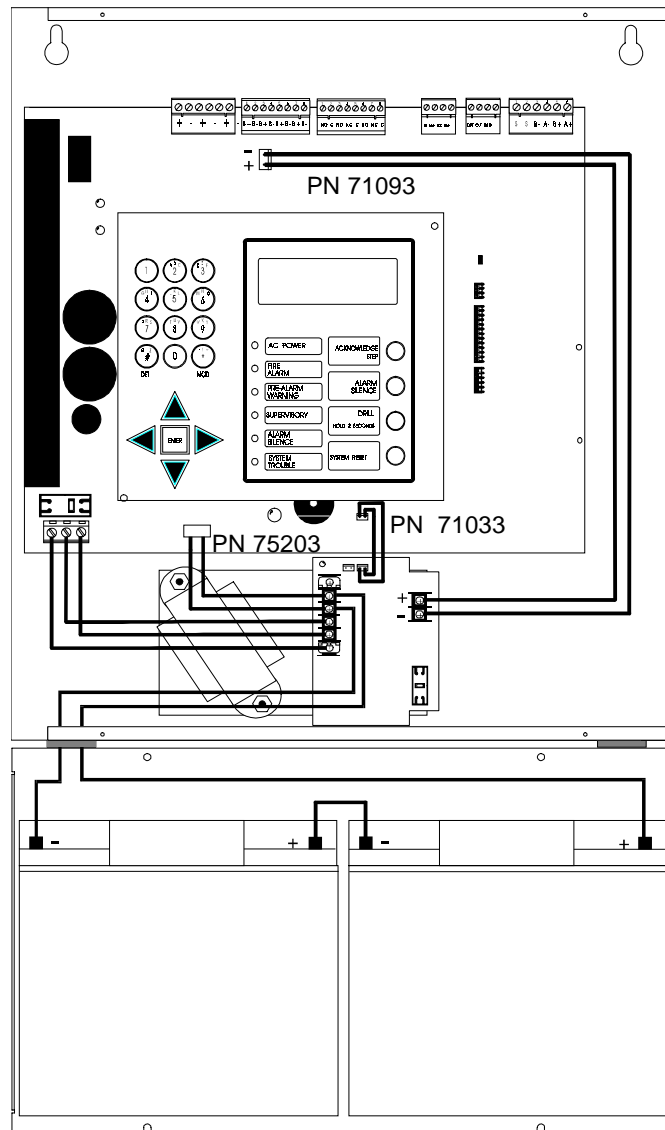


**Figure J-1   AFP-200/AVPS-24 Power Expansion**

# Appendix K – UL Power-limited Wiring Requirements

## General Description

Power-limited and nonpower-limited circuit wiring must remain separated in the cabinet.  All power-limited circuit wiring must remain at least ¼ inch away from any nonpower-limited circuit wiring.  Furthermore, all power-limited and nonpower-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits.  A typical wiring diagram for the AFP-200 is shown in Figure K-1.

## RTM-8 Relay Transmitter Module

Refer to Figure 2-35 for additional information on this module.  Figure K-1 below shows the RTM-8 Module installed in the AFP-200.  Power-limited and nonpower-limited wiring must maintain a minimum distance of ¼ inch wire to wire.  Note that a gap of ¾ inch exists between relay four and relay five.  It is recommended that if using this module to drive both power-limited and nonpower-limited circuits, use the first four relays to drive power-limited circuits and the next four relays to drive nonpower-limited circuits.  Using relays 5-8 for non-power-limited circuits allows grouping them with the transmitter output nonpower-limited wiring.

If using all relays as power-limited circuits, the .25 inch gap between relay eight and the nonpower-limited transmitter output terminal meets UL power-limited wiring requirements.
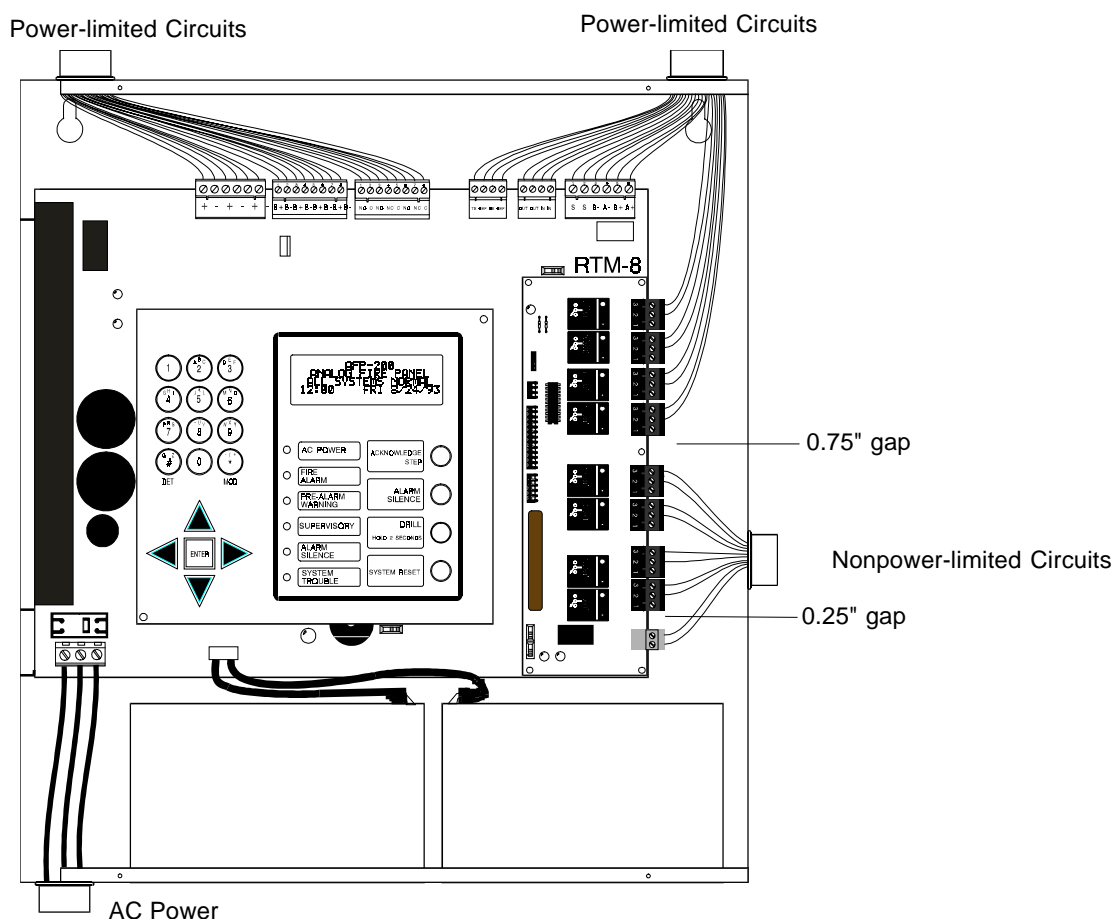


**Figure K-1 – Typical Wiring Diagram for UL Power-limited Requirements**

# Appendix L – U.S. Coast Guard

Following is a list of equipment suitable for use in marine and shipyard applications as compatible with the AFP-200.

**ABM-16AT** Annunciator Blank Module
**ABM-32A** Annunciator Blank Module
**ACM-16AT** Annunciator Control Module
**ACM-32A** Annunciator Control Module
**ACM-8R** Annunciator Control Module (Relay)
**AEM-16AT** Annunciator Expander Module
**AEM-32A** Annunciator Expander Module
**AFM-16A** Annunciator Fixed Module
**AFM-16AT** Annunciator Fixed Module
**AFM-32A** Annunciator Fixed Module
**AVPS-24** Audio/Visual Power Supply
**B401B** Detector Base
**B402B** Four-Wire Detector Base
**B501** Flangeless Base for Intelligent Detectors
**B501BH** Sounder Base
**BGX-101L** Addressable Manual Pull Station
**BX-501** Base for all Intelligent Detectors/Sensors
**CAB-AM** Cabinet for Marine Applications
**CMX-1** Addressable Control Module
**CMX-2** Addressable Control Module
**CP-651** Ionization Detector
**CPX-551** Intelligent Ionization Smoke Detector
**CPX-751** Intelligent Ionization Smoke Detector
**CRT-2** Video Display Monitor with Keyboard
**DHX-501** Duct Housing
**DHX-502** Duct Housing
**Drip Shield Kit Alternate to CAB-AM**
**FDX-551** Intelligent Thermal Sensor
**ISO-X** Loop Fault Isolator Module
**LCD-80** Liquid Crystal Display Module
**LDM-32** Lamp Driver Module
**LDM-E32** Lamp Driver Module
**LDM-R32** Lamp Driver Module
**LP-610** Smoke Detector Base
**MMX-1** Addressable Monitor Module
**MMX-2** Addressable Monitor Module
**MMX-101** Addressable Mini Monitor Module
**PRN-4** 80-Column Printer
**N-ELR** Assortment Pack with Mounting Plate
**N-ARA-10** Agent Release Pull Station
**NIB-96** Network Interface Board
**NR45-24** Notifier Remote Battery Charger
**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-47K** 47K End-of-Line Resistor
**R-470K** 470K End-of-Line Resistor
**RTM-8** Relay Module

**SB-10** Surface Backbox
**SMB-500** Surface Mount Box
**SDX-551** Intelligent Photoelectric Detector
**SDX-751** Intelligent Photoelectric Detector
**SD-651** Photoelectric Detector

**System Sensor**
**1400** Smoke Detector
**1451** Smoke Detector
**2400TH** Smoke Detector with Thermal
**2451** Smoke Detector
**A2143-00** End-of-Line Resistor Assembly
**A77-716B** End-of-Line Power Supervision Relay
**MA-24** Electronic Sounder, 24 VDC
**MA-24D** Sounder, 24 VDC
**MASS24110ADA** 24 VDC Sounder/Strobe 110 CD
**MASS2415ADA** 24 VDC Sounder/Strobe 15 CD
**MASS241575ADA** 24 VDC Sounder/Strobe 15/75 CD
**MASS2475ADA** 24 VDC Sounder/Strobe 15/75 CD
**MASS24LO** 24V Red Sounder/Strobe
**MASS24LOC** 24V Sounder/Strobe Ceiling
**PS24LO** 24V Red Sounder Strobe
**RA-400/RA400Z** Remote LED Assembly
**SS-24** Strobe 24 VDC
**SS24110ADA** 24 VDC Sounder/Strobe 110 CD
**SS2415ADA** 24 VDC Sounder/Strobe 15 CD
**SS241575ADA** 24 VDC Sounder/Strobe 15/75 CD
**SS2475ADA** 24 VDC Sounder/Sounder 75 CD
**SS24LO** 24 V Red Sounder Strobe
**SS24LOC** 24V Sounder/Strobe Ceiling

**Hochiki**
**HSC-200** Detector Base
**HSC-4R** Four-Wire Detector Base
**SIH-24F** Smoke Detector
**SLK-24F** Smoke Detector

**Wheelock**
**7002T-24** Horn with Strobe, 24 VDC
**MB-G6-24-R** Bell 6" Gong 24 VDC Red
**MB-G10-24-R** Bell 10" Gong 24 VDC Red

**Fenwal**
**27121-0** 140 Degree F. Thermal Detector
**27121-0** 190 Degree F. Thermal Detector
**27121-0** 225 Degree F. Thermal Detector

# Notes

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