

# P110 Installation Manual

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# 1 Safety messages

People's lives depend on your safe installation of our products. It is important to read, understand and follow all instructions shipped with this product. The equipment described herein is listed by the NRTL only when installed and configured in the manner described herein

It is possible to install equipment incorrectly or arrange system components and installation wiring in such a manner that life safety functions are not properly performed and, as a result, lives may be lost. To minimize this possibility, become familiar with the system layout and operation of the entire Fire-Protective Signaling System. Do not alter any mechanical or electrical features of the equipment supplied. Become familiar with the Building Code and Fire Prevention Code or other authority having jurisdiction requirements in the area of the installation.

The Facilities Engineer and the Safety Engineer should make selection of mounting location for this equipment and routing of wiring. Listed below are some other important safety instructions and precautions you should follow:

- This unit must be installed by a qualified electrician in accordance with NFPA 72, and national and local electrical and fire codes, under the direction of the authority having jurisdiction.
- Only authorized and competent personnel must be allowed access to panel controls or panel power source, to limit the possibility of malfunction or failure.
- Do not connect this unit to system wiring when circuits are energized. Check field wiring lines to ensure that voltages are not present. Warranty is void if the equipment is damaged by improperly connected untested wiring or if fused improperly.
- The equipment must be connected to a dedicated source of reliable AC power adequate for the rating of the system as configured. The source must be secure and properly labeled "Fire Alarm Circuit Control".
- A suitable battery set must be used to assure required operation in case of primary power loss. The battery set must be replaced after 4 years, or earlier if capacity is excessively reduced. The batteries should be checked at least twice per year, or more often if required by local codes.
- Wiring used in the system must be adequate for the service and installed in accordance with applicable codes.
- Devices used in the system and connected to the control panel must be verified compatible with the panel.
- All effective warning speakers produce loud sounds which, in certain circumstances, may cause permanent hearing loss. Take appropriate precautions such as wearing hearing protection. Recommendations in OSHA Sound Level Standard (29 CFR 1910) should not be exceeded.
- After installation and completion of initial system test, provide a copy of this instruction sheet to all personnel responsible for operation, periodic testing and maintenance of this equipment.
- After installation, ensure that all bolts and threaded joints are tightened.
- After installation and completion of initial system test, a program for periodic testing of this device must be established. Proper periodic maintenance is required to assure operation through the life of the system, and to determine that point at which useful life of the system or of any of its components has been reached. Any malfunctioning units must be repaired or replaced immediately by competent, authorized personnel. Refer to NFPA 72, local Fire Codes and the authority having jurisdiction.
- Instructions for proper response by building occupants must be developed and distributed in accordance with the Building Code and Fire Prevention Code or other authority having jurisdiction.
- Unauthorized repair or servicing of equipment may result in degradation of performance and/or property damage, serious injury, or death to you or others. If a malfunctioning unit is encountered, do not attempt any field repair/retrofit of parts.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you and others.

The programming technician is ultimately responsible for conformance to the applicable codes and purchase order.

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This manual cannot cover all details or contingencies which could exist in a system application. Refer to the authorized distributor if additional information is required.

Specifications are subject to change without notice.

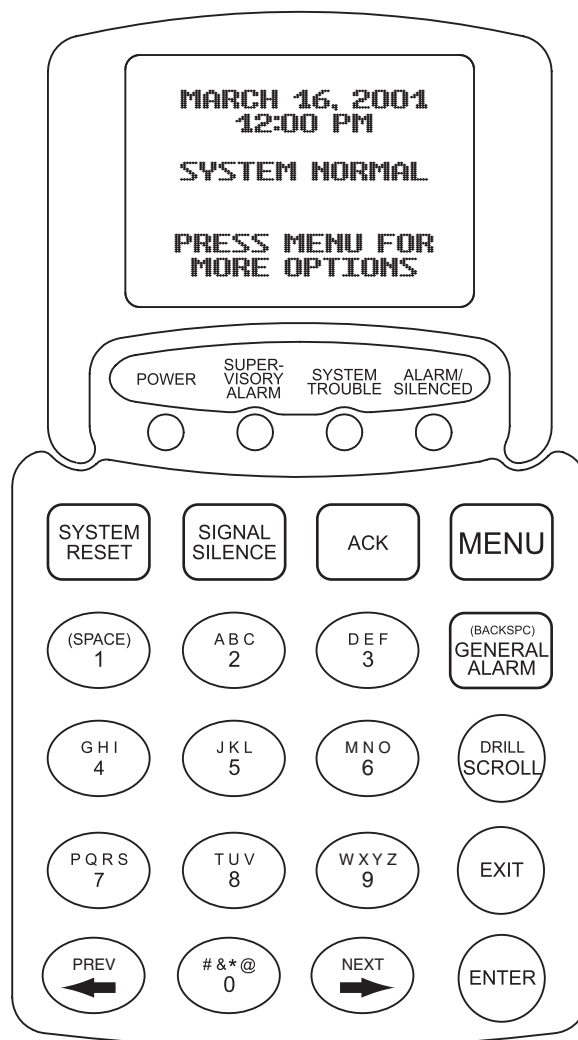
## 2 Description and specifications

### 2.1 General

The P110 Fire Alarm System is designed for economy and ease of installation and troubleshooting. It contains an interface for a single SLC, has two built-in notification appliance circuits (NACs), and three on-board relay outputs (alarm, trouble, and supervisory alarm). The P110 uses System Sensor addressable detectors and modules. LCD annunciators provide annunciation and control of the system. The Auto-Learn feature can be used to quickly configure a system and additional system configuration can be done completely through the annunciator or with an optional PC interface. Options include: PDACT communicator, NAC expander, meter display, remote relays, and serial/parallel ports (for connection to a PC).

### 2.2 User control interface

All system control is through an annunciator (at least one is required, up to 10 are allowed) and each annunciator has full display and control facilities. The main status display is an LCD screen with 8 line by 16 character text capability. LEDs indicate Alarm (red), Trouble (yellow), Supervisory alarm (yellow), and AC Power ON (green). A piezoelectric sounder provides audible annunciation of off-normal indications: alarm (steady on), supervisory alarm (fast pulse), or trouble (slow pulse).



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Figure 2-1. Control interface.



Control switches include direct selections for Reset, Silence, Acknowledge, General Alarm, and Drill.

Security is provided by a locking door and a keyswitch. Buttons on the keypad are not accessible unless the keyswitch is activated. Maintenance and programming functions are further protected by passwords (entering the password locks out any other annunciator from maintenance or programming).

## 2.3 Main circuit board

The main circuit board contains the system processor and non-volatile memory for system firmware and configuration database. Wiring terminals are provided on the main circuit board for line power, auxiliary power (non-resettable and resettable), P110 network, two NACs, and three auxiliary relays (alarm, trouble, and supervisory alarm). Two connections for transformers are on the circuit board and a connector for the battery. The motherboard has locations for mounting an SLC interface, a PDACT communicator, a NAC expansion card, and a meter display. A heartbeat pattern on the main circuit board LED indicates that the processor is executing properly.

## 2.4 Power supply

One transformer is required, which provides up to 2A of system output. Another transformer may be added to increase the system output to 6A. Two 12V sealed lead acid batteries are used for standby power.

**Table 2-1: Power specifications**

Specification	Rating	
	With 1 PX3 transformer	With 2 PX3 transformers
Line (input)	120VAC, 60 Hz 0.6A standby, 0.7A alarm	120VAC, 60 Hz 0.65A standby, 2.0A alarm
Branch circuit rating	15A	15A
Available system current	2A	6A
Standby	24VDC* (2 - 12V sealed lead acid batteries)	
Max standby capacity	72AH	
Battery charger	1.75A max current, 27.5V float voltage	

\* See *Appendix C Battery Size Calculations* for required standby capacity.

## 2.5 Input circuits and groups

The P110 uses devices from the System Sensor family of addressable detectors and function modules. Compatible devices are listed in *Appendix A Options and Compatible Devices*. The system has a single addressable SLC accepting up to 99 detectors and 99 function modules, connected in Styles 4 or 6, or Style 7 with M500X isolators.

Input devices can be placed into input groups. The P110 allows for up to 200 input groups.

**Table 2-2: SLC specifications for Model P1SS**

Specification	Rating
Number of SLCs	1
Wiring styles	Style 4 or 6, Style 7 (with M500X isolators)
Operating voltage	24VDC, power limited
Max number of devices	99 sensors and 99 modules
Compatible devices	System Sensor devices, see <i>A.2 Compatible SLC devices</i>
Max total line resistance	40 ohms (20 ohms per wire)
Max total line capacitance	0.5 uF (wire only), 52,000 uF (devices only)
Max total line length	See <i>B.1 Wire Selection Tables</i>



## 2.6 Output circuits and groups

Built into the basic P110 system control are two NACs. The optional P1N2 NAC expansion board adds two NACs. Each NAC may be configured as silenceable or non-silenceable and wired as Style Y (Class B) or Style Z (Class A). Three independently configurable sounding patterns are available: steady on, march time (fast or slow), and temporal. On-board NACs are each rated 3A, 24V FWR and expansion NACs are each rated 2A 24V FWR. Total NAC power is limited to available system power.

The NACs are supervised for short, open or ground fault conditions. An end of line resistor is required for Class B wiring. Class A wiring does not use the end of line resistor.

Auxiliary relays provide Form C contacts for alarm, trouble, and supervisory alarm conditions. Up to 5 P1R relay modules can be added to the system to provide additional programmable relays. The relays are rated 10A at 277VAC or 5A at 30VDC.

NACs and relays can be configured to activate upon initiation from any input group. NACs and relays can be placed into output groups. The P110 allows for up to 32 output groups.

**Table 2-3: NAC specifications for main circuit board and Model P1N2**

Specification	Rating
Number of NACs	2 built-in, expandable to 4 with Model P1N2
Wiring styles	Style Y (Class B) or Style Z (Class A)
Operating voltage	Regulated 24V FWR
Max current	3A per NAC* (main board), power limited 2A per NAC* (on P1N2), power limited
Compatible devices	See A.3 <i>Compatible NAC devices</i>
End of line device	R5.1K
Max total line length	See B.1 <i>Wire Selection Tables</i>

\* Within limits of system current (see Table 2-1: Power specifications)

**Table 2-4: System relay specifications**

Specification	Rating
Number of relays	1 alarm, 1 trouble, 1 supervisory alarm (all are common)
Type	Form C
Contact rating	5A @ 30VDC, 10A @ 277VAC
Power factor	1.0

**Table 2-5: Auxiliary power circuits specifications**

Specification	Rating
Number of circuits	1 resettable, 1 non-resettable
Operating voltage	24VDC
Combined max current	1A standby*, power limited 2A alarm*, power limited

\* Within limits of system current (see Table 2-1: Power specifications)

## 2.7 Network

The P110 network consists of one control panel and up to 10 network devices. Network connections use 4-conductor wire with two twisted pairs. One pair carries power (24VDC) and the second carries RS-485 communications. Network devices may be connected in a style 4 or 6 configuration. Network devices include P1A LCD annunciator, P1R remote relay assembly (to expand contact-closure applications) and P1O communication interface for serial communication with a PC. These devices are mounted in separate enclosures.



**Table 2-6: Network circuit specifications**

Specification	Rating
Communication protocol	RS-485
Number of circuits	1
Wiring styles	Style 4 (Class B) or Style 6 (Class A)
Compatible devices	See <i>A.5 Compatible devices for network</i>
Max number of devices	10 devices or 2A load current*, whichever is greater power limited
Max total line length	See <i>B.1 Wire Selection Tables</i>
Max total line resistance	100 ohms (50 ohms per wire)

\* Within limits of system current (see *Table 2-1: Power specifications*)

## 2.8 External Communications

For transmitting control signals and data outside the system, several capabilities are included. The main control assembly includes relays to indicate alarm, trouble, and supervisory alarm conditions. Modules on the addressable loop may also be used for appropriate control functions where convenient. Other communications devices include:

PDACT: digital alarm communications transmitter allowing transmission of point data to a SIA Level 1 receiver.

P1O: for connection to a PC for programming (up to 1 P1O devices allowed).

P1R: remote relay accessory with 8 programmable relays (up to 5 P1R modules allowed).

UCT: for remote station communication

## 2.9 Additional functions and features

The P110 system also includes the following capabilities:

- Remote operation of Reset, Silence, General Alarm, Alert, Recall, and Drill functions
- Drift compensation for addressable sensors
- Pre-alarm, pre-signal, positive alarm sequence (PAS), and alarm verification by point
- Auto-Learn with configuration verification/comparison functions
- Audible or silent one-man walk test
- 500 event history record
- Pullstation response time of 2 seconds maximum
- Devices may be individually enabled or disabled
- Devices may be individually verified

## 2.10 System programming

The initial Auto-Learn assigns all devices a set of initial default parameters and assigns them to a common general-alarm zone. Subsequent Auto-Learn verifies via user confirmation those items that are different from the current operating configuration to assure complete programming. The user then enters the full operating configuration to be used.

## 2.11 Enclosure

The control panel is housed in a wall-mount cabinet, including up to 12Ah backup batteries. Larger batteries may be mounted in an auxiliary UL864 Listed cabinet.

Annunciators are contained in a wall-mounted enclosure, model P1-CABA.

**Table 2-7: P110-CAB Enclosure specifications**

Specification	Rating
Overall dimensions (inches)	25.25H x 15.75W x 4.625D

**2.12 Service use**

The P110 is intended for commercial applications and indoor, dry environments.

- Local
- Remote Station (requires Model UCT or PDACT)
- Central Station (requires Model PDACT)

**2.13 Listings and approvals**

UL Listed: File S1411 (Guide UOJZ, UL864)

CSFM Listed





## 3 Installation and Wiring

Installation of the P110 panel and system accessories requires qualified, trained, and equipped personnel who are familiar with both the fire alarm codes and installation methods for this specific equipment. Final programming requires special familiarity with the applicable local codes. The versatility of this system implies sensitivity to mishandling and misprogramming beyond that of less capable equipment.

### 3.1 Parts Supplied for installation

- Transformer
- Control panel including enclosure, front keypad, and main board
- Battery cable
- Test resistors
- SLC
- Other optional modules may be purchased separately

### 3.2 Preparation

To avoid degradation of the operating circuitry, it is recommended that the printed circuit boards be removed during cabinet mounting, wire installation, and any other procedures that may introduce dust, metal shavings, grease or any other foreign matter into the area of the electronic circuitry.

**WARNING:** *In an extended system, there may be several sources of power on devices connected into the control unit. All power must be disconnected during installation or wiring of system components and not introduced until installation is complete and checked out.*

### 3.3 Panel Location

The control unit should be located on the ground floor and easily accessible to authorized personnel. The area should be reasonably free of dust, vibration, and moisture, and a dedicated source of power must be available. The mounted enclosure should normally be at a convenient height to facilitate servicing.

Annunciators should be mounted at convenient locations, at approximately eye-level.

### 3.4 Mount the enclosure

The P110 enclosure may be either surface or flush mounted. Directions for mounting are below.

If flush mounting, cut a hole in the wall to accommodate the backbox.

Use four #10 lag screws or other suitable fasteners (not included) to mount the control unit back box to the wall, as shown in the figure. The mounting fasteners must be adequate to support up to 30 pounds, including the control unit, optional devices, battery set, and conduit connections.

If an auxiliary power supply or battery enclosure is being used at the panel, it may be mounted directly below the main panel enclosure, close nipped, with a minimum of 1 inch between enclosures for door clearance. Wiring to these devices should be as short as possible to minimize voltage drop

### 3.5 Prepare for wiring

Break out the required entry points and attach any required conduit. Run the system wires and label each adequately for future reference. The cabinet door may be removed for easy access to the cabinet by removing the screw at the bottom hinge.

Note that the code requirements for power-limited wiring apply to most external runs, and the requirements for non-power-limited wiring apply to the mains power input(s).

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### 3.6 Install the main circuit board and transformer

Mount the main circuit board onto the standoffs with the board oriented as shown in Figure 3-1. Figure 3-1. Wiring. Insert the transformer into the enclosure slots so that the connector mates with P1 and secure the transformer with the bar. Install the second transformer, if used, in a similar manner so that it mates to P5 of the main circuit board.

### 3.7 Install optional accessories

To install accessory assemblies, follow installation instructions provided with the accessories.

### 3.8 Connect AC power

Wire the dedicated AC supply line to the terminals on the main circuit board as shown. The supply should have a separate fuse or breaker at the main distribution panel so that no other electrical devices can initiate power loss in the circuit. Be sure that the ground terminal is wired directly to the electrical panel ground bonding point or another acceptable earth ground. The neutral wire must connect to the electrical panel neutral distribution bar and not directly to ground.

**WARNING** *Dangerous voltages appear on these terminals and associated circuitry when the AC supply is turned on. Be sure the circuit is protected from inadvertent energization during the assembly process.*

### 3.9 Connect external circuits

When all remote devices have been connected to their circuits, connect these circuits to the panel according to the wiring diagram.

**CAUTION:** *To maintain proper operation and supervision of sensors, indicators, and modules, it is necessary that wiring instructions with the devices be followed exactly, particularly with regard to in and out connections to the devices. It is also necessary that each addressable device be properly programmed with address and status (if applicable), and in conformance with the building system layout. Misaddressed or miswired devices may cause severe malfunctions and be difficult to locate.*

### 3.10 Mount the door

- Mount the door onto the hinge pins on the back box and secure with the screw at the bottom hinge.
- Frame and mount a copy of the operating instructions found in the appendix of the P110 operation manual to the wall near the panel.

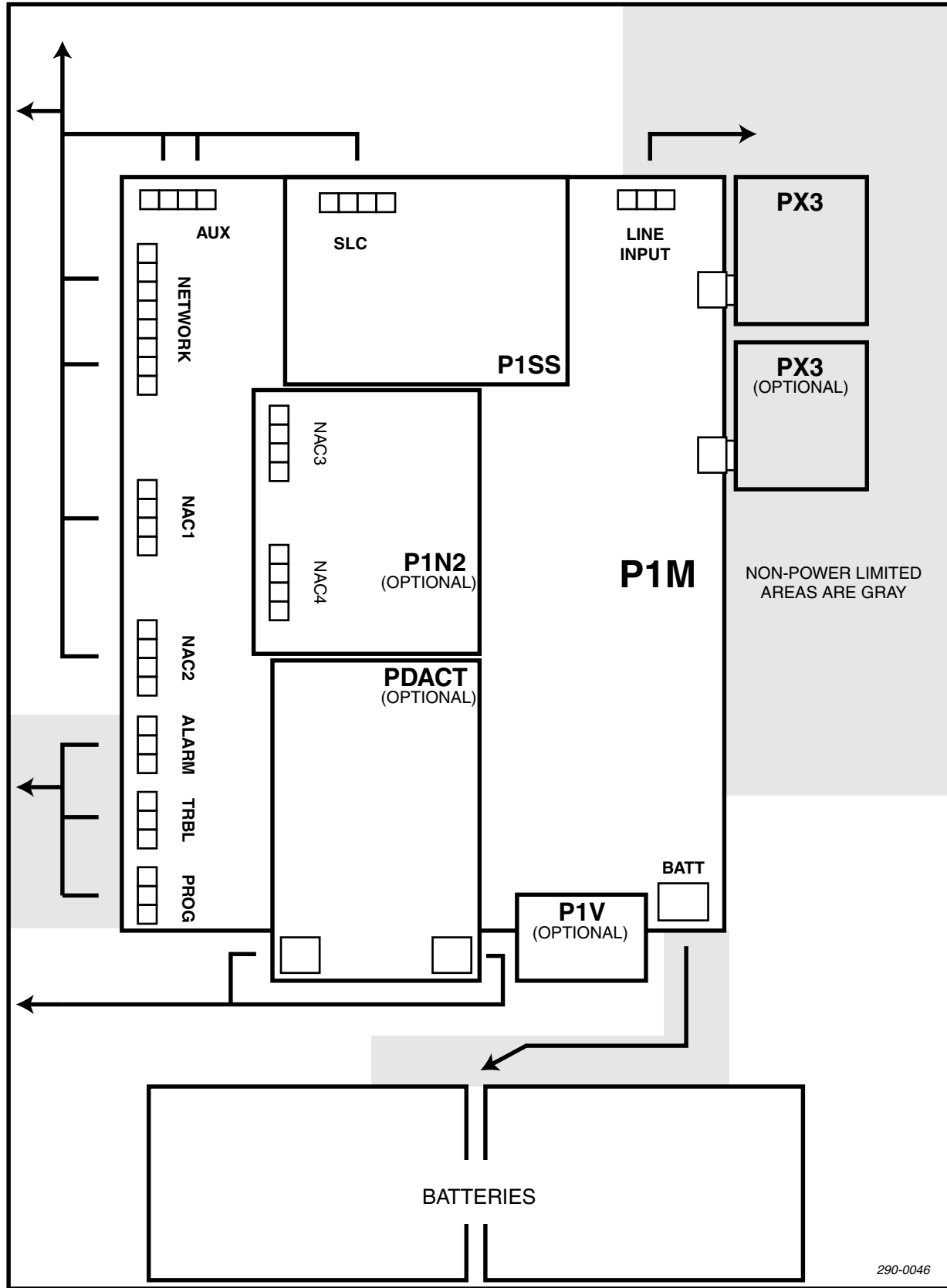
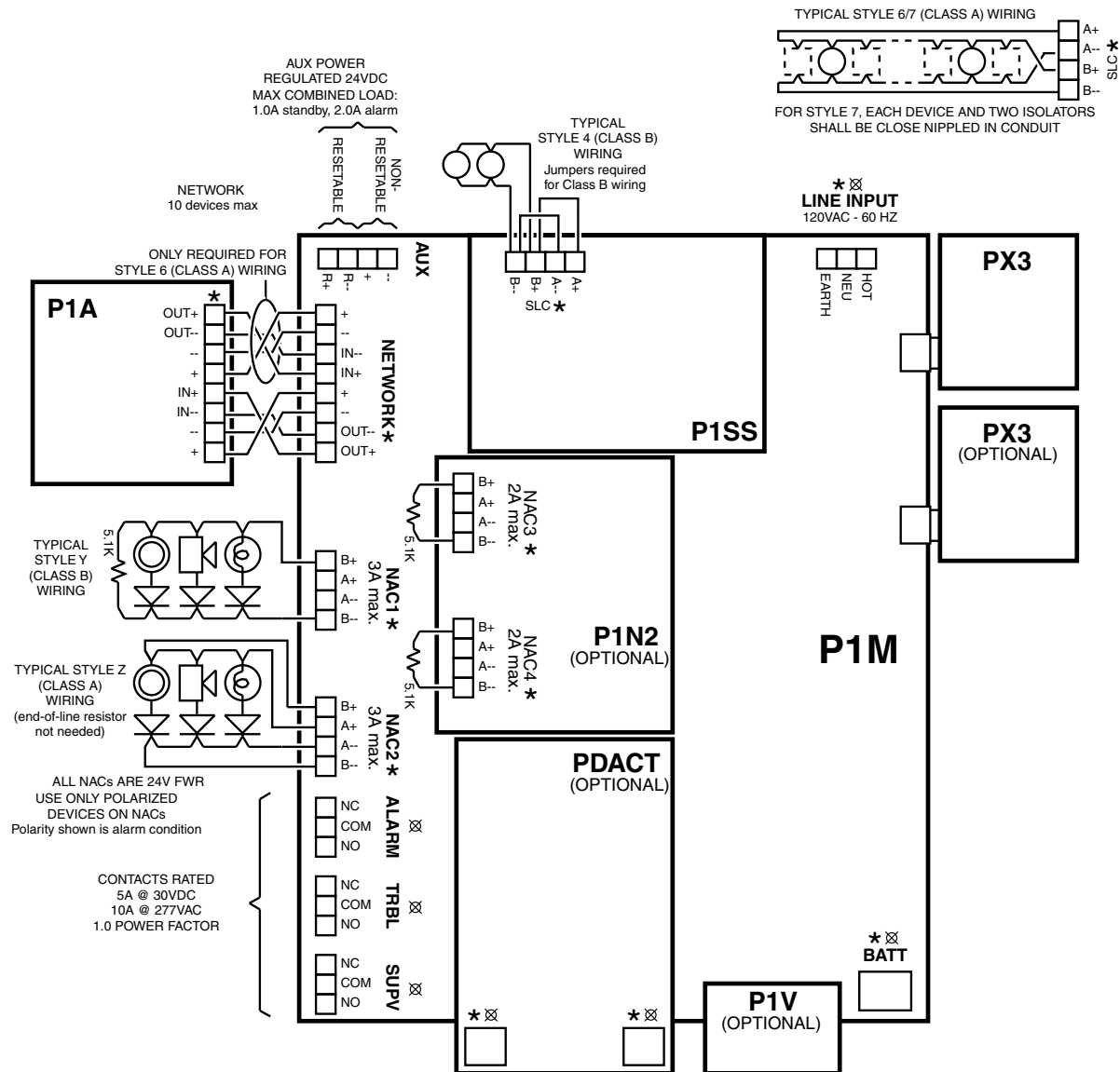


Figure 3-1. Wiring.

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**SUPERVISED AND POWER LIMITED**

- ★ Marks supervised circuits
- ☒ Marks non-power limited circuits (all others are power limited)

- NOTES:**
- 1) Use only smoke sensors that are listed in compatibility listing in owner's manual.
  - 2) Leave end-of-line test resistors on unused circuits.
  - 3) Combined load of all external devices, including indicating appliances, is not to exceed 2A when one transformer (PX3) is used and not to exceed 6A when two transformers are used.
  - 4) All EOL resistors are 5.1K (#024-4556)

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**Figure 3-2. Wiring.**



### 3.11 Install batteries

**WARNING:** *Improperly connecting or shorting the battery terminals may cause severe damage to the panel and/or batteries and might result in personal injury.*

Place the required batteries in the space provided at the bottom of the control panel enclosure. If a battery set larger than 7AH is required, an additional battery enclosure is required.

The 24V battery set required by the panel consists of two 12V sealed lead-acid batteries mounted as shown and connected in series. The series connection is made using jumper on the battery cable assembly as shown in the diagram.

Mate the polarized battery cable to the main circuit board and attach the red wire to the red or + terminal of the battery set. Attach the black wire to the black or – terminal of the battery.

### 3.12 Apply system power

Energize the AC power lines to the panel. The AC Power LED at the annunciator should be illuminated.

### 3.13 Check system operation

Initial acceptance testing is required before normal operation of the system. Inspection, testing, and maintenance may be performed by the owner, if qualified, or by a qualified contractor. Service personnel must be qualified and experienced in inspection, testing, and maintenance of fire alarm systems, including certification by the manufacturer or a recognized authority.

Any individuals or facilities receiving transmitted alarm, supervisory, or trouble signals, and all building occupants, must be notified before commencement and on completion of any test operations, to prevent unnecessary response.

Initial acceptance testing includes complete visual inspection and verifying the following items:

- Correct function of the control panel in receipt of all functional inputs and operation of all signals and auxiliary functions, and supervision of shorts, opens, grounds, power supply faults and battery faults.
- Instrument measurement of the integrity and isolation of all applicable conductors (unpowered).
  - No improper shorts or opens.
  - No stray voltages between installation conductors and other conductors or ground. The maximum stray voltage must not exceed 1 volt ac/dc.
  - All conductors not intentionally grounded must be isolated from ground by at least 20k ohms.
  - All conductors not intentionally connected together must be isolated from each other and from ground by at least 20k ohms.
- Loop resistance of each initiating and indicating circuit conductor loop must be recorded and must not exceed the resistance of the equivalent of maximum wire length and end-of-line device.
- Operation of lamps, LEDs, and displays
- Rated power supply load, and charging capability and parameters.
  - Power supply must be tested under worst-case maximum load with the battery disconnected.
  - With the batteries charged and on trickle charge from the power supply, the terminal voltage shall be between 27.4vdc and 27.6 vdc.
- Visual inspection of the batteries and system connections must verify sound condition before conducting back-up power tests.
- Operation of back-up supply (battery), including standby and alarm load capability. (May use simulated loads.)
  - With the AC supply to the panel disconnected, the power loss trouble must be indicated, and the standby and alarm current demand measured. General alarm systems must be operated for at least 5 minutes to demonstrate the capability of operating standby and alarm on battery power.
- Proper operation of all audible and visual trouble signals, including ground-fault indication when any conductor is grounded.

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- Proper operation identification of annunciators shall be verified, including fault conditions.
- Function of all detection devices.
  - Thermal fire detectors must be tested with a heat source per manufacturer's instructions for response in less than 1 minute.
  - Manual fire alarm boxes must initiate alarm within [10 seconds].
  - Smoke detectors must be tested in place with smoke or a listed aerosol and approved test equipment to verify calibration, function, and smoke entry.
  - Smoke Detectors with Thermal Element must have the two functions tested separately.
- Function of all other sensing or initiating devices must be tested under defined operating conditions according to manufacturer's specifications.
- Function of all supervisory devices must be tested under operating conditions as specified by the manufacturer.
- Function of all notification devices, including visible indicators verified against approved plans and audible output levels measured with a sound level meter meeting ANSI S1.4a, Type 2 requirements.
- Alarm verification time delay and alarm response must be verified for circuits so programmed.
- Circuit supervision must be verified by creating open circuits.
- Normal and trouble operation of the DACT, if used, and connection to two separate telephone lines must be verified.
- Normal and trouble operation of the city tie, if used, must be verified by introducing alarm, trouble, and supervisory signals, as applicable.

Any change in system hardware or software must be followed by complete test of the items involved and 10% of the unchanged items up to 50 devices. Full change records must be kept, as well as the system test records. Changes to the control panel require retest of all critical functions.

# Appendix A. Options and Compatible Devices

## A.1 Add-on options and replacement parts

The following modules attach directly to the P110 main board.

Harrington Part No.	Harrington Model No.	Description
P1M	P1M	Panel main board
PX3	PX3	Transformer, 3A
P1SS	P1SS	SLC module for System Sensor protocol
P1N2	P1N2	NAC expansion module with (2) NACs
024-4556	R5.1K	End-of-line resistor for NACs
P1V	P1V	Meter display
P110-CAB	P110-CAB	Cabinet for panel

## A.2 Compatible SLC devices

### A.2.1. Addressable fire sensors

Harrington Part No.	System Sensor Model No.	Description
349-1048	1251B	Ionization sensor – low profile
349-1046	2251B	Photoelectric sensor – low profile
349-1047	2251TB	Photo/thermal multicriteria sensor
	2251TMB	Photo/thermal multicriteria sensor
349-1049	5251P, 5251B	Fixed temperature thermal sensor, 135°
	5251H	Fixed temperature thermal sensor, 190°
349-1050	5251RP, 5251RB	Rate-of-rise thermal sensor
	7251	High sensitivity smoke sensor
349-1055	DH200RPL	Duct smoke sensor, photoelectric
349-1057	DH200PL	Duct smoke sensor with auxiliary relay contacts

### A.2.2. Sensor bases:

Harrington Part No.	System Sensor Model No.	Description
349-0496	B501B	Addressable analog sensor base
349-0525	B501BH	Addressable analog sensor base w/sounder
349-1023	B501BHT	Addressable analog sensor base w/sounder, temporal
349-0757	B210LP	Base, low profile
349-0647	B224RB	Relay base
349-0856	B224BI	Isolator base

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**A.2.3. Addressable accessory modules:**

Harrington Part No.	System Sensor Model No.	Description
349-0667	M502M	Conventional zone interface module*
349-1069	CZ-6	Conventional zone interface module, 6 zones*
349-0509	M500M, M500MB	Input module
349-0497	M501M	Input module, miniature
349-1020	M500DM	Input module, 2 inputs
349-1068	IM-10	Input module, 10 inputs
349-1021	M500S	Supervised output module
349-1067	SC-6	Supervised output module, 6 outputs
349-1022	M500R	Relay module
349-1066	CR-6	Relay module, 6 relays
349-0511	M500X, M500XB	Isolator module

\* Refer to manufacturer's documentation for compatible 2-wire sensors

**A.3 Compatible NAC devices****A.3.1. Harrington Signal**

EMHG0 series mechanical horns  
 EHG0 series electronic horns  
 MHG0 series mini horns  
 HSG4, HSG3, HSG1, HSG0 series electronic horn strobes  
 EHSG0, EMHSG0 series horn strobes  
 WEMHSG series outdoor horn strobes  
 MHSG0 series mini horn strobes  
 SSG4, SSG3, SSG1, SSG0, SSTG0 series strobes

**A.3.2. CPG Signals**

SPLF, SPAF, SPHP, SPHH series Powertone® speaker/strobes utilizing V1971 strobes  
 MSLP, MSHP series mini-speaker/strobes utilizing V1971 strobes  
 V1971 series strobes

**A.3.3. Amseco**

SL24C, SAD24, RSD24, SL, CSL CSLB, CSLR series strobes  
 SH, CSH, CSHB, series horn/strobes  
 CSS, SSC, SFH speaker strobes

**A.3.4. Wheelock**

ET70WP-2475WFR weather proof speaker strobe  
 RSS series multicandela strobes  
 AS24 series multi-candela horn/strobes  
 AH24 series electronic horns  
 MTWP, RSSWP weatherproof strobes  
 ASWP weatherproof horn/strobe

**A.3.5. Gentex**

GMH24 series mechanical horns  
 HG12 series electronic horns

GX90 series mini horns  
 GX90S Series mini horn strobes  
 SHG24, HS24, SHG24, GMS24 series horn strobes  
 WGMS24 series outdoor horn strobes  
 GES24, ST24, GXS, series strobes

#### A.4 Compatible devices for auxiliary power circuit

Harrington Part No.	Manufacturer Part No.	Description
<b>Harrington Signal</b>		
349-0767	ADS-24120-I	Duct detector, ion
349-0768	ADS-24120-P	Duct detector, photo
<b>System Sensor</b>		
Refer to A.2 Compatible SLC devices		
<b>Fire Fighting Enterprises LTD</b>		
FFE-50R	50RU	Reflective beam smoke detector, long range
FFE-100R	100RU	Reflective beam smoke detector, short range

##### A.4.1. Relays

Harrington Part No.	Manufacturer Part No.	Description
<b>Faraday</b>		
345-0274	711-1	Remote relay unit
<b>Air Products &amp; Controls</b>		
345-0461	MR-101/C	Remote relay unit
	MR-201/C	Remote relay unit
	MR-104/C	Remote relay unit
345-0451	MR-204/C	Remote relay unit
345-3001	PAM-4	E.O.L. relay
<b>System Sensor</b>		
349-0671	A77-716B	E.O.L. relay

Notes:

1. The accessory devices listed above may be wired to the auxiliary power outputs.
2. For specific wiring and installation information, read the instructions provided with each device.



### A.5 Compatible devices for network

Harrington Part No.	Harrington Model No.	Description
P1A	P1A	Annunciator
P1R	P1R	Relay module with (8) programmable relays
P1O	P1O	Communication module for serial port connection to a PC
P1-CABA	P1-CABA	Cabinet for P1A
P1-CABR	P1-CABR	Cabinet for P1R, or P1O

### A.6 Compatible communicators

#### A.6.1. Remote station city tie transmitter

Harrington Part No.	Harrington Model No.	Description
345-2083	UCT	City tie transmitter

#### A.6.2. DACTs

Harrington Part No.	Harrington Model No.	Description
PDACT	PDACT	DACT with point data transmission

#### A.6.3. DACT receivers

Refer to PDACT manual (780-0843) for SIA Level 1 compatible receivers.

# Appendix B. Wire and Battery Selection

## B.1 Wire Selection Tables

**NOTE:** All wire lengths below assume the use of solid copper wire as given by NEC Chapter 9, Table 8. If using different wire, values may vary.

**Table B-1: Resistance of Solid Copper Wire\***

Wire gauge (AWG)	Resistance (ohms/1000ft)
18	8.08
16	5.08
14	3.19
12	2.01

\*Refer to NEC Chapter 9, Table 8.

**Table B-2: SLC Wire Lengths**

Wire gauge (AWG)	Maximum distance to farthest point (ft)
18	2475
16	3937
14	6270
12	9950

**Table B-3: NAC Wire Lengths\***

Load (A)	Maximum distance to farthest point (ft)			
	18	16	14	12
0.10	619	984	1567	2488
0.25	248	396	627	995
0.50	124	197	313	498
0.75	82	131	209	332
1.00	62	98	157	249
1.25	50	79	125	199
1.50	41	66	104	166
1.75	35	56	90	142
2.00	31	49	78	124
2.25	28	44	70	111
2.50	25	39	63	100
2.75	23	36	57	90
3.00	21	33	52	83

\* Maximum line drop: 1V

**Table B-4: Network Wire Lengths**

Wire gauge (AWG)	Maximum distance to farthest point (ft)
18	6188
16	9843
14	15674
12	24876

\*Maximum resistance of 100 ohms (50 ohms per wire)







