EST3X Technical Reference Manual

Australia/New Zealand technicians please note
Certain functions and features contained in this manual are not suitable for the ANZ market. Please refer to ANZ specific material regarding Australian display.

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Version This document applies to EST3X with C-CPU firmware version 1.x.

Contact information For contact information, see www.est-fire.com.

Content

Important information

Regulatory information

This product has been designed to meet the requirements of NFPA 72 *National Fire Alarm Code*, UL 864 *Standard for Control Units for Fire Protective Signaling Systems*, and ULC S527 *Standard for Control Units for Fire Alarm Systems*.

Limitation of liability

To the maximum extent permitted by applicable law, in no event will KGS FS be liable for any lost profits or business opportunities, loss of use, business interruption, loss of data, or any other indirect, special, incidental, or consequential damages under any theory of liability, whether based in contract, tort, negligence, product liability, or otherwise. Because some jurisdictions do not allow the exclusion or limitation of liability for consequential or incidental damages the preceding limitation may not apply to you. In any event the total liability of KGS FS shall not exceed the purchase price of the product. The foregoing limitation will apply to the maximum extent permitted by applicable law, regardless of whether KGS FS has been advised of the possibility of such damages and regardless of whether any remedy fails of its essential purpose.

Installation in accordance with this manual, applicable codes, and the instructions of the authority having jurisdiction is mandatory.

While every precaution has been taken during the preparation of this manual to ensure the accuracy of its contents, KGS FS assumes no responsibility for errors or omissions.

Advisory messages

Advisory messages alert you to conditions or practices that can cause unwanted results. The advisory messages used in this document are shown and described below.

WARNING: Warning messages advise you of hazards that could result in injury or loss of life. They tell you which actions to take or to avoid in order to prevent the injury or loss of life.

Caution: Caution messages advise you of possible equipment damage. They tell you which actions to take or to avoid in order to prevent the damage.

Note: Note messages advise you of the possible loss of time or effort. They describe how to avoid the loss. Notes are also used to point out important information that you should read.

EST3X FCC compliance

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

3-MODCOM FCC compliance

Cautions

- To ensure proper operation, this dialer must be installed according to the enclosed installation instructions. To verify that the dialer is operating properly and can successfully report an alarm, it must be tested immediately after installation, and periodically thereafter, according to the enclosed test instructions.
- In order for the dialer to be able to seize the phone line to report an alarm or other event when other customer equipment (telephone, answering system, computer modem, etc.) connected to the same line is in use, the dialer *must* be connected to a properly installed RJ-31X jack. The RJ-31X jack must be connected in series with, and ahead of, all other equipment attached to the same phone line. Series installation of an RJ-31X jack is depicted in the wiring diagram. If you have any questions concerning these instructions, you should consult your telephone company or a qualified installer.

Testing

When programming emergency numbers or making test calls to emergency numbers, remain on the line and briefly explain to the dispatcher the reason for the call. Perform programming and testing activities in the off-peak hours, such as early morning or late evenings.

Compliance

- **For equipment approved before July 23, 2001:** This dialer complies with Part 68 of the FCC rules. A label attached to the dialer contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.
- **For equipment approved after July 23, 2001:** This dialer complies with Part 68 of the FCC rules and the requirements adopted by the Administrative Council for Terminal Attachments (ACTA). A label attached to the dialer contains, among other information, a product identifier in the format US:AAAEQ##TXXXX. If requested, this information must be provided to the telephone company.
- The plug and jack used to connect the dialer to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by ACTA. The dialer must be connected to a compliant RJ-31X or RJ-38X jack using a compliant cord. If a modular telephone cord is supplied with the dialer, it is designed to meet these requirements. See installation instructions for details.
- A ringer equivalence number is used to determine how many devices you can connect to a telephone line. If the total REN value for all devices connected on a telephone line exceeds that allowed by the telephone company, the devices may not ring on an incoming call. In most (but not all) areas the total REN value should not exceed 5.0. To be certain of the total REN value allowed on a telephone line, contact the local telephone company.

  For products approved after July 23, 2001, the REN is part of the product identifier in the format US:AAAEQ##TXXXX. The digits ## represent the REN without a decimal point. Example: 03 is an REN of 0.3. For earlier products the REN is listed separately.
- If the dialer is harming the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify you as soon as possible. You will also be advised of your right to file a complaint with the FCC, if you believe it is necessary.
- The telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the operation of the dialer. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

- If you are experiencing problems with the dialer, contact the manufacturer for repair or warranty information. If the dialer is harming the telephone network, the telephone company may request that you disconnect the dialer until the problem is resolved.
- The dialer contains no user serviceable parts. In case of defects, return the dialer for repair.
- You may *not* connect the dialer to a public coin phone or a party line service provided by the telephone company.

3-MODCOM Industry Canada information

Note: The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user disconnect the equipment.

Caution: Users should not attempt to make connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate

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Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Note: The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirements that the sum of the Load Numbers of all the devices does not exceed 100.

Chapter 1
Introduction

Summary

This chapter provides information about this manual and other related documentation.

Content

About this manual

This manual provides information on how to install, program, and operate an EST3X life safety control panel. It is organized as follows:

Chapter 1, Introduction: Provides information about this manual and other related documentation.

Chapter 2, Product description: Provides technical descriptions of the control panel and its operation. It also provides descriptions of the command menus.

Chapter 3, Operating instructions: Provides instructions for operating the fire alarm system from the control panel user interface. It is intended for those who might be expected to operate the control panel in a fire alarm emergency.

Chapter 4, Supplementary applications: Provides technical descriptions of supplementary applications that can expand system capabilities.

Chapter 5, Installation: Provides installation information for system components and applications. It is intended for those trained and authorized to maintain the fire alarm system.

Chapter 6, Preventive maintenance and testing: Provides maintenance schedules and testing procedures for fire alarm system. It is intended for those trained and authorized to maintain the fire alarm system.

Chapter 7, Service and troubleshooting: Provides instructions for servicing and troubleshooting the fire alarm system. It is intended for those trained and authorized to maintain the fire alarm system.

Appendix A, System calculations: Provides worksheets for sizing standby batteries, and for calculating the maximum wire lengths for notification appliance circuits and intelligent addressable loops.

Appendix B, Addresses: Provides a comprehensive list of addresses to use as a general reference.

Appendix C, Programming options: Summarizes the operation of the system.

Intended audience

The intent of this document is to provide trained and authorized personnel with technical, operational, service, and maintenance information.

Fire alarm system limitations

The purpose of an automatic fire alarm system is to provide early detection and warning of a developing fire. There are a number of uncontrollable factors that can prevent or severely limit the ability of an automatic fire alarm system to provide adequate protection. As such, an automatic fire alarm system cannot guarantee against loss of life or loss of property.

Two main causes of system failures are improper installation and poor maintenance. The best way to minimize these types of system failures is to have only trained fire alarm system professionals design, install, test, and maintain your fire alarm system in accordance with national and local fire codes.

Fire alarm systems will not operate without electrical power. As fires frequently cause power interruption, we suggest that you discuss ways to safeguard the electrical system with your local fire protection specialist.

Chapter 2
Product description

Summary

This chapter provides descriptions of the control panel and its components, and the operator interface controls, indicators, and commands.

Content

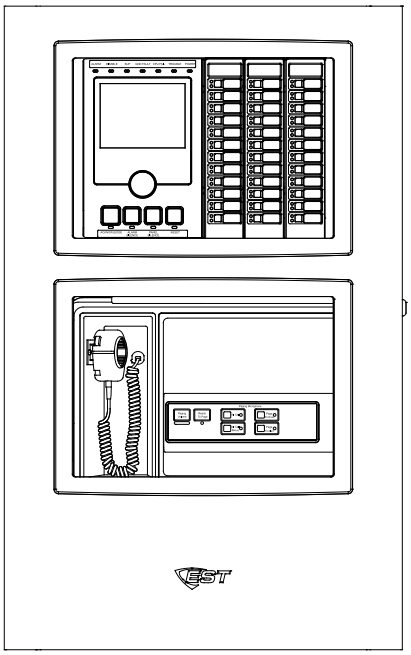
General description

This topic provides a general description of the system control panel, hardware capabilities, option cards, panel components, accessories, and remote annunciator panels.

System overview

The EST3X fire alarm control panel (FACP) can operate as a stand-alone control panel or in an 8-node peer-to-peer Class B or Class A EST3X life safety network. Its flexibility allows integration with a 64-node EST3 life safety network via a 3X-NET RS-485 network option card or 3X-FIB fiber network option card.

Figure 1: EST3X control panel, front view



A standard EST3X control panel consists of a cabinet backbox and door, a PS10-4B Power Supply Card, and an SFS1-ELEC Chassis Electronics Assembly. See Figure 2 on page 7 for an exploded view of the cabinet.

The control panel can be mounted directly on the finished wall surface (surface mount) or partially recessed in a wall cavity (semiflush mount). Semiflush mounted cabinets require the TRIM6 Trim Kit that is ordered separately.

You can add accessories to your life safety system that can expand its functionality. See “Panel components” on page 10 for a list of option cards and accessories.

Control panel architecture

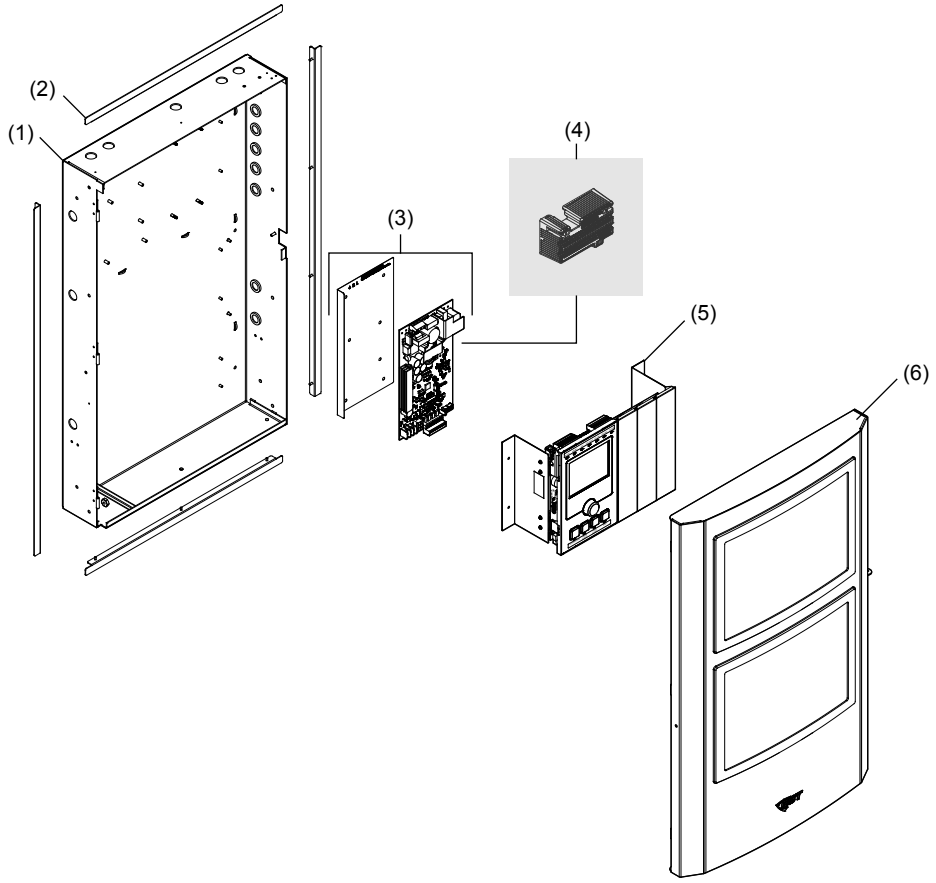
Control panel

Figure 2 provides an exploded view of a standard EST3X control panel. For a complete list of panel components and options, see “Panel components” on page 10.

EST3X control panel models are listed below.

Model	Description
3X-SFS1B	Fire alarm control panel, bronze door, English
3X-SFS1Bi	Fire alarm control panel, bronze door, language selectable
3X-SFS1R	Fire alarm control panel, red door, English
3X-SFS1Ri	Fire alarm control panel, red door, language selectable

Figure 2: EST3X fire alarm control panel, exploded view

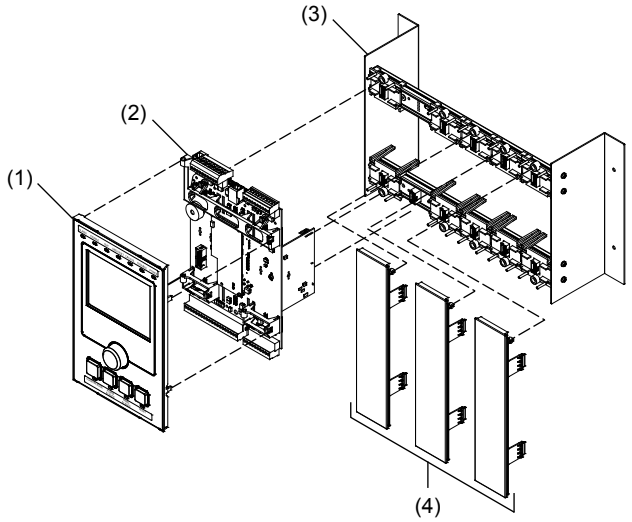


(1) CAB6B Backbox
(2) TRIM6 Trim Kit (optional)
(3) PS10-4B Power Supply Board
(4) Protective cage (installed for ULC applications only)
(5) SFS1-ELEC Chassis Electronics Assembly
(6) 4X-CAB6D(R) Door

Electronics chassis assembly

Figure 3 provides an exploded view of the SFS1-ELEC.

Figure 3: SFS1-ELEC electronics chassis assembly, exploded view



(1) 4X-LCD(-LC) User Interface
(2) SFS1-CPU Main Board
(3) Electronics chassis
(4) 4X-LRMF filler plates

System size

Table 1 lists the maximum hardware capabilities for a single EST3X control panel.

Table 1: Control panel hardware capabilities

Item	Maximum capacity
Signaling line circuits (SLC)	6 [1]
Addressable detectors	750 (125 detectors each SLC) [2]
Addressable modules	750 (125 single address modules each SLC)
Initiating device circuits	24
Notification appliance circuits	16 Class B, 4 Class A
Auxiliary power circuits	4 continuous, programmable 1 continuous or resettable
Local annunciators	3
Remote annunciators and graphic annunciators	30
Reverse polarity outputs	3

Item	Maximum capacity
Networked EST3X control panels	• 8 EST3X nodes (max.) when 3X-NET8 or 3X-FIB8 option cards are installed • 64 EST3X nodes (max.) when 3X-NET or 3X-FIB option cards are installed • 64 integrated EST3 and EST3X nodes (max.) when 3X-NET or 3X-FIB option cards are installed in the EST3X nodes

[1] One built-in dual loop controller on the CPU plus two Signature dual loop controller modules installed on the chassis rail.

[2] Capacity for Signature loop controllers.

Programmable features

The EST3X control panel includes a number of programmable features that can be configured using the 3-SDU System Definition Utility (V5.02 or later).

- Groups: Allows you to create a collection of devices that are grouped in the database in order to provide a group response that is separate from that of its member devices.
- Custom audio messages: Allows you to record custom audio messages for broadcasting through an emergency voice/alarm system.
- Automatic alarm signal silence timer: Determines how long alarm signals remain active if they are not silenced manually. Possible values are 0 to 60 minutes.
- Reset inhibit timer: Ensures alarm signals are active for at least 1 to 60 minutes before you can silence them or reset the system.
- AC power fault delay timer: Delays reporting AC power failure off-premises.
- Waterflow silence: Allows you to silence alarm signals when a waterflow device is activated.
- Zone re-sound inhibit: Prevents silenced signals from re-sounding when another device in the same Zone group activates.
- Two-stage timer: Specifies the time you want to allow for two-stage operation. The timer starts on the first alarm event.
- Trouble re-sound: Determines how long panel trouble buzzers can remain silent with an active event on the panel. The buzzer re-sounds when the time is exceeded. By default, this timer is set to 24 hours.
- Message routing: Routes messages to panels through network routing, or to panels and printer ports using message annunciation routing.

- Time controls: Provide for the automatic starting and stopping of system events based on time and date. Time controls run in the background and do not require any operator action.

Panel components

This section describes the components that can be installed in the control panel.

Standard control panel components

Table 2: Control panel standard components

Model	Description
CAB6B	Backbox: Provides the housing for locally installed EST3X components. See installation sheet P/N 3101764 for specifications.
PS10-4B	Power supply board: Provides the required power and related supervision functions for the control panel, as well as filtered and regulated power, and 24 VDC for ancillary equipment. Installs on the backbox. See installation sheet P/N 3101774 for specifications.
SFS1-ELEC SFS1i-ELEC	Electronics Chassis: Provides the mounting, internal power, and audio and data distribution for the main board, user interface, and option cards. Includes a preinstalled SFS1-CPU Main Board, a 4X-LCD User Interface for the SFS1-ELEC or 4X-LCD-LC for the SFS1i-ELEC, and three blank filler plates. Installs on the backbox. See installation sheet P/N 3101766 for specifications. The preinstalled SFS1-CPU Main Board processes all information from modules installed in the same cabinet and from other control panels on the EST3X life safety network. The CPU provides common relay outputs, two signaling line circuits, network data and digital audio risers, panel programming inputs, and connection to R-Series remote annunciators. One 3-SDC1 Signature loop controller module is preinstalled on the board. See installation sheet P/N 3101773 for specifications. The preinstalled 4X-LCD or 4X-LCD-LC provides the user interface for the fire alarm control panel. The 4X-LCD-LC provides language insert pockets to change the control and indicator labels. See installation sheet P/N 3101767 for specifications. The preinstalled 4X-LRMF filler plates can be replaced with up to three 4X Series Control-Display modules. See installation sheet P/N 3101816 for specifications.
4X-CAB6D(R)	Cabinet door: Provides two viewing windows and is secured with a key lock. See installation sheet P/N 3101765 for specifications.

Control panel options

Note: Option cards and modules are ordered separately and installed in the field.

Table 3: Control panel option cards

Model	Description
CLA-PS10	Class A Adapter Card: Converts the Class B notification appliance/auxiliary power circuits on the PS10-4B Power Supply Card to Class A notification appliance circuits or auxiliary output circuits. Installs on the PS10-4B. See installation sheet P/N 3101776 for specifications.
3X-NET8	RS-485 Network Option Card: Provides the interface for both the network data riser and a digital audio riser. Provides connection to other EST3X control panels to form an EST3X life safety network (8-node max.). Installs on the SFS1-CPU. See installation sheet P/N 3101768 for specifications.
3-SDC1	Signature loop controller module: Provides a Class B or Class A signaling line circuit and resettable 24 VDC for powering conventional two-wire smoke detector circuits on Signature Series modules. Installs on the SFS1-CPU. See installation sheet P/N 3101772 for specifications.
3-SSDC1	Single Signature loop controller module: Provides one Class B or Class A Signature data loop for Signature Series detectors and modules. The module also provides a connection for powering conventional two-wire smoke detector circuits on Signature Series modules. Installs on the SFS1-ELEC hardware layer. See installation sheet, P/N 3100584 for specifications.
3-SDDC1	Dual Signature loop controller module: Provides two Class B or Class A Signature data loops for Signature Series detectors and modules. The module also provides a connection for powering conventional two-wire smoke detector circuits on Signature Series modules. Installs on the SFS1-ELEC hardware layer. See installation sheet P/N 3100584 for specifications.
3X-NET	RS-485 Network Option Card: Provides the interface for both the network data riser and a digital audio riser. Provides EST3X control panel integration with an EST3 life safety network. Installs on the SFS1-CPU. See installation sheet P/N 3101771 for specifications.
3X-FIB8	Fiber Optic Network Option Module: Provides a fiber optic or combination fiber optic and RS-485 communication path for up to eight EST3X control panels. Installs on the SFS1-CPU and on a half-footprint space on the CAB6B backbox. See installation sheet, P/N 3101769 for specifications.
3X-FIB	Fiber Optic Network Option Module: Provides a fiber optic or combination fiber optic and RS-485 communication path for up to 64 EST3X control panels. The module also provides EST3X control panel integration with an EST3 life safety network. Installs on the SFS1-CPU and on a half-footprint space on the CAB6B backbox. See installation sheet, P/N 3101971 for specifications.
3X-ETH1	Ethernet Adapter Card: Provides a standard 10/100 BaseT Ethernet network connection for panel programming and diagnostics. Installs on the SFS1-CPU. See installation sheet P/N 3101775 for specifications.

Model	Description
3-IDC8/4	Traditional zone I/O module: Provides eight Class B traditional direct connect Initiating Device Circuits (IDC) for compatible two-wire smoke detectors and dry contact initiating devices or four NAC circuits. Installs on the SFS1-ELEC hardware layer. See installation sheet, P/N 270492 for specifications.
3-LDSM	Display support module: Provides the circuitry required to operate a control-display module when the cabinet does not have enough modules installed on the electronics chassis hardware layer. Installs on the SFS1-ELEC hardware layer. See installation sheet P/N 270485 for specifications.
3-MODCOM	Modem communicator module: Provides dialer communications between the EST3X control panel and remote locations over telephone lines. Installs on the SFS1-ELEC hardware layer. See installation sheet P/N 387476 for specifications.
3-OPS	Off-premises signal module: Provides three independent reverse polarity circuits for transmitting alarm, supervisory, and trouble signals to compatible receivers. Installs on the SFS1-ELEC hardware layer. See installation sheet P/N 270494 for specifications.
3-AADC1	Analog addressable driver controller module: Provides one Class B or Class A loop for analog addressable sensors and modules. Installs on the SFS1-ELEC hardware layer. See installation sheet P/N 3100585 for specifications.
3-ZA20(A/B)	20-watt zoned audio amplifier module: Provides a standard 25 or 70 VRMS output line level, a 1 kHz temporal tone evacuation signal, a 20 SPM tone for alert signal, and a power limited 24 VDC NAC circuit. Installs on the SFS1-ELEC hardware layer. See installation sheet, P/N 387463 for specifications.
3-ZA40(A/B)	40-watt zone audio amplifier module: Provides a standard 25 or 70 VRMS output line level, a 1 kHz temporal tone evacuation signal, a 20 SPM tone for alert signal, and a power limited 24 VDC NAC circuit. Installs on the SFS1-ELEC hardware layer. See installation sheet, P/N 387463 for specifications.
4X-24R	Control-display module: Provides an additional operator interface using an annunciator strip with 24 red LEDs. Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-24Y	Control-display module: Provides an additional operator interface using an annunciator strip with 24 yellow LEDs. Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-12RY	Control-display module: Provides an additional operator interface using an annunciator strip with 12 red-over-yellow LED pairs. Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-12SR	Control-display module: Provides an additional operator interface using an annunciator strip with 12 LED-switches and red LEDs. Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.

Model	Description
4X-12/S1GY	Control-display module: Provides an additional operator interface using an annunciator strip with 12 LED-switches and green-over-yellow LEDs. Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-12/S1RY	Control-display module: Provides an additional operator interface using an annunciator strip with 12 LED-switches and red-over-yellow LEDs. Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-6/3S1G2Y	Control-display module: Provides an additional operator interface using an annunciator strip with six groups of three LED-switches and green LEDs (top switch), and yellow LEDs (middle and bottom switch). Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-6/3S1GYR	Control-display module: Provides an additional operator interface using an annunciator strip with six groups of three LED-switches and green LEDs (top switch), yellow LEDs (middle switch), and red LEDs (bottom switch). Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
4X-4/3SGYWR	Control-display module: Provides an additional operator interface using an annunciator strip with four groups of three LED-switches and green LEDs (top switch), yellow-over-white LEDs (middle switch), and red LEDs (bottom switch). Installs on an SFS1-ELEC hardware layer module. See installation sheet P/N 3101777 for specifications.
3X-PMI	Paging Microphone Interface: Adds controls for emergency voice/alarm communications to a EST3X control panel. Consists of an audio mounting bracket, EAEC Emergency Audio Evacuation Controller card, audio enclosure, and paging microphone. Installs on the CAB6B backbox. See installation sheet P/N 3101875 for specifications.

Control panel accessories

Table 4: Control panel accessories

Model	Description
3-REMICA	Remote Paging Microphone: Provides remote paging capability throughout a building or campus. Each 3-REMICA has two inputs for connecting other remote microphone units. The paging circuit supports up to 63 interconnected remote paging stations. See installation sheet P/N 387466 for specifications.

Model	Description
R-Series remote annunciator	Remote annunciators: Provide status indication and common controls for the control panel. The following annunciators and interface cards can be used with the EST3X control panel. • RLCD-C Remote Annunciator: Provides LCD text annunciation with common controls. See installation and operation guide P/N 3100969-EN for specifications. • RLCD Remote Annunciator: Provides LCD text annunciation without common controls. See installation and operation guide P/N 3100969-EN for specifications. • RLED-C Remote Annunciator: Provides LED zone annunciation with common controls. See installation and operation guide P/N 3100969-EN for specifications. • RLED24 Remote Annunciator Expander: Provides 24 red-over-yellow pairs of LEDs (12 pairs configurable as yellow-over-yellow). See installation and operation guide P/N 3100969-EN for specifications. • GCI Graphic Annunciator Interface Card: Connects a compatible UL/ULC Listed fire alarm control panel to an LED-based graphic annunciator. See installation sheet P/N 3100973 for specifications. • GCIX Graphic Annunciator Expander Card: Provides additional switch inputs and LED outputs on GCI card-based graphic annunciators. See installation sheet P/N 3101296 for specifications.
FSB-PC2, FSB-PCLW	Communication Bridge: Provides a communication bridge between EST3X life safety systems and a building management system by converting the EST3X control panel External Communications Protocol into supported serial and Ethernet protocols. See installation sheet P/N 3102007-EN for specifications.
SIGA-REL	Releasing Module: Actuates solenoid valves that control the release of water or chemical extinguishing agents in support of fire suppression applications such as sprinkler systems and automatic fire extinguishing systems. See technical reference manual P/N 387348 for specifications.
RPM	Reverse Polarity Module: Provides three reverse polarity transmitters: one for system common alarm; one for system common trouble; and one for system common supervisory. Installs on a half-footprint space on the CAB6B backbox. See installation sheet P/N 3100430 for specifications.
CTM	City Tie Module: Provides a single municipal box connection for activating a local energy type master box connected to a public fire alarm reporting system. See installation sheet P/N 3101025 for specifications.
3-TAMP	Tamper Switch: Detects an open EST3X control panel door. Installs on the CAB6B backbox. See installation sheet P/N 387422 for specifications.
MN-PASM2 [1]	Preamp Supervision Module: Supervises preamp (line level) audio signals. Installs in a single-gang electrical box or on an MN-BRKT1 bracket. See installation sheet P/N 3101950 for specifications.

Model	Description
CDR-3	Bell Coder: Provides coded outputs in response to alarm conditions for systems requiring march time, temporal, or unique coded outputs in separate zones and decodes alarm codes embedded in printer messages received through RS-232 input. Installs on a half footprint space on the CAB6B backbox. See installation sheet P/N 3100023 for specifications.
PT-1S	Serial Printer: Connects to the fire alarm control panel to print system events such as status changes, active events, or reports. See installation sheet P/N 3100989 for specifications.
TRIM6	Trim Kit: Provides a trim ring for a semiflush mounted CAB6B backbox. See installation sheet P/N 3101778 for specifications.

[1] Model MN-PASM was replaced by model MN-PASM2. For systems still using the MN-PASM, refer to the *MN-PASM Preamp Supervision Module Installation Sheet* (P/N 3101580).

Minimum system requirements

The EST3X can operate as a stand-alone control panel, as part of an EST3X life safety network (64-node max.), or as part of an EST3 life safety network (64-node max.).

The EST3X control panel is listed for the following types of service:

- Commercial protected premises fire alarm control unit
- Smoke control system
- Releasing device control unit
- Emergency communication and relocation

The EST3X control panel is also listed for use as a burglary annunciator when connected to an EST3 life safety system that includes security features.

For a list of components required to meet each service listing, refer to the *EST3X UL Listing Document* (P/N 3101752-EN).

EST3X user interface

The 4X-LCD and 4X-LCD-LC provide the user interface for the EST3X control panel. The interface is comprised of an alphanumeric LCD screen, operator controls, and LED indicators.

The 4X-LCD-LC allows you to install separately ordered language inserts into pockets on the interface for the control and indicator labels. See the *4X-LK Language Kit Installation Sheet* (P/N 3101995) for a list of available kits and installation instructions.

Buzzer indicator

In coordination with visual event notifications on the user interface, the control panel employs a buzzer to alert the operator of off-normal system conditions such as active alarms, active tests, disabled zones, active fault conditions, and active monitor conditions. The list below shows the buzzer patterns that sound with associated events.

- Alarm: 3-3-3 pattern
- Supervisory: 2-2 pattern
- Trouble: 30 pulses per minute
- Monitor: 3-3-3 pattern

Note: As determined by the 3-SDU configuration, a reminder buzzer may sound.

Operator controls and indicators

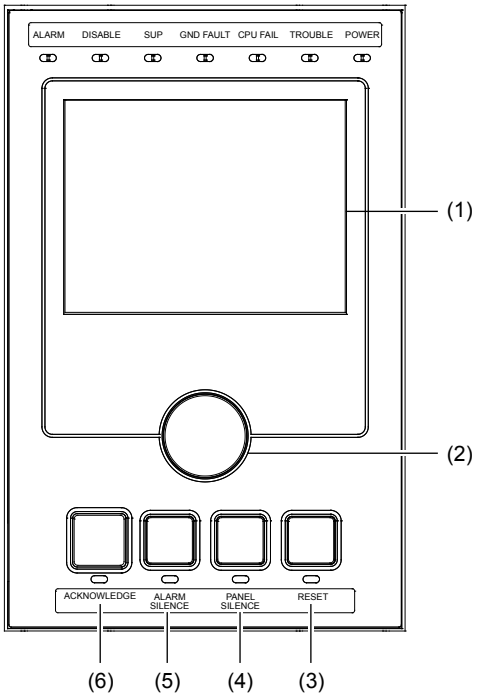


Table 5: User interface operator controls and indicator descriptions

No.	Control/Indicator	Description
1	LCD screen	Backlit liquid crystal display, 240 × 320 pixels, 24 lines of 40 characters. The LCD provides information relevant to the current condition of the control panel.
2	Rotary controller	Scrolls through and selects messages and menu commands.
3	Reset button and LED	Pressing the button activates the system's reset sequence to restore the system to normal. The LED flashes quickly during the smoke power-down phase, flashes slowly during the power-up phase, is on steady during the system restore, and is off when the system has reset. You can configure the Reset button to require an access level password.
4	Panel Silence button and LED [1]	For Local systems, pressing the button turns the control panel buzzer off after all events have been acknowledged. For Proprietary systems, the Panel Silence button is not operational. The LED indicates the panel is in an off-normal condition and that the panel has been placed in panel silence mode. You can configure the Panel Silence button to require an access level password.
5	Alarm Silence button and LED	Pressing the button turns off the emergency voice/alarm communications (EVAC) and Alert channels, and all active audible and visible notification appliance circuits. Pressing the button a second time turns the notification appliance circuits back on. The LED indicates that the active notification appliance circuits have been silenced. You can configure the Alarm Silence button to require an access level password.
6	Acknowledge button and LED	Acknowledges all current events. The LED indicates the function is active.

[1] The control panel buzzer can be configured to resound at a regular interval to remind the operator that the panel has been silenced.

System status indicators

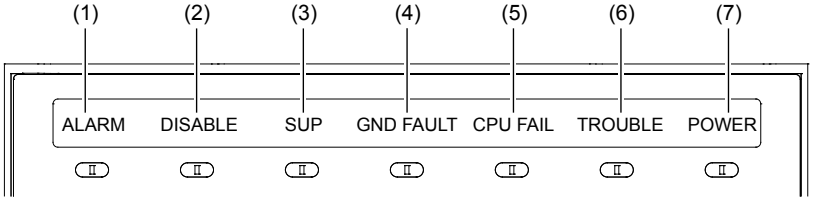


Table 6: User interface system status indicator descriptions

No.	Indicator	Description
1	Alarm	The LED serves as a common alarm event indicator. A flashing LED indicates that there is an event in the Alarm Queue that has not been acknowledged. A steady LED indicates that all events in the queue have been acknowledged.
2	Disable	The LED indicates that a device, card, group, time control, switch, or LED has been manually disabled.
3	SUP	The LED serves as a common supervisory event indicator. A flashing LED indicates that there is an event in the Supervisory Queue that has not been acknowledged. A steady LED indicates that all events in the queue have been acknowledged.
4	GND Fault	The LED indicates that the SFS1-CPU module has detected a ground fault.
5	CPU Fail	The LED indicates that the CPU has detected a processor failure. Processor failures must be reset manually using the Reset button.
6	Trouble	The LED serves as a common trouble event indicator. A flashing LED indicates that there is an event in the Trouble Queue that has not been acknowledged. A steady LED indicates that all events in the queue have been acknowledged.
7	Power	The LED indicates the primary (AC) power status. The LED is on when the panel has primary power. The LED is off when the panel does not have primary power or when part of a life safety network another panel does not have primary power.

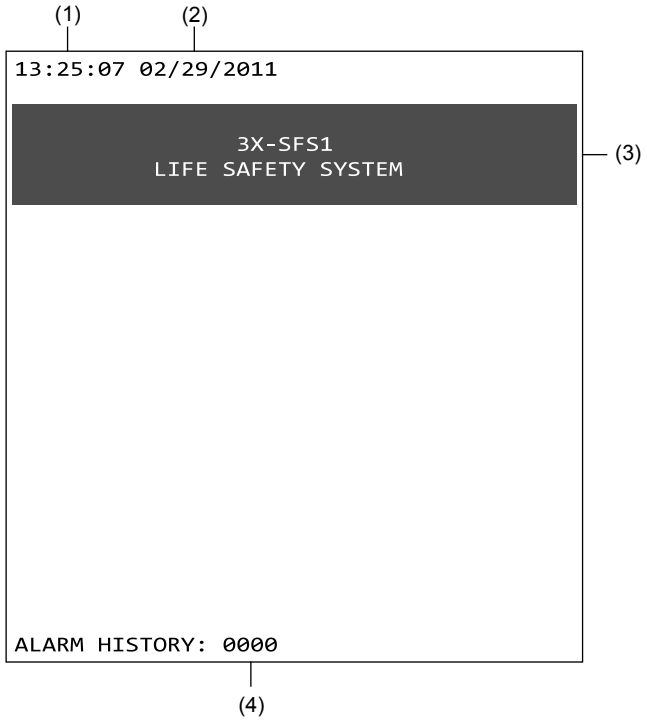
LCD screen indications

The LCD screen on the user interface provides information relevant to the current functional condition of the control panel. There are two screen modes: system normal and system off-normal.

System normal screen

System normal means that the life safety system is in a normal or startup state. In this state, the LCD screen is clear of any event messages. Only the time, date, custom banner (if programmed), and Alarm History are displayed.

Figure 4: System-normal LCD screen



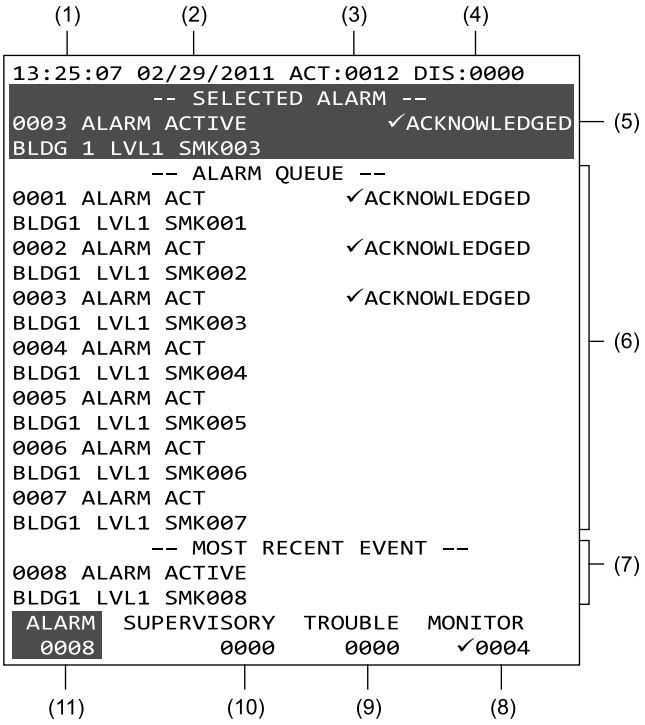
(1) Time
(2) Date
(3) Custom banner message
(4) Number of times the panel has gone into alarm

System off-normal

System off-normal means the control panel has entered an alarm, disabled, or test state. In this state, event messages display on the screen that provide information about the events. Up to eight event messages can be displayed on the screen: seven in the event message section of the screen and one in the “Most Recent Event” section.

Note: The off-normal screen (event message screen) only displays when events are activated. It does not display when events are restored.

Figure 5: System off-normal LCD screen



(1) Time
(2) Date
(3) Number of active points
(4) Number of disabled points
(5) Selected event message
(6) Event message field
(7) Most recent, highest priority event message
(8) Number of monitor event messages stored in the Monitor Queue
(9) Number of trouble event messages stored in the Trouble Queue
(10) Number of supervisory event messages stored in the Supervisory Queue
(11) Number of alarm event messages stored in the Alarm Queue

Event message queues

The EST3X control panel dynamically maintains 1,000 most recent, highest priority event messages across the four queues. An individual queue can hold 999 messages. The queues display at the bottom of the event message screen (see Figure 5).

The event message queues allow you to view details of messages to help locate points that are in an abnormal state. When the system signals a status change, the control panel posts the event message for the point that activated the event into the appropriate event message queue.

The four types of queues and event messages are listed below, by priority.

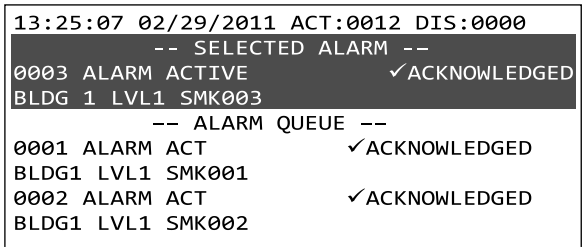
- Alarm (highest priority): Alarm event messages are used to identify the source of an active alarm within the system. They signal fire alarms or other life-threatening emergencies (e.g., active smoke detectors, pull stations, waterflow alarm switches).
- Supervisory: Supervisory event messages are used to identify changes to a supervisory state with the system. They can signal off-normal conditions with guard's tours, sprinkler and extinguishing systems, and other equipment related property safety (e.g., a closed gate valve).

  Note: In the US Local and Proprietary marketplace, security events are stored in the Supervisory Queue. For all marketplace settings other than the US security events are stored in the Monitor Queue.
- Trouble: Trouble event messages are used to identify faults with the alarm system. They can signal missing detectors, disabled points, and ground faults.
- Monitor (lowest priority): Monitor event messages are used to signal the operation of ancillary equipment (e.g., a fan feedback switch).

  Note: For all marketplace settings other than the US security events are stored in the Monitor Queue. In the US Local and Proprietary marketplace, security events are stored in the Supervisory Queue.

An event message consists of two lines of text, as shown in Figure 6. The first line displays the event number and the event name. The second line displays the message text, which is either the address of the point that activated the event or, if programmed, a location description.

Figure 6: Event message



User access levels

Certain user interface controls and command menu functions are password protected and have a user access level that is determined by the marketplace setting. The four user access levels are detailed in Table 7.

Each access level is given a default password that should be changed once the panel is put into service. See “Changing Access Level passwords” on page 66 for instructions.

Note: User access for initiating commands times out after a preconfigured period of time. When the time out setting is reached, the panel reverts to the default level. The time out period is configured in the 3-SDU and can be set from 00:15 to 99:59 minutes. The default setting is 5 minutes.

Table 7: User access level privileges

User access level	Privileges
Default level (No password required)	• Acknowledge function (button) • Alarm silence function (button) [1] • Panel silence function (button) [1] • Reset function (button) [1] • Event details • Statuses • Reports • Drill function (activate/restore) • Output selection • Display/printer selection • Printer selection • Toggle language
Level 1	All default privileges, plus: • Guard patrol routes (activate/restore)
Level 2	All default and level 1 privileges, plus: • Devices (enable/disable) • Zone groups (enable/disable) • Remote read lock (activate/restore) • Remote write unlock (activate/restore) • Sensor bypass (activate/restore) • Gas accel response (activate/restore) • Alternate sensitivity (activate) • Alternate message route (activate) • Primary sensitivity (restore) • Primary message route (restore) • Change time (program) • Change date (program) • Security devices (bypass/unbypass) • Security partitions (arm/disarm) • Change password for level 1 (program)

User access level	Privileges
Level 3	All default, level 1 and 2 privileges, plus: • AND group (enable/disable) • Matrix group (enable/disable) • Guard patrol group (enable/disable) • Instruction text group (enable/disable) • Time control (enable/disable) • Switch (enable/disable) • LED (enable/disable) • Relay (activate/restore) • Audio amp (activate/restore) • Audio message (activate/restore) • Holiday list (program) • Change password for level 2 (program)
Level 4	All default, level 1, 2, and 3 privileges, plus: • Service group (enable/disable) • Card (enable/disable) • Restart by panel (program) • Restart all panels (program) • Clear history (program) • Test (start/cancel) • Signature device test • Change password for level 3 (program)
Level 5	All default, level 1, 2, 3 and 4 privileges, plus: • Change password for level 4 (program)

[1] Can be programmed from the 3-SDU for an access level password.

Command menus

System commands are organized into menus that are used to operate the control panel from the LCD screen. They are organized into menus that are selected using the rotary controller. For instructions on using the controller, see “Using the rotary controller” on page 44.

Queue Menu

The Queue Menu allows you to view details of a selected event message and to view messages that are stored in queues by type (alarm, supervisory, trouble, and monitor).

Note: The Queue Menu is only available when the system is off-normal.

Table 8: Queue Menu selection descriptions

Selection	Access level	Description
Exit Menu	None	Returns to the event message screen
Details	None	Displays details of a selected event message
Alarm	None	Displays alarm event messages for reviewing or acknowledging
Supervisory	None	Displays supervisory event messages for reviewing or acknowledging
Trouble	None	Displays trouble event messages for reviewing or acknowledging
Monitor	None	Displays monitor event messages for reviewing or acknowledging
Main Menu	None	Displays the Main Menu

Main Menu

The Main Menu is the gateway to all of the command menus. It is directly accessed from the system normal screen. It is accessed from the Queue Menu when the system is off normal.

Table 9: Main Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the system normal screen
Exit Menu	None	Returns to the event message screen
Status	None	Displays the Status Menu
Enable	None	Displays the Enable Menu
Disable	None	Displays the Disable Menu
Activate	None	Displays the Activate Menu
Restore	None	Displays the Restore Menu
Reports	None	Displays the Reports Menu
Program	None	Displays the Program Menu
Test	None	Displays the Test Menu
Security [1]	None	Displays the Security Menu

[1] Only available when the security control function is enabled in the 3-SDU.

Status Menu

Use the commands on the Status Menu to check the status of the system. The report that each command creates includes both physical points and pseudo points.

Table 10: Status Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu
Exit Menu	None	Returns to the event message screen
All Active Points	None	Displays or prints a list of all points that are in an active or other off-normal state (trouble, disable, etc.)
Alarm	None	Displays or prints a list of all active (in alarm) alarm input device types
Supervisory	None	Displays or prints a list of all active supervisory input device types
Trouble	None	Displays or prints a list of all points in trouble
Monitor	None	Displays or prints a list of all active monitor input device types
Test	None	Displays or prints a list of points in active service groups that are in the active or trouble state
Disabled Points	None	Displays or prints a list of all addressable points that are disabled
Outputs	None	Displays or prints a list of all active output device types and LED-switch card LEDs
Security [1]	None	Displays or prints a list for one of the following: • Partition: Lists security partitions and shows the selected partition's corresponding state • Holdup: Lists holdup devices and their corresponding state

[1] Only available when the security control function is enabled in the 3-SDU.

Enable Menu

All components are enabled at power-up unless programmed otherwise. Use the commands on the Enable Menu to place parts of the system that have been disabled back into service.

Table 11: Enable Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu
Exit Menu	None	Returns to the event message screen
Device	2	Enables a device or circuit; requires the panel, card, and device address
Card	4	Enables an option card or control-display module; requires the panel and card address
Group	Level 3: AND, Matrix, Guard Patrol, Zone, and Inst. Text groups Level 4: Service Group	Displays the Enable Group Menu from which you can enable the following: • AND group: Select from a list of AND groups • Matrix Group: Select from a list of Matrix groups • Service Group: Select from a list of Service groups • Guard Patrol Group: Select from a list of Guard Patrol groups • Zone Group: Select from a list of Zone groups • Inst Text Group: Select from a list of Instruction Text groups
Time Control	3	Displays a list of the programmed time controls, from which a time control may be enabled
Switch	3	Enables a switch on a control-display module; requires the panel, card, and device address
LED	3	Enables the LEDs on a control-display module; requires the panel, card, and device address

Disable Menu

Use the commands on the Disable Menu to take individual zones, input and output points, option cards, and other parts of the fire alarm system out of service.

Note: The disable command uses counters. Example, if you disable a device twice, you must enable it twice to re-enable the device.

Table 12: Disable Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu
Exit Menu	None	Returns to the event message screen.
Device	2	Disables a device or circuit; requires the panel, card, and device address

Selection	Access level	Description
Card	4	Disables an option card or control-display module; requires the panel and card address
Group	Level 3: AND, Matrix, Guard Patrol, Zone, and Inst Text groups Level 4: Service Group	Displays the Disable Group Menu from which you can disable the following: • AND Group: Select from a list of AND groups • Matrix Group: Select from a list of Matrix groups • Service Group: Select from a list of Service groups • Guard Patrol Group: Select from a list of Guard Patrol • Zone Group: Select from a list of Zone groups • Inst Text Group: Select from a list of Instruction Text groups
Time Control	3	Displays a list of the programmed time controls, from which a time control may be disabled
Switch	3	Disables a switch on a control-display module; requires the panel, card, and device address
LED	3	Disables the LEDs on a control-display module; requires the panel, card, and device address

Activate Menu

Use the commands on the Activate Menu to switch outputs and LED indicators on, and switch sensor sensitivity and event message routing to alternate settings.

Table 13: Activate Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu.
Exit Menu	None	Returns to the event message screen.
Alt Sensitivity	2	Switches fire detector sensitivity settings from primary alarm sensitivity to alternate alarm sensitivity.
Alt Message Route	2	Switches event message routing from primary message routing to alternate message routing.
Guard Patrol Route	3	Provides a list of guard patrol routes.
Relay	3	Activates a relay or output module. Select one of the states from the Output Priority Menu. Requires a panel, card, and device address. • Set: Overrides low, medium, and high priority commands and forces the device to the desired state. The Set priority does not reset the device's priority counters. • Latch: Overrides low, medium, and high priority commands and forces the device to the desired state. The Latch priority does reset the device's priority counters.

Selection	Access level	Description
		• Low Priority: Forces the device to the desired state and adjusts the Low Priority counter accordingly. • Medium Priority: Forces a device to the desired state and adjusts the Medium Priority counter accordingly. • High Priority: Forces a device to the desired state and adjusts the High Priority counter accordingly.
LED	3	Changes the output state of an LED from off to an active state or from one active state to another active state. Select one of the states from the Output Priority Menu. Requires a panel, card, and device address. • Steady: Select one of the states from the Output Priority Menu. - Set: Overrides low, medium, and high priority commands and forces the device to the desired state. The Set priority does not reset the device's priority counters. - Latch: Overrides low, medium, and high priority commands and forces the device to the desired state. The Latch priority does reset the device's priority counters. - Low Priority: Forces the device to the desired state and adjusts the Low Priority counter accordingly. - Medium Priority: Forces a device to the desired state and adjusts the Medium Priority counter accordingly. - High Priority: Forces a device to the desired state and adjusts the High Priority counter accordingly. • Fast Blink: Select one of the states from the Output Priority Menu (see the priority states described in "Steady" above). - Set - Latch - Low Priority - Medium Priority - High Priority • Slow Blink: Select one of the states from the Output Priority Menu (see the priority states described in "Steady" above). - Set - Latch - Low Priority - Medium Priority - High Priority

Selection	Access level	Description
Audio Amp [1]	3	Changes the output state of an audio amplifier. Select one of the states from the Output Priority Menu. Requires a panel, card, and device address. • Set: Overrides low, medium, and high priority commands and forces the device to the desired state. The Set priority does not reset the device's priority counters. • Latch: Overrides low, medium, and high priority commands and forces the device to the desired state. The Latch priority does reset the device's priority counters. • Low Priority: Forces the device to the desired state and adjusts the Low Priority counter accordingly. • Medium Priority: Forces a device to the desired state and adjusts the Medium Priority counter accordingly. • High Priority: Forces a device to the desired state and adjusts the High Priority counter accordingly.
Audio Message [1]	3	Allows selection of a different audio message and channel for a corresponding amplifier. Requires the message and channel for a panel, card, and device address.
Drill	None	Turns on all audible and common alarm output device types and, if configured, all visible device types. Drill does not put the panel into alarm.
Remote Read Lock	2	Use when connecting to the panel to read status and diagnostic information via TCP/IP instead of the RS-232 connection. By default, this feature is "unlocked." Locking this feature prevents reading from the panel. The command can be issued to a single panel or all panels. **Note:** Activating and restoring the Remote Read Lock command does not affect reading panel status and diagnostic information over the RS-232 connection.
Remote Write Unlock	2	Allows a project database download to the control panel via a TCP/IP connection instead of an RS-232 connection when the panel is equipped with an Ethernet card. The default setting is "locked." The command can be issued to a single panel or all panels. **Notes** • Activating and restoring the Remote Write Unlock command does not affect downloading the project database over the RS-232 connection. • This function should only be used by the installer or service provider. Changes to the fire alarm system must be tested and may require local authority approval.

Selection	Access level	Description
Sensor Bypass	2	Keeps the photo element on a SIGA2-PHS Multisensor Smoke Detector from generating a supervisory message. Requires a panel, card, and device address).
Gas Accel Response	2	Changes the carbon monoxide (CO) rate of a CO detector for testing purposes. Requires a panel, card, and device address.

[1] Requires a 3X-PMI Paging Microphone Interface.

Restore Menu

Use the commands on the Restore Menu to switch outputs and LED indicators off, and switch sensor sensitivity and event message routing to their primary settings.

Table 14: Restore Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu.
Exit Menu	None	Returns to the event message screen.
Primary Sensitivity	2	Returns the fire detector sensitivity setting from alternate to primary alarm sensitivity.
Primary Msg Route	2	Returns the fire detector sensitivity setting from alternate to primary message routing.
Guard Patrol Route	3	Clears a guard patrol alarm.
Relay	3	Restores the output state of a relay. Select one of the states from the Output Priority Menu. Requires a panel, card, and device address. • Set • Latch • Low Priority • Medium Priority • High Priority
LED	3	Restores the output state of an LED from on to an inactive state. Select one of the states from the Output Priority Menu. Requires a panel, card, and device address. • Set • Latch • Low Priority • Medium Priority • High Priority

Selection	Access level	Description
Audio Amp	3	Restores the output state of an audio amplifier. Select one of the states from the Output Priority Menu. Requires a panel, card, and device address. • Set • Latch • Low Priority • Medium Priority • High Priority
Audio Message	3	Restores the message and channel for a corresponding amplifier. Requires the message and channel for a panel, card, and device address.
Drill	None	Cancels the drill signal.
Remote Read Lock	2	Returns the panel to the unlocked state by either panel or all panels.
Remote Write Unlock	2	Returns the panel to the locked state by either panel or all panels.
Sensor Bypass	2	Returns the photo element on a SIGA2-PHS Multisensor Smoke Detector to normal supervisory messaging. Requires a panel, card, and device address.
Gas Accel Response	2	Returns the CO rate of detection for a CO detector to normal. Requires a panel, card, and device address.

Reports Menu

Use the commands on the Reports Menu to retrieve maintenance and service related information from the control panel. There are four kinds of reports: Maintenance, History, Revisions, and MODCOM compliance.

Table 15: Reports Menu

Selection	Access level	Description
Back	None	Returns to the previous menu.
Exit Menu	None	Returns to the event message screen.
Device Maintenance	None	Lets you select one of the reports described below. • Dirty Devices > 80%: Lists all addressable smoke detectors that have a %Dirty value of 80% and greater. Smoke detectors that are more than 80% dirty should be cleaned or replaced as soon as possible. Requires a panel address. You can select to display or print the report. • Dirty devices > 20%: Lists all addressable smoke detectors that have a %Dirty value 20% and greater. A

Selection	Access level	Description
		smoke detector that is more than 20% dirty should be noted for possible cleaning or replacing. Requires a panel address. You can select to display or print the report. • Single Device: Lists the %Dirty value for a single smoke detector. The report also includes the smoke detector's model type, primary and alternate alarm sensitivity values, and, if programmed, a location description. Requires a panel, card, and device address. You can select to display or print the report. • Devices on a card: Lists the %Dirty value for all of the smoke detectors on a signaling line circuit. The report also includes each smoke detector's model type, primary and alternate alarm sensitivity values, and, if programmed, a location description. Requires a panel, card, and loop controller address (L). You can select to display or print the report.
History	None	Creates a report that lists the last 1,000 events and operator commands processed by the control panel. The items in the list are presented in reverse chronological order. The event or system command name, address, time and date of occurrence, and the source that initiated the event or command are included. Requires a panel address. You can select to display or print the report for the following: • History with Text: Provides a history of events and operator commands logged by the panel. For each point that activated or restored, the detail includes the point's message text. • History without Text: Provides a history of events and operator commands logged by the system. For each point that activated or restored, the detail includes the point's device address.
Revisions	None	Creates a report that lists the revision level of all the hardware and software components installed in the cabinet. Requires a panel address. You can select to display or print the report.
MODCOM Compliance	None	Creates a report of the installed MODCOM address and its NFPA compliance. Requires a panel address. You can select to display or print the report. **Note:** If "Fully Programmable" was selected in the 3-SDU for the MODCOM setting, the panel will report that it is noncompliant. However, individual rules could have been written in the 3-SDU that make it compliant.

Program Menu

Use the commands on the Program Menu to modify certain system settings, restart the system, and clear the alarm history. If the system was programmed with a secondary language, you can toggle languages from the Program Menu.

Table 16: Program Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu.
Exit Menu	None	Returns to the event message screen.
Change Time	2	Sets the system time set in hours, minutes and seconds (HHMMSS) that appears at the top of the LCD screen.
Change Date	2	Sets the system date in month, day, and year that appears at the top of the LCD screen.
Edit Password	Level 2 to change Level 1 Level 3 to change Level 2 Level 4 to change Level 3 Level 5 to change Level 4	Changes the password for Access levels 1 to 4.
Restart	4	Restarts the fire alarm system without removing power. The command can be made by panel or all panels.
Edit Holiday List	3	Creates a list of holidays so that a panel can activate a time-controlled event based on whether the day is a scheduled holiday. Each panel holds its own list of up to 255 holidays. Select one of the following: • Add Holiday: Requires the month and day (MMDD). • Edit Holiday: Displays a list of scheduled holidays that can be edited. • Delete Holiday: Displays a list of scheduled holidays that can be deleted.
Clear History	4	Resets the alarm counter and erases the list of events that occurred on the panel since it was placed into service or the last time the history file was cleared. The command can be issued to a single panel or all panels. **Caution:** This command is for use only by an authorized service technician. Clearing the panel history file means that all history data for the panel is permanently deleted.

Selection	Access level	Description
Toggle Language	None	Switches the LCD menu names and default primary message text to a preprogrammed secondary language. **Notes** • The “Secondary Language” option must have been selected in the 3-SDU for this function to work. • Custom message text does not switch to the secondary language when toggled.

Test Menu

Use the commands on the Test Menu to perform periodic inspection tests on the fire alarm system.

Table 17: Test Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu.
Exit Menu	None	Returns to the event message screen.
Start Test	4	Displays a list of Service groups. You can verify the operation of devices in a selected group without causing the control panel to enter the fire alarm or trouble state.
Cancel Test	4	Displays a list of Service groups. Upon canceling a test, any devices left in an active state causes the control panel to report a trouble.
Lamp Test	None	Temporarily turns on the panel buzzer, all LED indicators, and every pixel on the LCD screen.
Sig. Device Test	4	Places a Signature device into test condition. Signature devices include all sensors, modules, and security devices. Select one of the listed test conditions. Requires the panel, card, and device address. • Alarm [1]: Tests the primary active state of an input device • Prealarm [2]: Tests the secondary active state of an input device • Trouble

[1] Alarm means the primary active state of an input device. For example, Monitor or Supervisory devices can also be tested with this command.

[2] Prealarm means the secondary active state of an input device, when supported. For example, some security devices have a secondary state, such as a security tamper. This command allows you to test the device.

Security Menu

Use the commands on the Security Menu to set the device bypass and monitor state of a security partition when the EST3X control panel is integrated with an EST3 life safety network that includes security features.

Note: The Security Menu is only available when the security control function is enabled in the 3-SDU.

Table 18: Security Menu selection descriptions

Selection	Access level	Description
Back	None	Returns to the previous menu.
Exit Menu	None	Returns to the event message screen.
Device	2	Sets the bypass state of a security alarm in a security partition. The partition must be disarmed before you can set the bypass state. Select either Bypass or Remove Bypass. Requires the panel, card, and device address.
Partition	2	Sets the monitoring state for a security partition. Select one of the following: • Partition Disarm: Displays a list of armed partitions that can be disarmed. • Partition Away: Displays a list of partitions to arm. “Away” arms the partition so the system monitors all devices, both perimeter and interior of the protected area. • Partition Stay: Displays a list of partitions to arm. “Stay” arms the partition so the system monitors only those devices on the perimeter of the protected area. • Partition Reset: Displays a list of partitions that can be reset.

Chapter 3
Operating instructions

Summary

This chapter provides instructions for operating the fire alarm system from the EST3X control panel's user interface.

Content

Operating states

The EST3X control panel operates in the normal, alarm, disable, supervisory, trouble, monitor, test, and drill states.

Normal state

The system operates in the normal (or quiet) state in the absence of any events. In the normal state, the Power LED is on and the LCD screen shows the time, date, custom banner (if programmed), and the Alarm History count (see Figure 4 on page 19).

Alarm state

The control panel enters the alarm state (system off-normal) when a point signals an alarm event. For example, a detector, pull station, or waterflow switch is activated.

Output of the alarm state

Upon entering the alarm state, the control panel:

- Activates all common alarm outputs and common alarm relays
- Activates the common alarm contact on the main board
- Activates the first alarm pseudo point
- Changes the active state for the point that signaled the alarm event

Indication of the alarm state

To indicate it is in the alarm state, the control panel:

- Sounds the panel buzzer
- Flashes the Alarm LED
- Displays an event message in the Alarm Queue for the point that signaled the alarm event

If the active point is an alarm zone and a control-display module is installed, the control panel also flashes the zone’s alarm LED on the module.

Disable state

The control panel enters the disable state when a point signals that a system component is disabled.

When a point is disabled, the control panel does not process any of the point's status changes and the point remains in its current state. For example, if an audible device type in the normal state was disabled and subsequently activated, the audible device type would not turn on until it was enabled. Conversely, if an active audible device type were disabled and subsequently restored, the audible device type would not turn off until it was enabled.

If a point in trouble is disabled and the cause of the trouble changes while the point is disabled, the point's original trouble event message may not update when the point is enabled.

Note: For anything other than a zone, use the Disabled Points command on the Status Menu to identify a disabled point.

Output of the disable state

Upon entering the disable state, the control panel:

- Activates the first trouble pseudo point
- Activates the first disable pseudo point
- Changes the active state for the point that signaled the disable event

Indication of the disable state

To indicate it is in the disable state, the control panel:

- Sounds the panel buzzer
- Turns on the Disable LED
- Flashes the Trouble LED
- Displays an event message in the Trouble Queue for the point that signaled the disable event, provided there are no higher priority events

Supervisory state

The control panel enters the supervisory state when a point signals a supervisory event.

Output of the supervisory state

Upon entering the supervisory state, the control panel:

- Activates the common supervisory contacts on the SFS1-CPU

- Activates the first supervisory pseudo point
- Changes the active state for the point that signaled the supervisory event

Indication of the supervisory state

To indicate it is in the supervisory state, the control panel:

- Sounds the panel buzzer
- Flashes the SUP LED
- Displays an event message in the Supervisory Queue for the point that signaled the supervisory event, provided there are no higher priority events

If the active point is a supervisory zone and a control-display module is installed, the control panel also flashes the zone's active LED on the module.

Trouble state

The control panel enters the trouble state when a point signals a trouble event.

Output of the trouble state

Upon entering the trouble state, the control panel:

- Activates the common trouble contacts on the main board
- Activates the first trouble pseudo point
- Changes the active state for the point that signaled the trouble event

Indication of the trouble state

To indicate it is in the trouble state, the control panel:

- Sounds the panel buzzer
- Flashes the Trouble LED
- Turns on the GND Fault LED if the trouble is an earth ground fault

If the point is an alarm, supervisory, or monitor zone and a control-display module is installed, the control panel also flashes the zone's Trouble LED on the module.

Monitor state

The control panel enters the monitor state when a supervisory or monitor input is activated.

Output of the monitor state

Upon entering the monitor state, the control panel:

- Activates the first monitor pseudo point
- Changes the active state for the point that signaled the monitor event

Indication of the monitor state

To indicate it is in the monitor state, the control panel:

- Sounds the panel buzzer
- Displays the point's event message in the Monitor Queue, provided there are no higher priority events

If the point is a monitor zone and a control-display module is installed, the control panel also flashes the zone's active LED on the module.

Note: Monitor indications are restored automatically when the monitor input is restored.

Test state

The control panel enters the test state when a service group is activated.

Output of the test state

Upon entering the test state, the control panel:

- Activates the first monitor pseudo point
- Activates the first trouble pseudo point
- Activates the first test pseudo point
- Changes the active state for the service group that was activated

While in the test state:

- When a member of an active service group signals an active event, the control panel executes the service group's active test response
- When a member of an active service group signals a trouble event, the control panel executes the service group's trouble test response

Note: If you do not program a trouble test response, the control panel executes the active test response instead.

Indication of the test state

To indicate it is in the test state, the control panel:

- Sounds the panel buzzer
- Flashes the Trouble LED
- Displays an event message in the Trouble Queue for the first test pseudo point, provided there are no higher priority events
- Displays an event message in the Monitor Queue for the service group that was activated, provided there are no higher priority events

Drill state

The drill function activates the system notification appliances generally for conducting a fire drill. In this state, an alarm is not transmitted to the central monitoring station (CMS).

Output of the drill state

Upon entering the drill state, the control panel:

- Activates the first activated pseudo point
- Changes the active state for the device that activated

Indication of the drill state

To indicate it is in the test state, the control panel:

- Activates all audible and common alarm output devices
- Activates all configured visual devices

Control panel power up

Initial power up

When you power up the EST3X control panel for the first time, the LCD may begin to show event messages on the screen as the SFS1-CPU microprocessor begins communicating with devices. You can use the Panel Silence button to silence the buzzer and the Acknowledge button to acknowledge any events.

Once powered up, you need to download a database created in the 3-SDU to the control panel. You can create a startup version of the database to assign panel addresses and perform preliminary device verifications. See “Creating an initial startup database” on page 110.

Notes

- Before applying power to the control panel, make sure the standby batteries are not connected to the PS10-4B Power Supply.
- The PS10-4B Power Supply should already be installed and mains AC (primary power) wired to the input terminals (TB1). Refer to the *PS10-4B Power Supply Board Installation Sheet* (P/N 3101774) if additional wiring instructions are required.
- For a network system, download the initial database to each control panel separately, to establish the correct control panel addresses. After the initial download, all further downloads can be made from a single panel in the network.
- For networked systems, you should not connect the network wiring until after the project has been downloaded to each of the panels and you have cleared all troubles except for network communication faults.

To power up the control panel for the first time:

1. Apply power to the control panel.
2. Connect the batteries to the battery wiring terminal on the PS10-4B Power Supply. See “Standby batteries” on page 121.
3. Press the Panel Silence button and the Acknowledge button, if necessary.
4. Download the database as instructed in “Downloading a database” on page 67.
5. If errors display on the LCD screen, refer to “Runtime errors” on page 146 for information on resolving them.
6. For a network system, clear any faults between control panels.
7. Verify proper operation. Refer to “Routine maintenance and tests” on page 151 for Initial and Reacceptance testing.

Using the rotary controller

The rotary controller on the EST3X user interface replaces the up, down, and enter keys found on other user interfaces. Turning the rotary controller allows you to scroll through event messages on the LCD screen, menus and lists, and

numbers for panel, card, and device addressing. Pressing (clicking) the rotary controller allows you to access event message details, menus, and selection screens. It also allows you to enter address numbers and backspaces.

Selecting menus and commands

Press the rotary controller to access the first menu, from which you will access other menus. For all menus, turn the dial to scroll to a desired selection. Press the dial to click the selection.

Returning to the event message screen or previous screen

Pressing the rotary controller while in certain screens returns you to the event message screen or the previous screen.

Note: Pressing the Acknowledge button also returns you to the event message screen or the previous screen.

Returning to the previous screen from an address field

In an address field, you can access the previous screen from the first number in the field by turning the rotary controller to the “<” character and then pressing the dial.

For example, in the address field below you are positioned at the first number. If you click the “<” character you will return to the previous screen.

```
ENTER DEVICE
<PCCDDD
```

Entering a panel, card, or device address

Turn the rotary controller clockwise or counterclockwise to scroll to the desired number (0-9), and then press the controller to enter the number. Pressing the rotary controller automatically moves the cursor to the next number position.

Backspacing

In an address field, you can backspace to a previous number by turning the rotary controller to scroll to the “<” character and then pressing the dial. You can then reenter the number.

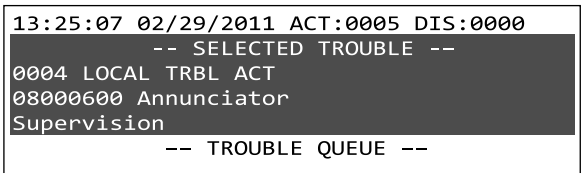
In the address example below, you will change the number 3.

```
ENTER DEVICE
0103<DDD
```

Selecting an event message

Turn the rotary controller to scroll through and select an event on the LCD screen. The selected event appears in a highlighted field at the top of the screen, as shown in Figure 7.

Figure 7: Selecting an event message



Accessing the Queue Menu

The Queue Menu allows you to view details of a selected event message and to select queues (Alarm, Supervisory, Trouble, or Monitor) to view the messages stored in them.

Note: The Queue Menu is only available when the system is off-normal.

To access the Queue Menu:

1. From the event message screen, click the rotary controller to display the Queue Menu.

Accessing the Main Menu

The Main Menu is directly accessed from the system normal screen or Queue Menu when the system is off-normal.

To access the Main Menu from the system normal screen:

1. Click the rotary controller.

To access the Main Menu from the event message screen:

1. Click the rotary controller to display the Queue Menu, and then click Main Menu.

Silencing the panel buzzer

The control panel EST3X sounds the panel buzzer when an event message is posted into one of the event message queues. Pressing the Panel Silence button or acknowledging the event message silences the buzzer. The panel buzzer automatically re-sounds when a new event message is posted or when the panel trouble resound timer expires (typically 24 hours).

Notes

- The panel buzzer may be configured to sound periodically to remind you of unacknowledged event messages.
- For nonlatching events, the panel buzzer automatically silences when the event is restored. For example, when a trouble clears.
- Pressing the Panel Silence button also silences the buzzer on remote annunciators, provided the remote annunciators are communicating.
- The panel silence function can be programmed in the 3-SDU for an access level password.

To silence the panel buzzer:

1. Press the Panel Silence button to acknowledge the event message.
2. If prompted, enter the access level password.

Silencing alarm signals

WARNING: The protected premises may be occupied. Do not silence alarm signals or reset the control panel unless you are authorized to do so and only after all occupants have been evacuated.

Pressing the Alarm Silence button silences all audible alarm signals and, if configured, all visual alarm signals.

Pressing the Alarm Silence button *does not* silence alarm signals under the following conditions:

- When a waterflow alarm switch is active and the system is configured to prevent silencing alarm signals activated by a waterflow alarm switch
- When the system is configured to delay the silencing of alarm signals, in which case the Alarm Silence button may not be operational for up to five minutes following an alarm event
- May automatically silence notification appliances after 1 to 60 minutes

Silenced outputs automatically re-sound when:

- The Alarm Silence button is pressed a second time
- Another alarm input activates
- Another alarm input in the same zone activates, unless the system is configured to prevent it

Note: The alarm silence function can be programmed in the 3-SDU for an access level password.

To silence alarm signals:

1. Press the Alarm Silence button.
2. If prompted, enter the access level password.

Acknowledging events

When an event occurs, it is important that you acknowledge it and review the issue. The control panel handles the event by showing it on the LCD screen as an event message, sounding the panel buzzer, placing the event in the appropriate queue (Alarm, Supervisory, Trouble, or Monitor), and causing the Acknowledge LED to flash.

Pressing the Acknowledge button places a check mark and the word “Acknowledged” to the right of the event. The LED stops flashing and the panel silences after all events have been acknowledged.

To acknowledge an event:

1. Press the Acknowledge button.

Resetting the fire alarm system

WARNING: The protected premises may be occupied. Do not reset the fire alarm system until the proper authorities have determined that the threat of fire is no longer present.

Pressing the Reset button restores the system to its normal state, provided all latched inputs have been restored before the end of the reset cycle.

If alarm signal initiating devices have not been restored before the end of the reset cycle:

- Active alarm signals will remain active
- Silenced alarm signals will remain silenced

Notes

- The Reset button may be inoperable for up to three minutes following an alarm event
- The Reset button does not affect disabled points or manually overridden functions.
- The reset function can be programmed in the 3-SDU for an access level password.

To reset the fire alarm system:

1. Press the Reset button.
2. If prompted, enter the access level password.

Restarting the fire alarm system

Restarting the system reinitializes it without removing power.

To restart the fire alarm system:

1. Access the Main Menu, and then click Program.
2. Click Restart.
3. Click By Panel, and then enter the panel address.

   — or —

   Click All Panels.
4. Enter the access level password.

Clearing the alarm history

Caution: This command is for use only by an authorized service technician. Clearing the panel history file means that all history data for the panel is permanently deleted.

The alarm history counter keeps track of how many times the control panel has entered the alarm condition. Clearing the history resets the counter shown on the LCD screen (see Figure 4 on page 19) and erases the list of events that occurred on the panel since it was placed into service or the last time the history file was cleared.

To clear the alarm history:

1. Access the Main Menu, and then click Program.
2. Click Clear History.
3. Click By Panel, and then enter the panel address.

   — or —

   Click All Panels.
4. Enter the access level password.

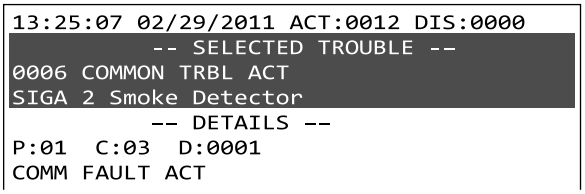
Viewing event message details

Viewing event details provides the address of the device that generated the event and, if programmed, the location. Different detail information is displayed for device, group, guard patrol, and instruction text.

To view the details of an event message:

1. Scroll to the desired event message.
2. Click to display the Queue Menu, and then click Details.

Figure 8: Event message details for a device activation



Device details

If a device activation causes an event, the Details screen shows the active device's logical address and the off-normal state.

Group details

If a group activation causes an event, the Details screen shows the state of the device, device address, and device message, which is usually the device location.

Guard patrol details

When a guard patrol route goes active, the Details screen shows the event or state of the off-normal station, as well as the logical address, patrol or route number, and station number of the device.

Instruction text details

You can program the system to include detailed instructions for certain events. When specific devices go into alarm, the system generates a related monitor event. If you select the monitor event, then press Details, the instruction text is displayed.

Viewing reports

System reports are used to check the current condition or history of the EST3X life safety network. A report can be displayed on the LCD screen or printed to a local printer.

Status reports

The status reports listed below are available to help you determine the current state of the system.

- All Active Points: Lists all addressable points that are in an active (alarm) state
- Alarm: Lists all active alarm input device types
- Supervisory: Lists all active supervisory input device types
- Trouble: Lists all points in trouble

- Monitor: Lists all active monitor input device types
- Test: Lists points in an active service group that are in the active or trouble state
- Disabled Points: Lists all addressable points that are disabled
- Outputs: Lists all active output device types and control-display card LEDs

To access a status report:

1. Access the Main Menu, and then click Status.
2. Click the desired report.
3. Enter the panel address.
4. Click Display and scroll through the list. When finished, click or press the Acknowledge button to exit the screen.

   — or —

   Click Print Locally, select the printer, and then click again to exit the screen.

Abnormal points report

Use the All Active Points command on the Status Menu to display or print a list that includes all points in the system that are not in their normal state.

Note: During normal operation, most points in the system are not active. Points whose normal state is active are included in the list.

To display or print a list of all abnormal points:

1. Access the Main Menu, and then click Status.
2. Click All Active Points.
3. Enter the panel address.
4. Click Display and scroll through the list. When finished, click or press the Acknowledge button to exit the screen.

   — or —

   Click Print Locally, select the printer, and then click again to exit the screen.

Device maintenance reports

A set of device maintenance reports are available to help you determine if any addressable smoke detector devices require maintenance. Each report gives you

the option to display it on the LCD screen or print it to a local printer. The device maintenance reports are listed below.

- Dirty Devices > 80%: Lists all addressable smoke detectors that have a %Dirty value of 80% and greater. Smoke detectors that are more than 80% dirty should be cleaned or replaced as soon as possible.

  Note: The %Dirty value is an indication of a smoke detector's ability to compensate for environmental conditions. Smoke detectors with higher percentages are less able to compensate.
- Dirty Devices > 20%: Lists all addressable smoke detectors that have a %Dirty value of 20% and greater. A smoke detector that is more than 20% dirty should be noted for possible cleaning or replacing.
- Single Device: Lists the %Dirty value for a single smoke detector. The report also includes the smoke detector's model type, primary and alternate alarm sensitivity values, and, if programmed, a location description. To view this report you must know the device address of the smoke detector.
- Devices on a Card: Lists the %Dirty value for all of the smoke detectors on a signaling line circuit. The report also includes each smoke detector's model type, primary and alternate alarm sensitivity values, and, if programmed, a location description. To view this report you must know the panel number, card number, and loop number of the signaling line circuit.

To access a device maintenance report:

1. Access the Main Menu, and then click Status.
2. Click Device Maintenance, and then click the desired report.
3. Where required, enter the panel address, card address, device address, or loop controller address (L).
4. Click Display and scroll through the list. When finished, click or press the Acknowledge button to exit the screen.

   — or —

   Click Print Locally, select the printer, and then click again to exit the screen.

History report

The history report lists the last 1,000 events or operator instructions processed by the control panel or since its history was cleared. The event or system command name, address, time and date of occurrence, and the source that initiated the event or command are included.

The report is structured with the most recent event or instruction listed first. The report can be displayed for viewing on the LCD screen or printed to a local printer. The history reports are listed below.

- History with Text: Provides a history of events and operator commands logged by the panel. For each point that activated or restored, the detail includes the point's message text.
- History without Text: Provides a history of events and operator commands logged by the system. For each point that activated or restored, the detail includes the point's device address.

To view a history report:

1. Access the Main Menu, and then click Status.
2. Click Reports, and then click History.
3. Click the desired report and enter the panel address.
4. Click Display and scroll through the list. When finished, click or press the Acknowledge button to exit the screen.

   — or —

   Click Print Locally, select the printer, and then click again to exit the screen.

System revisions report

The Revisions report provides system database information, installed card types and their firmware, bootstrap, and database versions, and system IP addresses.

The initial Revision Report screen shows system information described in the table below.

Item	Description
Alarm Count	Shows the total number of times that the panel has gone into alarm since the alarm history was cleared.
Market	Shows the Marketplace setting configured in the 3-SDU.
CPU	Shows the SFS1-CPU Main Board firmware version number.
3-SDU	Shows the SDU version number.
Audio DB	If a supplementary audio feature is installed, shows the database version number.
SDU PRJCT	Shows the SDU project (database) version.

Item	Description
DB S/N	Shows the database serial number (S/N) created when the database was converted. **Note:** Database serial numbers must match to avoid database incompatibility faults.
DB Date	Shows the date the database was downloaded.
IP ADDR	Shows the IP address of the control panel.
IP NETWRK	Shows the IP network address of the control panel.
IP GTWY	Shows the IP gateway address of the control panel.

Turning the rotary controller displays information on installed cards, as described in the table below.

Item	Description
Card	Shows the card address.
ANN Type	Shows the 4X Series Control-Display Module type.
Card Type	Shows the card type. For example, 3-SDDC.
Firmware	Shows the card's firmware version and date.
Bootstrap	Shows the main SFS1-CPU card's boot loader and bootstrap version and date as follows: • For card address 3, the boot loader version and date • For card address 4, the bootstrap version and date
Database	Shows the card's database version and date.

To view the Revisions report:

1. Access the Main Menu, and then click Reports.
2. Click Revisions.
3. Enter the panel address.
4. Click Display and view initial system information. Turn the rotary controller to view information on installed cards. When finished, click or press the Acknowledge button to exit the screen.

   — or —

   Click Print Locally, select the printer, and then click again to exit the screen.

MODCOM Compliance report

The 3-MODCOM module provides dialer communications between the EST3X control panel and remote locations over telephone lines. During system programming, the 3-MODCOM can be automatically configured as an NFPA 72 compliant modem or manually customized (non-compliant). The MODCOM Compliance report lists the compliance level of 3-MODCOM modules in a given panel.

To view the MODCOM Compliance report:

1. Access the Main Menu, and then click Reports.
2. Click MODCOM Compliance, and then enter the panel address.
3. Click Display. When finished, click or press the Acknowledge button to exit the screen.

   — or —

   Click Print Locally, select the printer, and then click again to exit the screen.

Disabling and enabling devices

Devices include input and output circuits, detectors, and modules. Disabling a device isolates it from the system. While the device is disabled, the EST3X control panel logs the status change signals, but is prevented from processing the signals until the device is enabled. For example, the control panel does not activate an alarm event when you activate a disabled detector, but it will after the detector is enabled.

The control panel keeps track of how many times you disable a device without enabling it. You must enable a device the same number of times you disable it in order to return the device to its original condition.

Device addresses are listed in Appendix B “Addresses” on page 257.

Notes

- You cannot disable a device configured as a common alarm output.
- Disabling all of the devices in a Zone group automatically disables the Zone group. Enabling each device in a Zone group automatically enables the Zone group.
- Disabling the device address for the dialer or a dialer account deletes all event messages sent to that account before they are transmitted. The dialer still transmits the account’s test-abnormal message and any message that was in the dialer queue before the account was disabled.

- When you enable a device, all indicators and outputs activated by the device will reactivate.

To disable a device:

1. Access the Main Menu, and then click Disable.
2. Click Device, and then enter the panel, card, and device address.
3. Enter the access level password.

To enable a device:

1. Access the Main Menu, and then click Enable.
2. Click Device, and then enter the panel, card, and device address.
3. Enter the access level password.

Disabling and enabling option cards

Option cards can include hardware layer cards and modules, and operator layer control-display modules. Disabling a card isolates it from the system. While the card is disabled, the EST3X control panel logs the status change signals, but is prevented from processing the signals until the card is enabled.

The control panel keeps track of how many times you disable a card without enabling it. You must enable a card the same number of times you disable it in order to return the card to its original condition.

Option card addresses are listed in Appendix B “Addresses” on page 257.

To disable an option card:

1. Access the Main Menu, and then click Disable.
2. Click Card, and then enter the panel and card addresses.
3. Enter the access level password.

To enable an option card:

1. Access the Main Menu, and then click Enable.
2. Click Card, and then enter the panel and card addresses.
3. Enter the access level password.

Disabling and enabling logic groups

A logic group is an *object* that is created in the 3-SDU. Groups are required in order to execute certain system functions, but groups bear no physical relationship to the system. For example, smoke detectors can be assigned to the same Zone group even though they are not attached to the same wire run.

Disabling a group isolates it from the system. While the group is disabled, the EST3X control panel is prevented from processing status change signals from every device in the group until the device is enabled. For example in a Zone group, the control panel does not activate an alarm event when you activate a disabled detector, but it will after the detector is enabled.

The control panel keeps track of how many times you disable a group without enabling it. You must enable a group the same number of times you disable it in order to return the group to its original condition.

Note: If you disabled a Zone group by disabling all of the devices in the zone, enabling the zone enables all of the devices in the zone.

The logic groups are listed below.

- AND group: A collection of devices that are grouped in the database to provide a group response that is separate from that of its member devices. An AND group activates when a specified number of devices change to a specified state. The specified state can be alarm, supervisory, trouble, monitor, or not active (NA). AND groups can be configured to signal an alarm, supervisory, trouble, or monitor condition upon activation.
- Matrix group: A collection of devices that are grouped in the database to provide a unique system response when a specified number of its members signal an alarm event or when more than one device in a defined search radius signals an alarm event. A member's alarm, supervisory, trouble, or monitor state’s active status serves as an input for activating the AND group.
- Service group: A collection of devices that are grouped together in the database to provide a unique response for testing purposes. When enabled, the Service group automatically disables the member device's normal alarm response, and provides a common alternate test response.
- Guard patrol group: A collection of guard station devices that are grouped in the database to provide a unique system response when any member of the group fails to change to the active state in the correct order or within specified time limits.

- Zone group: A collection of input devices that are grouped in the database to provide a unique response separate from their individual device responses. Zone groups can be configured to go into alarm when any member of the group goes active or when any device in the group goes into trouble.
- Instruction text group: A collection of devices that are grouped in the database to provide additional detailed instructions or warnings when any device in the group changes to a qualified active state.

To disable a group:

1. Access the Main Menu, and then click Disable.
2. Click Group, and then select the group type.
3. Click the group from the group list.
4. Enter the access level password.

To enable a group:

1. Access the Main Menu, and then click Enable.
2. Click Group, and then select the group type.
3. Click the group from the group list.
4. Enter the access level password.

Disabling and enabling system time controls

System time controls are configured in the 3-SDU to set up automatic starting and stopping of system events based on time and date. The controls run in the background and do not require any operator action. In the event you need to disable a control, you can do so from the control panel.

To disable a time control:

1. Access the Main Menu, and then click Disable.
2. Click Time Control, and then click the desired time control.
3. Enter the access level password.

To enable a time control:

1. Access the Main Menu, and then click Enable.
2. Click Time Control, and then click the desired time control.
3. Enter the access level password.

Activating alarm signals manually

The EST3X drill feature lets you activate alarm signals manually without putting the panel into alarm. When you activate a drill, all audible alarm signals turn on and, if configured, all visual alarm signals, but other automatic fire alarm responses are not activated. The alarm signals remain active until the drill is canceled.

To activate a Drill:

1. Access the Main Menu, click Activate, and then click Drill.
2. If prompted, enter the access level password.

To cancel a Drill:

1. Press the Alarm Silence button.

   — or —

   Access the Main Menu, click Restore, and then click Drill.

Testing the system and devices

Test commands are used to perform periodic inspection tests on the fire alarm system.

Performing a lamp test

Use the Lamp Test command on the Test Menu to verify the operation of the LCD screen and LED indicators. The lamp test command temporarily turns on the panel buzzer, all LED indicators, and every pixel on the LCD. The command only operates the indicators on the panel from which the command is initiated.

To perform a lamp test:

1. Access the Main Menu, and then click Test.
2. Click Lamp Test.

Testing Signature devices

The Sig. Device Test command allows you to place a Signature device into the alarm, prealarm, or trouble condition for testing purposes. Signature devices

include all detectors, modules, and security devices. To test a Signature device, the device must be connected to a signaling line circuit.

Notes

- For latching devices, you must reset the panel to restore the tested device to its normal state. Nonlatching devices restore automatically without resetting the panel.
- The Alarm Test command puts the device into alarm condition and activates its programmed alarm responses.

To test a Signature device:

1. Access the Main Menu, and then click Test.
2. Click Sig. Device Test, and then click the test condition.
3. Enter the panel, card, and device addresses.
4. Enter the access level password.

Testing alarm input devices

In order to test an alarm input device, the device must be part of a Service group that was created in the 3-SDU. Service groups allow alarm input devices to be activated without placing the system into alarm. The protected premises may be divided into more than one Service group to make testing possible without leaving the entire premises unprotected. Refer to the 3-SDU help for instructions on creating Service groups.

Notes

- Putting a Service group into test introduces a Service Group Active event in the queue. To determine which Service group is in test, view the details of the event message (see “Viewing event message details” on page 50).
- The alarm input test automatically times out after approximately 1-hour of inactivity.

To put a Service Group into test:

1. Access the Main Menu, and then click Test.
2. Click Start Test, and then click the desired Service group.
3. Enter the access level password.

To cancel the alarm input device test:

1. Access the Main Menu, and then click Test.

2. Click Cancel Test, and then click the Service group that is in test.
3. Enter the access level password.

Changing output states

Use the Activate and Restore commands to change the output state of relays, NAC circuit outputs, control-display module LEDs, and audio amplifiers.

Use one of the following command priority levels to change the output state.

- Set: Overrides low, medium, and high priority instructions and forces the device to the desired state. The Set priority does not reset the device's priority counters.
- Latch: Overrides low, medium and high priority instructions and forces the device to the desired state. The Latch priority will reset the device's priority counters.
- Low Priority: Forces the device to the desired state and adjusts the low priority counter accordingly.
- Medium Priority: Forces a device to the desired state and adjusts the medium priority counter accordingly.
- High Priority: Forces a device to the desired state and adjusts the high priority counter accordingly.

For control-display modules, see "Changing the output state of an LED" on page 75."

Changing the output state for a relay

A relay module can be on (activated) or off (restored). In the active state, the relay module's normally-open contacts are held closed and the normally-closed contacts are held open.

To activate a relay output state:

1. Access the Main Menu, and then click Activate.
2. Click Relay, and then click the desired output priority.
3. Enter the panel, card, and device address of the relay.
4. Enter the access level password.

To restore a relay output state:

1. Access the Main Menu, and then click Restore.
2. Click Relay, and then click the desired output priority.
3. Enter the panel, card, and device address of the relay.
4. Enter the access level password.

Changing the output state for an audio amplifier

To activate an audio amplifier output state:

1. Access the Main Menu, and then select Activate.
2. Select Audio Amp, and then select the desired output priority.
3. Enter the panel, card, and device address of the audio channel on the ACHS channel selector card (for example the EVAC channel).
4. Enter the access level password.
5. Return to the Activate Menu, and then select Relay.
6. Select the desired output priority.
7. Enter the panel, card, and device address of the Signature Series amplifier card.

To restore an audio amplifier output state:

1. Access the Main Menu, and then select Restore.
2. Select Audio Amp, and then select the desired output priority.
3. Enter the panel, card, and device address of the audio channel on the ACHS channel selector card.
4. Enter the access level password.
5. Return to the Restore Menu, and then select Relay.
6. Select the desired output priority.
7. Enter the panel, card, and device address of the Signature Series amplifier card.

Switching the smoke detector alarm sensitivity threshold

Intelligent addressable smoke detectors are configured with two alarm sensitivity thresholds: primary and alternate. The alarm sensitivity setting, determines how easily automatic fire detectors can sense a fire alarm condition. This allows you to increase or reduce an individual detector's sensitivity at various times of the day, dependent upon, environmental conditions, occupancy, manufacturing processes, etc.

A time control is commonly used to automatically switch alarm sensitivity thresholds. However, you can manually switch alarm sensitivity thresholds by using command menus.

Primary alarm sensitivity threshold

Typically, the primary alarm sensitivity threshold is set to a lower threshold. This threshold is commonly used for a daytime operation to reduce the occurrence of nuisance alarms when a facility is occupied, or when environmental conditions may create prealarm conditions.

Alternate alarm sensitivity threshold

The alternate alarm sensitivity threshold sets the *secondary threshold* at which the smoke detector activates an alarm event. Typically, the alternate threshold is set to a higher sensitivity threshold. This threshold is commonly used for a nighttime or weekend operation, when the facility is unoccupied.

Alarm sensitivity setting levels

Alarm sensitivity settings are expressed in percent of smoke obscuration per foot. The setting defines the threshold at which the detector will change to the alarm state when the smoke in its sensing chamber exceeds the obscuration per foot threshold. The alarm sensitivity levels for Signature devices are described below.

Note: When smoke detectors having both ionization and photoelectric elements are used, the sensitivity setting applies to both elements.

- Most: Activates an alarm event when the smoke level reaches approximately 1.0 %/ft obscuration (0.7 %/ft for ionization detectors)
- More: Activates an alarm event when the smoke level reaches approximately 2.0 %/ft obscuration (1.0 %/ft for ionization detectors)

- Normal: Activates an alarm event when the smoke level reaches approximately 2.5 %/ft obscuration (1.2 %/ft for ionization detectors)
- Less: Activates an alarm event when the smoke level reaches approximately 3.0 %/ft obscuration (1.4 %/ft for ionization detectors)
- Least: Activates an alarm event when the smoke level reaches approximately 3.5 %/ft obscuration (1.6 %/ft for ionization detectors, 2.46 %/ft for a SIGA-SD Duct Smoke Detector)

Switching the sensitivity threshold

To activate the alternate alarm sensitivity settings:

1. Access the Main Menu, and then click Activate.
2. Click Alt Sensitivity.
3. Enter the access level password.

To restore the primary alarm sensitivity settings:

1. Access the Main Menu, and then click Restore.
2. Click Primary Sensitivity.
3. Enter the access level password.

Changing event message routing

Event messages are configured with two message routes: primary and alternate. The message route setting determines where event messages are displayed. Typically, the primary message route is used for a daytime operation and the alternate message route is used for a nighttime or weekend operation.

In most applications, a time control is used to automatically switch between event message routes. However, you can manually switch event message routes using the command menus.

Changing the event message routing

To activate alternate message routing:

1. Access the Main Menu, and then click Activate.
2. Click Alt Message Route.
3. Enter the access level password.

To restore primary message routing:

1. Access the Main Menu, and then click Restore.
2. Click Primary Msg Route.
3. Enter the access level password.

Changing Access Level passwords

Password protection is used to regulate access to certain user interface controls and commands. It is recommended that you change the default passwords once the panel is put into service.

Access level	Default password
1	1111
2	2222
3	3333
4	4444

Note: The user access time out can be configured in the 3-SDU. The default setting is 5 minutes. When user access times out, the panel returns to the default level (0).

An access level password can only be changed by a higher access level. This is referred to as the *controlling* access level. The access level you want to change is called the *target* access level.

To change the access level password:

1. On the Main Menu, choose Program.
2. On the Program Menu, choose Edit Password.
3. Click the target access level.
4. Enter the password for the controlling access level.
5. Enter the new password for the target access level.

Changing the LCD screen language

Use the Toggle Language command on the Program Menu to switch the LCD menu names and default primary message text to a preprogrammed secondary language.

Notes

- The “Secondary Language” option must have been selected in the 3-SDU for this function to work.
- Custom message text does not switch to the secondary language when toggled.

To change LCD screen text attributes to the secondary language:

1. Access the Main Menu, and then click Program.
2. Click Toggle Language.

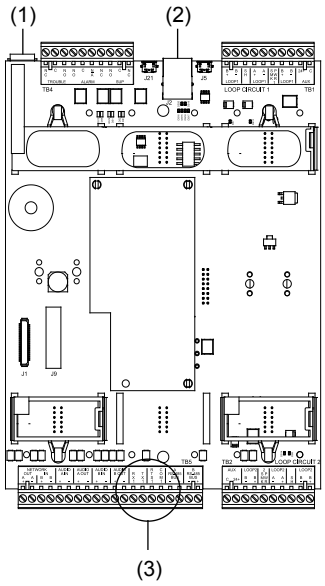
Downloading a database

The control panel provides three ways to download the 3-SDU database into the SFS1-CPU directly from a computer.

- Through the RJ-45 Ethernet jack on the main board (requires optional Ethernet adapter card)
- Through the RS-232 RJ-11 modular jack on the main board
- Through the RS-232 terminal block on the main board (requires a separately ordered DB-9 programming cable, P/N 260097)

Note: This function should only be used by the installer or service provider. Changes to the fire alarm system must be tested and may require local authority approval.

Figure 9: Download-connectors on the SFS1-CPU



(1) RJ-11 modular jack
(2) RJ-45 Ethernet cable jack
(3) RS-232 terminal block

Ethernet download

For downloading the project database via a TCP/IP Ethernet connection, the SFS1-CPU is locked by default to disallow unauthorized database changes. Use the Remote Write Unlock command on the Activate Menu to allow the download.

Notes

- An Ethernet adapter card must be installed to download the database using a TCP/IP Ethernet connection.
- Activating and restoring the Remote Write Unlock command does not affect downloading the project database over the RS-232 connection.
- A Remote Write Unlocked event appears in the Monitor Queue and the buzzer sounds when the panel is unlocked. Both are restored to normal after the panel is restored to its default setting.
- The unlock command times out after 15 minutes.

To download the project database using an Ethernet connection:

1. Connect one end of a Cat 5 or Cat 5e standard Ethernet cable to the RJ-45 jack on the SFS1-CPU. See Figure 9.
2. Connect the other end of the cable to the RJ-45 jack on the computer with the project database.

3. From the EST3X control panel, access the Main Menu, and then click Activate.
4. Click Remote Write Unlock.
5. Click By Panel, and then enter the panel address and access level password.

   — or —

   Click All Panels, and then enter the access level password.
6. From the 3-SDU on the connected computer, configure the communication functions for a TCP/IP connection, and then download the database.

   Press F1 to open the 3-SDU Help topics, if necessary.
7. When the download is finished, access the Main Menu, and then click Restore.
8. Click Remote Write Unlock.
9. Repeat step 3. If the user time out period has expired, reenter the access level password.

RS-232 download

To download the project database using the RS-232 telephone jack:

1. Connect one end of a standard RS-232 cable to the RJ-11 modular telephone jack on the SFS1-CPU. See Figure 10 on page 70.
2. Connect the other end of the cable to the RS-232 jack on the computer with the project database.
3. From the 3-SDU on the connected computer, configure the communication functions, and then download the database.

   Press F1 to open the 3-SDU Help topics, if necessary.

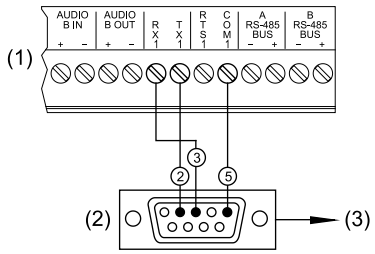
To download the project database using the RS-232 terminal block:

Note: Requires a separately ordered programming cable, P/N 260097.

1. Connect one end of a DB-9 programming cable to the terminal block on the SFS1-CPU. See Figure 10.
2. Connect the other end of the cable to the RS-232 jack on the computer with the project database.
3. From the 3-SDU on the connected computer, configure the communication functions for an RS-232 connection, and then download the database.

   Press F1 to open the 3-SDU Help topics, if necessary.

Figure 10: RS-232 terminal block connections to the DB-9 programming cable



(1) SFS1-CPU terminal connector block
(2) Rear view of female DB-9 connector
(3) RS-232 jack of computer

Using a TCP/IP connection to read from the panel

Use the Remote Read Lock command on the Activate Menu to be able to read status and diagnostic information from the panel instead of using the RS-232 connection. By default, the control panel is unlocked. See Figure 9 on page 68 for the location of the RJ-45 Ethernet connector on the SFS1-CPU main board.

Notes

- An Ethernet card must be installed and the panel connected to a LAN or WAN for data uploads from the panel.
- Activating and restoring the Remote Read Lock command does not affect reading panel status and diagnostic information over the RS-232 connection.
- A “Remote Read Locked” event appears in the Monitor Queue and the buzzer sounds when the panel is locked. Both are restored to normal after the panel is restored to its default setting.

To prevent reading from the panel:

1. From the Main Menu, choose Activate.
2. Choose Remote Read Lock.
3. Choose By Panel, and then enter the panel address (PP).

   — or —

   Choose All Panels.
4. Enter the access level password.

To allow reading from the panel:

1. From the Main Menu, choose Restore.
2. Choose Remote Read Lock.
3. Choose By Panel, and then enter the panel address (PP).

   — or —

   Choose All Panels.
4. Enter the access level password.

Setting the system time and date

The control panel incorporates a system clock to time stamp events and to activate time controls. The time is presented in 24-hour format. The date is presented in day-month-year format.

Setting the time

Use the Change Time command on the Program Menu to set the system clock for the current time. The time is entered in 24-hour format, for example:

000000 = midnight
010000 = 1:00 a.m.
120000 = noon
130000 = 1:00 p.m.
235900 = 11:59 p.m.

Note: On NFPA 72 systems, the Change Time command is not available at access level 2.

To set the system clock for the current time:

1. Access the Main Menu, and then click Status.
2. Click Program, and then enter the access level password.
3. Enter the hour, minutes, and seconds.

   Example: To set the time for 7:27:00 p.m., enter 192700.

Setting the date

Use the Change Date command on the Program Menu to set the system clock for the current date.

Note: On NFPA 72 systems, the Change Date command is not available at access level 2.

To set the system calendar for the current date:

1. Access the Main Menu, and then click Status.
2. Click Program, and then enter the access level password.
3. Enter the day (DD), month (MM) and year (YYYY).

Configuring holiday lists

The Holiday time control is a special time control used to program holidays on a per panel basis. Holiday time controls supersede the normal SDU-programmed system time controls on dates that are designated as holidays. The command is accessed from the Program Menu.

To add a holiday:

1. Access the Main Menu, and then click Program.
2. Click Edit Holiday List, and then click Add Holiday.
3. Enter the holiday month and day.
4. Enter the access level password.

To edit a holiday:

1. Access the Main Menu, and then click Program.
2. Click Edit Holiday List, and then click Edit Holiday.
3. Click the desired holiday, and then enter the correct month and day.
4. Enter the access level password.

To delete a holiday:

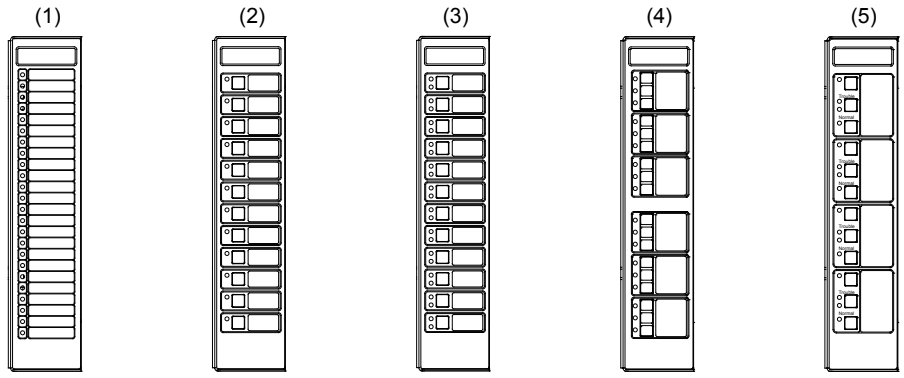
1. Access the Main Menu, and then click Program.
2. Click Edit Holiday List, and then click Delete Holiday.
3. Click the desired holiday, and then press the Acknowledge button to return to the previous screen.
4. Enter the access level password.

Control-display modules

4X Series control-display modules provide additional operator interface capability. They can be mounted on any of the last three card address spaces on

the control panel electronics chassis. A blank insert is provided for labeling the LEDs and switches.

Figure 11: Control-display modules



No.	Model	Description
1	4X-24R 4X-24Y 4X-12RY	Twenty-four red LEDs Twenty-four yellow LEDs Twelve red-over-yellow LED pairs
2	4X-12SR	Twelve LED-switches with red LEDs
3	4X-12/S1GY 4X-12/S1RY	Twelve LED-switches with green-over-yellow LEDs Twelve LED-switches with red-over-yellow LEDs
4	4X-6/3S1G2Y 4X-6/3S1GYR	Six groups of three LED-switches with green LEDs (top switch), and yellow LEDs (middle and bottom switch) Six groups of three LED-switches with green LEDs (top switch), yellow LEDs (middle switch), and red LEDs (bottom switch)
5	4X-4/3SGYWR	Four groups of three LED-switches with green LEDs (top switch), yellow-over-white LEDs (middle switch), and red LEDs (bottom switch)

The buttons on a control-display module use one of three available operating modes that are database configured.

- Toggle: The state of the button changes each time the button is pushed (i.e. “off” to “on” or “on” to “off”). Toggle buttons are commonly used to control two-state operations such as on/off, open/close, speaker select, telephone select, etc.
- Interlocked: Three adjacent toggle buttons that operate as a group. Pushing any button in the group turns the output of the other two buttons “off” and turns its own output “on.” The interlocked mode is commonly used for hands-off auto control of HVAC systems. An interlocked button in the “on” state can be turned “off” without activating a second button by pressing the “on” button

a second time. The output of the “on” button remains on during panel reset. It must be manually returned to “Auto” when no longer required.

- Momentary: The button is “on” only while pressed by the operator. Momentary buttons are typically to issue brief commands. Examples include lamp test, function reset, and test sequence. The command is issued only while the button is pressed.

You may find multiple button modes on a single control-display module. Consult your site-specific documentation for additional information.

Disabling and enabling control-display modules

Disabling a control-display module isolates it from the system. While disabled, changes to the module’s state are not processed. When the module is disabled, the Disable LED on the user interface indicates and a Disabled Active event shows in the Trouble Queue.

Enabling a control-display module re-establishes it as part of the system. When enabled, any changes in state that occurred while the module was disabled are processed.

To disable a control-display module:

1. Access the Main Menu, and then click Disable.
2. Click Card, and then enter the panel and card addresses.
3. Enter the access level password.

To enable a control-display module:

1. Access the Main Menu, and then click Enable.
2. Click Card, and then enter the panel and card addresses.
3. Enter the access level password.

Disabling and enabling control-display module elements

Disabling and enabling control-display switches

To disable a control-display switch:

1. Access the Main Menu, and then click Disable.
2. Click Switch, and then enter the panel, card, and device addresses.
3. Enter the access level password.

To enable a control-display switch:

1. Access the Main Menu, and then click Enable.
2. Click Switch, and then enter the panel, card, and device addresses.
3. Enter the access level password.

Disabling and enabling control-display LEDs

To disable a control-display LED:

1. Access the Main Menu, and then click Disable.
2. Click LED, and then enter the panel, card, and device addresses.
3. Enter the access level password.

To enable a control-display LED:

1. Access the Main Menu, and then click Enable.
2. Click LED, and then enter the panel, card, and device addresses.
3. Enter the access level password.

Changing the output state of an LED

Use the Activate command to change the output state of LEDs on a control-display module. Changing the output state requires entering a command priority level to one of the following output states:

- Set: Overrides low, medium, and high priority instructions and forces the device to the desired state. The set priority does not reset the device's priority counters.
- Latch: Overrides low, medium, and high priority instructions and forces the device to the desired state. The latch priority does reset the device's priority counters.
- Low Priority: Forces the device to the desired state and adjusts the low priority counter accordingly.
- Medium Priority: Forces a device to the desired state and adjusts the medium priority counter accordingly.
- High Priority: Forces a device to the desired state and adjusts the high priority counter accordingly.

To change the LED output state:

1. Access the Main Menu, and then click Activate.

2. Click LED, and then click the desired indication rate.
3. Click the desired output priority.
4. Enter the panel, card, and device address of the relay.
5. Enter the access level password.

To restore the LED output state:

1. Access the Main Menu, and then click Restore.
2. Click LED, and then click the desired indication rate.
3. Click the desired output priority.
4. Enter the panel, card, and device address of the relay.
5. Enter the access level password.

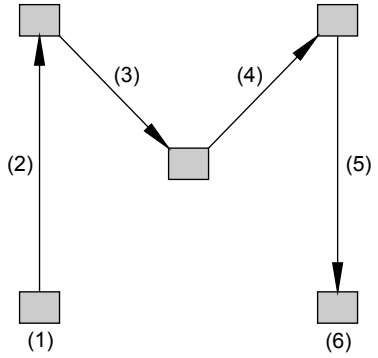
Guard patrols

Security guards are required to walk any one of a number of predetermined routes called tours. During each tour, the guard must activate guard patrol stations that are strategically located along the route. Should a guard activate a station too early, too late, or out of sequence, a guard patrol alarm event message will display on the LCD screen.

The stations on a given route comprise a Guard Patrol group, which is created in the 3-SDU. You can define more than one guard patrol tour for each guard patrol group. Each route can define a different sequence of devices and different limit times for each device.

For example, Figure 12 shows a guard’s patrol route consisting of five stations. The system designer has assigned a minimum and maximum time allowance for the guard to go between any two guard stations. If the guard arrives too early, too late, or at the wrong station, an active guard patrol event is generated.

Figure 12: Sample Guard Patrol route assignment



(1) First station
(2) 7 to 10 minutes
(3) 8 to 10 minutes
(4) 12 to 18 minutes
(5) 10 to 15 minutes
(6) Last station

Starting a guard's tour

Activating a Guard Patrol group starts the system's early, late, and out of sequence sensing mechanisms. If a station reports in early, late, or out of sequence, the guard patrol sensing mechanisms stop and the tour is ended.

There are three ways to start a guard patrol tour:

- Issue the Activate command for the for the Guard Patrol group from the control panel.
- Press a control-display module button that was programmed to turn on the Guard Patrol group. Refer to the 3-SDU help for configuration instructions.
- Trigger a device attached to the first station in a route

To start a guard patrol from the Activate Menu:

1. Access the Main Menu, and then click Activate.
2. Click Guard Patrol Route, and then click the desired route.
3. Enter your access level password.

Ending a guard's tour

A guard patrol tour is automatically ended when all stations on the route have been successfully operated within the allowable time period and in the proper sequence.

Clearing a guard patrol alarm

When a guard patrol tour ends because a guard patrol station was not activated at the proper time, the system issues an event message. When a guard patrol event is generated, you must restore the guard patrol route to clear the alarm. To determine which stations reported in, view the details of the event (see “Viewing event message details” on page 50).

To restore a guard patrol:

1. Access the Main Menu, and then click Restore.
2. Click Guard Patrol Route, and then click the route to be restored.
3. Enter your access level password.

Disabling and enabling a guard patrol group

Disabling the group isolates it from the system just as if it were a hardware component. The command only disables the group response. When a group is disabled, the Disable LED indicates and a Disabled Active event shows in the Trouble Queue.

Enabling a Guard Patrol group establishes it as part of the system just as if it were a hardware component. When enabled, any changes in state that occurred while the group was disabled are processed.

To disable a guard patrol group:

1. Access the Main Menu, and then click Disable.
2. Click Group, and then select Guard Patrol.
3. Click the group from the group list.
4. Enter the access level password.

To enable a guard patrol group:

1. Access the Main Menu, and then click Enable.
2. Click Group, and then select Guard Patrol.
3. Click the group from the group list.
4. Enter the access level password.

Chapter 4
Supplementary applications

Summary

This chapter describes supplementary applications that can be controlled or monitored locally to expand your life safety system capabilities.

Content

Digital audio subsystem

The digital audio subsystem consists of a variety of signal sources, integral amplifiers, and control software. The 3X-PMI Paging Microphone Interface adds controls for emergency voice and alarm communications to your EST3X life safety system.

The 3X-PMI interface is designed so that when an alert page is issued the page signal automatically overrides any other signals. Zoned amplifiers are distributed throughout the system. They provide the demultiplexing, switching, amplification, and circuit supervision.

Refer to the *3X-PMI Paging Microphone Interface Installation Sheet* (P/N 3101875) for technical specifications.

Figure 13: 3X-PMI Paging Microphone Interface

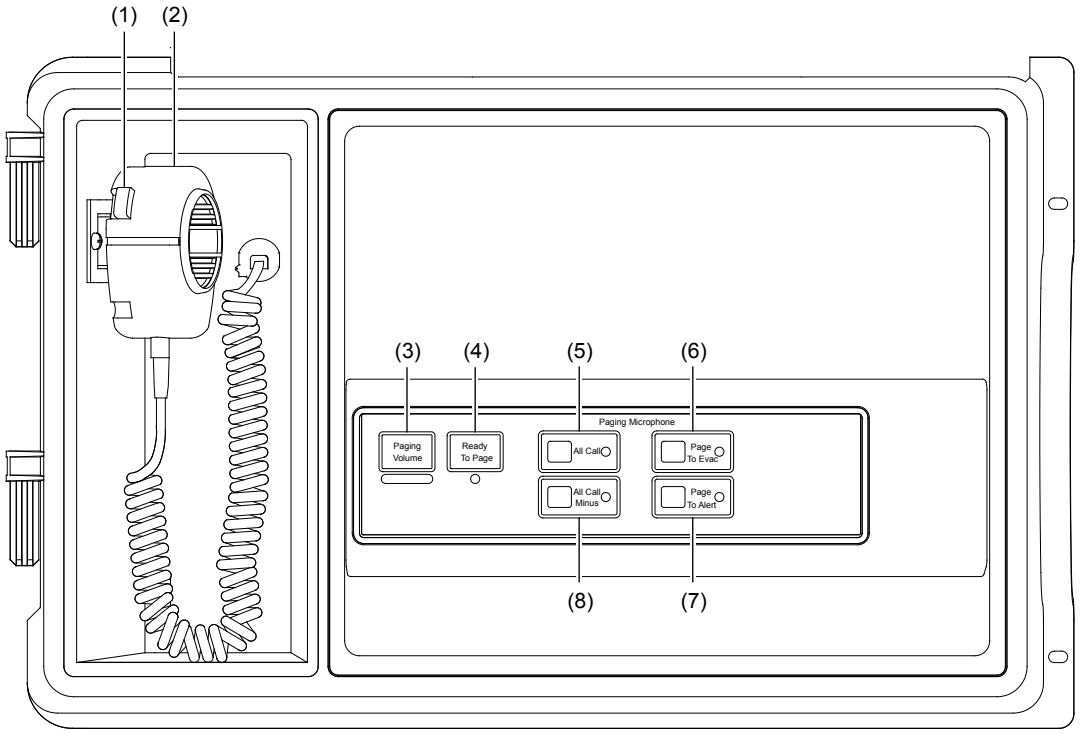


Table 19: 3X-PMI operator controls and indicator descriptions

No.	Control/Indicator	Description
1	PTT button	Pressing the PTT button enables transmission of a live voice announcement.
2	Paging microphone	Handheld microphone that allows initiation of a live voice announcement.

No.	Control/Indicator	Description
3	Paging Volume	LED indicates the audio level of the person speaking into the microphone.
4	Ready To Page	LED flashes during preannouncement tone and is steady when ready to page.
5	All Call	Pressing the All Call button temporarily transfers all amplifiers to the Page channel while the page is active. The All Call command distributes the page signal to every amplifier in the system. Pressing the button a second time exits the All Call mode. The LED indicates when in the All Call mode.
6	Page To Evac	Pressing the Page to Evac button temporarily transfers the Page signal to all amplifiers actively connected to the EVAC channel. All EVAC amplifiers then receive and distribute the Page signal. Pressing the button a second time exits the Page to Evac mode. The LED indicates when in the Page to Evac mode.
7	Page To Alert	Pressing the Page to Alert button temporarily transfers the Page signal to all amplifiers actively connected to the Alert channel. All Alert amplifiers then receive and distribute the page signal. Pressing the button a second time exits the Page To Alert mode. The LED indicates when in the Page to Alert mode.
8	All Call Minus	Pressing the All Call Minus button temporarily transfers the page signal to all amplifiers except those connected to the EVAC and Alert channels. Pressing the button a second time exits the All Call Minus mode. The LED indicates when in the All Call Minus mode.

Network audio riser source

The EAEC Emergency Audio Evacuation Controller Card is the source of the network audio riser. Available audio sources are local and remote voice page functions. An integral tone generator database is provided for the EVAC, Alert, and other functions. Alternately, the EAEC integral digital voice message playback unit can simultaneously provide multiple prerecorded messages that may be assigned to any channel.

The network audio riser consists of a single pair (Class B) or two pairs (Class A) of wires connect all amplifiers together. The multiplexer within the EAEC converts and compresses the real time audio signal and converts it to a digital format. The output of the digital message playback unit and the integral tone generator database is already in the digital format. The eight signal sources in digital format are then combined together as selected by the system designer using a multiplexer. All command and control signals for the audio system are distributed over the network data riser.

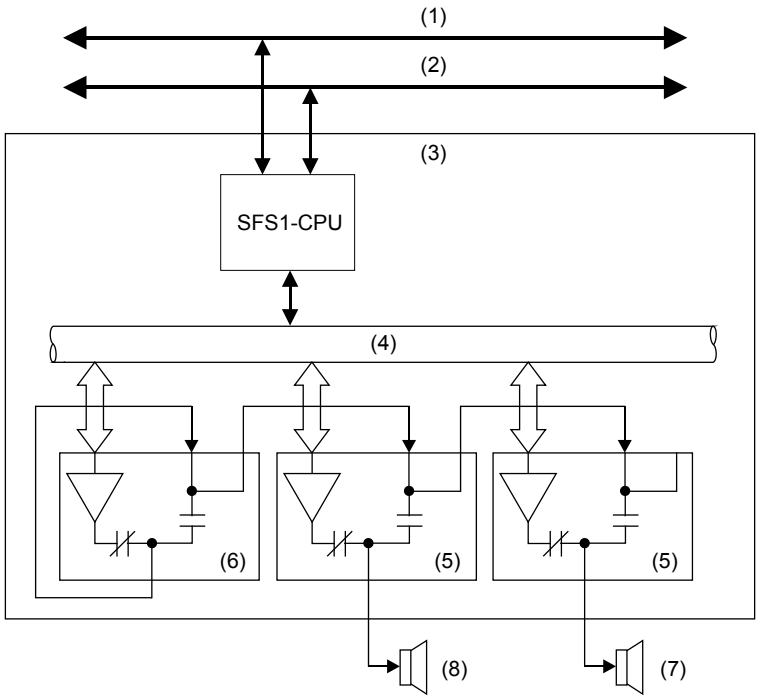
Amplifiers

Amplifiers are designed to feed a single audio zone and provide an integral 24 VDC visual notification appliance circuit. Amplifier modules are available in 20 and 40 watt versions, with each amplifier providing a single supervised Class B or A audio output circuit. The amplifier is configurable for either 25 or 70 VRMS output. An independent supervised Class B or Class A, 24 VDC, 3.5 A notification appliance circuit (NAC) is also provided on the 20 and 40 watt amplifiers to drive notification appliances. In addition, automatic backup amplifiers can be added on a switched common backup configuration.

Each audio power amplifier has an integral demultiplexer, making the eight audio channels available to the amplifier's input, as directed by the system programming. Each amplifier also contains circuitry that handles routine signal processing functions such as channel priority.

The amplifier's output is a dedicated, supervised, 25 or 70 VRMS speaker circuit, which covers one audio zone in the protected facility. Figure 14 on page 83 is an example of an enclosure with two zone amplifiers and a backup amplifier. In response to an alarm, selected audio amplifiers have been connected to the required audio channels. Note in the example that two different audio signals are being broadcast simultaneously.

Figure 14: Normal amplifier operation



(1) Network data riser
(2) Network audio riser
(3) Equipment enclosure
(4) Local rail bus
(5) Zoned amplifier
(6) Backup amplifier
(7) Alert
(8) EVAC

Backup amplifiers

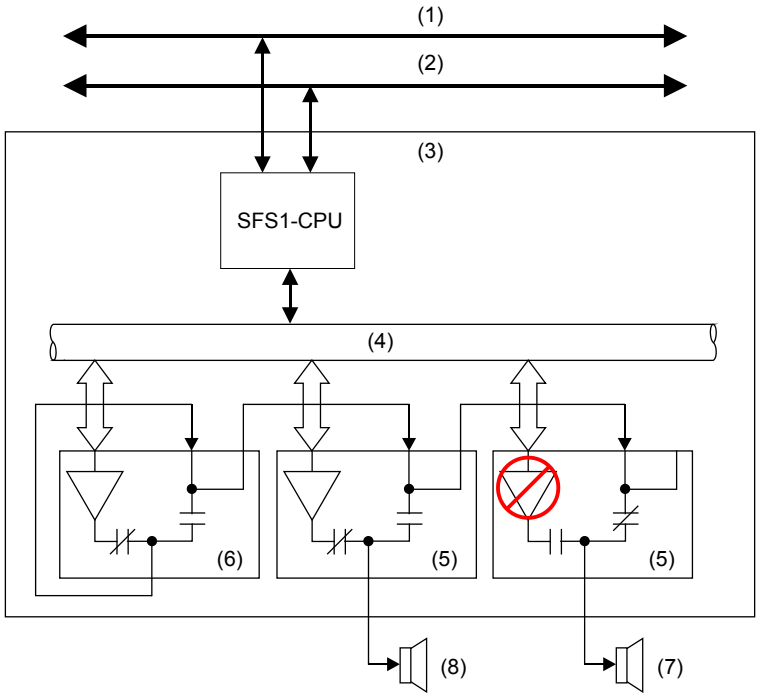
In the event of an amplifier failure (not a field wiring problem), the backup amplifier automatically replaces the failed amplifier.

In Figure 15, on page 84 the failure of amplifier three caused the backup amplifier to automatically connect to the same audio source as the failed amplifier. The output of the backup amplifier replaced the output of the failed amplifier.

Notes

- A backup amplifier will not replace an amplifier that has detected a field wiring problem.
- The backup amplifier will back up a failed amplifier if it was being used for Page, EVAC, or Alert. It will not back up an amplifier being used on an Auxiliary or General channel.

Figure 15: Single amplifier failure



(1) Network data riser
(2) Network audio riser
(3) Equipment enclosure
(4) Local rail bus
(5) Zoned amplifier
(6) Backup amplifier
(7) Alert
(8) EVAC

Table 20: Amplifier fault conditions

Possible fault condition	Amplifier operation
Amplifier loses communication with CPU	If the panel is configured for stand-alone operation, the amplifier automatically switches to the EVAC channel and outputs its 1 kHz temporal tone when the panel detects an alarm. If the panel is not configured for stand-alone operation, the amplifier will not output any signal.
Panel loses communication with network data riser	Amplifier switches to the EVAC channel only in response to the local panel's programming uses the default EVAC message.
Panel loses communication with network audio riser	Amplifier switches to the EVAC channel in response to the system programming. For EVAC, the amplifier uses its 1 kHz temporal tone. For Alert, the amplifier uses its 1 kHz 20 bps tone.

Audio signal priority

During system configuration, each of the eight available audio channels is assigned one of the five available types listed in Table 21 on page 85. The Page,

and Auxiliary types may only be assigned to a single channel. The General type may be assigned to up to four channels.

Table 21: Network audio channel parameters

Channel attribute	Priority
Page	1
EVAC	2
Alert	3
Auxiliary	4
General	5

Each channel type has a priority level associated with it. When more than one channel is commanded to source a given amplifier, the amplifier will connect to the source having the highest priority. The Page channel will only go active when the microphone PTT button is pressed.

3X-PMI special page modes

There are five types of page modes available on the network:

- All Call
- EVAC
- Alert
- All Call Minus
- Selective Page

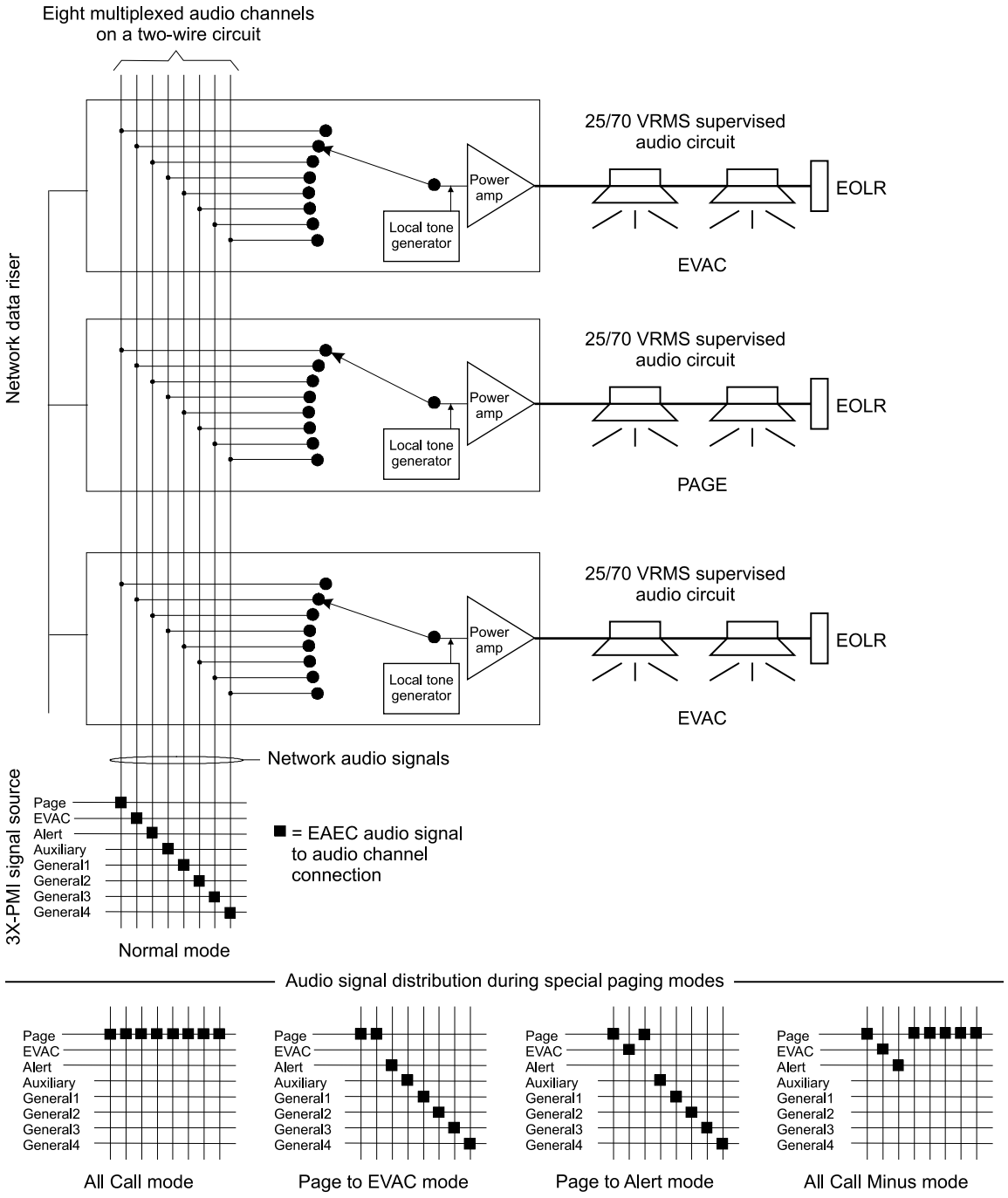
The first four modes are available by pressing a single button on the front of the 3X-PMI. These functions are most commonly used in an emergency situation.

The page buttons provide instantaneous switching of the page signal to the most frequently contacted areas of the building. The special page modes do not require any source switching by zoned audio amplifiers. When a special page switch is activated, the signal content of the eight outgoing audio channels is modified. Figure 16 on page 86 illustrates this principle.

In the normal page mode, the audio signal sources are each connected to a separate audio channel, as represented by a ■ at the intersection of the signal source and the audio channel, shown at the lower left of Figure 16. Each audio channel is represented as a vertical line in this figure. The eight audio channels are actually multiplexed together and distributed over a common pair of wires called the network audio riser. The figure shows the system in the normal page mode, with the zoned audio amplifiers processing EVAC signals on the 1st and 3rd levels, and a page signal on the 2nd level.

A Selective Page is issued by pressing a display-control button that is assigned to selected audio zones. The action temporarily transfers the selected amplifiers to the page channel while the page is active, distributing the page signal only to selected audio zones.

Figure 16: Page mode signal flow



The *All Call* mode is used to send a page to the entire facility. When the All Call switch is activated, the EAEC is put into the all call mode. In this mode, the zoned audio amplifiers do not all transfer to the page channel. Rather, the EAEC redirects the page signal source to all the audio channels. Figure 16 on page 86 shows the all call page source to audio channel connections in the lower left corner. Note that all channels receive the same signal. Any amplifier on the system, regardless of the audio channel selected, will receive the page. Any amplifiers that were previously idle will power up and receive the page.

The *Page to EVAC* mode is used to send a page to the areas automatically receiving the evacuation signal. Activating the EVAC switch causes the EAEC to enter the page to EVAC mode. In this mode, the zoned audio amplifiers connected to the EVAC channel do not transfer to the page channel. Rather, the EAEC redirects the page signal source to the EVAC channel. Figure 16 shows the page to EVAC mode page source to EVAC channel connections. The page and EVAC audio channels both receive the page signal. Any amplifier connected to either the Page or the EVAC audio channels will receive the page. The alert, auxiliary and general channels are connected to their respective signal sources, as in the normal mode.

The *Page to Alert* mode is used to send a page to the areas automatically receiving the alert signal. Activating the Alert switch causes the EAEC to enter the page to alert mode. In this mode, the zoned audio amplifiers connected to the alert channel do not transfer to the page channel. Rather, the EAEC redirects the page signal source to the alert channel. Figure 16 shows the page to alert mode page source to alert channel connections. The page and alert audio channels both receive the page signal. Any amplifier connected to either the page or alert audio channels will receive the page. Any amplifiers that were previously idle will power up and receive the page. The EVAC, auxiliary and general channels are connected to their respective signal sources, as in the normal mode.

The *All Call Minus* mode is used to send a page to all areas NOT automatically receiving the EVAC or alert signals. In high rise applications, all call minus is an effective way to quickly select stairwells. Pressing the All Call Minus button causes the EAEC to enter the all call minus mode. In this mode, the zoned audio amplifiers connected to the auxiliary and general channels do not transfer to the page channel. Rather, the EAEC redirects the page signal source to the auxiliary and four general channels. Figure 16 shows the all call minus mode page source to auxiliary and general channel connections. The page, auxiliary and four general audio channels all receive the page signal. Any amplifier connected to the page, auxiliary or general audio channels will receive the page. The EVAC and alert channels are connected to their respective signal sources, as in the normal mode.

Automatic messaging

One of the features of the 3X-PMI is the method used to monitor the integrity of the digital audio system. When an audio messaging system is configured, default audio messages are recorded for the EVAC and Alert channels. The text of default messages should be generic in nature, and should not include location specific instructions. When the system is in the normal condition, the 3X-PMI continuously transmits default messages over the network audio riser. The zone amplifiers use the default messages to verify their operational integrity, as well as the integrity of the riser wiring.

When an alarm is detected, the evacuation and alert message channels are selected by the amplifiers in the appropriate areas in the facility, as directed by the system rules. If a specific evacuation message has been programmed to play in response to the alarm, it is sent out over the evacuation channel. Location specific evacuation messages contain information and instructions that should only be used for a specific alarm location. Should a second alarm from another location be received, the evacuation message playing as a result of the first alarm may not be appropriate for the second alarm.

Note: In the event of conflicting messaging instructions caused by multiple alarm events, the system will play the default evacuation message whenever two or more different messages are requested at the same time on the evacuation channel. By reverting to the generic default evacuation message in multiple alarm location scenarios, no one can be misdirected by the wrong message. Default messages also play during alarms when no location specific message has been requested.

Testing the audio system integrity

Activate prerecorded audio messages stored in the 3X-PMI to test the integrity of the digital audio system.

To test the audio system integrity:

1. Access the Main Menu, and then click Activate.
2. Click Audio Message, and then enter the panel, card, device, and channel addresses.
3. Enter your access level password.
4. When finished, access the Main Menu, and then click Restore.
5. Click Audio Message, and then enter the panel, card, device, and channel addresses.
6. If required, enter your access level password.

Using the 3X-PMI paging microphone

The basic tasks in responding to an emergency event are:

1. Use the All Call function to announce the arrival of the fire department, making any necessary announcements.
2. Use the Page To Evac function to reinforce the evacuation of the occupants in areas receiving the evacuation signal.
3. Use the Page To Alert function to notify the areas not in immediate danger to prepare to evacuate, or that evacuating people may enter their safe area.
4. Use the All Call Minus button to make announcements to areas of the facility not receiving the EVAC or Alert signals, as required. Stairwells are typical areas to use the All Call Minus page function.

Note: If the site is equipped with a remote paging microphone, it may be used to issue pages throughout the facility. A remote microphone page is automatically overridden by any pages issued by the local microphone in the 3X-PMI.

To make an announcement using the local paging microphone:

1. Select the areas to receive the page by pressing the appropriate page function button(s). The button's integral LED will be on steady when the system is ready to receive the page.
2. Press the PTT button on the microphone. The Ready to Page LED will flash while the preannouncement tone is sounding.
3. Begin the announcement once the Ready to Page LED is on steady. Adjust your voice level so that the Paging Volume LED only flickers occasionally.
4. When you are finished making your announcement, release the PTT button, and then press the page function button again to cancel the page and return the system to its original condition.

   Note: The system automatically cancels the page and returns to it original condition after a short delay, if you do not cancel the page manually.

Remote annunciation

R-Series remote annunciators communicate with the EST3X control panel over the RS-485 riser. They provide common control switches, system status indicators, zone event messages, and zone status indicators at remote locations throughout the protected premises. The EST3X life safety system compatible R-Series remote annunciator models are shown in Figure 17 on page 90 and

described in Table 22. See the *R-Series Remote Annunciators and Expanders Installation and Operation Guide* (P/N 3100969-EN) for specifications.

Operating power can come from one of the following sources:

- The auxiliary power outputs on a PS10-4B power supply card
- Continuous AUX power on the CPU
- An auxiliary/booster power supply that is UL/ULC listed for fire protective signaling systems

Figure 17: Compatible R-Series remote annunciators

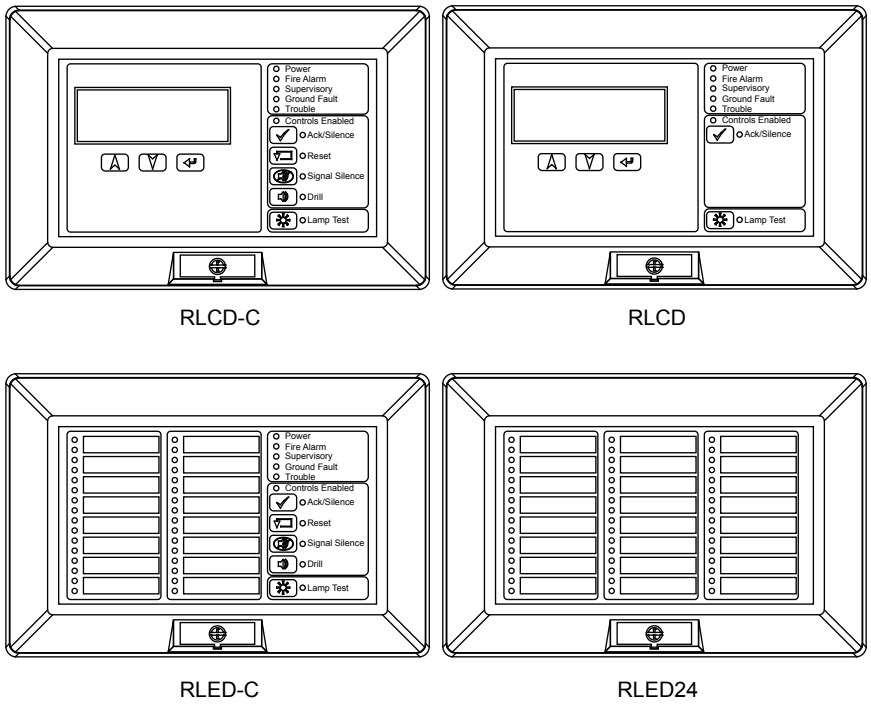
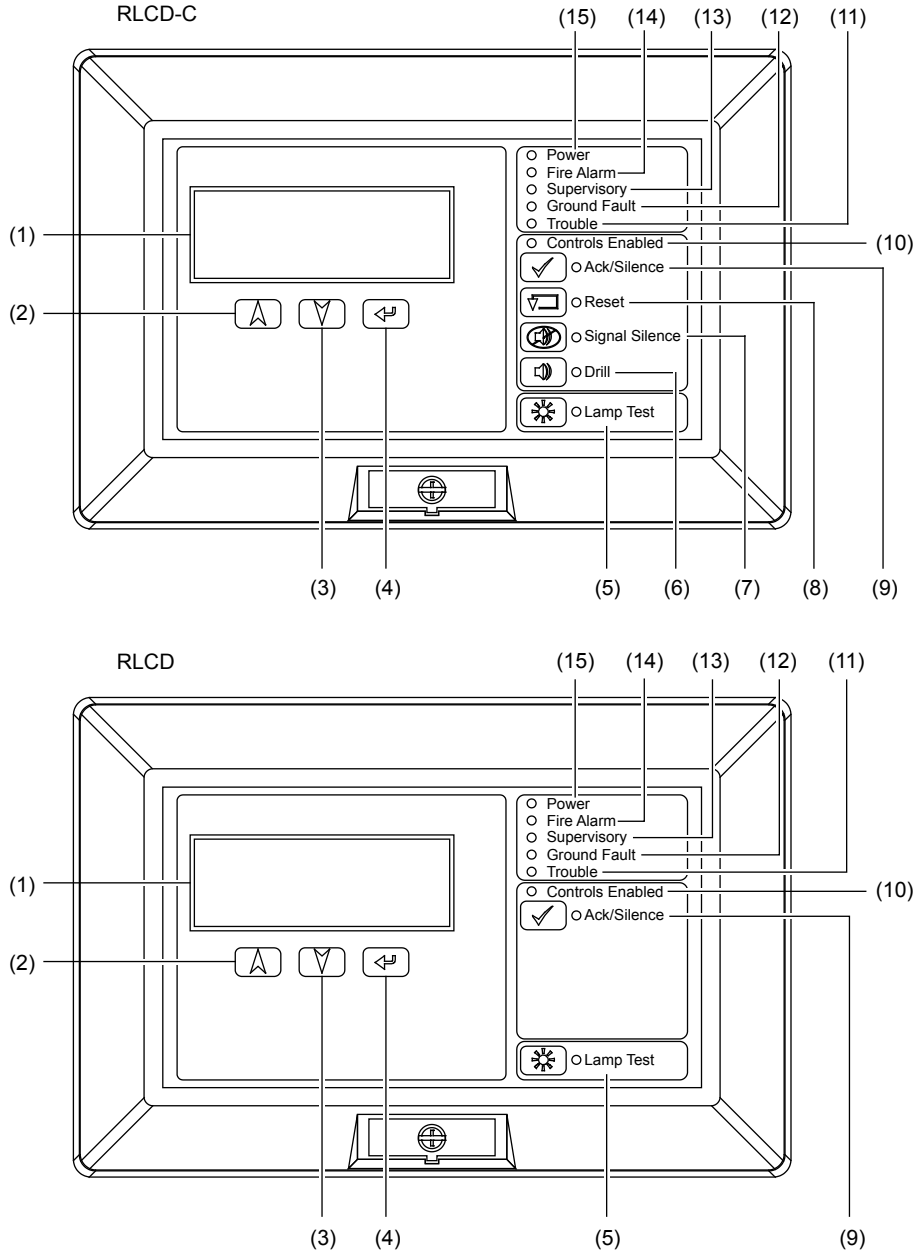


Table 22: Compatible R-Series remote annunciators

Model	Description
RLCD-C	Remote LCD text annunciator with common controls and indicators.
RLCD	Remote LCD text annunciator with indicators (no common controls).
RLED-C	Remote LED annunciator with common controls and 16 pairs of programmable LEDs. The first 12 pairs are dedicated red-over-yellow LEDs. The last four pairs can be configured in the 3-SDU as red-over-yellow LEDs or as yellow-over-yellow LEDs.
RLED24	Remote annunciator LED expander with 24 pairs of programmable LEDs. The top 12 pairs are dedicated red-over-yellow LEDs. The bottom 12 pairs can be configured in the 3-SDU as red-over-yellow LEDs or as yellow-over-yellow LEDs.

LCD model remote annunciator controls and indicators

Figure 18: LCD model remote annunciator controls and indicators



Note: Items 6 through 8 are excluded from the RLCD.

Table 23: LCD model remote annunciator indicators and controls

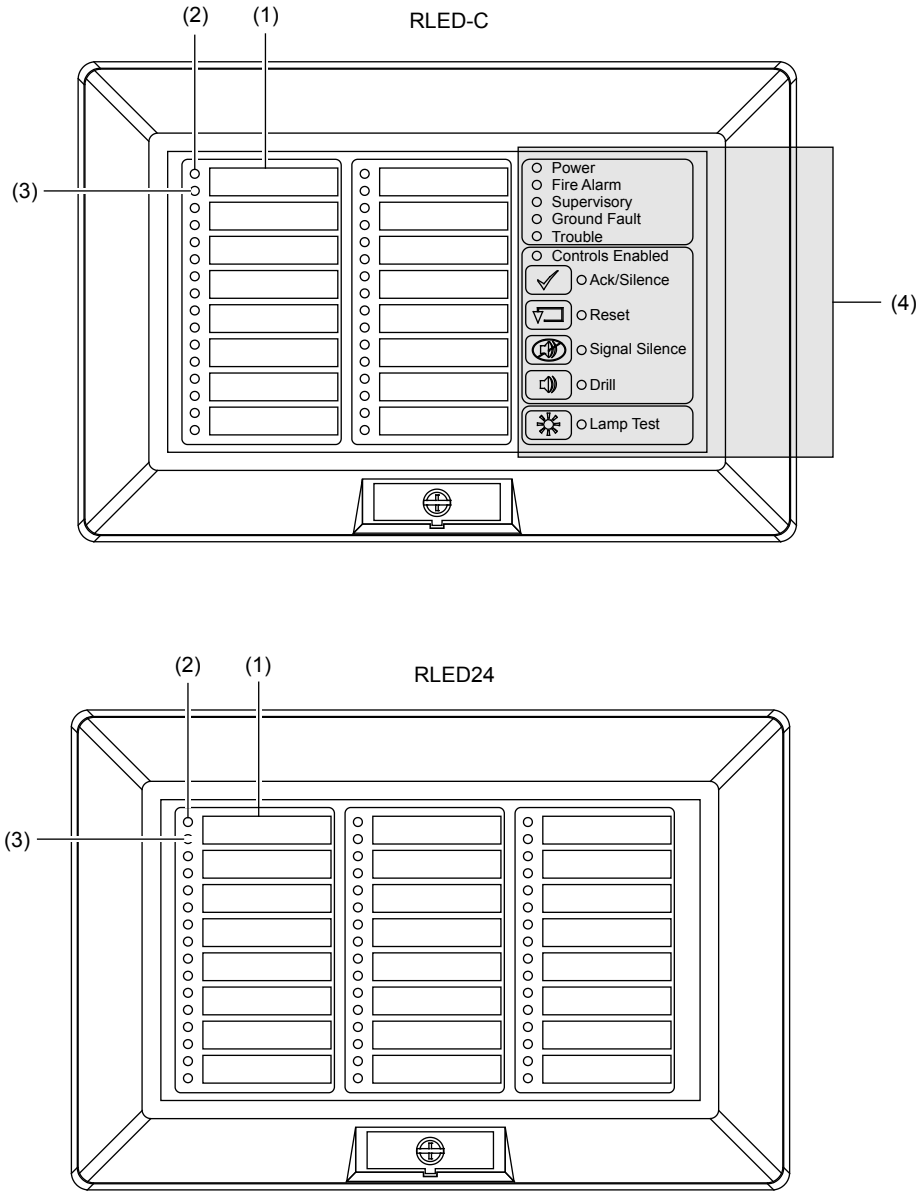
No.	Item	Description
1	LCD screen	Displays system status, event messages, and event message details.

No.	Item	Description
2	Up cursor button	Pressing the cursor scrolls up through the messages in the event message queue and scrolls up through characters for password entry.
3	Down cursor button	Pressing the cursor scrolls down through the messages in the event message queue and scrolls down through characters for password entry.
4	Enter button	Pressing the button displays message details for the current message and enters the password character selected.
5	Lamp Test LED and button	Pressing the button turns on all LEDs and displays a test pattern on the LCD. The test runs for ten seconds. The LED indicates the lamp test is running.
6	Drill LED and button [1]	Pressing the button turns on all audible and common alarm output devices and, if configured, all visible devices. Pressing the button again turns them back off. The LED indicates the function is active. Requires a password to operate.
7	Signal Silence LED and button [1]	Pressing the button turns off (silences) all active audible and common alarm output devices and, if configured, all visible devices. Pressing the button again turns them back on. The LED indicates the function is active. Requires a password or the enable controls key to operate.
8	Reset LED and button [1]	Pressing the button restores the system to the normal state, if no inputs are latched in the active state. The LED indicates the reset function is active. Requires a password or the enable controls key to operate.
9	Ack/Silence LED and button	Pressing the button silences the panel buzzer and acknowledges all current events. The LED indicates the function is active. Requires a password or the enable controls key to operate.
10	Controls Enabled LED	Blue LED indicates the controls in that group are enabled at the annunciator. Enabling the controls requires a password or the enable controls key.
11	Trouble LED	Yellow LED indicates an active trouble state. Flashing indicates a new trouble event; steady indicates all current trouble events have been acknowledged.
12	Ground Fault LED	Yellow LED indicates a system ground fault.
13	Supervisory LED	Yellow LED indicates an active supervisory state. Flashing indicates a new supervisory event; steady indicates all current supervisory events have been acknowledged.
14	Fire Alarm LED	Red LED indicates an active fire alarm state. Flashing indicates a new fire alarm event; steady indicates all current fire alarm events have been acknowledged.
15	Power LED	Green LED indicates the annunciator is energized.

[1] Control and indicator is not on the RLCD remote annunciator.

LED model remote annunciator and expander controls and indicators

Figure 19: LED model remote annunciator and expander controls and indicators



Note: Item 4 is excluded from the RLED24.

Table 24: LED model remote annunciator and expander controls and indicators

No.	Item	Description
1	Zone description label	User-defined zone or device description
2	Active LED	Red LED indicates the zone or device is in alarm state

No.	Item	Description
3	Trouble LED	Yellow LED indicates the zone or device is in trouble state
4	Controls and indicators [1]	See items 5 through 15 in Table 23 on page 91

[1] Controls and indicators are not on the RLED24 remote expander.

Integrated EST3 network

When your EST3X system is part of an EST3 life safety network, you can take advantage of the EST3 network's Mass Notification Service, ULC Remote and Central Station Service, and the following UL/ULC Security Services:

- Local alarm
- Police Station alarm
- Central Station alarm
- Proprietary alarm
- Holdup alarm

You to can set security device partitions and the bypass state for the security devices from the EST3X control panel LCD.

Note: To integrate with an EST3 network, the 3X-NET RS-485 Network Option Card or 3X-FIB Fiber Network Option Module must be installed.

Security device partitions

A security partition is a group of devices intended to secure a physical area. When you arm a partition, you instruct the system to monitor those devices for armed alarm events.

Partitions can be armed for two states: Stay and Away. Arming to Stay causes the system to monitor only those devices on the perimeter of the protected area. This leaves you free to move about inside the partition. Arming to Away causes the system to monitor all devices, both perimeter and interior.

Before arming the partition, the system checks all the devices in the partition to ensure that they are in the normal state. Typically, if a device is off-normal it may prevent the partition from being armed. However, you can elect to disable the off-normal device and arm the remaining devices in the partition.

When commanded to conditionally arm, the partition may arm directly or may generate an error or warning under the following conditions:

- The partition is configured to issue a warning (not an error) for non-security objects that are off-normal. If non-security objects are configured to issue an error on partition arming, then the partition will always issue an error message and will not arm conditionally when any one single error device is off-normal. When this occurs, the partition can only be “forced” into an arm state by pressing the rotary controller.
- The total number of off-normal non-security devices plus the total number of bypassed or disabled regular security devices do not exceed the maximum number of bypassed/disabled devices (as set in the 3-SDU.)
- When security devices are in a test condition, the partition will arm with no warning even if the number of these devices exceeds the 3-SDU setting for maximum number of bypassed/disabled devices.

Note: Issuing an unconditional forced arm command to a partition may result in undesirable false security alarm events.

Partition monitoring states

Use the Partition command on the Security Menu to set a partition’s monitoring state. The following commands are available.

- Partition Disarm: Stops the system from monitoring the devices.
- Partition Away: Arms the partition so the system monitors all devices, both perimeter and interior of the protected area.
- Partition Stay: Arms the partition so the system monitors only those devices on the perimeter of the protected area. This leaves you free to move about inside the partition.
- Partition Reset: System checks all devices in the partition, deletes old status messages, and adds new status messages

Notes

- The Security Menu is only available when the security control function is enabled during system programming.
- When arming a partition that has a disabled device, a warming message appears. You can press the rotary controller to force the partition into the armed state or press the Acknowledge button to exit the Partition command.

To set a partition monitoring state:

1. Access the Main Menu, and then click Security.
2. Click Partition, and then click the desired command.
3. Click the appropriate partition.
4. Enter the access level password.

Bypass state

When you bypass a security device, the system suppresses the device's security alarm events but continues to process all other events (e.g. tamper, fault, and maintenance). For example, if a bay door is damaged so that the door contact cannot be closed it prevents arming of the partition. As a temporary measure you can bypass the door contact to make it possible to arm the partition.

Use the Device command on the Security Menu to set the bypass state of a security alarm in a security partition.

Note: A bypass command can only be applied while the partition is disarmed. While bypassed, the device's alarm events are not processed. The panel will go into alarm if you remove the bypass from the device while it is still in an alarm state.

To bypass a security device:

1. Access the Main Menu, and then click Security.
2. Click Device, and then click Bypass.
3. Enter the panel (PP), card (CC), and device (DDDD) addresses.
4. Enter the access level password.

To remove the bypass setting:

1. Access the Main Menu, and then click Security.
2. Click Device, and then click Remove Bypass.
3. Enter the panel (PP), card (CC), and device (DDDD) addresses.
4. Enter the access level password.

Building management system communication

You can configure your EST3X system to communicate with a building management system by using an FSB-PC2 or FSB-PCLW Communication Bridge. These field server bridges are ancillary devices that provide a communication bridge between an EST3 or an EST3X systems and a building management system (BMS) by converting the EST control panel External Communications Protocol into supported serial and Ethernet protocols. The communication bridge operates over RS-232 or RS-485 serial communications, or Ethernet (10/100Base-T).

The communication bridge mounts on a separately ordered bracket (FSB-BRKT2) that can be installed on the side of an SFS1-ELEC chassis in an EST3X cabinet or in an MFC-A external enclosure. You can configure your system for communication between a same BMS and a single EST control panel or multiple control panels in your network. See *FSB-PC2 and FSB-PCLW Communication Bridge Installation Sheet* (P/N 3102007) for application details, as well as installation instructions and specifications.

FireWorks communication

FireWorks lets you use one or more display computers to monitor and control several networks of multiplex signaling systems. You can configure your EST3X and combination EST3-EST3X systems to communicate with a FireWorks UL5W7 workstation over the RS-232 connection on the SFS1-CPU. Refer to the *FireWorks UL5W7 Workstation Installation Manual* (P/N 3101492-EN) for installation instructions and specifications.

Chapter 5
Installation

Summary

This chapter provides installation information for system components and applications that supplement the instructions provided on individual component installation sheets

Content

UL 864 notification appliance circuit (NAC) signal synchronization

Table 25 lists the installation requirements for systems that must meet UL 864 NAC signal synchronization requirements.

Table 25: Installation requirements for UL 864 signal synchronization

Circuit	Installation requirements
PS10-4B NACs	Emergency evacuation signals are synchronized with main board signaling line circuits on a “per cabinet” basis when you configure the NACs as a Genesis device type and use Genesis or Enhanced Integrity notification appliances.
SFS1-CPU Main Board signaling line circuits	Emergency evacuation signals are synchronized with PS10-4B NACs on a “per cabinet” basis when you use SIGA-CC1S or SIGA-MCC1S modules configured for auto-sync output (personality code 25) and Genesis or Enhanced Integrity notification appliances. 3-SSDC(1) and 3-SDDC(1) modules: • Emergency evacuation signals are synchronized on a “per loop” basis when you use SIGA-CC1S or SIGA-MCC1S modules (personality code 25) and Genesis or Enhanced Integrity notification appliances. • Emergency evacuation signals are synchronized on a “per module” basis when you use SIGA-CC1 or SIGA-MCC1 modules (personality code 5), G1M or G1M-RM Genesis Signal Master modules, and Genesis notification appliances.
3-AADC	Emergency evacuation signals are synchronized on a “per circuit” basis when you use G1M or G1M-RM Genesis Signal Master modules, and Genesis notification appliances.
3-IDC8/4	Emergency evacuation signals are synchronized on a “per circuit” basis when you use G1M or G1M-RM Genesis Signal Master modules, and Genesis notification appliances. See Figure 20 on page 103 for typical wiring.
SIGA-CC1, SIGA-MCC1, SIGA-CC1S, and SIGA-MCC1S	Signature CC1 modules do not generate temporal signals, they simply turn the NAC circuit on or off. You must configure the notification appliances for temporal or steady output as desired.
3-ZA20 and 3-ZA40 amplifier modules	Emergency evacuation signals are synchronized on a “per circuit” basis when you use G1M or G1M-RM Genesis Signal Master modules, and Genesis notification appliances.

Circuit	Installation requirements
G1M and G1M-RM	The G1M and G1M-RM Genesis Signal Master modules can be used to synchronize NACs consisting of Genesis appliances. They can also be used to synchronize mixed NACs consisting of Genesis and Enhanced Integrity appliances, but the first appliance must be a Genesis device and the Genesis Signal Master module must be mounted on this device. G1M and G1M-RM Genesis Signal Master modules cannot be used to synchronize NACs consisting of Enhanced Integrity appliances.

Typical circuits

The circuit diagrams provided in this section use the term *zone* to indicate notification zones as defined in UL 864 (an area that is covered by notification appliances that are activated simultaneously).

Figure 20 on page 103 shows a typical application of the 3-IDC8/4 module for supporting two notification zones. In this example, power is being supplied from the SFS1-ELEC chassis electronics and the jumpers (JP1 through JP4) on the module are set accordingly. Refer to the *3-IDC8/4 Traditional Zone I/O Module Installation Sheet* (P/N 270492) for additional information on the 3-IDC8/4.

It is also possible to create a similar application that uses external power, supplied to NAC 1/2 IN and NAC 5/6 IN on the 3-IDC8/4. Refer to the 3-IDC8/4 installation sheet (P/N 270492) for wiring details and jumper settings.

In Figure 20, both zones are configured with separate NAC circuits for audible and visible appliances. NAC 1 and NAC 5 are programmed as visible device types, and NAC 2 and NAC 6 as audible device types. This means that the signal silence function can be configured to silence only the horns.

Separating the visible and audible devices is optional and may not be required for your project. Refer to the Genesis Signal Master installation sheets for additional configurations and wiring details.

Figure 20: Typical 3-IDC8/4 card NAC wiring

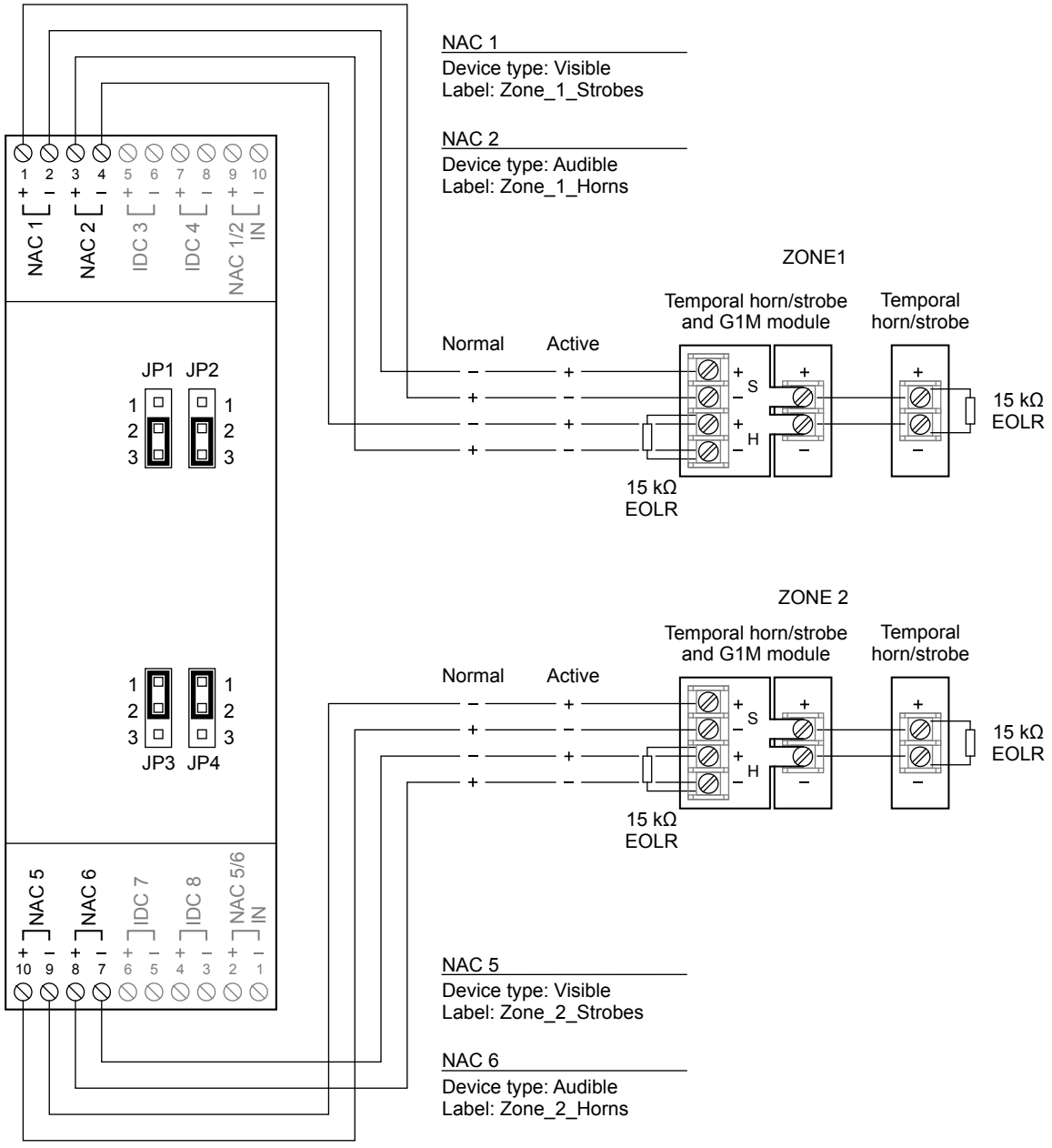
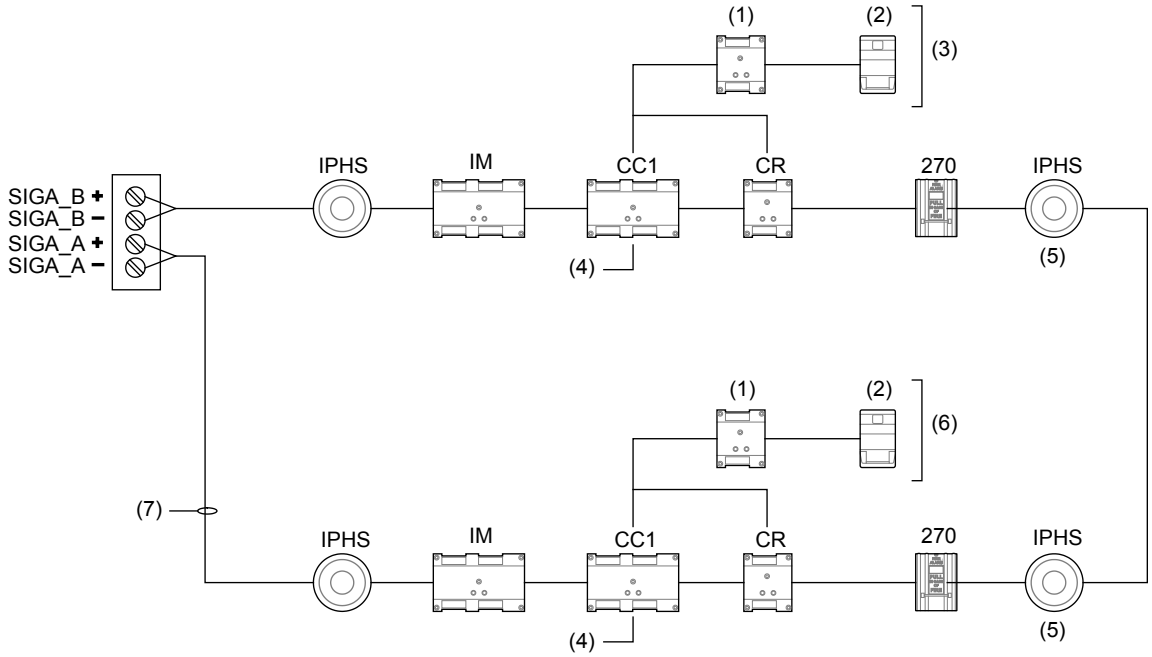


Figure 21 shows a Signature loop wired as Class A for notification circuit synchronization.

Figure 21: Class A Signature wiring for notification circuit signal synchronization



(1) Sync module
(2) Temporal horn/strobe
(3) Notification zone 1
(4) AUX riser
(5) Isolator base
(6) Notification zone 2
(7) Class A (required)

Figure 22 on page 105 shows two NACs on a Signature data loop. Each NAC is controlled by a SIGA-CC1S module, one for audible appliances and one for visible appliances. The SIGA-CC1S modules provide signal synchronization for both NACs.

As in Figure 20, this configuration allows the audible appliances to be silenced independently of the visible appliances. This operation is optional and may or may not be required for your project.

Figure 22: Typical SIGA-CC1S NAC wiring

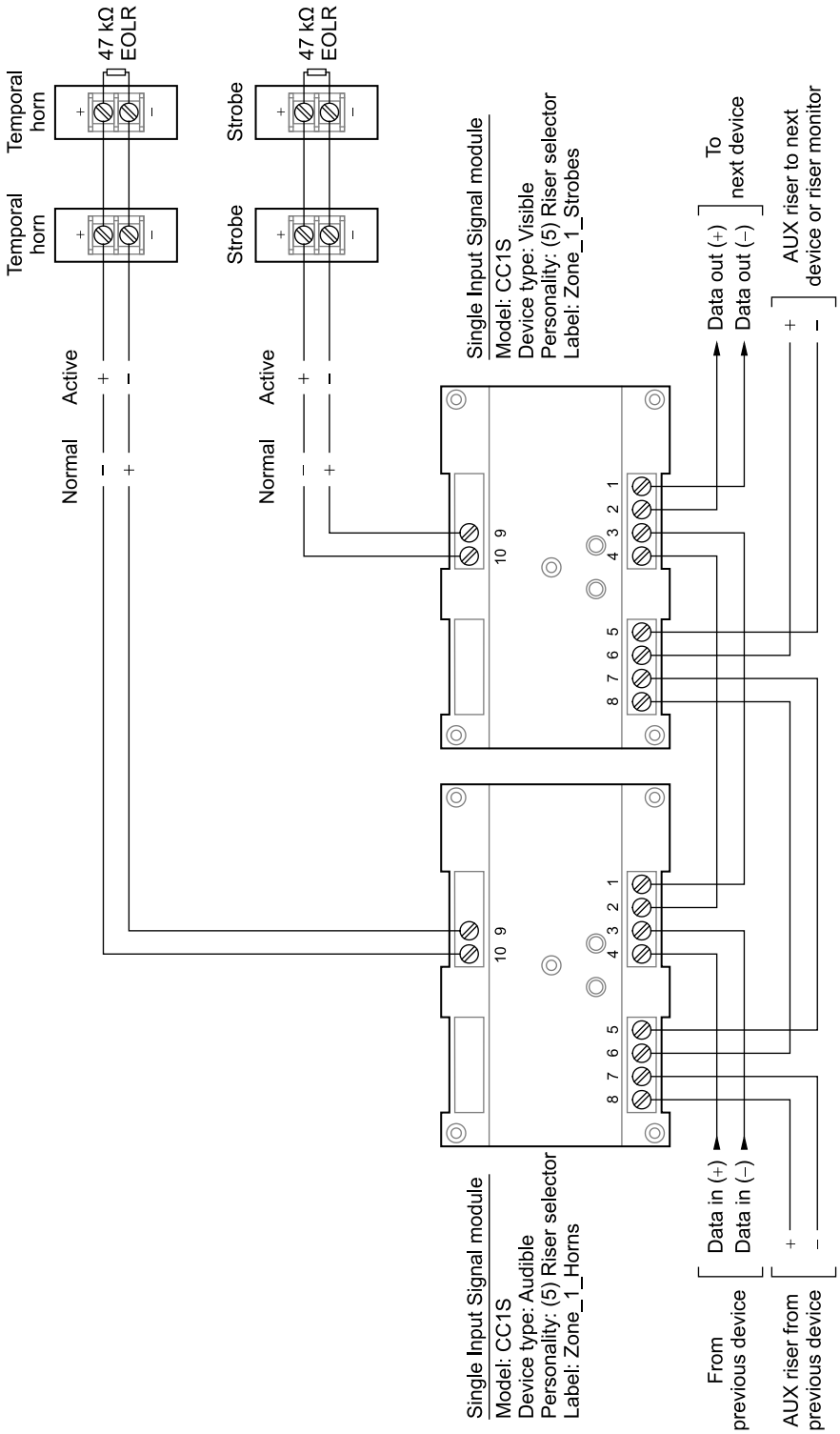


Figure 23 on page 107 shows a single SIGA-CC1 switching a NAC on or off. The G1M module provides signal synchronization for the temporal horn/strobe appliances.

As in earlier examples, this circuit allows for independent silencing of the audible appliances. This operation is provided by the SIGA-CR module, which opens or closes the circuit between S+ and H+ on the G1M module. In this case, you must program the operation of the SIGA-CR in the 3-SDU. The SDU settings for signal silence operation will not determine the operation of the audible appliances in this NAC.

Note also that this application could be implemented with a SIGA-CC1S module. The SIGA-CC1S provides signal synchronization compatible with the operation of the G1M module.

The advantage to using a SIGA-CC1S module is that the NAC would then be synchronized with other NACs on the Signature data loop.

Figure 23: Typical SIGA-CC1 NAC wiring

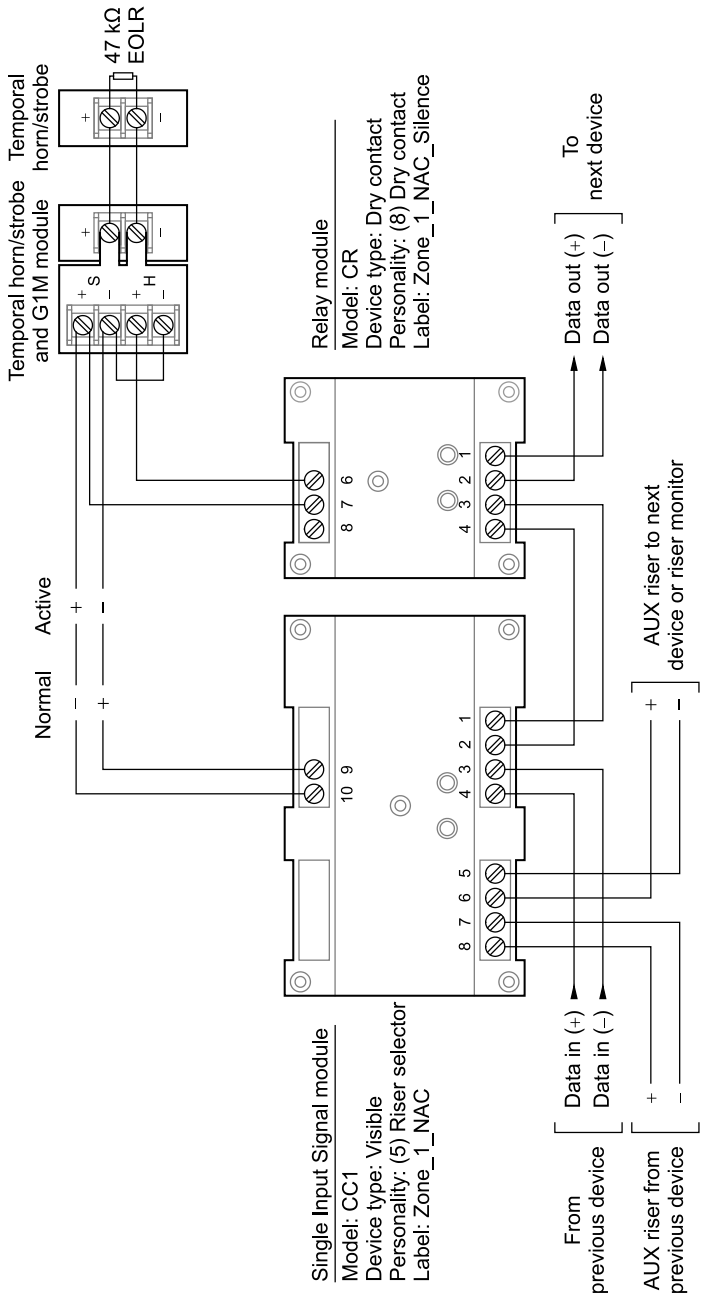


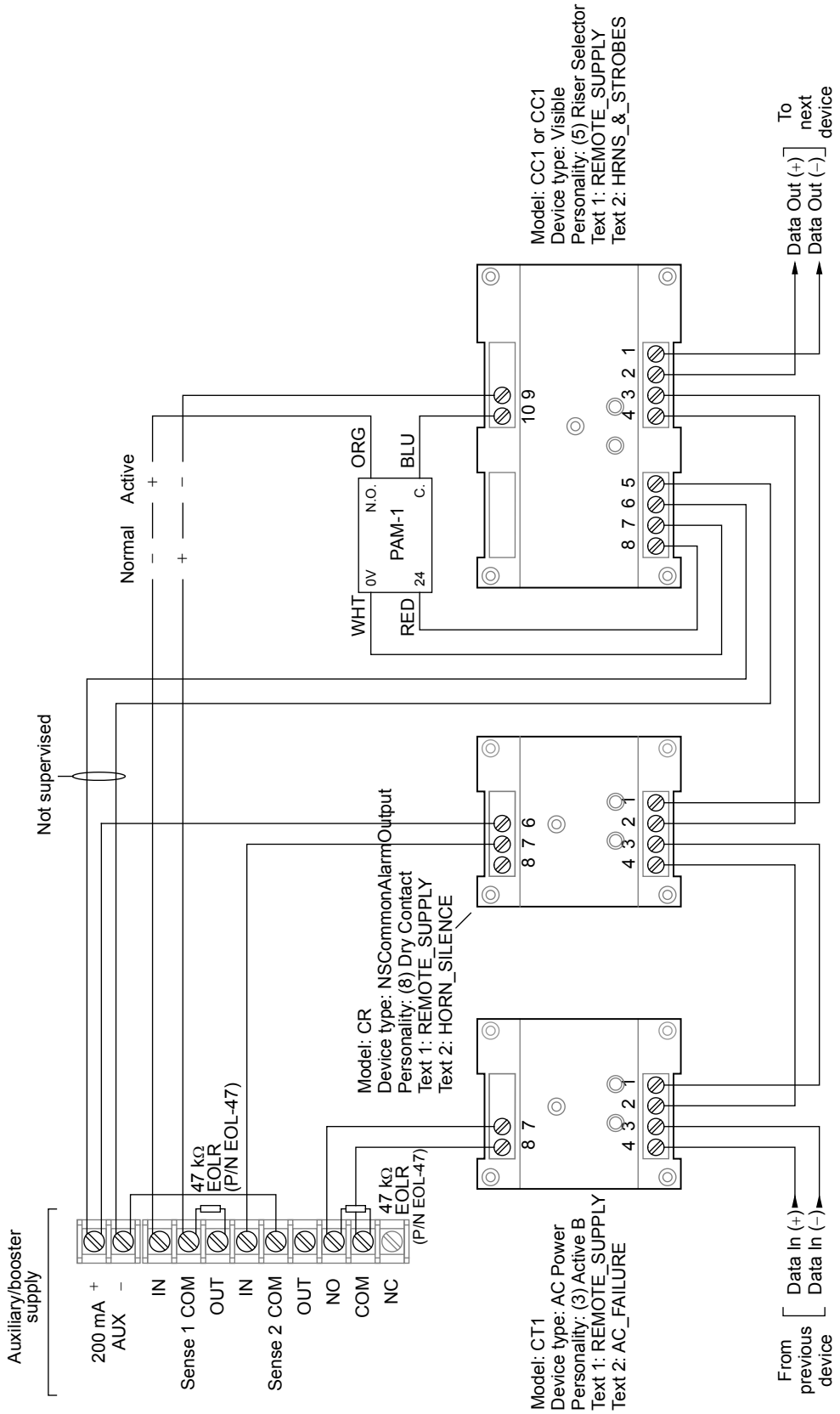
Figure 24 on page 109 shows an auxiliary/booster power supply being used to power the NAC, to provide synchronization and horn silence capability. Because the auxiliary/booster supply has the ability to silence the horn circuit, this application can be created using only the Signature loop wiring.

The SIGA-CT1 module monitors the power supply for AC failure. The SIGA-CR module signals the power supply to turn the horns on or off. The SIGA-CC1 module signals the power supply when the system goes into alarm, turning the NAC on.

Notes

- The power supply can only synchronize the notification appliances to which it is connected. If you need to synchronize several similar NACs on the same Signature loop, you can use a SIGA-CC1S module in place of the SIGA-CC1.
- All wiring is supervised and power-limited unless otherwise noted.
- Install a PAM-1 or equivalent listed relay only when you are required to supervise the 200 mA AUX circuit wiring.
- Configure Sense 1 and Sense 2 operation for Genesis Master mode and NAC operation for “continuous.” See the documentation received with the auxiliary/booster supply for details.
- Use a CC1S if you want to maintain signal synchronization across multiple auxiliary/booster supplies on the same Signature loop.

Figure 24: Using an auxiliary/booster supply for horn silence capability with two wires



Creating an initial startup database

Use the 3-SDU software to create the initial startup database. The 3-SDU provides extensive instructions for configuring, programming, and testing your EST3X life safety system. The initial startup database is useful for the following:

- Assigning panel addresses when you bring up the system for the first time
- Verifying the correct installation of option cards and optional control-display modules
- Adjusting the gain on an optionally installed 3X-PMI and amplifier modules

Suggestions

When creating the initial startup database:

- Only include the hardware configuration for each cabinet in the system.
- Do not include any device loops in the initial database. The device loops should be installed after verifying the cabinet configuration, and then added to the final database.
- It is not necessary to configure any option cards. They can be added to the final database.
- Save the initial database, and then after installing the option cards define the cabinet configuration and device loops in the 3-SDU and save it as a different version. This method eliminates doubling your workload by having to edit two databases as you add cabinets to the system.
- If the cabinet contains amplifiers and a 3X-PMI, do the following:
  - From the 3-SDU, program a control-display module switch to send a 0.7 VRMS, 1 kHz tone to the amplifiers. Label the switch 1KHZ_TONE and add the following rule to the rules file.

    ```
    [AMPLIFIER_SETUP]
    SW '1KHZ_TONE':
       AMPON '*' TO 'Ch_Gen*',
       MSGON '1KHZ_TONE' TO 'Ch_Gen*';
    ```

  - Record an audio message that consists of the 1 kHz tone in the Audio Message Recorder’s Clip Library and label it 1KHZ_TONE. Refer to the 3-SDU help for instructions on recording messages.
- If a CDR-3 Bell Coder is installed and connected to the AUX input on a 3X-PMI, do the following:

- From the 3-SDU, program a control-display module toggle switch to turn on the amplifiers and select the auxiliary channel. Label the switch AUX_INPUT_ADJUST and add the following rule to the rules file:

```
[AUX_INPUT_SETUP]
SW 'AUX_INPUT_ADJ':
   AMPON '*' TO 'Ch_Aux*';
```

System installation sequence

Follow these basic instructions when installing a panel. Refer to the installation sheet that came with a component for specific instructions.

Notes

- Make sure the installation location is free from construction dust and debris, and is not subject to extreme temperature ranges and excess humidity.
- Ensure sufficient floor and wall space, to avoid obstructions during installation and servicing.
- When installing the cabinet, use fasteners that can support the full weight of the cabinet, including standby batteries.
- Be sure to tighten the fasteners firmly to prevent the cabinet from vibrating.
- Remove a panel component from its protective antistatic packaging only for inspection or installation.
- Do not connect standby batteries until initial panel power up (see “Initial power up” on page 43).
- Install the power supply and any half-footprint modules on the backbox, and any option cards on the back of the SFS1-CPU before installing the SFS1-ELEC assembly. Refer to Figure 25 on page 113 for the footprint locations on the backbox.

Sequence list

Note: Install all control panel components as instructed on the installation sheet that came with the component.

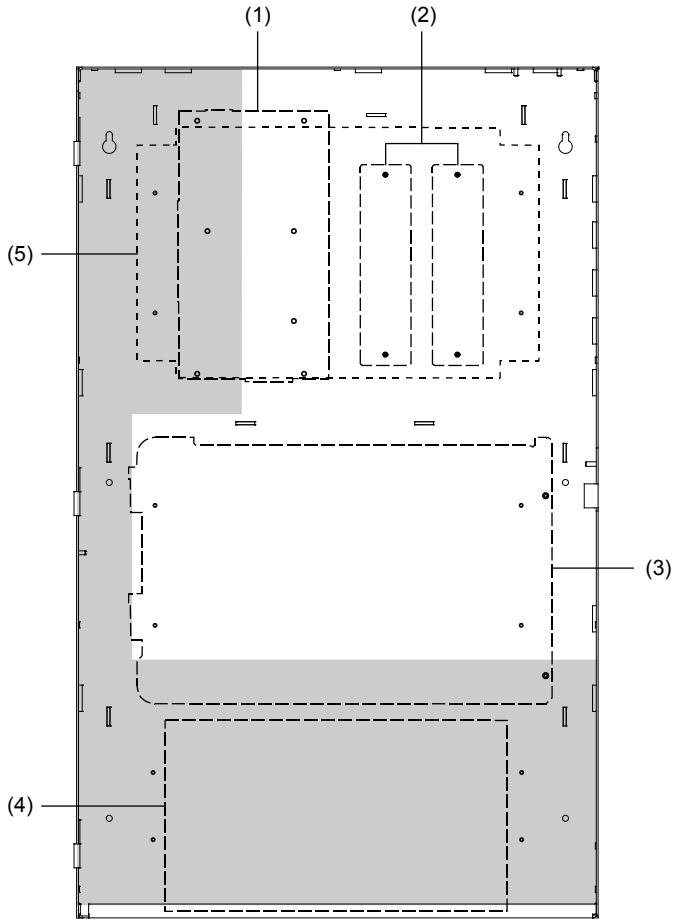
1. Unpack the equipment and make sure it is not damaged. Be sure to remove the installation sheets from component accessory bags.
2. Install the CAB6B Backbox at the required location and pull all the required conductors through the conduit into the backbox.

3. Verify the field wiring. See Table 26 on page 128 “Field wiring tests.”
4. Install the PS10-4B Power Supply Board and any project-required half-footprint modules.
5. Install any project required option cards on the back of the SFS1-CPU.
6. Install the SFS1-ELEC chassis assembly.
7. Install the optional 3X-PMI, if required for the project.
8. Power up the panel and download an optional initial startup database. See “Initial power up” on page 43.
9. Install all project required option cards and control-display modules on the chassis.
10. Connect field wiring.
11. Define the cabinet configuration, device loops, option cards, etc. for a final 3-SDU database, and then download it to the control panel. See “Downloading a database” on page 67.
12. Install the 4X-CAB6D(R) door.

Component installation

The CAB6B backbox holds the power supply, electronics chassis assembly, option cards, standby power supply batteries, and optional audio subsystem components for the control panel. Figure 25 on page 113 shows the footprint areas for each component. Refer to the installation sheet that came with the component for installation instructions.

Figure 25: CAB6B backbox component footprints



(1) PS10-4B Power Supply Board mounting area
(2) Half-footprint module mounting areas
(3) 3X-PMI Paging Microphone Interface mounting area
(4) Standby battery compartment area
(5) SFS1-ELEC Chassis Electronics Assembly mounting area

Note: Route nonpower-limited wiring on the shaded area of the cabinet and power-limited wiring on the non-shaded area.

PS10-4B Power Supply Board

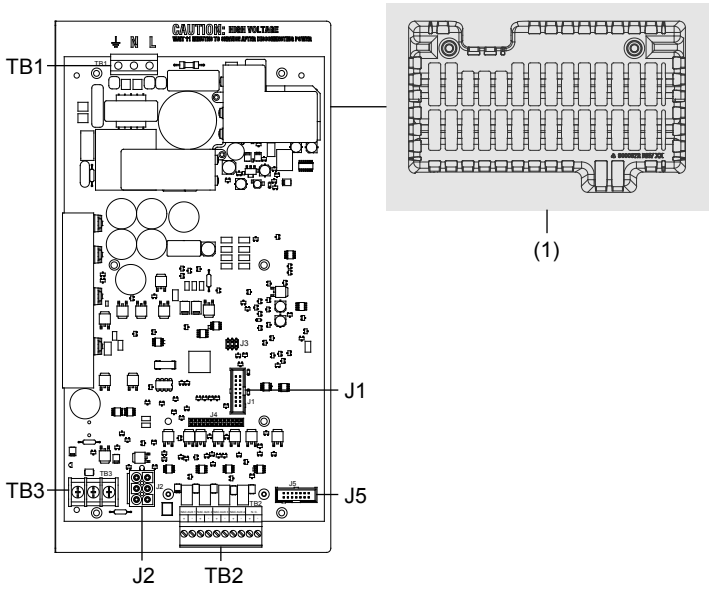
WARNINGS

- Electrocution hazard. To avoid personal injury or death from electrocution, make sure the distribution circuit providing mains AC is rendered inoperative prior to connecting mains input wiring to the PS10-4B Power Supply.
- Electrocution hazard. To avoid personal injury or death from electrocution, remove all sources of power and wait 11 minutes to allow stored energy to discharge before installing or removing equipment.

Caution: Circuit boards are sensitive to electrostatic discharge (ESD). To avoid damage, follow ESD handling procedures.

One PS10-4B Power Supply Board is required for each control panel. The power supply provides the required power and related supervisory functions for the control panel as well as filtered, regulated power, and 24 VDC output for operating notification appliances and ancillary equipment.

Figure 26: PS10-4B Power Supply Board



(1) Power supply protective cage used in ULC applications
J1 Data ribbon cable connector
J2 Power supply cable connector
J5 Audio system connector option
TB1 Mains input wiring
TB2 NAC/AUX wiring
TB3 Battery wiring

On-board terminals and connectors facilitate connection to the SFS1-CPU, mains input wiring, NAC/AUX wiring, and battery wiring. The 24 VDC rechargeable

battery circuit on the power supply board has the capacity to charge up to two 65 Ah sealed lead acid batteries. The CAB6B can house up to two 17 Ah batteries. Install batteries larger than 17 Ah in a separate listed enclosure.

Mains power wiring must be double insulated and connected only to a dedicated 120 V or 230 V mains power distribution circuit with its own disconnect device. Mains input and battery wiring are supervised and nonpower-limited. Route nonpower-limited wiring on the left side of the cabinet, as shown in Figure 25 on page 113. Refer to the *PS10-4B Power Supply Board Installation Sheet* (P/N 3101774) for connecting power supply field wiring and for specifications.

NAC/AUX power circuits

The PS10-4B provides four 24 V Class B NAC/AUX power circuits. The NAC/AUX terminal marking indicates signal polarity when the circuit is active. Polarity reverses when the circuit is not active. For a list of devices you can connect to special application circuits, refer to the control panel compatibility list (P/N 3101801-EN).

For notification appliance circuits only, adding an optional CLA-PS10 Class A Adapter card converts the four Class B NAC/AUX power circuits on the PS10-4B power supply card to Class A. Refer to the *CLA-PS10 Class A Adapter Card Installation Sheet* (P/N 3101776) for connecting field wiring and for specifications.

Class B or Class A NAC/AUX circuits configured as NAC outputs are supervised and power-limited. Route power-limited wiring on the right side of the cabinet, as shown in Figure 25. For proper circuit supervision, break the wire run at each notification appliance and do not loop wires around notification appliance terminals.

Note: NAC/AUX circuits configured as auxiliary power outputs must be turned on and off using a startup rule. For example, a rule is needed to turn them off during an AC power failure if they are powering non-life safety devices and you want to preserve battery life.

SFS1-ELEC chassis hardware and operator layer components

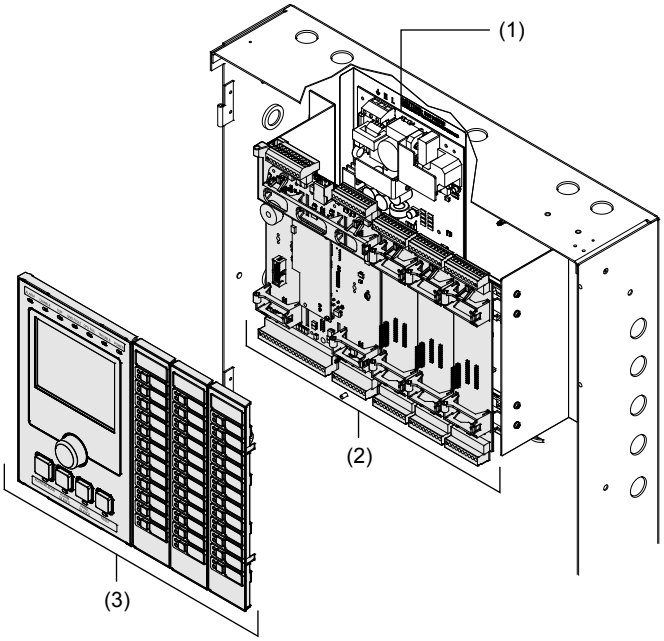
WARNING: Electrocution hazard. To avoid personal injury or death from electrocution, remove all sources of power and allow stored energy to discharge before installing or removing equipment.

Caution: Circuit boards are sensitive to electrostatic discharge (ESD). To avoid damage, follow ESD handling procedures.

The SFS1-ELEC Chassis Electronics Assembly provides the mounting, internal power, and audio and data distribution for the SFS1-CPU Main Board, 4X-LCD or 4X-LCD-LC User Interface, up to three hardware layer option cards, and up to three operator layer 4X Series control-display modules. The main board and user interface are preinstalled on the chassis, as are three blank filler plates. The blank filler plates are used to cover empty card slots when control-display modules are not used.

Figure 27 on page 117 shows hardware and operator layer components installed on the chassis. In the figure, the hardware layer shows the SFS1-CPU Main Board installed in the first three slots on the chassis and three option cards in the last three slots. The operator layer shows the 4X-LCD(-LC) User Interface, which attaches to the main board, and three optional 4X Series control-display modules, each of which attaches to the option card behind it. Refer to the *SFS1-ELEC Chassis Electronics Assembly Installation Sheet* (P/N 3101766) for connecting field wiring and for specifications.

Figure 27: SFS1-ELEC chassis hardware and operator layer devices



(1) PS10-4B. A protective cage is installed over the power supply for ULC applications
(2) Hardware layer components (SFS1-CPU and option cards)
(3) Operator layer components (4X-LCD(-LC) and 4X Series control-display modules)

SFS1-CPU Main Board

The SFS1-CPU Main Board is a hardware layer board that processes all information from modules installed in the same cabinet and from other control panels on the life safety network. One main board is required for each panel in an EST3X network. The SFS1-CPU is always installed on the first three card slots.

One 3-SDC1 Signature loop controller module for signaling line circuit 1 (SLC1) is preinstalled on the SFS1-CPU. The signaling line circuit supports up to 125 detector and 125 module addresses. It also provides dedicated non-resettable 24 VDC for powering conventional two-wire smoke detector circuits on Signature Series modules. Refer to the *SFS1-CPU Main Board Installation Sheet* (P/N 3101773) for connecting field wiring and for specifications.

In an EST3 life safety system, a 3-SAC local rail module communicates on the rail while talking to the 3-SFS1-CPU and various devices on the SPUR network. In an EST3X life safety system, the SAC Manager exists as a firmware subsystem on the SFS1-CPU and is treated like a virtual card. As such, it uses the 3-SAC module's firmware to emulate its functionality. The SAC Manager has its own card address and set of device addresses.

Option cards

Hardware layer option cards are installed in the last three card addresses on the electronics chassis. See the “Panel components” section on page 10 for a list of panel options and accessories.

Notes

- If there are empty card addresses on the chassis, consider installing 4X-LRMF Local Rail Module Filler Plates to fill up the spaces.
- If a control-display module will not be installed over an option card, you can attach a 4X-DR Blank Door to the card. Refer to the *4X-DR Blank Door Installation Sheet* (P/N 3101895) for more information.
- If the project requires a 3-MODCOM option card, see “3-MODCOM Modem Communicator module” on page 130 for configuration instructions as well as the installation sheet received with the module.

4X-LCD and 4X-LCD-LC User Interface

The 4X-LCD(-LC) is an operator layer module that interfaces with the SFS1-CPU to provide indicators and user controls for the control panel. Only one 4X-LCD(-LC) is required to provide a point of control for the entire network. However, additional user interfaces can be added to any EST3X control panel in the EST3X network to provide additional points of control. Refer to the *4X-LCD and 4X-LCD User Interface Installation Sheet* (P/N 3101767) for installation instructions and specifications.

4X Series control-display modules

4X Series control-display modules are operator layer modules that provide additional operator interface capability. They can be mounted on any of the last three card addresses on the SFS1-ELEC chassis (see Figure 27 on page 117). Refer to the *4X Series Control-Display Module Installation Sheet* (P/N 3101777) for installation instructions and specifications.

Digital audio subsystem

WARNING: Electrocution hazard. To avoid personal injury or death from electrocution, remove all sources of power and allow stored energy to discharge before installing or removing equipment.

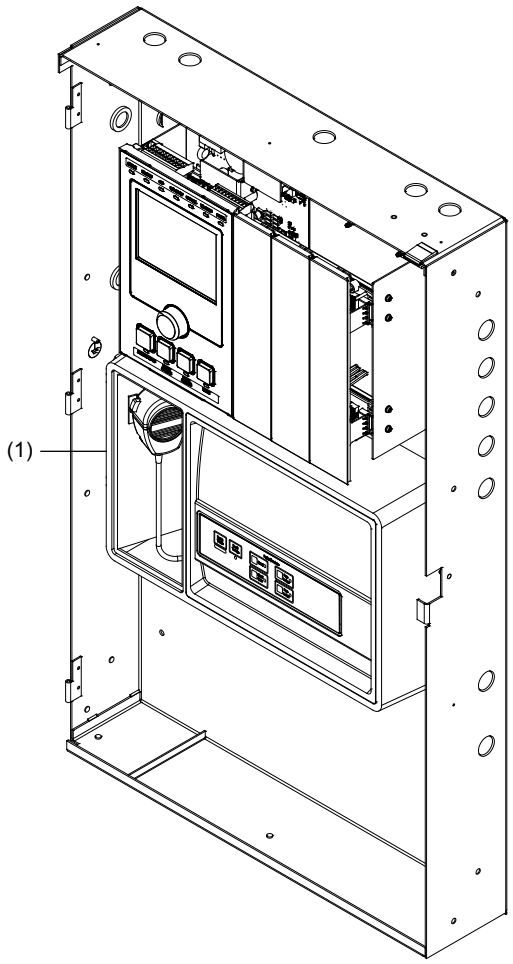
Caution: Circuit boards are sensitive to electrostatic discharge (ESD). To avoid damage, follow ESD handling procedures.

3X-PMI Paging Microphone Interface

The 3X-PMI provides controls for emergency voice and alarm communications in the audio subsystem. The interface is installed on the backbox, below the SFS1-ELEC assembly (see Figure 28). It consists of an audio mounting bracket, EAEC Emergency Audio Evacuation Controller card, audio enclosure, and paging microphone. In the 3-SDU, the 3X-PMI is identified in the cabinet configuration as ASU, under Rail 2 Type (Configure > Cabinet).

See “Digital audio subsystem” on page 80 for detailed information on the 3X-PMI. Refer to the *3X-PMI Paging Microphone Interface Installation Sheet* (P/N 3101875) for installation instructions and specifications.

Figure 28: 3X-PMI Paging Microphone Interface



(1) 3X-PMI Paging Microphone Interface

Digital audio wiring

A digital audio riser consists of a single pair (Class B) or two pairs (Class A) of wires that connect all amplifiers together. Since the digital signals are multiplexed, any of eight independent audio sources can be directed to any amplifier connected to the network. All command and control signals for the audio system are distributed over the network data riser. Refer to the *SFS1-CPU Main Board Installation Sheet* (P/N 3101773) for connecting digital audio riser field wiring.

Audio amplifiers

The audio amplifier's output is a dedicated and supervised speaker circuit that covers one audio zone in the protected facility. An independent supervised Class B or Class A, 24 VDC, 3.5 A, notification appliance circuit is provided on the 20 and 40 watt amplifiers.

Figure 14 on page 83 is an example of an enclosure with two zone amplifiers and a backup amplifier. In response to an alarm, selected audio amplifiers have been connected to the required audio channels.

Backup amplifiers

Each cabinet can contain one zoned amplifier module that automatically backs up the primary zoned amplifier module in the event of failure (not a field wiring problem) installed in the same cabinet. All the amplifiers must have the same output voltage rating.

Note: A backup amplifier will back up a failed amplifier if it was being used for Page, EVAC, or Alert. It will not back up an amplifier being used on an Auxiliary or General channel.

Refer to Figure 15 on page 84 for an example of a primary amplifier failure causing the backup amplifier to automatically connect to the same audio source as the failed amplifier to replace its output.

Preamp supervision module

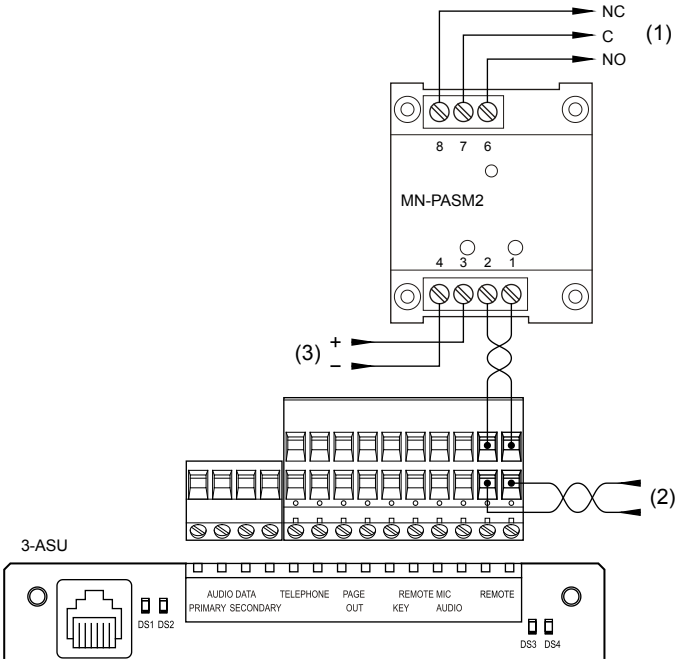
The MN-PASM2 Preamp Supervision Module supervises preamp (line level) audio signals.

The MN-PASM2 trouble relay contacts transfer 10 to 60 seconds after losing the audio signal and immediately after losing power. The contacts restore automatically after the audio signal or power returns.

The module installs in a single-gang electrical box or mounts on the MN-BRKT1. See Figure 29 on page 121 for field wiring. Refer to the *MN-PASM2 Preamp Supervision Module Installation Sheet* (P/N 3101950) for installation instructions and specifications.

Note: Model MN-PASM was replaced by model MN-PASM2. For systems still using an MN-PASM, refer to the *MN-PASM Preamp Supervision Module Installation Sheet* (P/N 3101580).

Figure 29: MN-PASM2 wiring for an audio subsystem



(1) Trouble relay. Normally closed contact (NC) held open. Normally open contact (NO) held closed. Unsupervised and power-limited.
(2) Line level audio in. Supervised and power-limited. Replace the 3-ASU terminal block with the terminal blocks supplied with the MN-PASM2.
(3) Supervised and power-limited. Use the control panel power supply or a 24 VDC, continuous, regulated, power supply that is UL/ULC Listed for fire protective signaling systems.

Standby batteries

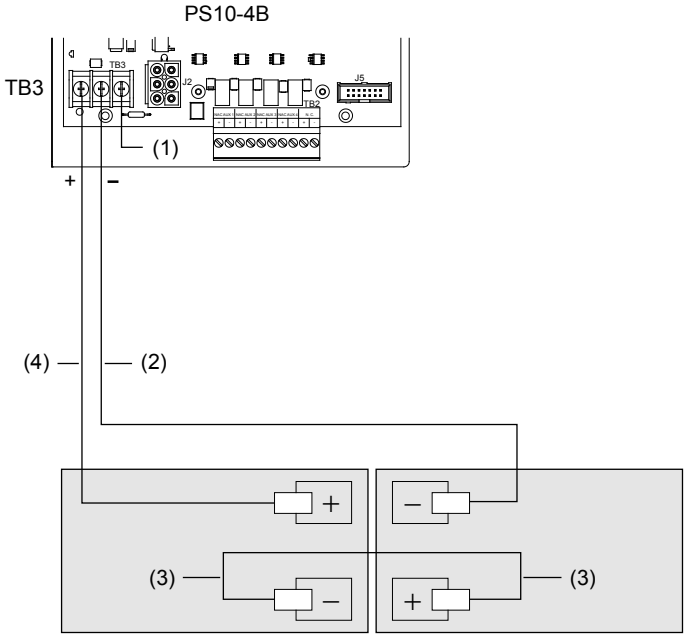
Caution: To avoid damage to equipment, do *not* connect standby batteries unless the control panel is already powered up using AC power. See “Initial power up” on page 43.

To provide continued panel operation in the event mains power is interrupted, the 24 VDC rechargeable battery circuit on the PS10-4B Power Supply has the capacity to charge up to two 65 Ah sealed lead acid standby batteries.

Up to two 17 Ah sealed lead acid standby batteries can be housed on the battery tray in the CAB6B backbox (see Figure 25 on page 113 for the compartment location). Install batteries larger than 17 Ah in a separate listed enclosure.

Use the diagram in Figure 30 when connecting the battery wiring to the power supply. Before connecting the batteries, confirm the panel is already powered up using AC power.

Figure 30: Wiring standby batteries to the power supply



(1) No connection
(2) Black wire from standby battery
(3) Blue wire
(4) Red wire from standby battery

Connecting auxiliary/booster power supplies

UL requires that you monitor secondary power sources housed in auxiliary and booster power supply enclosures for loss of AC power to ensure the following:

- Upon loss of AC power, the control panel must provide an audible and visible trouble signal
- Remote station, central station, and proprietary-type protected premises units must transmit a trouble signal off-premises

To meet UL requirements, you need to connect a SIGA-CC1 (or SIGA-CC1S) and a SIGA-CT1 to the booster supply. The SIGA-CC1 is used to activate the booster supply and to signal common troubles. The SIGA-CT1 is used to signal booster supply AC power failures.

Mount the SIGA-CC1 and SIGA-CT1 inside the booster supply cabinet as described in the technical documentation received with booster supply. Connect field wiring as shown in Figure 31 on page 124.

Booster power supply configuration

Set DIP switches SW 2-6 to On. This configures the booster supply's Trouble relay to close only on loss of AC power. All other booster troubles are signaled through the sense circuits.

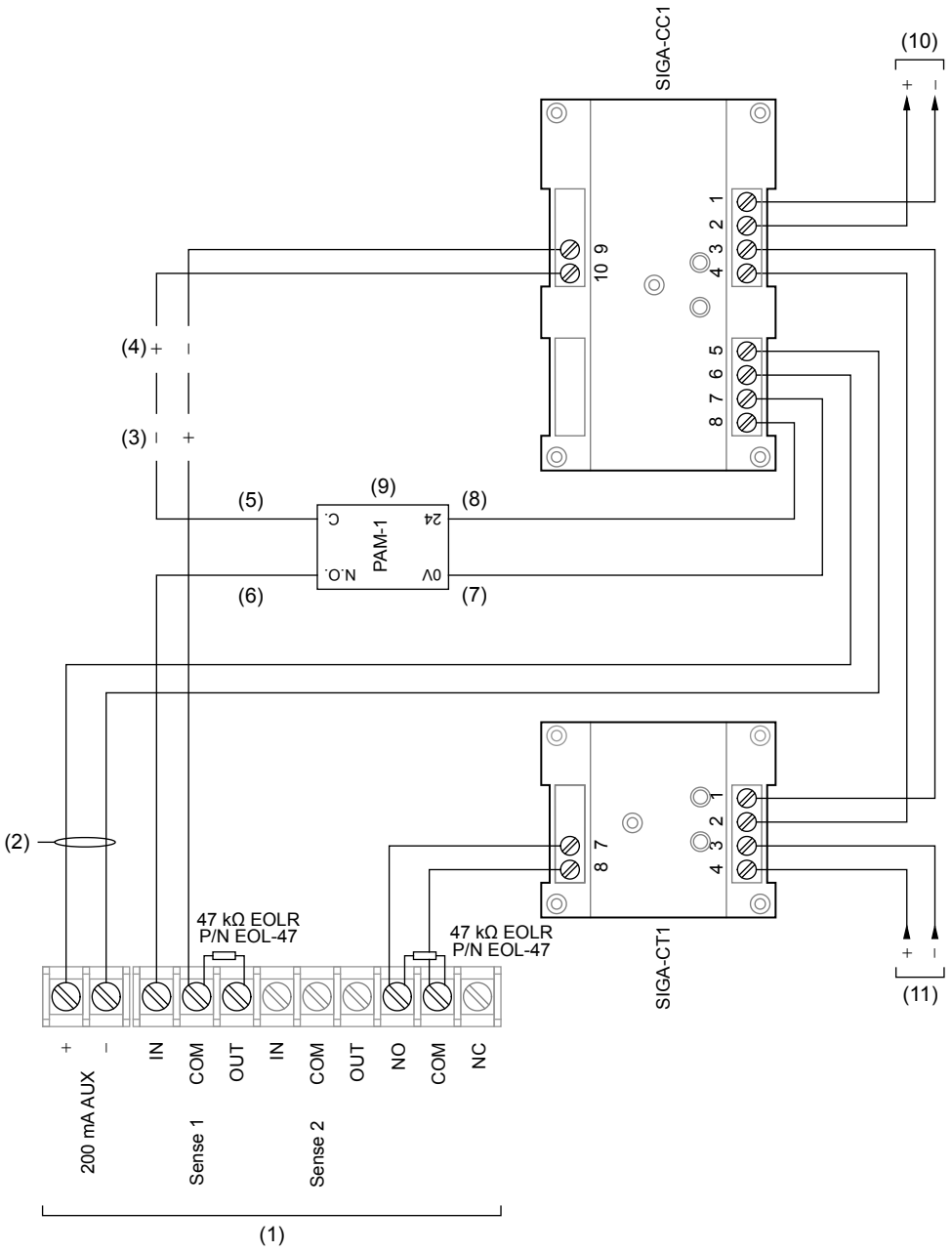
Note: In Figure 31, the booster supply is configured so that Sense 1 controls all four NACs. For DIP switch settings for this and other booster supply configurations, refer to the technical documentation received with the booster supply.

Signature modules configuration

Configure the SIGA-CC1 and SIGA-CT1 modules as shown below.

Module	Properties
SIGA-CC1	Device Type = SUPERVISEDOUTPUT Personality code 5: signal - supervised output (Class B) Text 1 = REMOTE_SUPPLY Text 2 = SENSE_1
SIGA-CT1	Model = CT1 Device Type = ACFAIL Personality code 3: active - NO nonlatching (Class B) Text 1 = REMOTE_SUPPLY Text 2 = AC_FAILURE

Figure 31: Typical booster power supply wiring



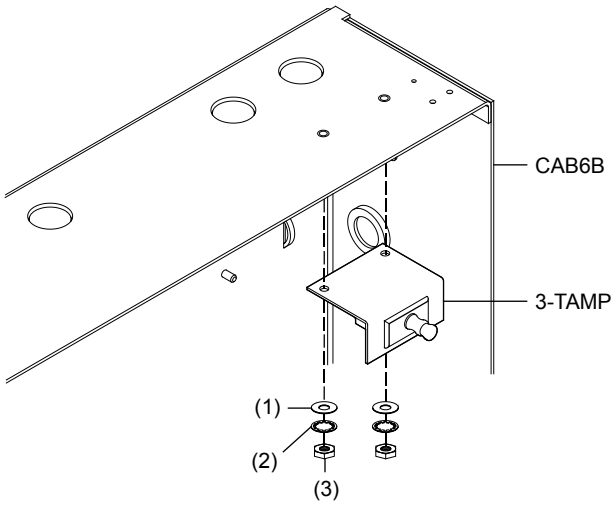
(1) Auxiliary/booster supply
(2) Not supervised
(3) Normal
(4) Active
(5) Blue
(6) Orange
(7) White
(8) Red
(9) Install a PAM-1 or equivalent listed relay only when required to supervise the 200 mA AUX circuit wiring
(10) Data Out, Signature loop to next device
(11) Data In, Signature loop from previous device

Tamper switch

It is a UL Listing requirement that all control panels in a life safety system that includes security functions have a tamper switch. When the EST3X control panel is integrated with an EST3 network, install a 3-TAMP supervision switch to meet UL requirements. Figure 32 shows the mounting location in the CAB6B.

Before installing the switch, refer to the *3-TAMP, 3-TAMP5, 3-TAMPRCC Cabinet Tamper Switches Installation Shee*t (P/N 387422) for additional installation information and wiring instructions.

Figure 32: Installing the 3-TAMP tamper switch in the CAB6B



(1) #8 flat washer (2X)
(2) #8 lock washer (2X)
(3) #8-32 nut (2X)

Fiber optics

3X series fiber network option modules provide a fiber optic or combination fiber optic and RS-485 communication path for up to 64 control panels on EST3X and EST3X/EST3 combination networks.

EST3X network

For an EST3X network, the 3X-FIB8 and 3X-FIB fiber network option modules are available, both providing fiber optic or combination fiber optic and RS-485 communication.

- 3X-FIB8 Fiber Network Option Module: Provides a communication path for up to *eight* EST3X control panels on an EST3X network. Refer to the *3X-FIB8 Fiber Network Option Module Installation Sheet* (P/N 3101769) for installation, wiring, and specifications.

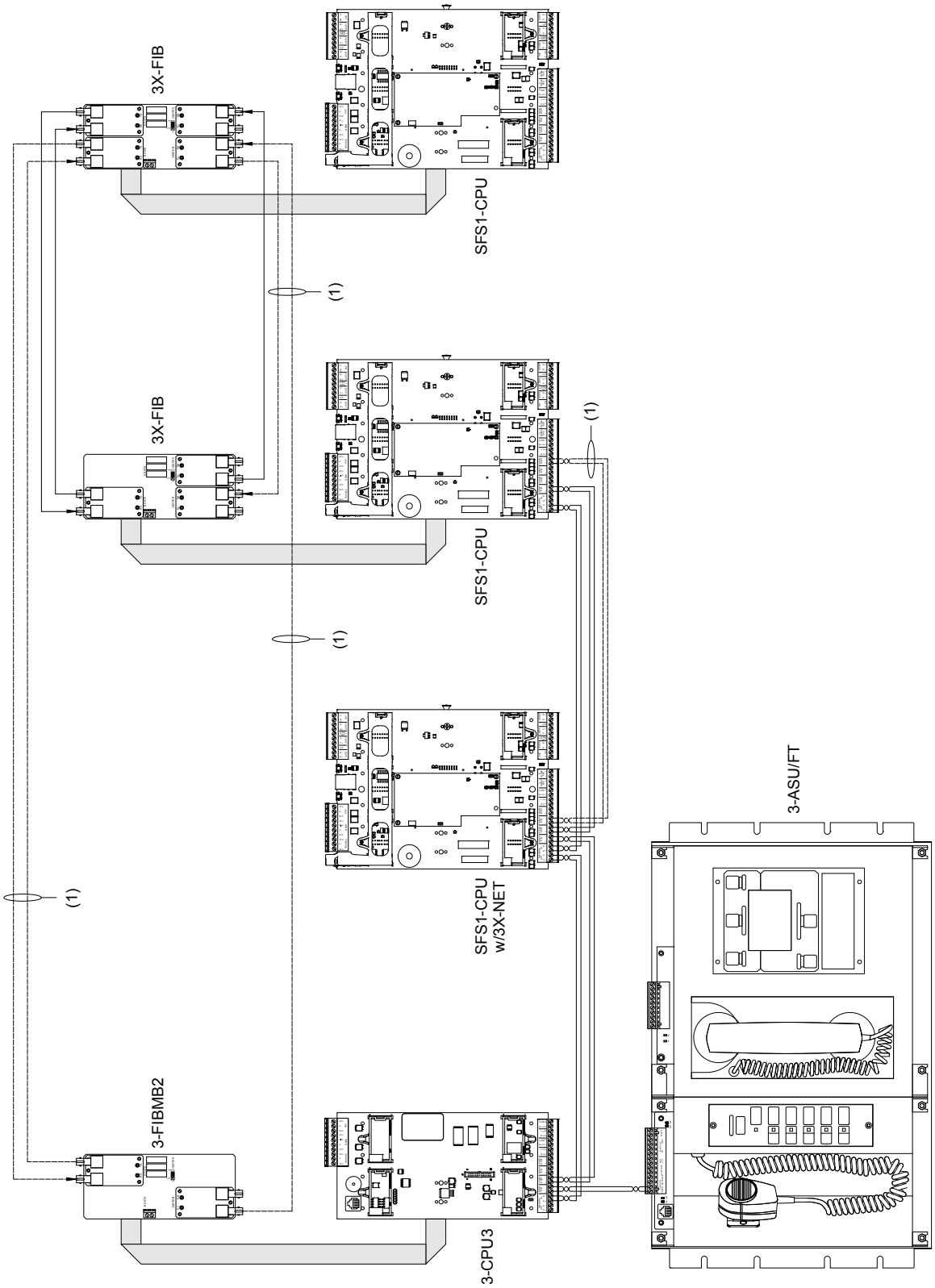
- 3X-FIB Fiber Network Option Module: Provides a communication path for up to *64* EST3X control panels on an EST3X network. This module also provides integration with an EST3 network (see below). Refer to the *3X-FIB Fiber Network Option Module Installation Sheet* (P/N 3101971) for installation instructions, wiring, and specifications.

EST3X/EST3 combination network

The 3X-FIB Fiber Network Option Module allows you to integrate your EST3X control panel with an EST3 network of up to 64 nodes. The combination network provides EST3X control panel communication with the EST3 Mass Notification Service, ULC Remote and Central Station Service, and certain UL/ULC Security services. The communication path can be fiber optic or a combination of fiber optic and RS-485. See Figure 33 on page 127 for an example of combined EST3X and EST3 network cabling. Refer to the *3X-FIB Fiber Network Option Module Installation Sheet* (P/N 3101971) for installation instructions, specifications, and additional cabling diagrams.

For more information about the EST3 fire alarm panel 3-CPU3, refer to the *3-CPU3 Central Processor Module Installation Sheet* (P/N 3100648). For more about the 3-ASU/FT, refer to the *3-ASU/FT Audio Source Unit with Firefighter's Telephone Installation Sheet* (P/N 270481).

Figure 33: Combination EST3X/EST3 fiber optic network cabling



Preliminary field wiring testing

It is recommended that you test all circuits before they are connected to the control panel components. Table 26 indicates the recommended tests and acceptable test results.

Note: Individual devices are not checked as part of these tests. All equipment installed on field circuits must be individually tested to ensure proper operation when the system running.

Table 26: Field wiring tests

Circuit type	Test
DC notification appliance circuit	1. Measure the resistance between conductors. The circuit resistance should be infinite if no devices are installed on the circuit. The circuit resistance should be approximately 15 kΩ when the polarized notification appliances and the end-of-line resistor are correctly installed. 2. Reverse the meter leads. The circuit resistance between conductors should read approximately 10 Ω to 20 Ω. If the resistance reading is still approximately the same value when the meter leads are reversed, one or more polarized devices are installed incorrectly. 3. Measure the resistance between each conductor and earth ground. The resistance should be infinite.
Audio notification appliance circuit	1. Measure the resistance between conductors. The circuit resistance between conductors should be infinite if no devices are installed on the circuit. The circuit resistance should be approximately 15 kΩ when the polarized notification appliances and the end-of-line resistor are correctly installed. 2. Reverse the meter leads. The circuit resistance between conductors should still read approximately 15 kΩ. 3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.
Signature data loops	1. With field wiring disconnected, verify the continuity of each conductor. Each conductor should measure less than 38 Ω. 2. Measure the resistance between conductors. The circuit resistance between conductors should be infinite if no devices are connected to the circuit. The circuit resistance between conductors should be between approximately 18 kΩ (250 devices) and 4.5 MΩ (1 device) when devices are installed. 3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.

Circuit type	Test
Analog addressable circuits	1. Verify the continuity of each conductor. Each conductor should measure less than 50 Ω. 2. Measure the resistance between conductors. The circuit resistance between conductors should be infinite if no devices are connected to the circuit. 3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.
Traditional initiating device circuits	1. Verify the continuity of each conductor. 2. Measure the resistance between conductors. The circuit resistance between conductors should be infinite if no devices are connected to the circuit. The circuit resistance between conductors should be approximately 4.7 kΩ when devices are installed. 3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.
RS-485 communication circuits	The EST3X control panel uses RS-485 circuits for the: • Network data riser • Network audio riser 1. Verify the continuity of each conductor. Each conductor should measure between 0 and 50 Ω. 2. Measure the resistance between conductors. The circuit resistance between conductors should be infinite if no devices are connected to the circuit. The circuit resistance between conductors should be approximately 50 Ω when devices are installed. 3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.
RS-232 Communication Circuits	With both ends of the circuit disconnected: 1. Verify the continuity of each conductor. Each conductor should measure between 0 and 25 Ω. 2. Measure the resistance between conductors. The circuit resistance between conductors should be infinite. 3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.
Earth Ground	Measure the resistance between the earth ground terminal and a convenient water pipe or electrical conduit. The circuit resistance should be less than 0.1 Ω.

3-MODCOM Modem Communicator module

The 3-MODCOM Modem Communicator is a hardware layer option card that connects the EST3X system to a switched telephone network. The module has two 8-position modular jacks for connecting two loop-start lines.

The 3-MODCOM can support 255 accounts and communicate with 80 receivers in any of the following protocols:

- Contact ID
- SIA DCS
- SIA P2 (3/1 Pulse Format)
- SIA P3 (4/2 Pulse Format)

The 3-MODCOM configuration settings made in the 3-SDU define the line properties, receiver attributes, account parameters, and transmission details.

Line types

The 3-MODCOM can be configured as a one- or two-line dialer, a modem, or a modem and one- or two-line dialer.

Note: For UL listed or FM approved installations, you must configure the 3-MODCOM as a two-line dialer. Both lines must have supervision (line-cut detection) selected.

Central Monitoring Station dialing

The 3-MODCOM electronically dials receivers in the CMS using either pulse or tone dialing, as specified in the 3-SDU. The module dials the stored CMS telephone number using the same digits that would be used if a person were dialing from the premises with an ordinary telephone.

Call timers

The 3-MODCOM sends messages in order of their priority. Messages may include device and user ID information regarding events, such as openings, closings, alarms, and tamper or trouble events. The module waits for acknowledgement that each message sent has been received. Where necessary, the 3-MODCOM can be configured to begin dialing without waiting for a dial tone. This option is used in areas where the telephone line has an absent or erratic dial tone.

Transmission process

The 3-MODCOM includes features that provide an appreciable level of transmission integrity. Multiple telephone lines and multiple telephone numbers help to ensure that a call to the receiver gets through.

The 3-MODCOM module sequences through the following basic steps to contact the CMS receiver.

1. The 3-MODCOM seizes one of the telephone lines and puts the line on-hook for a minimum of 3 seconds.

   This cuts off any ongoing call and disconnects the line from any telephone or dialing devices that are connected downstream.

   Note: The module tries to select an unused line for its first two attempts.

2. The 3-MODCOM takes the line off-hook and waits for a dial tone.

   The Line 1 or Line 2 LED indicates.

   If a dial tone is not received by the configured time, the module goes on-hook, increments the attempt counter, and continues to alternate lines and numbers until a dial tone is acquired.

   If the 3-MODCOM is configured with two telephone numbers and only one telephone line, it will make four attempts using the first telephone number, then four attempts using the second telephone number. This alternation of telephone numbers continues as needed until a connection is made or the configured number of dial attempts has been made.

   Note: In areas where the telephone system has no dial tone, or where the dial tone is erratic, you can configure the 3-MODCOM to dial without waiting for a dial tone.

3. The 3-MODCOM dials the CMS using the programmed dialing mode and telephone number.

4. The 3-MODCOM waits for a handshake message from the CMS, indicating that a connection has been established.

   If a handshake is not received within 40 seconds the module puts the telephone line on-hook and waits for the configured period.

   After the wait, processes 2 through 4 are repeated. If the module is still unable to contact the receiver, it seizes the other telephone line and repeats two attempts. If still unable to contact the receiver, it switches back to the first telephone line and attempts to contact the receiver using the secondary telephone number. If still unable to contact the receiver, the module continues to alternate lines and numbers until the configured maximum number of attempts have been reached. If the maximum number of attempts is reached,

the module sends a trouble message to the SFS1-CPU. The module retries the full number of attempts if another event is activated or makes one attempt if a configured period (Wait Time Between Attempts) expires.

5. When the call is completed, ringing is detected by the CMS dialer-receiver (DACR). The DACR goes off-hook and transmits a handshake.
6. If the handshake matches the desired transmit format, the 3-MODCOM transmits, in the specified format, all premises event data.

   The Line 1 or Line 2 LED flashes to indicate data is being transmitted.
7. The 3-MODCOM waits for an acknowledgement and a shutdown signal from the CMS receiver, then puts the line on-hook, ending the call.

   The Line 1 or Line 2 LED stops indicating.

Installing the 3-MODCOM

When installing the 3-MODCOM, follow these general steps:

1. Identify suitable telephone company lines and services.
2. Install the 3-MODCOM module on the electronics chassis.
3. Connect the 3-MODCOM to telephone company lines.
4. Download configuration data from the 3-SDU.
5. Make test transmissions to verify proper operation.

Telephone line requirements

The 3-MODCOM is supplied with two 7-foot cables that are 8-conductor, flat telephone cables, with 8-position modular plugs on both ends. One end of the cable plugs into the 3-MODCOM. The other end plugs into an RJ-31X jack. You must obtain the RJ-31X jack locally.

WARNING: Failure to use an RJ-31X jack violates FCC and NFPA regulations. A telephone connected directly to the incoming telephone line without the proper use of the RJ-31X jack will cause a telephone company trouble when used and possibly prevent the dialer from getting through to the CMS receiver in an emergency.

- The RJ-31X jack must be used to connect each line of the 3-MODCOM to the switched telephone network. One jack is required for each telephone line.

  The 8-position jack has a special jumper between terminals 1 and 4, and 5 and 8. This jumper is in place when the plug is removed from the jack.

Removing the plug re-establishes connection to the premises telephones. Inserting the plug opens the jumper and connects the 3-MODCOM, which provides a series connection to the telephones.

Refer to the *3-MODCOM, 3-MODCOMP Modem Communicator Installation Sheet* (P/N 387476) for a diagram of the jack wiring.

- 3-MODCOM dialers can be used for most applications that use telephone lines. The exceptions are:
  - The central station telephone number cannot be dialed directly (using access numbers and area code where necessary) without operator interception of the call
  - Multiparty service (a party line) exists
  - Operator assistance is required to complete a telephone call and a foreign exchange cannot be introduced
  - Connection is not established within 38 seconds following completion of dialing
- The 3-MODCOM dialer circuit is compatible with any switched telephone network that employs direct dialing (local) and Direct Distance Dialing (DDD), without operator interception of the call.
- Operator interception occurs in some areas where message billing is not completely automatic. Where operator interception is involved, you must obtain a foreign exchange (FX) connection from the central station exchange to the exchange serving the customer. The FX provides a local number for calling the central station without toll billing. A WATS or ground-start line connection must not be used for this purpose because the line cannot be supervised.
- The 3-MODCOM includes a feature that prevents jamming by an incoming telephone call. The feature is based on a telephone service option referred to as called party disconnect. This option lets the receiver of a call disconnect by hanging up the telephone for a period of time, even if the caller stays on the line. The time required for disconnect varies in different areas, but is usually between 18 and 90 seconds. Called party disconnect is available in most areas. To determine whether the called party disconnect control is available in the area to be served, consult the local telephone company.

  In areas not having called party disconnect, the 3-MODCOM module is vulnerable to jamming by an incoming call. To minimize the possibility of jamming, we recommend that the customer order a separate, unlisted number for exclusive use of the 3-MODCOM module. The customer should keep this number confidential. In the case of the two-line dialer, two premises

telephone numbers would have to be busied by incoming calls to jam the system.

Progressive anti-jamming measures would entail the use of one unlisted telephone number, or two unlisted numbers for maximum dialer integrity.

- The 3-MODCOM must be connected to the incoming line ahead of all connected equipment on that line, but just behind the demarcation block. This puts the control unit telephone connection in series, assuring that all telephones, answering machines, and FAX machines are disconnected during dial-out to the CMS. This requirement is necessary so the 3-MODCOM dialer circuit can seize the line for its exclusive use in the event of an alarm.
- Using a telephone line that is considered essential for conducting business at the site is not preferred. The dialer must be the first connection in line because it seizes the line and disconnects all other equipment when making a call. If connection will be made to a telephone company line that is also used for normal business purposes, advise the customer that the telephone service will be disrupted for a few minutes during the connection period.
- If the incoming lines to the protected premises involve a rotary telephone line arrangement, make the connection to the line having the highest number. This will create the least interference with business lines.
- In areas where the telephone company requires their own connector block be installed, it should be wired as per the USOC RJ-31X or RJ-38X configuration. (The RJ-38X configuration is identical to RJ-31X except for a jumper between 2 and 7 that is used in some residential applications but is not used by the 3-MODCOM.)
- When the 3-MODCOM is configured as a two-line dialer module, two incoming lines must be used and connections must be made to each line.

Installing the 3-MODCOM module

Refer to the *3-MODCOM, 3-MODCOMP Modem Communicator Installation Sheet* (P/N 387476) for installation instructions, wiring, and specifications.

Connecting the 3-MODCOM to telephone company lines

Notes

- For the installation of a system in compliance with NFPA 72, the 3-MODCOM must be connected to loop-start telephone lines. If the site has ground-start lines, two separate loop-start lines must be installed for the dialer.

- If the installation is for a certified fire alarm system or a burglar alarm system in compliance with NFPA 72, the telephone company line must be of the called party disconnect type (also called timed-release disconnect). This feature permits the communication module to seize the line and dial out, even when the telephone company line is in use.

To determine the type of telephone company line:

1. Disconnect the line pair and connect the lines to a test meter.

   If the line is equipped for loop-start, the meter should read 48 to 52 VDC between the lines.

   If the line is equipped for ground-start, the meter will read 0 VDC between the lines, 48 to 52 VDC between one line and ground, and 0 VDC between the other line and ground.

To determine whether the telephone line supports called party disconnect:

1. Have someone telephone the premises from the outside.
2. Hang up the telephone that received the call, but have the individual who placed the call remain on the line.
3. After 40 seconds, pick up the called telephone again to determine whether the caller has been disconnected.

Downloading the configuration database

After installing the 3-MODCOM and configuring its database in the 3-SDU, download the database. Refer to “Downloading a database” on page 67 for download instructions.

Note: For UL listed or FM approved installations, you must configure the 3-MODCOM as a two-line dialer and both lines must have supervision (line-cut detection) selected.

Testing the transmission

The 3-SDU provides a report that lists all CMS codes that can be transmitted from the 3-MODCOM. Give this report to the appropriate CMS.

After the CMS has programmed the central monitoring database, perform transmission tests as required by the local authority having jurisdiction (AHJ) and CMS.

Note: Transmission failures are latched at the panel. You must reset the panel in order to clear them.

Failover operation

To address the possibility of a communication failure or device trouble, you can create a failover operation in the 3-SDU for the 3-MODCOM. Failover operates by enabling and disabling various accounts defined for the project. On detection of a fault or trouble, project rules disable accounts on the failed 3-MODCOM and enable matching accounts on the backup 3-MODCOM.

Failover operation results in a system that is resistant to trouble arising from telephone lines, 3-MODCOMs, or the SFS1-CPU module. The operation can be limited to a single panel or can span two or more panels anywhere in a network.

In systems with a single 3-MODCOM you can include a second 3-MODCOM that acts as a redundant unit. In systems with two or more 3-MODCOMs, you can program the system so that the units back up each other, while still handling their normal traffic.

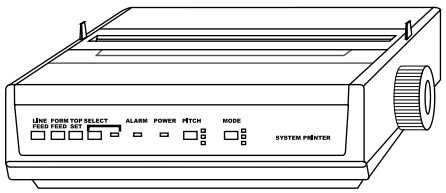
Monitoring and diagnostics

See “LED indicator diagnostics” on page 180 for the LED states.

Connecting a PT-1S serial printer

The PT-1S serial printer can be connected to an EST3X control panel to provide a printout of system events such as status changes, active events, and reports. The printer is an 80-character line width, freestanding printer that uses standard form feed paper.

Figure 34: PT-1S serial printer



An illustrated setup guide that contains detailed instructions for assembling the printer, installing the print drivers, and performing other tasks is included with the printer. Refer to the guide when unpacking, assembling, and setting up the printer. A user guide is provided on the CD included with the printer. Refer to the user guide for instructions on using the front panel to configure printer settings.

Notes

- For supervised printers, use PT-1S printer model D22300A (120 V) and PT-1S/220 printer model D22300B (220/240 V).
- If connecting the PT-1S printer to a serial port that is shared with a CDR-3 Bell Coder, refer to “Connecting a CDR-3 for coded tone output” on page 140.

Wiring specifications

- Length: 50 ft (15.2 m) max.
- Resistance: 13 Ω max.
- Wiring: 22 AWG (0.50 mm^2)

DIP switch settings

Supervised printer

Table 27: Supervised printer DIP switch settings

	Switch							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
SW1	On	On	On	On	On	On	On	On
SW2	On [1]	Off [1]	On [1]	Off	Off	On	On	On

[1] Recommended baud rate is 4800 bps

Unsupervised printer

Table 28: Unsupervised printer DIP switch settings

	Switch							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
SW1	On	On	On	Off	On	On	On	On
SW2	On [1]	Off [1]	On [1]	Off	Off	On	On	On

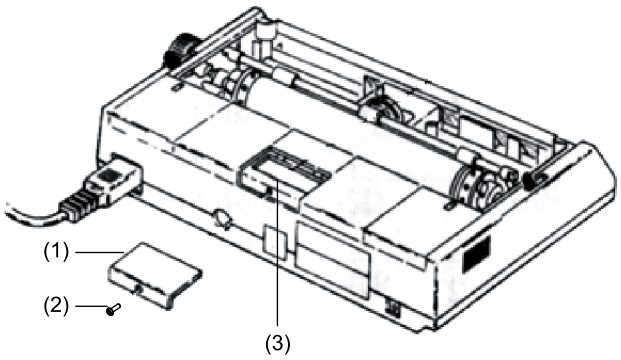
[1] Recommended baud rate is 4800 bps

Configuring the printer

1. Configure the printer port using the 3-SDU.
2. Remove the screw from the DIP switch cover on the back of printer. See Figure 35.

3. Set the printer DIP switches as shown in Table 27 or Table 28.
4. Replace the DIP switch cover.

Figure 35: Removing the PT-1S printer DIP switch cover



(1) DIP switch cover (2) DIP switch cover screw (3) DIP switches

Wiring

WARNING: Electrocution hazard. To avoid personal injury or death from electrocution, remove all sources of power and allow stored energy to discharge before installing or removing equipment.

Notes

- Use a serial cable with a 25 pin, D-Sub male connector on one end. The cable can be purchased locally or constructed using the DB-25 connector provided with the printer.
- Serial printer connections are power-limited and may or not be supervised, depending on the control panel.
- Locate supervised serial/USB printers in the same room as the equipment to which they connect.
- Locate unsupervised serial/USB printers in the same room and within 20 ft. (6.1 m) of the equipment to which they connect. Enclose wiring in conduit or equivalent protection against mechanical injury.
- Serial connection requires UL Listed and CSA Approved shielded RS-232C cable. Cable length may not exceed 50 ft. (15.2 m).

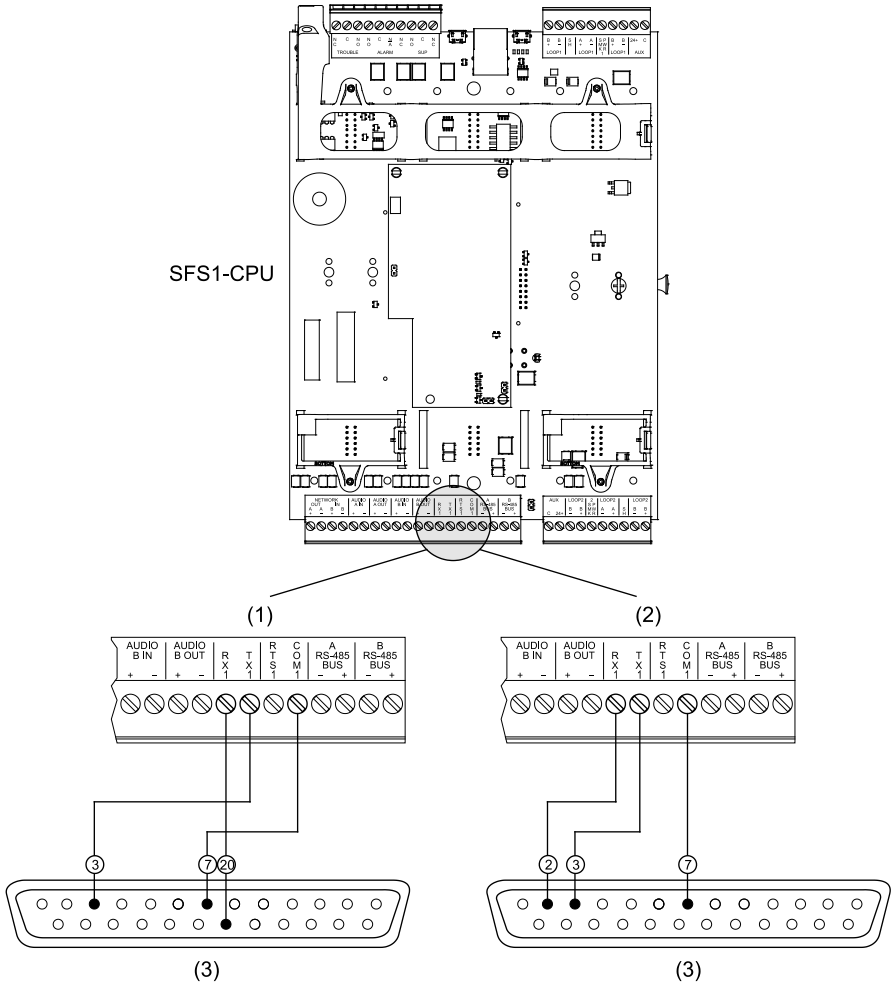
To build the serial cable:

1. Cut the cable to the length required for your application.
2. Wire one end of the cable to the pins on the DB-25 connector. See Figure 36.

To connect the serial cable to the control panel:

1. Plug the DB-25 serial connector into the serial port on the back of the printer.
2. Wire the other end of the cable to TB5 on the SFS1-CPU. See Figure 36.

Figure 36: Typical RS-232 wiring for serial printers



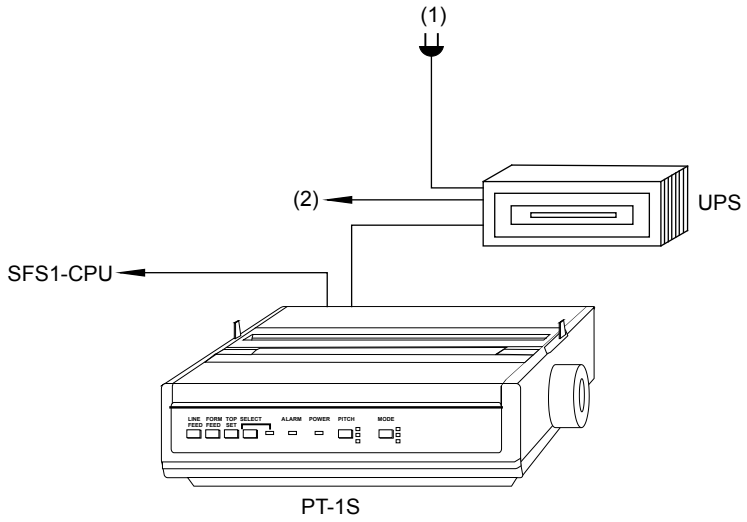
(1) For a supervised serial printer
(2) For an unsupervised serial printer
(3) Front view of male DB-25 connector

System printer standby power supply

If the PT-1S printer is required to operate during a brownout conditions or AC power failure, install an uninterruptible power supply (UPS). See Figure 37.

The UPS should be UL Listed for fire protection (UTRZ) and provide 120 VAC at 50/60 Hz for at least 24 hours. If the printer is required to operate during brownout conditions or AC power failures, install a UL Listed (UTRZ) uninterruptible power supply that can maintain printer operating voltage for at least 24 hours.

Figure 37: Uninterruptible power supply wiring



(1) 120 VAC, 15 A circuit
(2) UPS trouble contact monitor circuit

Connecting a CDR-3 for coded tone output

The CDR-3 Bell Coder module can be connected to the AUX input on the 3X-PMI EAEC card to provide a coded or march time tone to the audio system. See Table 29 for power and installation specifications.

Table 29: CDR-3 power and installation specifications

Input power	
Input voltage	24 VDC nominal
Standby current	60 mA
Current	
Standby	60 mA
Alarm	100 mA

Mounting	Half-footprint space on the back of the CAB6 backbox (see Figure 25 on page 113 for the footprint location)

When connecting a CDR-3 to a serial port that is shared with a PT-1S printer, you must connect both devices using an IOP3A.

IOP3A isolator module

The IOP3A isolator module provides two RS-232 connections that allow you to connect a CDR-3 for coded tone output when a PT-1S printer is connected to the control panel. See Table 30 for power and installation specifications.

Table 30: IOP3A power and installation specifications

Input power	
Voltage	24 VDC nominal
Standby current	60 mA
Isolated power output	
Voltage	12 VDC
Current	10 mA max.
Mounting	Half-footprint space on the back of the CAB6 backbox (see Figure 25 on page 113 for the footprint location)

Note: All *unsupervised* RS-232 connections must be in the same room, within 20 ft. (6.1 m), and enclosed in conduit or equivalent protection against mechanical injury.

Configuring a CDR-3 for coded tone output

Refer to the Figure 39 wiring diagram on page 143 for a CDR-3 coded tone output application. If your control panel setup includes a PT-1S printer, refer to the Figure 40 wiring diagram on page 144. Refer to the information below for configuration settings.

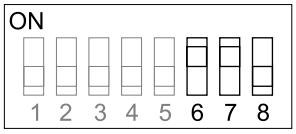
Configuration settings

- Set the CDR-3 parity DIP switch S1-6 to ON (no parity) as shown in Figure 38 on page 142.
- Refer to the *CDR-3 Bell Coder Installation Sheet* (P/N 3100023) for other settings and specifications.
- For a combined CDR-3 and PT-1S printer application:
  - Set the CDR-3 baud rate DIP switches S1-7 and S1-8 (see Figure 38), and the PT-1S baud rate to the same rate. The recommended rate is 2400 bps.

- Configure the 3-SDU Cabinet Configuration > Ports > Port Type to CDR-3/Printer and the Baud Rate to the same rate as the CDR-3 and printer
- Set the IOP3A DIP switch SW1 to UP (enables outputs 1 and 2; disables DB9 and RJ12 connectors)
- Set the IOP3A jumpers as follows:
  - Jumper JB1: Pins 2-3 (Supervision Mode) (Note: Jumpers JB1 and JB4 settings must agree)
  - Jumper JB2 (Output 1): IN for an unsupervised printer (disables 12 VDC on TB2-1); OUT for a supervised printer (enables TB2)
  - Jumper JB3 (Output 2): IN (disables 12 VDC on TB3-1)
  - Jumper JB4: IN (Supervision Mode) (Note: Jumpers JB1 and JB4 settings must agree)

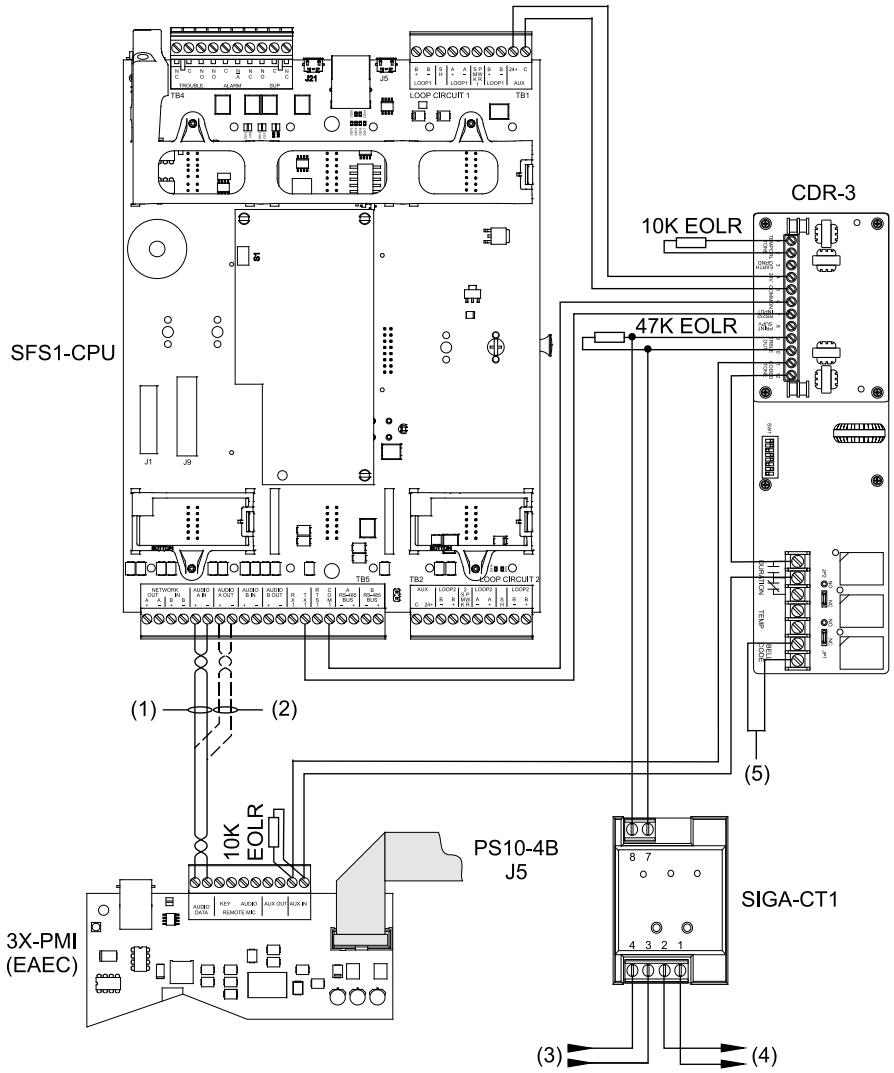
Note: After configuring and wiring the CDR-3, adjust zoned amplifier output levels and the 3X-PMI EAEC auxiliary input gain as necessary.

Figure 38: CDR-3 parity and baud rate settings



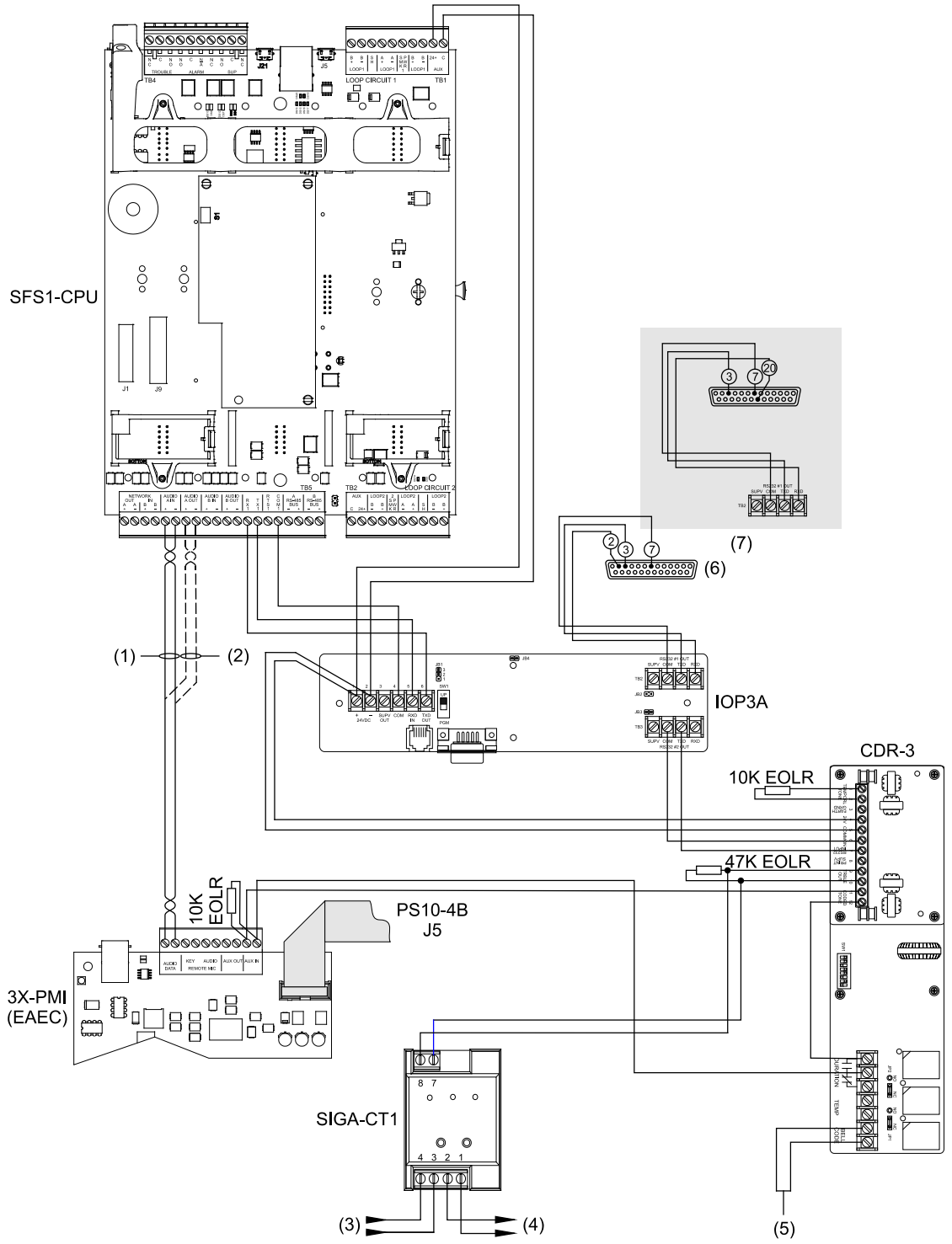
S1-6	S1-7	S1-8	Description
ON	–	–	No parity
–	OFF	OFF	1200 baud
–	OFF	ON	2400 baud
–	ON	OFF	4800 baud (factory default)
–	ON	ON	9600 baud

Figure 39: CDR-3 wiring for coded tone output



(1) Network option card installed
(2) Network option card not installed
(3) From Signature controller or previous device
(4) To next device
(5) For CDR-3 control of notification appliance circuits

Figure 40: Combined CDR-3 and IOP3A wiring for a PT-1S printer application



(1) Network option card installed
(2) Network option card not installed
(3) From Signature controller or previous device
(4) To next device
(5) For CDR-3 control of notification appliance circuits
(6) DB-25 male connector to unsupervised PT-1S printer (front view)
(7) DB-25 male connector to supervised PT-1S printer (front view)

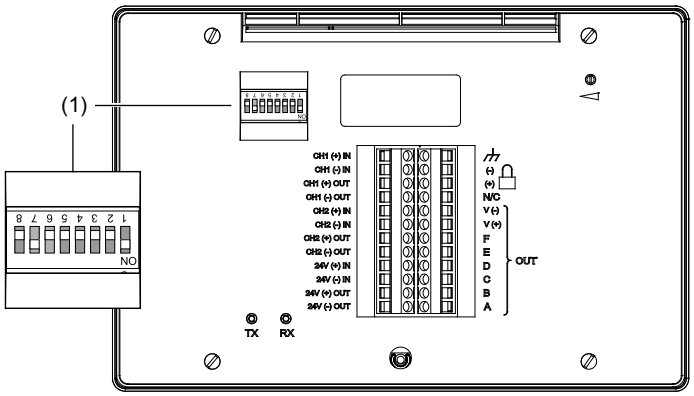
R-Series annunciator DIP switch settings

For correct operation, the R-Series remote annunciator must be configured with a unique address and must be in communication with the EST3X fire alarm control panel. These settings are configured from the DIP Switch SW1 on the back of the annunciator (see Figure 41). Refer to Table 31 for descriptions of each Switch SW1 segment (switch). Refer to Table 32 on page 146 for examples of address settings.

For complete R-Series annunciator installation instructions, see the *R-Series Remote Annunciators and Expanders Installation and Operation Guide* (P/N 3100969-EN).

Note: DIP Switch SW1 segment 7 (SW1-7) *must* be set to On for annunciator communication with the EST3X fire alarm control panel. In the On position, R-Series remote annunciators and GCI graph annunciators support Class B and Class A wiring, Style 6.

Figure 41: R-Series annunciator rear view showing DIP SW1 segments



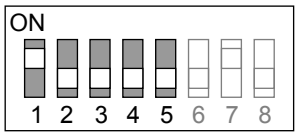
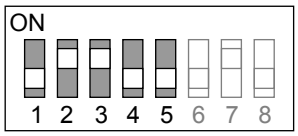
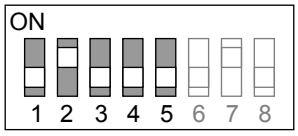
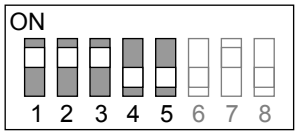
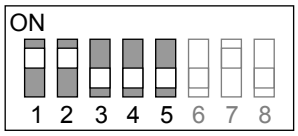
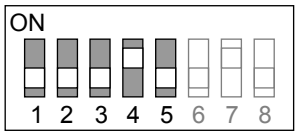
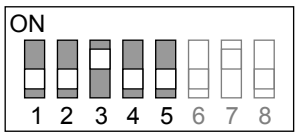
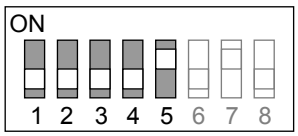
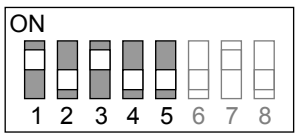
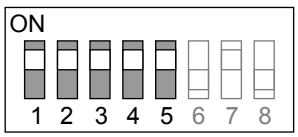
(1) DIP Switch SW1

Table 31: DIP Switch SW1 settings

Switch	Description
SW1-1 to SW1-5	Annunciator address (in binary): The factory preset address is 2. Possible values are 1 to 31. See Table 32 for examples.
SW1-6	Baud rate: Off = 9600 baud (factory default setting) On = All other baud rates

Switch	Description
SW1-7	Annunciator circuit type: Off = Circuit supports Class B and Redundant Class B wiring On = Circuit supports Class B and Class A wiring **Note:** SW1-7 *must* be set to On.
SW1-8	Not used

Table 32: Examples of DIP Switch address settings

Address	Setting	Address	Setting
1		6	
2		7	
3		8	
4		16	
5		31	

Runtime errors

Once all the cabinets have been defined, the devices labeled, and rules written in the 3-SDU the information is compiled. If the compiler finds no errors, the database is ready to be downloaded to the control panel. If an error occurs during the download process, it is referred to as a runtime error.

One source of runtime errors occurs during the initial database download. Until all portions of the database are downloaded into the SFS1-CPU memory, errors will be generated. Most of these errors will resolve themselves as the system progresses through download stages.

A second source of runtime errors can occur if there is a mismatch between the cabinet configuration in the 3-SDU and the actual installed hardware. Common causes include a card address mismatch, card type mismatch, or even an entire cabinet mismatch.

A third source of runtime errors is primarily caused by communication problems between cabinets during the download. These can occur after the initial database has been downloaded into all cabinets and subsequent downloads are performed using the network data loop.

Table 33 lists some error messages that may appear on the LCD screen during the database download.

Note: Refer to Chapter 7 “Service and troubleshooting” on page 167 for issues other than those listed below that may arise during panel operation.

Table 33: Runtime errors caused by the database download

Error message	Problem
Unable to perform operation	The control panel needs restarted
Busy signal	The system is busy; wait, and then retry the download
Size parameter trouble	Check the download connections and 3-SDU settings, and then retry the download
Checksum error in packet	Check the download connections and 3-SDU settings, and then retry the download
Device type error	A conflict exists between the 3-SDU download setting and the device type; check the configuration
Parcel #	Check the download connections and 3-SDU settings, and then retry the download
Inaccessible panel	The 3-SDU cannot see the panel; check the network wiring
Session in progress	The system is busy; wait, and then retry
Erase program trouble	Check the download connections and 3-SDU settings, and then retry the download
Block number	Check the download connections and 3-SDU settings, and then retry the download
Version mismatch	The downloaded firmware does not agree with the version setting; correct the mismatch

Chapter 6
Preventive maintenance and testing

Summary

This chapter provides instruction for maintaining and testing the EST3X life safety system.

Content

Visual inspections

Perform visual inspections in accordance with Table 34, or more often if required by the local AHJ. See Table 36 on page 157 for test methods.

Table 34: Visual inspection schedule

Component	Frequency	Recommended procedure
Radiant energy fire detectors	Monthly	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.
Supervisory signal devices	Monthly	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
Waterflow devices	Monthly	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
Batteries	Semiannually	Inspect batteries for corrosion or leakage. Verify that the battery connections are tight and secure. Clean the connections, if required. Replace batteries every 5 years, or sooner if conditions warrant.
Control unit trouble signals	Semiannually	Ensure there are no changes that may adversely affect equipment performance.
Emergency voice/alarm communication equipment	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Remote annunciators	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Duct detectors	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Electromechanical releasing devices	Semiannually	Ensure there are no changes that may adversely affect equipment performance.
Fire extinguishing systems or suppression systems	Semiannually	Ensure there are no changes that may adversely affect equipment performance.
Fire alarm boxes	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Heat detectors	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.

Component	Frequency	Recommended procedure
Smoke detectors	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.
Guard tour equipment	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Interface equipment	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Alarm notification appliances	Semiannually	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
Supervising station fire alarm system transmitters	Semiannually	Ensure there are no changes that may adversely affect equipment performance.
Control unit	Annually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
Fiber optic cable connections	Annually	Inspect the cables for any visible signs of damage, loose connections, or other changes that may adversely affect performance.

Routine maintenance and tests

Perform routine maintenance and tests in accordance with Table 35 on page 156 or more often if required by the local AHJ. See Table 36 on page 157 for test methods.

Notes

- Before starting testing, notify all areas where the alarm sounds and off premises locations that receive alarm and trouble transmissions that testing is in progress.
- Keep records of all testing and maintenance on the protected premises for a period of at least five (5) years.
- A complete check of installed field wiring and devices should be made at regular intervals, in accordance with NFPA 72 and ULC 524 requirements. This includes testing all alarm and supervisory alarm initiating devices and circuits, and any off premise connections.
- Panel operation should be verified in the alarm, supervisory, and trouble modes.

Required tools

- Slotted screwdriver, insulated
- Digital multimeter
- 1.1 kΩ,1 W resistor
- 12-inch (30.5 cm) jumper lead with alligator clips
- Commercial grade (1200 to 1500 W) hair blower (for testing heat detectors)
- Conventional vacuum cleaner (for cleaning SIGA and SIGA2 detectors)
- Signature Series Tool Kit (P/N SIGA-ST) (for cleaning SIGA detectors)
- Control panel door key
- System passwords (if any)

Signature device maintenance tips

Detectors

When removing one detector at a time, wait 1-minute after replacing the first detector before removing the next detector. This gives the system time to recognize and remap the first detector before generating a trouble condition caused by removing the second detector.

CO maintenance alert

In addition to displaying a maintenance alert when the photo element dirtiness is at or above 80%, the loop controller displays a maintenance alert when the CO sensor module is at or below 6 months until end-of-life. If both elements are at or above these thresholds, there is only one maintenance alert.

Once the dirtiness threshold is at 100%, a dirty detector trouble displays for the photo element. Once there are zero months until end-of-life, the panel displays the CO end-of-life trouble message.

CO maintenance report

The CO sensor module has a life span of 6 years. After 6 years, the detector sends out an end-of-life trouble message. When the message is transmitted, replace the CO sensor module.

To determine the months until end-of-life, run a maintenance report from the LCD screen. See “Device maintenance reports” on page 52.

Modules

Inspect Signature modules to ensure the physical installation is secure. Regularly perform functional testing of the module, as required by the AHJ.

Signature detector cleaning procedures

There are two cleaning procedures: one for SIGA detectors and one for SIGA2 detectors.

Note: Disable the detector before cleaning it, in order to avoid false alarms.

Cleaning SIGA detectors

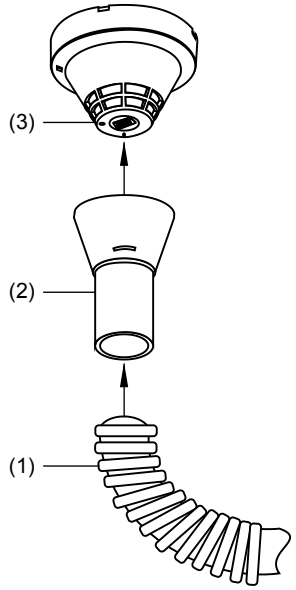
SIGA detectors require using a conventional vacuum cleaner equipped with the detector cleaning tool from the Signature Series Tool Kit (P/N SIGA-ST). Install the tool on the end of the suction hose (nominal 1.5 in. (3.8 cm) ID). This creates a high velocity vortex scrubbing action around the detector to remove loose dust and debris.

Note: Without using the detector cleaning tool, it is not possible to verify the dirtiness levels after cleaning. If the cleaning tool is not used, clean the detector per instructions below, operate the detectors for a minimum of two hours, and then restart the loop controller. When cleaned properly, the maintenance indicators return to normal condition.

To clean SIGA detectors:

1. Disable the detector to prevent false alarms (see “Disabling and enabling devices” on page 56).
2. Use the conventional vacuum cleaner brush attachment to remove any visible dirt and debris from the immediate area of the detector.
3. Connect the detector cleaning tool to the vacuum hose. See Figure 42 on page 154.
4. Place the detector cleaning tool over the detector head for approximately 10 seconds.
5. After the detector has been cleaned, restore it to proper operation (see “Disabling and enabling devices” on page 56).
6. Run the detector sensitivity report to print a list of detector sensitivity and compensation readings and to verify the effectiveness of the cleaning.

Figure 42: Using the detector cleaning tool



(1) Vacuum hose
(2) Detector cleaning tool
(3) Detector head

Cleaning SIGA2 detectors

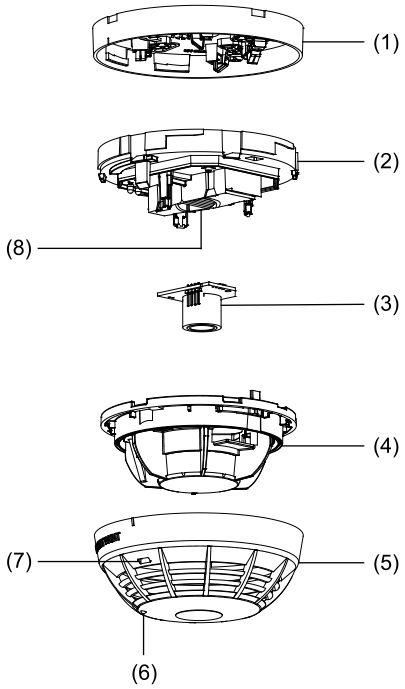
SIGA2 detectors require opening the detector and cleaning the interior using a vacuum cleaner and a soft brush.

To clean SIGA2 detectors:

1. Disable the detector to prevent false alarms (see “Disabling and enabling devices” on page 56).
2. Use a conventional vacuum cleaner brush to remove visible dirt and debris from the immediate area of the detector.
3. Remove the detector from the detector base by inserting a small screwdriver into the tamper-resist access slot while rotating the detector counterclockwise. See Figure 43 on page 155.
4. Push the locking tab on the bottom of the detector toward the center, and then twist and pull to remove the cover.
5. Using a soft brush and vacuum, carefully remove any dust and dirt from around the sensor chambers.
6. After the detector has been cleaned, reassemble and restore it to proper operation (see “Disabling and enabling devices” on page 56).

7. Operate the detector for a minimum of two hours, and then restart the loop controller. When cleaned properly, the maintenance indicators return to normal condition.
8. Check and record the detector's dirty level reading to verify the effectiveness of cleaning. See "Device maintenance reports" on page 52.
9. If cleaning is unsuccessful, return the detector to the factory and replace it with a new detector.

Figure 43: Cleaning a SIGA2 detector



(1) Mounting base
(2) Detector base
(3) CO sensor module (CO detectors only)
(4) Smoke chamber
(5) Detector cover
(6) LED indicator
(7) Access slot for tamper-resist mechanism
(8) Optics box

Signature Series detector component replacement procedures

SIGA2 smoke chamber

SIGA2 smoke detectors have replaceable smoke chambers. Replace the chamber if after cleaning the detector the control panel still indicates a dirty detector. Refer to the installation sheet received with the smoke chamber for instructions.

Replacement smoke chambers are listed below.

Model	Replaces smoke chamber on:
2-SPRC1	SIGA2 -PS, SIGA2-PHS
2-SPRC2	SIGA2-PCOS, SIGA2-PHCOS

CO sensor module

Signature Series CO detectors use a 2-CORPL replacement sensor. Replace the sensor every 6 years, or when the control panel indicates a sensor end-of-life condition. Refer to the *2-CORPL CO Replacement Module Installation Sheet* (P/N 3101589) for instructions.

Note: For proper operation, never replace the CO sensor itself without the PCB because each board has calibration data specific to the CO sensor.

Maintenance schedule

Table 35: Routine maintenance schedule

Component	Frequency
Control equipment [1]	Quarterly/Annually
Supervisory signal devices (except valve tamper switches)	Quarterly
Off-premises transmission equipment	Quarterly
Waterflow devices	Semiannually
Valve tamper switches	Semiannually
Batteries [2]	Annually
Control unit trouble signals	Annually
Fiber optic cable connections	Annually
Emergency voice/alarm communication equipment	Annually
Remote annunciators	Annually
Smoke detectors	Annually
Heat detectors	Annually
Fire alarm boxes	Annually
Fire extinguishing systems or suppression systems	Annually
Guard tour equipment	Annually
Interface equipment	Annually
Audible notification appliances	Annually

Component	Frequency
Textual audible notification appliances (speakers)	Annually
Visible notification appliances	Annually
Supervising station fire alarm system transmitters	Annually

[1] Test control equipment quarterly when it is not connected to a supervising station.
[2] Replace batteries every five years or sooner if conditions warrant.

Table 36: Routine maintenance and tests

Component	Test	Test methods
Control panel	Visual inspection	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
	Initial and Reacceptance	1. Verify that the control panel indicates open, short, and ground faults for all notification appliance circuits, initiating device circuits, and signaling line circuits. 2. Verify that the control panel activates all evacuation signals and auxiliary functions according to the site specific software. 3. Verify that all controls and indicators are working. 4. Disconnect the primary (mains) power. Verify that the control unit indicates an AC power failure.
	Quarterly/Annual	Test one-fourth of the entire system every three months such that the entire system is tested in a one year period, or test the entire system once each year.
Standby batteries	Visual inspection	Inspect batteries for corrosion or leakage. Verify that the battery connections are tight and secure. Clean the connections, if required. Replace batteries every five years or sooner if conditions warrant.
	Initial and Reacceptance	1. With the control panel powered up, and with the batteries connected and fully charged, verify the voltage across the battery terminals is the correct voltage in accordance with the battery manufacturer's specifications. 2. With the control panel under full load, disconnect the primary (mains) power. Wait until the standby operation time requirement passes then activate all alarm signals. Verify that the alarm signals remain active for at least 5 minutes for horns and strobes or 15 minutes for audio in the USA, whichever is greater.

Component	Test	Test methods
	Annual	1. With the control panel powered up, and with the batteries connected and fully charged, verify that the voltage across the battery terminals is the correct voltage in accordance with the battery manufacturer's specifications. 2. Test the capacity of the batteries using a battery tester suitable for the amp-hour rating of the batteries.
Remote annunciators	Visual inspection	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
	Initial and Reacceptance	1. Verify that the remote annunciator indicates open, short, and ground faults while testing the panel. 2 Very that all controls and indicators are working. 3. If LEDs are configured, verify the indicators by activating the points correlated to the LED. 4. Disconnect the RS-485 line and verify that a trouble message is displayed on both the panel and the remote annunciator.
Smoke detectors	Visual inspection	1. Verify that the detector’s green LED flashes. 2. Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.
	Initial and Reacceptance	1. Remove the detector from its base. Verify that the control panel displays a trouble message that correctly identifies the detector. 2. Activate the detector. Verify that the detector’s red LED flashes and the control panel displays an alarm message that correctly identifies the detector. 3. If the detector is installed in a relay base, verify the correct operation of the relay. 4. Run a Device Maintenance Report on all the smoke detectors in the system. Verify that all sensitivity levels fall within acceptable limits. Keep a printed copy for your records.

Component	Test	Test methods
	Annual	1. Activate the detector. Verify that the detector's red LED flashes and the control panel displays an alarm message that correctly identifies the detector. 2. If the detector is installed in a relay base, verify the correct operation of the relay. 3. Run a Device Maintenance Report on all the smoke detectors in the system. Verify that all sensitivity levels fall within acceptable limits. Keep a printed copy for your records.
Heat detectors	Visual inspection	1. Verify that the detector's green LED flashes. 2. Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.
	Initial and Reacceptance	**Caution:** Directing heated air at a single point may permanently damage the heat detector. Wave the hair blower slowly back and forth approximately 1 in. from the heat entry slots. 1. Remove the detector from its base. Verify that the control panel displays a trouble message that correctly identifies the detector. 2. Activate the detector using a commercial grade (1200 to 1500 W) hair blower. Verify that the detector's red LED flashes and the control panel displays an alarm message that correctly identifies the detector. 3. If the detector is installed in a relay base, verify the correct operation of the relay.
	Annual	**Caution:** Directing heated air at a single point may permanently damage the heat detector. Wave the hair blower slowly back and forth approximately 1 in. from the heat entry slots. 1. Activate the detector using a commercial grade (1200 to 1500 W) hair blower. Verify that the detector's red LED flashes and the control panel displays an alarm message that correctly identifies the detector. 2. If the detector is installed in a relay base, verify the correct operation of the relay.
Duct detectors	Visual inspection	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
	Initial and Reacceptance	Activate the equipment. Make sure the control panel correctly identifies the device.

Component	Test	Test methods
	Semiannual	Activate the equipment. Make sure the control panel correctly identifies the device.
Fire alarm boxes	Visual inspection	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
	Initial and Reacceptance	Activate the equipment. Make sure the control panel correctly identifies the device.
	Semiannual	Activate the equipment. Make sure the control panel correctly identifies the device.
Alarm input modules (except waterflow switch inputs)	Visual inspection	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	1. Open the circuit. Verify that the control panel displays a trouble message that correctly identifies the module. 2. Short each side of the circuit to ground one at a time. Verify that for each short the control panel displays a ground fault message that correctly identifies the module. 3. Activate the module. Verify that the module's red LED flashes and the control panel displays an alarm message that correctly identifies the module.
	Annual	Activate the module. Verify that the red LED flashes and the control panel displays an alarm message that correctly identifies the module.
Waterflow switch input modules	Visual inspection	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	1. Open the circuit. Verify that the control panel displays a trouble message that correctly identifies the module. 2. Short each side of the circuit to ground one at a time. Verify that for each short the control panel displays a ground fault message that correctly identifies the module. 3. Activate the module. Verify that the module's red LED flashes and the control panel displays an alarm message that correctly identifies the module.
	Semiannual	Activate the module. Verify that the module's red LED flashes and the control panel displays an alarm message that correctly identifies the module.

Component	Test	Test methods
Supervisory input modules (except valve tamper inputs)	Visual inspection	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	1. Open the circuit. Verify that the control panel displays a trouble message that correctly identifies the module. 2. Short each side of the circuit to ground one at a time. Verify that for each short the control panel displays a ground fault message that correctly identifies the module. 3. Activate the module. Verify that the module's red LED flashes and the control panel displays a supervisory message that correctly identifies the module.
	Quarterly	Activate the module. Verify that the module's red LED flashes and the control panel displays a supervisory message that correctly identifies the module.
Valve tamper input modules	Visual inspection	Verify that the module's green LED flashes. Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	1. Open the circuit. Verify that the control panel displays a trouble message that correctly identifies the module. 2. Short each side of the circuit to ground one at a time. Verify that for each short the control panel displays a ground fault message that correctly identifies the module. 3. Activate the module. Verify that the module's red LED flashes and the control panel displays a supervisory message that correctly identifies the module.
	Semi-annual	Activate the module. Verify that the module's red LED flashes and the control panel displays a supervisory message that correctly identifies the module.
Releasing modules	Visual inspection	Verify that DS2 flashes and DS4 is on. Ensure there are no changes that may adversely affect equipment performance.

Component	Test	Test methods
	Initial and Reacceptance	**WARNING:** Disconnect all wiring on TB4 (RELEASE 1 and RELEASE 2) when servicing or testing the system. Disabling points does not prevent activation of the release circuits. Failure to follow these instructions may result in loss of life, serious injury, or property damage. 1. Verify that the control panel indicates open, shorts, and ground faults for each of the circuits. 2. Verify that the release initiation circuit activates the release circuits as intended, and that all required signals are indicated on the control panel. 3. Verify that the manual release switch, if used, activates the release circuits as intended, and that all required signals are indicated on the control panel. 4. Verify that the abort switch, if used, prevents the release circuits from activating as intended.
	Semiannual	**WARNING:** Disconnect all wiring on TB4 (RELEASE 1 and RELEASE 2) when servicing or testing the system. Disabling points does not prevent activation of the release circuits. Failure to follow these instructions may result in loss of life, serious injury, or property damage. 1. Verify that the release initiation circuit activates the release circuits as intended, and that all required signals are indicated on the control panel. 2. Verify that the manual release switch, if used, activates the release circuits as intended, and that all required signals are indicated on the control panel. 3. Verify that the abort switch, if used, prevents the release circuits from activating as intended.
Audible notification appliances	Visual inspection	Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	Using a sound level meter meeting ANSI S1.4a Type 2 requirements, measure and record the maximum output of each appliance when the audible emergency evacuation signal is on. Set the sound level meter in accordance with ANSI S3.41 and use the time-weighted characteristic F (FAST).

Component	Test	Test methods
	Annual	Using a sound level meter meeting ANSI S1.4a Type 2 requirements, measure and record the maximum output of each appliance when the audible emergency evacuation signal is on. Set the sound level meter in accordance with ANSI S3.41 and use the time-weighted characteristic F (FAST).
Textual audible notification appliances (speakers)	Visual inspection	Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	Using a sound level meter meeting ANSI S1.4a Type 2 requirements, measure and record the maximum output of each appliance when the audible emergency evacuation signal is on. Set the sound level meter in accordance with ANSI S3.41 and use the time-weighted characteristic F (FAST). Verify that audible information is distinguishable and understandable.
	Annual	Using a sound level meter meeting ANSI S1.4a Type 2 requirements, measure and record the maximum output of each appliance when the audible emergency evacuation signal is on. Set the sound level meter in accordance with ANSI S3.41 and use the time-weighted characteristic F (FAST). Verify that audible information is distinguishable and understandable.
Visible notification appliances	Visual inspection	Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	Verify that the appliance locations are in accordance with the approved layout and are set for the correct candela rating. Verify that each appliance flashes.
	Annual	Verify that each appliance flashes.
Off-premises transmission equipment	Visual inspection	Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	1. Activate an alarm initiating device. Verify that the off-premises location receives an alarm signal. 2. Create a trouble condition. Verify that the off-premises location receives a trouble signal. 3. Activate a supervisory device. Verify that the off-premises location receives a supervisory signal. 4. If the module is configured to transmit alarm signals and trouble signals over the same dedicated pair of wires, create a trouble condition, and then activate an alarm initiating device. Verify that the off-premises location

Component	Test	Test methods
		receives an alarm signal and a trouble signal.
	Semiannual	1. Activate an alarm initiating device. Verify that the off-premises location receives an alarm signal. 2. Create a trouble condition. Verify that the off-premises location receives a trouble signal. 3. Activate a supervisory device. Verify that the off-premises location receives a supervisory signal. 4. If the module is configured to transmit alarm signals and trouble signals over the same dedicated pair of wires, create a trouble condition, and then activate an alarm initiating device. Verify that the off-premises location receives an alarm signal and a trouble signal.
Digital alarm communicator transmitter (DACT)	Visual inspection	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
	Initial and Reacceptance	1. Activate an alarm input while using the primary telephone line for a telephone call. • Verify that the supervising station receives the correct signal. • Verify completion of the transmission attempt occurs within 90 seconds. 2. Disconnect the primary telephone line and connect the secondary telephone line. • Verify that the control panel indicates a DACT trouble message. • Verify that the DACT transmits the trouble signal to the supervising station within 4 minutes of detecting the fault. 3. Disconnect the secondary telephone line and connect the primary telephone line. • Verify that the control panel indicates a DACT trouble message. • Verify that the DACT transmits the trouble signal to the supervising station within 4 minutes of detecting the fault.
	Semiannual	Same as initial and reacceptance testing.

System trouble and maintenance log

Date	Time	Event	Initial

Record of completion

NFPA 72 requires a Record of Completion be filled out at the time of system acceptance and approval, and revised when changes to the system are made. You can download a copy of the form from the NFPA website (www.nfpa.org).

After completing the Record of Completion form, mount it near the fire alarm panel or give it to the building representative.

Chapter 7
Service and troubleshooting

Summary

This chapter provides instructions for servicing and troubleshooting the fire alarm system. It is intended for those trained and authorized to maintain the system.

Content

System repairs

The EST3X life safety system is made up of modular assemblies that are easily installed and maintained. Because of the modular design, component level field repairs mainly consist of isolating a fault to the circuit card in an assembly and replacing the defective card.

The following table provides a general guideline of recommended spare components to have on hand.

Table 37: Recommended spares list

Minimum of 1 each or 10% of the quantity installed	Minimum of 3 each or 10% of the quantity installed
• Power supply • Option cards • Amplifiers (if no backup installed in system) • Printer ribbon	• Monitor modules • Control modules • Heat detectors • Ionization smoke detectors • Photoelectric smoke detectors • Detector base • Duct detector filter kits • Breakglass replacement for pull stations • Breakglass replacement for warden stations • Horn, bell, strobe, and speaker

Service and repair of system components centers around the following assumptions:

- Qualified technicians possessing a complete understanding of the system hardware and functions will perform maintenance.
- Only certified maintenance technicians will service the equipment.
- Maintenance technicians will have a readily available supply of replacement parts.

Precautions

Removing or replacing circuit board modules

When removing or replacing circuit modules, always remember to:

- First disconnect the battery then remove AC power from the control panel. Removing or replacing circuit modules when power is applied will damage the equipment.
- Avoid applying excessive force to the snap-rivet fasteners that lock the plug-in modules in place. If needed, use the extraction tool provided in the hardware kit.

Handling static sensitive circuit board modules

Many of the panel components are circuit boards that are sensitive to electrostatic discharge. To avoid damage to the board, take the following precautions:

- Use only approved grounding straps that are equipped with a 1 MΩ resistive path to earth ground.
- Remove a circuit board module from its protective antistatic packaging only for inspection or installation.
- Always hold circuit modules by the sides. Avoid touching component leads and connector pins.

Panel restart problems

The EST3X system is designed to conduct a startup interrogation of the system's database integrity and its configured hardware. When a new CPU database is downloaded to a panel, the panel restarts and validates the database. If a database error is detected, the panel will attempt to restart, and in some cases continually restart. If your panel continually restarts, recycle the panel several times as described below to restore the system to its normal state.

To restore the system:

1. Disconnect battery wiring to the power supply.
2. Apply AC power to the panel and wait until the buzzer sounds.
3. After 5 to 10 seconds remove AC power, and then reapply power.

4. Repeat step 3 five times; *however*, the fifth time leave AC power connected.

   The LCD should display “Panel Service Utility ... waiting for SDU download.”
5. Open the 3-SDU project and compile the rules.
6. Run a database conversion, and then download the database to the panel.
7. Reconnect battery wiring to the power supply.

Note: The panel will restore to normal state if there are no discrepancies between the database and installed equipment, and all hardware is functioning correctly.

Hardware problems

Hardware problems are typically identified by an intermittent or total failure of a device. The problem may occur within an equipment cabinet or with field wiring and devices.

The quickest way to locate a hardware problem is by selectively isolating portions of the system and observing the results of the isolation. By isolating smaller and smaller portions of the system, hardware faults can usually be located.

Substituting hardware

WARNING: Electrocution hazard. To avoid personal injury or death from electrocution, remove all sources of power and allow stored energy to discharge before installing or removing equipment.

Caution: Circuit boards are sensitive to electrostatic discharge (ESD). To avoid damage, follow ESD handling procedures.

The local rail modules in the EST3X life safety network are microprocessor based. The single and dual Signature loop controller modules, SFS1-CPU Main Board, 3-AADC1 Analog addressable Device Controller module, and 3X-PMI Paging Microphone Interface all have “flash” memory, which is used to store the operating firmware. The flash memory is empty when the module is shipped from the factory. Because the content of each module is specific to its cabinet location, do not substitute these modules without downloading the new cabinet configuration database.

Along with the information above, the following is a list of other substitution and replacement rules.

Rule 1: A hardware layer module must be replaced with the same model number module.

Rule 2: An operator layer control-display module must be replaced with the same module number control-display module.

Rule 3: A substitute hardware layer module must have an identical control-display module installed as the module it replaces.

Rule 4: A substitute module should be installed in the same card location as the module it is replacing.

Adding hardware

When hardware is added to a cabinet, a portion of the network configuration database must also be changed. The extent of the changes depends on the rule relationships between the added component and the rest of the network. Once the new hardware has been configured in the 3-SDU, revised copies of the database must then be downloaded to the control panel.

Hardware troubleshooting

PS10-4B Power Supply troubleshooting

Under most conditions, a defective power supply will be identified by the system, and annunciated as a trouble. The system may continue to operate nearly normally, as the battery connected to the faulty supply will automatically be switched into the circuit, as the load demands.

You can connect the panel to the PC running the 3-SDU and perform a power supply diagnostics check. Refer to the 3-SDU diagnostics help topic for details.

Table 38: Voltage specifications

Test Point	Voltage
NAC output current	
Regulated	3.0 A max. per circuit 6.0 A total, shared
Special application	3.0 A max. per circuit 9.0 A total, shared
AUX output current	6.0 A total, shared
Input AC voltage	94 to 264 VAC, 50/60 Hz
Battery charging current	1.5 or 3 A, selectable

Table 39: Power Supply troubleshooting

Problem	Possible cause
Auxiliary voltage low (< 20 V)	• There is an excessive load
Batteries will not charge	• The system is in alarm mode • The NAC/AUX outputs on the power supply are configured for AUX and are loaded with more than 6.0 A • The wrong battery type is configured in the 3-SDU • The battery is shorted • The battery is not wired correctly to the PS10-4B
System will not operate on batteries	• The battery voltage is low • The batteries were connected before AC power was energized • The batteries are defective

SFS1-CPU Main Board troubleshooting

The SFS1-CPU controls all the communication and processing of information for modules located in its cabinet. EST3X life safety network communication between SFS1-CPU modules in other cabinets is also processed by the SFS1-CPU.

Network communication is RS-485 when a 3X-NET8 or 3X-NET RS-485 network option card is installed in the SFS1-CPU or fiber optic when a 3X-FIB8 or 3X-FIB fiber network option module is installed.

The SFS1-CPU main board provides several LEDs that indicate activity on a communication path. See Figure 44 on page 174 for the LED locations on the main board and Table 40 on page 174 for LED descriptions.

Note: If an SFS1-CPU is defective, the entire SFS1-ELEC must be replaced.

Figure 44: SFS1-CPU LEDs

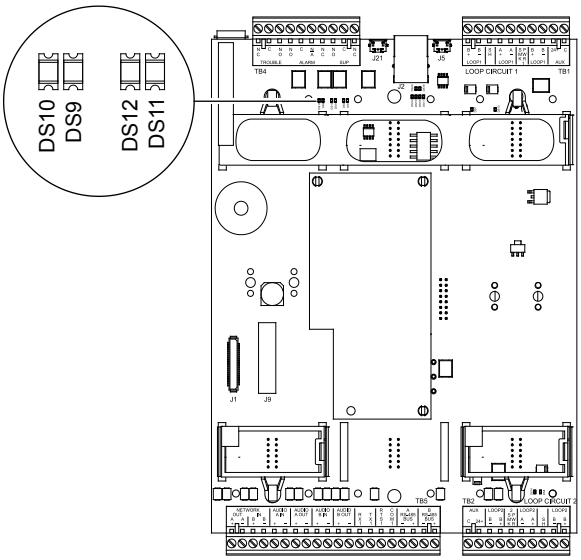


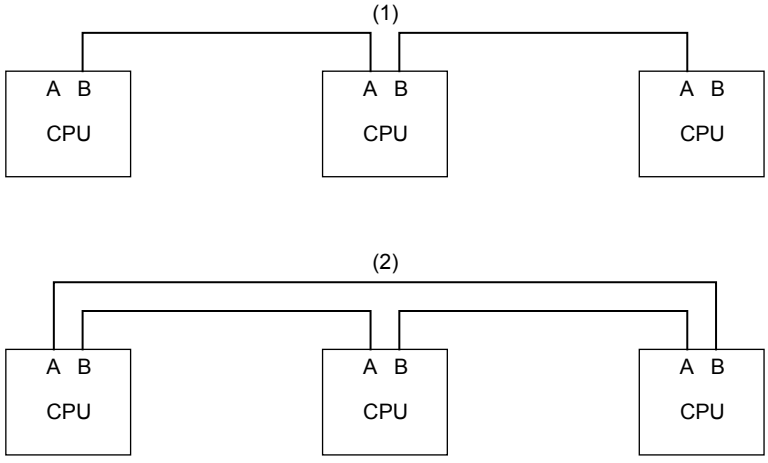
Table 40: SFS1-CPU LED descriptions

LED	Normal state	Descriptions
DS9	Flashing	Network data RX Class B activity
DS10	Flashing	Network data TX Class B activity
DS11	Flashing	Network data RX Class A activity
DS12	Flashing	Network data TX Class A activity

Network data and digital audio risers

LEDs DS9, DS10, DS11, and DS12 in Figure 44 show the location and normal state of the network communication status LEDs on the SFS1-CPU.

Network wiring alternates between channel A and channel B, as shown below.



(1) Class B network wiring one-line diagram
(2) Class A network wiring one-line diagram

When multiple SFS1-CPU modules are networked together, using Class B wiring the network data LEDs should flash on all panels except the first and last panels. This indicates normal two-way network communication activity on both data channels.

When multiple SFS1-CPU modules are networked together using Class A wiring, the network data LEDs should flash continuously. This indicates normal two way network communication activity on data channels A and B.

The data network and digital audio risers are isolated at each SFS1-CPU. This prevents a shorted data loop from interrupting communication on the entire loop.

When trying to isolate trouble on a data network or digital audio riser, remember that both shorted and open loop segments will interrupt communication between two SFS1-CPU modules. In this case, the EST3X life safety network will reconfigure and operate as two independent sub-networks

Due to the isolation between cabinets, during a ground fault condition the number of potential loops to be investigated is limited to those originating from a single cabinet.

Table 41: SFS1-CPU Main Board troubleshooting

Problem	Possible cause
LEDs DS9 (RX) and DS10 (TX) or DS11 (RX) and DS12 (TX) are off, or both pairs are off	• The TB5 network wiring + and − are reversed • The loop was not properly terminated • The network A and B loops are crossed • An improper wire was used • A ground fault has been detected • The 3X-NET8/3X-NET option card is not properly seated
The peripheral RS-232 device wired to TB5 is inoperative	• The TX and RX wires are reversed • The CPU and peripheral device baud rates are mismatched • The peripheral device is off-line or improperly configured • The communication card is missing • There is lack of continuity on the network wiring
RS-485 (TB5) network communication is inoperative	• Network wiring + and − are reversed • The 3X-NET8/3X-NET option card is not seated properly • The network A and B loops are crossed • An improper wire was used

Problem	Possible cause
No characters show on the LCD screen, the control-display module button is inoperative, and the Power LED is off	• The ribbon cable between the LCD and CPU is loose or defective • The CPU is defective (replace the entire SFS1-ELEC electronics chassis) • The LCD is defective (replace the LCD on the SFS1-ELEC) • The CPU is not configured in the 3-SDU for the 4X-LCD • There is no power to the panel

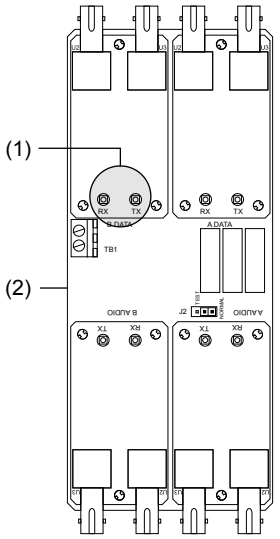
Fiber Network Option module troubleshooting

The 3X-FIB8 and 3X-FIB fiber network option modules provide a fiber optic or combination fiber optic and RS-485 communication path. The modules consist of an adapter card and electronics card.

Separately ordered fiber optic transceivers are installed on the electronics card to provide transmission and reception capability over the fiber optic cable. The LEDs on the transceivers indicate loop activity.

Note: If a panel must be powered down for service, connect a backup power source to the 24 VDC terminals (TB1) on the electronics card to maintain network communication.

Figure 45: Fiber optic communication LEDs



(1) Transceiver RX/TX LEDs
(2) Fiber optic module electronics card

Table 42: 3X-FIB8 troubleshooting

Problem	Possible causes
The TX LED is not flashing on the transceiver	• The ribbon cable between the adapter card and electronics card is improperly installed or defective • The adapter card is not properly seated in J6 on the CPU
The RX LED is not flashing on the transceiver	• An incorrect cable is connected to the port • The fiber strand may be broken or missing • There is lack of continuity between one panel and another
The RX LED is steady on the transceiver	• Jumper JP1 was left in the test position

Test jumpers

Jumper J2 on the electronics card is used to put the module in test mode. Refer to the *3X-FIB8 Fiber Network Option Module Installation Sheet* (P/N 3101769) or *3X-FIB Fiber Network Option Module Installation Sheet* (P/N 3101971) for testing instructions.

4X Series control-display modules troubleshooting

The 4X Series control-display modules operate independently of the option card on which they are installed; however, they use the option card's electronics to communicate with the SFS1-CPU.

Performing a lamp test will quickly isolate hardware problems from programming problems with any control-display module. See "Performing a lamp test" on page 60.

Table 43: Control-display module troubleshooting

Problem	Possible cause
The LEDs, buttons, and host option card are inoperative	• There is no power to the panel • The ribbon cable between the control-display module and the host option card is loose or defective • The control-display is defective • The host module is defective
The LEDs and buttons are inoperative but the host option card is working correctly	• The ribbon cable between the control-display and host option card is loose or defective • The control-display is not defined in the 3-SDU • The control-display is defective

Problem	Possible cause
The LEDs respond incorrectly	• The control-display is not defined in the 3-SDU • The control-display LED is not identified in the 3-SDU • A rule governing LED operation is not correctly written
A button does not perform the expected function	• The control-display is not defined in the 3-SDU • The button is not identified correctly in the 3-SDU • A rule governing button operation is not correctly written

3-ZAxx zoned amplifier modules troubleshooting

Table 44: 3-ZAxx Zoned Audio Amplifier module troubleshooting

Problem	Possible cause
The audio output level is too low	• A jumper is set for 25 VRMS but connection is to a 70 VRMS circuit • The gain is set too low • The auxiliary input level to the 3X-PMI is too low
There is no audio output or is extremely low	• An open fuse needs replaced (not field replaceable) • The gain is set too low • The prerecorded message/tone is too low • There is an incorrect channel activation
The audio output level is too high	• A jumper is set for 70 VRMS but connection is to a 25 VRMS circuit • The gain is set too high • The input level to the 3X-PMI is too high
The amplifier current is limiting	• The audio circuit overloaded • The input level to the 3X-PMI is too high
An incorrect amplifier version is reported by the CPU	• The jumpers are installed incorrectly • An incorrect model amplifier installed

3-OPS Off-Premises Signal module troubleshooting

Table 45: 3-OPS Off-Premises Signal module troubleshooting

Problem	Possible cause
The module is in trouble state	• The master box circuit is open or not reset • The reverse polarity circuit is open • A 3.6 kΩ EOL resistor is not installed on unused circuits
The remote receiver indicates a loop trouble and does not receive an alarm	• The circuit polarity is reversed • A circuit is open • There is excessive circuit resistance • A receiver is incompatible • The module is defective
The remote receiver does not indicate a loop trouble and does not receive an alarm	• The module is not defined in the 3-SDU • A receiver is incompatible • The module is defective

3-IDC8/4 Initiating Device Circuit module troubleshooting

Table 46: 3-IDC8/4 Initiating Device Circuit module troubleshooting

Problem	Possible cause
The module is in trouble state	• A 4.7 kΩ EOL resistor is not installed on unused IDC circuits • A 15 kΩ EOL resistor is not installed on unused NAC circuits • There is no communication with the CPU module • The module is not defined in the 3-SDU • The field wiring connector is not plugged into the module
NAC output is not working	• The jumpers are installed incorrectly • An external source is configured but not connected • The circuit is overloaded • The circuit is silenced • The circuit is shorted • A polarized device is defective or reversed on the circuit • Output was not programmed

Problem	Possible cause
The IDC circuit is not working	• There is an incompatible two-wire smoke detectors • There is excessive wiring resistance or capacitance • There is an open circuit on the line

3-LDSM Display Support module troubleshooting

Table 47: 3-LDSM Display Support module troubleshooting

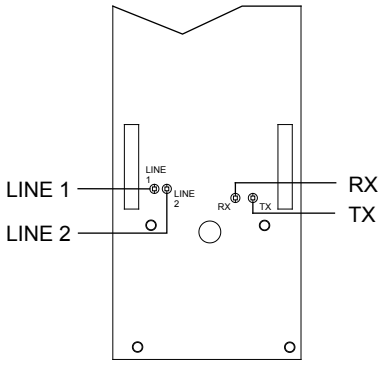
Problem	Possible cause
All control-display module LEDs and buttons are inoperative but the 3-LDSM is working correctly	• The ribbon cable between the control-display module and 3-LDSM is loose or defective • The 3-LDSM module is not defined in the 3-SDU • The control-display not defined in the 3-SDU • The control-display is defective

3-MODCOM Modem Communicator module troubleshooting

LED indicator diagnostics

LINE 1 and LINE 2 LEDs on the 3-MODCOM provide diagnostic information. See the tables below for a description of the LEDs and their dialing and data transmission states.

Figure 46: 3-MODCOM LED indicators



Label	Description
LINE 1	Indicates line 1 telephone activity
LINE 2	Indicates line 2 telephone activity

Label	Description
RX	Indicates receive activity
TX	Indicates transmit activity

Table 48: 3-MODCOM LINE 1 and LINE 2 LED states

LED state	LINE 1 description	LINE 2 description
Off	There is no activity	There is no activity
On	LINE 1 has been seized	LINE 2 has been seized
Slow flash	Dialer or modem data is being passed on LINE 1	Dialer data is being passed on LINE 2 (modem data is passed only on LINE 1)
Slow flash (both LEDs)	The application code or configuration code is downloading from the CPU or 3-SDU	
Fast flash	There is ringing on LINE 1 (flashing pattern detected)	N/A (LINE 2 does not have ring detection)

Audible diagnostics

Obtain an audio amplifier device locally for listening to the distinctive sounds associated with dialing, receiving handshakes, transmitting data, and receiving acknowledgements. Place a 0.1 µF, 200 V or greater capacitor in series with one of the leads. Alternately, you can use a lineman's handset in monitor mode.

During downloading from a remote computer, you will hear the distinct sound of modems establishing a connection, and then a series of rapid chirps as data is transmitted.

Note: Remove the audio amplifier when you finish troubleshooting.

Common problems

Evaluation of visual and audible indications will usually serve to isolate the source of trouble. Before replacing a 3-MODCOM, investigate the following common causes of a module problem.

- The module is not properly seated on the electronics chassis, or one or more connector pins are bent away from the associated connectors
- A modular telephone plug is not connected to the appropriate line 1 or line 2 jack, is not fully seated, or is not connected at the telephone block
- The module is configured with incorrect CMS telephone numbers
- The telephone line is faulty

If the module and telephone line are okay, check the CMS telephone number by dialing it using a standard telephone plugged directly into the RJ-31X jack. (The jack will accommodate a standard modular phone plug.) You should:

1. Hear a dial tone when going off-hook
2. Lose the dial tone after dialing the first digit

3. Hear the receiver ringing
4. Hear the CMS receiver go off-hook and send a handshake tone

Typical problems dialing the CMS involve missing or incorrect area codes, the need to dial 1 for long distance, or missing line access codes (for example, dialing 9 for an outside line).

If the receiver answers, check that it is sending out the correct handshake. For SIA P2 (3/1 pulse), SIA P3 (4/2 pulse), and SIA DCS the receiver should send a single tone of 0.5 to 1.0 seconds in duration. For Contact ID, the handshake signal consists of two short tones of different frequency. For TAP, there should be a modem-type exchange of handshake messages.

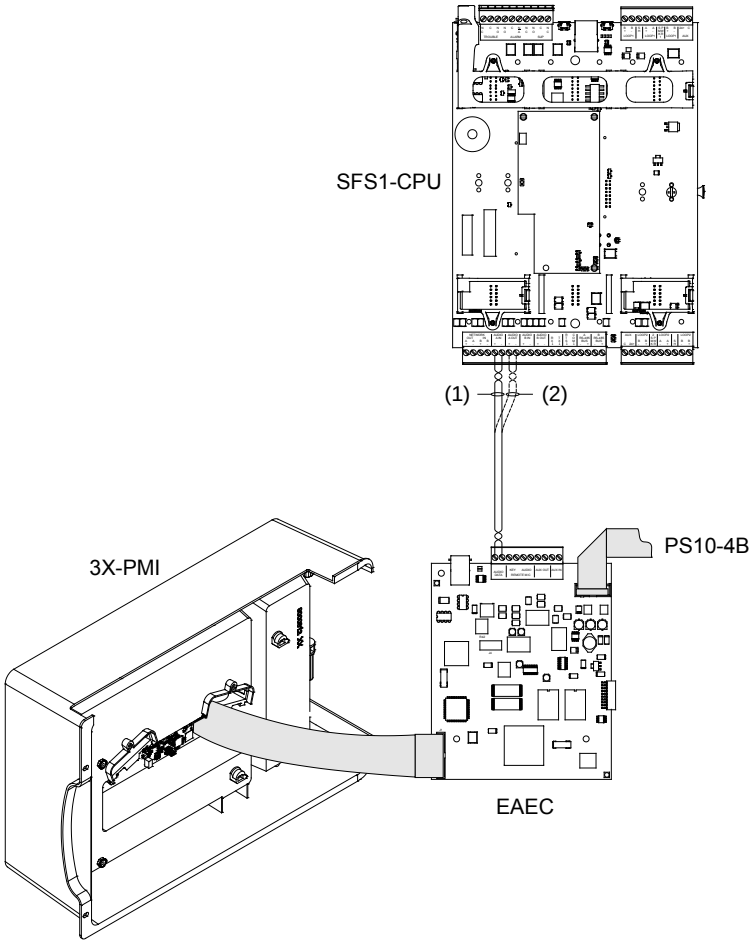
If the receiver sends the correct handshake and the 3-MODCOM transmits data but the receiver does not send an acknowledgement, check that the receiver is compatible with the desired protocol. (SIA DCS, P2, and P3 standards are available from the Security Industry Association). Typical problems involve an incompatible format or data message.

If the handshake and acknowledge signals are audible, check that the correct account number was configured in the 3-MODCOM and the code being sent was correctly programmed in the CMS computer.

Where a 3-MODCOM module is suspected of being faulty, try substituting a known good one that has been properly programmed.

3X-PMI Paging Microphone Interface troubleshooting

Figure 47: 3X-PMI interface, EAEC card, and SFS1-CPU



(1) Network option card installed
(2) Network option card not installed

Table 49: 3X-PMI Paging Microphone Interface troubleshooting

Problem	Possible cause
The interface does not respond nor is there RX or TX LED activity on the EAEC card	• The ribbon cable between the 3X-PMI audio interface card and EAEC card is loose or defective • The ribbon cable between the PS10-4B and EAEC card is missing • The 3X-PMI is not programmed

Problem	Possible cause
There is no All Call page audio output from the network amplifiers or the low level page output terminals	• The paging microphone is defective • The page inhibit timer setting in the 3-SDU is too long • The EAEC card is defective • The ribbon cable between 3X-PMI audio interface card and EAEC card is loose or defective • The amplifier is defective • Output modules connected to the amplifier are not activating through programming
There is no All Call page audio output from the network amplifiers but output is available at the low level page output terminals	• A short or open is detected on the digital audio data riser or there is incorrect wiring • A short or open is detected on the network data riser from incorrect wiring • The connection to TB5 on the CPU is loose or incorrectly wired • The 3X-PMI is incorrectly defined in the 3-SDU • The amplifiers are not properly installed or they are defective • Output modules connected to the amplifier are not activating through programming • The amplifier channel is incorrectly programmed
Page audio is distorted	• The operator is speaking too loud into the microphone • The amplifier gain is set too high
The auxiliary input volume level is too low	• The AUX input/output gain control on the EAEC needs adjusting • A short or open is detected on the AUX input wiring
The auxiliary input volume level is too high	• The AUX input/output gain control on the EAEC needs adjusting • The amplifier output gain is set too high
Recorded messages are not working properly	• The audio database was not correctly downloaded • An incorrect message label was referenced
Messages are going to wrong floors	• The amplifier and message labels, and rules are incorrect or mislabeled
The remote microphone is in trouble state	• There is a wrong or missing EOL resistor on the microphone key input • There is no supervisory tone on the DC current for the remote microphone audio output

Pseudo points

A pseudo point is an input or output point that is not a physical device. For example, ground fault and communication fault notifications. When a pseudo point event occurs, a message displays on the control panel LCD screen that shows the point address and label. You can find the pseudo point source and description by cross-referencing to the pseudo point Address column in the tables that follow.

Table 50: System pseudo points

Address	Label	Source	Description
0001	Startup Response	CPU	The system changes to the active state when the panel is energized or when an operator initiates a restart from the LCD command menu
0002	First Alarm Response	CPU	The system changes to the active state when the first point on a panel or any panel in the same network routing group changes to the alarm state
0003	First Supervisory Response	CPU	The system changes to the active state when the first point on a panel or any panel in the same network routing group changes to the supervisory state
0004	First Trouble Response	CPU	The system changes to the active state when the first point on a panel or any panel in the same network routing group changes to the trouble state
0005	First Monitor Response	CPU	The system changes to the active state when the first point on a panel or any panel in the same network routing group changes to the monitor state
0006	Evacuation Response	CPU	The system changes to the active state when an operator presses a switch that executes the Evacuation command
0007	Drill Response	CPU	The system changes to the active state when an operator presses a switch that executes the Drill command
0008	AllCall Response	CPU	The system changes to the active state when an operator presses the All Call or All Call Minus switch on the 3X-PMI
0009	Alarm Silence Response	CPU	The system changes to the active state when an operator presses a switch that executes the Alarm Silence command

Address	Label	Source	Description
0010	Two Stage Timer Expiration	CPU	The system changes to the active state when a panel's two-stage alarm timer expires
0012	Reset Phase 1	CPU	The system changes to the active state when the first phase of the 3-phase reset cycle starts
0013	Reset Phase 2	CPU	The system changes to the active state when the second phase of the 3-phase reset cycle starts
0014	Reset Phase 3	CPU	The system changes to the active state when the third phase of the 3-phase reset cycle starts
0015	First Disable Response	CPU	The system changes to the active state when the first point on a panel or any panel in the same network routing group changes to the disable state
0016	Fail Safe Event	CPU	The system changes to the active state when a device asserts the rail alarm-not line and the CPU module has not registered an alarm event
0017	Service Group Active	CPU	The system changes to the active state when an operator enables a Service Group from the LCD command menu
0018	Two Stage Timer Active	CPU	The system changes to the active state when a panel's two-stage alarm timer starts
0019	Loop Controller Reset Extension	CPU	The system changes to the active state when a loop controller stays in the reset mode longer than expected
0020	Service Device Supervision	CPU	The system changes to the active state when an operator cancels a Service Group test while a circuit under test remained active
0021	User Trouble	CPU	The system changes to the active state when an operator forces a trouble into the system (not implemented at this time)
0022	Ext Database Incompatibility	CPU	The system changes to the active state when a different database is in one or more network nodes
0023	Reboot Fault	CPU	The system changes to the active state when the CPU module is interrupted unexpectedly
0101-0164	Comm Fail xx	CPU	The system changes to the active state when the CPU is unable to communicate with the networked CPU module in cabinet xx
0200-0222	Task xx Watchdog Violation	CPU	The system changes to the active state when an EST3 task fails to execute properly

Address	Label	Source	Description
0261-0279	Configuration Mismatch Card xx	CPU	The system changes to the active state when the card in slot xx cannot perform the programmed advance feature (currently only when in degraded mode)
0281-0299	DB Out Of Sync with CPU Card xx	CPU	The system changes to the active state when the controller module in rail slot xx reports an actual and expected data mismatch
0300-0399	Task xx Watchdog Violation	CPU	The system changes to the active state when EST3X CPU task xx fails to execute properly

Table 51: Local alarm pseudo points

Address	Label	Source	Description
0676	Unprogrammed Device Data Card_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A device that is not defined in the 3-SDU database is in alarm or trouble state
0676	Unprogrammed Device	3-AADC1	A device that is not defined in 3-SDU database is in alarm or trouble state
0686	Unprogrammed Device Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A device that is not defined in 3-SDU database is in alarm or trouble state

Table 52: Local trouble pseudo points [1]

Address	Label	Source	Description
0001	Class A Fault SAC Device	3-SAC	There is a fault or break in the Class A loop on the annunciator bus
0002	Class A Fault Video Bus	3-SAC	There is a fault or break in the Class A loop on the video bus
0003	Annunciator Supervision	3-SAC	The control-display module is faulty or missing, or is not properly configured
0004	Rail Module Communications Fault	3-SAC	There is a local rail communication failure in the cabinet
0005	Video Communication Fault	3-SAC	There is a fault or break in the video signal lines
0006	RAM Fault or Stack Fault	3-SAC	There is a fault in the internal ANN bus processor
0007	Code Supervision	3-SAC	The executable program is corrupt
0008	Internal Fault	3-SAC	There is an ANN bus hardware failure
0009	Configuration Fault	3-SAC	N/A

Address	Label	Source	Description
0010	Database Supervision	3-SAC	The database is corrupt
0071	Task Failure	3-SAC	A SAC task fails to run
0600	Annunciator Supervision	General	The control-indicating module is faulty, missing, or not properly configured
0601	Class A Failure	CPU	There is a fault or break in the Class A network data riser connection
0601	Comm Fault	PS10-4B	A communication fault occurred between the CPU and the PS10-4B module
0601	Rail Module Communication Fault	General	There is a local rail communication failure in the cabinet
0602	Ground Fault Detection	CPU	There is a ground fault with a cabinet component or in field wiring
0603	Audio Supervision	CPU	A short or open is detected on the audio data loop
0604	Internal Fault	General	There is a CPU hardware failure
0604	RAM Fault or Stack Fault	3-AADC1	The RAM or stack (memory) failed its interval check
0605	Database Supervision	General	The database is corrupt
0605	DB Supervision Audio Default	3-ASU (EAEC)	• No message is present • There is a problem erasing flash • The message space fails internal checks
0606	Code Supervision	General	The executable program is corrupt
0607	Auxiliary Port One	CPU	A short or open is detected on the port 1 serial communication circuit
0607	Data Card Fault One	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The LIM card on the module is missing or loose
0607	Data Card Fault	3-AADC1	The LIM card on the module is missing or loose
0607	Bootloader Supervision	3-ASU (EAEC)	The bootloader code is corrupted
0608	Auxiliary Port Two	CPU	A short or open is detected on the port 2 serial communication circuit
0608	Data Card Fault Two	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The LIM card on the module is missing or loose

Address	Label	Source	Description
0608	Waiting for SDU Download	3-ASU (EAEC)	The database download from the SDU is in progress or incomplete
0609	Panel in Download Mode	CPU	The panel is out of service to accept download data
0609	Configuration Fault	General	• A module is in the wrong slot • An incorrect control-display is on the host module
0610	Network Audio Circuit A Fault	CPU	There is a loss of signal on the primary audio connection
0610	Rail Voltage Out of Spec	3X-NET RS-485	• The rail voltage is >30 VDC or <21 VDC • There is an excessive rail current load • The rail is faulty or misadjusted
0610	Telephone Line 1	3-MODCOM	A line-cut fault is detected on phone line 1
0611	Network Audio Circuit B Fault	CPU	There is a loss of signal on the secondary audio connection
0611	Telephone Line 2	3-MODCOM	A line-cut fault is detected on phone line 2
0612	Receiver Test Line 1	3-MODCOM	The line 1 test transmission to the CMS failed
0612	Unexpected Card	CPU	An undefined card is detected
0613	Bat Cut Off	3X-NET RS-485	The battery voltage is below 19.5 VDC when on standby battery
0613	Receiver Test Line 2	3-MODCOM	The line 2 test transmission to the CMS failed
0614	AC Brownout	3X-NET RS-485	AC line voltage is below 93 VAC at 50/60 Hz
0614	RS-232 Channel	3-MODCOM	There is a communication failure with the RS-232 card on the module
0615	Batt Trbl	3X-NET RS-485	• There is an open on the wiring • The battery voltage is below 20.4 VDC • The battery internal resistance is too high (load test failure)
0616	Network Class A Circuit A Failure	CPU	The CPU is unable to receive data on data riser circuit A
0617	Network Class A Circuit B Failure	CPU	The CPU is unable to receive data on data riser circuit B
0617	DSP Supervision	3-MODCOM	The DSP chip on the module failed

Address	Label	Source	Description
0617	Power Supply Fail	3X-NET RS-485	• The cables between the power supply and CPU are loose or missing • The power supply is defective
0619	Charger Over Current	3X-NET RS-485	• The cables between the power supply and CPU are loose or missing • The power supply or CPU is defective
0620	Battery Int Resistance	3X-NET RS-485	The battery is degraded
0620	Demux Audio Input	3-ZAxx	The digitized audio data is missing
0620	Waiting for SDU Download	3-MODCOM	A database download from the 3-SDU is in progress or incomplete
0621	NAC Pump Fault	3X-NET RS-485	• The charge pump for the NACs is in trouble state • The NAC charge pump voltage is below 30V, preventing the NACs from operating • The power supply is defective
0621	Amp Overcurrent	3-ZAxx	• A short is detected on the circuit • The speaker wattage tap setting exceeds the output rating of the amplifier • The 70 VRMS jumper setting is being used with 25 VRMS speakers
0622	Primary Audio Output DC	3-ZAxx	• There is an open DC NAC circuit, or a missing or wrong value EOL resistor • A short is detected on the a DC NAC circuit
0622	Rail Over Current	3X-NET RS-485	The power supply has detected an over current condition (> 10A)
0623	Battery Charger Fault	3X-NET RS-485	The charger may not be able to charge the batteries
0623	Primary Audio Output Analog	3-ZAxx	• There is an open audio NAC circuit, or a missing or wrong value EOL resistor • A short is detected on the audio NAC circuit • The output voltage jumper is set wrong
0624	Application Fault	3X-NET RS-485	The power supply detected a fault while testing its internal subsystems

Address	Label	Source	Description
0624	Backup Audio Output Analog	3-ZAxx	• There is an open audio NAC circuit, or a missing or wrong value EOL resistor • A short is detected on the audio NAC circuit • The output voltage jumper is incorrectly set
0625	Amplifier Daughter Board	3-ZAxx	The board is defective
0626	Thermistor Supervision	3X-NET RS-485	The thermistor is either missing or not functioning
0626	Fuse Supervision	3-ZAxx	There is an open fuse on the amplifier
0627	Measurement Fault	3X-NET RS-485	The A/D readings are not reliable
0627	PAL Supervision	3-ZAxx	The PAL chip on the amplifier is bad
0628	NAC Class A Mismatch	3X-NET RS-485	• The expected Class A configuration does not match actual hardware • The CLA-PS10 adapter may be missing
0640	Jumper Fault	3-OPS	The jumpers are incorrectly set
0641	AtoD Converter Failure	3-OPS	There is an internal module failure
0642	City Tie Open	3-OPS	N/A
0652	Input Supervision Trbls	3-ASU (EAEC)	The microphone or connections are defective
0653	Phone Page Time Out	3-ASU (EAEC)	The phone page switch activated for a period that exceeds the time limit set in the 3-SDU
0654	Audio Hardware Mismatch	3-ASU (EAEC)	There is a mismatch between the installed ACHS and the ACHS configured in the 3-SDU
0655	RAM Diagnostic Failure	3-ASU (EAEC)	There is a memory failure on the EAEC
0656	Audio Default Failure	3-ASU (EAEC)	• The memory card is missing • The audio database does not exist
0657	All Call Minus	3-ASU (EAEC)	The All Call Minus feature activated
0658	Audio Interface Failure	3-ASU (EAEC)	There is a 3X-PMI hardware fault
0659	Audio Class Supervision	3-ASU (EAEC)	A short or open is detected on a riser

Address	Label	Source	Description
0670	In Bootloader	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The PC is attempting a download
0670	In Bootloader	3-AADC1	The PC is attempting a download
0671	Line Opened or Shorted Data Card_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	• A short is detected on the loop • An open is detected on the Class A loop
0671	Line Opened or Shorted	3-AADC1	There is a wiring fault
0672	Map Fault Data Card1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	• A mismatch between the actual data and expected data is detected • The wiring is defective • The device is defective
0677	Grnd Fault Data Card_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A wiring fault is detected
0677	Grnd Fault	3-AADC1	A wiring fault is detected
0679	Smoke Power Current Limit Card_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A fault occurred on the smoke power circuit of 3-SDC card 1
0679	Smoke Power Current Limit	3-AADC1	N/A
0680	Unused Data Card_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	N/A
0680	Internal Failure	3-LDSM	N/A
0681	Invalid Response Instruction	CPU	• A programmed response has an invalid instruction • The database is possibly corrupt
0681	Line Opened or Shorted Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	• A short is detected on the loop • An open is detected on a Class A loop
0682	Main Board Internal Fault	CPU	The CPU on the EST3X control panel detected an internal fault on the main board

Address	Label	Source	Description
0682	Map Fault Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	• There is a mismatch between the actual data and expected data • The wiring is defective • The device is defective
0683	Main Board Comm Fault	CPU	The CPU daughter card communication with the CPU failed
0684	Network Compatibility Fault	CPU	The network option card is not compatible with the network configuration
0685	Aux Output Fault	CPU	The AUX board on the CPU main is faulty (i.e. shorted)
0686	Ethernet Card Configuration Fault	CPU	The expected Ethernet card type does not match the actual
0687	Ethernet Card Internal Fault	CPU	The Ethernet card detected an internal fault
0687	Ground Fault Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	• There is a wiring fault • The conductor connected to the data card has continuity to ground
0689	Smoke Power Current Limit Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A fault occurred on the smoke power circuit of 3-SDC card 2
0690	Unused Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	N/A
0691	Map Mismatch DataCard1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The Expected map on loop 1 does not map to the Actual
0692	Map Mismatch DataCard2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The Expected map on loop 2 does not map to the Actual
0693	Too Many Devices DataCard1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The number of sensors or modules attached to loop 1 exceeded the maximum allowed
0694	Too Many Devices DataCard2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The number of sensors or modules attached to loop 2 exceeded the maximum allowed

Address	Label	Source	Description
0695	Inhibit Normal Flash Bypassed Datacard1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	Inhibition of device LED flashing has been bypassed. Device LEDs will flash according to state Note: Applies to DH and DS nonmapping devices.
0696	Inhibit Normal Flash Bypassed Datacard2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	Inhibition of device LED flashing has been bypassed. Device LEDs will flash according to state Note: Applies to DH and DS nonmapping devices.

[1] For R-Series annunciator local trouble pseudo points, see Table 53 and Table 54.

Table 53: R-Series annunciator local trouble pseudo points

Address [1]	Label	Annunciator	Description
xx90	Annunciator Communications	RLCD, RLCD-C, RLED-C, RGCI	A communication fault occurred between the panel and an R-Series annunciator
xx91	Annunciator RAM Supervision	RLCD, RLCD-C, RLED-C, RGCI	An R-Series annunciator RAM fault was detected
xx92	Annunciator CH1 Communications	RLCD, RLCD-C, RLED-C, RGCI	N/A
xx93	Annunciator Configuration	RLCD, RLCD-C, RLED-C, RGCI	• The R-Series annunciator configuration does not match the actual hardware • The R-Series expander is not communicating with the R-Series annunciator
xx94	Annunciator Class A	RLCD, RLCD-C, RLED-C, RGCI	N/A
xx95	Ann Database Supervision	RLCD, RLCD-C, RLED-C, RGCI	The R-Series annunciator database is corrupt
xx96	Annunciator Code Supervision	RLCD, RLCD-C, RLED-C, RGCI	The R-Series annunciator database is corrupt

[1] Up to 30 annunciators can be configured per cabinet. The first two digits in the address column represent the annunciator number. See Table 54.

Table 54: Annunciator address set

Annunciator Number	Address set	Annunciator Number	Addresses set
1	0290-0296	16	4790-4796
2	0590-0596	17	5090-5096
3	0890-0896	18	5390-5396
4	1190-1196	19	5690-5696
5	1490-1496	20	5990-5996
6	1790-1796	21	6290-6296
7	2090-2096	22	6590-6596
8	2390-2396	23	6890-6896
9	2690-2696	24	7190-7196
10	2990-2996	25	7490-7496
11	3290-3296	26	7790-7796
12	3590-3596	27	8090-8096
13	3890-3896	28	8390-8396
14	4190-4196	29	8690-8696
15	4490-4496	30	8990-8996

Table 55: Local monitor pseudo points

Address	Label	Source	Description
0615	Incoming Ring	3-MODCOM	An incoming call was received
0622	Outgoing Call in Progress	3-MODCOM	The dialer is active
0629	Request Backup	3-ZAxx	N/A
0650	All Call Active	3-ASU (3X-PMI)	An operator pressed the All Call switch
0651	Mic Key Active	3-ASU (3X-PMI)	An operator pressed the push-to-talk button on the paging microphone
0673	Mapping In Progress DataCard_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	The loop controller is currently mapping the devices in the field
0674	Mapping Disbled Data Card_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	Mapping was manually disabled

Address	Label	Source	Description
0675	Dev. Maint Alert DataCard_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A detector on loop 1 is dirty
0675	Device Maint Alert	3-AADC1	N/A
0678	Reconstct Line DataCard_1	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	N/A
0678	Reconstct Line	3-AADC1	N/A
0683	Mapping In Progress Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	N/A
0684	Mapping Disbld Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	Mapping was manually disabled
0685	Dev. Maint Alert Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	A detector on loop 2 is dirty
0688	Reconstct Line Data Card_2	3-SSDC 3-SSDC1 3-SDDC 3-SDDC1	N/A

Table 56: Nonsupervised output pseudo points

Address	Label	Source	Description
0621	Manual Answer Control	3-MODCOM	The module answers incoming calls

Table 57: Local relay pseudo points

Address	Label	Source	Description
0002	Amplifier_Backup	3-ZAxx	The panel changes to the active state when the amplifier's input relay selects the backup amplifier input as its signal source
0003	Channel_1_Relay_ Confirmation	3-ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 1
0004	Channel_2_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 2

Address	Label	Source	Description
0005	Channel_3_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 3
0006	Channel_4_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 4
0007	Channel_5_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 5
0008	Channel_6_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 6
0009	Channel_7_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 7
0010	Channel_8_Relay_ Confirmation	ZAxx	The panel changes to the active state when the amplifier's input relay selects channel 8
0011	Page Select	ZAxx	The panel changes to the active state when the amplifier's input relay selects the Page channel

Table 58: Logic group pseudo points

Address	Label	Description
0024000x	Text_Group xx	The user-defined Instruction Text group has triggered an event (possible addresses are 00240001 to 00240999)
0025000x	Zone_Group xx	The user-defined Zone group has triggered an event (possible addresses are 00250001 to 00250999)
0026000x	Service_Group xx	The user-defined Instruction Service group has triggered an event (possible addresses are 00260001 to 00260255)
0027000x	AND_Group xx	The user-defined AND group has triggered an event (possible addresses are 00270001 to 00270999)
0028000x	Matrix_Group xx	The user-defined Matrix group has triggered an event (possible addresses are 00280001 to 00280255)
0031000x	Guard_Patrol_Group xx	The user-defined Guard Patrol group has triggered an event (possible addresses are 00310001 to 00310255)

Understanding Signature data loops

Operation

The advanced features of the Signature controller module perform a number of advanced operations. These operations are not always apparent from the control panel. Table 59 lists a number of Signature data loop conditions and describes the loop's operational responses.

Table 59: Signature data loop operation

When you:	Response
Remove a detector, and then reinstall the detector in the same base	• A system trouble displays on the LCD screen when the detector is removed. The message shows the detector's label or address. • The system restores when the detector is reinstalled.
Remove a module or pull station, and then reinstall the module/pull station in the same location	• A system trouble displays on the LCD screen when the module/pull station is removed. The message shows the device's label or address. • The system restores when the module/pull station is reinstalled.
Remove a detector, and then install a different detector of the same type in the same base	• A system trouble displays on the LCD screen when the detector is removed. The message shows the detector's label or address. • The Signature loop controller remaps the loop, replacing the serial number of the old detector with the serial number of the new detector, when mapping is enabled. All of the old detector's sensitivity and verification settings are transferred to the new detector. The system returns to normal when mapping is finished. • The communication fault for the old detector remains, when mapping is disabled.
Remove a module or pull station, and then reinstall a different module/pull station of the same type in the same location. **Note:** A SIGA-UM replacement module must have jumper JP1 set in the same position as the original module.	• A system trouble displays on the LCD screen when the module/pull station is removed. The message shows the device's station label or address. • The Signature loop controller remaps the loop, replacing the serial number of the old device with the serial number of the new device, when mapping is enabled. If the devices are modules (not pull stations), the old module's personality codes are transferred to the new module. The system returns to normal when mapping is finished. • The communication fault for the old detector remains, when mapping is disabled.

When you:	Response
Remove a detector, and then reinstall a different detector type in the same base.	• A system trouble displays on the LCD screen when the detector is removed. The message shows the detector's label or address. • The Signature loop controller remaps the loop, replacing the serial number of the old detector with the serial number of the new detector, when mapping is enabled. All of the old detector's sensitivity and verification settings are transferred to the new detector. The new detector will be operational but a system trouble displays, indicating a device type mismatch. To clear the trouble, the new detector type must be assigned to the base using the 3-SDU and the database downloaded to the panel. • The communication fault for the old detector remains, when mapping is disabled.
Remove a module or pull station, and then reinstall a different module/pull station type in the same location.	• A system trouble displays on the LCD screen when the module/pull station is removed. The message shows the device's station label or address. • The Signature loop controller remaps the loop, replacing the serial number of the old device with the serial number of the new device, when mapping is enabled. The new device is *not* operational. A system trouble displays, indicating a device type mismatch. To clear the trouble, the new device type must be defined using the 3-SDU and the database downloaded to the panel. • The communication fault for the old detector remains, when mapping is disabled. • If a single address module is replaced with a dual address module or vice versa, a map fault is generated by the address count mismatch.

Signature data loop troubleshooting basics

The 3-SDC1 loop controller card provides one Class B or Class A signaling line circuit that supports up to 125 detectors and 125 module addresses. The card also provides resettable 24 VDC for powering conventional two-wire smoke detector circuits on Signature Series modules. When a device is removed from the loop, the loop controller recognizes the change and the control panel processes the information.

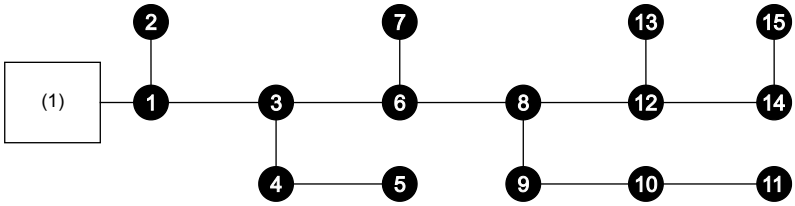
Isolating loop and device problems

The process of isolating a problem on a Signature data loop is similar to that used on a conventional fire alarm Initiating Device Circuit (IDC). An accurate and complete wiring diagram of the loop installation is the best troubleshooting aid

available. When the diagram is used in conjunction with the information provided by the control panel, you can easily isolate open conditions or defective devices. The loop shown in Figure 48 below will be used to illustrate basic troubleshooting techniques.

Note: When troubleshooting Class A loops, disconnect the loop from the return (loop A) terminals and temporarily jumper both loop A terminals to the respective loop B terminals. You can then troubleshoot the loop as a Class B loop.

Figure 48: Normal Signature data loop topology

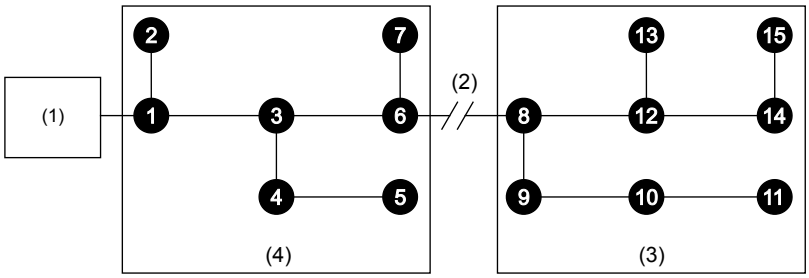


(1) Signature loop controller

Open circuit conditions

On a loop with an open fault, the Signature modules communicate with devices up to the break and the control panel LCD screen displays a trouble condition for all devices beyond the break. Figure 49 shows devices 1 through 7 continuing to operate and devices 8 through 15 reporting device troubles.

Figure 49: Open fault on the data loop



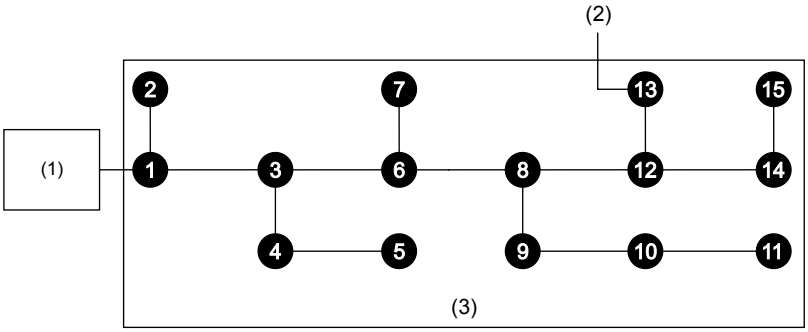
(1) Signature loop controller
(2) Break in the loop
(3) Devices in trouble
(4) Devices operating normally

In Figure 49, a wire break or intermittent connection between devices 6 and 8 is the most probable cause of the failure. Other possible causes include a device failure in devices 9 through 15, failure to define them in the loop controller's database, or failure to define them correctly in the 3-SDU.

Short circuit conditions

Short circuit conditions require selective isolation of portions of the loop to systematically narrow down the fault's location. A shorted circuit typically reports to the control panel a trouble condition on all devices, as shown in Figure 50.

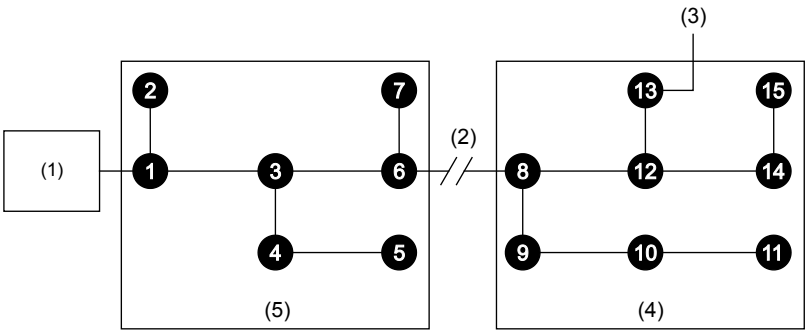
Figure 50: Wiring short on the data loop



(1) Signature loop controller
(2) Wiring short location
(3) Devices in trouble

To isolate the short, open the data loop at a point that will disconnect approximately 50% of the installed devices as shown in Figure 51.

Figure 51: Isolating a short on the data loop



(1) Signature loop controller
(2) Open in loop to isolate the short
(3) Wiring short location
(4) Devices remain in trouble
(5) Devices return to operation

After opening the loop, if some of the devices restore, the short is located on the portion of the loop that has been disconnected. If no devices restore, the short has been isolated to the first 50% of the loop.

Reconnect the previously isolated portion of the loop. If during the first isolation process some devices restored, open the loop at a location *electrically farther*

from the loop controller, and then repeat the analysis. If during the first process no devices restored, open the loop at a location *electrically closer* to the loop controller, and then repeat the analysis.

Continue increasing or decreasing the number of devices on the opened loop leg until you isolate the device or wire segment causing the problem.

Distinguishing short circuits from off-hook conditions in telephone risers

If local regulations require the ability to distinguish between a short circuit and an off-hook condition in a telephone riser, you must configure the circuit so that it functions as a four-state telephone. Compatible riser selector modules and telephone sets are listed below.

- SIGA-CC1 riser selector
- SIGA-CC1S riser selector
- SIGA-CC2 riser selector
- SIGA-MCCA riser selector
- SIGA-MCC1 riser selector
- SIGA-MCC1S riser selector
- Portable handset and receptacle (P/N 6830-3 and 6833-4) telephone module
- Remote telephone and wall box, Break Glass (P/N 6830-4 and 6831-1, or 6831-3) telephone module
- Remote telephone and wall box, Nonbreak Glass (P/N 6830-4 and 6831-2, or 6831-4) telephone module

Note: For instructions on configuring a four-state telephone, refer to the installation sheet supplied with the SIGA input or output module.

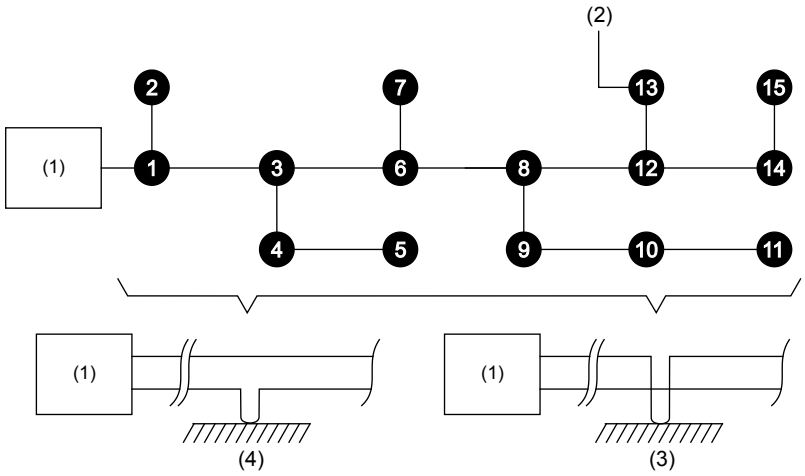
Ground fault conditions

Ground fault conditions require selective isolation of portions of the data loop to systematically narrow down the fault's location. A loop with a ground fault (approximately 10 kΩ or less to ground) causes the GND Fault LED on the control panel user interface to indicate. The conditions can occur on the Signature loop, the 24 VDC smoke power circuit, or the input circuits to 3-SDC1, 3-SSDC1, and 3-SDDC1 loop controllers. The general location of a ground fault can be determined by viewing a Trouble Report (see "Status reports" on page 51) or by indications and messages on the control panel user interface (see Table 60).

Table 60: Ground fault indications

Control panel user interface indications	Ground fault location
The GND Fault LED is on but no device trouble message shows on the LCD screen	• Loop controller circuit • 24 VDC smoke power circuit
The GND Fault LED is on and a device trouble message with the device address displays on the LCD screen	Positive leg of the input circuit for the device

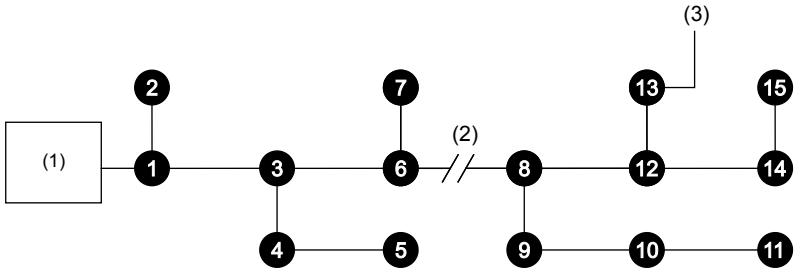
Figure 52: Data loop ground faults



(1) Signature loop controller
(2) Ground fault location
(3) Positive ground fault
(4) Negative ground fault

To isolate the ground fault, open the suspect loop (both conductors) at a point that will disconnect approximately 50% of the installed devices as shown in Figure 53. A similar technique is used on smoke power or module input circuits.

Figure 53: Data loop ground fault isolation



(1) Signature loop controller (ground fault LED Off)
(2) Both conductors open insolates the ground fault
(3) Ground fault

After opening the loop, if the GND Fault LED goes out, the ground fault is located on the portion of the loop that has been disconnected. If the LED remains on and no devices restore, the short has been isolated to the first 50% of the loop.

Reconnect the previously isolated portion of the loop, and then open the loop at a new point. If during the first isolation process the GND Fault LED went off, open the loop at a location *electrically farther* from the loop controller, and then repeat the analysis. If during the first process the GND Fault LED remained on, open the loop at a location *electrically closer* to the loop controller, and then repeat the analysis.

Continue increasing or decreasing the number of devices on the opened loop leg until you will isolate the device or wire segment causing the problem.

Notes

- The ground fault detection circuitry requires approximately 30 to 40 seconds response time when the fault is removed.
- The EST3X control panel performs a ground fault test for 2 seconds at 18-second intervals. If the system is working properly, the voltage between earth ground and logic negative should be between 12.3 VDC and 16.8 VDC during the 2-second test. The system reports a ground fault when the voltages are less than 12.3 VDC and more than 16.8 VDC. In a non-faulted system, the voltage outside the 2-second test period may float randomly. If the system is faulted, then the voltage is likely to be a fixed value such as 3 or 19 VDC.

Substituting Signature Series devices

When substituting a *known good* detector or module in place of a suspect device, the following scenarios can take place.

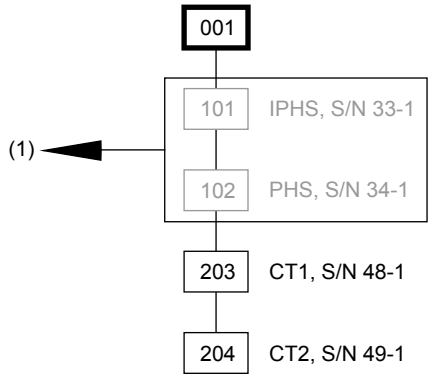
1. If the substituted device is the same model as the suspect device, the system accepts it with no further operator action. When the substituted device is installed, the system goes into trouble. When the quantity of devices defined on the loop is reached, the system automatically remaps the loop, stores the revised information, and returns to normal. This process may take a few minutes.
2. If the substituted device is a different model than the suspect device, when the device count is correct, the Signature controller module automatically remaps the loop. A trouble occurs at the address of the suspect device as the result of a map fault because the known good device’s parameters differ from those of the removed suspect device. You must accept the parameters of the known good device to remove the fault. These can be changed later.

3. If the substituted device is a nonmapping DH or DS detector, the system automatically disables the mapping feature. As a result, a Map Fault and Mapping Disabled monitor event is generated. You must remove the detector and restart the panel to restore mapping operations.

Detectors

When one or more devices are removed from a Signature loop for servicing, as shown in Figure 54, the control panel LCD screen displays a trouble condition for each device. If the control panel is connected to the computer running the 3-SDU, the Current Status tab on the Signature Series Status / Diagnostics window indicates a trouble condition. If the detector is removed from an isolator base, the isolator will transfer.

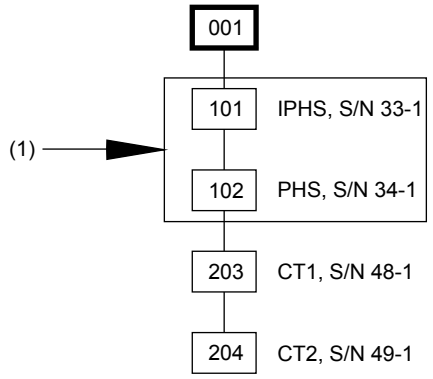
Figure 54: Detectors removed for service



(1) Removed detectors

If the devices are returned to their original locations, as shown in Figure 55, the map supervision function recognizes the detectors have been returned as originally installed and mapped, and no additional action is taken.

Figure 55: Detectors returned to original location

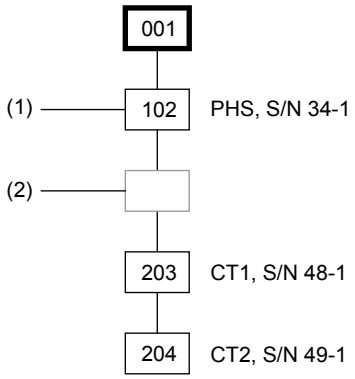


(1) Detectors returned

If the devices are returned to different locations, the map supervision function recognizes that previously mapped serial numbers occupy new map locations. When the mapping supervision function recognizes the need to remap the loop, the panel is put in the map pending state. In the map pending state, the panel automatically remaps the loop when the quantity of reinstalled devices is equal to or greater than the quantity of devices defined in the original map. If the control panel is connected to the computer running the 3-SDU, the Current Status tab on the Signature Series Status / Diagnostics window indicates *Mapping Pending*.

In Figure 56, the PHS, S/N 34-1 detector originally installed at address 102 has been installed in the location originally occupied by the IPHS, S/N 33-1 detector.

Figure 56: One detector returned to a new location on the loop



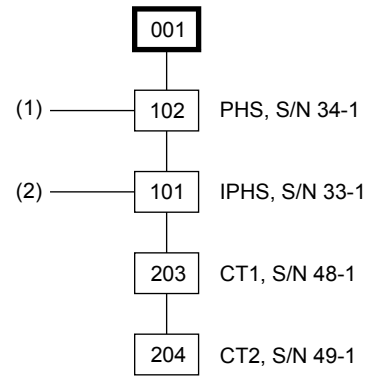
(1) PHS, S/N 34-1 detector installed in a new location
(2) IPHS, S/N 33-1 detector not installed

Until all devices are returned on the loop and the loop automatically remaps, the original S/N-to-panel address correlation is still valid. Figure 56, shows that the device address moves with the detector until the loop is remapped. In this example, relocating the PHS detector temporarily relocated address 102. Until all devices are returned and the loop remapped, testing a relocated detector will cause the panel to respond as though the detector was still installed in its original location.

During mapping, all devices remain operational and are capable of initiating an alarm. Figure 57 on page 207 shows that both the IPHS and the PHS detectors retain their old S/N-to-panel address correlations while the loop is mapping. Mapping activity is indicated on the control panel LCD screen. If the control panel is connected to the computer running the 3-SDU, the Current Status table on the Signature Series Status / Diagnostics window indicates *Mapping in Progress*.

Once mapped, the mapping supervision function automatically correlates a panel address to a specific map location until manually changed using the SDU configuration utility.

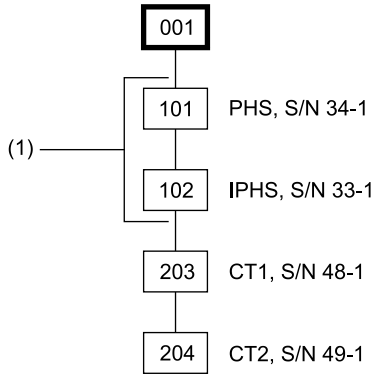
Figure 57: Both detectors returned to new locations



(1) PHS, S/N 34-1 detector returned to service in new location before remapping
(2) IPHS, S/N 33-1 detector returned to service in new location before remapping

Figure 58 shows the map after remapping. Note that the new S/N-to-panel address correlations have been made. The IPHS detector is now correlated with address 102 and the PHS detector is correlated with address 101. The relocated devices will now respond as programmed for the original address location.

Figure 58: Both detectors remapped



(1) Remapped detectors PHS, S/N 34-1 and IPHS, S/N 33-1

When a factory-new detector replaces an in-service detector, the new detector is operational with a default address of 00 until it is mapped. When the loop is remapped, the new detector is given the address assigned to its map location. If a factory-new detector is added over and above the expected number of devices on the loop, it is operational with a default address of 00. However, the panel reports a trouble because the *actual map* contains one more device than the *expected map*.

Modules

When a module is replaced with another module of the same type, automatic remapping assigns the replacement module the personality code of the module originally installed at that map location.

If a module is replaced with a module of a different type one of three things can happen.

1. If a single address module, such as the SIGA-CT1 or SIGA-CC1, is replaced with a different type of single input module, the loop remaps all devices. However, the new module type will not operate because of incompatible personality codes. A map fault generates because the actual device differs from the expected device. The new device type must be defined in the 3-SDU and the database downloaded into the panel. The map fault will then clear.
2. If a single address module is replaced with a dual address module, the panel unsuccessfully attempts to remap all devices. A map fault generates because the actual device differs from the expected device, and the dual address module does not operate. To clear the map fault, define the new module using the 3-SDU, and then download the database into the panel.
3. If a dual address module is replaced with a single address module, the panel never automatically attempts to remap all devices because the panel does not see enough devices (one address less) on the loop. A manual remap will also be unsuccessful. A map trouble shows on the control panel LCD screen as the panel remains in map pending mode. To clear the trouble, define the new module using the 3-SDU, and then download the database into the panel.

Notes

- Do not replace factory-programmed devices such as pull stations and MM1 modules with a SIGA-CT1.
- For mapping purposes, give all manual pull stations the device type *Pull,* regardless of their model numbers.

Device type replacement

If a different Signature device model is substituted for a suspect device, when the device count is correct the Signature controller module automatically remaps the loop. A trouble occurs at the address of the suspect device as the result of a map fault, because the known good device’s parameters differ from those of the suspect device that was removed from the loop. To clear the map fault, accept the parameters of the known good device. You can change the parameters later.

Note: Signature Series devices require a solid connection at their terminals. If a wire can wiggle, it will be subject to contact resistance variations due to temperature changes. A loose wire can result in an intermittent connection, which will affect communication between the Signature devices and the control module. Using a proper size screwdriver, securely tighten all wiring connections.

Substituting Signature loop controller modules

When substituting a known good Signature Series loop controller module in place of a suspect module, it must be defined in the 3-SDU and the database downloaded into the panel. See “Downloading a database” on page 67.

The Signature loop controller module has two separate memories.

1. The first memory stores the firmware code that makes the module operate. If there is a problem with the firmware, or if an upgrade has been issued, download the new firmware into the module from the 3-SDU. When upgrading the firmware, do not download the bootstrap data unless specifically instructed to do so.
2. The second memory stores the Signature loop controller configuration settings that were compiled in the 3-SDU. If you suspect that the module itself is bad, download the loop configuration settings for the loop to which the substitute module is connected.

Substituting Signature Series devices on a nonmapping loop

When nonmapping DH and DS detectors are configured on a Signature loop, mapping is disabled for the loop. When substituting a known good detector or module in place of a suspect device, one of the following scenarios can take place.

1. If the substituted device is the same model as the suspect device and preprogrammed with the same device address, the system accepts it with no further action. When the substituted device is installed, the system goes into trouble. When the quantity of devices defined on the loop is reached, the system stores the revised information, updates the device’s personality code and other parameters, and returns to normal. This process may take a few minutes.
2. If the substituted device is a different model than the suspect device but is preprogrammed with the same device address, the system accepts it but generates a device fault indicating the difference in models. The details of the trouble indicate a “bad type fault”. To remove the fault, you must accept the

model of the known good device using the 3-SDU or replace the substituted device with a model that matches the suspect device.

3. If the substituted device is preprogrammed with a different device address, a trouble occurs at the address of the suspect device because it was removed. The system may also generate a device trouble if the substituted device address matches another device already configured on the loop or it may generate an “unprogrammed device” trouble. You must remove the substituted device, and then use the SIGA-PRO tool or the 3-SDU to reprogram its address to remove the fault.

Signature loop controller troubleshooting

Table 61 provides a list of possible problems that may be detected by the loop controller module. For information on identifying and locating Signature data loop problems, refer to “Using the SDU Signature Series diagnostics tool” on page 213.

Table 61: Signature Series loop controller troubleshooting

Problem	Possible cause
An open is detected on the loop	• The loop is incorrectly wired or a connector is loose • A detector or isolator base is defective • A conductor is broken • A device is not installed on the loop • A device is not defined in the 3-SDU
A short is detected on the loop	• The loop is incorrectly wired (often crossed wires on a device base) • A detector, detector base, or module is defective • The insulation between conductors is nicked
A ground fault is detected on the loop	• There is a pinched wire between the device and electrical box • The wire insulation is nicked

Problem	Possible cause
An internal trouble is detected on the loop	• A detector is defective or dirty • A CO module is defective or not seated correctly • A photo or heat sensor is reading too high or too low • A light source is affecting a detector • There is a short between a detector and detector base • An isolator or relay base is defective • Devices are drawing too much or too little current during mapping
A maintenance alert is detected on the loop	A detector is nearing end of life
The system reports an “End of life ACT” event	A CO module needs replacement

Mapping errors

Table 62 lists basic mapping errors. For detailed information on identifying and locating mapping errors, refer to “Using the SDU Signature Series diagnostics tool” on page 213.

Notes

- Do not replace factory-programmed devices such as pull stations and MM1 modules with a SIGA-CT1.
- For mapping purposes, give all manual pull stations the device type *Pull,* regardless of their model numbers.

Table 62: Signature Series loop controller mapping errors

Problem	Possible causes
A mapping error is detected on the loop	• There is a discrepancy between the expected map and the devices installed on the loop (serial number, personality code, or device type) • A device ID was incorrectly entered in the 3-SDU • There are more than 124 T-taps on the loop • There is excessive loop resistance • There is excessive loop capacitance • Devices on the loop are drawing too much current during mapping • Devices on the loop are not drawing enough current during mapping
The system continues to remap the data loop	• An intermittent connection is causing one or more devices to lose then reestablish communication with the loop controller • There is a defective device or detector base
A device type error is detected on the loop	There is a discrepancy between the device type recorded on the internal map and the device installed on the loop

Signature device troubleshooting

Module LED indicators

Each Signature Series module has a red and green status LED. These LEDs are useful when trying to determine the communication and alarm or active status of Signature devices.

Table 63: Signature Series module status LEDs

LED status	Device status
Green flashing	Normal communication
Red flashing	Alarm or active (either input of dual input modules)
Red and green steady	Stand-alone alarm or active (either input of dual input modules)

Common causes of Signature Series module and device problems

Common causes for Signature Series modules and devices not responding correctly or reporting trouble events are listed below.

- The module/device is installed in the wrong location or is not addressed correctly
- The module/device is not defined in the 3-SDU database
- An incorrect personality code was programmed into the module
- The jumper is in the wrong position
- 24 VDC for smoke power is low or missing
- Inputs 1 and 2 were switched
- There is a ground fault
- There is incorrect wiring
- There are mapping errors
- A short or open is detected on the output circuit
- The polarized device is installed in reverse
- There is an incorrect or missing EOL resistor
- The module/device is defective

Refer to “Using the SDU Signature Series diagnostics tool” for details on how to identify and locate Signature module and device problems.

Using the SDU Signature Series diagnostics tools

The System Definition Utility contains a Signature Series diagnostics tool that is used to aid in isolating and correcting faults with the Signature data loop detectors and modules.

Notes

- Try troubleshooting techniques described in “Understanding Signature data loops” on page 198 *before* using the 3-SDU tool.
- Press F1 when using the 3-SDU, to open the Help topic for the page that you are currently viewing.

To access the Signature Series Status / Diagnostics tool:

1. Connect the computer running the 3-SDU application to the panel that has the Signature loop controller that is in trouble.
2. Configure the Remote Read Lock setting, if using an Ethernet connection (see “Using a TCP/IP connection to read from the panel” on page 70).

3. Open the 3-SDU project, click Tools on the menu bar, select Signature Series, and then click Status / Diagnostics.
4. From the Signature Series Status / Diagnostics window, set the communication criteria.

   If using an RS-232 connection, the suggested baud rate is 19200.
5. From the Cabinet list, select the appropriate cabinet.
6. From the Loop Controller list, select the appropriate loop controller module.
7. From the Delay list, set the interval at which diagnostic updates will be received.
8. Click Connect.
9. Click each tab to view the diagnostic results.

Signature Series loop diagnostics sequence

Table 64 lists the suggested SDU diagnostics sequence for isolating problems on a Signature data loop and with individual devices.

Table 64: Suggested Signature Series loop diagnostics sequence

For data loop faults, go to:	For device faults, go to:
1. Mapping Errors tab	1. Device Troubles tab
2. Device Chains tab	2. Trouble Tables tab
3. Message Counters tab	

Mapping errors diagnostics

Mapping errors prevent the system from successfully generating a Signature data loop map.

Click the Mapping Errors tab to view information as to why the Signature loop controller module failed to successfully map the devices on the signaling line circuit. Press F1 to open the Help topic, which provides instructions, descriptions, and troubleshooting tips for the information provided. Refer to Table 65 for suggested corrective actions.

Table 65: Signature Series mapping errors diagnostics

Problem	Suggested corrective action
The mapping command failed either because the sensor did not draw current or it was not possible to obtain stable mapping data from the signaling line circuit	• Verify that wiring is correct • Verify that devices are operational • Review the Chain Response and Device Response lists on the Device Chains tab to identify the failed devices • Check for loose wiring connections at the devices or T-taps • Check for faulty device(s)
While mapping a chain from a device back to the Signature loop controller, the chain was built with holes in it	• Review the Chain Response and Device Response lists on the Device Chains tab to identify the failed devices • Compare the serial numbers in the Chain Response and Device Response lists on the Device Chains tab with the actual wiring to identify a conflict
Map tables are inconsistent	• Upload the current map • Compare the current map with the expected map • Write the map back to the loop controller • Ensure loop wiring is correct
The actual Signature data loop map does not match the expected map	• Compare the current map with the expected map • Write the map back to the loop controller • Ensure loop wiring is correct
Device address assignment failed	Review the serial number or address; if missing, replace the device
The map in use has invalid data (map supervision failure)	Wait for automatic map reconstruction to complete before continuing
Mapping supervision detected a change on the loop (a map rebuild was scheduled)	Wait for automatic map reconstruction to complete before continuing
Mapping supervision detected the device address or short address of the device being supervised changed (a map rebuild was scheduled)	Wait for automatic map reconstruction to complete before continuing
The mapping command failed because the sensor did not draw current, or it was not possible to obtain stable mapping data from the loop (a map rebuild was scheduled)	• Wait for automatic map reconstruction to complete before continuing • Check for loose wiring • Check for a defective device

Problem	Suggested corrective action
Mapping was aborted by an external event, such as a new start on a device (a map rebuild was scheduled)	Wait for automatic map reconstruction to complete before continuing
Mapping supervision detected that the supervised device's type changed (a map fault was flagged)	• Replace the device • Correct the loop controller programming
Mapping aborted because a short or open was detected on the loop wiring	• Check for an open or short on a Class A loop • Check for a short across the entire Class B loop • A reset may restart mapping
Panel startup is not able to recreate the current map	Wait for the automatic map reconstruction to complete before continuing
Assigning a short address to a device failed, possibly causing duplicate short addresses and mapping failures	• Review the Chain Response and Device Response lists on the Device Chains tab to identify the failed device • Replace the device • Check for a wiring fault
Mapping is disabled	Enable mapping
While mapping a chain from a device back to the loop controller, the chain appears to have two devices at the same location	• Check for faulty wiring or a faulty device on the loop • Review the Chain Response and Device Response lists on the Device Chains tab to identify the conflict
More than 125 end-of-line devices are detected on the loop	• Correct the wiring • Remap the loop • Reduce the number of T-taps
While mapping a chain from a device back to the Signature loop controller, a device displays past the end of the chain	• Review the Device Chains list to identify the device • Compare the serial numbers or addresses with the actual wiring to identify the problem
Mapping detected a difference between the device at the end-of-line and the devices in its chain	• Review the Device Chains lists to identify the conflict • Compare the serial numbers or addresses with the actual wiring to identify the conflict

Device chain diagnostics

A chain is a list of devices connected between the Signature loop controller module and a device being interrogated during loop mapping. The chains and

subchains created during the mapping process create a loop map. If a loop fails to map properly, investigate the devices making up chains and subchains to find the reason. Click the Device Chains tab to display a chain generated during the failed mapping process. Press F1 to open the Help topic that provides instructions and descriptions for the information provided.

Examine the chain and look for gaps within the address or serial number lists in a chain or subchain.

- Gaps in the list indicate areas that were not successfully mapped. A gap within the chain does not mean that the missing device has a problem; it means that the device was not successfully mapped.
- Compare the Chain Response and Device Response lists. All the devices on the Device Response list should also appear on the Chain Response list.
- Look for duplicate addresses or serial numbers on the same list.

Failure of a device to successfully map may be the result of a problem with another device, or wiring in a chain or subchain not directly connected to the unmapped device. Although the missing or duplicate devices are not always the cause of map failure, these devices should be examined for defects and wiring errors, and for duplicate entries in the 3-SDU.

Message counters diagnostics

During normal operation, the Signature loop controller module issues communication messages to the Signature devices on its loop. Message counters indicate how many times a communication message has been issued and the number of successful return messages. During normal operation, the percentage of messages received correctly should exceed 99%. Intermittent device or wiring problems are indicated by a low successful message rate.

Click the Message Counters tab to check the loop controller’s message error rate. Press F1 to open the Help topic that provides instructions and descriptions for the information provided.

Preventive measures can be taken by establishing a baseline of successful messages over a period time for each loop. From the base line information, any changes from the norm can be quickly identified and corrected before a communication problem develops.

Device troubles diagnostics

Each Signature device is equipped with a 32-bit trouble register. Should a device’s trouble bit be set at any time in the device’s history, the device and the

nature of the trouble will appear in the Latching Troubles By Device Address window on the Signature Series Status / Diagnostics, Device Troubles tab.

While on the Device Troubles tab, press F1 to open its Help topic, which provides instructions and descriptions for the information provided.

Refer to Table 66 and Table 67 for a list of device trouble messages and their possible causes, and possible solutions.

Table 66: Signature Series device trouble messages

Device Trouble tab message	Possible cause	Possible solution
External device line short	The detector is defective	Replace the detector.
External device line open	The detector is defective	Replace the detector.
Error XMIT light	The detector is dirty	Clean the detector.
Device switched to short after isolator relay operated	A short is detected on the loop.	Locate and remove the cause of the short.
ESK value too low	• The detector is dirty. • The ion chamber is bad.	• Clean the detector. • Replace the detector.
ESK slope too high	• The detector is dirty. • The ion chamber is bad.	• Clean the detector. • Replace the detector.
ESK slope too low	• The detector is dirty. • The ion chamber is bad.	• Clean the detector. • Replace the detector.
Quiescent too large	Devices on the loop are drawing too much current during the mapping process.	Place a temporary short across the data loop (approximately 5 seconds).
Quiescent too small	Devices on the loop are not drawing enough current during the mapping process.	• Check for defective wiring. • Replace the device.
Short on relay base	The relay base is bad.	Replace the relay base.
External or isolator relay failure to switch	The base is bad.	Replace the base.
External or isolator relay switched	• The relay base is bad. • External electrical noise is present.	• Replace the relay base. • Remove or shield the noise source.
“O” value too small	The base is bad.	Replace the base.
Ion rate-of-rise too high	The ion chamber is bad.	Replace the detector.
Ion quiescent too high	The detector is dirty.	Clean the detector.
Ion quiescent too low	The detector is dirty.	Clean the detector.
Ion value too low	The detector is defective.	Replace the detector.
Thermal value too high	The base is bad.	Replace the base.

Device Trouble tab message	Possible cause	Possible solution
Thermal value too low	The base is bad.	Replace the base.
A/D converter fault	The A/D converter is defective.	Replace the detector.
EEPROM checksum error	The EEPROM is bad.	Replace the detector.
EEPROM write time out	The EEPROM is bad.	Replace the detector.
Unknown device type	The EEPROM is bad.	Replace the detector.
EEPROM write verify fault	The EEPROM is bad.	Replace the detector.
Ambient light too high	• The detector is dirty. • Outside light is reaching the detector chamber.	• Clean the detector. • Eliminate light source.
Photo quiescent too high	The detector is dirty.	Clean the detector.
Photo quiescent too low	The detector is dirty.	Clean the detector.
Photo value too high	The base is bad.	Replace the base.
Max. quiescent value threshold optical sensor exceed – dirtied	The detector is dirty.	Clean the detector.
Min. quiescent value threshold optical sensor exceed – dirtied	The photo sensor reading is too low.	From the control panel, reset the panel. If the trouble recurs after 68 minutes, replace the detector.
Filtered optical test too big	• The detector is dirty. • A light source noise is affecting the detector.	• Clean the detector. • Eliminate the light source noise or move the detector.
Filtered optical test is too small	The photo sensor reading is too low.	From the control panel, reset the panel. If the trouble recurs after 2 seconds, replace the detector.
Filtered thermal too big	The thermistor is bad, causing a high heat sensor reading. (**Note:** A heat alarm occurs prior to the trouble.)	Replace the detector.
Filtered thermal too small	The thermistor is bad, causing a low heat sensor reading.	Replace the detector.
CO communication trouble UART	There is no communication between the SIGA2 detector and CO sensor.	Open the SIGA2 detector and make sure the CO module is properly seated.
CO sensor failure	The SIGA2 detector CO module failed supervision.	From the control panel, reset the panel. If the trouble recurs after 44 seconds replace the detector.
CO end of life	The SIGA2 detector CO module has reached its end of life.	Replace the module.

Device Trouble tab message	Possible cause	Possible solution
CO checksum failure	The SIGA2 detector CO module is not calibrated.	Replace the CO module.
Static value for vector measurement too big	Devices on the loop are drawing too much current during the mapping process.	Place a temporary short across the data loop (approximately 5 seconds).
Static value for vector measurement too small	Devices on the loop are not drawing enough current during mapping.	• Replace the detector base. • Check for defective wiring.
Short circuit on relay base	There is a short between the detector and detector base. (**Note:** The detector will report that it has a standard base, regardless of the real base type.)	Remove the short.
Device has switched to a short circuit while closing the isolator relay	There is a short on the loop. (**Note:** This only applies to detectors with an isolator base.)	Remove the short on the loop.
External or isolator relay does not switch	The base cannot change its state.	Isolator base: • Remove the detector from the base for 60 seconds, and then put it back on the base. If the trouble returns or there is no power to the next base, replace the faulty base. Relay base: • Remove the detector from the base for 60 seconds, and then put it back on the base. If the trouble returns, replace the faulty base. • Smoke the detector while it is on the base. If after the alarm the trouble returns, replace the base.
Error with EEPROM ID, EEPROM not initialized	• The flash memory is corrupted. • The EEPROM is empty (the devices are not identified).	Replace the detector.
In EEPROM data, non-existent device type	The detector is not a Signature detector.	Replace the detector.
Double failure by EEPROM Write Verify	The detector cannot write to the flash memory.	Replace the detector.

Table 67: Signature Series module trouble messages

Device Trouble message	Possible cause	Possible solution
Relay switched	The relay toggled from the actual state	• Manually reset the relay • Replace the module
Vector current too large	Devices on the loop are drawing too much current during the mapping procedure	Place a temporary short across the data loop (approximately 5 seconds)
Vector current too small	Devices on the loop are not drawing enough current during the mapping procedure	• Reduce the loop resistance • Replace the base • Check for defective wiring
EEPROM not initialized	The EEPROM is not properly programmed	Replace the module
EEPROM write time out	The EEPROM is bad	Replace the module
A/D time out	The A/D converter is defective	Replace the module
EEPROM write verify fault	The EEPROM is defective	Replace the module
Line monitor trouble	The loop voltage is low	Check the loop
Class A trouble	A short or open is detected on the input or output circuit	Check input/output loop wiring
RAM not programmed	The RAM is bad	Replace the module

Trouble Tables diagnostics

Trouble Tables display multiple categories of active device troubles. The active troubles should be compared with a device's trouble history (Device Trouble tab) to determine any possible trouble pattern.

Click the Trouble Tables tab to resolve device troubles. Press F1 to open the Trouble Tables Help topic that provides instructions and descriptions for the information provided.

Refer to Table 66 and Table 67 for a list of trouble messages, their possible causes and possible solutions.

Signature Series real-time statuses

The Signature Series status function is used to determine the real-time status of a Signature data loop. This function is useful in isolating and correcting faults on the loop.

Click the Current Status tab to display real-time data. Press F1 to open the Current Status Help topic, which provides instructions and descriptions for the information provided.

Displaying a status log of current events

Click the Status Log tab to show a real-time list of events that have occurred since the system last established a connection to the loop controller. Press F1 to open the Status Log Help topic.

Displaying an in-progress chart

Click the Mapping Progress tab to show a real-time graph of the loop controller's progress through its initialization process. Press F1 to open the Mapping Progress Help topic, which provides instructions and descriptions for the information provided.

Analog addressable devices and modules

Substituting analog addressable driver controller modules

When substituting a known good 3-AADC1 controller module in place of a suspect module, it must be defined in the 3-SDU and the database downloaded into the panel. See “Downloading a database” on page 67.

The 3-AADC1 controller module actually has two separate memories: one for firmware and one for configuration information.

1. The first memory stores the firmware code that makes the module operate. If there is a problem with the firmware, or if an upgrade has been issued, download the new firmware into the module from the 3-SDU. When upgrading the module firmware, you do not need to download the bootstrap data unless specifically instructed to do so.
2. The second memory stores the controller’s configuration settings that were compiled in the 3-SDU. If you suspect that the module is bad, download the configuration information for the loop to which the substitute module will be connected.

Table 68 provides a list of possible problems that may occur with the 3-AADC1 loop controller. For detailed information on identifying and locating mapping errors, refer to “Using the SDU Analog Addressable diagnostic tool” on page 226.

Table 68: 3-AADC1 analog loop controller module troubleshooting

Problem	Possible cause
An open is detected on the analog loop	• The loop is incorrectly wired or a connector is loose • A detector or isolator base is defective • A conductor is broken • A device is not installed on the loop • A device is not entered into 3-SDU database
A short is detected on the analog loop	• The loop is incorrectly wired • A detector, detector base, or module is defective • The insulation is nicked between conductors
A ground fault is detected on the analog loop	• There is a pinched wire between a device and electrical box • The wire insulation is nicked

Analog addressable detector

Table 69 provides a list of possible problems that may occur with an analog addressable detector. For detailed information on identifying and locating faults, refer to “Using the SDU Analog Addressable diagnostic tool” on page 226.

Table 69: Analog addressable detector troubleshooting

Symptom	Possible causes
The detector is not responding correctly	• The detector is installed in the wrong location or improperly addressed • The detector is not defined in the 3-SDU • There is an incorrect device response in database
The detector displays a trouble on the LCD screen	• The detector is missing or incorrectly wired on the loop • The detector information was not downloaded into 3-AADC1 module database (ID error) • There is a ground fault on the loop • There is an internal detector fault
The detector displays incorrectly as an alarm on the LCD screen	• The detector is extremely dirty • If an ionization detector, it is installed in an area of extremely high airflow • The detector is installed in area of high ambient smoke • The detector is defective

Analog device troubleshooting

Module LED indicators

Each analog addressable module has an integral red status LED. The LED is useful when trying to determine the communication and alarm or active status of a device. See Table 70.

Table 70: Analog addressable device status LED

LED status	Device status
Flashing	Polling device
Steady	Alarm or active

Common causes of analog addressable module problems

Common causes for analog addressable modules not responding correctly or reporting trouble events are listed below.

- A module/device is installed in the wrong location or is not addressed correctly
- A module/device is not defined in the 3-SDU database
- A module/device is missing or incorrectly connected to the loop
- The break-off tab is set incorrectly
- A ground fault is detected
- There is incorrect wiring
- A short or open is detected on the output loop
- The polarized device is installed in reverse
- There is an incorrect or missing EOL resistor
- The EOL resistor value is too low
- The module is defective

Refer to “Using the SDU Analog Addressable diagnostic tool” on page 226 for details on how to identify and locate Analog Addressable device and module problems.

Analog data loop wiring problems

There are three basic wire-related analog addressable loop problems: excessive resistance, excessive capacitance, a ground faults.

1. Excessive wiring resistance: Rarely is excessive wiring resistance the sole cause of analog addressable loop problems. For any length of cable, the amount of resistance and capacitance per foot does not change and the analog addressable circuit capacitance limits are usually reached before the resistance limits. The signal operates between 0 and 24 VDC. Excessive loop resistance causes the signal to shrink from a maximum of 23 VDC to a lower voltage, for example 20 VDC. The 3 V drop in the wiring is due to wire resistance.

   To measure the analog addressable loop voltage drop, use an oscilloscope to measure the peak voltage at the analog addressable module and at each analog addressable device. If the voltage difference is greater than 2 VDC, the resistance in the wire run is excessive. Too much resistance in the analog addressable wire run is typically caused by small wire size or a bad connection.

   If the wire size is too small for the run length, the only remedies are to replace the wire with a larger size, or install additional analog addressable modules, dividing the loop into acceptable lengths. Breaks or bad connections in the analog addressable loop wiring can be identified by comparing the calculated loop resistance value with the measured loop resistance value. The measured wiring loop resistance should not be different from the calculated loop resistance by much more than a few ohms.

2. Excessive wiring capacitance: Excessive capacitance in analog addressable loop wiring will distort the digital signal. As wiring capacitance increases, the square edges of the digital waveform start to curve. Excessive wiring capacitance causes the waveform to curve beyond the point where a device can recognize the waveform and respond when polled.

   Wiring capacitance also affects the turn-on current spike. If the turn-on current spike is not present in the digital sequence, there is a high probability the analog addressable device’s communication will not be understood by the 3-AADC1 controller.

   Analog addressable circuit capacitance problems are typically caused by long wire runs, ground faults on the loop, improper T-taps, or improper shielding.

   If shielded wire is used, the shield must be treated as a third conductor. It must be free of all ground faults and have continuity throughout. If the wire capacitance is too large for the run length, the only remedies are to replace the wire with a cable having a lower capacitance per foot or to install

additional analog addressable modules, dividing the loop into acceptable lengths.

3. Ground faults: Eliminating ground faults on the analog addressable circuit reduces the amount of capacitance on the wiring. You should check the loop to ensure it is free from ground faults.

Correcting analog addressable loop wiring problems

If the analog addressable loop is wired with improper T-taps or excessive capacitance, use the following corrective measures.

- Redesign the analog addressable loop correctly and re-pull the wire
- Balance the loop. Balancing the loop can help in some cases but is not a substitute for proper wiring practice. If loop balancing is required, call Technical Support for additional information.

Using the SDU Analog Addressable diagnostic tools

The System Definition Utility contains an analog addressable diagnostics tool that is used to assist the installing technician in isolating and correcting faults with analog addressable loops, detectors, and modules.

Note: Pressing F1 at any time in the 3-SDU application opens the Help topic for the page that you are currently viewing.

To access the Analog Addressable Status / Diagnostics tool:

1. Connect the computer running the SDU application to the panel that has the analog addressable loop controller in trouble.
2. See “Using a TCP/IP connection to read from the panel” on page 70 and configure the Remote Read Lock setting.
3. Open the 3-SDU project, click Tools on the menu bar, select Analog Addressable, and then click Status / Diagnostics.
4. From the System Sensor Status / Diagnostics window, set the communication criteria.

   If using an RS-232 connection, the suggested baud rate is 19200.
5. From the Cabinet list, select the appropriate cabinet.
6. From the Loop Controller list, select the appropriate controller module.

7. From the Delay list, set the interval at which diagnostic updates will be received.
8. Click Connect.
9. Click each tab to view the diagnostic results.

Trouble Tables diagnostics

The Trouble Tables analog addressable diagnostics tool displays multiple categories of active device troubles. The active troubles should be compared with a device's trouble history (Device Trouble tab) to determine any possible trouble pattern.

Click the Trouble Tables tab to see the list of active device troubles. Press F1 to open the Trouble Tables Help topic, which provides instructions and descriptions for the information provided.

The Device Address, Loop, and Label columns on the Trouble Tables list the address, loop, and label of the sensor and module talking to the 3-AADC1 analog addressable controller. The total number of communicating devices should equal the number of installed devices. If the total is less then the number of installed devices, see the Communications Fault column for missing devices or devices not connected. If the total is higher then the number of installed devices, see the Unexpected Fault column to identify extra device(s) installed on the loop.

Table 71 describes analog addressable device faults reported by the analog addressable controller and their possible causes.

Table 71: Trouble Tables for analog addressable device faults

Trouble Table column	Description	Possible causes
Internal Fault	The device is reporting an internal problem	The device is defective
Type Fault	It is the wrong device type for the current configuration	Two device addresses are transposed
Duplicate Fault	Two or more devices have the same address	• If the total number of communicating devices equals those installed, there is a duplicate device address • If the total number of communicating devices is less then the number of installed devices *and* a communications fault is reported, the device in the Communications Fault column is addressed at the location shown in the Duplicate Fault column

Trouble Table column	Description	Possible causes
Unexpected Fault	The device is reporting at an unconfigured address	If the total number of communicating devices equals those installed *and* a communications fault is reported, the unexpected fault device should be set to the address listed in the Communications Fault column
Communication Fault	The device is missing	• There is a wiring error or the device is not installed • If the total number of communicating devices is one less then the number of installed devices *and* a duplicate fault exists, the address shown in the Communications Fault column is addressed at the location shown in Duplicate Fault column • If the total number of communicating devices equals those installed *and* an unexpected fault exists, the unexpected fault device should be set to the address shown in the Communications Fault column
Open Fault	An open is detected in the field wiring	• The loop is incorrectly wired or the connector is loose • The detector or isolator base is defective • The conductor is broken • The device is not installed on the loop • The device is not defined in the 3-SDU
Ground Fault	The device has a ground fault	There is a ground fault on the field wiring side of the device
Short Fault	A short is detected in the field wiring	• The loop is incorrectly wired • The detector, detector base, or module is defective • The insulation is nicked between conductors
Compatibility Fault	An incorrect device type is installed	Incompatible devices are intermixed on the loop
Dirty Head	The detector needs cleaned	The detector is dirty
Maint Alert	Perform device maintenance	The device requires maintenance

Addressing faults diagnostics

Most addressing faults are quickly located because the wrong address gives a clue as to the fault location. For example, if module 164 is duplicated and module 174 is missing, then the module 174 probably has its tens digit off by one position.

Duplicate device faults may be harder to locate. For example, the carpenter put up a partition-hiding sensor 53, then the electrician noticed it was missing and spliced in a new base. Now there are two sensors at address 53.

To identify devices with duplicate addresses, remove one of the suspected duplicate sensors. The duplicate fault should clear within 30 seconds if the sensor removed is a duplicate. Disconnect half of the loop. Allow a minute or so for the loop to stabilize and the faults to report. From the Ready Comm tab in the diagnostics window, click New Data from Loop Controller. The remaining duplicate sensor (53) should still appear as if it is physically connected between the loop controller and the wiring break. Continue to add or remove segments of the loop in gradual increments, repeating the diagnostics upload until the physical location of the problem detector is located.

Using HyperTerminal to troubleshoot the system

HyperTerminal is a useful tool for gathering information from the control panel and for troubleshooting system faults through an RS-232 port connection. The information gathered can be saved as a plain text file (TXT extension) and submitted electronically to technical support for evaluation.

HyperTerminal comes with your Windows operating system as an installable option. HyperTerminal, if installed, is typically found on the Accessories menu (Start > Programs > Accessories > HyperTerminal).

Setting up a HyperTerminal connection

Before you can gather information from the control panel, you must set up a HyperTerminal connection.

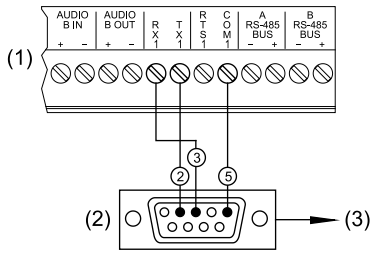
To set up a HyperTerminal connection:

1. Start HyperTerminal.
2. In the Connection Description dialog box, type a name for the connection in the Name box, and then click OK.

3. In the Connect To dialog box, select the COM port you are using to connect your laptop computer to the control panel, and then click OK.
4. In the COM port's Properties dialog box, set the port settings as described below, and then click OK.

   Bits per second: 9600
   Data bits: 8
   Parity: None
   Stop bits: 1
   Flow control: None
5. On the File menu, click Save to save your connection settings.
6. Connect one end of a DB-9 programming cable to the terminal block on the SFS1-CPU. See Figure 59.
7. Connect the other end of the cable to the RS-232 jack on the computer.

Figure 59: RS-232 terminal block connections to the DB-9 programming cable



(1) SFS1-CPU terminal connector block
(2) Rear view of female DB-9 connector
(3) RS-232 jack of computer

Appendix A
System calculations

Summary

This appendix provides instructions and worksheets for calculating wire lengths and sizing standby batteries.

Content

Network data riser limits

Cumulative data network capacitance refers to the total capacitance of all copper wire used for the data riser. The cumulative capacitance of data networks must be within certain limits to permit stable network communications.

Audio networks are not affected by cumulative capacitance, due to the method of retransmitting data. The audio network retransmits data byte-by-byte, so the individual bit times of a byte are restored at each node in the network.

The data network retransmits data bit-by-bit. This method of retransmitting data restores the amplitude of a bit at each node, but any distortions in bit timing are passed through to the next node. Data network communication faults begin to occur at about 23% distortion of bit timing.

Cumulative data network capacitance induces bit timing distortion.

A fiber link in a data network electrically isolates two nodes, but distortions in bit timing are not restored by the fiber segment. Distortions in bit timing are passed through the fiber to the next node. The bit transition time of model 3X-FIB8 and 3X-FIB fiber cards is fast enough to be neglected in determining the maximum wire length that can be used in the data network.

Data network specifications

Here are the maximum allowed values between any three nodes of a network.

- Resistance: 90 ohms (Ω)
- Capacitance: 0.3 microfarads (μF)
- Distance: 5,000 feet

The following table lists the maximum cumulative capacitance for the entire data network given various wire sizes and transmission rates. Maximum cumulative capacitance is the total capacitance of all installed copper wire used in the data network.

Maximum cumulative capacitance in microfarads

Wire size (AWG)	At 38.4 Kbaud	At 19.2 Kbaud
18	1.4	2.8
16	1.8	3.6
14	2.1	4.2

Cable properties

Data and audio networks in an EST3X system do *not* require the use of shielded cable. Networks designed with twisted-pair can be about twice as long as those designed with shielded cable.

The maximum length of a data network varies with the properties of the wire used. Wire manufacturers typically provide specifications for wire resistance and capacitance.

Resistance is generally specified in ohms per 1,000 feet, and must be doubled for 1,000 feet of a twisted-pair cable. Capacitance is specified in picofarads per foot (pF/ft).

The capacitance between conductors of a twisted-pair is commonly referred too as *conductor-conductor* or *mutual* capacitance. Shielded cable has an additional capacitance between each conductor and the shield. The capacitance of either conductor to shield is typically twice the value of mutual capacitance, and the highest value of capacitance must be used when calculating the maximum length of a data network.

The overall length of data networks designed with twisted-pair cable is about twice as long as data networks designed with shielded cable due to the additional capacitance resulting from the shield.

Calculating a maximum length

The maximum length of a data network can be calculated by dividing the maximum cumulative capacitance allowed by the highest capacitance rating of the selected cable.

For example, say you wanted to determine maximum length of a data network using 18 AWG cable that is rated at 25 pF per foot. The network will communicate at 38.4 Kbaud.

The maximum length equals the maximum cumulative capacitance divided by the capacitance per foot. In equation form:

ML = MCC / CPF

Where,

ML = Maximum length
MCC = Maximum cumulative capacitance
CPF = Capacitance per foot

In our example, the calculation is as follows:

ML = 1.4 μF / 25 pF/ft
ML = 56,000 ft

Calculating maximum wire capacitance per foot

The capacitive property of twisted-pair cable varies and the cost of cable generally increases as the capacitance per foot decreases. Following is a sample calculation for determining the maximum capacitance per foot that a cable can have for a given network length.

The maximum capacitance per foot equals the maximum cumulative capacitance divided by the total network length. In equation form:

MCPF = MCC / TNL

Where,

MCC = Maximum cumulative capacitance, from the table given in this topic

TNL = Total network length, the sum of the lengths of individual copper runs in the network

For example, the total copper distance of a network is 26,000 feet. Calculate the maximum capacitance per foot that can be used for 18 AWG twisted-pair cable at 38.4K baud.

MCPF = MCC / TNL

MCPF = 1.4 μF / 26,000 ft

MCPF = 53.8 pF/ft

Signature data loop wire length

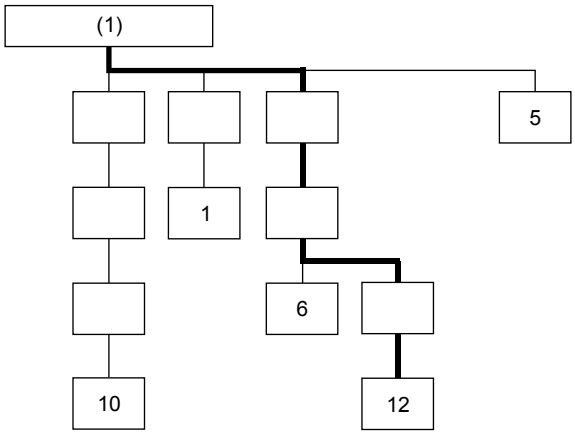
Signaling line circuit resistance and capacitance determines the maximum length of a Signature data loop. Circuit resistance affects the wire length of the longest loop branch. Circuit capacitance affects the total amount of wire that can be used on the loop.

Notes

- The design of the Signature data loop must not exceed either of the two measurements.
- There are no restrictions placed on the wiring used for the Signature data loop. Longer wire runs may be obtained using standard (non-twisted, non-shielded) wire pairs.

Determine the maximum allowable branch length

The maximum branch length is the wire distance measured from the Signature controller module to the last device on the longest loop path as shown below.



(1) Signature loop controller

Several factors influence the maximum allowable branch length:

- Wire gauge and type
- Number of Signature detectors and modules installed on the branch
- Number of SIGA-UMs or SIGA-MABs configured for two-wire smoke detectors installed on the branch

Table 72 through Table 75 provide the maximum allowable branch length for any detector, module, SIGA-UM, and SIGA-MAB and the wire gauge combination. Using the wire distances specified in the tables ensures that the signaling line circuit does not exceed the maximum circuit resistance of the Signature loop.

Note: To calculate the wire distance with respect to circuit resistance, the tables assume that the loop is end-loaded (all devices are clustered more towards the end of the loop) and the loop uses standard non-shielded wire.

To determine the maximum allowable length of a Signature data loop branch:

1. Identify the device located farthest from the Signature controller.
2. Determine the number of Signature detectors, modules, and SIGA-UMs or SIGA-MABs configured for two-wire smokes that lie on the same conductive path between the device identified in step 1 and the Signature controller.
3. Calculate the number of detector and module addresses. Some Signature modules require two addresses.
4. Determine the size of the wire used to construct the loop.

5. Find the maximum allowable wire distance for the longest branch in the lookup tables as follows:

   If no SIGA-UMs or SIGA-MABs are installed, use Table 72.

   If 1 to 5 SIGA-UMs or SIGA-MABs are installed, use Table 73.

   If 6 to 10 SIGA-UMs or SIGA-MABs are installed, use Table 74.

   If 11 to 15 SIGA-UMs or SIGA-MABs are installed, use Table 75.

Table 72: Maximum branch length with zero SIGA-UMs/SIGA-MABs configured for two-wire smokes

Signature detector addresses	Signature module addresses	Maximum allowable wire distance using non-twisted, non-shielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	ft	m	ft	m
1–25	0	7437	2267	11815	3601	18792	5728
26–50	0	7038	2145	11180	3408	17782	5420
51–75	0	6638	2023	10545	3214	16772	5112
76–100	0	6238	1901	9910	3021	15762	4804
101–125	0	5839	1780	9275	2827	14752	4497
0	1–25	7267	2215	11544	3519	18361	5597
1–25	1–25	6867	2093	10909	3325	17351	5289
26–50	1–25	6467	1971	10275	3132	16342	4981
51–75	1–25	6068	1849	9640	2938	15332	4673
76–100	1–25	5668	1728	9005	2745	14322	4365
101–125	1–25	5268	1606	8370	2551	13312	4057
0	26–50	6697	2041	10639	3243	16921	5157
1–25	26–50	6297	1919	10004	3049	15911	4850
26–50	26–50	5897	1798	9369	2856	14901	4542
51–75	26–50	5498	1676	8734	2662	13891	4234
76–100	26–50	5098	1554	8099	2469	12881	3926
101–125	26–50	4698	1432	7464	2275	11871	3618
0	51–75	5906	1800	9383	2860	14923	4549
1–25	51–75	5250	1600	8340	2542	13265	4043
26–50	51–75	4633	1412	7360	2243	11707	3568
51–75	51–75	4051	1235	6435	1961	10235	3120
76–100	51–75	3498	1066	5558	1694	8839	2694
101–125	51–75	2973	906	4723	1440	7512	2290
0	76–100	3931	1198	6245	1903	9932	3027
1–25	76–100	3404	1037	5407	1648	8601	2621
26–50	76–100	2899	883	4605	1404	7324	2232
51–75	76–100	2413	735	3833	1168	6096	1858
76–100	76–100	1945	593	3089	942	4913	1498
101–125	76–100	1493	455	2371	723	3771	1149
0	101–125	2631	802	4180	1274	6649	2027
1–25	101–125	2165	660	3439	1048	5470	1667
26–50	101–125	1713	522	2721	829	4328	1319
51–75	101–125	1274	388	2023	617	3218	981
76–100	101–125	847	258	1345	410	2140	652
101–125	101–125	431	131	685	209	1089	332

Table 73: Maximum branch length with 1 to 5 SIGA-UMs/SIGA-MABs configured for two-wire smokes

Signature detector addresses	**Signature module addresses**	**Maximum allowable wire distance using non-twisted, non-shielded wire pairs**					
		18 AWG		**16 AWG**		**14 AWG**	
		ft	**m**	**ft**	**m**	**ft**	**m**
1–25	0	6778	2066	10768	3282	17126	5220
26–50	0	6131	1869	9741	2969	15492	4722
51–75	0	5501	1677	8739	2664	13899	4236
76–100	0	4885	1489	7760	2365	12342	3762
101–125	0	4282	1305	6802	2073	10819	3298
0	1–25	5353	1632	8504	2592	13525	4122
1–25	1–25	4720	1439	7498	2286	11926	3635
26–50	1–25	4100	1250	6513	1985	10359	3157
51–75	1–25	3491	1064	5546	1691	8821	2689
76–100	1–25	2893	882	4597	1401	7311	2228
101–125	1–25	2306	703	3663	1116	5826	1776
0	26–50	3776	1151	5999	1829	9542	2908
1–25	26–50	3153	961	5009	1527	7966	2428
26–50	26–50	2539	774	4034	1230	6416	1956
51–75	26–50	1935	590	3075	937	4890	1491
76–100	26–50	1340	409	2130	649	3387	1032
101–125	26–50	754	230	1197	365	1905	581
0	51–75	2491	759	3957	1206	6293	1918
1–25	51–75	1868	569	2967	904	4720	1439
26–50	51–75	1254	382	1992	607	3168	966
51–75	51–75	648	198	1030	314	1638	499
76–100	51–75	50	15	80	24	126	39
101–125	51–75						
0	76–100	1386	422	2201	671	3501	1067
1–25	76–100	760	232	1208	368	1921	586
26–50	76–100	143	44	227	69	361	110
51–75	76–100						
76–100	76–100						
101–125	76–100						
0	101–125						
1–25	101–125						
26–50	101–125						
51–75	101–125						
76–100	101–125						
101–125	101–125						

Table 74: Maximum branch length with 6 to 10 SIGA-UMs/SIGA-MABs configured for two-wire smokes

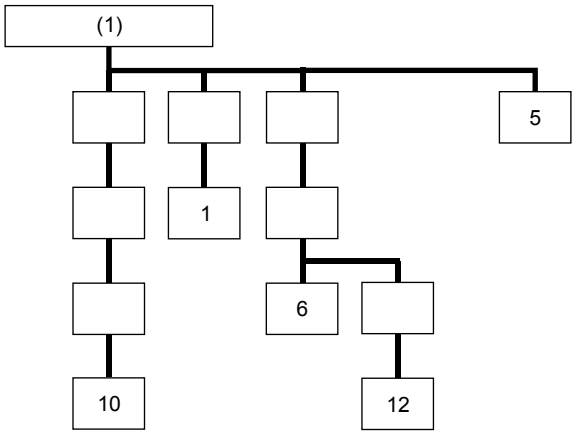
Signature detector addresses	Signature module addresses	Maximum allowable wire distance using non-twisted, non-shielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	ft	m	ft	m
1–25	0	5045	1538	8015	2443	12748	3886
26–50	0	4494	1370	7139	2176	11355	3461
51–75	0	3950	1204	6275	1913	9981	3042
76–100	0	3414	1040	5423	1653	8625	2629
101–125	0	2884	879	4581	1396	7286	2221
0	1–25	4106	1252	6523	1988	10375	3162
1–25	1–25	3542	1080	5627	1715	8950	2728
26–50	1–25	2985	910	4742	1445	7542	2299
51–75	1–25	2435	742	3868	1179	6152	1875
76–100	1–25	1891	576	3004	916	4778	1456
101–125	1–25	1353	412	2150	655	3419	1042
0	26–50	2869	874	4557	1389	7248	2209
1–25	26–50	2296	700	3648	1112	5802	1768
26–50	26–50	1730	527	2749	838	4372	1332
51–75	26–50	1170	357	1859	567	2957	901
76–100	26–50	617	188	979	299	1558	475
101–125	26–50	68	21	108	33	172	53
0	51–75	1796	547	2853	869	4537	1383
1–25	51–75	1214	370	1929	588	3067	935
26–50	51–75	638	195	1014	309	1613	492
51–75	51–75	69	21	109	33	173	53
76–100	51–75						
101–125	51–75						
0	76–100	833	254	1323	403	2105	642
1–25	76–100	242	74	385	117	613	187
26–50	76–100						
51–75	76–100						
76–100	76–100						
101–125	76–100						
0	101–125						
1–25	101–125						
26–50	101–125						
51–75	101–125						
76–100	101–125						
101–125	101–125						

Table 75: Maximum branch length with 11 to 15 SIGA-UMs/SIGA-MABs configured for two-wire smokes

Signature detector addresses	Signature module addresses	Maximum allowable wire distance using non-twisted, non-shielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft	m	pi	ft	pi	m
1–25	0	3931	1198	6245	1904	9932	3028
26–50	0	3427	1045	5444	1660	8659	2640
51–75	0	2928	893	4651	1418	7397	2255
76–100	0	2432	741	3864	1178	6145	1873
101–125	0	1941	592	3083	940	4903	1495
0	1–25	3247	990	5158	1572	8204	2501
1–25	1–25	2722	830	4324	1318	6878	2097
26–50	1–25	2202	671	3498	1066	5563	1696
51–75	1–25	1686	514	2678	816	4259	1298
76–100	1–25	1174	358	1865	569	2966	904
101–125	1–25	666	203	1058	323	1683	513
0	26–50	2204	672	3502	1067	5570	1698
1–25	26–50	1664	507	2644	806	4205	1282
26–50	26–50	1129	344	1793	547	2852	870
51–75	26–50	598	182	950	290	1511	461
76–100	26–50	71	22	113	34	179	55
101–125	26–50						
0	51–75	1263	385	2007	612	3192	973
1–25	51–75	710	216	1128	344	1794	547
26–50	51–75	161	49	256	78	407	124
51–75	51–75						
76–100	51–75						
101–125	51–75						
0	76–100						
1–25	76–100						
26–50	76–100						
51–75	76–100						
76–100	76–100						
101–125	76–100						
0	101–125						
1–25	101–125						
26–50	101–125						
51–75	101–125						
76–100	101–125						
101–125	101–125						

Determining the total loop length

The total loop length is the sum of the lengths of all the wire segments installed in the data loop.



(1) Signature loop controller

The total length of all the cable installed in the Signature loop cannot exceed the values listed below:

	Wire Size		
Wire type	**14 AWG**	**16 AWG**	**18 AWG**
Twisted pair	13,157 ft (4,010 m)	13,888 ft (4,233 m)	20,000 ft (6,096 m)
Twisted-shielded pair	5,952 ft (1,814 m)	6,098 ft (1,859 m)	8,621 ft (2,628 m)
Non-twisted, non-shielded pair	20,000 ft (6,096 m)	20,000 ft (6,096 m)	20,000 ft (6,096 m)

If the cable manufacturer's data indicates the capacitance per foot of the cable, the following method may be used to determine the maximum total loop length.

Note: In no case may the total loop length of a Signature data loop exceed 20,000 feet (6,098 meters).

Lmax = 500,000 / Cpf

Where,

- Lmax = maximum total cable length in feet
- Cpf = Cable capacitance in picofarads per foot

Note: A short circuit on a Signature data loop can disable the entire loop. In order to limit the effect of a single short circuit, SIGA-IB Isolator Bases or SIGA-IM Isolator modules can be installed at strategic points on the loop.

Notification appliance signaling line circuit calculations

Introduction

This topic shows you how to determine the maximum cable length of a notification appliance circuit for a given number of appliances.

Two methods are presented: worksheet and equation. The worksheet method is simpler, but your installation must meet the criteria listed on the worksheet. If your installation does not meet these criteria, you need to use the equation method.

The methods given here determine cable lengths that work under all operating conditions. The calculations ensure that the required operating voltage and current will be supplied to all notification appliances. To do this, we assume these two worst-case conditions:

- The voltage at the NAC terminals is the minimum provided by the power supply
- The notification appliances are clustered at the end of the NAC cable

Other, more detailed methods that distribute the appliance load along the NAC cable may indicate that longer cable runs are possible.

What you will need

Appliance and cable values

Whether you use the worksheet method or the equation method, you will need to know the following:

- The minimum operating voltage required for the appliances
- The maximum operating current drawn by each appliance
- The resistance per unit length of the wire used (Ω/ft)

This information can be found on the appliance installation sheets and on the cable specification sheet.

NAC source values

For either method, you will need some fixed or calculated operating values for your specific NAC circuit source. An EST3X control panel has three possible sources. These are listed in Table 76 along with their fixed values.

Table 76: NAC calculation values

NAC source	**Maximum voltage (V)**	**Source voltage (V)**	**Load factor (V/A) [1]**	**Power supply type**
PS10-4B Power Supply	26.4	22.4	0.0	DC
3-IDC8/4 Traditional Zone I/O Module [2]	26.0	21.3	0.0	DC
3-ZA20 or 3-ZA40 Zoned Audio Amplifiers[2]	25.9	21.7	0.0	DC

[1] The PS10-4B has an onboard boost circuit to keep battery voltage at a required value. If the battery voltage drops below the required value, the boost circuit activates.

[2] These values only apply when the card is used in an EST3X control panel.

The *maximum voltage* is the highest voltage measured at the NAC terminals. This value is not used in the calculations, but is given so you can ensure appliance compatibility.

The *source voltage* is the theoretical operating minimum for the NAC source, and is calculated as 85% of 24 volts [minus the diode drop].

The *load factor* is a measure of how the power supply voltage reacts when a load is applied. The load factor measures the voltage drop per ampere of current drawn by the load.

The *power type* reflects the type of power supplied to the NAC terminals at minimum voltage. The current draw of notification appliances can vary substantially with the type of power supplied: full-wave rectified (VFWR) or direct current (VDC). It is important to know the power type at minimum terminal voltage.

You will need to calculate the following values relating to your power supply and to the NAC circuit current. These are:

- Minimum voltage
- Voltage drop

The *minimum voltage* is the lowest voltage measured at the NAC terminals when the power supply is under the maximum load for that loop (i.e. for the appliances that constitute the NAC).

The *voltage drop* is the difference between the minimum voltage and 16 V. This value is for use with the worksheet only.

Worksheet method

Use this worksheet to determine the maximum cable length of a notification appliance circuit for a given number of appliances.

Use this worksheet only if all the appliances are regulated. That is, they must have a minimum operating voltage of 16 V. For other appliances, use the "Equation method."

Worksheet 1: NAC cable length

		PS10-4B	3-IDC8/4	3-ZA20/40	
Total operating current [1]					A
Load factor	×	0.0	0.0	0.0	V/A
Load voltage drop	=				V
Source voltage		22.4	21.3	21.7	V
Load voltage drop	−				V
Minimum voltage	=				V
Regulated appliance voltage	−	16.0	16.0	16.0	V
Voltage drop [2]	=				V
Total operating current	÷				A
Maximum resistance	=				Ω
Wire resistance (Ω/ft) [3]	÷				
Maximum wire length	=				ft
	÷	2	2	2	
Maximum cable length	=				ft

[1] Total of the maximum operating currents for all appliances as specified for DC power. Refer to the appliance installation sheets for operating currents.

[2] This voltage drop is valid for regulated notification appliances only. For special application appliances, see "Equation method," later in this topic.

[3] Use the manufacturer's published wire resistance expressed in ohms per foot. For typical values, see Table 77 on page 245.

Equation method

Appliance operating voltage and current

Regulated notification appliances have an operating range from 16 V to 33 V. Use 16 V as the minimum appliance voltage when using regulated notification appliances.

When using special application appliances, refer to the installation sheets to determine the minimum appliance voltage required.

What if there are different types of appliances in the NAC, and each type has a different minimum operating voltage? In this case, use the *highest* minimum voltage required by any appliance.

The total current requirement for the appliances will be the sum of the individual maximum currents drawn by each appliance when using DC power. Use the maximum current for the appliance over the 16 V to 33 V range.

If all appliances draw the same maximum current, the total current is the maximum current multiplied by the number of appliances. If different appliance types have different maximum currents, the total current is the sum of the maximum current for each appliance type multiplied by the number of appliances of that type.

Wire resistance

Typical wire resistances are shown in the following table.

Table 77: Typical wire resistances

Wire gauge (AWG)	Resistance 1-strand uncoated copper		Resistance 7-strand uncoated copper	
	Ω per foot	Ω per meter	Ω per foot	Ω per meter
12	0.00193	0.00633	0.00198	0.00649
14	0.00307	0.01007	0.00314	0.01030
16	0.00489	0.01604	0.00499	0.01637
18	0.00777	0.02549	0.00795	0.02608

When performing these calculations, always refer to the actual cable supplier documentation and use the actual Ω/ft (or Ω/m) for the cable being used.

Calculating the maximum CAB cable length

1. Calculate the total current (Itot) as the sum of the maximum operating currents for all the appliances.

   Itot = ΣIa

   Where:
   Ia = appliance maximum current

   Refer to the appliance installation sheets for Ia. Remember to use the maximum operating current specified for DC power.

2. Calculate the minimum voltage (Vm).

   Vm = Vr − (Itot × K)

   Where:
   Vr = source voltage
   Itot = total current (from above)
   K = load factor

   For the PS10-4B power supply, Vr is 22.4 V and K is 0.0 V/A.

   For the 3-IDC8/4 power supply, Vr is 21.3 V and K is 0.0 V/A.

   For the 3-ZA20/40 power supply, Vr is 21.7 V and K is 0.0 V/A.

3. Calculate the allowable voltage drop (Vd) between the NAC circuit source and the appliances.

   Vd = Vm − Va

   Where:
   Vm = minimum voltage (from above)
   Va = appliance minimum voltage

   For regulated notification appliances, Va is 16 V. For special application appliances, Va is the lowest operating voltage specified on the appliance installation sheet.

4. Calculate the maximum resistance (Rmax) the wire can have.

   Rmax = Vd / Itot

   Where:
   Vd = voltage drop
   Itot = total current

5. Calculate the maximum length of the cable (Lc), based on the maximum resistance allowed, the resistance of the wire, and the number of wires in the cable (two).

   Lc = (Rmax / Rw) / 2

   Where:
   Rmax = maximum resistance
   Rw = wire resistance factor

   Example: The NAC source is the PS10-4B. You are using regulated notification appliances. Assume that the maximum operating current for each appliance is 100 mA for DC power, and that 20 appliances will be placed on the NAC. The cable is 12 AWG wire, and the manufacturer specifies a wire resistance factor of 0.002 Ω/ft.

   Itot = ΣIa
   = 20 × 0.1 A
   = 2 A

   Vm = Vr − (Itot × K)
   = 22.4 V − (2 A × 0.0 V/A)
   = 22.4 V − 0.0 V
   = 22.4 V

   Vd = Vm − Va
   = 22.4 V − 16.0 V
   = 6.4 V

   Rmax = Vd / Itot
   = 6.4 V / 2.0 A
   = 3.2 Ω

   Lc = (Rmax / Rw) / 2
   = (3.2 Ω / 0.002 Ω/ft) / 2
   = 1600.0 ft / 2
   = 800.0 ft

   So the maximum wire run for this NAC would be 800 ft (rounding down for safety).

25 or 70 VRMS NAC wire length

The maximum allowable wire length is the farthest distance that a pair of wires can extend from the amplifier to the last speaker on the notification appliance circuit without losing more than 0.5 dB of signal. Calculating the maximum allowable wire length using this method ensures that each speaker operates at its full potential.

Several factors influence the maximum allowable wire length:

- Wire size
- Output signal level of the amplifier driving the circuit
- Number of speakers installed on the circuit

To calculate the maximum allowable wire length for a 0.5 dB loss, use the following formula:

Maximum length = (59.25 × Amplifier output²) / (Wire resistance × circuit load)

Where,

- Amplifier output is the signal level in VRMS supplied by the amplifier driving the circuit
- Circuit load is the total watts required by the audio circuit
- Wire resistance is the resistance rating of the wire per 1000 ft pair, see Table 78.

For example, the maximum allowable wire length for an audio circuit consisting of a 30 W, 25 VRMS amplifier driving thirty 1 watt speakers, using 18-gauge wire would be 95 ft.

94.95 = (59.25 × 25²) / (13 × 30)

Table 78: Wire resistance ratings

Wire Size	Resistance per 1,000 ft pair (ohms)
18 AWG (0.75 mm²)	13.0
16 AWG (1.0 mm²)	8.0
14 AWG (1.50 mm²)	5.2
12 AWG (2.5 mm²)	3.2

Table 79 and Table 80 on page 249 give the maximum allowable wire lengths for various wire sizes and loads. Use Table 79 when designing circuits for amplifiers set for 25 VRMS output. Use Table 80 when designing circuits for amplifiers set for a 70 VRMS output.

Table 79: Maximum allowable length at 25 VRMS, 0.5 dB loss

Wire size	Circuit load requirement											
	15 W		20 W		30 W		40 W		95 W		120 W	
	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
18 AWG (0.75 sq mm)	190	58	142	43	95	29	71	22	Over max current limit		Over max current limit	
16 AWG (1.0 sq mm)	309	94	231	70	154	47	116	35	48.7	15	39	12
14 AWG (1.5 sq mm)	475	145	356	109	237	72	178	54	75	23	59	18
12 AWG (2.5 sq mm)	772	235	579	176	386	118	289	88	121.8	37	96	29

Table 80: Maximum allowable length at 70 VRMS, 0.5 dB loss

Wire size	Circuit load requirement											
	15 W		20 W		30 W		40 W		95 W		120 W	
	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
18 AWG (0.75 sq mm)	1489	454	1117	340	744	227	558	170	235	72	186	57
16 AWG (1.0 sq mm)	2420	738	1815	553	1210	369	907	276	382	116	302	92
14 AWG (1.5 sq mm)	3722	1134	2792	851	1861	567	1396	426	588.7	180	465	142
12 AWG (2.5 sq mm)	6049	1844	4537	1383	3024	922	2268	691	955	291	756	230

Analog addressable circuit wire length

Table 81 lists the maximum wire distances allowed for analog addressable circuits.

Notes

- Maximum wire resistance cannot exceed 50 ohms.
- Maximum wire capacitance cannot exceed 0.05 microfarads.

Table 81: Maximum allowable wire distance for analog addressable circuits

Wire gauge	Max loop Capacitance	Twisted, non-shielded		Twisted, shielded		Non-twisted, non-shielded	
		ft	m	ft	m	ft	m
18	0.01 μF	4000	1219	1724	525	5000	1524
	0.02 μF	8000	2438	3448	1051	10000	3048
	0.03 μF	12000	3658	5172	1576	15000	4572
	0.04 μF	16000	4877	6896	2102	20000	6096
	0.05 μF	20000	6096	8620	2627	25000	7620
16	0.01 μF	2777	846	1219	372	5000	1524
	0.02 μF	5555	1693	2439	743	10000	3048
	0.03 μF	8333	2540	3658	1115	15000	4572
	0.04 μF	11111	3387	4878	1487	20000	6096
	0.05 μF	13888	4233	6097	1858	25000	7620
14	0.01 μF	2631	802	1190	363	5000	1524
	0.02 μF	5263	1604	2380	725	10000	3048
	0.03 μF	7894	2406	3571	1088	15000	4572
	0.04 μF	10526	3208	4761	1451	20000	6096
	0.05 μF	13157	4010	5952	1814	25000	7620

Cabinet battery

Use the following method to calculate the minimum ampere-hour capacity of a battery required in order to operate a panel in the absence of AC power. Battery calculations must be performed separately for each cabinet in the system.

Determine the total amount of current in milliamps required by all of the components that derive power from the battery while the panel is in standby

mode. Multiply the total amount of standby current by the number of hours that the panel is required to operate in standby mode while on battery power.

Determine the total amount of current in milliamps required by all of the components that derive power from the battery while the panel is in alarm mode. Multiply the total amount of alarm current by the number of minutes that the panel is required to operate in alarm mode while on battery power. Divide the result by 60 to convert minutes to hours.

Add the total amount of standby current and the total amount of alarm current then divide the result by 1000 to convert to ampere-hours. Multiply this number by 1.2 to add a 20% safety factor to the calculations.

Battery calculations

Battery capacity worksheet

Instructions: Enter the standby and alarm currents from the other worksheets, and then calculate the size of standby batteries you need based on your operating time requirements.

	Standby current (mA)	Alarm current (mA)	
Total control panel current (from Worksheet A)			
Total NAC current (from Worksheet B)	0		
Total AUX current (from Worksheet C)			
Smoke power [1]			
Total current			
Operating time required	× h	× min	
		÷ 60	
	+	=	mAh
			× 1.2
			mAh
			÷ 1,000
Battery capacity			**Ah**

[1] A maximum of fifteen SIGA-UM or SIGA-MAB modules per signaling line circuit can be configured to support two-wire smoke detectors (personality codes 13, 14, 20, and 21). For standby current, enter 2.0 mA for each smoke power circuit used. For alarm current, enter 17.0 mA for each smoke power circuit used.

Worksheet A: Control panel current

Instructions: Enter the number of option cards installed in the control panel under Quantity, then calculate the standby and alarm currents using the values below, and then calculate the total at the bottom.

Devices	Qty	Standby current (mA)	Alarm current (mA)	Qty x Standby current (mA)	Qty x Alarm current (mA)
Base panel [1]	1	378.0	482.0	378.0	482.0
Display modules [2]		2.0	2.0		
3-LDSM		5.0	5.0		
3-SDC1 [3]		120.0	132.0		
3X-NET8		98.0	98.0		
3X-NET		98.0	98.0		
3X-FIB8 [4]		105.0	105.0		
3X-FIB [4]		105.0	105.0		
3X-ETH1		42.0	54.0		
CLA-PS10		2.0	2.0		
3X-PMI [5]		23.0	29.0		
3-SSDC1 [6]		144.0	204.0		
3-SDDC1 [6]		264.0	336.0		
3-AADC1 [6]		175.0	205.0		
3-IDC8/4		48.0	408.0		
3-OPS		53.0	147.0		
3-MODCOM		60.0	95.0		
3-ZA20(A/B)		62.0	1120.0		
3-ZA40(A/B)		62.0	2480.0		
Totals (mA)					

[1] Includes the PS10-4B, the SFS1-CPU, one 3-SDC1 card with a fully loaded loop, and a 4X-LCD(-LC).

[2] Add 1.5 mA for each active LED and 5 mA if the display module is connected to a 3-LDSM.

[3] Standby and alarm current values are for a fully loaded loop.

[4] Add 71.2 mA for each SMXLO2, 76.8 for each SMXHI2, and 20.0 mA for each MMXVR.

[5] Includes EAEC card currents.

[6] A 3-SSDC1 card with two 3-SDC1 cards is the same as one 3-SDDC1 card.

Worksheet B: NAC power current

Instructions: For each circuit, enter the total amount of alarm current required. Use the DC RMS current values listed on the device installation sheet for your calculations.

Devices	Standby current (mA)	Alarm current (mA)
NAC/AUX 1		
NAC/AUX 2		
NAC/AUX 3		
NAC/AUX 4		
3-IDC8/4 - IDC/NAC 1 [1]		
3-IDC8/4 - IDC/NAC 2 [1]		
3-IDC8/4 - IDC/NAC 5 [1]		
3-IDC8/4 - IDC/NAC 6 [1]		
3-ZA20(A/B)		
3-ZA40(A/B)		
Total (mA)		

[1] Enter values only if the NAC signal source is the PS10-4B power supply.

Worksheet C: AUX power current load

Instructions: For each NAC/AUX circuit used to provide AUX power, enter the total amount of standby and alarm currents required by the devices powered by the circuit. Use the standby and alarm currents on the device installation sheet for your calculations.

Devices	Standby current (mA)	Alarm current (mA)
NAC/AUX 1		
NAC /AUX 2		
NAC /AUX 3		
NAC /AUX 4		
SFS1-CPU Main Board		
SIGA-REL module [1][2]		
RPM module [1]		
CDR-3 module [1]		
IOP3A [1]		
Total (mA)		

[1] Do not include currents if the module *is not* installed.

[2] A maximum of ten SIGA-REL modules per signaling line circuit can be installed.

Fiber optic cable worksheet

The fiber optic cable worksheet should be used to verify that the light attenuation factors do not exceed the fiber optic budget for any fiber optic cable segment.

Notes

- The contractor installing the fiber optic cable provides items A, B, and D.
- Fiber optic budget must be greater than the total link loss (F).

Fiber optic cable worksheet

Link Name	A Cable loss per unit distance [ ] dB/Ft [ ] dB/Km [ ] dB/Mi	B Distance [ ] Feet [ ] Km [ ] Miles	C Cable Loss A × B	D Number of Splices	E Contingency Splices	F Total Link Loss (dB) C+2[D+E]

Appendix B
Addresses

Summary

This appendix provides a list of fire alarm system device addresses.

Content

Address formats

EST3X addresses are in PPCCDDDD format, where:

- PP is the cabinet number. Possible values are 00 to 99.
- CC is the card number. Possible values are listed in Table 82.
- DDDD is the device number. Possible values are listed in Table 83, Table 84, and Table 85.

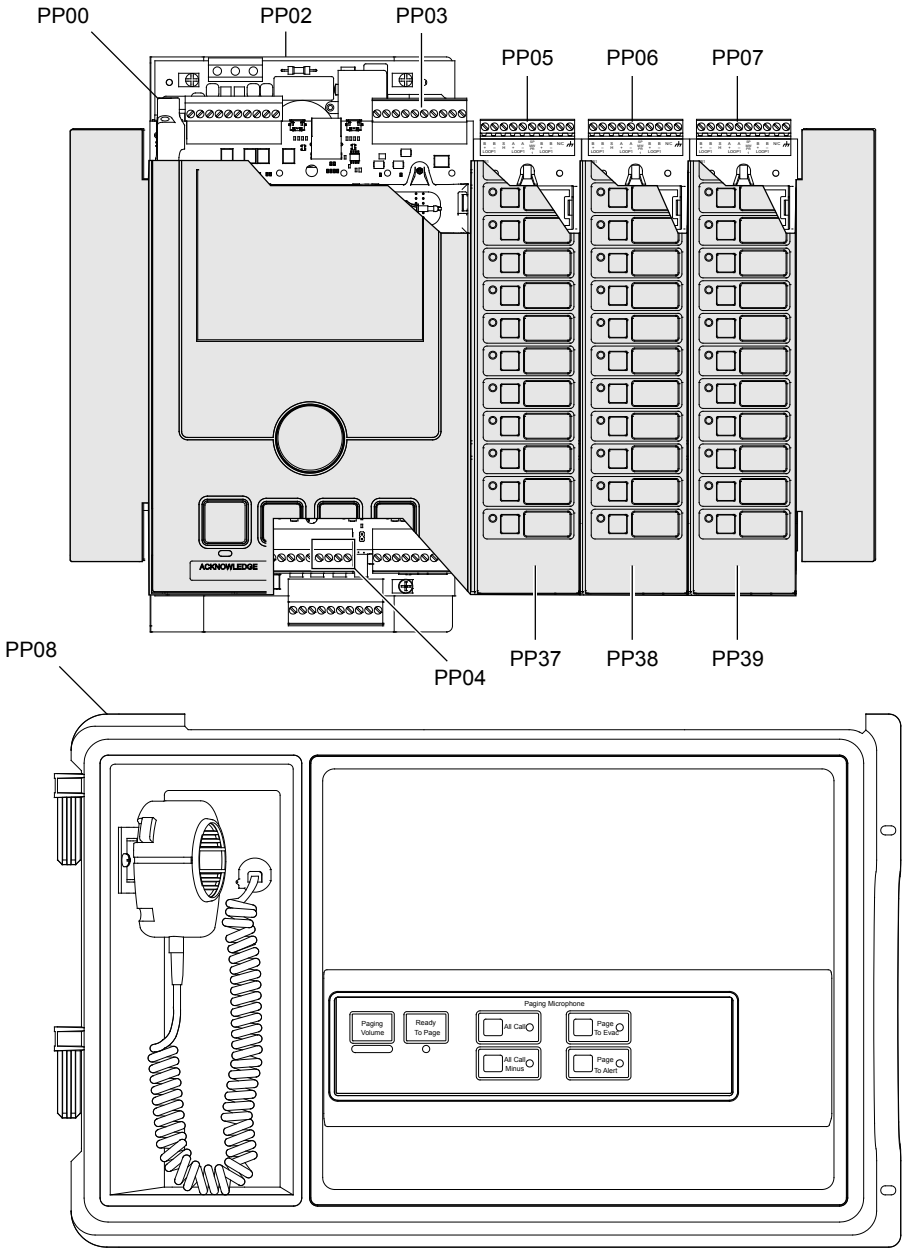
Card address

Cards have a physical address and a logical address. The physical address identifies the card's location in the panel. The logical address identifies the card in the CPU database. See Table 82 below and Figure 60 on page 259.

Table 82: EST3X card addressing

Card or circuit	Logical address
SFS1-CPU Main Board	00
4X-LCD(-LC) User Interface	32
PS10-4B Power Supply	02
Signature loop controller on the SFS1-CPU Main Board	03
Remote annunciator interface on the SFS1-CPU Main Board	04
Option card installed in Card Slot 4	05
Option card installed in Card Slot 5	06
Option card installed in Card Slot 6	07
3X-PMI Paging Microphone Interface	08
Display module connected to the option card installed in Card Slot 4	37
Display module connected to the option card installed in Card Slot 5	38
Display module connected to the option card installed in Card Slot 6	39

Figure 60: Logical addresses for an EST3X control panel



Hardware layer device addresses

Table 83 lists the device addresses for points on the EST3X hardware layer.

Table 83: EST3X hardware layer device addresses

Card	Device or circuit	Address
PS10-4B	NAC/AUX 1	PP020001
	NAC /AUX 2	PP020002
	NAC /AUX 3	PP020003
	NAC /AUX 4	PP020004
SFS1-CPU		
Loop 1	Detectors	PP030001 to PP030125
	Modules	PP030126 to PP030250
Loop 2	Detectors	PP030251 to PP030375
	Modules	PP030376 to PP030500
3-IDC8/4	IDC/ NAC 1	PPCC0001
	IDC / NAC 2	PPCC0002
	IDC 3	PPCC0003
	IDC 4	PPCC0004
	IDC / NAC 5	PPCC0005
	IDC / NAC 6	PPCC0006
	IDC 7	PPCC0007
	IDC 8	PPCC0008
3-SSDC1	Detectors	PPCC0001 to PPCC0125
	Modules	PPCC0126 to PPCC0250
3-SDDC1		
Loop 1	Detectors	PPCC0001 to PPCC0125
	Modules	PPCC0126 to PPCC0250
Loop 2	Detectors	PPCC0251 to PPCC0375
	Modules	PPCC0376 to PPCC0500
3-AADC1	Detectors	PPCC0001 to PPCC0099
	Modules	PPCC0101 to PPCC0199
3-ZA20(A/B)	Amplifier output	PPCC0000
	NAC output	PPCC0001
3-ZA40(A/B)	Amplifier output	PPCC0000
	NAC output	PPCC0001
3X-PMI	Default_Normal_PP_08	PP080001
	Default_Alert_PP_08	PP080002
	Default_EVAC_PP_08	PP080003
	Default_Pre_PP_08	PP080004
	MSG_005 to MSG_255	PP080005 to PP080255

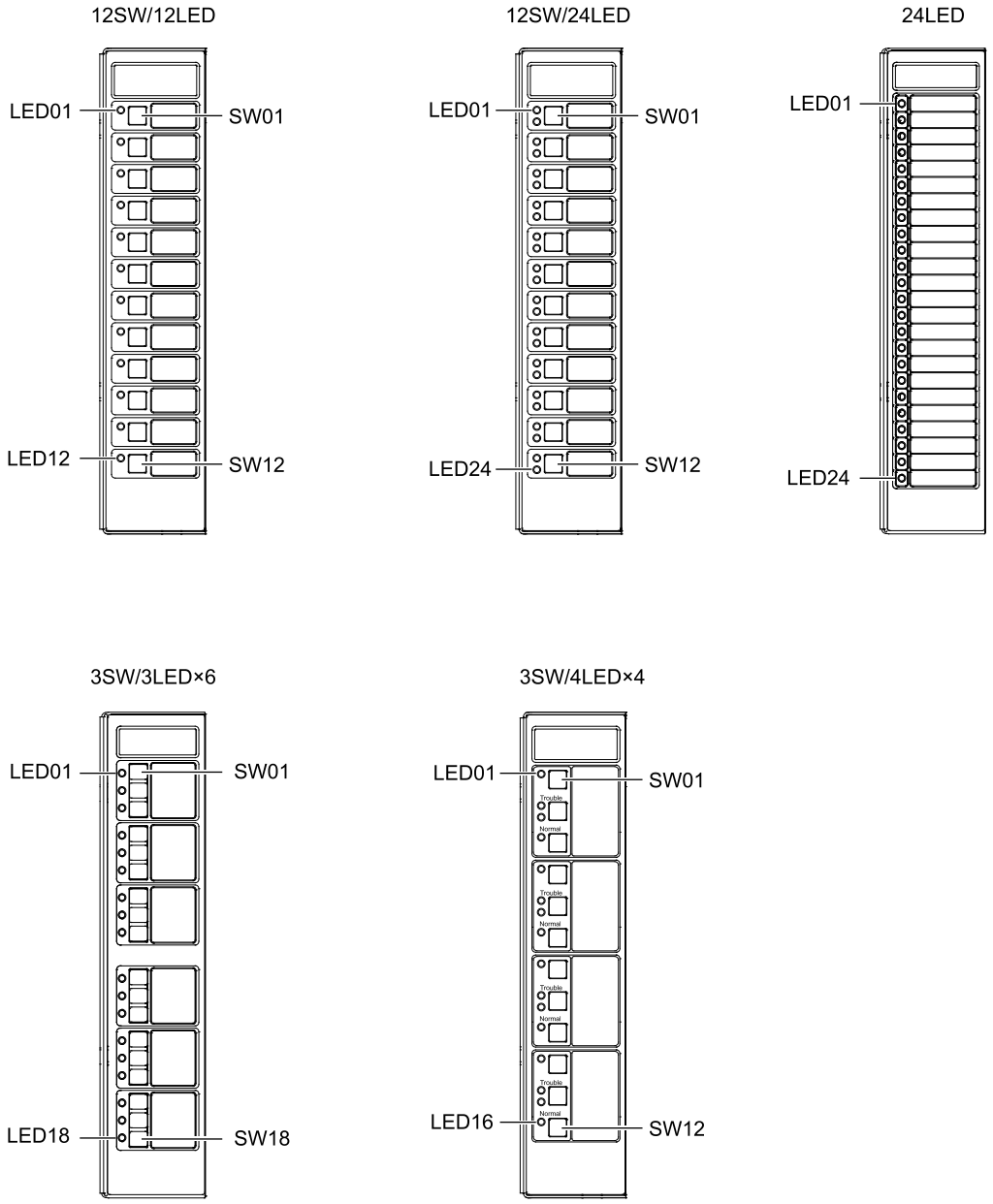
Operator layer device address

Table 84 lists the device addresses for points on the EST3X operator layer. See also Figure 61 on page 262.

Table 84: EST3X operator layer device addresses

Module type	**LED** or switch	Address
12SW/12LED	SW01 to SW12 LED01 to LED12	PPCC0001 to PPCC0012 PPCC0129 to PPCC0140
12SW/24LED	SW01 to SW12 LEDs	PPCC0001 to PPCC0012 PPCC0129 to PPCC0152
24LED	LED01 to LED24	PPCC0129 to PPCC0152
3SW/3LED×6	Switches LEDs	PPCC0001 to PPCC0018 PPCC0129 to PPCC0146
3SW/4LED×4	Switches LED01 LED02 LED03 LED04 LED05 LED06 LED07 LED08 LED09 LED10 LED11 LED12	PPCC0001 to PPCC0012 PPCC0129 PPCC0131 PPCC0132 PPCC0133 PPCC0135 PPCC0137 PPCC0138 PPCC0139 PPCC0141 PPCC0143 PPCC0144 PPCC0145

Figure 61: Operator layer LED and switch numbering



Remote annunciator device addresses

Table 85 on page 266 lists the device addresses for LEDs and switches on RLED-C remote annunciators, RLED24 expanders, GCI graphic annunciator cards, and GCIX expander cards. See also Figure 62, Figure 63, and Figure 64.

Figure 62: R-LED-C LED numbering

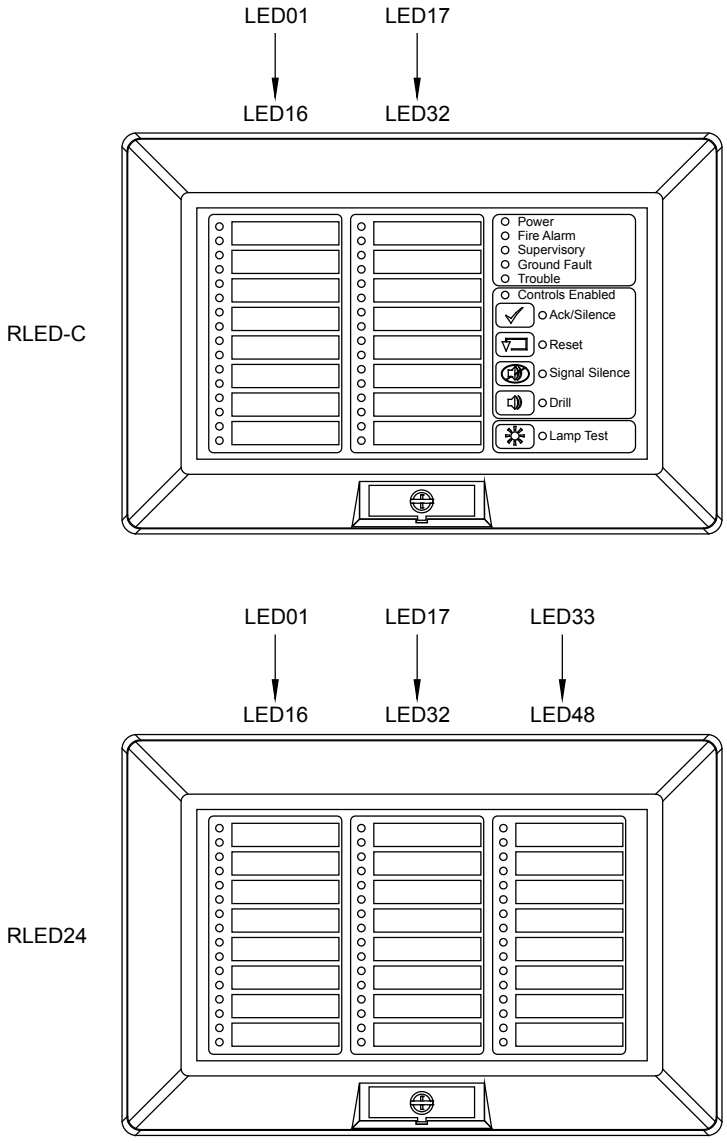


Figure 63: GCI card LED and switch numbering

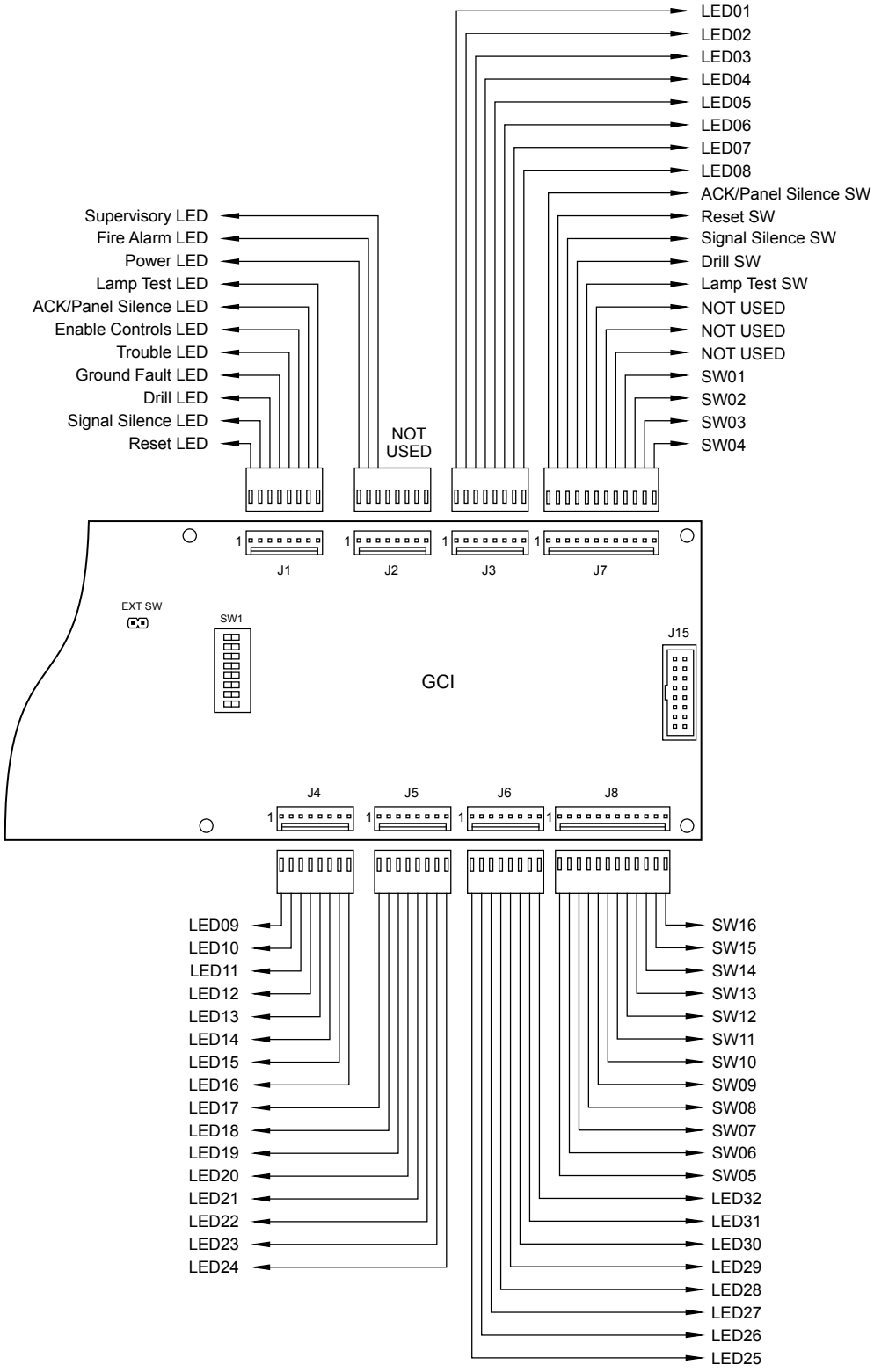


Figure 64: GCIX card LED and switch numbering

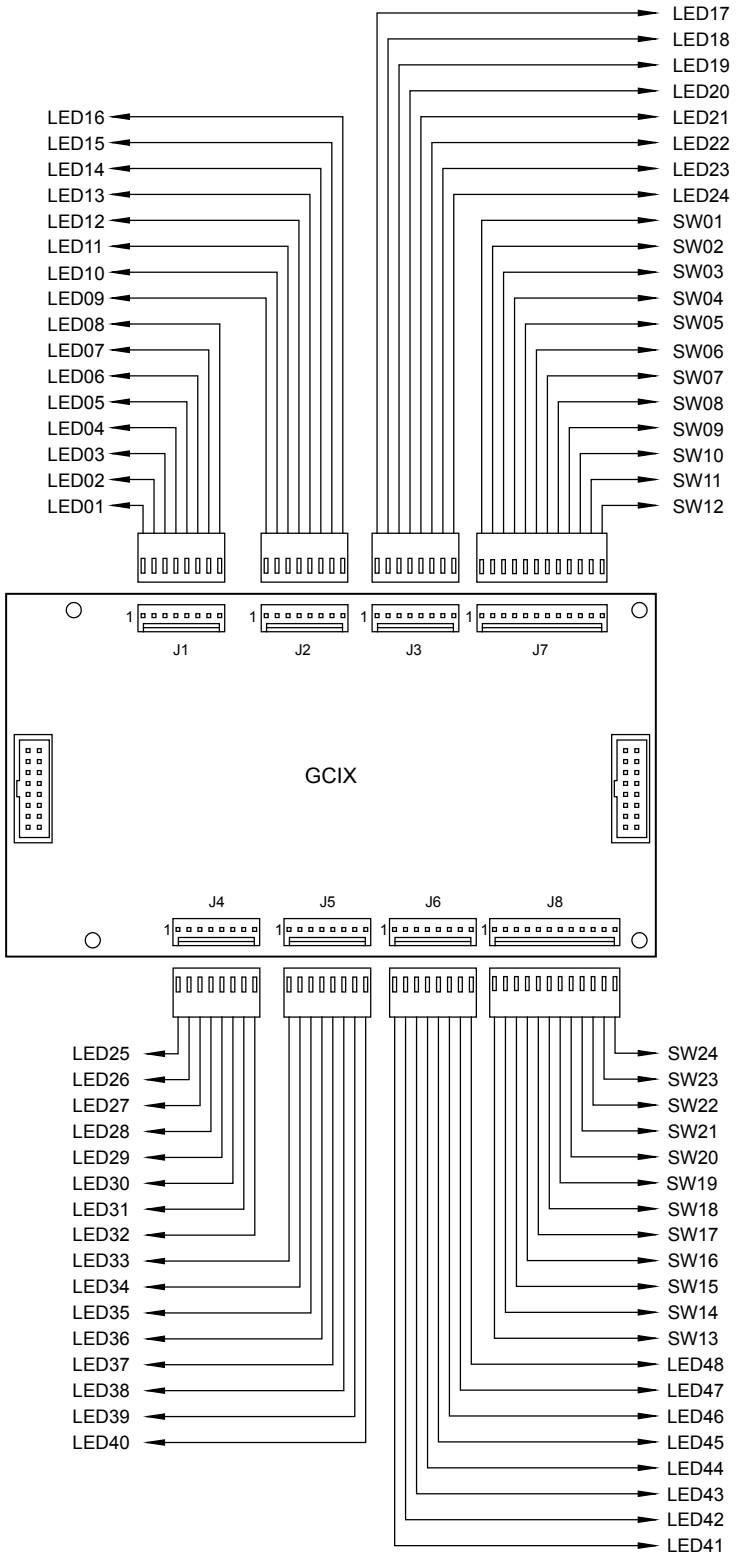


Table 85: Remote annunciator device addresses

No.	Annunciator	LED or switch	Address
1	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP040201 to PP040232 PP020249 to PP040264
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP040301 to PP040348 PP040349 to PP040372
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP040401 to PP040448 PP040449 to PP040472
2	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP040501 to PP040532 PP020549 to PP040564
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP040601 to PP040648 PP040649 to PP040672
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP040701 to PP040748 PP040749 to PP040772
3	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP040801 to PP040832 PP020849 to PP040864
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP040901 to PP040948 PP040949 to PP040972
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041001 to PP041048 PP041049 to PP041072
4	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP041101 to PP041132 PP021149 to PP041164
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041201 to PP041248 PP041249 to PP041272
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041301 to PP041348 PP041349 to PP041372
5	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP041401 to PP041432 PP021449 to PP041464
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041501 to PP041548 PP041549 to PP041572
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041601 to PP041648 PP041649 to PP041672
6	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP041701 to PP041732 PP021749 to PP041764
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041801 to PP041848 PP041849 to PP041872
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP041901 to PP041948 PP041949 to PP041972

No.	Annunciator	LED or switch	Address
7	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP042001 to PP042032 PP022049 to PP042064
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP042101 to PP042148 PP042149 to PP042172
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP042201 v PP042248 PP042249 to PP042272
8	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP042301 to PP042332 PP022349 to PP042364
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP042401 to PP042448 PP042449 to PP042472
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP042501 to PP042548 PP042549 to PP042572
9	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP042601 to PP042632 PP022649 to PP042664
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP042701 to PP042748 PP042749 to PP042772
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP042801 to PP042848 PP042849 to PP042872
10	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP042901 to PP042932 PP022949 to PP042964
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043001 to PP043048 PP043049 to PP043072
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043101 to PP043148 PP043149 to PP043172
11	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP043201 to PP043232 PP043249 to PP043264
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043301 to PP043348 PP043349 to PP043372
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043401 to PP043448 PP043449 to PP043472
12	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP043501 to PP043532 PP043549 to PP043564
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043601 to PP043648 PP043649 to PP043672
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043701 to PP043748 PP043749 to PP043772

No.	Annunciator	LED or switch	Address
13	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP043801 to PP043832 PP043849 to PP043864
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP043901 to PP043948 PP043949 to PP043972
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044001 to PP044048 PP044049 to PP044072
14	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP044101 to PP044132 PP044149 to PP044164
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044201 to PP044248 PP044249 to PP044272
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044301 to PP044348 PP044349 to PP044372
15	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP044401 to PP044432 PP044449 to PP044464
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044501 to PP044548 PP044549 to PP044572
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044601 to PP044648 PP044649 to PP044672
16	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP044701 to PP044732 PP044749 to PP044764
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044801 to PP044848 PP044849 to PP044872
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP044901 to PP044948 PP044949 to PP044972
17	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP045001 to PP045032 PP045049 to PP045064
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP045101 to PP045148 PP045149 to PP045172
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP045201 to PP045248 PP045249 to PP045272
18	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP045301 to PP045332 PP045349 to PP045364
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP045401 to PP045448 PP045449 to PP045472
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP045501 to PP045548 PP045549 to PP045572

No.	Annunciator	LED or switch	Address
19	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP045601 to PP045632 PP045649 to PP045664
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP045701 to PP045748 PP045749 to PP045772
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP045801 to PP045848 PP045849 to PP045872
20	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP045901 to PP045932 PP045949 to PP045964
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046001 to PP046048 PP046049 to PP046072
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046101 to PP046148 PP046149 to PP046172
21	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP046201 to PP046232 PP046249 to PP046264
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046301 to PP046348 PP046349 to PP046372
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046401 to PP046448 PP046449 to PP046472
22	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP046501 to PP046532 PP046549 to PP046564
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046601 to PP046648 PP046649 to PP046672
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046701 to PP046748 PP046749 to PP046772
23	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP046801 to PP046832 PP046849 to PP046864
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP046901 to PP046948 PP046949 to PP046972
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP047001 to PP047048 PP047049 to PP047072
24	RLED-C or GCI GCI	LED01 to LED32 SW01 to SW16	PP047101 to PP047132 PP047149 to PP047164
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP047201 to PP047248 PP047249 to PP047272
	RLED24 or GCIX GCIX	LED01 to LED48 SW01 to SW24	PP047301 to PP047348 PP047349 to PP047372

No.	Annunciator	LED or switch	Address
25	RLED-C or GCI	LED01 to LED32	PP047401 to PP047432
	GCI	SW01 to SW16	PP047449 to PP047464
	RLED24 or GCIX	LED01 to LED48	PP047501 to PP047548
	GCIX	SW01 to SW24	PP047549 to PP047572
	RLED24 or GCIX	LED01 to LED48	PP047601 to PP047648
	GCIX	SW01 to SW24	PP047649 to PP047672
26	RLED-C or GCI	LED01 to LED32	PP047701 to PP047732
	GCI	SW01 to SW16	PP047749 to PP047764
	RLED24 or GCIX	LED01 to LED48	PP047801 to PP047848
	GCIX	SW01 to SW24	PP047849 to PP047872
	RLED24 or GCIX	LED01 to LED48	PP047901 to PP047948
	GCIX	SW01 to SW24	PP047949 to PP047972
27	RLED-C or GCI	LED01 to LED32	PP048001 to PP048032
	GCI	SW01 to SW16	PP048049 to PP048064
	RLED24 or GCIX	LED01 to LED48	PP048101 to PP048148
	GCIX	SW01 to SW24	PP048149 to PP048172
	RLED24 or GCIX	LED01 to LED48	PP048201 to PP048248
	GCIX	SW01 to SW24	PP048249 to PP048272
28	RLED-C or GCI	LED01 to LED32	PP048301 to PP048332
	GCI	SW01 to SW16	PP048349 to PP048364
	RLED24 or GCIX	LED01 to LED48	PP048401 to PP048448
	GCIX	SW01 to SW24	PP048449 to PP048472
	RLED24 or GCIX	LED01 to LED48	PP048501 to PP048548
	GCIX	SW01 to SW24	PP048549 to PP048572
29	RLED-C or GCI	LED01 to LED32	PP048601 to PP048632
	GCI	SW01 to SW16	PP048649 to PP048664
	RLED24 or GCIX	LED01 to LED48	PP048701 to PP048748
	GCIX	SW01 to SW24	PP048749 to PP048772
	RLED24 or GCIX	LED01 to LED48	PP048801 to PP048848
	GCIX	SW01 to SW24	PP048849 to PP048872
30	RLED-C or GCI	LED01 to LED32	PP048901 to PP048932
	GCI	SW01 to SW16	PP048949 to PP048964
	RLED24 or GCIX	LED01 to LED48	PP049001 to PP049048
	GCIX	SW01 to SW24	PP049049 to PP049072
	RLED24 or GCIX	LED01 to LED48	PP049101 to PP049148
	GCIX	SW01 to SW24	PP049149 to PP049172

Logic group addresses

Table 86 lists the addresses for EST3X logic groups.

Table 86: EST3X logic group addresses

Logical output	Address
Command lists	00220001 to 00221999
Partitions	00230001 to 00230255
Instruction text	00240001 to 00240999
Zone groups	00250001 to 00250999
Service groups	00260001 to 00260255
AND groups	00270001 to 00270999
Matrix groups	00280001 to 00280255
Time controls	00300001 to 00300255
Guard patrols	00310001 to 00310255

Appendix C
Programming options

Summary

This appendix summarizes panel programming options.

Content

Programming options

For programming instructions, refer to the 3-SDU Help.

NOTICE TO USERS, INSTALLERS, AUTHORITIES HAVING JURISDICTION, AND OTHER INVOLVED PARTIES:

This product incorporates field-programmable software. In order for the product to comply with the requirements in the *Standard for Control Units and Accessories for Fire Alarm Systems*, UL 864, certain programming features or options must be limited to specific values or not used at all as indicated below.

Programmable feature or option	**Permitted in UL 864? (Y/N)**	**Possible settings**	**Settings permitted in UL 864**
Telephone line supervision	Y	No / Yes	Yes
Second telephone line	Y	No / Yes	No [1] Yes
Trouble Resound	Y	00:00:00 to 99:59:59	00:00:00 [2] to 24:00:00
AC Power Delay	Y	Disabled 01:00 to 45:00	01:00 to 03:00
Event message routing	Y	All Cabinets No Cabinets User defined routes (1 to 15)	All Cabinets No Cabinets [3] User defined routes (1 to 15) [4]
Event message display filtering: Alarm, Supervisory, and Trouble options	Y	Enabled Disabled	Enabled Disabled [5]
Delays (programmed in rules)	Y	0 to 65,535 seconds	0 to 65,535 seconds [6]
Alarm verification	Y	0 to 56 seconds	0 to 44 seconds
CMS event reporting priority (programmed in rules)	Y	1 to 255	1 to 255 [7]
CMS activate and restore messages (programmed in rules)	Y	Send on activation Send on restoration	Activation and restoration triggers must match the message type
Zone group member device types	Y	GENALARM SMOKE SMOKEVFY HEAT PULL STAGEONE STAGETWO WATERFLOW	GENALARM SMOKE SMOKEVFY [8] HEAT PULL STAGEONE [8] STAGETWO [8] WATERFLOW

Programmable feature or option	Permitted in UL 864? (Y/N)	Possible settings	Settings permitted in UL 864
AND group member device types, Activation event: Q1 - Alarm	Y	GENALARM SMOKE SMOKEVFY HEAT PULL STAGEONE STAGETWO WATERFLOW	GENALARM SMOKE SMOKEVFY [9] HEAT PULL STAGEONE [9] STAGETWO [9] WATERFLOW
AND group device activation count	Y	1 to 255	1 to 255 [10]
Matrix group member device types	Y	GENALARM SMOKE SMOKEVFY HEAT PULL STAGEONE STAGETWO WATERFLOW	GENALARM SMOKE SMOKEVFY [8] HEAT PULL STAGEONE [8] STAGETWO [8] WATERFLOW
Matrix groups: Device activation count	Y	3 to 10	3 to 10 [10]
Signature input modules: Personality code 18	N	N/A	N/A
SIGA-IO(-MIO) modules: Personality codes 35 and 36	N	N/A	N/A
CO Supervisory	N	Latching Nonlatching	N/A
CO Monitor	N	Latching Nonlatching	N/A

[1] Allowed only when the supervising station supervises the telephone line and annunciates fault conditions within 200 seconds
[2] Allowed only on control panels that transmit trouble event signals off premises
[3] Allowed only with monitor device types and switches
[4] Allowed only if the user route includes the control panel
[5] Allowed only on nonrequired remote annunciators
[6] Allowed only when setting does not prevent the activation or transmission of alarm or supervisory signals within 10 seconds or trouble signals within 200 seconds
[7] When priorities are used, alarm events must have a higher priority than supervisory and trouble events
[8] Not allowed in Zone groups that are used to initiate the release of extinguishing agent or water
[9] Not allowed in AND groups that are used to initiate the release of extinguishing agent or water
[10] A minimum device activation count of 2 is required if the AND group or Matrix group is used to initiate the release of extinguishing agents or water

Glossary

Term	Definition
active	Points that are in an alarm state.
activate	To turn on or energize. Pertains to outputs (including logical outputs).
alarm	The state of a fire alarm initiating device that has detected a smoke or fire condition. The state of a security device that has been triggered.
alarm silence timer	A panel option that automatically silences the notification appliance circuits (NACs) after a preprogrammed time limit after the last alarm.
AND statement	A system input defined in the 3-SDU that activates when *all* the input conditions as indicated in its AND statement list, are active.
card	Modules that connect to the electronics chassis and control-display modules.
Class A IDC	A circuit, connected directly to initiating devices that signals a trouble condition upon an open condition on the circuit. All devices wired on the circuit to continue to operate in the event of a single open. Similar to Style D & E integrity monitoring.
Class A NAC	A circuit, connected directly to notification appliances that signals a trouble condition upon an open or shorted condition on the circuit. All appliances wired on the circuit to continue to operate in the event of a single open. Similar to Style Z integrity monitoring.
Class B IDC	A circuit, connected directly to initiating devices that signals a trouble condition upon an open condition on the circuit. All devices wired on the circuit to continue to operate up to the location of a break. Similar to Styles A, B, C, & D integrity monitoring.
Class B NAC	A circuit connected directly to notification appliances that signal a trouble condition upon an open or shorted condition on the circuit. All appliances wired on the circuit to continue to operate up to the location of a break. Similar to Styles W, X, and Y integrity monitoring.

CMS	Central monitoring station
command list	A predefined list of 3-SDU commands. You can activate a command list from a rule, from another command list, or from an external command and control system.
DACT	Digital alarm communicator transmitter. A system component which transmits digital alarm, supervisory, and trouble signals to a central monitoring station (CMS) over dial-up telephone lines. The 3-MODCOM is a DACT.
database	User-defined, permanently stored, system parameters containing system zone definitions, device types, responses, messages, etc.
device	Circuits, buttons, or LEDs that exist on the electronics chassis and all addressable devices connected by field wiring. Any Signature Series detector or module.
device address	A number that uniquely identifies a detector or module on a Signature data loop
dialer	See DACT.
disable	Prevent an input, output, or system feature from functioning.
download	To send a project database configured in the 3-SDU on your PC to the system control panel.
enable	Permit an input, output, or system feature to function.
EVAC	Emergency Voice/Alarm Communications.
fiber optic	Communication format that uses light signals carried on glass fibers to transmit and receive data.
global domain	Features that operate in all network cabinets.
group	A collection of Signature devices defined in the 3-SDU that is treated as a single entity for programming purposes. Groups can have messages and responses over and above the messages and responses of the individual group members.
IDC	Initiating device circuit. An input circuit connected directly to any manual or automatic initiating device, whose normal operation results in an alarm or supervisory signal indication at the control panel. The electrical integrity of the circuit is monitored by the fire alarm system.
label	A unique identifier for an object.
local system	A system that operates according to the provisions of NFPA 72, Chapter 3.
loop	The wiring that connects devices to the fire alarm control panel.
matrix	A correlation sheet defined in the 3-SDU that indicates the relationship between the activation of an input and the effect it will have upon all system outputs.

modem	Short for modulator/demodulator. A communications device that enables a computer to transmit information over a standard telephone line. Sophisticated modems are also capable of such functions as automatic dialing, answering, and redialing in addition to transmitting and receiving. The 3-MODCOM includes a modem.
NAC	Notification appliance circuit. A circuit connected directly to notification appliances. The electrical integrity of the circuit is monitored by the fire alarm system.
output	A signal generated by the system based upon responses defined in the system database and sent to external field devices. Outputs are LEDs and modules.
output priority	A system of hierarchy that allows or prevents setting or resetting outputs. Output priorities range from low to high.
personality code	A number code used to set the configuration and operation of a SIGA module. The personality code is either factory installed or must be downloaded into SIGA modules for proper operation.
power-limited	Wiring and equipment that conforms with and is installed to the *National Electrical Code*, Article 760, power-limited provisions.
proprietary system	A system that operates according to the provisions of NFPA 72, Chapter 4-4.
pseudo point	An input or output point that is not a physical device. For example, ground fault and communication fault notifications.
reset	An active condition or command used to force an output to its OFF condition. An output's OFF state may be in the restored condition (normal condition, not under the influence of a response) or the reset condition. An output reset state contains a priority level.
response	A list of outputs or functions that occur as a result of the change of state of an input.
restore	Refers to a condition of an input, where the input is not active. It also refers to the condition of an output where the output is not in its set or reset condition and does not have a priority value associated with it.
riser	An electrical path that contains power or a signal that is used by multiple outputs, zones, or circuits.
RS-232	A serial communications format normally used for serial peripheral devices from a computer. RS-232 cables have a maximum length of 50 ft (15.2M).
RS-485	A serial differential communications format used to communicate between the panel and remote annunciators.
SDU	EST3 System Definition Utility program. Software that lets programmers configure and program an EST3X control panel.
sensitivity	The relative percent obscuration of a detector.

sequence	A series of actions separated by time delays.
service group	A collection of devices defined in the 3-SDU that are configured for testing as a group using the system test function.
signaling line circuit	The wiring that connects devices to the fire alarm control panel.
Signature data loop	The wiring that connects Signature Series devices to the fire alarm control panel.
supervisory circuit	An IDC input circuit used to monitor the status of critical fire protection equipment.
supervisory open (trouble)	A condition generated when a supervisory zone is open or in ground fault, or when a Signature Series device is not responding to a poll.
System definition utility	See SDU.
time control	An input activated by the time of day or day of the month.
verification alarm	Upon receipt of an alarm by a smoke detector, verified detectors attempt to automatically reset. Receipt of a second alarm within the 60-second confirmation period after the automatic detector reset period is indicative of a verified alarm.
zone	A group of Signature Series detectors and modules defined in the SDU that has a unique zone number and acts as a single entity for programming purposes whenever any component of the zone is activated

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