



# EST4 Technical Reference Manual

# Content

	Important information	iv
<b>Chapter 1</b>	<b>Introduction</b>	1
	About this manual	2
	Intended audience	2
	Life safety system limitations	2
<b>Chapter 2</b>	<b>Product description</b>	3
	System overview	4
	Cybersecurity	5
	Network topologies	6
	Supported fire alarm system types	6
	Migrating an EST3 system to an EST4 system	11
	Control unit components	11
	EST4 LCD display modules	18
	Fire privilege levels	26
	LCD screen operator controls	28
<b>Chapter 3</b>	<b>Operating instructions</b>	37
	Operating states	38
	Control unit power up	41
	Obtaining and recording node MAC addresses	42
	Downloading the 4-CU firmware and project database to the control unit	43
	Signing in and out of the control unit	46
	User administration	46
	Setting the system date and time	49
	Changing the LCD screen to an alternate language	50
	Silencing the operator alert signal	50
	Silencing alarm signals	51
	Acknowledging events	51
	Requesting, granting, and denying command center control	52
	Resetting the life safety system	55
	Rebooting the life safety system	55
	Clearing the alarm history	56
	Freezing the events history	56
	Viewing event details	57
	Viewing and printing system reports	59
	Closing system reports and details reports	61
	Disabling and enabling devices	63
	Disabling and enabling local rail modules (LRMs)	64
	Disabling and enabling logic groups	64
	Disabling and enabling time controls	65
	Activating alarm signals manually	66
	Testing the system and devices	66
	Changing output states	68
	Switching the smoke detector alarm sensitivity threshold	68
	Configuration of the Alarm Sensitivity button on EST4 networks	69
	System Function 1 through 4 on EST4 networks	70
	Adding and deleting holidays	70
	Control-display modules	71

<b>Chapter 4</b>	<b>Installation 73</b>
	System installation sequence 74
	Component installation 75
	Installing a node module in an existing network 87
	Preliminary field wiring testing 89
	Network pass-through compatibility 90
	Circuit compatibility 91
	UL 864 notification appliance circuit signal synchronization 92
	Connecting PT-1S series printers 98
	Connecting a CDR-3 for coded tone output 101
	Adjusting amplifier output levels 103
<b>Chapter 5</b>	<b>Supplementary applications 105</b>
	Notification Control Areas 106
	Mass notification system (MNS) emergency communication 107
	Audio subsystem 108
	Prerecorded Message Operation 113
	Remote annunciation 118
	Graphic annunciation 119
	Communication services 119
	VESDA aspirating smoke detectors 126
	ModuLaser aspirating smoke detectors 127
	Centralized audio applications 129
	Building management control system 145
<b>Chapter 6</b>	<b>Preventive maintenance and testing 147</b>
	Visual inspections 148
	Routine maintenance and tests 149
	System trouble and maintenance log 155
	Record of completion 156
<b>Chapter 7</b>	<b>Service and troubleshooting 157</b>
	System repairs 158
	Precautions 158
	Hardware problems 159
	Hardware troubleshooting 159
	Pseudo points 177
	Understanding Signature data loops 178
	Signature loop controller troubleshooting 187
	Signature device troubleshooting 188
<b>Appendix A</b>	<b>System calculations 193</b>
	Network data riser limits 194
	Signature data loop wire length 194
	Notification appliance circuit calculations 201
	25 or 70 VRMS NAC wire length 206
	Cabinet battery 207
	Fiber optic cable worksheet 212
<b>Appendix B</b>	<b>System addressing 213</b>
	Address format 214
	Module addresses 214
	LRM device addresses 217
	Control-display device addresses 217

<b>Appendix C</b>	<b>Pseudo points table</b> 223 Pseudo points 224
<b>Appendix D</b>	<b>UL 864 programming requirements</b> 269 UL 864 programming requirements 270
	<b>Glossary</b> 273
	<b>Index</b> 277

# Important information

## Regulatory information

This product has been designed to meet the requirements of NFPA 72 National Fire Alarm Signaling Code, UL 864 Standard for Control Units and Accessories for Fire Alarm Systems, and CAN/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 Carrier 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 Carrier 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 Carrier 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, Carrier 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.

## EST4 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(P) 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 a 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(P) 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

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 2

Intended audience 2

Life safety system limitations 2

## About this manual

This manual provides information on how to install, program, and operate an EST4 control unit. 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 unit and its operation. It also provides descriptions of the command menus.

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

**Chapter 4, Installation:** Provides installation information for system components and applications. It is intended for those trained and authorized to maintain the life safety system.

**Chapter 5, Supplementary applications:** Provides technical descriptions of supplementary applications that can expand system capabilities.

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

**Chapter 7, Service and troubleshooting:** Provides instructions for servicing and troubleshooting the life safety system. It is intended for those trained and authorized to maintain the 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, System addressing:** Provides a list of logical addresses for system modules and devices.

**Appendix C, Pseudo points:** Provides pseudo point addresses, sources, and descriptions that can be used to troubleshoot pseudo point events.

**Appendix D, UL 864 programming requirements:** Summarizes the operation of the system.

## Intended audience

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

## Life safety system limitations

The purpose of an automatic life safety 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 life safety system to provide adequate protection. As such, an automatic life safety 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 life safety system professionals design, install, test, and maintain your life safety system in accordance with national and local fire codes.

Life safety 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 fire alarm control unit (FACU) and its components, and the operator interface controls, indicators, and commands.

## Content

System overview	4
System size	4
4-CU computer specifications	5
Cybersecurity	5
Network topologies	6
Supported fire alarm system types	6
Protected Premises (Local) Fire Alarm System	6
Auxiliary Alarm System	6
Remote Supervising Station Alarm System	7
Smoke Control System	7
Releasing Fire Alarm System	8
Central Station Service Alarm System	8
EVAC Emergency Communication System	9
In-building Mass Notification System	9
Proprietary Supervising Station Alarm System	10
Proprietary Protected Premises Unit	10
Migrating an EST3 system to an EST4 system	11
Control unit components	11
EST4 LCD display modules	18
Operator alert signal	18
User interface command controls and indicators	19
LCD screen indications	22
Event indicators and event counters	24
Event message lists	24
Event Display Priorities	26
Fire privilege levels	26
LCD screen operator controls	28
LCD screen user interface icons and option buttons	28
List bar	30
Action bar	31
Command bar	32

# System overview

The EST4 control unit can operate as a stand-alone control unit or in a Class B/DCLB, Class A/DCLA, Class X/DCLC, Class N, or full mesh EST4 life safety network. Control unit cabinets are available in a variety of sizes and are designed to use modular hardware components that can meet most applications.

EST4 user interface modules mount onto the inner door UI frame assembly and hardware modules onto the backbox chassis rail for data processing, intrapanel communication of command and control data, response data, audio signal processing, and power distribution. Most field wiring is terminated using plug-in terminal strips for easy installation and servicing of modules. Refer to “Control unit components” on page 11 for a list of standard FACU components and optional equipment.

## System size

Table 1 lists the maximum hardware capabilities for EST4 control units.

**Table 1: EST4 hardware capabilities**

Item	Maximum capacity
<b>EST4 stand-alone</b>	
Signaling line circuits (SLC)	10
Addressable detectors	2,500 (250 detectors each SLC)
Addressable modules	2,500 (250 modules each SLC)
Initiating device circuits	144 Class B/DCLB
Notification appliance circuits	72 Class B/DCLB
Aspirating smoke detectors	61
Reverse polarity outputs	3
LED/switch annunciators	24
<b>EST4 network</b>	
Remote annunciators and graphic annunciators	The networked system is capable of scaling to 100 emergency control centers with user interfaces (UIs) for command and control, audio and firefighters telephone
Networked EST4 control units	<p>150 nodes total (maximum of 100 nodes (99 hops max.) can be connected in a flat Class B/DCLB network) [1][2]</p> <p><b>Network scale:</b></p> <p>150 nodes,            375,000 Signature addressable devices (150 nodes × 10 signaling line circuits × 250 devices),            VESDA: 1,525 aspirating smoke detectors (25 4-ASDCPU × 61 detectors),            ModuLaser: 3,810 aspirating smoke detectors and modules (30 4-ASDCPU × 127 detectors/modules)            (Note: Supports up to 112 ModuLaser detectors per 4-ASDCPU),            86,400 annunciation indicators; 86,400 control switches,            250 audio messages;            100 command centers; 100 audio channels per notification control area,            200 audio channels per system</p>

[1] The 4-NET-TP-HC supports a maximum of two simultaneous audio IP streams of live paging or 1 VRMS input in addition to pre-recorded audio. A network with 4-NET-TP-HC connections supports a maximum of 15 nodes. Live firefighter's telephone is not supported.

[2] The 4-NET-XT supports a single audio IP stream of live paging or 1 VRMS input in addition to pre-recorded audio. A network with 4-NET-XT connections supports a maximum of 15 nodes. Live firefighter's telephone is not supported.

## 4-CU computer specifications

The 4-CU computer specifications provided in Table 2 below are the *minimum* recommended requirements for performing 4-CU functions. While the minimum requirements are acceptable, 4-CU performance can be improved by increasing computer memory and processor speed.

Two factors affect the amount of time it takes for a 4-CU database conversion to EST4 control units:

- Computer size (processor speed and memory)
- Project size (number of control units in a network and number of devices)

**Example:** For a computer with the minimum recommended requirements, a project with 12 control units and 4,000 devices may take only 10 minutes for a database conversion. However, a project with 30 control units and 25,000 devices may take 90 minutes for a database conversion.

**Table 2: Minimum recommended 4-CU computer specifications**

Minimum requirement	
Operating system	Windows 10 Professional (64 bit)
Processor [1]	7th Generation Core i5
Memory [1]	16 GB RAM
Hard drive	512 GB SSD (unencrypted)
Display/Monitor	17 inch, 1920 × 1080

[1] The project size affects the amount of time for a database conversion. Increasing the computer memory size and processor speed can reduce conversion time.

## Cybersecurity

The EST4 life safety system provides levels of protection and the flexibility to deploy in a manner that can help with cybersecurity requests. The system's flexibility allows the installer to work with the building owner and local IT professionals to match the system to their IT and cybersecurity needs.

- Airgap: EST4 has multiple levels of physical security that can be used to meet simple airgap requirements in systems without firewalls.
- Internal network: EST4 has multiple levels of physical security that can be used, such as tamper switches and control unit keyed door locks.
- Firewalls: When external connections are needed, EST4 protects the life safety network by offering the fire listed 4-FWAL series firewall modules. The 4-FWAL separates the life safety network from outside networks.
- Access and authentication: Access to an EST4 system is based on industry-standard, best practices. First a physical barrier, the locked door, provides a barrier to the system. To gain access to higher level system operations, a seven-digit PIN is required. All control unit access is role-based; a user can only perform actions explicitly allowed by system configuration and the permissions policy set in the system configuration.

See *EST4 Network and Audio Application Guide* (P/N 3102306) for detailed information on how EST4 addresses cybersecurity protection.

## Network topologies

EST4 allows wiring topology to be determined by the needs of your installation. The various supported topologies can be combined on a single network as well as hybrid variations. For more information see *EST4 Network and Audio Application Guide* (P/N 3102306).

## Supported fire alarm system types

The EST4 fire alarm control unit is listed for use as the following types of fire alarm systems:

- Protected Premises (Local) Fire Alarm System
- Auxiliary Alarm System
- Remote Supervising Station Alarm System
- Smoke Control System
- Releasing Fire Alarm System
- Central Station Service Alarm System
- Emergency Voice/Alarm Communication System (EVAC)
- In-building Mass Notification System
- Proprietary Supervising Station Alarm System

The minimum requirements to meet each service listing are shown below. For optional components, refer to *EST4 UL Listing Document* (P/N 3102629).

### Protected Premises (Local) Fire Alarm System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-COMREL common relay card (optional)
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device circuit module (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display module(s) (at least one control-display module)

### Auxiliary Alarm System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-COMREL common relay card (optional)
- 4-FWAL1 firewall module (at least one)

- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device circuit module (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display module(s) (at least one control-display module)
- 3-MODCOM modem communicator module or 3-MODCOMP modem communicator plus pager module (at least one)
- 3-OPS off-premises signaling module (when used with outside wiring a UL listed secondary protector manufactured by DITEK, Model DTK36VLPSCP must be used)
- RPM reverse polarity module
- CTM city tie module

## Remote Supervising Station Alarm System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-COMREL common relay option card
- 4-NET-TP(-HC) twisted pair controller or 4-NET-CAT Small Form-Factor Pluggable (SFP) network controller (one pair is needed for interunit network communication)
- 4-NET-SM -MM, -SMH, -SMU, -SMD SFP fiber-optic network controller (one pair is needed for interunit network communication; the 4-NET-SMU and 4-NET-SMD make one up/down pair)
- 4-FWAL-SM -MM -SMH -SMU -SMD -CAT SFP firewall adapters (one plus the appropriate 4-FWAL is required for non-interunit interfacing)
- 4-FWAL-1 -2 -3 -4 firewall module (one or more control-display modules required if control unit is used as a firefighter smoke control station (FSCS))
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device circuit module (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display module(s) (at least one control-display module)
- 3-MODCOM modem communicator module or 3-MODCOMP modem communicator plus pager module (at least one)
- 3-OPS off-premises signaling module (when used with outside wiring a UL listed secondary protector manufactured by DITEK, Model DTK36VLPSCP must be used)
- RPM reverse polarity module
- CTM city tie module

## Smoke Control System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)

- 4-CPU central processor unit
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card(at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display module(s) (one or more control-display modules required if control unit is used as an FSCS)

## Releasing Fire Alarm System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S control-display modules (at least one control-display module)
- SIGA-REL releasing module

## Central Station Service Alarm System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-NET-TP(-HC) twisted pair 4-NET-CAT SFP network controller (one pair is needed for interunit network communication)
- 4-NET-SM -MM, -SMH, -SMU, -SMD SFP fiber-optic network controller (one pair is needed for interunit network communication; the 4-NET-SMU and 4-NET-SMD make one up/down pair)
- 4-FWAL-SM -MM -SMH -SMU -SMD -CAT SFP firewall adapters (one plus the appropriate 4-FWAL is required for non-interunit interfacing)
- 4-FWAL-1 -2 -3 -4 firewall module (one or more control-display modules required if control unit is used as an FSCS)
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display modules (at least one control-display module)
- 3-MODCOM modem communicator module or 3-MODCOMP modem communicator plus pager module

## EVAC Emergency Communication System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device (at least one IDC module or SLC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display modules (at least one control-display module)
- 4-MIC paging microphone
- IB3-125 or IB3-250 Dukane amplifier (at least one amplifier) (EST4 is capable of producing a 520 Hz low-frequency signal tone via the following listed amplifiers: 3-ZA20A/B, 3-ZA40A/B, 3-ZA95A/B, SIGA-AA30, SIGA-AA50, 1B3-125, or 1B3-250. Refer to the EST4 Compatibility List for compatible low-frequency audible appliances.)
- 3-ZA20(A/B), 3-ZA40(A/B), or 3-ZA95 zone amplifier (at least one amplifier; at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)

## In-building Mass Notification System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-NET-TP(-HC) twisted pair controller or 4-NET-CAT SFP network controller (one pair is needed for interunit network communication)
- 4-NET-SM -MM, -SMH, -SMU, -SMD SFP fiber-optic network controller (one pair is needed for interunit network communication; the 4-NET-SMU and 4-NET-SMD make one up/down pair)
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device (at least one IDC module or SLC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display modules (at least one control-display module)
- 4-MIC paging microphone
- 3-ZA20(A/B), 3-ZA40(A/B), or 3-ZA95 zone amplifier (at least one amplifier; at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)

## Proprietary Supervising Station Alarm System

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-NET-TP(-HC) twisted pair controller or 4-NET-CAT SFP network controller (one pair is needed for interunit network communication)
- 4-NET-SM -MM, -SMH, -SMU, -SMD SFP fiber-optic network controller (one pair is needed for interunit network communication; the 4-NET-SMU and 4-NET-SMD make one up/down pair)
- 4-USBHUB multiport USB hub module
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device circuit module (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- PT-1S series printer (For EST4 Proprietary applications to meet CAN/ULC-S559 requirement for printing 50 events in 90 seconds, a PT-1S+ printer should be used. If a PT-1S printer is used, the first line printed, which is comprised of Event Type+Branch path+label text, can only be a maximum of 35 characters for the PT-1S printer to meet the requirement.)
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display module(s) (at least one control-display module)

## Proprietary Protected Premises Unit

- 3-CAB5B, 7B, 14B, or 21B control unit backbox (at least one backbox and appropriate door)
- 4-CAB8D, 16D, 24D, 24DRL or 3-CAB7D, 14D, 21D door assembly (at least one door and appropriate backbox)
- 3-PPS/M(-230) or 4-PPS/M power supply (a primary power supply is required for every 4-CPU that is in the system)
- 4-CPU central processor unit
- 4-NET-TP(-HC) twisted pair controller or 4-NET-CAT SFP network controller (one pair is needed for interunit network communication)
- 4-NET-SM -MM, -SMH, -SMU, -SMD SFP fiber-optic network controller (one pair is needed for interunit network communication; the 4-NET-SMU and 4-NET-SMD make one up/down pair)
- 4-USBHUB multiport USB hub module
- 3-SDDC1, 3-SDDC2, 3-SSCD1, or 3-SSDC2 SLC module and 3-SDC1(-HC) data circuit card (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- 3-IDC8/4 initiating device circuit module (at least one SLC module or IDC module must be installed with one output programmed for an audible EVAC and one input configured for initiating)
- PT-1S series printer (For EST4 Proprietary applications to meet CAN/ULC-S559 requirement for printing 50 events in 90 seconds, a PT-1S+ printer should be used. If a PT-1S printer is used, the first line printed, which is comprised of Event Type+Branch path+label text, can only be a maximum of 35 characters for the PT-1S printer to meet the requirement.)
- 4-LCD or 4-3LCD display module user interface (4-3LCD when not using 4-CABxD doors)
- 4-24L, 4-24L12S, 4-24L18S, 4-24L24S, 3-24R, 3-24Y, 3-24G, 3-12RY, 3-12SG, 3-12SR, 3-12SY, 3-12/S1GY, 3-12/S1RY, 3-12/S2Y, 3-12/S2R, 3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3S2RY, 3-4/3SGYWR control-display module(s) (at least one control-display module)

# Migrating an EST3 system to an EST4 system

EST3 life safety control units can be migrated to an EST4 life safety control unit by replacing certain modules and hardware. Equipment replacement requirements depends on your system design. Refer to the *EST3 to EST4 Migration Guide* (P/N 3102305) for details on how to upgrade an EST3 life safety control unit to an EST4 life safety control unit.

## Control unit components

This section describes the compatible equipment enclosures, modules, and accessories that can be used with the EST4 control unit.

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

**Table 3: Equipment enclosures**

Model	Description
<b>Backboxes</b>	
3-CAB series backboxes	<p>Equipment backboxes: Semi-flush or surface mount backboxes that provide the housing for locally installed EST4 components and batteries.</p> <ul style="list-style-type: none"> <li>3-CAB5B: Includes a built in rail assembly providing five local rail module spaces, one footprint for a power supply, and a 1/2 footprint. Space for two 10 Ah standby batteries. Use with 4-CAB8D series door assemblies. See installation sheet P/N 3102288 for specifications.</li> <li>3-CAB7B: Space for one chassis assembly providing seven local rail module spaces. Space for two 18 Ah standby batteries. Use with 4-CAB16D series door assemblies. See installation sheet P/N 387557 for specifications.</li> <li>3-CAB14B: Space for two chassis assemblies each providing seven local rail module spaces. Space for two 18 Ah standby batteries. Use with 4-CAB24D series door assemblies. See installation sheet P/N 387557 for specifications.</li> <li>3-CAB21B: Space for three chassis assemblies each providing seven local rail module spaces. Space for two 18 Ah standby batteries. Use with 4-CAB24DL series door assemblies. See installation sheet P/N 387557 for specifications.</li> </ul>
4-ANNMT series annunciator backboxes	<p>Annunciator backboxes. Provides the housing for annunciator equipment. See installation sheet P/N 3102276 for specifications.</p> <ul style="list-style-type: none"> <li>4-2ANNMT: 2 wide annunciator backbox includes a trim kit for surface mounting or semiflush mounting. Used with 4-2ANN annunciator assembly.</li> <li>4-4ANNMT: 4 wide annunciator backbox includes a trim kit for surface mounting or semiflush mounting. Used with 4-4ANN annunciator assembly.</li> <li>4-6ANNMT: 6 wide annunciator backbox includes a trim kit for surface mounting or semiflush mounting. Used with 4-6ANN annunciator assembly.</li> <li>4-8ANNMT: 4 wide x two rows high annunciator backbox, surface mount. Used with 4-8ANN annunciator assembly. For semiflush mounting use 3-CAB5B.</li> <li>4-16ANNMT: 8 wide x two rows high annunciator backbox, surface mount. Used with 4-16ANN annunciator assembly. For semiflush mounting use 3-CAB7B.</li> <li>4-24ANNMT: 8 wide x three rows high annunciator backbox, surface mount. Used with 4-24ANN annunciator assembly. For semiflush mounting use 3-CAB14B.</li> </ul>

Model	Description
<b>Doors</b>	
4-CAB8D series doors	<p>4-CAB8D Series Door: Includes an inner and outer door. The outer door provides a viewing window and is secured with a key lock. The inner door incorporates one 4-4ANNFA UI frame assembly that provides mounting for the optional user interface modules (4-LCD, 4-LCDANN, 4-LCDAUDTEL, 24L series control-display modules, 4-FT, and 4-MIC). See installation sheet P/N 3102272 for specifications.</p> <p><b>Note:</b> Use with the 3-CAB5B Equipment Backbox and the 4-8ANNMT.</p> <ul style="list-style-type: none"> <li>• 4-CAB8D: Bronze door assembly</li> <li>• 4-CAB8DR: Red door assembly</li> </ul>
4-CAB16D series doors [1]	<p>4-CAB16D Series Door: Includes an inner and outer door. The outer door provides a viewing window and is secured with a key lock. The inner door incorporates two 4-8ANNFA UI frame assemblies that provide mounting for the optional user interface modules (4-LCD, 4-LCDANN, 4-LCDAUDTEL, 24L series control-display modules, 4-FT, and 4-MIC). See installation sheet P/N 3102273 for specifications.</p> <p><b>Note:</b> Use with the 3-CAB7B Equipment Backbox and the 4-16ANNMT.</p> <ul style="list-style-type: none"> <li>• 4-CAB16D: Bronze door assembly</li> <li>• 4-CAB16DR: Red door assembly</li> </ul>
4-CAB24D series doors [1]	<p>4-CAB24D Series Door: Includes an inner and outer door. The outer door provides a viewing window and is secured with a key lock. The inner door incorporates three 4-8ANNFA UI frame assemblies that provide mounting for the optional user interface modules (4-LCD, 4-LCDANN, 4-LCDAUDTEL, 24L series control-display modules, 4-FT, and 4-MIC). See installation sheet P/N 3102274 for specifications.</p> <p><b>Note:</b> Use with the 3-CAB14B Equipment Backbox and the 4-24ANNMT.</p> <ul style="list-style-type: none"> <li>• 4-CAB24D: Bronze door assembly</li> <li>• 4-CAB24DR: Red door assembly</li> </ul>
4-CAB24DL series doors [1]	<p>4-CAB16D Series Door: Includes an inner and outer door. The outer door provides a viewing window and is secured with a key lock. The inner door incorporates three 4-8ANNFA UI frame assemblies that provide mounting for the optional user interface modules (4-LCD, 4-LCDANN, 4-LCDAUDTEL, 24L series control-display modules, 4-FT, and 4-MIC). See installation sheet P/N 3102275 for specifications.</p> <p><b>Note:</b> Use with the 3-CAB21B Equipment Backbox.</p> <ul style="list-style-type: none"> <li>• 4-CAB24DL: Bronze door assembly</li> <li>• 4-CAB24DRL: Red door assembly</li> </ul>
4-2ANND	Annunciator door assembly: Includes an inner and outer door. The outer door has a viewing window and is secured with a key lock. The inner door incorporates a 4-2ANNFA UI Frame Assembly that provides mounting for user interface modules. The 4-2ANND mounts to the 4-2ANNMT backbox and is included with the 4-2ANN annunciator assembly. See installation sheet P/N 3102278 for specifications.
4-4ANND	Annunciator door assembly: Includes an inner and outer door. The outer door has a viewing window and is secured with a key lock. The inner door incorporates a 4-4ANNFA UI Frame Assembly that provides mounting for user interface modules. The 4-4ANND mounts to the 4-4ANNMT backbox and is included with the 4-4ANN annunciator assembly. See installation sheet P/N 3102289 for specifications.
4-6ANND	Annunciator door assembly: Includes an inner and outer door. The outer door has a viewing window and is secured with a key lock. The inner door incorporates a 4-6ANNFA UI Frame Assembly that provides mounting for user interface modules. The 4-6ANND mounts to the 4-6ANNMT backbox and is included with the 4-6ANN annunciator assembly. See installation sheet P/N 3102290 for specifications.

[1] The outer door can be modified to install a locally sourced New York City lock. For more information see *EST4 New York City Panel Lock Installation Sheet* (P/N 3102293).

**Table 4: Power supplies**

Model	Description
3-BBC/M(-230)	<p>Booster/Charger Supply: Provides additional power to the control unit, and shares the control unit's 24 VDC electrical load with the 3-PPS/M. The 3-BBC/M is comprised of a heat sink assembly and a monitor module. The booster supply monitor module provides the interface between the booster power supply and the control unit, making the required data and power connections to and from the rail chassis. The heat sink assembly mounts onto four studs on the back panel of the 3-CHAS7 rail chassis and the monitor module plugs into the chassis rail. See installation sheet P/N 270495 for specifications.</p> <p><b>Note:</b> The module must be firmware version 3.63 or higher.</p>
3-BPS/M(-230)	<p>Booster Power Supply: Provides additional power to the control unit, and shares the control unit's 24 VDC electrical load with the 3-PPS/M. The 3-BPS/M is comprised of a heat sink assembly and a monitor module. The booster supply monitor module provides the interface between the booster power supply and the control unit, making the required data and power connections to and from the rail chassis. The heat sink assembly mounts onto four studs on the back panel of the 3-CHAS7 rail chassis and the monitor module plugs into the chassis rail. See installation sheet P/N 270495 for specifications.</p> <p><b>Note:</b> The module must be firmware version 3.63 or higher.</p>
3-PPS/M(-230)	<p>Primary Power Supply: Provides the required power and related supervision functions for the control unit, as well as filtered and regulated power to the LRM's and 24 VDC for ancillary equipment. The 3-PPS/M is comprised of a heat sink assembly and a monitor module. The heat sink assembly mounts onto four studs on the back panel of the 3-CHAS7 rail chassis and the monitor module plugs into the chassis rail. See installation sheet P/N 270495 for specifications.</p> <p><b>Note:</b> The module must be firmware version 3.63 or higher.</p>
4-PPS/M	<p>Power Supply: Replaces the 3-PPS/M Primary Power Supply, 3-BPS/M Booster Power Supply, and 3-BBC/M Booster Charger Supply. The 4-PPS/M can be configured as a primary power supply (PPS), booster power supply (BPS), or booster charger (BBC).</p> <p>Provides the required power and related supervision functions for the control unit. A 4-PPS/M consists of a power supply unit mainboard and a monitor module. The mainboard mounts onto the back of the chassis or cabinet. The module plugs into one chassis rail space and is secured to the rail using snap rivet fasteners.</p> <p>PPS: When configured as a PPS the power supply provides filtered, regulated power to the rail chassis modules as well as 24 VDC for operating ancillary equipment.</p> <p>BPS or BBC: When configured as a booster power supply (BPS or BBC) the power supply provides additional power over and above that of the primary power supply.</p> <p>See installation sheet P/N 3102673 for specifications.</p>

**Table 5: Control unit sub-assemblies**

Model	Description
<b>Central processor units</b>	
4-CPU	<p>Central Processor Module: Processes all information from modules installed in the same cabinet and networked control units. Installs onto two spaces on the rail chassis assembly. See installation sheet P/N 3102258 for specifications.</p> <p><b>Note:</b> The 4-COMREL Common Relay Module and 4-AUDTELS Audio IO and Telephone Riser Source Module can be used with the 4-CPU.</p>
4-ANNCPU	<p>Annunciator Central Processor Module: Processes all control information from switches on the displays, as well as processing the data received from the network for display. The module is used in FACU and remote annunciator enclosures. See installation sheet P/N 3102264 for specifications.</p> <p><b>Note:</b> The 4-ANNAUDTEL Annunciator Audio Telephone Interface Module can be used with the 4-ANNCPU.</p>

Model	Description
4-ASDCPU	Aspirating Smoke Detector Central Processor Module. Processes communication to VESDA and ModuLaser aspirating smoke detectors. See installation sheet P/N 3102880 for specifications.  <b>Note:</b> The 4-ASDCPU Aspirating Smoke Detector Central Processor Module must be used with the 4-CPU, 4-ANNCPU, or 4-CPUGRPH.
4-CPUGRPH	Graphic Annunciator Central Processor Module: Provides connection to 3-EVDVR(A) and 3-EVPWR(A) graphic annunciators. Installs in the graphic annunciator backbox. See installation sheet P/N 3102346 for specifications.
<b>LCDs</b>	
4-LCD	Main LCD Display Module: Provides the user interface for the fire alarm control unit. The module includes operator command controls, LED indicators, and a resistive touch screen (4.5 x 3.4 in., 18 bit color, 640 x 480 pixels) capable of displaying eight events (768 10-point characters).The module installs in the top, far left space on the inner door UI frame assembly and connects to the 4-CPU. See installation sheet P/N 3102261 for specifications.
4-3LCD	EST3 Upgrade Main LCD Display Module: Replacement for the 3-LCD when upgrading EST3 systems. Installs on the 4-CPU. See installation sheet P/N 3102259 for specifications.
4-LCDAUDTEL	Audio and Firefighter Telephone Control LCD Display Module: Provides the user interface for the firefighter telephone and microphone. Installs in the far left space on the inner door UI frame assembly and connects to the 4-ANNCPU. See installation sheet P/N 3102262 for specifications.
<b>Chassis rail modules</b>	
3-IDC8/4	Traditional zone I/O module: Provides eight Class B/DCLB 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 backbox chassis rail. See installation sheet 270492 for specifications.  <b>Note:</b> The module must be firmware version 3.60 or higher.
3-MODCOM	Modem communicator module: Provides dialer communications between the control unit and remote locations over telephone lines. Installs on the backbox chassis rail. See installation sheet P/N 387476 for specifications.  <b>Note:</b> The module must be firmware version 3.60 or higher. The firmware can be upgraded only by serial download.
3-MODCOMP	Modem communicator module with pager interface: Provides dialer communications between the control unit and remote locations over telephone lines. It also can send information to individual predefined pagers. Installs on the backbox chassis rail. See installation sheet P/N 387476 for specifications.  <b>Note:</b> The module must be firmware version 3.60 or higher. The firmware can be upgraded only by serial download.
3-OPS	Off-premises signaling module: Provides three independent reverse polarity circuits for transmitting alarm, supervisory, and trouble signals to compatible receivers. Can also be configured to provide a single reverse polarity connection (reverses on alarm, opens on trouble) or for a local energy municipal box connection. Installs on the backbox chassis rail. See installation sheet P/N 270494 for specifications.  <b>Note:</b> The module must be firmware version 3.00 or higher.
3-SDC1	Signature data circuit card: Provides a Class B/DCLB or Class A/DCLA signaling line circuit and resettable 24 VDC for powering conventional two-wire smoke detector circuits on Signature modules. Installs on the rail chassis. See installation sheet P/N 3101772 for specifications.
3-SDC1-HC	Signature loop controller card: Optional replacement card for the 3-SDC1 for installations where the signaling line circuit has more than 90 isolators and isolator bases (with SIGA1 sensors installed). Provides a Class B/DCLB, Class A/DCLA, or Class X/DCLC signaling line circuit and resettable 24 VDC for powering conventional two-wire smoke detector circuits on Signature modules. See installation sheet P/N 3102326 for specifications.

Model	Description
3-SDDC1	<p>Dual Signature loop controller module: Provides two Class B/DCLB, Class A/DCLA, or Class X/DCLC Signature data loops for Signature detectors and modules. The module also provides a connection for powering conventional two-wire smoke detector circuits on Signature modules. Installs on the backbox chassis rail. See installation sheet P/N 3100584 for specifications.</p>
	<p><b>Note:</b> The module must be firmware version 5.20 or higher. The firmware can be upgraded only by serial download.</p>
3-SSDC1	<p>Single Signature loop controller module: Provides one Class B/DCLB, Class A/DCLA, or Class X/DCLC Signature data loop for Signature detectors and modules. The module also provides a connection for powering conventional two-wire smoke detector circuits on Signature modules. Installs on the backbox chassis rail. See installation sheet P/N 3100584 for specifications.</p>
	<p><b>Note:</b> The module must be firmware version 5.20 or higher. The firmware can be upgraded only by serial download.</p>
3-SSDC2	<p>Single Signature loop controller module: Provides one Class B/DCLB, Class A/DCLA, or Class X/DCLC 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 backbox chassis rail. See installation sheet, P/N 3102703 for specifications.</p>
3-SDDC2	<p>Dual Signature loop controller module: Provides two Class B/DCLB, Class A/DCLA, Class X/DCLC 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 backbox chassis rail. See installation sheet P/N 3102703 for specifications.</p>
3-ZA20(A/B)	<p>20-watt zoned audio amplifier module: Provides a standard 25 or 70 VRMS audio circuit, a power-limited 24 VDC notification appliance circuit, and integrated 1000 Hz temporal tone generators. EST4 nodes store their prerecorded messages locally. Programmed messages become active when a locally generated alarm is initiated, even when a catastrophic network failure occurs. The zoned amplifier's temporal tone generators will produce a backup signal should the main CPU suffer a catastrophic failure.</p>
	<p>Installs on the backbox chassis rail. See installation sheet P/N 387463 for specifications.</p>
	<p><b>Note:</b> The module must be firmware version 3.64 or higher.</p>
3-ZA40(A/B)	<p>40-watt zone audio amplifier module: Provides a standard 25 or 70 VRMS audio circuit, a power-limited 24 VDC notification appliance circuit, and integrated 1000 Hz temporal tone generators. EST4 nodes store their prerecorded messages locally. Programmed messages become active when a locally generated alarm is initiated, even when a catastrophic network failure occurs. The zoned amplifier's temporal tone generators will produce a backup signal should the main CPU suffer a catastrophic failure.</p>
	<p>Installs on the backbox chassis rail. See installation sheet P/N 387463 for specifications.</p>
	<p><b>Note:</b> The module must be firmware version 3.64 or higher.</p>
3-ZA95	<p>95-watt zone audio amplifier module: Provides a standard 25 or 70 VRMS audio circuit and integrated 1000 Hz temporal tone generators.</p>
	<p>EST4 nodes store their prerecorded messages locally. Programmed messages become active when a locally generated alarm is initiated, even when a catastrophic network failure occurs. The zoned amplifier's temporal tone generators will produce a backup signal should the main CPU suffer a catastrophic failure.</p>
	<p>Installs on the backbox chassis rail. See installation sheet P/N 3100765 for specifications.</p>
	<p><b>Note:</b> The module must be firmware version 3.64 or higher.</p>

#### Riser and relay cards

4-ANNAUDTEL	<p>Annunciator audio telephone interface option card: Used with the 4-ANNCPU to process information from the 4-FT Firefighter Telephone Master Handset and 4-MIC Paging Microphone. The option card installs on the 4-ANNCPU. See installation sheet P/N 3102325 for specifications.</p>
-------------	--

Model	Description
4-AUDTELS	<p>Audio IO and Telephone Riser Source Module: Used with the 4-CPU to process information from the 4-FT Firefighter Telephone Master Handset and 4-MIC Paging Microphone.</p> <p>Provides a single telephone riser and/or up to four 1 VRMS Audio inputs/outputs to a 4-CPU. The option card and terminal board mount on the back side of the 4-CPU. See installation sheet P/N 3102279 for specifications.</p>
4-COMREL	<p>Common Relay Module: Provides common alarm, common trouble, and common supervisory relay outputs, and connections for end-of-line resistors. Installs on the 4-CPU. See installation sheet P/N 3102284 for specifications.</p>
<b>User interface modules</b>	
4-24L series control-display modules	<p>EST4 control-display modules: Provides additional user interface capability for the life safety system. Installs onto the inner door UI frame assembly. See installation sheet P/N 3102263 for specifications.</p> <ul style="list-style-type: none"> <li>• 4-24L: 24 LEDs (programmable as red, yellow, green, white, or blue)</li> <li>• 4-24L12S: 12 LED-switches with 2 LEDs per switch (programmable as red, yellow, green, white, or blue)</li> <li>• 4-24L18S: 6 groups of 3 LED-switches with 4 LEDs per switch (programmable as red, yellow, green, white, or blue)</li> <li>• 4-24L24S: 24 LED-switches with 24 LEDs (programmable as red, yellow, green, white, or blue)</li> </ul>
4-FT	<p>Firefighter Telephone Master Handset: Provides local telephone handset support to EST4 control units and remote annunciators. Installs onto the inner door UI frame assembly. Controls and indicators are provided via a 4-LCD or 4-LCDAUDTEL display modules or 4-24L series control display modules. See installation sheet 3102267 for specifications.</p>
4-MIC	<p>Paging microphone: Provides local microphone paging support to an EST4 control unit. Installs onto the inner door UI frame assembly. Controls and indicators are provided via a 4-LCD or 4-LCDAUDTEL display module. See installation sheet P/N 3102266 for specifications.</p>

**Table 6: Network sub-assemblies [1]**

Model	Description
<b>Firewall modules</b>	
4-FWAL series firewall modules	<p>Firewall modules: Blocks unauthorized access to the EST4 life safety network, while permitting outward communication. See installation sheet P/N 3102280 for specifications.</p> <ul style="list-style-type: none"> <li>• 4-FWAL1: Supports communication with Fireworks, ACS services, and third party devices.</li> <li>• 4-FWAL2: Supports communication with Fireworks, ACS services, third party devices, , IP DACT dialer, and web browser services.</li> <li>• 4-FWAL3: Supports communication with Fireworks, ACS services, third party devices, web browser services, and email services.</li> <li>• 4-FWAL4: Supports communication with Fireworks, ACS services, third party devices, IP DACT dialer, web browser services, and email services.</li> </ul>
<b>Small Form-Factor Pluggable (SFP) modules</b>	
4-FWAL-CAT	<p>100 Mbps SFP network adapter. Provide 100Base-TX RJ-45 internetwork connections between the EST4 system and external or peripheral systems. The adapter mounts in one SFP slot in the 4-FWALx Series Firewall Module. See installation sheet P/N 3102322 for specifications.</p>
4-FWAL series fiber-optics network adapters	<p>Firewall SFP network adapters: Input/output devices for use on the 4-FWAL series firewall modules. The 4-FWAL series SFP controllers provide internetwork connections between the EST4 system and external or peripheral systems. The adapters mount in one SFP slot in the 4-FWALx Series Firewall Module. See installation sheet P/N 3102277 for specifications.</p> <p>4-FWAL-SM: SFP network media interface, single-mode fiber-optic, with a 9/125 <math>\mu</math> (G.652) fiber pair up to 6.2 miles (10 km).</p>

Model	Description
	<p>4-FWAL-MM: SFP network media interface, multi-mode fiber-optic, with a 50/125 <math>\mu</math> (OM3/OM4) fiber pair up to 1.24 mi. (2 km), 62.5/125 <math>\mu</math> (OM1) fiber pair up to 0.62 mi. (1 km), or a 100/140 <math>\mu</math> fiber pair up to 150 m.</p> <p>4-FWAL-SMH: SFP network media interface, single-mode fiber-optic, high-power output, with a 9/125 <math>\mu</math> (G.652) fiber pair up to 24.8 mi (40km).</p> <p>4-FWAL-SMU: SFP network media interface, bi-directional, single-mode fiber-optic with a 9/125 <math>\mu</math> (G.652) fiber up to 6.2 miles (10 km). The 4-FWAL-SMU must be paired with a 4-FWAL-SMD.</p> <p>4-FWAL-SMD: SFP network media interface, bi-directional, single-mode fiber-optic with a 9/125 <math>\mu</math> (G.652) fiber up to 6.2 miles (10 km). The 4-FWAL-SMD must be paired with a 4-FWAL-SMU.</p>
4-NET-CAT	100 Mbps SFP Network Controller: Supports all command and control, live and recorded audio functions, and live firefighters telephone network functions. Plugs into one SFP slot in the 4-CPU, 4-ANNCPU, 4-CPUGRPH, or the 4-NET-AD modules. See installation sheet P/N 3102270 for specifications.
4-NET-TP	Twisted Pair SFP Network Controller: Supports all command and control, and live and recorded audio functions. The 4-NET-TP also supports live firefighters telephone network functions. Plugs into one SFP slot in the 4-CPU, 4-ANNCPU, 4-CPUGRPH, or the 4-NET-AD modules. See installation sheet 3102268 for specifications.
4-NET-TP-HC [2]	Twisted Pair SFP Network Controller High Capacity: Supports all command and control, and live and recorded audio functions. Plugs into one SFP slot in the 4-CPU, 4-ANNCPU, 4-CPUGRPH, or the 4-NET-AD modules. See installation sheet 3102268 for specifications.
4-NET series fiber-optics network controllers	<p>Fiber-optic SFP network controllers: Provides intranetwork connections within the life safety system. The controllers mount in one SFP slot in the 4-CPU, 4-ANNCPU, 4-CPUGRPH, or the 4-NET-AD network controllers. See installation sheet P/N 3102271 for specifications.</p> <ul style="list-style-type: none"> <li>• 4-NET-MM: Multi-mode fiber-optic, with a 50/125 <math>\mu</math> (OM3/OM4) fiber pair up to 1.24 mi. (2 km), 62.5/125 <math>\mu</math> (OM1) fiber pair up to 0.62 mi. (1 km), or a 100/140 <math>\mu</math> fiber pair up to 150 m.</li> <li>• 4-NET-SMH: Dual filament, single-mode fiber-optic, high-power output, with a 9/125 <math>\mu</math> (G.652) fiber pair up to 24.8 mi (40km).</li> <li>• 4-NET-SMU: Single filament, single-mode fiber-optic with a 9/125 <math>\mu</math> (G.652) fiber up to 6.2 miles (10 km). The 4-NET-SMU must be paired with a 4-NET-SMD.</li> <li>• 4-NET-SMD: Single filament, single-mode fiber-optic with a 9/125 <math>\mu</math> (G.652) fiber up to 6.2 miles (10 km). The 4-NET-SMD must be paired with a 4-NET-SMU.</li> <li>• 4-NET-SM: Dual filament, single-mode fiber-optic, with a 9/125 <math>\mu</math> (G.652) fiber pair up to 6.2 miles (10 km).</li> </ul>

#### Expander modules

4-NET-AD	Network Adder Module: Provides additional 4-NET series SFP network connections, allowing additional network interconnections from a control unit or annunciator. See installation sheet 3102287 for specifications.
4-NET-XT [3]	Twisted Pair Full Duplex Network Extender Module: Provides long distance network data between nodes, typically using existing telephone single-pair wires. Supports all command and control, and live and recorded audio functions. See installation sheet 3102286 for specifications.

[1] EST4 supports network pass-through mode of operation on the 4-CPU, 4-ANNCPU, 4-NET-AD, and 4-CPUGRPH CPUs. Pass-through from the CPU module eth1 and eth0 network connections is supported from one SFP to another SFP of any like-rated SFP module type except a 4-NET-TP to a 4-NET-TP-HC connection. For more information see "Network pass-through compatibility" on page 90 and the *EST4 Network and Audio Application Guide* (P/N 3102306).

[2] The 4-NET-TP-HC supports a maximum of two simultaneous audio IP streams of live paging or 1 VRMS input in addition to prerecorded audio. A network with 4-NET-TP-HC connections supports a maximum of 15 nodes. Note that a 4-NET-XT is not for use with firefighter telephones.

[3] The 4-NET-XT supports a single audio IP stream of live paging or 1 VRMS input in addition to prerecorded audio. A network with 4-NET-XT connections supports a maximum of 15 nodes. The 4-NET-XT is not for use with firefighter telephones.

**Table 7: Control unit accessories**

Model	Description
4-USBHUB	Multi-port USB Hub Module: Provides isolated RS-232 for a CDR-3 connection, USB and terminal block connections, isolated host for system printer, and no isolated device USB connections. Installs in a half-footprint space in the enclosure. See installation sheet P/N 3102281 for specifications.
Tamper switches	Tamper switch: Used to detect an open cabinet door. See installation sheet P/N 387422 for specifications. <ul style="list-style-type: none"> <li>• 4-TAMP: Used with EST4 doors. Installs on the top or side of a 3-CAB7B, 3-CAB14B, 3-CAB21B.</li> <li>• 3-TAMP: Used with EST3 doors. Installs on the top or side of a 3-CAB7B, 3-CAB14B, 3-CAB21B.</li> <li>• 3-TAMP5: Used with EST3 or EST4 doors. Installs on the top or side of a 3-CAB5, 3-CAB5B.</li> <li>• 3-TAMPRCC: Used with 3-RCC enclosure doors. Installs on the top or side of a 3-RCCxR.</li> </ul>
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 equipment backbox. See installation sheet P/N 3100023 for specifications.
PT-1S PT-1S+	Serial Printer: Connects to the fire alarm control unit to print system events such as status changes, active events, or reports. <ul style="list-style-type: none"> <li>• PT-1S: See installation sheet P/N 3100989 for specifications.</li> <li>• PT-1S+: See installation sheet P/N 3102823 for specifications.</li> </ul> <p><b>Note:</b> For an isolated connection, use the 4-USBHUB.</p>

## EST4 LCD display modules

An EST4 system uses LCD display modules to provide the user interface for the fire alarm control unit.

- The 4-LCD and 4-3LCD modules are main LCD display modules that include operator command controls, LED indicators, and an LCD screen.
- The 4-LCDAUDTEL Audio and Firefighter Telephone Control LCD Display Module includes an operator LCD screen.

## Operator alert signal

In coordination with visual event notifications on the user interface, the control unit employs an audible signal to alert the operator of off-normal system conditions for active event conditions. Different operator alert signal patterns are assigned to the event queues. Table 8 below shows the signal patterns used in the US Market. Note that the market setting for your control unit may result in different patterns.

**Note:** The operator alert signal may automatically sound a reminder signal, if supported by the market.

**Table 8: Operator alert patterns (US Market patterns shown)**

Event queue	Operator alert pattern
Call In	3 pulses every 16 seconds
Control Request	2 pulses every 4 seconds
Alarm	3 pulses every 4 seconds
Emergency	3 pulses every 4 seconds
Supervisory	2 pulses every 4 seconds

Event queue	Operator alert pattern
Building	2 pulses every 4 seconds
Disable	1 pulse every 4 seconds
Trouble	1 pulse every 4 seconds
Ground	1 pulse every 4 seconds
Other	1 pulse every 16 seconds

## User interface command controls and indicators

The 4-LCD and 4-3LCD user interface command controls and indicators are shown in the figure below. See Table 9 below for a description of each control and indicator.

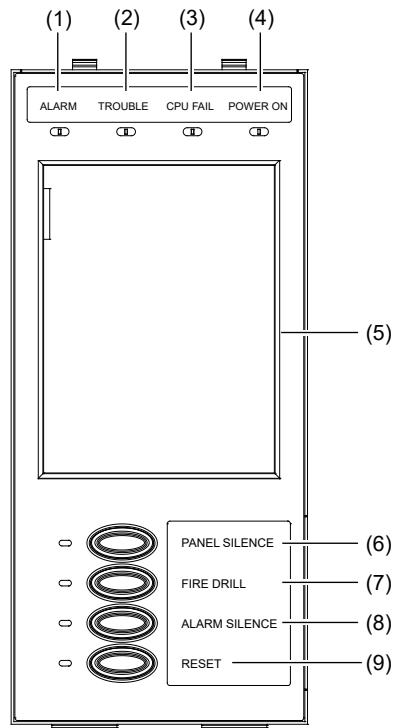


Table 9: User interface command controls and indicators descriptions

No.	Control/Indicator	Description
1	Alarm LED	The LED serves as a common alarm event indicator.
2	Trouble LED	The LED serves as a common trouble event indicator.
3	CPU Fail LED	The LED indicates that the CPU has detected a processor failure. Processor failures must be reset manually using the Reset button. A steady LED indicates that the CPU Fail pseudo point is active. An off LED indicates that CPU communications have been restored.

No.	Control/Indicator	Description
4	Power On LED	<p>The LED indicates the power status for the control unit. The indicator is set by the selected market.</p> <p><b>Power Always On:</b> A steady LED indicates that either primary power or standby power are present. An off LED indicates that both primary power and standby power are missing.</p> <p><b>Power Follows AC:</b> A steady LED indicates that primary power is present and off when primary power is missing. An off LED indicates that standby power is present or is missing.</p> <p><b>Power Only If Available AC and Battery:</b> A steady LED indicates that both primary power and standby power are present. An off LED indicates that either primary power or standby power are missing.</p>
5	LCD screen	<p>The LCD screen display provides information relevant to the current condition of the control unit, as well as operator controls. See “LCD screen indications” on page 22 for details on the LCD screen.</p>
6	Panel Silence button and LED (button one default label and setting)	<p>This configurable button is programmed by default as Panel Silence.</p> <p>The button can be configured as:</p> <p><b>Panel Silence:</b> For Local mode systems, pressing the Panel Silence button turns the operator alert signal off and acknowledges all events have been reviewed.</p> <p>For Proprietary mode systems, the Panel Silence button is not operational. The operator alert signal only silences after each event has been individually acknowledged in the order displayed.</p> <p>The Panel Silence LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating the control unit is in an off-normal condition and the control unit has been placed in Panel Silence mode, and turns off when the system returns to normal.</p> <p><b>Drill:</b> Pressing the Fire Drill button activates the system drill response. Pressing the button a second time cancels the drill response.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Alternate Alarm Sensitivity:</b> Smoke detectors can operate using two levels of sensitivity: primary and alternate. Pressing the Alternate Sensitivity button switches Signature detectors to their alternate operating settings. Pressing the button a second time switches them back to primary sensitivity levels.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Acknowledge:</b> Pressing the Acknowledge button acknowledges events.</p> <p>For Proprietary mode systems, pressing the Acknowledge button acknowledges an event and turns the operator alert signal off when each event has been individually acknowledged in the order displayed.</p> <p><b>Note:</b> For Local mode systems, the button acts only as a scroll down button and does not acknowledge events. Pressing the button scrolls down to select the next event in the currently active queue displayed on the LCD.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the system returns to normal.</p> <p><b>Lamp Test:</b> Pressing the Lamp Test button temporarily turns on all visual indicators on the local control unit and the LCD screen cycles through colors to reveal any dead pixels.</p>

No.	Control/Indicator	Description
		<p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Note:</b> If the local control unit is part of a command center, the lamp test is also executed on all nodes within the command center.</p> <p><b>System Function 1, System Function 2, System Function 3, or System Function 4:</b> Pressing the System Function button activates the response programmed for function.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Note:</b> No action assigned.</p>
7	Fire Drill button and LED (button two default label and setting)	<p>This configurable button is programmed by default as Drill (Fire Drill).</p> <p>The button can be configured in the 4-CU as:</p> <p><b>Drill:</b> Pressing the Fire Drill button activates the system drill response. Pressing the button a second time cancels the drill response.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Panel Silence:</b> For Local mode systems, pressing the Panel Silence button turns the operator alert signal off and acknowledges all events have been reviewed.</p> <p>For Proprietary mode systems, the Panel Silence button is not operational. The operator alert signal only silences after all events have been acknowledged.</p> <p>The Panel Silence LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating the control unit is in an off-normal condition and the control unit has been placed in Panel Silence mode, and turns off when the system returns to normal.</p> <p><b>Alternate Alarm Sensitivity:</b> Smoke detectors can operate using two levels of sensitivity: primary and alternate. Pressing the Alternate Sensitivity button switches Signature detectors to their alternate operating settings. Pressing the button a second time switches them back to primary sensitivity levels.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Acknowledge:</b> Pressing the Acknowledge button acknowledges events.</p> <p>For Proprietary mode systems, pressing the Acknowledge button acknowledges an event and turns the operator alert signal off when all events have been acknowledged in the order displayed.</p> <p><b>Note:</b> For Local mode systems, the button acts only as a scroll down button and does not acknowledge events. Pressing the button scrolls down to select the next event in the currently active queue displayed on the LCD.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the system returns to normal.</p> <p><b>Lamp Test:</b> Pressing the Lamp Test button temporarily turns on all visual indicators on the local control unit and the LCD screen cycles through colors to reveal any dead pixels.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Note:</b> If the local control unit is part of a command center, the lamp test is also executed on all nodes within the command center.</p>

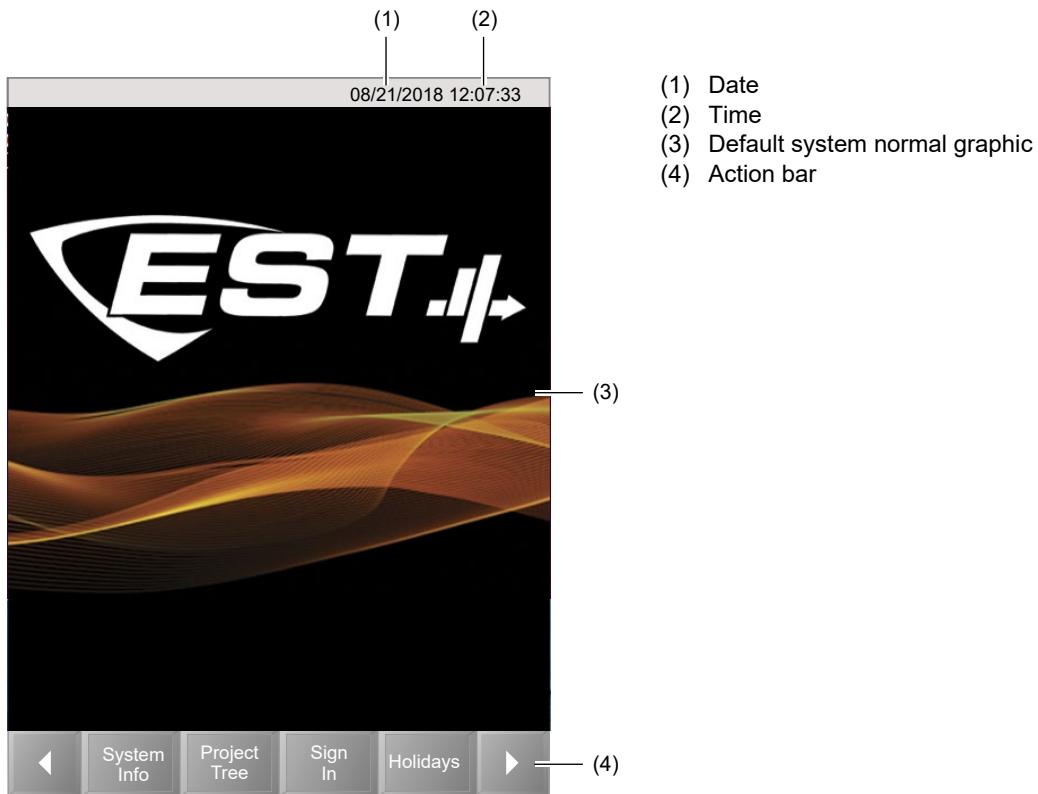
No.	Control/Indicator	Description
		<p><b>System Function 1, System Function 2, System Function 3, or System Function 4:</b> Pressing the System Function button activates the response programmed for function.</p> <p>The LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the command function is active, and turns off when the function ends.</p> <p><b>Note:</b> No action assigned.</p>
8	Alarm Silence button and LED (button three)	<p>This non-configurable button is programmed as Alarm Silence.</p> <p>Pressing the Alarm Silence button turns off the EVAC and ALERT channels, and all active audible and visible NACs if configured. Pushing the button a second time turns the notification appliance circuits back on. This button may be used to cancel the drill signal.</p> <p>The Alarm silence LED turns on as white while the button is pressed. When the button is released, the LED is on steady as yellow, indicating that the active notification appliance circuits have been silenced, and turns off when the system returns to normal.</p> <p><b>Note:</b> Project configuration settings affect the operation of the Alarm Silence function.</p>
9	Reset button and LED (button four)	<p>This non-configurable button is programmed as Reset.</p> <p>Pressing the Reset button activates the system's reset sequence to restore the system to normal.</p> <p>The Reset LED turns on as white while the button is pressed. When the button is released, the LED flashes as green quickly during the smoke power-down phase, flashes slowly during the power-up phase, is on steady during the restoral phase, and turns off when the system has reset.</p> <p><b>Notes</b></p> <ul style="list-style-type: none"> <li>• The Reset button is disabled as long as the alarm silence inhibit timer is running.</li> <li>• The Reset button does not affect disabled points or manually overridden functions.</li> </ul>

## LCD screen indications

The 4-LCD, 4-3LCD, and 4-LCDAUDTEL display module LCD screen provides information relevant to the current functional condition of the control unit. There are two screen modes: system normal and system off-normal.

### System normal screen

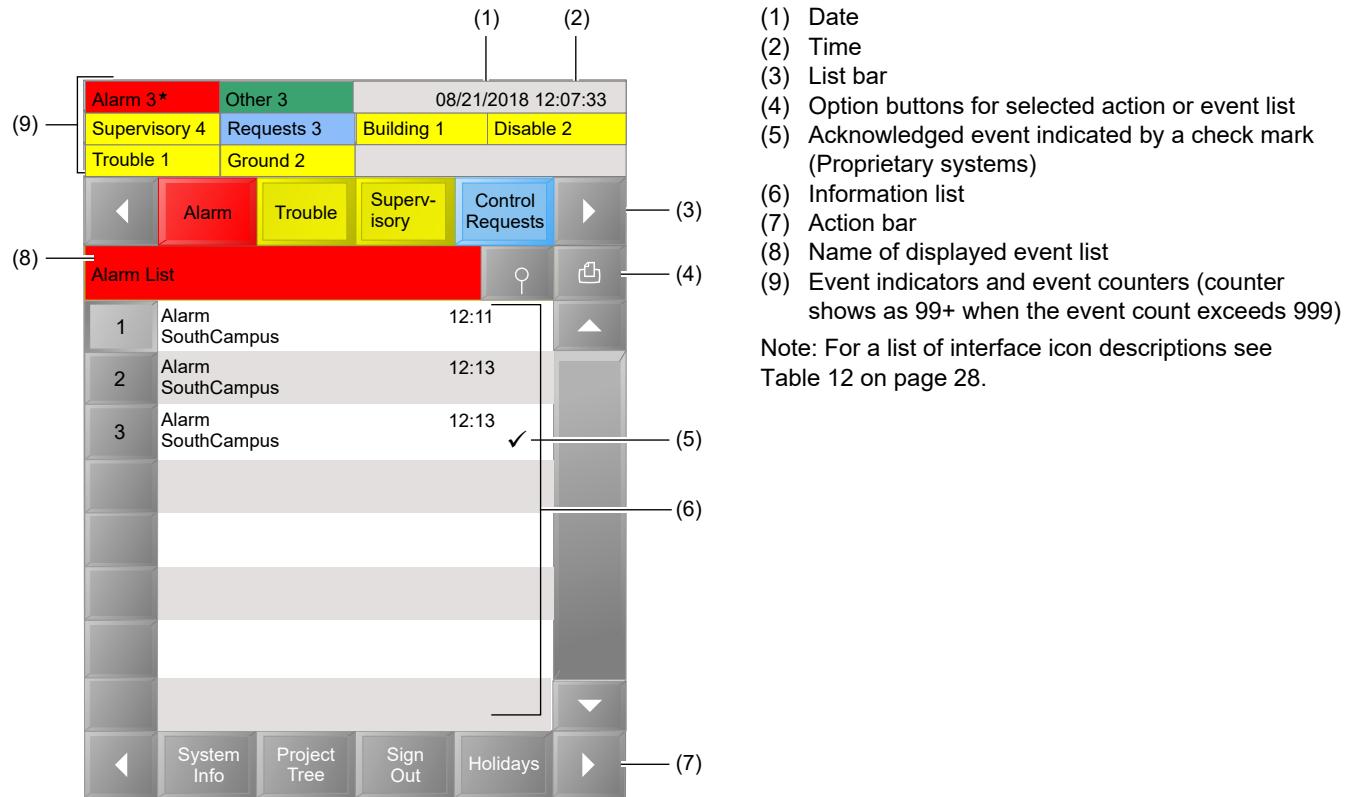
System normal means that the control unit is in the normal (standby) state. In this state, the LCD screen is clear of any event messages. Only the time, date, system normal graphic, and Action buttons are displayed.

**Figure 1: System normal LCD screen**

### System off-normal

System off-normal means the control unit has changed to the alarm, trouble, supervisory, monitor, disabled, or test state. In this state, the screen displays event messages. The event messages provide details about what is happening in the system. The LCD screen displays the eight most recent highest priority events at one time.

**Note:** The off-normal LCD screen only displays when events are activated. It does not display when events are restored. In Proprietary mode, restore events are displayed and all must be acknowledged in order to return to normal.

**Figure 2: System off-normal LCD screen**

## Event indicators and event counters

The event indicators (queues) that display on the LCD screen are determined by the 4-CPU properties configured in the 4-CU. Events in the queues can pass through to a configured printer, coder, or Email Service.

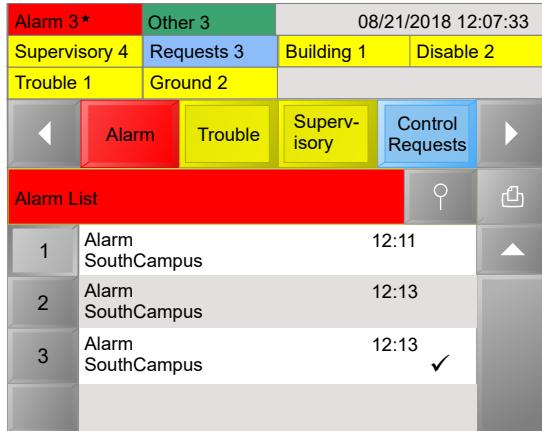
The event counters display the number of events in the event queue. If the number of events in the event queue exceeds 999, the count displays as 99+. A star designates that there are unacknowledged or new events since the control unit was last silenced.

**Note:** The market setting determines which event types go into each event queue, and their priority (see Table 10 on page 25).

## Event message lists

Event message lists 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 unit posts the event message for the point that activated the event in the appropriate event message list.

An event message consists of two lines of text, as shown in Figure 3 on page 25. The first line displays the event type and time of the event. The second line displays the location text of the point that activated the event.

**Figure 3: Event message**

The event queues on the List bar display in order of priority based on programming and market settings. Event types are mapped to the queues based on the project's market setting. Table 10 below shows the event types that go into each event queue, and their priority, for US, Latin America, International, Middle East, and New Zealand markets.

**Table 10: Event type-to-queue for US, Latin America, International, Middle East, and New Zealand markets**

Event queue	Priority	Max Events	Event type
Call In	1	100	FirePhone
Request	2	100	Requested, Granted
Alarm	3	2,000	Alarm, Pull, Heat, Waterflow, Stagetwo, Zone, AND, Matrix, HeatAlarm, ASD Alarm L1, ASD Alarm L2, ASD Alarm L3, ASD Alarm L4 [2]
Emergency	4	2,000	Emergency, COAlarm, COAlarm3, ComboAlarm3
Supervisory	5	2,000	Supervisory, PreAlarm [1], Valve, Gatevalve, Tamper, COSupervisory, COSupervisory3, SmokeSupervisory, ASD Supervisory L1, ASD Supervisory L2, ASD Supervisory L3, ASD Supervisory L4, ASD Supervisory L5, ASD Supervisory L6
Building	6	1,000	Temperature, Power, Signal, Interlockfeedback, InterlockFBFailure, Interlock, Damper, Fan, Door
Disable	7	2,000	Disablement, SensorBypass, Testevent, ObjectRunning, Servicegroup, Isolate/Disable
Trouble	8	2,000	TroubleOpen, TroubleShort, LocalTrouble, Dirtyhead, Devicecommunication, Internalfault, Badtype, Badpersonality, Unexpecteddevice, CommonTroubleinput, Devicecompatibility, Acknowledge, AccessTrouble, ACFail, EndOfLife, DeviceInitFault, BaseTypeFault, SensitivityFault, DeviceConfigurationFault, RiserFault, InvalidAddress, DuplicatesFault, ASD Trouble L1, ASD Trouble L2, ASD Trouble L3, ASD Trouble L4, ASD Trouble L5, ASD Trouble L6
Ground	9	500	Groundfault
Other	10	500	PreAlarm [1], AlarmVerify, Station, MaintenanceAlert, RelayConfirmation, Monitor, LocalMonitor, Switch, TimeControl, InstructionText, COMonitor, COMonitor3, ASD Monitor L1, ASD Monitor L2, ASD Monitor L3, ASD Monitor L4, ASD Monitor L5, ASD Monitor L6

[1] PreAlarm events appear in the Supervisory queue but are considered Monitor events, which do not trigger the supervisory relay. PreAlarm events appear in the "History" report as monitor events.

[2] For viewing ASD event details, see "VESDA events mapping" on page 126 and "ModuLaser events mapping" on page 128.

## Event display priorities

New events of the types listed below, if set as a high priority event type in the 4-CU, will interrupt the current LCD display and switch the display to the queue of the new event type immediately, overriding any user timeout.

- Call In
- Request (RGD)
- Alarm
- Emergency

The list above is in priority order so in the event there are active alarms and the alarm queue is displayed or the project tree or other display is active, a new Call In or Request event would switch the display to either of those queues immediately. It is possible in the 4-CU to make any or all of the above the highest priority event type. For example, you could select the Alarm and Emergency queues to be the highest priority and they would not be overridden by a Call In or Request event.

**Note:** The user timeout will only be overridden if one or more of the queues to display priorities has been set and only for that queue or queues.

## Fire privilege levels

Certain user interface controls and functions are password protected and have a fire privilege level that is determined by the market setting or administrator programming. The fire privilege levels are summarized in Table 11 below.

**Note:** The fire privilege level assigned to a user can be changed by the administrator (user ID 009). See “User administration” on page 46 for more information.

Table 11: Fire privileges by access level

Fire privilege level	Privileges
0 (default; no user sign in required)	<ul style="list-style-type: none"> <li>• Reports</li> <li>• Write access function (1 hour or 8 hour access)</li> <li>• Print function</li> <li>• Reset command functions</li> <li>• Find device</li> <li>• Control request, grant, and deny</li> <li>• Panel Silence button [1][2]</li> <li>• Drill button [1][2]</li> <li>• Alternate Alarm Sensitivity button [1][2]</li> <li>• Acknowledge button [1][2]</li> <li>• Lamp Test button [1][2]</li> <li>• System Function button [1][2]</li> <li>• Alarm Silence button [1]</li> <li>• Reset button [1]</li> </ul>
001	All level 0 privileges, plus: <ul style="list-style-type: none"> <li>• Remote read function</li> <li>• Status holdup report (future feature)</li> </ul>
002	All level 0 and 1 privileges (reserved for future features)

Fire privilege level	Privileges
003	All level 0, 1, and 2 privileges, plus: <ul style="list-style-type: none"> <li>• Freeze history function</li> <li>• Toggle alternate sensitivity function</li> <li>• System time and date</li> <li>• Device (enable/disable)</li> <li>• Logic groups (enable/disable)</li> <li>• Switch (enable/disable)</li> <li>• Relay (activate/restore)</li> <li>• LED (activate/restore)</li> <li>• Audio amp (activate/restore)</li> <li>• Audio message (play/stop)</li> </ul>
004	All level 0, 1, 2, and 3 privileges, plus: <ul style="list-style-type: none"> <li>• Clear history function</li> <li>• Holidays (add/delete)</li> <li>• Write access function (unlimited access)</li> <li>• Reboot (restart) function (local and networked control units)</li> <li>• Card (enable/disable)</li> <li>• Test (start/cancel)</li> <li>• Signature device test</li> </ul>
005	All level 0, 1, 2, 3, and 4 privileges (reserved for future features)
Administrator	All level 0, 1, 2, 3, 4, and 5 privileges, plus: <ul style="list-style-type: none"> <li>• User administration (add, delete, assign fire privileges, modify all user PINs)</li> </ul>

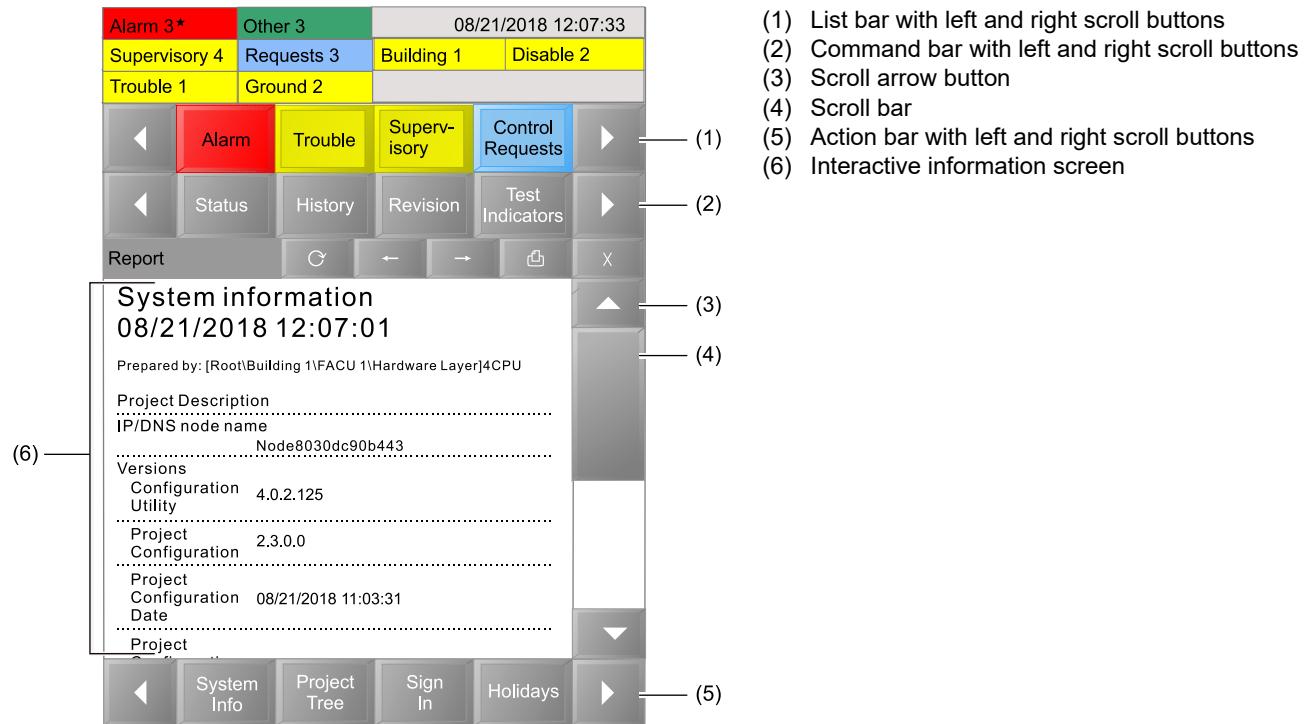
[1] Based on system programming, this button may be unavailable until you sign in.

[2] System programming determines the function assigned to panel control Button 1 (top button) and Button 2 on the 4-LCD user interface.

## LCD screen operator controls

The LCD screen provides list buttons, action buttons, and command buttons that let you operate the control unit, configure various unit settings, and view system information and event activity.

**Figure 4: LCD screen operator controls**



## LCD screen user interface icons and option buttons

The user interface includes several conditional icons, some of which act as operator controls (option buttons). Table 12 below provides descriptions of the icons that you may see.

**Table 12: Operator interface icon and option button descriptions**

Icon	Description	Icon	Description
★	Appears next to the event indicator counters. Designates there are unacknowledged or new events since the control unit was last silenced.	⌚	Users administration button. Tap to show/hide user PIN.
⌨	Appears next to the signed in user ID.	💾	Users administration button. Tap to save user information.
⟳	Reports option button. Tap to refresh the report.	☑	Request control button. Tap to grant control. See "Requesting, granting, and denying command center control" on page 52.

Icon	Description	Icon	Description
←	Reports option button. Tap to go to previous page.	☒	Request control button. Tap to deny control.  See "Requesting, granting, and denying command center control" on page 52.
→	Reports option button. Tap to go to next page.	⌚	Fire phone connect button. Tap to connect a disconnected call.  <b>Note:</b> The control unit must be in control for this button to function.
X	<ul style="list-style-type: none"> <li><b>Reports: Close option button.</b> Tap to return to a previous screen.</li> <li>System Information report: Returns to the highest priority event list with queued events or the system normal screen.</li> <li>Device details report accessed from the event list: Returns to the selected event and event list or the next event in the list if the selected event has cleared. If no events are in the previous event list, the screen shows the highest priority event list with queued events or the system normal screen.</li> <li>Device details report accessed from the project tree: Returns to the selected device on the project tree.</li> <li><b>Holidays and Users: Delete option button.</b> User administration button. Tap to delete a holiday or user.</li> </ul>	☎	Fire phone disconnect button. Tap to disconnect a connected call.  <b>Note:</b> The control unit must be in control for this button to function.
🖨	Printer option button. Tap to send report to a configured printer.  The printer icon appears for 3 seconds either next to the date or replaces the keyboard icon next to the user ID.	▶ ∞	Future feature
👤	Details option button. Tap to access an event details report.	▶ 1X	Future feature
✓	Acknowledge events button. Tap to acknowledge events.  <b>Note:</b> Displays if one of the command and control buttons (Table 9, item 6 or item 7) is not configured as Acknowledge.  Appears next to acknowledged events for Proprietary mode systems.	▶ 3X	Future feature
☒	Keypad delete button. Tap to delete a character when using the screen keypads.	■	Future feature

Icon	Description	Icon	Description
	Users administration button. Tap to modify user privileges.		Keypad button. Tap to enter and go to next screen.

## List bar

The List bar (Figure 4 on page 28) contains buttons for selecting which event messages you want to display on the screen. The market determines which event types are assigned to which list buttons. The List bar is only available when the system displays the off-normal screen.

The LCD screen displays up to four list buttons at a time. Tap the left or right scroll button to view the other list buttons. Up to ten lists may be available based on your control unit configuration and market setting.

**Table 13: List bar button descriptions**

List	Minimum fire privilege level	Description
Call In	0	<p>Displays the Call In event list, which shows firefighter telephone call events stored in the list, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>
Control Requests	0	<p>Displays the Control Requests event list, which shows a list of control requests and whether granted or denied, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>
Alarm	0	<p>Displays the Alarm event list, which shows alarm events stored in the list, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>
Emerg (Emergency)	0	<p>Displays the Emergency event list, which shows emergency events stored in the list, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>
Supervisory	0	<p>Displays the Supervisory event list, which shows supervisory events stored in the list, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>
Building	0	<p>Displays the Building event list, which shows building events stored in the list in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>
Disable	0	<p>Displays the Disabled event list, which shows disabled events stored in the list, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button . Print the Details Report by tapping the print button .</p>

List	Minimum fire privilege level	Description
Trouble	0	<p>Displays the Trouble event list, which shows trouble events stored in the list in the order, in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button ⓘ. Print the Details Report by tapping the P print button ☰.</p>
Ground Fault	0	<p>Displays the Ground Fault event list, which shows ground fault events stored in the list, in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button ⓘ. Print the Details Report by tapping the print button ☰.</p>
Other	0	<p>Displays the Other event list, which shows ancillary events stored in the list in the order in which they were received.</p> <p>View an event's Details Report by tapping the event number, and then the details button ⓘ. Print the Details Report by tapping the print button ☰.</p>

## Action bar

The Action bar (Figure 4 on page 28) contains buttons for selecting system commands and changing administrative settings. Tapping action buttons opens system information and interactive screens, and command buttons that are used to apply system operations. The Action bar is available whether the system is normal or off normal.

The LCD screen displays up to four action buttons at a time. Tap the left or right scroll button to view the other action buttons.

**Table 14: Action bar button descriptions**

Action button	Minimum fire privilege level	Description
System Info	0	<p>Displays the System information report and launches a Command bar that provides several system operation command buttons.</p> <p>When signed in as fire privilege level 1 to 5, or level 9 additional command system operation buttons appear.</p>
Project Tree	0	<p>Displays the project tree. Use the vertical scroll bar to view hidden sections of the expanded tree.</p> <ul style="list-style-type: none"> <li>• Recent Site Locations: Shows a maximum of 10 locations that the operator has viewed.</li> <li>• Top level: Expanding the top level of the project tree shows expandable nodes and branches that can hold hardware, operator, and communication devices that were configured in the 4-CU for the local control unit and networked control units.</li> </ul> <p><b>Note:</b> By default, the project tree displays the device location text, as configured in the 4-CU.</p> <p>Tapping a device on the tree, displays its Device details report. Tapping the close icon (X) on the details report returns you to the project tree.</p> <p>For certain devices, the Command bar launches. The command buttons that appear are dependent on the fire privilege level of the user.</p>

Action button	Minimum fire privilege level	Description
Sign In/Sign Out (toggle button)	0	<p>Sign In: Displays a keypad for entering your 7-digit PIN to access user privileges. The first three digits of the PIN are your user ID followed by a 4-digit PIN. The button toggles to Sign Out.</p> <p>Sign Out: Signs the user out of the system and shows the system normal screen or, if events are queued, the highest priority event list. The button toggles to Sign In.</p> <p><b>Note:</b> If the local control unit is part of a command center, the Sign In/Sign Out action is also executed on all nodes within the command center.</p>
Find Device	0	<p>Displays a keypad for entering a device address.</p> <p>Tapping the next page icon (→) on the keypad takes you to the device's device details report.</p>
Holidays	0	<p>Displays the Holiday List screen.</p> <p>When signed in as fire privilege level 4 and higher, the Command bar launches to allow adding and deleting holidays.</p>
Users	0	<p>Displays the Users List screen.</p> <p>When signed in as fire privilege level 9 (administrator), the Command bar launches to add and delete users, and apply user privileges.</p> <p>When signed in as fire privilege level 011-099 a PIN option button appears on the Users List that allows the user to change their PIN.</p> <p>Also see, "User administration" on page 46.</p>
Request Control	0	<p>Activates a request to take control of the system and displays the Requests event indicator/counter, sounds the operator alert signal, and displays the Control Request List button.</p> <p>Also see, "Requesting, granting, and denying command center control" on page 52.</p>
Alternate language (Example: Español or English)	0	<p>Switches the names on LCD screen buttons, lists, indicators, and the text in primary event message to the 4-CU configured alternate language.</p> <p><b>Notes</b></p> <ul style="list-style-type: none"> <li>• For the alternate language button to appear on the Action bar, the Alternate Language property must be configured in the 4-CU (Project &gt; Edit Properties &gt; Alternate Language).</li> <li>• If the local control unit is part of a command center, switching to the alternate language is also executed on all nodes within the command center.</li> <li>• The LCD screen defaults to the primary language at control unit startup.</li> </ul>

## Command bar

The Command bar (Figure 4 on page 28) appears when you tap certain action buttons or items on the LCD screen. For example, if you tap the System Info button, the Command bar appears containing several buttons that include allowing you to enable and disable devices and zones, activate and restore switch outputs, and view system reports.

The LCD screen displays up to four command buttons at a time. Tap the left or right scroll button to view the other command buttons.

**Table 15: Command bar button descriptions**

<b>Command button</b>	<b>Associated Action button</b>	<b>Minimum fire privilege level</b>	<b>Description</b>
System Info	System Info	0	System information report. Lists the control unit firmware version, 4-CU version, and hardware configurations.
License Info		0	License information report. Lists EST4 control unit third-party and open source software and licensing.
Status		0	Status (all) report. Lists active events and disabled points from the selected node.
Status Disabled		0	Status (disabled) report. Lists all addressable points that are in the disabled state.
Status Test		0	Status (test) report. Lists off-normal devices under test.
History		0	History report. Lists up to the last 30,000 events (10,000 latest events, 10,000 alarm events, 10,000 frozen events) processed by the selected node in reverse chronological order, from the current date to the beginning of the previous month. The date range for the report is shown on the report screen.
History Alarm		0	History Alarm report. Lists the event name, time, date, and location text for all alarm events in reverse chronological order, from the current date to the beginning of the previous month. The date range for the report is shown on the report screen.
History Trouble		0	History Trouble report. Lists the event name, time, date, and location text for all trouble events in reverse chronological order, from the current date to the beginning of the previous month. The date range for the report is shown on the report screen.
History Supervisory		0	History – Supervisory report. Lists the event name, time, date, and location text for all supervisory events in reverse chronological order, from the current date to the beginning of the previous month. The date range for the report is shown on the report screen.
Maintenance		0	Maintenance report. Lists the %Dirty value for all of the detectors on a signaling line circuit for the selected node. For CO detectors the report includes CO Life Left Months or CO DAY Running. The report includes each detector's model type, primary and alternate alarm sensitivity values, and, if programmed, a location description.
Maintenance Dirty		0	Maintenance (dirty) report. Lists all addressable smoke detectors that have a %Dirty value 80% and greater. A smoke detector that is more than 80% dirty should be noted for possible cleaning or replacing.
Maintenance Not Clean		0	Maintenance (not clean) report. Lists all addressable smoke detectors that have a %Dirty value of 20% and greater. Smoke detectors that are more than 20% dirty should be cleaned or replaced as soon as possible.
Revision		0	Revision report. Lists the revision level of the configuration components in the local control unit, including CPU, hardware, operator layer, audio, and SFP modules.
1 Hour Access		0	Provides a validation code that unblocks the Remote Write command for one hour to permit database changes. The code must be entered in the 4-CU to allow database downloads from a programming computer to the 4-CPU in the EST4 control unit.  When tapped, the operator alert sounds, and the Other command button displays to show the "Remote write unlocked" local monitor event.

Command button	Associated Action button	Minimum fire privilege level	Description
8 Hour Access		0	<p>Provides a validation code that unblocks the Remote Write command for eight hours to permit database changes. The code must be entered in the 4-CU to allow database downloads from a programming computer to the 4-CPU in the EST4 control unit.</p> <p>When tapped, the operator alert sounds, and the Other command button displays to show the “Remote write unlocked” local monitor event.</p>
Cancel Access		0	Immediately restores the Remote Write command and prevents access to database changes.
Reset		0	Resets the local control unit. When tapped, the Reset control button indicator flashes.
Reset All		0	Resets all networked nodes. When tapped, the Reset control button indicator flashes.
Test Indicators		0	Activates a color-cycle test for the LCD and a test of all control unit LEDs and installed control-display module LEDs.
Status Holdup		1	Future feature.
Lock Incoming Network		1	Blocks web browser services for all 4-FWAL series nodes.
<b>Note:</b> When an end user attempts to log on to the Web Browser Service the system will return an HTTP 401 Unauthorized Error message.			
Unlock Incoming Network		1	Unblocks web browser services for all 4-FWAL series nodes.
Freeze History		3	Archives the most recent events (up to 10,000 events) so that they cannot be overwritten.
Toggle Alternate Sensing		3	Switches detector alarm sensitivity levels from primary to alternate or from alternate to primary, whichever is currently active.
Set Date Time		3	Opens a keypad that lets you set the system time and date.
Clear History		4	Erases the list of events that occurred on the control unit since it was placed into service or the last time the history file was cleared. This includes unfreezing and erasing archived history.
Unlimited Access		4	<p>Provides a validation code that unblocks the Remote Write command for an unlimited amount of time to permit database changes. The code must be entered in the 4-CU to allow database downloads from a programming computer to the 4-CPU in the EST4 control unit.</p> <p>When tapped, the operator alert sounds, and the Other command button displays to show the “Remote write unlocked” local monitor event.</p>
Reboot Node		4	Restarts the local control unit without removing power.
Reboot All		4	Restarts all networked control units without removing power.
Enable	Project Tree	3	Enables a device selected in the project tree.
Disable		3	Disables a device selected on the project tree.
Activate		3	Activates AND groups and command lists selected in the project tree.
Restore		3	Restores AND groups and command lists.
On		3	Activates input and output devices selected in the project tree.
Off		3	Restores the input and output devices.

Command button	Associated Action button	Minimum fire privilege level	Description
On		3	Turns on a control-display LED selected in the project tree to steady.
Fast Blink		3	Turns on a control-display LED selected in the project tree to fast blink.
Slow Blink		3	Turns on a control-display LED selected in the project tree to slow blink.
Off		3	Turns off the control-display LED.
▶ ∞		3	Future feature.
■		3	Future feature.
▶ 1X		3	Future feature.
▶ 3X		3	Future feature.
Activate		4	Starts a Service Group test for an alarm input device that is part of the service group selected in the project tree. Service groups allow alarm input devices to be activated without placing the system into alarm.
Restore		4	Stops the Service Group test.
CO Test On		4	Places a Signature CO detector or Signature optical smoke detector selected in the project tree into accelerated sensing rates for testing purposes.
CO Test Off		4	Returns the selected Signature CO detector or Signature optical smoke detector to normal sensing rates.
Test Activate 1		4	Places a Signature device selected in the project tree into alarm state for verification testing.
Test Activate 2		4	Places a Signature device selected in the project tree into prealarm state for verification testing.
Test trouble		4	Places a Signature device selected in the project tree into trouble state for verification testing.
IPCID Test		4	Activates an IP CID-to-central monitoring station (CMS) selected in the project tree verification test.
IPCIDMOD Test		4	Activates a MODCOM CID-to-CMS verification test.
IPSIA Test		4	Activates a MODCOM SIA-to-CMS verification test.
Add	Holidays	4	Opens a keypad that lets you add holiday schedules.
X (Delete)		4	Displays a list of scheduled holidays that can be deleted.
Add User	Users	9	Allows the administrator to add a new user ID number (011 to 099). When adding a user the administrator assigns their personal identification number (PIN) and fire privilege level.
Delete User		9	Allows the administrator to delete a user.  <b>Note:</b> User IDs 001 to 005 and 009 (administrator) cannot be deleted.
Privileges		9	Allows the administrator to modify a user PIN and fire privilege level.

The LCD screen displays up to four command buttons at a time. Tap the left or right scroll button to view the other command buttons.

# Chapter 3

# Operating instructions

## Summary

This chapter provides instructions for operating the life safety system from the EST4 control unit's user interface.

## Content

Operating states	38	Rebooting the life safety system	55
Normal state	38	Clearing the alarm history	56
Alarm state	38	Freezing the events history	56
Disable state	38	Viewing event details	57
Supervisory state	39	Viewing and printing system reports	59
Trouble state	39	System reports on the control unit	59
Monitor state	40	Closing system reports and details reports	61
Test state	40	Uploading reports to the 4-CU	62
Drill state	41	Disabling and enabling devices	63
Control unit power up	41	Disabling and enabling local rail modules (LRMs)	64
Initial power up	41	Disabling and enabling logic groups	64
Obtaining and recording node MAC addresses	42	Disabling and enabling time controls	65
Downloading the 4-CU firmware and project database to the control unit	43	Activating alarm signals manually	66
Downloading firmware to the control unit	44	Testing the system and devices	66
Downloading a project database	45	Performing a lamp test	66
Signing in and out of the control unit	46	Testing Signature devices	67
User administration	46	Testing alarm input devices	68
Adding users	47	Changing output states	68
Deleting users	47	Switching the smoke detector alarm sensitivity threshold	68
Changing user PINs	48	Primary alarm sensitivity threshold	68
Changing fire privilege levels	48	Alternate alarm sensitivity threshold	69
Resetting the administrator password (user ID 009)	48	Alarm sensitivity settings	69
Setting the system date and time	49	Switching the sensitivity threshold	69
Changing the LCD screen to an alternate language	50	Configuration of the Alarm Sensitivity button on EST4 networks	69
Silencing the operator alert signal	50	System Function 1 through 4 on EST4 networks	70
Silencing alarm signals	51	Adding and deleting holidays	70
Acknowledging events	51	Control-display modules	71
Requesting, granting, and denying command center control	52	Disabling and enabling control-display modules	71
Resetting the life safety system	55	Disabling and enabling control-display module elements	72

## Operating states

The EST4 control unit operates in the normal, alarm, disable, supervisory, trouble, monitor, test, and drill states.

**Note:** This section describes the operation of a stand-alone control unit configured using default settings. Actual operation may vary depending on your project's configuration.

### Normal state

The system operates in the normal (standby) state in the absence of any events. In the normal state, the LCD screen shows the time, date, and LCD background graphic (see Figure 1 on page 23).

### Alarm state

The control unit enters the alarm state when a point signals an alarm condition. For example, when a smoke detector, pull station, or waterflow switch is activated.

#### Output of the alarm state

Upon entering the alarm state, the control unit:

- Activates all supervised and unsupervised common alarm outputs
- Changes over the alarm relay contacts on a 4-COMREL, if installed
- 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 unit:

- Sounds the operator alert signal
- Turns on the Alarm LED on the LCD user interface
- Posts the event activated by the point into the appropriate event list queue (refer to Table 10 on page 25 for a list of event types-to-queue)

### Disable state

The control unit enters the trouble state when a point signals a disabled condition.

When a point is disabled, the control unit 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 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. This is dependent on the point state or the 4-CU configuration setting for the Restore Event on Disable property.

**Note:** View the Status Disabled report to identify a disabled point.

## **Output of the disable state**

Upon entering the disable state, the control unit:

- 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 unit:

- Sounds the operator alert signal
- Turns on the Trouble LED on the LCD user interface
- Posts the event activated by the point into the appropriate event list queue (refer to Table 10 on page 25 for a list of event types-to-queue)

## **Supervisory state**

The control unit enters the supervisory state when a point signals a supervisory condition.

## **Output of the supervisory state**

Upon entering the supervisory state, the control unit:

- Activates all supervised and unsupervised common supervisory outputs
- Activates the supervisory signal output on a 3-OPS, if installed
- Changes over the supervisory relay contacts on a 4-COMREL, if installed
- 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 unit:

- Sounds the operator alert signal
- Posts the event activated by the point into the appropriate event list queue (refer to Table 10 on page 25 for a list of event types-to-queue)

## **Trouble state**

The control unit enters the trouble state when a point signals a trouble condition.

## **Output of the trouble state**

Upon entering the trouble state, the control unit:

- Changes over the trouble relay contacts on a 4-COMREL, if installed
- 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 unit:

- Sounds the operator alert signal
- Turns on the Trouble LED on the LCD user interface
- Posts the event activated by the point into the appropriate event list queue (refer to Table 10 on page 25 for a list of event types-to-queue)

## Monitor state

The control unit enters the monitor state when a point signals a monitor condition.

### Output of the monitor state

Upon entering the monitor state, the control unit:

- 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 unit:

- Sounds the operator alert signal
- Posts the event activated by the point into the appropriate event list queue (refer to Table 10 on page 25 for a list of event types-to-queue)

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

## Test state

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

### Output of the test state

Upon entering the test state, the control unit:

- Activates the first monitor pseudo point
- Activates the first trouble 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 unit executes the service group's active test response
- When a member of an active service group signals a trouble event, the control unit executes the service group's trouble test response

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

### Indication of the test state

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

- Sounds the operator alert signal
- Turns on the Trouble LED on the LCD user interface

- Activates the Trouble event indicator and displays an event message in the Trouble list queue for the first test pseudo point, provided there are no higher priority events
- Activates the Other event indicator and displays an event message in the Other list 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.

### Output of the drill state

Upon entering the drill state, the control unit:

- Changes the active state for the device that activated

### Indication of the drill state

To indicate it is in the drill state, the control unit:

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

## Control unit power up

### Initial power up

When you power up the EST4 control unit for the first time, the LCD screen may begin to show event messages as the 4-CPU microprocessor begins communicating with devices. You can use the Panel Silence button to silence the operator alert signal. For Proprietary systems, use the Acknowledge button, if programmed, to acknowledge any events.

#### Notes

- Before applying power to the control unit, make sure the standby batteries are not connected to the 3-PPS/M / 4-PPS/M Power Supply.
- The 3-PPS/M / 4-PPS/M Power Supply should already be installed and mains AC (primary power) wired to the input terminals (TB1).

#### To power up the control unit for the first time:

1. Apply power to the control unit.
2. Connect the batteries to the battery wiring terminal on the 3-PPS/M / 4-PPS/M Power Supply.
3. Press the Panel Silence button, and the Acknowledge button, if necessary.
4. Download the database as instructed in “Downloading a project database” on page 45.
5. For a network system, clear any faults between control units.
6. Verify proper operation. Refer to “Routine maintenance and tests” on page 149 for Initial and Reacceptance testing.

# Obtaining and recording node MAC addresses

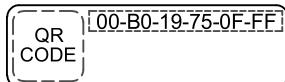
Each node CPU module in the EST4 system has a unique MAC address that is used to identify the node in the EST4 network. The node module's MAC address must be entered in the 4-CU for the CU to be able to communicate with the control unit.

The following are node-modules: 4-CPU, 4-ANNCPU, 4-CPUGRPH, 4-NET-AD, 4-ASDCPU, and 4-FWALx. See *4-CU Help* for information on entering MAC addresses in the 4-CU.

The MAC address can be obtained from node's product label or by querying the network.

## To manually record the MAC address from the node-module's product label:

1. From the 4-CU, print a node list to use for recording the MAC addresses.
  - In the Navigation pane, select the system branch under Project Tree.
  - On the Node List tab, format the list grid, and then select any row in the grid.
  - On the Home tab, in the Operations group, click Print.
2. From the control unit, before you install the node-module locate the product label on the front, bottom left corner of the module.



Manually record the MAC address shown on the label onto the node list sheet.

— or —

Scan the QR code and save it to record later.

3. From the 4-CU, enter the MAC address for each node. See *4-CU Help* for information on entering MAC addresses in the 4-CU.

## To manually record the MAC address from the System Information report:

1. Tap System Info on the Action bar.
2. On the System Information report, locate IP/DNS node name.

The address shown in the report is prefaced by the word "node." Record only the numeric portion of the address. For example, the report shows node00B019750FFF, however, only record 00B019750FFF.

3. Manually record the MAC address onto the node list sheet. For example, 00-B0-19-75-0F-FF.

## To query the network:

1. Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU. See Figure 5.
2. Connect the Type A end of the cable to a standard USB port on the computer with the project database.
3. From the control unit LCD screen:
  - On the Action bar, tap System Info.
  - On the Command bar, tap 1 Hour Access or 8 Hour Access to obtain a 4-CU required access code that will allow read access.
4. From the 4-CU:
  - On the Home tab, in the Communication group, click Enter Access Code.
  - Enter the Access Code, and then click Validate.

On the Home tab, in the Communication group, click Query Network, and then Refresh. The query returns network information that includes node MAC addresses. The window remains open until you close it.

In the Navigation pane, select the system branch under Project Tree.

On the Node List tab, format the list grid, and then select the node for which you want to enter the MAC address.

On the Edit Properties tab, enter or copy and paste the MAC Address property from the Query Network screen.

5. From the control unit LCD screen, when finished entering all MAC addresses:

On the Action bar, tap System Info.

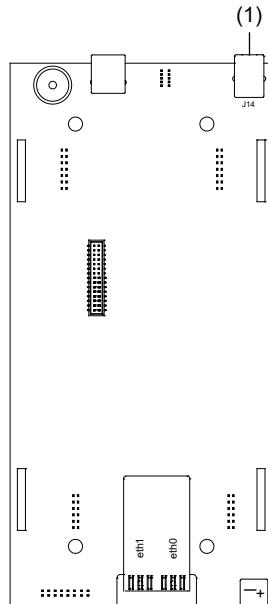
On the Command bar, tap Cancel Access, to block read access.

## Downloading the 4-CU firmware and project database to the control unit

You can download firmware and project databases from the project computer to the control unit through a USB connection. The control unit CPU is blocked by default to disallow unauthorized database changes. An authorization code must be obtained from the control unit and entered into the 4-CU that activates the Remote Write Unlock command and allows the download.

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

Figure 5: Download port on the CPU



(1) USB Type B port

### Notes

- It is recommended that *before* downloading to a system control unit you save the 4-CU project.
- A USB 2.0, Type A to B cable is required.

- The Windows-based Remote Network Driver Interface Specification (RNDIS) driver is required on the project computer to provide the programming interface between the computer and CPU. Refer to the *4-CU Release Notes* for instructions on installing the RNDIS driver.
- To avoid possible failure of the download process due to a login/logout error, any Wi-Fi or other network adapters should be disabled on the project computer. Only the USB RNDIS connection should be enabled during the download process.
- A Remote Write Unlocked local monitor event appears in the Other queue and the operator alert signal sounds when the control unit is unlocked. Both are restored to normal after the control unit is restored to its default setting when the access is cancelled by the programmer or the access period expires.
- On large networked systems beyond 64 nodes it is necessary to connect the computer running the 4-CU to a CPU node that is within 63 hops of every other node on the network. This assures successful communication of configuration, firmware, and other data to the entire EST4 system. A 'hop' is a Class B/DCLB straight connection from one CPU node to another.

## Downloading firmware to the control unit

The control unit allows you to download the 4-CU firmware into the CPU directly from a computer through the USB Type B port on the 4-CPU.

There are three steps in downloading the firmware to the control unit:

- Step 1: Download the firmware file.
- Step 2: Import the firmware into the 4-CU.
- Step 3: Download the firmware to the control unit.

### Step 1: Download the firmware file:

1. Download the firmware file to any location on the computer with the 4-CU:

Enter [www.edwardsfiresafety.com](http://www.edwardsfiresafety.com) in your web browser, and then at the bottom of the page click MyEddie Login to log on to the My-Eddie website.

Locate the 4-CU firmware file in Resources & Training > Software, and then download the file.

### Step 2: Import the firmware into the 4-CU and update each node CPU:

1. From the 4-CU:

Click the Firmware Management tab.

On the Home tab, in the Options group, click Import Firmware.

Browse to the location of the firmware file (.enc file type).

Select the file, and then click Open.

Click Import Firmware.

Click the Project Management tab, and then open the project.

In the Navigation pane, for *each* node update its CPU firmware version:

Select the node, and then click the Hardware Layer tab.

Select the CPU module, and then click the Edit Properties tab.

In the LRM Configuration group, Firmware Version property select the new firmware.

### Step 3: Download the firmware to the control unit

**Note:** An RNDIS driver is required for the PC port to communicate with the control unit. If necessary, install it before proceeding. Refer to the *4-CU Release Notes* for instructions on installing the RNDIS driver.

1. Disable or disconnect any Wi-Fi or other network adapters on the project computer. Only the USB RNDIS connection should be enabled during the download process.
2. Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU. See Figure 5.
3. Connect the Type A end of the cable to a standard USB port on the computer with the project database.
4. From the control unit LCD screen:
  - On the Action bar, tap System Info.
  - On the Command bar, tap 1 Hour Access or 8 Hour Access to obtain a 4-CU required access code that will allow you to download to the control unit.
5. From the 4-CU:
  - On the Project Management tab, open the project.
  - On the Home tab, in the Communication group, click Enter Access Code.
  - Enter the access code, and then click Validate.
  - On the Home tab, in the Communication group, click Query Network, and then Refresh to confirm communication with the node(s).
  - On the Communication tab, click Transmit to All Nodes or Transmit To Specific Node(s).
    - **Transmit to All Nodes:** Use to transfer the current 4-CU configuration to all nodes on the EST4 network.
    - **Transmit to Specific Node(s):** Use to transfer the current 4-CU configuration to selected nodes on the EST4 network.
- A progress bar displays in the lower right side of the CU window. The control unit reboots when the download is complete.
6. From the control unit LCD screen, when finished downloading:
  - On the Action bar, tap System Info.
  - On the Command bar, tap Cancel Access.

## Downloading a project database

The control unit allows you to download the project database into the CPU directly from a computer through the USB Type B port on the 4-CPU.

### Notes

- An RNDIS driver is required on the project computer to provide the programming interface between the computer and CPU. If necessary, install it before proceeding. Refer to the *4-CU Release Notes* for instructions on installing the RNDIS driver.
- It is recommended that *before* downloading a project database to a control unit you save the 4-CU project.

### To download the project database:

1. Disable or disconnect any Wi-Fi or other network adapters on the project computer. Only the USB RNDIS connection should be enabled during the download process.
2. Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU. See Figure 5.
3. Connect the Type A end of the cable to a standard USB port on the computer with the project database.

4. From the control unit LCD screen:

On the Action bar, tap System Info.

On the Command bar, tap 1 Hour Access or 8 Hour Access to obtain a 4-CU required access code that will allow you to download to the control unit.

5. From the 4-CU:

On the Project Management tab, open the project.

On the Communication tab, click Enter Access Code.

Enter the access code, and then click Validate.

On the Communication tab, click Query Network, and then Refresh to confirm communication with the node(s).

On the Communication tab, click Transmit to All Nodes or Transmit To Specific Node(s).

- **Transmit to All Nodes:** Use to transfer the current 4-CU configuration to all nodes on the EST4 network.
- **Transmit to Specific Node(s):** Use to transfer the current 4-CU configuration to selected nodes on the EST4 network.

A progress bar displays in the lower right side of the CU window. The control unit reboots when the download is complete.

6. From the control unit LCD screen, when finished downloading:

On the Action bar, tap System Info.

On the Command bar, tap Cancel Access.

## Signing in and out of the control unit

Certain user interface controls and functions are password protected, requiring the user to sign in. The user password is comprised of a 3-digit user ID and 4-digit PIN (example, 0011234) as assigned by administrator

**To sign into the control unit:**

1. On the Action bar, tap Sign In.
2. Enter your 3-digit user ID and 4-digit PIN provided by the administrator. Example, 0031234.

Your user ID number and the signed in icon appear at the top of the screen. Example, 003 .

**To sign out of the control unit:**

1. On the Action bar, tap Sign Out.

## User administration

The number of users that can sign into the control unit is configured in the 4-CU. The system supports a maximum of 99 users. By default, the system reserves the first ten user numbers: six numbers are user IDs automatically configured with fire privilege levels and four numbers are unused (see Table 16 on page 47).

Certain user interface controls and functions are password protected and have a fire privilege level that is determined by the market setting or administrator programming. The 7-digit user password is comprised of a 3-digit user ID and a 4-digit PIN (example, 0011234).

The EST4 control unit automatically includes six default user IDs, each having default fire privileges. The user access time out can be configured in the 4-CU for a period of 15 seconds to 8 hours. The default setting is 5 minutes. When the user timeout period expires, the control unit reverts to the default fire privilege level.

Table 16 below shows the default user IDs and PINs, and the fire privilege level pre-assigned to each user ID.

**Table 16: Default user IDs, PINs, and fire privileges**

User IDs [1]	Default PIN [2]	Default fire privilege level [3]
None (no sign in, ID 0) [4]	–	0
001	1234	1
002	1234	2
003	1234	3
004	1234	4
005	1234	5
009	1234	Administrator (all privileges)
011 to 099	As set by the administrator (user ID 009)	As set by the administrator (user ID 009)
<b>Note:</b> Users 011 to 099 can change their own PIN.		

[1] You cannot assign user ID numbers 006, 007, 008, or 010.

[2] It is recommended that you change the default PIN once the control unit is put into service.

[3] Refer to Table 11 on page 26 for a list of fire privileges by level.

[4] Permission allowing access to system functions and features without logging on (ID 0) must be configured in the 4-CU (Project Tree Configuration > Node List).

## Adding users

**Note:** Only administrators (user ID 009) can add new users.

### To add a user:

1. Sign in as the administrator, and then tap **Users** on the Action bar.
- Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.
2. Tap **Add** on the Command bar, and then use the interface keypad to enter the 3-digit user ID (011 to 099) for the new user. The screen automatically changes to **NEW PIN** screen.
3. Enter the 4-digit PIN for the user. You can show the PIN by tapping the show/hide button .
4. Tap the **Next** button on the interface keypad to display the **User: nnn Fire Privilege** list.
5. Tap the desired level, and then tap the save button . The screen changes to **User List** and includes the new user.

## Deleting users

**Note:** Only the administrators (user ID 009) can delete users.

### To delete a user:

1. Sign in as the administrator, and then tap **Users** on the Action bar.

2. Tap Delete on the Command bar.
3. Tap the user number to be deleted, and then tap the delete button X. The screen changes to User List and no longer includes the deleted user number.

## Changing user PINs

### Notes

- Administrators (user ID 009) can change all users PIN. User IDs 011 to 099 can change their own PIN.
- User PINs are automatically reconciled with the most recent updated settings across an EST4 network based on the time stamp, as long as the nodes are compatible (i.e., running on the same version of firmware and configuration). The time stamp for a User ID is modified whenever a change to password/privilege is saved on a node. Time stamp based reconciliation is done so the latest information of a user is available and consistent throughout the network.

### To change user PINs:

1. Sign in, and then tap Users on the Action bar.  
Administrator (user ID 009): Can change all users (001 to 099) PIN  
User IDs 011 to 099: Can change their own PIN
2. Tap Privileges on the Command bar.
3. On the User List, tap the user ID number, and then tap the edit button .
4. Enter the new 4-digit PIN for the user, and then tap the save button . You can show the PIN by tapping the show/hide button .

## Changing fire privilege levels

**Note:** Only the administrator (user ID 009) can change fire privilege levels.

1. Sign in as the administrator, and then tap Users on the Action bar.
2. Tap Privileges on the Command bar.
3. On the Modify User list, tap the user ID number, and then tap the edit button .
4. Enter the 4-digit PIN for the user, and then tap the Next button.
5. On the User: nnn Fire Privilege screen, tap the new fire privilege level, and then tap the save button .

## Resetting the administrator password (user ID 009)

You can reset the administrator password in the event you have forgotten the password or need to reset it for other reasons by contacting Edwards Technical Support and requesting a password of the day. The temporary password is downloaded from the 4-CU project computer physically connected to the control unit 4-CPU.

**Note:** The temporary password generated by Edwards Technical Support is good until midnight the same day.

### To reset the administrator password:

1. Disable or disconnect any Wi-Fi or other network adapters on the project computer. Only the USB RNDIS connection should be enabled during the download process.
2. Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU. See Figure 5.
3. Connect the Type A end of the cable to a standard USB port on the computer with the project database.

4. From the 4-CU:

On the Project Management tab, select the project for your system.

In the Project group, click Recover Password. The Recover Password dialog box provides a token number. Edwards Technical Support will require this token number to generate a password of the day that will be used to reset the administrator password at the control unit.

Email the password token to Edwards Technical Support at [edwards.techsupport@carrier.com](mailto:edwards.techsupport@carrier.com). In the subject box type: Reset EST4 Panel Admin Password Request. Technical Support will respond to the email with the password of the day.

5. From the control unit LCD screen:

On the Action bar, tap System Info.

On the Command bar, tap 1 Hour Access or 8 Hour Access to obtain a 4-CU required access code that will allow you to download to the control unit.

6. From the 4-CU:

On the Project Management tab, open the project.

On the Communication tab, click Enter Access Code.

Enter the access code, and then click Validate.

On the Communication tab, click Query Network, and then Refresh to confirm communication with the node(s).

On the Communication tab, click Reset Panel Admin Password.

In the Reset Panel Admin Password dialog box, type the password of the day provided by Edwards Technical Support.

Click Reset. The message “Resetting panel admin password successful” should appear at the bottom left side of the 4-CU screen signaling that the control unit administrator password is reset to the default password.

7. From the control unit LCD screen:

On the Action bar tap Sign In, and then sign in to the control unit using the default password (see Table 16 on page 47).

On the Action bar tap System Info, and then on the Command bar, tap Cancel Access.

Disconnect the USB cable.

Change your administrator password (see “Changing user PINs” on page 48).

## Setting the system date and time

The control unit incorporates a system clock to time stamp events and to activate time controls. The time is presented in 24-hour format. The date format is determined by the 4-CU project property setting. The default format is presented in month-day-year.

**Note:** Only users with fire privilege 3 and higher can access the system clock function.

### To set the system date and time:

1. Sign in (requires fire privilege 3 or higher), and then tap System Info on the Action bar.

**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.

2. On the Command bar, tap Set Date Time.

3. Use the interface keypad to enter date and time.

The default format is YYYYMMDD hhmmss. Where,

YYYY = 4-digit year

MM = 2-digit month

DD = 2-digit day

hh = 2-digit hour

mm = 2-digit minutes

ss = 2-digit seconds

**Note:** 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.

The date and time at the top of the user interface screen immediately changes.

## Changing the LCD screen to an alternate language

For control units configured in the 4-CU for an alternate language, a language button displays on the Action bar. The button name shows the alternate language configured for the control unit. For example, Española or English.

When the alternate language button is tapped, the names on LCD screen buttons, lists, and indicators and the text in primary event messages switches to the configured alternate language. If the local control unit is part of a command center, switching to the alternate language is also executed on all nodes within the command center.

### Notes

- For the alternate language button to appear on the Action bar, the Alternate Language property must be configured in the 4-CU (Project > Edit Properties > Alternate Language).
- Custom event message text does not switch to the alternate language.
- The LCD screen defaults to the primary language at control unit startup.

### To change the LCD screen to the alternate language:

- Tap the alternate language button on the Actions bar (example: Español or English).

## Silencing the operator alert signal

The control unit sounds the operator alert signal 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 operator alert signal. The operator alert signal automatically re-sounds when a new event message is posted or when the system panel silence cancel timer expires (typically 24 hours).

For Proprietary systems, the Panel Silence button is not operational. The operator alert signal only silences after each event has been individually acknowledged in the order displayed.

### Notes

- For nonlatching events, the operator alert signal automatically silences when the event is restored. For example, when a trouble clears.

- Pressing the Panel Silence button may also silence the operator alert signal on remote annunciators if the system is configured to do so.
- Based on system programming, the Panel Silence button may be unavailable until you sign in. Default operation does not require you to sign in.

#### To silence the operator alert signal:

1. Press the Panel Silence operator control button.
2. If prompted, sign in using the interactive keypad.

**Note:** Default operation does not require you to sign in.

## Silencing alarm signals

---

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

---

Pressing the Alarm Silence operator control button silences all audible alarm signals and, if configured, all visual alarm signals. Pressing the button a second time turns back on the signals.

Pressing the Alarm Silence operator control 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 when a waterflow alarm switch is active
- When the system is configured to delay the silencing of alarm signals (Alarm Silence Inhibit property), in which case the Alarm Silence button may not be operational for up to five minutes following the first alarm event

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 alarm signals from re-sounding

**Note:** Based on system programming, the Alarm Silence button may be unavailable until you sign in. Default operation does not require you to sign in.

#### To silence alarm signals:

1. Press the Alarm Silence operator control button.
2. If prompted, sign in using the interactive keypad.

**Note:** Default operation does not require you to sign in.

## Acknowledging events

When an event occurs, it is important that you acknowledge it and review the issue. The control unit handles the event by showing it on the LCD screen as an event message, sounding the operator alert signal, placing the event in the appropriate queue, and, when configured, flashing the Acknowledge LED.

If an operator control button has been programmed in the 4-CU as Acknowledge, pressing the Acknowledge button acknowledges events.

For Proprietary systems, pressing the Acknowledge button acknowledges an event and turns the operator alert signal off after all events have been individually acknowledged in the order displayed.

**Note:** Based on system programming, the Acknowledge button may be unavailable until you sign in. Default operation does not require you to sign in.

Table 17 below describes the behavior of event messages for Local and Proprietary modes.

**Table 17: Event message behavior for Local and Proprietary modes**

Scenario	Local mode	Proprietary mode
No new events have activated since the last time the control unit was silenced	The highest priority event queue displays.	The highest priority event queue displays.
New events have activated since the last time the control unit was silenced	The first new, highest priority event displays and the buzzer sounds.	The first unacknowledged event in the highest priority queue displays and the buzzer sounds.
An active non-latching event is restored	The event clears from the display queue.	A new restoral event appears and the buzzer sounds. Upon acknowledgement of both the event activation and restoral, the event clears from the display queue.

#### To acknowledge an event:

1. Press the Acknowledge operator control button.
2. If prompted, sign in using the interactive keypad.

**Note:** Default operation does not require you to sign in.

## Requesting, granting, and denying command center control

To broadcast audio announcements from the control unit the unit must be in control of audio communications in the life safety system. Request to control a system and permission to grant or deny the request can be made from the 4-LCD display module user interface, or from 4-CU rules-programmed control-display module switches.

How the request, grant, deny (RGD) operation handles demands for control of audio communications is configured in the 4-CU, in association with notification areas (NCAs) and command centers. The command center configuration defines it as a control location within a notification control area. The command center resides in a notification control area and is the control unit used to request, grant, or deny control of an NCA, whether the one in which it resides or another NCA. Refer to “Notification Control Areas” on page 106 for information on NCA logic devices, command center logic devices, and RGD logics.

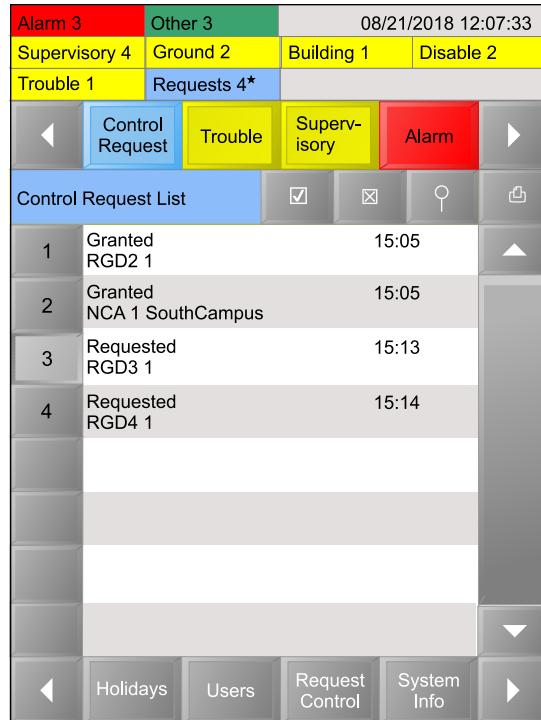
In 4-CU programming, your system may be configured to automatically grant control to a request(s) if a manual response has not been made before a timer expires. The NCA’s Request Timer property specifies how long the system waits. See Table 18 on page 53 for how the system automatically responds when Request Timer settings are configured to turn on.

**Table 18: Request Timer automatic response to system control requests**

Request Timer setting	If no one has control of the NCA	If someone has control of the NCA
Off	The system automatically grants control to the first request regardless of priority.	The system automatically grants control to the highest-priority request. You must manually grant control to equal- or lower-priority requests.
00:00 (mm:ss)	The system automatically grants control to the first request regardless of priority.	The system automatically grants control to the next request regardless of priority.
00:01 to 10:00 (mm:ss)	The system automatically grants control to the first request regardless of priority.	<p>The system automatically grants control to the highest-priority request when the request timer expires.</p> <p>If there are two requests from RGDs that have the same priority, control is automatically granted on first-in-first-out (FIFO) basis.</p> <p><b>Note:</b> The system ignores the Request Timer when a request is received from an RGD with a higher priority than the RGD in control, and automatically grants control to the higher priority RGD.</p>

In the Figure 6 example on page 54, RGD2 1 is in control when RGD3 1 and RGD4 1 request control. In this example, control can manually be granted to a requesting RGD one of the following ways.

- Tap the NCA 1 SouthCampus number, and then tap the  (grant) button, control is granted to the requesting RGD (RGD3 1 or RGD4 1) that has higher priority. If both requesting RGDs have the same priority, control goes to the RGD that first requested control.  
— or —
- RGD2 1 is currently in control and has the highest priority when its operator taps its Granted number in the Control Request List queue, and then taps the  (deny) button to release control. Control is granted to the requesting RGD (RGD3 1 or RGD4 1) that has higher priority. If both requesting RGDs have the same priority, control goes to the RGD that first requested control.

**Figure 6: Control Request List queue example****To request control:**

1. On the Action bar, tap Request Control. The Control Request list button appears and the operator alert signal sounds.
2. Tap the Control Request List button. Control Request List screen displays and shows the request.

When control is granted or denied, the response will show in the list.

**Note:** If the system is programmed to automatically respond if a manual response is not received prior to the system timer expiring, control is granted as shown in Table 18 on page 53.

**To grant control:**

1. On the Control Request List screen:

Tap the number of the command center shown as Granted, and then tap the  (grant) button.

**Note:** The grant button is functional only on the node that has control.

If multiple command centers are requesting control at the same time, control is granted to the requesting control center that has higher priority. If all contiguously requesting control centers have the same priority, control goes to the first requested control.

— or —

If in control and highest priority, tap the Granted number in the Control Request List queue, and then tap the  (deny) button to release control. If multiple command centers are requesting control at the same time, control is granted to the requesting control center that has higher priority. If all contiguously requesting control centers have the same priority, control goes to the first requested control.

**To deny control:**

1. On the Control Request List screen, tap the number of the command center shown as Granted, and then tap the  (deny) button.

## Resetting the life safety system

**WARNING:** Death or serious injury. The protected premises may be occupied. Do not reset the life safety system until the proper authorities have determined that the threat of fire is no longer present.

Resetting the life safety system 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 the first alarm event.
- The Reset button does not affect disabled points or manually overridden functions.
- Based on system programming, the Reset button may be unavailable until you sign in.

**To reset the life safety system:**

1. Press the Reset operator control button.
2. If prompted, sign in using the interactive keypad.

**Note:** Default operation does not require you to sign in.

## Rebooting the life safety system

Rebooting the system reinitializes it without removing power.

**Note:** Only users with fire privilege 4 and higher can access the reboot function.

**To reboot the system:**

1. Sign in (requires fire privilege 4 or higher), and then tap System Info on the Action bar.

**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.

2. Tap the desired reboot button on the Command bar.
  - Reboot Node: Reboots the local control unit
  - Reboot All: Reboots all networked control units

## Clearing the alarm history

**Caution:** Clearing the control unit history file permanently deletes all history data for the control unit.

The alarm history counter keeps track of how many times the control unit has entered the alarm condition. Clearing the history resets the event indicator counters on the LCD screen (Figure 1 on page 23) and erases the list of events that occurred on the control unit since it was placed into service or the last time the history file was cleared.

### Notes

- Only users with fire privilege 4 and higher can access the clear history function.
- Clearing the alarm history also unfreezes and erases archived history.

#### To clear the alarm history:

1. Sign in (requires fire privilege 4 or higher), and then tap System Info on the Action bar.

**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.

2. On the Command bar, tap Clear History.

## Freezing the events history

When the Freeze History command is activated, the system archives the most recent events (up to 10,000) so that they cannot be overwritten.

**Note:** Only users with fire privilege 3 and higher can access the freeze history function.

#### To freeze event history:

1. Sign in (requires fire privilege 3 or higher), and then tap System Info on the Action bar.

**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.

2. On the Command bar, tap Freeze History.

#### To view or print events in the freeze history archive:

1. Connect to the control unit to the 4-CU, as described in “Uploading reports to the 4-CU” on page 62.

2. After confirming 4-CU communication with the node(s), from the control unit LCD screen:

On the Action bar, tap System Info.

On the System Info screen, find History Frozen and note the date and time that the Freeze history command was activated.

3. From the 4-CU:

In the Navigation pane, select the Project Tree branch.

On the Project Tree Configuration tab, click the Node list tab, and then select the node from which you want the freeze history events.

On the Reports tab, in the System Reports group, click Events, and then select History Report.

In the History Report dialog box, configure the report properties.

- History Types: Select All, Alarm, Supervisory, Trouble, or Test.
- Start Time: Enter the desired begin date and time.
- End Time: Enter the History Frozen information noted in step 2 above.

Click Run. The history report displays listing the selected alarm types that occurred within the specified timeframe.

4. From the control unit LCD screen, when finished:

On the Action bar, tap System Info.

On the Command bar, tap Cancel Access, to block read access.

## Viewing event details

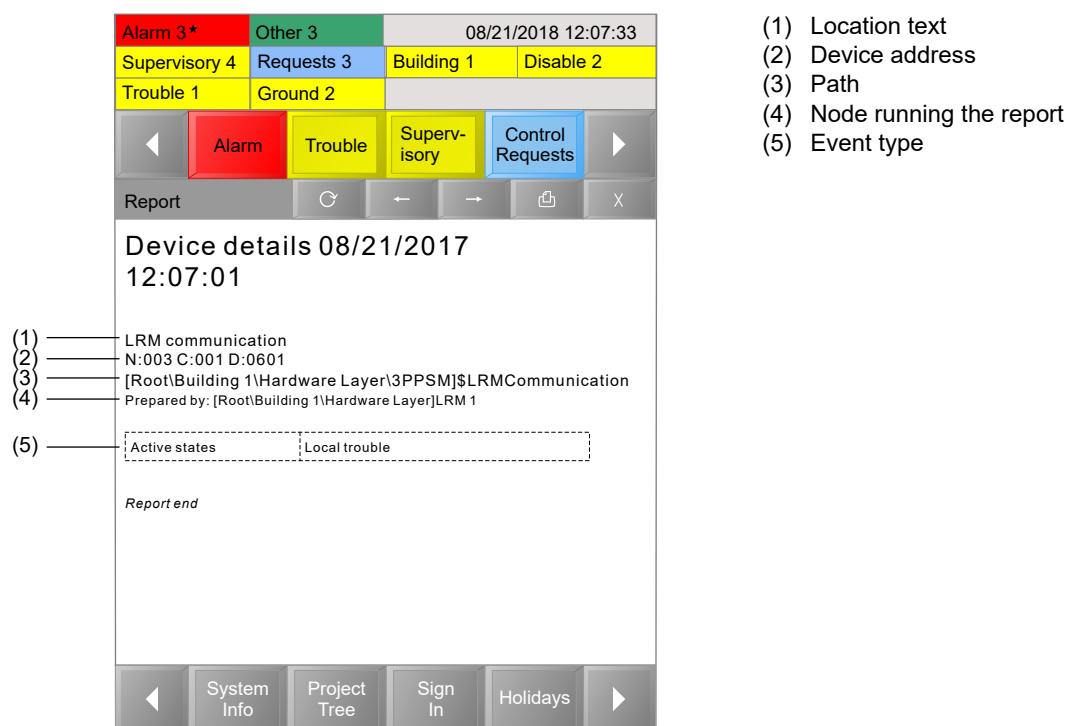
A details report provides information that identifies a device that generated a system event and the event type (Figure 7 below).

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

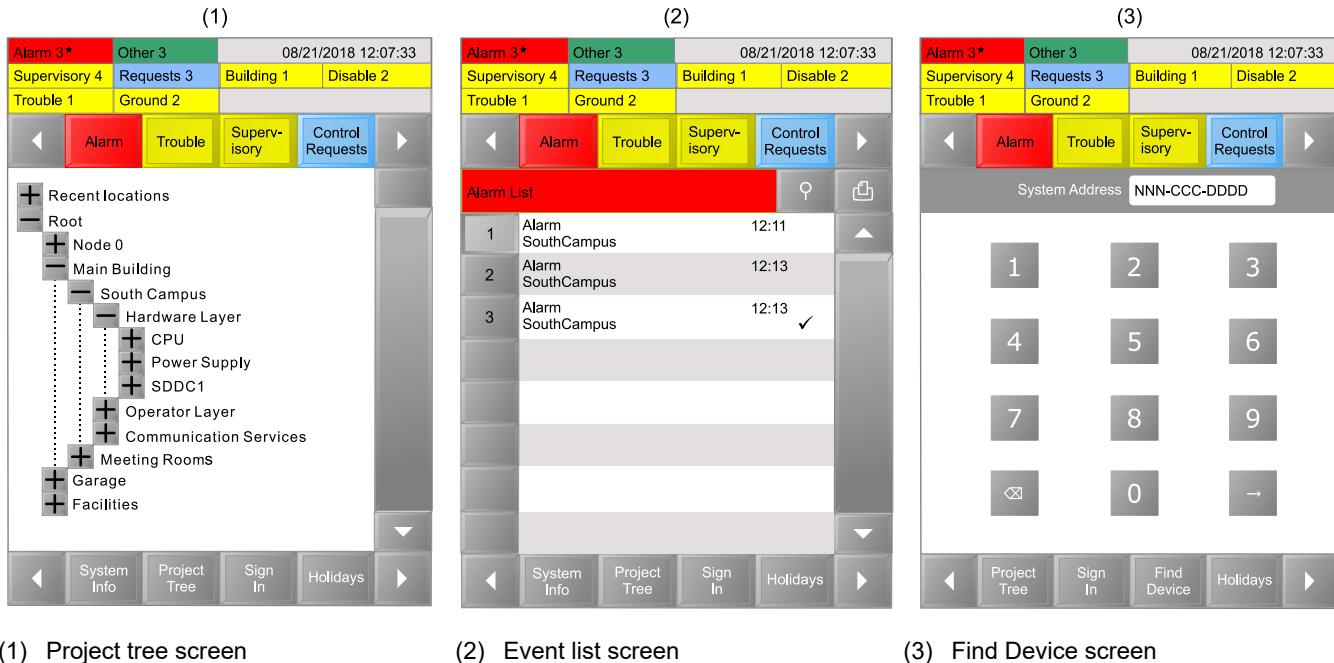
**Logic group details:** If a group activation causes an event, the Details screen shows the state of the device, device address, and device message, which is usually the device location.

**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.

Figure 7: Event details report



Event details can be accessed from the project tree, event list, or Find Device screen.

**Figure 8: Viewing event details**

(1) Project tree screen

(2) Event list screen

(3) Find Device screen

**To view device details from the project tree:**

1. On the Action bar, tap Project Tree.
2. Expand the project tree by tapping the (expand) button, and then locate the target device or pseudo point.
3. Tap on the device/pseudo point. The Device Details Report displays.

To print the report: Tap the (print) button on the details report.

To return to the previous screen, tap the (close) button on the details report. The screen returns to the same selected device on the project tree.

**To view device details from an event list:**

1. Tap an event List button. For example, Alarm.
2. In the list, tap the event number, and then tap the details button . The Device Details Report displays.

To print the report: Tap the (print) button on the details report.

To return to the previous screen, tap the (close) button on the details report. The screen returns to the same selected event and event list or the next event in the list if the selected event has cleared. If no events are in the previous event list, the screen shows the highest priority event list with queued events or the system normal screen.

**To view device details from the Find Device screen:**

1. On the Action bar, tap Find Device.
2. Use the interface keypad to enter the device address. EST4 addresses are in NNNCCCDDDD format, where
  - NNN is the node number.
  - CCC is the local rail module slot address.
  - DDDD is the device's point address.

3. Tap the Next button (→) on the interface keypad. The Device Details Report displays.

To print the report: Tap the  (print) button on the details report.

To return to the previous screen, tap the X (close) button on the details report.

## Viewing and printing system reports

Reports are used to check the current condition or history of the EST4 life safety network. EST4 system reports can be viewed and printed from either the control unit LCD screen or from the computer running the 4-CU programming utility.

### System reports on the control unit

Table 19 below lists the reports that you can access from the control unit. The report displays on the LCD screen and can also be printed to a local printer.

**Table 19: Reports accessed from the control unit**

Report type	Description
Status	<p>The status reports listed below are available to help you determine the current state of the system.</p> <ul style="list-style-type: none"> <li>• Status: Lists all active events and disabled points from the selected node.</li> <li>• Status Disabled: Lists of addressable points that are disabled.</li> <li>• Status Test: Lists all off-normal devices under test.</li> <li>• Status Holdup: Future feature.</li> </ul>
Maintenance	<p>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.</p> <ul style="list-style-type: none"> <li>• Maintenance Not Clean: Lists all addressable smoke detectors that have a %Dirty value of 20% and greater. Smoke detectors that are more than 20% dirty should be cleaned or replaced as soon as possible.</li> </ul> <p><b>Note:</b> 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.</p> <ul style="list-style-type: none"> <li>• Maintenance Dirty: Lists all addressable smoke detectors that have a %Dirty value of 80% and greater. A smoke detector that is more than 80% dirty should be noted for possible cleaning or replacing.</li> <li>• Maintenance: 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.</li> </ul>

Report type	Description
History	<p>History reports list the most recent events or operator instructions processed by the control unit for the previous month to current or since its history was cleared. To view all months, use the 4-CU reports feature or a web browser. The event or system command name, address, time and date of occurrence, and the source that initiated the event or command are included.</p> <p>When the Freeze History command is activated, the system freezes and archives up to 10,000 of the most recent events so that they cannot be overwritten. They can, however, be erased when the Clear history command is activated. To view or print a Freeze History archive, see "Freezing the events history" on page 56.</p> <p>When the Clear History command is activated, event indicator counters reset on the LCD screen and the list of events that occurred on the control unit since it was placed into service, or the last time the history file was cleared, is erased. This includes unfreezing and erasing archived history.</p> <p>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.</p> <ul style="list-style-type: none"> <li>• History: Lists the last 30,000 events and operator commands (10,000 latest events, 10,000 alarm events, 10,000 frozen events) processed by selected node from the current date to the beginning of the previous month.</li> <li>• History Alarm: Lists the event name, time, date, and location text for all alarm events from the current date to the beginning of the previous month.</li> <li>• History Trouble: Lists the event name, time, date, and location text for all trouble events from the current date to the beginning of the previous month.</li> <li>• History Supervisory: Lists the event name, time, date, and location text for all supervisory events from the current date to the beginning of the previous month.</li> </ul>
Revision	<p>The Revision report provides system database information and installed hardware information. The hardware that shows on the list is dependent on the devices installed in the control unit cabinet.</p> <p>The initial Revision report is described below.</p> <ul style="list-style-type: none"> <li>• Alarm history count: Shows the total number of times that the control unit has gone into alarm since the alarm history was cleared.</li> <li>• Market: Shows the 4-CU market setting.</li> <li>• Configuration version: Shows the 4-CU project version number.</li> <li>• Configuration time stamp: Shows the date and time that the 4-CU project was created or modified.</li> <li>• Configuration schema: Shows the 4-CU firmware-to-software interface version.</li> <li>• Configuration messaging: Shows the 4-CU internal messaging protocol version.</li> <li>• Firmware: Shows the 4-CU firmware version.</li> <li>• LRM x shows: <ul style="list-style-type: none"> <li>– LRM type</li> <li>– Firmware version and date</li> <li>– Bootloader version and date</li> </ul> </li> <li>• CDM xx Announcer shows: <ul style="list-style-type: none"> <li>– Announcer type</li> <li>– Firmware version and date</li> <li>– Bootloader version and date</li> </ul> </li> <li>• CPU shows: <ul style="list-style-type: none"> <li>– CPU type</li> <li>– Firmware version and date</li> <li>– Bootloader version and date</li> </ul> </li> </ul>

Report type	Description
System Information	<p>The System Info report provides a project description that includes the control unit MAC address required for communication between the 4-CU and control unit, and project versioning numbers. The System Information report content is described below.</p> <p><b>Project Description</b></p> <ul style="list-style-type: none"> <li>• IP/DNS node name: Shows the MAC address of the installed CPU (node).</li> <li>• Versions: <ul style="list-style-type: none"> <li>– Configuration Utility: Shows the 4-CU software version.</li> <li>– Project Configuration: Shows the 4-CU project version number.</li> <li>– Project Configuration Date: Shows the date and time that the database was downloaded.</li> <li>– Project Configuration ID: Shows the database serial number created when the database was converted.</li> <li>– Configuration schema: Shows the 4-CU software-to-firmware interface version.</li> <li>– Message Schema: Shows the 4-CU internal messaging protocol version.</li> <li>– Firmware: Shows the 4-CU firmware version.</li> <li>– Archive Locations: Shows the 4-CU project's archive locations.</li> <li>– Archive Enabled: Shows whether the project is configured to automatically archive project files.</li> </ul> </li> </ul>
License Information	The License Information report provides a list of open source and third-party software used in the EST4 control unit.

#### To view or print reports from the control unit LCD:

1. On the Action bar, tap System Info.
2. On the Command bar, tap the desired report button. The report displays on the screen.

Tap the  (print) button to send the report to a local printer.

#### To view device reports:

See “Viewing event details” on page 57.

## Closing system reports and details reports

When you close a system report, or Device Details report, the LCD returns to a previous screen as described below.

- Closing the System Information report returns the screen to the highest priority event list with queued events or the system normal screen.
- Closing a Device Details report accessed from the event list returns the screen to the selected event and event list or the next event in the list if the selected event has cleared. If no events are in the previous event list, the screen shows the highest priority event list with queued events or the system normal screen.
- Closing a Device Details report accessed from the project tree returns the screen to the selected device on the project tree.

#### To close reports:

1. Tap the X (close) button on the report. The screen that the LCD returns to is dependent on the report you were viewing, as described above.

## Uploading reports to the 4-CU

Table 20 below lists the system reports that can be uploaded to the 4-CU, and then viewed and printed.

**Table 20: System reports accessed from the 4-CU**

Report type	Description
Details	The Details report lists the type of event, address of the device that generated the event and the location of a system event.
Status	<p>The status reports listed below are available to help you determine the current state of the system.</p> <ul style="list-style-type: none"> <li>• All Off normal: Lists all active events and disabled points from the selected node.</li> <li>• Disabled: Lists of addressable points that are disabled.</li> <li>• Test: Lists points in an active logic group that are in the active or trouble state.</li> <li>• Holdup: Future feature</li> </ul>
Maintenance	<p>A set of device maintenance reports are available to help you determine if any addressable smoke detector devices require maintenance.</p> <ul style="list-style-type: none"> <li>• Not Clean: Lists all addressable smoke detectors that have a %Dirty value of 20% and greater. Smoke detectors that are more than 20% dirty should be cleaned or replaced as soon as possible.</li> <li>• 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.</li> <li>• Dirty: Lists all addressable smoke detectors that have a %Dirty value of 80% and greater. A smoke detector that is more than 80% dirty should be noted for possible cleaning or replacing.</li> <li>• All: 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 location description.</li> <li>• Device: Lists the %Dirty value for a single smoke detector. For CO detectors the report includes CO Life Left Months or CO DAY Running. The report also includes the smoke detector's model type, primary and alternate alarm sensitivity values, and location description. To view this report you must select the device from the Project Tree.</li> </ul>
List	<p>The List reports option provides access to the holidays and users added to the control unit.</p> <ul style="list-style-type: none"> <li>• Holidays: Lists the holidays added to the control unit.</li> <li>• Users: Lists the users added to the control unit and their fire privilege.</li> </ul>
Events	<p>Alarm History: Alarm History reports list the events or operator instructions processed by the control unit for a user-specified timeframe.</p> <ul style="list-style-type: none"> <li>• All: Lists the last 30,000 events and operator commands processed by selected node.</li> <li>• Alarm: Lists the event name, time, date, and location text for all alarm events.</li> <li>• Trouble: Lists the event name, time, date, and location text for all trouble events.</li> <li>• Supervisory: Lists the event name, time, date, and location text for all supervisory events.</li> <li>• Test: Lists the event name, time, date, and location text for all test events.</li> </ul> <p>Event Queue: Lists the event name, time, date, and location text for all events that were mapped to the user-specified queue.</p>
Informational	<p>The Informational reports option provides access system database and hardware information, and project versioning numbers.</p> <p>Revisions: Lists system database and installed hardware information. See "Revisions Report" in Table 19 on page 59 for the details on the information that displays.</p> <p>System: Lists the control unit MAC address, project versioning numbers, component licensing and copyright information. See "System Info" in Table 19 on page 59 for the details on the information that displays.</p>

### To view and print systems reports uploaded to the 4-CU:

1. Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU. See Figure 5 on page 43.
2. Connect the Type A end of the cable to a standard USB port on the computer with the project database.
3. From the control unit LCD screen:
 

On the Action bar, tap System Info.

On the Command bar, tap 1 Hour Access or 8 Hour Access to obtain a 4-CU required access code that will allow read access.
4. From the 4-CU:
 

On the Communication tab, click Enter Access Code.

Enter the Access Code, and then click Validate.

On the Communication tab, click Query Network, and then Refresh to confirm communication with the node(s). The window remains open until you close it.

In the Navigation pane, select the Project Tree branch.

On the Project Tree Configuration tab, click the Node list tab, and then select the node for which you want the upload system information.

On the Reports tab, in the System Reports group, click desired report. See Table 20 on page 62 for a description of the available reports.

If required, enter information when prompted. The report displays on the screen. You can also print or save the report. Refer to *4-CU Help* for instructions.
5. From the control unit LCD screen, when finished:
 

On the Action bar, tap System Info.

On the Command bar, tap Cancel Access, to block read access.

## 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 EST4 control unit logs the status change signals, but is prevented from processing the signals until the device is enabled. For example, the control unit does not activate an alarm event when you activate a disabled detector, but it will after the detector is enabled.

The control unit 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. The Status Disabled report provides a counter that shows the number of times the device was manually disabled.

### 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. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target device.
3. Tap the device, and then tap Disable on the Command bar.

#### To enable a device:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target device.
3. Tap the device, and then tap Enable on the Command bar.

**Note:** Enable the device the same number of times that you disabled it. If necessary, view the Status Disabled report to see the manual disable counter (Action Bar > System Info > Status Disabled).

4. A warning screen appears before enabling the device. Note that the panel will go into alarm if you enable a disabled device that is still in alarm state. Click OK to enable the device or Cancel to cancel the action.

## Disabling and enabling local rail modules (LRMs)

Local rail modules can include chassis rail cards and modules, and UI frame assembly control-display modules. Disabling a module isolates it from the system. While the module is disabled, the EST4 control unit logs the status change signals, but is prevented from processing the signals until the module is enabled.

**Note:** The control unit keeps track of how many times you disable a module without enabling it. You must enable a module the same number of times you disable it in order to return the module to its original condition. The Status Disabled report provides a counter that shows the number of times the device was manually disabled.

#### To disable an LRM:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target LRM.
3. Tap the module, and then tap Disable on the Command bar.

#### To enable an LRM:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target LRM.
3. Tap the module, and then tap Enable on the Command bar.

**Note:** Enable the device the same number of times that you disabled it. If necessary, view the Status Disabled report to see the manual disable counter (Action Bar > System Info > Status Disabled).

## Disabling and enabling logic groups

A group is a *logic* device that is created in the 4-CU. 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 EST4 control unit 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 unit does not activate an alarm event when you activate a disabled detector, but it will after the detector is enabled.

The control unit keeps track of how many times you disable a logic group without enabling it. You must enable a logic group the same number of times you disable it in order to return the group to its original condition. The Status Disabled report provides a counter that shows the number of times the device was manually disabled.

**Note:** If you disabled a Zone logic 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.
- 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. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target group.
3. Tap the group, and then tap Disable on the Command bar.

#### To enable a group:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target group,
3. Tap the group, and then tap Enable on the Command bar.

**Note:** Enable the device the same number of times that you disabled it. If necessary, view the Status Disabled report to see the manual disable counter (Action Bar > System Info > Status Disabled).

## Disabling and enabling time controls

Time Controls are *logic* devices that are created in the 4-CU. They are configured 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 unit.

#### To disable a time control:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target time control.
3. Tap the time control, and then tap Disable on the Command bar.

#### To enable a time control:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target time control.
3. Tap the group, and then tap Enable on the Command bar.

## Activating alarm signals manually

The EST4 drill feature lets you activate alarm signals manually without putting the control unit 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.

#### Notes

- To activate a drill using a 4-LCD operator control button, either button one or two must be programmed in the 4-CU as Drill.
- The drill function can be programmed for a fire privilege level password. The default setting is no PIN required.

#### To activate a drill:

1. Press the Drill operator control button.
2. If prompted, enter the fire privilege password using the interactive keypad.

#### To cancel a drill:

1. Press the Drill operator control button.
2. If prompted, enter the fire privilege password using the interactive keypad.

## Testing the system and devices

Test commands are used to perform periodic inspection tests on the life safety system.

### Performing a lamp test

Use the Lamp Test operator button on the 4-LCD display module user interface to verify the operation of the LCD screen and LED indicators. The lamp test command temporarily turns on the operator alert signal, all LED indicators, and every pixel on the LCD screen. If the local control unit is part of a command center, the lamp test is also executed on all nodes within the command center.

#### Notes

- To activate a lamp test using an operator control button, either LCD button 1 or 2 must be programmed in the 4-CU as Lamp Test.

- A control-display module switch can also be programmed to activate the LampTestOn command.
- The lamp test function can be programmed for a fire privilege level password. The default setting is no PIN required.

**To activate a lamp test:**

1. Press the Lamp Test operator control button.
2. If prompted, enter the fire privilege password using the interactive keypad.

## Testing Signature devices

Use commands accessed from the control unit LCD screen to remotely place a Signature device into the alarm, prealarm, monitor, supervisory, or trouble condition for testing purposes. Signature devices include all detectors and modules. To test a Signature device, the device must be connected to a signaling line circuit.

**Note:** For latching devices, you must reset the control unit to restore the tested device to its normal state. Nonlatching devices restore automatically without resetting the control unit.

**To place a Signature CO detector into test state:**

1. Sign in (requires fire privilege 4 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target Signature CO detector.
3. Tap the detector, and then tap CO Test On on the Command bar.

To cancel the test, tap CO Test Off on the Command bar.

**To place a Signature optical smoke detector into test state:**

1. Sign in (requires fire privilege 4 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target Signature optical smoke detector.
3. Tap the detector, and then tap CO Test On on the Command bar.

To cancel the test, tap CO Test Off on the Command bar.

**To place a Signature device into test state:**

1. Sign in (requires fire privilege 4 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target Signature device.
3. Tap the device, and then tap Test Trouble on the Command bar.

**To place a Signature device into alarm, monitor, or supervisory state:**

1. Sign in (requires fire privilege 4 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target Signature device.
3. Tap the device, and then tap Test Activate 1 on the Command bar.

**To place a Signature device into prealarm state:**

1. Sign in (requires fire privilege 4 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target Signature device.
3. Tap the device, and then tap Test Activate 2 on the Command bar.

## 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 4-CU. 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.

**Note:** The alarm input test automatically times out after approximately 1-hour of inactivity.

### To put a Service Group into test:

1. Sign in (requires fire privilege 4 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target Service group.
3. Tap the Service group, and then tap Activate on the Command bar. To cancel the test, tap Restore on the Command bar.

## Changing output states

Use the On and Off commands to change the output state of relays, NAC circuit outputs, and audio amplifiers.

**Note:** Only users with fire privilege 3 can access this function.

### To activate an output state:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target device.
3. Tap the device, and then tap On on the Command bar.

### To restore a relay output state:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target device.
3. Tap the device, and then tap Off on the Command bar.

## 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 much smoke is needed for the automatic fire detectors to 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 a command button.

### 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 settings

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. Sign in (requires fire privilege 3 or higher), and then tap System Info on the Action bar.

**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.

2. On the Command bar, tap Toggle Alternate Sensing.

**To restore the primary alarm sensitivity settings:**

1. Sign in (requires fire privilege 3 or higher), and then tap System Info on the Action bar.

**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.

2. On the Command bar, tap Toggle Alternate Sensing.

## Configuration of the Alarm Sensitivity button on EST4 networks

When configuring a system to adjust Alarm Sensitivity settings at different times of day across groups of nodes, Network Routing for the switch to perform this operation must be configured with the same routing group as the State Network Routing of the nodes. The routing group should include only those nodes that adjust their

sensitivity at the same time as the node where the switch is pressed. Similarly, other nodes that change their sensitivity at a different time should be configured with a different routing group to match the nodes in their group.

**Example:** A system has 16 nodes with nodes 1, 2, and 3 using a different alternate sensitivity time than the other 13 nodes (4 through 16), and LCD button 2 is used for Alternate Sensitivity. The Network Routing for button 2 on Nodes 1 through 3 should be set via the node's Operator Layer LCD properties to a Nodes123Route, and the State Network Routing for nodes 1, 2, and 3 should be set via the node's Hardware Layer CPU properties to the same group Nodes123Route. The Network Routing for button 2 on nodes 4 through 16 should be set to a Nodes4to16Route and the State Network Routing for nodes 4 through 16 should be set to the same routing group Nodes4to16Route.

## System Function 1 through 4 on EST4 networks

When configuring System Function 1 through 4 switch operations across nodes, Network Routing for the switch to perform this operation must be configured with the same routing group as the State Network Routing of the nodes. The routing group should include only those nodes that have the same function as the node where the switch is pressed. Similarly, other nodes that use a different function should be configured with a different routing group to match the nodes in their group.

**Example:** A system has 16 nodes with nodes 1, 2, and 3 using 4-LCD button 2 to execute a system function. The other 13 nodes (4 through 16) use LCD button 2 for a different System Function. The Network Routing for button 2 on Nodes 1 through 3 should be set via the node's Operator Layer LCD properties to a Nodes123Route, and the State Network Routing for nodes 1, 2, and 3 should be set via the node's Hardware Layer CPU properties to the same group Nodes123Route. The Network Routing for button 2 on nodes 4 through 16 should be set to a Nodes4to16Route and the State Network Routing for nodes 4 through 16 should be set to the same routing group Nodes4to16Route.

## Adding and deleting holidays

The Holiday time control is a special time control used to program up to 99 holidays on a per control unit basis. Holiday time controls supersede the normal CU-programmed system time controls on dates that are designated as holidays.

### To add a holiday:

1. Sign in (requires fire privilege 4 or higher), and then tap Holidays on the Action bar.  
**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.
2. Tap Add on the Command bar.
3. Use the interface keypad to enter the 2-digit month and 2-digit day (MMDD). For example, 0101.

The Holiday list appears, showing the added holiday.

### To delete a holiday:

1. Sign in (requires fire privilege 4 or higher), and then tap Holidays on the Action bar.  
**Note:** If the control unit is part of a command center, you will be signed in on all nodes within the command center.
2. Tap Delete on the Command bar.
3. Tap the number of the holiday to be deleted, and then tap the delete button X.

The Holiday list appears, no longer showing the deleted holiday.

## Control-display modules

Control-display modules provide additional operator interface capability. The 4-24L series modules provide pockets for inserting custom labels. The labels can be printed using the 4-CU configuration utility.

**Note:** To learn how to print custom control-display module labels, see *4-CU Help*.

Model [1]	Description
4-24L	24 indicators
4-24L12S	24 indicators and 12 switches
4-24L18S	24 indicators and 18 switches
4-24L24S	24 indicators and 24 switches

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:** 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 hand-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 control unit 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 used to activate functions that are self-restoring. Examples include lamp test, function reset, and test sequence.

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, 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 not processed.

### To disable a control-display module:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target control-display module.
3. Tap the control-display, and then tap Disable on the Command bar.

### To enable a control-display module:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target control-display module.
3. Tap the control-display module, and then tap Enable on the Command bar.

## Disabling and enabling control-display module elements

### Disabling and enabling control-display module switches

#### To disable a control-display module switch:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target switch.
3. Tap the switch, and then tap Disable on the Command bar.

#### To enable a control-display module switch:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target switch.
3. Tap the switch, and then tap Enable on the Command bar.

### Disabling and enabling control-display module LEDs

#### To disable a control-display module LED:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target LED indicator.
3. Tap the LED indicator, and then tap Disable on the Command bar.

#### To enable a control-display module LED:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target LED indicator.
3. Tap the LED indicator, and then tap Enable on the Command bar.

### Setting a control-display module LED mode

#### To set a control-display module LED mode:

1. Sign in (requires fire privilege 3 or higher), and then tap Project Tree on the Action bar.
2. Expand the project tree by tapping the expand button , and then locate the target LED indicator.
3. Tap the LED indicator, and then tap one of the following: Steady, Fast Blink, Slow Blink, Off.

# Chapter 4

# Installation

## Summary

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

## Content

System installation sequence	74
Sequence list	74
Component installation	75
Enclosure backboxes	75
Local rail module chassis	76
Enclosure doors	76
4-CPU	77
3-PPS/M and 4-PPS/M primary power supplies	78
Standby batteries	82
3-MODCOM(P) Modem Communicator module	83
Installing a node module in an existing network	87
Preliminary field wiring testing	89
Network pass-through compatibility	90
Circuit compatibility	91
UL 864 notification appliance circuit signal synchronization	92
Typical circuits	92
Connecting PT-1S series printers	98
Printer configuration settings	98
Wiring the PT-1S series printer	99
System printer standby power supply	100
Connecting a CDR-3 for coded tone output	101
Wiring the CDR-3	101
Adjusting amplifier output levels	103

## System installation sequence

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

### Notes

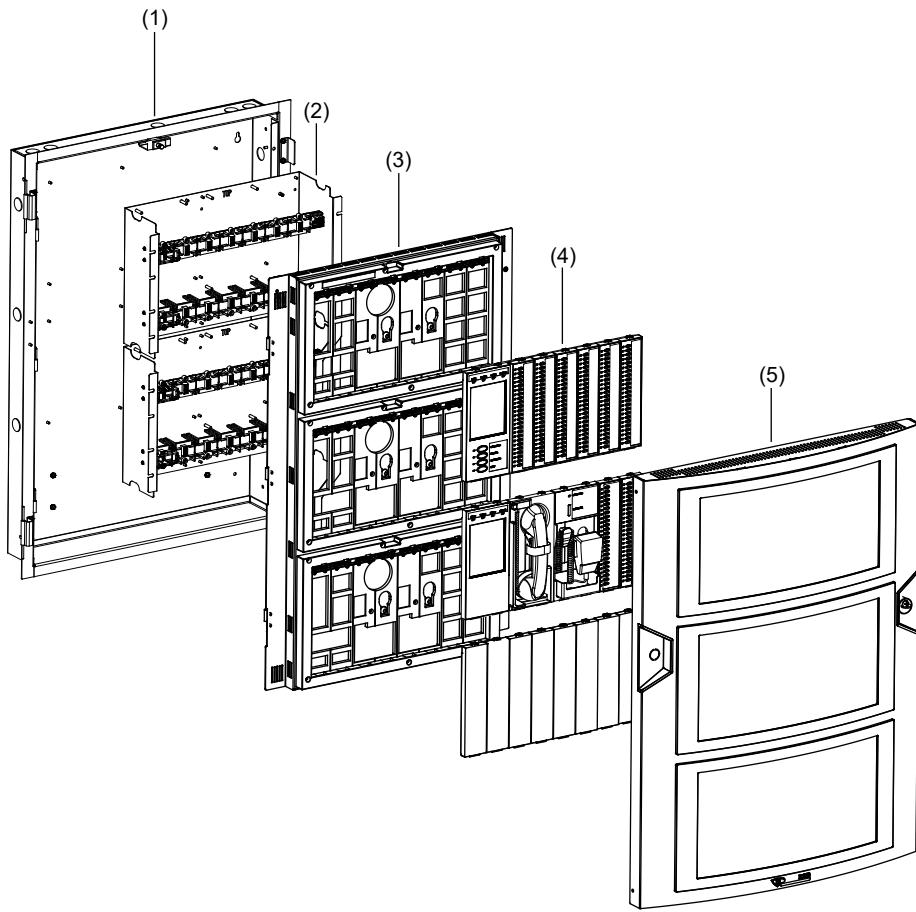
- Make sure the installation location is free from construction dust and debris and is not subject to extreme temperature ranges and excess humidity.
- Ensure sufficient floor and wall space, to avoid obstructions during installation and servicing.
- When installing the cabinet, use fasteners that can 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 control unit component from its protective antistatic packaging only for inspection or installation.
- Do not connect standby batteries until initial control unit power up (see “Initial power up” on page 41).

## Sequence list

### Notes

- Install all FACU components as instructed on the installation sheet that came with the component.
  - Record MAC addresses and locations required during 4-CU programming (see “Obtaining and recording node MAC addresses” on page 42).
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 backbox at the required location and pull all the required wiring through the conduit into the backbox.
  3. Install the local rail module (LRM) chassis assembly.
  4. Verify the field wiring. See “Preliminary field wiring testing.”
  5. Install the 3-PPS/M / 4-PPS/M Power Supply and any project-required half-footprint modules.
  6. Install any project required option cards on the 4-CPU, and then install the 4-CPU.
  7. Install all project required option cards and local rail modules on the chassis rail.
  8. Install the inner door, and then install all user interface modules on the UI frame assembly.
  9. Connect field wiring.
  10. Power up the control unit and download an optional initial startup database. See “Initial power up” on page 41.
  11. Define the cabinet configuration, device loops, option cards, etc. for a final 4-CU database, and then download it to the control unit. See “Downloading a project database” on page 45.
  12. Install the outer door assembly onto the backbox.

**Figure 9: Exploded view of EST4 cabinet (3-CAB14B backbox and 4-CAB24D door shown)**



- |                      |                            |
|----------------------|----------------------------|
| (1) Backbox          | (4) User interface modules |
| (2) Chassis assembly | (5) Outer door             |
| (3) Inner door       |                            |

**Note:** See Table 6 on page 16 for a list of user interfaces and chassis rail modules.

## Component installation

An EST4 enclosure houses all of the control unit components. Enclosure components can include power supplies, batteries, electronics and communication rails, user interfaces, option modules, and audio subsystem components needed for an EST4 system to operate as a standalone unit or part of a network.

### Enclosure backboxes

The enclosure backbox holds the primary power supply module, footprint option cards, chassis rail for hardware LRM<sub>s</sub> and optional audio subsystem components, and standby batteries for the control unit.

See Table 3 on page 11 for a list of backboxes used in an EST4 system.

## Local rail module chassis

### 3-CHAS7 LRM chassis

The 3-CHAS7 chassis is used in an EST4 enclosure to provide the mounting, internal power, and data distribution for up to seven local rail modules, including power supply modules, CPU node modules, and one half-footprint module.

A 4-BRKT-CB or 4-BRKT-CS mounting bracket can be mounted on the 3-CHAS7. The brackets provide space for one 4-ANNCPU, 4-FWAL1, 4-FWAL2, 4-FWAL3, 4-FWAL4, 4-ASDCPU, or a 4-NET-AD module. For more information about the 4-BRKT-CB bracket, see *4-BRKT-CB Mounting Bracket Installation Sheet* (P/N 3102323). For more information about the 4-BRKT-CS bracket, see *4-BRKT-CS Mounting Bracket Installation Sheet* (P/N 3102399).

The first two slots of the *first* 3-CHAS7 in the control unit are used for a 4-CPU central processor unit. See Table 5 on page 13 for a list of CPU modules and Table 6 on page 16 for firewall modules. The last five slots on the first 3-CHAS7 are used for optional LRMs. See Table 5 on page 13 for a list of chassis rail modules that can be installed.

The seven slots on a second or third 3-CHAS7 chassis in a control unit are used for additional optional rail modules.

#### Notes

- You *cannot* install local rail modules in slots 3 and 4 on the 3-CHAS7 rail when a 4-FT firefighter telephone is installed on the inner door UI frame assembly.
- For more information see *3-CHAS7 Local Rail Module Chassis Installation Sheet* (P/N 270484).

### 3-CAB5B backbox with LRM chassis

A 3-CAB5B backbox can be used in an EST4 enclosure to provide the mounting, internal power, and data distribution for up to five local rail modules, including power supply modules and CPU node modules.

The first two slots of the chassis rail are used for a 4-CPU central processor unit. The last three slots are used for optional LRMs. See Table 5 on page 13 for a list of chassis rail modules that can be installed.

#### Notes

- You cannot install a 4-ANNCPU, 4-FWAL1, 4-FWAL2, 4-FWAL3, 4-FWAL4, or 4-NET-AD module in a 3-CAB5B backbox when a 4-CPU is installed.
- You can install a 4-ANNCPU if removing the 3-CAB5B chassis rail to use the backbox with a 4-CAB8D door as a semiflush mounted annunciator cabinet.
- You cannot install local rail modules in slots 4 and 5 on the 3-CAB5B LRM rail when a 4-FT firefighter telephone is installed on the inner door UI frame assembly.
- For more information see *3-CAB5B Equipment Backbox* (P/N 3102288).

## Enclosure doors

The EST4 enclosure door consists of an inner and outer door. The outer door may have one or more viewing windows and is secured with a key lock. The inner door isolates the operator from the panel electronics and wiring. The inner door also incorporates UI frame assemblies for mounting user interface modules.

See Table 3 on page 11 for a list of EST4 equipment enclosure doors.

### Inner door UI frame assembly user interface modules

User interface modules installed on the UI frame assembly rail include LCD user interface modules, control-display modules, 4-MIC paging microphone, and 4-FT firefighter telephone. The EST4 control unit uses the Controller Area Network (CAN) serial communication protocol for user interface module communication through

the UI frame assembly rail to the CPU. See Table 5 on page 13 for a list of LCD display modules and user modules.

When a user module is not installed on the UI frame assembly you can install a 4-FIL blank plate to cover the slot. For more information about the filler plate, see *4-FIL Blank Plate Installation Sheet* (P/N 3102285).

### Notes

- For a 3-CHAS7 LRM chassis, when a 4-FT firefighter telephone is installed on the UI frame assembly, you *cannot* install local rail modules in slots 3 and 4 on the LRM rail behind the 4-FT.
- For a 3-CAB5B backbox LRM rail, when a 4-FT firefighter telephone is installed on the inner door UI frame assembly, you *cannot* install local rail modules in slots 4 and 5 on the LRM rail behind the 4-FT.
- When a 4-LCDx user interface module is not installed on the UI frame assembly, a 4-CABL0542 flex cable is used to connect the control unit's CPU to the UI frame assembly rail. For example, a command center can be comprised of multiple control units and only one of the control unit houses the LCD user interface module. The flex cable is for use in 3-CAB5B, 3-CAB7B, 3-CAB14B, and 3-CAB21B backboxes. For more information about the 4-CABL0542, see *4-CABL Series Flex Cable Installation Sheet* (P/N 3102265).

### Outer door tamper switch

For added enclosure security, a tamper switch can be installed in the backbox that will detect an open enclosure door. For more information see *Tamper Switches Installation Sheet* (P/N 387422).

### Outer door New York city lock

For 4-CAB16D, 4-CAB24D, and 4-CAB24DL doors, the outer door lock can be modified to accommodate installation of a New York City Lock.

For more information see *EST4 New York City Lock Installation Sheet* (P/N 3102293).

## 4-CPU

Before installing the 4-CPU, refer to the *4-CPU Central Processor Module Installation Sheet* (P/N 3102258). for additional installation information and wiring instructions.

---

### 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 3-PPS/M / 4-PPS/M 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.

### Notes

- Each 4-CPU has a label with a unique MAC address printed on it in text and in the form of a QR code. This unique MAC address is used by the 4-CU configuration utility to identify the 4-CPU (node). Prior to installing the 4-CPU, record the MAC address in project documentation or enter it in the 4-CU. See “Obtaining and recording node MAC addresses” on page 42.
- The 4-CPU can be mounted to the 3-CHAS7 or the 3-CAB5B chassis.
- All wiring is power-limited and supervised.

- Maintain 0.25 in. (6 mm) separation between power-limited and nonpower-limited wiring at all times. Refer to the backbox documentation for details.

The accessory modules and flex cables that can be attached to the 4-CPU are listed in Table 21 below. Refer to the documentation that is provided with the module for installation details.

**Table 21: Accessories**

Model	Description
4-AUDTELS	The 4-AUDTELS Audio I/O and Telephone Riser Source Module provides a single telephone riser, paging microphone support, and up to four 1 VRMS audio channels that can be programmed for either input or output operation.
4-COMREL	The 4-COMREL Common Relay Module provides three common relays (alarm, supervisory, and trouble) with duplicated terminals for installing EOLRs.
4-CABL0542	The 4-CABL0542 connects the 4-CPU to the UI rail when no 4-LCD display module is installed on a 4-CAB8D(R), 4-CAB16D(R), 4-CAB24D(R), or 4-CAB16D(R)L inner door.

## 3-PPS/M and 4-PPS/M primary power supplies

One 3-PPS/M or 4-PPS/M primary power supply is required for each control unit. The power supply provides the required power and related supervisory functions for the control unit as well as filtered, regulated power, and 24 VDC output for operating notification appliances and ancillary equipment. The power supply consists of a heat sink mainboard and a monitor module. The monitor module plugs into the rail, and the heat sink mainboard mounts onto the rail chassis.

For more information about the 3-PPS/M see Power Supply Installation Sheet (P/N 270495) for installation instructions and specifications. For more information about the 4-PPS/M see 4-PPS/M Power Supply Installation Sheet (P/N 3102673) for installation instructions and specifications.

### 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 3-PPS/M or 4-PPS/M 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.

### Cautions

- Equipment damage. Do not install the 4-PPS/M in the same cabinet as a 3-PPS/M, 3-BPS/M, or 3-BBC/M. Combining the 4-PPS/M with legacy power supplies will cause damage to the power supply.
- Equipment damage. Circuit boards are sensitive to electrostatic discharge (ESD). To avoid damage, follow ESD handling procedures.

### Notes

- Mains input and battery wiring are supervised and nonpower-limited.
- Connect the mains power wiring after all power supplies have been installed. No more than one primary power supply and three booster supplies may be connected to a single mains AC circuit.
- 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.
- Each set (pair) of batteries must be connected to a separate battery charging circuit, heat sink mainboard.
- A 3-PPS/M(-230) and a 3-BPS/M(-230) can be wired to the same set of batteries as well as a 3-BBC/M(-230) and a 3-BPS/M(-230) but never a 3-PPS/M(-230) and a 3-BBC/M(-230).

- If more than one 4-PPS/M power supply is attached to a set of batteries, only one supply can have its battery charger enabled. The switch S1 setting on the monitor module turns on and off the power supply's battery charging capability. For switch setting details on a 4-PPS/M configured as a PPS, BPS, or BBC, see *4-PPS/M Power Supply Installation Sheet* (P/N 3102673).
- Each power supply must have its own separate pair of wires connecting it to a set of standby batteries. Daisy chaining battery connections from power supply to power supply is not allowed.
- All battery wiring must be the same length and wire gauge.
- All batteries connected to the same control unit must have the same ampere-hours rating, be from the same manufacturer, and have the same manufacturing date code.
- Batteries greater than 17 Ah and any additional standby batteries must be installed in an external battery cabinet. If an external battery cabinet is used to house standby batteries, the cabinet must be installed within three feet and in the same room as the control unit.
- Each power supply must be connected to only one set of batteries.

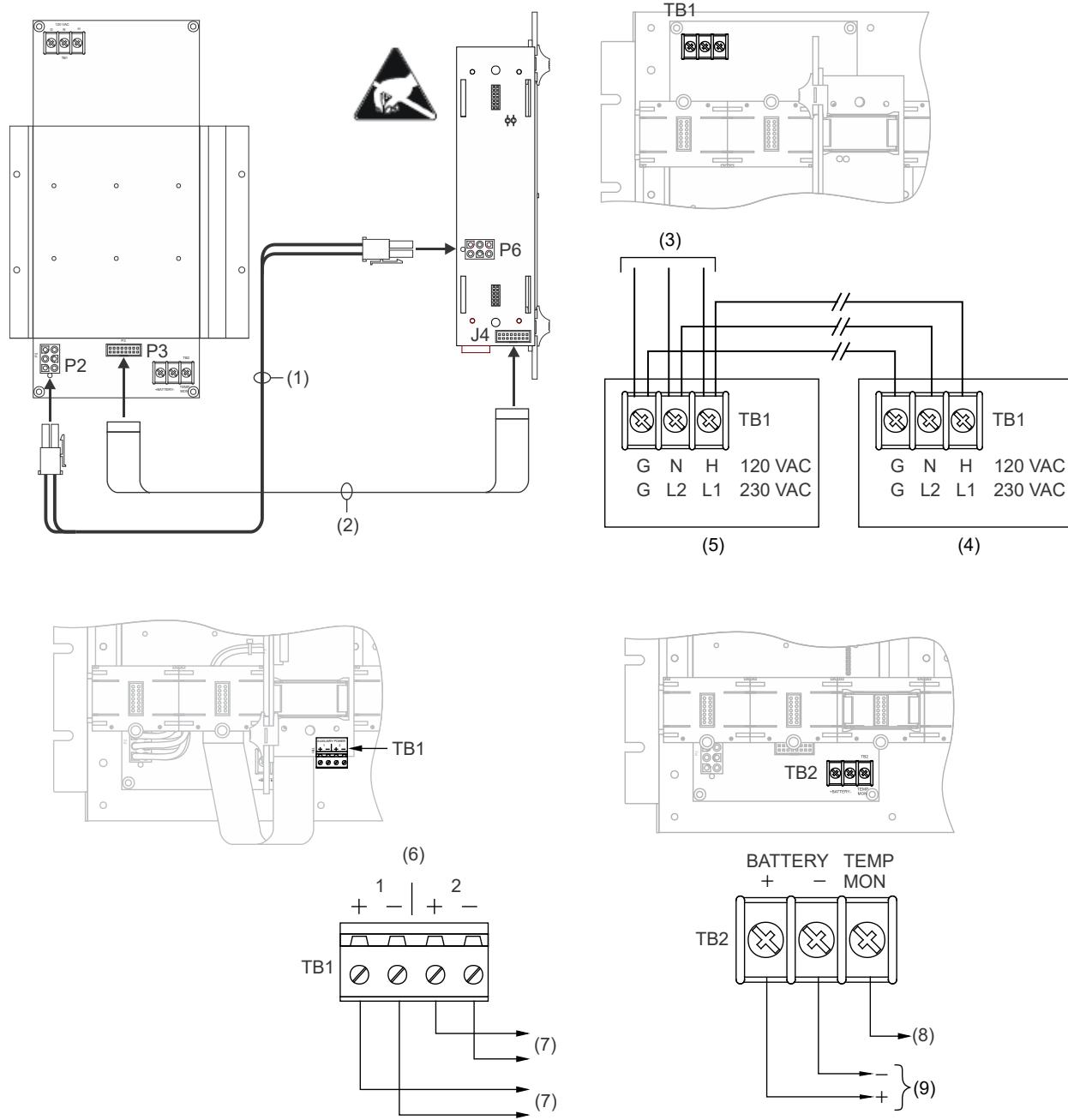
Refer to Table 22 below for power supply and standby battery requirements.

**Table 22: 3-PPS/M power supply and standby battery requirements**

Total current	3-PPS/M(230) power supplies required	Battery sets required
7 A	1 3-PPS/M(-230)	1 set, 65 Ah max.
14 A	1 3-PPS/M(-230) 1 3-BPS/M(-230)	1 set, 65 Ah max.
	1 3-PPS/M(-230) 1 3-BBC/M(-230)	2 sets, 65 Ah max.
21 A	1 3-PPS/M(-230) 2 3-BPS/M(-230)	1 set, 65 Ah max.
	1 3-PPS/M(-230) 2 3-BBC/M(-230)	3 sets, 65 Ah max.
28 A	1 3-PPS/M(-230) 3 3-BPS/M(-230)	1 set, 65 Ah max.
	1 3-PPS/M(-230) 3 3-BBC/M(-230)	4 sets, 65 Ah max.

**Table 23: 4-PPS/M power supply and standby battery requirements**

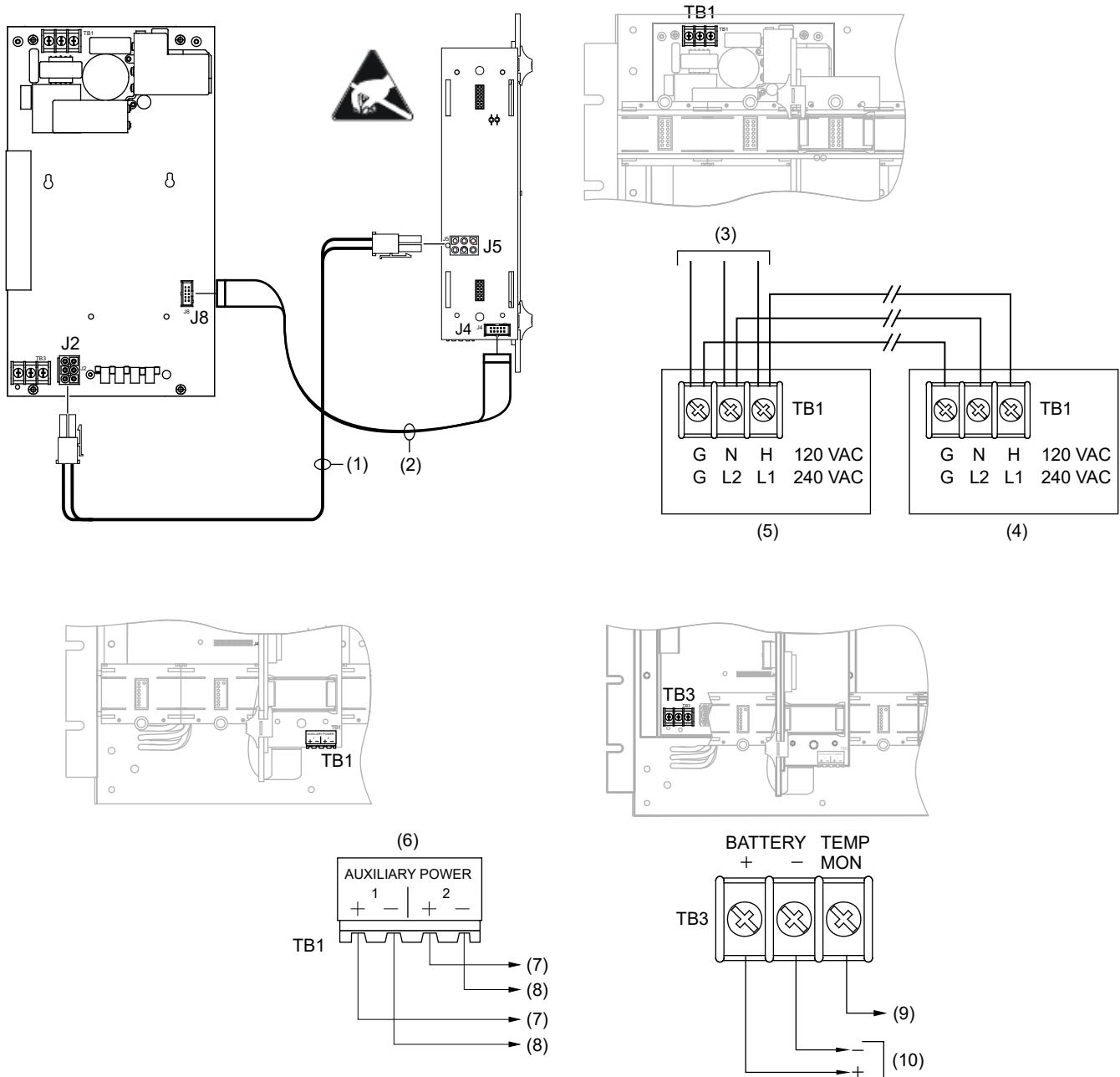
Total current	4-PPS/M power supplies required	Battery sets required
7 A	1 (PPS)	1 set, 65 Ah max.
14 A	1 (PPS) 1 (BPS)	1 set, 65 Ah max.
	1 (PPS) 1 (BBC)	2 sets, 65 Ah max.
21 A	1 (PPS) 2 (BPS)	1 set, 65 Ah max.
	1 (PPS) 2 (BBC)	3 sets, 65 Ah max.
28 A	1 (PPS) 3 (BPS)	1 set, 65 Ah max.
	1 (PPS) 3 (BBC)	4 sets, 65 Ah max.

**Figure 10: 3-PPS/M(-230) Power Supply**

- (1) Cable harness P/N 250187
- (2) Ribbon cable P/N 250189 (primary monitor module), P/N 250188 (booster monitor module)
- (3) Dedicated 120 V or 230 V mains distribution circuit
- (4) Last booster supply in the same cabinet
- (5) Primary power supply

- (6) Auxiliary power
- (7) 24 VDC
- (8) Not used
- (9) To plus and minus terminals on cabinet battery or to plus and minus terminals on power distribution bus in remote cabinet

Figure 11: 4-PPS/M Power Supply



3-PPS/M and 4-PPS/M on-board terminals and connectors facilitate 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.

## Auxiliary power riser

The 3-PPS/M / 4-PPS/M provides a 24 VDC auxiliary power riser on the power supply monitor module. The auxiliary DC output rating is listed below.

- Special applications: Two 24 VDC connections at 3.5 A maximum. Wiring is power-limited and supervised for ground faults and shorts. For a list of devices you can connect to special application circuits, refer to the control unit compatibility list.
- Regulated applications: One 24 VDC connection at 3.5 A maximum for all circuits except the regulated NAC and one 24 VDC connection at 1.0 A maximum for regulated NACs to 3-IDC8/4 modules only. Wiring is power-limited and supervised for ground faults and shorts.

## Low Battery Cutoff (LBC)

To protect the power supply from damage caused by extreme discharge you can specify in the 4-CU how long the system runs on low battery power before automatically shutting down. In LBC mode, when the power supply indicates the battery has reached its lower limit (approximately 19.5 VDC) the system automatically shuts down, ensuring that an extreme load is not placed on individual power supplies.

## Standby batteries

Standby batteries are used as secondary power for a control unit, as defined by NFPA 72. See Table 24 below for a list of standby batteries and backbox capacity.

### Notes

- Each set (pair) of batteries must be connected to a separate battery charging circuit, either on a 3-PPS/M(-230), 3-BBC/M(-230), or 4-PPS/M configured as a PPS or BBC.
- For a 4-PPS/M power supply, switch S1 setting on the monitor module turns on and off the power supply's battery charging capability. For switch setting details on a 4-PPS/M configured as a PPS, BPS, or BBC, see 4-PPS/M Power Supply Installation Sheet (P/N 3102673).
- All battery wiring must be the same length and wire gauge.
- All batteries connected to the same control unit must have the same ampere-hours rating, be from the same manufacturer, and have the same manufacturing date code.
- Standby batteries greater than 17 Ah and any additional batteries must be installed in an external battery cabinet. If an external battery cabinet is used to house standby batteries, the cabinet must be installed within 3-foot of the control unit and in the same room.

**Table 24: Standby batteries and backbox capacities**

Backbox model	Battery capacity	Battery voltage (VDC) Ah capacity @ 20 hr rate	Battery dimensions TH × CH × CW × CD [1]	Catalog number EST model
3-CAB5B	2	12 VDC 10 Ah	6.48 × 6.32 × 5.28 × 3.15	12V10A
3-CAB7B	2	12 VDC 18 Ah	6.56 × 6.50 × 7.13 × 3.0	12V17A
3-CAB14B	2	12 VDC 18 Ah	6.56 × 6.50 × 7.13 × 3.0	12V17A
3-CAB21B	2	12 VDC 18 Ah	6.56 × 6.50 × 7.13 × 3.0	12V17A
3-RCC7R	2	12 VDC 18 Ah or 2 12 VDC 26 Ah or 2 12 VDC 51 Ah or 2 12 VDC 65 Ah [2]	6.56 × 6.50 × 7.13 × 3.0 6.94 × 6.94 × 6.44 × 4.88 7.88 × 7.88 × 10.13 × 5.16 7.44 × 7.44 × 14.25 × 5.0	12V17A 12V24A 12V50A 12V65A

Backbox model	Battery capacity	Battery voltage (VDC) Ah capacity @ 20 hr rate	Battery dimensions TH × CH × CW × CD [1]	Catalog number EST model
3-RCC14R	2	12 VDC 18 Ah or	6.56 × 6.50 × 7.13 × 3.0	12V17A
	2	12 VDC 26 AH or	6.94 × 6.94 × 6.44 × 4.88	12V24A
	2	12 VDC 51 Ah or	7.88 × 7.88 × 10.13 × 5.16	12V50A
	2	12 VDC 65 Ah [3]	7.44 × 7.44 × 14.25 × 5.0	12V65A
3-RCC21R	2	12 VDC 18 Ah or	6.56 × 6.50 × 7.13 × 3.0	12V17A
	2	12 VDC 26 Ah or	6.94 × 6.94 × 6.44 × 4.88	12V24A
	2	12 VDC 51 Ah or	7.88 × 7.88 × 10.13 × 5.16	12V50A
	2 or 4	12 VDC 65 Ah [4]	7.44 × 7.44 × 14.25 × 5.0	12V65A
BC-1(R)	2	12 VDC 18 Ah or	6.56 × 6.50 × 7.13 × 3.0	12V17A
	2	12 VDC 26 Ah or	6.94 × 6.94 × 6.44 × 4.88	12V24A
	2	12 VDC 40 Ah	6.69 × 6.69 × 7.75 × 6.50	12V40A
BC-2(R)	2	12 VDC 18 Ah	6.56 × 6.50 × 7.13 × 3.0	12V17A

[1] TH = terminal height, CH = case height, CW = case width, CD = case depth

[2] Requires one 3-BATS shelf in addition to dedicated battery space to support two 12V 65 AH standby batteries - no chassis space available in this configuration.

[3] Requires one 3-BATS shelf in addition to dedicated battery space to support two 12V 65 AH standby batteries - one chassis space available in this configuration.

[4] Requires one 3-BATS shelf in addition to dedicated battery space to support two 12V 65 AH standby batteries - two chassis spaces available in this configuration.

— or —

Requires three 3-BATS shelves in addition to dedicated battery space to support four 12V 65 AH standby batteries - no chassis space available in this configuration.

## 3-MODCOM(P) Modem Communicator module

The 3-MODCOM(P) Modem Communicator is a chassis rail module that connects the EST4 system to a public switched telephone network or cellular network when used with a compatible cellular capture module. The MODCOM(P) has two 8-position modular jacks for connecting two loop-start lines.

**Note:** Refer to the control unit compatibility list for a list of compatible cellular capture modules. Refer to the *Cellular Capture Module Configuration Application Guide* (P/N 3102371) for model-specific programming and wiring requirements.

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

- Contact ID
- SIA DCS
- TAP (3-MODCOMP only)

The 3-MODCOM(P) configuration settings made in the 4-CU define the line properties, receiver attributes, account parameters, and transmission details.

### Line types

The 3-MODCOM(P) 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(P) as a two-line dialer. Both lines must have supervision (line-cut detection) selected.

## Central Monitoring Station dialing

The 3-MODCOM(P) electronically dials receivers in the CMS using either pulse or tone dialing, as specified in the 4-CU. 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(P) 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(P) 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(P) 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(P) module sequences through the following basic steps to contact the CMS receiver.

1. The 3-MODCOM(P) 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(P) 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(P) 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(P) to dial without waiting for a dial tone.

3. The 3-MODCOM(P) dials the CMS using the programmed dialing mode and telephone number.
4. The 3-MODCOM(P) 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 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 (DSCR). The DSCR goes off-hook and transmits a handshake.

6. If the handshake matches the desired transmit format, the 3-MODCOM(P) 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(P) 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(P)**

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

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

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

### **POTS line requirements**

The 3-MODCOM(P) 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(P). The other end plugs into an RJ-31X jack. You must obtain the RJ-31X jack locally.

**Note:** For cellular capture module line requirements, refer to the *3-MODCOM and 3-MODCOMP Modem Communicator Installation Sheet* (P/N 387476). For cellular capture module model-specific programming and wiring requirements, refer to the *Cellular Capture Module Configuration Application Guide* (P/N 3102371).

---

**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(P) 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(P), which provides a series connection to the telephones.

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

- 3-MODCOM(P) 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(P) 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(P) 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(P) 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(P) module. The customer should keep this number confidential. In the case of the two-line dialer, two premises telephone numbers would have to be bussed 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(P) 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(P) 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(P).)
- When the 3-MODCOM(P) is configured as a two-line dialer module, two incoming lines must be used, and connections must be made to each line.

## Connecting the 3-MODCOM(P) to telephone company lines

### Notes

- For the installation of a system in compliance with NFPA 72, the 3-MODCOM(P) 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 life safety 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.
- For connecting the 3-MODCOM(P) to a cellular capture module for communication over a digital cellular network, refer to the *3-MODCOM and 3-MODCOMP Modem Communicator Installation Sheet* (P/N 387476). For cellular capture module model-specific programming and wiring requirements, refer to the *Cellular Capture Module Configuration Application Guide* (P/N 3102371).

**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(P) and configuring its database in the 4-CU, download the database. Refer to “Downloading a project database” on page 45 for download instructions.

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

**Testing the transmission**

The 4-CU provides a report that lists all CMS codes that can be transmitted from the 3-MODCOM(P). 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 control unit. You must reset the control unit 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 4-CU for the 3-MODCOM(P). 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(P) and enable matching accounts on the backup 3-MODCOM(P).

Failover operation results in a system that is resistant to trouble arising from telephone lines, 3-MODCOM(P)s, or the 4-CPU module. The operation can be limited to a single control unit or can span two or more control units anywhere in a network.

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

## Installing a node module in an existing network

When adding a new node to an existing network, the port on the existing node to which the new node is physically connected must first be configured as active in the 4-CU and the project downloaded to the control unit. The download opens the existing node's port so that when the new node module is added the configuration utility can connect to it. If the existing node's port is not first activated, when you install the new node module and attempt to query the network the query will not be able to access the new node.

EST4 provides the following node types:

- 4-CPU Central Processor Module
- 4-ANNCPU Annunciator Central Processor Module
- 4-NET-AD Network Adder Module
- 4-FWALx Firewall Module [1]
- 4-CPUGRPH Graphic Annunciator Central Processor Module

[1] When connecting to external services with a 4-FWAL module it is important to keep in mind the following configuration requirements.

- When multiple Ethernet connections are used on a 4-FWAL module:
  - Each port, eth0 and eth1, must be connected to a different subnet. If auto-addressing is used, the ports must be connected to different DHCP servers.
  - Assure that the connected server(s) or hosts belong to the same subnet as the connected eth0 or eth1 port.
  - If your network setup necessitates reaching a host on a different subnet use eth0 for this configuration.
- The 4-FWAL module should be positioned at the end of the line of CPUs in an enclosure so that the life safety network is not exposed to the non-life safety network.
- When installing an EST4 network that includes a backbone and multiple Notification Control Areas (NCAs) as described in the *EST4 Network and Audio Application Guide* (P/N 3102306), it is important that the 4-FWAL module is not directly connected to the Backbone node between NCAs.
- If using DHCP servers and the configured DHCP address has changed (i.e., the network configuration updated) before the lease expired, the node must be rebooted in order to acquire the new IP address.

#### To install a node module in an existing network:

1. Physically connect the 4-CU project computer to the control unit 4-CPU:

Disable or disconnect any Wi-Fi or other network adapters on the project computer. Only the USB RNDIS connection should be enabled during the download process.

Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU.

Connect the Type A end of the cable to a standard USB port on the computer with the project database.

2. Configure the port on the existing node module using the 4-CU:

From the 4-CU, on the Project Management tab, open the project.

In the project tree, select the existing node to which the new node will be connected, and then click Edit Properties.

In the Active Ports property, select the port used to physically connect to the new node module.

3. Obtain an access code using the existing node's control unit LCD screen:

From the control unit LCD screen, on the Action bar, tap System Info.

On the Command bar, tap 1 Hour Access or 8 Hour Access to obtain a 4-CU required access code that will allow you to download to the control unit.

4. Query the network and download the project database using the 4-CU:

From the 4-CU, on the Home tab, in the Communication group, click Enter Access Code.

Enter the access code, and then click Validate.

In the Communication group, click Query Network, and then click Refresh to confirm communication with the network nodes.

On the Communication tab, click Transmit to All Nodes or Transmit To Specific Node(s).

- **Transmit to All Nodes:** Use to transfer the current 4-CU configuration to all nodes on the EST4 network.
- **Transmit to Specific Node(s):** Use to transfer the current 4-CU configuration to selected nodes on the EST4 network.

A progress bar displays in the lower right side of the CU window. The control unit reboots when the download is complete.

5. Install the new node in the control unit cabinet. Refer to the node's installation sheet for installation details.

**Note:** If reusing a CPU module from another system and the module may have been preconfigured, make sure that the appropriate USB or ETH ports are enabled for the new installation. If necessary, connect the 4-CU directly to the node.

6. Add and configure the new node using the 4-CU (refer to 4-CU Help if necessary):

From the 4-CU, select Root in the project tree, and then add the new node.

In the project tree, select the new node, and then click Edit Properties.

Configure the new node as required for your project.

7. Obtain a new access code using the control unit LCD screen (see step 3).

8. Repeat step 4 to query the network and download the project database.

9. Cancel the access code, when finished downloading:

From the control unit LCD screen, on the Action bar, tap System Info.

On the Command bar, tap Cancel Access.

## Preliminary field wiring testing

It is recommended that you test all circuits before they are connected to the control unit components. Table 25 below 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 is running.

**Table 25: Field wiring tests**

Circuit type	Test
DC notification appliance circuit	<ol style="list-style-type: none"> <li>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.</li> <li>2. Reverse the meter leads. The circuit resistance between conductors should read approximately 10 kΩ to 20 kΩ. If the resistance reading is still approximately the same value when the meter leads are reversed, one or more polarized devices are installed incorrectly.</li> <li>3. Measure the resistance between each conductor and earth ground. The resistance should be infinite.</li> </ol>

Circuit type	Test
Audio notification appliance circuit	<ol style="list-style-type: none"> <li>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.</li> <li>2. Reverse the meter leads. The circuit resistance between conductors should still read approximately 15 kΩ.</li> <li>3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.</li> </ol>
Signature SLCs	<ol style="list-style-type: none"> <li>1. With field wiring disconnected, verify the continuity of each conductor. Each conductor should measure less than 38 Ω.</li> <li>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.</li> <li>3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.</li> </ol>
Traditional initiating device circuits	<ol style="list-style-type: none"> <li>1. Verify the continuity of each conductor.</li> <li>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.</li> <li>3. Measure the resistance between each conductor and earth ground. The circuit resistance between a conductors and earth ground should be infinite.</li> </ol>
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.

## Network pass-through compatibility

EST4 supports network pass-through mode of operation on the 4-CPU, 4-ANNCPU, 4-NET-AD, and 4-CPUGRPH CPUs. Pass-through from the CPU module eth1 and eth0 network connections is supported from one SFP to another SFP of any like-rate SFP module type except a 4-NET-TP to a 4-NET-TP-HC connection. See Table 26 below.

For more information on EST4 network and audio applications, see the *EST4 Network and Audio Application Guide* (P/N 3102306).

**Table 26: Network pass-through compatibility**

eth0 SFP	eth1 SFP
4-NET-CAT	CAT, MM, SM, SMH, SMD, SMU
4-NET-MM	CAT, MM, SM, SMH, SMD, SMU
4-NET-SM	CAT, MM, SM, SMH, SMD, SMU
4-NET-SMH	CAT, MM, SM, SMH, SMD, SMU
4-NET-SMD	CAT, MM, SM, SMH, SMD, SMU
4-NET-SMU	CAT, MM, SM, SMH, SMD, SMU
4-NET-TP	TP
4-NET-TP-HC	TP-HC

## Circuit compatibility

The circuit compatibility matrix in Table 28 on page 92 shows which circuit types may occupy the same conduit or be combined together, where permitted by code.

**Table 27: Circuit compatibility matrix**

Legend		Circuit wiring specifications												
		24 VDC power-limited	4-NET-TP twisted-pair circuit	4-NET-TP-HC twisted-pair circuit	4-NET-CAT Cat5x circuit	25 VRMS audio power-limited	25 VRMS audio nonpower-limited	70 VRMS audio power-limited	70 VRMS audio nonpower-limited	Signature signaling line circuit	Traditional two-wire IDC	4-AUDTELS firephone riser	AC mains, nonpower-limited	4-NET series fiber-optic circuit
1 = No restrictions		1 1	1 2	1 2	1 4	1 2	Ø	1 2	Ø	1 1	1 1	1 3	Ø	1 1
2 = Twisted-pair cable		2 1	2 2	2 2	2 4	2 2	Ø	2 2	Ø	2 1	2 1	2 3	Ø	2 1
3 = Twisted-pair, shielded cable		2 1	2 2	2 2	1 4	2 2	Ø	2 2	Ø	2 1	2 1	2 3	Ø	2 1
4 = CAT4 or better		4 1	4 2	4 2	4 4	4 2	4 2	4 2	4 2	4 1	4 1	4 3	Ø	4 1
Ø = Do not combine														
Gray box = Power-limited circuit														
White box = Allowed in same conduit by manufacturer [1]														
1 \ 1 = Top number														
Bottom number														
24 VDC power-limited		1 1	1 2	1 2	1 4	1 2	Ø	1 2	Ø	1 1	1 1	1 3	Ø	1 1
4-NET-TP twisted-pair circuit [2]		2 1	2 2	2 2	2 4	2 2	Ø	2 2	Ø	2 1	2 1	2 3	Ø	2 1
4-NET-TP-HC twisted-pair circuit [2]		2 1	2 2	2 2	1 4	2 2	Ø	2 2	Ø	2 1	2 1	2 3	Ø	2 1
4-NET-CAT CAT5x circuit		4 1	4 2	4 2	4 4	4 2	4 2	4 2	4 2	4 1	4 1	4 3	Ø	4 1
25 VRMS audio power-limited		2 1	2 2	2 2	2 4	2 2	Ø	2 2	Ø	2 1	2 1	3 3	Ø	2 1
25 VRMS audio nonpower-limited		Ø	Ø	Ø	Ø	Ø	2 2	Ø	2 2	Ø	Ø	Ø	Ø	2 1
70 VRMS audio power-limited		2 1	2 2	2 2	2 4	2 2	Ø	2 2	Ø	2 1	2 1	3 3	Ø	2 1
70 VRMS audio nonpower-limited		Ø	Ø	Ø	Ø	Ø	2 2	Ø	2 2	Ø	Ø	Ø	Ø	2 1
Signature signaling line circuit		1 1	1 1	1 2	1 4	1 2	Ø	1 2	Ø	1 1	1 1	1 3	Ø	1 1
Traditional two-wire IDC		1 1	1 1	1 2	1 4	1 2	Ø	1 2	Ø	1 1	1 1	1 3	Ø	1 1
4-AUDTELS firephone riser		3 1	3 2	3 2	3 4	3 3	Ø	3 3	Ø	3 1	3 1	3 3	Ø	3 1
AC mains, nonpower-limited		Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	1 1	Ø
4-NET series fiber-optics circuit		1 1	1 2	1 2	1 4	1 2	1 2	1 2	1 2	1 1	1 1	1 3	Ø	1 1

[1] Install and wire devices in accordance with applicable national and local codes, ordinances, and regulations.

[2] Twisted-pair wiring should be a single twisted-pair with six twists per foot minimum. All specifications in Table 27 above should be met to maximize noise immunity.

# UL 864 notification appliance circuit signal synchronization

Table 28 below lists the installation requirements for systems that must meet UL 864 signal synchronization requirements.

**Table 28: Installation requirements for UL 864 signal synchronization**

Circuit	Installation requirements
3-SSDC1 and 3-SDDC1 3-SSDC2 and 3-SDDC2	Emergency evacuation signals are synchronized on a “per loop” basis when used with SIGA-CC1S or SIGA-MCC1S modules (personality code 25) or SIGA-CC2A or SIGA-MCC2A modules (personality code 19 or 25) and Genesis or Enhanced Integrity notification appliances.  Emergency evacuation signals are synchronized on a “per module” basis when used with SIGA-CC1, SIGA-CC2A, SIGA-CC2A or SIGA-MCC2A modules (personality code 5), 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.  To silence audible appliances separately, use two NAC channels from the 3-IDC8/4 to provide separate audible and visible power to the NAC. In this configuration, the signal silence function operates as defined in your project. See Figure 12 on page 93 for typical wiring.  Configure the audible notification appliances for temporal or steady output as desired.
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, 3-ZA40, and ZA95 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.
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).

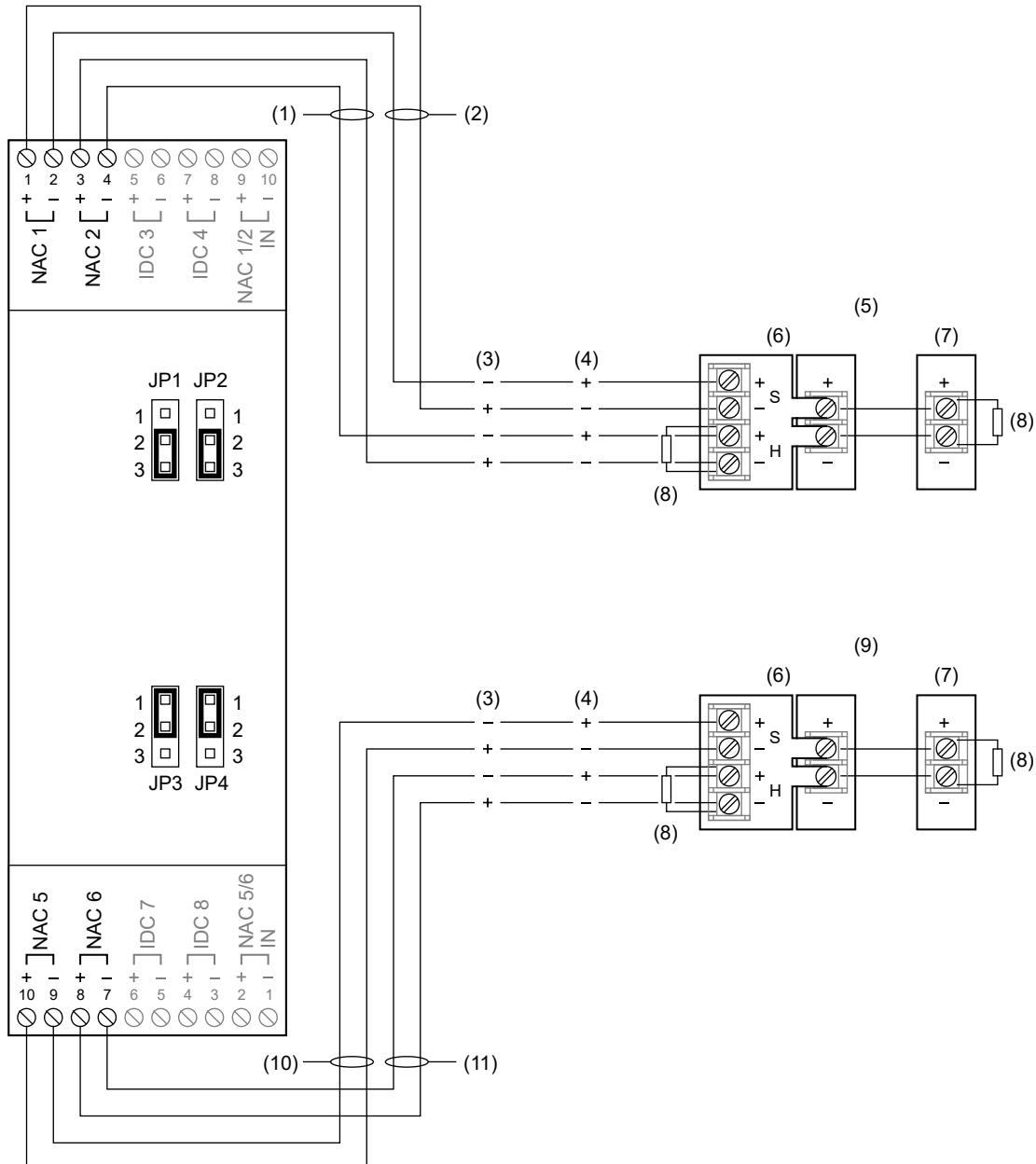
Figure 12 on page 93 shows a typical application of the 3-IDC8/4 module for supporting two notification zones. In this example, power is being supplied from the chassis rail and the jumpers (JP1 through JP4) on the module are set accordingly. Refer to the *3-IDC8/4 Traditional Zone I/O Module Installation 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 12, 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.

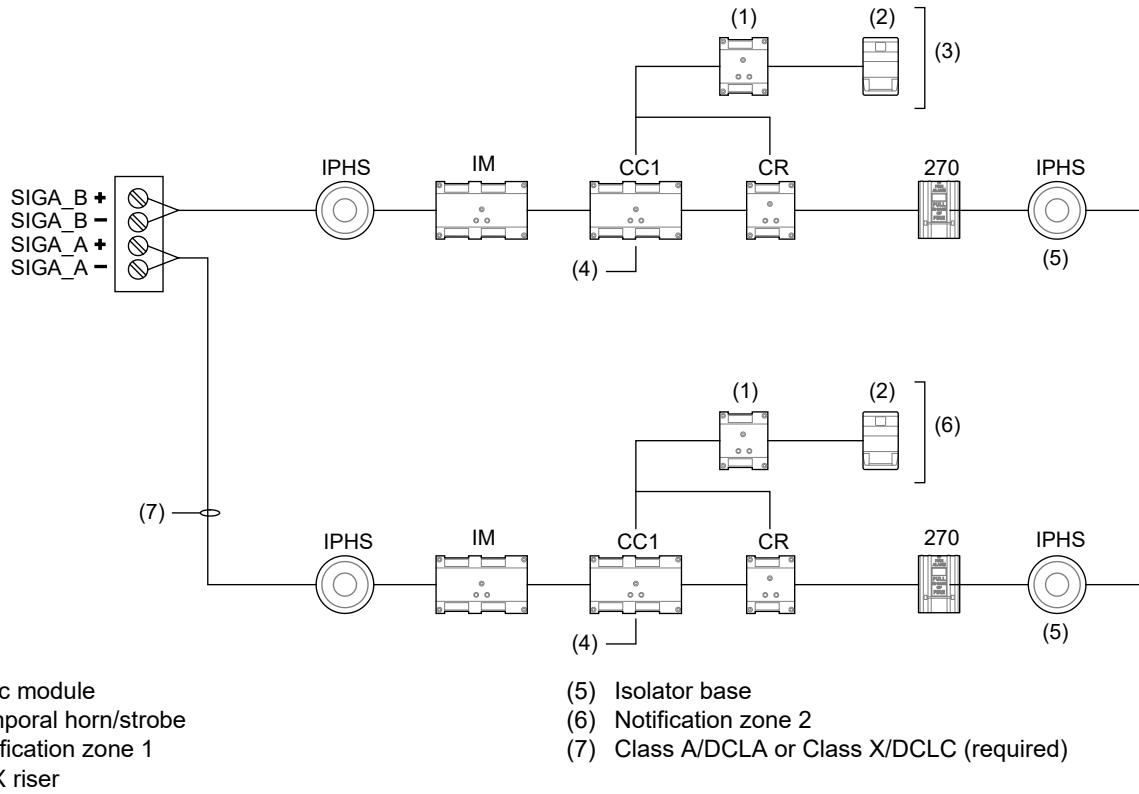
**Figure 12: Typical 3-IDC8/4 card NAC wiring**



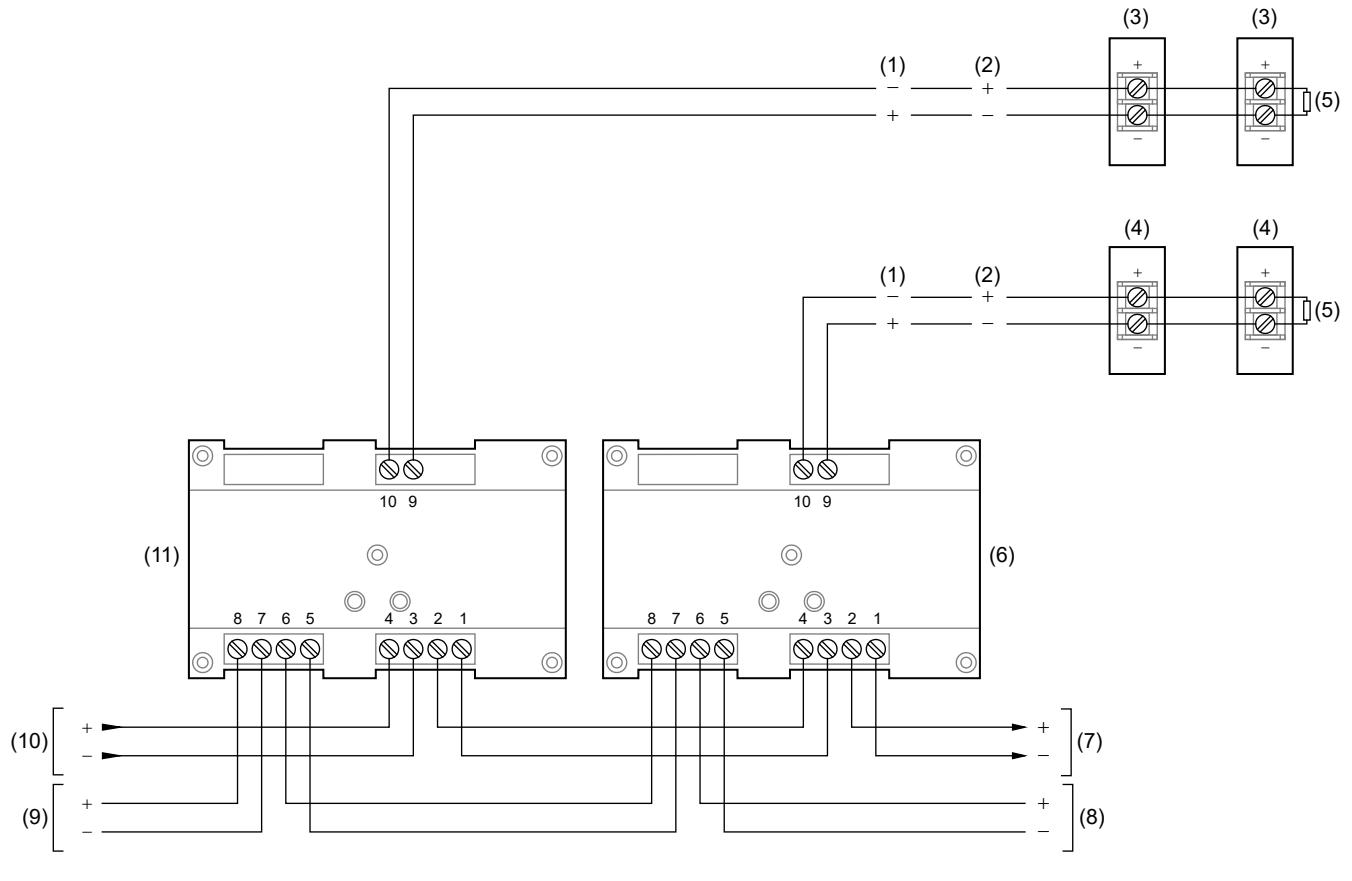
- (1) NAC 2, Device type: Audible, Label: Zone\_1\_Horns
- (2) NAC 1, Device type: Visible, Label: Zone\_1\_Strobes
- (3) Normal
- (4) Active
- (5) Zone 1
- (6) Temporal horn/strobe and G1M module
- (7) Temporal horn/strobe
- (8) 15 kΩ EOLR
- (9) Zone 2
- (10) NAC 5, Device type: Visible, Label: Zone\_2\_Strobes
- (11) NAC 6, Device type: Audible, Label: Zone\_2\_Horns

Figure 13 below shows a Signature SLC wired as Class A/DCLA or Class X/DCLC for notification circuit signal synchronization.

**Figure 13: Class A/DCLA Signature wiring for signal synchronization**



**Figure 14: Typical SIGA-CC1S NAC wiring**



- |  |   |
|--|---|
| (1) Normal<br>(2) Active<br>(3) Temporal horn<br>(4) Strobe<br>(5) 47 kΩ EOLR<br>(6) CC1S:<br>Device type: Visible<br>Personality: (5) Riser Selector<br>Label: ZONE_1_STROBES | (7) Data out to next device<br>(8) AUX riser to next device or riser monitor<br>(9) AUX riser from previous device<br>(10) Data in from previous device<br>(11) CC1S:<br>Device type: Audible<br>Personality: (5) Riser Selector<br>Label: ZONE_1_HORNS |
|--|---|

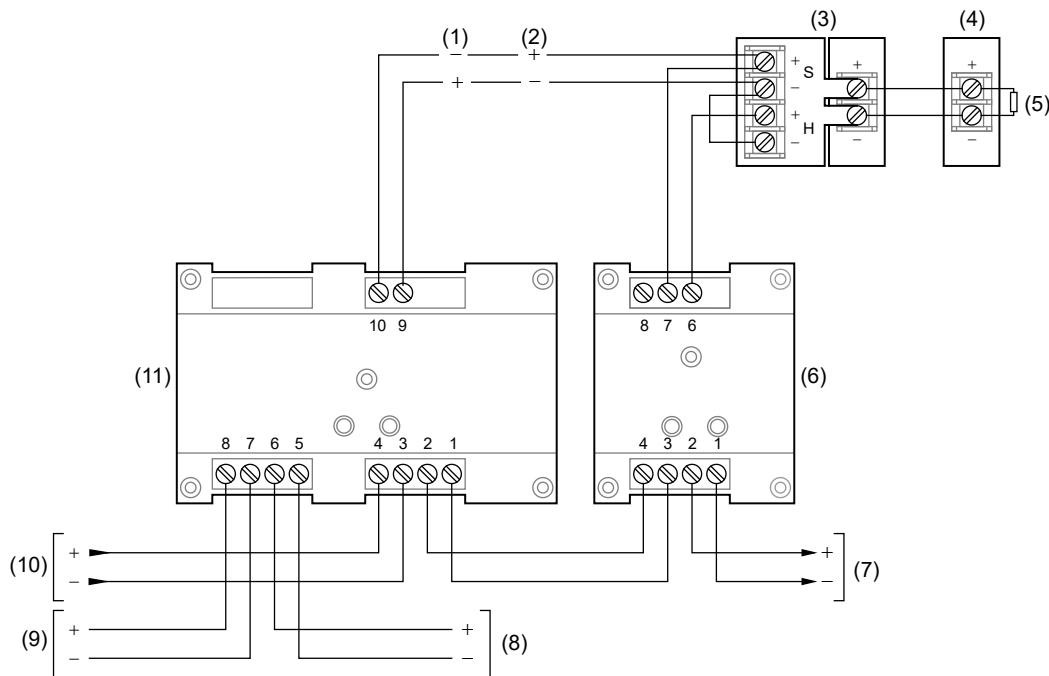
Figure 15 below shows a single SIGA-CC1 switching a NAC on or off. The G1M module provides signal synchronization for the temporal horn/strobe appliances.

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 4-CU. The CU 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 SLC.

**Figure 15: Typical SIGA-CC1 NAC wiring**



- |   |   |
|---|---|
| (1) Normal                              | (7) Data out to next device                   |
| (2) Active                              | (8) AUX riser to next device or riser monitor |
| (3) Temporal horn/strobe and G1M module | (9) AUX riser from previous device            |
| (4) Temporal horn/strobe                | (10) Data in from previous device             |
| (5) 47 kΩ EOLR                          | (11) CC1:                                     |
| (6) CR:                                 | Device type: Visible                          |
| Device type: Dry Contact                | Personality: (5) Riser Selector               |
| Personality: (8) Dry Contact            | Label: ZONE_1_NAC                             |
| Label: ZONE_1_NAC_SILENCE               |   |

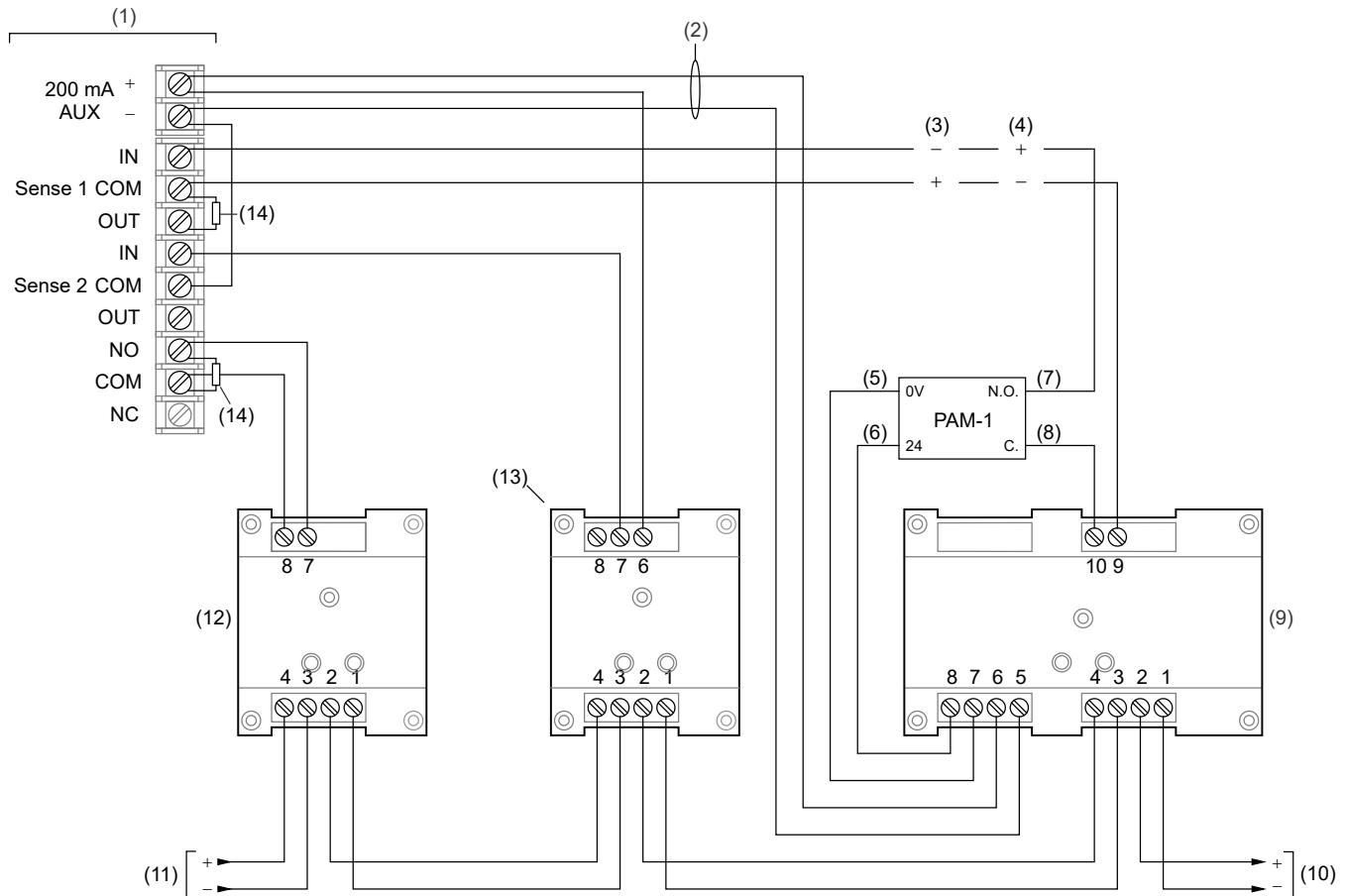
Figure 16 on page 97 shows an auxiliary/booster power supply being used to power the NAC, to provide synchronization and horn silence capability. Because the auxiliary/booster supply has the ability to silence the horn circuit, this application can be created using only the Signature wiring.

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 PAM1 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 16: Using an auxiliary/booster supply for horn silence capability with two wires**



- (1) Auxiliary/booster supply  
(2) Not supervised  
(3) Normal  
(4) Active  
(5) White  
(6) Red  
(7) Orange  
(8) Blue  
(9) CC1 or CC1S:  
Device type: Visible  
Personality: (5) Riser Selector  
Text 1: REMOTE\_SUPPLY  
Text 2: HRNS\_&\_STROBES

- (10) Data out to next device  
(11) Data in from previous device  
(12) CT1:  
Device type: AC Power  
Personality: (3) Active B  
Text 1: REMOTE\_SUPPLY  
Text 2: HRNS\_&\_STROBES  
(13) CR:  
Device type: NSCommonAlarmOutput  
Personality: (8) Dry Contact  
Text 1: REMOTE\_SUPPLY  
Text 2: HRNS\_&\_STROBES  
(14) 47 kΩ EOLR

## Connecting PT-1S series printers

The PT-1S and PT-1S+ serial printers can be connected to an EST4 control unit by way of the 4-USBHUB to provide a printout of system events such as status changes, active events, and reports. The printers are 80-character line width, freestanding printers that use standard form feed paper.

The EST4 Printer Service communications service is used to allow the transmission of system events through the EST4 control unit to the printer. For more about the Printer Service and other communication services see “Communication services” on page 119.

**Figure 17: PT-1S serial printer**



**Note:** Refer to *PT-1S Fire Alarm Printer Installation Sheet* (P/N 3100989) for details.

**Figure 18: PT-1S+ serial printer**



**Note:** Refer to *PT-1S+ Printer Installation Sheet* (P/N 3102823) for details.

Printer manufacturer’s documentation is provided with the printer that contains detailed instructions for assembling the printer, installing the print drivers, configuring the serial interface, and testing the printer.

## Printer configuration settings

### Configuring the printer’s serial interface

Configure the printer’s serial interface settings using printer controls. Instructions for configuring the settings are provided in the printer manufacturer’s documentation and can also be found in *PT-1S Fire Alarm Printer Installation Sheet* (P/N 3100989) and *PT-1S+ Printer Installation Sheet* (P/N 3102823).

Permissible serial interface settings are shown in Table 29 on page 99. Refer to the printer manufacturer’s documentation for the printer’s serial interface default settings.

**Table 29: PT-1S series printers permissible serial interface settings**

Item	Permissible settings
Parity	None, Even
Serial Data 7/8 bits	8 bits
Protocol	Ready/Busy [1], X-ON/X-OFF [2]
Diagnostic Test	No
Busy Line	DTR
Baud rate	4800
DSR Signal	Invalid
DTR Signal	Ready on Power Up
Busy Time	200 ms

[1] For supervised printers

[2] For unsupervised printers

### Configuring the Printer Service port setting

Allowing an EST4 control unit to send events to a connected PT-1S or PT-1S+ printer is managed by the EST4 Printer Service communications service that is configured in the 4-CU. The USB Port property in the Printer Service specifies the 4-USBHUB port to which the printer is physically connected.

#### To configure the Printer Service port setting:

- From the 4-CU:

In the Navigation pane, on the Project Tree select the node that contains the Printer Service.

On the Node Configuration tab, in the Communication Services list select the Printer Service.

On the Edit Properties tab, for the USB Port property enter one of the following:

2-1.1 for a printer connected directly to the CPU

— or —

2-1.5 or 2-1.6 (dependent on port used) for a printer connected through a 4-USBHUB

— or —

2-1.5.1 or 2-1.6.1 (dependent on port used) for a printer installed further than 16.4 ft. (5 m) from the 4-USBHUB using a USB extender cable (P/N 4-CABLUSBLG)

**Note:** Add .1 for every USB extender cable used. Example, for a printer using three USB extender cables the port property would be 2-1.5.1.1.1 or 2-1.6.1.1.1 (dependent on port used).

### Wiring the PT-1S series printer

Wire the printer in accordance with applicable national and local codes, ordinances, and regulations. For more information about the PT-1S, see *PT-1S Fire Alarm Printer Installation Sheet* (P/N 3100989). For more information about the PT-1S+, see *PT-1S+ Printer Installation Sheet* (P/N 3102823).

---

**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

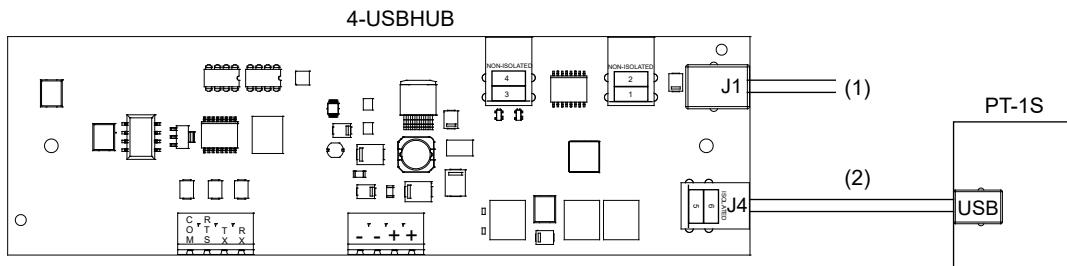
- USB printer connections are power-limited and may or not be supervised, depending on the control unit.

- Locate supervised USB printers in the same room as the equipment to which they connect.
- Locate unsupervised USB printers in the same room and within 20 ft. (6.1 m) of the equipment to which they connect for UL; 59 ft. (18 m) for ULC. Enclose wiring in conduit or equivalent protection against mechanical injury.

For printers located further than 20 ft. of the equipment, use

- Printers that incorporate isolation can be connected to any EST4 CPU, Type A port.
- Printers that do not incorporate isolation and cause a ground fault when connected to the CPU, require a customer supplied isolation dongle. This configuration is not UL/ULC approved.
- For more information about the 4-USBUHUB, see *4-USBUHUB Multi-port USB Hub Module Installation Sheet* (P/N 3102281).
- If the printer is required to operate during brownout conditions and AC power failures, install a UL Listed (UTRZ) uninterruptible power supply that can maintain printer operating voltage for at least 24 hours. See "System printer standby power supply" below.
- For ULC printer applications in which a UPS is used as the emergency power supply, install this product and the UPS in a lockable enclosure in accordance with CAN/ULC-S527.

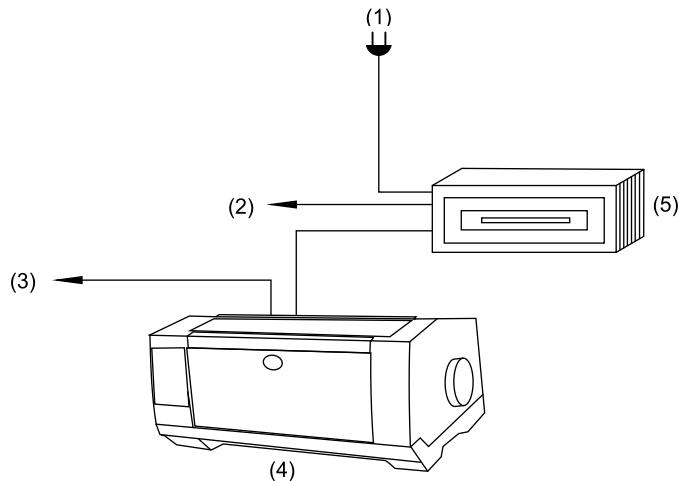
**Figure 19: Typical printer wiring using the 4-USBUHUB**



- (1) From a 4-CPU, 4-ANNCPU, 4-NET-AD, 4-ASDCPU, or a 4-FWAL-1,-2, -3, -4 module that supplies primary 24 VDC and communication to the 4-USBUHUB at this connection. A USB 3.0 cable (supplied with the 4-USBUHUB) is required
- (2) USB 2.0 A to B cable (customer supplied)

## System printer standby power supply

For a printer using an uninterruptible power supply the UPS should be UL Listed for fire protection (UTRZ) and provide 120 VAC at 50/60 Hz for at least 24 hours.

**Figure 20: Printer to uninterruptible power supply wiring**

- (1) 120 VAC, 14 A circuit
- (2) UPS trouble contact monitor circuit
- (3) To the 4-USBHUB J4 connection
- (4) Printer
- (5) Uninterruptible power supply

## Connecting a CDR-3 for coded tone output

The CDR-3 Bell Coder module can be connected to the 4-USBHUB module to provide a coded or march time tone to the audio system. For more information see *CDR-3 Bell Coder Installation Sheet* (P/N 3100023).

The EST4 Coder Service communications service is used to allow communication through the EST4 control unit to the bell coder. The Coder Service properties are configured in the 4-CU. For more about the Coder Service and other communication services see “Communication services” on page 119.

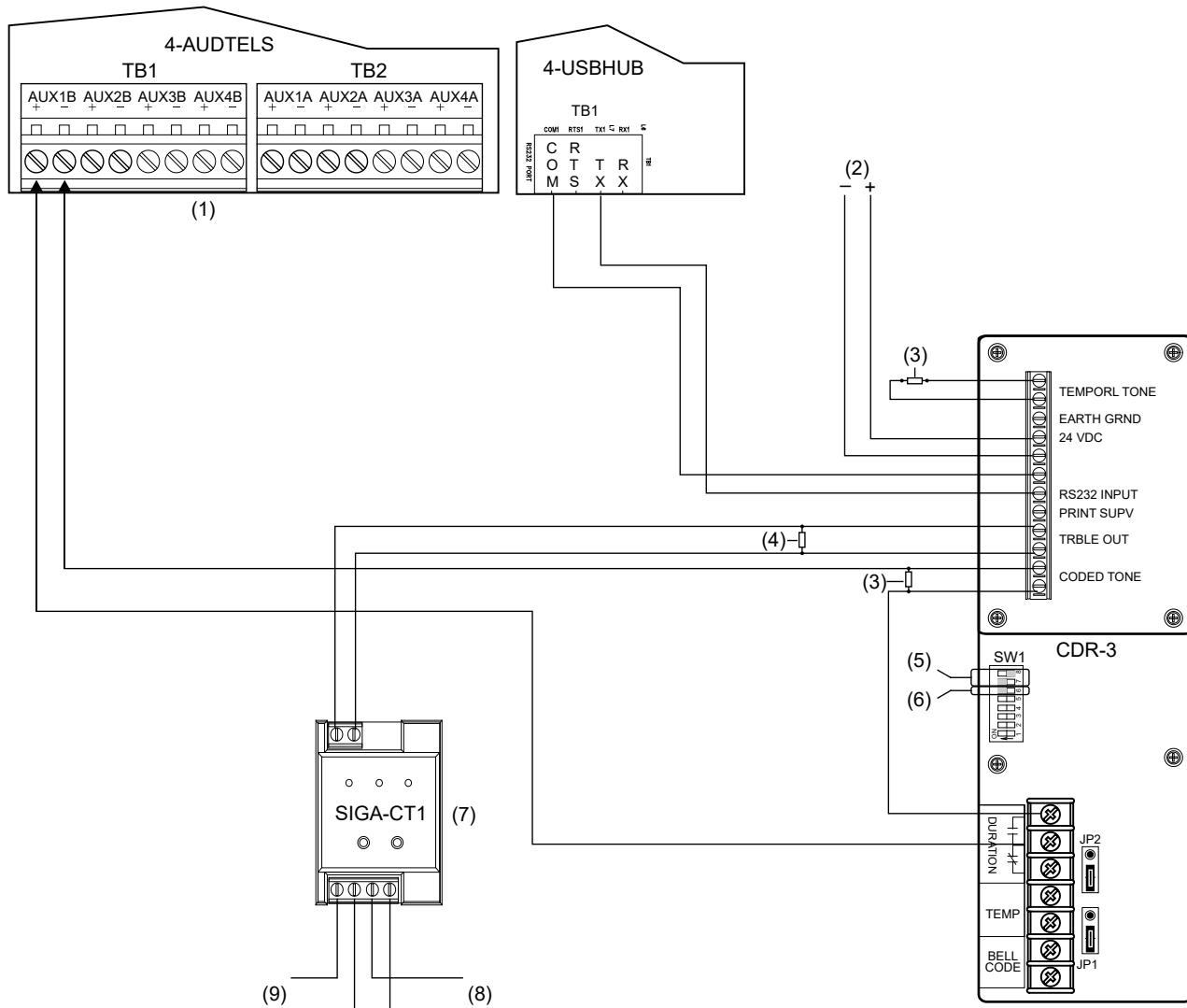
### Wiring the CDR-3

Wire the CDR-3 in accordance with applicable national and local codes, ordinances, and regulations.

**Note:** Configure the SW1 parity DIP switch to NONE and the baud rate DIP switches to 4800, to match the 4-CU settings. See Figure 21, item 5 and item 6 on page 102.

**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.

Figure 21: CDR-3 wiring



## Legend

- (1) 4-AUDTELS mounted on a 4-CPU
- (2) From a regulated 24 VDC power supply that is UL/ULC listed for fire protective signaling systems
- (3) 10 kΩ EOLR (P/N EOL-10)
- (4) 47 kΩ EOLR (P/N EOL-47)
- (5) SW1 DIP switches S1-7 and S1-8: S1-7 = ON, S1-8 = OFF (default 4800 baud rate)
- (6) SW1 DIP switch S1-6: Set to ON (no parity)
- (7) Configure the SIGA-CT1 as a non-latching input circuit with the Monitor device type
- (8) SLC OUT
- (9) SLC IN

## Notes

- Wiring is supervised and power-limited.
- Maintain 0.25 in. (6 mm) separation between power-limited and nonpower-limited wiring at all times.
- For more information about the 4-USBHUB, see *4-USBHUB Multi-port USB Hub Module Installation Sheet* (P/N 3102281).
- For more information see *4-AUDTELS Audio IO and Telephone Riser Source Module Installation Sheet* (P/N 3102279).
- For more information see *SIGA-CT1 Single Input Module Installation Sheet* (P/N 387021P).

# Adjusting amplifier output levels

The audio system works best if the prerecorded tones and messages have roughly the same volume, or amplitude. The process of establishing a common maximum amplitude is sometimes called *normalizing*.

We suggest that you normalize your tones and messages to a maximum amplitude of 1 V peak-to-peak, or an average of 0.7 VRMS using a sound editor, and then import them into the 4-CU.

Before starting the process of adjusting the amplifier output levels, you need the following:

- A project database that contains a 1 kHz tone WAV file
- An installed control-display module with a switch programmed to turn on the 1 kHz tone
- An RMS voltmeter (Fluke 83 or equivalent)

## To adjust the output level:

1. Disconnect the field wiring to all the zoned audio amplifier modules in the control unit.
2. Place an RMS meter across the amplifier's TB2 NAC/B+ and NAC/B- terminals.
3. Press the control-display module switch programmed to turn on the 1 kHz tone.
4. Adjust the amplifier's gain pot until the RMS meter displays the configured output level (25 or 70 VRMS).
5. Reconnect the amplifier's field wiring.
6. Press the control-display module switch again and verify that the output level remains the same.
7. If the output level needs readjusted, repeat steps 1 through 6.

# Chapter 5

# Supplementary applications

## Summary

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

## Content

Notification Control Areas	106	Coder Service	120
Notification Control Area logics	106	ECP Service	120
Command Center logics	106	Email Service	120
Request Grant Deny logics	106	IP Receiver Service	122
Port blocking of audio traffic	106	Printer Service	122
Mass notification system (MNS) emergency communication	107	Web Browser Service	122
Audio subsystem	108	Abound Connected Safety (ACS) Service	125
Audio subsystem components	108	ModuLaser Net Service	125
Amplifiers	110	Vesda Net Service	125
Audio types	111	VESDA aspirating smoke detectors	126
Audio signal priority	111	UL listing requirements for EST4 integration	126
Paging functions	112	VESDA events mapping	126
Automatic messaging	113	ModuLaser aspirating smoke detectors	127
Prerecorded Message Operation	113	ModuLaser events mapping	128
4-MIC microphone live voice announcements	113	Centralized audio applications	129
4-MIC live mass notification signaling	115	Amplifier Terminal Panel Cabinet (ATPC)	130
4-FT firefighter telephone live voice announcements	116	ATP Amplifier Terminal Panel and ATPINT	
4-FT firefighter telephone two-way communication	117	Interface card	131
Remote annunciation	118	Dukane audio amplifiers	133
Standard components	118	ATP and 3-ATPINT terminal connections and	
Graphic annunciation	119	jumper settings	135
Communication services	119	ATP external battery charger	139
		Wiring diagrams	140
		Building management control system	145

## Notification Control Areas

NCA programming allows the programmer to group nodes that are installed throughout the premises. Typically, there is one NCA per building with one primary control location and multiple remote control locations. NCAs provide a structure for the distributed audio system and are used to define the audio subsystem's coverage area.

A basic NCA has one or more command centers for controlling the operations of the members of the NCA. In some installations multiple NCAs can be managed by one or more CCSs.

Notification Control Area, Command Center, and Request Grant Deny logic devices are configured in the 4-CU that can allow implementation of single or multiple command centers for a protected premises. The logic group functionalities are independent operations that can have an audio subsystem. At any given time, one command center in an NCA can be granted control so that a user can initiate fire responses.

For more information about audio applications, components, and examples see *EST4 Network and Audio Application Guide* (P/N 3102306).

### Notification Control Area logics

NCA logic devices are used to define the audio subsystem's coverage area. NCA programming defines the device nodes within a premises and allows the programmer to group nodes that are installed throughout the premises. Typically, there is one NCA per building with one primary control location and multiple remote control locations in each.

A basic NCA has one or more autonomous control units and local operator consoles for managing the NCA. Multiple NCAs can be managed from one or more command centers, also referred to as central control stations (CCSs).

Refer to *4-CU Help* for information on configuring an NCA logic device.

### Command Center logics

Command center logic devices are used to define control locations within a notification control area. Command center programming works in association with NCAs and RGD logic devices to act as a Central Control Station. The control center resides in a notification control area and is the control unit used to request, grant, or deny control of an NCA, whether the one in which it resides or another NCA.

Refer to *4-CU Help* for information on configuring a Command Center logic device.

### Request Grant Deny logics

Request Grant Deny logics is a programming method working in association with NCAs and command centers to arbitrate demands for control of audio communications in the life safety system. Request to control a system and permission to grant or deny the request can be made from the 4-LCD display module user interface, or from programmed control-display module switches.

Refer to *4-CU Help* for information on configuring a Request Grant Deny logic device.

### Port blocking of audio traffic

Port blocking allows users to specify whether audio messages from other NCAs on a network connection should be blocked. This is helpful where the user wants to page to a remote NCA from a CCS that is different from the NCA which the CCS belongs to, preventing the audio from traversing to the CCS's own NCA.

Refer to *4-CU Help* for information on configuring Ethernet (eth0, eth1) and USB (usb0, usb1) block mode.

# Mass notification system (MNS) emergency communication

Emergency communication/mass notification systems typically perform notification operations in the following order of priority:

1. Special suppression activation
2. MNS signaling
3. Fire life safety signaling
4. Other property notification

Signals from the MNS system must have the capability of overriding all other notification signals, except suppression, but whether MNS signals have priority over fire alarm signals must be determined by risk analysis.

Once MNS operation is activated, a trained operator must maintain manual control over the system at all times.

## MNS paging

In MNS signaling mode, the 4-AUDTELS redirects the page signal source to the Emergency audio channel. Any amplifier connected to either the Page or Emergency audio channels will receive the page. The Emergency (MNS) audio channel can be configured in the 4-CU for MNS signaling (i.e., the Emergency channel) to be higher priority than fire alarm signaling (i.e., the Evacuation and Alert channels).

For information on making live MNS announcements see “4-MIC live mass notification signaling” on page 115.

## MNS Email

When configured for mass notification, the 4-FWAL series firewall module is provided with connections via a primary port to a UL/ULC Listed DRMNS email server.

Transmit MNS events and fire events to separate accounts so that the appropriate authorities are dispatched.

When transmitting MNS events, turn off the auto generate CID feature on accounts intended for MNS transmission.

The overall MNS system with a 4-FWAL series firewall module (with email capability) shall have a maximum of five email addresses that can connect to a UL/ULC Listed DRMNS email server.

## MNS IP Dialer, DACT, and CCM

Transmit MNS events and fire events to separate accounts so that the appropriate authorities are dispatched.

When employing MNS service, you may use nonstandard CID codes. However, you must notify the central station of the nonstandard MNS CID codes so that the appropriate authorities can be informed.

Do not use a cellular connection to transmit MNS events.

## Security and data protection levels

**Table 30: UL 2572 second edition and ULC-S576 security and data protection levels**

UL 2572 requirement	Security levels	Level employed
Approved Security Function for FIPS PUB 140-2	N/A	No encryption employed
Communication Security	0 to 3	0 [1][4]
Stored Data Security	0 to 2	0 [1]
Access Control Security	0 to 3	0 or 1 [2]
Physical Security Access	0 to 3	1 [3]
Audit Control	1 to 3	Not provided

[1] Meets communication security level 1 only if 4-FWAL series firewall module employs a dedicated MNS connection, where only MNS events are permitted to be transmitted. All other non-MNS events must use another connection.

[2] Security is employed. Access by way of the front panel is controlled by a four-digit PIN (1000 PIN combinations). Access automatically times out after reaching the configured user time out period. The default setting is five minutes. Security level 1.

[3] Security is employed. Access is restricted by a locked cabinet door.

[4] In order to transmit MNS email, an EST4 email capable 4-FWAL series firewall module must be installed in the same secured room as the UL/ULC listed DRMNS email server.

## Audio subsystem

The audio subsystem consists of a variety of signal sources and amplifiers, which can add emergency voice and alarm communications to your EST4 life safety system. Live paging, playing prerecorded audio, support for 1 VRMS audio input and output, and telephone conversations between master and remote firefighter telephone handsets are supported in the EST4 system. The audio system is programmed using the 4-CU. For more programming information, refer to the *4-CU Help*.

**Note:** For more information about audio applications, components, and examples see *EST4 Network and Audio Application Guide* (P/N 3102306).

## Audio subsystem components

**Note:** For more information about audio subsystem components in an EST4 network with NCAs, see *EST4 Network and Audio Application Guide* (P/N 3102306).

**4-AUDTELS Audio IO and Telephone Riser Source Module:** The 4-AUDTELS provides up to four line-level inputs or outputs and one firephone riser, and supports one 4-MIC connection and one 4-FT connection.

For more information about the 4-AUDTELS, see *4-AUDTELS Audio IO and Telephone Riser Source Module Installation Sheet* (P/N 3102284).

**4-ANNAUDTEL Annunciator Audio Telephone Interface Module:** The 4-ANNAUDTEL mounts on the 4-ANNCPU card and supports one 4-MIC connection and one 4-FT connection.

For more information about the 4-ANNAUDTEL, see *4-ANNAUDTEL Annunciator Audio Telephone Interface Module Installation Sheet* (P/N 3102325).

**4-MIC Paging Microphone:** The 4-MIC provides paging capability local to the node, within an NCA, or over an entire network. The 4-MIC assembly incorporates push-to-talk (PTT) LED that illuminates when the PTT button is pressed, and a microphone audio level LED that illuminates red if the voice level is too high.

For more information about the 4-MIC, see *4-MIC Paging Microphone Installation Sheet* (P/N 3102266) for technical specifications.

**4-FT Firefighter Telephone:** The 4-FT firefighter telephone handset provides the capability of making phone connections between a remote phone handset on a riser (typically uses SIGA-CC1(S) modules) and firefighter's telephones 4-FT. An EST4 node and an NCA can be connected to a *single* telephone riser. The maximum simultaneous phone connections is six, five remote plus one master.

- Five phone off-hook limit: The 4-AUDTELS telephone riser supports up to five telephones off-hook in addition to the master handset at the control unit at any one time. The flexibility of the EST4 system permits any number of phones to be wired on a single phone circuit, as long as they are not all used simultaneously.
- One phone per circuit: The advantages of installing a single firefighter phone station or jack on a SIGA-CC1 module (personality code 6) are numerous. The system provides complete control and annunciation phone/circuit. Installing a single phone on a circuit permits the operator to immediately identify the exact location of the calling party. Because the 4-AUDTELS will only permit five circuits to be connected simultaneously, the maximum number of off-hook handsets can never be exceeded. Should a branch telephone circuit be damaged during a fire, the fault will not affect other phone circuits. When there is only one phone per circuit, troubleshooting of faults is simplified.

For more information about the 4-FT, see *4-FT Firefighter Telephone Master Handset Installation Sheet* (P/N 3102267) for technical specifications.

### Central processor modules

**4-CPU Central Processor Module:** The 4-CPU provides connections for a firefighter telephone, a paging microphone, and up to four 1 VRMS audio channels that can be programmed for either input or output operation (requires optional 4-AUDTELS).

For more information about the 4-CPU, For more information see *4-CPU Central Processor Module Installation Sheet* (P/N 3102258).

**4-ANNCPU Announcer Central Processor Module:** The 4-ANNCPU is a control element for the LCD display module user interface and control-display modules connected to it.

For more information about the 4-ANNCPU, see *4-ANNCPU Announcer Central Processor Module Installation Sheet* (P/N 3102264).

**Table 31: 4-ANNCPU accessories**

Model	Description
4-ANNAUDTEL	The 4-ANNAUDTEL Announcer Audio Telephone Interface Module is used with the 4-ANNCPU to process information from the 4-FT Firefighter Telephone Master Handset and 4-MIC Paging Microphone.
4-CABL0504	Used to connect the 4-ANNCPU to a 4-LCDAUDTEL or a 4-LCD when the 4-ANNCPU is installed in a 4-2ANNMT, 4-4ANNMT, or 4-6ANNMT backbox.
4-CABL0509	Used to connect the 4-ANNCPU to a 4-LCDAUDTEL when mounted horizontally on a 4-MPLT plate
4-CABL0542	Used to Connect the 4-ANNCPU to the UI rail when no 4-LCDAUDTEL or a 4-LCD is installed on a 4-CAB8D(R), 4-CAB16D(R), 4-CAB24D(R), or 4-CAB16DL(R) inner door.

For systems using audio, a 4-ANNAUDTEL accessory module is mounted on the top, front side of the 4-ANNCPU to control audio functions for a firefighter telephone and a paging microphone.

Refer to Table 32 on page 110 to determine when a 4-ANNAUDTEL or 4-AUDTELS is required for audio applications.

**Table 32: Audio interface card matrix**

Installed CPU model	4-MIC / 4-FT installed next to:	Required audio module	
		4-ANNAUDTEL Annunciator Audio Telephone Interface	4-AUDTELS Audio I/O and Telephone Riser
4-CPU	4-CPU		X
4-ANNCPU	4-ANNCPU	X	
4-CPU and 4-ANNCPU	4-CPU		X
4-CPU and 4-ANNCPU	4-ANNCPU	X	
4-CPU and 4-ANNCPU	4-CPU and requires a telephone riser		X
4-CPU and 4-ANNCPU	4-ANNCPU and requires a telephone riser	X	X

## Amplifiers

Amplifiers are designed to feed a single audio zone and provide a 24 VDC visible notification appliance circuit. Amplifier modules are available in 20, 40, and 95 watt versions, with supervised Class B/DCLB or Class A/DCLA audio output circuits. The amplifier is configurable for either 25 or 70 VRMS output. An independent supervised Class B/DCLB or Class A/DCLA, 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. For more information about audio applications, see *EST4 Network and Audio Application Guide* (P/N 3102306).

**Table 33: Amplifier fault conditions**

Possible fault condition	Amplifier operation
Amplifier loses communication with CPU	If the control unit is configured for stand-alone operation, the amplifier automatically switches to the EVAC channel and outputs its 1 kHz temporal tone when the control unit detects an alarm.  If the control unit is not configured for stand-alone operation, the amplifier will not output any signal.
Control unit loses communication with network data riser	Amplifier switches to the EVAC channel only in response to the local control unit's programming uses the default EVAC message.
Amplifier plays a backup tone when an audio message plays	A short on the 4-CPU voltage-controlled oscillator (VCO) causes the amplifier to play a backup tone when the audio message plays.
Control unit loses communication with network	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 types

EST4 supports live paging using the 4-MIC, 4-FT, and 1 VRMS input. Prerecorded audio can be played over multiple logical channels. The prerecorded audio will not be distributed over the network, instead each node will have a copy of the audio messages and the playing is synchronized across nodes configured to play the same messages. The system also provides two-way, wired telephone communications capability between a 4-FT handset and multiple portable telephone riser handsets.

Refer to *EST4 Network and Audio Application Guide* (P/N 3102306) for details.

### Prerecorded audio message properties

Refer to Table 34 below for the supported prerecorded audio message format.

**Table 34: Prerecorded audio message properties**

Property	Specification
File type	WAV
Capture device	PCM
Sample rate	16 kHz max.
Bit depth	16 max.
Audio channel	Mono
Message duration	180 seconds (3 minutes) max.

## Audio signal priority

Each audio channel type has a priority level associated with it. Table 35 below shows the priority of each channel. The Page channel will only go active when the microphone PTT button is pressed or when a page from a 4-FT is selected.

For more information see *EST4 Network and Audio Application Guide* (P/N 3102306).

**Table 35: Audio signal priority levels**

Channel	Priority
Page	1
Emergency [1]	2
EVAC	3
Alert	4
Auxiliary	5
General	6
Other	6

[1] The priority in Table 35 above applies if the user chooses Mass Notification to have higher priority than Fire in the project configuration. If fire is chosen, Evacuate and Alert will have higher priority than Emergency.

## Paging functions

When an alarm is detected, the EVAC and Alert message channels are selected for 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, the proper channel and message are selected and sent to the amplifiers. In the case of paging, since the manual controls should always override the automatic controls, if the user chooses to page to Evacuate or Alert, the prerecorded message will stop playing until the paging is done. The prerecorded message will then continue in a synchronized manner.

In addition to standard paging functions (Page to Evacuation, Page to Alert, All Call, and All Call Minus), EST4 also includes Page to Other and Page to Emergency. Table 36 below shows the different paging functions and to which channel type the system will page when selecting any of the paging options.

**Table 36: Paging functions**

Paging type	Channels
Page to All call [1]	Paging + Evacuate + Alert + Auxiliary + General
Page to All call minus [1]	Paging + Auxiliary + General
Page to Evacuate	Paging + Evacuate
Page to Alert	Paging + Alert
Page to Emergency (Mass Notification)	Paging + Emergency
Page to Other	Paging + Other

[1] This will activate idle audio amplifier and pre-amp circuits to the Paging channel.

The *All Call* function is used to broadcast live-voice instructions to the entire facility at the same time. When the All Call paging function is activated, the page signal is connected to every audio channel to ensure that the amplifier receives the signal regardless of which channel is selected. Note that all channels receive the same signal. Any amplifier on the system, regardless of the audio channel selected, will receive the page. All amplifiers that were previously idle will power up and receive the page.

The *All Call Minus* function 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. Activating the All Call Minus Switch causes the 4-AUDTELS to enter the All Call Minus function. In this function, the 4-AUDTELS redirects the page signal source to the auxiliary and general channels. The Page, Auxiliary and General audio channels all receive the page signal. Any amplifier connected to the Page, Auxiliary or General audio channels will receive the page. Any amplifiers that were previously idle will power up and receive the page. The EVAC and Alert channels are connected to their respective signal sources, as in the normal mode.

The *Page to EVAC* function is used to send a page to the areas automatically receiving the evacuation signal. Activating the EVAC switch causes the 4-AUDTELS/ANNAUDTEL to enter the Page to EVAC function. In this function, the 4-AUDTELS redirects the page signal source to the EVAC channel. 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, as controlled by the 4-CPU. The Alert, Auxiliary, and General channels are connected to their respective signal sources, as in the normal mode.

The *Page to Alert* function is used to send a page to the areas automatically receiving the alert signal. Activating the Alert switch causes the 4-AUDTELS to enter the Page to Alert function. In this function, the 4-AUDTELS redirects the page signal source to the Alert channel. 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. The EVAC, Auxiliary, and General channels are connected to their respective signal sources, as in the normal mode.

The *Page to Emergency* function is used for Mass Notification systems. Activating the Page to Emergency switch causes the 4-AUDTELS to enter the Page to Emergency function. In this function, the 4-AUDTELS redirects the page signal source to the Emergency channel. Any amplifier connected to either the page or Emergency audio channels will receive the page.

The *Page to Other* function is a quick way to reach people in stairwells and elevators. Activating the *Page to Other* switch causes the 4-AUDTELS to enter the *Page to Other* function. In this function, the 4-AUDTELS redirects the page signal source to the *Other* channel. Any amplifier connected to either the *page* or *Other* audio channels will receive the page.

## Automatic messaging

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 an alarm is detected, the EVAC 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 EVAC 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.

## Prerecorded Message Operation

There is a slight difference in the playing of prerecorded messages between systems using a zone amp and those that do not. For systems utilizing zone amps, when an audio message is activated, the message begins and continues to play even when a rule or operation restores that message. When that message is reactivated, the audio output will start playing at the current point and not start over from the beginning. On systems with 4-AUDTELS 1 VRMS outputs that do not use zone amps, when audio messages are restored or stopped the message does not continue in the background. If that message is reactivated, the audio output will start playing from the beginning.

## 4-MIC microphone live voice announcements

The basic tasks in responding to an emergency event are:

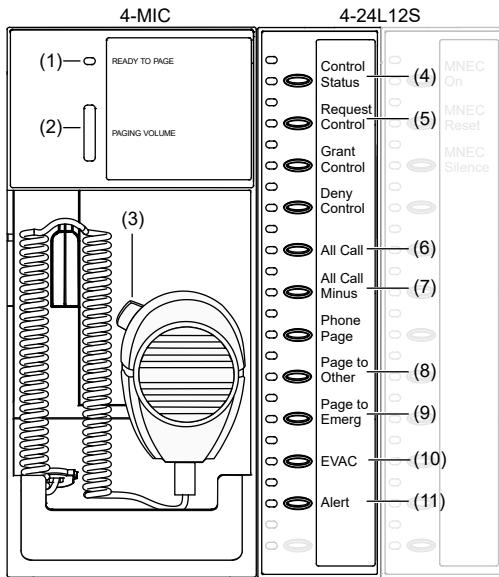
- Use All Call mode to announce the arrival of the fire department, making any necessary announcements.
- Use Page to Evac mode to reinforce the evacuation of the occupants in areas receiving the evacuation signal.
- Use Page to Alert mode to notify the areas not in immediate danger to prepare to evacuate, or that evacuating people may enter their safe area.
- Use All Call Minus mode 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 mode.

### Notes

- All paging functions require a 4-24L series control-display module.
- Refer to *4-CU Help* for information on writing rules for the required control-display module indicators and switches.
- Your system may be configured differently than described below.

**To make a live voice announcement:**

1. For a control unit programmed as a command center, request for control of the EST4 system may be required.
  - Using the operator touch screen:  
On the Action bar, tap Request Control. The Control Request List screen displays and shows the request. When control is granted or denied, the response will show in the list.  
**Note:** If the system is programmed to automatically respond if a manual response is not received prior to the system timer expiring, control is granted as shown in Table 18 on page 53.  
When control is granted, proceed to step 2.
  - Using a 4-24L series control-display module (see Figure 22 below):  
If the top Control Status LED (4) is steady, proceed to step 2. If not, press Request Control (5); its LED flashes while requesting control. When the top Control Status LED is steady, proceed to step 2.

**Figure 22: 4-MIC voice announcements using control-display module switches and indicators**

**Note:** 4-24L12S indicators and switches functions require 4-CU rules programming.

2. Remove the microphone from its hook, and then press the areas to receive the page.
 

All Call (6): Broadcasts to all areas whether or not they are sounding a signal.

All Call Minus (7): Broadcasts to areas not currently sounding the evacuation signal or the alert signal.

Page to Other (8): Broadcasts live voice messages to areas such as stairwells and elevators.

Page to Emerg (9): Broadcasts live voice messages to areas defined for mass notification announcements.

EVAC (10): Broadcasts to areas currently sounding the evacuation signal.

Alert (11): Broadcasts to areas configured to areas currently sounding the alert signal.
3. Press and hold the microphone push-to-talk switch (PTT) (3). The Ready to Page LED (1) flashes during a preannouncement tone. When the LED is on steady, begin the announcement. Adjust your voice level so that the red LED on the Paging Volume meter (2) does not illuminate.
4. Release the PTT switch when the announcement is finished and return the microphone to its hook.

## 4-MIC live mass notification signaling

In MNS signaling mode, the 4-AUDTELS redirects the page signal source to the Emergency channel. Any amplifier connected to either the Page or Emergency audio channels will receive the page.

### Notes

- All paging functions require a 4-24L series control-display module.
- Refer to *4-CU Help* for information on writing rules for the required control-display module indicators and switches.
- Your system may be configured differently than described below.

### To make a live mass notification announcement:

1. For a control unit programmed as a command center, request for control of the EST4 system may be required.

- Using the operator touch screen:

On the Action bar, tap Request Control. The Control Request List screen displays and shows the request. When control is granted or denied, the response will show in the list.

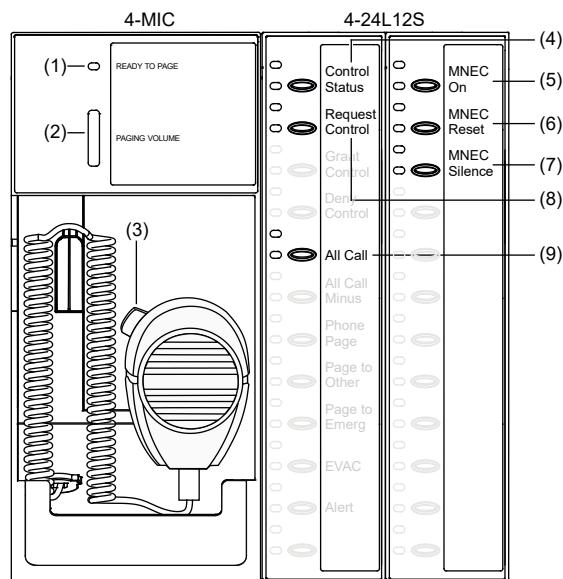
**Note:** If the system is programmed to automatically respond if a manual response is not received prior to the system timer expiring, control is granted as shown in Table 18 on page 53.

When control is granted, proceed to step 2.

- Using a 4-24L series control-display module (see Figure 23 below):

If the top Control Status LED (4) is steady, proceed to step 2. If not, press Request Control (8); its LED flashes while requesting control. When the top Control Status LED is steady, proceed to step 2.

**Figure 23: 4-MIC live MNS signaling using control-display module switches and indicators**



**Note:** 4-24L12S indicators and switches functions require 4-CU rules programming.

2. Press the MNEC On button (5) on the control-display module, to activate the function.
3. Remove the microphone from its hook, and then press the All Call button (9) on the control-display module.
4. Press and hold the microphone push-to-talk switch (PTT) (3). The Ready to Page LED (1) flashes during a preannouncement tone. When the LED is on steady, begin the announcement. Adjust your voice level so that the red LED on the Paging Volume meter (2) does not illuminate.

- Release the PTT switch when the announcement is finished and return the microphone to its hook.

**To silence mass notification signals:**

- Press MNEC Silence (Figure 23 on page 115, item 7). The bottom LED indicates silence is active.

**Note:** This action only silences mass notification signals. To silence fire alarm signals, see “Silencing alarm signals” on page 51.

**To reset the system when mass notification operation is active:**

- Press MNEC Reset (Figure 23 on page 115, item 6) on the control-display module. The bottom LED indicates the reset is active.

**Note:** This action only resets the system when mass notification operation is active. To reset the system for fire events, see “Resetting the life safety system” on page 55.

## 4-FT firefighter telephone live voice announcements

The EST4 system includes a phone page feature that permits individuals with access to a remote firefighter telephone to make announcements over the emergency voice/alarm communications system.

**Notes**

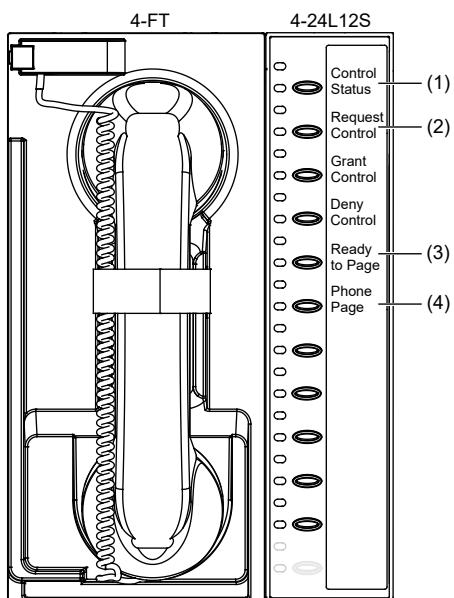
- All 4-FT live voice announcement functions require a 4-24L series control-display module.
- Refer to *4-CU Help* for information on writing rules for the required control-display module indicators and switches.
- Your system may be configured differently than described below.

**To make a live voice announcement:**

- For a control unit programmed as a command center, request for control of the EST4 system is required. Use a 4-24L series control-display module to request control. See Figure 24 below.

If the top Control Status LED (1) is steady, proceed to step 2. If not, press Request Control (2); its LED flashes while requesting control. When the top Control Status LED is steady, proceed to step 2.

**Figure 24: 4-FT live voice announcements using control-display module switches and indicators**



**Note:** 4-24L12S indicators and switches functions require 4-CU rules programming.

2. Remove the telephone handset from its hook.
3. The Ready to Page LED (Figure 24 on page 116, item 3) on the control-display module flashes during a preannouncement tone. When the LED is on steady, press the Phone Page button (item 4) and begin your announcement.
4. When finished, place the telephone handset on its hook.

## 4-FT firefighter telephone two-way communication

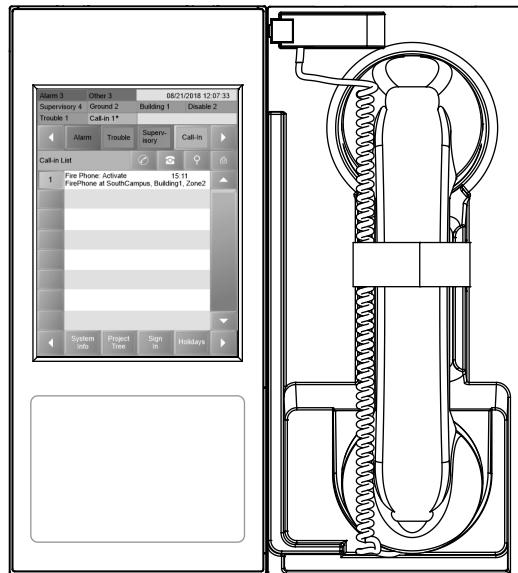
The 4-FT firefighter telephone provides an analog telephone riser for totally independent two-way communications between the fire command stations and firefighter telephone stations / jack telephones installed at strategic locations throughout the protected facility. It is also possible to connect two-way communication between 4-FT fire command stations, which provides a means to connect firefighter telephones on two different telephone risers (see *EST4 Audio and Network Application Guide* (P/N 3102306)).

### Answering incoming calls

An incoming call is initiated when a remote firefighter telephone is plugged into a telephone jack, generating a visual and audible incoming call signal at the fire command station. The caller hears a tone until the handset is connected to the system. The fire command station operator manually connects the incoming phone call to the phone riser to complete the call. The firefighter telephone can also be used as a page source.

The incoming call sounds the control unit operator alert signal and displays the Call-in List button on the LCD screen that, when tapped, displays the Call-In List showing all incoming calls in the order in which they were received. Firefighter telephone function buttons also appear that serve as operator controls for connecting and disconnecting calls when the command center is in control.

**Figure 25: 4-FT installed with a 4-LCDAUDTEL Audio and Firefighter Telephone Control Display Module**



### To answer a call:

1. For a control unit programmed as a command center, request for control of the EST4 system is required.
  - Using the operator touch screen:  
On the Action bar, tap Request Control. The Control Request List screen displays and shows the request. When control is granted or denied, the response will show in the list.

**Note:** If the system is programmed to automatically respond if a manual response is not received prior to the system timer expiring, control is granted as shown in Table 18 on page 53.

- Using a 4-24L series control-display module (see Figure 24 on page 116):

If the top Control Status LED (item 1, Figure 24) is steady, proceed to step 2. If not, press Request Control (item 2, Figure 24); its LED flashes while requesting control. When the top Control Status LED is steady, proceed to step 2.

2. From the operator touch screen, on the List bar, tap Call-in. See Figure 25 on page 117.
3. In the Call-in List, locate the desired call, and then tap the call-in event number.
4. Tap the connect button  to connect the call to the master (local) telephone handset. The event's status changes to Connected.
5. Remove the telephone from its hook and communicate with the caller.
6. To add another call-in location to the conversation, in the Call-in list tap the location's event number, and then tap Connect again.

Up to five phone circuits can be connected, in addition to the master telephone.

### Disconnecting calls

When the caller is ready to hang up or remove a phone from its jack, disconnect the call.

#### To disconnect a call:

1. On the Call in List, locate the call to be disconnected, and then tap the call-in event's number.
2. Tap the disconnect button  to disconnect the call. The event status changes to Disconnected.  
When the *remote telephone handset* is hung up or removed from the phone jack, the call will be removed from the Call-in list.
3. Place the *master telephone handset* on its hook. The Call-in event indicator and Call-in list no longer appear on the LCD screen.

## Remote annunciation

4-ANN series remote annunciator control units provide remote annunciation options for your life safety network, and other applications. Depending on your remote annunciator control unit configuration the system can provide emergency annunciation, system monitoring and control, local microphone paging, local telephone communications, LED annunciation, and switch controls.

## Standard components

### 4-ANNCPU annunciator control unit central processor unit

The 4-ANNCPU is the control element for the LCD display module user interface and control-display modules installed in a remote annunciator. The module processes all control information from switches on the displays installed within the cabinet as well as processing the data received from the network for display. The module ships with the inner and outer door assembly and installs on the inner door frame assembly. For more information see *4-ANNCPU Annunciator Central Processor Module Installation Sheet* (P/N 3102264).

### 4-LCDANN remote annunciator LCD display module user interface

The 4-LCDANN Remote Announcer LCD Display Module provides a 4.5 × 3.4 in. VGA color touch screen display capable of displaying 24 lines of 40 characters for system monitoring and includes operator controls and

indicators. The LCD display module ships with the inner and outer door assembly and installs on the inner door frame assembly. For more information see *4-LCDANN Remote Announcer LCD Display Module Installation Sheet* (P/N 3102260).

## Graphic annunciation

A 4-CPUGRPH Graphic Announcer Central Processor Module is the control element for graphic driver interface modules installed in graphic annunciators. The 4-CPUGRPH consists of a CPU module, a Graphic Interface Card, and a mounting plate.

The 4- CPUGRPH module provides:

- One USB host port
- One USB device port
- Connections for two SFP (small form-factor pluggable) network adapters
- Connection to 3-EVDVR drivers

For more information about see *4-CPUGRPH Graphic Announcer Central Processor Module Installation Sheet* (P/N 3102346).

## Communication services

EST4 communications services may be used to allow transmission of system events through an EST4 control unit to external devices such as central monitoring stations, computers, printers, and smartphones. Communication occurs over Ethernet or fiber SFP input/output network adapters using communication services described in this section.

Table 37 below shows the maximum number of services that can be configured for a node type. The services can be any combination of different services but cannot exceed the maximum number.

**Table 37: Communication services and node types**

Service	Chassis rail modules									
	4-CPU	4-ANNCPU	4-ASDCPU	4-CPUGRPH	4-FWAL1	4-FWAL2	4-FWAL3	4-FWAL4	4-NET-AD	
Coder	1	1	0	1	1	1	1	1	1	1
ECP [2]	0	0	0	0	8	8	8	8	0	
Email	0	0	0	0	0	0	8	8	0	
ACS	0	0	0	0	1	1	1	1	0	
IP Receiver	0	0	0	0	0	8	0	8	0	
Printer [1]	2	2	0	2	2	2	2	2	2	
Vesda Net	0	0	1	0	0	0	0	0	0	
ModuLaser Net	0	0	1	0	0	0	0	0	0	
Web Browser	0	0	0	0	0	8	8	8	0	
<b>Max. allowed</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>2</b>	

[1] Two printers are supported when a 4-USBHUB is used. One printer is supported when a Coder Service is also used.

[2] Uses External Communications Protocol XML (ECPxml) that requires an ECP license key to allow communication with the control unit. Supports FireWorks 9.0 and later, and FSB-PC4 and FSB-PC4LW. To obtain a third-party license key, contact your local Edwards representative.

## Coder Service

The Coder Service allows an EST4 control unit to send events to a connected CDR-3 bell coder by way of RS-232 on a 4-USBUHUB. For information about wiring the CDR-3 see “Connecting a CDR-3 for coded tone output” on page 101.

The CDR-3 connection is supported on EST4 CPUs and firewall modules.

One Coder Service can be configured for the following nodes:

- 4-CPU. For more information about the 4-CPU, see *4-CPU Central Processor Module Installation Sheet* (P/N 3102258).
- 4-ANNCPU. For more information about the 4-ANNCPU, see *4-ANNCPU Annunciator Central Processor Module Installation Sheet* (P/N 3102264).
- 4-NET-AD. For more information about the 4-NET-AD, see *4-NET-AD Network Adder Module Installation Sheet* (P/N 3102258).
- 4-CPUGRPH. For more information about the 4-CPUGRPH, see *4-CPUGRPH Graphic Annunciator Central Processor Module Installation Sheet* (P/N 3102346).
- 4-FWAL1, 4-FWAL2, 4-FWAL3, 4-FWAL4. For more information about the 4-FWAL, see *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280).

## ECP Service

The ECP Service allows external third-party applications to connect to an EST4 control unit by way of a TCP port. A network of control units can support up to 10 ECP connections for third-party communication.

ECP connections are supported on 4-FWAL1, 4-FWAL2, 4-FWAL3, 4-FWAL4 firewall modules. For more information about 4-FWAL modules, see *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280).

Up to eight ECP services can be configured for the firewall module. Refer to *4-CU Help* for instructions on configuring the ECP Service.

Before starting the configuration process in the 4-CU, you need to gather configuration settings from the remote interface administrator. To guide you through what information to gather, download the *EST4 Network Services Configuration Worksheet* (P/N 3102627) from the My-Eddie website. To access the website, enter [www.edwardsfiresafety.com](http://www.edwardsfiresafety.com) in your web browser, and then at the bottom of the page click MyEddie Login. Log on to the My-Eddie website, and then locate the worksheet in Resources & Training.

### ECP over IP communication with FireWorks

An EST4 control unit can connect to stand-alone FireWorks workstation computers running FireWorks 9.0 and later, and to nonredundant or redundant FireWorks server computers running FireWorks 9.1 and later. The user-configured ECP service allows transmission of system events over IP. For more FireWorks information, refer to documentation received with your FireWorks workstation.

## Email Service

The Email Service allows an EST4 control unit to communicate system events to email or text addresses through SMTP servers. Email messages allow communication of multiple or single system events; text messages allow single system events.

For text messaging, a text message is routed to the recipient's wireless service provider phone number email address through a configured SMTP server. The wireless service provider then transmits the message to the recipient's text account. Check with the wireless provider for their carrier gateway address and any additional carrier requirements.

The email connection is supported on 4-FWAL3 and 4-FWAL4 firewall modules. The firewall module supports eight email services, one account per Email Service (up to 20 email addresses per email account). For more information about 4-FWAL modules, see *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280). For instructions on configuring email services, refer to *4-CU Help*.

Before starting the configuration process in the 4-CU, you need to gather configuration settings from the local IT administrator. If no local IT administrator or local SMTP server is available and a public email service will be used, you need to contact the Internet service provider for configuration settings. To guide you through what information to gather, download the *EST4 Network Services Configuration Worksheet* (P/N 3102627) from the My-Eddie website. To access the website, enter [www.edwardsfiresafety.com](http://www.edwardsfiresafety.com) in your web browser, and then at the bottom of the page click MyEddie Login. Log on to the My-Eddie website, and then locate the worksheet in Resources & Training.

### **EST4 Trust Level property**

The SMTP server Trust Level property is configured on the Email Service properties tab in the 4-CU. You can choose to authenticate the server using a digital certificate or choose no authentication. Because some commercial services may not be included in the “Root Certification” option, it is recommended that you choose “No Authentication.”

**Note:** When selecting the EST4 Certificate option, the SSL certificate must exist in the 4-CU SSL Certificate List. Email certificates are added by selecting the Project SSL Certificate List Tab, and then clicking the Upload Certificate button from the Operations toolbar. This selection should be used if you have your own certificate or the public email certificate is not included in the Mozilla Public License root certificates integral to EST4.

#### **To configure the Trust Level:**

1. From the 4-CU:

On the Home tab, in the Navigation pane, on the Project Tree select the node that has the Email Service.

On the Node Configuration tab, click the Communication Services tab, select the Email Service, and then click the Edit Properties tab.

In the Communication Service Configuration group, Trust Level property, select No authentication.

### **EST4 email supervision property**

EST4 supervises the email server periodically by default. You can disable the feature on the Email Service properties tab in the 4-CU. Even when disabled the system will still report a fault on the LCD if an email fails to send.

#### **To turn off email supervision:**

1. From the 4-CU:

On the Home tab, in the Navigation pane, on the Project Tree select the node that has the Email Service.

On the Node Configuration tab, click the Communication Services tab, select the Email Service, and then click the Edit Properties tab.

In the Communication Service Configuration group, Supervision Interval property, set the interval to time to 00:00:00:00 (dd:hh:mm:ss).

**Note:** The system will still indicate a fault when supervision has been disabled and an email fails to send.

### **Third-party email provider settings**

When using email providers such as Gmail that offer two-factor authentication, it may be necessary to configure your Email Service to accept messages from the EST4 system. For example when using Gmail, the email account should be set to “Allow less secure apps or devices” to send email. This property may be found under your Email Account, Security Settings. Keep in mind this does make your email connection less secure. EST4 has been tested with Gmail.

Some email providers support multiple TCP ports. Check that you are using the proper TCP port for your email server. Use the TCP port that supports TLS v1.2 connections. Example, Gmail provides TCP ports 465 and 587 for secure connections, but only port 587 supports the TLS v1.2 protocol used by an EST4 system.

## IP Receiver Service

The IP Receiver Service allows an EST4 control unit to communicate system events to a central monitoring station (CMS) by way of Ethernet as an alternative to, or in conjunction with, an IP-DACT dialer. A network of control units can support up to 100 IP Receiver accounts (75 maximum if all are configured to automatically generate events).

The IP-DACT connection is supported on 4-FWAL2 and 4-FWAL4 firewall modules. For more information about 4-FWAL modules, see *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280).

Up to eight IP receiver services can be configured for the firewall module. Refer to *4-CU Help* for instructions on configuring the IP Receiver services.

Before starting the configuration process in the 4-CU, you need to gather configuration settings. If the control unit will be configured for CMS and FireWorks communication you will need to gather settings from both of those system administrators. To guide you through what information to gather, download the *EST4 Network Services Configuration Worksheet* (P/N 3102627) from the My-Eddie website. To access the website, enter [www.edwardsfiresafety.com](http://www.edwardsfiresafety.com) in your web browser, and then at the bottom of the page click MyEddie Login. Log on to the My-Eddie website, and then locate the worksheet in Resources & Training.

## Printer Service

The Printer Service allows an EST4 control unit to send events to a connected PT-1S series printer by way of a direct connection to the USB port on the CPU or the USB port on a 4-USBHUB. For more information about wiring the PT-1S series printer, see “Connecting PT-1S series printer” on page 98.

The printer connection is supported on EST4 CPUs and firewall modules.

Up to two printer services can be configured for the following nodes when a 4-USBHUB is used (only one printer is supported for a direct connection):

- 4-CPU. For more information about the 4-CPU, see *4-CPU Central Processor Module Installation Sheet* (P/N 3102258).
- 4-ANNCPU. For more information about the 4-ANNCPU, see *4-ANNCPU Annunciator Central Processor Module Installation Sheet* (P/N 3102264).
- 4-NET-AD. For more information about the 4-NET-AD, see *4-NET-AD Network Adder Module Installation Sheet* (P/N 3102258).
- 4-CPUGRPH. For more information about the 4-CPUGRPH, see *4-CPUGRPH Graphic Annunciator Central Processor Module Installation Sheet* (P/N 3102346).
- 4-FWAL1, 4-FWAL2, 4-FWAL3, 4-FWAL4. For more information about the 4-FWAL, see *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280).

## Web Browser Service

The Web Browser Service allows authorized end users to access EST4 system-wide reports using an Internet browser. The Web Browser Service uses the Hypertext Transfer Protocol Secure (HTTPS) communication protocol to provide a secure connection that includes user log on control and a five minute timeout.

The Web Browser Service connection is supported on EST4 control units with a 4-FWAL2, 4-FWAL3, or 4-FWAL4 firewall module installed. The number of external Internet browsers that can be authenticated to

connect to the EST4 system is not limited, however, only up to eight concurrent EST4 web browser services can be configured for the firewall module.

Before starting the configuration process in the 4-CU, you need to gather configuration settings from the local IT administrator. To guide you through what information to gather, download the EST4 Network Services Configuration Worksheet (P/N 3102627) from the My-Eddie website. To access the website, enter [www.edwardsfiresafety.com](http://www.edwardsfiresafety.com) in your web browser, and then at the bottom of the page click MyEddie Login. Log on to the My-Eddie website, and then locate the worksheet in Resources & Training.

## Notes

- The EST4 control unit must have a 4-FWAL2, 4-FWAL3, or 4-FWAL4 firewall module installed and configured in the 4-CU. The IP address for the firewall module is the URL address used for accessing the Web Browser Service through an Internet browser. Refer to *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280) for information about 4-FWAL modules. Refer to *4-CU Help* for instructions on configuring the 4-FWALx nodes.
- A web browser Communication Service must be configured in the 4-CU, to allow 4-FWALx communication with the Internet browser. Up to eight EST4 web browser services can be configured. Refer to *4-CU Help* for instructions on configuring web browser services.
- A web browser password must be configured in the 4-CU that allows the end user to access EST4 system reports for a node. Refer to *4-CU Help* for instructions on configuring the Web Browser Password property in project operation settings.
- The Web Browser Service is supported on Chrome, Internet Explorer, Safari, and Firefox Internet browsers.

## To access EST4 system reports using an Internet browser:

1. Open your Internet browser, and then enter the URL address for the 4-FWALx. Example, <https://192.167.1.3>.

**Note:** The URL address must include the “https” prefix.

2. On the System access screen (Figure 26 on page 124):

Select the node from which you want reports, and then enter the web browser password.

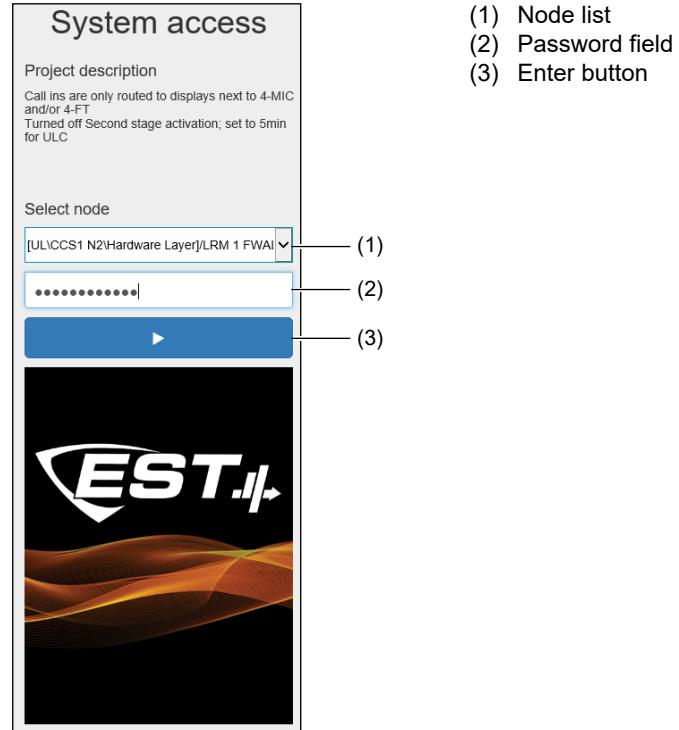
Click the enter button (►), to log on to the Web Browser Service and access the control unit.

## Notes

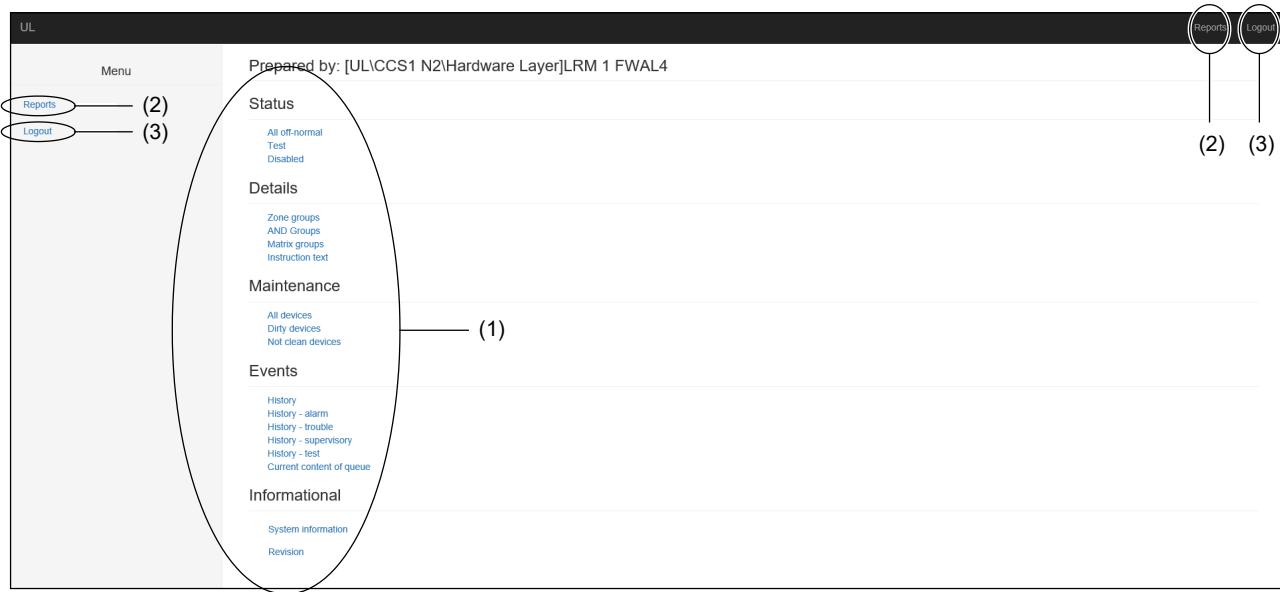
- If someone has initiated the Lock Incoming Network command at the control unit, the network connection will be blocked. When you attempt to log on, the Web Browser Service will return an HTTP 401 Unauthorized Error message. The network connections will remain blocked until the Unlock Incoming Network command is initiated at the control unit. The commands block/unblock web services for all firewall nodes.

The Lock Incoming Network and Unlock Incoming Network commands are accessed by tapping System Info on the Action bar, and then locating the commands on the Command bar.

- If all web browser services are in use, when you attempt to log on the system will return the message “There are no available connections at this time. Please try again later.”

**Figure 26: Web Browser Service: System access log on**

3. On the main menu of reports screen (Figure 27 below), click the desired report. If prompted, apply the report filter options.

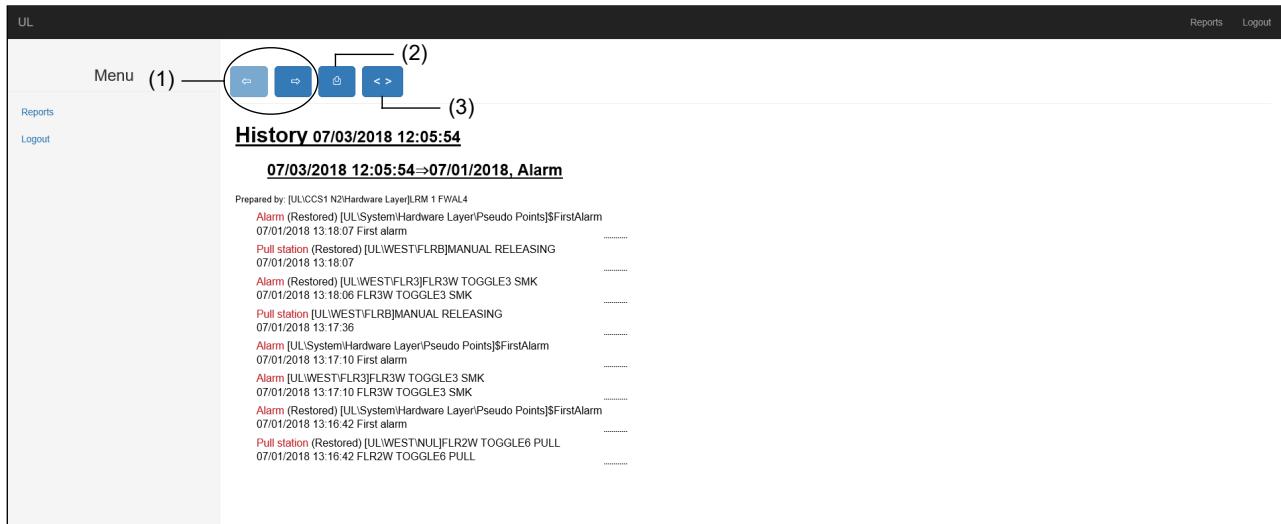
**Figure 27: Web Browser Service: Main menu of reports**

- (1) List of system reports
- (2) Return to the main menu of reports

- (3) Log off from the Web Browser Service

4. Use the report screen function buttons (Figure 28 below) to go to next and previous pages for the displayed report and to print the report to a printer or as an XML file.

**Figure 28: Web Browser Service: Print and view report pages**



- (1) Go to next or previous page for the displayed report  
 (2) Print the displayed report to a printer

- (3) Print the displayed report as an XML file

## Abound Connected Safety (ACS) Service

The ACS Service allows the EST4 control unit to connect to the cloud and send live events and reports. The service is supervised by default, and any disconnection will be reported as a “communication service” trouble. In order for the service to work, the panel must be connected to the internet and to a DNS server that can resolve public addresses.

### Notes

- You must have at least one 4-FWAL-x CPU module in your project to add the ACS Service. You cannot add more than one ACS Service per project.
- For ACS troubleshooting, refer to *EST4 Abound Connected Safety (ACS) Troubleshooting Guide* (P/N 3102940).

## ModuLaser Net Service

The 4-ASDCPU provides a single service that can connect to a ModuLaser Command Display module through an Ethernet connection between the 4-ASDCPU and Command Display Module. The Command Display module provides the communication path between ModuLaser detectors and the EST4 control unit.

## Vesda Net Service

The 4-ASDCPU provides a single service that can connect to a single VESDA HLI through the isolated RS-232 interface on a 4-USBHUB. See “VESDA aspirating smoke detectors” on page 126.

## VESDA aspirating smoke detectors

The EST4 system supports direct communication with VESDA aspirating smoke detectors through a 4-ASDCPU Aspirating Smoke Detector CPU module. The 4-ASDCPU requires connection to a 4-USBHUB wired to an FW-HSSX1 high level interface (HLI) device.

An EST4 control unit supports up to 61 VESDA detectors per 4-ASDCPU and FW-HSSX1 pair. An EST4 network supports 25 4-ASDCPUs.

For installation and wiring, see the following:

- *4-ASDCPU Aspirating Smoke Detector CPU Installation Sheet* (P/N 3102880)
- *4-USBHUB Multi-port USB Hub Module Installation Sheet* (P/N 3102281)
- *FW-HSSX1 VESDA Modbus High Level Interface Installation Sheet* (P/N 3102240)

For information on VESDA applications, see *EST4 VESDA Application Guide* (P/N 3102883).

## UL listing requirements for EST4 integration

To meet UL listing requirements when integrating VESDA smoke detectors into an EST4 life safety system:

- All devices on the VESDAnet network must be isolated from earth ground.
- The Health Check Period on the HLI must be set for 45 seconds.
- Alarm signals from VESDA detectors must remain on the EST4 system (latched) until the system is manually reset.
- A VESDAnet network may cover more than one fire zone. Each fire zone may include one or more VESDA detectors. A single VESDA detector may not cover more than one fire zone.
- The system must provide distinct alarm, supervisory, and monitor visual indicators for each VESDA detector, or for each fire zone.
- The system must provide a distinct common trouble indicator for each VESDA detector, or for each fire zone.
- If not powered from the EST4, the system must provide a distinct ground fault indicator for each FW-HSSX1.
- If the FW-HSSX1 is powered from an APS6A, the system must provide a distinct AC power fail indicator for each APS6A power supply.
- For open area detection, program VESDA Fire 2 and Fire 1 states to activate fire alarm events, VESDA Alert and Action states to activate fire monitor events, and VESDA faults to activate fire trouble events.

To meet UL listing requirements when VESDA detectors are used in EST4 releasing device service applications:

- VESDA detectors may be used to activate releasing device circuits on EST4 life safety systems employing cross-zone or counting-zone initiation utilizing point detection, sector detection (aspirating), or a combination of both.

## VESDA events mapping

VESDA detector events are mapped in EST4 as shown in Table 38 on page 127 and are based on configuration. Each VESDA event can be selected for an EST4 event queue. It will report an ASD event type based on the queue selection.

**Table 38: VESDA ASD events mapping**

<b>VESDA detector event</b>	<b>Default queue</b>	<b>Queue options</b>	<b>EST4 event types</b>
Fire 2	Alarm	Alarm	etASDAlarmL1
		Supervisory	etASDSupL1
		Trouble	etASDTroubleL1
		Monitor	etASDMonitorL1
Fire 1	Alarm	Alarm	etASDAlarmL2
		Supervisory	etASDSupL2
		Trouble	etASDTroubleL2
		Monitor	etASDMonitorL2
Action	Supervisory	Alarm	etASDAlarmL3
		Supervisory	etASDSupL3
		Trouble	etASDTroubleL3
		Monitor	etASDMonitorL3
Alert	Supervisory	Alarm	etASDAlarmL4
		Supervisory	etASDSupL4
		Trouble	etASDTroubleL4
		Monitor	etASDMonitorL4
Urgent Fault	Trouble	Supervisory	etASDSupL5
		Trouble	etASDTroubleL5
		Monitor	etASDMonitorL5
Minor Fault	Monitor	Supervisory	etASDSupL6
		Trouble	etASDTroubleL6
		Monitor	etASDMonitorL6

## ModuLaser aspirating smoke detectors

The EST4 system supports communication to ModuLaser aspirating smoke detectors through a 4-ASDCPU connected to a ModuLaser Command Display module. The Command Display module provides the communication path between ModuLaser detectors and the EST4 control unit. See Table 39 below for a list of ModuLaser modules used in a ModuLaser network.

An EST4 network supports up to 30 4-ASDCPU modules. One 4-ASDCPU supports up to 127 ModuLaser modules. Each 4-ASDCPU supports up to two command modules. When the EST4 network is connected to FireWorks, ModuLaser events annunciated on EST4 are routed to FireWorks.

ModuLaser modules are supported in an EST4 system using 4-CU version 7.10 and later. Each connected ModuLaser module must use the same ModuLaser firmware version to allow communication with each other.

**Table 39: ModuLaser modules**

<b>Model</b>	<b>Description</b>	<b>Model</b>	<b>Description</b>
FHSD8300-ULF	Minimum Display module	FHSD8320-ULF	Command Display module
FHSD8310-ULF	Standard Display module	FHSD8330-ULF	Aspirating Smoke Detector module

For installation of additional components, see the following:

- *4-PPS/M Power Supply Installation Sheet* (P/N 3102673)
- *Power Supplies Installation Sheet* (P/N 270495) (for 3-PPS/M(-230))
- *Auxiliary Power Supply Technical Reference Manual* (P/N 3100970)
- *BPS Series Fire Alarm Power Supply Technical Reference Manual* (P/N 3100485)
- *4-FWAL-CAT 100 Mbps SFP Network Adapter Installation Sheet* (P/N 3102322)

For information on ModuLaser applications, see *EST4 ModuLaser Application Guide* (P/N 3102967).

## ModuLaser events mapping

ModuLaser detector events are mapped in EST4 as shown in Table 40 below and are based on module configurations. Each ModuLaser event can be selected for an EST4 event queue. It will report an ASD event type based on the queue selection.

**Table 40: ModuLaser ASD events mapping**

ModuLaser event	Default queue	Selectable queues	EST4 event types	Rules operator
Fire2	Alarm	Alarm	etASDAlarmL1	ASDArmL1
		Supervisory	etASDSupL1	ASDSupL1
		Trouble	etASDTroubleL1	ASDTroubleL1
		Monitor	etASDMonitorL1	ASDMonitorL1
Fire1	Alarm	Alarm	etASDAlarmL2	ASDArmL2
		Supervisory	etASDSupL2	ASDSupL2
		Trouble	etASDTroubleL2	ASDTroubleL2
		Monitor	etASDMonitorL2	ASDMonitorL2
Pre-Alarm	Supervisory	Alarm	etASDAlarmL3	ASDArmL3
		Supervisory	etASDSupL3	ASDSupL3
		Trouble	etASDTroubleL3	ASDTroubleL3
		Monitor	etASDMonitorL3	ASDMonitorL3
Auxiliary/Alert	Supervisory	Alarm	etASDAlarmL4	ASDArmL4
		Supervisory	etASDSupL4	ASDSupL4
		Trouble	etASDTroubleL4	ASDTroubleL4
		Monitor	etASDMonitorL4	ASDMonitorL4
General Fault	Trouble	Supervisory	etASDSupL5	ASDSupL5
		Trouble	etASDTroubleL5	ASDTroubleL5
		Monitor	etASDMonitorL5	ASDMonitorL5
General Warning	Monitor	Supervisory	etASDSupL6	ASDSupL6
		Trouble	etASDTroubleL6	ASDTroubleL6
		Monitor	etASDMonitorL6	ASDMonitorL6

# Centralized audio applications

Centralized audio applications are supported on EST4 systems. The 4-AUDTELS Audio IO and Telephone Riser Source Module provides the 1 VRMS audio required for connection to banked audio amplifiers.

One audio amplifier (3-ZAxx, IB3-250, or IB3-125) is required for each audio channel to be operated simultaneously. The output of each amplifier is reduced from 25 VRMS to the 1 VRMS input level using the 3-ATPINT interface card, and then fed into the input of the banked amplifiers.

The audio riser output of the banked amplifiers is directed to the appropriate areas using Signature Series modules. The SIGA-CC1 module, Figure 43 on page 143, is used for single channel systems and the SIGA-CC2 module, Figure 44 on page 144, for two channel systems. EST4 audio system programming requires that the Signature modules controlling the audio signals be programmed in addition to the programming required for the audio amplifier(s) supplying the audio signal.

Table 41 below lists publications that provide additional information for devices referenced in this section. Refer to the publication for specific device settings, terminal connections, specifications, and installation procedures.

**Table 41: Related publications for centralized audio applications**

Device	Document P/N	Document name
3-ATPINT	387284	3-ATPINT Interface Card Installation Sheet
3-ZA20A, 3-ZA20B, 3-ZA40A, 3-ZA40B	387463	3-ZA20A, 3-ZA20B, 3-ZA40A, 3-ZA40B Zoned Audio Amplifiers Installation Sheet
4-AUDTELS	3102279	4-AUDTELS Audio IO and Telephone Riser Source Module Installation Sheet
ATP, ATP-220	3101001	ATP and ATP-220 Amplifier Terminal Panel Installation Sheet
ATPC	270219	Amplifier Terminal Panel Cabinet (ATPC) Installation Manual
IB3-125	403-352	1B3125 125-watt Power Amplifier Installation Sheet
IB3-250	427-06-00018	1B3250 250-watt Power Amplifier Installation Sheet
SIGA-CC1	387022P	SIGA-CC1 Single Input Signal Module Installation Sheet
SIGA-CC2	387040P	SIGA-CC2 Dual Input Signal Module Installation Sheet
SIGA-CC2A	3101168	SIGA-CC2A Dual Input Signal Module Installation Sheet
SIGA-CR	387023P	SIGA-CR Control Relay Module Installation Sheet
SIGA-MAB	387356P	SIGA-MAB Class A/B Input/Output Module Installation Sheet
SIGA-MCC1	387352P	SIGA-MCC1 Single Input Signal Module Installation Sheet
SIGA-MCC2	387353P	SIGA-MCC2 Dual Input Signal Module Installation Sheet
SIGA-MCC2A	3101340	SIGA-MCC2A Dual Input Signal Module Installation Sheet
SIGA-RM1	387347	SIGA-RM1 Signature Series Riser Monitor Module Installation Sheet
SIGA-UMI	3102191	SIGA-UMI Universal Class A/B Module Installation Sheet

## Amplifier Terminal Panel Cabinet (ATPC)

For a centralized audio application, the ATPC is used to house an RKU series equipment rack, Amplifier Terminal Panel (ATP), 3-ATPINT Interface card, Dukane 125 W (model IB3-125) or 250 W (model IB3-250) audio amplifiers, standby batteries and, in some situations, an external battery charger.

The ATPC can be located up to 3,000 ft. (914 m) from 3-ZAxx amplifiers supplying audio signals.

### RKU series equipment racks

UL Listed RKU series equipment racks are used to house the banked Dukane amplifiers and associated equipment. The equipment racks are designed to support standard 19-inch (48.26 cm) wide rack-mount components. They are constructed of 16 gauge steel and finished in either white or black enamel. Refer to Table 42 below for a list of RKU equipment rack models and measurement specifications.

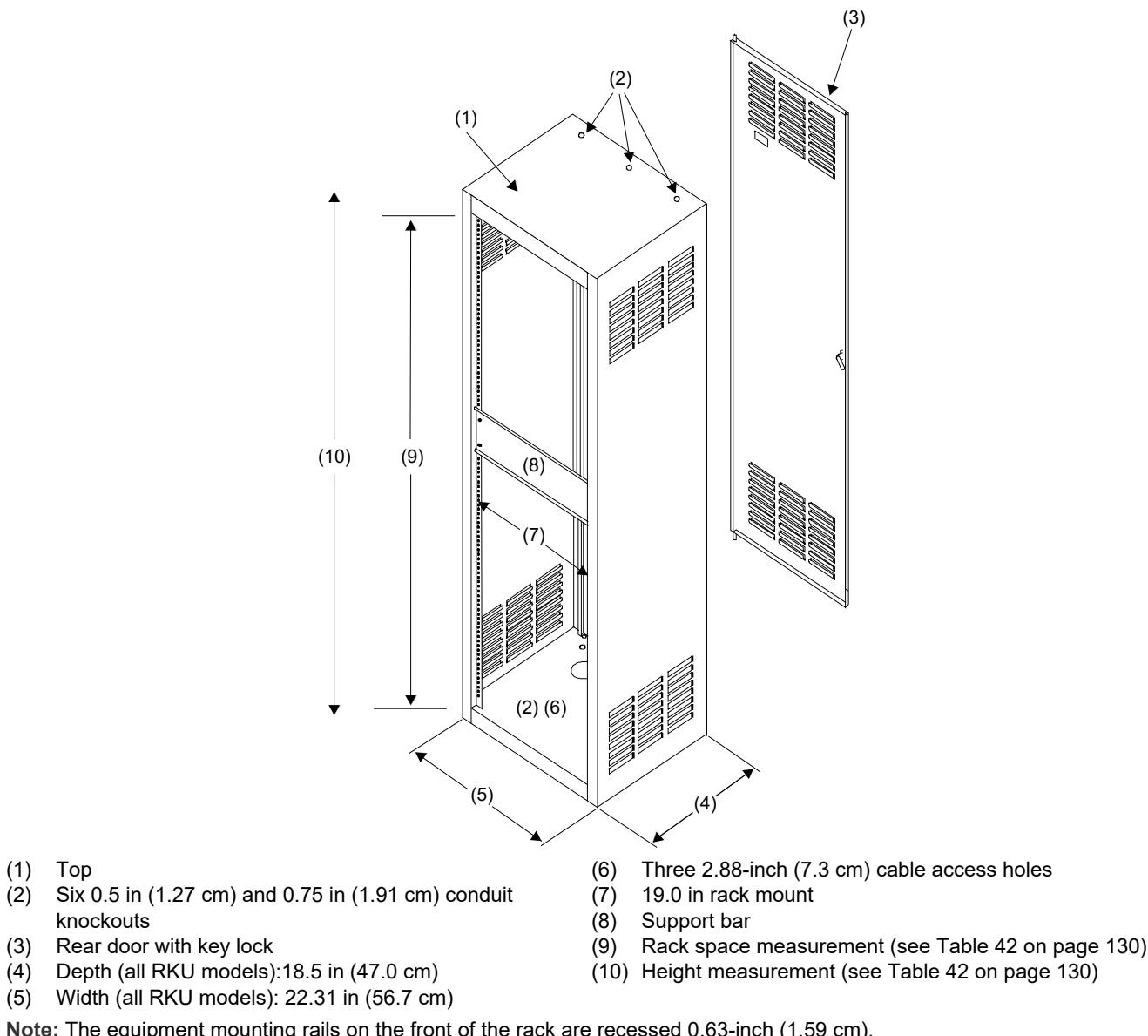
Interior-facing louvers on the RKU side panels and the back door provide ventilation for installed equipment, while maintaining a flush outside surface for side-by-side stacking of multiple racks. The louvered back door attaches to the cabinet with spring hinges, allowing easy field access and door removal. A key lock is provided on the door for added security.

Six conduit knockouts are available on the top end panel (three on top, three on the flange), and six on the bottom end panel (three on the bottom, three on the flange). Three cable access holes are located on the bottom end panel for routing wiring to cabinet components. See Figure 29 on page 131.

Multiple racks can be installed side-by-side where additional cabinet capacity is required.

**Table 42: RKU series equipment rack measurement specifications**

Model	Width	Depth	Height	Rack Space
RKU-36(B)	22.31 in. (56.7 cm)	18.50 in. (47.0 cm)	41.06 in. (104.3 cm)	36.75 in. (93.3 cm)
RKU-42(B)	22.31 in. (56.7 cm)	18.50 in. (47.0 cm)	46.31 in. (117.6 cm)	42.00 in. (106.7 cm)
RKU-61(B)	22.31 in. (56.7 cm)	18.50 in. (47.0 cm)	65.56 in. (166.5 cm)	61.25 in. (155.6 cm)
RKU-70(B)	22.31 in. (56.7 cm)	18.50 in. (47.0 cm)	74.31 in. (188.7 cm)	70.00 in. (177.8 cm)
RKU-77(B)	22.31 in. (56.7 cm)	18.50 in. (47.0 cm)	81.31 in. (206.5 cm)	77.00 in. (195.6 cm)

**Figure 29: RKU equipment rack**

## ATP Amplifier Terminal Panel and ATPINT Interface card

### ATP

The ATP supervises AC power to audio amplifiers and ensures that they can operate as needed during AC power failures or brownouts. If a power failure or brownout occurs, and the amplifiers are active, a power relay transfers battery power to the amplifiers. The amplifiers only draw battery power when in use. Two ATP models are available:

- ATP terminal panel, 120 VAC
- ATP-220 terminal panel, 220 VAC

The ATP enters a trouble state if any of the following events occur:

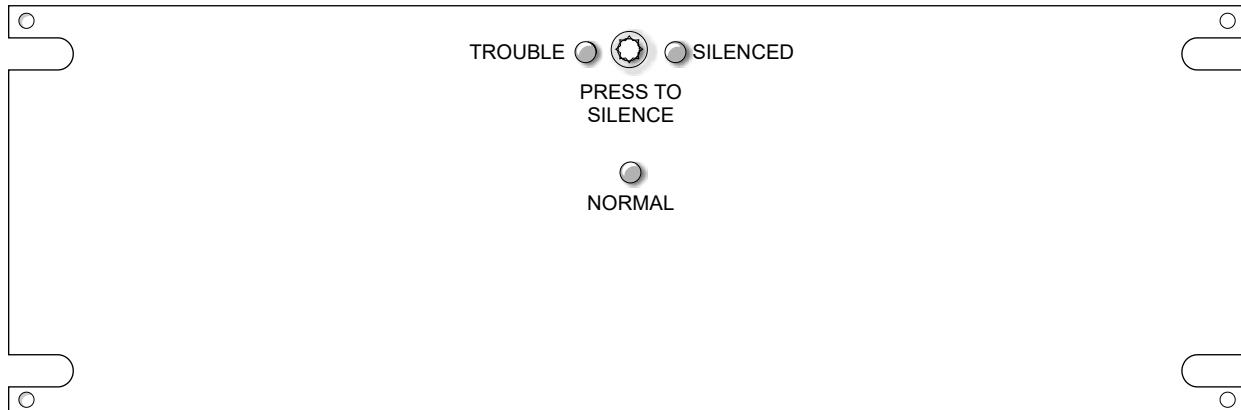
- ATP brownout or loss of AC power
- Low battery charge or missing battery (with J2 enabled)

- Ground fault (if ground fault detection J1 is enabled)
- Fuse failure

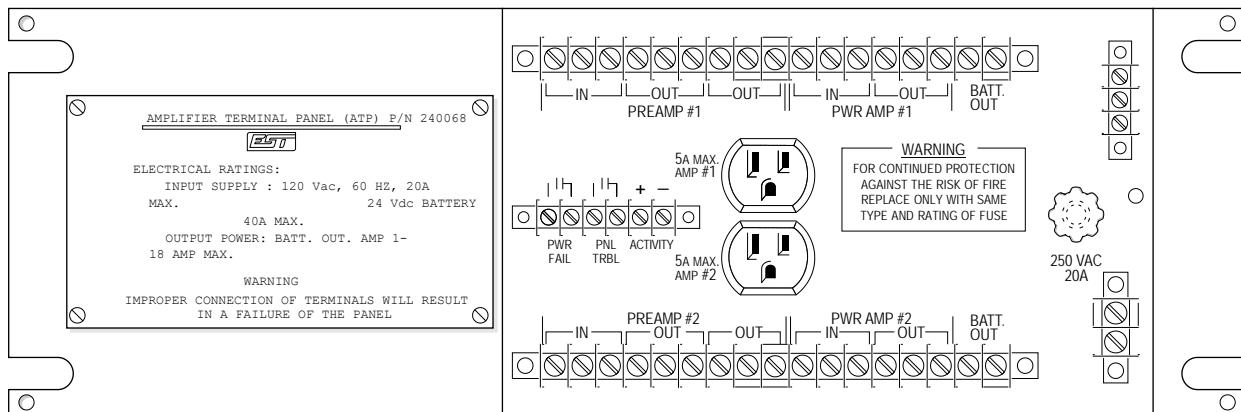
### Notes

- The ATP must have a 3-ATPINT installed to work with the EST4 system.
- The ATP supports two 1B3-250 Dukane amplifiers maximum.

**Figure 30: ATP, front view**



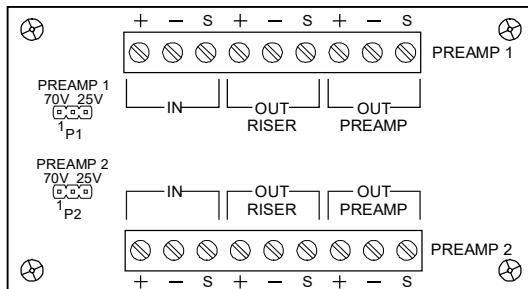
**Figure 31: ATP, rear view**



### 3-ATPINT

The 3-ATPINT Interface Card is a 25 V and 70 V adapter card for the ATP. The 3-ATPINT is required when using distributed (high voltage) output for an audio amplifier as the audio source for the ATP.

The 3-ATPINT is designed for use with audio source amplifiers that use 24 VDC output circuit supervision with an EOL resistor. Multiple 3-ATPINT cards can be connected to a common source amplifier using Class B/DCLB or Class A/DCLA supervision, as provided by the sourcing amplifier.

**Figure 32: 3-ATPINT Interface card**

### ATP with 3-ATPINT operation

An ATP with installed 3-ATPINT is mounted in an RKU rack and provides termination for the power amplifier's audio power and control signals. The ATP has an integral battery charger capable of charging 40 Ah (maximum) of standby batteries. The charger is fully supervised and provides a silenceable trouble buzzer and trouble contacts. One ATP is required for every two amplifiers.

When a brownout condition is sensed at the ATP, the trouble contacts and AC fail contacts are closed and a programmed supervisory zone reports the condition to the EST4 system. The EST4 system is designed to provide +24 VDC to the ATP's audio activity input by-way-of control relay, enabling standby power only when primary power to the amplifiers has failed and audio is active during an alarm condition.

### Battery backup

When multiple ATPs share a common battery or when a backup amplifier is supplied from a single battery source, an external battery charger must be used. Battery power is applied to the amplifiers by the ATP. The internal battery charger supports two standby batteries of up to 40 Ah capacity.

**Caution:** Do not connect the battery chargers of multiple ATPs in parallel to increase the charger current.

When calculating the battery size required to support the amplifiers, the alarm current must be known.

- Each 250 W amplifier connected to the system draws 20 amperes at 24 VDC at full load
- Each 125 W amplifier connected to the system draws 10 amperes at 24 VDC at full load

The amplifiers draw no current in standby mode. NFPA 72 specifies that designing the system to provide 15 minutes of evacuation alarm at full load is the equivalent of 2 hours of emergency operation; however, the local AHJ or local codes can modify the amount of time for which standby power must be provided.

## Dukane audio amplifiers

Two Dukane amplifiers models are available:

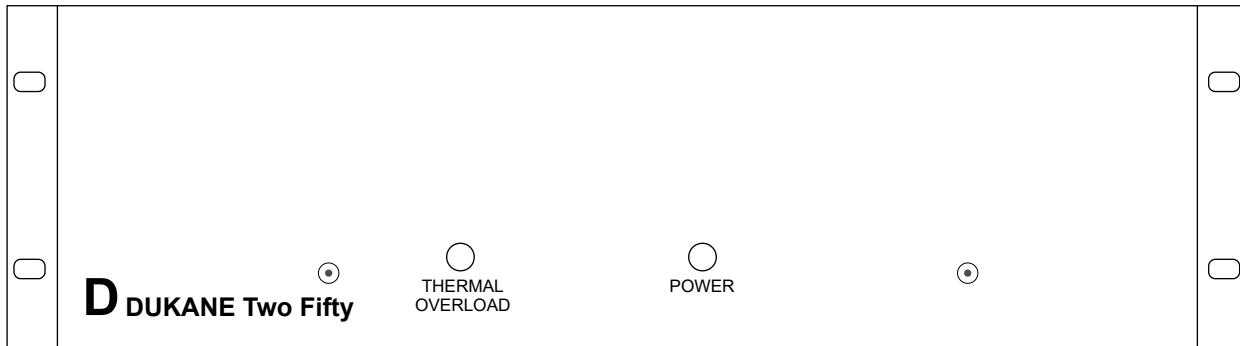
- 1B3-125, 125 watt output
- 1B3-250, 250 watt output

Both models operate from 120 VAC, 50/60 Hz, as well as 24 VDC battery standby. The amplifiers are mounted in an ATPC.

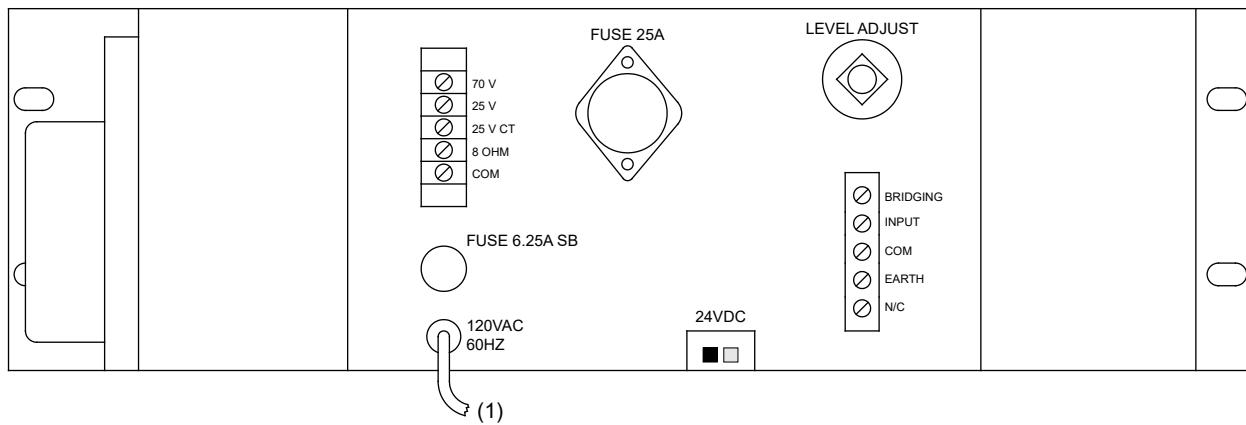
### Notes

- The 1B3-250 amplifier should be loaded to no more than 72% of rated capacity. The amp is derated by 28% to allow for continuous operation and line loss averages.
- The ATP supports two 1B3-250 amplifiers maximum.
- Do not connect the EARTH ground jumper link to the audio COM terminal. If connected, a ground fault on the audio riser may occur.

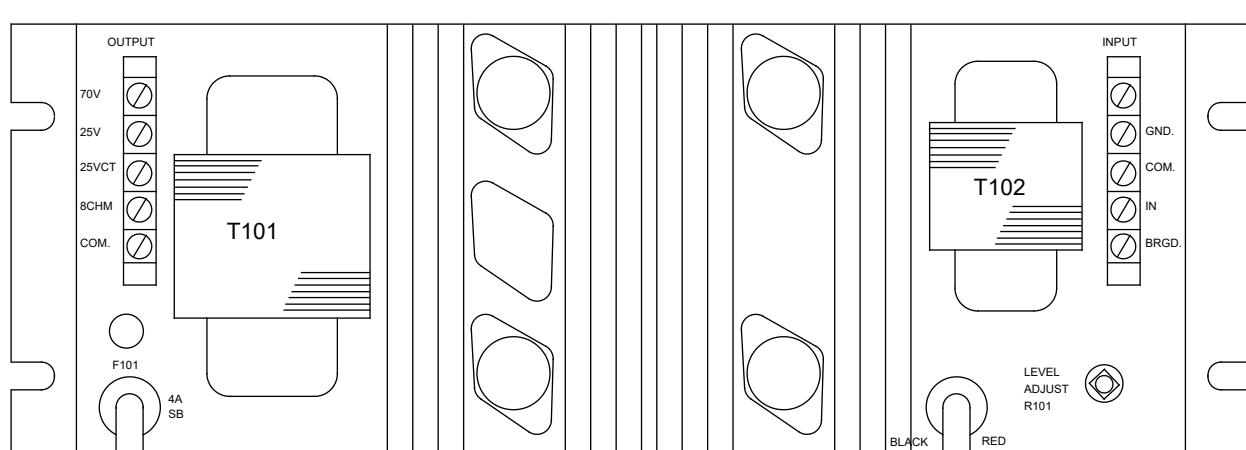
**Figure 33: Dukane 1B3-250, front view**



**Figure 34: Dukane 1B3-250, rear view**



**Figure 35: Dukane 1B3-125, rear view**

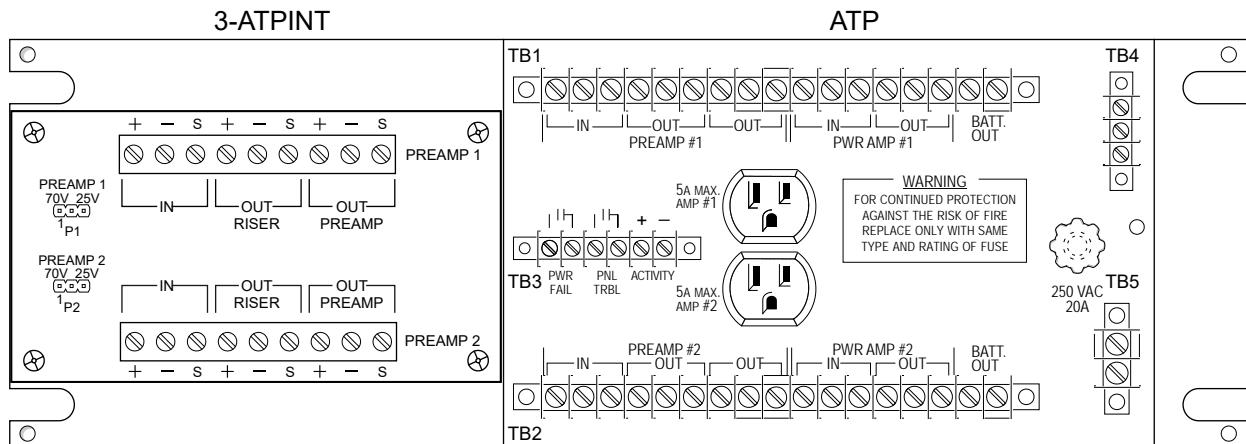


**Table 43: Dukane 1B3-125 and 1B3-250 amplifiers specifications**

	<b>1B3125</b>	<b>1B3-250</b>
Rated output power	125 W	250 W (180 W max. loaded)
Max. signal input	1 VRMS	1 VRMS
Input impedance	75 kΩ	75 kΩ
Output voltage	25 or 70 VRMS	25 or 70 VRMS
Primary power	120 VAC, 60 Hz	120 VAC, 60 Hz
Battery power	24 VDC	24 VDC
AC power consumption		
Standby	27 W	48 W
Full load	360 W	700 W
DC power consumption		
Standby	0 W (when using the ATP)	0 W (when using the ATP)
Full load	11.5 A	20 A
Dimensions (H × W × D)	5.25 × 19.0 × 6.625 in (13.3 × 48.3 × 16.8 cm)	8.5 × 19 × 15 in (21.6 × 48.3 × 38.1 cm)
Weight	22.5 lb. (10.1 kg)	55 lb. (24.9 kg)

The output of the amplifier must be set for the proper value by adjusting Level Adjust on the back of the amplifier. For 1,000 Hz generated tones, the amplifier must adjust for 70 VRMS output by using an RMS voltmeter.

## ATP and 3-ATPINT terminal connections and jumper settings

**Figure 36: ATP with 3-ATPINT installed, rear view**

### ATP terminal connections

**Table 44: ATP TB1 and TB2 terminals for connecting audio signals to the ATP and the two amplifiers**

Terminal	Description
Preamp IN	<i>Do not use if 3-ATPINT is installed.</i> Provides input from the fire control unit audio subsystem. If multiple ATP modules are used, connect to the Preamp Out terminal of the previous ATP.
Preamp OUT	<i>Do not use if 3-ATPINT is installed.</i> Connects to the Preamp In terminals of the next ATP. If this is the last ATP, terminate as indicated in Table 46.

Terminal	Description
Preamp OUT	<i>Do not use if 3-ATPINT is installed.</i> Connects to the High Z input terminal of the Dukane amplifier.
Power Amp IN	Connects to the 70 V or the 25 V output of the Dukane amplifier.
Power Amp OUT	Connects to a SIGA-RM1 Signature Series Riser Monitor Module configured as a riser monitor. Each riser can supply 180 W, max.

**Table 45: ATP TB3 terminals**

Terminal	Description
ATP power fail	Normally open relay contacts that close when primary power to the amplifiers is lost or in brownout condition.  Connect to a SIGA-CT1 Signature Series Single Input Module configured as an ACFail device type. Make sure that jumper JP1 is in position 1 as shown in Figure 38 on page 137 so that the ATP does not create an additional delay.  If ACFail device type is not used to monitor the ACFail of the ATP, then JP1 must be installed in position 2 where the built in ACFail delay on the ATP is used and this contact is to be supervised by a supervisory input either on the control unit or via a Signature Series input module configured as a supervisory input.
Panel trouble	Normally open relay contacts close when any of the following problems occur: <ul style="list-style-type: none"> <li>• Failure of the battery charger circuit (if enabled)</li> <li>• Blown fuse or circuit breaker</li> <li>• Ground fault on battery terminals</li> <li>• Brownout or loss of AC power</li> </ul>
Activity	When this input is active, power relay contacts transfer battery power to the BATT OUT terminals.  Connect these terminals to a SIGA-CR Signature Series Control Relay Module to provide 24 VDC during any system alarm state or user activation of the paging system.

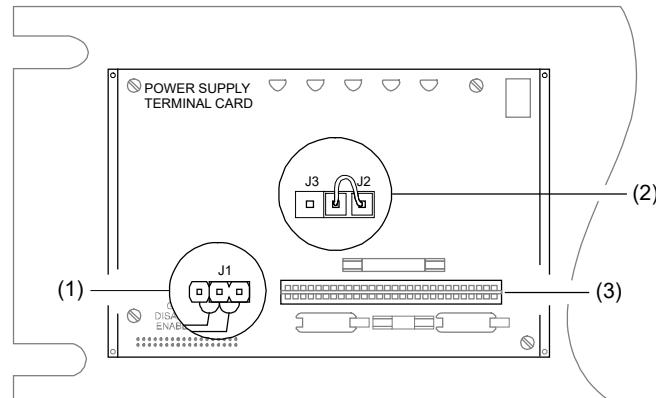
**Table 46: ATP preamplifier termination**

Amplifiers per channel	EOL resistor value	Number
0	10 kΩ, 0.5 W	260002
1–5	1.8 kΩ, 0.5 W	260044
6–10	2.2 kΩ, 0.5 W	260045
11–15	3.0 kΩ, 0.5 W	260046
16–20	3.9 kΩ, 0.5 W	260001
21–25	6.8 kΩ, 0.5 W	260047

### ATP jumper settings

Two jumpers for configuring the ATP are found on the power supply terminal card. Jumper J1 is used to enable or disable the ground fault detector. Jumper J3-J2 is used to enable or disable the internal battery charger. For more information see Figure 37 on page 137 and Table 47 on page 137.

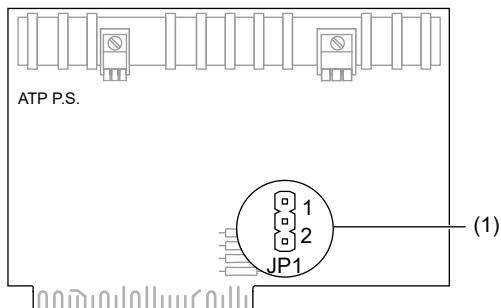
One jumper (JP1) is found on the power supply card. Jumper JP1 is used to impose a 150-minute delay on trouble indication when an AC power loss or brownout occurs. This delay is used to prevent false trouble reports in areas where brief power failures occur frequently. See Figure 38 on page 137 and Table 48 on page 137 for details.

**Figure 37: ATP power supply terminal card placement of J1 and J3-J2 jumpers**

- (1) Jumper J1, enlarged
- (2) Jumper J3-J2 with the jumper installed in the J2 position
- (3) Connector for the power supply card

**Table 47: ATP power supply terminal card jumper positions**

Jumper	Function
J1	Ground fault detector jumper: <ul style="list-style-type: none"> <li>• ENABLE position enables the ground fault detector</li> <li>• DISABLE position disables the ground fault detector</li> </ul>
J3-J2	Internal battery charger jumper: <ul style="list-style-type: none"> <li>• JP2 position enables the internal battery charger</li> <li>• JP3 position disables the internal battery charger</li> </ul>

**Figure 38: ATP power supply card placement of JP1 jumper**

- (1) Jumper JP1

**Table 48: ATP power supply card jumper positions**

Jumper	Position	Response to AC power failure or brownout
JP1	Position 1	The ATP goes into trouble immediately
JP1	Position 2	The ATP waits for 150 minutes. If power has not been restored to normal levels before 150 minutes, the ATP goes into trouble.

### 3-ATPINT terminal connections

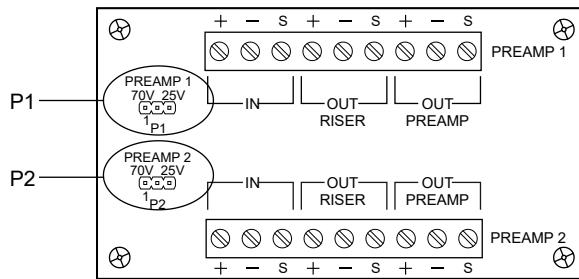
**Table 49: 3-ATPINT terminals**

Terminal	Description
IN riser	To audio source amplifier 25 or 70 VRMS output, or previous 3-ATPINT riser output
OUT RISER	25 or 70 VRMS output to next 3-ATPINT IN riser or EOL resistor
OUT PRE AMP	Low level audio to audio power amplifier input

### 3-ATPINT jumper settings

Two jumpers are used for configuring the 3-ATPINT input voltage. See Figure 39 below and Table 50 below for details.

**Figure 39: 3-ATPINT P1 and P2 jumpers positions**



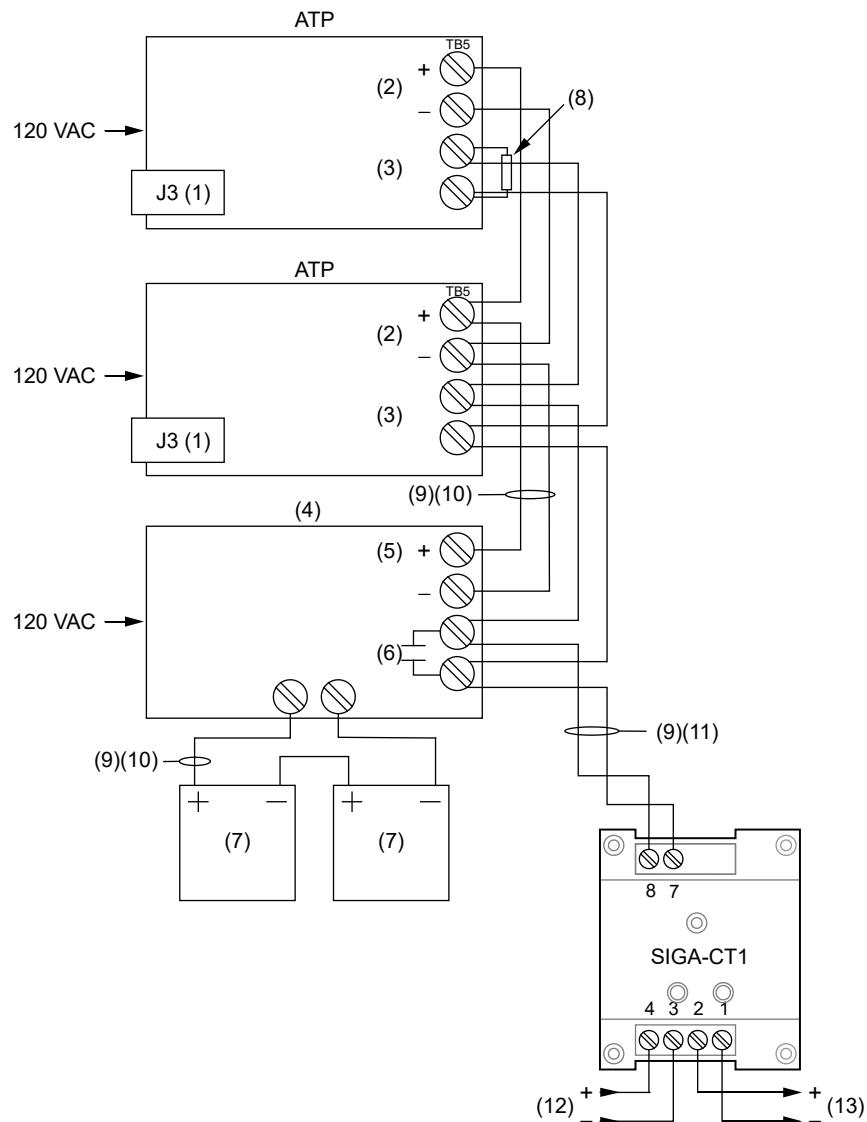
**Table 50: 3-ATPINT jumper positions**

Jumper	Position	Function
P1	Position 1/2	Sets PREAMP 1 input voltage to 70 VRMS
	Position 2/3	Sets PREAMP 1 input voltage to 25 VRMS
P2	Position 1/2	Sets PREAMP 2 input voltage to 70 VRMS
	Position 2/3	Sets PREAMP 2 input voltage to 25 VRMS

## ATP external battery charger

When multiple ATPs are connected to a common battery set, disable the ATP internal battery charger by installing J3 and removing J2 on the power supply terminal board (Figure 37 on page 137). Use an external battery charger that can charge up to 160 Ah standby batteries, as shown in Figure 40 below.

**Figure 40: ATP external battery charger wiring**



### Legend

- |   |  |
|---|--|
| (1) Disable charger jumper J3 on the ATP power supply terminal card (see Figure 37 on page 137) | (7) Standby battery (24 VDC 160 Ah max.)     |
| (2) Battery IN  | (8) UL/ULC Listed 47 kΩ end-of-line resistor |
| (3) Panel trouble   | (9) Supervised                               |
| (4) External battery charger  | (10) Nonpower-limited                        |
| (5) Load  | (11) Power-limited                           |
| (6) Battery trouble   | (12) Data IN                                 |
|   | (13) Data OUT                                |

### Notes

- Maximum wire size: 10 AWG (5.26 mm<sup>2</sup>)
- External battery charger must be installed in same enclosure as the ATP

## Wiring diagrams

This section includes examples of wiring diagrams used in centralized audio applications.

See specific device installation sheets for more information about a device. You can find publication part numbers listed in Table 41 on page 129.

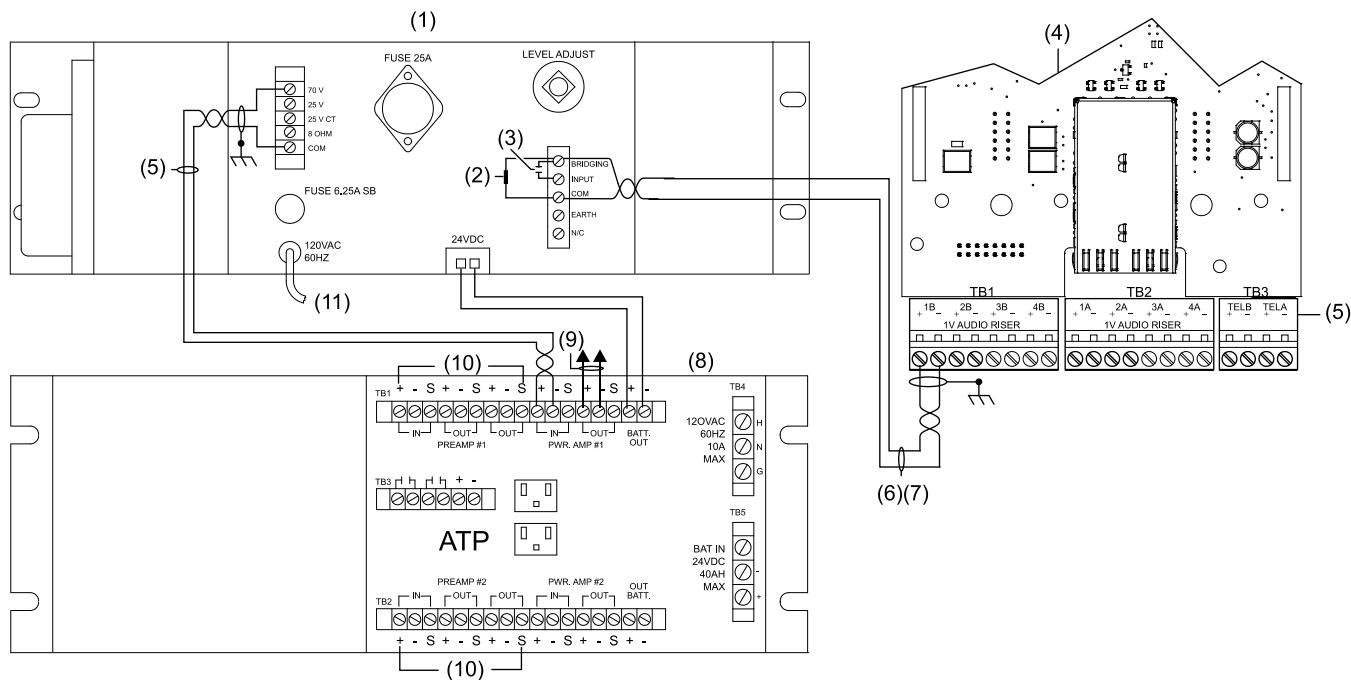
### Notes

- Follow power-limited or nonpower-limited wiring practices as determined by the amplifier providing the audio signal.
- Wiring between the output of each 3-ZA20 and its associated banked amplifier input should be twisted-pair, shielded cable and can be configured for Class A/DCLA or Class B/DCLB integrity monitoring.

### 4-AUDTELS wiring for 1 VRMS to Dukane amplifiers

**Note:** See *ATP and ATP-220 Amplifier Terminal Panel Installation Sheet* (P/N 3101001) for more information on to Dukane amplifiers.

**Figure 41: 4-AUDTELS – ATP and 1 VRMS to Dukane ampler (1B3-250 shown)**



### Legend

- |     |                                  |      |                         |
|-----|----------------------------------|------|-------------------------|
| (1) | 1B3-250 Dukane amplifier         | (7)  | Twisted-pair, shielded  |
| (2) | 15 kΩ EOLR (P/N EOL-15)          | (8)  | ATP                     |
| (3) | 0.033 µF capacitor (P/N CAP-DUK) | (9)  | Audio riser out         |
| (4) | 4-AUDTELS                        | (10) | Do not use              |
| (5) | 4-AUDTELS terminal board         | (11) | To ATP power receptacle |

### Notes

- Maintain 0.25 in. (6 mm) separation between power-limited and nonpower-limited wiring at all times.
- A CAP-DUK capacitor must be used on each Dukane amplifier.
- For Canadian mass notification installations, a minimum of 4 hours of standby battery power is required in conjunction with an automatic starting, engine driven generator.
- The 1B3-250 Dukane amplifier should be loaded to no more than 72% of rated capacity. The amp is derated by 28% to allow for continuous operation and line loss averages.

## Backup audio amplifier

Various methods are available to provide a backup amplifier in the event that a primary amplifier fails. Depending upon the local AHJ, a single backup amplifier can be required for each primary amplifier or a single backup per bank of amplifiers.

Figure 42 on page 142 provides an example of centralized banked audio with a backup amplifier. In the example:

- Five Dukane 1B3-250 audio amplifiers are used, four primary amplifiers and one backup amplifier, and one SIGA-RM1 riser module for each amplifier.
- For rules programming:

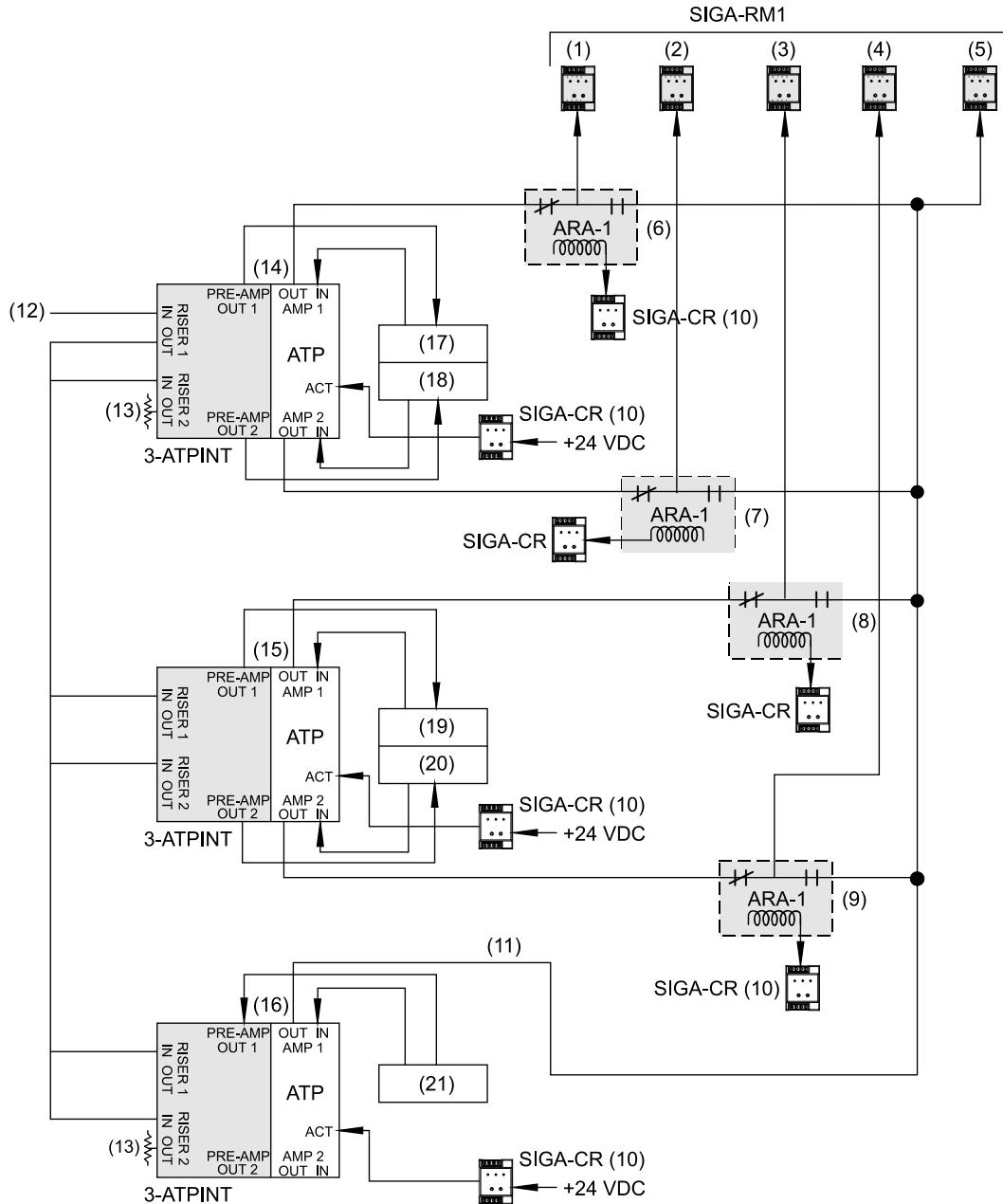
There is an AND logic device group for *each* SIGA-RM1 riser module that has the First Alarm pseudo point and SIGA-RM1 in the group. Because there is a SIGA-RM1 for each of the four primary Dukane audio amplifiers, there are four AND groups.

The SIGA-RM1 for the backup amplifier is for information only to verify that the backup amplifier is operational (no rules programming is needed).

The AND group activates a SIGA-RM1 Command List that first disables itself, then disables all SIGA-RM1 modules, then activates the SIGA-CR transfer relay of the failed amplifier, and then enables itself.

A System Reset rule enables all the RM1 modules.

Figure 42: Example wiring for centralized banked audio with one backup amplifier



## Legend (see figure notes on next page)

- (1) SIGA-RM1 riser reports audio amplifier 1 failure
- (2) SIGA-RM1 riser reports audio amplifier 2 failure
- (3) SIGA-RM1 riser reports audio amplifier 3 failure
- (4) SIGA-RM1 riser reports audio amplifier 4 failure
- (5) SIGA-RM1 riser provides information only to verify backup audio amplifier 5 is operation
- (6) ARA-1 relay activates on amplifier 1 failure
- (7) ARA-1 relay activates on amplifier 2 failure
- (8) ARA-1 relay activates on amplifier 3 failure
- (9) ARA-1 relay activates on amplifier 4 failure
- (10) SIGA-CR defined as nonsupervised output
- (11) Backup riser
- (12) From 3-ZA20/B
- (13) UL/ULC Listed 15 KΩ end-of-line resistor
- (14) ATP1: AMP 1 and AMP 2  
3-ATPINT: PRE-AMP OUT 1 and PRE-AMP OUT 2
- (15) ATP2: AMP 3 and AMP 4  
3-ATPINT: PRE-AMP OUT 3 and PRE-AMP OUT 4
- (16) ATP3: AMP 5 and AMP 6  
3-ATPINT: PRE-AMP OUT 5 and PRE-AMP OUT 6
- (17) Dukane 1B3-250 audio amplifier 1
- (18) Dukane 1B3-250 audio amplifier 2
- (19) Dukane 1B3-250 audio amplifier 3
- (20) Dukane 1B3-250 audio amplifier 4
- (21) Dukane 1B3-250 backup audio amplifier

Figure 42 notes

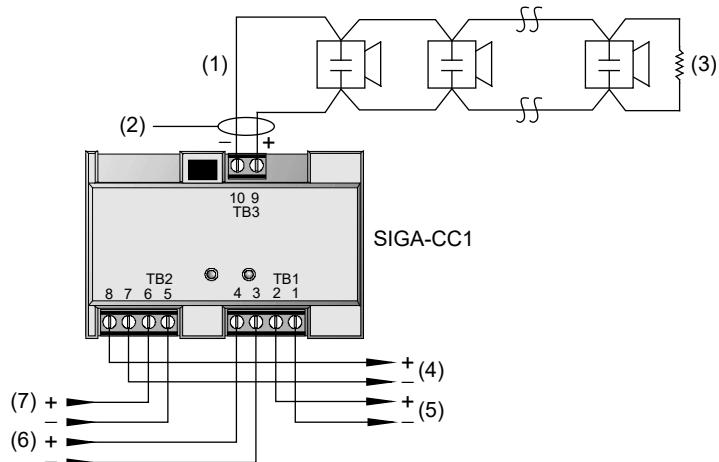
- SIGA-RM1 modules report riser troubles to the network controller.
- The ARA-1 relay installs on an ARM-8 module. For more information about the ARA-1, see *ARM-8 Auxiliary Relay Module Installation Sheet* (P/N 270753).

## Branch speaker wiring

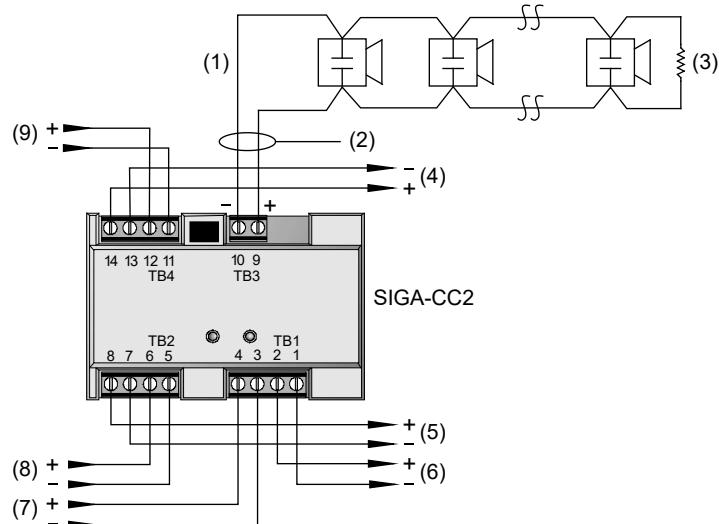
Signature modules are used to connect individual floor branch speaker circuits to the main riser. Table 51 below lists the single channel and dual channel modules that can be used for Class B/DCLB and Class A/DCLA branch speaker wiring.

**Table 51: Branch speaker wiring single and dual channel Signature modules**

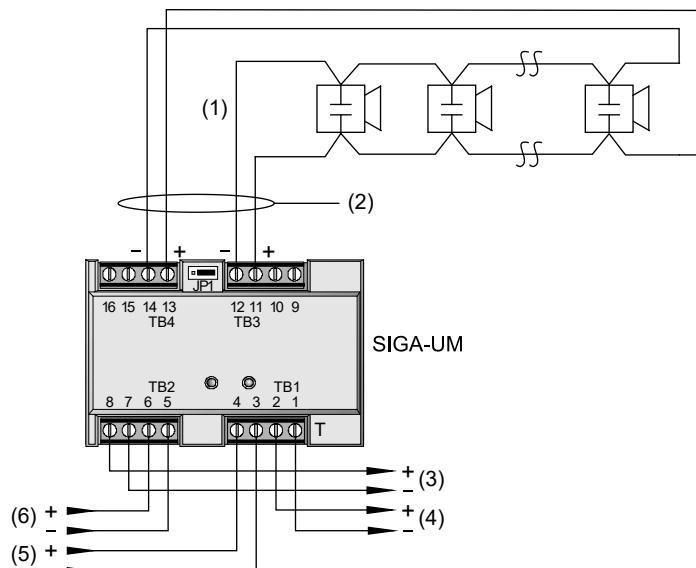
Channels	Class B/DCLB Signature modules	Class A/DCLA Signature modules
Single channel	SIGA-CC1, SIGA-MCC1, SIGA-UM, SIGA-MAB, SIGA-CC2, SIGA-MCC2	SIGA-UM, SIGA-MAB
Dual channel	SIGA-CC2, SIGA-MCC2	SIGA-CC2A, SIGA-MCC2A

**Figure 43: Typical Class B/DCLB, single channel wiring using a SIGA-CC1**

- |     |  |     |  |
|-----|--|-----|--|
| (1) | Typical speaker circuit                          | (5) | Data OUT to next device                              |
| (2) | Class B/DCLB wiring                              | (6) | Data IN from Signature controller of previous device |
| (3) | UL/ULC Listed 47 KΩ end-of-line resistor         | (7) | Riser IN from ATP                                    |
| (4) | Riser OUT to next end-of-line supervisory device |     |  |

**Figure 44: Typical Class B/DCLB, dual channel wiring using a SIGA-CC2**

- (1) Typical speaker circuit  
 (2) Class B/DCLB wiring  
 (3) UL/ULC Listed 47 KΩ end-of-line resistor  
 (4) Channel 2 (input 2) riser OUT to next device or next end-of-line supervisory device  
 (5) Channel 1 (input 1) riser OUT to next device or next end-of-line supervisory device  
 (6) Data OUT to next device  
 (7) Data IN from Signature controller of previous device  
 (8) Channel 1 (input 1) riser IN from ATP  
 (9) Channel 2 (input 2) riser IN from ATP

**Figure 45: Typical Class A/DCLA single channel wiring using a SIGA-UM Module**

- (1) Typical speaker circuit  
 (2) Class A/DCLA wiring  
 (3) Channel 1 (input 1) riser OUT to next device or next end-of-line supervisory device  
 (4) Data OUT to next device  
 (5) Data IN from Signature controller of previous device  
 (6) Channel 1 (input 1) riser IN from ATP

## Building management control system

The FSB-PC4 and FSB-PC4LW field server bridges (FSB) provide a communication bridge between an EST4 life safety system and building management systems (BMS). This is accomplished by converting the EST4 control unit External Communications XML Protocol (ECPxml) into supported RS-485, LonWorks, and Ethernet protocols.

The FSB-PC4 is Edwards' multiple protocol FSB that supports BACnet or Modbus protocols. The UL 864 Listed FSB-PC4 can be used in non-ancillary applications where the BMS can activate and restore AND groups and commands lists on the EST4 control unit.

The FSB-PC4LW is Edwards' single protocol FSB that supports the LonWorks protocol. The FSB-PC4LW is intended for ancillary use only. Use in non-ancillary applications is not permitted.

The FSB mounts on a separately ordered bracket (FSB-BRKT2) that can be installed on the side of a chassis in an EST4 FACU or in an MFC-A external enclosure. The EST4 FACU requires a 4-FWALx firewall module that permits external access to the EST4 system and an ECP Communication Service configured in the 4-CU to allow external applications to connect to the system. See *FSB-PC4 and FSB-PC4LW Communication Bridge Application Guide* (P/N 3102260) for application details, programming and installation instructions, and FSB specifications.



# Chapter 6

# Preventive maintenance and testing

## **Summary**

This chapter provides instruction for maintaining and testing the EST4 life safety system.

## **Content**

Visual inspections 148

Routine maintenance and tests 149

Maintenance schedule 149

System trouble and maintenance log 155

Record of completion 156

# Visual inspections

Perform visual inspections in accordance with Table 52, or more often if required by the local AHJ. See Table 54 on page 150 for test methods.

**Table 52: 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.
Smoke detectors	Semiannually	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.
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 life safety 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 53 below or more often if required by the local AHJ. See Table 54 on page 150 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.
- Control unit operation should be verified in the alarm, supervisory, and trouble modes.
- For SIGA and SIGA2 Signature Series detector testing and maintenance procedures, refer to *Signature Series Detector Application Bulletin* (P/N 270145).

## Maintenance schedule

**Table 53: Routine maintenance schedule**

Component	Initial and Reacceptance	Other
Control equipment [1]	Y	Quarterly/Annually
Batteries [2]	Y	Annually
Control unit trouble signals	Y	Annually
Fiber optic cable connections	Y	Annually
Emergency voice/alarm communication equipment	Y	Annually
Remote annunciators	Y	Annually
Smoke detectors	Y	Annually
Heat detectors	Y	Annually
Fire alarm boxes	Y	Annually
Supervisory signal devices (except valve tamper switches)	Y	Quarterly
Waterflow devices	Y	Semiannually
Valve tamper switches	Y	Semiannually
Fire extinguishing systems or suppression systems	Y	Annually
Interface equipment	Y	Annually
Audible notification appliances	Y	Annually
Textual audible notification appliances (speakers)	Y	Annually
Visible notification appliances	Y	Annually
Off-premises transmission equipment	Y	Quarterly
Supervising station fire alarm system transmitters	Y	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 54: Routine maintenance and tests**

<b>Component</b>	<b>Test</b>	<b>Test methods</b>
Control unit	Visual inspection	Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>1. Verify that the control unit indicates open, short, and ground faults for all notification appliance circuits, initiating device circuits, and signaling line circuits.</li> <li>2. Verify that the control unit activates all evacuation signals and auxiliary functions according to the site specific software.</li> <li>3. Verify that all controls and indicators function as intended.</li> <li>4. Disconnect the primary (mains) power. Verify that the control unit indicates an AC power failure.</li> </ol>
	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 5 years or sooner if conditions warrant.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>1. With the control unit 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.</li> <li>2. With the control unit 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 US, whichever is greater.</li> </ol>
	Annual	<ol style="list-style-type: none"> <li>1. With the control unit 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.</li> <li>2. Test the capacity of the batteries using a battery tester suitable for the amp-hour rating of the batteries.</li> </ol>
Smoke detectors	Visual inspection	<ol style="list-style-type: none"> <li>1. Verify that the detector's green LED flashes if programmed to do so.</li> <li>2. Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.</li> </ol>
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>1. Remove the detector from its base. Verify that the control unit displays a trouble message that correctly identifies the detector.</li> <li>2. Activate the detector. Verify that the detector's red LED flashes and the control unit displays an alarm message that correctly identifies the detector.</li> <li>3. If the detector is installed in a relay base, verify the correct operation of the relay.</li> <li>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.</li> </ol>

Component	Test	Test methods
	Annual	<ol style="list-style-type: none"> <li>1. Activate the detector. Verify that the detector's red LED flashes and the control unit displays an alarm message that correctly identifies the detector.</li> <li>2. If the detector is installed in a relay base, verify the correct operation of the relay.</li> <li>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.</li> </ol>
Heat detectors	Visual inspection	<ol style="list-style-type: none"> <li>1. Verify that the detector's green LED flashes.</li> <li>2. Inspect the equipment for any visible signs of damage or other changes that may adversely affect performance. Clean if necessary.</li> </ol>
	Initial and Reacceptance	<p><b>Caution:</b> 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.</p> <ol style="list-style-type: none"> <li>1. Remove the detector from its base. Verify that the control unit displays a trouble message that correctly identifies the detector.</li> <li>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 unit displays an alarm message that correctly identifies the detector.</li> <li>3. If the detector is installed in a relay base, verify the correct operation of the relay.</li> </ol>
	Annual	<p><b>Caution:</b> 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.</p> <ol style="list-style-type: none"> <li>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 unit displays an alarm message that correctly identifies the detector.</li> <li>2. If the detector is installed in a relay base, verify the correct operation of the relay.</li> </ol>
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 unit correctly identifies the device.
	Semiannual	Activate the equipment. Make sure the control unit 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 unit correctly identifies the device.
	Semiannual	Activate the equipment. Make sure the control unit correctly identifies the device.

Component	Test	Test methods
Alarm input modules (except waterflow switch inputs)	Visual inspection	Verify that the module's green LED flashes. Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>Open the circuit. Verify that the control unit displays a trouble message that correctly identifies the module.</li> <li>Short each side of the circuit to ground one at a time. Verify that for each short the control unit displays a ground fault message that correctly identifies the module.</li> <li>Activate the module. Verify that the module's red LED flashes and the control unit displays an alarm message that correctly identifies the module.</li> </ol>
	Annual	Activate the module. Verify that the red LED flashes and the control unit displays an alarm message that correctly identifies the module.
Waterflow switch input modules	Visual inspection	Verify that the module's green LED flashes. Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>Open the circuit. Verify that the control unit displays a trouble message that correctly identifies the module.</li> <li>Short each side of the circuit to ground one at a time. Verify that for each short the control unit displays a ground fault message that correctly identifies the module.</li> <li>Activate the module. Verify that the module's red LED flashes and the control unit displays an alarm message that correctly identifies the module.</li> </ol>
	Semiannual	Activate the module. Verify that the module's red LED flashes and the control unit displays an alarm message that correctly identifies the module.
Supervisory input modules (except valve tamper inputs)	Visual inspection	Verify that the module's green LED flashes. Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>Open the circuit. Verify that the control unit displays a trouble message that correctly identifies the module.</li> <li>Short each side of the circuit to ground one at a time. Verify that for each short the control unit displays a ground fault message that correctly identifies the module.</li> <li>Activate the module. Verify that the module's red LED flashes and the control unit displays a supervisory message that correctly identifies the module.</li> </ol>
	Quarterly	Activate the module. Verify that the module's red LED flashes and the control unit displays a supervisory message that correctly identifies the module.
Valve tamper input modules	Visual inspection	Verify that the module's green LED flashes. Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>Open the circuit. Verify that the control unit displays a trouble message that correctly identifies the module.</li> <li>Short each side of the circuit to ground one at a time. Verify that for each short the control unit displays a ground fault message that correctly identifies the module.</li> <li>Activate the module. Verify that the module's red LED flashes and the control unit displays a supervisory message that correctly identifies the module.</li> </ol>
	Semi-annual	Activate the module. Verify that the module's red LED flashes and the control unit displays a supervisory message that correctly identifies the module.
Releasing modules	Visual inspection	Verify that DS2 flashes and DS4 is on. Ensure that there are no changes that may adversely affect equipment performance.

Component	Test	Test methods
	Initial and Reacceptance	<p><b>WARNING:</b> 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.</p> <ol style="list-style-type: none"> <li>1. Verify that the control unit indicates open, shorts, and ground faults for each of the circuits.</li> <li>2. Verify that the release initiation circuit activates the release circuits as intended, and that all required signals are indicated on the control unit.</li> <li>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 unit.</li> <li>4. Verify that the abort switch, if used, prevents the release circuits from activating as intended.</li> </ol>
	Semiannual	<p><b>WARNING:</b> 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.</p> <ol style="list-style-type: none"> <li>1. Verify that the release initiation circuit activates the release circuits as intended, and that all required signals are indicated on the control unit.</li> <li>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 unit.</li> <li>3. Verify that the abort switch, if used, prevents the release circuits from activating as intended.</li> </ol>
Audible notification appliances	Visual inspection	Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	Measure and record sound pressure levels throughout the protected area to ensure the minimum audibility requirements of NFPA 72 are met. Confirm synchronization of outputs within each notification zone per NFPA 72.
	Annual	Measure and record sound pressure levels throughout the protected area to ensure the minimum audibility requirements of NFPA 72 are met. Confirm synchronization of outputs within each notification zone per NFPA 72.
Textual audible notification appliances (speakers)	Visual inspection	Ensure there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	Measure and record sound pressure levels of the required tone(s) preceding the textual audible (voice) message throughout the protected area to ensure the minimum audibility requirements of NFPA 72 are met. Verify that audible information is distinguishable and understandable.
	Annual	Measure and record sound pressure levels of the required tone(s) preceding the textual audible (voice) message throughout the protected area to ensure the minimum audibility requirements of NFPA 72 are met. Verify that audible information is distinguishable and understandable.
Visible notification appliances	Visual inspection	Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	<p>Verify that the appliance locations are in accordance with the approved layout and are set for the correct candela rating.</p> <p>Verify that each appliance flashes. Verify synchronization of the light output between devices as required by NFPA 72.</p>
	Annual	Verify that each appliance flashes. Verify synchronization of the light output between devices as required by NFPA 72.

Component	Test	Test methods
Off-premises transmission equipment	Visual inspection	Ensure that there are no changes that may adversely affect equipment performance.
	Initial and Reacceptance	<ol style="list-style-type: none"> <li>1. Activate an alarm initiating device. Verify that the off-premises location receives an alarm signal.</li> <li>2. Create a trouble condition. Verify that the off-premises location receives a trouble signal.</li> <li>3. Activate a supervisory device. Verify that the off-premises location receives a supervisory signal.</li> <li>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.</li> </ol>
	Semiannual	<ol style="list-style-type: none"> <li>1. Activate an alarm initiating device. Verify that the off-premises location receives an alarm signal.</li> <li>2. Create a trouble condition. Verify that the off-premises location receives a trouble signal.</li> <li>3. Activate a supervisory device. Verify that the off-premises location receives a supervisory signal.</li> <li>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.</li> </ol>
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	<ol style="list-style-type: none"> <li>1. Activate an alarm input while using the primary telephone line for a telephone call. <ul style="list-style-type: none"> <li>• Verify that the supervising station receives the correct signal.</li> <li>• Verify completion of the transmission attempt occurs within 90 seconds.</li> </ul> </li> <li>2. Disconnect the primary telephone line and connect the secondary telephone line. <ul style="list-style-type: none"> <li>• Verify that the control unit indicates a DACT trouble message.</li> <li>• Verify that the DACT transmits the trouble signal to the supervising station within 4 minutes of detecting the fault.</li> </ul> </li> <li>3. Disconnect the secondary telephone line and connect the primary telephone line. <ul style="list-style-type: none"> <li>• Verify that the control unit indicates a DACT trouble message.</li> <li>• Verify that the DACT transmits the trouble signal to the supervising station within 4 minutes of detecting the fault.</li> </ul> </li> </ol>
	Semiannual	Same as initial and reacceptance testing.

# System trouble and maintenance log

## 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](http://www.nfpa.org)).

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

# Chapter 7

# Service and troubleshooting

## Summary

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

## Content

System repairs	158	3-MODCOM(P) Modem Communicator module troubleshooting	174
Precautions	158	4-MIC paging microphone troubleshooting	176
Removing or replacing circuit board modules	158	4-FT fire fighter telephone troubleshooting	177
Handling static sensitive circuit board modules	158	Pseudo points	177
Hardware problems	159	Understanding Signature data loops	178
Substituting hardware	159	Operation	178
Adding hardware	159	Signature data loop troubleshooting basics	179
Hardware troubleshooting	159	Substituting Signature Series devices	183
3-PPS/M / 4-PPS/M Power Supply troubleshooting	159	Substituting Signature loop controller modules	187
EST4 node troubleshooting	160	Substituting Signature Series devices on a nonmapping loop	187
Fiber optics network troubleshooting	170	Signature loop controller troubleshooting	187
CAT5 and twisted-pair network troubleshooting	171	Signature device troubleshooting	188
4-24L series control-display modules troubleshooting	171	Module LED indicators	188
3-ZAx zoned amplifier modules troubleshooting	172	Common causes of Signature Series module and device problems	189
3-OPS Off-Premises Signal module troubleshooting	172	Signature mapping diagnostics	189
3-IDC8/4 Initiating Device Circuit module troubleshooting	173	Uploading Signature diagnostics from the control unit	191

# System repairs

The EST4 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 55: Recommended spares list**

Minimum of 1 each or 10% of the quantity installed	Minimum of 3 each or 10% of the quantity installed
<ul style="list-style-type: none"> <li>• Power supply</li> <li>• Option cards</li> <li>• Amplifiers (if no backup installed in system)</li> <li>• Printer ribbon</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor modules</li> <li>• Control modules</li> <li>• Heat detectors</li> <li>• Photoelectric smoke detectors</li> <li>• Detector base</li> <li>• Breakglass replacement for pull stations</li> <li>• Breakglass replacement for warden stations</li> <li>• Horn, bell, strobe, and speaker</li> </ul>

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 unit. 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.

### Handling static sensitive circuit board modules

Many of the control unit 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  $1 \text{ M}\Omega$  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.

## 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 control unit's CPU automatically configures the firmware, bootstrap, and configuration database of replaced 3-SxDC1, 3-MODCOM(P), 4-ANNAUDTEL, 4-AUDTELS, and control display modules. No download from the 4-CU is required.

The following is a guideline for substitutions and replacements.

- A chassis rail module must be replaced with the same model number module.
- A UI frame assembly control-display module must be replaced with the same module number control-display module.
- 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 4-CU, revised copies of the database must then be downloaded to the control unit.

## Hardware troubleshooting

### 3-PPS/M / 4-PPS/M 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 control unit to the PC running the 4-CU and perform a power supply diagnostics check. Refer to the *4-CU Help* for details on using diagnostics tools.

**Table 56: Voltage specifications**

<b>Test Point</b>	<b>Voltage</b>
Output ratings	
Special applications	
Total	24 VDC at 7.0 A (internal and auxiliary outputs)
Internal DC	24 VDC at 7.0 A max.
Auxiliary DC	Two 24 VDC at 3.5 A max.
	Power-limited and supervised for ground faults and shorts
	For special applications, see the panel compatibility list
Regulated applications	
Total	24 VDC at 4.5 A (internal and auxiliary outputs)
Auxiliary DC	Two: one 24 VDC at 3.5 A maximum for all circuits except the regulated NAC; one 24 VDC at 1.0 A max. for regulated NACs to 3-IDC8/4 modules only
	Power-limited and supervised for ground faults and shorts
Input AC voltage	
3-PPS/M	120 VAC, +10%, -15%, 4.0 A, 50 to 60 Hz 230 VAC, +10%, -15%, 1.5 A, 50 to 60 Hz (-230 only)
4-PPS/M	120 to 240 VAC, +10%, -15%, 3.0 A, 50 to 60 Hz
Battery charging	
Current	10 to <30 Ah (1.5 A) or 30 to 65 Ah (3.0 A)
Type	Temperature compensated dual rate

**Table 57: Power Supply troubleshooting**

<b>Problem</b>	<b>Possible cause</b>
Auxiliary voltage low	There is an excessive load
Batteries will not charge	<ul style="list-style-type: none"> <li>• The system is in alarm mode</li> <li>• The NAC/AUX outputs on the power supply are configured for AUX and are loaded with more than 7.0 A</li> <li>• The wrong battery type is configured in the 4-CU</li> <li>• The battery is shorted</li> <li>• The battery is not wired correctly to the 3-PPS/M / 4-PPS/M</li> </ul>
System will not operate on batteries	<ul style="list-style-type: none"> <li>• The battery voltage is low</li> <li>• The batteries were connected before AC power was energized</li> <li>• The batteries are defective</li> </ul>

## EST4 node troubleshooting

EST4 provides the following node types:

- 4-CPU Central Processor Module
- 4-ANNCPU Announcer Central Processor Module
- 4-NET-AD Network Adder Module
- 4-FWAL
- x Firewall Module
  - 4-CPUGRPH Graphic Announcer Central Processor Module
  - 4-ASDCPU Aspirating Smoke Detector Central Processor Module

## 4-CPU Central Processor Module troubleshooting

The 4-CPU is a node module that processes all information from modules installed in the same cabinet and from other nodes in the life safety network.

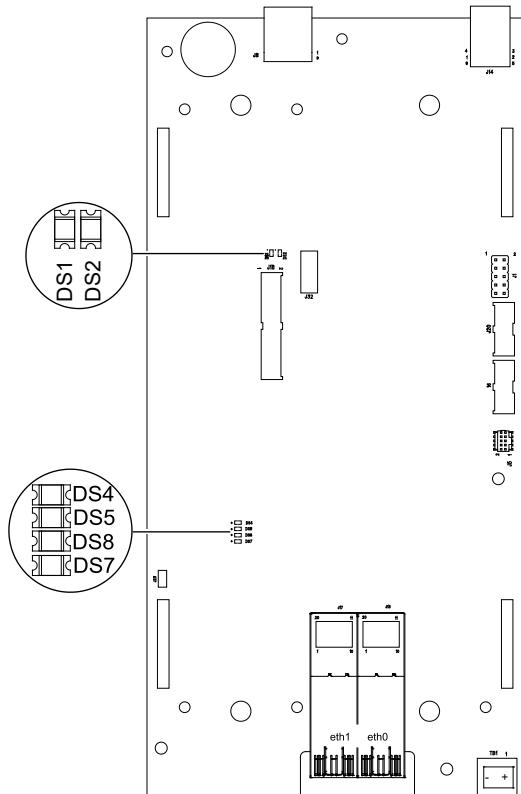
The 4-CPU module incorporates:

- One USB 3.0, Type A connector to connect supported USB devices (5 VDC)
- One USB 3.0, Type B connector device port (usb0) to connect to a PC
- Two SFP (small form-factor pluggable) network adapter connectors (eth0, eth1)
- A network backup power connection for a 24 VDC battery source, to maintain network and audio communication in the event that the control unit needs to be powered down for service.
- Several LEDs that indicate activity on a communication path. See Figure 46 below for the LED locations on the module and Table 58 below for LED descriptions.

EST4 network node count: 1

For more information, see *4-CPU Central Processor Module Installation Sheet* (P/N 3102258).

**Figure 46: 4-CPU LEDs**



**Table 58: 4-CPU LED descriptions**

LED	State	Descriptions
DS1	ON - blinking	Rail communications transmit activity
DS2	ON - blinking	Rail communications receive activity
DS4	ON – blinking [1]	eth0 (J15, Figure 46 above) Network communications activity
DS5	ON – solid [2]	eth0 (J15, Figure 46 above) Network link established

LED	State	Descriptions
DS7	ON – blinking [1]	eth1 (J17, Figure 46 on page 161) Network communications activity
DS8	ON – solid [2]	eth1 (J17, Figure 46 on page 161) Network link established

[1] LED indicates activity between the 4-CPU and the SFP, not the field wiring even if the remote connection has been removed or has failed.

[2] LED indicates the link between the 4-CPU and the SFP, not field wiring even if remote connection has been removed or has failed.

**Table 59: 4-CPU troubleshooting**

Problem	Possible cause
LEDs DS1 or DS2 is off	<ul style="list-style-type: none"> <li>CPU is not firmly seated on the chassis rail</li> <li>CPU failure</li> </ul>
LEDs DS4 and DS5 or DS7 and DS8, individually or pairs, are off	<ul style="list-style-type: none"> <li>SFP controller connection to J15 or J17 is loose</li> <li>Loop was not properly terminated</li> <li>Improper wire used</li> <li>Ground fault has been detected</li> </ul>
4-USBHUB connected peripheral RS-232 device is inoperative	<ul style="list-style-type: none"> <li>4-USBHUB connection to J8 is loose</li> <li>Peripheral device is off-line or improperly configured</li> </ul>
Data or audio communication is inoperative	<ul style="list-style-type: none"> <li>SFP controller connection to J15 or J17 is loose</li> <li>Improper wire used</li> </ul>
Network connection between nodes in the same cabinet is not working	<p>Reinitialize the system to reboot all nodes in the cabinet (see “Rebooting the life safety system” on page 55).</p> <p>See “Installing a node module in an existing network” on page 87.</p>
Not sure which node in the system generated a Communication fault or an Incompatibility fault	In order to ensure that network troubles are communicated to all the nodes, a Network Trouble event is generated when a node experiences either a Communication fault or and Incompatibility fault. To be able to determine which node generated the fault, look at the details report of the event.
LCD display module user interface is inoperative, and the power LED is off	<ul style="list-style-type: none"> <li>Flex cable between the LCD display module and CPU is loose or defective</li> <li>CPU is defective</li> <li>LCD display module is defective</li> <li>CPU is not configured in the 4-CU for the LCD display module</li> <li>No power to the control unit</li> </ul>
Network query from 4-CU cannot access new node installed in an existing network	Port on the existing node to which the new node is physically connected was not activated in the 4-CU and the project downloaded before trying to query the new node. See “Installing a node module in an existing network” on page 87.

#### 4-ANNCPU Announcer Central Processor Module troubleshooting

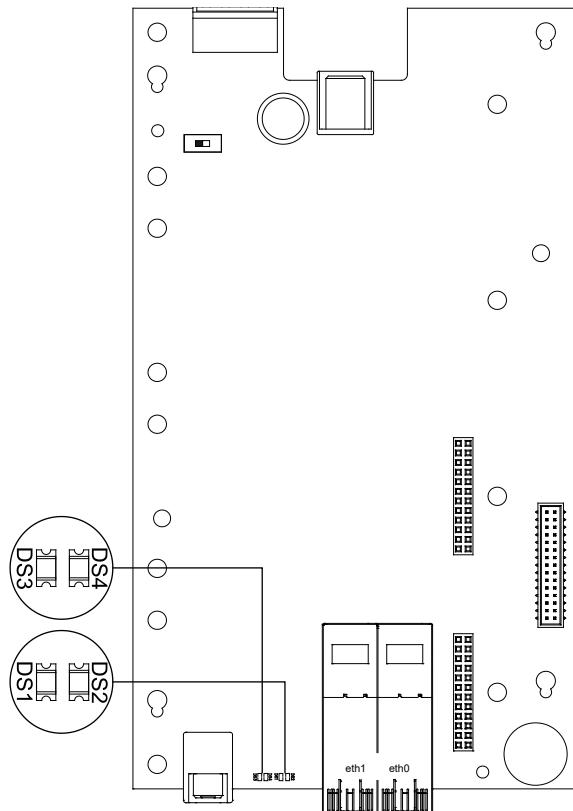
The 4-ANNCPU is an annunciator node module that provides user interface and audio capability.

The 4-ANNCPU module incorporates:

- One USB 3.0, Type A connector to connect supported USB devices (5 VDC)
- One USB 3.0, Type B connector device port (usb0) to connect to a PC
- Two SFP (small form-factor pluggable) network adapter connectors (eth0, eth1)

EST4 network node count: 1

For more information about the 4-ANNCPU, see *4-ANNCPU Announcer Central Processor Module Installation Sheet* (P/N 3102264).

**Figure 47: 4-ANNCPU LEDs****Table 60: 4-ANNCPU LED descriptions**

LED	State	Descriptions
DS1	ON – blinking	eth0 Network communications activity
DS2	ON – solid	eth0 Network link established
DS3	ON – blinking	eth1 Network communications activity
DS4	ON – solid	eth1 Network link established

**Table 61: 4-ANNCPU troubleshooting**

Problem	Possible cause
LEDs DS1 and DS2 or DS3 and DS4, individually or pairs, are off	<ul style="list-style-type: none"> <li>SFP controller connection is loose</li> <li>Loop was not properly terminated</li> <li>Improper wire used</li> <li>Ground fault has been detected</li> </ul>
4-USBUHUB connected peripheral RS-232 device is inoperative	<ul style="list-style-type: none"> <li>4-USBUHUB connection to J8 is loose</li> <li>Peripheral device is off-line or improperly configured</li> <li>Lack of continuity on the network wiring</li> </ul>
Data or audio communication is inoperative	<ul style="list-style-type: none"> <li>SFP controller connection is loose</li> <li>Improper wire used</li> </ul>
Network connection between nodes in the same cabinet is not working	<p>Reinitialize the system to reboot all nodes in the cabinet (see “Rebooting the life safety system” on page 55).</p> <p>See “Installing a node module in an existing network” on page 87.</p>

Problem	Possible cause
Not sure which node in the system generated a Communication fault or an Incompatibility fault	In order to ensure that network troubles are communicated to all the nodes, a Network Trouble event is generated when a node experiences either a Communication fault or and Incompatibility fault. To be able to determine which node generated the fault, look at the details report of the event.
Redundant 24 VDC power is inoperative	When a 4-ANNCPU is installed in an annunciator cabinet, switch S2 is not positioned to OFF
LCD display module user interface is inoperative, and the power LED is off	<ul style="list-style-type: none"> <li>• Flex cable between the LCD display module and 4-ANNCPU is loose or defective</li> <li>• 4-ANNCPU is defective</li> <li>• LCD display module is defective</li> <li>• 4-ANNCPU is not configured in the 4-CU for the LCD display module</li> <li>• No power to the control unit</li> </ul>
Network query from 4-CU cannot access new node installed in an existing network	Port on the existing node to which the new node is physically connected was not activated in the 4-CU and the project downloaded before trying to query the new node. See “Installing a node module in an existing network” on page 87.

#### 4-NET-AD Network Adder Module troubleshooting

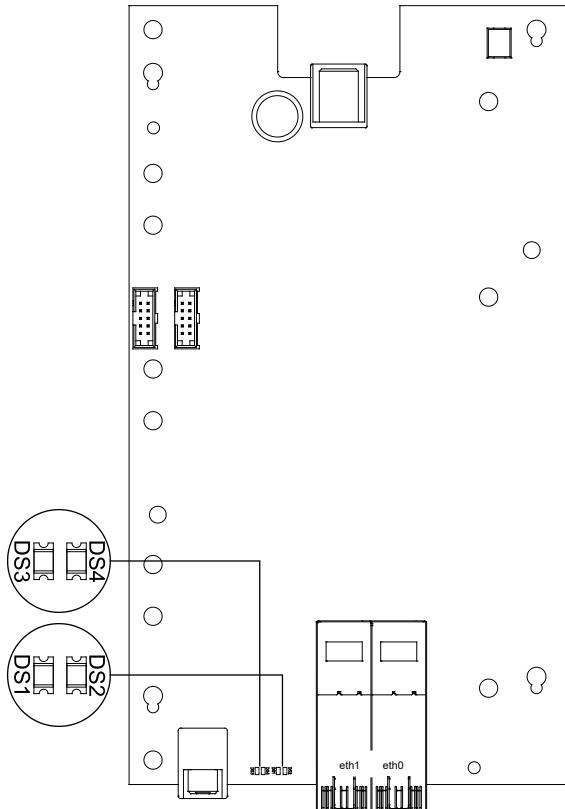
The 4-NET-AD Network Adder Module provides additional 4-NET series SFP network connections. Using the 4-NET-AD in an enclosure allows two additional network interconnections. A single enclosure can support a maximum of six network interconnections.

The 4-NET-AD module incorporates:

- One USB 3.0, Type A connector
- One USB 3.0, Type B connector
- Two SFP (small form-factor pluggable) network adapter connectors

EST4 network node count: 1

For more information about the 4-NET-AD, see *4-NET-AD Network Adder Module Installation Sheet* (P/N 3102287).

**Figure 48: 4-NET-AD LEDs****Table 62: 4-NET-AD LED descriptions**

LED	State	Descriptions
DS1	ON – blinking	eth0 Network communications activity
DS2	ON – solid	eth0 Network link established
DS3	ON – blinking	eth1 Network communications activity
DS4	ON – solid	eth1 Network link established

**Table 63: 4-NET-AD troubleshooting**

Problem	Possible cause
LEDs DS1 and DS2 or DS3 and DS4, individually or pairs, are off	<ul style="list-style-type: none"> <li>SFP controller connection is loose</li> <li>Improper wire used</li> <li>Ground fault has been detected</li> </ul>
Data or audio communication is inoperative	<ul style="list-style-type: none"> <li>SFP controller connection is loose</li> <li>Improper wire used</li> </ul>
Network connection between nodes in the same cabinet is not working	<p>Reinitialize the system to reboot all nodes in the cabinet (see “Rebooting the life safety system” on page 55).</p> <p>See “Installing a node module in an existing network” on page 87.</p>
Not sure which node in the system generated a Communication fault or an Incompatibility fault	In order to ensure that network troubles are communicated to all the nodes, a Network Trouble event is generated when a node experiences either a Communication fault or an Incompatibility fault. To be able to determine which node generated the fault, look at the details report of the event.

Problem	Possible cause
Network query from 4-CU cannot access new node installed in an existing network	Port on the existing node to which the new node is physically connected was not activated in the 4-CU and the project downloaded before trying to query the new node. See "Installing a node module in an existing network" on page 87.

#### 4-FWAL1/2/3/4 Firewall Module troubleshooting

The 4-FWAL series firewall modules block unauthorized access to the EST4 life safety network, while permitting outward communication.

The 4-FWAL series modules provide:

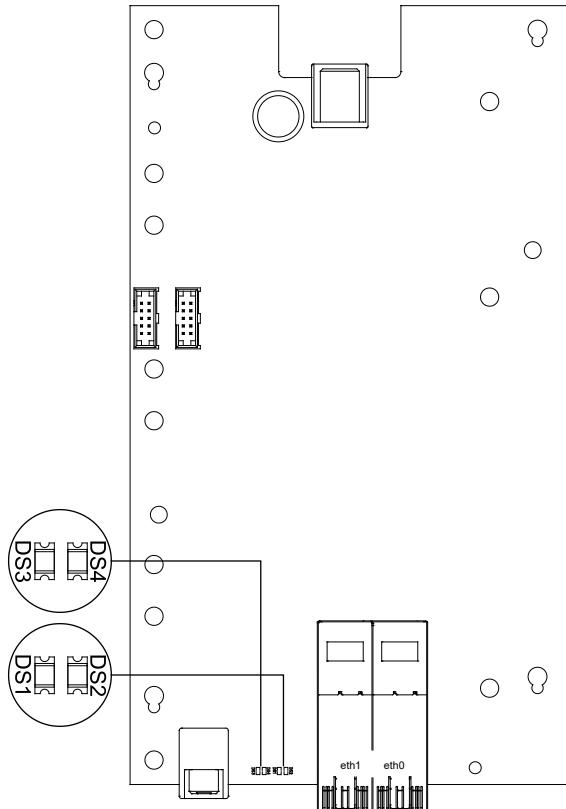
- One USB host port
- One USB device port
- Connections for two SFP (small form-factor pluggable) network adapters

EST4 network node count: 1

**Note:** The following options are preferred for Internet connection to a 4-FWALx configured to run the ACS Service:

1. Use a wired connection from the 4-FWALx to a router as opposed to an unmanaged switch. Routers ensure that clients receive network traffic intended just for them.
2. It is not recommended to use a switch, but if a managed switch is used, configure the port used for the 4-FWALx to be isolated so traffic from/to other clients is not sent to the 4-FWALx.
3. To isolate network traffic, set up a VLAN dedicated to the 4-FWALx configured to run the ACS Service.

For more information about the 4-FWAL1/2/3/4, see *4-FWAL Series Firewall Module Installation Sheet* (P/N 3102280).

**Figure 49: 4-FWAL1/2/3/4 LEDs****Table 64: 4-FWAL1/2/3/4 LED descriptions**

LED	State	Descriptions
DS1	ON – blinking	eth0 Network communications activity
DS2	ON – solid	eth0 Network link established
DS3	ON – blinking	eth1 Network communications activity
DS4	ON – solid	eth1 Network link established

**Table 65: 4-FWAL1/2/3/4 troubleshooting**

Problem	Possible cause
LEDs DS1 and DS2 or DS3 and DS4, individually or pairs, are off	<ul style="list-style-type: none"> <li>SFP controller connection is loose</li> <li>Improper wire used</li> <li>Ground fault has been detected</li> </ul>
Data or audio communication is inoperative	<ul style="list-style-type: none"> <li>SFP controller connection is loose</li> <li>Improper wire used</li> </ul>
Network connection between nodes in the same cabinet is not working	<p>Reinitialize the system to reboot all nodes in the cabinet (see “Rebooting the life safety system” on page 55).</p> <p>See “Installing a node module in an existing network” on page 87.</p>
Not sure which node in the system generated a Communication fault or an Incompatibility fault	In order to ensure that network troubles are communicated to all the nodes, a Network Trouble event is generated when a node experiences either a Communication fault or an Incompatibility fault. To be able to determine which node generated the fault, look at the details report of the event.

Problem	Possible cause
Control unit reported a communication service trouble	The configured DHCP address changed (i.e., the network configuration updated) before the lease expired. Unplugging and plugging in an SFP for an interface configured for DHCP on an FWAL will result in a new DHCP request from the FWAL or rebooting the node will trigger a request for a new IP address.
Network query from 4-CU cannot access new node installed in an existing network	Port on the existing node to which the new node is physically connected was not activated in the 4-CU and the project downloaded before trying to query the new node. See "Installing a node module in an existing network" on page 87.
Communication service interface is not working	When both 4-FWAL Ethernet ports are enabled, they must be connected to different subnets/DHCP servers and, if auto-addressing is used, the ports must be connected to different DHCP servers.  Also, it is possible the configured DHCP address changed before the lease expired. Unplugging and plugging in an SFP for an interface configured for DHCP on an FWAL will result in a new DHCP request from the FWAL or rebooting the node will trigger a request for the new IP address.
4-FWAL operation fails when both Ethernet ports are used	When both 4-FWAL Ethernet ports are enabled, they must be connected to different subnets/DHCP servers and, if auto-addressing is used, the ports must be connected to different DHCP servers.

#### 4-CPUGRPH Graphic Annunciator Central Processor Module troubleshooting

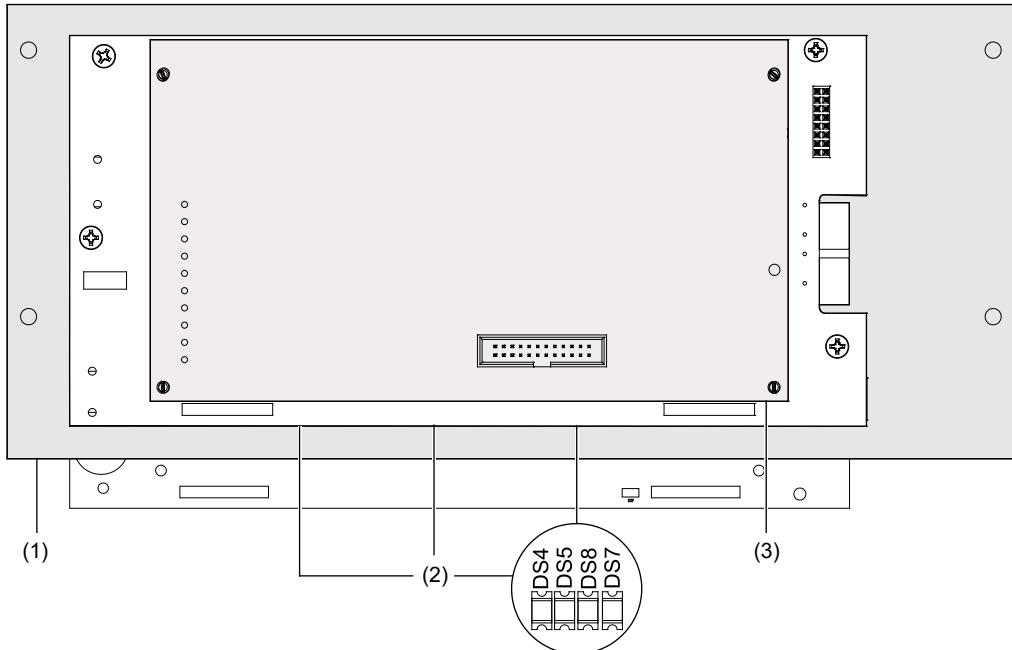
The 4-CPUGRPH is a node that provides an interface to a graphical annunciator.

The 4-CPUGRPH module incorporates:

- One USB 3.0, Type A connector
- One USB 3.0, Type B connector
- Two SFP (small form-factor pluggable) network adapter connectors
- Network backup power connection: In the event that the panel needs to be powered down for service, a 24 VDC battery source can be connected to TB1 to maintain network and audio communications during the servicing.

EST4 network node count: 1

For more information about the 4-CPUGRPH, see *4-CPUGRPH Graphic Annunciator Central Processor Module* (P/N 3102346).

**Figure 50: 4-CPUGRPH LEDs**

- (1) Mounting plate
- (2) CPU (DS4, DS5, DS7, and DS8 LEDs are located on the back of the CPU card)
- (3) Graphic interface card

**Table 66: 4-CPUGRPH LED descriptions**

LED	State	Descriptions
DS4	ON – blinking	eth0 Network communications activity
DS5	ON – solid	eth0 Network link established
DS7	ON – blinking	eth1 Network communications activity
DS8	ON – solid	eth1 Network link established

**Table 67: 4-CPUGRPH troubleshooting**

Problem	Possible cause
LEDs DS4 and DS5 or DS7 and DS8, individually or pairs, are off	<ul style="list-style-type: none"> <li>• SFP controller connection is loose</li> <li>• Improper wire was used</li> <li>• Ground fault has been detected</li> </ul>
Data or audio communication is inoperative	<ul style="list-style-type: none"> <li>• SFP controller connection is loose</li> <li>• Improper wire used</li> </ul>
Not communicating with graphic annunciator	Ribbon cable connection is loose at connector from the graphic interface card to the 3-EVPWR(A)

### Network data riser

Network wiring originates from eth0 and eth1 network SFP connections on the EST4 nodes. Network wiring connections to other nodes can be made between eth0 and eth0 or between eth 0 and eth1. To function properly, the SFP eth port must be enabled using the 4-CU.

The data network riser is isolated at each node. This prevents a shorted data loop from interrupting communication on the entire loop.

When trying to isolate trouble on a data network riser, remember that both shorted and open network segments will interrupt communication between two nodes. In this case, the EST4 life safety network will reconfigure and operate as two independent sub-networks.

#### **4-ASDCPU Aspirating Smoke Detector Central Processor Module troubleshooting**

The 4-ASDCPU Aspirating Smoke Detector CPU module supports EST4 control unit communication to VESDA and ModuLaser aspirating smoke detectors.

The 4-ASDCPU module provides:

- One USB Type A host port (usb1) – Only used in a VESDA integration to connect to a 4-USBHUB that is wired to an FW-HSSX1 high level interface (HLI) device.
- One USB Type B device port (usb0) – Used to receive 24 VDC power from the 4-CPU, 4-ANNCPU, or 4-NET-AD module.
- Two Ethernet network SFP connections – In a ModuLaser integration, eth0 always connects to the first Command Display module (lowest address of two command modules) and eth1 connects to a second Command Display module.

EST4 network node count: 1

For more information about the 4-ASDCPU, see *4-ASDCPU Aspirating Smoke Detector CPU Module Installation Sheet* (P/N 3102880). For more information about VESDA applications, see *EST4 VESDA Application Guide* (P/N 3102883). For more information about ModuLaser applications, see *EST4 ModuLaser Application Guide* (P/N 3102967).

**Table 68: 4-ASDCPU troubleshooting**

Problem	Possible cause
Control unit reported a communication service trouble	VESDA network: <ul style="list-style-type: none"> <li>• The FW-HSSX1 is disconnected from the 4-USBHUB RS232 port. Check the connections and ensure the FW-HSSX1 is properly powered up.</li> <li>• The VESDAnet is configured for Class A/DCLA wiring and there is a break in that RS485 communication loop.</li> </ul> ModuLaser SenseNET network: <ul style="list-style-type: none"> <li>• The Ethernet connection to the ModuLaser Command Display module is disconnected. Check the connection.</li> </ul>
Control unit reported a communication fault	Occurs when any ModuLaser module is powered down or not on line.

#### **Fiber optics network troubleshooting**

The 4-NET series fiber-optic SFP network controllers and 4-FWAL series fiber-optics SFP network adapters provide IPv6 fiber, Class A/DCLA, Class B/DCLB, or Class X/DCLC and mesh networking topologies. The controllers mount in one of two available SFP slots in an EST4 CPU node.

LEDs on the 4-CPU module indicate activity on the fiber communication path. See Figure 46 on page 161 for the LED locations on the module and Table 58 on page 161 for LED descriptions.

**Note:** If a control unit 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.

For more information, see *4-NET Series Fiber Optics SFP Network Controllers Installation Sheet* (3102271).

**Table 69: EST4 fiber-optics SFP network controllers**

Model	Description
4-NET-SM	SFP network media interface, dual filament, single-mode fiber-optic, with a 9/125 $\mu$ (G.652) fiber pair up to 8.7 miles (14 km).
4-NET-MM	SFP network media interface, multi-mode fiber-optic, with a 50/125 $\mu$ (OM3/OM4) fiber pair up to 1.24 mi. (2 km), 62.5/125 $\mu$ (OM1) fiber pair up to 0.62 mi. (1 km), or a 100/140 $\mu$ fiber pair up to 150 m.
4-NET-SMH	SFP network media interface, dual filament, single-mode fiber-optic, high-power output, with a 9/125 $\mu$ (G.652) fiber pair up to 24.8 mi (40 km).
4-NET-SMU	SFP network media interface, single filament, single-mode fiber-optic with a 9/125 $\mu$ (G.652) fiber up to 6.2 miles (10 km). The 4-NET-SMU must be paired with a 4-NET-SMD.
4-NET-SMD	SFP network media interface, single filament, single-mode fiber-optic with a 9/125 $\mu$ (G.652) fiber up to 6.2 miles (10 km). The 4-NET-SMD must be paired with a 4-NET-SMU.
4-FWAL-SM	SFP network media interface, single-mode fiber-optic, with a 9/125 $\mu$ (G.652) fiber pair up to 8.7 miles (14 km).
4-FWAL-MM	SFP network media interface, multi-mode fiber-optic, with a 50/125 $\mu$ (OM3/OM4) fiber pair up to 1.24 mi. (2 km), 62.5/125 $\mu$ (OM1) fiber pair up to 0.62 mi. (1 km), or a 100/140 $\mu$ fiber pair up to 150 m.
4-FWAL-SMH	SFP network media interface, single-mode fiber-optic, high-power output, with a 9/125 $\mu$ (G.652) fiber pair up to 24.8 mi (40 km).
4-FWAL-SMU	SFP network media interface, bi-directional, single-mode fiber-optic with a 9/125 $\mu$ (G.652) fiber up to 6.2 miles (10 km). The 4-FWAL-SMU must be paired with a 4-FWAL-SMD.
4-FWAL-SMD	SFP network media interface, bi-directional, single-mode fiber-optic with a 9/125 $\mu$ (G.652) fiber up to 6.2 miles (10 km). The 4-FWAL-SMD must be paired with a 4-FWAL-SMU.

## CAT5 and twisted-pair network troubleshooting

The 4-NET-CAT and 4-NET-TP(-HC) twisted pair SFP network controllers provide IPv6 copper, Class A/DCLA, Class B/DCLB, or Class X/DCLC and mesh networking topologies. The controllers mount in one SFP slot in an EST4 CPU.

LEDs on the 4-CPU module indicate activity on the communication path. See Figure 46 on page 161 for the LED locations on the module and Table 58 on page 161 for LED descriptions.

**Note:** If a control unit must be powered down for service, connect a backup power source to the 24 VDC terminals (TB1) on the 4-CPU electronics card to maintain network communication.

For more information about the 4-NET-CAT, see *4-NET-CAT 100 Mbps SFP Network Controller Installation Sheet* (3102270).

For more information about the 4-NET-TP or 4-NET-TP-HC, see *4-NET-TP(-HC) Twisted Pair SFP Network Controller Installation Sheet* (3102270).

## 4-24L series control-display modules troubleshooting

The 4-24L series control-display modules mount on the UI frame assemblies attached to the inner door.

Performing a lamp test will quickly isolate hardware problems from programming problems with any control-display module. See “Performing a lamp test” on page 66.

**Table 70: Control-display module troubleshooting**

<b>Problem</b>	<b>Possible cause</b>
The indicators and buttons are inoperative	<ul style="list-style-type: none"> <li>• There is no power to the control unit</li> <li>• The control-display module is not properly seated on the UI frame assembly</li> <li>• The control-display module is defective</li> <li>• The control-display module is not defined in the 4-CU</li> </ul>
The indicators respond incorrectly	<ul style="list-style-type: none"> <li>• The control-display or indicator is not defined in the 4-CU</li> <li>• A rule governing indicator operation is not correctly written</li> </ul>
A button does not perform the expected function	<ul style="list-style-type: none"> <li>• The control-display or button is not defined in the 4-CU</li> <li>• A rule governing button operation is not correctly written</li> </ul>

## 3-ZAxx zoned amplifier modules troubleshooting

**Table 71: 3-ZAxx Zoned Audio Amplifier module troubleshooting**

<b>Problem</b>	<b>Possible cause</b>
The audio output level is too low	<ul style="list-style-type: none"> <li>• A jumper is set for 25 VRMS but connection is to a 70 VRMS circuit</li> <li>• The gain is set too low</li> </ul>
There is no audio output or is extremely low	<ul style="list-style-type: none"> <li>• An open fuse needs replaced (not field replaceable)</li> <li>• The gain is set too low</li> <li>• The prerecorded message/tone is too low</li> <li>• There is an incorrect channel activation</li> </ul>
The audio output level is too high	<ul style="list-style-type: none"> <li>• A jumper is set for 70 VRMS but connection is to a 25 VRMS circuit</li> <li>• The gain is set too high</li> </ul>
The amplifier current is limiting	<ul style="list-style-type: none"> <li>• The audio circuit overloaded</li> <li>• The input level to the 4-MIC is too high</li> </ul>
An incorrect amplifier version is reported by the CPU	<ul style="list-style-type: none"> <li>• The jumpers are installed incorrectly</li> <li>• An incorrect model amplifier installed</li> </ul>

## 3-OPS Off-Premises Signal module troubleshooting

**Table 72: 3-OPS Off-Premises Signal module troubleshooting**

<b>Problem</b>	<b>Possible cause</b>
The module is in trouble state	<ul style="list-style-type: none"> <li>• The master box circuit is open or not reset</li> <li>• The reverse polarity circuit is open</li> <li>• A 3.6 kΩ EOL resistor is not installed on unused circuits</li> </ul>
The remote receiver indicates a loop trouble and does not receive an alarm	<ul style="list-style-type: none"> <li>• The circuit polarity is reversed</li> <li>• A circuit is open</li> <li>• There is excessive circuit resistance</li> <li>• A receiver is incompatible</li> <li>• The module is defective</li> </ul>

Problem	Possible cause
The remote receiver does not indicate a loop trouble and does not receive an alarm	<ul style="list-style-type: none"> <li>• The module is not defined in the 4-CU</li> <li>• A receiver is incompatible</li> <li>• The module is defective</li> </ul>

## 3-IDC8/4 Initiating Device Circuit module troubleshooting

Table 73: 3-IDC8/4 Initiating Device Circuit module troubleshooting

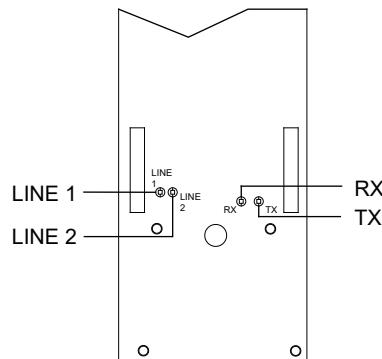
Problem	Possible cause
The module is in trouble state	<ul style="list-style-type: none"> <li>• A 4.7 kΩ EOL resistor is not installed on unused IDC circuits</li> <li>• A 15 kΩ EOL resistor is not installed on unused NAC circuits</li> <li>• There is no communication with the CPU module</li> <li>• The module is not defined in the 4-CU</li> <li>• The field wiring connector is not plugged into the module</li> </ul>
NAC output is not working	<ul style="list-style-type: none"> <li>• The jumpers are installed incorrectly</li> <li>• An external source is configured but not connected</li> <li>• The circuit is overloaded</li> <li>• The circuit is silenced</li> <li>• The circuit is shorted</li> <li>• A polarized device is defective or reversed on the circuit</li> <li>• Output was not programmed</li> </ul>
The IDC circuit is not working	<ul style="list-style-type: none"> <li>• There is an incompatible two-wire smoke detectors</li> <li>• There is excessive wiring resistance or capacitance</li> <li>• There is an open circuit on the line</li> </ul>

## 3-MODCOM(P) Modem Communicator module troubleshooting

### LED indicator diagnostics

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

**Figure 51: 3-MODCOM(P) 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 74: 3-MODCOM(P) 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 4-CU	
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(P), 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 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.

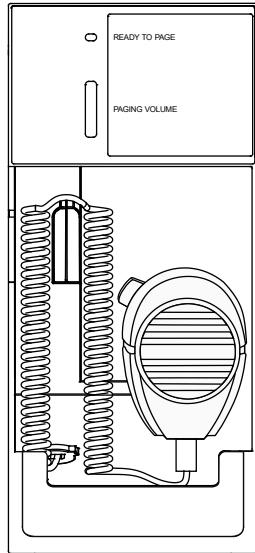
If the receiver sends the correct handshake and the 3-MODCOM(P) transmits data but the receiver does not send an acknowledgement, check that the receiver is compatible with the desired protocol. (SIA DCS standard is available from the Security Industry Association). Typical problems involve an incompatible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

If the handshake and acknowledge signals are audible, check that the correct account number was configured in the 3-MODCOM(P) and the code being sent was correctly programmed in the CMS computer.

Where a 3-MODCOM(P) module is suspected of being faulty, try substituting a known good one that has been properly programmed.

## 4-MIC paging microphone troubleshooting

**Figure 52:4-MIC**



**Table 75: 4-MIC troubleshooting**

Problem	Possible cause
Microphone functionality is not working	<ul style="list-style-type: none"> <li>The 4-CPU is missing the 4-AUDTELS or the 4-ANNCPU is missing the 4-ANNAUDTEL cards</li> <li>The 4-MIC is not properly seated in the UI frame assembly</li> <li>The 4-MIC is not programmed</li> <li>The 4-MIC is defective</li> </ul>
Page audio is distorted	<ul style="list-style-type: none"> <li>The operator is speaking too loud into the microphone</li> <li>The amplifier gain is set too high</li> <li>A speaker is located too close to the 4-MIC</li> </ul>

## 4-FT fire fighter telephone troubleshooting

Figure 53:4-FT

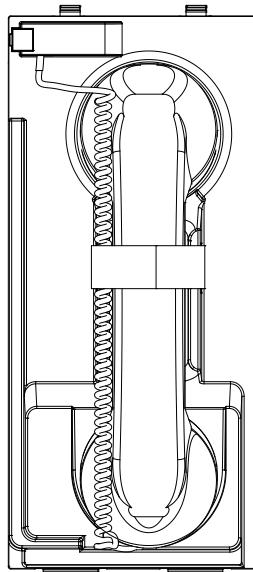


Table 76: 4-FT troubleshooting

Problem	Possible cause
Telephone functionality is not working	<ul style="list-style-type: none"> <li>• The 4-CPU is missing the 4-AUDTELS or the 4-ANNCPU is missing the 4-ANNAUDTEL cards</li> <li>• The 4-FT is not properly seated in the UI frame assembly</li> <li>• The 4-FT is not programmed</li> <li>• The 4-FT is defective</li> </ul>
Page audio is distorted	<ul style="list-style-type: none"> <li>• The operator is speaking too loud into the telephone handset</li> <li>• The amplifier gain is set too high</li> </ul>

## 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 an event message displays on the LCD screen. Viewing the event message details provides the pseudo point address.

Refer to the pseudo point tables in Appendix C “Pseudo points table” on page 223 where you can cross-reference the pseudo point address to its source and read a brief description.

**Note:** For instructions on how to view event details, see “Viewing event details” on page 57.

# 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 unit. Table 77 lists a number of Signature data loop conditions and describes the loop's operational responses.

**Table 77: Signature data loop operation**

When you:	Response
Remove a detector, and then reinstall the detector in the same base	<ul style="list-style-type: none"> <li>A system trouble displays on the LCD screen when the detector is removed. The message shows the detector's label or address.</li> <li>The system restores when the detector is reinstalled.</li> </ul>
Remove a module or pull station, and then reinstall the module/pull station in the same location	<ul style="list-style-type: none"> <li>A system trouble displays on the LCD screen when the module/pull station is removed. The message shows the device's label or address.</li> <li>The system restores when the module/pull station is reinstalled.</li> </ul>
Remove a detector, and then install a different detector of the same type in the same base	<ul style="list-style-type: none"> <li>A system trouble displays on the LCD screen when the detector is removed. The message shows the detector's label or address.</li> <li>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.</li> <li>The communication fault for the old detector remains when mapping is disabled.</li> </ul>
Remove a module or pull station, and then reinstall a different module/pull station of the same type in the same location.  <b>Note:</b> A SIGA-UM replacement module must have jumper JP1 set in the same position as the original module.	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>The communication fault for the old module remains when mapping is disabled.</li> </ul>
Remove a detector, and then reinstall a different detector type in the same base.	<ul style="list-style-type: none"> <li>A system trouble displays on the LCD screen when the detector is removed. The message shows the detector's label or address.</li> <li>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 4-CU and the database downloaded to the control unit.</li> <li>The communication fault for the old detector remains when mapping is disabled.</li> </ul>

When you:	Response
Remove a module or pull station, and then reinstall a different module/pull station type in the same location.	<ul style="list-style-type: none"> <li>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.</li> <li>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 <i>not</i> operational. A system trouble displays, indicating a device type mismatch. To clear the trouble, the new device type must be defined using the 4-CU and the database downloaded to the control unit.</li> <li>The communication fault for the old detector remains when mapping is disabled.</li> <li>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.</li> </ul>
Add a device to the configuration but do not add the physical device to the Loop.	<ul style="list-style-type: none"> <li>After configuration download an Unprogrammed device fault appears for the device that is not present.</li> <li>The actual map should be uploaded from the panel and accepted/committed and then downloaded to the panel.</li> <li>At that point, only a device communication trouble should appear until the actual device is installed. Once the device is installed, the mapping steps should be executed again.</li> </ul>

## Signature data loop troubleshooting basics

The 3-SDC1 loop controller card provides one Class B/DCLB or Class A/DCLA 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 unit processes the information.

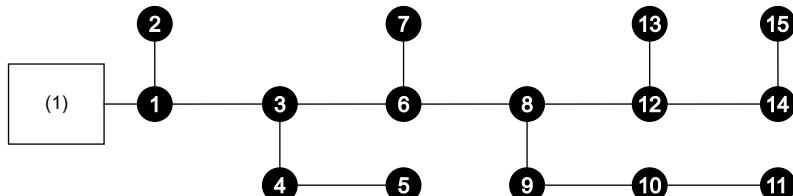
**Note:** The 3-SDC1-HC is an optional replacement card for the 3-SDC1 and should be used for installations where the signaling line circuit has more than 90 isolator modules and isolator bases (with SIGA1 sensors installed).

### 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 unit, you can easily isolate open conditions or defective devices. The loop shown in Figure 54 below will be used to illustrate basic troubleshooting techniques.

**Note:** When troubleshooting Class A/DCLA 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/DCLB loop.

Figure 54: Normal Signature data loop topology

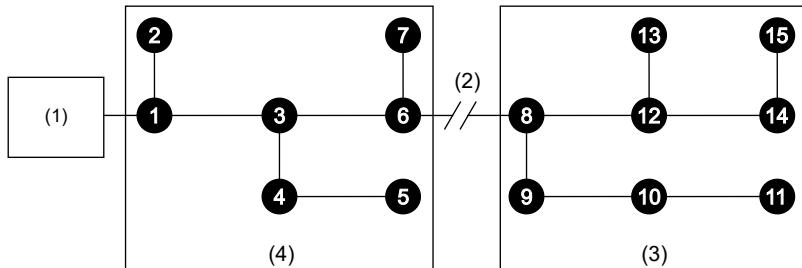


(1) Signature loop controller

## Open circuit conditions

On a loop with an open fault, the Signature modules communicate with devices up to the break. The control unit LCD screen displays a trouble condition for all devices beyond the break. Figure 55 shows devices 1 through 7 continuing to operate and devices 8 through 15 reporting device troubles.

**Figure 55: Open fault on the data loop**



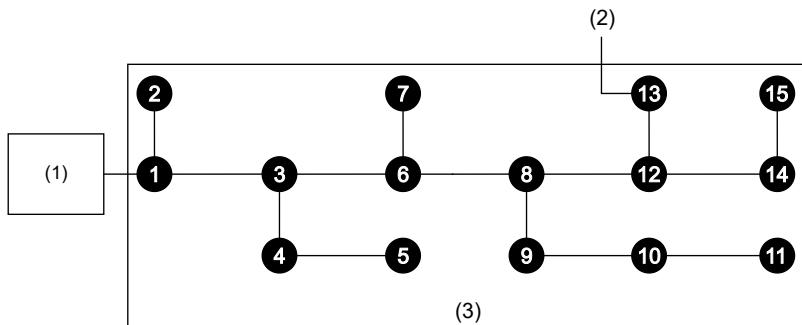
- (1) Signature loop controller
- (2) Break in the loop
- (3) Devices in trouble
- (4) Devices operating normally

In Figure 55, 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 4-CU.

## Short circuit conditions

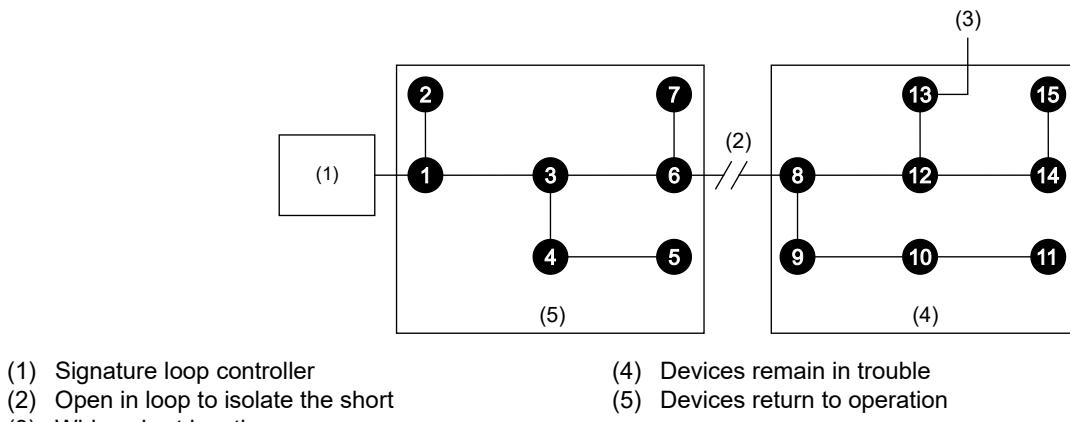
Short circuit conditions require selective isolation of portions of the loop to systematically narrow down the fault's location. A shorted circuit typically reports to the control unit a trouble condition on all devices, as shown in Figure 56.

**Figure 56: 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 57.

**Figure 57: Isolating a short on the data loop**

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.

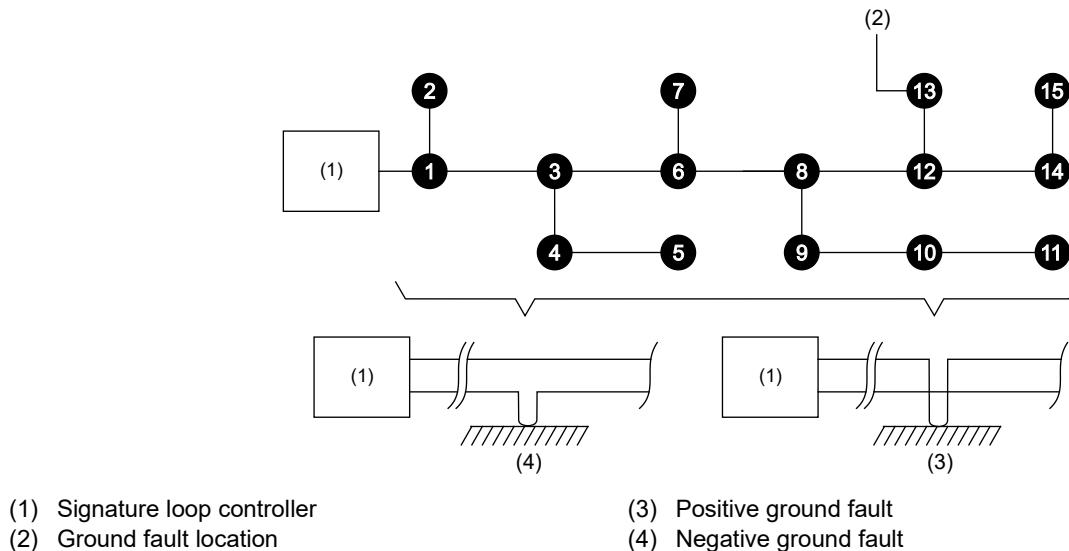
## Ground fault conditions

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  $10\text{ k}\Omega$  or less to ground) activates the Ground event queue indicator on the LCD screen. The conditions can occur on the Signature loop, the 24 VDC smoke power circuit, or the input circuits to 3-SDC1(-HC), 3-SSDC1, 3-SDDC1, 3-SSDC2, and 3-SDDC2 loop controllers. The general location of a ground fault can be determined by viewing indications and messages on the control unit user interface (see Table 78).

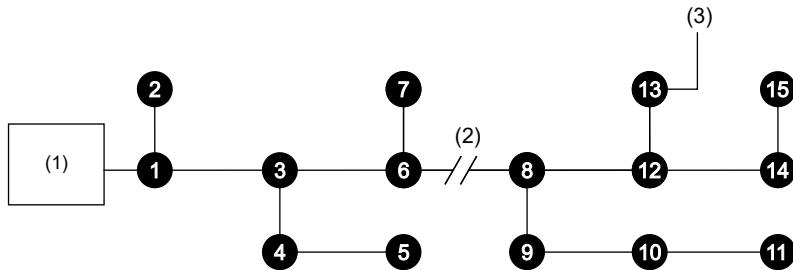
**Table 78: Ground fault indications**

Control unit user interface indications	Ground fault location
The Ground event queue indicator activates but no event message shows in the Ground Fault event list	<ul style="list-style-type: none"> <li>Loop controller circuit</li> <li>24 VDC smoke power circuit</li> </ul>
The Ground event queue indicator activates, and the event message appears in the Ground Fault event list	Positive leg of the input circuit for the device

**Figure 58: Data loop ground faults**



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 59. A similar technique is used on smoke power or module input circuits.

**Figure 59: Data loop ground fault isolation**

- (1) Signature loop controller (ground fault LED Off)
- (2) Both conductors open isolates the ground fault
- (3) Ground fault

After opening the loop, if the GND Fault event clears, 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 event cleared, 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 event remained, 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 EST4 control unit 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

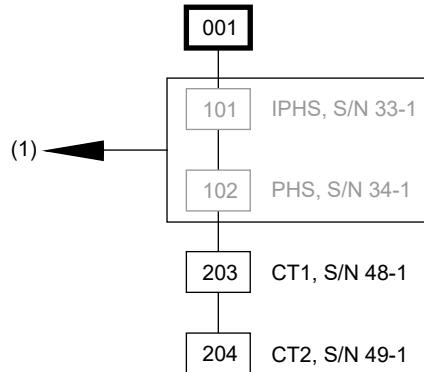
When substituting a *known good* detector or module in place of a suspect device, the following scenarios can take place.

1. With mapping enabled, 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. With mapping enabled, 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 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 control unit to restore mapping operations.

## Detectors

When one or more devices are removed from a Signature loop for servicing, as shown in Figure 60, the control unit LCD screen displays a trouble condition for each device. If the detector is removed from an isolator base, the isolator will transfer.

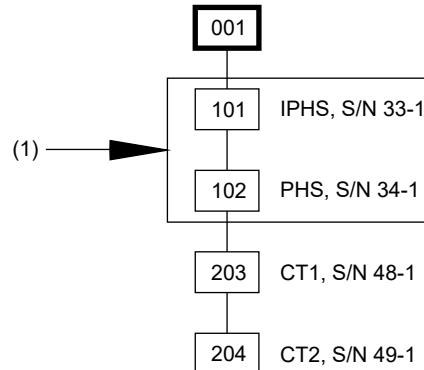
**Figure 60: Detectors removed for service**



(1) Removed detectors

If the devices are returned to their original locations, as shown in Figure 61, the map supervision function recognizes the detectors have been returned as originally installed and mapped, and no additional action is taken.

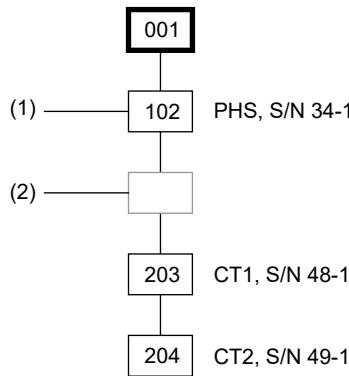
**Figure 61: Detectors returned to original location**



(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 control unit is put in the map pending state. In the map pending state, the control unit 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.

In Figure 62, 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.

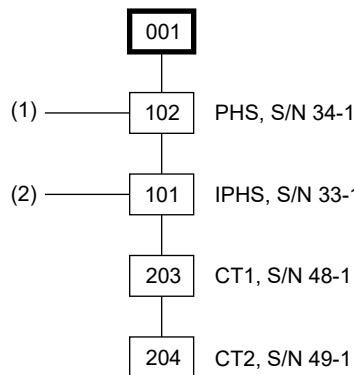
**Figure 62: One detector returned to a new location on the loop**

- (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-control unit address correlation is still valid. Figure 62, 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 control unit to respond as though the detector was still installed in its original location.

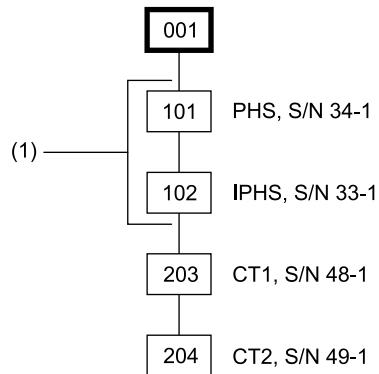
During mapping, all devices remain operational and are capable of initiating an alarm. Figure 63 below shows that both the IPHS and the PHS detectors retain their old S/N-to-control unit address correlations while the loop is mapping. Mapping activity is indicated on the control unit LCD screen.

Once mapped, the mapping supervision function automatically correlates a control unit address to a specific map location until manually changed using the CU configuration utility.

**Figure 63: 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 64 shows the map after remapping. Note that the new S/N-to-control unit 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 64: 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 control unit 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 4-CU and the database downloaded into the control unit. The map fault will then clear.
2. If a single address module is replaced with a dual address module, the control unit 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 4-CU, and then download the database into the control unit.
3. If a dual address module is replaced with a single address module, the control unit never automatically attempts to remap all devices because the control unit 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 unit LCD screen as the control unit remains in map pending mode. To clear the trouble, define the new module using the 4-CU, and then download the database into the control unit.

## 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 4-CU and the database downloaded into the control unit.

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 4-CU. 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 4-CU. 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 4-CU 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 4-CU to reprogram its address to remove the fault.

## Signature loop controller troubleshooting

Table 79 provides a list of possible problems that may be detected by the loop controller module. For information on identifying and locating Signature SLC problems, see "Signature mapping diagnostics" on page 189.

### 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 79: Signature Series loop controller troubleshooting**

<b>Problem</b>	<b>Possible cause</b>
An open is detected on the loop	<ul style="list-style-type: none"> <li>The loop is incorrectly wired, or a connector is loose</li> <li>A detector or isolator base is defective</li> <li>A conductor is broken</li> <li>A device is not installed on the loop</li> <li>A device is not defined in the 4-CU</li> </ul>
A short is detected on the loop	<ul style="list-style-type: none"> <li>The loop is incorrectly wired (often crossed wires on a device base)</li> <li>A detector, detector base, or module is defective</li> <li>The insulation between conductors is nicked</li> </ul>
A ground fault is detected on the loop	<ul style="list-style-type: none"> <li>There is a pinched wire between the device and electrical box</li> <li>The wire insulation is nicked</li> </ul>
An internal trouble is detected on the loop	<ul style="list-style-type: none"> <li>A detector is defective or dirty</li> <li>A CO module is defective or not seated correctly</li> <li>A photo or heat sensor is reading too high or too low</li> <li>A light source is affecting a detector</li> <li>There is a short between a detector and detector base</li> <li>An isolator or relay base is defective</li> <li>Devices are drawing too much or too little current during mapping</li> </ul>
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

## 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 80: Signature Series module status LEDs**

<b>LED status</b>	<b>Device status</b>
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 4-CU 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

## Signature mapping diagnostics

The 4-CU mapping feature allows you to perform diagnostics on all devices connected to a Signature loop controller module. When mapping is turned on for the signaling line circuit, you can upload data from the SLC to the 4-CU to view device information and placement on the circuit. By using the mapping tool you can compare actual data with expected data to remove any conflicts between the configured map and the current map. See “Uploading Signature diagnostics from the control unit” on page 191 for instructions on uploading data.

Refer to Table 81 for suggested corrective actions. Refer to *4-CU Help* for details on how to identify and locate Signature module and device problems.

**Table 81: Signature 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	<ul style="list-style-type: none"> <li>• Verify that wiring is correct</li> <li>• Verify that devices are operational</li> <li>• Review 4-CU Signature Diagnostics to identify failed devices</li> <li>• Check for loose wiring connections at the devices or T-taps</li> <li>• Check for faulty device(s)</li> </ul>
While mapping a chain from a device back to the Signature loop controller, the chain was built with holes in it	<ul style="list-style-type: none"> <li>• Review 4-CU Signature Diagnostics to identify failed devices</li> <li>• Review 4-CU Signature Diagnostics to compare the serial numbers or addresses with the actual wiring to identify the conflict</li> </ul>
Map tables are inconsistent	<ul style="list-style-type: none"> <li>• Upload the current map</li> <li>• Compare the current map with the expected map</li> <li>• Write the map back to the loop controller</li> <li>• Ensure loop wiring is correct</li> </ul>

Problem	Suggested corrective action
The actual Signature data loop map does not match the expected map	<ul style="list-style-type: none"> <li>• Compare the current map with the expected map</li> <li>• Write the map back to the loop controller</li> <li>• Ensure loop wiring is correct</li> </ul>
The system continues to remap the data loop	<ul style="list-style-type: none"> <li>• An intermittent connection is causing one or more devices to lose then reestablish communication with the loop controller</li> <li>• There is a defective device or detector base</li> </ul>
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
The mapping command failed because the sensor did not draw current, or it was not possible to obtain stable mapping data from the loop	<ul style="list-style-type: none"> <li>• Check for loose wiring</li> <li>• Check for a defective device</li> </ul>
Mapping supervision detected that the supervised device's type changed (a map fault was flagged)	<ul style="list-style-type: none"> <li>• Replace the device</li> <li>• Correct the loop controller programming</li> </ul>
Mapping aborted because a short or open was detected on the loop wiring	<ul style="list-style-type: none"> <li>• Check for an open or short on a Class A/DCLA loop</li> <li>• Check for a short across the entire Class B/DCLB loop</li> <li>• A reset may restart mapping</li> </ul>
Control unit startup is not able to recreate the current map	Wait for the automatic map reconstruction to complete before continuing
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	<ul style="list-style-type: none"> <li>• Check for faulty wiring or a faulty device on the loop</li> <li>• Review 4-CU Signature Diagnostics to identify the conflict</li> </ul>
More than 125 end-of-line devices are detected on the loop	<ul style="list-style-type: none"> <li>• Correct the wiring</li> <li>• Remap the loop</li> <li>• Reduce the number of T-taps</li> </ul>
Mapping detected a difference between the device at the end-of-line and the devices in its chain	<ul style="list-style-type: none"> <li>• Review 4-CU Signature Diagnostics to identify the conflict</li> <li>• Review 4-CU Signature Diagnostics to compare the serial numbers or addresses with the actual wiring to identify the conflict</li> </ul>

## Uploading Signature diagnostics from the control unit

The control unit allows you upload data from the SLC to the 4-CU for troubleshooting devices on the circuit.

**Note:** An RNDIS driver is required for the PC port to communicate with the control unit. If necessary, install it before proceeding. Refer to the *4-CU Release Notes* for instructions on installing the RNDIS driver.

### To download the project database:

1. Connect the Type B end of a USB 2.0 cable to the J14 USB port on the 4-CPU. See Figure 5 on page 43.
2. Connect the Type A end of the cable to a standard USB port on the computer with the 4-CU.
3. From the control unit LCD screen:

On the Action bar, tap System Info.

On the Command bar, tap 1 Hour Access Code or 8 Hour Access Code to obtain a 4-CU required access code that will allow you to download to the control unit.

4. From the 4-CU:

On the Project Management tab, open the project.

On the Home tab, in the Communication group, click Enter Access Code.

Enter the Access Code, and then click Validate.

On the project tree, select the Signature loop controller, and then the SLC to be mapped.

On the Home tab, in the Communication group, click Mapping Options, and then choose Upload Signature Data from > Panel. A progress bar displays in the lower right side of the CU window during the upload.

**Note:** Refer to *4-CU Help* for details on other options on the Mapping Options list.

5. From the control unit LCD screen, when finished uploading:

On the Action bar, tap System Info.

On the Command bar, tap Cancel Access Code, to activate the Remote Write Lock command.

6. Refer to *4-CU Help* for details on using the Signature diagnostics data and reports.

# Appendix A

# System calculations

## Summary

This appendix provides instructions and worksheets for calculating wire lengths and sizing standby batteries.

## Content

Network data riser limits	194
Signature data loop wire length	194
Determine the maximum allowable branch length	194
Determining the total loop length	200
Notification appliance circuit calculations	201
Introduction	201
What you will need	201
Worksheet method	203
Equation method	204
25 or 70 VRMS NAC wire length	206
Cabinet battery	207
Battery calculations	208
Fiber optic cable worksheet	212

## 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.

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.

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 fiber modules is fast enough to be neglected in determining the maximum wire length that can be used in the data network.

For EST4 network media risers and cable specifications, see *EST4 Audio and Network Application Guide* (P/N 3102306).

## Signature data loop wire length

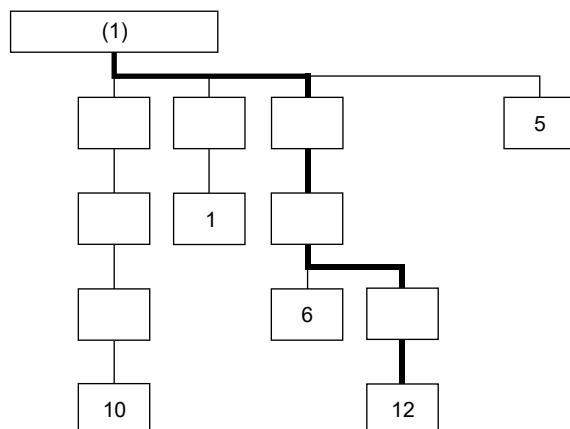
Signaling line circuit resistance and capacitance determines the maximum length of a Signature data loop. Circuit resistance affects the wire length of the longest loop branch. Circuit capacitance affects the total amount of wire that can be used on the loop.

### 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 82 through Table 85 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 82.

If 1 to 5 SIGA-UMs or SIGA-MABs are installed, use Table 83.

If 6 to 10 SIGA-UMs or SIGA-MABs are installed, use Table 84.

If 11 to 15 SIGA-UMs or SIGA-MABs are installed, use Table 85.

**Table 82: 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 83: 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 84: Maximum branch length with 6 to 10 SIGA-UMs/SIGA-MABs configured for two-wire smokes**

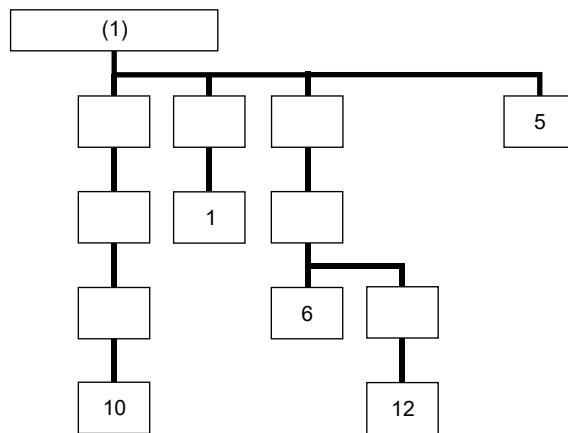
Signature detector addresses	Signature module addresses	Maximum allowable wire distance using non-twisted, non-shielded wire pairs					
		18 AWG		16 AWG		14 AWG	
		ft.	m	ft.	m	ft.	m
1–25	0	5045	1538	8015	2443	12748	3886
26–50	0	4494	1370	7139	2176	11355	3461
51–75	0	3950	1204	6275	1913	9981	3042
76–100	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 85: 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 type	Wire Size		
	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).

$$L_{max} = 500,000 / C_{pf}$$

Where,

- $L_{max}$  = maximum total cable length in feet
- $C_{pf}$  = 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 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 ( $\Omega/\text{ft.}$ )

This information can be found on the appliance installation sheets and on the cable specification sheet.

### Power supply values

For either method, you'll need some fixed or calculated operating values for your specific power supply. The fixed values are:

- Maximum voltage = 27.4 V
- Rated voltage = 20.4 V
- Load factor = 0.37 V/A
- Power type = DC

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 *rated voltage* is the theoretical operating minimum for the power supply 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**

	NAC1	NAC2	NAC3	NAC4	
Total operating current [1]	[ ]	[ ]	[ ]	[ ]	A
Load factor	x 0.37	0.37	0.37	0.37	V/A
Load voltage drop	= [ ]	[ ]	[ ]	[ ]	V
Rated voltage	[ ]	20.4	20.4	20.4	V
Load voltage drop	- [ ]	[ ]	[ ]	[ ]	V
Minimum voltage	= [ ]	[ ]	[ ]	[ ]	V
Regulated appliance voltage	- 16.0	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	2	
<b>Maximum cable length</b>	= [ ]	[ ]	[ ]	[ ]	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 86 on page 204.

## 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 86: Typical wire resistances**

Wire gauge (AWG)	Resistance 1-strand uncoated copper	Resistance 7-strand uncoated copper
	Ω per foot	Ω per meter
12	0.00193	0.00633
14	0.00307	0.01007
16	0.00489	0.01604
18	0.00777	0.02549
	Ω per foot	Ω per meter
0.00198	0.00649	
0.00314	0.01030	
0.00499	0.01637	
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

- Calculate the total current ( $I_{tot}$ ) as the sum of the maximum operating currents for all the appliances.

$$I_{tot} = \sum I_a$$

Where:

$I_a$  = appliance maximum current

Refer to the appliance installation sheets for  $I_a$ . Remember to use the maximum operating current specified for DC power.

- Calculate the minimum voltage ( $V_m$ ).

$$V_m = V_r - (I_{tot} \times K)$$

Where:

$V_r$  = rated voltage

$I_{tot}$  = total current (from above)

$K$  = load factor

For the power supply,  $V_r$  is 20.4 V and  $K$  is 0.37 V/A.

3. Calculate the allowable voltage drop ( $V_d$ ) between the NAC circuit source and the appliances.

$$V_d = V_m - V_a$$

Where:

$V_m$  = minimum voltage (from above)

$V_a$  = appliance minimum voltage

For regulated notification appliances,  $V_a$  is 16 V. For special application appliances,  $V_a$  is the lowest operating voltage specified on the appliance installation sheet.

4. Calculate the maximum resistance ( $R_{max}$ ) the wire can have.

$$R_{max} = V_d / I_{tot}$$

Where:

$V_d$  = voltage drop

$I_{tot}$  = total current

5. Calculate the maximum length of the cable ( $L_c$ ), based on the maximum resistance allowed, the resistance of the wire, and the number of wires in the cable (two).

$$L_c = (R_{max} / R_w) / 2$$

Where:

$R_{max}$  = maximum resistance

$R_w$  = wire resistance factor

Example: The NAC source is the 3-PPS/M. 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.

$$\begin{aligned} I_{tot} &= \sum I_a \\ &= 20 \times 0.1 \text{ A} \\ &= 2 \text{ A} \end{aligned}$$

$$\begin{aligned} V_m &= V_r - (I_{tot} \times K) \\ &= 22.4 \text{ V} - (2 \text{ A} \times 0.0 \text{ V/A}) \\ &= 22.4 \text{ V} - 0.0 \text{ V} \\ &= 22.4 \text{ V} \end{aligned}$$

$$\begin{aligned} V_d &= V_m - V_a \\ &= 22.4 \text{ V} - 16.0 \text{ V} \\ &= 6.4 \text{ V} \end{aligned}$$

$$\begin{aligned} R_{max} &= V_d / I_{tot} \\ &= 6.4 \text{ V} / 2.0 \text{ A} \\ &= 3.2 \Omega \end{aligned}$$

$$\begin{aligned} L_c &= (R_{max} / R_w) / 2 \\ &= (3.2 \Omega / 0.002 \Omega/\text{ft.}) / 2 \\ &= 1600.0 \text{ ft.} / 2 \\ &= 800.0 \text{ ft.} \end{aligned}$$

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:

$$\text{Maximum length} = (59.25 \times \text{Amplifier output}^2) / (\text{Wire resistance} \times \text{circuit load})$$

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 87.

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.

$$94.95 = (59.25 \times 25^2) / (13 \times 30)$$

**Table 87: Wire resistance ratings**

Wire Size	Resistance per 1,000 ft. pair (ohms)
18 AWG (0.75 mm <sup>2</sup> )	13.0
16 AWG (1.0 mm <sup>2</sup> )	8.0
14 AWG (1.50 mm <sup>2</sup> )	5.2
12 AWG (2.5 mm <sup>2</sup> )	3.2

Table 88 and Table 89 on page 207 give the maximum allowable wire lengths for various wire sizes and loads. Use Table 88 when designing circuits for amplifiers set for 25 VRMS output. Use Table 89 when designing circuits for amplifiers set for a 70 VRMS output.

**Table 88: 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 mm <sup>2</sup> )	190	58	142	43	95	29	71	22	Over max current limit		Over max current limit	
16 AWG (1.0 mm <sup>2</sup> )	309	94	231	70	154	47	116	35	48.7	15	39	12
14 AWG (1.5 mm <sup>2</sup> )	475	145	356	109	237	72	178	54	75	23	59	18
12 AWG (2.5 mm <sup>2</sup> )	772	235	579	176	386	118	289	88	121.8	37	96	29

**Table 89: 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 mm <sup>2</sup> )	1489	454	1117	340	744	227	558	170	235	72	186	57
16 AWG (1.0 mm <sup>2</sup> )	2420	738	1815	553	1210	369	907	276	382	116	302	92
14 AWG (1.5 mm <sup>2</sup> )	3722	1134	2792	851	1861	567	1396	426	588.7	180	465	142
12 AWG (2.5 mm <sup>2</sup> )	6049	1844	4537	1383	3024	922	2268	691	955	291	756	230

## Cabinet battery

Use the following method to calculate the minimum ampere-hour capacity of a battery required in order to operate a control unit 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 millamps required by all of the components that derive power from the battery while the control unit is in standby mode. Multiply the total amount of standby current by the number of hours that the control unit is required to operate in standby mode while on battery power.

Determine the total amount of current in millamps required by all of the components that derive power from the battery while the control unit is in alarm mode. Multiply the total amount of alarm current by the number of minutes that the control unit 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)	CO alarm current (mA)
Total control unit current (from Worksheet A)	<input type="text"/>	<input type="text"/>	0
Total NAC/AUX current (from Worksheet B)	0	<input type="text"/>	0
Total CO alarm current (from Worksheet C)	0	0	<input type="text"/>
Smoke power [1]	<input type="text"/>	<input type="text"/>	0
<b>Total current</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Operating time required	$\times$ <input type="text"/> h	$\times$ <input type="text"/> min	$\times$ <input type="text"/> 12 h
	<input type="text"/>	<input type="text"/>	<input type="text"/>
	$\div 60$	$+ 12 \text{ h}$	
	<input type="text"/> + <input type="text"/> = <input type="text"/>	$\times 1.2$ [2]	<input type="text"/> mAh
		$\div 1,000$	<input type="text"/> Ah
<b>Battery capacity</b>			

[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.

[2] Required 20% safety margin.

**Worksheet A: Control unit current**

**Instructions:** Enter the number of option cards installed in the FACU 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)
4-CPU (includes 3-PPS/M(230) / 4-PPS/M configured as PPS)		230.0	230.0		
4-AUDTELS		85.0	101.0		
4-ANNCPU		145.0 at 24 VDC	145.0 at 24 VDC		
4-ANNAUDTEL		98.0	98.0		
4-CPUGRPH		123.0	123.0		
4-PPS/M configured as BPS		45	45		
4-PPS/M configured as BBC		45	45		
3-BPS/M(230)		50.0	50.0		
3-BBC/M(230)		70.0	70.0		
Display modules, EST4		4.0	10.0		
Display modules, EST3 retrofit only [1]		2.0 plus 1.5 for each active LED	2.0 plus 1.5 for each active LED		
3-LDSM		5.0	5.0		
4-LCD		50.0	110.0		
4-LCDAUDTEL		50.0	110.0		
4-3LCD		40.0	93.0		
4-NET-TP(-HC)		32.0	32.0		
4-NET-CAT / 4-FWAL-CAT		27.0	27.0		
4-NET-SM / 4-FWAL-SM		35.0	35.0		
4-NET-MM / 4-FWAL-MM		35.0	35.0		
4-NET-SMH / 4-FWAL-SMH		35.0	35.0		
4-NET-SMU / 4-FWAL-SMU		35.0	35.0		
4-NET-SMD / 4-FWAL-SMD		35.0	35.0		
4-FWAL1 / 4-FWAL2 / 4-FWAL3 / 4-FWAL4		130.0 at 24 VDC	130.0 at 24 VDC		
4-ASDCPU		130 at 24 VDC	130 at 24 VDC		

Devices	Qty	Standby current (mA)	Alarm current (mA)	Qty x Standby current (mA)	Qty x Alarm current (mA)
4-USBBHUB – USB ports	[ ]	44.0 (no nonisolated ports used)	44.0 plus 130.0 per nonisolated ports used	[ ]	[ ]
4-NET-AD	[ ]	130.0 at 24 VDC	130.0 at 24 VDC	[ ]	[ ]
4-NET-XT	[ ]	110.00	110.0	[ ]	[ ]
4-MIC	[ ]	8.0	38.0	[ ]	[ ]
4-FT	[ ]	9.0	168.0	[ ]	[ ]
FSB-PC4	[ ]	100.0	140.0	[ ]	[ ]
FSB-PC4LW	[ ]	130.0	170.0	[ ]	[ ]
4-COMREL	[ ]	0.0	8.0	[ ]	[ ]
3-SSDC1, 3-SSDC2 [2][3]	[ ]	144.0	204.0	[ ]	[ ]
3-SDDC1, 3-SDDC2 [2][3]	[ ]	264.0	336.0	[ ]	[ ]
3-IDC8/4	[ ]	48.0	408.0	[ ]	[ ]
3-OPS	[ ]	53.0	147.0	[ ]	[ ]
3-MODCOM / 3-MODCOMP	[ ]	60.0	95.0	[ ]	[ ]
3-ZA20(A/B)	[ ]	62.0	1,120.0	[ ]	[ ]
3-ZA40(A/B)	[ ]	62.0	2,480.0	[ ]	[ ]
3-ZA95	[ ]	85.0	5,540.0	[ ]	[ ]
Other	[ ]			[ ]	[ ]
Totals (mA)				[ ]	[ ]

[1] Add 5.0 mA if the display module is connected to a 3-LDSM.

[2] Standby and alarm current values are for a fully loaded loop.

[3] A 3-SSDC1 / 3-SSDC2 card with two 3-SDC1 or 3-SDC1-HC cards is the same as one 3-SDDC1 / 3-SDDC2 card.

**Worksheet B: NAC/AUX power current**

**Instructions:** For each NAC/AUX circuit used to provide 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. Use the DC RMS current values listed on the device installation sheet for your calculations.

Devices	Standby current (mA)	Alarm current (mA)
AUX 1 [1]		
AUX 2 [1]		
AUX 3 [1]		
AUX 4 [1]		
AUX 5 [1]		
AUX 6 [1]		
AUX 7 [1]		
AUX 8 [1]		
3-IDC8/4 - IDC/NAC 1 [2]		
3-IDC8/4 - IDC/NAC 2 [2]		
3-IDC8/4 - IDC/NAC 5 [2]		
3-IDC8/4 - IDC/NAC 6 [2]		
SIGA-REL module [1][3]		
CDR-3 module [1]		
3-ZA20(A/B) NAC [1]		
3-ZA40(A/B) NAC [1]		
<b>Total (mA)</b>		

[1] Enter values only if the power source is the 3-PPS/M, 3-BPS/M(-230), 3-BBC/M(-230), or 4-PPS/M configured as PPS, BPS, or BBC power supply.

[2] Enter values only if the power source is the 3-PPS/M, 3-BPS/M(-230), 3-BBC/M(-230), or 4-PPS/M configured as PPS, BPS, or BBC power supply (based on the 3-IDC 8/4 jumper settings).

[3] A maximum of ten SIGA-REL modules per signaling line circuit can be installed.

## **Worksheet C: CO device current load**

**Instructions:** For each AUX circuit used to provide power to sounder bases for CO devices, enter the total amount of alarm current required by the devices. Use the alarm currents on the device installation sheet for your calculations.

CO devices	Alarm current (mA)
AUX 1 [1]	
AUX 2 [1]	
AUX 3 [1]	
AUX 4 [1]	
AUX 5 [1]	
AUX 6 [1]	
AUX 7 [1]	
AUX 8 [1]	
Total (mA)	

[1] Enter values only if the power source is the 3-PPS/M, 3-BPS/M(-230), 3-BBC/M(-230), or 4-PPS/M configured as PPS, BPS, or BBC power supply.

# 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

# Appendix B

# System addressing

## Summary

This appendix provides a list of logical addresses for system modules and devices.

## Content

Address format 214

Module addresses 214

LRM device addresses 217

Control-display device addresses 217

## Address format

EST4 addresses are in NNNCCCDDDD format, where:

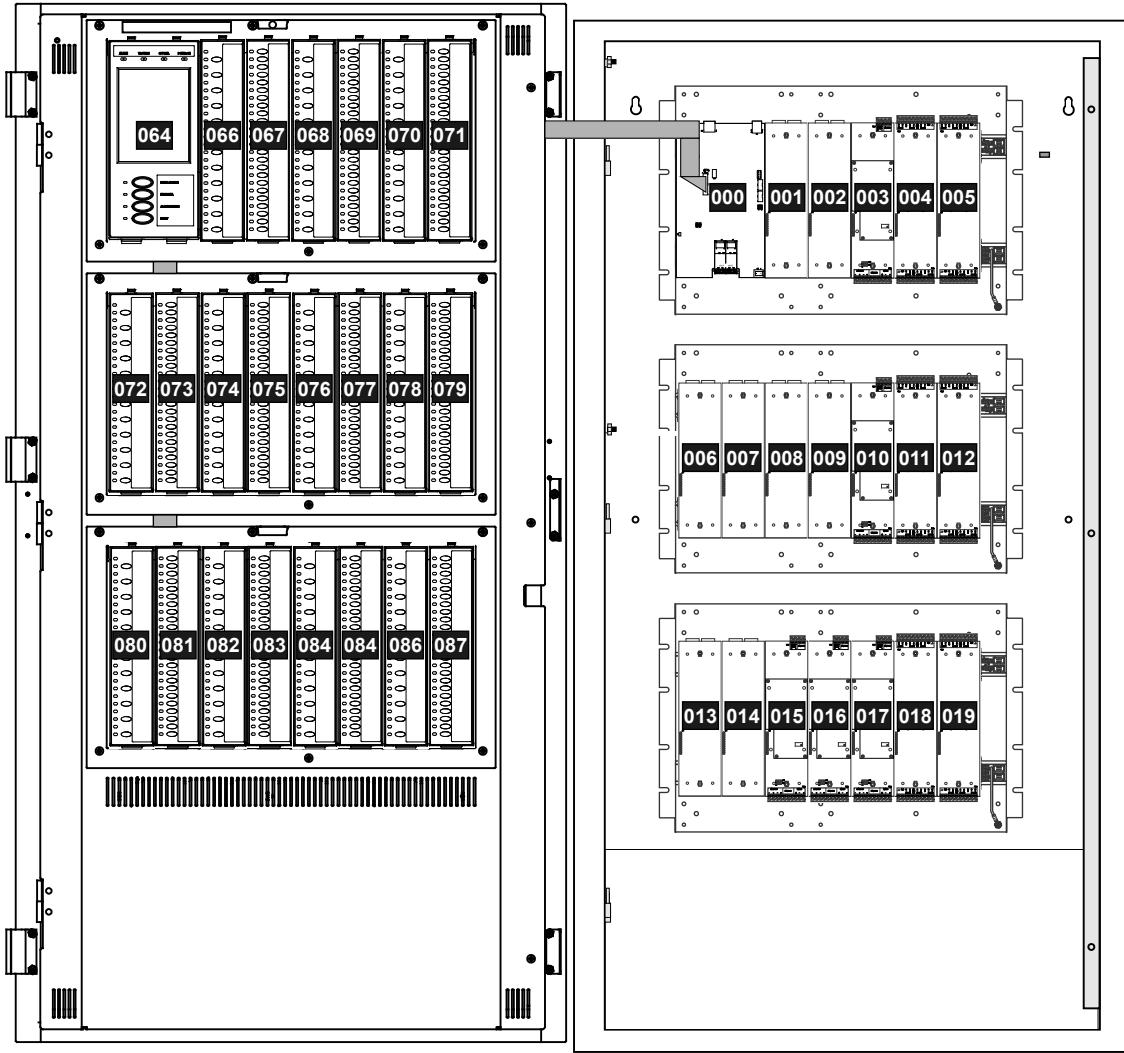
- NNN is the node number. The node number is assigned when the installer downloads the CU database into the control unit.
- CCC is the local rail module slot address. The node number and LRM slot address make up the LRM's logical address.
- DDDD is the device's point address. The node number, LRM logical address, and LRM device point address make up the device or circuit's logical address.

## Module addresses

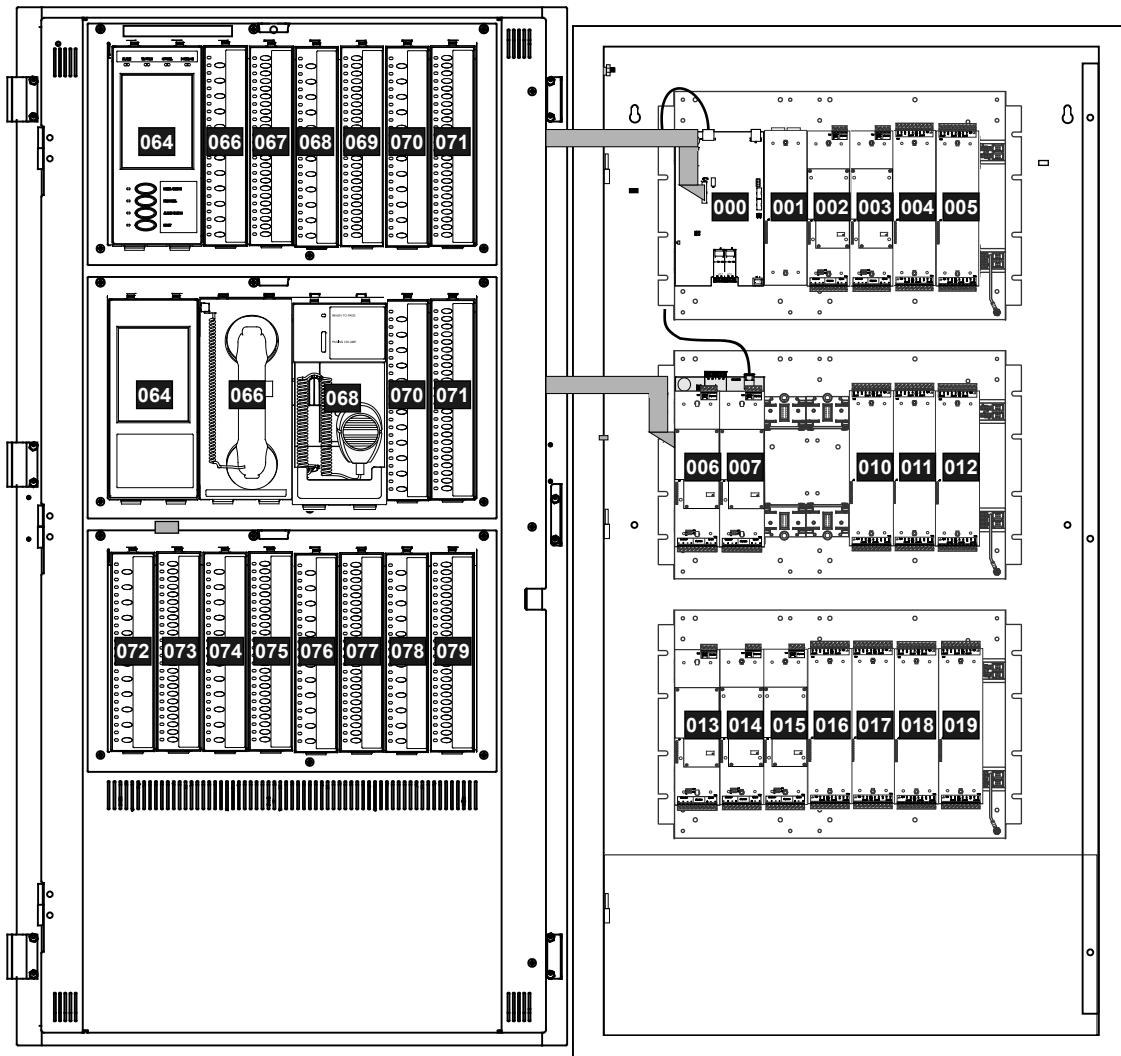
Modules have a physical address and a logical address. The physical address identifies the card's location in the panel. The logical address identifies the card in the CPU database.

For a control unit with one node, see Figure 65 and Table 90 on page 215.

For a control unit with multiple nodes, see Figure 66 and Table 91 on page 216.

**Figure 65: Logical addressing for control unit with one node (4-CAB21DL inner door/4-CAB21B backbox shown)****Table 90: Logical addressing for a control unit with one node**

Card	Logical address
<b>Operator layer modules on the inner door frame assembly</b>	
4-LCD	NNN064(065)
Control-display modules	NNN066 to NNN087
<b>Hardware LRMs on the 3-CHAS7 chassis</b>	
4-CPU	NNN000
Local rail modules	NNN001 to NNN019

**Figure 66: Logical addressing for control unit with multiple nodes (4-CAB21DL inner door/4-CAB21B backbox shown)****Table 91: Logical addressing for a control unit with multiple nodes**

Card	Logical address
<b>Operator layer modules on the inner door frame assembly</b>	
4-LCD	NNN064(065)
Control-display modules	NNN066 to NNN071
4-LCDANN	NNN064(065) [1]
4-FT	NNN066(067) [2][5]
4-MIC	NNN068(069) [3]
Control-display modules	NNN070 to NNN079
<b>Hardware LRM s on the 3-CHAS7 chassis</b>	
CPU node [4]	NNN000
Local rail modules	NNN001 to NNN007 [5]
Local rail modules	NNN010 to NNN019

[1] 4-LCDx logical addressing restarts with NNN064 when the 4-LCDx is connected to a CPU node module.

[2] A 4-FT firefighter telephone occupies two slots on the inner door frame assembly. The logical address for the 4-FT is the first address of the two slots used (example, NNN066 in Figure 66 above).

- [3] A 4-MIC paging microphone occupies two slots on the inner door frame assembly. The logical address for the 4-MIC is the first address of the two slots used (example, NNN068 in Figure 66 on page 216).
- [4] CPU node module logical addressing is NNN000 when the node is connected to an EST4 LCD operator layer module.
- [5] Local rail modules are not installed on the 3-CHAS rail behind a 4-FT firefighter telephone to prevent damage to the back of the 4-FT firefighter telephone. Slot addresses behind a 4-FT are not used (example, NNN008 and NNN009 in Figure 66).

## LRM device addresses

Table 92 below lists the device addresses for points for LRMs installed on the chassis rail.

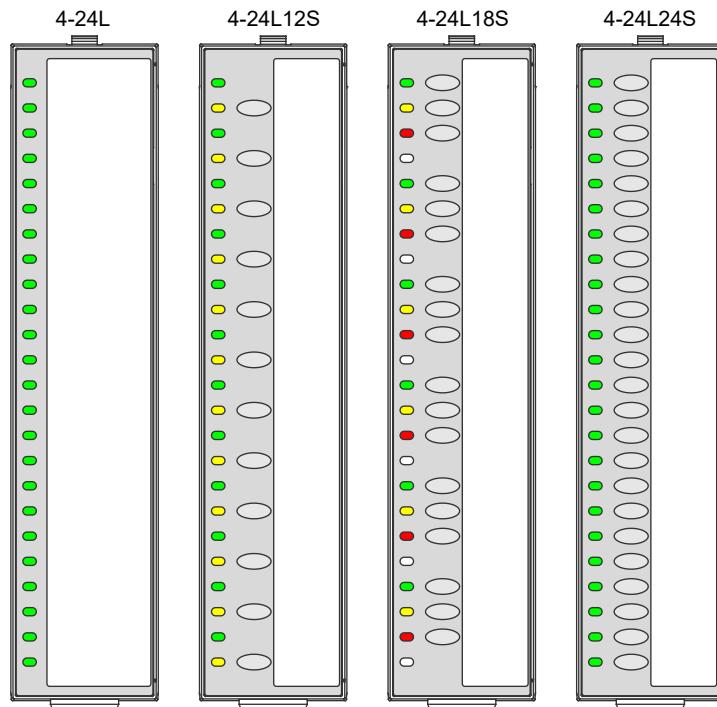
**Table 92: LRM device point addresses**

Card	Device or circuit	Address
3-IDC8/4	IDC/NAC 1 IDC/NAC 2 IDC 3 IDC 4 IDC/NAC 5 IDC/NAC 6 IDC 7 IDC 8	NNNCCC0001 NNNCCC0002 NNNCCC0003 NNNCCC0004 NNNCCC0005 NNNCCC0006 NNNCCC0007 NNNCCC0008
3-SSDC1 / 3-SSDC2	Detectors Modules	NNNCCC0001 to NNNCCC0125 NNNCCC0126 to NNNCCC0250
3-SDDC1 / 3-SDDC2		
Loop 1	Detectors Modules	NNNCCC0001 to NNNCCC0125 NNNCCC0126 to NNNCCC0250
Loop 2	Detectors Modules	NNNCCC0251 to NNNCCC0375 NNNCCC0376 to NNNCCC0500
3-ZA20(A/B)	Amplifier output 24V DC output	NNNCCC0000 NNNCCC0001
3-ZA40(A/B)	Amplifier output 24V DC output	NNNCCC0000 NNNCCC0001
3-ZA95	Amplifier output 24V DC output	NNNCCC0000 NNNCCC0001

## Control-display device addresses

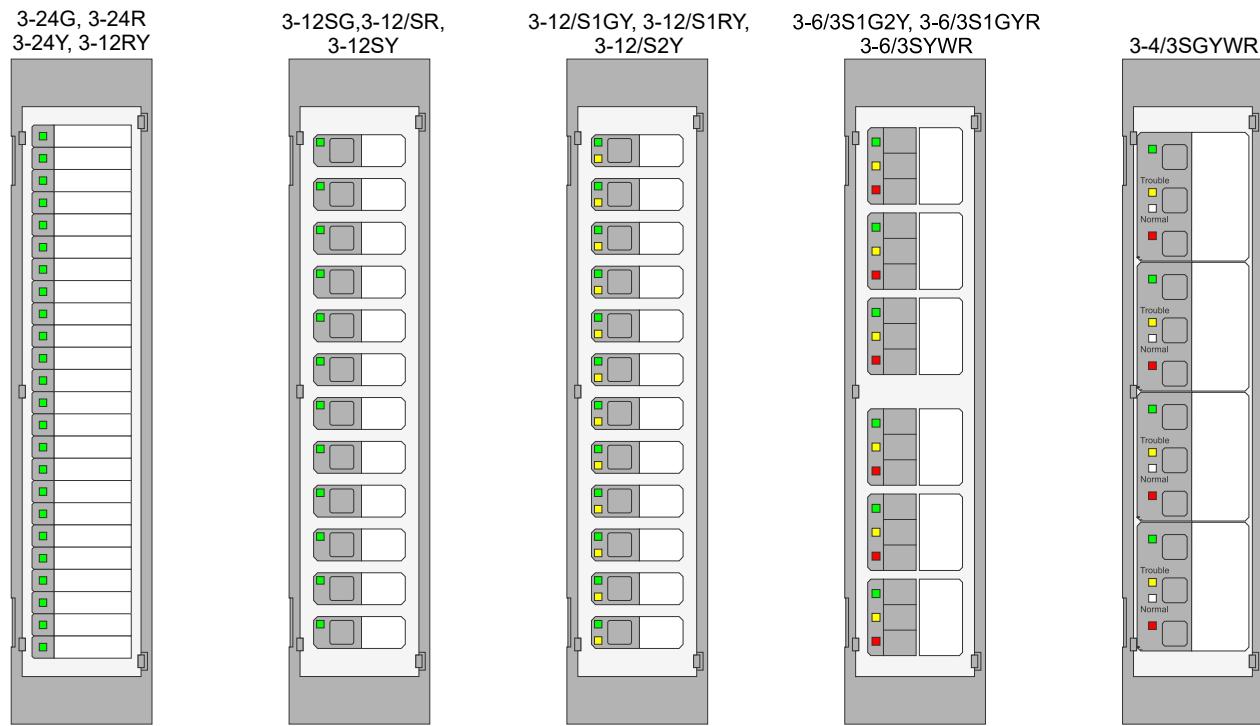
The tables in this section list switch and indicator addresses that the system assigns to operator layer control-display modules.

- EST4 system control-display modules LED and switch numbering see Table 93 on page 218
- EST3 migrated system control-display modules LED and switch numbering see Table 94 on page 220

**Figure 67: EST4 operator layer control-display modules****Table 93: EST4 operator layer control-display addresses**

<b>Module type</b>	<b>Switch group</b>	<b>Switch address</b>	<b>Indicator address</b>
4-24L	N/A	N/A	0129 to 0152
4-24L12S	1	0002	0129 to 0130
	2	0004	0131 to 0132
	3	0006	0133 to 0134
	4	0008	0135 to 0136
	5	0010	0137 to 0138
	6	0012	0139 to 0140
	7	0014	0141 to 0142
	8	0016	0143 to 0144
	9	0018	0145 to 0146
	10	0020	0147 to 0148
	11	0022	0149 to 0150
	12	0024	0151 to 0152
4-24L18S	1	0001	0129
	2	0002	0130
	3	0003	0131
	-	-	0132
	4	0005	0133
	5	0006	0134
	6	0007	0135
	-	-	0136

<b>Module type</b>	<b>Switch group</b>	<b>Switch address</b>	<b>Indicator address</b>
	7	0009	0137
	8	0010	0138
	9	0011	0139
	–	–	0140
	10	0013	0141
	11	0014	0142
	12	0015	0143
			0144
	13	0017	0145
	14	0018	0146
	15	0019	0147
	–	–	0148
	16	0021	0149
	17	0022	0150
	18	0023	0151
	–	–	0152
4-24L24S	1 to 24	0001 to 0024	0129 to 0152

**Figure 68: EST3 control-display LED and switch numbering****Table 94: EST3 operator layer control-display addresses**

<b>Module type</b>	<b>Switch group</b>	<b>Switch address</b>	<b>Indicator address</b>
3-24G, 3-24R, 3-24Y, 3-12RY	N/A	N/A	0129 to 0152
3-12SG, 3-12SR, 3-12SY	1	0001	0129
	2	0002	0130
	3	0003	0131
	4	0004	0132
	5	0005	0133
	6	0006	0134
	7	0007	0135
	8	0008	0136
	9	0009	0137
	10	0010	0138
	11	0011	0139
	12	0012	0140
3-12/S1GY, 3-12/S1RY, 3-12/S2Y	1	0001	0129 0130
	2	0002	0131 0132
	3	0003	0133 0134
	4	0004	0135 0136
	5	0005	0137 0138

Module type	Switch group	Switch address	Indicator address
3-6/3S1G2Y, 3-6/3S1GYR, 3-6/3SGYWR	6	0006	0139 0140
	7	0007	0141 0142
	8	0008	0143 0144
	9	0009	0145 0146
	10	0010	0147 0148
	11	0011	0149 0150
	12	0012	0151 0152
	1	0001 0002 0003	0129 0130 0131
	2	0004 0005 0006	0132 0133 0134
	3	0007 0008 0009	0135 0136 0137
	4	0010 0011 0012	0138 0139 0140
	5	0013 0014 0015	0141 0142 0143
	6	0016 0017 0018	0144 0145 0146
3-4/3SGYWR	1	0001 0002 0003	0129 0130 0131 0132
	2	0004 0005 0006	0133 0134 0135 0136
	3	0007 0008 0009	0137 0138 0139 0140
	4	0010 0011 0012	0141 0142 0143 0144



# Appendix C

# Pseudo points table

## Summary

This appendix provides pseudo point addresses, sources, and descriptions used to troubleshoot pseudo point events.

## Content

Pseudo points 224  
Faults 265

## Pseudo points

The table in this appendix provides pseudo point addresses, event types, sources, and descriptions that can be used to troubleshoot pseudo point events.

View the event's message details on the LCD screen to identify the pseudo point address. Cross-reference the pseudo point address to the Address column in Table 95 below to find details about the pseudo point.

**Note:** For instructions on how to view event details, see “Viewing event details” on page 57.

**Table 95: EST4 pseudo points**

Address	Label	Device type	Source	Description
0001	\$Startup	Startup	EST4	Control unit is energized, or operator initiated a restart.
0001	\$MicrophonePushTo Talk	Local monitor	4-MIC	Operator pressed the push-to-talk switch on paging microphone.
0001	\$Switch1	Common control switch	4-LCD/4-3LCD	User interface control button 1 pressed.
0002	\$First Alarm	First alarm	EST4	Control unit or any control unit in the same network routing group changed to the alarm state.
0002	\$AmplifierBackup	Local relay	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	Amplifier's input relay selected backup amplifier input as its signal source.
0002	\$Switch2	Common control switch	4-LCD/4-3LCD	User interface control button 2 pressed.
0003	\$First Supervisory	First supervisory	EST4	Control unit or any control unit in the same network routing group changed to the supervisory state.
0003	\$Switch3	Common control switch	4-LCD/4-3LCD	User interface control button 3 pressed.
0003 - 0010	\$AmplifierChannel1 - \$AmplifierChannel8	Local relay	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	Amplifier's input relay selected channel x.
0004	\$First Trouble	First trouble	EST4	Control unit or any control unit in the same network routing group changed to the trouble state.
0004	\$Switch4	Common control switch	4-LCD/4-3LCD	User interface control button 4 pressed.
0005	\$First Monitor	First monitor	EST4	Control unit or any control unit in the same network routing group changed to the monitor state.
0006	\$Evacuated	Evacuation	EST4	Operator pressed a switch that executed the EvacuationOn command.
0007	\$Drilling	Drill	EST4	Operator pressed a switch that executed the DrillOn command.
0008	\$AllCall	All call	EST4	Operator pressed a switch that executed an All Call function.
0009	\$AlarmSilenced	Alarm silence	EST4	Operator pressed a switch that executed the AlarmSilenceOn command.

Address	Label	Device type	Source	Description
0010	\$TwoStageTimerExpiration	Two stage timer expiration	EST4	Control unit's second stage activation timer expired.
0011	\$Resetting	Reset	EST4	Operator pressed a switch that executed the ResetOn command.
0011	\$AmplifierPage	Local relay	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	Amplifier's input relay selected Page channel.
0012	\$R1	R1	EST4	First phase of the 3-phase reset cycle starts.
0013	\$R2	R2	EST4	Second phase of the 3-phase reset cycle starts.
0014	\$R3	R3	EST4	Third phase of the 3-phase reset cycle starts.
0015	\$FirstDisable	First disable	EST4	First point on a control unit or any control unit in the same network routing group changed to disable state.
0016	\$ServiceGroupActive	Service group active	EST4	Operator enabled a Service Group from the control unit.
0017	\$TwoStageTimerActive	Two stage timer active	EST4	Control unit's second stage activation timer started.
0018	\$AllCallMinus	All call minus	EST4	Operator pressed a switch that executed the All Call Minus function.
0019	\$CMSFirstTrouble	CMS first trouble	EST4	First point on a control unit or any control unit in the same network routing group changed to CMS trouble state.
0020	\$AlarmSilenceInhibit	Signal silence inhibit	EST4	Control unit's alarm silence inhibit timer expired.
0021	\$AlternateSensingMode	Alternate sensing mode	EST4	Control unit's alternate sensing (sensitivity) mode activated.
0022	\$SystemFunction1	System monitor	EST4	Operator pressed an LCD user interface button or control-display switch that executed a programmed Function 1 command.
0023	\$SystemFunction2	System monitor	EST4	Operator pressed an LCD user interface button or control-display switch that executed a programmed Function 2 command.
0024	\$SystemFunction3	System monitor	EST4	Operator pressed an LCD user interface button or control-display switch that executed a programmed Function 3 command.
0025	\$SystemFunction4	System monitor	EST4	Operator pressed an LCD user interface button or control-display switch that executed a programmed Function 4 command.
0026	\$RemoteReadLocked	Local monitor	EST4	IP read communications between the 4-CU and the control unit is blocked.
0027	\$RemoteWriteUnlocked	Local monitor	EST4	IP write communications between the 4-CU and the control unit is unblocked.
0028	\$PanelSilence	Local monitor	EST4	N/A (future use).

Address	Label	Device type	Source	Description
0029	\$AudioMessageSync	Local trouble	EST4	N/A (future use)
0030	\$NetworkReconciling	Local monitor	EST4	Network communication failure or packet loss caused the control unit to start the reconcile process.  This will happen when a node is disconnected or powered down and reconnected to the fire network. If this happens randomly or this indication does not clear, check the history for network communication troubles with a specific control unit node. Check wiring to and from that, or all nodes for loose connections.
				If unable to resolve this issue, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0031	\$NetworkOutOfRange Node	Local trouble	EST4	Control unit added to the network but not configured in the 4-CU.  Update the project configuration to include the control unit.
0032	\$UnconfiguredAlarm	General alarm	EST4	Alarm on a control unit is incompatible with system programming.  Update the project configuration to include the control unit.
0051-0300	\$Network CommunicationNode x	Communication failure	EST4	CPU is unable to communicate with the networked CPU module in control unit x.  This will happen when a node is disconnected or powered down and reconnected to the fire network. If this happens randomly or this indication does not clear, check the history for network communication troubles with a specific control unit node. Check wiring to and from that, or all nodes for loose connections.
				If unable to resolve this issue, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0129	\$IndicatorAlarm	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0129	\$ReadyToPage	Common control indicator	4-MIC	For internal use only.
0130	\$IndicatorTrouble	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0131	\$IndicatorCPUPFail	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.

Address	Label	Device type	Source	Description
0132	\$IndicatorFollowsAC	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0133	\$Indicator1	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0134	\$Indicator2	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0135	\$Indicator3	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0136	\$Indicator4	Common control indicator	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	For internal use only.
0301-0550	\$Network IncompatibilityNode x	External database incompatibility	EST4	<p>Database or firmware mismatch caused communication failure with control unit x.</p> <p><b>Note:</b> It is recommended that <i>before</i> downloading a project database to a system node you save the 4-CU project.</p> <p>The project database used by a node is not the same version as other nodes on the fire network. Review the events and Revision report at each node to determine which node (or nodes) has the incorrect version. Re-execute the project download to update the incorrect node(s) and if possible, connect directly to that node.</p> <p>The same steps should be taken if there is a firmware mismatch. When viewing the Revision report for firmware mismatches, check versions for all firmware.</p>
0600	\$Fail-safe	Fail safe	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	<p>An LRM module, an LRM slot, bent pin on the rails, module incorrectly installed or a defective CPU, can cause the Fail Safe Event. Remove one module off the rail at the time, and power up the system after each and see if the Fail Safe Event returns. Continue this process until the faulty piece of hardware is located.</p> <p>The Fail Safe Event changes to the active state when a device asserts the rail alarm—not line and the CPU module has not registered an alarm event.</p> <p>If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0600	\$Annunciator Supervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-ZA20B(A) 3-ZA40B(A) 3-ZA95 3-SSDCx 3-SDDCx 3-MODCOM(P)	Module is faulty, missing, or not properly configured.  Review the project configuration to assure it matches the board and module installation. Check all connections and positions of modules in the hardware and operator layers.  If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0601	\$LoopControllerReset Extension	Loop reset extension	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Loop controller stayed in reset mode longer than expected.  Power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node.  If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0601	\$LRMCommunication	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-ZA20B(A) 3-ZA40B(A) 3-ZA95 3-SSDCx 3-SDDCx 3-MODCOM(P)	Communication failure on the chassis rail.  Verify all LRMs in the configuration are physically installed on the chassis.  If so, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node.  If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.

Address	Label	Device type	Source	Description
0601	\$CANCommunication	Local trouble	4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC 4-AUDTELS 4-ANNAUDTEL	<p>Communication failure on the UI frame assembly rail.</p> <p>Verify all operator layer modules in the configuration are physically installed on the chassis. Make sure if an AUDTELS is required or is installed that audio is completely configured and that the AUDTELS is installed. Make sure 'Audio Hardware' is set to 'Installed' for the node, an NCA is configured and one of the following is in the configuration of the Node:</p> <ul style="list-style-type: none"> <li>• 4FT phone</li> <li>• 4MIC</li> <li>• At least one of the four risers should be configured as IN or OUT</li> </ul> <p>Once the configuration is checked, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node.</p> <p>If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0602	\$ServiceDeviceSupervision	Service device supervision	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	<p>Operator canceled Service Group test while a circuit under test remained active.</p> <p>Clear the active state of the device under test before canceling the Service Group.</p>

Address	Label	Device type	Source	Description
0602	\$FirmwareMismatch	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-SSDCx 3-SDDCx 3-MODCOM(P) 4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC	<p>Mismatch between module firmware and 4-CU database.</p> <p>Perform a complete 4-CU download to the EST4 network.</p> <p>If the trouble persists, review the download results and events to see if any nodes failed to update.</p> <p>Locate the modules that have failed and perform a revision report on the panels with failures. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and the 4-CU release notes.</p> <p>Check history for other troubles such as \$DownloadFail and CAN or LRM communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If the failure persists, contact Edwards Technical Support prior to replacing the module in question. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0603	\$UserTriggered	User trouble	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Operator forced a trouble into the system.

Address	Label	Device type	Source	Description
0603	\$DownloadFail	Local trouble	3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-SSDCx 3-SDDCx 3-MODCOM(P) 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	Firmware download to the module failed.  Perform a complete 4-CU download to the EST4 network.  If the trouble persists, review the download results and events to see if any nodes failed to update.  Locate the modules that have failed and perform a revision report on the panels with failures. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i> , (P/N 3102306) and the 4-CU release notes.  Check history for other troubles such as CAN or LRM communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.  If necessary and possible, retry the download while connected directly to the node.  If the failure persists, contact Edwards Technical Support prior to replacing the module in question. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.

Address	Label	Device type	Source	Description
0604	\$ExternalDatabaseIncompatibility	External database incompatibility	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Different database is in one or more networked control units.  Perform a complete 4-CU download, including firmware to the EST4 system  If the trouble persists, review the download results and events to see if any nodes failed to update.  Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i> , (P/N 3102306) and the 4-CU release notes.
0604	\$UnhandledCondition	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-ZA20B(A) 3-ZA40B(A) 3-ZA95 3-SSDCx 3-SDDCx 3-MODCOM(P) 4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC	Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.  If necessary and possible, retry the download while connected directly to the node.  If the failure persists, contact Edwards Technical Support prior to replacing the module in question. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.

Address	Label	Device type	Source	Description
0605	\$RebootFault	Reboot fault	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	The CPU module is interrupted unexpectedly. The CPU module experienced an unexpected restart. This could have been due to a watchdog failure or internal fault. Review the event history for specific details.  <b>Note:</b> Reset required [1]
0605	\$DataSupervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-ZA20B(A) 3-ZA40B(A) 3-ZA95 3-SSDCx 3-SDDCx 3-MODCOM(P) 4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC	Corrupt configuration or invalid module.  The project configuration does not match the existing installed hardware or has been corrupted either during transfer or for some other reason. Review the event history details to determine the relevant module. Check the module revision and type to be sure it is compatible with the current panel version. Replace or reconfigure as needed.
0606	\$NetworkTransmit Overflow	Local trouble	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Node unable to transmit queued messages within the time limit set in the 4-CU.  This is a network communication issue where a CPU node network buffers have overflowed. This would typically be associated with other network problems. Review the event history for network communication or CPU faults. Correct any physical network connection problems. Review the <i>EST4 Audio and Network Application Guide</i> , (P/N 3102306) for recommended topologies when using audio or complex network routing.  <b>Note:</b> Reset required [1]

Address	Label	Device type	Source	Description
0606	\$CodeSupervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC C 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-ZA20B(A) 3-ZA40B(A) 3-ZA95 3-SSDCx 3-SDDCx 3-MODCOM(P) 4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC	Corrupt executable program  The panel firmware has been corrupted either during transfer or for some other reason. Review the 4-CU project and panel firmware versions to be sure you are using the latest versions compatible with the installed hardware (see product release notes). Retrieve the proper version from the My-Eddie website if necessary and import the firmware into the 4-CU. Verify within the project that all nodes are configured for the correct firmware version and download the project to the system.  If the failure persists, contact Edwards Technical Support prior to replacing any nodes. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0607	\$NetworkReceive Congestion	Local trouble	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Receiving node unable to process incoming packets within time limit set in the 4-CU.  This is a network communication issue where a CPU node network buffers have overflowed. This would typically be associated with other network problems. Review the event history for network communication or CPU faults. Correct any physical network connection problems. Review the <i>EST4 Audio and Network Application Guide</i> , (P/N 3102306) for recommended topologies when using audio or complex network routing.
0607	\$SDC1Supervision	Local trouble	3-SSDCx 3-SDDCx	<b>Note:</b> Reset required [1]  Missing or loose LIM card on loop controller module for SLC1.
0608	\$WatchdogViolation	Task failure	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	EST4 task failed to execute properly.  The CPU module experienced an unexpected restart caused by a watchdog failure or internal fault. Review the event history for specific details. The watchdog failure may have been a result of another issue. Reboot the system.

Address	Label	Device type	Source	Description
0608	\$SDC2Supervision	Local trouble	3-SSDCx 3-SDDCx	Missing or loose LIM card on loop controller module for SLC2.  Power down the system and check all hardware and operator layer connections. Make sure all modules are seated properly and the configuration matches what is physically installed. Repower the system.
0609	\$Configuration Supervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC 3-LDSM 3-EVDVR 3-EVDVRA 3-OPS 3-IDC8/4 3-ZA20B(A) 3-ZA40B(A) 3-ZA95 3-SSDCx 3-SDDCx 3-MODCOM(P) 4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC	Module is in the wrong rail slot.  Verify the configuration matches what is physically installed. Power down the system and check all hardware and operator layer connections. Make sure all modules are seated properly. Repower the system.
0609 - 0627	\$Configuration MismatchCard1 - \$Configuration MismatchCard19	Local trouble	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Card in slot xx cannot perform as programmed.  The project database used by a node is not the same version as other nodes on the fire network. Review the events and Revision report at each node to determine which node (or nodes) has the incorrect version. Re-execute the project download to update the incorrect node(s) and if possible, connect directly to that node.

Address	Label	Device type	Source	Description
0610	\$RailVoltageSupervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<ul style="list-style-type: none"> <li>• Rail voltage is &gt;30 VDC or &lt;21 VDC</li> <li>• Excessive rail current load</li> <li>• Faulty or misadjusted rail</li> </ul> <p>Power down the system and check all hardware layer (LRM) connections. Make sure all modules are seated properly and verify the power supply connections are secure. Repower the system. If the problem persists, review the detailed history to check for a specific LRM with communication or power issues. Power down and remove any card(s) with power or communications issues. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0610	\$SupervisionLine1	Local trouble	3-MODCOM(P)	<p>Line-cut fault detected on phone line 1.</p> <p>Check the phone line connections to the MODCOM and verify there is dial tone on the line.</p>
0610	\$LCDSupervision	Local trouble	4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL	<p>Internal wiring fault detected on the LCD module or low backlight current, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0610	\$AudioConnectionToRail	Local trouble	4-FT	<p>Phone page activated for a period that exceeded time limit set in the 4-CU</p>
0610	\$MicrophoneTrouble	Local trouble	4-MIC	<p>Defective microphone or connections.</p> <p>Failure of the microphone transducer connection. Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0611	\$RailVoltageBelowBattery	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<p>Excessive rail current load.</p> <p>Power down the system and check all hardware layer (LRM) connections. Make sure all modules are seated properly and verify the power supply connections are secure. Repower the system. If the problem persists, review the detailed history to check for a specific LRM with communication or power issues. Power down and remove any card(s) with power or communications issues. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0611	\$SupervisionLine2	Local trouble	3-MODCOM(P)	<p>Line-cut fault detected on phone line 2.</p> <p>Check the phone line connections to the MODCOM and verify there is dial tone on the line.</p>
0611	\$PhoneSupervision	Local trouble	4-FT	<p>Internal wiring fault on the master firefighter telephone handset.</p> <p>The handset is not detected. Verify cable is inserted properly in the jack.</p>
0611	\$MicrophoneKey	Local trouble	4-MIC	<p>Internal wiring fault on the paging microphone.</p> <p>The push to talk button has malfunctioned, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0612	\$HeatSinkTemperature	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<p>Power supply is too hot</p> <ul style="list-style-type: none"> <li>• Clogged enclosure vents</li> <li>• Heat sink not fastened properly</li> </ul> <p>Power down the system. Verify enclosure vents are clear and there are no loose parts in the power supply. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0612	\$Receiver1Supervision	Local trouble	3-MODCOM(P)	<p>Line 1 test transmission to CMS failed.</p> <p>Check the phone line connections to the MODCOM and verify there is dial tone on the line. Verify the receiver answers a call.</p>
0612	\$OffHookTrouble	Local trouble	4-FT	<p>Defective hook switch.</p> <p>The off hook detection has malfunctioned, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0613	\$LowBatteryCutoff	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<p>Battery voltage is below 19.5 VDC when on standby battery.</p> <p>This is a latched trouble condition with non silenceable buzzer. The system will shut down when the Low Battery cutoff timer expires unless AC is provided. Reconnect AC to the system.</p>
0613	\$Receiver2Supervision	Local trouble	3-MODCOM(P)	<p>Line 2 test transmission to CMS failed.</p> <p>Check the phone line connections to the MODCOM and verify there is dial tone on the line. Verify the receiver answers a call.</p>
0614	\$RS232Supervision	Local trouble	3-MODCOM(P)	Communication failure.

Address	Label	Device type	Source	Description
0614	\$ACSupervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	AC line voltage is below 93 VAC at 50/60 Hz.  Power down the system. Check the building AC voltage. Check the AC cable wiring to the EST4 power supply.
0615	\$BatterySupervision	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<ul style="list-style-type: none"> <li>• Open detected on wiring.</li> <li>• Battery voltage is below 22.5 VDC.</li> <li>• Battery internal resistance too high (load test failure).</li> </ul> Check battery wiring connections. If AC is not connected, reconnect AC and let the batteries charge back up to appropriate levels. If AC is connected, load test the batteries prior to replacing them.
0615	\$IncomingRing	Local monitor	3-MODCOM(P)	Incoming call received.
0616	\$AuxiliarySupervision2	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<ul style="list-style-type: none"> <li>• Excessive load.</li> <li>• Short detected on wiring.</li> </ul> Power down the system. Check wiring to and from the AUX2 terminals. Repower the system.  If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0617	\$PowerSupplyFail	Local trouble	33-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<ul style="list-style-type: none"> <li>• Loose or missing cables between the power supply and CPU.</li> <li>• Defective power supply.</li> </ul> Power down the system. Check wiring between the power supply and monitor card. Repower the system.  If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0617	\$DSPSupervision	Local trouble	3-MODCOM(P)	Failed DSP chip on module.  Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0618	\$AuxiliarySupervision1	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<ul style="list-style-type: none"> <li>• Excessive load.</li> <li>• Short detected on wiring.</li> </ul> Power down the system. Check wiring to and from the AUX1 terminals. Repower the system.  If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.

Address	Label	Device type	Source	Description
0619	\$DriverPowerSupplyFail	Local trouble	3-PPS/M (230) / 4-PPS/M as PPS 3-BPS/M(230) / 4-PPS/M as BPS 3-BBC/M(230) / 4-PPS/M as BBC	<ul style="list-style-type: none"> <li>• Loose or missing cables between power supply card and monitor card.</li> <li>• Defective power supply card or monitor card.</li> </ul> <p>Power down the system. Check wiring between the power supply and monitor card. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0620	\$WaitingForDownload		3-MODCOM(P)	<p>4-CU database download in progress or incomplete.</p> <p>If this event persists after a 4-CU download for more than 1 hour, perform another download including the firmware. If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0620	\$IncomingAudioSupervision	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<p>Missing digitized audio data.</p> <p>Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0621	\$AmplifierOvercurrent	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<ul style="list-style-type: none"> <li>• Short detected on wiring.</li> <li>• Speaker wattage tap setting exceeds amplifier output rating.</li> <li>• 70 VRMS jumper setting used with 25 VRMS speakers.</li> </ul> <p>Power down the system. Check 70 VRMS/25 VRMS jumper setting are correct and that the configuration matches the actual zone amp module, check connections and wiring between the EST4 and speakers. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0621	\$ManualAnswer	Non-supervised output	3-MODCOM(P)	Module answered incoming calls.

Address	Label	Device type	Source	Description
0622	\$PrimaryAudioOutput DC	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<ul style="list-style-type: none"> <li>• Open detected on DC NAC wiring.</li> <li>• Missing or wrong value EOL resistor.</li> <li>• Short detected on DC NAC wiring.</li> </ul> <p>Power down the system. Check the EOL resistor is correct and check connections and wiring between the zone amp terminals and notification appliance. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0622	\$OutgoingCallIn Progress	Local monitor	3-MODCOM(P)	Dialer active.
0623	\$PrimaryAudioOutput Analog	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<ul style="list-style-type: none"> <li>• Open detected on audio NAC wiring.</li> <li>• Missing or wrong value EOL resistor.</li> <li>• Short detected on audio NAC wiring.</li> <li>• Output voltage jumper incorrectly set.</li> </ul> <p>Power down the system. Check the EOL resistor and voltage jumper are correct and check connections and wiring between the zone amp terminals and notification appliance. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0624	\$BackupAudioOutput Analog	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<ul style="list-style-type: none"> <li>• Open detected on audio NAC wiring</li> <li>• Missing or wrong value EOL resistor</li> <li>• Short detected on audio NAC wiring</li> <li>• Output voltage jumper incorrectly set</li> </ul> <p>Power down the system. Check the EOL resistor and voltage jumper are correct and check connections and wiring between the zone amp terminals and notification appliance. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0625	\$DaughterBoard Supervision	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<p>Defective board.</p> <p>Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0626	\$FuseSupervision	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	<p>Open fuse detected on amplifier.</p> <p>Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0627	\$ProgrammableLogic Supervision	Local trouble	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	Bad PAL chip on amplifier.  Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0628 - 0646	\$DatabaseSyncCard1 - \$DatabaseSyncCard19	Card database incompatibility	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	CPU reporting mismatch between actual data and expected data.  Perform a complete 4-CU download including firmware to the EST4 system.  If the trouble persists, review the download results/events to see if any nodes failed to update.  Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in <i>EST4 Audio and Network Application Guide</i> , (P/N 3102306) and release notes.  Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.  If necessary and possible retry the download while connected directly to the node.  If the failure persists, contact Edwards Technical Support prior to replacing the hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0629	\$RequestBackup Amplifier	Local monitor	3-ZA20B(A) 3-ZA40B(A) 3-ZA95	N/A
0640	\$JumperPosition Supervision	Local trouble	3-OPS	Jumpers incorrectly set.  Check the wiring configuration to make sure it matches the jumper settings.
0641	\$AToDSupervision	Local trouble	3-OPS	Internal module failure.  Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0642	\$CityTieSupervision	Local trouble	3-OPS	Incorrect EOL or connection to off premises monitoring station has failed.  Check the EOL is correct if required and not present if not required. Verify all wiring between the terminals and the central station is correct.

Address	Label	Device type	Source	Description
0647	\$Annunciator Supervision	Local trouble	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Internal wiring fault on node.  Verify all operator layer modules in the configuration are physically installed on the chassis.  If so, power down the problem node and check all connections, power and communications, including making sure all loop cards are seated properly. Power up the node.
0648	\$GroundFault	Ground fault	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.  • Wiring fault. • Conductor connected to data card has continuity to ground.  Follow steps to find the connection to earth ground.
0649	\$AudioSupervision	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	Short or open detected on a riser.  Check wiring to and from the audio riser and audio source. Restart the node.  If the trouble persists contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0650	\$InternalFault	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Module failure. If the fault persists or returns, review the event history and record the internal fault details. Contact Edwards Technical Support.  <b>Note:</b> Restart required [1]

Address	Label	Device type	Source	Description
0651	\$DatabaseSupervision	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>Corrupt database.</p> <p>Perform a complete 4-CU download to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to replacing the hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0652	\$CodeSupervision	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>Corrupt executable program.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to replacing the hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0653	\$DownloadInProgress	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>4-CU database download in progress or incomplete.</p> <p>If this event persists after a 4-CU download for more than 1 hour, perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to replacing the hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0654	\$UnexpectedModule	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>Undefined module detected.</p> <p>Review the configuration against what is physically installed in the cabinet. Correct, as necessary.</p> <p>If the failure persists, contact Edwards Technical Support prior to replacing the hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0655	\$InvalidInstruction	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<ul style="list-style-type: none"> <li>• Invalid instruction for programmed response.</li> <li>• Corrupt database.</li> </ul> <p>If restart does not clear the issue, perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to replacing the hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p> <p><b>Note:</b> Restart required [1]</p>
0656	\$MainBoardInternalFault	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>CPU detected internal fault on the main board.</p> <p>If restart does not clear the issue, review the event history and record the internal fault details including the infotext (see Table 96 on page 265 for details) and contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p> <p><b>Note:</b> Restart required [1]</p>
0657	\$CommunicationFault	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>Communication failed between CPU daughter card and CPU.</p> <p>Contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0658	\$eth0GroundFault	Ground fault	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>Ground fault on eth0.</p> <p>Follow steps to find the connection to earth ground on the ethernet wiring.</p>

Address	Label	Device type	Source	Description
0659	\$eth1GroundFault	Ground fault	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Ground fault on eth1.  Follow steps to find the connection to earth ground on the ethernet wiring.
0660	\$eth0	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Configured SFP not connected to eth0 port on the node card (network link failure).  Verify the configuration matches what is physically installed. If the eth0 should be connected to another node or external service, then check the SFP is seated properly. If the eth0 is unused, disable it in the 4-CU project.
0661	\$eth1	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Configured SFP not connected to eth1 port on the node card (network link failure).  Verify the configuration matches what is physically installed. If the eth1 should be connected to another node or external service, then check the SFP is seated properly. If the eth1 is unused, disable it in the 4-CU project.
0662	\$usb0	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	USB cable not connected to USB port on the node card, an unexpected device or the 4-CU is connected to the USB port.  This pseudo point will report when the 4-CU is connected to the EST4.  If that is not the case, verify nothing unexpected is connected to the USB port. Verify the configuration matches the actual node to node USB connections.
0663	\$usbNetwork	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Failed network connection with 4-USBHUB.  Verify all USB connections between nodes and 4-USBHUBs are secure and correctly match the configuration.
0664	\$usbPowerCurrent Overload	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Connected 4-ANNCPU consuming too much current from the USB.  Make sure the USB cables between nodes in the cabinet are connected properly.  If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.

Address	Label	Device type	Source	Description
0665	\$PowerSupplyFault	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<ul style="list-style-type: none"> <li>• Loose or missing cable between power supply and CPU.</li> <li>• Defective power supply.</li> </ul> <p>Power down the system. Check wiring between the power supply and monitor card. Repower the system.</p> <p>If the problem persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0666	\$eth0Card	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<ul style="list-style-type: none"> <li>• Configured SFP not connected to eth0 port on the node card.</li> <li>• Connected SFP in eth0 port on the node card is not configured.</li> </ul> <p>Check the configuration to be sure it matches with what is physically installed. Verify SFPs are inserted completely and verify the network media is appropriate for the SFP type and is connected to the correct node and SFP type on both ends.</p>
0667	\$eth1Card	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<ul style="list-style-type: none"> <li>• Configured SFP not connected to eth1 port on the node card.</li> <li>• Connected SFP in eth1 port on the node card is not configured.</li> </ul> <p>Check the configuration to be sure it matches with what is physically installed. Verify SFPs are inserted completely and verify the network media is appropriate for the SFP type and is connected to the correct node and SFP type on both ends.</p>
0668	\$WIFILink	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	N/A (future use)

Address	Label	Device type	Source	Description
0669	\$MainDatabase SupervisionFault	Local trouble	4-CPU	<p>Corrupt database on the 4-CPU.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0669	\$MainboardDataBase Fault	Local trouble	4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>CPU detected database fault on the main board.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0670	\$MainBoardCode SupervisionFault	Local trouble	4-CPU	<p>Corrupt firmware on the 4-CPU.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0670	\$MainBoardCodeFault	Local trouble	4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	<p>Corrupt code on the 4-CPU.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0670	\$ExecutingBootloader	Local trouble	3-SSDCx 3-SDDCx	<p>4-CU attempting download.</p> <p>If the trouble persists for more than 60 minutes, review the download results and events to see if any nodes failed to update.</p> <p>Locate the modules that have failed and perform a revision report on the panels with failures. Verify the versions installed are supported as defined in the 4-CU release notes.</p> <p>Check history for other troubles such as LRM communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0671	\$MainBoard Configuration SupervisionFault	Local trouble	4-CPU	<p>Bad microcode configuration on the CPU.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p> <p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0671	\$Mainboard ConfigurationFault	Local trouble	4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	<p>Bad microcode configuration on the CPU/node.</p> <p>Perform a complete 4-CU download including firmware to the EST4 system.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306) and release notes.</p>
				<p>Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If necessary and possible, retry the download while connected directly to the node.</p> <p>If the failure persists, contact Edwards Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0671	\$LineSupervisionSDC1	Local trouble	3-SSDCx 3-SDDCx	<p>Wiring fault on SLC1.</p> <p>Check loop 1 wiring on the relevant SLC module for short or open circuits.</p>
0672	\$NetworkNeighbor AuthenticationFault	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	N/A (future use)
0672	\$MapFlawSDC1	Local trouble	3-SSDCx 3-SDDCx	<ul style="list-style-type: none"> <li>• Mismatch detected between actual data and expected data on SLC1</li> <li>• Defective wiring on SLC1 (e.g. un-tightened wire terminals)</li> <li>• Defective device on SLC1</li> </ul> <p>Verify detectors, modules and base types installed on the SLC match the configuration. Check event history for any related device communication issues. Check and correct any wiring issues. Measure AC and DC inductance on the SLC wiring. Make use of the SIGA-HDT to diagnose the fault.</p> <p>Perform an upload to the 4-CU of the Signature Data. Correct any mapping errors and redownload the updated project to the EST4.</p>

Address	Label	Device type	Source	Description
0673	\$MainBoardFirmware Mismatch	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Mismatch between CPU firmware and 4-CU database.  Perform a complete 4-CU download including firmware to the EST4 system.  If the trouble persists, review the download results/events to see if any nodes failed to update.
				Locate the node that failed and perform a revision report. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i> , (P/N 3102306) and release notes.
				Check history for other troubles such as network communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.
				If necessary and possible, retry the download while connected directly to the node.
				If the failure persists, contact Edwards Technical Support prior to changing hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0673	\$MappingInProgress SDC1	Local monitor	3-SSDCx 3-SDDCx	SLC1 currently mapping field devices.
0674	\$NetworkMessageLost	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	Failed attempts to resend an out of sequence message.  Review the event history and details report of the event. If this is a frequent event, recheck all network connections, and that SFPs are seated properly. If this happened during a time of multiple event processing, review the network topology to assure there are no slow network media types on the network backbone.
0674	\$MappingOffSDC1	Local monitor	3-SSDCx 3-SDDCx	SLC1 mapping manually disabled

Address	Label	Device type	Source	Description
0674	\$FWALUnderAttack	Local monitor	4-FWAL1,2,3,4	<p>One or more of the 4-FWALx Ethernet ports is experiencing an overload of messages, possibly a cyberattack. The services on the ETH port are temporarily stopped until the messages stop or return to normal. The local IT department should be notified and all building network routers, switches, and firewalls should be checked and settings updated for proper protections.</p> <p><b>Note:</b> The following options are preferred for Internet connection to a 4-FWALx configured to run the ACS Service:</p> <ol style="list-style-type: none"> <li>1. Use a wired connection from the 4-FWALx to a router as opposed to an unmanaged switch. Routers ensure that clients receive network traffic intended just for them.</li> <li>2. It is not recommended to use a switch, but if a managed switch is used, configure the port used for the 4-FWALx to be isolated so traffic from/to other clients is not sent to the 4-FWALx.</li> <li>3. To isolate network traffic, set up a VLAN dedicated to the 4-FWALx configured to run the ACS service.</li> </ol>
0675	\$PerformanceFault	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	N/A (future use)
0675	\$MaintenanceAlert SDC1	Local monitor	3-SSDCx 3-SDDCx	<p>Dirty detector on SLC1.</p> <p>Detector has become dusty or dirty. Follow recommended cleaning procedures</p>
0676	\$Unprogrammed DeviceSDC1	General alarm	3-SSDCx 3-SDDCx	<p>Device on SLC1 circuit not defined in 4-CU is in alarm or trouble state.</p> <p>Remove the relevant device or add it to the project configuration.</p>

Address	Label	Device type	Source	Description
0676	\$eth0LinkFail	Local monitor	4-CPU 4-ANNCPU 4-NET-AD 4-CPUGRPH	Configured SFP connected to eth0 port on the node card is unable to communicate with other configured nodes on the fire network.  Verify the correct ethernet connection, CAT5, fiber or twisted pair, is present between nodes as configured. If all connections are valid, perform a complete 4-CU download to the EST4 system. If the trouble persists, review the download results/events to see if any nodes failed to update. If any failures exist, power down the problem node and recheck all connections, and that SFPs are seated properly. Power up the node and retry the download.  If the failure persists, replace any SFPs in question and contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0677	\$GroundFaultSDC1	Ground fault	3-SSDCx 3-SDDCx	<ul style="list-style-type: none"> <li>• Wiring fault on SLC1.</li> <li>• Conductor connected to SLC1 data card has continuity to ground.</li> </ul> Run the SIGA-HDT Ver. 1.8 or later with compatible firmware on the SLC to diagnose the fault. Check wiring on the SLC and devices for connections to ground.
0677	\$eth1LinkFail	Local monitor	4-CPU 4-ANNCPU 4-NET-AD 4-CPUGRPH	Configured SFP connected to eth1 port on the node card is unable to communicate with other configured nodes on the fire network.  Verify the correct ethernet connection, CAT5, fiber or twisted pair, is present between nodes as configured. If all connections are valid, perform a complete 4-CU download to the EST4 system. If the trouble persists, review the download results/events to see if any nodes failed to update. If any failures exist, power down the problem node and recheck all connections, and that SFPs are seated properly. Power up the node and retry the download.  If the failure persists, contact Edwards Technical Support before replacing any hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0678	\$RestoringLineSDC1	Local monitor	3-SSDCx 3-SDDCx	N/A

Address	Label	Device type	Source	Description
0678	\$eth0IsolateFault	Non-supervised output	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-ASDCPU	Isolates eth0 port to determine which Ethernet link is generating a ground fault.
0679	\$SmokePowerSDC1	Local trouble	3-SSDCx 3-SDDCx	Fault detected on SLC1 smoke power circuit.  Verify wiring and devices connected on the SLC1 Smoke Power output.
0679	\$eth1IsolateFault	Non-supervised output	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-ASDCPU	Isolates eth1 port to determine which Ethernet link is generating a ground fault.
0680	\$FailSafeDatabase	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Control unit in fail safe mode due to corrupted database or unexpected unit behavior (CPU is able to communicate with LRMS and recover).  Perform a complete 4-CU download to the EST4 system. If the trouble persists, review the download results/events to see if any nodes failed to update. If any failures exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.
0680	\$UnhandledCondition	Local trouble	3-LDSM 3-EVDVR 3-EVDVRA	If the failure persists, contact Edwards Technical Support before replacing any hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0680	\$UnusedSDC1	Local trouble	3-SSDCx 3-SDDCx	CPU module failure. If restart does not solve the issue, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.  <b>Note:</b> Restart required [1].
0681	\$LineSupervisionSDC2	Local trouble	3-SSDCx 3-SDDCx	Wiring fault on SLC2.  Check loop 2 wiring on the relevant SLC module for short or open circuits.
0681	\$TestLogging	Non-supervised output	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-ASDCPU	N/A (future use).

Address	Label	Device type	Source	Description
0682	\$InternalTrouble	Local trouble	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Firmware failure on the main CPU.  Perform a complete 4-CU download to the EST4 system. If the trouble persists, review the download results/events to see if any nodes failed to update. If any failures exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.  If the failure persists, contact Edwards Technical Support before replacing any hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0683	\$MapFlawSDC2	Local trouble	3-SSDCx 3-SDDCx	<ul style="list-style-type: none"> <li>• Mismatch between actual data and expected data on SLC2</li> <li>• Defective wiring on SLC2</li> <li>• Defective device on SLC2</li> </ul> Verify detectors, modules and base types installed on the SLC match the configuration. Check event history for any related device communication issues. Check and correct any wiring issues. Measure AC and DC inductance on the SLC wiring. Make use of the SIGA-HDT to diagnose the fault.
				Perform an upload to the 4-CU of the Signature Data. Correct any mapping errors and redownload the updated project to the EST4.
0683	\$InternalMonitor	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	For internal use only.
0683	\$MappingInProgress SDC2	Local monitor	3-SSDCx 3-SDDCx	SLC2 currently mapping field devices.
0684	\$CANDownloadIn Progress	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	4-CU database download in progress to devices on UI frame assembly rail.
0684	\$MappingOffSDC2	Local monitor	3-SSDCx 3-SDDCx	SLC2 mapping manually disabled.

Address	Label	Device type	Source	Description
0685	\$CPUCard	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Main CPU board mismatch.  Review the configuration and verify the CPU type is configured correctly. Perform a complete 4-CU download to the EST4 system. If the trouble persists, review the download results/events to see if any nodes failed to update. If any failures exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.  If the failure persists, contact Edwards Technical Support before replacing any hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0685	\$MaintenanceAlert SDC2	Local monitor	3-SSDCx 3-SDDCx	Dirty detector on SLC2.  Detector has become dusty or dirty. Follow recommended cleaning procedures.
0686	\$CULoggedIn	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4	4-CU log on to control unit executed.  If this appears but there is no active 4-CU connection to any node, reboot the fire system.
0686	\$Unprogrammed DeviceSDC2	General alarm	3-SSDCx 3-SDDCx	Device on SLC2 not defined in 4-CU is in alarm or trouble state.  Remove the relevant device or add it to the project configuration.
0687	\$GroundFaultSDC2	Ground fault	3-SSDCx 3-SDDCx	<ul style="list-style-type: none"> <li>• Wiring fault on SLC2.</li> <li>• Conductor connected to SLC2 data card has continuity to ground.</li> </ul> Run the SIGA-HDT Ver. 1.8 or later with compatible firmware on the SLC to diagnose the fault. Check wiring throughout the system for connections to ground.
0687	\$NetworkTrouble	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Expected node not communicating on the network.  Check network wiring to and from the node. Download the project configuration directly to the node that is not communicating on the network.
0688	\$RestoringLineSDC2	Local monitor	3-SSDCx 3-SDDCx	N/A

Address	Label	Device type	Source	Description
0688	\$UnexpectedCanDevice	Local trouble	4-24L series 4-LCD/4-3LCD 4-LCDANN 4-LCDAUDTEL 4-FT 4-MIC 4-AUDTELS 4-ANNAUDTEL 4-ASDCPU	This can occur if Audio Hardware is set to Installed for the Node but there is no AUDTELS installed, or an AUDTELS module is installed, but audio is not completely configured.  Verify all operator layer modules in the configuration are physically installed on the chassis and are included in the project.
				Make sure an NCA is configured and one of the following is in the configuration of the Node: <ul style="list-style-type: none"><li>• 4FT phone</li><li>• 4MIC</li><li>• At least one of the four risers should be configured as IN or OUT</li></ul>
0689	\$SmokePowerSDC2	Local trouble	3-SSDCx 3-SDDCx	Fault detected on SLC2 smoke power circuit.  Verify wiring and devices connected on the SLC2 Smoke Power output.
0690	\$UnusedSDC2	Local trouble	3-SSDCx 3-SDDCx	N/A
0690	\$LampTest	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	Lamp test has been activated at the node.
0691	\$MapMismatchSDC1	Local trouble	3-SSDCx 3-SDDCx	Mismatch between actual data and expected data on SLC1.  Verify detectors, modules and base types installed on the SLC match the configuration. Check event history for any related device communication issues. Check and correct any wiring issues. Rerun the mapping operation.
0692	\$MapMismatchSDC2	Local trouble	3-SSDCx 3-SDDCx	Mismatch between actual data and expected data on SLC2.  Verify detectors, modules and base types installed on the SLC match the configuration. Check event history for any related device communication issues. Check and correct any wiring issues. Rerun the mapping operation.
0693	\$ExtraDevicesSDC1	Local trouble	3-SSDCx 3-SDDCx	Number of devices on SLC1 exceeds maximum allowed.  Reduce the number of devices connected to the SLC, 125 or less modules and 125 or less detectors.
0694	\$ExtraDevicesSDC2	Local trouble	3-SSDCx 3-SDDCx	Number of devices on SLC2 exceeds maximum allowed.  Reduce the number of devices connected to the SLC, 125 or less modules and 125 or less detectors.

Address	Label	Device type	Source	Description
0695	\$INModeBypassed SDC1	Local trouble	3-SSDCx 3-SDDCx	Inhibition of device LED flashing was bypassed (LEDs will flash according to state)  <b>Note:</b> Applies to DH and DS nonmapping devices
0696	\$INModeBypassed SDC2	Local trouble	3-SSDCx 3-SDDCx	Inhibition of device LED flashing was bypassed (LEDs will flash according to state)  <b>Note:</b> Applies to DH and DS nonmapping devices
0701 - 0710	\$Service1 - \$Service10	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH 4-ASDCPU	Primary configuration communication failure with remote server for IP Receiver, Email, ECP, Printer, Web browser, Coder, Vesda Net, ModuLaser Net, or ACS services.  Multiple invalid login attempts (greater than five) were made on a web service.  If connection to a communication service has failed, check the following depending upon the service type: <ul style="list-style-type: none"><li>• Printer powered on and physically connected.</li><li>• Coder connected properly.</li><li>• IP Receiver configured properly. Execute a test from the control unit.</li><li>• Verify the email server, account and passwords are configured properly.</li><li>• Verify the ECP license and password and secure mode are configured properly.</li><li>• Verify the IP address and subnets are configured properly for all services.</li><li>• Verify network connections to/from the 4-FWAL ethernet ports.</li><li>• For specific ACS service failures, refer to <i>EST4 Abound Connected Safety (ACS) Troubleshooting Guide</i> (P/N 3102940).</li><li>• If the failure persists, contact Edwards Technical Support before replacing any hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</li></ul>
0711 - 0725	\$ServiceMonitor1 - \$ServiceMonitor20	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	A monitor event has occurred related to the communication service.

Address	Label	Device type	Source	Description
0726 - 0735	\$ServiceAlternate1 - \$ServiceAlternate10	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	Communication failure with backup remote CMS or SMTP server for IP Receiver or Email services.  Connection to a backup communication service has failed. Check the following depending upon the service type:  Alternate IP Receiver configured properly. Execute a test from the control unit.
				Verify the alternate email server, account and passwords are configured properly.
				Verify the 4-FWAL IP address and subnets are configured properly.
				Verify network connections to/from the 4-FWAL ethernet ports.
0736 - 0745	\$ServiceAlternate Monitor1 - \$ServiceAlternate Monitor10	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	N/A (not used).
0751 - 0775	\$ServiceDisabled1 - \$ServiceDisabled25	Local trouble	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	Communication service disabled.
0777	\$TelephoneCallsIn	Local monitor	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	N/A (future use).
0778	\$PageByTelephone	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center initiated an EVAC announcement from the master firephone.
0779	\$AllCallActive	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center activated the All Call function at the NCA.
0780	\$AllCallMinusActive	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center activated the All Call function at the NCA.
0781	\$PageToEvacuated	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center connected the 4-MIC paging microphone to the Evacuation audio channel.
0782	\$PageToAlerted	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center connected the 4-MIC paging microphone to the Alert audio channel.

Address	Label	Device type	Source	Description
0783	\$PageToEmergency	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center connected the 4-MIC paging microphone to the Emergency audio channel.
0784	\$PageToOther	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Operator at a command center activated the Other function at the NCA.
0785	\$ExternalToPage	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer activated a page from an external (third-party) firephone.
0786	\$ExternalToAllCall	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer activated the All Call function from external (third-party) microphone.
0787	\$ExternalToAllCall Minus	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer activated the All Call Minus function from external (third-party) microphone.
0788	\$ExternalToEvacuated	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer connected a 4-AUDTELS audio riser input to the Evacuated audio channel.
0789	\$ExternalToAlerted	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer connected a 4-AUDTELS audio riser input to the Alert audio channel.
0790	\$ExternalTo Emergency	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer connected a 4-AUDTELS audio riser input to the Emergency audio channel.
0791	\$ExternalToAuxiliary	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer activated the Auxiliary function from external (third-party) microphone.
0792	\$ExternalToOther	Audio source	4-CPU 4-ANNCPU 4-FWAL1, 2, 3, 4 4-NET-AD 4-CPUGRPH	Customer activated the Other function from external (third-party) microphone.

Address	Label	Device type	Source	Description
0800	\$AudACSelFirmware Mismatch	Local trouble	4-CPU 4-ANNCPU	<p>Firmware mismatch between the CPU and audio module.</p> <p>Perform a complete 4-CU download to the EST4 network.</p> <p>If the trouble persists, review the download results/events to see if any nodes failed to update.</p> <p>Locate the modules that have failed and perform a revision report on the panels with failures. Verify the versions installed are supported as defined in the <i>EST4 Audio and Network Application Guide</i>, (P/N 3102306).</p> <p>Check history for other troubles such as CAN or LRM communication failures. If any exist, power down the problem node and check all connections, power, and communications, including making sure all loop cards are seated properly. Power up the node and retry the download.</p> <p>If the failure persists, contact Edwards Technical Support before replacing any hardware. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>
0801	\$AUDTEL Communication	Local trouble	4-CPU 4-ANNCPU	<p>AUDTELS card communication fault.</p> <p>Check AUDTELS, ANNAUDTEL or LCDAUDTEL connection to make sure the unit is seated properly. Verify ribbon and other cables are connected properly and securely. Restart the node. If the trouble persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p> <p>Verify the configuration matches the hardware and that all cards in the project configuration are physically present.</p>
0802	\$AUDTELFault	Local trouble	4-CPU 4-ANNCPU	<p>AUDTELS card detected an error.</p> <p>Location text 'CPU audio card integrity'</p> <p>Restart the relevant node. If restart does not clear the issue, review the event history and record the internal fault details including the infotext (see Table 97 on page 266 for more details) and contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.</p>

Address	Label	Device type	Source	Description
0803	\$AUDTELData Supervision	Local trouble	4-CPU	Corrupted record in AUDTELS.  Problem with memory in the AUDTELS that likely occurred during manufacturing. Restart the node. If the trouble persists, contact Edwards Technical Support for replacement.
0804	\$AUDTELCode Supervision	Local trouble	4-CPU 4-ANNCPU	Corrupt firmware on the AUDTELS.  Problem with memory in the AUDTELS that likely occurred during manufacturing. Restart the node. If the trouble persists, contact Edwards Technical Support for replacement.
0805	\$AUDTEL Configuration Supervision	Local trouble	4-CPU 4-ANNCPU	Corrupt database record in the AUDTELS.  Problem with memory in the AUDTELS that likely occurred during manufacturing. Restart the node. If the trouble persists, contact Edwards Technical Support for replacement.
0806	\$AUDTELMIC Supervision	Local trouble	4-CPU 4-ANNCPU	Input fault on AUDTELS or ANNAUDTEL module's microphone input circuit.  Check 4-MIC connection to make sure the unit is seated and locked into the chassis. Verify ribbon and other cables are connected properly and securely. Restart the node.  If the trouble persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0807	\$AUDTELRiser Supervision	Local trouble	4-CPU	Open or short detected on the firephone riser circuit.  Check wiring to and from the telephone riser at each handset and at the control unit with the 4-FT. Restart the node.  If the trouble persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.
0808	\$TelephoneRiserOn	Non-supervised output	4-CPU	Output used to turn off riser supervision when firephone is active
0809 - 0812	\$AudioInput1 - \$AudioInput4	Audio source	4-CPU	Short or open detected on external (third-party) audio input circuit x on the AUDTELS.  Check wiring to and from the audio riser or 1 VRMS source. Restart the node.  If the trouble persists, contact Edwards Technical Support. Have the node diagnostics, panel history, and copy of the exported project available for technical support review.

Appendix C: Pseudo points table

Address	Label	Device type	Source	Description
0813	\$Preamplifier1	Audio output	4-CPU	Preamplifier 1 output signal detected
0814 - 0821	\$Preamplifier1Channel1 - \$Preamplifier1Channel8	Local relay	4-CPU	Preamplifier 1 selected audio source channel x
0822	\$Preamplifier1ChannelPage	Local relay	4-CPU	Preamplifier 1 selected the page channel
0823	\$Preamplifier2	Audio output	4-CPU	Preamplifier 2 output signal detected
0824 - 0831	\$Preamplifier2Channel1 - \$Preamplifier2Channel8	Local relay	4-CPU	Preamplifier 2 selected audio source channel x
0832	\$Preamplifier2ChannelPage	Local relay	4-CPU	Preamplifier 2 selected the page channel
0833	\$Preamplifier3	Audio output	4-CPU	Preamplifier 3 output signal detected
0834 - 0841	\$Preamplifier3Channel1 - \$Preamplifier3Channel8	Local relay	4-CPU	Preamplifier 3 selected audio source channel x
0842	\$Preamplifier3ChannelPage	Local relay	4-CPU	Preamplifier 3 selected the page channel
0843	\$Preamplifier4	Audio output	4-CPU	Preamplifier 4 output signal detected
0844 - 0851	\$Preamplifier4Channel1 - \$Preamplifier4Channel8	Local relay	4-CPU	Preamplifier 4 selected audio source channel x
0852	\$Preamplifier4ChannelPage	Local relay	4-CPU	Preamplifier 4 selected the page channel
1001 - 1999	\$IPReceiverAccount1 - \$IPReceiverAccount999	IP account	4-FWAL1, 2, 3, 4	IP receiver CMS account x
2001 - 2999	\$EmailAccount1 - \$EmailAccount999	Email account	4-FWAL1, 2, 3, 4	Email account x
3001 - 3020	\$User1 - \$User20	Local monitor	4-CPU 4-ANNCPU 4-FWAL1,2,3,4 4-NET-AD 4-CPUGRPH	User x log on input
Non-pseudo point issue	FWAL reboot	Internal Fault	4-FWAL1, 2, 3, 4	If both eth ports are connected to the same IPV4 DHCP server, the FWAL node reboots due to a watchdog failure.

[1] If the event persists after a panel reset, call Edwards Technical Support at +1 800 655 4497.

## Faults

The \$MainBoardInternalFault, \$AUDTel and \$UnhandledCondition occur for multiple reasons as shown in the tables below. The infotext value reported with these faults is a 32 bit unsigned integer, where each bit within the number represents a status. The active state is a 1 and inactive state is 0. Some bits are unused.

The faults below marked with an asterisk (\*) will trigger the internal fault. The other status bits may or may not be set depending on those conditions at the time of the internal fault.

**Example:** If all the internal fault bits are 1 in the incoming status, then the value shown in the infotext will be 0x3E800080. Using this value, it can be determined which error caused the internal fault. In the table below, you can see all seven bit-errors are “1”, which means seven errors occurred and caused an internal fault.

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

### Main Board Supervision related faults

Table 96: \$MainBoardInternalFault Bit Values

Bit position	Description
(0 = right most bit)	
0	Reserved
1	Reserved
2	Reserved
3	Reserved
4	Reserved
5	Riser power input 2 not present
6	Riser power input 1 not present
7	The Buzzer pattern configuration data is invalid
8	Ground fault test is in progress
9	USB VBUS disable due to USB voltage issue
10	Ethernet 2 reset status
11	Ethernet 1 reset status
12	Ethernet 2 power status
13	Ethernet 1 power status
14	USB VBUS current overload has occurred
15	A ground fault has been detected
16	Reserved
17	Reserved
18	Reserved
19	The processor is rebooting
20	A code execution fault occurred within the module
21	Communications problem with the main CPU

Bit position	Description
(0 = right most bit)	
22	Memory check of configuration settings has failed
23	The RAM memory check has failed
24	The flash code memory check has failed
25	Code execution fault has occurred
26	A memory overrun fault occurred within the module
27	The RAM memory check has failed
28	The Self-Test has failed
29	A code execution fault occurred within the module
30	The module is missing valid configuration data
31	Reserved

#### Audio related faults when 4-AUDTELS or 4-ANNAUDTEL are installed or configured

Table 97: \$AUDTELFault Bit Values

Bit position	Description
(0 = right most bit)	
0	A ground fault has been detected
1	The microphone is not detected
2	A short circuit has occurred on the telephone riser
3	An open circuit has been detected on the telephone riser
4	Ground fault detected on Aux channel 4 (4-AUDTELS only)
5	Ground fault detected on Aux channel 3 (4-AUDTELS only)
6	Ground fault detected on Aux channel 2 (4-AUDTELS only)
7	Ground fault detected on Aux channel 1 (4-AUDTELS only)
8	Short circuit fault detected on Aux channel 4 (4-AUDTELS only)
9	Short circuit fault detected on Aux channel 3 (4-AUDTELS only)
10	Short circuit fault detected on Aux channel 2 (4-AUDTELS only)
11	Short circuit fault detected on Aux channel 1 (4-AUDTELS only)
12	Open circuit fault detected on Aux channel 4 (4-AUDTELS only)
13	Open circuit fault detected on Aux channel 3 (4-AUDTELS only)
14	Open circuit fault detected on Aux channel 2 (4-AUDTELS only)
15	Open circuit fault detected on Aux channel 1 (4-AUDTELS only)
16	Communication failure with supervision microcontroller (4-AUDTELS only)
17	Failure to update Codec gain settings
18	Reserved
19	The processor is rebooting

Bit position	Description
(0 = right most bit)	
20	A code execution fault occurred within the module
21	Communications problem with the main CPU
22	Memory check of configuration settings has failed
23	The RAM memory check has failed
24	The flash code memory check has failed
25	Code execution fault has occurred
26	A memory overrun fault occurred within the module
27	The RAM memory check has failed
28	The Self-Test has failed
29	A code execution fault occurred within the module
30	The module is missing valid configuration data
31	Reserved

### Annunciator operator layer (LCD, LED/SW, 4-MIC, 4-FT) related faults

Table 98: \$UnhandledCondition

Bit position	Description
(0 = right most bit)	
0	Reserved
1	Reserved
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Mismatch of actual slot address
7	Off hook status
8	4-MIC key press status
9	LCD configuration mismatch fault detected (4-LCD configured but 4-LCDAUDTEL detected)
10	LCD configuration mismatch fault detected (4-LCDAUDTEL configured but 4-LCD detected)
11	Telephone connection status
12	Mismatch between handset presence and detection
13	Fault detected with the 4-MIC key
14	Fault detected with the 4-MIC
15	Reserved
16	Reserved
17	Reserved

Bit position (0 = right most bit)	Description
18	Reserved
19	The processor is rebooting
20	A code execution fault occurred within the module
21	Communications problem with the main CPU
22	Memory check of configuration settings has failed
23	The RAM memory check has failed
24	The flash code memory check has failed
25	Code execution fault has occurred
26	A memory overrun fault occurred within the module
27	The RAM memory check has failed
28	The Self-Test has failed
29	A code execution fault occurred within the module
30	The module is missing valid configuration data
31	Reserved

# Appendix D

# UL 864 programming requirements

## **Summary**

This appendix summarizes control unit programming options.

## **Content**

UL 864 programming requirements 270

# UL 864 programming requirements

For programming instructions, refer to the *4-CU 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
Panel Silence Cancel	Y	Off 00:00:10:00 to 07:00:00:00 (dd:hh:mm:ss)	00:00:10:00 to 01:00:00:00 (dd:hh:mm:ss) [1]
AC Fail Delay	Y	Off 00:01:00 to 02:00:00 (dd:hh:mm)	00:01:00 to 00:03:00 (dd:hh:mm)
Event message routing	Y	All None User defined (1 to 15)	All None [2] User defined routes (1 to 15) [3]
Event message display filtering: Alarm, Supervisory, and Trouble options	Y	Enabled Disabled	Enabled Disabled [4]
Delays (programmed in rules)	Y	0 to 65,535 seconds	0 to 65,535 seconds [5]
Alarm verification	Y	None 4 to 56 seconds	4 to 44 seconds
Alternate alarm verification	Y	None 4 to 56 seconds	4 to 44 seconds
Automatic alarm silence	Y	Off 00:01 to 01:00 (hh:mm)	Off 00:03 to 01:00 (hh:ss)
Panel Silence Cancel	Y	Off 00:00:10:00 to 07:00:00:00 (dd:hh:mm:ss)	00:00:10:00 to 01:00:00:00
CMS event reporting priority (programmed in rules)	Y	1 to 255	1 to 255 [6]
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, Activation event: Alarm	Y	GENALARM SMOKE SMOKEVFY HEAT PULL STAGEONE STAGETWO WATERFLOW COALARM COSUPERVISORY	GENALARM SMOKE SMOKEVFY [7] HEAT PULL STAGEONE [7] STAGETWO [7] WATERFLOW COALARM COSUPERVISORY

Programmable feature or option	Permitted in UL 864? (Y/N)	Possible settings	Settings permitted in UL 864
AND group member device types, Activation event Alarm	Y	GENALARM SMOKE SMOKEVFY HEAT PULL STAGEONE STAGETWO WATERFLOW COALARM COSUPERVISORY	GENALARM SMOKE SMOKEVFY [8] HEAT PULL STAGEONE [8] STAGETWO [8] WATERFLOW COALARM COSUPERVISORY
AND group device activation count	Y	1 to 255	1 to 255 [9]
Matrix group member device types	Y	GENALARM SMOKE SMOKEVFY HEAT PULL STAGEONE STAGETWO WATERFLOW COALARM COSUPERVISORY	GENALARM SMOKE SMOKEVFY [7] HEAT PULL STAGEONE [7] STAGETWO [7] WATERFLOW COALARM COSUPERVISORY
Matrix groups: Device activation count	Y	3 to 10	3 to 10 [9]
Signature input modules: Security device types	N	Guard Security Security24Hour SecurityDay SecurityInterior SecurityInteriorMonitor SecurityPerimeter SecurityPerimeterMonitor	N/A
Signature input modules: Personality code 18	N	Alarm – soft short latching, European Style Class C (Class B/DCLB)	N/A
Signature input modules: Maximum Delta Count	N	0 to 9	N/A
Signature input modules: Delay	N	None Delayed Follower	N/A
SIGA-IO(-MIO) modules: GenAlarm Personality codes 35 and 36	N	(35) Alarm – NO delayed latching input/output NO (36) Alarm – NO delayed latching input/output NC	N/A
CO Supervisory event	N	Latching Nonlatching	N/A
CO Monitor event	N	Latching Nonlatching	N/A
4-FWALx, 4-NET-AD modules: Display Partition Filtering	N	All None All user-defined partition routing groups	N/A

Programmable feature or option	Permitted in UL 864? (Y/N)	Possible settings	Settings permitted in UL 864
LCD screen configuration: Queues to Display	Y	Call In Request Alarm Emergency Supervisory Security Building Disable Trouble Ground Other	Call In Request Alarm Emergency Supervisory Building Disable Trouble Ground Other
LCD screen configuration (4-CPU, 4-ANNCPU, 4-CPUGPH, 4-FWALx, 4-NET-AD: Queues to Alert Signal Only)	Y	Call In Request Alarm Emergency Supervisory Security Building Disable Trouble Ground Other	Call In Request Alarm Emergency Supervisory Building Disable Trouble Ground Other
User Timeout	Y	Off 00:00:15 to 08:00:00 (hh:mm:ss)	Off 00:00:15 to 08:00:00 (hh:mm:ss) [10]

[1] Allowed only on control units that transmit trouble event signals off premises.

[2] Allowed only with monitor device types and switches.

[3] Allowed only if the user route includes the control unit.

[4] Allowed only on nonrequired remote annunciators.

[5] 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.

[6] When priorities are used, alarm events must have a higher priority than supervisory and trouble events.

[7] Not allowed in Zone groups that are used to initiate the release of extinguishing agent or water.

[8] Not allowed in AND groups that are used to initiate the release of extinguishing agent or water.

[9] 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.

[10] Set User Time Out for 30 minutes or less when you are using access level passwords as the only means of preventing unauthorized access to the system.

# Glossary

Term	Definition
Abound Connected Safety (ACS)	An EST4 communications service that allows the panel to connect to the cloud and send live events and reports.
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.
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 4-CU that activates when <i>all</i> the input conditions as indicated in its AND statement list, are active.
ASD	Aspirating Smoke Detector
card	See module.
CC	Command Center
CCS	Central Control Station
Central Control Station	Terminology used to identify a command center that may or may not reside in a notification control area, but it can control audio over its own or multiple NCAs.
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.
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.
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.
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.
CMS	Central monitoring station
Command Center	Command centers are used to control audio within a Notification Control Area (NCA). The command center resides in a notification control area and it is the control unit used to request, grant, or deny control of the audio operation of an NCA, whether the one in which it resides or another NCA when the command center is a CCS.

Term	Definition
command list	A 4-CU logic device used to create a predefined list of 4-CU commands. You can activate a command list from a rule, from another command list, or from an external command and control system.
CU	Configuration Utility. 4-CU software that lets programmers configure and program an EST4 control unit.
DACT	Digital alarm communicator transmitter. A system component which transmits digital alarm, supervisory, and trouble signals to a central monitoring station over dial-up telephone lines. The 3-MODCOM(P) is a DACT.
database	User-defined, permanently stored, system parameters containing system definitions, device types, responses, messages, etc.
device	Circuits, buttons, or LEDs that exist on the chassis rail or UI frame assembly 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	Prevents an input, output, or system feature from functioning.
download	To send a project database configured in the 4-CU on your PC to the system control unit.
ECPxml	External Communications Protocol XML. A protocol that requires customer licensing to allow communication with the control unit.
enable	Permits 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.
group	A collection of Signature devices defined in the 4-CU that is treated as a single entity for programming purposes.
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 unit. The electrical integrity of the circuit is monitored by the fire alarm system.
input	A signal generated by a field device and sent to the control unit for evaluation and responses as determined by the system database. Inputs to the system are detectors, modules, and switches.
label	A unique identifier for a device.
Local system	A system that operates according to the provisions of NFPA 72.
loop	The wiring that connects devices to the fire alarm control unit.
matrix	A 4-CU logic device to create a correlation sheet 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(P) includes a modem.
module	Modules (cards) installed on the backbox chassis rail and control-display modules installed on the inner door UI frame assembly.

Term	Definition
NAC	Notification appliance circuit. A circuit connected directly to notification appliances. The electrical integrity of the circuit is monitored by the fire alarm system.
NCA	Notification Control Area
node	A control unit used to monitor system inputs for status changes and activate system outputs. The following are node modules: 4-FWALx, 4-CPU, 4-ANNCPU, 4-CPUGRPH, and 4-NET-AD.
notification control areas	Grouped nodes installed throughout the premises that provide a structure for the distributed audio system and are used to define the audio subsystem's coverage area.
	A basic NCA has one or more command centers for controlling the operations of the members of the NCA. In some installations multiple NCAs can be managed by one or more CCSSs.
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.
point	See device.
POTS	Plain Old Telephone Service. Standard telephone service employing analog signal transmission over copper loops.
power-limited	Wiring and equipment that conforms with and is installed to the <i>National Electrical Code</i> , Article 760, power-limited provisions.
Proprietary system	A system that operates according to the provisions of NFPA 72.
pseudo point	An input or output point that is not a physical device. For example, ground fault and communication fault notifications.
Request Grant Deny	A 4-CU logic device that works in association with NCAs and command centers to arbitrate demands for control of audio communications in the life safety system.
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	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.
RGD	See Request Grant Deny.
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.
sequence	A series of actions separated by time delays.
service group	A 4-CU logic device that defines a collection of devices 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 unit.
Signature data loop	The wiring that connects Signature Series devices to the fire alarm control unit.

## Glossary

Term	Definition
SMTP	Simple Mail Transfer Protocol. The Internet standard for email transmission.
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.
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 4-CU logic device that defines a group of Signature Series detectors and modules that has a unique zone number and acts as a single entity for programming purposes whenever any component of the zone is activated

# Index

**3**

- 3-CHAS7
  - install, 76
  - slots, 76
- 3-IDC8/4, 14
  - troubleshooting, 173
- 3-MODCOM, 14
  - install, 83
  - troubleshooting, 174
- 3-MODCOMP, 14
  - install, 83
  - troubleshooting, 174
- 3-OPS, 14
  - troubleshooting, 172
- 3-PPS/M
  - auxiliary power riser, 82
  - install, 78
  - low battery cutoff, 82
  - troubleshooting, 159
- 3-SDC1, 14
- 3-SDC1-HC, 14

**4**

- 4-ANNCPU
  - accessories, 109
  - audio subsystem component, 109
  - remote annunciation, 118
  - troubleshooting, 162
- 4-ASDCPU
  - troubleshooting, 170
- 4-AUDTELS
  - channels, 111
- 4-CPU
  - accessories, 78
  - audio subsystem component, 109
  - installed on chassis rail, 76
  - installing, 77
  - troubleshooting, 161
- 4-CPUGRPH
  - troubleshooting, 168
- 4-CU
  - archive setting, 61

firmware version, 60  
market setting, 60  
project number, 60  
project version, 61  
software version, 61  
time stamp, 60  
view system reports, 63

**4-FT**

- announcements, 116
- answer call, 117
- disconnect call, 118
- installed on UI rail, 77
- two-way communication, 117

**4-FWALx**

- troubleshooting, 166

**4-LCDANN**

- remote annunciation, 118

**4-LCDx**

- installed on UI rail, 77

**4-MIC**

- announcements, 113
- MNS signaling, 115
- troubleshooting, 176, 177

**4-NET-AD**

- troubleshooting, 164

**4-PPS/M**

- auxiliary power riser, 82
- install, 78
- low battery cutoff, 82
- troubleshooting, 159

**4-USBHUB**, 18

**A**

Abound Connected Safety. See ACS  
access level. See fire privilege

Acknowledge button, 51

acknowledge events, 51

ACS Service, 125

Action

- bar, 23
- buttons, 23

Action bar, 24

- buttons, 31

- add
    - hardware, 159
    - users, 47
  - addresses
    - 3-CHAS rail, 215, 216
    - device circuits, 217
    - EST3 control-display indicators, 219
    - EST3 control-display switches, 219
    - EST4 control-display indicators, 218
    - EST4 control-display switches, 218
    - format, 214
    - hardware layer, 215, 216
    - LRM points, 217
    - modules, 214
    - operator layer, multiple node, 216
    - operator layer, one node, 215
    - UI rail, 215, 216
  - administration
    - users, 46
  - administrator button
    - delete holiday, 29
    - delete user, 29
    - modify user privileges, 30
    - save user information, 28
    - show/hide PIN, 28
  - alarm
    - indications, 38
    - output, 38
    - sensitivity threshold, 68
    - state, 38
  - alarm history count, 60
  - Alarm LED, 19
  - Alarm Silence button and LED, 22
  - Alert announcement, 112
  - All Call announcement, 112
  - All Call Minus announcement, 112
  - alternate alarm sensitivity, 69
  - amplifiers, 110
  - AND group
    - disable, 64
    - enable, 64
  - announcements
    - 4-FT, 116
    - 4-MIC, 113
  - answer call, 117
  - aspirating smoke detectors
    - ModuLaser, 127
    - Vesda, 126
  - ATP, 131
    - external battery charger, 139
    - terminals and jumpers, 135
  - ATPC, 130
  - ATPINT, 132
    - terminals and jumpers, 138
  - audio amplifier, 110
  - troubleshooting, 172
  - audio subsystem
    - audio interface card matrix, 110
    - CPUs, 109
  - audio synchronization, 92
  - automatic messaging, 113
- B**
- backboxes, 11
    - standby batteries, 82
  - BACnet protocol, 145
  - batteries
    - calculate minimum ampere-hour capacity, 207
  - branch speaker wiring, 143
  - building management system, 145
  - buttons
    - LCD screen, 28
  - buzzer, 18
- C**
- calculate
    - maximum NAC circuit wire length, 201
    - minimum battery ampere-hour capacity, 207
  - CAT5 network
    - troubleshooting, 171
  - CDR-3, 18
    - Coder Service, 120
    - install, 101
  - centralized audio, 129
    - ATP, 131
    - ATP wiring, 135
    - ATPC, 130
    - ATPINT, 132
    - ATPINT wiring, 138
    - backup audio amplifier, 141
    - banked audio wiring diagram, 142
    - branch speaker wiring, 143
    - Dukane audio amplifiers, 133
    - RKU equipment racks, 130
    - wiring diagram, 140
  - change
    - alarm sensitivity threshold, 68
    - fire privilege, 48
    - output state, 68
    - PIN, 48
    - screen language, 50
  - channels, 111
  - chassis rail
    - addressing, 215, 216
    - CPU, 76
    - install, 76
    - LRMS, 76
    - slots, 76
  - chassis rail modules, 14

3-IDC8/4, 14  
 3-MODCOM, 14  
 3-MODCOMP, 14  
 3-OPS, 14  
 3-SDC1(HC), 14  
 3-SDDC1, 15  
 3-SSDC1, 15  
 3-ZAxx, 15  
 4-ANNAUDTEL, 15  
 4-AUDTELS, 16  
 4-COMREL, 16  
 circuit compatibility, 91  
 clear alarm history, 56  
 close  
   report, 61  
 close report, 29  
 CO detectors  
   testing, 67  
 coder, 18  
 Coder Service, 120  
 Command bar  
   buttons, 24, 28, 32, 124  
 Command Center, 106  
   logic device, 106  
 communication services, 119  
   ACS, 125  
   Coder, 120  
   ECP, 120  
   Email, 120  
   IP Receiver, 122  
   ModuLaser Net, 125  
   Printer, 122  
   Vesda Net, 125  
   Web Browser, 122  
 computer specifications, 5  
 connect fire phone button, 29  
 control-display module  
   buttons, 71  
   disabling button, 72  
   disabling LED, 72  
   disabling module, 71  
   enabling button, 72  
   enabling LED, 72  
   enabling module, 71  
   indicator addresses for 4-24 series modules, 218  
   indicator addresses for EST3 modules, 219  
   models, 71  
   operating modes, 71  
   switch addresses for 4-24 series modules, 218  
   switch addresses for EST3 series modules, 219  
   troubleshooting, 171  
 CPU Fail LED, 19  
 CPU models, 13  
 cybersecurity, 5

**D**

database  
   download, 45, 191  
 date  
   LCD screen, 23  
   setting, 49  
 delete  
   users, 47  
 delete character, 29  
 delete holiday, 29  
 delete user, 29  
 deny control, 52  
 deny request button, 29  
 device  
   circuit addresses, 217  
   drill, 66  
   find, 58  
   message, 24  
 DH detector, 187  
 DH detector, 183  
 disable  
   AND group, 64  
   control-display module, 71  
   control-display module button, 72  
   control-display module LED, 72  
   devices, 63  
   indications, 39  
   Instruction Text group, 64  
   LRMs, 64  
   Matrix group, 64  
   output, 39  
   Service group, 64  
   state, 38  
   Zone group, 64  
 disconnect call, 118  
 disconnect fire phone button, 29  
 doors, 12  
   install, 76  
   New York city lock, 77  
   tamper switch, 77  
 download  
   database, 43  
   firmware, 43  
   USB port, 43  
 drill  
   output, 41  
   performing, 66  
   state, 41  
 Drill button and LED, 21  
 DS detector, 187  
 DS detector, 183  
 Dukane audio amplifiers, 133

**E**

ECP Service, 120  
 elevator control system, 145  
 Email Service, 120  
 Emergency announcement, 112  
 enable  
   AND group, 64  
   control-display module, 71  
   control-display module button, 72  
   control-display module LED, 72  
   devices, 63  
   Instruction Text group, 64  
   LRMs, 64  
   Matrix group, 64  
   Service group, 64  
   Zone group, 64  
 enter button, 30  
 EST4 nodes. *See* nodes  
 EVAC, 111  
 EVAC announcement, 112  
 event details button, 29  
 Event Details buttons, 24  
 event indicator, 24  
 event message  
   list, 24  
   Local mode, 52  
   number, 24  
   Proprietary mode, 52  
   screen, 23  
   type, 24  
 event type  
   maximum events, 25  
   priority, 25  
   to queue, 25  
 expander modules, 17

**F**

fiber optics cable worksheet, 212  
 fiber optics network  
   troubleshooting, 170  
 field server bridge, 145  
 Find Device, 58  
 fire phone button  
   connect, 29  
   disconnect, 29  
 fire privilege  
   change, 48  
   levels, 26  
 firewall modules, 16  
 firmware version  
   4-CU, 60  
   annunciator, 60  
   CPU, 60  
   LRM, 60

freeze events history, 56  
 FSB-PC4(LW), 145

**G**

go to next report page button, 29  
 go to previous report page button, 29  
 grant control, 52  
 graphic annunciation  
   4-CPUGRPH, 119  
 ground faults  
   Signature data loop, 182  
 groups, 64

**H**

hardware  
   adding, 159  
   problems, 159  
   replacement, 159  
 history  
   clear, 56  
   freeze, 56  
 History reports  
   4-CU, Alarm, 62  
   4-CU, All, 62  
   4-CU, Supervision, 62  
   4-CU, Test, 62  
   4-CU, Trouble, 62  
   History, 60  
   History Alarm, 60  
   History Supervision, 60  
   History Trouble, 60  
 holiday lists  
   adding, 70  
   deleting, 70  
   editing, 70

**I**

icons, 28  
 indications  
   alarm state, 38  
   disable state, 39  
   monitor state, 40  
   supervisory state, 39  
   test state, 40  
   trouble state, 40  
 initiating device circuit troubleshooting, 173  
 install  
   3-CHAS7, 76  
   3-MODCOM(P), 83  
   3-PPS/M, 78  
   4-CPU, 77  
   backboxes, 75  
   CDR-3, 101  
   chassis rail, 76

- components, 75
  - doors, 76
  - sequence, 74
  - Instruction Text**
    - disabling group, 64
    - enabling group, 64
  - IP Receiver Service, 122
- K**
- keypad button
    - delete character, 29
    - enter, 30
    - go to next screen, 30
- L**
- lamp test, 66
  - LCD models, 14
  - LCD screen, 20
    - buttons, 28
    - date, 23
    - icons, 28
    - language, 50
    - normal, 23
    - off-normal, 23
    - option buttons, 28
    - time, 23
  - List bar, 24
    - buttons, 30
  - lists, 24
  - local rail module. *See LRM*
  - lock
    - remote write, 45, 191
  - logic groups, 64
    - Command Center, 106
    - NCA, 106
    - RGD, 106
  - logical addressing. *See addresses*
  - loop controller
    - 3-SDC1, 14
    - 3-SDC1-HC, 14
    - 3-SDDC1, 15
    - 3-SDDC2, 15
    - 3-SSDC1, 15
    - 3-SSDC2, 15
    - ground faults, 182
  - low battery cutoff (LBC), 82
  - LRM**
    - installed on chassis rail, 76
    - point addresses, 217
- M**
- MAC address, 42
  - maintenance
    - log, 155
  - schedule and tests, 149
  - tests, 149
  - visual inspections, 148
- Maintenance reports**
    - 4-CU, All, 62
    - 4-CU, Device, 62
    - 4-CU, Dirty, 62
    - 4-CU, Not Clean, 62
    - Maintenance, 59
    - Maintenance Device, 59
    - Maintenance Dirty, 59
    - Maintenance Not Clean, 59
  - mapping error, 189
    - message, 189
  - market setting, 60
  - mass notification system emergency communication.
    - See MNS*
  - Matrix group
    - disable, 64
    - enable, 64
  - migrating an EST3 system, 11
  - MNS**, 107
    - 4-MIC announcement, 115
    - email, 107
    - IP dialer, 107
    - paging, 107
    - security and data protection levels, 108
    - signaling, 116
    - silence signal, 116
  - Modbus protocol, 145
  - Modem Communicator. *See 3-MODCOM, See 3-MODCOMP*
  - modify user privileges button, 30
  - ModuLaser**
    - detectors, 127
    - event mapping, 128
    - ModuLaser Net Service, 125
  - modules
    - removing or replacing, 158
    - troubleshooting, 188
  - monitor
    - indications, 40
    - outputs, 40
    - state, 40
- N**
- NAC**
    - circuit cable length, 201
    - synchronization, 92
  - NCA**, 106
    - Command Center, 106
    - logic device, 106
    - port blocking, 106
    - RGD, 106
  - network data riser

limits, 194  
 network pass-through compatibility, 90  
 network topologies, 6  
 New York city lock, 77  
 next keypad screen button, 30  
 nodes  
   4-ANNCPU, 160  
   4-ASDCPU, 160  
   4-CPU, 160  
   4-CPUGRPH, 160  
   4-FWALx, 160  
   4-NETAD, 160  
   troubleshooting, 160  
 nonmapping  
   devices, 183, 187  
   loops, 187  
 normal state, 38  
 notification appliance loop  
   determining maximum wire length, 201  
 Notification Control Area. *See NCA*  
 notification zones, 92

**O**

obscuration, 69  
 off-normal, 23  
 off-premises module troubleshooting, 172  
 operating states, 38  
 operator alert signal, 18  
   silencing an alarm, 51  
   silencing the panel, 50  
 operator controls  
   interface buttons, 19  
   interface indicators, 19  
   LCD screen, 28  
 optical detectors  
   testing, 67  
 option button  
   close report, 29  
   event details, 29  
   go to next page, 29  
   go to previous page, 29  
   print, 29  
   refresh report, 28  
 option buttons, 28  
 Other announcement, 112  
 output  
   alarm state, 38  
   changing states, 68  
   disable state, 39  
   monitor state, 40  
   supervisory state, 39  
   test state, 40  
   trouble state, 39

**P**

page types  
   Alert, 112  
   All Call, 112  
   All Call Minus, 112  
   Emergency (Mass Notification), 112  
   EVAC, 112  
   Other, 112

**paging**

  troubleshooting, 176, 177

Panel Silence button and LED, 20

pass-through compatibility, 90

password. *See PIN*

personal identification number

  PIN, 47

**PIN**

  administration, 47

  change, 48

port blocking, 106

Power LED, 20

power supplies, 13, 78

  standby battery requirements, 79, 80

power up, 41

previous screen, 61

primary alarm sensitivity, 68

print report button, 29

print reports

  control unit, 61

Print screen button, 24

printer, 18

Printer Service, 122

programming requirements, 270

Proprietary Receiving Unit, 10

pseudo points, 177

  table, 224

PT-1S, 18

  configuration settings, 98

  install, 98

  standby power, 100

PT-1S+, 18

  configuration settings, 98

  install, 98

  standby power, 100

**Q**

queues, 24

**R**

reboot the system, 55

refresh report button, 28

remote annunciation

  4-ANNCPU, 118

Remote Write Unlock, 45, 191

reports

4-CU maintenance reports, 62  
 4-CU status reports, 62  
 4-CU System report, 62  
 4-CU, Details report, 62  
 4-CU, history reports, 62  
 4-CU, Revisions report, 62  
 close, 61  
 control unit, 59  
 History, 60  
 Maintenance, 59  
 Revisions, 60  
 Status, 59  
 System Info, 61  
 request control, 52  
 request control button, 28  
   deny, 29  
   grant, 28  
**Request Grant Deny.** See RGD  
 Reset button and LED, 22  
 reset the system, 55  
 return to previous screen, 61  
**Revisions report**  
   4-CU, 62  
   Alarm history count, 60  
   Annunciator, 60  
   Configuration messaging, 60  
   Configuration schema, 60  
   Configuration time stamp, 60  
   Configuration version, 60  
   CPU, 60  
   Firmware, 60  
   LRM, 60  
   Market, 60  
**RGD**  
   logic device, 106  
**RKU equipment racks, 130**

**S**

save user information, 28  
 scroll bars and buttons, 24, 28, 124  
**Service group**  
   disable, 64  
   enable, 64  
**services.** See communication services  
**SFP modules, 16**  
**show/hide PIN, 28**  
**sign in, 46**  
**sign out, 46**  
**signal priority, 111**  
**Signature data loop**  
   branch length, 194  
   determining total length, 200  
   operation, 178  
   troubleshooting, 179  
   wire length, 194

**Signature detector**  
   testing, 67  
**Signature device**  
   testing, 67  
   troubleshooting, 188  
**Signature loop controller**  
   troubleshooting, 187  
**Signature mapping diagnostics, 189**  
**silence**  
   alarm signals, 51  
   operator alert signal, 50  
**spare parts list, 158**  
**standby batteries, 82**  
   backbox capacities, 82  
   capacities, 82  
   power supplies requirements, 79, 80  
**static-sensitive handling, 158**  
**Status reports**  
   4-CU, All Off Normal, 62  
   4-CU, Disabled, 62  
   4-CU, Status Holdup, 62  
   4-CU, Test, 62  
   Status, 59  
   Status Disabled, 59  
   Status Holdup, 59  
   Status Test, 59  
**strobe synchronization, 92**  
**substituting**  
   devices on nonmapping loops, 187  
   hardware, 159  
   Signature controller modules, 187  
   Signature Series devices, 183  
**supervisory**  
   indications, 39  
   output, 39  
   state, 39  
**synchronization, 92**  
**system**  
   addressing, 214  
   enabling time controls, 65  
   normal screen, 22  
   off-normal screen, 23  
   rebooting, 55  
   resetting, 55  
   setting the date, 49  
   setting the time, 49  
   size, 4  
**System Info report**  
   Licensing, 61  
   Project Description, 61  
   Versions, 61  
**System report**  
   4-CU, 62

**T**

tamper switches, 18, 77

test

- alarm input devices, 68

- CO detectors, 67

- indications, 40

- lamp, 66

- LCD and LEDs, 66

- optical detectors, 67

- output, 40

- preliminary field wiring, 89

- Signature detectors, 67

- Signature devices, 67

- state, 40

time

- LCD screen, 23

- setting, 49

time controls, 65

touch screen display, 20

trouble

- indications, 40

- output, 39

- state, 39

trouble and maintenance log, 155

Trouble LED, 19

troubleshooting, 158

twisted-pair network

- troubleshooting, 171

**U**

UI frame assembly

- UI rail, 76

UI rail

- 4-FT, 76

- 4-LCDx, 77

- 4-MIC, 76

- addressing, 215, 216

- control-display modules, 76

- slots, 76

UL 864, 92

- programming requirements, 270

UL Listed services, 6

- Auxiliary system, 6

- Central Station, 8

- Local system, 6, 10

- Mass EVAC emergency communication, 9

- Mass Notification emergency communication, 9

- Releasing Device control, 8

- Remote Station, 7

- Smoke Control system, 7

unlock

- remote write, 45, 191

USB port

- download, 43

**user**

- access levels, 26

- add, 47

- administration, 46

- command controls, 19

- delete, 47

- ID administration, 47

- indicators, 19

- interface, 18

- LCD screen controls, 28

**user modules**

- 4-FT, 16

- 4-MIC, 16

- control display modules, 16

- installed on UI rail, 76

**V****VESDA**

- detectors, 126

- event mapping, 126

- Vesda Net Service, 125

**view event details**

- from event list, 58

- from Find Device screen, 58

- from project tree, 58

**view reports**

- 4-CU, 63

- control unit, 61

**W****Web Browser Service****wire length calculations**

- NAC circuit, 201

- network data riser, 194

- Signature data loops, 194

**Z****zone**

- disabling group, 64

- enabling group, 64

**zoned amplifier**

- troubleshooting, 172