

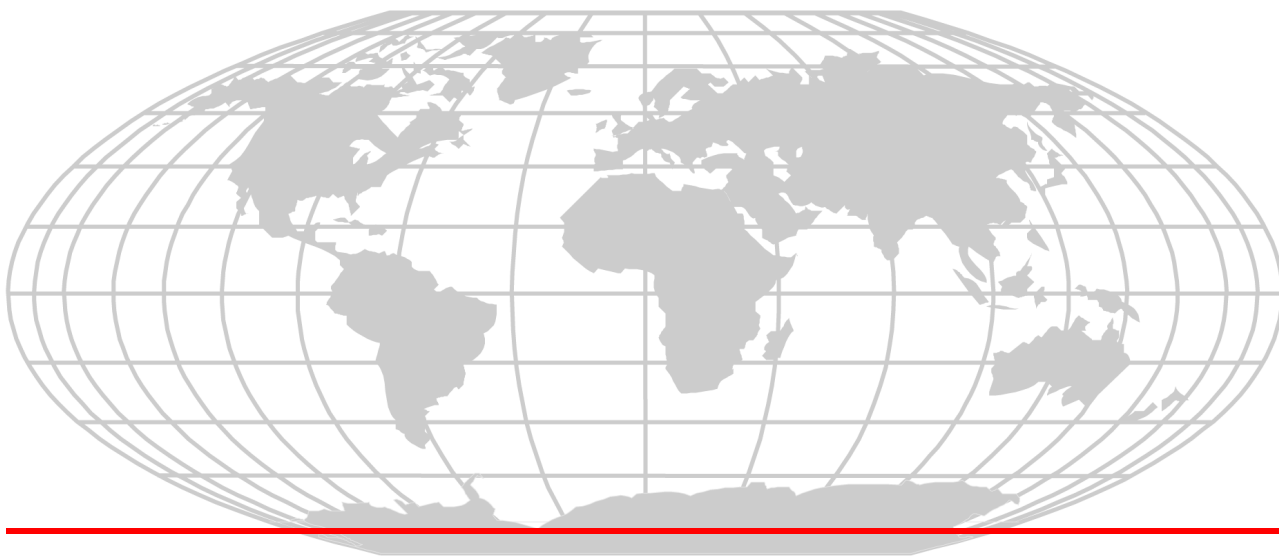
Webster University - Interdisciplinary Science Building

Fire Alarm System

Operations & Maintenance Manuals

TABLE OF CONTENTS

1. Notifier NFS-320	Page 2
2. Notifier 411UDAC	Page 78
3. Potter PSN-106B	Page 162
4. Notifier FDU-80	Page 210
5. Notifier NBG-12LX	Page 242
6. Power Sonic PS-1270, PS-12260F2	Page 244
7. System Sensor RTS151	Page 272
8. System Sensor DNR	Page 274
9. System Sensor CO1224T	Page 280
10. Notifier FSP-851	Page 284
11. System Sensor P2R, SR, PC2R	Page 286



Fire Alarm Control Panel
→ NFS-320/E/C,
NFS-320SYS/E
Operations Manual

Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

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

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. This document can be found at <http://www.systemsensor.com/appguides/>. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

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

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

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

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

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type

of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

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

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

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

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

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

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

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

Telephone lines needed to transmit alarm signals from a premises to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system

Installation Precautions

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

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

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

This system meets NFPA requirements for operation at 0-49° C/32-120° F and at a relative humidity $93\% \pm 2\%$ RH (non-condensing) at $32^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($90^{\circ}\text{F} \pm 3^{\circ}\text{F}$). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of $15\text{-}27^{\circ}\text{C}/60\text{-}80^{\circ}\text{F}$.

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

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

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

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

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

This system contains static-sensitive components.

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

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

Precau-D1-9-2005

FCC Warning

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

Canadian Requirements

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

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

HARSH™, NIS™, and NOTI-FIRE-NET™ are all trademarks; and **Acclimate® Plus, FlashScan®, NION®, NOTIFIER®, ONYX®, ONYXWorks®, UniNet®, VeriFire®, and VIEW®** are all registered trademarks of Honeywell International Inc. **Echelon®** is a registered trademark and **LonWorks™** is a trademark of Echelon Corporation. **ARCNET®** is a registered trademark of Datapoint Corporation. **Microsoft®** and **Windows®** are registered trademarks of the Microsoft Corporation.

©Monday, October 07, 2013 by Honeywell International Inc. All rights reserved. Unauthorized use of this document is strictly prohibited.

Software Downloads

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments or suggestions about our online Help or printed manuals, you can email us.

Please include the following information:

- Product name and version number (if applicable)
- Printed manual or online Help
- Topic Title (for online Help)
- Page number (for printed manual)
- Brief description of content you think should be improved or corrected
- Your suggestion for how to correct/improve documentation

Send email messages to:

FireSystems.TechPubs@honeywell.com

Please note this email address is for documentation feedback only. If you have any technical issues, please contact Technical Services.

Table of Contents

Section 1: General Information.....	8
1.1: UL 864 Compliance.....	8
1.2: About This Manual	8
1.2.1: Cautions and Warnings.....	8
1.2.2: Typographic Conventions.....	8
1.2.3: Supplemental Information	9
1.2.4: Shortcuts to Operating Functions	10
1.3: Introduction to the Control Panel	10
Section 2: Use of the Controls.....	11
2.1: Introduction.....	11
2.2: System Status Indicator LEDs	11
2.3: Control Keys	12
2.3.1: Acknowledge/Scroll Display.....	12
2.3.2: Signal Silence	13
2.3.3: System Reset	13
2.3.4: Drill.....	14
2.3.5: Lamp Test.....	14
2.4: Programming Keypad	14
Section 3: Operation of the Control Panel.....	16
3.1: Overview.....	16
3.2: Normal Mode of Operation	17
3.3: Fire Alarm Mode of Operation	17
3.3.1: How the Control Panel Indicates a Fire Alarm.....	17
3.3.2: How to Respond to a Fire Alarm.....	18
3.3.3: Interpreting Fire Alarm Type Codes	18
3.4: Mass Notification Mode of Operation.....	19
3.4.1: How the Control Panel Indicates a Mass Notification Alarm	19
3.4.2: How to Respond to a MN Alarm.....	20
3.4.3: How the Control Panel Indicates a Mass Notification Supervisory	21
3.4.4: How to Respond to a MN Supervisory.....	21
3.4.5: How the Control Panel Indicates a Mass Notification Trouble.....	21
3.4.6: How to Respond to a MN Trouble	22
3.4.7: Interpreting MN Type Codes.....	22
3.5: Carbon Monoxide (CO) Alarm Mode of Operation	23
3.5.1: How the Control Panel Indicates a CO Alarm	23
3.5.2: How to Respond to a CO alarm.....	23
3.5.3: Interpreting CO Alarm/Supervisory Type ID Codes.....	24
3.6: System Trouble Mode of Operation	24
3.6.1: How the Control Panel Indicates a System Trouble.....	24
3.6.2: How to Respond to a System Trouble.....	25
3.7: Security Alarm Mode of Operation	26
3.7.1: How the Control Panel Indicates a Security Alarm.....	26
3.7.2: How to Respond to a Security Alarm.....	26
3.7.3: Interpreting Security Type Codes.....	27
3.8: Active Supervisory Signal Mode of Operation	27
3.8.1: How the Control Panel Indicates an Active Supervisory	27
3.8.2: How to Respond to an Active Supervisory	28
3.8.3: How to Interpret Supervisory Type Codes.....	28
3.9: Pre-Alarm Warning Mode of Operation	29
3.9.1: How the Control Panel Indicates a Pre-Alarm Warning	29
3.9.2: How to Respond to a Pre-Alarm Warning.....	30
3.10: Disabled Points Mode of Operation	31
3.11: Non-Alarm Mode of Operation	31

3.11.1: Purpose of Non-Alarm Points	31
3.11.2: How the Control Panel Indicates an Active Fire Control	32
3.11.3: How the Control Panel Indicates an Active Non-Fire Point	32
3.12: Active Trouble Monitor Mode of Operation	32
3.12.1: How the Control Panel Indicates an Active Trouble Monitor	32
3.12.2: How to Respond to an Active Trouble Monitor	33
3.13: Output Circuit Trouble Mode of Operation	33
3.13.1: Overview	33
3.13.2: How the Control Panel Indicates a NAC Trouble	34
3.13.3: How the Control Panel Indicates a Control/Relay Trouble	34
3.13.4: How to Respond to a NAC or Control/Relay Trouble	35
3.14: Operation of Special System Timers	35
3.14.1: What are System Timers?	35
3.14.2: How to View System Timer Selections	35
3.14.3: How System Timers Work	36
3.15: Waterflow Circuit Operation	36
3.16: Style 6 and Style 7 Operation	36
Section 4: Read Status Operation	37
4.1: Introduction	37
4.2: What is Read Status?	37
4.2.1: Quick Reference Key Sequences	37
4.3: Entering Read Status	37
4.4: Viewing and Printing a Read Status	38
4.4.1: How to View Read Status of Devices, Zones, & System Settings	38
4.4.2: How to View Read Status for Event and Alarm History	47
4.4.3: How to Print Points, Event and Alarm History	48
4.4.4: How to View and Print Hidden Event and Alarm History	50
Appendix A: Special Zone Operation	51
A.1: Overview	51
A.2: Releasing Zones (R0-R9)	51
A.2.1: Purpose of Releasing Zones	51
A.2.2: How to View Releasing Zone Selections	52
A.2.3: How Releasing Zones Operate	52
A.3: Time, Date, and Holiday Functions	54
A.3.1: Overview	54
A.3.2: How to View Time Control Selections	54
A.3.3: How to View Holiday Function Selections	55
A.3.4: How Time Control and Holiday Functions Work	55
A.4: NAC Coding	56
A.4.1: Overview of Coding	56
A.4.2: How to View Coding (F8) Selections	56
A.4.3: How to Respond to an Alarm with Coding	57
A.5: Presignal and Positive Alarm Sequence (PAS) Operation	57
A.5.1: Overview	57
A.5.2: What is Presignal and PAS?	57
A.5.3: How to View Presignal and PAS Selections	58
A.5.4: How to Respond to an Alarm with Presignal Delay Timer (no PAS)	58
A.5.5: How to Respond to an Alarm with Presignal Delay Timer (PAS selected)	59
Appendix B: Intelligent Detector Functions	60
Appendix C: Remote Terminal Access	61
C.1: General Description	61
C.2: Operating Modes	61
C.2.1: Local Terminal Mode (LocT)	61
C.2.2: Local Monitor Mode (LocM)	62

C.2.3: Remote Terminal Mode (RemT)	62
C.3: Using the CRT-2 for Read Status	63
C.3.1: Overview	63
C.3.2: Accessing Read Status Options	63
C.3.3: Read Point	64
C.3.4: Display Devices in Alarm or Trouble	64
C.3.5: Display All Programmed Points	65
C.3.6: Step-through History	65
C.3.7: View All History	65
C.3.8: Step-through Alarm History	65
C.3.9: View All Alarm History	65
C.4: Using the CRT-2 for Alter Status	65
C.4.1: Overview	65
C.4.2: Accessing Alter Status Options	66
C.4.3: Enable or Disable Detectors, Modules or Zones	66
C.4.4: Change Alarm and Pre-Alarm Levels	67
C.4.5: Clear Verification Counter	67
C.4.6: Clear the Entire History Buffer	67
C.4.7: Set the Pre-Alarm for Alert or Action	68
Appendix D: Point and System Troubles Lists	69
D.1: Point (Device) Troubles	69
D.2: System Troubles	70
Index	72

Section 1: General Information

1.1 UL 864 Compliance

This product has been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 9th Edition.

1.2 About This Manual

1.2.1 Cautions and Warnings

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



CAUTION:

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



WARNING:

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

1.2.2 Typographic Conventions

This manual uses the following typographic conventions as listed in below:

When you see	Specifies	Example
text in small caps	the text as it appears in the LCD display or on the control panel	MARCH TIME is a selection that appears in the LCD display; or Press the ENTER key
text in quotes	a reference to a section or a LCD menu screen	"Read Status"; specifies the Read Status section or menu screen
bold text	In body text, a number or character that you enter	Press 1 ; means to press the number "1" on the keypad
italic text	a specific document	<i>NFS-320</i> Installation Manual
a graphic of the key	In a graphic, a key as it appears on the control panel	Press  means to press the Escape key

Table 1.1 Typographic Conventions in this Manual



NOTE: In this manual, the term NFS-320 is used to refer to the NFS-320, NFS-320E, NFS-320C, NFS-320SYS and NFS-320SYS/E unless otherwise noted.

1.2.3 Supplemental Information

The table below provides a list of documents referenced in this manual, as well as documents for selected other compatible devices. The document series chart (DOC-NOT) provides the current document revision. A copy of this document is included in every shipment.

Compatible Conventional Devices (Non-addressable)	Document Number
Device Compatibility Document	15378
Fire Alarm Control Panel (FACP) and Main Power Supply Installation	Document Number
NFS-320/E/C Installation, Operations, and Programming Manuals NFS-320C Canadian Applications Addendum	52745, 52746, 52747 52745CDN
NFS-320SYS/E/C Installation Manual	53717
SLC Wiring Manual	51253
Note: For individual SLC Devices, refer to the <i>SLC Wiring Manual</i>	
Off-line Programming Utility	Document Number
VeriFire® Tools CD help file	VERIFIRE-TC
Power Supplies, Auxiliary Power Supplies & Battery Chargers	Document Number
ACPS-2406 Installation Manual	51304
ACPS-610 Instruction Manual	53018
APS-6R Instruction Manual	50702
APS2-6R Instruction Manual	53232
CHG-120 Battery Charger Manual	50641
FCPS-24S6/FCPS-24S8 Field Charger/Power Supply Manual	51977
Networking	Document Number
High-Speed Network Communication Module	54014
High-Speed Noti•Fire•Net Instruction Manual	54013
Noti•Fire•Net Manual, Network Version 5.0 & Higher	51584
ONYXWorks™ Workstation Hardware & Software Application: Installation and Operation Manual	52342
ONYXWorks™ NFN Gateway (PC Platform) Installation & Operation Manual	52307
ONYXWorks™ NFN Gateway (Embedded Platform) Installation & Operation Manual	52306
NCM-W/F Installation Document	51533
NCS ONYX® Network Control Station Manual, Network Version 4.0 & Higher	51658
NCA-2 Network Control Annunciator Manual	52482
NCA Network Control Annunciator Manual	51482
System Components	Document Number
Annunciator Control System Manual	15842
ACM-8R Annunciator Control Module Manual	15342
FDU-80 Remote Annunciator Manual	51264
LCD-80 Liquid Crystal Display Annunciator	15037
LCD2-80 Liquid Crystal Display Annunciator	53242
LDM Series Lamp Driver Annunciator Manual	15885
SCS Smoke Control Manual (Smoke and HVAC Control Station)	15712
DPI-232 Direct Panel Interface Manual	51499
TM-4 Installation Document (Reverse Polarity Transmitter)	51490
UDACT Manual (Universal Digital Alarm Communicator/Transmitter)	50050
UDACT-2 Manual (Universal Digital Alarm Communicator/Transmitter)	54089
FireVoice-25/50 & FireVoice-25/50ZS Manual	52290

Table 1.2 Supplemental Documentation (1 of 2)

Table 1.2 Supplemental Documentation (2 of 2)**1.2.4 Shortcuts to Operating Functions**

1 !



2 @

To the left of each program function, you'll find a keypad shortcut, which contains a series of keypad entries required to access the program function. All shortcuts start with the control panel in normal operation.

For example, the keypad shortcut to the left, shows how to enter the Read Status function with the control panel in normal operation, as well as how to exit the function.

1.3 Introduction to the Control Panel

The NFS-320 is a modular, intelligent Fire Alarm Control Panel (FACP) with features suitable for most applications. Following is a list of operating features available.

- Alarm Verification selection, to reduce unwanted alarms, for intelligent detector points
- Positive Alarm Sequence (PAS) and Presignal per NFPA 72
- Silence Inhibit timer and Auto Silence timer for Notification Appliance Circuits (NACs)
- March time/temporal code for Notification Appliance Circuits (NACs)
- Programmable Signal Silence, System Reset, and Alarm Activate functions through monitor modules
- Automatic time-of-day and day-of-week control functions, with holiday option
- Intelligent Sensing with nine field-adjustable Pre-Alarm levels with programmable Control-By-Event (CBE)
- Operate automatic smoke or heat detector sounder base on action Pre-Alarm level, with general evacuation on alarm level
- Security alarm point option with separate audible signal code
- Audible alarm signaling options
- Programmable Control-By-Event control of outputs from individual alarm or supervisory addressable devices
- Networks with other FACP's and equipment for large applications.

Section 2: Use of the Controls

2.1 Introduction

Listing of the controls and indicators and where to find information on their use:

Operating Components	Covered in
Twelve System Status Indicator LEDs	"System Status Indicator LEDs" on page 11
Five Control Keys	"Control Keys" on page 12
Programming Keypad	"Programming Keypad" on page 14

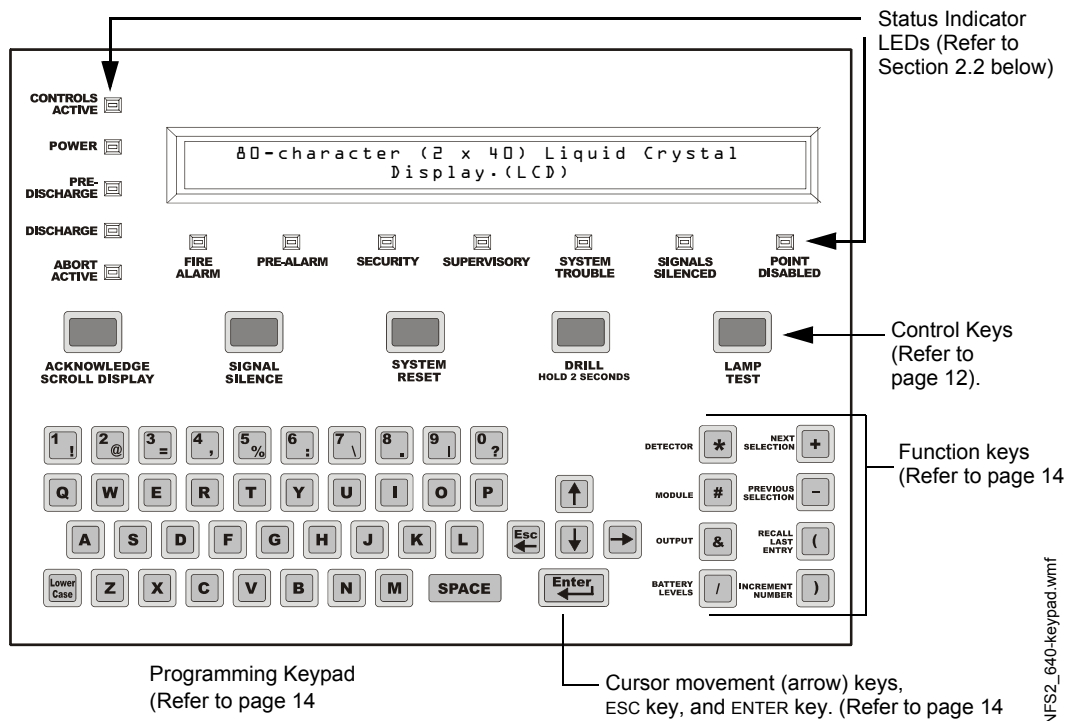


Figure 2.1 NFS-320 Control Panel Keys and Indicators

2.2 System Status Indicator LEDs

The control panel contains 12 labeled LEDs described in Table 2.1.

Indicator	Color	When Active	To Turn Off
CONTROLS ACTIVE	Green	Lights when the panel assumes control of local operation as primary display.	Turns off automatically when another panel assumes control of local operation.
POWER	Green	Lights when the proper primary AC power is applied. Remains lit while power is applied.	Always lit with AC power applied.

Table 2.1 Descriptions of System Status Indicator LEDs (1 of 2)

Indicator	Color	When Active	To Turn Off
PRE-DISCHARGE	Red	Lights when any of the releasing zones have been activated, but have not yet discharged a releasing agent.	Turns off automatically when no releasing zones are in the pre-discharge state.
DISCHARGE	Red	Lights when any of the releasing zones are active and in the process of discharging a releasing agent.	Turns off automatically when no releasing zones are discharging a releasing agent.
ABORT ACTIVE	Yellow	Lights when an abort switch has been activated.*	Turns off automatically when an abort switch has been pressed and its timer is still counting down.
FIRE ALARM	Red	Flashes when a non-acknowledged fire alarm exists. Lights steadily after you acknowledge the fire alarm.	Clear the alarm condition and reset the system.
PRE-ALARM	Red	Flashes when a non-acknowledged fire Pre-Alarm exists. Lights steadily after you acknowledge the Pre-Alarm.	Clear the pre-alarm condition. (An Action Pre-Alarm requires a system reset.)
SECURITY	Blue	Flashes when a non-acknowledged Security alarm exists. Lights steadily after you acknowledge the alarm.	Clear the Security alarm condition and reset the system.
SUPERVISORY	Yellow	Flashes when a non-acknowledged Supervisory condition exists. Lights steadily after you acknowledge the event.	Clear the condition (Supervisory inputs require a system reset if they are latching. Refer to Table 3.4 page 29 for latching information.).
SYSTEM TROUBLE	Yellow	Flashes when a non-acknowledged system trouble exists. Lights steadily after you acknowledge the trouble.	Clear the trouble condition.
SIGNALS SILENCED	Yellow	Lights steadily after a fire alarm condition occurs and after you press SIGNAL SILENCE to silence all outputs. Flashes to indicate that some silenceable outputs are on and some are off.	Press SYSTEM RESET. DRILL will also turn off the LED.
POINT DISABLED	Yellow	Lights when one or more system devices are disabled.	Enable the device or remove the disabled device from the system program.

Table 2.1 Descriptions of System Status Indicator LEDs (2 of 2)

- * Activation of a Manual Release Switch will override PredischARGE Delay and override an active Abort Release Switch, resulting in an immediate agent release.

2.3 Control Keys

The control panel provides five Control Keys as described below:

2.3.1 Acknowledge/Scroll Display

Use the ACKNOWLEDGE/SCROLL DISPLAY key to respond to new alarm or trouble signals. When pressed, the control panel does the following:

- Silences the panel sounder
- Changes all active LED indicators from flashing to steady
- Sends an Acknowledge message to the History buffer and installed printers, CRT-2 terminals, and FDU-80 annunciators
- Sends a signal to silence the sounders on the FDU-80 and ACS annunciators

You can also press this key to display multiple alarms or troubles. If more than one alarm or trouble exists, the control panel displays the next alarm or trouble for 3 seconds (or until you press the ACKNOWLEDGE/SCROLL DISPLAY key), then displays the next alarm or trouble.



NOTE: If Local Control is set to “0” (NO), the FACP will not respond to ACKNOWLEDGE, and the piezo will not sound.

2.3.2 Signal Silence

Use the SIGNAL SILENCE key to silence the panel sounder and turn off all audio and visual devices connected to Notification Appliance Circuits. When pressed, the control panel does the following:

- Turns off the panel sounder
- Turns off all silenceable output circuits
- Lights the SIGNALS SILENCED LED
- Sends a SIGNALS SILENCED message to the History buffer and installed printers, CRT-2 terminals, and FDU-80 annunciators

Partial Signal Silence

When some active outputs are silenced and others remain constant, the SIGNALS SILENCED LED will flash



NOTE: If Local Control is set to “0” (NO) or “2” (Partial Control), the FACP will not respond to SIGNAL SILENCE.

2.3.3 System Reset

Use the SYSTEM RESET key to reset the control panel. When pressed, the control panel does the following:

- Clears ALL active inputs
- Interrupts resettable power
- Sends a “System Reset” message to the History buffer, and installed printers, CRT-2 terminals, and FDU-80 annunciators
- Decouples from Noti•Fire•Net, if connected, for 60 seconds to allow Cooperative Control By Event (CCBE) to clear.

If any alarm or trouble exists after you press the SYSTEM RESET key, all NACs, control outputs, and panel audio and visual indicators will reactivate.



NOTE: Trouble conditions will not clear and re-report upon reset.



NOTE: If Local Control is set to “0” (NO), the FACP will not respond to SYSTEM RESET.

2.3.4 Drill

Use the DRILL key to manually activate all silenceable outputs and Notification Appliance Circuits. To prevent accidental activation, you must press the DRILL key for 2 seconds. When pressed, the control panel does the following:

- Turns on all silenceable NACs
- Turns off the SIGNALS SILENCED LED
- Sends a Manual Evacuate message to the History buffer and installed printers, CRT-2 terminals, and FDU-80 annunciators



NOTE: If Local Control is set to “0” (NO) or “2” (Partial Control), the FACP will not respond to DRILL.

2.3.5 Lamp Test

Use the LAMP TEST key to test the control panel LEDs and the panel sounder. When pressed and held, the control panel does the following:

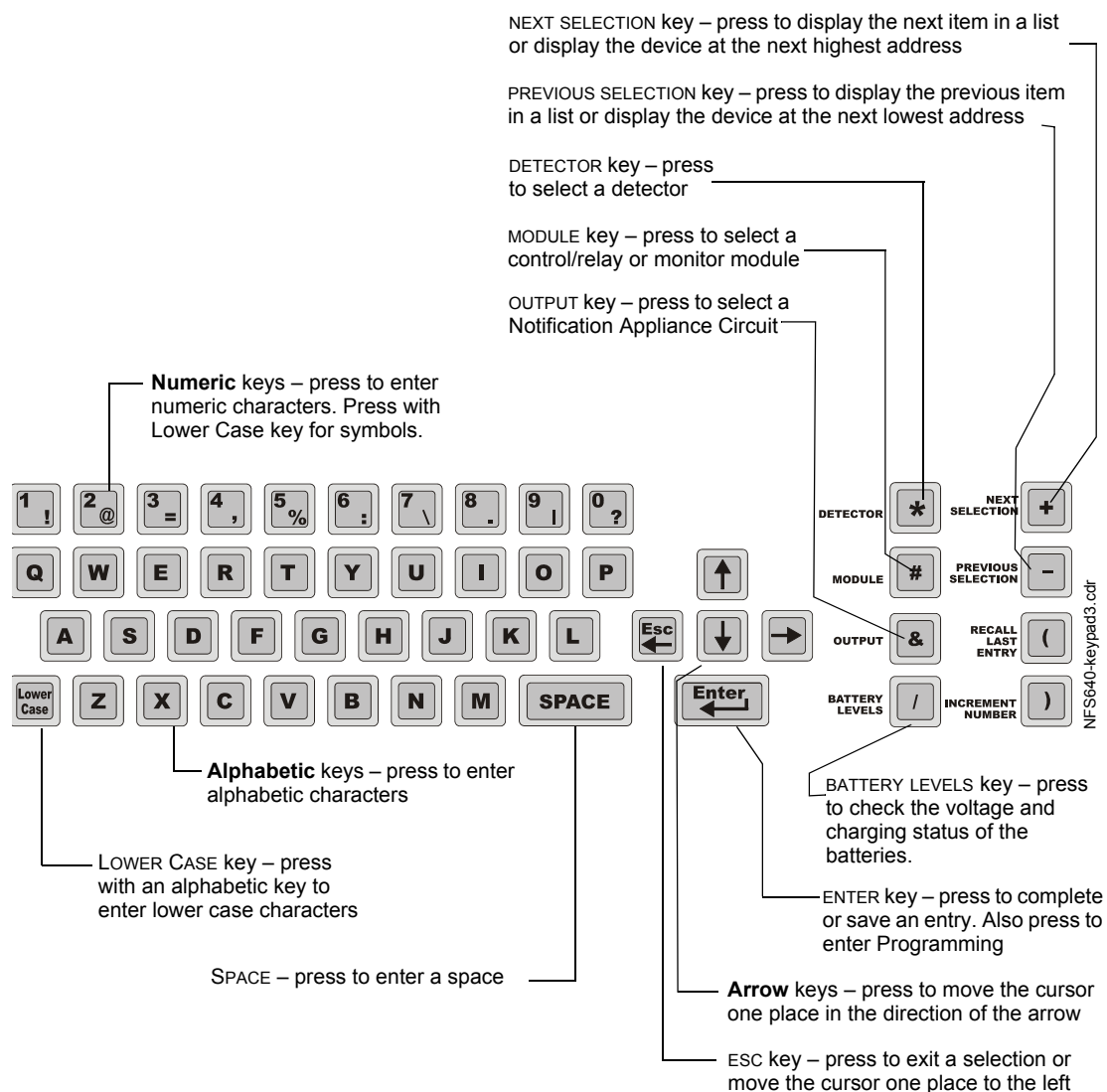
- Lights all control panel LEDs
- Turns on the panel sounder
- Lights all segments of the LCD display. When the LAMP TEST key is held for longer than five seconds, the LCD will display the Software Revisions.

2.4 Programming Keypad

The programming keypad includes:

- Function keys: DETECTOR, MODULE, OUTPUT, BATTERY LEVELS, NEXT SELECTION, PREVIOUS SELECTION, RECALL LAST ENTRY, and INCREMENT NUMBER
- ENTER key
- Cursor movement keys: ESC/LEFT ARROW key, UP key, RIGHT key, DOWN key
- Alphabetic and numeric keys, with LOWER CASE selection key

Shown below is the Programming Keypad, with descriptions for the keys.



Section 3: Operation of the Control Panel

3.1 Overview

This section contains instructions for operating the control panel. Listed below are the topics detailed in this section:

Section	Refer to Page
3.2, "Normal Mode of Operation"	page 17
3.3, "Fire Alarm Mode of Operation"	page 17
3.4, "Mass Notification Mode of Operation"	page 19
3.5, "Carbon Monoxide (CO) Alarm Mode of Operation"	page 22
3.6, "System Trouble Mode of Operation"	page 23
3.6, "System Trouble Mode of Operation"	page 24
3.7, "Security Alarm Mode of Operation"	page 26
3.8, "Active Supervisory Signal Mode of Operation"	page 27
3.9, "Pre-Alarm Warning Mode of Operation"	page 29
3.10, "Disabled Points Mode of Operation"	page 31
3.11, "Non-Alarm Mode of Operation"	page 31
3.12, "Active Trouble Monitor Mode of Operation"	page 32
3.13, "Output Circuit Trouble Mode of Operation"	page 33
3.14, "Operation of Special System Timers"	page 35
3.15, "Waterflow Circuit Operation"	page 36
3.16, "Style 6 and Style 7 Operation"	page 36

This manual also contains information on operating the control panel in the appendixes, listed as follows:

- Appendix A, "Special Zone Operation", on page 51
- Appendix B, "Intelligent Detector Functions", on page 60
- Appendix C.3, "Remote Terminal Mode Functions", on page 63
- Appendix D, "Point and System Troubles Lists", on page 69



WARNING:

When used for CO₂ releasing applications, observe proper precautions as stated in NFPA 12. Do not enter the protected space unless physical lockout and other safety procedures are fully completed. Do not use software disable functions in the panel as lockout.

3.2 Normal Mode of Operation

The system operates in Normal mode when no alarms or troubles exist. In Normal mode, the control panel displays a System Normal message as follows

SYSTEM NORMAL	01:56P 041511 Tue
---------------	-------------------

Figure 3.1 Sample System Normal Message

In Normal mode, the control panel does the following functions at regular intervals:

- Polls all SLC devices and the four NACs to check for valid replies, alarms, troubles, circuit integrity, supervisory signals, etc.
- Checks power supply troubles and batteries at 10-second intervals
- Sends a supervisory query on the optional FDU-80 and verifies proper response
- Refreshes the LCD display and the optional FDU-80 display and updates time
- Scans for any keypad or Control Key entries
- Performs a detector automatic test operation
- Tests system memory
- Monitors for microcontroller failure

3.3 Fire Alarm Mode of Operation

3.3.1 How the Control Panel Indicates a Fire Alarm

When an initiating device (detector or monitor module) activates, the control panel does the following:

- Produces a steady audible tone
- Activates the System Alarm relay (TB4)
- Flashes the FIRE ALARM LED
- Displays a Type Code that indicates the type of device that activated the fire alarm
- Displays ALARM in the status banner on the LCD display, along with information specific to the device, as shown below:

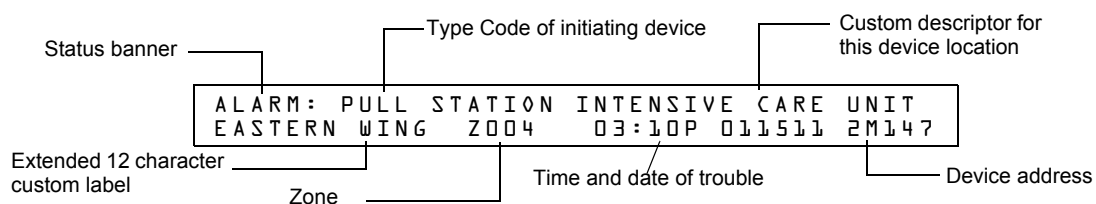


Figure 3.2 Sample Fire Alarm Display

- Sends an Alarm message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
- Latches the control panel in alarm. (You can not return the control panel to normal operation until you correct the alarm condition and reset the control panel)
- Initiates any Control-By-Event actions
- Starts timers (such as Silence Inhibit, Auto Silence)
- Activates the general alarm zone (Z00)

3.3.2 How to Respond to a Fire Alarm

If the control panel indicates a fire alarm, you can do the following:

- To silence only the panel sounder:
Press the ACKNOWLEDGE/SCROLL DISPLAY key. The local sounder will silence and the FIRE ALARM LED will change from flashing to steady.
The control panel will send an acknowledge message to the LCD display, history buffer, and installed printers, FDU-80 annunciators, and CRT-2s.
- To silence the panel sounder and any activated outputs that are programmed as silenceable:
Press the SIGNAL SILENCE key. The FIRE ALARM LED and SIGNALS SILENCED LED light steady.
The control panel sends a Signal Silenced message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s. The figure below shows a sample Alarm Silenced message.

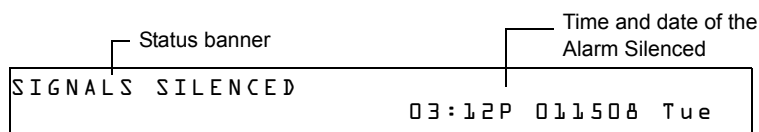


Figure 3.3 Sample Alarm Silenced Message

1. Check the Alarm message for the location and type of trouble.
2. Correct the condition causing the alarm.
3. When you finish correcting the alarm condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the “System Normal” message). The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.3.3 Interpreting Fire Alarm Type Codes

The Type Code that displays in the Alarm message indicates the function of the point that initiates the fire alarm. For example, a monitor module with a PULL STATION Type Code means that the monitor module connects to a manual pull station. The table below lists the Type Codes that can appear in an alarm message:

Type Code	Latching (Y/N)	Purpose	What it does
Monitor Modules			
Blank	Y	Indicates activation of a device with no description	Lights FIRE ALARM LED and activates CBE
HEAT DETECT	Y	Indicates activation of a conventional heat detector	Lights FIRE ALARM LED and activates CBE
MONITOR	Y	Indicates activation of an alarm-monitoring device	Lights FIRE ALARM LED and activates CBE
PULL STATION	Y	Indicates activation of a manual fire-alarm-activating device, such as a pull station.	Lights FIRE ALARM LED and activates CBE
RF MON MODUL	Y	Indicates activation of a wireless alarm-monitoring device	Lights FIRE ALARM LED and activates CBE
RF PULL STA	Y	Indicates activation of a wireless manual fire-alarm-activating device, such as a pull station	Lights FIRE ALARM LED and activates CBE
SMOKE CONVEN	Y	Indicates activation of a conventional smoke detector attached to an FZM-1	Lights FIRE ALARM LED and activates CBE
SMOKE DETECT	Y	Indicates activation of a conventional smoke detector attached to an FZM-1	Lights FIRE ALARM LED and activates CBE
WATERFLOW	Y	Indicates activation a waterflow alarm switch	Lights FIRE ALARM LED and activates CBE
EVACUATE SW	N	Performs Drill function	Activates all silenceable outputs
MAN. RELEASE	Y	Indicates activation of a monitor module programmed to a releasing zone to perform a releasing function.	Lights FIRE ALARM LED and activates CBE

Table 3.1 Fire Alarm Type Codes (1 of 2)

Type Code	Latching (Y/N)	Purpose	What it does
MANREL DELAY	Y	Indicates activation of a monitor module programmed for a release output	Lights FIRE ALARM LED and activates CBE
SECOND SHOT	N	Provides second activation of releasing zone after soak timer has expired.	Indicates ACTIVE and activates CBE
CO MONITOR*	Y	Indicates activation of a CO conventional detector	Activates CBE, does not light an indicator at the control panel.
Detectors			
SMOKE(ION)	Y	Indicates activation of an ion smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCT I)	Y	Indicates activation of a duct ion smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(PHOTO)	Y	Indicates activation of a photo smoke detector	Lights FIRE ALARM LED and activates CBE
RF_PHOTO	Y	Indicates activation of a wireless photoelectric smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCTL)	Y	Indicates activation of a duct laser detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCTP)	Y	Indicates activation of a duct photo smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(HARSH)*	Y	Indicates activation of a HARSH smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(LASER)	Y	Indicates activation of a laser smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(BEAM)	Y	Indicates activation of a beam smoke detector	Lights FIRE ALARM LED and activates CBE
SMOKE(DUCTL)	Y	Indicates activation of a duct laser smoke detector	Lights FIRE ALARM LED and activates CBE
AIR REF	Y	Indicates activation of a laser air reference detector.	Lights FIRE ALARM LED and activates CBE
HEAT	Y	Indicates activation of a 190°F intelligent thermal detector	Lights FIRE ALARM LED and activates CBE
HEAT+	Y	Indicates activation of a 190°F adjustable threshold intelligent thermal detector	Lights FIRE ALARM LED and activates CBE
HEAT(ANALOG)	Y	135°F intelligent thermal sensor	Lights FIRE ALARM LED and activates CBE
HEAT (ROR)	Y	15°F per minute rate-of-rise detector	Lights FIRE ALARM LED and activates CBE
SMOKE ACCLIM	Y	Indicates activation of detector without freeze warning	Lights FIRE ALARM LED and activates CBE
SMOKE (ACCL+)	Y	Indicates activation of a detector with freeze warning	Lights FIRE ALARM LED and activates CBE
SMOKE MULTI*	Y	Multi sensor smoke detector	Lights FIRE ALARM LED and activates CBE
PHOTO/CO*	Y	Indicates activation of the Photo, Heat, or CO element of a detector	Lights FIRE ALARM LED for photo and heat, no LED will light for a CO alarm. Photo and heat will activate CBE, CO alarm activates special function zone FC and sixth CBE zone only (sixth CBE zone programmable via VeriFire Tools)
PHOTO/CO (P SUP)*	Y	Indicates activation of the Photo, Heat or CO element of a detector.	Lights FIRE ALARM LED for heat, no LED will light for a CO alarm, supervisory LED will light for photo alarm, heat and photo will activate CBE, CO alarm activates special function zone FC and sixth CBE zone only (sixth CBE zone programmable via VeriFire Tools)
PHOTO/CO (C SUP)*	Y	Indicates activation of the Photo, Heat or CO element of a detector.	Lights FIRE ALARM LED for heat and photo alarms, will light supervisory LED for CO alarm, photo and heat alarms will activate CBE, CO alarm will activate sixth CBE zone only (sixth CBE zone programmable via VeriFire Tools)

*FlashScan mode only

Table 3.1 Fire Alarm Type Codes (2 of 2)

3.4 Mass Notification Mode of Operation

3.4.1 How the Control Panel Indicates a Mass Notification Alarm

When an initiating device activates, the control panel does the following:

- Produces a steady audible tone

- Does not activate any alarm relays or devices programmed as Alarm Pending or General Pending
- Does not flash any panel LEDs
- Displays a Type Code that indicates the type of device that activated the MN alarm
- Displays MN ALM in the status banner on the LCD display, along with information specific to the device, as shown below:

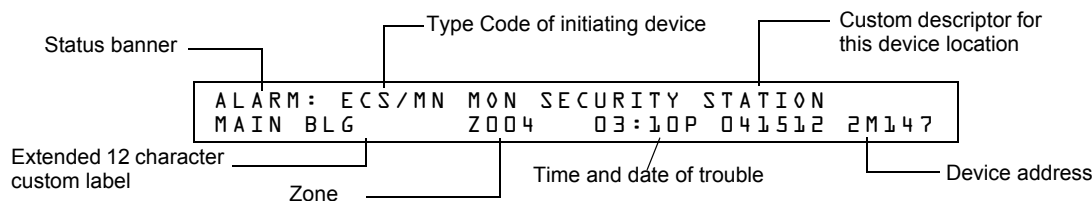


Figure 3.4 Sample MN Alarm Display

- Sends an Alarm message to the LCD display, remote annunciators, History buffer and installed printers, and CRT-2s.
- Latches the control panel in MN alarm. (You can not return the control panel to normal operation until you correct the alarm condition and reset the control panel)
- Initiates any Control-By-Event actions
- Activates special zone ZFD (Not applicable for FirstCommand applications)
- Sends an Alarm message to the central station receiver via the network, if applicable

3.4.2 How to Respond to a MN Alarm

If the control panel indicates a mass notification alarm, you can do the following:

- To silence only the panel sounder:
Press the ACKNOWLEDGE/SCROLL DISPLAY key on a network control device. The local sounder will silence. The control panel will send an acknowledge message to the LCD display, remote annunciators, history buffer, and installed printers, and CRT-2s.
- To silence the panel sounder and any activated outputs that are programmed as silenceable:
Press the SIGNAL SILENCE key on a network control device. The SIGNALS SILENCED LED will light steady.

The control panel sends a Signal Silenced message to the remote annunciators, History buffer and installed printers, and CRT-2s. The figure below shows a sample Alarm Silenced message.

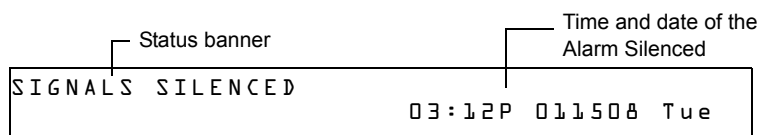


Figure 3.5 Sample Alarm Silenced Message

1. Check the alarm message for the location and type of trouble.
2. Correct the condition causing the alarm.
3. When you finish correcting the alarm condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the “System Normal” message). The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, remote annunciators, and CRT-2s.

3.4.3 How the Control Panel Indicates a Mass Notification Supervisory

When an initiating device activates, the control panel does the following:

- Produces a warbling audible tone
- Activates any alarm relays or devices programmed as Supervisory Pending, General Supervisory, or General Pending
- Flashes the panel's Supervisory LEDs
- Displays a Type Code that indicates the type of device that activated the MN supervisory
- Displays MN SUP in the status banner on the LCD display, along with information specific to the device, as shown below:

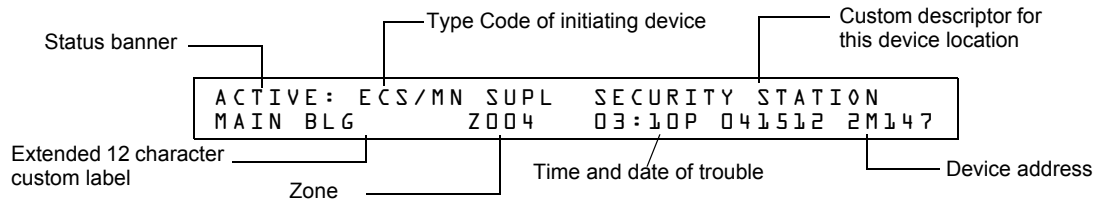


Figure 3.6 Sample MN Supervisory Display

- Sends an MN Supervisory message to the LCD display, remote annunciators, History buffer and installed printers, and CRT-2s.
- Initiates any Control-By-Event actions
- Activates special zone ZFE
- Sends an MN Supervisory message to the central station receiver via the network, if applicable

3.4.4 How to Respond to a MN Supervisory

If the control panel indicates a MN supervisory alarm, you can do the following:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the supervisory LED from flashing to steady. An Acknowledge message is sent to the remote annunciators, history buffer, installed printers, and CRTs. Pressing the ACKNOWLEDGE/SCROLL DISPLAY key will acknowledge all MN supervisory events on the fire panel.
2. Correct the condition that activated the MN supervisory point.
3. For a Latching event, press the system reset key to return the panel to normal operation. For a non-latching event, the panel will return to normal operation once the supervisory condition is corrected.

The control panel sends a "System Normal" message to the LCD display, History buffer, installed printers, remote annunciators, and CRT-2s

3.4.5 How the Control Panel Indicates a Mass Notification Trouble

When an initiating device activates, the control panel does the following:

- Produces a pulsed audible tone
- Activates any alarm relays or devices programmed as Trouble Pending, General Trouble, or General Pending
- Flashes the panel's Trouble LEDs
- Displays a Type Code that indicates the type of device that activated the MN supervisory

- Displays MN TBL in the status banner on the LCD display, along with information specific to the device, as shown below:

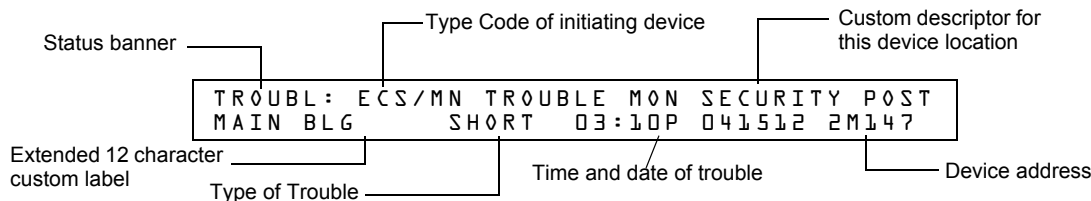


Figure 3.7 Sample MN Trouble Display

- Sends an MN Trouble message to the LCD display, remote annunciators, History buffer and installed printers, and CRT-2s.
- Initiates any Control-By-Event actions
- Activates special zone ZFF
- Sends an MN Trouble message to the central station receiver via the network, if applicable

3.4.6 How to Respond to a MN Trouble

If the control panel indicates a MN trouble, you can do the following:

- Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the Trouble LED from flashing to steady. An Acknowledge message is sent to the remote annunciators, history buffer, installed printers, and CRTs. Pressing the ACKNOWLEDGE/SCROLL DISPLAY key will acknowledge all MN trouble events on the fire panel.
- Check the trouble message for location and type of trouble.
- Correct the condition that the trouble condition. If the trouble clears, the panel sends a Clear trouble message to the History Buffer, installed printers, remote annunciators and CRT-2s (troubles will clear from the fire panel even if they are not acknowledged.).
- If no other events are present in the fire panel, a “System Normal” message is sent to the LCD display, remote annunciators, history buffer, installed printers, and CRT-2s. The fire panel returns to normal operation.

3.4.7 Interpreting MN Type Codes

The Type Code that displays in the fire panel message indicates the function of the point that initiates the activation. The table below lists the Type Codes that can appear in an alarm message:

Type Code	Latching (Y/N)	Purpose	What it does
Monitor Modules			
ECS/MN MONITOR ¹	Y	Indicates activation of a mass notification device	Activates CBE, does not light and LEDs, overrides existing fire events ² , shuts off silenceable outputs and all fire activated strobes
ECS/MN SUPL ¹	Y	Indicates activation of a mass notification device	Lights SUPERVISORY LED and activates CBE
ECS/MN SUPT	N	Indicates activation of a mass notification device	Lights SUPERVISORY LED and activates CBE
ECS/MN TROUBLE MON ¹	N	Indicates trouble on a mass notification device	Monitors mass notification devices. Will generate a trouble condition for both open and short conditions
¹ This type code is not compatible with FirstCommand applications.			
² If ECS/MN OVERRIDE is not selected in VeriFire Tools, fire events will take precedence over ECS/MN audio events.			

3.5 Carbon Monoxide (CO) Alarm Mode of Operation

3.5.1 How the Control Panel Indicates a CO Alarm

When a CO alarm from a FCO-851 or monitor module with a CO monitor activates due to a CO alarm event, the control panel does the following:

- Produces a pulsed audible tone (if the piezo is enabled)
- Displays a CO alarm event that indicates the type of device that activated the CO alarm
- Displays ALARM in the status banner on the LCD display, along with information specific to the device, as shown below:

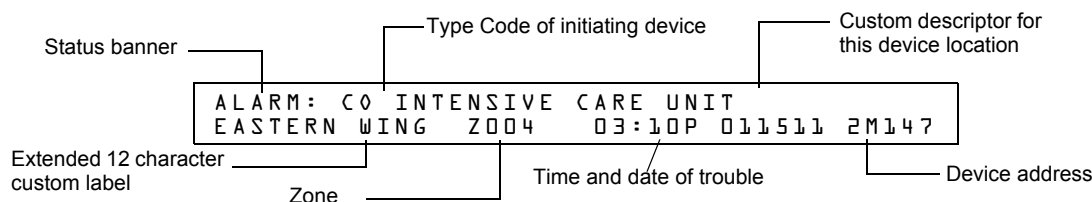


Figure 3.8 Sample CO Alarm Display

- Sends a CO alarm message to the LCD display, remote annunciators, History buffer, installed printers, and CRT-2s.
- Latches the control panel in CO alarm. (You can not return the control panel to normal operation until you correct the CO alarm condition and reset the control panel.)
- Initiates any Control-By-Event actions and activates special function zone FC.

3.5.2 How to Respond to a CO alarm

If the control panel indicates a CO alarm, you can do the following:

- To silence only the panel sounder:

Press the ACKNOWLEDGE/SCROLL DISPLAY key. The local sounder will silence.

The control panel will send an acknowledge message to the LCD display, remote annunciators, history buffer, installed printers, and CRT-2s

- To silence the panel sounder and any activated outputs that are programmed as silenceable:

Press the SIGNAL SILENCE key. The SIGNAL SILENCE LED will light steady.

The control panel sends an Signal Silenced message to the History buffer, installed printers, remote annunciators, and CRT-2s. The figure below shows a sample Alarm silenced message.

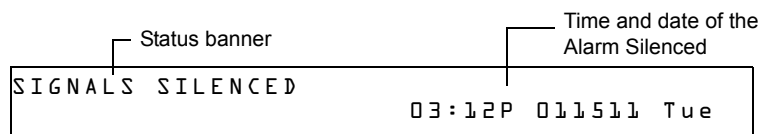


Figure 3.9 Sample Alarm Silenced Message

1. Check the Alarm message for the location and type of trouble.
2. Correct the condition causing the CO alarm.
3. When you finish correcting the CO alarm condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the "System Normal" message). The control panel sends a "System Normal" message to the LCD display, History buffer, installed printers, FDU-80 annunciators, and CRT-2s.

3.5.3 Interpreting CO Alarm/Supervisory Type ID Codes

The Type Code that displays in the CO alarm message indicates the function of the point that initiates the CO alarm. For example, a monitor module with a CO MONITOR Type Code means that the monitor module monitors a conventional CO Detector. The table below lists the Type Codes that can appear in an alarm message:

Type Code	Latching (Y/N)	Purpose	What it does
Monitor Modules			
CO Monitor*	Y	Indicates activation of a CO conventional detector	Activates CBE, CO alarm does not light an indicator at the control panel.
Detectors			
Photo/CO*	Y	Indicates activation of the Photo, Heat, or CO element of a detector	Activates CBE, CO alarm does not light an indicator at the control panel.
Photo/CO (C Sup)*	Y	Indicates activation of the Photo, Heat or CO element of a detector.	Activation of the Heat or Photo elements will light an indicator at the control panel. Activation of the CO element will light the SUPERVISORY LED. Activates the CBE
Photo/CO (P Sup)*	Y	Indicates activation of the Photo, Heat or CO element of a detector.	Activation of the Heat element will light an indicator at the control panel. Activation of a CO alarm will not light an indicator at the control panel. Activation of the Photo element will light the SUPERVISORY LED. Activates the CBE
*FlashScan mode only			

Table 3.2 CO Alarm Type Codes

3.6 System Trouble Mode of Operation

3.6.1 How the Control Panel Indicates a System Trouble

The system goes into system trouble when the control panel detects an electrical fault. If no fire alarms exist, the control panel does the following:

- Produces a pulsed audible tone
- Activates the Trouble relay (TB4)
- Flashes the SYSTEM TROUBLE LED
- Displays a Type Code that indicates the type of device with a trouble.
- Displays TROUBLE in the status banner on the LCD display as well as the type of trouble and information specific to the device, as shown in Figure 3.10 below.
- Sends a Trouble message to the LCD display, history buffer and installed printers, FDU-80 annunciators, and CRT-2s.



NOTE: If a fire alarm exists when a trouble exists, the SYSTEM TROUBLE LED lights, but the Alarm message appears in the LCD display.

Typical Trouble message that appears on the LCD display:

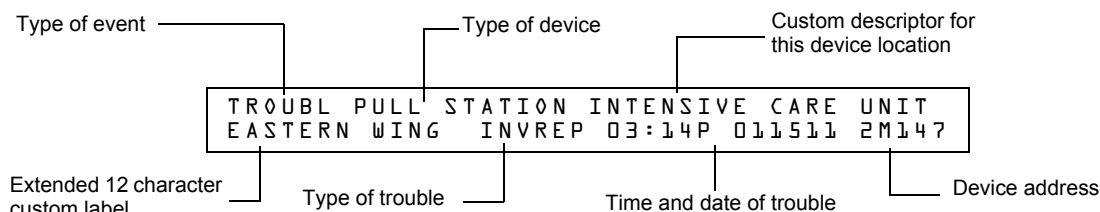


Figure 3.10 Sample Trouble Message

3.6.2 How to Respond to a System Trouble

If the control panel indicates a trouble, you can do the following:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SYSTEM TROUBLE LED from flashing to steady—regardless of the number of troubles, alarms, security and supervisory signals.



NOTE: Pressing the SIGNAL SILENCE key when only troubles exist, gives the same result as pressing the ACKNOWLEDGE/SCROLL DISPLAY key.

2. The control panel sends an Acknowledge message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

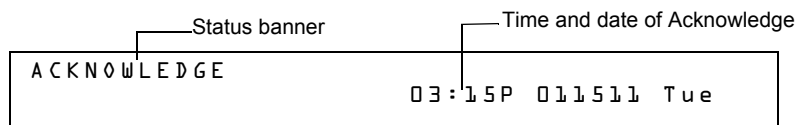


Figure 3.11 Sample Acknowledge Message

3. Check the trouble message for the location and type of trouble.

```

TROUBL MONITOR      MODULE ADDRESS  M021 Z00 OPEN CIRCUIT  08:10A 041508 2M021
TROUBL MONITOR      MODULE ADDRESS  M022 Z00 OPEN CIRCUIT  08:12A 041508 2M022
  
```

Figure 3.12 Sample Trouble Messages on CRT-2 or Printer

4. Correct the condition causing the trouble. If the trouble clears, the control panel sends a Clear Trouble message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

If all troubles clear and no supervisory signals or fire alarms exist, the control panel does the following:

- Returns to Normal operation (indicated by the “System Normal” message)
- Sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Restores troubles automatically - even if troubles are not acknowledged

If multiple trouble conditions exist in the system, the LCD and optional CRT-2 and FDU-80 annunciators display automatically step through each trouble every 3 seconds in the following order:

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

Press the ACKNOWLEDGE/SCROLL DISPLAY key and the display stops on the current trouble event for 1 minute, then begins to automatically step through remaining troubles. To manually step through remaining troubles, press the ACKNOWLEDGE/SCROLL DISPLAY key.

Refer to Appendix D, “Point and System Troubles Lists”, on page 69 for explanations of troubles that appear on the display.

3.7 Security Alarm Mode of Operation

3.7.1 How the Control Panel Indicates a Security Alarm

The system goes into Security mode when a monitor module point programmed with a Security Type Code activates. If no fire alarm exists, the control panel does the following:

- Produces a warbling audible tone
- Turns on the Security relay (TB5)
- Flashes the SECURITY LED (blue)
- Displays a Type Code that indicates the type of security alarm being generated
- Displays ACTIVE in the status banner on the control panel, along with information specific to the device
- Sends a Security message to the LCD display, History buffer, and installed printers, FDU-80 annunciators, and CRT-2s
- Sends a Security message to the proprietary receiver via the network, if applicable.



NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Security alarm will resound the panel sounder.

A Typical security message that appears on LCD display:

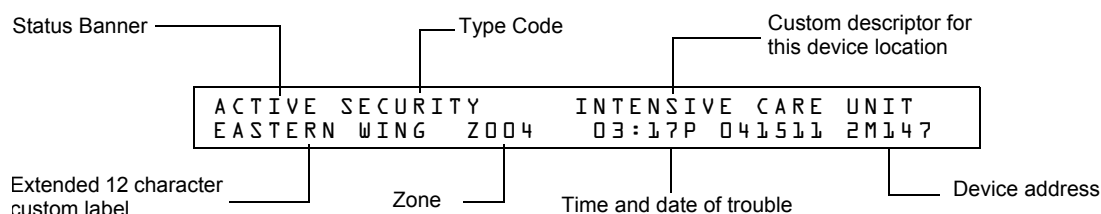


Figure 3.13 Sample Security Alarm Message

3.7.2 How to Respond to a Security Alarm

A Security Type Code latches the control panel. To return the control panel to normal operation, you must correct the condition causing the security condition, then reset the control panel. If the control panel indicates a security alarm, take the following action:



NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Security alarm will resound the panel sounder.

1. Press the ACKNOWLEDGE/SCROLL display key to silence the panel sounder and switch the SECURITY LED from flashing to steady—regardless of the number of troubles, alarms, supervisory, and security signals. The control panel sends a Security message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
2. Correct the condition that activated the Security point.

- When you finish correcting the Security condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the “System Normal” message). The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.7.3 Interpreting Security Type Codes

The Type Code that displays in the security alarm message indicates the type of security alarm being generated by the monitor module that initiates the alarm. For example, a monitor module with a Type Code of AREA MONITOR indicates an intruder in a protected premises area. The table below lists the Type Codes that can appear in a security alarm message.

Monitor Modules			
Type Code	Latching (Y/N)	Purpose	What it does
AREA MONITOR	Y	Monitors area surveillance equipment, such as motion detectors	Lights SECURITY LED, activates CBE
SECURITY	Y	Monitors security switches for tampering	Lights SECURITY LED, activates CBE
SYS MONITOR	Y	Monitors critical equipment for security	Lights SECURITY LED, activates CBE

Table 3.3 Security Type Codes

3.8 Active Supervisory Signal Mode of Operation

3.8.1 How the Control Panel Indicates an Active Supervisory

The system goes into Supervisory mode when a monitor module point programmed with a Supervisory type code activates. When a Supervisory point activates, the control panel does the following:

- Produces a warbling audible tone
- Turns on the Supervisory relay (TB5)
- Flashes the SUPERVISORY LED (yellow)
- Displays one of the Type Codes listed in Table 3.4.
- Displays ACTIVE in the status banner on the control panel, along with information specific to the device
- Sends a Supervisory message to the LCD display, History buffer, and installed printers, FDU-80 annunciators, and CRT-2s



NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Supervisory alarm will resound the panel sounder.

A Typical Supervisory message that appears on LCD display:

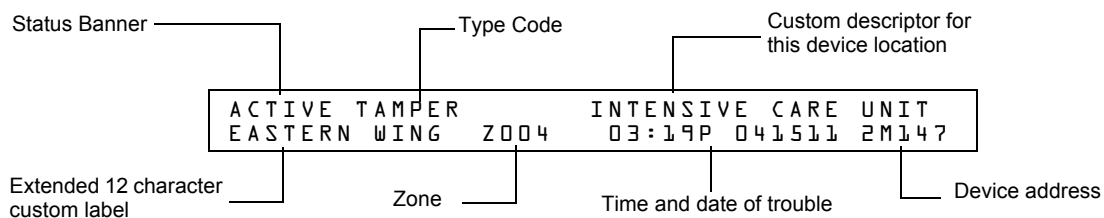


Figure 3.14 Sample Supervisory Signal Message

3.8.2 How to Respond to an Active Supervisory

If a Latching Supervisory Type Code Displays

Some Supervisory Type Codes latch the control panel (Refer to Table 3.4 for a list of these type codes). To return the control panel to normal operation, you must correct the condition causing the supervisory condition, then reset the control panel. Take the following action:



NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Supervisory alarm will resound the panel sounder.

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SUPERVISORY LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals. The control panel sends a Supervisory message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
2. Correct the condition that activated the supervisory point.
3. When you finish correcting the latching supervisory condition, press the SYSTEM RESET key to return the control panel to normal operation (indicated by the “System Normal” message). The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

If Non-latching Type Code Displays

Some Supervisory Type Codes do not latch the control panel. (Refer to Table 3.4 for a list of these type codes). The control panel automatically returns to normal operation, when you correct the condition that activates the supervisory point. If the control panel indicates a non-latching supervisory point, take the following action:



NOTE: If a fire alarm exists, and there are silenced alarms (the SIGNALS SILENCED LED is lighted), a Supervisory alarm will resound the panel sounder.

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SUPERVISORY LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals. The control panel sends a Supervisory message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s.
2. Correct the condition that activated the supervisory point.
3. The control panel automatically returns to normal operation (indicated by the “System Normal” message) and the control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.8.3 How to Interpret Supervisory Type Codes

The Type Code that displays in the Supervisory message indicates the function of the point that initiates the Supervisory. For example, a monitor module with a TAMPER Type Code means that the monitor module connects to a tamper switch.

Type Codes that can appear in an Supervisory message:

Monitor Modules			
Type Code	Latching (Y/N)	Purpose	What it does
WATERFLOW S	Y	Indicates supervisory condition for activated water flow switch	Lights SUPERVISORY LED and activates CBE
RF SUPERVSRY	N	Monitors a radio frequency device	Lights SUPERVISORY LED and activates CBE
LATCH SUPERV	Y	Indicates latching supervisory condition	Lights SUPERVISORY LED and activates CBE
TRACK SUPERV	N	Indicates tracking supervisory condition	Lights SUPERVISORY LED and activates CBE
SPRINKLR SYS	Y	Indicates activation of sprinkler system	Lights SUPERVISORY LED and activates CBE
TAMPER	Y	Indicates activation of tamper switch	Lights SUPERVISORY LED and activates CBE
Detectors			
SUP.T(DUCTI)	N	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(DUCTI)	Y	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUPT(DUCTL)	N	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUPL(DUCTL)	Y	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.T(DUCTP)	N	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(DUCTP)	Y	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUPT(PHOTO)	N	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(PHOTO)	Y	Photo detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.T(ION)	N	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(ION)	Y	Ion detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.L(LASER)	Y	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
SUP.T(LASER)	N	Laser detector that indicates supervisory (non-alarm) condition	Lights SUPERVISORY LED and activates CBE
PHOTO/CO (C SUP)*	Y	Indicates activation of the Photo, Heat or CO element of a detector.	Activation of a Heat or Photo elements will light an indicator at the control panel. Activation of the CO element will light the SUPERVISORY LED. Activates the CBE
PHOTO/CO (P SUP)*	Y	Indicates activation of the Photo, Heat or CO element of a detector.	Activation of a Heat element will light an indicator at the control panel. Activation of a CO alarm will not light an indicator at the control panel. Activation of the Photo element will light the SUPERVISORY LED. Activates the CBE
*FlashScan mode only			

Table 3.4 Supervisory Type Codes

3.9 Pre-Alarm Warning Mode of Operation

3.9.1 How the Control Panel Indicates a Pre-Alarm Warning

The control panel activates a Pre-Alarm Warning if a detector exceeds the programmed Pre-Alarm Alert or Action level. When a detector activates a Pre-Alarm, the control panel does the following:

- Pulses the panel sounder
- Flashes the PRE-ALARM LED
- Activates the Pre-Alarm zone (F9)
- Sends a Pre-Alarm message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Displays a pre alarm status banner, the Type Code of the detector, and the Pre-Alarm level (Alert or Action) on the LCD display, along with information specific to the device as shown in Figure 3.15.

3.9.2 How to Respond to a Pre-Alarm Warning

Pre-Alarm Alert and Action Levels

The Pre-Alarm function is a programmable option which determines the system's response to real-time detector sensing values above the programmed setting. Use the Pre-Alarm function if you want to get an early warning of incipient or potential fire conditions. The Pre-Alarm function provides one of two levels of Pre-Alarm as follows:



NOTE: For detailed information on Pre-Alarm applications, refer to the *NFS-320 Programming Manual*.

- Alert – a non-latching condition that causes a Pre-Alarm when a detector reaches the programmed Pre-Alarm level.
- Action – a latching condition that causes a Pre-Alarm when a detector reaches the programmed Pre-Alarm level.

Responding to a Pre-Alarm Warning

The Pre-Alarm screen display is the same for both alert and action conditions. Following is a sample screen for a Pre-Alarm message.

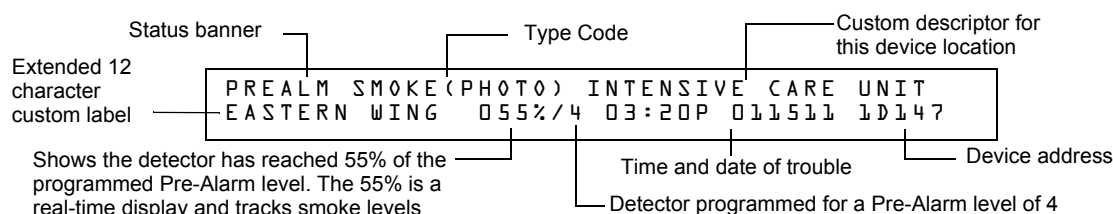


Figure 3.15 Sample of an Alert Pre-Alarm Message

An Alert Pre-Alarm automatically restores to normal when the detector sensitivity, programmable to one of nine settings, drops below the programmed Alert level. Zone F09 automatically clears when no Pre-Alarm conditions exist.

An Action Pre-Alarm latches until you reset the system - even if the detector sensitivity drops below the Action level. Zone F09 activates - but Zone Z00 (general alarm) and the trouble and alarm relays do not activate. The fifth zone programmed, not the first four, in the detector's CBE activates. A subsequent alarm condition for this detector clears the Action indication from the LCD display.

Interpreting Pre-Alarm Type Codes

The Type Code that displays in the Pre-Alarm warning indicates the function of the point that initiates the Pre-Alarm warning. Refer to the Detectors section of Table 3.1 for the Type Codes that can appear in a Pre-Alarm warning, and for descriptions of those Type Codes.

3.10 Disabled Points Mode of Operation

The control panel indicates disabled points by displaying a screen for each disabled detector, monitor module, and control/relay module. Disabled points do not cause an alarm or any Control-by-Event activity. If more than one point is disabled, the control panel automatically displays by priority, mimicking the alarms.



CAUTION:

Disabling a zone disables all input and output devices associated with the zone if the zone is in first zone “primary” mapped location.

When one or more points are disabled, the control panel does the following:

- Holds all disabled output points in the off-state
- Flashes the SYSTEM TROUBLE LED
- Lights the POINT DISABLED LED
- Sends a Disabled Point message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Displays a message for each disabled point

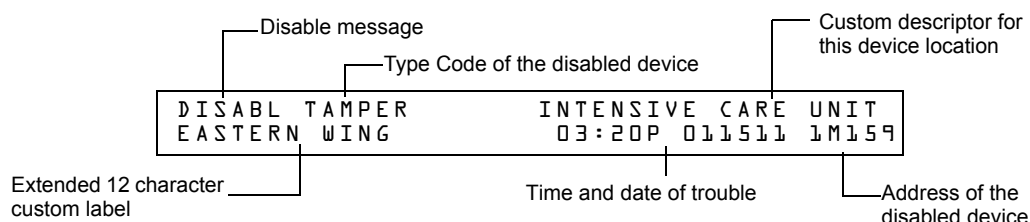


Figure 3.16 Sample Disabled Point Message

3.11 Non-Alarm Mode of Operation

3.11.1 Purpose of Non-Alarm Points

Non-Alarm points are addressable monitor modules programmed with one of the Non-Alarm Type Codes listed in Table 3.5. Non-Alarm points, except Non-Fire, operate like monitored system functions that can produce troubles—but with the differences shown in the following sections.

<i>Monitor Modules</i>			
Type Code	Latching (Y/N)	Purpose	What it does
ACCESS MONTR	N	Used for monitoring building access	Activates CBE
ACK SWITCH	N	Performs Acknowledge function	Silences panel sounder, gives an Acknowledge message on the panel LCD
DRILL SWITCH	N	Performs Drill function	Activates silenceable outputs
FIRE CONTROL	N	Used for air handler shutdown, intended to override normal operating automatic functions	Activates CBE, does NOT light an indicator at the control panel
NON-FIRE	N	Used for energy management or other non-fire situations. Does not affect operation of the control panel	Activates CBE, does NOT light an indicator at the control panel
PAS INHIBIT	N	Inhibits Positive Alarm Sequence	Inhibits Positive Alarm Sequence
RESET SWITCH	N	Performs Reset function	Resets control panel
SIL SWITCH	N	Performs Signal Silence function	Turns off all activated silenceable outputs
ABORT SWITCH	N	Indicates Active at the panel	Aborts activation of a releasing zone

Table 3.5 Non-Alarm Type Codes

3.11.2 How the Control Panel Indicates an Active Fire Control

Activation of a FIRE CONTROL point causes the control panel to do the following:

- Initiate the monitor module Control-by-Event
- Send a message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Display an ACTIVE status banner and FIRE CONTROL Type Code on the LCD display, along with information specific to the device

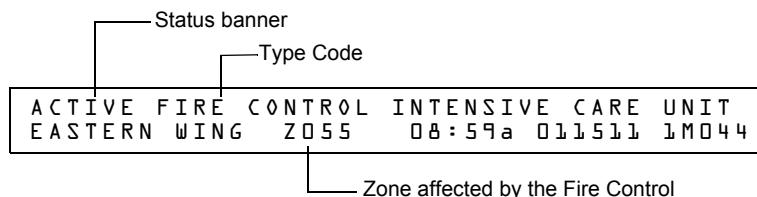


Figure 3.17 Sample Fire Control Point Display

3.11.3 How the Control Panel Indicates an Active Non-Fire Point

Non-Fire point operation does not affect control panel operation, nor does it display a message at the panel LCD. Activation of a Non-Fire point activates CBE—but does not cause any indication on the control panel. For example, you can program a Non-Fire point to turn lights in a zone to a lower setting when activated. In this case, when the point activates the control panel activates the point's CBE to turn the lights down without any audio or visual indication on the control panel.

3.12 Active Trouble Monitor Mode of Operation

3.12.1 How the Control Panel Indicates an Active Trouble Monitor

Trouble Monitor Points are monitor modules programmed with the following Type Codes:

Type Code	Latching (Y/N)	Device Function	Point Function
EQUIP MONITR	N	Used for recording access to monitored equipment	Activates CBE
POWER MONITR	N	Used to monitor remote power supplies or other external equipment	Indicates trouble
TROUBLE MON	N	Used to monitor remote power supplies or other external equipment	Indicates trouble

Table 3.6 Trouble Monitor Type Codes

These types of monitor modules operate like monitored system functions that can produce troubles—but with the following differences:

- The LCD display status banner displays ACTIVE as shown:

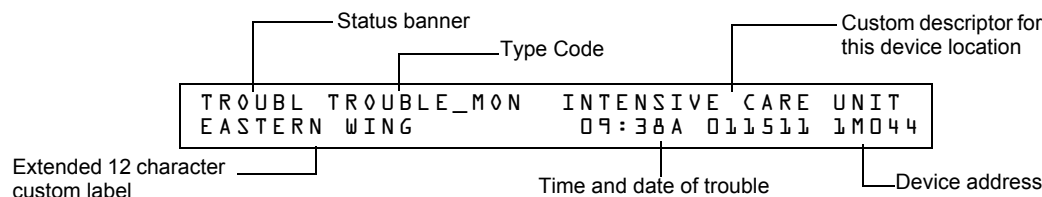


Figure 4 Sample Trouble Monitor Point Message

- The monitor module is non-latching: the module will return to normal when the trouble condition no longer exists.
- The monitor modules activate Control-by-Event

- The panel trouble relay transfers (TB4)

3.12.2 How to Respond to an Active Trouble Monitor

If the control panel indicates an active Trouble Monitor Point, take the following action:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SYSTEM TROUBLE LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals.
2. The control panel sends an Acknowledge message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s. Check the trouble message for the location and type of trouble.
3. Correct the condition causing the trouble.
4. When the trouble condition is corrected, the panel will return to normal operation (indicated by the “System Normal” message).
5. The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.13 Output Circuit Trouble Mode of Operation

3.13.1 Overview

Output circuits include NACs, Control/Relay Modules, and Transponder Points. This section contains a description of control panel operation for each type of output circuit.

- Four NACs are included on the control panel
- Control/Relay Modules connected to the control panel on an SLC
- Transponder Points: XPC-8 (CLIP only), or XP6-C (CLIP or FlashScan)

<i>Trouble Type Codes for Control Modules and NAC Circuits</i>			
Type Code	Silenceable (Y/N)	Configuration	Device Function
CONTROL	N	NAC	Supervised NAC
RELAY	N	FORM-C relay	Relay Output
BELL CIRCUIT	N	NAC	Supervised NAC for notification appliance
STROBE CKT	N	NAC	Supervised NAC for notification appliance
HORN CIRCUIT	N	NAC	Supervised NAC for notification appliance
AUDIBLE CKT	N	NAC	Supervised NAC for notification appliance
REL END BELL	N	NAC	Supervised NAC for notification appliance
blank	N	NAC	Supervised NAC for undefined device
RELEASE CKT	N	NAC	Directs outputs to perform a releasing function.
REL CKT ULC	N	NAC	Directs outputs to perform a release function as required by ULC.
REL AUDIBLE	N	NAC	NAC, activated upon release
NONRESET CTL*	N	NAC	Relay output, unaffected by “System Reset” command
TELEPHONE	N	NAC	Standard Telephone circuit
REL CODE BELL**	N	NAC	Supervised NAC (NFS-320 NAC only)
INSTANT RELE	N	NAC	NAC, short = normal; supervised for open circuits and ground faults. Always non-silenceable and switch-inhibited.
ALARMS PEND	N	NAC	Output that will activate upon receipt of an alarm condition, and remain in the alarm state until all alarms have been acknowledged.
CONTROL NAC**	N	NAC	Supervised NAC

Table 3.7 Control Module and NAC Circuit Trouble Type Codes (1 of 2)

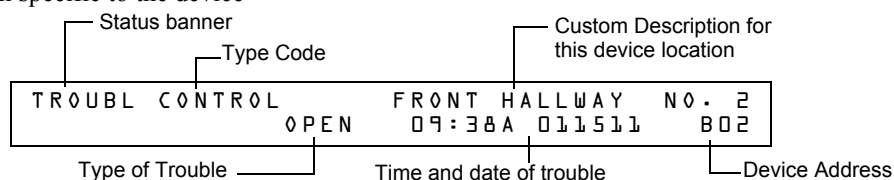
GEN ALARM	Y		Control Module, an XPC-8 circuit, or an XP6-C configured as a Municipal Box Transmitter for NFPA 72 Auxiliary Fire Alarm Systems application. This Type ID can also be used for general alarm activation.
GEN SUPERVIS	Y		Control Module, an XPR-8 relay, or an XP6-R activated under any Supervisory condition (includes sprinkler type).
GEN TROUBLE	Y		Control Module, an XPR-8 relay, or an XP6-R activated under any System Trouble condition.
GENERAL PEND	Y		Control Module, an XPC-8 circuit, or an XP6-C that will activate upon receipt of an alarm and/or trouble condition, and remain in the ON state until all events have been ACKNOWLEDGED.
TROUBLE PEND	N		Control Module, an XPC-8 circuit, or an XP6-C that will activate upon receipt of a trouble condition, and remain in the ON state until all troubles have been ACKNOWLEDGED.
MNS GENERAL ¹	N	NAC	Mass Notification supervised output
MNS CONTROL ¹	N	NAC	Mass Notification supervised output
MNS STROBE ¹	N	NAC	Mass Notification supervised output
MNS SPEAKER ^{1*}	N	NAC	Mass Notification supervised output for speaker circuits
MNS RELAY ^{1*}	N	NAC	Mass Notification supervised output
* Type Code is Control Module type code only.			
** Type Code is NAC Circuit type code only.			
¹ This type code is not compatible for FirstCommand applications.			

Table 3.7 Control Module and NAC Circuit Trouble Type Codes (2 of 2)

3.13.2 How the Control Panel Indicates a NAC Trouble

A Trouble occurring on a NAC causes the control panel to do the following:

- Produce a pulsed audible tone
- Flash the SYSTEM TROUBLE LED
- Turn on the Trouble relay (TB4)
- Send a message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s
- Display a trouble status banner and a CONTROL Type Code on the LCD display, along with information specific to the device

**Figure 3.1 Sample of a NAC in Trouble Message**

3.13.3 How the Control Panel Indicates a Control/Relay Trouble

A trouble occurring on a control/relay module or control/relay transponder causes the control panel to do the following:

- Produce a pulsed audible tone
- Flash the SYSTEM TROUBLE LED
- Turn on the Trouble relay (TB4)
- Send a message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s

- Display a trouble status banner and CONTROL Type Code on the LCD display, along with information specific to the device

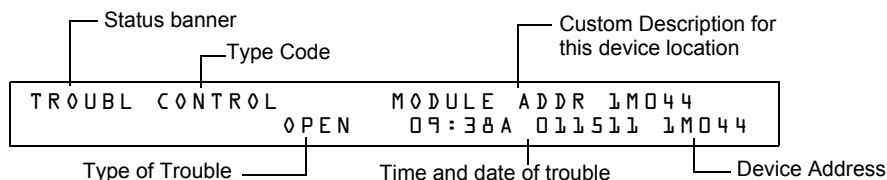


Figure 3.2 Sample of a Control/Relay Module in Trouble Message

3.13.4 How to Respond to a NAC or Control/Relay Trouble

If the control panel indicates an active NAC or Control/Relay Trouble, take the following action:

1. Press the ACKNOWLEDGE/SCROLL DISPLAY key to silence the panel sounder and switch the SYSTEM TROUBLE LED from flashing to steady—regardless of the number of troubles, alarms, and supervisory signals.
2. The control panel sends an Acknowledge message to the History buffer and installed printers, FDU-80 annunciators, and CRT-2s. Check the trouble message for the location and type of trouble.
3. Correct the condition causing the trouble.
4. When the trouble condition is corrected, the panel will return to normal operation (indicated by the “System Normal” message).
5. The control panel sends a “System Normal” message to the LCD display, History buffer and installed printers, FDU-80 annunciators, and CRT-2s.

3.14 Operation of Special System Timers

3.14.1 What are System Timers?

There are user-programmable time delays for three specific functions: the Auto Silence Timer, the Alarm Verification Timer, and the Silence Inhibit Timer. Figure 3.3 shows a sample System Function Selection screen with system timer settings. For instructions on changing system functions, refer to the *NFS-320 Programming Manual*.

3.14.2 How to View System Timer Selections

You can use the Read Status Entry option (explained in Chapter 4) to view the current selection for the System Timers. To do so, press the keys shown below in sequence:



The LCD display shows the current selections for System Functions, which includes the three system timers.

Sample LCD display of a System Function screen with system timer selections:

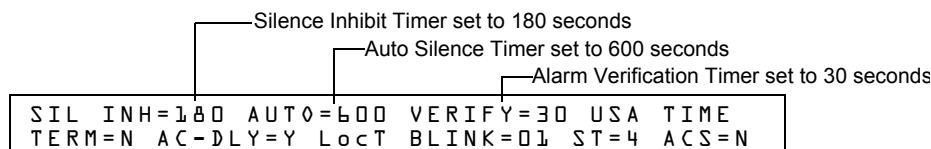


Figure 3.3 Sample System Function Selection Screen

3.14.3 How System Timers Work

The control panel can operate with special system timers: Auto Silence Timer, Alarm Verification Timer and Silence Inhibit Timer.

Auto Silence Timer

A timer that functions like pressing the SIGNAL SILENCE key. When the Auto Silence Timer reaches its programmed value (600-900 seconds), the control panel automatically shuts off all active outputs programmed as silenceable.

Alarm Verification Timer

A timer that directs the control panel to ignore a fire alarm for a smoke detector, programmed for Alarm Verification, while the Alarm Verification Timer is counting. Table 3.8 contains a summary of how the Alarm Verification Timer works.

If	The control panel does this
A second fire alarm occurs while the Alarm Verification Timer is counting	Ignores the Alarm Verification Timer
The Alarm Verification Timer elapses and a fire alarm still exists	Activates the fire alarm
The Alarm Verification Timer expires and a fire alarm no longer exists	Increments the Alarm Verification counter (up to 99) for the device and returns to normal operation

Table 3.8 Alarm Verification Timer Operation

Silence Inhibit Timer

A timer that disables the SIGNAL SILENCE key function and inhibits reset during countdown for the programmed time (0-300 seconds) when a fire alarm occurs. A Silence Inhibit Timer starts at the first fire alarm. Subsequent alarms will not restart the timer until the alarm condition is completely resolved and a panel reset is performed.

3.15 Waterflow Circuit Operation

If a monitor module programmed with a WATERFLOW Type Code initiates a fire alarm, the control panel disables the SIGNAL SILENCE key and the Auto Silence Timer. Refer to the *NFS-320 Installation Manual* for information on Waterflow circuits.



NOTE: In firmware version 18.x (or higher), silenceable outputs activated from a WATERFLOW type code activation can be silenced if the silenceable waterflow option is enabled via VeriFire Tools.

3.16 Style 6 and Style 7 Operation

Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open or short), it will attempt to drive both ends of the loop, maintaining communication in an unsupervised method. The trouble will display on the panel as a Style 6 trouble until you correct the condition. Style 7 configuration of the SLC requires the use of ISO-X isolator modules.

Section 4: Read Status Operation

4.1 Introduction

This section contains instructions and sample screens to show how to access all Read Status functions and menus. For information on Read Status using a CRT-2 refer to Appendix C.3, “Remote Terminal Mode Functions”, on page 63.

4.2 What is Read Status?

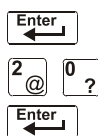
Read Status is a control panel function that lets you view system program information—but not change any programmed settings. The Read Status function lets you do the following:

- View Read Status information without entering a password.
- Enter and operate Read Status functions while the control panel provides full fire protection.
- View Read Status information while a fire alarm or trouble condition exists.



NOTE: If a fire alarm or trouble occurs while you are in Read Status, the control panel automatically exits Read Status operation and displays the new fire alarm or trouble.

4.2.1 Quick Reference Key Sequences



For quick reference, in the left margin next to each Read Status option is a block that shows the key sequence needed to view that option.

For example, the block to the left shows how to display the “Read Point” screen:

4.3 Entering Read Status

To enter Read Status, follow these steps:

1. From the “System Normal” screen, press the ENTER key. The control panel displays the “Entry” screen as shown below;

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

2. From the “Entry” screen, press the 2 key. The control panel displays the “Read Status Options” screen as shown below:

```
READ POINT=0 HIST=2 ALARM HIST=4 <ENTER>
PRNT POINT=1 HIST=3 ALARM HIST=5 <ENTER>
```

4.4 Viewing and Printing a Read Status

To view or print Read Status information follow the instructions below:

Option	Press	Lets you
Read Point	0 key, ENTER key	View information for a detector, module, NAC or zone
Print Points	1 key, ENTER key	Print information for all installed points in the system
Read History	2 key, ENTER key	Display the total number of events in the History buffer and step through each event in sequence
Print History	3 key, ENTER key	Print the contents of the History buffer (up to 800 events)
Read Alarm History	4 key, ENTER key	View a display of the number of alarms in the Alarm History buffer, then scroll through each alarm event
Print Alarm History	5 key, ENTER key	Print the contents of the Alarm History buffer (up to 200 events)



NOTE: If attempting to read a point that is not installed, the control panel displays “Not Installed”.

During all Read Status operations (except print operations) the control panel starts a 2-minute timer each time you press a key. If the control panel does not detect a key press for 2 minutes, the control panel exits Read Status and returns to the “System Normal” display.

In Read Status, you can also do the following:

- Press the ESC key to delete the previous entry.
- Press the SYSTEM RESET key to abort Read Status.

4.4.1 How to View Read Status of Devices, Zones, & System Settings

Overview

Read Point options 0, 2, and 4 in the Read Status Screen let you display and view information for devices and zones programmed into the control panel, as well as view system and annunciator settings. This section provides instructions and sample displays so you can view Read Status.

Topics covered in this section:

To view Read Status for	Refer to
Intelligent Detectors	“How to View Read Status for a Detector” on page 39
Control/relay and Monitor modules	“How to View Read Status for a Control/Relay or Monitor Module” on page 40
NAC	“How to View Read Status for a NAC” on page 41
Software Zones (Z01-Z99)	“How to View Read Status for a Software Zone (Z01-Z99)” on page 42
Special Zones (F0-F9)	“How to View Read Status for a Special Zone (F0-F9)” on page 42
Releasing Zones (R0-R9)	“How to View Read Status for a Releasing Zone (R0-R9)” on page 43
System Functions	“How to Read Status for System Functions” on page 43
Annunciator Selections	“How to Read Status for Annunciator Selections” on page 44

How to Display the Total of Installed Devices

Enter 2 A

To view the total number of installed devices, enter the “Read Status” screen by pressing the ENTER key, then 2, then A. A screen similar to the following will appear:

```
LI:159Dets, 159Mods
SB LI:000: 64 Bells: 04
```

How to Display a Point or Zone for Read Status

Enter 2 0 ? Enter

From the “Read Status” screen, press 0, then press the ENTER key to display the “Read Point Entry” screen as shown below:

```
ZONE=Z,AA,E      DETECTOR=* ,LDAAA,E
MODULE=# ,LMAA,E  OUTPUT CKT=& ,AA,E
```

- To view a detector, press DETECTOR *****, detector SLC address, ENTER.
- To view a zone, press **Z**, zone number, ENTER.
- To view a monitor or control/relay module, press MODULE **#**, module SLC address, ENTER.
- To view a NAC, press OUTPUT **&**, two-digit address, (for example 01 for B01, etc.), ENTER.

When you select a device or a zone, the control panel displays information for the device or zone, but does not send this information to the serial ports or the History buffer.

How to View Read Status for a Detector

Enter 2 0 ? Enter *

Three digit address

+ next device
- previous device

From the “Read Status” screen, press 0, then press the ENTER key. You can now view Read Status for a detector as follows: press DETECTOR, enter the three digit address, then press the ENTER key. For example, to read the status of detector 1D002: press DETECTOR, enter address 002, then press the ENTER key. The control panel now displays information about the detector, as shown in Figure 4.1.

The display and descriptions of the fields are shown below:

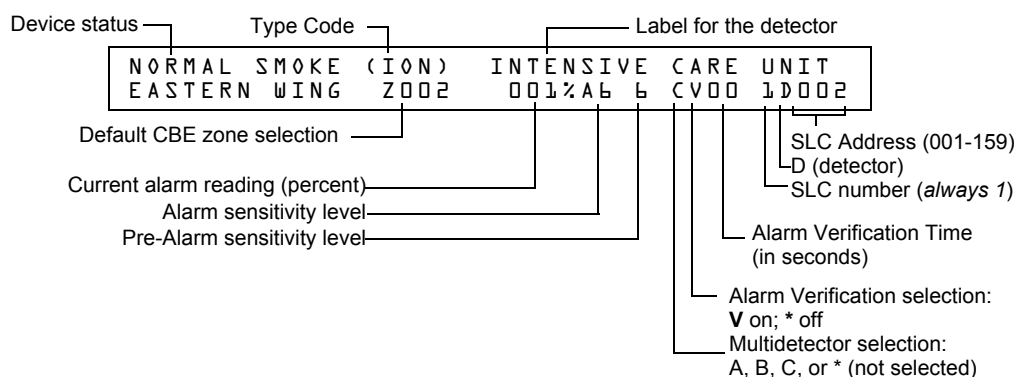


Figure 4.1 Sample Detector Read Status Display

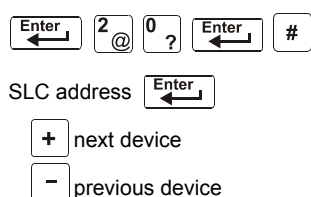
- **Device Status** The status of the detector: Normal, Alarm, or Test.
- **Type Code** The software Type Code that identifies the type of detector. (Refer to “Point Programming” in the *NFS-320 Programming Manual*.)
- **Default CBE Zone Selection** This is the first zone in the 5 zone CBE list. Defaults are Zone 001 (Heat detectors) Zone 002 (Ion detectors) Zone 003 (Photo detectors) Zone 004 (Laser detectors) Zone 005 (Multisensor). Values may differ depending on point programming.
- **Current alarm reading** (xxx%) The current alarm reading of the detector, as a percentage of the alarm sensitivity setting.
- **Alarm sensitivity level** (Ax) The alarm sensitivity (x=1-9) entered in the Detector Sensitivity Screen.
- **Pre-Alarm sensitivity level** The Pre-Alarm Sensitivity (1-9; 0 = Pre-Alarm not used) entered in the Detector Settings Screen.



NOTE: Refer to “Detector Sensitivity Settings” in the *NFS-320 Programming Manual* for more information on the Pre-Alarm and Alarm Sensitivity settings

- **Cooperative Multi-Detector selection** A smoke detector programmed to evaluate readings from nearby detectors in making Alarm or Pre-Alarm decisions. Cooperative Multi-Detector sensing also allows the combination of ionization with photoelectric technology in reaching an alarm decision.
 * – Multi-not used.
 A – combines the detector’s alarm decision with the next SLC address above.
 B – combines the detector’s alarm decision with the next SLC address below.
 C – combines the detector’s alarm decision with the next SLC address above and the next SLC address below.
- **Alarm Verification (* or V)**
 * – Alarm Verification not programmed for this detector.
 V – Alarm Verification enabled.
 Alarm Verification is a user-defined global time function that can reduce the number of nuisance alarms. Refer to page 36 for more information.
- **Device SLC Address** The SLC address of the detector.

How to View Read Status for a Control/Relay or Monitor Module



From the “Read Status” screen, press **0**, then press the ENTER key. You can now view Read Status for a monitor or a control/relay module as follows: press MODULE, enter the SLC address, then press the ENTER key. For example, to read the status of an FCM-1 module 1M147: press MODULE, enter 147, then press the ENTER key. The control panel now displays information about the module as shown in Figure 4.2.

The display and descriptions of the fields are shown below:

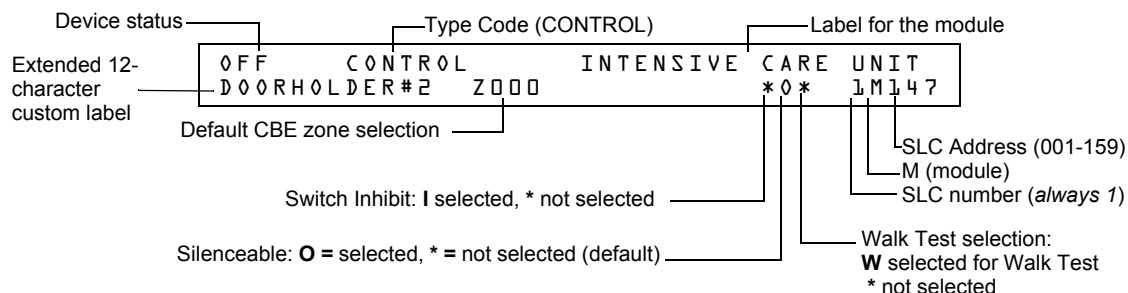


Figure 4.2 Sample Control/Relay or Monitor Module Read Status Display

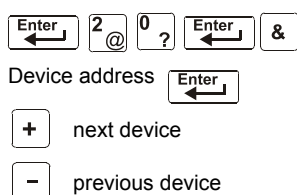
- **Device Status** The status of the module: control/relay module [On (device active) OFF (device not active)] or monitor module (Normal, Alarm, or Test).
- **Type Code** The software Type Code that identifies the type of module. (Refer to “Point Programming” in the *NFS-320 Programming Manual*.)
- **CBE list** Only the first zone in the device’s CBE list will be displayed.
- **Device SLC Address** The SLC address of the module.
- **Switch Inhibit (control/relay module only)** Displays whether the remote ON/OFF capability of the device is inhibited. (I=on; *=off).
- **Silenceable (control/relay module only)** A selection that specifies if the device can be silenced during an alarm by pressing the signal silence key. Possible values are:
 * = output nonsilenceable
 F = silenceable, resound by fire alarm
 U = silenceable, resound by supervisory alarm
 B = silenceable, resound by security alarm
 T = silenceable, resound by trouble
 O = silenceable, does not resound



NOTE: If the “Strobe” Type ID is used with System Sensor Strobe synchronization, F, U, B, T, or O will silence the entire circuit, “*” will silence the horn portion only.

Walk Test (control/relay module only) A selection that specifies if the device will activate during a Walk Test.

How to View Read Status for a NAC



From the “Read Status” screen, press **0**, then press the ENTER key. You can now view Read Status for a NAC as follows: press OUTPUT, enter the device address, then press the ENTER key. For example, to read the status of NAC 0-2: press OUTPUT, enter 02, then press the ENTER key. The control panel now displays information for a NAC as shown in Figure 4.3.

The display and descriptions of the fields are shown below:

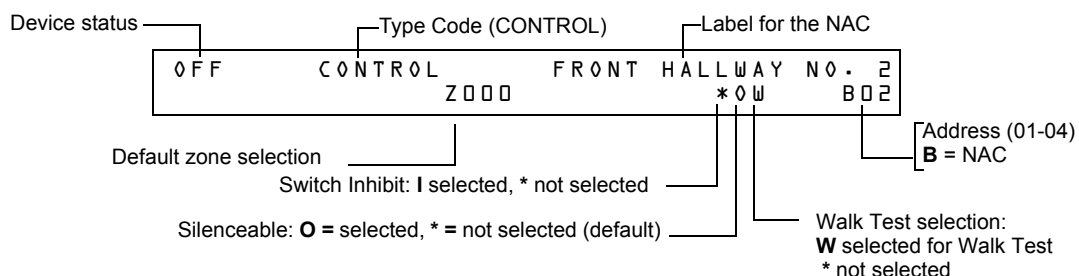


Figure 4.3 Sample NAC Read Status Display

- **Device Status** The status of the device: ON (device active) OFF (device not active).
- **Type Code** The software Type Code that identifies the type of NAC. Refer to “Appendix F - Type Codes” in the *NFS-320 Programming Manual*.
- **CBE List** Only the first zone in the NAC’s CBE list will be displayed here.
- **Device Address** The address of the NAC (01-04)
- **Switch Inhibit** A selection for disabling the switch function for the control/relay or transponder output circuit. (I=on; *=off).

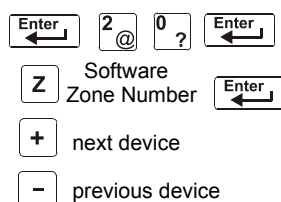
- **Silenceable** A selection that specifies if the device can be silenced during an alarm by pressing the SIGNAL SILENCE key. Possible values are:
 * = output nonsilenceable
 F = silenceable, resound by fire alarm
 U = silenceable, resound by supervisory alarm
 B = silenceable, resound by security alarm
 T = silenceable, resound by trouble
 O = silenceable, does not resound



NOTE: If the “Strobe” Type ID is used with System Sensor Strobe synchronization, F, U, B, T, or O will silence the entire circuit, “*” will silence the horn portion only.

- **Walk Test** A selection that specifies if the device will activate during a Walk Test.

How to View Read Status for a Software Zone (Z01-Z99)



From the “Read Status” screen, press **0**, then press the ENTER key. You can now view Read Status for a Software Zone as follows: press **Z**, enter the zone number (01-99), then press the ENTER key. For example, to read the status of Software Zone 07: press **Z**, enter **07**, then press the ENTER key. The control panel now displays information for a Software Zone as shown below.

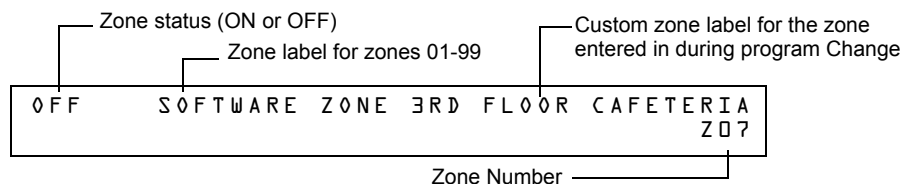
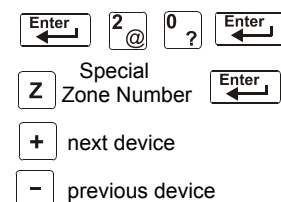


Figure 4.4 Sample Software Zone Read Status Display

How to View Read Status for a Special Zone (F0-F9)



From the “Read Status” screen, press **0**, then press the ENTER key. You can now view Read Status for a Special Zone as follows: press **Z**, enter the zone number (F0-F9), then press the ENTER key. For example, to read the status of Special Zone F8: press **Z**, enter **F8**, then press the ENTER key. The control panel now displays information for a Special Zone as shown below.



NOTE: The zone label depends on the type of Special Zone. For example, CODING FUNCTION CODE TYPE for F8.

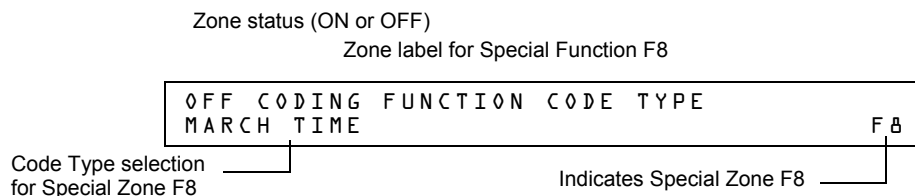
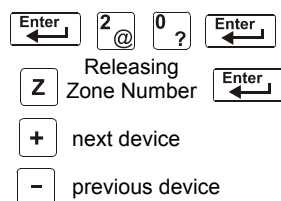


Figure 4.5 Sample Special Zone Read Status Display

How to View Read Status for a Releasing Zone (R0-R9)



From the “Read Status” screen, press **0**, then press the ENTER key. You can now view the Read Status of a Releasing Zone as follows: press **Z**, enter the zone number (R0-R9), then press the ENTER key. For example, to read the status of Releasing Zone R0, enter **Z**, enter **R0**, then press the ENTER key. The control panel now displays information for a Releasing Zone as shown below.

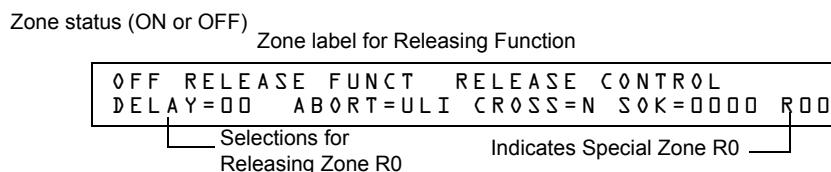
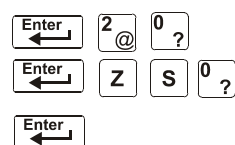


Figure 4.6 Sample Releasing Zone Read Status Display

How to Read Status for System Functions



The “System Functions” screen specifies global settings for the control panel. From the “Read Status” screen, press **0**, then press the ENTER key. You can now view Read Status for System Functions as follows: press **Z**, enter **S0**, press the ENTER key. Shown below is a sample display and description of items for the Read Status of System Functions:

SIL INH=000	AUTO=000	VERIFY=30	USA TIME
TERM=N	AC_DLY=Y	LocT	BLINK=01 ST=4 ACS=N

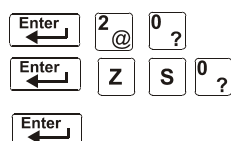
Parameter	Description	Settings
SIL INH=000	Silence Inhibit timer in seconds.	000 = no timer; or the timer duration in seconds up to 300.
AUTO=000	Auto Silence Timer in seconds.	000 = no timer; 600-900 seconds.
VERIFY=30	Alarm Verification Timer	00 = no timer; 00-30 seconds.
USA TIME	Time and date display format	USA TIME or EUR TIME
TERM=N	Terminal supervision	YES – To supervise the wiring of an FDU-80. NO – No FDU-80 supervision.
AC_DLY=N	Delays AC loss reporting	YES - AC loss reporting is delayed for approximately 3 hours. NO - No AC loss delay.
LocT	One of three operating modes of a PC or terminal connected to the control panel (through TB12 PC Terminal)	LocT – terminal connected to control panel and located in the same room as the control panel. LocM – terminal connected to control panel but requires password for operation. RemT – terminal connected through a modem for Read Status operations only.

Table 4.1 System Function Parameters (1 of 2)

Parameter	Description	Settings
BLINK=01	The rate at which intelligent control or monitor modules blink during polling	BLINK=00: No blink BLINK=01: Devices blink on every poll. BLINK=16: Devices blink every 16th poll.
ST=4	NFPA wiring style operation for the SLC	4 – Style 4 SLC or 6 – both Style 6 and Style 7 SLC
ACS=N	Use ACS Selection Groups	N – No annunciator selected or Y – Select and display ACS Selection Groups

Table 4.1 System Function Parameters (2 of 2)

How to Read Status for Annunciator Selections



Annunciator Selection screens specify the information that displays on ACS annunciators. From the “Read Status” screen, press **0**, then press the ENTER key. You can now view Read Status for System Functions as follows: press **Z**, enter **S**, enter annunciation selection number (1-4), press the ENTER key. Sample LCD displays for the Read Status of Annunciator Selection are shown below:

A1=Address ACS selection group

S1 ANNUN SELECTION1: A1=H A2=* A3=* A4=*
 A5=* A6=* A7=* A8=* A9=* A10=* A11=*

Figure 4.7 Annunciator Selection 1 Screen

To view the next three annunciator selection screens, press the **+** (NEXT SELECTION) key.

S2 ANNUN SELECTION2: A12=* A13=* A14=*
 A15=* A16=* A17=* A18=* UDACT=N

Figure 4.8 Annunciator Selection 2 Screen

If UDACT=N, the control panel displays the Annunciator Selections 3 and 4 screen, addresses A20-A32, as shown below:

S3 ANNUN SELECTION3: A20=* A21=* A22=*
 A23=* A24=* A25=* A26=* A27=* A28=*

S4 ANNUN SELECTION4: A29=* A30=* A31=*
 A32=*

Figure 4.9 Annunciator Selections 3 and 4 Screens

S5 REGION=0 TBL.REMIND=2 ALA.ROLL=Y
 LOCAL CONTROL=1 IP ACCESS=0 DCC-MODE=N

Figure 4.10 System Function Selection 5 Screen

S6 FLASHSCAN LIDET LIMOD
 Y Y

Figure 4.11 System Function Selection 6 Screen

S7

NODE: 000.XXX, STYLE?:N THRESHOLD CHANNEL A:H, CHANNEL B:H

Figure 4.12 System Function Selection 7 Screen

- SEC_RLY and SUP_RLY (0= turn on by Fire Alarm, 1= turn on by Security, 2= turn on by Supervisory).
- BAT_SIZE (1= battery size is greater than 26 Ahr, 0= less than 26 Ahr).
- C_DRILL (custom drill N= No custom drill, Y= Yes).
- TERM_DATA (0= LCD80 Terminal using 7 bit data, 1= LCD80 Terminal using 8 bit data).
- PRT_BAND (0= 2400, 1= 4800, 2= 9600).

S8

SEC_RLY:1 SUP_RLY:2 BAT_SIZE:0 C_DRILL:N TERM_DATA:0 PRT_BAUD:2 CHARGER:Y
--

Figure 4.13 System Function Selection 8 Screen

An Annunciator Selection screen shows the information that will display on the ACS annunciators. The table below contains the ACS display selections.

1 through 9	Programmable Annunciator #1 through #9
0	Programmable Annunciator #10
A	8 Systems points + Zones 1-56
B	Zones 57-99, 9 F zones, 8 R zones, 4 NAC
C	Loop 1, Modules 1-64
D	Not Used
E	Loop 1, Modules 65-128
F	Not Used
G	Loop 1, Modules 129-159
H	Loop 1, Detectors 1-64
I	Not Used
J	Loop 1, Detectors 65-128
K	Not Used
L	Loop 1, Detectors 129-159
M	Not Used
N	8 Systems points + Zones 1-56, used for remote station communicator (TM-4)
O	8 Systems points + Zones 1-56, used for municipal box trip output (TM-4)

Annunciator addresses 1 to 19 can be programmed to any one of the above selections. If there is a UDACT or UDACT-2, selections A-M will be sent to Annunciator addresses 20 to 32 respectively.

Table 4.2 ACS Selection Groups

An example of ACS selections in Annunciator Selection Screen 1:

ANNUN SELECTION1: A1=H A2=C A3=* A4=* A5=* A6=* A7=* A8=* A9=* A10=* A11=*

Figure 4.14 Annunciator Selection Screen 1 Example



NOTE: An ACS selection marked with an asterisk (*) indicates no annunciator selection.

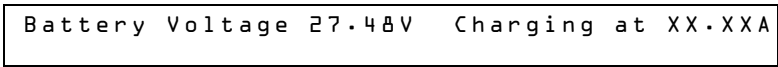
The figure above shows annunciator selections for addresses A1-A3 (addresses A4-A10, marked with asterisks, are not selected)

- Annunciators set to annunciator address 1 (A1) display the status of detectors 1-64 on SLC 1 (ACS Selection Group H)
- Annunciators set to annunciator address 2 (A2) display the status of intelligent modules 1-64 on SLC-1 (ACS Selection Group C)

How to Read Status for Battery Levels

Pressing the BATTERY LEVEL key on the NFS-320 keyboard displays information concerning the state of the battery.

A sample LCD display is shown below.



Battery Voltage 27.48V Charging at XX.XXA

Figure 4.15 Battery Levels

4.4.2 How to View Read Status for Event and Alarm History

Overview

The control panel maintains a History buffer of the last 800 events, each with a time and date stamp. History events include the following:

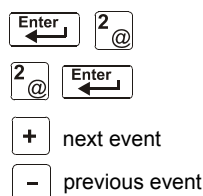
- All alarms, troubles and operator actions, such as: Acknowledge, System Reset, Signal Silence, Drill, and Walk Test.
- Programming entries (Program Change and Status Change, but not Read Status), along with a number (0-9) indicating the programming submenu (for example, 0=Clear). For an example, see Figure 4.18.

You can view events from the History buffer in two forms: by displaying all events (option 2, HIST=2) or by displaying alarm events only (option 4, ALARM HIST=4).



NOTE: The History buffer contains 800 events total, including the alarm events that display for Alarm history. The control panel generates Alarm history from the alarm events that exist in the 800-event History buffer.

How to View Read Status for Event History



Option 2 (HIST=2) lets you view the total number of events in the History buffer (up to 800 events), then view each event in chronological sequence. From the “Read Status” screen, press 2, then press the ENTER key to display the “Event History” screen. A sample of the Event History screen is shown below:

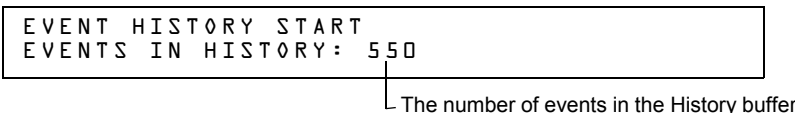


Figure 4.16 Sample Event History Display

To display events in the History buffer, do the following:

- Press the NEXT SELECTION key to step through each event from the first entry (oldest event first) in the History buffer, or
- Press the PREVIOUS SELECTION key to step through each event from the most recent entry in the History buffer.



NOTE: The NEXT SELECTION key will show the most recent event first, and then move to its normal function of displaying the oldest events first.

A sample LCD display for a trouble event:

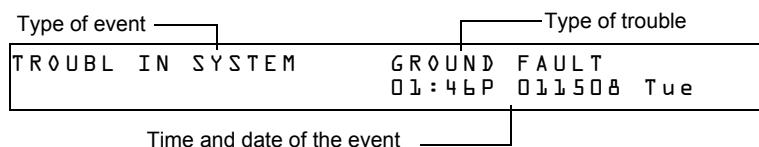


Figure 4.17 Sample Trouble Event Display

A sample LCD display for a Program Change event:

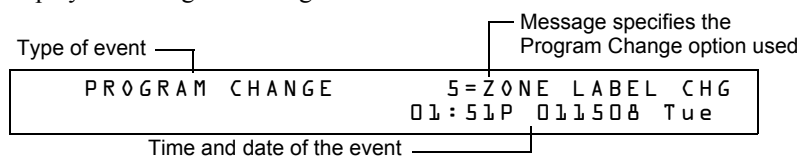


Figure 4.18 Sample Program Change Event Display

How to View Read Status for Alarm History



Option 4 (ALARM HIST=4) lets you view the total number of alarms in the History buffer (up to 200), then view each alarm in chronological sequence. From the “Read Status” screen, press **4**, then press the ENTER key to display the “Event History” screen. A sample Alarm History screen is shown below:

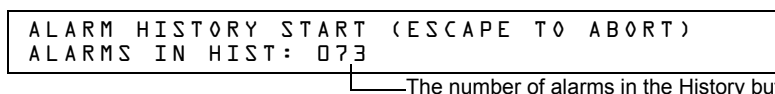


Figure 4.19 Sample Alarm History Display

To display alarms in the buffer, do the following:

- Press the NEXT SELECTION key to step through each alarm from the first entry (oldest alarm first) in the buffer, or
- Press the PREVIOUS SELECTION key to step through each alarm from the most recent entry in the buffer



NOTE: The NEXT SELECTION key will show the most recent event first, and then move to its normal function of displaying the oldest events first.

A sample display for an alarm event:

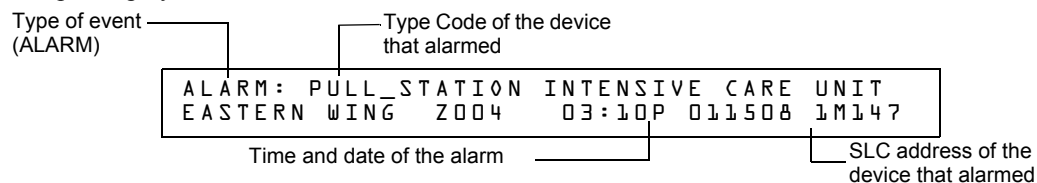


Figure 4.20 Sample Alarm Event Display

4.4.3 How to Print Points, Event and Alarm History

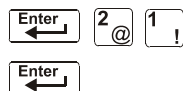
Overview

Read Point options 1, 3, and 5 in the “Read Status” screen let you print points, event history, and alarm history. This section contains instructions for printing, as well as sample point, event history, and alarm history printouts.



NOTE: Before printing, make sure your control panel is connected to a compatible printer and the printer is configured according to the manufacturer’s specifications, and that the correct baud rate is selected at the panel.

How to Print Points



Option 1 (PRNT POINT=1) lets you print a list of all points programmed into the system. From the “Read Status” screen, press **1**, then press the ENTER key to print a list of installed points. A sample Print Point screen is shown below:

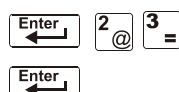
```
STATUS PRINT
```

Figure 4.21 Sample Print Point Display

A sample printout of three points using the Print Point option:

```
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D043      Z003 000%A8 8 ** 1D043
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D044      Z003 000%A8 8 ** 1D044
NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D045      Z003 000%A8 8 ** 1D045
```

How to Print Event History



Option 3 (HIST=3) lets you print a list of all events in the History buffer (up to 800). From the “Read Status” screen, press **3**, then press the ENTER key to print a list of events. A sample History Print screen is shown below:

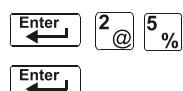
```
HISTORY PRINT
```

Figure 4.22 Sample History Print Screen

A sample printout of three events in history using the History Print option:

```
***** EVENT HISTORY START*****
SYSTEM RESET
ALARM: SMOKE (ION) DETECTOR ADDR 1D075      Z002 02:28P 011508 Tue
ALARM: SMOKE (ION) DETECTOR ADDR 1D076      Z002 02:28P 011508 1D076
ACKNOWLEDGE                                02:28P 011508 Tue
```

How to Print Alarm History



Option 5 (ALARM HIST=5) lets you print a list of alarm events in the History buffer (up to 200). From the “Read Status” screen, press **5**, then press the ENTER key to print a list of alarm events. A sample Print Alarm History screen is shown below:

```
ALARM HISTORY PRINT
```

Figure 4.23 Sample Print Alarm History Display

A sample printout of two alarm events in the History buffer using the Print Alarm History option.

```
*****ALARM HISTORY START*****
ALARM: SMOKE (ION) DETECTOR ADDR 1D075      Z002 02:28P 011508 1D075
ALARM: SMOKE (ION) DETECTOR ADDR 1D076      Z002 02:28P 011508 1D076
*****PRINT END*****
```

4.4.4 How to View and Print Hidden Event and Alarm History

The control panel maintains a copy of the History buffer. For instance, if someone clears the History buffer using Status Change programming option 4, the control panel retains a copy of the History buffer. The copy of the preceding History buffer is called a Hidden History buffer and a copy of the preceding Alarm History is called a Hidden Alarm History buffer.

If you attempt to view or print history and the control panel displays one of the screens shown below you can use the options listed in the table below to view the contents of a Hidden History buffer.

```
HISTORY EMPTY      (ESCAPE TO ABORT)
*****
```

Figure 4.24 History Empty Display

```
ALARM HISTORY EMPTY (ESCAPE TO ABORT)
*****
```

Figure 4.25 Alarm History Empty Display

Options for viewing and printing Hidden History and Hidden Alarm History do not appear in the LCD display when in Read Status. You can view and print the contents of these Hidden History buffers using the options listed in the table below. You read and print Hidden History and Hidden Alarm History the same way you read and print history using the options that appear on the “Read Status” screen. The table also contains references to the sections that contain instructions for reading and printing history.

To	Press	Refer to
Read Hidden Alarm History	 2 @ 6 : 	“How to View Read Status for Alarm History” on page 48
Print Hidden Alarm History	 2 @ 7 \ 	“How to Print Alarm History” on page 49
Read Hidden History	 2 @ 8 . 	“How to View Read Status for Event History” on page 47
Print Hidden History	 2 @ 9 	“How to Print Event History” on page 49

Table 4.3 Hidden History Selections

Appendix A: Special Zone Operation

A.1 Overview

This section contains information for operating the control panel as detailed in the topics listed below:

Section	Special Zone	Refer to Page
A.2, "Releasing Zones (R0-R9)"	R0-R9	page 51
A.3, "Time, Date, and Holiday Functions"	F5, F6, F7	page 54
A.4, "NAC Coding"	F8	page 56
A.5, "Presignal and Positive Alarm Sequence (PAS) Operation"	F0	page 57

A.2 Releasing Zones (R0-R9)

A.2.1 Purpose of Releasing Zones



WARNING: When used for CO₂ releasing applications, observe proper precautions as stated in NFPA 12. Do not enter the protected space unless physical lockout and other safety procedures are fully completed. Do not use software disable functions in the panel as lockout.

The control panel provides ten Releasing Zones (R0-R9). These are special zones that you can use for up to ten independent releasing operations. This section contains descriptions of each Releasing Function option and an example of how Releasing Zone options work.

For instructions on programming Releasing Functions, refer to the *NFS-320 Programming Manual*.

Each Releasing Zone includes the following releasing options:

Option	Description
Cross Zone	Cross Zones let you program the control panel to activate a Releasing Zone when two or more initiating devices are alarmed. Cross Zone selections are: Y Two or more detectors are alarmed that are mapped to one of the ten Releasing Zones (R0-R9) Z Two or more detectors are alarmed that are mapped to two different Software Zones and mapped to one of the ten Releasing Zones (R0-R9). H At least one smoke detector mapped to one of the ten Releasing Zones (R0-R9) is alarmed <i>and</i> at least one heat detector mapped to the same Releasing Zone as the smoke detector is alarmed. N Cross Zones not used
Delay Timer	Select a 0–60 second delay before activating a zone.
Abort	An Abort Switch Type Code used to abort activation of a zone.
Manual Release	Allows immediate zone activation by overriding the abort function, cross-zone function, and delay timer.
Soak Timer	Automatically shuts off the releasing device after a preprogrammed period of time. Select 0001-9999 seconds for a Soak Timer or 0000 seconds for no Soak Timer.

Table A.1 Releasing Options

A.2.2 How to View Releasing Zone Selections

You can use the Read Status Entry option to view the current selections for a Releasing Zone. For example, to view selections for Releasing Zone R1, press the keys in sequence:



A sample LCD display of a Releasing Function selected for Releasing Zone R1:

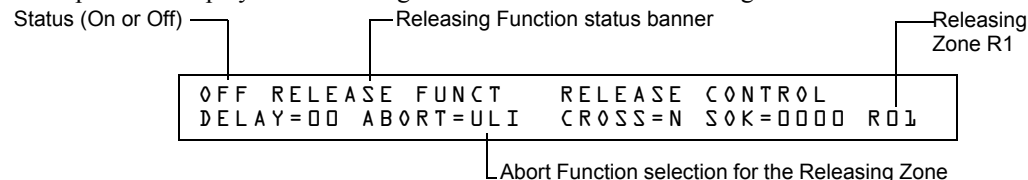
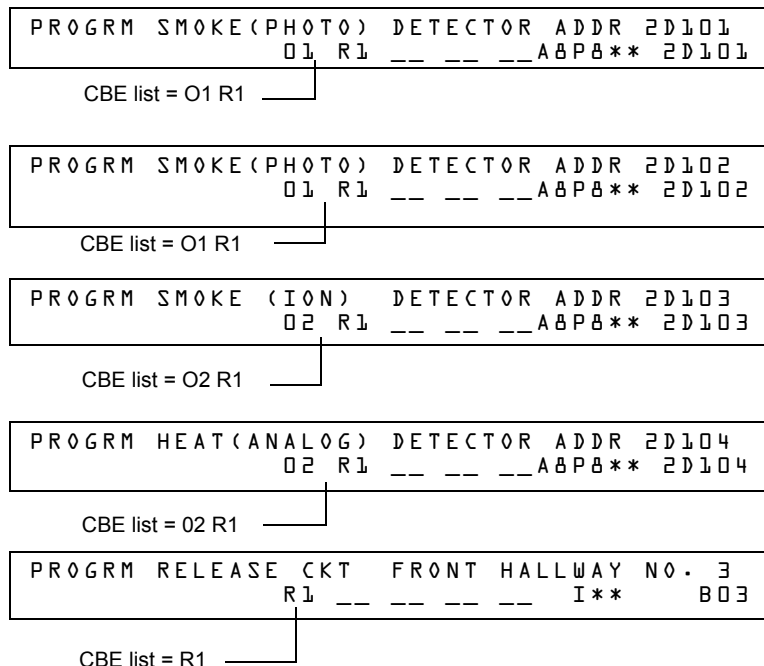


Figure A.1 Sample Read Status for a Releasing Zone

A.2.3 How Releasing Zones Operate

The figure below contains an illustrated example of how Releasing Zones work, using cross zone selections with four detectors and a NAC mapped to Releasing Zone 1 (listed as ZR1 in the CBE list). Table A.2 lists the cross zone selections and the conditions that activate the Releasing Zone:



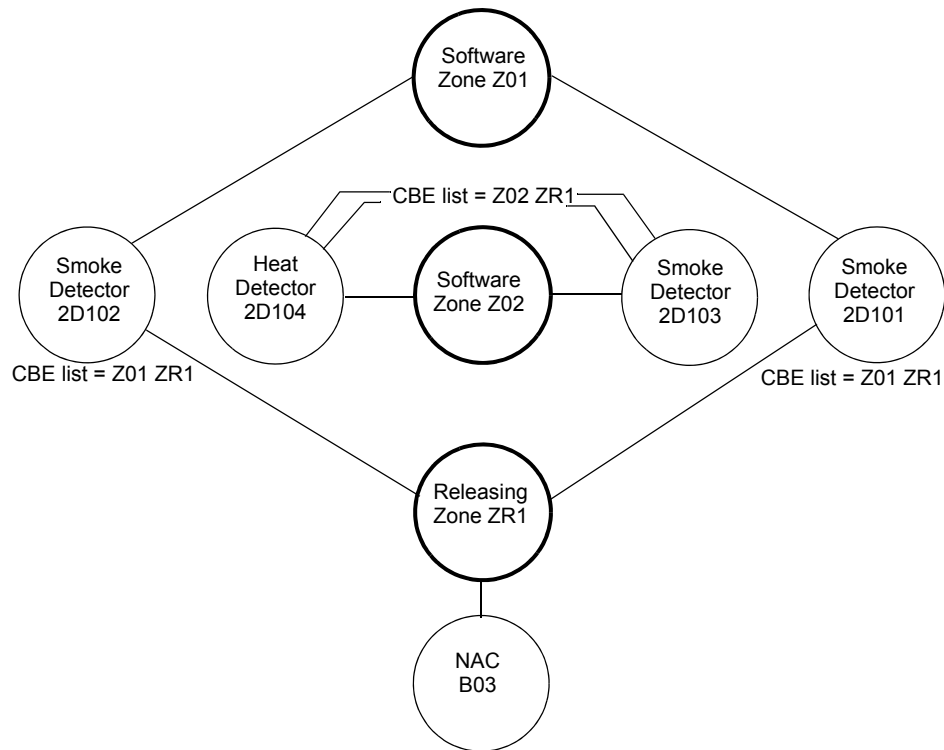


Figure A.2 Illustrated Example of Cross Zone Programming

Listing of each Cross Zone option and the conditions required to activate the Releasing Zone, according to the example shown in Figure A.2.

Cross Zone Selection (Cross=)	Condition(s) Required to Activate the Releasing zone
Cross=N	An alarm from any initiating devices activates the releasing circuit.
Cross=Y	An alarm from any two initiating devices activates the releasing circuit.
Cross=Z	An alarm from two initiating devices mapped to different Software Zones, but mapped to the same Releasing Zone. • An alarm from 2D101 and 2D103 – detectors mapped to different zones, but both list ZR1 in their CBE. • An alarm from 2D102 and 2D104 – detectors mapped to different zones, but both list ZR1 in their CBE. • An alarm from 2D101 and 2D104 – detectors mapped to different zones, but both list ZR1 in their CBE. • An alarm from 2D102 and 2D103 – detectors mapped to different zones, but both list ZR1 in their CBE.
Cross=H	Activation of heat detector 2D104 and one smoke detector (2D101, 2D102, or 2D103).

Table A.2 Example of Cross Zone Selections

A.3 Time, Date, and Holiday Functions

A.3.1 Overview

The control panel includes a real-time clock that displays the time-of-day, the date, and the day-of-week. The clock includes a lithium battery backup. Time displays in a USA format (12-hour time format with month/day/year) or a EUR (European) format as shown below:

TR OUBL	CON TROL	MOD ULE	ADD R	1M 159
	0PEN	03:48P	011508	1M 159

USA Time and Date format (default)

TR OUBL	CON TROL	MOD ULE	ADD R	1M 159
	0PEN	15:48	150108	1M 159

EUR Time and date format

Figure A.3 Sample USA and EUR Time/Date Formats

The control panel also provides Time Control zones F5 and F6 for time and date control functions and zone F7 for holiday functions.

A.3.2 How to View Time Control Selections

You can use the Read Status Entry option to view the current selection for the Time function. To do so, press the following keys in sequence:



or



NOTE: For instructions on programming the Time function, refer to the *NFS-320 Programming Manual*.

The LCD display shows the current selections for the Time Control function. The figure below shows a sample LCD display of a Time Control function:

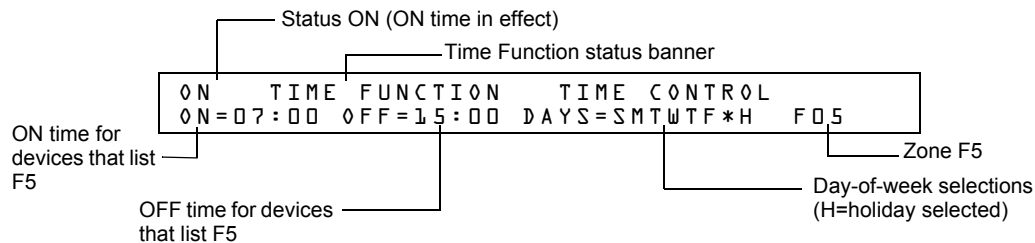


Figure A.4 Sample Read Status for Time Function

A.3.3 How to View Holiday Function Selections

You can use the Read Status Entry option to view the current selection for the Holiday function. To do so, press the following keys in sequence:



NOTE: For instructions on programming the Holiday function, refer to the *NFS-320 Programming Manual*.

The LCD display in Figure A.5 gives an example of an LCD display of a Holiday function:

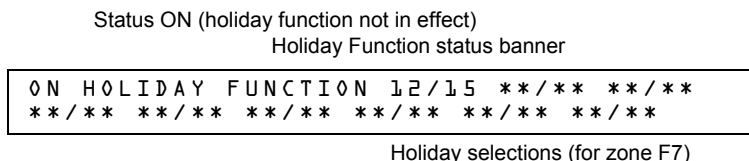


Figure A.5 Sample Read Status for Holiday Function

A.3.4 How Time Control and Holiday Functions Work

Time and Holiday activation occurs automatically and does not require operator intervention. All outputs with a CBE list containing F5 or F6 activate within the times specified for the days of the week listed in F5 or F6. All smoke detectors with a CBE list containing F5 or F6 switch to their lowest sensitivity (AL:9) within the times specified for the days of the week listed in ZF5 or ZF6. Refer to “Intelligent Sensing Applications” in the *NFS-320 Programming Manual* for details on setting detector sensitivity.

Time Control is active for all days of the week listed in F5 or F6. Holidays listed in F7 are excluded unless you list Holidays (H) in the day-of-week selection of F5 and F6 (shown in Figure A.4). Enter the time functions in a 24-hour format with the OFF time later than the ON time. After changing programming using Time Control, always reset the control panel.



NOTE: You can turn a NON FIRE control point on and off, by listing zone F5 or F6 in the CBE list of a control/relay module.

You can use Time Control zones F5 and F6 to program non-fire applications such as turning lights on and off, setting a thermostat, and so on. For example, you can program zones F5 and F6 to activate outputs at one time of day and deactivate outputs at later time, on specified days of a week. Table A.3 contains descriptions of additional Time Control applications:

Application	Requirement
Control day and night sensitivity of intelligent, addressable detectors	List zone F5 or F6 in the detector CBE. This automatically sets the detector sensitivity to the minimum setting (AL:9) during the day and automatically returns detector sensitivity to programmed sensitivity during the evening.
Control a specific date of year	Input up to nine date in the Holiday selection screen for Special Zone F7, then list zone F7 (Holiday) in the CBE of a device.

Table A.3 Time Control Applications

A.4 NAC Coding

A.4.1 Overview of Coding

A Coding selection is the Code Type that pulses when the control panel activates a NAC mapped to Special Zone F8. Special Zone F8 provides coding selections (see Table A.4) that you can list in the CBE of a NAC. To use a Code Type, program a NAC to list Zone F8 (reserved for a Code Type) in the NAC CBE list.



NOTE: Control modules (FCM-1, FRM-1) cannot be coded.

The table below contains descriptions of the signals that correspond to each NAC Code Type:

Coding Selection	Signal	Notes
March Time (default)	120 PPM (pulses Per minute)	Default selection for NACs mapped to F8.
Two-Stage	Alert signal (20 PPM) or General Alarm signal (Temporal pattern)	Alert signal – When an alarm occurs and not activated by another zone, the output pulses at 20 PPM. General Alarm signal – If not acknowledged within 5 minutes, the control panel switches from 20 PPM to Temporal pattern.
California	10 sec. On, 5 sec. Off, repeats	n/a
Temporal	0.5 on, 0.5 off, 0.5 on, 0.5 off, 0.5 on, 1.5 off, repeats	Used as a standard general EVAC signal.
Two-Stage Canada (3 minutes)	Alert signal (20 PPM) Drill Switch activation switches to Temporal pattern	Operates the same as Two-Stage except it will only switch to second stage: • by activation of Drill Switch, or • the three minute timer expires, or • through a CBE event (General Alarm Z00 plus Zones 1-99 or Logic Zones 1-20)
Two-Stage Canada (5 minutes)	Alert signal (20 PPM) Drill Switch activation switches to Temporal pattern	Operates the same as Two-Stage except it will only switch to second stage: • by activation of Drill Switch, or • the five minute timer expires, or • through a CBE event (General Alarm Z00 plus Zones 1-99 or Logic Zones 1-20)
Two-Stage Canada Manual	Alert signal (20 PPM) Drill Switch activation or CBE activation switches to Temporal pattern	Operates the same as Two-Stage except it will only switch to second stage: • by activation of Drill Switch, or • through a CBE event (General Alarm Z00 plus Zones 1-99 or Logic Zones 1-20)
System Sensor Strobe		Synchronizes System Sensor ADA horn/strobes.
Gentex Strobe		Synchronizes Gentex horns/strobes.

Table A.4 F8 Code Types and Audio Signals

A.4.2 How to View Coding (F8) Selections

You can use the Read Status Entry option to view the current selection for the Coding function. To do so, press the following keys in sequence:



NOTE: For instructions on programming the Coding function, refer to the *NFS-320 Programming Manual*.

The LCD display shows the current selections for the Code Type. Figure A.6 shows a sample LCD display of a Code Type selection of March Time:

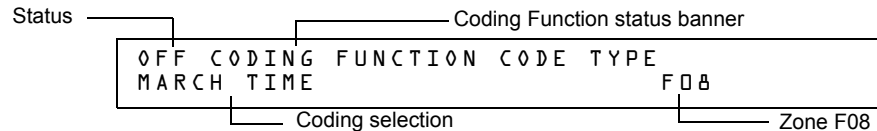


Figure A.6 Sample Read Status for Coding Function

A.4.3 How to Respond to an Alarm with Coding

If an alarm occurs with a Coding selection, the control panel latches the control panel in alarm and pulses outputs mapped to F8 at the pulse specified by the Coding selection (see Table A.4). To silence the outputs, press the SIGNAL SILENCE key.

A.5 Presignal and Positive Alarm Sequence (PAS) Operation

A.5.1 Overview

This section describes the Presignal and PAS selection, and provides instructions on how to do the following:

- View Presignal and PAS selections
- Respond to an alarm with Presignal
- Operate the control panel with a Presignal Delay Timer only
- Operate the control panel with a Presignal Delay Timer and PAS

A.5.2 What is Presignal and PAS?

Presignal is a feature that initially causes alarm signals to only sound in specific areas, monitored by qualified persons. This allows delay of the alarm from 60 to 180 seconds after the start of alarm processing. The control panel Presignal feature provides two selections:



NOTE: Presignal differs from the Alarm Verification Timer which does not require human intervention.

- A Presignal Delay Timer (60-180 seconds) that delays activation of all outputs with a CBE that includes Special Zone F0.
- A PAS selection, in addition to the Presignal Delay Timer, that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs activate immediately and automatically.

An illustration of Presignal and PAS timing.

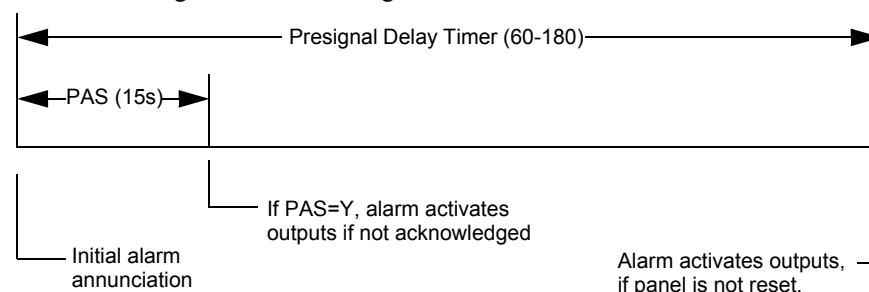


Figure A.7 Presignal and PAS Time

A.5.3 How to View Presignal and PAS Selections

You can use the Read Status Entry option to view the current selection for the Presignal function. To do so, press the keys in sequence:



NOTE: For instructions on programming the Presignal function, refer to the *NFS-320 Programming Manual*.

The LCD display shows the current selections for the Presignal function. The figure below shows a sample LCD display of a Presignal function selected for PAS and a Presignal Delay Timer of 60 seconds:

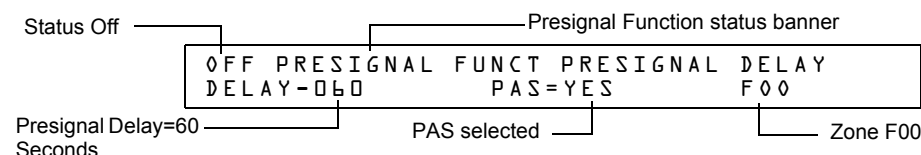


Figure A.8 Sample Read Status for Presignal Function



NOTE: If any monitor modules are programmed with a PAS INHIBIT Type Code and a fire alarm occurs, zone F0 goes false and aborts the Presignal Delay Timer.

A.5.4 How to Respond to an Alarm with Presignal Delay Timer (no PAS)

If an alarm occurs with a Presignal Delay Timer (60-180 seconds), the control panel displays the type of device and the SLC address of the device causing the alarm. If a second alarm occurs during the Presignal Delay Timer, the control panel aborts the Presignal Delay Timer and activates all programmed outputs. A sample Alarm screen for a monitor module is shown below:

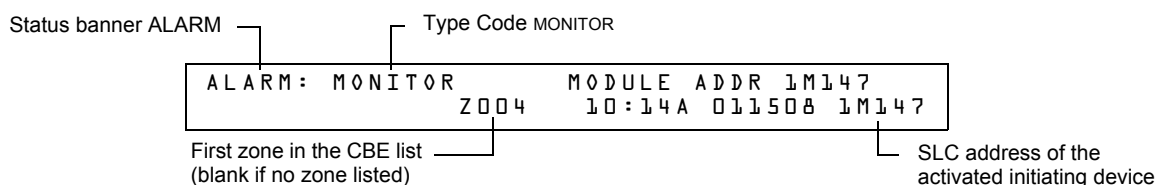


Figure A.9 Sample Alarm Display Screen

The FIRE ALARM LED flashes and the panel sounder pulses a steady tone. The control panel latches until the alarm is corrected and you press the SYSTEM RESET key to reset the control panel. You have the duration of the Presignal Delay Timer (60-180 seconds) to respond to the alarm before the control panel automatically activates all outputs programmed to F0. You can take the following actions:

- To silence the panel sounder and change the FIRE ALARM LED from flashing to steady, press the ACKNOWLEDGE/SCROLL DISPLAY key.
- To abort the Presignal Delay Timer, press the SYSTEM RESET key.
- To manually activate all outputs programmed to F0, press the DRILL key. The Manual Evacuate screen appears, the panel sounder pulses and the FIRE ALARM LED changes from flashing to steady. The Manual Evacuate screen and Alarm screen display alternately at 3-second intervals.

If the Presignal Delay Timer reaches its programmed value, without operator intervention, the control panel activates all outputs programmed to F0.

A.5.5 How to Respond to an Alarm with Presignal Delay Timer (PAS selected)

If an alarm occurs with a Presignal Delay Timer (60-180 seconds) and PAS selected, the control panel displays an Alarm screen that shows the type of device and the SLC address of the device causing the alarm. When an alarm comes from an initiating device with a CBE list that includes F0 (with PAS selected), the control panel delays the following outputs:

- System Alarm relay
- TM-4 Polarity Reversal Alarm output
- TM-4 Municipal Box output



NOTE: These outputs do not delay for Presignal operations without PAS selected.

If a second alarm occurs during the Presignal Delay Timer, the control panel aborts the Presignal Delay Timer and activates all programmed outputs.

A sample Alarm screen for a monitor module:

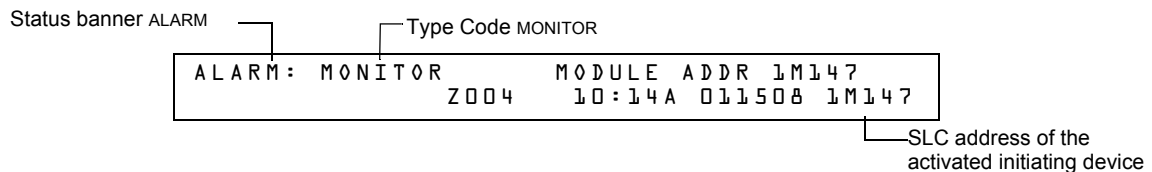


Figure A.10 Sample Alarm Display Screen

The FIRE ALARM LED flashes and the panel sounder pulses a steady tone. The control panel latches until the alarm is corrected and you press the SYSTEM RESET key to reset the control panel. You have 15 seconds to acknowledge the alarm or the control panel automatically activates all outputs programmed to F0. If you acknowledge the alarm within 15 seconds, the control panel increases the delay time to the full Presignal Delay Timer (60-180 seconds). You have the duration of the Presignal Delay Timer to respond to the alarm before the control panel activates all outputs programmed to F0. You can take the following actions:

- To increase the delay to the full programmed Presignal Delay Timer, press the ACKNOWLEDGE/SCROLL DISPLAY key. The panel sounder goes silent and the FIRE ALARM LED changes from flashing to steady.
- To abort the Presignal Delay Timer, press the SYSTEM RESET key.
- To manually activate all outputs programmed to F0, press the DRILL key. The Manual Evacuate screen appears, the panel sounder pulses and the FIRE ALARM LED changes from flashing to steady. The Manual Evacuate screen and Alarm screen display alternately at 3-second intervals.

If the Presignal Delay Timer reaches its programmed value, without operator intervention, the control panel activates all outputs programmed to F0.

Appendix B: Intelligent Detector Functions



NOTE: For instructions on selecting Intelligent Detector Functions, refer to the *NFS-320 Programming Manual*.

Descriptions for Intelligent Detector Functions

Function	Description
Analog Display	The control panel reads and displays analog information from the 318 analog detectors (159 per SLC). The display shows the sensed air at the detector as a percentage of the alarm threshold for each detector.
Sensitivity Adjust	Nine selections for manually setting intelligent detector alarm levels within the UL range. <i>If using ionization detectors in duct applications, set Sensitivity Adjust to Level 1.</i> Refer to the <i>NFS-320 Programming Manual</i> for detector sensitivity information.
Day/Night Sensitivity Operation	You can program the system to automatically force smoke detectors to minimum sensitivity during the day. Refer to "Time, Date, and Holiday Functions" on page 54.
Maintenance Alert	When compensation reaches the limit of the amount of drift compensation that can be safely applied, the control panel reports a trouble condition, according to National Fire Alarm Code standards. This condition also activates if the detector remains at very high or very low measured air levels for an extended time.
Automatic Test Operation	The control panel performs an automatic test of each detector every 256 minutes. Failure to meet the test limits causes an Auto Test Fail trouble.
Type Code Supervision	The control panel monitors hardware device Type Codes for each installed device at regular intervals (an interval can take up to 40 minutes for a full capacity system). If a mismatch of type compared to the program occurs, the control panel generates a point trouble labeled Invalid Type.
LED Control Operation	A global program selection to prevent detector LEDs from blinking as a result of polling during normal operation. A typical application is a sleeping area where a blinking light can distract people. As a standard function, independent of this programming selection, the control panel allows all LEDs to turn on in alarm.
Alarm Verification Timer and Verification Counter Operation	The control panel performs alarm verification on programmed intelligent smoke detectors. The Alarm Verification Timer is a global program selection of 0–60 seconds (ULC installations can not exceed 30 seconds). Each detector includes a Verification Counter, which displays the number of times that a detector entered verification but did not time-out to alarm. The Verification Counter increments to 99 and holds.

Table B.1 Intelligent Detector Functions

Appendix C: Remote Terminal Access

C.1 General Description

The control panel can communicate with a remote terminal or computer connected to the EIA-232 PC/Terminal port. Refer to the *NFS-320 Installation Manual* for installation information.



NOTE: See the *NFS-320 Programming Manual* for instructions on enabling the CRT.

This port may be set up for interactive operation or for monitoring only. Interactive operation requires that all equipment be UL-listed under UL Standard for Safety UL 864 and be installed and set up as directed under Local Terminal Mode (LocT) or Local Monitor Mode (LocM).

ITE (Information Technology Equipment) equipment listed under UL 1950 is allowed for ancillary system monitoring when the system is installed and set up as directed under Remote Terminal Mode (RemT).

C.2 Operating Modes

The control panel provides three operating modes for the CPU EIA-232 PC/Terminal port:

- Local Terminal - LocT
- Local Monitor - LocM
- Remote Monitor - RemM

You select the operating mode during control panel programming (Global System Functions). For more information, refer to the *NFS-320 Programming Manual*.

The following subsections outline the functions, password requirements, and additional information for each operating mode.

C.2.1 Local Terminal Mode (LocT)

Functions, passwords, and special requirements of Local Terminal Mode (LocT) are:

Functions:	Read Status, Alter Status, and Control Functions (Table C.1).
Passwords:	User-defined password for Alter Status functions.
Requirements:	The terminal must be mounted in a UL 864 listed enclosure or positioned to provide equivalent protection against unauthorized use.

Functions available with the Local Terminal Mode:

Function	Lets you...
Read Status	• Display the status of an individual point (Detector, Module, or Zone). • Display a list of all the points in Alarm or trouble. • Display a list of all programmed points in the system. • Step through the History buffer event by event. • Display the entire History buffer.
Alter Status	• Disable/Enable an individual point. • Change the sensitivity of a detector. • Clear the verification counter of all detectors. • Clear the entire History buffer. • Set the Intelligent Sensing alert and action levels.

Table C.1 Local Terminal Mode Functions (1 of 2)

Function	Lets you...
Control Functions	• Acknowledge. • Signal Silence. • System Reset. • Drill.

Table C.1 Local Terminal Mode Functions (2 of 2)

C.2.2 Local Monitor Mode (LocM)

Functions, passwords, and special requirements of Local Monitor Mode (LocM) are:

Functions:	Read Status, Alter Status, and Control Functions (Table C.2).
Passwords:	User-defined password for Alter Status and Control functions.
Requirements:	Password security feature for Control Functions eliminates the need for mounting the CRT-2 in an enclosure.

Functions available with the Local Monitor Mode:

Function	Lets you...
Read Status	• Display the status of an individual point (Detector, Module, or Zone). • Display a list of all the points in Alarm or trouble. • Display a list of all programmed points in the system. • Step through the History buffer event by event. • Display the entire History buffer.
Alter Status	• Disable/Enable an individual point. • Change the sensitivity of a detector. • Clear the verification counter of all detectors. • Clear the entire History buffer. • Set the Intelligent Sensing alert and action levels.
Control Functions	• Acknowledge • Signal Silence • System Reset • Drill

Table C.2 Local Monitor Mode Functions

C.2.3 Remote Terminal Mode (RemT)

Functions, passwords, and special requirements of Remote Terminal Mode (RemT) are:

Functions:	Read Status only. See Table C.3.
Passwords:	None
Requirements:	Use with UL ITE-listed terminals, including personal computers with the VeriFire™ Tools or terminal emulation software. Intended for terminals connected through modems, including FSK modems connected through a public switched telephone network.

Functions available with the Remote Terminal Mode:

Functions	Lets you...
Read Status	• Display the status of an individual point (Detector, Module, or Zone). • Display a list of all the points in Alarm or trouble. • Display a list of all programmed points in the system. • Step through the History buffer event by event. • Display the entire History buffer.
Alter Status	• N/A
Control Functions	• N/A

Table C.3 Remote Terminal Mode Functions

C.3 Using the CRT-2 for Read Status

C.3.1 Overview

This section shows how to perform Read Status functions from a CRT-2.



NOTE: See the *NFS-320 Programming Manual* for instructions on enabling the CRT port.

For more information see the “Read Status” section of this manual.

Function	Lets you...
Read Point	Read the status of any point in the system (detectors, modules, software zones, and system parameters).
Alm/Tbl Status	Display a list of all devices in the system that are in Alarm or trouble.
Read All Points	Display a list of all points programmed in the system. This list will display the status of all addressable detectors, modules, system parameters and software zones.
History Step	Step through the History buffer one event at a time.
History-All	Send the entire History buffer to the CRT, from the most recent event to the oldest event.

Table C.4 Read Status Functions

C.3.2 Accessing Read Status Options

Access the Read Status function from the CRT-2 by following these steps.

1. Turn on the CRT-2, which is connected to the control panel.
2. Press the Read Status function key. The control panel displays the “Read Status” menu options:

```
Rd Point=1, Rd Alm/Tbl=2, All Points=3, Hist:Step=4/All=5, Ala-Hist:Step=6/All=7
```

From the Read Status menu, you can select options 1-7.

C.3.3 Read Point

From the Read Status menu, select option **1** - Read Point. The CRT-2 displays the following:

Press <1> <ENTER>

Type	D(nnn), (n)M(nnn), Z(nn), F(n), R(n), Ex, Lx or S(n) then hit Enter
	Address)01-159)
	Number

Enter the following:.



NOTE: Press **F5** to scroll forward through a list of devices. Press **F6** to scroll back through a list of devices.

1. Enter the first letter of the device, using upper case letters.
 - Detector = "D"
 - Module = "M"
 - Zone = "Z"
 - Special Function = "F"
 - Releasing Zone = "R"
 - E Zone = "E"
 - L Zone = "L"
 - System Parameter = "S"
2. Enter the address or number of the device.
3. Press "ENTER".

Example Read points for detectors 1D001 and 1D002 on SLC 1:

Press <D> <0> <0> <1> <ENTER>

NORMAL SMOKE (PHOTO) INTENSIVE CARE UNIT NURSE LOUNGE	Z050	020%AB 6 CV30	1D001
---	------	---------------	-------

Press <NEXT>

NORMAL SMOKE (PHOTO) DETECTOR ADDR 1D002	Z002	000%AB 6 **	1D002
--	------	-------------	-------

C.3.4 Display Devices in Alarm or Trouble

From the "Read Status" menu, select option **2** - Read Alarms/Troubles. The CRT-2 will display the alarm and trouble history.

The semicolon, a control character in networking applications, separates the hour and minute of events displayed from history. If events display as they occur, a colon separates the hour and minute.

Press <2> <ENTER>

TRUUBL SMOKE(PHOTO) DETECTOR ADDR 1D003	INVREP 01:09P 041608 1D003
TRUUBL SMOKE (ION) DETECTOR ADDR 1D004	INVREP 01:09P 041608 1D004
TRUUBL HEAT(FIXED) DETECTOR ADDR 1D006	INVREP 01:09P 041608 1D006
TRUUBL MONITOR MODULE ADDR 1M041	INVREP 01:09P 041608 1M041
TRUUBL IN SYSTEM GROUND FAULT	01:09P 041608 Wed
TRUUBL IN SYSTEM BATTERY	01:09P 041608 Wed

C.3.5 Display All Programmed Points

From the “Read Status” menu, select option **3** - Read All Points. The CRT-2 displays a list of the status of all addressable detectors, modules, system parameters and software zones:

Press <3> <ENTER>

NORMAL SMOKE(PHOTO) DETECTOR ADDR 1D002	Z003	000%A8	8	**	1D002
NORMAL SMOKE (ION) DETECTOR ADDR 1D003	Z002	020%A6	6	**	1D003
NORMAL HEAT(FIXED) DETECTOR ADDR 1D006	Z001	050%		*	1D006
NORMAL SMOKE(LASER) DETECTOR ADDR 1D099	Z004	000%A6	6	*V00	1D099
OFF RELEASE CKT MODULE ADDR 1M001	ZR00			I**	1M001
NORMAL MONITOR MODULE ADDR 1M001	ZR00			I**	1M001
OFF RELAY MODULE ADDR 1M033	Z000			*FW	1M033
OFF SOFTWARE ZONE Zone 01					Z01

C.3.6 Step-through History

From the “Read Status” menu, select option **4** - History-Step. This option lets you step through all history events one event at a time. Step through the history list one event at a time by pressing the Next **F5** or Prior **F6** function keys.

C.3.7 View All History

From the “Read Status” menu, select option **5** - History ALL. The entire history of events will display on the screen.

C.3.8 Step-through Alarm History

From the “Read Status” menu, select option **6** - Alarm-History:Step. This option lets you step through the panel’s alarm history one event at a time by pressing the Next **F5** or Prior **F6** function keys.

C.3.9 View All Alarm History

From the “Read Status” menu select option **7** - Alarm History All. This entire history of alarm events will display on the screen, from most recent to oldest event.

Press <7> <ENTER>

```
***** ALARM HISTORY START *****
ALARM: MAN_RELEASE MODULE ADDR 1M065      10:21A 011508 1M065
ALARM: MAN_RELEASE MODULE ADDR 1M065      10:19A 011508 1M065
ALARM: MAN_RELEASE MODULE ADDR 1M065      03:20P 011508 1M065
ALARM: SMOKE (ION) DETECTOR ADDR 1D129     03:20P 011508 1M065
```

C.4 Using the CRT-2 for Alter Status

C.4.1 Overview

This section shows how to Alter Status functions from a CRT-2.



NOTE: The panel must be in Local Terminal Mode (LocT) or Local Monitor Mode (LocM).



NOTE: See the *NFS-320 Programming Manual* for instructions on enabling the CRT port.

Function	Lets you...
Disable	Enable or disable detectors or modules.
Alarm/Pre-Alarm	Change the Alarm and Pre-Alarm levels of any addressable detector in the system.
Clear Verification	Clear the verification counter for all the addressable detectors in the system.
Clear History	Clear the contents of the History buffer.
Set Action/Alert	Set the Pre-Alarm for Alert or Action.

Table C.5 Alter Status Functions

C.4.2 Accessing Alter Status Options

Access **Alter Status** function from the CRT-2 by following these steps.

1. Turn on the CRT-2 connected to the control panel.
2. Press the Alter Status function key. The control panel displays the Password screen.

Press <ALTER STATUS>

```
Enter Status Change Password or Escape to Abort
```

3. Enter the Status Change Password. The factory default Status Change Password is 1111. The password does not display on the CRT-2. Five asterisks will appear in place of the password.

Press <1><1><1><1><1><ENTER>

```
*****
```

The Alter Status Options menu appears.

```
1=Disable 2=Alarm/Prealarm 3=Clear Verification 4=Clear History 5=Alert/Action
```

From the Alter Status Options menu, you can select 1-5.

C.4.3 Enable or Disable Detectors, Modules or Zones

From the “Alter Status” menu select option 1 - Disable. Disable lets you enable or disable detectors, modules, or zones.

Press <1><ENTER>

```

      Address (01-159)
      |
Disable/Enable. Type D(nnn) / nMnnn / P(nnn) / Z(nnn) then Enter
STATUS CHANGE      Dis/Ena point      8:29A Tue 01/15/08
      |
      Number

```

Enter the following:

1. Enter the first letter to read one of the following, using upper case letters:
2. Detector = **D**
Module = **M**
NAC = **P**
Zone - **Z**
3. Enter the address or number of the device.
4. Press ENTER and a display similar to the following will appear.

EXAMPLE Disable Detector address 101 on SLC1:

Press <D><1><0><1><ENTER>

```
D101 Now Enabled, Enter E(Enable) / D(Disable) or Esc. to Abort
```

Press **D** to Disable (**E** to Enable); then press ENTER.

Press <D><ENTER>

```
Device now disabled
TROUBL SMOKE(PHOTO) DETECTOR ADDR 101 Z03 DEVICE DISABLED 08:29A Tue 01/15/08 D101
```

C.4.4 Change Alarm and Pre-Alarm Levels

This option lets you change the Alarm and Pre-alarm levels of any addressable detector in the system. Follow these steps.

1. From the “Alter Status” menu select option **2** - Alarm/Pre-alarm.

Press <2><ENTER>

```
Det. Alarm/Prealarm level, type address D(
TROUBL SMOKE(PHOTO) DETECTOR ADDR 101 Z03 DEVICE DISABLED 08:29A Tue 01/15/08 D101
```

2. Enter the address of the detector you wish to change. For example, change alarm and pre-alarm levels for detector 102 on SLC 1 to Alarm Level 4 & Pre-alarm Level 2.

Press <D><1><0><2><ENTER><A><5><P><2><ENTER>

```
STATUS CHANGE Alarm/Prealarm level 08:29A Tue 01/15/08
D102 sens. at level 5, Prealarm at level 3, Enter AxPx to change, Esc. to Abort
D102 now set at new Alarm level 5 and new Pre-alarm level 2
```

C.4.5 Clear Verification Counter

Clear verification lets you clear the verification counter for all the addressable detectors in the system.

Press <3><ENTER>

```
STATUS CHANGE Clear verify count 08:29A Tue 01/15/08
```

C.4.6 Clear the Entire History Buffer

Clear History lets you clear the entire History buffer.

Press <4><ENTER>

```
*****History Clear*****
```


C.4.7 Set the Pre-Alarm for Alert or Action

Set Action/Alert lets you set the Pre-alarm for Alert or Action. For example, change Pre-alarm from “Alert” to “Action” as follows:

Press <5><ENTER>

```
Set Pre-alarm Alert (N0)/Action(YES). Type N or Y then Enter
STATUS CHANGE      Change Alert/Action                      08:29A Tue 01/15/08
```

Press <Y><ENTER>

```
Pre-alarm now set for ACTION
```

Appendix D: Point and System Troubles Lists

There are a variety of point or system trouble types that may appear in a trouble message. The tables below give lists of the troubles and indications of their cause.

D.1 Point (Device) Troubles

A message from the “Trouble Type” column in the following table will appear in the upper right corner of the panel display when a point (device) trouble occurs. Use this table to help determine what the trouble is.

POINT TROUBLES		
TRouble TYPE	TRouble DESCRIPTION	ACTION
AC FAILURE	The auxiliary power supply has lost AC power.	Determine whether there is an AC power loss or whether the power supply and wiring is correct.
ADRFLT	Detector and new sounder base address doesn't match. Or the ACPS address is incorrect.	Readdress the incorrect device.
ALIGN	A beam detector is in configuration mode.	No action is necessary, as the trouble will clear when the configuration is complete. However, the detector will not detect a fire while this trouble exists.
BLOCK	Something has come between the detector's beam and its reflector.	Investigate and clear the blockage.
CHGFLT*	The power supply's battery charger is not working properly.	Correct the fault.
CO 6MN	The CO (carbon monoxide) detection element on the detector has six months left to expiration. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
CO EXP	The CO (carbon monoxide) detection element on the detector has reached the expiration date. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
CO TBL	The CO element on the detector is not working properly. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
DIRTY 1	The detector is dirty and needs cleaning	Clean the detector.
DIRTY 2	The detector requires cleaning immediately. It is a false alarm risk.	Clean the detector immediately.
DISABL	The point has been disabled.	Service and re-enable the point.
GNDFLT	There is a ground fault on the main or auxiliary power supply.	Correct the fault.
HI BAT	The auxiliary power supply's battery charge is too high.	Check the batteries for problems. Replace batteries if necessary.
INVREP	The device has returned a response to the panel that the panel did not expect.	Check the device for functionality, addressing and wiring.
IR TBL	The infrared element is not working properly on the detector. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
LO BAT	The auxiliary power supply's battery is low.	Check the batteries for problems. Replace batteries if necessary.
LO TEMP	The temperature read by a Heat+ or Acclimate™+ detector is too low.	Raise the heat in the area of the detector.
LO VAL	The detector chamber reading is too low; the detector is not operating properly. Or (CLIP Mode only) the thermistors, CO element, or infra-red element on the detector is not working properly, or they are experiencing a freeze warning.	The detector must be removed and replaced by an authorized service representative.
NO ANS	The device (module or detector) is not responding to the poll. Either the device is not working or it is not connected properly.	Determine whether the device is functional, and connected and addressed properly on the SLC.
NO SIG	The device (module or detector) is not responding to the poll. Either the device is not working or it is not connected properly.	Determine whether the device is functional, and connected and addressed properly on the SLC.
OPEN	The module device has an open circuit on its supervised wiring.	Check the connections from the module to the input or output device to which it is wired.
PRLOSS	The output module or new sounder base lost power.	Turn power back on.
PSFAIL	The power supply is not working properly.	Check the battery for problems. Replace battery if necessary.
SHORT	The module device has a short circuit on its supervised wiring.	Check the connections from the module to the input or output device to which it is wired.
TEST F	This detector has failed the FACP's periodic detector test for alarm capabilities.	The detector should be removed and replaced by an authorized service representative.
*This trouble may be fire panel or backup battery related. Test and replace backup batteries if necessary.		

Table D.1 Point (Device) Troubles (1 of 2)

POINT TROUBLES		
TROUBLE TYPE	TROUBLE DESCRIPTION	ACTION
THERM	The thermistors are not functioning properly on the detector. (This trouble generates in FlashScan mode only. CLIP mode will generate a LO VAL error.)	Replace the detector.
VER HI	This detector, which has been programmed to participate in alarm verification, has gone into and come out of verification its programmed limit without going into alarm. Either something is wrong with the detector or there is a condition nearby (such as someone smoking) that causes it to go into verification frequently.	Check the detector and the conditions nearby to determine the problem.

Table D.1 Point (Device) Troubles (2 of 2)

D.2 System Troubles

A message from the “Trouble Type” column in the following table will appear in the panel display when a system trouble occurs. Use this table to help determine the cause of the trouble.

SYSTEM TROUBLES		
TROUBLE MESSAGE TYPE	TROUBLE DESCRIPTION	ACTION
AC FAIL	The main power supply has lost AC power.	Determine whether there is an AC power loss or whether the power supply and wiring is correct.
ADV WALK TEST	There is an Advanced Walk Test in progress.	No action is required.
ANNUN <u>x</u> NO ANSWER	The annunciator at address <u>x</u> is not responding.	Determine whether the device is functional, and connected and addressed properly.
ANNUN <u>x</u> TROUBLE	The annunciator at address <u>x</u> is in trouble.	Determine if the ACS module is functional, correctly installed, and configured properly.
AUXILIARY TROUBLE	An auxiliary device connected to the NFS-320 at J6 is in trouble or the cable is missing.	Check the wiring and source.
BASIC WALK TEST	A Basic Walk Test is in progress.	No action is required.
BATTERY	The main power supply's battery charge is too high or too low.	Check batteries, replace if necessary.
BAT.BACKUP RAM	RAM battery backup is low.	Replace battery.
CHARGER FAIL*	The main power supply's battery charger is not working properly.	Correct the fault.
CORRUPT LOGIC EQUAT	The database that houses the panel's logic equations is corrupt. It must be re-downloaded, or all programming must be cleared and re-entered.	The database must be re-downloaded, or all programming must be cleared and re-entered.
DRILL ACTIVATED	Drill has been initiated.	No action is required.
EPROM ERROR	The application and/or boot code is corrupt.	Service is required.
EXCEEDED CONN. LIMIT	More than two panels have been connected to a high-speed network communications module.	Remove extra panel(s).
EXTERNAL RAM ERROR	The external RAM test failed.	Service is required.
GROUND FAULT	A ground fault has occurred within the panel.	Locate the ground fault and repair.
GROUND FAULT LOOP <u>x</u>	There is a ground fault on loop <u>x</u> .	Locate the ground fault and repair.
HS-NCM SNIFFER ACTIV	The HS-NCM is in a diagnostic mode.	No action is required.
INTERNAL RAM ERROR	The internal RAM test failed.	Service is required.
LCD80 SUPERVISORY	Communication has been lost with the LCD-80.	Check connections to the LCD-80 Annunciator.
LOADING.NO SERVICE	A program or database download is in progress. The panel is NOT providing fire protection during the download. P	Proper authorities should be notified while a download is in progress so that other means of fire protection can be supplied.
MASTER BOX TROUBLE	A TM-4 connected to a municipal box is in trouble.	Reset the master box.
MASTER BOX NO ANSWER	A TM-4 connected to a municipal box is not responding.	Determine whether the device is functional and connected properly.
*This trouble may be fire panel or backup battery related. Test and replace backup batteries if necessary.		
NCM COMM FAILURE	Communication is lost between the NFS-320 and the network communications module.	Check to see if the NUP cable is properly installed and the network communications module is functional.

Table D.2 System Troubles

SYSTEM TROUBLES		
TROUBLE MESSAGE TYPE	TROUBLE DESCRIPTION	ACTION
NETWORK FAIL PORT x	Communication lost between NCM Port x and corresponding node.	Check wiring and verify the node is online.
NETWORK INCOMPATIBLE	The brand of this panel is incompatible with this network.	Verify all nodes are branded for the same OEM.
NFPA 24HR REMINDER	This message occurs every day at 11 am if any troubles exist.	Resolve any troubles on the system.
NO DEV. INST ON L1	No devices are installed on the system.	Install SLC and run autoprogram.
PANEL DOOR OPEN	The panel door is open.	Close door.
POWER SUPPLY COMM FAIL	There has been a communication failure with the power supply.	Service is required.
PROGRAM CORRUPTED	The database that houses the panel's programming is corrupt.	The database must be re-downloaded, or all programming must be cleared and re-entered. Service is required.
PROGRAM MODE ACTIVATED	A user is currently accessing the panel's programming menus.	No action is required / Exit the Programming mode.
RELEASE DEV. DISABLE	Releasing devices have been disabled.	Enable the devices.
SELF TEST FAILED	Diagnostic test failed.	Call Technical Services.
STYLE 6 POS. LOOP x	There is an open circuit on the positive side of loop x. Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open), it will drive both ends of the loop, maintaining communication in an unsupervised method. The latching trouble will display on the panel as a Style 6 trouble until you correct the condition and press RESET. Style 7 configuration of the SLC requires the use of ISO-X modules.	
STYLE 6 NEG. LOOP x	There is an open circuit on the negative side of loop x. Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open), it will drive both ends of the loop, maintaining communication in an unsupervised method. The latching trouble will display on the panel as a Style 6 trouble until you correct the condition and press RESET. Style 7 configuration of the SLC requires the use of ISO-X modules.	
STYLE 6 SHORT LOOP x	Style 6 and Style 7 are supervised methods of communicating with addressable devices. If the control panel detects a trouble (open or short), it will drive both ends of the loop, maintaining communication in an unsupervised method. The latching trouble will display on the panel as a Style 6 trouble until you correct the condition and press RESET. Style 7 configuration of the SLC requires the use of ISO-X modules.	
SYS INITIALIZATION	The devices are initializing.	No action is required, as the trouble will clear when initialization is completed. However, the devices will not report off-normal events while this trouble exists.
TERMINAL SUPERVISORY	There is a communication error with the CRT-2.	Check connections to the CRT-2 terminal.
UDACT NO ANSWER	The UDACT or UDACT-2 is not responding.	Determine whether the UDACT/UDACT-2 is functional, and connected and addressed properly.
UDACT TROUBLE	The UDACT or UDACT-2 is in trouble.	Determine if the UDACT/UDACT-2 is functional and wired correctly.

Table D.2 System Troubles

NOTE: A charger fail trouble can be charger or battery related. Batteries near the end of their service life may not accept the periodic charge current required by UL 864 Ninth edition, and can result in the panel displaying a charger fail. Batteries should be tested and replaced as necessary before repairing or replacing the panel.

Index

A

- Abort **51**
- Abort Active LED **12**
- Acknowledge/Scroll Display control key **12**
- Active Supervisory Signal **27–29**
 - panel indication **27**
 - response to **28**
 - Type Codes **28**
- Alarm Verification Timer **35, 60**
- Alarm. See Fire Alarm **17**
- Analog Display **60**
- Annunciator Selections, read status **44**
- Auto Silence Timer **35**
- Automatic Test Operation **60**

B

- Battery Levels, read status **46**

C

- Caution
 - Disabling a zone disables all input and output... **31**
- Coding
 - to view F8 selections **56**
- Coding, NAC **56**
- Control Keys **12**
- Control Panel Keys and Indicators, illustration **11**
- Control/Relay Module Trouble
 - panel indication **34**
 - response to **35**
 - Type Codes **33**
- Control/Relay Module, read status **40**
- Controls Active LED **11**
- Cooperative Multi-Detector, read status **40**
- Cross Zone **51**
- Cross Zone Programming illustration **53**
- CRT-2 and Read Status **63**
 - Accessing **63**
- CRT-2 and Read Status. See Appendix C

D

- Date Functions **54**
- Day/Night Sensitivity Operation **60**
- Delay Timer **51**
- Detector
 - fire alarm type codes **19, 24**
 - Functions **60**
 - Read Status **40**
 - supervisory alarm type codes **29**
- Disabled Points **31**
- Discharge LED **12**

- Drill control key **14**

F

- Fire Alarm **17–18**
 - LED **12**
 - panel indication **17**
 - response to a **18, 57**
- Fire Control Type Code, active point **32**

H

- Hidden History, read status and print **50**
- History, event and alarm, read status **47**
- Holiday Functions **54**
 - to view selections **55**

I

- Increment Number key **14**
- ISO-X module **36, 71**

L

- Lamp Test control key **14**
- Latching Supervisory Type Code **28**
- Latching/non-latching type codes. See particular type code for definition.
- LED Control Operation **60**
- LEDs, table of **11**
- Local Control setting and control keys **13**
- LocM (Local Monitor) **61, 62**
- LocT (Local Terminal Mode) **61**

M

- Maintenance Alert **60**
- Manual Release **51**
- Mass Notification **19–22**
- MN Alarm
 - panel indication **19**
 - response to a **20**
- MN Supervisory
 - panel indication **21**
- MN Supervisoryresponse to a **21**
- MN Trouble
 - panel indication **21**
 - response to a **22**
- Monitor Module
 - fire alarm type codes **18, 24**
 - MN type codes **22**
 - non-alarm type codes **31**
 - Read Status **40**
 - security type codes **27**
 - supervisory alarm type codes **29**

trouble monitor type codes **32**

N

NAC Trouble

panel indication **34**

response to **35**

Type Codes **33**

NAC, read status **41**

Non-Alarm Points **31**

Non-Fire Point, active, panel indication **32**

Non-latching Supervisory Type Code **28**

Normal Mode of Operation **17**

O

Output Circuit Trouble **33–35**

P

Partial Signal Silence **13**

Point (Device) Troubles table **69**

Point Disabled LED **12**

Power LED **11**

Pre-alarm LED **12**

Pre-Alarm Warning **29**

action level **30**

alert level **30**

panel indication **29**

response to **30**

Pre-Discharge LED **12**

Presignal and Positive Alarm Sequence (PAS)

response to Presignal Delay Timer alarm
(no PAS) **58**

response to Presignal Delay Timer alarm
(PAS selected) **59**

to view selections **58**

R

Read Status **37–50**

to enter **37**

to print **48**

alarm history **49**

event history **49**

points **48**

print hidden event and alarm history
50

print points **49**

to view **38**

annunciator selections **44**

battery levels **46**

detector information **39**

devices, zones, system settings **38**

event and alarm history **47**

point or zone information **39**

Releasing Zone (R0-R9) **43**

releasing zone selections

software zones **42**

Special Zone (F0-F9) **42**

System Functions **43**

total of installed devices **39**

using a CRT. See Appendix C

Recall Last Entry key **14**

Releasing Zone (R0-R9), read status **43**

Releasing Zones (R0-R9) **51–53**

Remote Terminal Access **61–63**

RemT, Remote Terminal Mode **61, 62**

S

Security Alarm **26**

panel indication **26**

response to a **26**

Security LED **12**

Sensitivity Adjust **60**

Shortcuts to Operating Functions **10**

Signal Silence control key **13**

Signals Silenced LED **12**

Silence Inhibit Timer **35, 36**

Soak Timer **51**

Software Zone (Z01-Z99), read status **42**

Special Zone Operation **51–59**

Special Zone, read status **42**

Supervisory LED **12**

Supplemental Documentation **9**

System Functions, read status **43**

System Normal Message **17**

System Reset control key **13**

System Timers **35**

Alarm Verification Timer **35**

Auto Silence Timer **35**

Silence Inhibit Timer **35, 36**

to view selections **35**

System Trouble **24–26**

panel indication **24**

response to **25**

System Trouble LED **12**

System Troubles **70**

T

Time Functions **54**

to view selections **54**

Timers. See System Timers **35**

Transponder Points **33**

Trouble Monitor **32**

response to **33**

trouble monitor type codes **32**

Troubles

Point **69**

System **70**

Type Code Supervision **60**

Type Codes

Fire Alarm **18**

Mass Notification **22**

Non-alarm **31**
Security **27**
Supervisory **29**
Trouble **32**

W

Warning

When used for CO2 releasing applica-
tions... **16, 51**

Waterflow Circuit operation **36**

X

XP6-C **33**

XPC transponder points **33**

Manufacturer Warranties and Limitation of Liability

Manufacturer Warranties. Subject to the limitations set forth herein, Manufacturer warrants that the Products manufactured by it in its Northford, Connecticut facility and sold by it to its authorized Distributors shall be free, under normal use and service, from defects in material and workmanship for a period of thirty six months (36) months from the date of manufacture (effective Jan. 1, 2009). The Products manufactured and sold by Manufacturer are date stamped at the time of production. Manufacturer does not warrant Products that are not manufactured by it in its Northford, Connecticut facility but assigns to its Distributor, to the extent possible, any warranty offered by the manufacturer of such product. This warranty shall be void if a Product is altered, serviced or repaired by anyone other than Manufacturer or its authorized Distributors. This warranty shall also be void if there is a failure to maintain the Products and the systems in which they operate in proper working conditions.

MANUFACTURER MAKES NO FURTHER WARRANTIES, AND DISCLAIMS ANY AND ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS, TRADEMARKS, PROGRAMS AND SERVICES RENDERED BY MANUFACTURER INCLUDING WITHOUT LIMITATION, INFRINGEMENT, TITLE, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. MANUFACTURER SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY OR DEATH WHICH MAY ARISE IN THE COURSE OF, OR AS A RESULT OF, PERSONAL, COMMERCIAL OR INDUSTRIAL USES OF ITS PRODUCTS.

This document constitutes the only warranty made by Manufacturer with respect to its products and replaces all previous warranties and is the only warranty made by Manufacturer. No increase or alteration, written or verbal, of the obligation of this warranty is authorized. Manufacturer does not represent that its products will prevent any loss by fire or otherwise.

Warranty Claims. Manufacturer shall replace or repair, at Manufacturer's discretion, each part returned by its authorized Distributor and acknowledged by Manufacturer to be defective, provided that such part shall have been returned to Manufacturer with all charges prepaid and the authorized Distributor has completed Manufacturer's Return Material Authorization form. The replacement part shall come from Manufacturer's stock and may be new or refurbished. THE FOREGOING IS DISTRIBUTOR'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A WARRANTY CLAIM.

Warn-HL-08-2009.fm



World Headquarters
12 Clintonville Road
Northford, CT 06472-1610 USA
203-484-7161
fax 203-484-7118

www.notifier.com

ISO 9001
CERTIFIED
ENGINEERING & MANUFACTURING
QUALITY SYSTEMS

Fire Alarm Communicator

411UDAC

Manual

Document 51073
9/20/2013

Rev: **E**

P/N 51073:E

ECN 13-786

Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

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

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises following the recommendations of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. This document can be found at <http://www.systemsensor.com/appguides/>. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

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

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

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

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

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

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions

(caused by escaping gas, improper storage of flammable materials, etc.).

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

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

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

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

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

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

Telephone lines needed to transmit alarm signals from a premises to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional life safety system installers only. Adequate written records of all inspections should be kept.

Limit-D-1-2013

Installation Precautions

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

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

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

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

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

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

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

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

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

This system contains static-sensitive components.

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

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

Precau-D1-9-2005

FCC Warning

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

Canadian Requirements

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

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

HARSH™, NIS™, and NOTI-FIRE-NET™ are all trademarks; and Acclimate® Plus, ECLIPSE®, Filtrex®, FlashScan®, NION®, NOTIFIER®, ONYX®, ONYXWorks®, Pinnacle®, UniNet®, VeriFire®, and VIEW® are all registered trademarks of Honeywell International Inc. Echelon® is a registered trademark and LonWorks™ is a trademark of Echelon Corporation. ARCNET® is a registered trademark of Datapoint Corporation. Microsoft® and Windows® are registered trademarks of the Microsoft Corporation.

©2013. All rights reserved. Unauthorized use of this document is strictly prohibited.

Software Downloads

In order to supply the latest features and functionality in fire alarm and life safety technology to our customers, we make frequent upgrades to the embedded software in our products. To ensure that you are installing and programming the latest features, we strongly recommend that you download the most current version of software for each product prior to commissioning any system. Contact Technical Support with any questions about software and the appropriate version for a specific application.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments or suggestions about our online Help or printed manuals, you can email us.

Please include the following information:

- Product name and version number (if applicable)
- Printed manual or online Help
- Topic Title (for online Help)
- Page number (for printed manual)
- Brief description of content you think should be improved or corrected
- Your suggestion for how to correct/improve documentation

Send email messages to:

FireSystems.TechPubs@honeywell.com

Please note this email address is for documentation feedback only. If you have any technical issues, please contact Technical Services.

Table of Contents

Section 1: Product Description	10
1.1: Product Features	10
1.2: Specifications.....	12
1.3: Circuits.....	13
1.3.1: Channels/Inputs	13
1.3.2: Notification Appliance Circuit	13
1.3.3: Output Circuits	13
1.3.4: Auxiliary Relays.....	13
1.3.5: Earth Ground	13
1.4: Controls and Indicators.....	14
1.5: Components and Accessories	15
1.6: Digital Communicator Operation	15
1.7: Panel Configuration.....	16
1.8: Operational Modes.....	16
1.8.1: Normal Mode.....	16
1.8.2: Real Time Clock Mode.....	16
1.8.3: Program Mode	16
1.8.4: Troubleshoot Mode.....	16
1.8.5: Default Mode.....	16
1.9: Telephone Requirements and Warnings.....	17
1.9.1: Telephone Circuitry - PH1 & PH2	17
1.9.2: Digital Alarm Communicator:.....	17
1.9.3: Telephone Company Rights and Warnings.....	17
Section 2: Installation.....	18
2.1: Mounting Options	18
2.2: Mounting.....	18
2.3: Operating Power	20
Primary Power Source (AC) and Earth Ground Connections	20
Secondary Power Source (batteries).....	21
2.4: Input Channels	22
2.5: Output Circuits.....	25
Notification Appliance Circuit	25
Relay Programming.....	26
2.6: Telephone Circuits	27
2.7: Optional Programmer	28
2.8: UL Power-limited Wiring Requirements.....	29
Section 3: Modes of Operation	30
3.1: Normal Mode.....	30
3.1.1: Programmer Key Functions.....	31
MODE KEY	31
LAMP TEST KEY	31
1st EVENT KEY	32
DOWN ARROW	32
UP ARROW	32
ENTER/STORE	32
3.1.2: Programmer Display.....	32
3.2: Password Creation and Entry.....	32
3.3: Real Time Clock Mode.....	33
3.4: Program Mode	34
3.4.1: DACT Programming	36
Primary Central Station Phone Number (00 - 19).....	36
Primary Central Station Number Communication Format (20).....	36
Event Codes - Setting Entries.....	37

Ademco Contact ID Format Primary Central Station Event Codes	37
4+2 Standard and 4+2 Express Formats Primary Central Station Event Codes.....	38
All 3+1, 4+1 and 4+2 Expanded Formats Primary Central Station Event Codes	39
Primary Central Station Number Account Code (21 - 24)	40
Primary Central Station Number 24 Hour Test Time (25 - 28).....	40
Primary Central Station Number 24/12/8/6 Hour Test Time Interval (29)	40
Secondary Central Station Phone Number (30 - 49)	40
Secondary Central Station Number Communication Format (50)	41
Ademco Contact ID Format Secondary Central Station Event Codes	42
4+2 Standard and 4+2 Express Formats Secondary Central Station Event Codes.....	43
All 3+1, 4+1 and 4+2 Expanded Formats Secondary Central Station Event Codes	44
Secondary Central Station Number Account Code (51 - 54)	45
Secondary Central Station Number 24 Hour Test Time (55 - 58).....	45
Secondary Central Station Number 24/12/8/6 Hour Test Time Interval (59)	45
AC Loss Reporting Delay (60).....	45
Backup Reporting (61)	45
Reserved for Future Use (62)	45
DACT Trouble Reminder (63)	45
Operational Mode Selection (64).....	45
Input Channel 1 Function Selection (65).....	46
Input Channel 2 Function Selection (66) ¹	46
Input Channel 3 Function Selection (67) ¹	46
Input Channel 4 Function Selection (68) ¹	46
Input Channel 1 Delay Timer (69 - 71)	46
Input Channel 2 Delay Timer (72 - 74) ²	46
Input Channel 3 Delay Timer (75 - 77)	47
Input Channel 4 Delay Timer (78 - 80) ¹	47
Touchtone/Rotary Select for Primary Phone (81)	47
Make/Break Ratio for Primary Phone (82).....	47
Touchtone/Rotary Select for Secondary Phone (83)	47
Make/Break Ratio for Secondary Phone (84).....	47
Output Relay #1 Enable (85)	47
Output Relay #1 Function Selections (86).....	47
Output Relay #2 Enable (87)	47
Output Relay #2 Function Selections (88).....	47
Reserved for Future Use (89)	48
Panel Unlock (90)	48
Alarm Verification Enable (91)	48
Silence Inhibit Notification Appliance Circuit (92)	48
Autosilence Notification Appliance Circuit (93).....	48
Restoral Method (94).....	49
Coding, Notification Appliance Circuit (95).....	50
Trouble Call Limit - Dialer Runaway Prevention (96).....	50
Panel Identification Number (97 - 100).....	50
Service Terminal 1 Phone Number (101 - 120).....	51
Ring Count on Primary Phone Line (121 - 122).....	51
FAX/Answer Machine, Primary Phone Line (123).....	51
Service Terminal 2 Phone Number (124 - 143).....	51
Upload/Download Reports Sent to Secondary Central Station Phone #, Backup or Always (144).....	51
Programming Event Code Settings (145 - 312).....	51
3.5: Default Mode	51
3.6: Troubleshoot Mode	52
Channel/Inputs	52
AC Line	52
Notification Appliance Circuit	52
Telephone Line Testing	53

Section 4: Central Station Communications	54
4.1: Transmittal Priorities	57
4.2: Ademco Contact ID Format Event Code Description	57
Section 5: Remote Site Upload/Download.....	60
5.1: General.....	60
5.1.1: Security Features	61
Secret Code Verification	61
Panel Unlock	61
Time-out at 411UDAC.....	61
Callback to Service Terminal	62
Error Checking	62
Central Station Acknowledge.....	62
Data Protection/Integrity	62
5.2: Downloading to the Communicator.....	62
5.3: Uploading From the Communicator.....	62
5.4: Simultaneous Data Transfers	63
Section 6: Battery Calculations	64
6.1: 411UDAC Power Supply.....	65
Appendix A: Programming Sheets.....	66
A.1: Digital Communicator Options Program Sheets	66
A.2: Digital Communicator Options Program Sheet (Factory Defaults).....	68
Appendix B: Event Codes/Transmission Format Programming Sheets	70
B.1: 4+2 Standard & 4+2 Express Formats <u>Primary</u> Central Station	70
B.2: 4+2 Standard & 4+2 Express Formats <u>Secondary</u> Central Station	70
B.3: 4+2 Standard & 4+2 Express Formats <u>Primary</u> Central Station	71
B.4: 4+2 Standard & 4+2 Express Formats <u>Secondary</u> Central Station	71
B.5: All 3+1, All 4+1 and 4+2 Expanded Formats for <u>Primary</u> Central Station	72
B.6: All 3+1, All 4+1 and 4+2 Expanded Formats for <u>Secondary</u> Central Station	72
B.7: All 3+1, All 4+1 and 4+2 Expanded Formats for <u>Primary</u> Central Station (Factory Defaults).....	72
B.8: All 3+1, All 4+1 and 4+2 Expanded Formats for <u>Secondary</u> Central Station (Factory Defaults).....	72
B.9: Ademco Contact ID Format <u>Primary</u> Central Station	73
B.10: Ademco Contact ID Format <u>Secondary</u> Central Station	73
B.11: Ademco Contact ID Format <u>Primary</u> Central Station (Factory Defaults).....	74
B.12: Ademco Contact ID Format <u>Secondary</u> Central Station (Factory Defaults).....	74
Appendix C: Ademco Contact ID Format Event Code Description.....	75
Appendix D: Events and Default Event Codes.....	79
Appendix E: Operational Modes.....	80
Index.....	81

This digital communicator/transmitter has been designed to comply with standards set forth by the following regulatory agencies:

- Underwriters Laboratories
- NFPA National Fire Protection Association

Before proceeding, the installer should be familiar with the following documents.



NFPA Standards

Central Station Signaling Systems Protected Premises Unit (Automatic, Manual and Waterflow)

Proprietary Fire Alarm Systems (Protected Premises Unit)

Remote Station Fire Alarm Systems

Automatic Fire Detectors

Installation, Maintenance and Use of Notification Appliances for Fire Alarm Systems

Inspection, Testing and Maintenance for Fire Alarm Systems



Underwriters Laboratories Documents:

UL 217 Smoke Detectors, Single and Multiple Station

UL 268 Smoke Detectors for Fire Protective Signaling Systems

UL 346 Waterflow Indicators for Fire Protective Signaling Systems

UL 464 Audible Signaling Appliances

UL 521 Heat Detectors for Fire Protective Signaling Systems

UL 864 Standard for Control Units for Fire Protective Signaling Systems

UL 1481 Power Supplies for Fire Protective Signaling Systems

UL 1635 Digital Alarm Communicator System Units

UL 1638 Visual Signaling Appliances

UL 1971 Signaling Devices for Hearing Impaired

Other:

NEC Article 250 Grounding

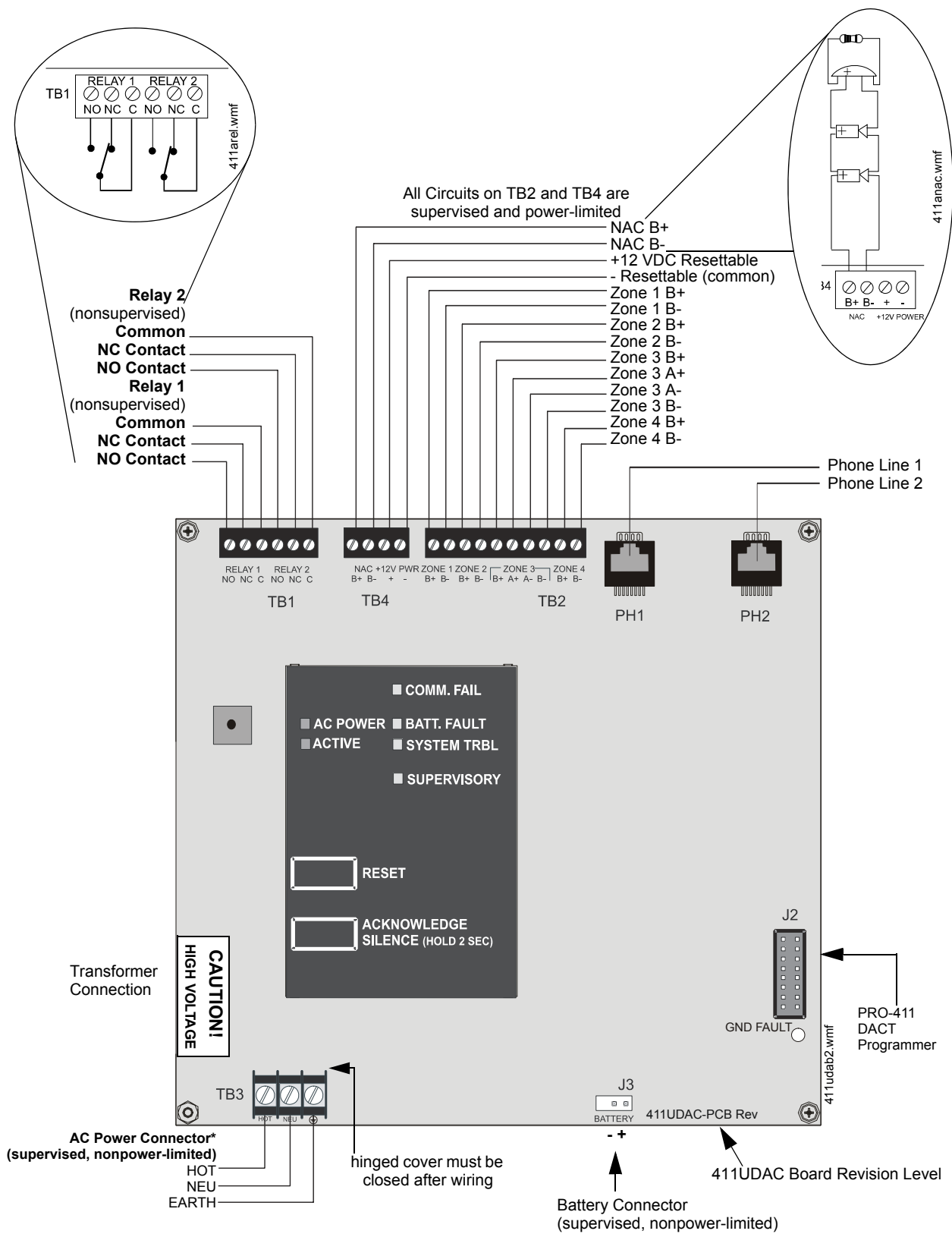
NEC Article 300 Wiring Methods

NEC Article 760 Fire Protective Signaling Systems

Applicable Local and State Building Codes

Requirements of the Local Authority Having Jurisdiction (LAHJ)

This product has been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864, 9th Edition. Operation of this product with products not tested for UL 864, 9th Edition has not been evaluated. Such operation requires the approval of the local Authority Having Jurisdiction (AHJ).



CAUTION: AC POWER TERMINAL LAYOUT CHANGE

USE CAUTION WHEN WIRING AC POWER TO THE 411UDAC AS TERMINAL LAYOUT HAS CHANGED ON TB3!!

Section 1: Product Description

The 411UDAC is a fire alarm communicator with four input/channels and dual telephone lines. The four inputs use conventional input devices. The 411UDAC accepts waterflow devices, four-wire smoke detectors, pull stations and other normally-open contact devices. The unit also supervises AC voltage, telephone line input voltage/current, battery level and battery charger operation.

Outputs include one supplementary NAC (Notification Appliance Circuit), two programmable Form-C relays and 12 VDC resettable special application power. The 411UDAC interfaces with the public switched telephone network and is compatible with most central station receivers. A total of fifteen popular communications formats are supported, including the industry standard Ademco Contact ID. The communicator also contains a unique DACT option that eliminates 'dialer runaway'. It restricts the transmission of any intermittent nuisance fault to 10 attempts in a 24 hour period.

Accessories include the Fire-Watch 411 Series DACT Programmer (Model PRO-411) as well as the PK-411UD Windows® -based remote site programming software. The 411UDAC is supplied with a compact metal cabinet.

The digital communicator can be programmed or interrogated off-site via the public switched telephone network. Any IBM compatible personal computer with Windows® XP or greater, with a 1200 baud Hayes® compatible modem and Upload/Download software P/N PK-411UD, may serve as a service terminal.

1.1 Product Features

- Four input/channels - three fixed Style B (Class B) and one Style A (Class A) or Style B (Class B)
- Programmable input channels
 - ✓ 4-wire smoke (Inputs 1 & 3 only)
 - ✓ pull station
 - ✓ normally-open contact
 - ✓ host panel trouble (Slave Mode)
 - ✓ supervisory
 - ✓ supervisory autoresettable
 - ✓ waterflow (silenceable)
 - ✓ waterflow (nonsilenceable)
- One Style Y (Class B) NAC (supplementary application)
- Dual telephone lines
 - ✓ Dual telephone line voltage detect
 - ✓ Alternating phone lines for 24 hour test messages
- 12 VDC operation
- Alarm Verification
- Signal Silence Inhibit
- Autosilence
- Trouble Reminder
- Trouble Resound - troubles will resound the buzzer every 24 hours at midnight until the trouble is cleared
- Optional TR-6 Series Trim Ring
- 20-digit central station and service terminal telephone numbers
- NAC coding per ANSI S-3.41 (Temporal Coding)



Figure 1.1 411UDAC Digital Communicator

- Separate external keypad and display
 - ✓ provides means of programming 411UDAC in program mode
 - ✓ provides means of testing input/output circuits (including telephone connections) in Troubleshoot Mode
- Compact in size 14.5" (36.83 cm) high X 12.875" (32.7 cm) wide X 4.5" (11.43 cm) deep metal cabinet
- Communicates vital status of monitored control panel (Slave Mode):
 - ✓ fire alarm
 - ✓ host control panel trouble
 - ✓ fire supervisory
 - ✓ AC (mains) power loss (programmable)
 - ✓ other
- Communicates vital status of 411UDAC:
 - ✓ digital communicator troubles
 - ✓ telephone Line 1 and 2 voltage fault
 - ✓ Primary Central Station number communication fault
 - ✓ Secondary Central Station number communication fault
 - ✓ system off-normal (local Program Mode entered)
 - ✓ 24 Hour normal test
 - ✓ 24 Hour abnormal test (24 hour test message with previously reported alarm or trouble still active)
- Individual LEDs for:
 - ✓ AC Power
 - ✓ System Trouble
 - ✓ Input Active
 - ✓ Supervisory
 - ✓ Communication Fail
 - ✓ Battery Trouble
 - ✓ Earth Fault
- Local piezo sounder with separate and distinct sounds for the various conditions
- Acknowledge/System Silence switch - 1st press silences local piezo sounder, 2nd press silences NAC
- Reset switch
- Real time clock
- Two Form-C relays, fully programmable to activate for the following conditions:

✓ fire alarm	✓ total communication failure
✓ host control panel trouble	✓ DACT trouble (factory default for relay)
✓ fire supervisory (latching)	
✓ fire supervisory (autoresettable)	
- Optional PK-411UD Remote Upload/Download Kit
- 'Dialer runaway' feature
- User selectable restoral methods

1.2 Specifications

AC Power - TB3

120 VAC, 60 Hz, 0.7 amps
 Wire size: minimum 14 AWG (2.00 mm²) with 600V insulation
 Supervised, nonpower-limited

Battery (lead acid only) - J3

Maximum Charging Circuit: Float charge - 13.6V @ 3.15 amps
 Maximum Charger Capacity: 14 Amp Hour battery
 Supervised, nonpower-limited

Channels/Inputs - TB2 Terminals 1 through 10

Programmable Channels 1 through 4
 Power-limited circuitry
 Fully supervised (monitored for opens, shorts and earth fault)
 Normal Operating Voltage: 12.0 VDC (ripple = 100 mV maximum)
 End-of-Line Resistor: 2.2K ohms, ½ watt (P/N 27070 UL listed)
 Operation for each channel:

- Channel/Input 1, Style B (Class B) 4-wire smoke detector input and Channel/Input 3, Style B (Class B) 4-wire smoke detectors or waterflows or Style D (Class A) waterflow input:
Connecting 4-wire detectors on Channel/Input 3 requires NFPA Style B (Class B) only.
 - Alarm Current: 11 mA
 - Short Circuit Current: 24 mA maximum
 - Maximum Detector Current in Standby: 1.8 mA
 - Maximum Loop Resistance: 30 ohms
 - Detector Loop Current is sufficient to ensure operation of a minimum of one alarmed detector per zone*
 - Standby Current: 5.17 mA (including End-of-Line Resistor)
- Channel/Input 2 and Channel/Input 4 - Style B (Class B) contact closure input:
 - Short Circuit Current: 4.46 mA maximum
 - Maximum Loop Resistance: 100 ohms
 - Standby Current: 2.66 mA
 - Refer to the *Device Compatibility Document* for listed compatible devices.

Notification Appliance Circuit - TB4 Terminals 1(+) & 2(-)

The 411UDAC Notification Appliance Circuit may only be used to supplement host panel NACs
 Style Y (Class B) power-limited and supervised circuit (monitored for opens, shorts, and earth fault)
 Maximum voltage drop in wiring: 2.0 VDC
 Operating voltage nominal 13.8 VDC
 Current for all external devices: 1.0 amp
 End-of-line resistor: 2.2K ohms, ½ watt (P/N 27070)
 Refer to the *Device Compatibility Document* for listed compatible devices

Two Form-C Relays - TB1 Terminals 1 through 6

Operating voltage nominal 12 VDC
 Contact rating: 2.0 amps @ 30 VDC (resistive) or 0.5 amps @ 30 VAC (resistive)
 Non-supervised

12 VDC Resettable Special Application Power - TB4 Terminals 3(+) and 4(-)

Operating voltage nominal 12 volts
 Maximum ripple voltage: 10 mV_{RMS}
 Up to 200 mA is available for powering 4-wire smoke detectors
 Power-limited and supervised with a UL-listed power supervision relay
 For power supply and battery calculations, refer to Section 6.

1.3 Circuits

The 411UDAC circuit board contains a MicroController Unit (MCU), dual modular phone line jacks, piezo sounder, and connectors for input, output and power wiring. A piezo silence switch and reset switch are provided on the membrane panel which plugs into connector J7 on the main circuit board.

1.3.1 Channels/Inputs

Four input channels are provided on the 411UDAC. The 411UDAC can be used to monitor a host FACP (Fire Alarm Control Panel) in Slave Mode or as a stand-alone FAC (Fire Alarm Communicator). Each input can be programmed to monitor the following conditions:

- fire alarm activation
- 4-wire smoke (channels 1 & 3 only)
- pull station
- normally open contact device
- waterflow
- trouble activation
- fire supervisory activation

1.3.2 Notification Appliance Circuit

One Style B NAC (Notification Appliance Circuit) requiring a 2.2K ohm End-of-Line resistor. This NAC can only be used to supplement host panel NACs.

1.3.3 Output Circuits

- Modular jacks are used to interface the primary and secondary phone lines to the public telephone network. Phone lines are fully supervised at all times (if communication is enabled).
- 12 volt resettable special application power output (200 mA)
- 12 volt battery charger will charge up to 14 AH batteries

1.3.4 Auxiliary Relays

Two dry Form-C relays, with contacts rated for 2.0 amps @ 30 VDC (resistive) or 0.5 amps @ 30 VAC (resistive), are installed on the main circuit board. Each relay is programmable for:

- ✓ Alarm
- ✓ Fire supervisory - latching
- ✓ Fire supervisory - autoresettable
- ✓ Host panel trouble
- ✓ DACT trouble
- ✓ Total communications failure

1.3.5 Earth Ground

Connect a separate earth ground wire to ground stud in backbox for transient protection (refer to Figure 2.3 on page 21 for location of stud).

1.4 Controls and Indicators

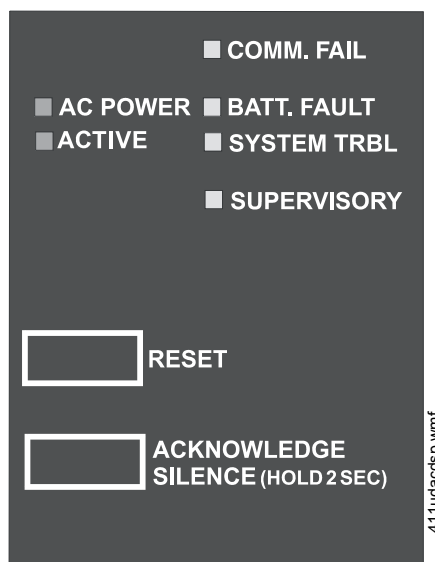


Figure 1.2 411UDAC Controls and Indicators

Front Panel Switch

- Reset Switch - to reset 411UDAC circuits
- Acknowledge/System Silence Switch
 - press once to acknowledge alarm or trouble (silence local 411UDAC piezo sounder and change all flashing LEDs to steady on)
 - press a second time and hold for minimum of two seconds to perform a System Signal Silence (silence Notification Appliance Circuit)

411UDAC Piezo Sounder

- The 411UDAC piezo sounder is used to locally annunciate DACT alarms and troubles. DACT troubles include input channel open circuit, NAC fault, phone line 1 or 2 voltage fault, phone number 1 or 2 communication fault and total communication failure. Separate and distinct sounds are provided for the following conditions:
 - ✓ alarm - steady On
 - ✓ trouble - 1 second On and 1 second Off
 - ✓ supervisory - ½ second On and ½ second Off

Front Panel Indicator

- AC Power - green LED
- Input Active - red LED
- Communication Fail - yellow LED
- System Trouble - yellow LED
- Supervisory - yellow LED
- Battery Trouble - yellow LED

Circuit Board Indicator

- Earth Fault - yellow LED (indicates zero impedance between panel and earth ground)

1.5 Components and Accessories

Main Circuit Board

The main circuit board contains the system's MCU (microcontroller unit), power supply, other primary components and wiring interface connectors. The main circuit board is shipped in the same carton as the cabinet but is not mounted in the cabinet. The circuit board should be installed only after the cabinet is mounted to the wall and the area is clean and free of potential contaminants.

Cabinet

The cabinet is red and measures 14.5" (36.83 cm) high X 12.875" (32.7 cm) wide X 4.5" (11.43 cm) deep. It provides space for up to two 7 Amp Hour batteries which must be ordered separately. A supplied bezel must be installed in the door opening.

Trim Ring

An optional Trim Ring (P/N TR-6-R) is available for the backbox. The Trim Ring provides a finished appearance for a semi-flush mounted panel.

Transformer Assembly

One transformer is shipped with the 411UDAC assembly, pre-mounted to the cabinet.

Fire-Watch 411 Series DACT Programmer (Model PRO-411)

The PRO-411 is an optional DACT programmer which can be used to troubleshoot and program the 411UDAC, as well as access the various modes of operation. The PRO-411 must be ordered separately.

PK-411UD Upload/Download Software Kit

The optional PK-411UD Kit consists of the PK-411UD Upload/Download software on CD and the PK-411UD Program Manual. The PK-411UD enables a user to program the 411UDAC off site via the public switched telephone network using any personal computer with Windows® XP or greater and a 1200 baud Hayes® compatible modem.

1.6 Digital Communicator Operation

The 411UDAC has been designed to be compatible with a wide variety of fire alarm, nonfire and combination control panels (Slave Mode operation). Numerous formats are also available for communication to a central station. Two modular phone jacks allow easy connection to telephone lines. Modular jacks are labeled PH1 and PH2 for the Primary and Secondary phone lines. The digital communicator provides the following functions:

- Line Seizure- takes control phone lines, disconnecting any premise phones which may be using the same lines
- Off/On-Hook - perform on and off-hook status to phone lines
- Listen for dial tone - 440 hertz tone typical in most networks
- Dialing the Central Station(s) phone number - default is Touch-Tone®, programmable to rotary
- Discern proper Central Station 'ACK' and 'Kiss-off' tone(s)
- Transmit data to the Central Station(s)
- Verify data has been accepted by the Central Station(s)
- Hang-up and release phone lines
- Communicate in a variety of formats (Table 4.1, "Format Selection Addresses (20 and 50) Programming," on page 55).

1.7 Panel Configuration

The 411UDAC can be configured, through programming, for the following modes of operation:

- Stand-alone Mode With Communicator Enabled - the 411UDAC functions as a latching digital alarm communicator in which all input circuit activations latch (except those programmed as autoresettable) and are restored only by pressing the local reset switch. The onboard communicator will attempt to transmit events to a Central Station
- Slave Mode With Communicator Enabled - the 411UDAC functions as a nonlatching slave to a host control panel and the onboard digital alarm communicator will attempt to transmit events to a Central Station
- Slave Mode With Communicator Disabled - the 411UDAC functions only as a nonlatching slave to a host control panel. The digital alarm communicator will not transmit to a Central Station

1.8 Operational Modes

1.8.1 Normal Mode

Normal Mode is the standard mode of operation in which the 411UDAC monitors the channel/input circuits as well as telephone line voltage and other internal circuits. In addition to locally annunciating system trouble, active channel/input and communication fail, the onboard communicator transmits system status information to UL listed central station receivers if programmed to do so. Transmitted data includes fire alarm, fire alarm trouble, supervisory alarm and AC loss information. Specific digital communicator troubles are also transmitted.

1.8.2 Real Time Clock Mode

Real Time Clock Mode allows the user to change the digital alarm communicator's internal 24 hour clock. Connecting an external Programmer allows access to the various Modes of operation. While the 411UDAC is in Real Time Clock Mode, it does not monitor channel inputs. Use of this mode requires a valid password.

1.8.3 Program Mode

Program Mode is used to change the programmed functions of the 411UDAC. While the 411UDAC is in Program Mode, it does not monitor channel inputs. In addition, some program items will be locked, which will prevent editing while the communicator is active (dialing, transmitting, etc.). Use of this mode requires a valid password.

1.8.4 Troubleshoot Mode

Troubleshoot Mode may be used to sample and display status for all channel/input circuits, Notification Appliance Circuit, AC power, battery, charger and 12 volt resettable power. In addition, Troubleshoot Mode may be used for testing the telephone line interconnect wiring. Connection from the 411UDAC's modular jacks, through the RJ31X jacks and into the telephone network may be easily checked. In this mode, the Programmer keypad acts similar to a telephone touchpad. While the 411UDAC is in Troubleshoot Mode, it does not monitor channel inputs.

1.8.5 Default Mode

Default Mode may be used to return all 411UDAC programming back to the factory default settings and to reset the Real-Time Clock to '00:01' midnight. See "Default Mode" on page 51.

1.9 Telephone Requirements and Warnings

1.9.1 Telephone Circuitry - PH1 & PH2

AC Ringer Equivalence Number (REN) = 0.4B

Mates with RJ31X Male Connector

Supervision Threshold: less than 5.0 volts for 2 minutes

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to determine the maximum REN for the calling area.

1.9.2 Digital Alarm Communicator:

Before connecting the 411UDAC to the public switched telephone network, the installation of two RJ31X jacks is necessary. The following information is provided if required by the local telephone company:

Manufacturer: Fire•Lite Alarms Inc./Notifier

One Fire-Lite Place

Northford, CT 06472

Product Model Number: 411UDAC

FCC Registration Number: 1W6AL04B411UDAC

AC Ringer Equivalence: 0.4B

FCC ID label is located on the inside cover.

Important! The DACT must not be used to dial a phone number that is call-forwarded per requirements of UL 864 9th Edition.

1.9.3 Telephone Company Rights and Warnings

The telephone company, under certain circumstances, may temporarily discontinue services and/or make changes in its facilities, services, equipment or procedures which may affect the operation of this digital communicator. However, the telephone company is required to give advance notice of such changes or interruptions. If the digital communicator causes harm to the telephone network, the telephone company reserves the right to temporarily discontinue service. Advance notification will be provided except in cases when advance notice is not practical. In such cases, notification will be provided as soon as possible. The opportunity will be given to correct any problems and to file a complaint.

DO NOT CONNECT THIS PRODUCT TO COIN TELEPHONE, GROUND START OR PARTY LINE SERVICES.

When the digital communicator activates, premise phones will be disconnected.

Two separate phone lines are required. Do not connect both telephone interfaces to the same telephone line.

The digital communicator must be connected to the public switched telephone network upstream of any private telephone system at the protected premises.

An FCC compliant telephone cord must be used with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible RJ31X male modular plug which is Part 68 compliant.

Section 2: Installation

2.1 Mounting Options

The cabinet may be either semi-flush or surface mounted. The door is removable during the installation period by opening and lifting it off the hinges. The cabinet mounts using two key slots and two additional 0.25" diameter holes located in the backbox. The keyslots are located at the top of the backbox and the two securing holes at the bottom.

Carefully unpack the system and check for shipping damage. Mount the cabinet in a clean, dry, vibration-free area where extreme temperatures are not encountered. The area should be readily accessible with sufficient room to easily install and maintain the panel. Locate the top of the cabinet approximately five feet above the floor with the hinge mounting on the left. Determine the number of conductors required for the devices to be installed. Sufficient knockouts are provided for wiring convenience. Select the appropriate knockout(s) and pull the required conductors into the box. All wiring should be in accordance with the National and/or Local codes for fire alarm systems.

2.2 Mounting

Backbox Mounting

1. Mark and predrill holes for the top two keyhole mounting bolts using the dimensions shown in Figure 2.1.
2. Install two upper fasteners in the wall with the screw heads protruding.
3. Using the upper 'keyholes', temporarily mount the backbox over the two screws.
4. Mark the lower two holes, remove the backbox from the wall and drill the lower two holes in the wall.

Main Circuit Board Mounting

1. When the location is clean and free of construction dust or other contaminants, install the main PC board by installing the four supplied standoffs on the four main circuit board mounting studs located in the backbox. Refer to Figure 2.1 for locations.
2. Position the main circuit board's four corner mounting holes over the four standoffs just installed. *Be certain to observe the proper ESD (Electro Static Discharge) precautions to prevent damage to the static sensitive circuits. This includes, but is not limited to, use of a wrist strap.*
3. Secure the main circuit board to the standoffs with the four supplied screws and attached washers.
4. Plug the transformer connector into the main circuit board connector J4. The connector is keyed and can only be plugged-in one way. Refer to Figure 2.3 on page 21 and Figure 2.11 on page 29 for transformer connector location and AC power connections.
5. When wiring is completed, re-install the door.

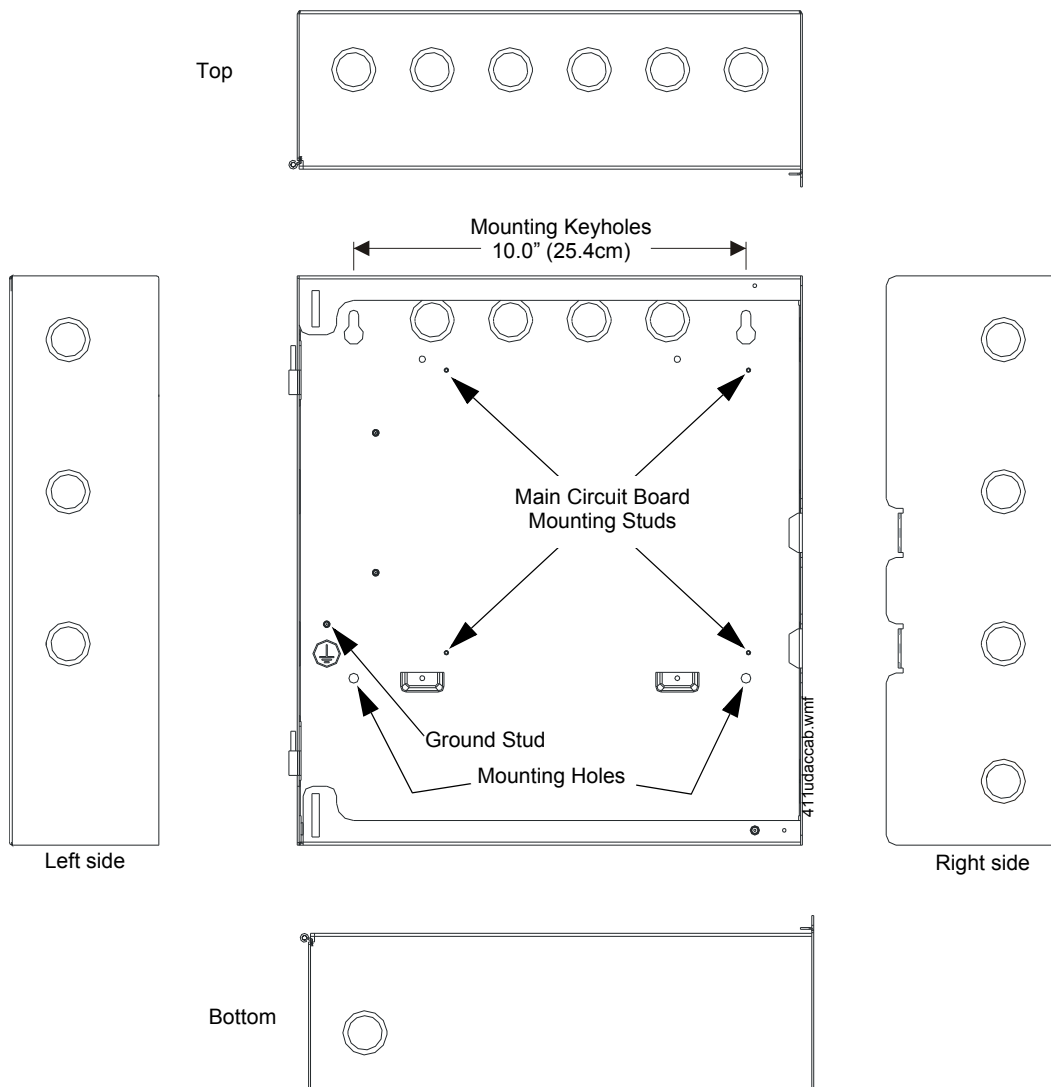


Figure 2.1 Cabinet Dimensions and Knockout Locations

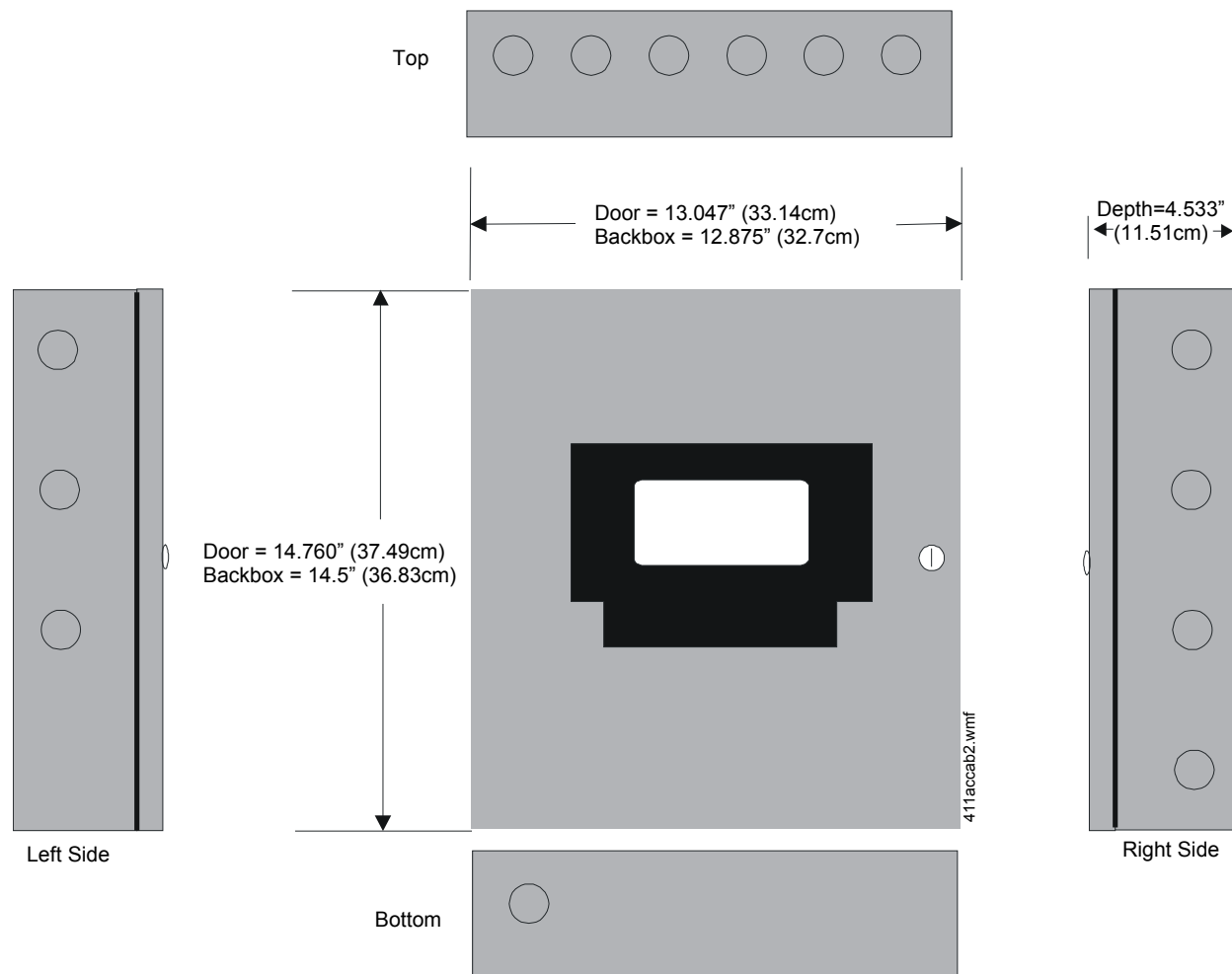


Figure 2.2 411UDAC Backbox

2.3 Operating Power



CAUTION: DISCONNECT POWER BEFORE SERVICING

SEVERAL DIFFERENT SOURCES OF POWER CAN BE CONNECTED TO THE 411UDAC. DISCONNECT ALL SOURCES OF POWER BEFORE SERVICING THIS UNIT. THE COMMUNICATOR AND ASSOCIATED EQUIPMENT MAY BE DAMAGED BY REMOVING AND/OR INSERTING MODULES OR CABLES WITH POWER APPLIED.

Primary Power Source (AC) and Earth Ground Connections

AC power connections are made inside the 411UDAC cabinet. The primary power source is 120 VAC, 60 Hz, 0.7 amps. Run a pair of wires (with ground conductor) from the protected premises main breaker box to TB3 of the main circuit board. As per the National Electric Code, use 14 AWG (2.00 mm²) or heavier gauge wire with 600V insulation. No other equipment may be connected to this circuit. In addition, this circuit must be provided with overcurrent protection and may not contain any power disconnect devices.

A separate earth ground connection must be made to ensure proper panel operation and lightning and transient protection. Remove the two keys nuts from the grounding stud in the backbox. Connect the incoming earth ground wire to supplied cable #71073 with a wire nut. Position the ring terminal end over the grounding stud. Secure with one of the keys nuts. Place the ring terminal from the other supplied ground cable #71073 over the ground stud and secure with the second keys nut. Wire the ground cable to the bottom position of TB3. Refer to the figure below for location of the stud. Apply AC power to the panel only after the system is completely installed and visually checked. Note that AC power must be applied to the panel before installing the battery interconnect cable.

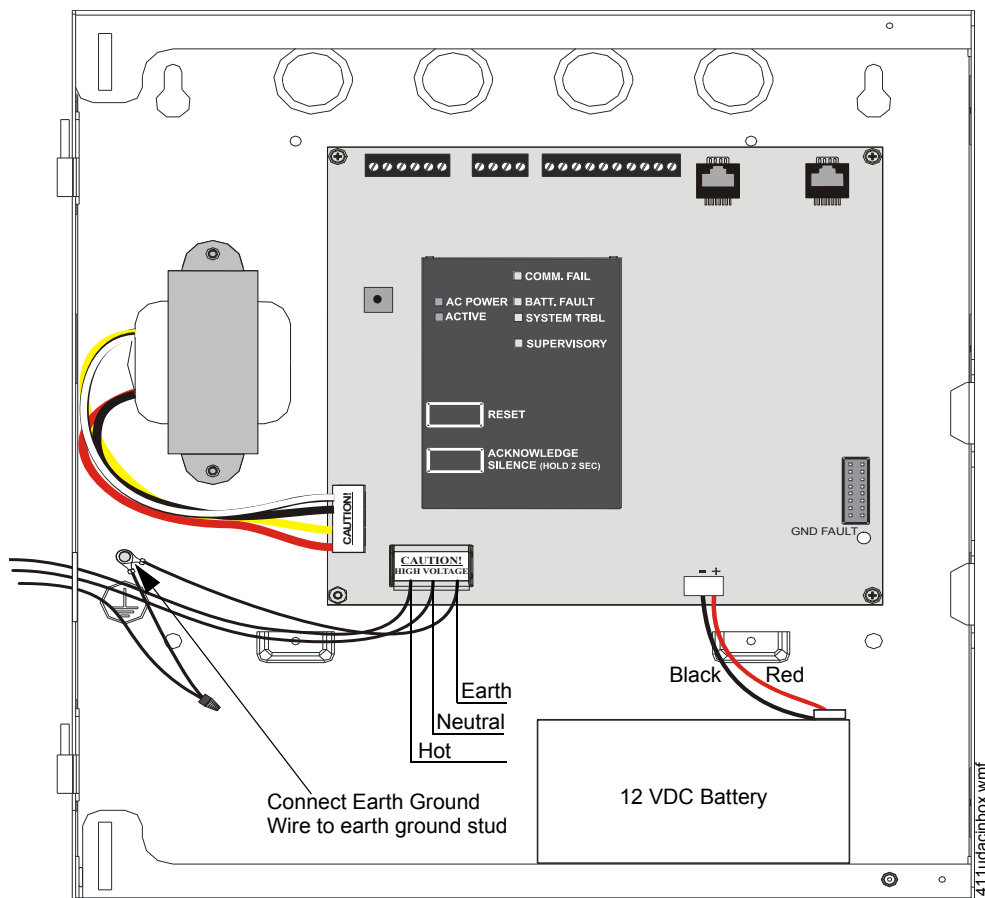


Figure 2.3 Operating Power Connections

Secondary Power Source (batteries)

Observe polarity while connecting the battery. When installing one 12 volt battery for up to 12 Amp Hour applications, connect the supplied battery cable (P/N 75516) by sliding the connector attached to the long red wire onto the positive (+) battery terminal and the connector attached to the long black wire onto the negative (-) battery terminal. Tie-wrap or tape the two unused short wires to the long wires.

When installing two 12 volt, 7 Amp Hour batteries (in parallel) for up to 14 Amp Hour applications, follow the same procedure as described for one battery except connect the unused short wires to the second battery. Slide the connector attached to the short red wire onto the positive (+) terminal of the second battery and the connector attached to the short black wire onto the negative (-) battery terminal of the second battery.

When the panel is ready to have power applied, connect the battery cable plug to connector J3 on the 411UDAC main circuit board. The battery charger is capable of recharging sealed lead acid type batteries. Refer to the battery calculations table to determine the correct battery rating.



CAUTION: BATTERY CONTAINS SULFURIC ACID

THE BATTERY CONTAINS SULFURIC ACID WHICH CAN CAUSE SEVERE BURNS TO THE SKIN AND EYES, AND CAN DESTROY FABRICS. IF CONTACT IS MADE WITH SULFURIC ACID, IMMEDIATELY FLUSH THE SKIN OR EYES WITH WATER FOR 15 MINUTES AND SEEK IMMEDIATE MEDICAL ATTENTION.

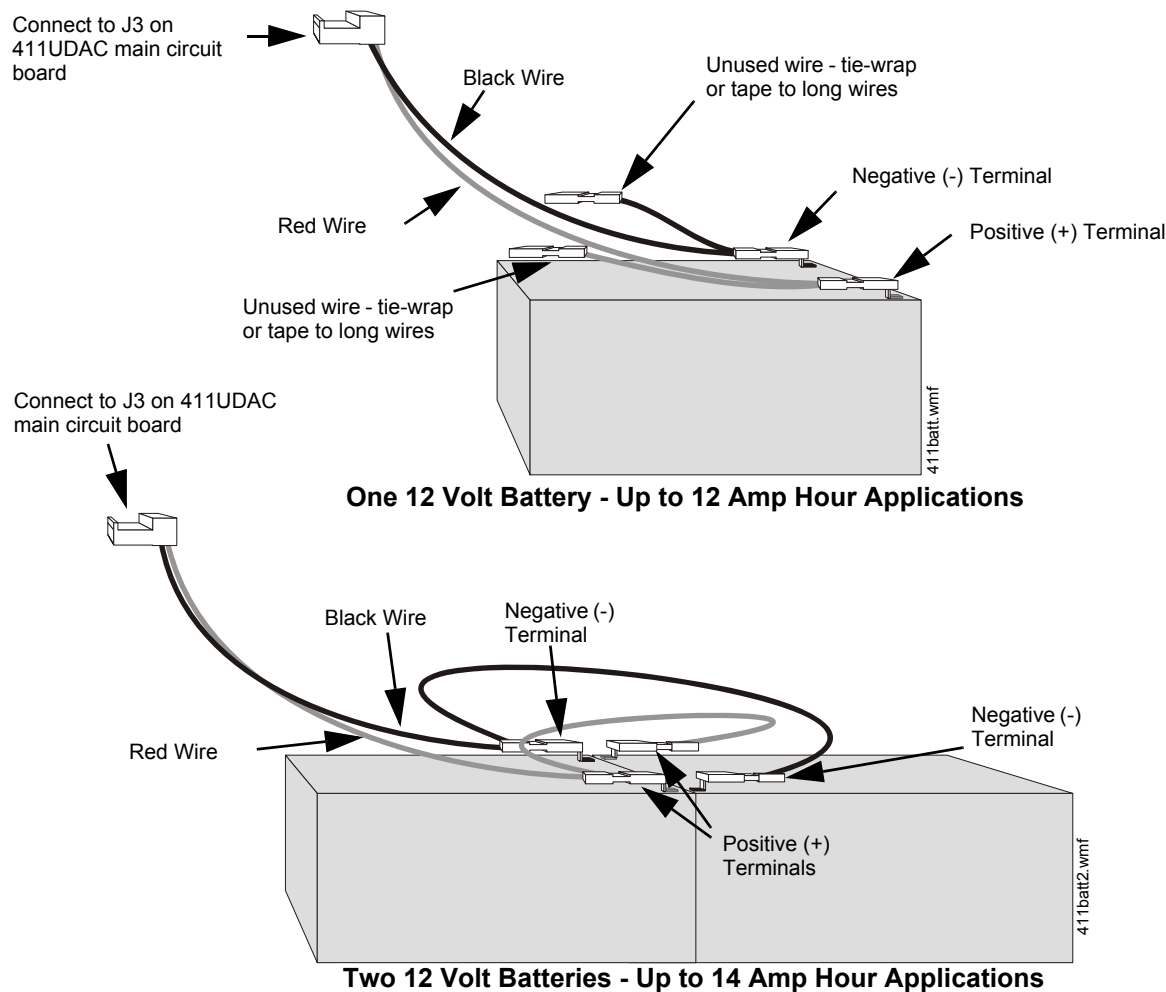


Figure 2.4 Battery Cable Connections

2.4 Input Channels

The 411UDAC has four channel inputs. Channel/input field wiring is supervised for opens (trouble), shorts (alarm) and ground faults (zero ohms impedance between panel and earth ground) by the 411UDAC. All conditions are visually and audibly annunciated and, if programmed, communicated to a Central Station.

Each channel is a Style B (Class B) Initiating Device Circuit with the exception of channel/input 3 which can be configured for Style B or Style D (Class A). All inputs can be connected to normally-open contact type devices. In addition, inputs 1 and 3 can be connected to conventional 4-wire smoke detectors. Figure 2.5, "Wiring Initiating Device Circuits" on page 23 for information on wiring Style B and Style D circuits.

The channel/inputs may be programmed as shown below:

- 4-wire smoke detector (inputs 1 & 3 only)
- Pull station
- Normally-open contact device
- Host panel trouble
- Supervisory
- Supervisory autoresettable
- Waterflow silenceable
- Waterflow nonsilenceable

A maximum of five waterflow devices may be used on any circuit programmed as a waterflow zone per NFPA 72.

It is allowable to mix an assortment of device types (i.e. smoke detectors, heat detectors, pull stations, etc.) on any zone. This is not recommended, however, since specific and detailed reports will not be possible (particularly critical when using Contact ID format). For example, the report of general fire alarm versus pull station fire alarm or smoke detector fire alarm could not be distinguished.

The factory default programming for each channel is as follows:

- ✓ Channel 1 - fire alarm (4-wire smoke)
- ✓ Channel 2 - pull station
- ✓ Channel 3 - fire alarm (4-wire smoke)
- ✓ Channel 4 - pull station

The following illustration shows Channel 1 connected to 4-wire smoke detectors, and UL-listed power supervision relay; Channel 2 connected to manual pull stations; Channel 3 connected to manual pull stations; and Channel 4 connected to waterflow devices. In this example, the factory default programming for Channel 4 must be changed from *pull station* to *waterflow device*.

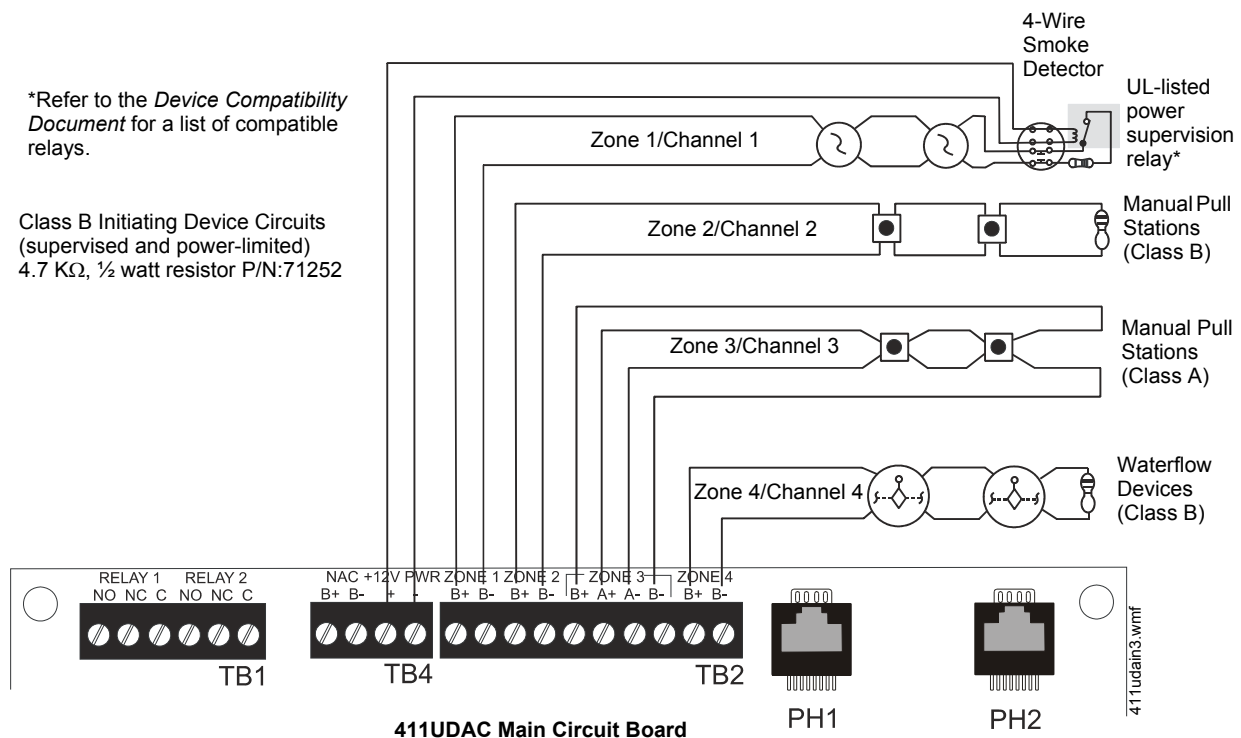


Figure 2.5 Wiring Initiating Device Circuits

Note: The addressable monitor module input, which is being used to monitor the 411UDAC Relay Output programmed for DACT Trouble must be programmed as 'DACT Trouble' at the FACP. The 411UDAC must be programmed as a Slave Communicator (programming address 64 set to '2')

Program the 411UDAC as follows:
 Channel 1 - Normally Open Contact Device (alarm)
 Channel 2 - Host Panel Trouble
 Channel 3 - Supervisory

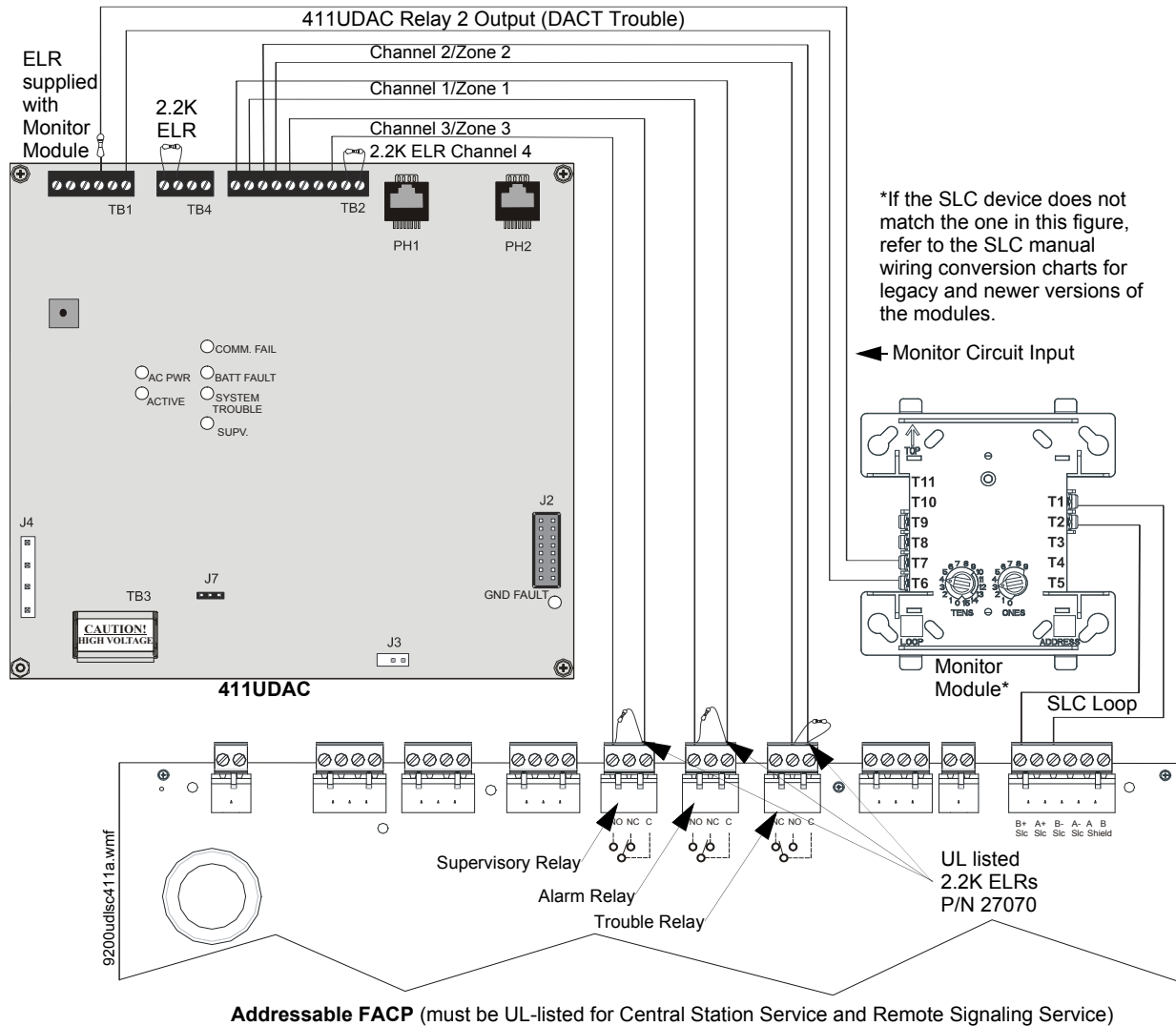


Figure 2.6 Typical Addressable FACP Connection to 411UDAC

2.5 Output Circuits

Notification Appliance Circuit

The 411UDAC provides one Style Y (Class B) NAC (Notification Appliance Circuit). The NAC is supervised and power-limited and is capable of 1.0 amp of current. Refer to the *Device Compatibility Document* for a listing of compatible notification appliances.

Notes:

1. The 411UDAC can only be used to supplement host panel NACs.
2. Do not connect strobes to the 411UDAC Notification Appliance Circuit.

The NAC may be programmed as follows:

- Silenceable
- Nonsilenceable (waterflow)
- Silence Inhibited (one minute)
- Autosilence (5 to 30 minutes)

Style Y (Class B) Notification Appliance Circuit
(supervised and power-limited).
2.2K ohms, ½ watt P/N 27070

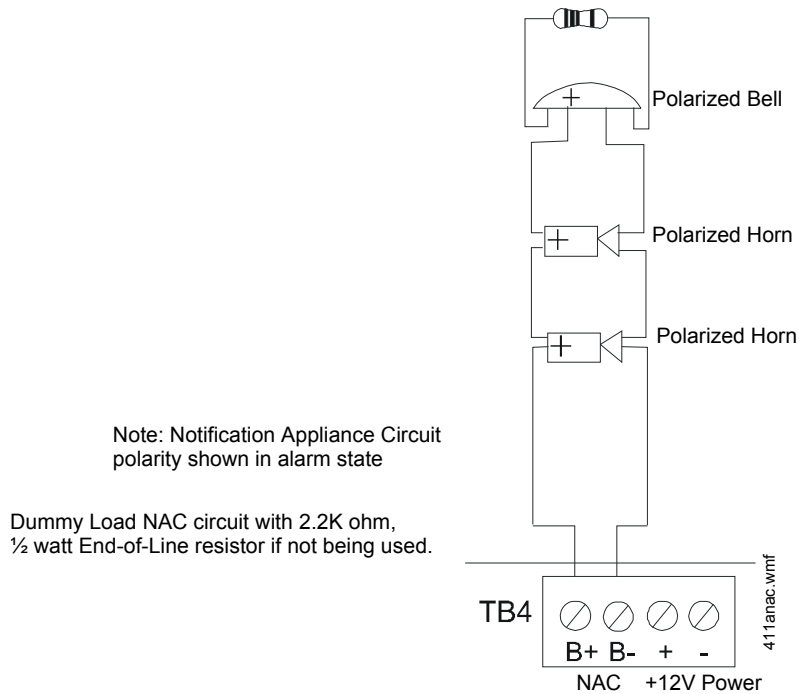


Figure 2.7 Notification Appliance Circuit Connections

Relay Programming

The relays are programmable for activation on fire alarm, host panel trouble, fire supervisory, total communication failure and DACT. Refer to “DACT Programming” on page 36. Addresses ‘85 - 88’ are used for programming relay functions and enable.

Note: Relay connections may be power-limited or nonpower-limited. However, connecting one type next to the other type is not allowed. Both circuits must be either power-limited or nonpower-limited.

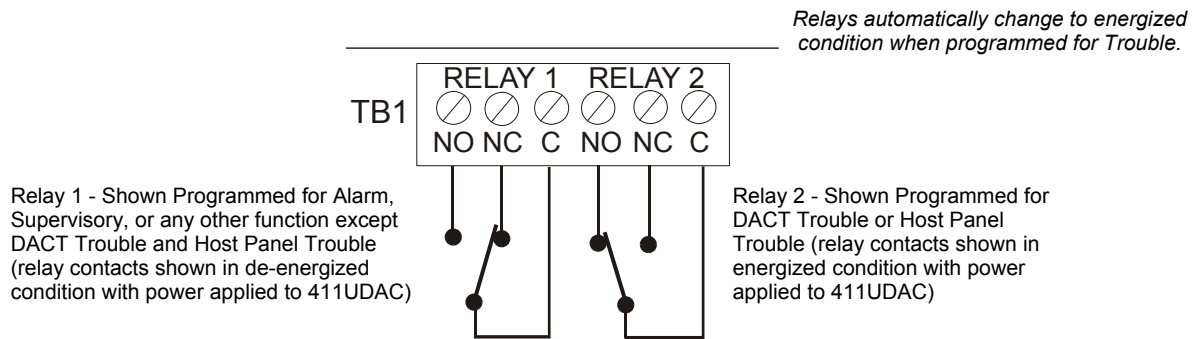


Figure 2.8 Programmable Relay

2.6 Telephone Circuits

Provision to connect two independent telephone lines is available via two telephone jacks labeled PH1 (Primary) and PH2 (Secondary). Telephone line control/command is possible via double line seizure as well as usage of an RJ31X style interconnection. (RJ31X jacks must be ordered separately).



CAUTION: PROPER FUNCTIONALITY

IT IS CRITICAL THAT THE 411UDAC BE LOCATED AS THE FIRST DEVICE ON THE INCOMING TELEPHONE CIRCUIT TO PROPERLY FUNCTION.

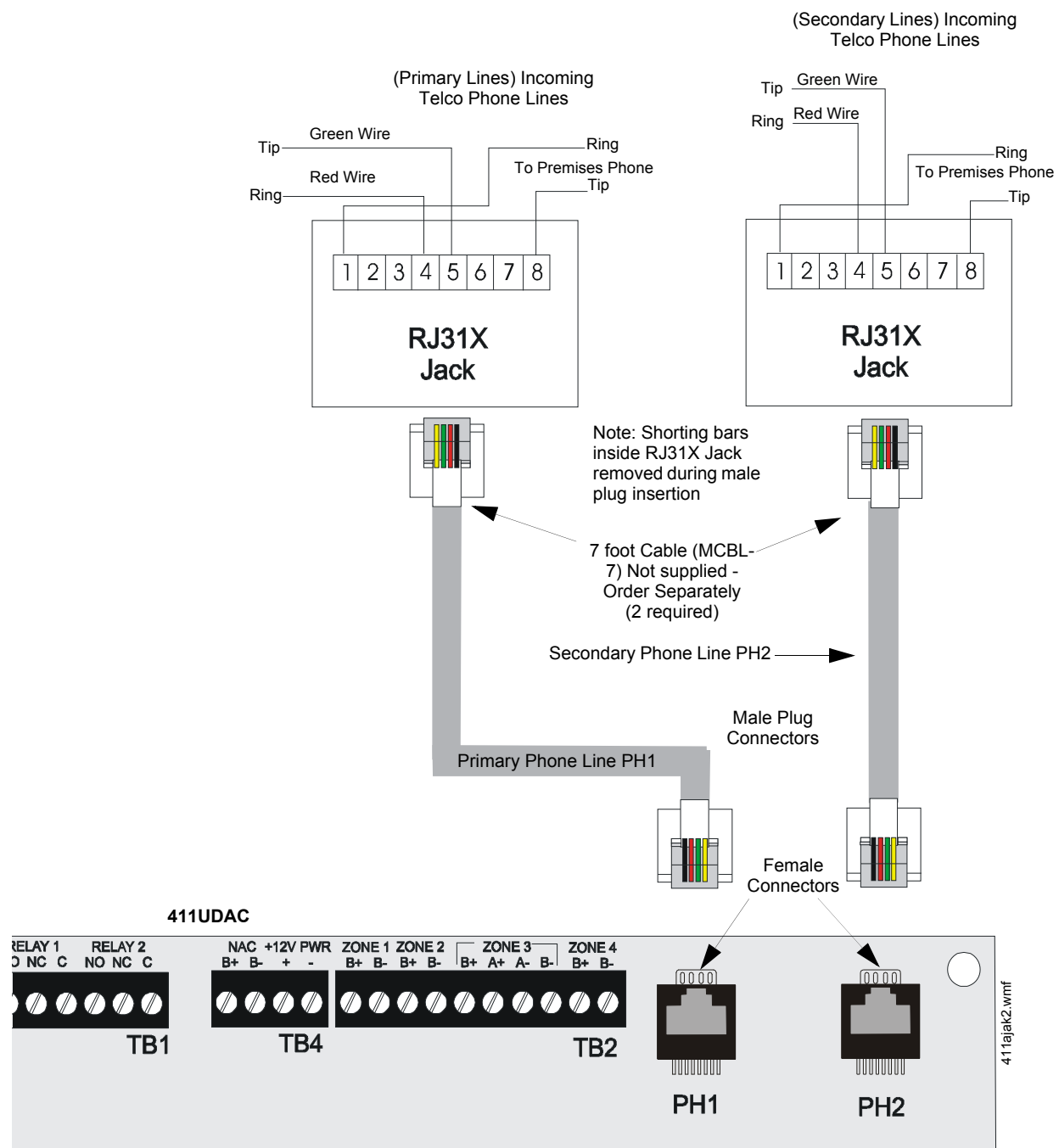


Figure 2.9 Wiring Phone Jacks

2.7 Optional Programmer

The Fire-Watch 411 Series DACT Programmer (Model PRO-411) is used to:

- ✓ switch between the digital alarm communicator's five Modes of operation
- ✓ set the digital alarm communicator's 24 hour internal clock in Real-Time Clock Mode
- ✓ program the 411UDAC digital alarm communicator in Program Mode
- ✓ test the status of input and output circuits (including telephone lines) in Troubleshoot Mode
- ✓ return all digital alarm communicator programming to the factory default settings in Default Mode

To use the PRO-411 Programmer:

1. Remove all power from the 411UDAC.
2. Unlock and open the 411UDAC door.
3. Connect the Programmer cable to connector J2 located in the lower right corner of the 411UDAC. Note that the key on the connector must align with the slot in the J2 connector.
4. Reapply power to the 411UDAC.
5. Operate the Programmer by pressing the **MODE** key. Enter the appropriate four digit code and then press the **[ENTER/STORE]** key.

Note that it is not possible to switch from Normal Mode to any other mode if any of the four Channels is programmed for fire alarm or fire supervisory and is active, that is, in alarm (shorted).

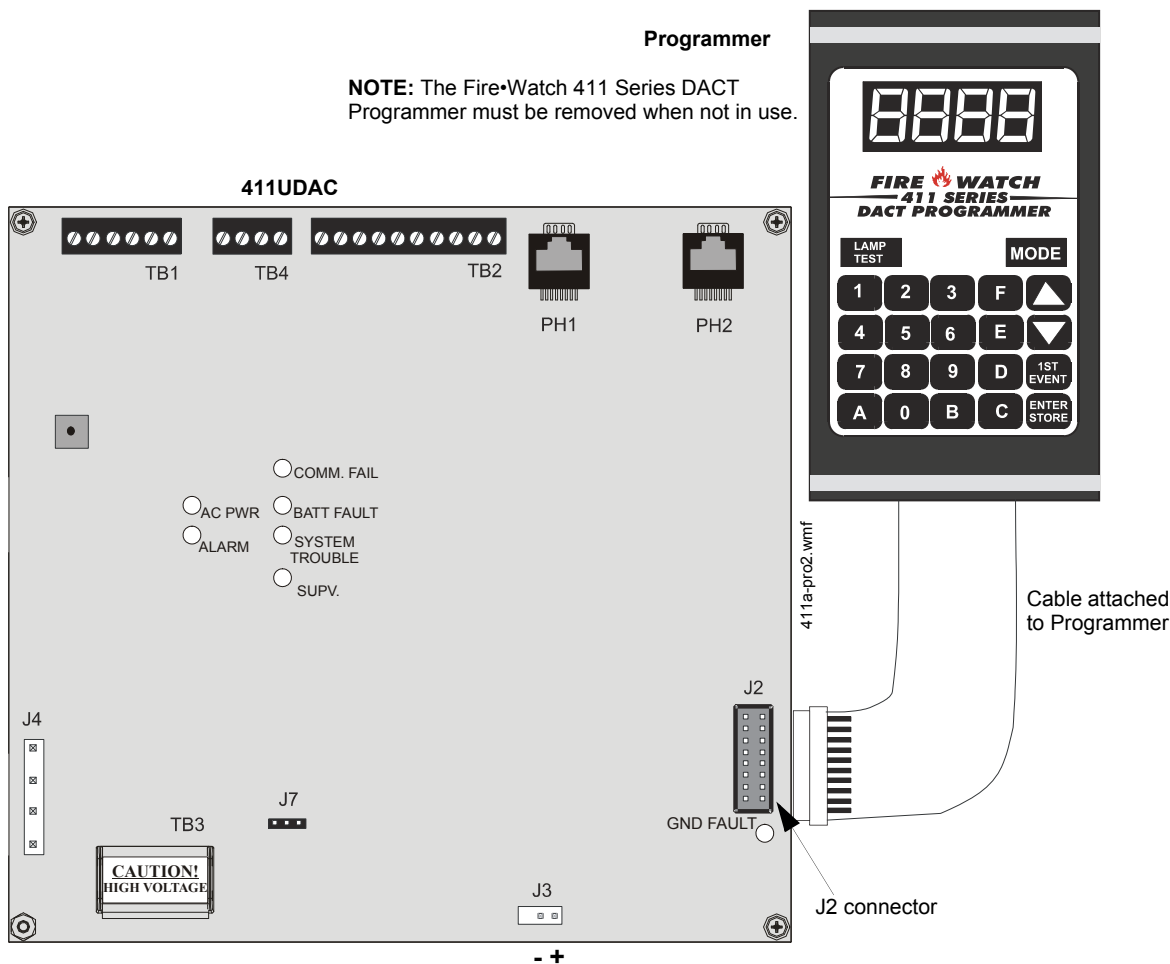


Figure 2.10 Programmer Connection to 411UDAC

2.8 UL Power-limited Wiring Requirements

Power-limited and nonpower-limited circuit wiring must remain separated in the cabinet. All power-limited circuit wiring must remain at least 0.25" away from any nonpower-limited circuit wiring. Furthermore, all power-limited and nonpower-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits. A typical wiring diagram for the 411UDAC is shown below.

Note: Relay connections may be power-limited or nonpower-limited, provided that 0.25" spacing is maintained between conductors of power-limited and nonpower-limited circuits.

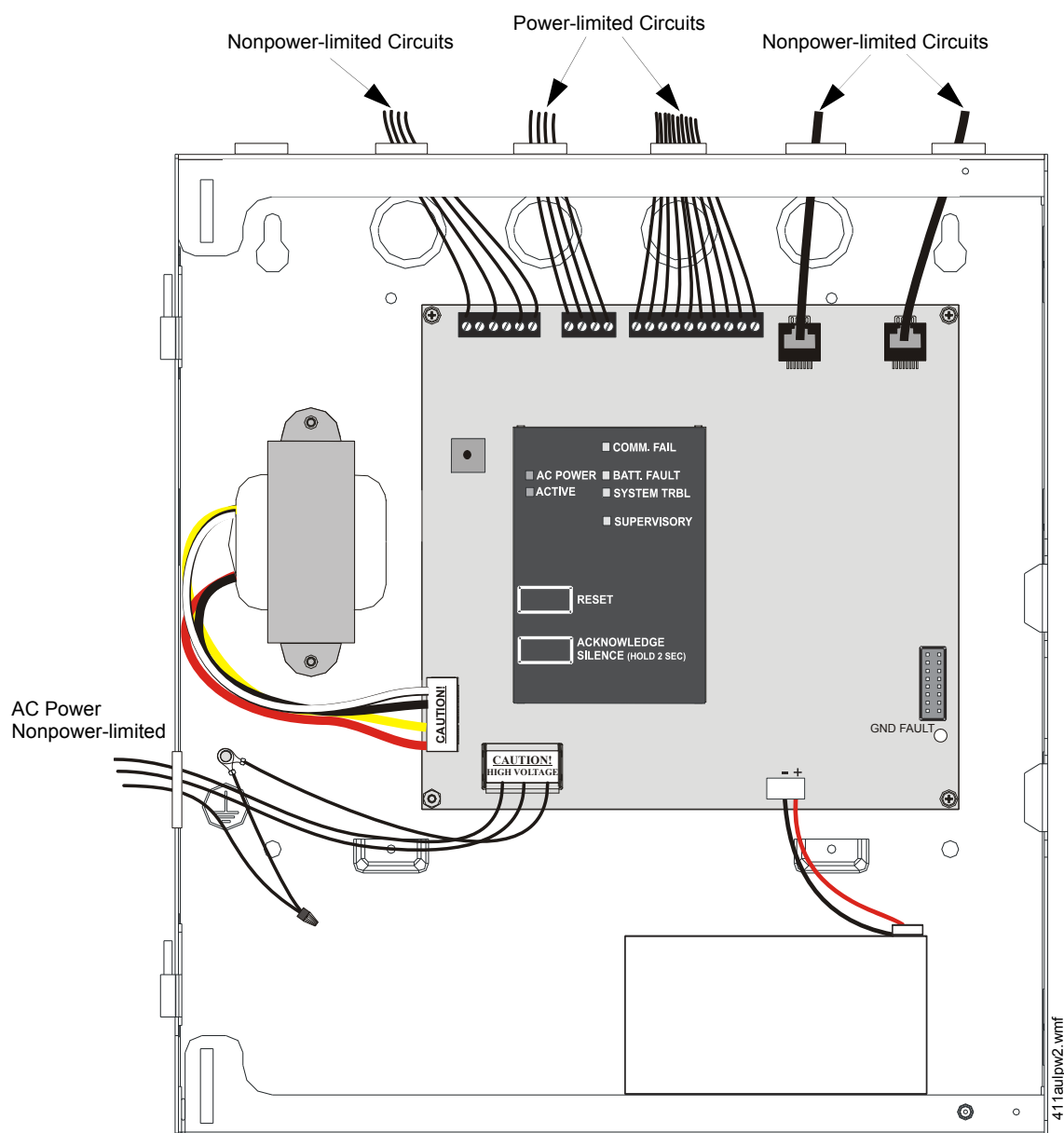


Figure 2.11 Typical UL Power-limited Wiring Diagram

Section 3: Modes of Operation

The 411UDAC has five operational modes:

- Normal Mode
- Real Time Clock Mode
- Program Mode (requires password)
- Troubleshoot Mode
- Default Mode (requires password)

The operational mode for the 411UDAC is Normal Mode. The operator is able to switch between any modes of operation provided no alarm events are active in the system. It should be noted that the unit will not respond to input activations while in any mode except Normal Mode.

Some modes require a password. Refer to Section 3.2.

Access to any other Mode requires connection of the PRO-411 DACT Programmer which consists of a keypad and display. Figure 3.1, “Programmer Keypad” on page 31.

Note that if the 411UDAC is configured to operate as a Slave Communicator, it will attempt to transmit all panel status to a Central Station. If set to operate in the Test Communicator configuration, the 411UDAC will function as a local slave panel only without transmitting panel status to a Central Station.

3.1 Normal Mode

Normal Mode is the standard (default) mode of operation for the 411UDAC. The unit continuously monitors the status of the four input channels as well as the status of the onboard digital communicator. If no activity is detected on the four input channels (no shorts or opens) and the 411UDAC is operating free of internal troubles, the unit will display the following conditions:

- ✓ All LEDs are off except the AC Power LED
- ✓ NAC output is off
- ✓ Onboard piezo sounder is off
- ✓ The relays are in their normal deactivated state
- ✓ Communicator is not transmitting to the Central Station

The 411UDAC transmits system status reports to a central station, if programmed to do so, via the public switched telephone network. Two supervised telephone line connections are made to interface the digital communicator to the telephone lines. Both telephone lines are supervised by the 411UDAC for proper voltage.

The 411UDAC is capable of line seizure on both the primary and secondary telephone line interfaces. *Any time the digital communicator detects the necessity to call the Central Station, line seizure will disconnect any local premises phones sharing the same telephone line. Sharing of phone lines, for fire systems, must be approved by the Local Authority Having Jurisdiction.* All transmissions to the Central Station will be sent over the Primary phone line. In the event of a noisy or faulty phone line, transmissions will be sent over the backup Secondary phone line.

Transmission options exist to:

- send reports to the secondary phone number as backup only
- send reports to both the primary and secondary phone numbers
- send reports to the first available central station phone number

If 10 total attempts to communicate are unsuccessful, the 411UDAC will turn on the Communication Fail LED.

The 411UDAC meets NFPA 72 requirements for Remote Station Protective Signaling Service and Central Station Signaling Service reporting requirements for: (a) the type of signal, (b) condition and (c) location of the reporting premises. See “Central Station Communications” on page 54, for additional information.

The 411UDAC can be switched from Normal Mode to any other Mode, provided no channel programmed for fire alarm or fire supervisory is active, that is, in alarm (shorted). The PRO-411 DACT Programmer, for use with the Fire•Watch 411 Series, must be connected to the 411UDAC in order to change from mode to mode.

3.1.1 Programmer Key Functions

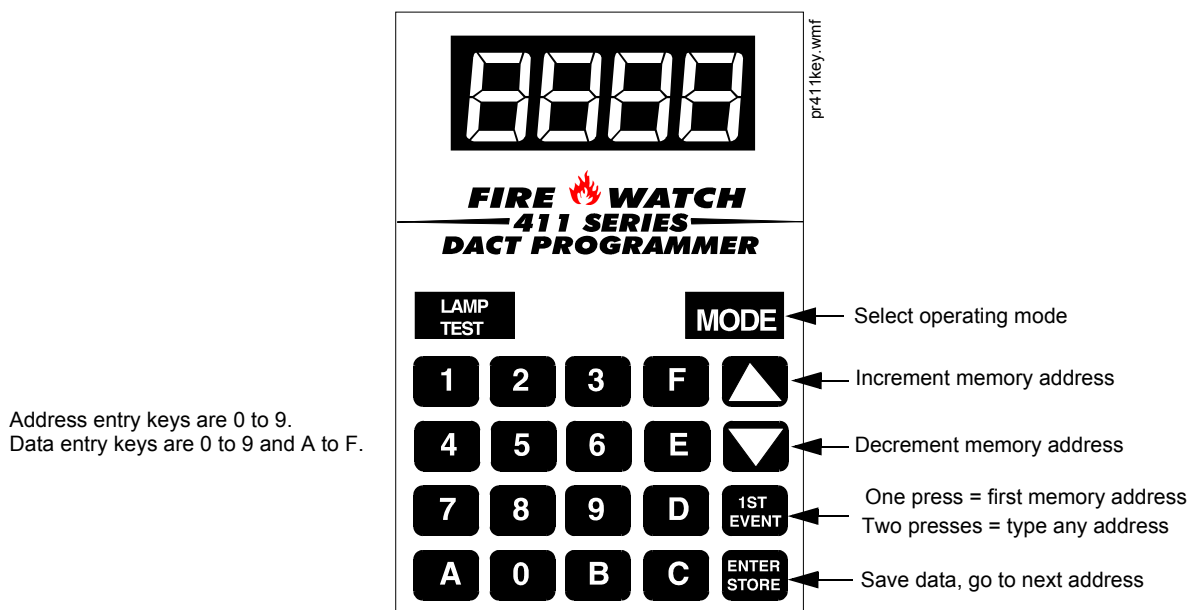


Figure 3.1 Programmer Keypad

MODE KEY

Pressing the **MODE** key followed by a valid 4-digit numerical code and the **[ENTER/STORE]** key selects one of the five modes of operation. To enter Normal Mode from any other mode, press the **MODE** key followed by **6676** and then **[ENTER/STORE]**.

- **6676** spells NORM on a Touch-Tone[®] phone.

If an incorrect key is entered, reenter the proper 4-digit code before pressing the **[ENTER/STORE]** key. Note that as information is entered into the 411UDAC, the digits will scroll across the Programmer display from right to left.

```

_ 6
_ 66
_ 667
6676

```

A pause of up to 10 seconds between each number is allowed while entering the code.

LAMP TEST KEY

Pressing the Lamp Test key on the Programmer, while the digital communicator is in Normal Mode, will cause the front panel LEDs and all segments of the four 7-segment display on the 411UDAC to light. A Lamp Test can only be performed in Normal Mode. The Lamp Test key can also be used in Troubleshoot Mode to view the 12 volt resettable power value.

1st EVENT KEY

This key, along with the **UP** and **DOWN** arrow keys, are used only in Program Mode. Press the **1st EVENT** key at any time to display the first program memory address and its content. The following may be displayed on the Programmer:

00_F
(address) (data)

If the **1st EVENT** key is pressed a second time, the following will be displayed on the Programmer display:

0.
↑
Digit to be programmed

The contents of any address can be viewed by entering the digits of the desired address. For example, to view the contents of address 86, press the '8' key on the keypad. '8' will appear as the first digit in the display, a blank will appear in the position of the second digit and the decimal point will move one position to the right, indicating that the next digit can now be entered.

8.
↑
Digit to be programmed

Press the '6' key on the keypad. '6' will appear as the second digit on the display and the decimal point will move one position to the right. Press the **[ENTER/STORE]** to view the contents of address 86.

86_.

DOWN ARROW

Use the **DOWN** arrow key to decrement the memory address and view its content.

UP ARROW

Use the **UP** arrow key to increment the memory address and view its content.

ENTER/STORE

Stores entry into nonvolatile E² memory located on the 411UDAC printed circuit board, then increments to the next higher address.

3.1.2 Programmer Display

Four 7-segment red LED characters provide visual display of information in the various modes of operation.

3.2 Password Creation and Entry

In order to access the Default Mode or Programming Mode, a valid password must be entered.

1. Press the **MODE** key followed by the 4-digit entry code (**3337** for Default Mode or **7764** for Program Mode).
2. Press the **[ENTER/STORE]** key. The display will read **LinP** indicating that a valid password is required to continue.

3. For the initial power-up of the 411UDAC or for the first power-up after a manually defaulted password, key in the default password **0000** and press **[ENTER/STORE]**. The display will then read **dC_P**.
4. Press **d** to continue with the default password or press **C** to change to a new password.
5. If **d** is entered in step 4, the display goes directly to the programming/default modes.
6. If **C** is entered in step 4, the display will read **En_P** prompting for a new password.
 - Key in a new 4-digit password. Valid passwords are any four digit code from 0001-9999.
 - The display will then read **rEnP**. Key in the new password again for verification.
 - Once the new password has been verified, the programming/default modes will be accessed.

If at any time a password was entered incorrectly, the display will read **AErr** indicating an invalid entry was made.

3.3 Real Time Clock Mode

Real Time Clock Mode is entered by pressing the **MODE** key followed by the 4-digit entry code **2525** and pressing the **[ENTER/STORE]** key. Accessing this mode requires authentication. Refer to Section 3.2.

- **2525** spells CLCK on a Touch-Tone[®] phone.

If an incorrect key is entered, reenter the proper 4-digit code before pressing the **[ENTER/STORE]** key. Note that as information is entered into the 411UDAC, the digits will scroll across the Programmer display from right to left.

```

  _2
 _25
_252
2525

```

A pause of up to 10 seconds between each number is allowed while entering the code. After pressing the **[ENTER/STORE]** key, the 411UDAC will be in Real Time Clock Mode. A maximum of 10 minutes idle time is allowed at this point before beginning program entries and between each key stroke, otherwise, the 411UDAC will return to Normal Mode. Note that the time is not stored until the fourth and final digit is selected and the **[ENTER/STORE]** key is pressed. If the 411UDAC returns to Normal Mode prior to entering the fourth digit, no changes will be stored and the original time is retained.

On entering Real Time Clock Mode, **0.001** will appear on the Programmer display:

```

      0.001
      ↑
Digit to be programmed

```

The time is displayed in military time. Note the position of the decimal point in the display. This indicates that the first digit to be programmed is the one to the left of the decimal point. To program the first hour digit, press the corresponding number on the Programmer keypad and then press the **[ENTER/STORE]** key. For example, to program 2:00 PM (**1400** in military time), press '1' on the keypad and then the **[ENTER/STORE]** key. The number '1' will appear as the far left digit and the decimal point will move one position to the right indicating that the second digit from the left is now ready for programming.

```

      10.01
      ↑
Digit to be programmed

```

Enter the second hour digit (4 in this example) and press the **[ENTER/STORE]** key. The number '4' will appear as the digit second from the left and the decimal point will move one position to the right indicating that the third digit from the left is now ready for programming.

140.1

 Digit to be programmed

Enter the first minute digit (0 in this example) and press the **[ENTER/STORE]** key. The number '0' will appear as the digit third from the left and the decimal point will move one position to the right indicating that the fourth digit from the left is now ready for programming.

1400.

 Digit to be programmed

Enter the second minute digit (0 in this example) and press the **[ENTER/STORE]** key. The number '0' will appear as the digit fourth from the left. Following the entry of the fourth and final digit, the operating mode will immediately switch to Normal Mode, indicating that programming of the time is now completed.

To exit Real Time Clock Mode before completing clock programming, press the **MODE** key, followed by the 4-digit code for an alternate mode and then the **[ENTER/STORE]** key. During Real Time Clock Mode, if no key is pressed within 10 minutes, the 411UDAC will revert to Normal Mode.

Note that upon power-up, the internal clock starts running at 00:01 midnight. It must be changed so that the 411UDAC can accurately call in test signals to the Central Station. Upon power loss or on entering Default Mode, the clock reverts to 00:01 midnight and must be reset.

3.4 Program Mode

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:			
Program feature or option	Permitted in UL 864? (Y/N)	Possible settings	Settings permitted in UL 864
AC Loss Delay	Y	AC Loss Delay = 0, 1, 2 (factory default), 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, or 18 hours Refer to "AC Loss Reporting Delay (60)" on page 45.	AC Loss Delay = 1 or 2 hours
Input Channel 1-4 Delay Timer	Y	0 – 179 seconds Refer to "Input Channel 1 Delay Timer (69 - 71)" on page 46	Delay timer = 0 - 90 seconds
Trouble Call Limit	N	Program Address 96 = 0 (factory default): unlimited calling to Central Station for any trouble condition Program Address 96 = 1: limits call for each unique trouble to 10 within a 24 hour period Refer to "Trouble Call Limit - Dialer Runaway Prevention (96)" on page 50	Program Address 96 = 0 for unlimited Central Station trouble calls

All programming selections made during Program Mode are stored in nonvolatile memory. This ensures that the 411UDAC will retain all entries made in Programming Mode even if power is removed.

The user must program the primary and secondary phone numbers, account numbers, 24-hour test report times and verify event codes for each Central Station account. The 411UDAC is shipped with the program options/features already factory programmed. Alternative options/features may be programmed if desired. If all factory default settings are acceptable, programming is complete.

Program Mode is entered by pressing the **MODE** key followed by the 4-digit program mode entry code **7764** and pressing the **[ENTER/STORE]** key. Accessing this mode requires authentication. Refer to Section 3.2.

- **7764** spells PROG on a Touch-Tone® phone.

If an incorrect key is entered, reenter the proper 4-digit code before pressing the **[ENTER/STORE]** key. Note that as information is entered into the 411UDAC, the digits will scroll across the Programmer display from right to left.

```

_ 7
_ 77
_ 776
7764

```

A pause of up to 10 seconds between each number is allowed while entering the code. After pressing the **[ENTER/STORE]** key, the 411UDAC will be in Program Mode. A maximum of 10 minutes idle time is allowed at this point before beginning program entries and between each key stroke, otherwise, the unit will return to Normal Mode. All entries made prior to the 10 minute time-out are valid and are stored.

Once in Program Mode, the 411UDAC will:

- ✓ Light the DACT Trouble LED
- ✓ Activate Relay if programmed for DACT trouble
- ✓ Ignore all other keys other than those mentioned in this section
- ✓ Display **00_F** on the Programmer display
- ✓ Continue to communicate any events not previously acknowledged at a central station prior to entering Programming Mode
- ✓ Communicate an 'Off Normal' event to the Central Station
- ✓ Turn off piezo

While in Program Mode, the first three locations on the left of the Programmer display represent the memory address and the last location (farthest right) represents the contents of the memory address. The first address displayed is shown below:

```

    00_F
(address) (data)

```

Certain program items will be locked from editing if the communicator is active (dialing, transmitting, etc.). These programming locations are '00-19' Primary Central Station Phone Number, '20' Primary Central Station Communications Format, '21-24' Primary Central Station Account Code, '30-49' Secondary Central Station Phone Number, '50' Secondary Central Station Communications Format, '51-54' Secondary Central Station Account Code, '61' Central Station Backup Reporting and '145-end' Event Codes.

To unlock these locations, either wait until the communicator stops transmitting or disable the communicator via address location 64 by changing the content of this address to '0.'

When desired changes have been completed, exit Programming Mode by pressing the **MODE** key, followed by the 4-digit code for an alternate mode and then the **[ENTER/STORE]** key. During Program Mode, if no key is pressed within 10 minutes, the unit will revert to Normal Mode.

The Programmer cable should not be removed from the 411UDAC unless the unit is in Normal Mode. If the Programmer cable is removed while the 411UDAC is in a Mode other than Normal Mode, the communicator will automatically revert to Normal Mode following a 10 minute time-out period. Note that if the Programmer is in Troubleshoot Mode when the cable is removed, the 411UDAC will revert to Normal Mode following a 20 minute time-out period.

3.4.1 DACT Programming

Primary Central Station Phone Number (00 - 19)

The first twenty addresses (00 - 19) are factory set to 'F' (00_F to 19_F). Programming is done as follows:

- ✓ If your phone number is 484-7161, press 4.
- ✓ The display will read 00_4.
- ✓ Press [ENTER/STORE] to save the entry to memory and increment to the next address 01_F.
- ✓ Enter the remaining numbers in their respective addresses as shown below:

Entry	4	8	4	7	1	6	1	F	F	F	F	F	F	F	F	F	F	F	F	
Address	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19

Valid entries for both the primary and secondary phone numbers are 0 to 9 and A to F with the numeric digits as dialed numbers and the hexadecimal digits representing the following functions:

- A = * on a Touch-Tone phone keypad
- B = # on a Touch-Tone phone keypad
- C = look for secondary dial tone for up to two seconds (then dial anyway)
- D = three second pause
- E = five second pause
- F = end of phone number (Note: F must remain in all unused phone number addresses)

If the first digit of the Primary Central Station Phone Number remains 'F' and the digital communicator is enabled for transmission to a Central Station, a primary phone number fault will be generated. The phone number must begin with a digit other than 'F.'

New FCC regulations allow extra digits to the CIC (Carrier ID Code), to identify the long distance carrier. The expanded phone number field of 20 digits facilitates this function. Simply enter the digits required by the telephone company if desired.

Primary Central Station Number Communication Format (20)

One location is needed to select the Communication Format to the primary phone number. Address 20 is used for this purpose. The factory default setting for this address is 'E', which is Contact ID Format. You may enter '0' through 'D' in place of the default, then press [ENTER/STORE]. Choose from the list of formats below:

- 0: 4+1 Ademco Express Standard, DTMF, 1400/2300 ACK
- 1: 4+2 Ademco Express Standard, DTMF, 1400/2300 ACK
- 2: 3+1 Standard 1800 Hz Carrier, 2300 Hz ACK
- 3: 3+1 Expanded 1800 Hz Carrier, 2300 Hz ACK
- 4: 3+1 Standard 1900 Hz Carrier, 1400 Hz ACK
- 5: 3+1 Expanded 1900 Hz Carrier, 1400 Hz ACK
- 6: 4+1 Standard 1800 Hz Carrier, 2300 Hz ACK
- 7: 4+1 Expanded 1800 Hz Carrier, 2300 Hz ACK
- 8: 4+1 Standard 1900 Hz Carrier, 1400 Hz ACK

- 9: 4+1 Expanded 1900 Hz Carrier, 1400 Hz ACK
- A: 4+2 Standard 1800 Hz Carrier, 2300 Hz ACK
- B: 4+2 Expanded 1800 Hz Carrier, 2300 Hz ACK
- C: 4+2 Standard 1900 Hz Carrier, 1400 Hz ACK
- D: 4+2 Expanded 1900 Hz Carrier, 1400 Hz ACK
- E: Contact ID, DTMF, 1400/2300 ACK
- F: Future use

Consult the Central Station for proper Format selection. For any Format chosen, all event codes are automatically programmed by the 411UDAC. Refer to Table 3.1, "Ademco Contact ID Format - Primary," on page 37, Table 3.2, "4+2 Standard and 4+2 Express Formats - Primary," on page 38 and Table 3.3, "All 3+1, 4+1 and 4+2 Expanded Formats - Primary," on page 39.

Event Codes - Setting Entries

The Format selected in address 20 will cause the 411UDAC to automatically program addresses 145 - 228 with the factory default settings. Any of the Event Code settings may be altered. Consult your Central Station prior to altering the event code settings. An entry of all zeros for any event code will cause the communicator to NOT transmit the report. *Transmission of reports to either or both Central Station phone numbers may be disabled.*

Upon accessing the first event code address (address 145) shown in Table 3.2, the following may be displayed on the Programmer 7-Segment Display, if the corresponding Format was selected in address 20.

1451
(address) (data)

The first three locations on the left of the Programmer display represent the memory address **145** of the Format previously selected in address 20. The last location **1** (farthest right) represents the contents of memory address **145** (which is the first digit of the event code).

The following Tables list the data which is automatically programmed for each Format that can be selected in address 20. The addresses shown in each Table contain the Setting data which is automatically programmed by the 411UDAC. To change the value, key in the new digit and then press the [ENTER/STORE] key to save the new value. Use the **Up** and **Down Arrow** keys to increment to the next address or decrement to the previous address.

Ademco Contact ID Format Primary Central Station Event Codes

If 'E' is entered for address 20, the following data is automatically programmed for the Primary Central Station phone number event codes. Enter '000' for the Setting to disable the report to the Central Station. The Channel # is not programmable.

<u>Address</u>	<u>Description</u>	<u>Setting</u>	<u>Channel/Input #</u>
145 - 147	Primary # Input Channel 1 Active Event Code	111	001
148 - 150	Primary # Input Channel 2 Active Event Code	115	002
151 - 153	Primary # Input Channel 3 Active Event Code	111	003
154 - 156	Primary # Input Channel 4 Active Event Code	115	004
157 - 159	Primary # Input Channel 1 Fault Event Code	380	001
160 - 162	Primary # Input Channel 2 Fault Event Code	380	002
163 - 165	Primary # Input Channel 3 Fault Event Code	380	003
166 - 168	Primary # Input Channel 4 Fault Event Code	380	004
169 - 171	Primary # AC Voltage Fault Event Code	301	000
172 - 174	Primary # Earth Fault Event Code	310	000

Table 3.1 Ademco Contact ID Format - Primary

<u>Address</u>	<u>Description</u>	<u>Setting</u>	<u>Channel/Input #</u>
175 - 177	Primary # Low Battery Fault Event Code	302	000
178 - 180	Primary # No Battery Fault Event Code	311	000
181 - 183	Primary # Phone Line 1 Voltage Fault Event Code	351	000
184 - 186	Primary # Phone Line 2 Voltage Fault Event Code	352	000
187 - 189	Primary # NAC Fault Event Code	321	000
190 - 192	Primary # Charger Fault Event Code	300	000
193 - 195	Primary # Phone Number 1 Communication Fault Event Code	354	001
196 - 198	Primary # Phone Number 2 Communication Fault Event Code	354	002
199 - 201	Primary # System Off Normal Fault Event Code	308	000
202 - 204	Primary # System Test Message	602	000
205 - 207	Primary # System Abnormal Test Message	608	000
208 - 210	Primary # Upload/Download Request Code	411	000
211 - 213	Primary # Upload Successful Code	416	000
214 - 216	Primary # Download Successful Code	412	000
217 - 219	Primary # Upload/Download Failed Code	413	000

Table 3.1 Ademco Contact ID Format - Primary**4+2 Standard and 4+2 Express Formats Primary Central Station Event Codes**

If '1, A or C' is entered for address 20, the following data is automatically programmed for the Primary Central Station phone number event codes. Enter '00' for the Setting to disable the report to the Central Station.

<u>Address</u>	<u>Description</u>	<u>Setting</u>
145 - 146	Primary # Input Channel 1 Active Event Code	11
147 - 148	Primary # Input Channel 2 Active Event Code	12
149 - 150	Primary # Input Channel 3 Active Event Code	13
151 - 152	Primary # Input Channel 4 Active Event Code	14
153 - 154	Primary # Input Channel 1 Fault Event Code	F1
155 - 156	Primary # Input Channel 2 Fault Event Code	F2
157 - 158	Primary # Input Channel 3 Fault Event Code	F3
159 - 160	Primary # Input Channel 4 Fault Event Code	F4
161 - 162	Primary # AC Fault Event Code	92
163 - 164	Primary # Earth Fault Event Code	61
165 - 166	Primary # Low Battery Fault Event Code	62
167 - 168	Primary # No Battery Fault Event Code	63
169 - 170	Primary # Phone Line 1 Voltage Fault Event Code	64
171 - 172	Primary # Phone Line 2 Voltage Fault Event Code	65
173 - 174	Primary # NAC Fault Event Code	66
175 - 176	Primary # Charger Fault Event Code	47
177 - 178	Primary # Phone Number 1 Communication Fault Event Code	6A
179 - 180	Primary # Phone Number 2 Communication Fault Event Code	6B
181 - 182	Primary # System Off Normal Fault Event Code	6F
183 - 184	Primary # Input Channel 1 Active Restore Code	E1
185 - 186	Primary # Input Channel 2 Active Restore Code	E2
187 - 188	Primary # Input Channel 3 Active Restore Code	E3
189 - 190	Primary # Input Channel 4 Active Restore Code	E4
191 - 192	Primary # Input Channel 1 Fault Restore Code	D1
193 - 194	Primary # Input Channel 2 Fault Restore Code	D2
195 - 196	Primary # Input Channel 3 Fault Restore Code	D3

Table 3.2 4+2 Standard and 4+2 Express Formats - Primary

<u>Address</u>	<u>Description</u>	<u>Setting</u>
197 - 198	Primary # Input Channel 4 Fault Restore Code	D4
199 - 200	Primary # AC Voltage Fault Restore Code	93
201 - 202	Primary # Earth Fault Restore Code	A1
203 - 204	Primary # Low Battery Fault Restore Code	A2
205 - 206	Primary # No Battery Fault Restore Code	A3
207 - 208	Primary # Phone Line 1 Voltage Fault Restore Code	A4
209 - 210	Primary # Phone Line 2 Voltage Fault Restore Code	A5
211 - 212	Primary # NAC Fault Restore Code	A6
213 - 214	Primary # Charger Fault Restore Code	57
215 - 216	Primary # Phone Number 1 Communication Fault Restore Code	AA
217 - 218	Primary # Phone Number 2 Communication Fault Restore Code	AB
219 - 220	Primary # System Off Normal Restore Code	AF
221 - 222	Primary # System Test Message	99
223 - 224	Primary # System Abnormal Test Message	91
225 - 226	Primary # Upload/Download Request Code	71
227 - 228	Primary # Upload Successful Code	72
229 - 230	Primary # Download Successful Code	73
231 - 232	Primary # Upload/Download Failed Code	74

Table 3.2 4+2 Standard and 4+2 Express Formats - Primary**All 3+1, 4+1 and 4+2 Expanded Formats Primary Central Station Event Codes**

If '0, 2, 3, 4, 5, 6, 7, 8, 9, B or D' is entered for address 20, the following data is automatically programmed for the Primary Central Station phone number event codes. Enter '0' for the Setting to disable the report to the Central Station.

<u>Address</u>	<u>Description</u>	<u>Setting</u>
145	Primary # Input Channel 1 Active Event Code	1
146	Primary # Input Channel 2 Active Event Code	1
147	Primary # Input Channel 3 Active Event Code	1
148	Primary # Input Channel 4 Active Event Code	1
149	Primary # Input Channel 1 Fault Event Code	F
150	Primary # Input Channel 2 Fault Event Code	F
151	Primary # Input Channel 3 Fault Event Code	F
152	Primary # Input Channel 4 Fault Event Code	F
153	Primary # AC Power Fault Event Code	9
154	Primary # Earth Fault Event Code	6
155	Primary # Low Battery Fault Event Code	6
156	Primary # No Battery Fault Event Code	6
157	Primary # Phone Line 1 Voltage Fault Event Code	6
158	Primary # Phone Line 2 Voltage Fault Event Code	6
159	Primary # NAC Fault Event Code	6
160	Primary # Charger Fault Event Code	4
161	Primary # Phone Number 1 Communication Fault Event Code	6
162	Primary # Phone Number 2 Communication Fault Event Code	6
163	Primary # System Off Normal Fault Code	6
164	Primary # Input Channel 1 Active Restore Code	E
165	Primary # Input Channel 2 Active Restore Code	E
166	Primary # Input Channel 3 Active Restore Code	E
167	Primary # Input Channel 4 Active Restore Code	E
168	Primary # Input Channel 1 Fault Restore Code	D
169	Primary # Input Channel 2 Fault Restore Code	D
170	Primary # Input Channel 3 Fault Restore Code	D

Table 3.3 All 3+1, 4+1 and 4+2 Expanded Formats - Primary

<u>Address</u>	<u>Description</u>	<u>Setting</u>
171	Primary # Input Channel 4 Fault Restore Code	D
172	Primary # AC Voltage Fault Restore Code	9
173	Primary # Earth Fault Restore Code	A
174	Primary # Low Battery Fault Restore Code	A
175	Primary # No Battery Fault Restore Code	A
176	Primary # Phone Line 1 Voltage Fault Restore Code	A
177	Primary # Phone Line 2 Voltage Fault Restore Code	A
178	Primary # NAC Fault Restore Code	A
179	Primary # Charger Fault Restore Code	
180	Primary # Phone Number 1 Communication Fault Restore Code	A
181	Primary # Phone Number 2 Communication Fault Restore Code	A
182	Primary # System Off Normal Restore Code	A
183	Primary # System Test Message	9
184	Primary # System Abnormal Test Message	F *
185	Primary # Upload/Download Request Code	7
186	Primary # Upload Successful Code	7
187	Primary # Download Successful Code	7
188	Primary # Upload/Download Failed Code	7

Table 3.3 All 3+1, 4+1 and 4+2 Expanded Formats - Primary

* For Formats 'B' and 'D', this address is defaulted to '9' instead of 'F.'

Primary Central Station Number Account Code (21 - 24)

The four locations at addresses 21 - 24 default to all '0's. Valid entries are 0 - 9 and A - F. The number of digits entered must match the format selection. If programming '2, 3, 4 or 5' into address 20, enter three digits (one digit each in locations 21, 22 and 23 - location 24 is ignored). If programming '0, 1, 6, 7, 8, 9, A, B, C, D or E' into address 20, enter four digits (one each in locations 21, 22, 23 and 24).

Primary Central Station Number 24 Hour Test Time (25 - 28)

Use military time when entering the 24 hour 'test' time. The 24 hour test report to phone number 1 takes up four locations, from addresses 25 - 28. The default is 00:00 (12:00 midnight). The limits for each location are as follows (do not use values of A - F as entries).

25: enter 0, 1 or 2

26: enter 0 - 9

27: enter 0 - 5

28: enter 0 - 9

Primary Central Station Number 24/12/8/6 Hour Test Time Interval (29)

The test report sent to the Primary phone number may be sent every 6, 8, 12 or 24 hours. If the message is to be sent every 24 hours, leave the factory default entry of '0'. If other test report times are needed, enter 1 = 12 hour, 2 = 8 hour or 3 = 6 hour.

Secondary Central Station Phone Number (30 - 49)

Addresses **30 - 49** are factory set to 'F' (**30_F to 49_F**). Programming is typically done as follows:

- ✓ If your phone number is 484-7161, press **4**.
- ✓ The display will read **30_4**.
- ✓ Press **[ENTER/STORE]** to save the entry to memory and increment to the next address **31_F**.

✓ Enter the remaining numbers in their respective addresses as shown below:

Entry	4	8	4	7	1	6	1	F	F	F	F	F	F	F	F	F	F	F	F	
Address	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49

Valid entries for both the primary and secondary phone numbers are 0 to 9 and A to F with the numeric digits as dialed numbers and the hexadecimal digits representing the following functions:

- A = * on a Touch-Tone phone keypad
- B = # on a Touch-Tone phone keypad
- C = look for secondary dial tone for up to two seconds (then dial anyway)
- D = three second pause
- E = five second pause
- F = end of phone number (Note: F must remain in all unused phone number addresses)

If the first digit of the Secondary Central Station Phone Number remains 'F' and the digital communicator is enabled for transmission to a Central Station, a secondary phone number fault will be generated. The phone number must begin with a digit other than 'F.'

Secondary Central Station Number Communication Format (50)

One location is needed to select the Communication Format to the secondary phone number. Address 50 is used for this purpose. The factory default setting for this address is 'E', which is Contact ID Format. You may enter '0' through 'D' in place of the default, then press [ENTER/STORE]. Choose from the list of formats below:

- 0: 4+1 Ademco Express Standard, DTMF, 1400/2300 ACK
- 1: 4+2 Ademco Express Standard, DTMF, 1400/2300 ACK
- 2: 3+1 Standard 1800 Hz Carrier, 2300 Hz ACK
- 3: 3+1 Expanded 1800 Hz Carrier, 2300 Hz ACK
- 4: 3+1 Standard 1900 Hz Carrier, 1400 Hz ACK
- 5: 3+1 Expanded 1900 Hz Carrier, 1400 Hz ACK
- 6: 4+1 Standard 1800 Hz Carrier, 2300 Hz ACK
- 7: 4+1 Expanded 1800 Hz Carrier, 2300 Hz ACK
- 8: 4+1 Standard 1900 Hz Carrier, 1400 Hz ACK
- 9: 4+1 Expanded 1900 Hz Carrier, 1400 Hz ACK
- A: 4+2 Standard 1800 Hz Carrier, 2300 Hz ACK
- B: 4+2 Expanded 1800 Hz Carrier, 2300 Hz ACK
- C: 4+2 Standard 1900 Hz Carrier, 1400 Hz ACK
- D: 4+2 Expanded 1900 Hz Carrier, 1400 Hz ACK
- E: Contact ID, DTMF, 1400/2300 ACK
- F: Future use

The Format selected in address 50 will cause the 411UDAC to automatically program addresses 229 - 312 with the factory default settings. Any of the Event Code settings may be altered. Consult your Central Station prior to altering the event code settings. An entry of all zeros for any event code will cause the communicator to NOT transmit the report. *Transmission of reports to either or both Central Station phone numbers may be disabled.*

Refer to "Central Station Communications" on page 54 for information on Format reporting.

Upon accessing the first event code address which is 229 (Table 3.5, “4+2 Standard and 4+2 Express Formats - Secondary,” on page 43), the following may be displayed on the Programmer’s 7-Segment Display, if the corresponding Format was selected in address 50.

2291
(address) (data)

The first three locations on the left of the Programmer’s display represent the memory address **229**. The last location **1** (farthest right) represents the contents of memory address **229** which is the first digit of the event code.

The following Tables list the data which is automatically programmed for each Format that can be selected in address 50. The addresses shown in each Table contain the event code Setting data which is automatically programmed by the 411UDAC. To change the value, key in the new digits and then press the [ENTER/STORE] key to save the new value. Use the **Up** and **Down Arrow** keys to increment to the next address or decrement to the previous address.

Ademco Contact ID Format Secondary Central Station Event Codes

If ‘E’ is entered for address 50, the following data is automatically programmed for the Secondary Central Station phone number event codes. Enter '000' for the Setting to disable the report to the Central Station.

<u>Address</u>	<u>Description</u>	<u>Setting</u>	<u>Channel/Input #</u>
233 - 235	Secondary # Input Channel 1 Active Event Code	111	001
236 - 238	Secondary # Input Channel 2 Active Event Code	115	002
239 - 241	Secondary # Input Channel 3 Active Event Code	111	003
242 - 244	Secondary # Input Channel 4 Active Event Code	115	004
245 - 247	Secondary # Input Channel 1 Fault Event Code	380	001
248 - 250	Secondary # Input Channel 2 Fault Event Code	380	002
251 - 253	Secondary # Input Channel 3 Fault Event Code	380	003
254 - 256	Secondary # Input Channel 4 Fault Event Code	380	004
257 - 259	Secondary # AC Voltage Fault Event Code	301	000
260 - 262	Secondary # Earth Fault Event Code	310	000
263 - 265	Secondary # Low Battery Fault Event Code	302	000
266 - 268	Secondary # No Battery Fault Event Code	311	000
269 - 271	Secondary # Phone Line 1 Voltage Fault Event Code	351	000
272 - 274	Secondary # Phone Line 2 Voltage Fault Event Code	352	000
275 - 277	Secondary # NAC Fault Event Code	321	000
278 - 280	Secondary # Charger Fault Event Code	300	000
281 - 283	Secondary # Phone Number 1 Communication Fault Event Code	354	001
284 - 286	Secondary # Phone Number 2 Communication Fault Event Code	354	002
287 - 289	Secondary # System Off Normal Fault Event Code	308	000
290 - 292	Secondary # System Test Message	602	000
293 - 295	Secondary # System Abnormal Test Message	608	000
296 - 298	Secondary # Upload/Download Request Code	411	000
299 - 301	Secondary # Upload Successful Code	416	000
302 - 304	Secondary # Download Successful Code	412	000
305 - 307	Secondary # Upload/Download Failed Code	413	000

Table 3.4 Ademco Contact ID Format - Secondary

4+2 Standard and 4+2 Express Formats Secondary Central Station Event Codes

If 1, A or C is entered for address 50, the following data is automatically programmed for the Secondary Central Station phone number event codes. Enter '00' for the Setting to disable the report to the Central Station.

<u>Address</u>	<u>Description</u>	<u>Setting</u>
233 - 234	Secondary # Input Channel 1 Active Event Code	11
235 - 236	Secondary # Input Channel 2 Active Event Code	12
237 - 238	Secondary # Input Channel 3 Active Event Code	13
239 - 240	Secondary # Input Channel 4 Active Event Code	14
241 - 242	Secondary # Input Channel 1 Fault Event Code	F1
243 - 244	Secondary # Input Channel 2 Fault Event Code	F2
245 - 246	Secondary # Input Channel 3 Fault Event Code	F3
247 - 248	Secondary # Input Channel 4 Fault Event Code	F4
249 - 250	Secondary # AC Fault Event Code	92
251 - 252	Secondary # Earth Fault Event Code	61
253 - 254	Secondary # Low Battery Fault Event Code	62
255 - 256	Secondary # No Battery Fault Event Code	63
257 - 258	Secondary # Phone Line 1 Voltage Fault Event Code	64
259 - 260	Secondary # Phone Line 2 Voltage Fault Event Code	65
261 - 262	Secondary # NAC Fault Event Code	66
263 - 264	Secondary # Charger Fault Event Code	47
265 - 266	Secondary # Phone Number 1 Communication Fault Event Code	6A
267 - 268	Secondary # Phone Number 2 Communication Fault Event Code	6B
269 - 270	Secondary # System Off Normal Fault Event Code	6F
271 - 272	Secondary # Input Channel 1 Active Restore Code	E1
273 - 274	Secondary # Input Channel 2 Active Restore Code	E2
275 - 276	Secondary # Input Channel 3 Active Restore Code	E3
277 - 278	Secondary # Input Channel 4 Active Restore Code	E4
279 - 280	Secondary # Input Channel 1 Fault Restore Code	D1
281 - 282	Secondary # Input Channel 2 Fault Restore Code	D2
283 - 284	Secondary # Input Channel 3 Fault Restore Code	D3
285 - 286	Secondary # Input Channel 4 Fault Restore Code	D4
287 - 288	Secondary # AC Voltage Fault Restore Code	93
289 - 290	Secondary # Earth Fault Restore Code	A1
291 - 292	Secondary # Low Battery Fault Restore Code	A2
293 - 294	Secondary # No Battery Fault Restore Code	A3
295 - 296	Secondary # Phone Line 1 Voltage Fault Restore Code	A4
297 - 298	Secondary # Phone Line 2 Voltage Fault Restore Code	A5
299 - 300	Secondary # NAC Fault Restore Code	A6
301 - 302	Secondary # Charger Fault Restore Code	57
303 - 304	Secondary # Phone Number 1 Communication Fault Restore Code	AA
305 - 306	Secondary # Phone Number 2 Communication Fault Restore Code	AB
307 - 308	Secondary # System Off Normal Restore Code	AF
309 - 310	Secondary # System Test Message	99
311 - 312	Secondary # System Abnormal Test Message	91
313 - 314	Secondary # Upload/Download Request Code	71
315 - 316	Secondary # Upload Successful Code	72
317 - 318	Secondary # Download Successful Code	73
319 - 320	Secondary # Upload/Download Failed Code	74

Table 3.5 4+2 Standard and 4+2 Express Formats - Secondary

All 3+1, 4+1 and 4+2 Expanded Formats Secondary Central Station Event Codes

If 0, 2, 3, 4, 5, 6, 7, 8, 9, B or D is entered for address 50, the following data is automatically programmed for the Secondary Central Station phone number event codes. Enter '0' for the Setting to disable the report to the Central Station.

<u>Address</u>	<u>Description</u>	<u>Setting</u>
233	Secondary # Input Channel 1 Active Event Code	1
234	Secondary # Input Channel 2 Active Event Code	1
235	Secondary # Input Channel 3 Active Event Code	1
236	Secondary # Input Channel 4 Active Event Code	1
237	Secondary # Input Channel 1 Fault Event Code	F
238	Secondary # Input Channel 2 Fault Event Code	F
239	Secondary # Input Channel 3 Fault Event Code	F
240	Secondary # Input Channel 4 Fault Event Code	F
241	Secondary # AC Power Fault Event Code	9
242	Secondary # Earth Fault Event Code	6
243	Secondary # Low Battery Fault Event Code	6
244	Secondary # No Battery Fault Event Code	6
245	Secondary # Phone Line 1 Voltage Fault Event Code	6
246	Secondary # Phone Line 2 Voltage Fault Event Code	6
247	Secondary # NAC Fault Event Code	6
248	Secondary # Charger Fault Event Code	4
249	Secondary # Phone Number 1 Communication Fault Event Code	6
250	Secondary # Phone Number 2 Communication Fault Event Code	6
251	Secondary # System Off Normal Fault Code	6
252	Secondary # Input Channel 1 Active Restore Code	E
253	Secondary # Input Channel 2 Active Restore Code	E
254	Secondary # Input Channel 3 Active Restore Code	E
255	Secondary # Input Channel 4 Active Restore Code	E
256	Secondary # Input Channel 1 Fault Restore Code	D
257	Secondary # Input Channel 2 Fault Restore Code	D
258	Secondary # Input Channel 3 Fault Restore Code	D
259	Secondary # Input Channel 4 Fault Restore Code	D
260	Secondary # AC Voltage Fault Restore Code	9
261	Secondary # Earth Fault Restore Code	A
262	Secondary # Low Battery Fault Restore Code	A
263	Secondary # No Battery Fault Restore Code	A
264	Secondary # Phone Line 1 Voltage Fault Restore Code	A
265	Secondary # Phone Line 2 Voltage Fault Restore Code	A
266	Secondary # NAC Fault Restore Code	A
267	Secondary # Charger Fault Restore Code	5
268	Secondary # Phone Number 1 Communication Fault Restore Code	A
269	Secondary # Phone Number 2 Communication Fault Restore Code	A
270	Secondary # System Off Normal Restore Code	A
271	Secondary # System Test Message	9
272	Secondary # System Abnormal Test Message	F *
273	Secondary # Upload/Download Request Code	7
274	Secondary # Upload Successful Code	7
275	Secondary # Download Successful Code	7
276	Secondary # Upload/Download Failed Code	7

Table 3.6 All 3+1, 4+1 and 4+2 Expanded Formats - Secondary

* For Formats 'B' and 'D', this address is defaulted to '9' instead of 'F.'

Secondary Central Station Number Account Code (51 - 54)

The four locations at addresses 51 - 54 default to all '0's. Valid entries are 0 - 9 and A - F. The number of digits entered must match the format selection. If programming '2, 3, 4 or 5' into address 50, enter three digits (one digit each in locations 51, 52 and 53 - location 54 is ignored). If programming '0, 1, 6, 7, 8, 9, A, B, C, D or E' into address 50, enter four digits (one each in locations 51, 52, 53 and 54).

Secondary Central Station Number 24 Hour Test Time (55 - 58)

Use military time when entering the 24 hour 'test' time. The 24 hour test report to phone number 1 takes up four locations, from addresses 55 - 58. The default is 00:00 (12:00 midnight). The limits for each location are as follows (do not use values of A - F as entries):

55: enter 0, 1 or 2

56: enter 0 - 9

57: enter 0 - 5

58: enter 0 - 9

Secondary Central Station Number 24/12/8/6 Hour Test Time Interval (59)

The test report sent to the Secondary phone number may be sent every 6, 8, 12 or 24 hours. If the message is to be sent every 24 hours, leave the factory default entry of '0'. If other test report times are needed, enter 1 = 12 hour, 2 = 8 hour or 3 = 6 hour.

AC Loss Reporting Delay (60)

Enter a digit of 0 - 9 or A - F corresponding to the number of hours to be delayed in reporting the loss of AC power. The factory default is '2' for 2 hours. The valid entries are '0' = no delay; '1' = 1 hours; '2' = 2 hours; '3' = 6 hours; '4' = 7 hours; '5' = 8 hours; '6' = 9 hours; '7' = 10 hours; '8' = 11 hours; '9' = 12 hours; 'A' = 13 hours; 'B' = 14 hours; 'C' = 15 hours; 'D' = 16 hours; 'E' = 17 hours; 'F' = 18 hours.

UL requires a 1-3 hour delay.

Backup Reporting (61)

Leaving address 61 at '0' means that reports will be transmitted to the secondary Central Station phone number only if attempts to communicate to the primary Central Station phone number are unsuccessful. Programming a '1' causes all reports to be transmitted to both the primary and secondary Central Station phone numbers. Programming a '2' causes reports to go to the first available receiver.

Do not alter this entry while the digital communicator is active!

Reserved for Future Use (62)

DACT Trouble Reminder (63)

The factory default entry of '0' in address location 63 disables the trouble reminder feature. Selecting '1' for location 63 will cause a reminding beep (after the Silence switch is pressed) every 15 seconds for active alarms and every two minutes during a DACT trouble condition. The beeps from the onboard piezo sounder will occur until the alarm or DACT fault is cleared. The piezo sounder will begin beeping at a rate of one second On and one second Off after 24 hours unless the DACT fault has been cleared.

Operational Mode Selection (64)

The factory default setting is '0' for latching inputs and the onboard communicator disabled. This prevents the unit from transmitting status information to the Central Station(s).

Address 64 Setting	411UDAC Operational Mode	411UDAC Function
0	Stand-alone/Communicator Disabled	latching inputs/onboard communicator disabled
1	Stand-alone/Communicator Enabled	latching inputs/onboard communicator enabled
2	Slave/Communicator Enabled	non-latching inputs/onboard communicator enabled
3	Slave/Communicator Disabled	non-latching inputs/onboard communicator disabled

Table 3.7 411UDAC Operational Modes**Input Channel 1 Function Selection (65)¹**

Factory default for Channel 1 is '0' for activation on fire alarm (4-wire smoke). Enter '1' for pull station; '2' for normally open contact device; '3' for host panel trouble; '4' for fire supervisory; '5' for fire supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow nonsilenceable.

Input Channel 2 Function Selection (66)¹

Factory default for Channel 2 is '1' for pull station. Enter '2' for normally open contact device; '3' for host panel trouble; '4' for fire supervisory; '5' for fire supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow nonsilenceable.

Note that '0' is not a valid entry.

Input Channel 3 Function Selection (67)¹

Factory default for Channel 3 is '0' for activation on fire alarm (4-wire smoke). Enter '1' for pull station; '2' for normally open contact device; '3' for host panel trouble; '4' for fire supervisory; '5' for fire supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow nonsilenceable.

Input Channel 4 Function Selection (68)¹

Factory default for Channel 4 is '1' for pull station. Enter '2' for normally open contact device; '3' for host panel trouble; '4' for fire supervisory; '5' for fire supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow nonsilenceable.

Note that '0' is not a valid entry.

Input Channel 1 Delay Timer (69 - 71)²

The Delay Timer is used to delay digital communicator transmission to a Central Station when the Input Channel is activated. Input Channel 1 Delay Timer is factory set to '000' seconds for no delay. The timer may be programmed for a delay of from 0 to 179 seconds. *Inputs programmed for fire alarm, pull station, host control panel trouble and fire supervisory, must not be delayed. A delay, therefore, cannot be selected for inputs programmed for these fire applications.* If the input is set for a waterflow function, the delay timer will also delay activation of the relay, piezo sounder and LEDs.

Input Channel 2 Delay Timer (72 - 74)²

The Delay Timer is used to delay digital communicator transmission to a Central Station when the Input Channel is activated. Input Channel 2 Delay Timer is factory set to '000' seconds for no delay. The timer may be programmed for a delay of from 0 to 179 seconds. *Inputs programmed for fire alarm, pull station, host control panel trouble and fire supervisory, must not be delayed. A delay, therefore, cannot be selected for inputs programmed for these fire applications.* If the input is set for a waterflow function, the delay timer will also delay activation of the relay, piezo sounder and LEDs.

1. Changing the input function will automatically change the corresponding Primary and Secondary event codes to reflect the new input function. The Communication Format should be programmed first, followed by the Input Channel Function. See "Events and Default Event Codes" on page 79.
2. This timer does not delay LED or Output Relay activation and is not used for channels programmed as AC Loss circuits.

Input Channel 3 Delay Timer (75 - 77)¹

The Delay Timer is used to delay digital communicator transmission to a Central Station when the Input Channel is activated. Input Channel 3 Delay Timer is factory set to '000' seconds for no delay. The timer may be programmed for a delay of from 0 to 179 seconds. *Inputs programmed for fire alarm, pull station, host control panel trouble and fire supervisory, must not be delayed. A delay, therefore, cannot be selected for inputs programmed for these fire applications.* If the input is set for a waterflow function, the delay timer will also delay activation of the relay, piezo sounder and LEDs.

Input Channel 4 Delay Timer (78 - 80)¹

The Delay Timer is used to delay digital communicator transmission to a Central Station when the Input Channel is activated. Input Channel 4 Delay Timer is factory set to '000' seconds for no delay. The timer may be programmed for a delay of from 0 to 179 seconds. *Inputs programmed for fire alarm, pull station, host control panel trouble and fire supervisory, must not be delayed. A delay, therefore, cannot be selected for inputs programmed for these fire applications.* If the input is set for a waterflow function, the delay timer will also delay activation of the relay, piezo sounder and LEDs.

Touchtone/Rotary Select for Primary Phone (81)

A '0' programmed in this address by the factory, triggers Touchtone dialing over the primary phone line. Select '1' for rotary dialing.

Make/Break Ratio for Primary Phone (82)

This address is used only if a '1' has been programmed for address 81. The Make/Break ratio is factory set to '0' which is 67/33 ratio, but may be changed to '1' which is 62/38 ratio.

Touchtone/Rotary Select for Secondary Phone (83)

A '0' programmed in this address by the factory, triggers Touchtone dialing over the secondary phone line. Select '1' for rotary dialing.

Make/Break Ratio for Secondary Phone (84)

This address is used only if a '1' has been programmed for address 83. The Make/Break ratio is factory set to '0' which is 67/33 ratio, but may be changed to '1' which is 62/38 ratio.

Output Relay #1 Enable (85)

The factory default setting for Output Relay #1 is '0' for disabled. Enter '1' to enable the relay.

Output Relay #1 Function Selections (86)

The Output Relay can be programmed to activate for any one of six conditions. The factory default for address 86 is '0' for activation on fire alarm. Program a '1' for host panel trouble; '2' for DACT trouble; '3' for latching fire supervisory; '4' for autoresettable fire supervisory; '8' for total communication failure.

Output Relay #2 Enable (87)

The factory default setting for Output Relay #2 is '0' for disabled. Enter '1' to enable the relay.

Output Relay #2 Function Selections (88)

Output Relay #2 can be programmed to activate for any one of six conditions. The factory default for address 88 is '2' for activation on DACT trouble. Program a '0' for activation on fire alarm; '1' for host panel trouble; '3' for latching fire supervisory; '4' for autoresettable fire supervisory; '8' for total communication failure.

1. This timer does not delay LED or Output Relay activation and is not used for channels programmed as AC Loss circuits.

Reserved for Future Use (89)

Leave default setting of '0'

Panel Unlock (90)

The communicator must be unlocked to accept a remote upload/download. Leaving the default setting of '0' will require the unlock code **8655** be entered for each data transfer session (30 minute timeout). Enter '1' to keep the communicator in a permanent unlocked state.

Alarm Verification Enable (91)

Alarm verification works only on zones programmed as 4-wire smoke detector zones (i.e. zones 1 and 3). After detecting an alarm, the panel removes power from four-wire smoke zones, resetting all 4-wire smoke detectors. Power is reapplied and a 16 second restart period allows detectors to stabilize. During the retard/reset/restart period of 24 seconds, subsequent alarms by the same initiating zone are ignored. An alarm detected on any other 4-wire detector zone during the restart period will cause immediate verified alarms. A subsequent alarm on the initiating zone occurring within the confirmation time will cause a verified alarm.



NOTE: Mixing devices on zones designated as 4-wire smoke zones is not recommended. The communicator will not transmit a signal to the Central Station signifying that alarm verification is in progress.

During the alarm verification period, access to other modes of operation is prevented.

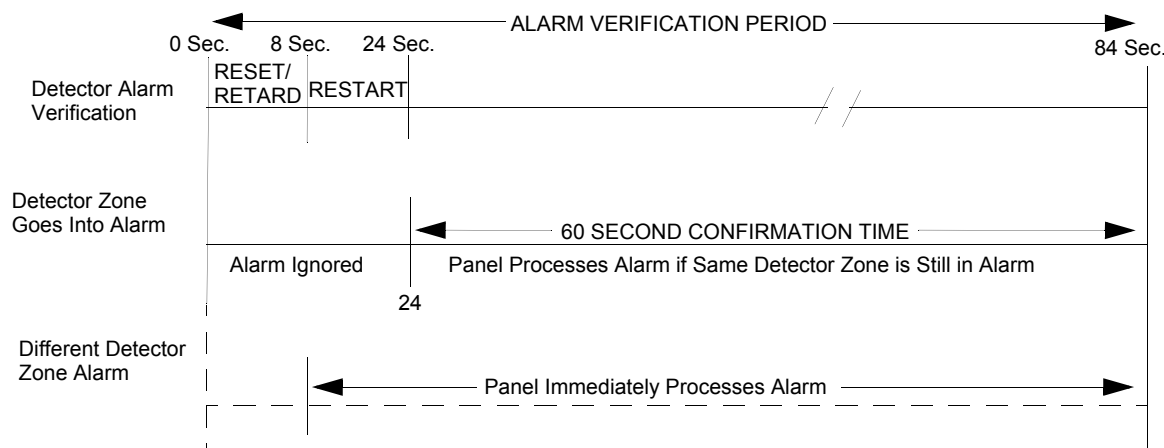


Figure 3.2 Verification Timing Diagram

Factory Default is no verification which is an entry of '0'. Entering '1' enables verification. Alarm Verification is ignored if the 411UDAC is configured for nonlatching Slave Communicator operation or Test Mode.



NOTE: Consult local Authority Having Jurisdiction (AHJ) prior to altering this address.

Silence Inhibit Notification Appliance Circuit (92)

Setting address 92 to '1' prevents the silencing or resetting of the Notification Appliance Circuit for one minute following an alarm. The factory default setting is '0' for no silence inhibit.

Autosilence Notification Appliance Circuit (93)

The Notification Appliance Circuit may be autosilenced after a programmed time interval between 5 and 30 minutes. Enter '1' for 5 minute autosilence; '2' for 10 minutes; '3' for 15 minutes; '4' for 20 minutes; '5' for 25 minutes; '6' for 30 minutes. The factory default is '0' for no autosilence.

Restoral Method (94)

Restoral Method refers to the *communication* of Restoral Events to a Central Station. It has no effect on the actual input circuit restoral itself.

- Typical Restoral Method - '0' entry programs the panel to transmit each input circuit restoral, as it occurs, to the Central Station. In Slave Mode, this means that as soon as an input restores, the communicator will immediately transmit the Restoral Event to the Central Station. In Stand-alone Mode, the restoral of inputs programmed as Autoresettable Supervisory will also cause the communicator to transmit a Restoral Event immediately. All other input types in Stand-alone Mode are latching and their restoral will not communicate a Restoral Event until the Reset Switch is pressed.
- Conditional Restoral Method #1 - '1' entry programs the panel to transmit each input circuit restoral, as it occurs, to the Central Station. In Slave Mode, this means that as soon as an input restores, the communicator will immediately transmit the Restoral Event to the Central Station. In Stand-alone Mode, the restoral of inputs programmed as Autoresettable Supervisory will also cause the communicator to transmit a Restoral Event immediately. All other input types in Stand-alone Mode are latching and the communication of their Restoral Events are dependent upon an after-reset condition.
The input circuit must be physically clear of an input short upon completion of the reset period. If, and only if, the input circuit is normal (clear of an input short) after the reset period will the communicator transmit a Restoral Event to the Central Station. If the input circuit remains active after the reset period, no transmission will take place.
- Conditional Restoral Method #2 - '2' entry programs the panel to transmit each input circuit restoral if, and only if, *all* input circuits are normal (clear of an input short). In Slave Mode, this means that as soon as *all* input circuits are restored, the communicator will transmit the Restoral Event(s) to the Central Station. In Stand-alone Mode, the restoral of inputs programmed as either Autoresettable Supervisory will cause the communicator to transmit a Restoral Event if, and only if, all input circuits are normal¹. All other input types in Stand-alone Mode are latching and the communication of their Restoral Events are dependent upon an after-reset condition. If, and only if, all input circuits are normal (clear of an input short) after the reset period will the communicator transmit a Restoral Event(s) to the Central Station. If *any* input circuit remains active after the reset period, no transmission will take place, *even if other input circuits are truly restored*.

1. Latching input circuits will never restore in Stand-alone Mode until the Reset Switch is pressed. If both an Autoresettable input circuit and a Latching input circuit are activated and subsequently cleared, only the Autoresettable input circuit will restore, but no transmission will occur to the Central Station since there is still an input circuit active (the Latching input circuit).

Table 3.8 describes the events that would take place after the reset period, according to each unique Communicator Restoral Method. It is assumed that an input circuit is active before reset.

Input Circuit After Reset	Typical Restoral Method	Conditional Restoral Method #1	Conditional Restoral Method #2
SHORTED	All local annunciation of the active event stops. The short is rediscovered after reset period and local annunciation begins again.* The panel communicates: 1. A Restoral Event 2. An Active Event†	All local annunciation of the active event stops. The short is rediscovered after reset period and local annunciation begins again.* The panel communicates nothing because this input is still in an active state after reset.	All local annunciation of the active event stops. The short is rediscovered after reset period and local annunciation begins again.* The panel communicates nothing because an input (can be any input) is still in an active state after reset.
NOT SHORTED	All local annunciation of the active event stops. The circuit is found to be in a normal state. The panel communicates: 1. A Restoral Event	All local annunciation of the active event stops. The circuit is found to be in a normal state. The panel communicates: 1. A Restoral Event	All local annunciation of the active event stops. The circuit is found to be in a normal state. <i>If, and only if, <u>all</u> input circuits are found to be in a normal state</i> will the panel communicate: 1. A Restoral Event Otherwise, the panel will communicate nothing.

Table 3.8 Restoral Methods

* Local annunciation is dependent upon input circuit function. Inputs programmed as waterflow devices will not annunciate until the waterflow retard period has expired. Inputs programmed as 4-wire smoke devices, with the Alarm Verification feature enabled, will not annunciate until the alarm is verified.

† Inputs programmed with a delay will not communicate the Active Event until the delay period has expired.

Coding, Notification Appliance Circuit (95)

Coding of the Notification Appliance Circuit is selectable as '0' for no coding (steady) or '1' for Temporal (½ second On, ½ second Off, ½ second On, ½ second Off, ½ second On, 1½ second Off). Factory default is '0' for no coding (steady). *Note that this NAC should only be used to supplement host panel NACs.*

Trouble Call Limit - Dialer Runaway Prevention (96)

Factory default setting of '0' in address 96, allows the digital communicator to call the Central Station each time any DACT trouble and any active Channel programmed for host panel trouble is detected by the 411UDAC. Programming a '1' in this address enables the Trouble Call Limit feature, which limits the number of 411UDAC and Input Channel Trouble calls to the Central Station to 10 calls for each unique trouble event within a 24 hour period. Separate limit counters keep track of each unique type of trouble (e.g. open input channel). To clear the limit counters, disable and then enable this location. Note that the number of phone line (communication) faults called to the Central Station are not limited by this feature. No subsequent restoral message is sent to the Central Station(s) for a particular trouble whose limit of 10 calls has been reached. Local DACT annunciation will still track the particular trouble and restoral.

Panel Identification Number (97 - 100)

The Panel Identification Number is a 4-digit code (valid digits are 0 to F) that is used to identify the installed panel. It is important to program this 4-digit code at the job site the first time that downloading is performed so that the called Service Terminal can identify the panel. The Factory default is '0000'. (Future Use).

Service Terminal 1 Phone Number (101 - 120)

Addresses 100 - 119 are reserved for the Service Terminal Number 1 phone number. Factory default is all 'F's. Valid entries are 0 - 9 plus A, B, C, D and E. Use 'F' to designate the end of the phone number. See "Remote Site Upload/Download" on page 60 for additional information.

Ring Count on Primary Phone Line (121 - 122)

Use this address to designate the number of rings allowed on the primary phone line prior to answering an incoming call from the Service Terminal. Factory default is '3' meaning the communicator will not answer an incoming call until 3 rings are detected. This entry may be programmed up to a maximum of '25' rings. A setting of '00' prevents the communicator from answering incoming calls.

FAX/Answer Machine, Primary Phone Line (123)

This entry is used when the primary phone line is being shared with a FAX, answering machine or other device. Factory default is '0' for no sharing of the primary phone line. An entry of '1' indicates that another device is sharing the primary phone line. The communicator will wait for three consecutive calls from the Service Terminal spaced 30 seconds apart, before responding. Sharing of phone lines requires the prior approval of the AHJ (Authority Having Jurisdiction).

Service Terminal 2 Phone Number (124 - 143)

Addresses 123 - 142 are reserved for the Service Terminal Number 2 phone number. Factory default is all 'F's. Valid entries are 0 - 9 plus A, B, C, D and E. Use 'F' to designate the end of the phone number. See "Remote Site Upload/Download" on page 60 for additional information.

Upload/Download Reports Sent to Secondary Central Station Phone #, Backup or Always (144)

Leaving address 144 programmed to the factory default setting of '0' means that reports for request for 'upload/download' and 'failed upload/download' will be sent to the secondary Central Station phone number only if attempts to the primary Central Station phone number are unsuccessful. Programming a '1' causes all reports to be transmitted to both primary and secondary phone numbers. Programming a '2' causes reports to be sent to the first available receiver.

Do not alter entry while the communicator is active.

Programming Event Code Settings (145 - 312)

Event Code Settings, corresponding to the Formats selected for the Primary Central Station phone number in address 20 and the Secondary Central Station phone number in address 50, are automatically set to factory default values. Refer to Table 3.1, "Ademco Contact ID Format - Primary," on page 37, Table 3.2, "4+2 Standard and 4+2 Express Formats - Primary," on page 38, and Table 3.3, "All 3+1, 4+1 and 4+2 Expanded Formats - Primary," on page 39 for format designated by address 20. Refer to Table 3.4, "Ademco Contact ID Format - Secondary," on page 42, Table 3.5, "4+2 Standard and 4+2 Express Formats - Secondary," on page 43, and Table 3.6, "All 3+1, 4+1 and 4+2 Expanded Formats - Secondary," on page 44 for format designated by address 50. The Event Code Settings can be altered. *Consult your Central Station prior to changing the event code settings.*

3.5 Default Mode

To return all program entries, including the upload/download secret password and time, to their factory original settings, perform the following steps only when the system is idle (i.e. the communicator is not active) and there are no active fire alarms or fire supervisories in the system:

Press the **MODE** key followed by the 4-digit code **3337** and press the **[ENTER/STORE]** key.

3337 spells DEFP (**DE**fault **P**rogramming) on a Touch-Tone[®] phone.

If an incorrect key is entered, reenter the proper 4-digit code before pressing the [ENTER/STORE] key. Within five seconds, repeat this entry by again pressing the **MODE** key followed by the 4-digit code **3337** and pressing the [ENTER/STORE] key. The display will read **LinP**. Enter your 4-digit password. When reprogramming is complete, the real time clock will display.

3.6 Troubleshoot Mode

In this mode, system status may be displayed on the 4-character display of the PRO-411. An internal voltmeter measures the voltage present at the channel/inputs, AC power input, and Notification Appliance Circuit. A lack of keyboard activity for a period of 20 minutes will cause the panel to return to Normal Mode.

To access the Troubleshoot Mode, press the **MODE** key followed by the digits 8768 and then the [ENTER/STORE] key.

8768 spells TROU on a Touch-Tone® phone.

Once in this mode, the 411UDAC will continue to communicate any events not yet acknowledged at a central station prior to entering Troubleshoot Mode. The **UP** arrow and **DOWN** arrow keys do not function in this mode.

All status displays in Troubleshoot Mode are shown in real-time, which means the display will update automatically as the status changes.

Channel/Inputs

Pressing **1** through **4** followed by the [ENTER/STORE] key on the PRO-411 displays the input status of the selected channel. Listed below are the status display and corresponding nominal threshold voltages, as measured across B+ and B-, for each zone:

Channel #	Normal with ELR	Shorted	Open Circuit
1 through 4 (status)	N	S	O
1 and 3 (voltage)	11.5V	0V	12.0V
2 and 4 (voltage)	5.0V	0V	12.0V

Where **N** = normal, **S** = active, and **O** = fault (or open)

AC Line

Pressing **A** followed by the [ENTER/STORE] key will display the AC input voltage as shown below. The following lists the AC line voltage range. The AC Power LED will turn off and the trouble LED will turn on when the AC line voltage drops below the Low Line threshold.

AC Line Voltage	Low Line	Normal	High Line
	102 VAC	115 VAC	132 VAC

Notification Appliance Circuit

Pressing **8** followed by the [ENTER/STORE] key will display the status of the Notification Appliance Circuit. Listed below are the status display and corresponding nominal threshold voltages for the NAC measured across B+ and B-:

NAC	Normal with ELR	Shorted	Open Circuit
status	N	S	O
voltage	-1.0V	0V	-5.5V

Where **N** = normal, **S** = shorted, and **O** = open

Telephone Line Testing

Press **C** for touchtone dialing or **D** for rotary dialing, followed by **[ENTER/STORE]**.

The Programmer keypad may be used as a telephone touchpad for number dialing. Once the first digit is pressed, the display will move the **C** or **D** character one position to the left, while placing the next digit to be dialed on the farthest right display position. Continue to press the phone numbers to be dialed. The dialer stores the digits as they are pressed. Press **1st EVENT** to go off hook and dial the stored digits. Pressing **[ENTER/STORE]** after dialing has started will terminate dialing. Successive depressions of the **1st EVENT** key hangs up and picks up the phone (places the phone on or off the hook).

The secondary phone line may be tested by pressing the **E** key for touchtone dialing or the **F** key for rotary dialing and then following the same procedure used for the primary phone line. A handset may be temporarily connected across transformer T1 of the 411UDAC as indicated in Figure 3.1. The handset, when connected across T1, may be used only as an amplifier/speaker or telephone with the keypad used for number dialing.

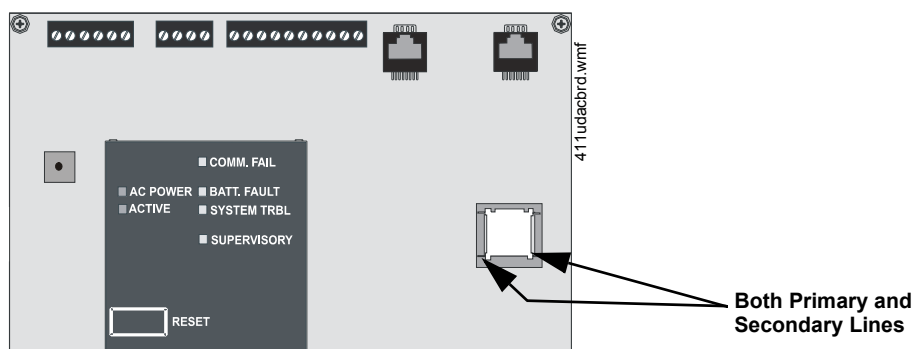


Figure 3.1 Handset/Speaker Connection

Section 4: Central Station Communications

The 411UDAC transmits system status reports to Central Stations via the public switched telephone network. Two supervised telephone line connections are made to interface the communicator to the telephone lines. Two 7-foot telephone cords P/N MCBL-7 may be used for this purpose (not supplied - order separately).

The digital communicator supervises both telephone lines for proper voltage. A delay of two minutes will occur before a fault in either phone line connection is reported as a trouble. When a fault is detected, an audible trouble signal will sound, the yellow Trouble LED will turn on, the optional trouble relay will activate if programmed for DACT trouble and the trouble condition will be reported to a central station over the remaining good phone line.

The digital communicator comes with line seizure capability provided for both the primary and secondary telephone line interfaces. Any time that the DACT needs to make a call to a central station, line seizure will disconnect any local premises phones sharing the same telephone line. All transmissions to central stations will be sent over the Primary Central Station phone line. In the event of noisy phone lines, transmissions will be sent over the backup Secondary phone line.

Two phone numbers must be programmed, the Primary Central Station phone number and the Secondary Central Station phone number. There are three options for transmission to the Central Station:

- All reports are always sent to the Primary Central Station phone number with the Secondary Central Station number for emergency backup purposes only
- All reports are sent to both Central Station phone numbers
- Reports are sent to the first available Central Station phone number only

The digital communicator is capable of reporting detailed messages depending upon the Format in use. Table 4.1 shows the data reporting structure for each of the pulsed formats as well as the Ademco Express Formats. Ademco Express Formats allow a typical data message to be transmitted to the Central Station in under 5 seconds. Pulsed formats typically require 15 to 20 seconds in comparison. Table 4.2 defines each letter code used in Table 4.1. See “Ademco Contact ID Format Event Code Description” on page 57 for a description of the data reporting structure for Ademco Contact ID Format.

	Format # 0, 2, 4, 6, 8	Format # 3, 5, 7, 9	Format # 1, A, C	Format # B, D
Report	3+1/4+1/Standard 4+1 Express	3+1/4+1/Expanded	4+2/Standard 4+2 Express	4+2/Expanded
Fire Alarm	SSS(S) FA	SSS(S) FA FAFAFA(FA) 2	SSSS FAFA2	SSSS FAZ
Fire Alarm Restore	SSS(S) RFA	SSS(S) RFA RFARFARFA (RFA) 2	SSSS RFARFA2	SSSS RFAZ
Channel/Input Trouble (Channel/Input Open)	SSS(S) TZ	SSS(S) TZ TZTZTZ(TZ) Z	SSSS TZTZ2	SSSS TZZ
Channel/Input Trouble Restore	SSS(S) RTZ	SSS(S) RTZ RTZRTZRTZ(RTZ) Z	SSSS RTZRTZ2	SSSS RTZZ
System Trouble	SSS(S) TS	SSS(S) TS TSTSTS(TS) Y	SSSS TSTS2	SSSS TSY
System Trouble Restore	SSS(S) RTS	SSS(S) RTS RTSRTSRTS(RTS) Y	SSSS RTSRTS2	SSSS RTSY
AC Loss	SSS(S) P	SSS(S) P PPP(P) Z	SSSS PP2	SSSS PP2
AC Loss Restore	SSS(S) RP	SSS(S) RP RPRPRP(RP) Z	SSSS RPRP2	SSSS RPRP2
Fire Supervisory Condition	SSS(S) V	SSS(S) V VVV(V) Z	SSSS VV2	SSSS VZ
Fire Supervisory Condition Restore	SSS(S) RV	SSS(S) RV RVRVR(RV) Z	SSSS RVRV2	SSSS RVZ
Test Report	SSS(S) X	SSS(S) X	SSSS XX2	SSSS XX2
Up or Download	SSS(S) UD	SSS(S) UD	SSS UDUD2	SSS UDUD2

Table 4.1 Format Selection Addresses (20 and 50) Programming

Where:

SSS or SSSS	=	Subscriber ID
FA	=	Fire Alarm (1st digit)
FA2	=	Fire Alarm (2nd digit)
Z	=	Channel/Input Number
RFA	=	Fire Alarm Restore (1st digit)
RFA2	=	Fire Alarm Restore (2nd digit)
TZ	=	Zone Trouble (1st digit)
TZ2	=	Zone Trouble (2nd digit)
RTZ	=	Zone Trouble Restore (1st digit)
RTZ2	=	Zone Trouble Restore (2nd digit)
TS	=	System Trouble (1st digit)
TS2	=	System Trouble (2nd digit)
RTS	=	System Trouble Restore (1st digit)
RTS2	=	System Trouble Restore (2nd digit)
P	=	AC Loss (1st digit)
P2	=	AC Loss (2nd digit)
RP	=	AC Loss Restore (1st digit)
RP2	=	AC Loss Restore (2nd digit)
V	=	Fire Supervisory Condition (1st digit)
V2	=	Fire Supervisory Condition (2nd digit)
RV	=	Fire Supervisory Condition Restore (1st digit)
RV2	=	Fire Supervisory Condition Restore (2nd digit)
X	=	Test Report (1st digit)
X2	=	Test Report (2nd digit)
Y	=	Trouble corresponding to the following:
	1	= Not Used
	2	= Not Used
	3	= Not Used
	4	= Telco Primary Line Fault
	5	= Telco Secondary Line Fault
	6	= Not Used
	7	= Not Used
	8	= Not Used
	9	= Not Used
	A	= Communication Failure Primary Number
	B	= Communication Failure Secondary Number
	C	= Not Used
	D	= Not Used
	E	= Not Used
	F	= Not Used
UD	=	Upload/Download (1st digit)
UD2	=	Upload/Download (2nd digit)

Table 4.2 Format Selection Address Explanation

Note that for Expanded Reporting, the digital communicator automatically adds the digit corresponding to the Channel/Input number, and the second digit corresponding to any system trouble condition. Only the first digit shown in Table 3.3 and Table 3.6 is programmable.

4.1 Transmittal Priorities

The digital communicator transmits highest priority events first. Events in terms of priority are listed below in descending order:

1. Fire Alarm (highest priority level)
2. Fire Supervisory
3. System Troubles
 - Host Panel Trouble (active input programmed for trouble)
 - AC Fail (after delay)
 - Channel/Input faults
 - Telephone line fault
 - Communication trouble
 - System Off Normal
4. Restoral Reports
 - Fire Alarm
 - Fire Supervisory
 - Host Panel Trouble
 - AC
 - Channel/Input fault
 - Telephone line
 - Communication
 - System Off Normal
5. System Test
6. Upload/Download events (lowest priority)

4.2 Ademco Contact ID Format Event Code Description

This section describes the various Event Codes and their messages which are available for the Ademco Contact ID Format. The reporting structure for the Ademco Contact ID Format is as follows:

SSSS 18 QXYZ GG CCC

Where:

SSSS	=	Four digit Subscriber ID Account Code (addresses 21 - 24 and 51 - 54)
18	=	Identifies transmission as Contact ID to the receiver at the Central Station
Q	=	Event Qualifier where 1 = New Event and 3 = New Restore
XYZ	=	Event code (shown in Tables)
GG	=	Group number
CCC	=	Channel/Input number

Notes:

1. **18**, which is used in the reporting structure to identify the transmission as Contact ID, is not printed out in the alarm and trouble report.
2. **Q**, which is the Event Qualifier for the reporting structure, is printed out in the report as an **E** for New Event or **R** for New Restore.
3. GG Group Number is fixed at '00' and cannot be changed.
4. CCC Channel/Input Number is transmitted as '001' for Channel/Input 1, '002' for Channel/Input 2, '003' for Channel/Input 3, '004' for Channel/Input 4.

Ademco Contact ID Reporting Structure

A typical printout from a Central Station receiver (such as the Ademco 685) of alarm and trouble reports in the Ademco Contact ID Reporting Structure follows:

<u>Time</u>	<u>Date</u>	<u>Rcvr/Line ID</u>	<u>SSSS</u>	<u>QXYZ</u>	<u>GG</u>	<u>CCCC</u>
11:28	03/25	11	7777	E110	00	C001 - general fire alarm on Channel/Input 1
11:28	03/25	11	7777	E111	00	C002 - smoke detector alarm on Channel/Input 2
11:28	03/25	11	7777	E380	00	C003 - fault on Channel/Input 3
11:28	03/25	11	7777	R110	00	C001 - Channel/Input 1 alarm restored
11:28	03/25	11	7777	R111	00	C002 - smoke detector Channel/Input 2 restored
11:28	03/25	11	7777	R380	00	C003 - Channel/Input 3 fault restored
11:28	03/25	11	7777	E158	00	C004 - high temperature, Channel/Input 4
11:28	03/25	11	7777	E151	00	C004 - gas detected, Channel/Input 4

The following table contains UL listed receivers compatible with the 411UDAC's onboard DACT.

Format # (Addresses 20 and 50)		FBI CP220FB (1)	Ademco 685 (2)	Silent Knight 9000 (3)	Silent Knight 9800 (4)	Osborne Hoffman 2000E (5)	Radionics 6600 (6)	Surgard System III (7)	Surgard MLR-2 (8)	Surgard MR-2000 (9)	Ademco MX8000 (10)
0	4+1 Ademco Express	✓	✓		✓	✓	✓	✓	✓	✓	✓
1	4+2 Ademco Express	✓	✓		✓	✓	✓	✓	✓	✓	✓
2	3+1/Standard/1800/2300	✓	✓	✓	✓	✓				✓	✓
3	3+1/Expanded/1800/2300	✓	✓	✓	✓	✓				✓	✓
4	3+1/Standard/1900/1400	✓	✓	✓	✓	✓				✓	✓
5	3+1/Expanded/1900/1400	✓	✓	✓	✓	✓				✓	✓
6	4+1/Standard/1800/2300		✓	✓	✓	✓		✓	✓	✓	✓
7	4+1/Expanded/1800/2300		✓	✓	✓	✓		✓	✓	✓	✓
8	4+1/Standard/1900/1400		✓	✓	✓	✓		✓	✓	✓	✓
9	4+1/Expanded/1900/1400		✓	✓	✓	✓		✓	✓	✓	✓
A	4+2/Standard/1800/2300	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B	4+2/Expanded/1800/2300	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
C	4+2/Standard/1900/1400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
D	4+2/Expanded/1900/1400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
E	Ademco Contact ID	✓	✓		✓	✓	✓	✓	✓	✓	✓

Table 4.3 Compatible UL Listed Receivers

- (1) With version 3.9 software.
- (2) With 685-8 Line Card with Rev. 4.4d software.
- (3) With 9002 Line Card Rev. 9035 software or 9032 Line Card with 9326A software.
- (4) With 124077V2.00 Receiver and 126047 Line Card Rev. M.
- (5) With V.7301 Receiver S/W.
- (6) With 01.01.03 Receiver S/W and Line Card 01.01.03.
- (7) Surgard System III software version 1.6.
- (8) Surgard MLR-2 software version 1.86.
- (9) With DSP4016 and V1.6 Line Card.
- (10) With 124060V206B and 124063 Line Card Rev. B

IMPORTANT! It is the installer's responsibility to ensure that the Digital Alarm Communicator/Transmitter is compatible with the Central Station Receiver, utilized by the monitoring service, prior to installation. The Compatibility Table provides a list of compatible receivers and associated software versions for the receivers. Changes in the hardware and/or software by the receiver manufacturers may affect the receiver compatibility with the DACT. After completing the installation, communication between the DACT and Central Station Receiver must be tested and verified.

Section 5: Remote Site Upload/Download

The 411UDAC may be programmed off site via the public switched telephone network. Any personal computer with Windows® XP or greater Upload/Download software P/N PK-411UD (available on PK-CD or online), may serve as a Service Terminal. For details on the remote site upload/download software package, refer to the *PK-411UD Manual*. The Upload/Download software allows the following:

- Download of the entire program
- Upload of the entire program
- Upload current status, system voltages or time
- Real-time upload of current status or system voltages
- Download new time



CAUTION: ERROR CHECKING

CHANGES TO PROGRAM ENTRIES OCCUR AS A RESULT OF THE DOWNLOADING PROCESS. AFTER SUCCESSFUL DOWNLOADING, MAKE CERTAIN TO PERFORM THE FOLLOWING STEPS:

1. Manually view programmed entries and compare to intended program data.
 2. Test all affected system operations.
 3. Immediately correct any problems found.
-

5.1 General

Any time that the digital communicator is contacted, a secret code (factory default 0000) is verified between the digital communicator and the Service Terminal. Changing the Secret Code may only be accomplished at the Service Terminal and subsequently loaded into the panel. Future upload or download requests cause verification of the Secret Code by the communicator before processing of data is allowed. If the Secret Code is not verified, the communicator will terminate the request immediately.

In order to contact the communicator, the following must be true:

- ✓ The digital communicator may be in any mode of operation including Normal, Program, Real Time Clock, Troubleshoot or Lamp Test. Downloading is not possible if the communicator is active during Central Station communications or while testing the phone lines while in Troubleshoot Mode.
- ✓ The digital communicator must be unlocked so it can accept a remote upload/download. Entering mode **8655** (UNLK) will unlock the panel for 30 minutes. Refer to "Panel Unlock (90)" for other programming options.
- ✓ There cannot be any active communications ongoing with a Central Station receiver.
- ✓ All active events must be successfully 'kissed-off' by the Central Station(s). The digital communicator must be in a standby state with no new information waiting to be transmitted to a Central Station.

Two basic communication mechanisms are supported as follows:

- Contact with callback - The Service Terminal calls the digital communicator. The communicator answers the call, confirms the calling party then hangs-up. The Service Terminal then waits for a callback from the communicator. After the digital communicator calls the Central Station and successfully reports that a request has been received, the communicator calls the Service Terminal back. Upon secret code verification, data transfers occur. When the data transfers are completed and the Service Terminal disconnects from the communicator, the digital communicator calls the Central Station back to confirm either successful or unsuccessful results.

- Contact with callback disabled - The Service Terminal calls the communicator. No hang-up sequence occurs. Data transfers proceed.

Note that Callback enable/disable is controlled by the master user at the Service Terminal on a per call basis.

With program address location 64 set to '1' in Program Mode, anytime a contact with callback is initiated, the communicator will first either contact the primary Central Station or contact both the primary and secondary Central Stations or contact the first available Central Station phone number to report a 'request for upload/download' message (depending upon the program entry in address location 137). Once the request is 'kissed-off' by the Central Station(s), the communicator will then call the appropriate Service Terminal and begin the downloading process.

With program address location 64 set to '1' in Program Mode, anytime a contact with callback disabled is initiated, the communicator and the Service Terminal will communicate and transfer data without first contacting a Central Station. When the data transfers are completed and the communicator disconnects from the Service Terminal, the communicator will call the Central Station and report one of the following:

- Upload/download request received
- Upload and/or download successful
- Upload/download failed

To prevent the 'request for upload/download' message(s) from being reported to the Central Station(s), make certain to set address 64 to '0' or '3' or disable all upload/download reports back to both Central Stations. Refer to Table 3.2 on page 38 through Table 3.4, "Ademco Contact ID Format - Secondary," on page 42 for additional information.

Unlike most competitive products, during the downloading process, the input monitoring and 411UDAC supervision remain active. Should an input activation or system trouble occur, the communicator immediately terminates downloading, processes the trouble or alarm locally and transmits the information to the Central Station(s).

5.1.1 Security Features

Remote site upload and download with the 411UDAC have been carefully designed to include key security features to ensure proper functionality. The key features are listed and explained below.

Secret Code Verification

A secret code is stored in the communicator by a Service Terminal to prevent unauthorized access. The secret code is created at the Service Terminal by a Master user and cannot be viewed or changed by anyone other than a Master user. Viewing of the secret code is prohibited at the communicator. Prior to allowing an upload or download of data, the communicator will verify the secret code transmitted by the Service Terminal.

Panel Unlock

The communicator must be in an unlocked state to accept a remote upload/download. Entering the 4 digit code will unlock the panel for a period of 30 minutes, unless otherwise programmed.

Time-out at 411UDAC

Upon answering an incoming call on the primary Central Station phone line, the communicator will listen for a modem connection signal. If this signal is not received within 30 seconds, the communicator will disconnect the call. Upon successful connection (i.e. secret code verified and callback complete if applicable), if no communication occurs within two minutes, the communicator will disconnect the call.

Callback to Service Terminal

Any time that the communicator is remotely requested to allow an upload or download with callback, it will confirm the source of the incoming call, hang-up and call the calling party (Service Terminal phone number) back.

Error Checking

As each block of data is received by the communicator, it is checked for accuracy. If an error is detected, the block is retransmitted until correct, up to a maximum of four times. If the Secret Code is not verified and four errors occur, the call is disconnected and the report that the upload/download was not successful is called to the Central Station(s).

Central Station Acknowledge

There is an option whereby the communicator will report to one or both Central Stations that a request for uploading or downloading has been received prior to processing the call. This is called the 'callback' option. If the Central Station(s) does not acknowledge receipt of this request, uploading or downloading is prohibited. If acknowledged by the Central Station(s), another message is transmitted informing the Central Station(s) that:

- downloading was successful
- uploading was successful
- uploading/downloading was not successful

Data Protection/Integrity

Programming data is completely verified for accuracy prior to reprogramming of the 411UDAC EEPROM. Incomplete or corrupted data packets are ignored or retried.

5.2 Downloading to the Communicator

Before initiating the download procedure, make certain that the communicator is unlocked and in the standby state.

Once an incoming call is accepted/answered by the communicator, the 411UDAC will:

1. Establish basic modem connection
2. Verify secret code
3. Verify callback vs. no callback request from the Service Terminal. If callback is requested, perform steps 4 through 10; if no callback is requested, perform steps 9 and 10 only
4. Verify product type
5. Identify the Service Terminal location
6. Hang-up/disconnect call
7. Call the Central Station(s) and transmit a request for upload/download message (if programmed to do so). If this message is accepted, the communicator will proceed to the next step
8. Return call to the Service Terminal
9. Verify secret code
10. Verify Product type
11. Begin downloading
12. Upon completion of download, call the Central Station(s) back and report a successful download or failed upload/download status (if programmed to do so).

5.3 Uploading From the Communicator

Items that may be uploaded from the communicator to a Service Terminal are:

- All or portions of programmed data plus the real time clock

- Troubleshoot system voltages in real-time or as a 'snapshot'
- Current system status in real-time continuous or as a 'snapshot'

Uploading is possible at any time provided the following conditions are true:

- ✓ The communicator may be in any mode of operation. Uploading is not possible if the communicator is active or while testing the phone lines while in Troubleshoot Mode.
- ✓ There cannot be any active communications ongoing with a Central Station receiver.
- ✓ All active events must be successfully 'kissed-off' by the Central Station(s). The communicator must be in a standby state with no new information waiting to be transmitted to a Central Station.

Once an incoming call is accepted/answered by the communicator, the 411UDAC will:

1. Establish basic modem connection
2. Verify secret code
3. Verify callback vs. no callback request from the Service Terminal. If callback is requested, perform steps 4 through 10; if no callback is requested, perform steps 9 and 10 only
4. Verify product type
5. Identify the Service Terminal location
6. Hang-up/disconnect call
7. Call the Central Station(s) and transmit a request for upload/download message (if programmed to do so). If this message is accepted, the communicator will proceed to the next step
8. Return call to the Service Terminal
9. Verify secret code
10. Verify product type
11. Begin downloading
12. Upon completion of download, call the Central Station(s) back and report a successful download or failed upload/download status (if programmed to do so).

Unlike most competitive products, during the uploading process, the 411UDAC fire protection remains active. Should a system trouble or alarm condition occur, the communicator immediately terminates uploading and processes the trouble or alarm locally and transmits the information to the Central Station(s).

5.4 Simultaneous Data Transfers

Uploading and downloading may take place on a single telephone call. Control and selection of the data transaction is coordinated at the Service Terminal. This eliminates multiple phone calls, allows instant verification of downloaded data files and simplifies the overall process.

Section 6: Battery Calculations

Use the Total Standby and Alarm Load Currents calculated in Tables 6.2, and 6.3, for the following battery calculations.

Standby Load Current in amps (from Table 6.2) []	X	Required Standby Time in Hours (24 or 60 Hours) []	=	_____
Alarm Load Current in amps (from Table 6.3) []	X	Required Alarm Time in Hours (i.e. 5 min. = 0.084 Hours) []	=	_____
Add Standby and Alarm Load for Required Ampere Hour Battery				_____
Multiplying by derating factor of 1.2				X1.2
Total Ampere Hour Battery ¹				_____

Table 6.1 Battery Calculations

- 1. Select a battery with an Amp Hour rating greater than that calculated in Table 6.1.
✓ NFPA 72 for Central Station and Proprietary Protected Premises systems require 24 hours of standby
- 2. Two 12 VDC, 7 Amp Hour batteries, wired in parallel, can be located in the backbox to provide 14 Amp Hours of backup (refer to Figure 2.4 on page 22 for battery cable connections)

6.1 411UDAC Power Supply

The 411UDAC provides filtered power for operating the digital communicator, external devices and the battery charger. The power for operating external devices is limited. Use Table 6.2 (standby or nonalarm) and Table 6.3 (alarm) to determine if external loading is within the capabilities of the power supply.

Device Type	# of Devices		Current (amps)		Total Current (amps)
Main Circuit Board	1	X	0.125	=	0.125
4-wire Detector Heads	[]	X	[]	=	
Power Supervision Relays		X		=	
Additional Current Draw from 12 VDC Resettable	[]	X	[]	=	
Sum Column for Standby Load				=	amps

Table 6.2 Load in Standby

Notes:

1. Refer to the *Device Compatibility Document* for compatible listed power supervision relays.
2. Refer to the *Device Compatibility Document* for 4-wire smoke detector standby current.

Device Type	# of Devices		Current (amps)		Total Current (amps)
Main Circuit Board	1	X	0.180	=	0.180
4-wire Detector Heads	[]	X	[]	=	
Power Supervision Relay	[]	X	0.025	=	
Notification Appliances	[]	X	[]	=	
Additional Current Draw from 12 VDC Resettable	[]	X	[]	=	
Sum Column for Alarm Load				=	amps

Table 6.3 Load in Alarm

Notes:

1. Refer to the *Device Compatibility Document* for compatible listed power supervision relays.
2. Refer to the *Device Compatibility Document* for 4-wire smoke detector current.
3. Maximum available current for notification appliances is 1.0 amp
4. Maximum available current from resettable output is 0.200 amps
5. Total system current cannot exceed 1.6 amps

A.1 Digital Communicator Options Program Sheets

☐₂₀ Primary Central Station Communication Format: *Valid entries are 0 to 9 and A to F.*

Primary Central Station Account Code: *Valid entries are 0 to 9 and A to F.*

 Primary Central Station 24-hour Test Time: *Use military time (i.e. 1400 for 2:00 PM).*

☐₂₉ Primary Number Test Time Interval. Enter '0' for 24-hour; '1' for 12-hour; '2' for 8-hour; '3' for 6-hour.

50 Secondary Central Station Communication Format: *Valid entries are 0 to 9 and A to F.*

☐ 51 ☐ 52 ☐ 53 ☐ 54 Secondary Central Station Account Code: *Valid entries are 0 - 9 and A - F.*

Secondary Central Station 24-hour Test Time: *Use military time (i.e. 1400 for 2:00 PM).*

☐₅₉ Secondary Number Test Time Interval. Enter '0' for 24-hour; '1' for 12-hour; '2' for 8-hour; '3' for 6-hour.

☐₆₀ AC Loss Reporting Delay. Enter '0' for no delay; '1' for 1 hours; '2' for 2 hours; '3' for 6 hours; '4' for 7 hours; '5' for 8 hours; '6' for 9 hours; '7' for 10 hours; '8' for 11 hours; '9' for 12 hours; 'A' for 13 hours; 'B' for 14 hours; 'C' for 15 hours; 'D' for 16 hours; 'E' for 17 hours; 'F' for 18 hours.

 **61 Backup Reporting.** Enter '0' to report to Secondary phone number as backup only; '1' to report to both Primary and Secondary phone number for all reports/messages; '2' reports go to first available receiver.

 62 Reserved for Future Use.

☐ ₆₃ DACT Trouble Reminder. Enter '0' to disable; '1' to enable.

64 Operational Mode Selection. Enter '0' for stand-alone/communicator disabled; '1' for stand-alone/communicator enabled; '2' for slave/communicator enabled; '3' for slave/communicator disabled. Default setting is '0'.

 ₆₅ Input Channel 1 Function Selection. Enter '0' for fire alarm; '1' for pull station; '2' for normally open contact; '3' for host panel trouble; '4' for supervisory; '5' for supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow nonsilenceable.

 66 Input Channel 2 Function Selection. Enter '1' for pull station; '2' for normally open contact; '3' for host panel trouble; '4' for supervisory; '5' for supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow non-silenceable.

 67 Input Channel 3 Function Selection. Enter '0' for fire alarm; '1' for pull station; '2' for normally open contact; '3' for host panel trouble; '4' for supervisory; '5' for supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow nonsilenceable.

 68 Input Channel 4 Function Selection. Enter '1' for pull station; '2' for normally open contact; '3' for host panel trouble; '4' for supervisory; '5' for supervisory autoresettable; '6' for waterflow silenceable; '7' for waterflow non-silenceable.

Input Channel 1 Delay Timer. Enter 0 - 179 seconds delay. *Factory default is '000' for no delay.*
Does not delay Input Channels programmed for fire functions.

   Input Channel 2 Delay Timer. Enter 0 - 179 seconds delay. *Factory default is '000' for no delay. Does not delay Input Channels programmed for fire functions.*

   Input Channel 3 Delay Timer. Enter 0 - 179 seconds delay. *Factory default is '000' for no delay.*
Does not delay Input Channels programmed for fire functions.

- ☐₇₈ ☐₇₉ ☐₈₀ Input Channel 4 Delay Timer. Enter 0 - 179 seconds delay. *Factory default is '000' for no delay. Does not delay Input Channels programmed for fire functions.*
- ☐₈₁ Touchtone/Rotary Select for Primary Phone. Enter '0' for touchtone dialing; '1' for rotary dialing.
- ☐₈₂ Make/Break Ratio for Primary Phone. Enter '0' for 67/33 ratio; '1' for 62/38 ratio.
- ☐₈₃ Touchtone/Rotary Select for Secondary Phone. Enter '0' for touchtone dialing; '1' for rotary dialing.
- ☐₈₄ Make/Break Ratio for Secondary Phone. Enter '0' for 67/33 ratio; '1' for 62/38 ratio.
- ☐₈₅ Output Relay #1 enable. Enter '1' to enable Relay #1; '0' to disable relay.
- ☐₈₆ Output Relay #1 Function. Enter '0' for relay to activate on alarm; '1' host panel trouble; '2' DACT trouble; '3' for latching fire supervisory; '4' for autoresettable fire supervisory; '7' (future use); '8' for total communication failure.
- ☐₈₇ Output Relay #2 enable. Enter '1' to enable Relay #2; '0' to disable relay.
- ☐₈₈ Output Relay #2 Function. Enter '0' for relay to activate on fire alarm; '1' host panel trouble; '2' for DACT trouble; '3' for latching fire supervisory; '4' for autoresettable fire supervisory; '7' (future use); '8' total communication failure.
- ☐₈₉ Reserved for future use. Leave default setting of '0.'
- ☐₉₀ Panel unlock. Enter '0' for password unlock, '1' for permanent unlock.
- ☐₉₁ Alarm verification. Enter '0' for no verification; '1' for verification of all 4-wire smoke zones.
- ☐₉₂ Silence inhibit. Enter '0' for no silence inhibit; '1' to inhibit silencing of NAC for one minute.
- ☐₉₃ Autosilence. Enter '0' for no autosilence; '1' for 5 minute autosilence; '2' for 10 minutes; '3' for 15 minutes; '4' for 20 minutes; '5' for 25 minutes; '6' for 30 minutes.
- ☐₉₄ Restoral method. Enter '0' for Typical restoral method; '1' for Conditional Restoral Method #1; '2' for Conditional Restoral Method #2.
- ☐₉₅ Coding, Notification Appliance Circuit. Enter '0' for no coding (steady); '1' for Temporal coding.
- ☐₉₆ Trouble Call Limit - Dialer Runaway Prevention Feature. Enter a '0' to disable this feature; '1' to enable Trouble Call Limit. *Factory default is '0' for disabled.*
- ☐₉₇ ☐₉₈ ☐₉₉ ☐₁₀₀ Panel Identification Number.
- ☐₁₀₁ ☐₁₀₂ ☐₁₀₃ ☐₁₀₄ ☐₁₀₅ ☐₁₀₆ ☐₁₀₇ ☐₁₀₈ ☐₁₀₉ ☐₁₁₀ ☐₁₁₁ ☐₁₁₂ ☐₁₁₃ ☐₁₁₄ ☐₁₁₅ ☐₁₁₆ ☐₁₁₇ ☐₁₁₈
- ☐₁₁₉ ☐₁₂₀ Addresses 101 to 120 store the Service Terminal 1 Phone Number. *Valid entries are 0 - 9 and A - E. 'F' designates the end of the phone number.*
- ☐₁₂₁ ☐₁₂₂ Ring Count on Primary Phone Line. Enter number of rings prior to panel answering call. *Valid entries are 00 to 25 (00 = no answer). Factory default is 03.*
- ☐₁₂₃ FAX/Answer Machine, Primary Phone Line. Enter '0' for no sharing of phone line; '1' for sharing.
- ☐₁₂₄ ☐₁₂₅ ☐₁₂₆ ☐₁₂₇ ☐₁₂₈ ☐₁₂₉ ☐₁₃₀ ☐₁₃₁ ☐₁₃₂ ☐₁₃₃ ☐₁₃₄ ☐₁₃₅ ☐₁₃₆ ☐₁₃₇ ☐₁₃₈ ☐₁₃₉ ☐₁₄₀ ☐₁₄₁
- ☐₁₄₂ ☐₁₄₃ Addresses 124 to 143 store the Service Terminal 2 Phone Number. *Valid entries are 0-9 and A-E. 'F' designates the end of the phone number.*
- ☐₁₄₄ Upload/Download Backup Reporting. Enter '0' for Upload/Download reports to go to the Secondary Central Station Phone Number on backup only; '1' for Upload/Download reports to always go to the Secondary; '2' for Upload/Download reports to go to the first available Central Station phone number.

A.2 Digital Communicator Options Program Sheet (Factory Defaults)

To enter Programming Mode, press the **MODE** key, **7764**, and then the **[ENTER/STORE]** key.

F₀₀ **F**₀₁ **F**₀₂ **F**₀₃ **F**₀₄ **F**₀₅ **F**₀₆ **F**₀₇ **F**₀₈ **F**₀₉ **F**₁₀ **F**₁₁ **F**₁₂ **F**₁₃ **F**₁₄ **F**₁₅ **F**₁₆ **F**₁₇ **F**₁₈ **F**₁₉

Addresses 00 to 19 store the Primary Central Station phone number. *Enter 'F' to represent the end of number.*

E₂₀ Primary Central Station Communication Format: *'E' for Ademco Contact ID Format.*

0₂₁ **0**₂₂ **0**₂₃ **0**₂₄ Primary Central Station Account Code.

0₂₅ **0**₂₆ **0**₂₇ **0**₂₈ Primary Central Station 24-hour Test Time: *'0000' = 12:00 midnight.*

0₂₉ Primary Number Test Time Interval. *'0' for 24-hours.*

F₃₀ **F**₃₁ **F**₃₂ **F**₃₃ **F**₃₄ **F**₃₅ **F**₃₆ **F**₃₇ **F**₃₈ **F**₃₉ **F**₄₀ **F**₄₁ **F**₄₂ **F**₄₃ **F**₄₄ **F**₄₅ **F**₄₆ **F**₄₇ **F**₄₈ **F**₄₉

Addresses 30 to 49 store the Secondary Central Station phone number. *Enter 'F' to represent the end of number.*

E₅₀ Secondary Central Station Communication Format: *'E' for Ademco Contact ID Format..*

0₅₁ **0**₅₂ **0**₅₃ **0**₅₄ Secondary Central Station Account Code:

0₅₅ **0**₅₆ **0**₅₇ **0**₅₈ Secondary Central Station 24-hour Test Time: *'0000' = 12:00 midnight.*

0₅₉ Secondary Number Test Time Interval. *'0' for 24-hours.*

2₆₀ AC Loss Reporting Delay. *'2' for 2 hour delay.*

0₆₁ Backup Reporting. *'0' to report to Secondary phone number as backup only.*

0₆₂ Reserved for Future Use.

0₆₃ DACT Trouble Reminder. *'0' disables trouble reminder.*

0₆₄ Operational Mode Selection. *'0' enables stand-alone mode, disables communication to Central Station.*

0₆₅ Input Channel 1 Function Selection. *'0' for fire alarm.*

1₆₆ Input Channel 2 Function Selection. *'1' for pull station alarm.*

0₆₇ Input Channel 3 Function Selection. *'0' for fire alarm.*

1₆₈ Input Channel 4 Function Selection. *'1' for pull station alarm.*

0₆₉ **0**₇₀ **0**₇₁ Input Channel 1 Delay Timer. *'000' for no delay. Does not delay fire functions.*

0₇₂ **0**₇₃ **0**₇₄ Input Channel 2 Delay Timer. *'000' for no delay. Does not delay fire functions.*

0₇₅ **0**₇₆ **0**₇₇ Input Channel 3 Delay Timer. *'000' for no delay. Does not delay fire functions.*

0₇₈ **0**₇₉ **0**₈₀ Input Channel 4 Delay Timer. *'000' for no delay. Does not delay fire functions.*

0₈₁ Touchtone/Rotary Select for Primary Phone. *'0' for touchtone dialing.*

0₈₂ Make/Break Ratio for Primary Phone. *'0' for 67/33 ratio.*

0₈₃ Touchtone/Rotary Select for Secondary Phone. *'0' for touchtone dialing.*

0₈₄ Make/Break Ratio for Secondary Phone. *'0' for 67/33 ratio.*

0₈₅ Output Relay #1 enable. *'0' to disable relay.*

0₈₆ Output Relay #1 Function. *'0' for activation on fire alarm (4-wire smoke).*

0₈₇ Output Relay #2 enable. *'0' to disable relay.*

2₈₈ Output Relay #2 Function. *'2' for activation on DACT trouble.*

- 0**₈₉ Reserved for future use. *Leave default setting of '0.'*
- 0**₉₀ Panel unlock. *'0' for password unlock.*
- 0**₉₁ Alarm verification. *'0' to disable.*
- 0**₉₂ Silence inhibit. *'0' to disable.*
- 0**₉₃ Autosilence. *'0' to disable.*
- 0**₉₄ Restoral method. *'0' for Typical restoral method.*
- 0**₉₅ Coding, Notification Appliance Circuit. *'0' for no coding (steady).*
- 0**₉₆ Trouble Call Limit - Dialer Runaway Prevention Feature. *'0' for disabled feature.*
- 0**₉₇ **0**₉₈ **0**₉₉ **0**₁₀₀ Panel Identification Number.
- F**₁₀₁ **F**₁₀₂ **F**₁₀₃ **F**₁₀₄ **F**₁₀₅ **F**₁₀₆ **F**₁₀₇ **F**₁₀₈ **F**₁₀₉ **F**₁₁₀ **F**₁₁₁ **F**₁₁₂ **F**₁₁₃ **F**₁₁₄ **F**₁₁₅ **F**₁₁₆ **F**₁₁₇ **F**₁₁₈
- F**₁₁₉ **F**₁₂₀ Addresses 101 to 120 store the Service Terminal 1 Phone Number. *Enter 'F' to represent the end of the phone number.*
- 0**₁₂₁ **3**₁₂₂ Ring Count on Primary Phone Line. *'03' for number of rings before answering call.*
- 0**₁₂₃ FAX/Answer Machine, Primary Phone Line. *'0' for no sharing of phone line.*
- F**₁₂₄ **F**₁₂₅ **F**₁₂₆ **F**₁₂₇ **F**₁₂₈ **F**₁₂₉ **F**₁₃₀ **F**₁₃₁ **F**₁₃₂ **F**₁₃₃ **F**₁₃₄ **F**₁₃₅ **F**₁₃₆ **F**₁₃₇ **F**₁₃₈ **F**₁₃₉ **F**₁₄₀ **F**₁₄₁
- F**₁₄₂ **F**₁₄₃ Addresses 124 to 143 store the Service Terminal 2 Phone Number. *Enter 'F' to represent the end of the phone number.*
- 0**₁₄₄ Upload/Download Backup Reporting. *'0' for Upload/Download reports to go to the Secondary Central Station Phone Number on backup only.*

Appendix B: Event Codes/Transmission Format Programming Sheets

To enter Programming Mode, press the **MODE** key, **7764** and then the **[ENTER/STORE]** key.

B.1 4+2 Standard & 4+2 Express Formats Primary Central Station

☐ 145	☐ 146	☐ 147	☐ 148	☐ 149	☐ 150	☐ 151	☐ 152	☐ 153	☐ 154	☐ 155	☐ 156	☐ 157	☐ 158	☐ 159	☐ 160
☐ 161	☐ 162	☐ 163	☐ 164	☐ 165	☐ 166	☐ 167	☐ 168	☐ 169	☐ 170	☐ 171	☐ 172	☐ 173	☐ 174	☐ 175	☐ 176
☐ 177	☐ 178	☐ 179	☐ 180	☐ 181	☐ 182	☐ 183	☐ 184	☐ 185	☐ 186	☐ 187	☐ 188	☐ 189	☐ 190	☐ 191	☐ 192
☐ 193	☐ 194	☐ 195	☐ 196	☐ 197	☐ 198	☐ 199	☐ 200	☐ 201	☐ 202	☐ 203	☐ 204	☐ 205	☐ 206	☐ 207	☐ 208
☐ 209	☐ 210	☐ 211	☐ 212	☐ 213	☐ 214	☐ 215	☐ 216	☐ 217	☐ 218	☐ 219	☐ 220	☐ 221	☐ 222	☐ 223	☐ 224
☐ 225	☐ 226	☐ 227	☐ 228	☐ 229	☐ 230	☐ 231	☐ 232								

B.2 4+2 Standard & 4+2 Express Formats Secondary Central Station

☐ 233	☐ 234	☐ 235	☐ 236	☐ 237	☐ 238	☐ 239	☐ 240	☐ 241	☐ 242	☐ 243	☐ 244	☐ 245	☐ 246	☐ 247	☐ 248
☐ 249	☐ 250	☐ 251	☐ 252	☐ 253	☐ 254	☐ 255	☐ 256	☐ 257	☐ 258	☐ 259	☐ 260	☐ 261	☐ 262	☐ 263	☐ 264
☐ 265	☐ 266	☐ 267	☐ 268	☐ 269	☐ 270	☐ 271	☐ 272	☐ 273	☐ 274	☐ 275	☐ 276	☐ 277	☐ 278	☐ 279	☐ 280
☐ 281	☐ 282	☐ 283	☐ 284	☐ 285	☐ 286	☐ 287	☐ 288	☐ 289	☐ 290	☐ 291	☐ 292	☐ 293	☐ 294	☐ 295	☐ 296
☐ 297	☐ 298	☐ 299	☐ 300	☐ 301	☐ 302	☐ 303	☐ 304	☐ 305	☐ 306	☐ 307	☐ 308	☐ 309	☐ 310	☐ 311	☐ 312
☐ 313	☐ 314	☐ 315	☐ 316	☐ 317	☐ 318	☐ 319	☐ 320								

--To enter Programming Mode, press the **MODE** key, **7764** and then the **[ENTER/STORE]** key.

B.3 4+2 Standard & 4+2 Express Formats Primary Central Station

1₁₄₅ **1**₁₄₆ **1**₁₄₇ **2**₁₄₈ **1**₁₄₉ **3**₁₅₀ **1**₁₅₁ **4**₁₅₂ **F**₁₅₃ **1**₁₅₄ **F**₁₅₅ **2**₁₅₆ **F**₁₅₇ **3**₁₅₈ **F**₁₅₉ **4**₁₆₀
9₁₆₁ **2**₁₆₂ **6**₁₆₃ **1**₁₆₄ **6**₁₆₅ **2**₁₆₆ **6**₁₆₇ **3**₁₆₈ **6**₁₆₉ **4**₁₇₀ **6**₁₇₁ **5**₁₇₂ **6**₁₇₃ **6**₁₇₄ **4**₁₇₅ **7**₁₇₆
6₁₇₇ **A**₁₇₈ **6**₁₇₉ **B**₁₈₀ **6**₁₈₁ **F**₁₈₂ **E**₁₈₃ **1**₁₈₄ **E**₁₈₅ **2**₁₈₆ **E**₁₈₇ **3**₁₈₈ **E**₁₈₉ **4**₁₉₀ **D**₁₉₁ **1**₁₉₂
D₁₉₃ **2**₁₉₄ **D**₁₉₅ **3**₁₉₆ **D**₁₉₇ **4**₁₉₈ **9**₁₉₉ **3**₂₀₀ **A**₂₀₁ **1**₂₀₂ **A**₂₀₃ **2**₂₀₄ **A**₂₀₅ **3**₂₀₆ **A**₂₀₇ **4**₂₀₈
A₂₀₉ **5**₂₁₀ **A**₂₁₁ **6**₂₁₂ **5**₂₁₃ **7**₂₁₄ **A**₂₁₅ **A**₂₁₆ **A**₂₁₇ **B**₂₁₈ **A**₂₁₉ **F**₂₂₀ **9**₂₂₁ **9**₂₂₂ **9**₂₂₃ **1**₂₂₄
7₂₂₅ **1**₂₂₆ **7**₂₂₇ **2**₂₂₈ **7**₂₂₉ **3**₂₃₀ **7**₂₃₁ **4**₂₃₂

B.4 4+2 Standard & 4+2 Express Formats Secondary Central Station

1₂₃₃ **1**₂₃₄ **1**₂₃₅ **2**₂₃₆ **1**₂₃₇ **3**₂₃₈ **1**₂₃₉ **4**₂₄₀ **F**₂₄₁ **1**₂₄₂ **F**₂₄₃ **2**₂₄₄ **F**₂₄₅ **3**₂₄₆ **F**₂₄₇ **4**₂₄₈
9₂₄₉ **2**₂₅₀ **6**₂₅₁ **1**₂₅₂ **6**₂₅₃ **2**₂₅₄ **6**₂₅₅ **3**₂₅₆ **6**₂₅₇ **4**₂₅₈ **6**₂₅₉ **5**₂₆₀ **6**₂₆₁ **6**₂₆₂ **4**₂₆₃ **7**₂₆₄
6₂₆₅ **A**₂₆₆ **6**₂₆₇ **B**₂₆₈ **6**₂₆₉ **F**₂₇₀ **E**₂₇₁ **1**₂₇₂ **E**₂₇₃ **2**₂₇₄ **E**₂₇₅ **3**₂₇₆ **E**₂₇₇ **4**₂₇₈ **D**₂₇₉ **1**₂₈₀
D₂₈₁ **2**₂₈₂ **D**₂₈₃ **3**₂₈₄ **D**₂₈₅ **4**₂₈₆ **9**₂₈₇ **3**₂₈₈ **A**₂₈₉ **1**₂₉₀ **A**₂₉₁ **2**₂₉₂ **A**₂₉₃ **3**₂₉₄ **A**₂₉₅ **4**₂₉₆
A₂₉₇ **5**₂₉₈ **A**₂₉₉ **6**₃₀₀ **5**₃₀₁ **7**₃₀₂ **A**₃₀₃ **A**₃₀₄ **A**₃₀₅ **B**₃₀₆ **A**₃₀₇ **F**₃₀₈ **9**₃₀₉ **9**₃₁₀ **9**₃₁₁ **1**₃₁₂
7₃₁₃ **1**₃₁₄ **7**₃₁₅ **2**₃₁₆ **7**₃₁₇ **3**₃₁₈ **7**₃₁₉ **4**₃₂₀

To enter Programming Mode, press the **MODE** key, **7764** and then the **[ENTER/STORE]** key.

B.5 All 3+1, All 4+1 and 4+2 Expanded Formats for Primary Central Station

145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184	185	186	187	188				

B.6 All 3+1, All 4+1 and 4+2 Expanded Formats for Secondary Central Station

233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276				

B.7 All 3+1, All 4+1 and 4+2 Expanded Formats for Primary Central Station (Factory Defaults)

1	1	1	1	F	F	F	F	9	6	6	6	6	6	6	4
161	6	6	6	E	E	E	E	D	D	D	D	9	A	A	A
177	A	A	5	A	A	A	9	F	7	7	7	7	7	7	7

B.8 All 3+1, All 4+1 and 4+2 Expanded Formats for Secondary Central Station (Factory Defaults)

1	1	1	1	F	F	F	F	9	6	6	6	6	6	6	4
249	6	6	6	E	E	E	E	D	D	D	D	9	A	A	A
265	A	A	5	A	A	A	9	F	7	7	7	7	7	7	7

--To enter Programming Mode, press the **MODE** key, **7764** and then the **[ENTER/STORE]** key.

B.9 Ademco Contact ID Format Primary Central Station

145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208
209	210	211	212	213	214	215	216	217	218	219					

B.10 Ademco Contact ID Format Secondary Central Station

233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296
297	298	299	300	301	302	303	304	305	306	307					

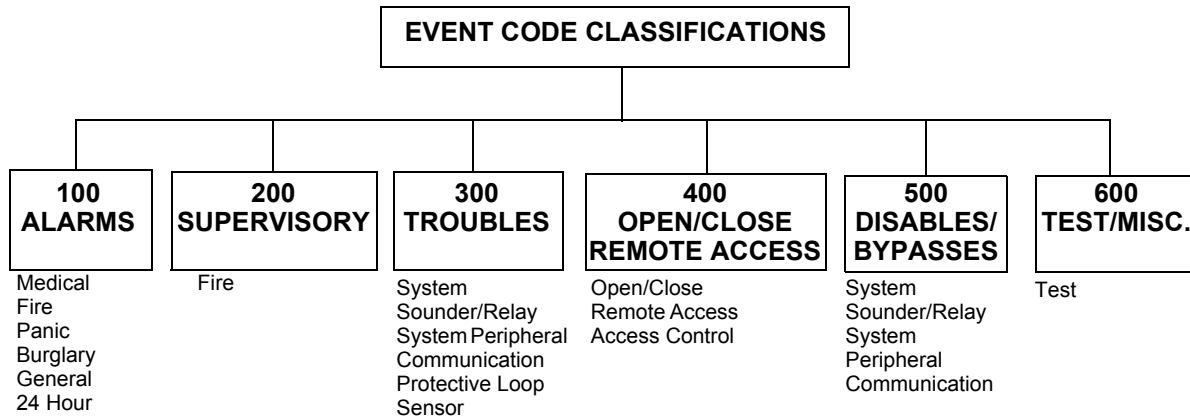
B.11 Ademco Contact ID Format Primary Central Station (Factory Defaults)

1₁₄₅ **1**₁₄₆ **1**₁₄₇ **1**₁₄₈ **1**₁₄₉ **5**₁₅₀ **1**₁₅₁ **1**₁₅₂ **1**₁₅₃ **1**₁₅₄ **1**₁₅₅ **5**₁₅₆ **3**₁₅₇ **8**₁₅₈ **0**₁₅₉ **3**₁₆₀
8₁₆₁ **0**₁₆₂ **3**₁₆₃ **8**₁₆₄ **0**₁₆₅ **3**₁₆₆ **8**₁₆₇ **0**₁₆₈ **3**₁₆₉ **0**₁₇₀ **1**₁₇₁ **3**₁₇₂ **1**₁₇₃ **0**₁₇₄ **3**₁₇₅ **0**₁₇₆
2₁₇₇ **3**₁₇₈ **1**₁₇₉ **1**₁₈₀ **3**₁₈₁ **5**₁₈₂ **1**₁₈₃ **3**₁₈₄ **5**₁₈₅ **2**₁₈₆ **3**₁₈₇ **2**₁₈₈ **1**₁₈₉ **3**₁₉₀ **0**₁₉₁ **0**₁₉₂
3₁₉₃ **5**₁₉₄ **4**₁₉₅ **3**₁₉₆ **5**₁₉₇ **4**₁₉₈ **3**₁₉₉ **0**₂₀₀ **8**₂₀₁ **6**₂₀₂ **0**₂₀₃ **2**₂₀₄ **6**₂₀₅ **0**₂₀₆ **8**₂₀₇ **4**₂₀₈
1₂₀₉ **1**₂₁₀ **4**₂₁₁ **1**₂₁₂ **6**₂₁₃ **4**₂₁₄ **1**₂₁₅ **2**₂₁₆ **4**₂₁₇ **1**₂₁₈ **3**₂₁₉

B.12 Ademco Contact ID Format Secondary Central Station (Factory Defaults)

1₂₃₃ **1**₂₃₄ **1**₂₃₅ **1**₂₃₆ **1**₂₃₇ **5**₂₃₈ **1**₂₃₉ **1**₂₄₀ **1**₂₄₁ **1**₂₄₂ **1**₂₄₃ **5**₂₄₄ **3**₂₄₅ **8**₂₄₆ **0**₂₄₇ **3**₂₄₈
8₂₄₉ **0**₂₅₀ **3**₂₅₁ **8**₂₅₂ **0**₂₅₃ **3**₂₅₄ **8**₂₅₅ **0**₂₅₆ **3**₂₅₇ **0**₂₅₈ **1**₂₅₉ **3**₂₆₀ **1**₂₆₁ **0**₂₆₂ **3**₂₆₃ **0**₂₆₄
2₂₆₅ **3**₂₆₆ **1**₂₆₇ **1**₂₆₈ **3**₂₆₉ **5**₂₇₀ **1**₂₇₁ **3**₂₇₂ **5**₂₇₃ **2**₂₇₄ **3**₂₇₅ **2**₂₇₆ **1**₂₇₇ **3**₂₇₈ **0**₂₇₉ **0**₂₈₀
3₂₈₁ **5**₂₈₂ **4**₂₈₃ **3**₂₈₄ **5**₂₈₅ **4**₂₈₆ **3**₂₈₇ **0**₂₈₈ **8**₂₈₉ **6**₂₉₀ **0**₂₉₁ **2**₂₉₂ **6**₂₉₃ **0**₂₉₄ **8**₂₉₅ **4**₂₉₆
1₂₉₇ **1**₂₉₈ **4**₂₉₉ **1**₃₀₀ **6**₃₀₁ **4**₃₀₂ **1**₃₀₃ **2**₃₀₄ **4**₃₀₅ **1**₃₀₆ **3**₃₀₇

Appendix C: Ademco Contact ID Format Event Code Description



EVENT

MESSAGE

Medical Alarms - 100

100 Medical
 101 Pendant transmitter
 102 Fail to report in

EMERG - Personal Emergency - #
 EMERG - Personal Emergency - #
 EMERG - Fail to Check-in - #

Fire Alarms - 110

110 Fire Alarm
 111 Smoke
 112 Combustion
 113 Waterflow
 114 Heat
 115 Pull Station
 116 Duct
 117 Flame
 118 Near Alarm

FIRE - Fire Alarm - #
 FIRE - Smoke Detector - #
 FIRE - Combustion - #
 FIRE - Waterflow - #
 FIRE - Heat Sensor - #
 FIRE - Pull Station - #
 FIRE - Duct Sensor - #
 FIRE - Flame Sensor - #
 FIRE - Near Alarm - #

Panic Alarms - 120

120 Panic Alarm
 121 Duress
 122 Silent
 123 Audible

PANIC - Panic - #
 PANIC - Duress - #
 PANIC - Silent Panic - #
 PANIC - Audible Panic - #

Burglar Alarms - 130

130 Burglary
 131 Perimeter
 132 Interior
 133 24-Hour
 134 Entry/Exit
 135 Day/Night
 136 Outdoor

BURG - Burglary - #
 BURG - Perimeter - #
 BURG - Interior - #
 BURG - 24-Hour - #
 BURG - Entry/Exit
 BURG - Day/Night
 BURG - Outdoor - #

EVENT	MESSAGE
137 Tamper	BURG - Tamper - #
138 Near Alarm	BURG - Near Alarm - #
<u>General Alarms - 140</u>	
140 General Alarm	ALARM - General Alarm - #
141 Polling loop open	ALARM - Polling Loop Open - #
142 Polling loop short	ALARM - Polling Loop Short - #
143 Expansion module failure	ALARM - Exp. Module Fail - #
144 Sensor tamper	ALARM - Sensor Tamper - #
145 Expansion module tamper	ALARM - Exp. Module Tamper - #
<u>24 Hour Non-Burglary - 150 and 160</u>	
150 24-Hour Non-Burg	ALARM - 24-Hr. Non-Burg - #
151 Gas detected	ALARM - Gas Detected - #
152 Refrigeration	ALARM - Refrigeration - #
153 Loss of heat	ALARM - Heating System - #
154 Water leakage	ALARM - Water Leakage - #
155 Foil break	ALARM - Foil Break - #
156 Day trouble	ALARM - Day Zone - #
157 Low bottled gas level	ALARM - Low Gas Level - #
158 High temp	ALARM - High Temperature - #
159 Low temp	ALARM - Low Temperature - #
161 Loss of air flow	ALARM - Air Flow - #
<u>Fire Supervisory - 200 and 210</u>	
200 Fire Supervisory	SUPER. - Fire Supervisory - #
201 Low water pressure	SUPER. - Low Water Pressure - #
202 Low CO2	SUPER. - Low CO2
203 Gate valve sensor	SUPER. - Gate Valve - #
204 Low water level	SUPER. - Low Water Level - #
205 Pump activated	SUPER. - Pump Activation - #
206 Pump failure	SUPER. - Pump Failure - #
<u>System Troubles - 300 and 310</u>	
300 System trouble	TROUBLE - System Trouble
301 AC loss	TROUBLE - AC Power
302 Low system battery	TROUBLE - System Low Battery
303 RAM checksum bad	TROUBLE - Bad RAM Checksum (Restore not applicable)
304 ROM checksum bad	TROUBLE - Bad ROM Checksum (Restore not applicable)
305 System reset	TROUBLE - System Reset (Restore not applicable)
306 Panel program changed	TROUBLE - Programming Changed (Restore not applicable)
307 Self-test failure	TROUBLE - Self Test Failure
308 System shutdown	TROUBLE - System Shutdown
309 Battery test failure	TROUBLE - Battery Test Failure
310 Ground fault	TROUBLE - Ground Fault - #
311 No battery	TROUBLE - No Battery
<u>Sounder/Relay Troubles - 320</u>	
320 Sounder/Relay	TROUBLE - Sounder Relay - #
321 Bell 1	TROUBLE - Bell/Siren #1
322 Bell 2	TROUBLE - Bell/Siren #2

EVENT	MESSAGE	
323 Alarm relay	TROUBLE - Alarm Relay	
324 Trouble relay	TROUBLE - Trouble Relay	
325 Reversing	TROUBLE - Reversing Relay	
326 Bell 3	TROUBLE - Bell/Siren #3	
327 Bell 4	TROUBLE - Bell/Siren #4	
<u>System Peripheral Troubles - 330 and 340</u>		
330 System Peripheral	TROUBLE - Sys. Peripheral - #	
331 Polling loop open	TROUBLE - Polling Loop Open	
332 Polling loop short	TROUBLE - Polling Loop Short	
333 Expansion module failure	TROUBLE - Exp. Module Fail - #	
334 Repeater failure	TROUBLE - Repeater Failure - #	
335 Local printer paper out	TROUBLE - Printer Paper Out	
336 Local printer failure	TROUBLE - Local Printer	
<u>Communication Troubles - 350 and 360</u>		
350 Communication	TROUBLE - Communication Trouble	
351 Telco 1 fault	TROUBLE - Phone Line #1	
352 Telco 2 fault	TROUBLE - Phone Line #2	
353 Long range radio xmitter fault	TROUBLE - Radio Transmitter	
354 Fail to communicate	TROUBLE - Fail to Communicate	
355 Loss of radio supervision	TROUBLE - Radio Supervision	
356 Loss of central polling	TROUBLE - Central Radio Polling	
<u>Protection Loop Troubles - 370</u>		
370 Protection loop	TROUBLE - Protection Loop - #	
371 Protection loop open	TROUBLE - Protection Loop Open - #	
372 Protection loop short	TROUBLE - Protection Loop Short - #	
373 Fire Trouble	TROUBLE - Fire Loop - #	
<u>Sensor Troubles - 380</u>		
380 Sensor trouble	TROUBLE - Sensor Trouble - #	
381 Loss of Supervision - RF	TROUBLE - RF Sensor Supervision - #	
382 Loss of Supervision - RPM	TROUBLE - RPM Sensor Supervision - #	
383 Sensor tamper	TROUBLE - Sensor Tamper - #	
384 RF transmitter low battery	TROUBLE - RF Sensor Batt. - #	
<u>Open/Close - 400</u>		
400 Open/Close	OPENING	CLOSING
401 Open/Close by user	OPENING - User #	CLOSING - User #
402 Group Open/Close	OPENING - Group User #	CLOSING - Group User #
403 Automatic Open/Close	OPENING - Automatic	CLOSING - Automatic
404 Late Open/Close	OPENING - Late	CLOSING - Late
405 Deferred Open/Close	Opening not used	Closed not used
406 Cancel	OPENING - Cancel	Closed not used
407 Remote arm/disarm	OPENING - Remote	CLOSING - Remote
408 Quick arm	Opening not applicable	CLOSING - Quick Arm
409 Keyswitch Open/Close	OPENING - Keyswitch	CLOSING - Keyswitch
<u>Remote Access - 410</u>		
411 Callback request made	REMOTE - Callback Requested	Restore not applicable

EVENT	MESSAGE	
412 Success - download/access	REMOTE - Successful Access	Restore not applicable
413 Unsuccessful access	REMOTE - Unsuccessful Access	Restore not applicable
414 System shutdown	REMOTE - System Shutdown	
415 Dialer shutdown	REMOTE - Dialer Shutdown	
416 Success - upload/access	REMOTE - Successful Access	Restore not applicable
 <u>Access Control - 420</u>		
421 Access denied	ACCESS - Access Denied - User #	Restore not used
422 Access report by user	ACCESS - Access Gained - User #	Restore not used
 <u>System Disables - 500 and 510</u>		
 <u>Sounder/Relay Disables - 520</u>		
520 Sounder/Relay disable	DISABLE - Sounder/Relay - #	
521 Bell 1 disable	DISABLE - Bell/Siren - #1	
522 Bell 2 disable	DISABLE - Bell/Siren - #2	
523 Alarm relay disable	DISABLE - Alarm Relay	
524 Trouble relay disable	DISABLE - Trouble Relay	
525 Reversing relay disable	DISABLE - Reversing Relay	
526 Bell 3 disable	DISABLE - Bell/Siren - #3	
527 Bell 4 disable	DISABLE - Bell/Siren - #4	
 <u>System Peripheral Disables - 530 and 540</u>		
 <u>Communication Disables - 550 and 560</u>		
551 Dialer disabled	DISABLE - Dialer Disable	
552 Radio transmitter disabled	DISABLE - Radio Disable	
 <u>Bypasses - 570</u>		
570 Zone bypass	BYPASS - Zone Bypass - #	
571 Fire bypass	BYPASS - Fire Bypass - #	
572 24-Hour zone bypass	BYPASS - 24-Hour Bypass - #	
573 Burglar bypass	BYPASS - Burg. Bypass - #	
574 Group bypass	BYPASS - Group Bypass - #	
 <u>Test Misc. - 600</u>		
601 Manual trigger test	TEST - Manually Triggered	Restore not applicable
602 Periodic test report	TEST - Periodic	Restore not applicable
603 Periodic RF transmission	TEST - Periodic Radio	Restore not applicable
604 Fire test	TEST - Fire Test	Restore not used
605 Status report to follow	STATUS - Status Follows	Restore not applicable
606 Listen-in to follow	LISTEN - Listen-in Active	Restore not applicable
607 Walk test mode	TEST - Walk Test Mode	
608 System abnormal test	TEST - System Abnormal Test	

Appendix D: Events and Default Event Codes

Note: The character 'x' in the following table refers to the input circuit number (1 - 4).

411UDAC Events	Format Group 1		Format Group 2		Ademco Contact ID	
Input Circuit Functions	Active	Restore	Active	Restore	Active and Restore	Sensor #
4-wire Smoke	1x	Ex	1	E	111	00x
Pull Station	1x	Ex	1	E	115	00x
Contact Closure	1x	Ex	1	E	110	00x
Host Control Panel Trouble	FF	Ex	F	E	373	00x
Latching Supervisory	8x	Ex	8	E	200	00x
Autoresettable Supervisory	8x	Ex	8	E	200	00x
Silenceable Waterflow	1x	Ex	1	E	113	00x
Nonsilenceable Waterflow	1x	Ex	1	E	113	00x
Other Events	Active	Restore	Active	Restore	Active and Restore	Sensor #
Input Circuit Fault	Fx	Dx	F	D	380	00x
AC Fault	92	93	9	9	301	000
Earth Fault	61	A1	6	A	310	000
Low Battery Fault	62	A2	6	A	302	000
No Battery Fault	63	A3	6	A	311	000
Phone Line 1 Fault	64	A4	6	A	351	000
Phone Line 2 Fault	65	A5	6	A	352	000
NAC Fault	66	A6	6	A	321	000
Phone Number 1 Fault	6A	AA	6	A	354	001
Phone Number 2 Fault	6B	AB	6	A	354	002
System Off Normal Fault	6F	AF	6	A	308	000
Special Events	Active	Restore	Active	Restore	Active and Restore	Sensor #
System Test Message	99	-	9	-	602	000
System Abnormal Test Message	91	-	F	-	608	000
Upload/Download Request	71	-	7	-	411	000
Upload Successful	72	-	7	-	416	000
Download Successful	73	-	7	-	412	000
Upload/Download Failed	74	-	7	-	412	000

Group Definitions:

Format Group 1

4+2 Ademco Express Standard, DTMF	1400/2300 Hz ACK
4+1 Expanded 1800 Hz Carrier	2300 Hz ACK
4+1 Expanded 1900 Hz Carrier	1400 Hz ACK
4+2 Standard 1800 Hz Carrier	2300 Hz ACK
4+2 Expanded 1800 Hz Carrier	2300 Hz ACK
4+2 Standard 1900 Hz Carrier	1400 Hz ACK
4+2 Expanded 1900 Hz Carrier	1400 Hz ACK

Format Group 2

4+1 Ademco Express Standard, DTMF	1400/2300 Hz ACK
3+1 Expanded 1800 Hz Carrier	2300 Hz ACK
3+1 Expanded 1900 Hz Carrier	1400 Hz ACK
3+1 Standard 1800 Hz Carrier	2300 Hz ACK
3+1 Standard 1900 Hz Carrier	1400 Hz ACK
4+1 Standard 1800 Hz Carrier	2300 Hz ACK
4+1 Standard 1900 Hz Carrier	1400 Hz ACK

Note that although all Expanded Mode formats communicate two digits per event, only the first digit is programmable. The second digit cannot be changed.

Appendix E: Operational Modes

CODE	ACTIVITY	NOTES
6676 (NORM)	Returns to normal operation	Fire protection is on.
2525 (CLCK)	Enters Real-Time Clock Mode	Program digital communicator time. Fire protection is off.
7764 (PROG)	Enters Program Mode	Allows programming of digital communicator. Fire protection is off.
3337 (DEFP)	Returns digital communicator to factory default program settings	Fire protection is off during Default Mode.
8768 (TROU)	Allows display of status for all circuits	Fire protection is off during Troubleshoot Mode.

Index

A

AC Loss Reporting Delay **45**
Acknowledge/System Silence **11**
Alarm Verification **10, 48**
Autosilence **10, 48**

B

Battery
 see also Secondary Power
board revision level **9**

C

Cabinet **15**
 Dimensions **19**
 Knockouts **19**
Channels/Inputs **12, 13**
 Alarm Current **12**
 End-of-Line Resistor **12**
 Loop Resistance **12**
 Operating Voltage **12**
 Operation **12**
 see also Input Channels
 Short Circuit Current **12**
Computer
 see Service Terminal
Connection **24**
Controls **14**

D

Default Mode **51**
Delay Timer **46**
Dialer Runaway **10, 11**
Digital Communicator **15**
Downloading **62**

E

Earth Ground **13**

F

Fire•Watch 411 **15**
Form-C Relays
 contact rating **12**
 operating voltage **12**
 programmable **13**
 See also Relays
Front Panel Indicator
 AC Power **14**
 Active **14**
 Battery Trouble **14**
 Communication Fail **14**

Earth Fault **14**
Supervisory **14**
System Trouble **14**
Front Panel Switch
 Acknowledge/System Silence **14**
 Reset **14**
Function Selections
 Channel **46**
 Relays **47**

I

Indicators **14**
Input Channels **10, 22**

M

Mounting **18**

N

Notification Appliance Circuit **10, 13, 25**
 Current **12**
 End-of-line resistor **12**
 Operating Voltage **12**
 Style Y **12**

O

Operating Power
 connections **21**
 Primary **20**
 Secondary **21**
 see also Battery
Operational Modes
 Default Mode **16, 51**
 Normal Mode **16, 30**
 Program Mode **16, 34**
 Real Time Clock Mode **16, 33**
 Troubleshoot Mode **16, 52**
Output Circuits **25**
 battery charger **13**
 resettable power **13**
 telephone circuits **13**
 see also Telephone Circuits

P

Panel Configuration
 Nonlatching Slave Panel Communicator
 16
 Test Mode **16**
Piezo Sounder **14**
PK-411 **11, 15**
Primary Power **12**

See also Operating Power - Primary
PRO-411. See also Fire•Watch 411 **15**
Product Features **10**

R

Receivers

UL Listed **59**

Resettable Power

current **12**

operating voltage **12**

Resistor, End-of-Line

Channels/Inputs **12**

Notification Appliance Circuit **12**

Restoral Methods **11, 49**

revision level **9**

S

Secondary Power

Battery Charging Circuit **12**

Charger Capacity **12**

See also 'Battery' and 'Operating Power -
Secondary'

Security Features **61**

Service Terminal **10, 51**

Signal Silence Inhibit **10, 48**

Simultaneous Data Transfers **63**

Stand-alone Fire Alarm Communicator **16**

T

Telephone Circuits **17, 27**

Transformer **15**

Transmittal Priorities **57**

trouble call limit **50**

Trouble Reminder **10, 45**

Trouble Resound **10**

U

UL Power-limited Wiring Requirements **29**

Uploading **62**

Manufacturer Warranties and Limitation of Liability

Manufacturer Warranties. Subject to the limitations set forth herein, Manufacturer warrants that the Products manufactured by it in its Northford, Connecticut facility and sold by it to its authorized Distributors shall be free, under normal use and service, from defects in material and workmanship for a period of thirty six months (36) months from the date of manufacture (effective Jan. 1, 2009). The Products manufactured and sold by Manufacturer are date stamped at the time of production. Manufacturer does not warrant Products that are not manufactured by it in its Northford, Connecticut facility but assigns to its Distributor, to the extent possible, any warranty offered by the manufacturer of such product. This warranty shall be void if a Product is altered, serviced or repaired by anyone other than Manufacturer or its authorized Distributors. This warranty shall also be void if there is a failure to maintain the Products and the systems in which they operate in proper working conditions.

MANUFACTURER MAKES NO FURTHER WARRANTIES, AND DISCLAIMS ANY AND ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE PRODUCTS, TRADEMARKS, PROGRAMS AND SERVICES RENDERED BY MANUFACTURER INCLUDING WITHOUT LIMITATION, INFRINGEMENT, TITLE, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. MANUFACTURER SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY OR DEATH WHICH MAY ARISE IN THE COURSE OF, OR AS A RESULT OF, PERSONAL, COMMERCIAL OR INDUSTRIAL USES OF ITS PRODUCTS.

This document constitutes the only warranty made by Manufacturer with respect to its products and replaces all previous warranties and is the only warranty made by Manufacturer. No increase or alteration, written or verbal, of the obligation of this warranty is authorized. Manufacturer does not represent that its products will prevent any loss by fire or otherwise.

Warranty Claims. Manufacturer shall replace or repair, at Manufacturer's discretion, each part returned by its authorized Distributor and acknowledged by Manufacturer to be defective, provided that such part shall have been returned to Manufacturer with all charges prepaid and the authorized Distributor has completed Manufacturer's Return Material Authorization form. The replacement part shall come from Manufacturer's stock and may be new or refurbished. THE FOREGOING IS DISTRIBUTOR'S SOLE AND EXCLUSIVE REMEDY IN THE EVENT OF A WARRANTY CLAIM.

Warn-HL-08-2009.fm

→ PSN-106, PSN-64, PSB-10

Installation, Operation, and Instruction Manual



POTTER ELECTRIC SIGNAL COMPANY, LLC
St. Louis, MO
(866) 956-1211 • (314) 595-6900 • FAX (314) 595-6999
www.pottersignal.com

Manual #5403590–Rev. A
12/09

Contents

Section 1: PSN-106	PSN-106:1
General Description	PSN-106:3
System Features	PSN-106:3
Mounting Instructions	PSN-106:3
Operating Instructions	PSN-106:3
Alarm Condition	PSN-106:3
Trouble Condition	PSN-106:4
Standby Operation	PSN-106:4
Testing and Maintenance	PSN-106:5
Battery Maintenance	PSN-106:5
Electrical Operating Characteristics	PSN-106:5
Notification Power Supply	PSN-106:6
Wiring Options	PSN-106:7
Class B Trigger and Class B Notification Circuit Trigger	PSN-106:7
Class A Trigger and Class A Notification Circuit	PSN-106:7
Class B - Multiple Supply Trigger	PSN-106:8
Class A - Multiple Supply Trigger	PSN-106:8
Pass Thru Mode	PSN-106:9
Wire Routing	PSN-106:10
Reference EOL	PSN-106:10
Dip Switch Programming	PSN-106:11
Input Trigger Type	PSN-106:11
Bulk Supply Options	PSN-106:11
Class A/B Selection	PSN-106:12
Door Holder AC Dropout delay	PSN-106:12
DC Output is Door Holder	PSN-106:12
Trouble Memory Enabled	PSN-106:12
Individual NAC Options	PSN-106:13
Battery Calculation Worksheet	PSN-106:15
Section 2: PSN-64	PSN-64:1
General Description	PSN-64:3
System Features	PSN-64:3
Mounting Instructions	PSN-64:3
Operating Instructions	PSN-64:3
Alarm Condition	PSN-64:3
Standby Operation	PSN-64:4
Trouble Condition	PSN-64:4
Testing and Maintenance	PSN-64:5
Battery Maintenance	PSN-64:5
Electrical Operating Characteristics	PSN-64:5
Notification Power Supply	PSN-64:6
Wiring Options	PSN-64:7
Class A Trigger and Class A Notification Circuit	PSN-64:7
Class B - Multiple Supply Trigger	PSN-64:8
Class A - Multiple Supply Trigger	PSN-64:8
Pass Thru Mode	PSN-64:9
Wire Routing	PSN-64:10
Reference EOL	PSN-64:10
Dip Switch Programming	PSN-64:11
Input Trigger Type	PSN-64:11
Bulk Supply Options	PSN-64:11
Class A/B Selection	PSN-64:12
Door Holder AC Dropout delay	PSN-64:12
DC Output is Door Holder	PSN-64:12
Trouble Memory Enabled	PSN-64:12
Individual NAC Options	PSN-64:13
Battery Calculation Worksheet	PSN-64:15

Section 3: PSB-10	PSB-10:1
General Description	PSB-10:3
Product Features	PSB-10:3
Mounting Instructions	PSB-10:3
Operating Instructions	PSB-10:3
Normal Operation	PSB-10:3
Trouble Condition	PSB-10:3
Testing and Maintenance	PSB-10:4
Battery Maintenance	PSB-10:4
Electrical Operating Characteristics	PSB-10:4
Wire Routing.....	PSB-10:5
Dip Switch Programming	PSB-10:6
Indicator LED Behavior	PSB-10:6
Bulk Power Supply	PSB-10:7
Battery Calculation Worksheet	PSB-10:8

Section 1: PSN-106

Installation, Operation, and Instruction Manual

Notification Power Supplies

(All specifications subject to revision.)

WARNING

The fire alarm system employing this power supply must be designed by people trained and competent in the design and layout of fire alarm systems. The system shall be designed and installed in accordance with all local and national codes and ordinances as well as the approval of the Authority Having Jurisdiction. Only trained, qualified and competent individuals should install, program and/or service the POTTER FIRE POWER SUPPLY. Competent people would be aware of these warnings, limitations, and requirements.

High voltage electrocution hazard. Do not handle live AC wiring or work on the device while AC power is active.

This manual is designed to help with the specification, installation, and programming of the POTTER FIRE POWER SUPPLY. It is imperative that this manual be completely read and understood before the installation or programming of the power supply. Save this manual for future reference.

General Description

The Potter PSN series of power supplies is designed to provide the power and flexibility needed for the most demanding fire system installations. The PSN-106 is a 10 Amp 24Vdc switch mode power supply design which is up to 50% more efficient than linear mode supplies the PSN series is your best choice for powering fire system notification appliances and accessories. New and retrofit construction requirements for ADA compliance are easily accomplished with ample power for additional notification appliances along with the ability to synchronize the notification appliances using built in sync generation for Potter, System Sensor®, Gentex® and Wheelock® notification appliances. The PSN series goes even further to make retrofits easier with the advanced QuadraSync feature which allows notification appliances from different manufacturers to sync with each other. You also have the option to monitor an existing circuit by placing a reference resistor of the same value on the power supply and continuing to monitor the circuit without changing the field EOL.

System Features

- Input voltage: 120/240VAC 50/60Hz
- Output voltage 24VDC @ 10A
- Six class “B” Style “Y” notification circuits on the PSN-106
 - Rated at 3 amps max each
 - Can be configured as up to three class “A” Style “Z” notification circuits
- Supervised Battery Charger: 27.3 @ 1A (supports 7-55 Ahr batteries)
- Integrated battery cut-off circuitry to protect batteries from deep discharge
- Two Trouble Relays (5A at 30VDC)
 - General System Trouble (programmable for AC delay via dip-switch)
 - Low AC Trouble
- Diagnostic LED’s
 - Status LED’s for Active NAC and NAC trouble conditions
 - Status LED’s for Earth Fault (Amber), AC (Green), Battery Fault (Amber)
 - Trouble Memory feature captures troubles which have previously restored.
- Synchronized notification appliance circuits
 - Potter
 - Wheelock®
 - Gentex®
 - System Sensor®
- Configurable output circuits (D.I.P. switch sets options for each circuit)
 - ANSI temporal-coded
 - Constant Power
 - Door-Holder Power
- Separate DC Power Output (3A)
- Two Trigger Inputs (Class A, Style Z or Class B, Style Y)
- Reference EOL terminals, allows 2K – 27K EOL value to be used
- QuadraSync panel wide synchronization of same or multiple brands.
- PassThru mode copies input signals to output (can be used in conjunction with QuadraSync)

Mounting Instructions

The standard mounting is a surface mount cabinet. The unit must be securely attached to a permanent partition using suitable fasteners. Five mounting holes are provided to accept ¼ inch diameter screws maximum. There are seven knock outs provided.

Operating Instructions

Alarm Condition

Notification Appliance Circuit:

Alarm devices operate in unison with the Trigger inputs from the main Fire Alarm Control Panel (FACP). When activated by the corresponding trigger input the associated Notification Appliance Circuit (NAC) will reverse polarity from a supervision state to the alarm state and supply power to the associated notification appliances until the trigger is removed. Each activated NAC will also power the L.E.D. associated with it, the L.E.D. will follow the steady or pulsing state of the NAC. The alarm-activated outputs are reset through the operation of the reset function of the Main FACP.

*Trouble Condition***NOTICE**

If the trouble memory feature has been enabled the L.E.D. will provide two brief pulses every second to indicate a trouble condition has occurred but is now restored. This can be useful when troubleshooting brief trouble conditions that come and go over a period of time

Notification Appliance Circuit:

If a trouble occurs on a NAC the associated L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

DC Power Circuit:

If a trouble occurs on the DC Power output the DC L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

AC:

When the Power supply detects the A.C. power input has fallen below an acceptable level the AC Power L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type and after a programmed delay the Low AC relay will also activate. When the trouble condition has been restored the L.E.D. and trouble relays will return to their normal state. (See notice.)

Low Battery:

When the Power supply detects the Battery is no longer functioning properly the Low Battery L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

Ground Fault:

When the Power supply detects a ground Fault condition which indicates a short between the Power Supply ground and the Earth Ground circuits the Ground Fault L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

Communication Trouble:

If the Bulk Power Supply and Control Board lose communication with each other the Comm L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

*Standby Operation***Notification Appliance Circuit:**

When in standby operation the NAC will be in the reversed supervision polarity and the associated L.E.D. will be off. Exception: When the NAC is programmed to be an DC Power Output the associated L.E.D. will be on during normal standby operation.

DC Power Circuit:

When in standby operation the DC Power will be on and the DC Power L.E.D. will be illuminated.

AC:

When in normal operation the AC Power L.E.D. will be on steady.

Low Battery:

When in normal operation the Low Battery L.E.D. will be off.

Ground Fault:

When in normal operation the Ground Fault L.E.D. will be off

Communication

When in normal operation the Comm L.E.D. will flash occasionally to indicate normal communication traffic is occurring.

Testing and Maintenance

System Testing should be performed periodically to insure proper operation.

Test the indicating circuits by initiating an alarm or test at the Main FACP.

Test for proper operation by actuating the notification appliance circuit the PSN-106 is monitoring.

Standby batteries and AC transfer are tested by interrupting the AC power line while an alarm condition exists.

Battery Maintenance

The PSN-106 should be tested at least once a year for proper operation as follows:

Output Voltage Test: Under normal load conditions, the DC output voltage should be checked for proper voltage level. Refer to the Power Supply Output Specifications Chart).

Battery Test: Under normal load conditions, check that the battery is fully charged. Check specific voltage both at the battery terminal and at the board terminals marked [+BAT-] to ensure there is no break in the battery connection wires.

Note: Maximum charging current is 1 Amp.

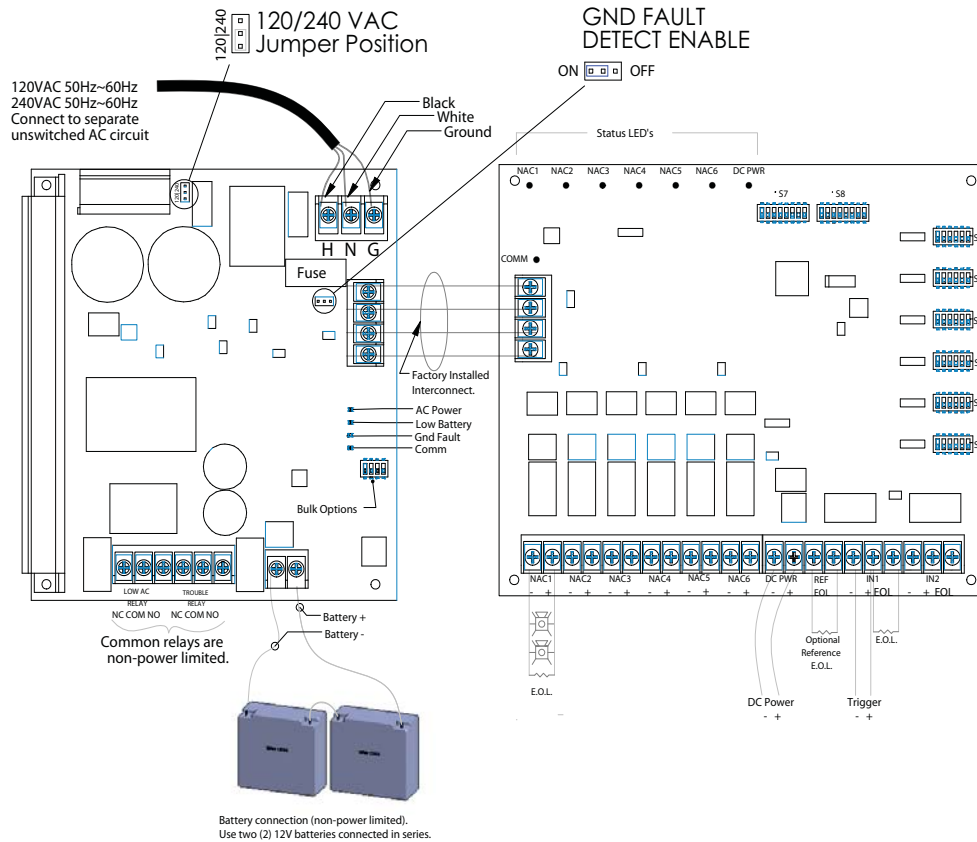
Note: Expected battery life is 5 years; however it is recommended changing batteries in 4 years or less if needed.

Electrical Operating Characteristics

Input Voltage	120 VAC @ 5.1 Amps or 240 VAC @ 2.5 Amps (Jumper selected) 50/60 Hz
Input Trigger	8 VDC to 33 VDC (15 ma) filtered or full wave rectified. Polarity reversal or continuous voltage
Output Voltage	24 VDC @ 10 Amps
Notification Outputs	24 VDC 3.0 Amps Maximum, Polarity Reversal
DC Power	3.0 Amps
Total System Current	PSN-106 = 10 Amps (total system load from all output circuits must not exceed 10 amps total_

The system uses a "Sealed Lead Acid" or "Gel-Cell" type of battery with a capacity of from 7 to 55 amp-hours. Fuse must be replaced with same size and rating (8A-250VAC, Time Lag).

Notification Power Supply



Primary AC

120VAC 50Hz~60Hz, 5.1AMP
 Min Low AC Detect 97VAC
 240VAC 50~60Hz 2.5AMP
 Min Low AC Detect 190VAC

Common Relays

3A @ 125VAC (Resistive)
 3A @ 30VDC (Resistive)

Battery Charging

27.3VDC @ 1A
 Low Battery Detect @20.4VDC

Earth Fault to Any Terminal

0 Ohms

Notification Appliance Circuits 1-6

24VDC @3A Power Limited
 Regulated
 Synchronization supported on NAC 1-6

DC Power Circuit

20.4VDC - 27.3VDC @3A Power Limited
 Special Application RSG-DH1224
 Listed Door Holder

Fuse Specification

8A-250VAC Time-Lag

Note: Total current draw from NAC 1-6 and DC Power must not exceed 10 amps.

F.C.C.

This device has been verified to comply with FCC Rules Part 15, Class A Operation is subject to the following conditions:

1. This device may not cause radio interference.
2. This device must accept any interference received including any that may cause undesired operation.

Requirements

System must be fully tested after installation.
 Intended for indoor use in dry locations only.
 Separation of power limited wiring from non-power limited wiring must be at least 1/4".

For proper operation the voltage drop to the farthest connected device must not exceed 3 volts. This can be calculated using the following formula:

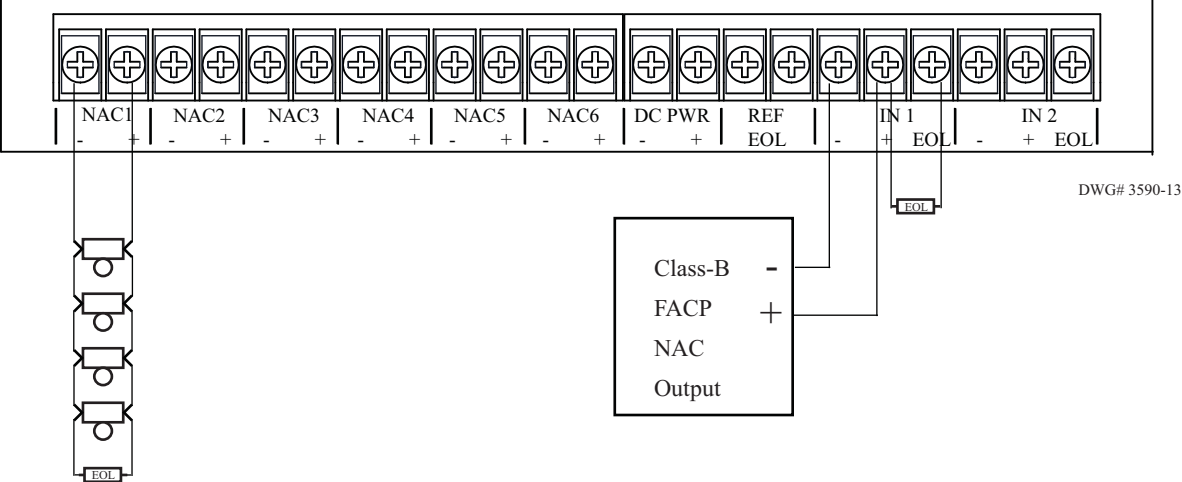
$$\frac{\text{(Alarm Current of Notification Appliances)}}{\text{(Wire Resistance)}} < 3 \text{ volts}$$

Install in accordance with installation manual Part Number 5403590 Rev A, NFPA 70, and NFPA 72

Wiring Options

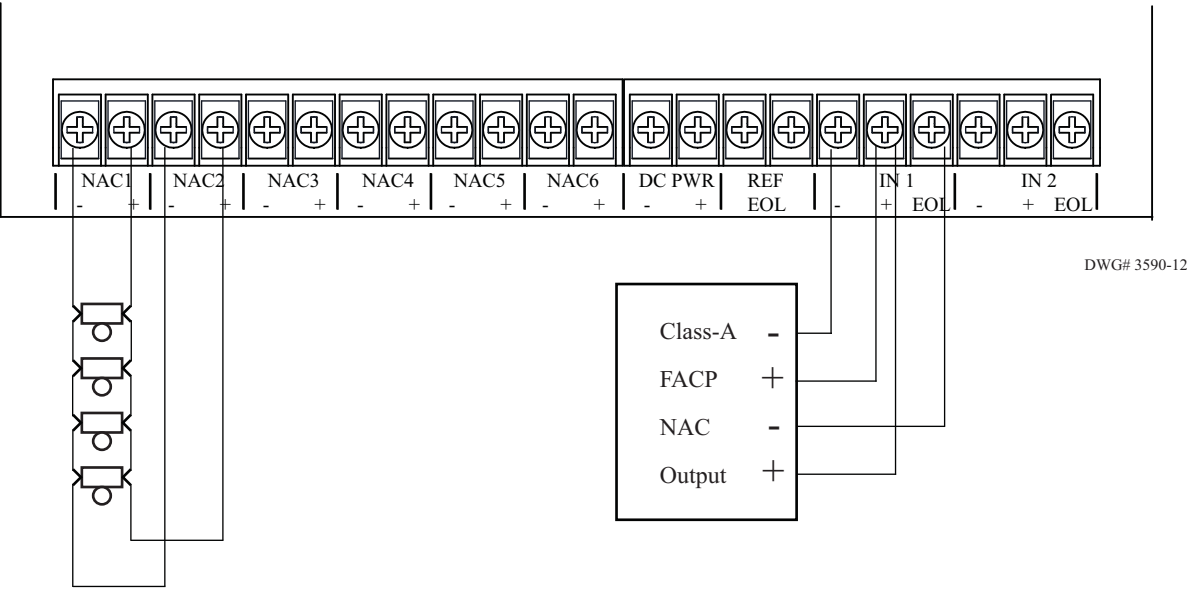
Class B Trigger and Class B Notification Circuit Trigger

Class B Style Y Trigger and Class B Style Y Notification Circuit Trigger inputs IN1 & IN2 can be connected to a Class B Style Y NAC trigger circuit as shown below. The PSN-106 provides 6 Class B Style Y NAC circuits, each rated for 3 amps. Each NAC circuit is individually selectable for Class A Style Z/ Class B Style Y operation, refer to the Dip Switch Programming for information on dip switch programming.



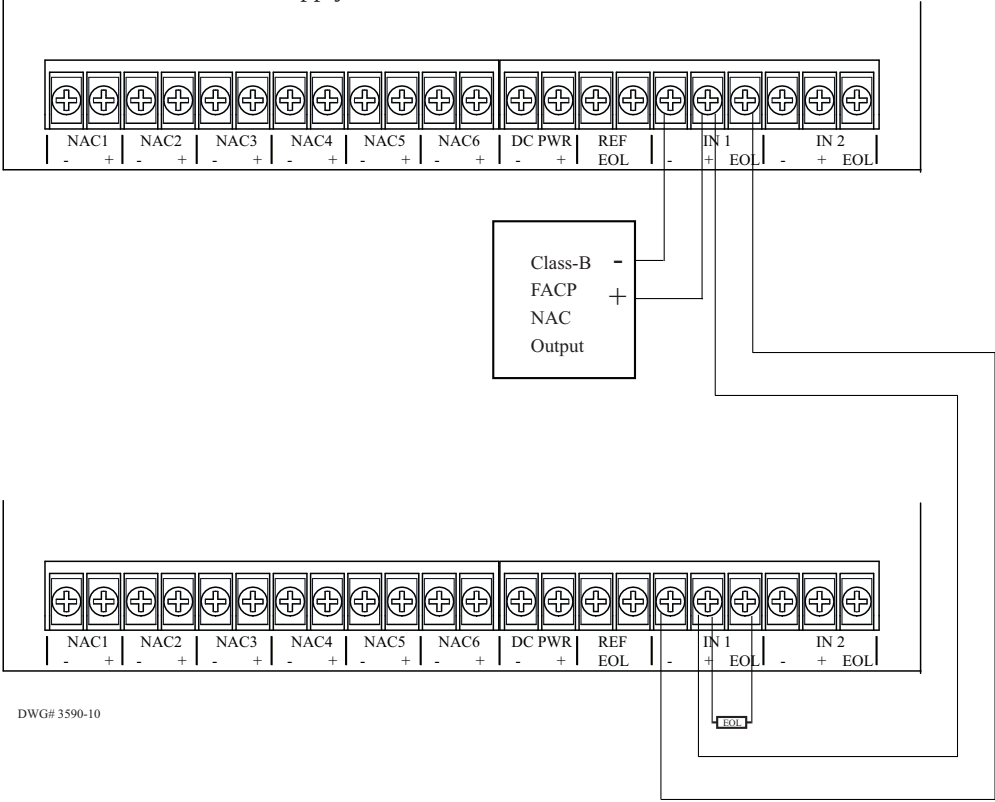
Class A Trigger and Class A Notification Circuit

Trigger inputs IN1 & IN2 can be connected to a class A NAC trigger circuit as shown below. The PSN-106 provides 3 Class A NAC circuits, each rated for 3 amps. Each NAC circuit is individually selectable for Class A/B operation, refer to the Dip Switch Programming section for information on dip switch programming.



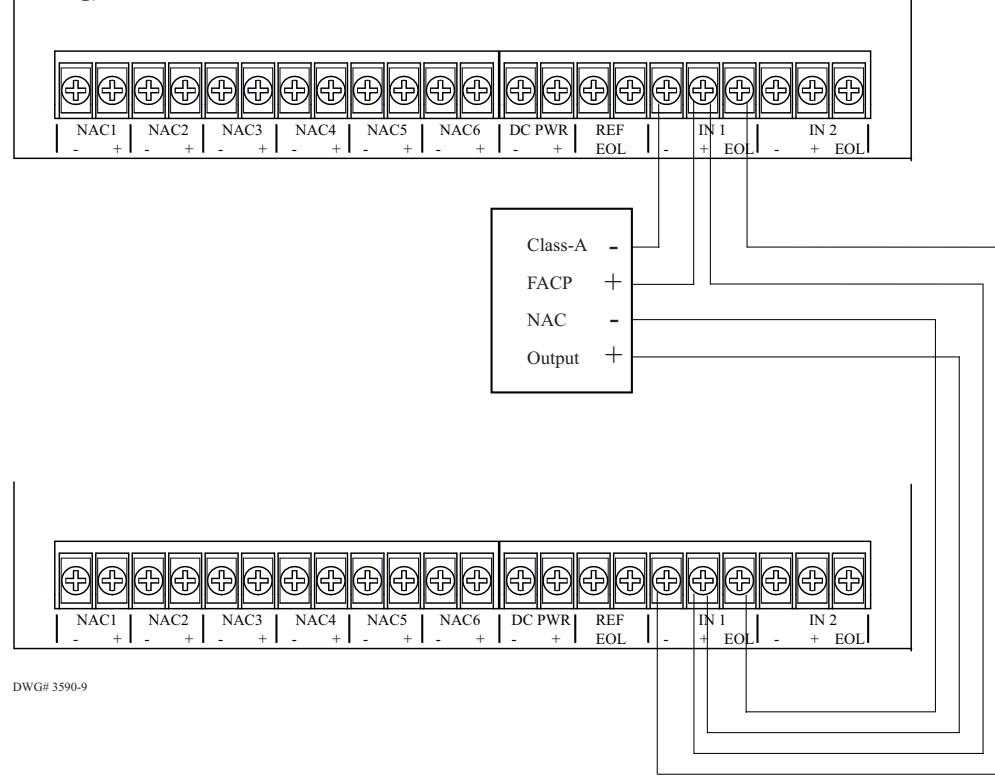
Class B - Multiple Supply Trigger

A single Class B Style Y trigger can be used to activate multiple supplies as shown below. The minimum wire gauge between supplies is 18 AWG. A maximum wiring distance of 10,000 feet is allowed from the triggering FACP and the last supply in the chain. The EOL resistor is located on the last supply in the chain.



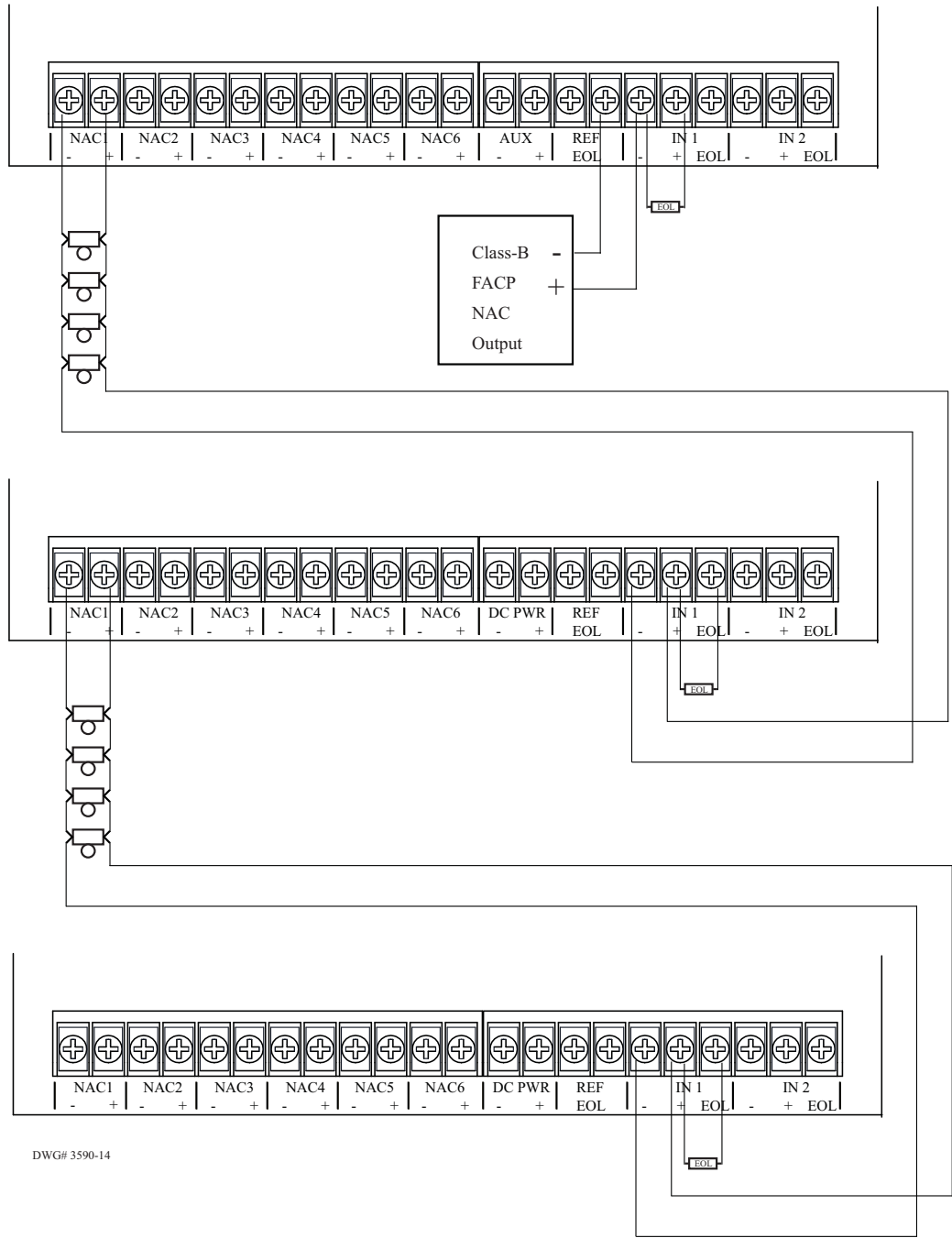
Class A - Multiple Supply Trigger

A single Class A Style Z trigger can be used to activate multiple supplies as shown below. The minimum wire gauge between supplies is 18 AWG. A total wiring distance of 10,000 feet is allowed from the triggering FACP to the last supply in the chain (including the return wiring).



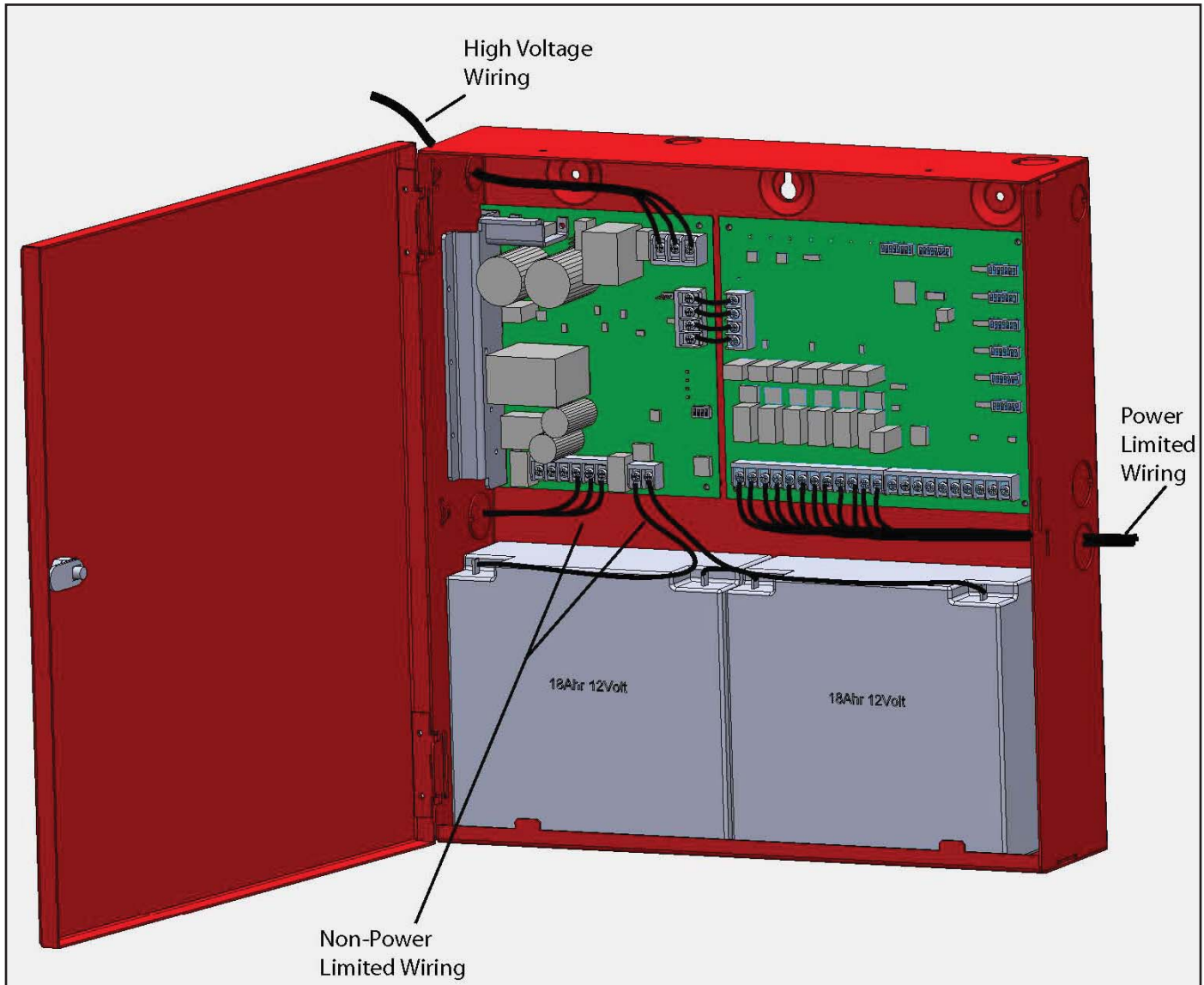
Pass Thru Mode

The NAC output of the PSN-106 can be used to trigger additional supplies. Up to 3 supplies maximum can be configured in this manner. Full system synchronization is maintained. The minimum wire gauge between supplies is 18 AWG. A maximum wiring distance of 10,000 feet is allowed between each supply.



Wire Routing

A minimum of ¼ inch separation must be maintained between Power Limited, Non-Power Limited, and High Voltage wiring. See illustration for suggested wire routing



Reference EOL

The PSN-106 uses a standard 5.1k EOL resistor (Potter part number 3005013).

In retrofit applications where a value other than 5.1k is already in use, a reference EOL input is provided. Simply connect a matching EOL resistor to the reference EOL input. All NAC wiring will then be supervised based on this value. Any EOL value from 2.0k to 27k can be used.

If no reference EOL is connected, 5.1k is assumed.

Dip Switch Programming

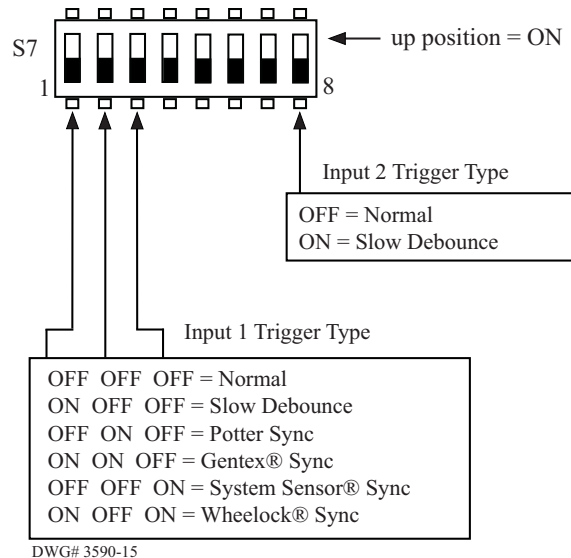
⚠ WARNING

Remove power before servicing or changing DIP switch programming selections

Input Trigger Type

(Selects the behavior of trigger inputs.)

- **Normal Trigger:** Trigger input is sampled at a high rate. Used for simple DC triggers, as well as for sync follow and pass-thru mode. A NAC configured as constant output will follow triggered and immediately activate.
- **Slow Debounce (Slow Trigger):** Allows a non-standard trigger signal to be used for activation. The slower response allows the outputs to remain active when the trigger signal is changing. This trigger will operate with ANSI Temporal Code 3.
- **Synchronization Triggers (Potter, Gentex®, Wheelock®, System Sensor®):** Used with QuadraSync to maintain synchronization of devices from different manufacturers.



Bulk Supply Options

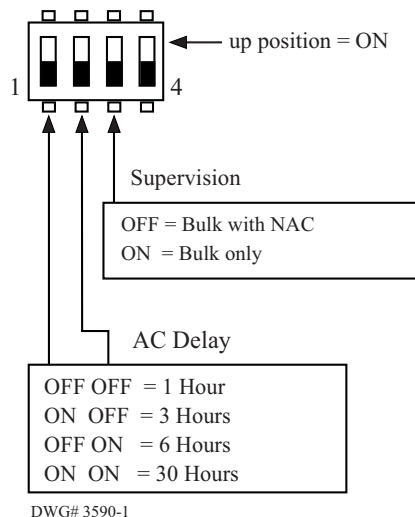
AC Report Delay:

Selects number of hours to delay before activating the general trouble relay in response to a low AC condition. Note that the Low AC relay is activated immediately.

Supervision:

This should always be in the OFF position to allow supervision of the wiring between the 24 VDC bulk supply board and the NAC control board.

NAC control board global options



Class A/B Selection

Each pair of NACs can be individually configured for class A/B operation. When class A is selected, the individual NAC options for the first NAC in the pair will apply. For example, if the circuit pair 1&2 is programmed for class A operation, then only the individual NAC option dip switch for circuit 1 will be used.

Door Holder AC Dropout delay

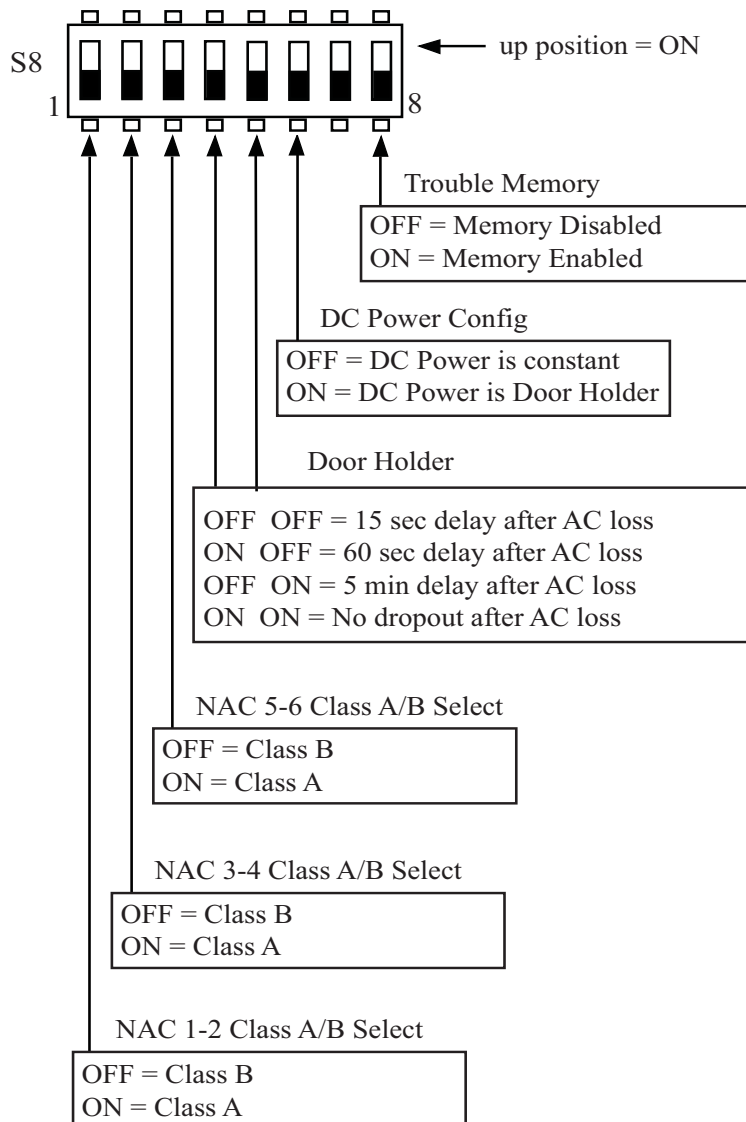
If the DC power output is used as door holder power, it can be configured to drop out in response to a low AC condition in order to minimize standby current. To minimize nuisance conditions a selectable AC dropout delay is provided. If “No doorholder dropout on AC Loss” is selected, door holder power will drop out in response to an alarm condition only.

DC Power Output is Door Holder

Specifies whether the DC power output will act as door holder power. If selected, the DC power will drop out in response to an alarm condition and optionally a low AC condition.

Trouble Memory Enabled

When enabled, any trouble conditions will be stored in memory after the condition has been corrected. Stored trouble conditions are indicated on the LED associated with the original trouble condition.



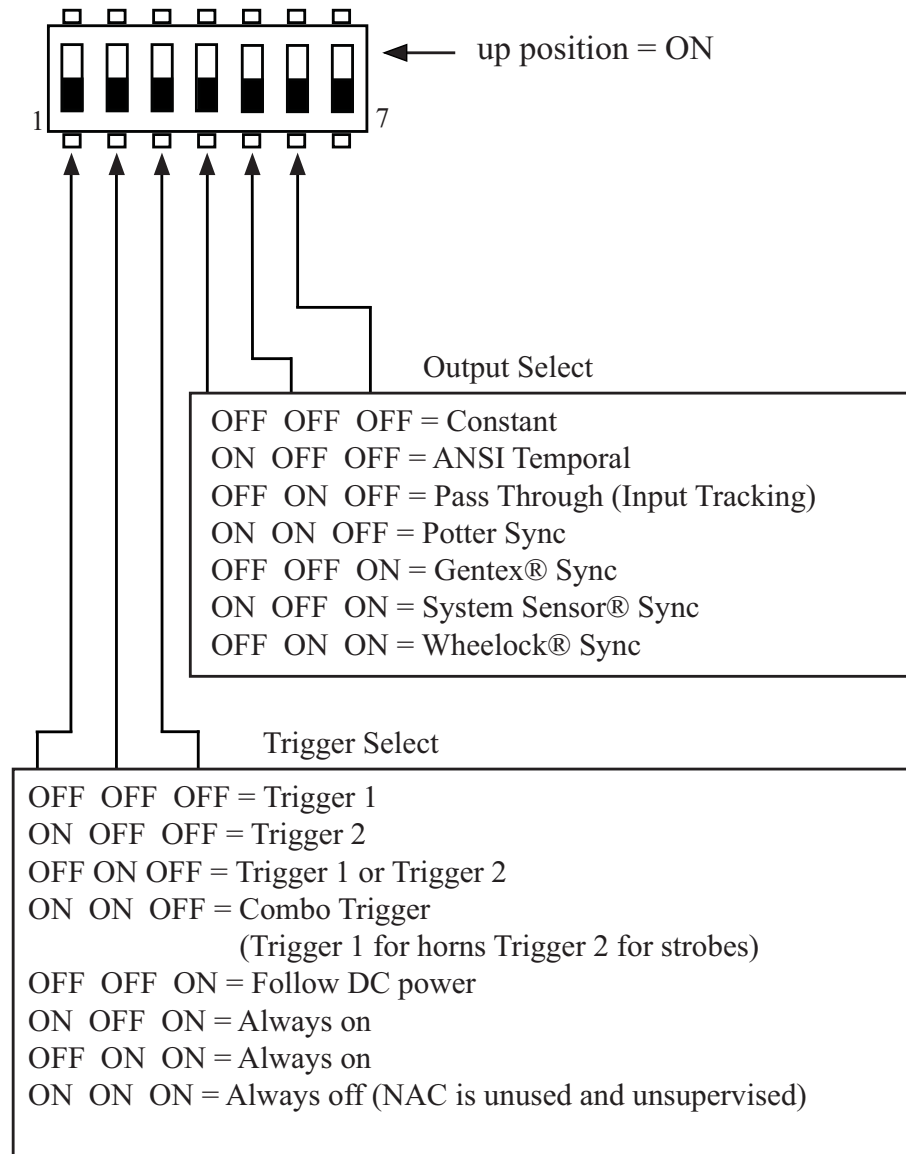
DWG# 3590-16

Individual NAC Options

Conditions for activating each NAC are individually programmed.

Trigger Selection: specifies which trigger input(s) to respond to.

- Trigger 1: NAC will activate when Trigger 1 is activated
- Trigger 2: NAC will activate when Trigger 2 is activated
- Trigger 1 or Trigger 2: NAC will activate when either Trigger 1 or Trigger 2 is activated.
- Combo: Can be used to separately control horns & strobes when used with one of the supported synchronization protocols. If Trigger 1 is present, both horns and strobes will be activated. If only Trigger 2 is present, horns will be disabled, and strobes will be activated.
- Follow DC Power: When selected, the NAC will exactly follow the activation/deactivation of the DC power output. Can be used to create additional door-holder power circuits.
- Always ON: Used to create a constant ON power output.
- Unused: NAC circuit will be unused.
- Output Selection: Specifies the output pattern to be generated when the output is activated.



DWG# 3590-11

Indicator LED Behavior

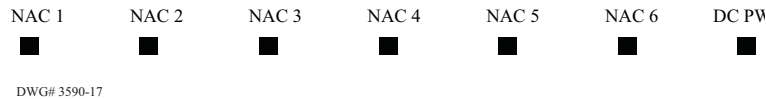
The NAC control board contains an indicator LED for each NAC circuit and a comm LED:

- NAC Led: Fast Flashing = NAC trouble (EOL missing, EOL shorted, or current limit condition)
- NAC Led: Solid or Pattern = NAC active. LED will follow pattern of NAC
- Comm: Used only to indicate supervision activity between bulk and control boards.

If the trouble memory option is enabled (Trouble Memory dip switch option on) the LEDs indicate if any previous trouble conditions are stored in memory.

Example: Suppose Trouble Memory is enabled and a NAC circuit EOL is detected as missing. While the EOL is missing, the LED associated with the NAC will flash continuously to indicate the trouble. If the EOL is replaced and the trouble condition is no longer present, the LED will begin issuing the trouble memory flash. This flash indicates that a trouble existed previously, but is no longer present. The trouble memory indication consists of two short flashes issued once per second.

Clear/reset Trouble Memory by setting the Trouble Memory dip switch off, and then back on to enable the feature.



The bulk supply board contains four indicator LEDs:

- AC Power: ON = AC Present, OFF = AC not present).
- Low Battery: Fast Flashing = Low battery condition. ON = Battery Charger Failure
- Earth Ground Fault: Flashing = Earth fault detected.
- Comm: Used only to indicate supervision activity between bulk and control boards (about one per second).

- — AC Power
- — Low Battery
- — Gnd Fault
- — Comm

DWG# 3590-18

Battery Calculation Worksheet

Standby current for the PSN-106 is 75 milli-amps.

Secondary Power Supply Requirements Table

Service Use	Standby Time	Alarm Time
NFPA 72 - Central Station (PPU) - Local	24 hours 24 hours	5 minutes 5 minutes

Calculation Table

1	2	3	4	5	6
Module/Device	Quantity	Standby mA Per Unit	Total Standby Current	Alarm mA Per Unit	Total Alarm Current
PSN-106	1	75	75	75	75
Total mA				Total mA	
Convert to A			x 0.001	Convert to A	x 0.001
(* Refer to Maximum allowable standby current)Total A				Total A	
Multiply by hours			x ____	5 min/12 or 10 min/6	÷ ____
Total Standby AH				Total Alarm AH	
				+ Total Standby AH	
				Total AH	
				Efficiency Factor	÷ 0.85
				Required AH	

Use a battery with a higher AH rating than Required AH

*** Maximum Allowable Standby Current (24-hour standby time)**

Battery Size	UL 24-hour	ULC 24-hour
7 AH	.213 Amps	.213 Amps
18 AH	.603 Amps	.603 Amps
33 AH	1.134 Amps	.603 Amps
55 AH	1.913 Amps	.603 Amps

This page intentionally left blank

Section 2: PSN-64

Installation, Operation, and Instruction Manual

Notification Power Supplies

(All specifications subject to revision.)

WARNING

The fire alarm system employing this power supply must be designed by people trained and competent in the design and layout of fire alarm systems. The system shall be designed and installed in accordance with all local and national codes and ordinances as well as the approval of the Authority Having Jurisdiction. Only trained, qualified and competent individuals should install, program and/or service the POTTER FIRE POWER SUPPLY. Competent people would be aware of these warnings, limitations, and requirements.

High voltage electrocution hazard. Do not handle live AC wiring or work on the device while AC power is active.

This manual is designed to help with the specification, installation, and programming of the POTTER FIRE POWER SUPPLY. It is imperative that this manual be completely read and understood before the installation or programming of the power supply. Save this manual for future reference.

General Description

The Potter PSN series of power supplies is designed to provide the power and flexibility needed for the most demanding fire system installations. The PSN-64 is a 6 Amp 24VDC switch mode power supply design which is up to 50% more efficient than linear mode supplies the PSN series is your best choice for powering fire system notification appliances and accessories. New and retrofit construction requirements for ADA compliance are easily accomplished with ample power for additional notification appliances along with the ability to synchronize the notification appliances using built in sync generation for Potter, System Sensor®, Gentex® and Wheelock® notification appliances. The PSN series goes even further to make retrofits easier with the advanced QuadraSync feature which allows notification appliances from different manufacturers to sync with each other. You also have the option to monitor an existing circuit by placing a reference resistor of the same value on the power supply and continuing to monitor the circuit without changing the field EOL.

System Features

- Input voltage: 120/240VAC 50/60Hz
- Output voltage 24VDC @ 6A
- Four class “B” initiating circuits on the PSN-64
 - Rated at 3 amps max each
 - Can be configured as up to two class “A” Style “Z” notification circuits
- Supervised Battery Charger: 27.3 @ 1A (supports 7-55 Ahr batteries)
- Integrated battery cut-off circuitry to protect batteries from deep discharge
- Two Trouble Relays (5A at 30VDC)
 - General System Trouble (programmable for AC delay via dip-switch)
 - Low AC Trouble
- Diagnostic LED’s
 - Status LED’s for Active NAC and NAC trouble conditions
 - Status LED’s for Earth Fault (Amber), AC (Green), Battery Fault (Amber)
 - Trouble Memory feature captures troubles which have previously restored.
- Synchronized notification appliance circuits
 - Potter
 - Wheelock®
 - Gentex®
 - System Sensor®
- Configurable output circuits (D.I.P. switch sets options for each circuit)
 - ANSI temporal-coded
 - Constant Power
 - Door-Holder Power
- Separate DC Power Output (3A)
- Two Trigger Inputs (Class A, Style Z or Class B, Style Y)
- Reference EOL terminals, allows 2K – 27K EOL value to be used
- QuadraSync panel wide synchronization of same or multiple brands.
- PassThru mode copies input signals to output (can be used in conjunction with QuadraSync)

Mounting Instructions

The standard mounting is a surface mount cabinet. The unit must be securely attached to a permanent partition using suitable fasteners. Five mounting holes are provided to accept ¼ inch diameter screws maximum. There are seven knockouts provided.

Operating Instructions

Alarm Condition

Notification Appliance Circuit:

Alarm devices operate in unison with the Trigger inputs from the main Fire Alarm Control Panel (FACP). When activated by the corresponding trigger input the associated Notification Appliance Circuit (NAC) will reverse polarity from a supervision state to the alarm state and supply power to the associated notification appliances until the trigger is removed. Each activated NAC will also power the L.E.D. associated with it, the L.E.D. will follow the steady or pulsing state of the NAC. The alarm-activated outputs are reset through the operation of the reset function of the Main FACP.

*Trouble Condition***NOTICE**

If the trouble memory feature has been enabled the L.E.D. will provide two brief pulses every second to indicate a trouble condition has occurred but is now restored. This can be useful when troubleshooting brief trouble conditions that come and go over a period of time.

Notification Appliance Circuit:

If a trouble occurs on a NAC the associated L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

DC Power Circuit:

If a trouble occurs on the DC Power output the DC Power L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

AC:

When the Power supply detects the A.C. power input has fallen below an acceptable level the AC Power L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type and after a programmed delay the Low AC relay will also activate. When the trouble condition has been restored the L.E.D. and trouble relays will return to their normal state. (See notice.)

Low Battery:

When the Power supply detects the Battery is no longer functioning properly the Low Battery L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

Ground Fault:

When the Power supply detects a ground Fault condition which indicates a short between the Power Supply ground and the Earth Ground circuits the Ground Fault L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

Communication Trouble:

If the Bulk Power Supply and Control Board loose communication with each other the Comm L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

*Standby Operation***Notification Appliance Circuit:**

When in standby operation the NAC will be in the reversed supervision polarity and the associated L.E.D. will be off.

Exception: When the NAC is programmed to be an DC Power Output the associated L.E.D. will be on during normal standby operation.

DC Power Circuit:

When in standby operation the DC Power Circuit will be on and the DC Power L.E.D. will be illuminated.

AC:

When in normal operation the AC Power L.E.D. will be on steady.

Low Battery:

When in normal operation the Low Battery L.E.D. will be off.

Ground Fault:

When in normal operation the Ground Fault L.E.D. will be off

Communication

When in normal operation the Comm L.E.D. will flash occasionally to indicate normal communication traffic is occurring.

Testing and Maintenance

System Testing should be performed periodically to insure proper operation.

Test the indicating circuits by initiating an alarm or test at the Main FACP.

Test for proper operation by actuating the notification appliance circuit the PSN-64 is monitoring.

Standby batteries and AC transfer are tested by interrupting the AC power line while an alarm condition exists.

Battery Maintenance

The PSN-64 should be tested at least once a year for proper operation as follows:

Output Voltage Test: Under normal load conditions, the DC Power output voltage should be checked for proper voltage level. Refer to the Power Supply Output Specifications Chart).

Battery Test: Under normal load conditions, check that the battery is fully charged. Check specific voltage both at the battery terminal and at the board terminals marked [+BAT-] to ensure there is no break in the battery connection wires.

Note: Maximum charging current is 1 amp.

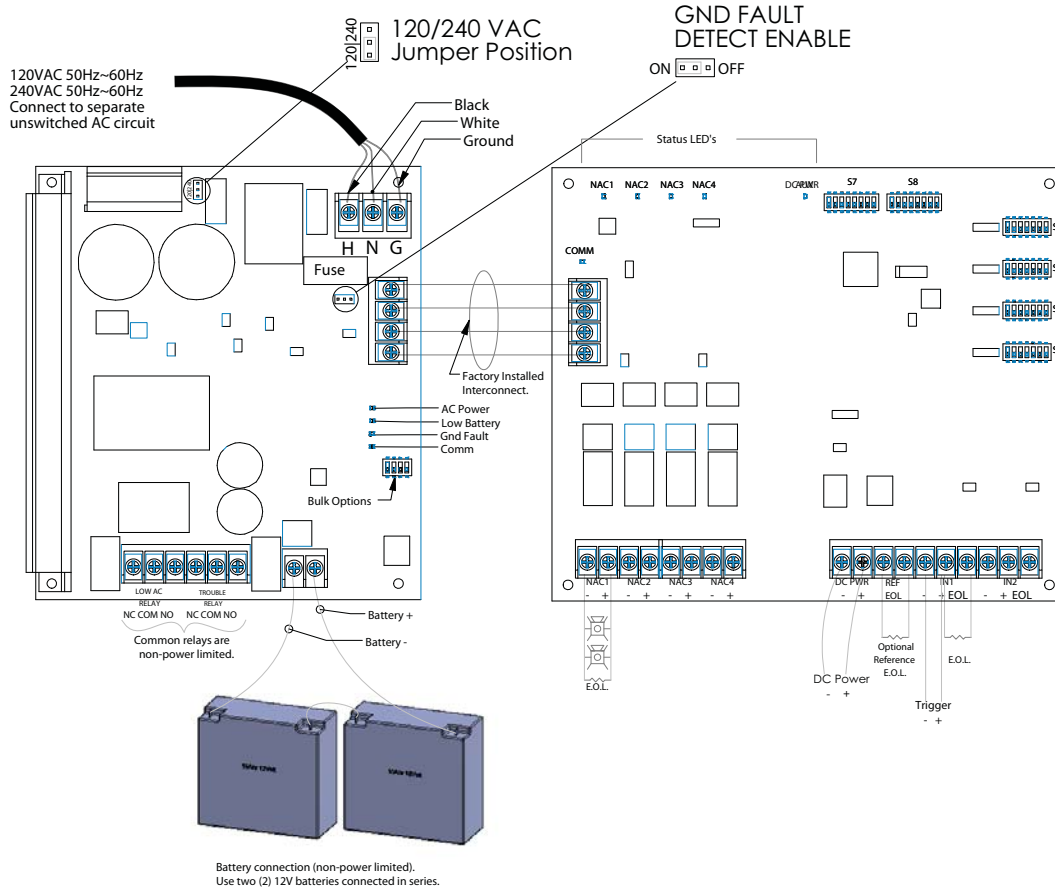
Note: Expected battery life is 5 years; however it is recommended changing batteries in 4 years or less if needed.

Electrical Operating Characteristics

Input Voltage	120 VAC @ 5.1 Amps or 240 VAC @ 2.5 Amps (Jumper selected) 50/60 Hz
Input Trigger	8 VDC to 33 VDC (15 ma) filtered or full wave rectified. Polarity reversal or continuous voltage
Output Voltage	24 VDC @ 6 Amps
Notification Outputs	24 VDC 3.0 Amps Maximum, Polarity Reversal
DC Power	3.0 Amps
Total System Current	PSN-64 = 6 Amps (total system load from all output circuits must not exceed 6 amps total)

The system uses a "Sealed Lead Acid" or "Gel-Cell" type of battery with a capacity of from 7 to 55 amp-hours. Fuse must be replaced with same size and rating (8A-250VAC, Time Lag).

Notification Power Supply



Primary AC

120VAC 50Hz~60Hz, 5.1AMP
 Min Low AC Detect 97VAC
 240VAC 50~60Hz 2.5AMP
 Min Low AC Detect 190VAC

Common Relays

3A @ 125VAC (Resistive)
 3A @ 30VDC (Resistive)

Battery Charging

27.3VDC @ 1 A
 Low Battery Detect @20.4VDC

Earth Fault to Any Terminal

0 Ohms

Notification Appliance Circuits 1-4

27.3VDC @3A Power Limited
 Regulated
 Synchronization supported on NAC 1-4

DC Power Circuit

20.4VDC - 27.3VDC @3A Power Limited
 Special Application RSG-DH1224
 Listed Door Holder

Fuse Specification

8A-250VAC Time-Lag

Note: Total current draw from NAC 1-4 and DC Power must not exceed 6 amps.

F.C.C.

This device has been verified to comply with FCC Rules Part 15, Class A Operation is subject to the following conditions:

1. This device may not cause radio interference.
2. This device must accept any interference received including any that may cause undesired operation.

Requirements

System must be fully tested after installation.
 Intended for indoor use in dry locations only.
 Separation of power limited wiring from non-power limited wiring must be at least 1/4".

For proper operation the voltage drop to the farthest connected device must not exceed 3 volts. This can be calculated using the following formula:

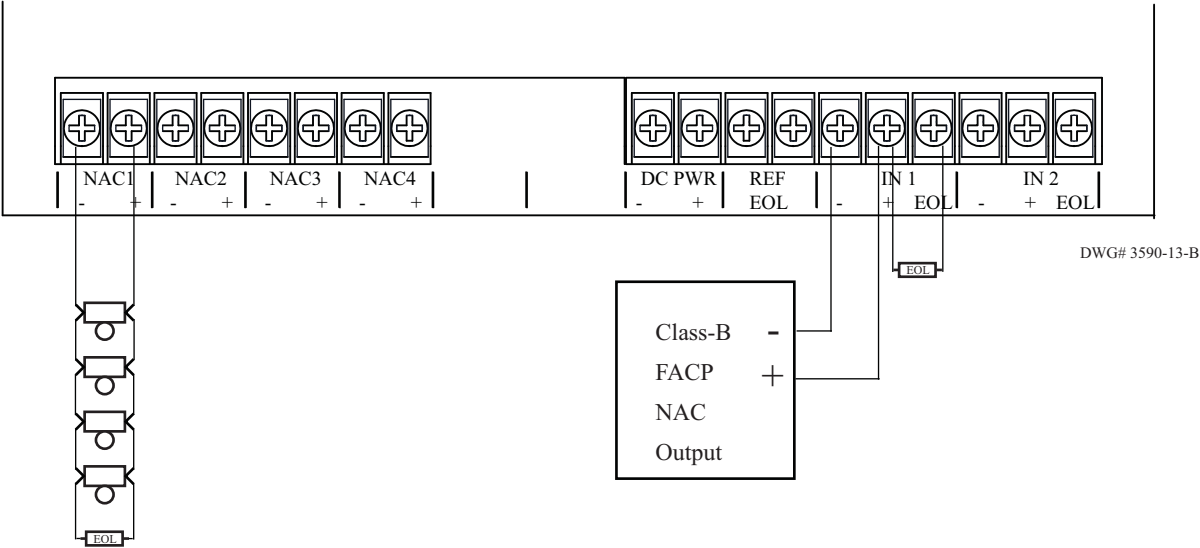
$$\frac{(\text{Alarm Current of Notification Appliances}) \times (\text{Wire Resistance})}{< 3 \text{ volts}}$$

Install in accordance with installation manual Part Number 5403590 Rev A, NFPA 70, and NFPA 72

Wiring Options

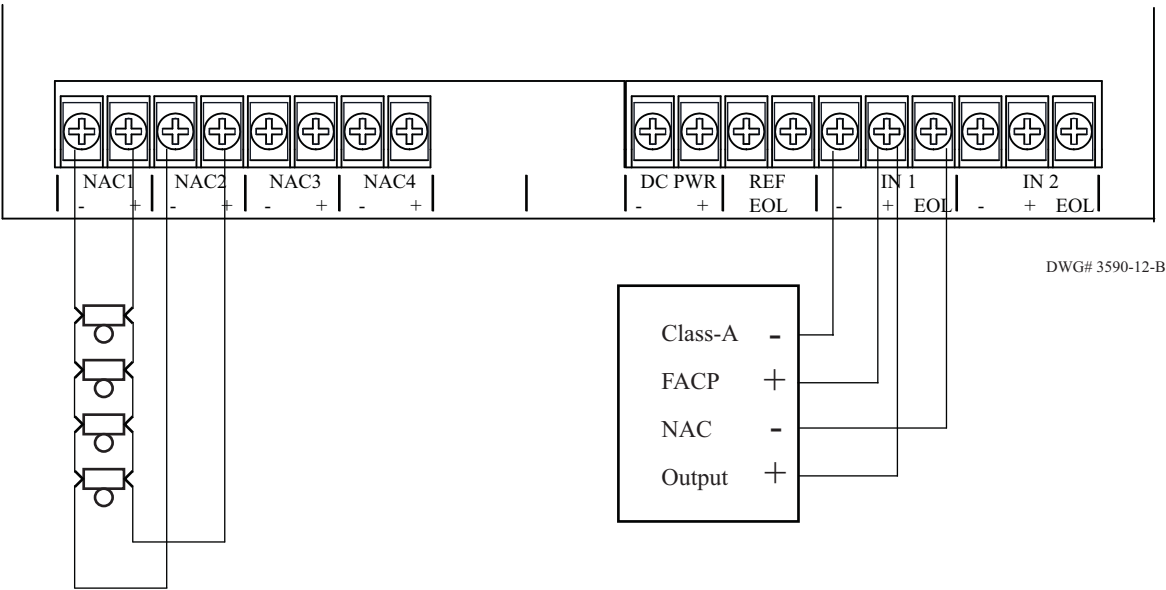
Class B Trigger and Class B Notification Circuit Trigger

Class B Style Y Trigger and Class B Style Y Notification Circuit Trigger inputs IN1 & IN2 can be connected to a Class B Style Y NAC trigger circuit as shown below. The PSN-64 provides 4 Class B Style Y NAC circuits, each rated for 3 amps. The PSN-64 provides 4 Class B Style Y NAC circuits, each rated at 3 amps. Each NAC circuit is individually selectable for Class A Style Z/ Class B Style Y operation, refer to the Dip Switch Programming section for information on dip switch programming.



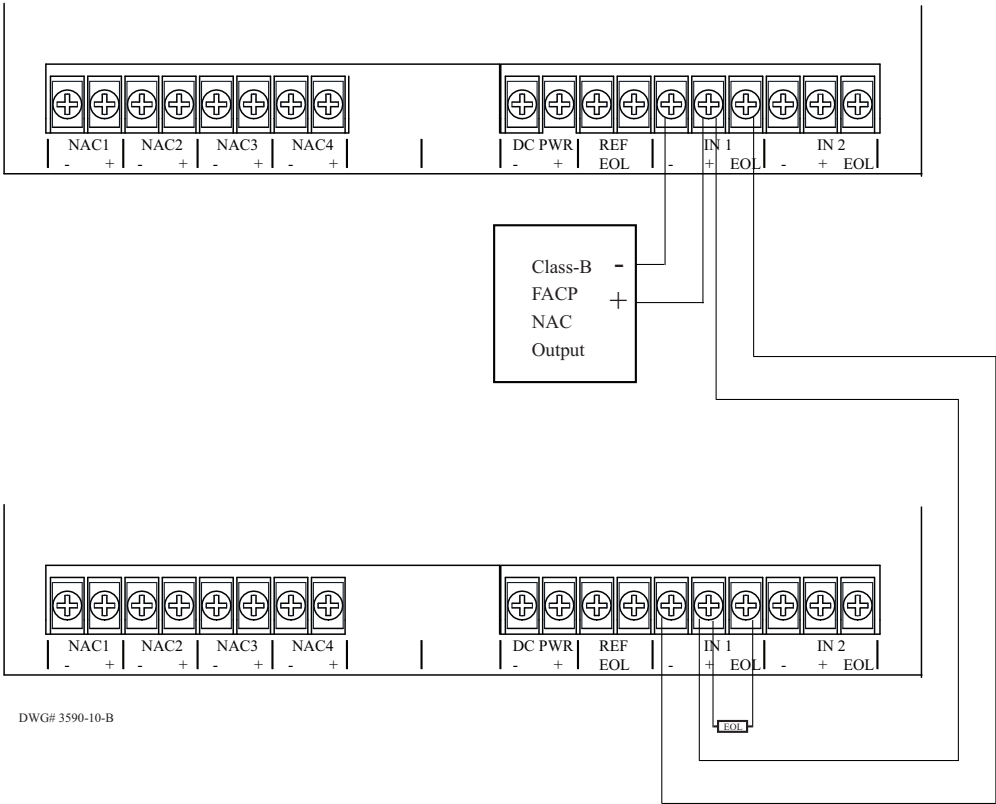
Class A Trigger and Class A Notification Circuit

Trigger inputs IN1 & IN2 can be connected to a class A NAC trigger circuit as shown below. The PSN-64 provides 3 Class A Style Z NAC circuits, each rated for 3 amps. The PSN-64 provides 4 Class B Style Y NAC circuits, each rated at 3 amps. Each NAC circuit is individually selectable for Class A Style Z/Class B Style Y operation, refer to the Dip Switch Programming section for information on dip switch programming.



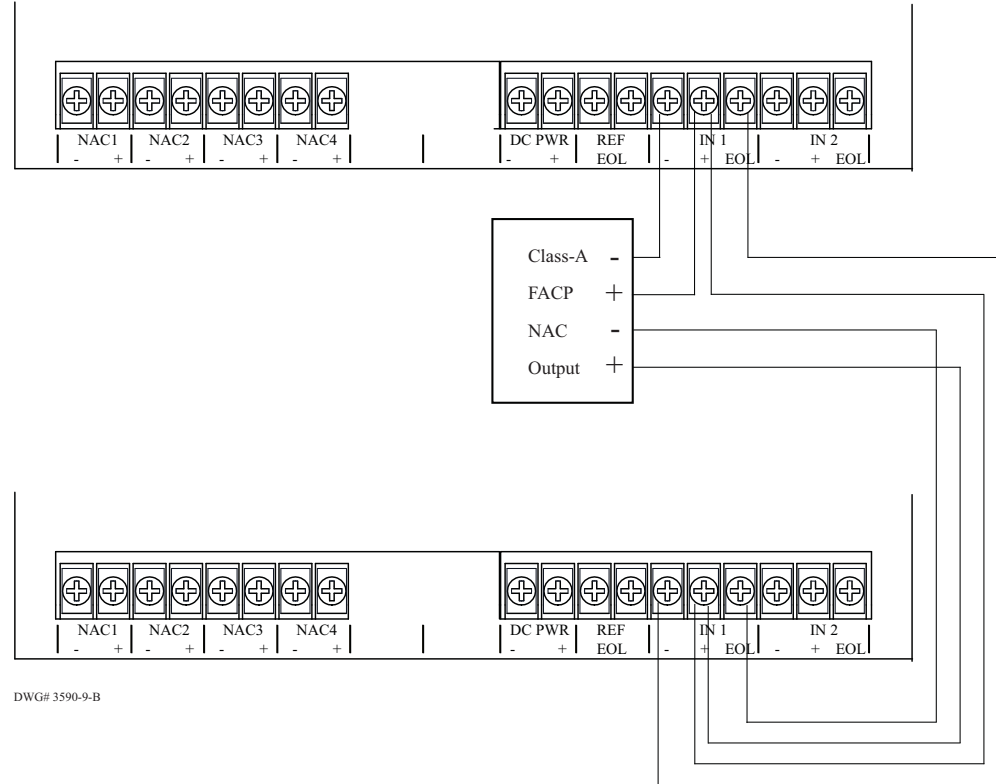
Class B - Multiple Supply Trigger

A single Class B Style Y trigger can be used to activate multiple supplies as shown below. The EOL resistor is located on the last supply in the chain. The minimum wire gauge between supplies is 18 AWG. A maximum wiring distance of 10,000 feet is allowed from the triggering FACP and the last supply in the chain.



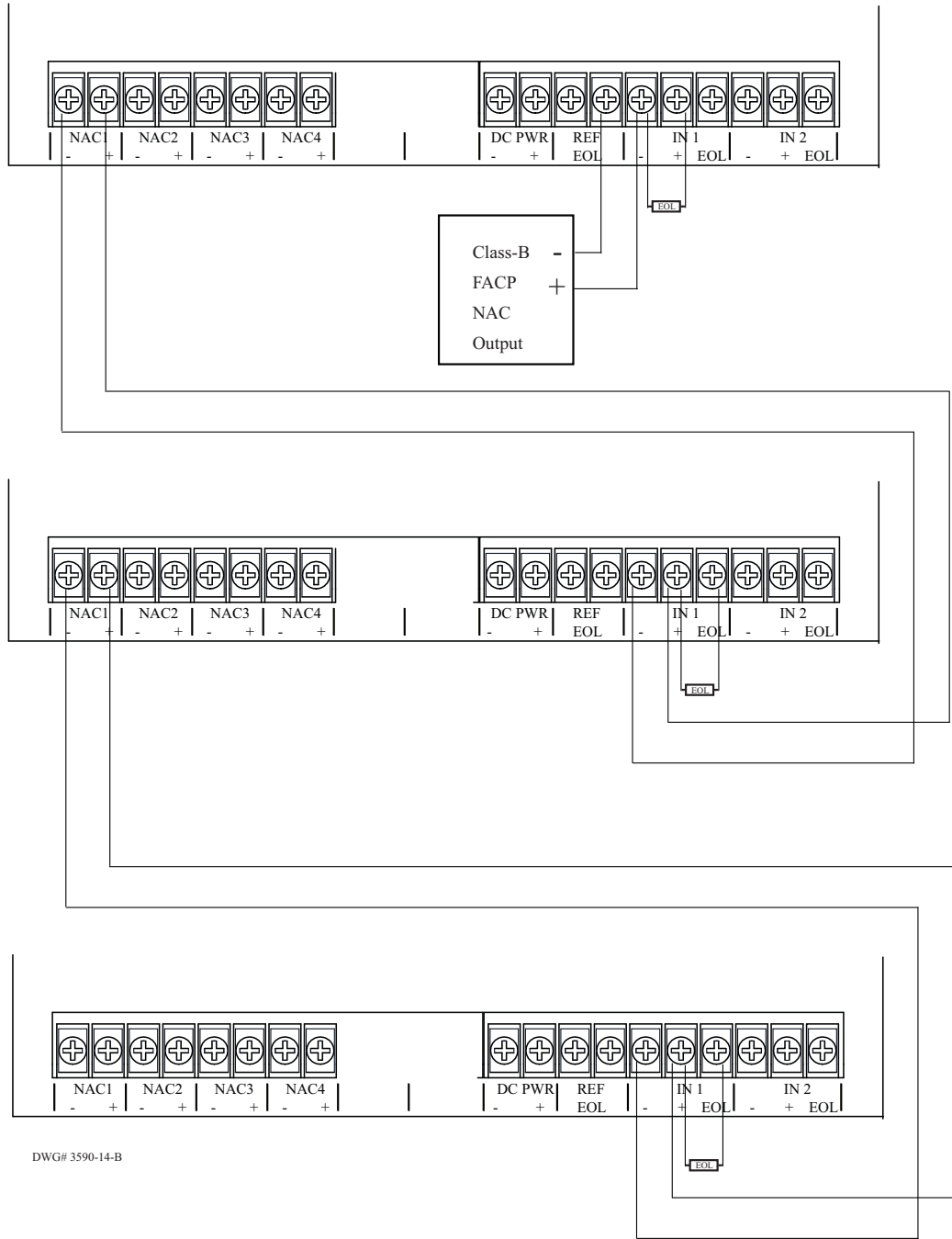
Class A - Multiple Supply Trigger

A single Class A Style Z trigger can be used to activate multiple supplies as shown below. The minimum wire gauge between supplies is 18 AWG. A total wiring distance of 10,000 feet is allowed from the triggering FACP to the last supply in the chain (including the return wiring).



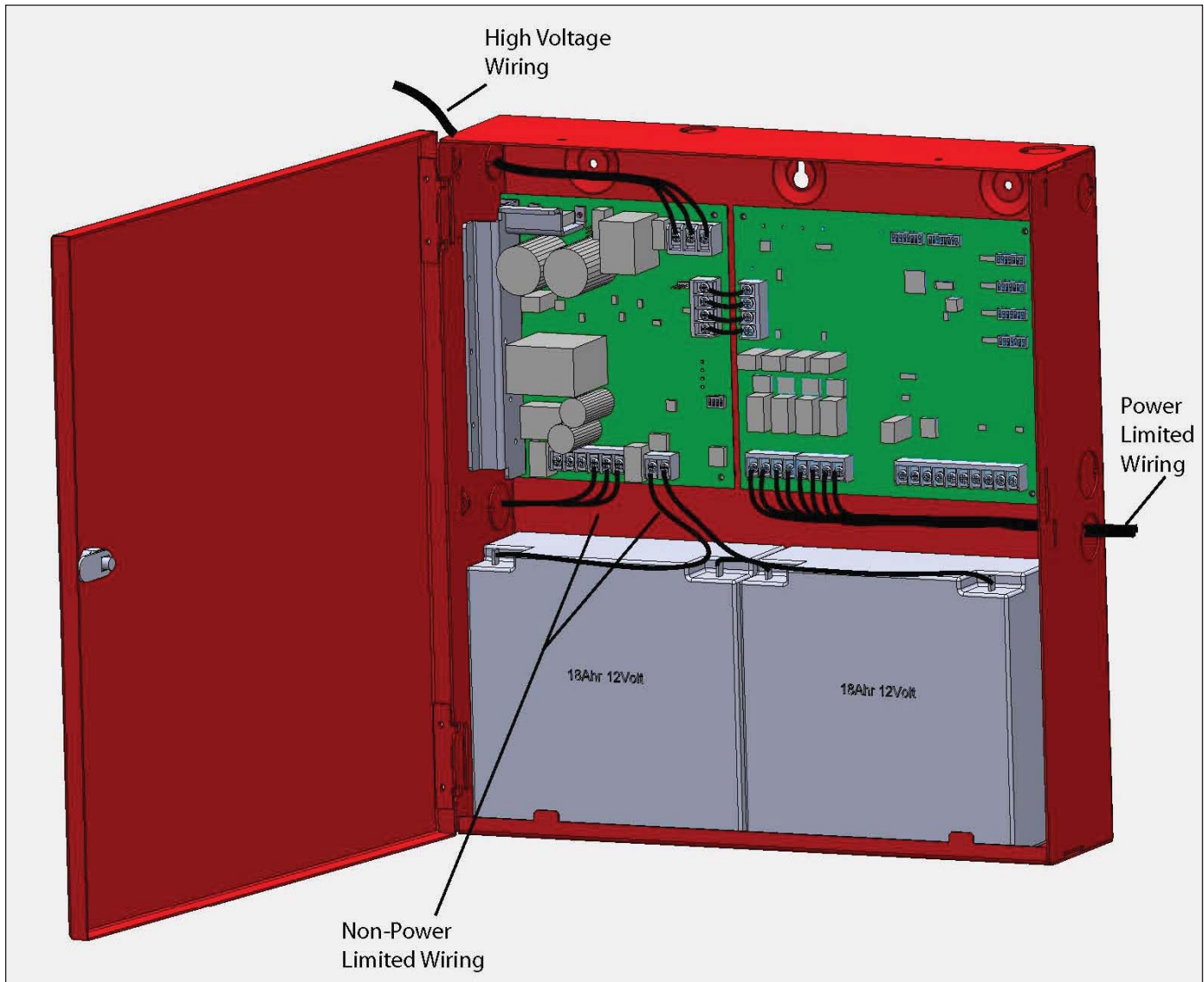
Pass Thru Mode

The NAC output of the PSN-64 can be used to trigger additional supplies. Up to 3 supplies maximum can be configured in this manner. Full system synchronization is maintained. The minimum wire gauge between supplies is 18 AWG. A maximum wiring distance of 10,000 feet is allowed between each supply.



Wire Routing

A minimum of ¼ inch separation must be maintained between Power Limited, Non-Power Limited, and High Voltage wiring. See illustration for suggested wire routing



Reference EOL

The PSN-64 uses a standard 5.1k EOL resistor (Potter part number 3005013).

In retrofit applications where a value other than 5.1k is already in use, a reference EOL input is provided. Simply connect a matching EOL resistor to the reference EOL input. All NAC wiring will then be supervised based on this value. Any EOL value from 2.0k to 27k can be used.

If no reference EOL is connected, 5.1k is assumed.

Dip Switch Programming

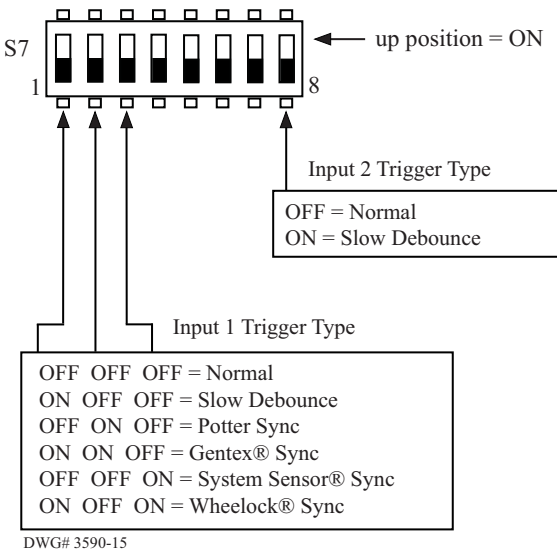
WARNING

Remove power before servicing or changing DIP switch programming selections

Input Trigger Type

(Selects the behavior of trigger inputs.)

- **Normal Trigger:** Trigger input is sampled at a high rate. Used for simple DC Power triggers, as well as for sync follow and pass-thru mode. A NAC configured as constant output will follow triggered and immediately activate.
- **Slow Debounce (Slow Trigger):** Allows a non-standard trigger signal to be used for activation. The slower response allows the outputs to remain active when the trigger signal is changing. This trigger will operate with ANSI Temporal Code 3.
- **Synchronization Triggers (Potter, Gentex®, Wheelock®, System Sensor®):** Used with QuadraSync to maintain synchronization of devices from different manufacturers.



Bulk Supply Options

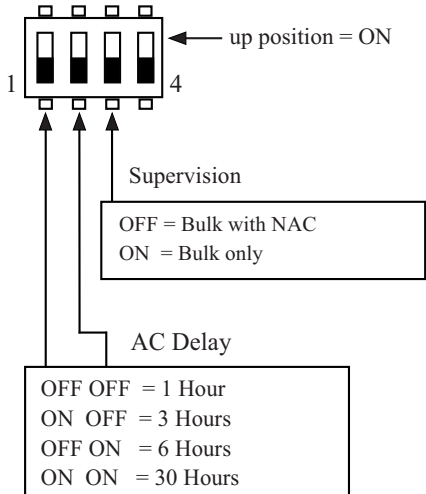
AC Report Delay:

Selects number of hours to delay before activating the general trouble relay in response to a low AC condition. Note that the Low AC relay is activated immediately.

Supervision:

This should always be in the OFF position to allow supervision of the wiring between the 24 VDC bulk supply board and the NAC control board.

NAC control board global options



Class A/B Selection

Each pair of NACs can be individually configured for class A/B operation. When class A is selected, the individual NAC options for the first NAC in the pair will apply. For example, is the circuit pair 1&2 is programmed for class A operation, then only the individual NAC option dip switch for circuit 1 will be used.

Door Holder AC Dropout delay

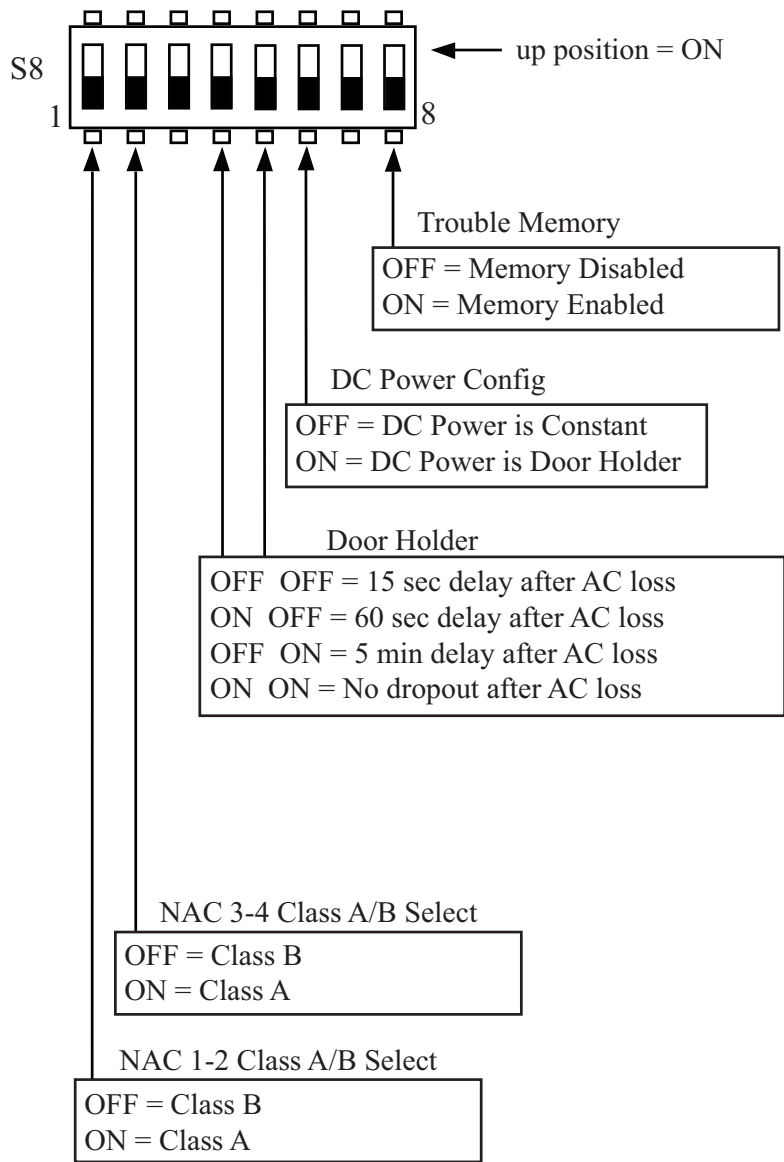
If the DC power output is used as door holder power, it can be configured to drop out in response to a low AC condition in order to minimize standby current. To minimize nuisance conditions a selectable AC dropout delay is provided. If “No doorholder dropout on AC Loss” is selected, door holder power will drop out in response to an alarm condition only.

DC Output is Door Holder

Specifies whether the DC power output will act as door holder power. If selected, the DC power will drop out in response to an alarm condition and optionally a low AC condition.

Trouble Memory Enabled

When enabled, any trouble conditions will be stored in memory after the condition has been corrected. Stored trouble conditions are indicated on the LED associated with the original trouble condition.



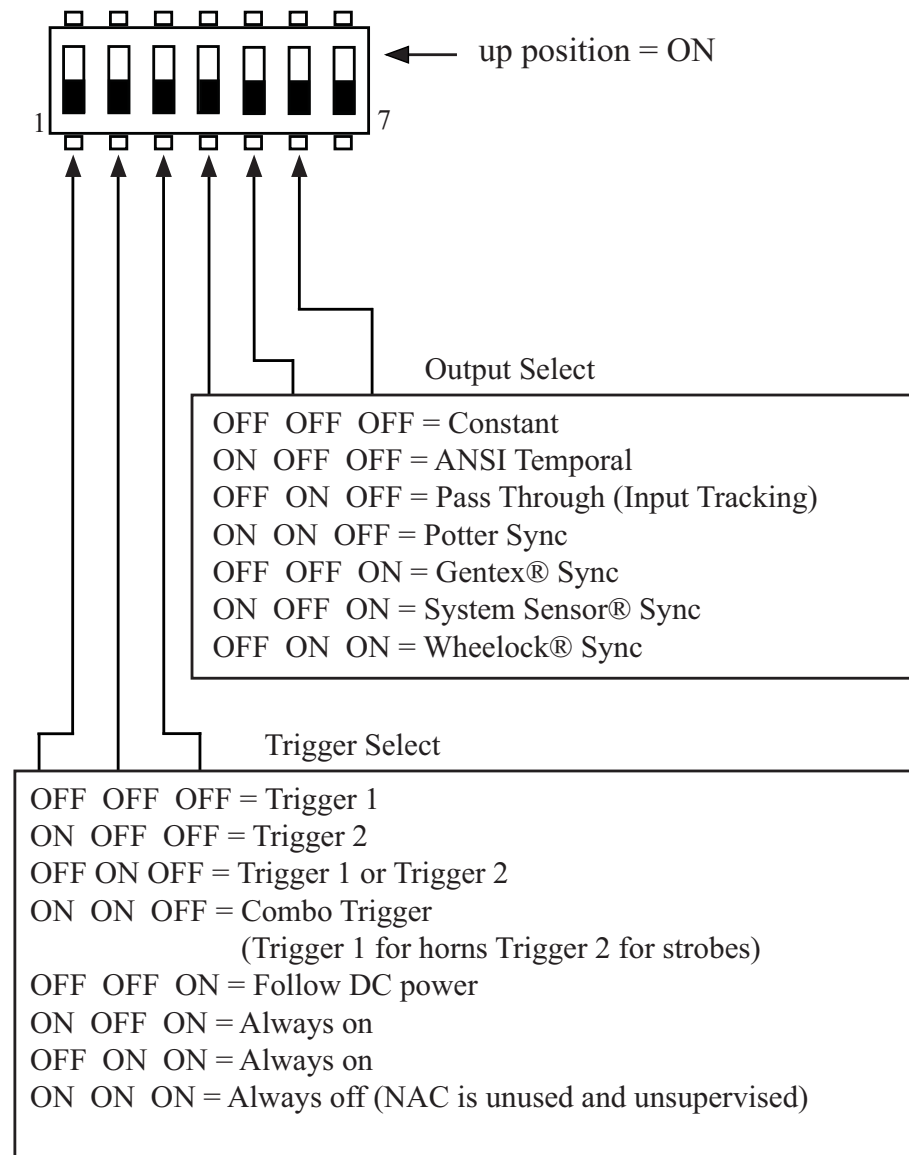
DWG# 3590-16-B

Individual NAC Options

Conditions for activating each NAC are individually programmed.

Trigger Selection: specifies which trigger input(s) to respond to.

- Trigger 1: NAC will activate when Trigger 1 is activated
- Trigger 2: NAC will activate when Trigger 2 is activated
- Trigger 1 or Trigger 2: NAC will activate when either Trigger 1 or Trigger 2 is activated.
- Combo: Can be used to separately control horns & strobes when used with one of the supported synchronization protocols. If Trigger 1 is present, both horns and strobes will be activated. If only Trigger 2 is present, horns will be disabled, and strobes will be activated.
- Follow DC Power: When selected, the NAC will exactly follow the activation/deactivation of the DC power output. Can be used to create additional door-holder power circuits.
- Always ON: Used to create a constant ON power output.
- Unused: NAC circuit will be unused.
- Output Selection: Specifies the output pattern to be generated when the output is activated.



DWG# 3590-11

Indicator LED Behavior

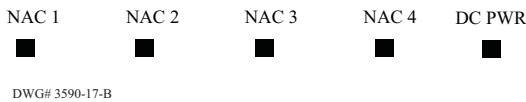
The NAC control board contains an indicator LED for each NAC circuit and a comm LED:

- NAC Led: Fast Flashing = NAC trouble (EOL missing, EOL shorted, or current limit condition)
- NAC Led: Solid or Pattern = NAC active. LED will follow pattern of NAC
- Comm: Used only to indicate supervision activity between bulk and control boards.

If the trouble memory option is enabled (Trouble Memory dip switch option on) the LEDs indicate if any previous trouble conditions are stored in memory.

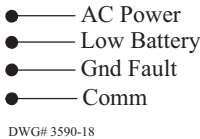
Example: Suppose Trouble Memory is enabled and a NAC circuit EOL is detected as missing. While the EOL is missing, the LED associated with the NAC will flash continuously to indicate the trouble. If the EOL is replaced and the trouble condition is no longer present, the LED will begin issuing the trouble memory flash. This flash indicates that a trouble existed previously, but is no longer present. The trouble memory indication consists of two short flashes issued once per second.

Clear/reset Trouble Memory by setting the Trouble Memory dip switch off, and then back on to enable the feature.



The bulk supply board contains four indicator LEDs:

- AC Power: ON = AC Present, OFF = AC not present).
- Low Battery: Fast Flashing = Low battery condition. ON = Battery Charger Failure
- Earth Ground Fault: Flashing = Earth fault detected.
- Comm: Used only to indicate supervision activity between bulk and control boards (about one per second).



Battery Calculation Worksheet

Standby current for the PSN-64 is 75 milli-amps.

Secondary Power Supply Requirements Table

Service Use	Standby Time	Alarm Time
NFPA 72 - Central Station (PPU) - Local	24 hours 24 hours	5 minutes 5 minutes

Calculation Table

1	2	3	4	5	6
Module/Device	Quantity	Standby mA Per Unit	Total Standby Current	Alarm mA Per Unit	Total Alarm Current
PSN-64	1	75	75	75	75
Total mA				Total mA	
Convert to A			x 0.001	Convert to A	x 0.001
(* Refer to Maximum allowable standby current)Total A				Total A	
Multiply by hours			x ____	5 min/12 or 10 min/6	÷ ____
Total Standby AH				Total Alarm AH	
				+ Total Standby AH	
				Total AH	
				Efficiency Factor	÷ 0.85
				Required AH	

Use a battery with a higher AH rating than Required AH

* Maximum Allowable Standby Current (24-hour standby time)

Battery Size	UL 24-hour	ULC 24-hour
7 AH	.213 Amps	.213 Amps
18 AH	.603 Amps	.603 Amps
33 AH	1.134 Amps	.603 Amps
55 AH	1.913 Amps	.603 Amps

This page intentionally left blank

Section 3: PSB-10

Installation, Operation, and Instruction Manual

Bulk Power Supplies

(All specifications subject to revision.)

 WARNING

The fire alarm system employing this power supply must be designed by people trained and competent in the design and layout of fire alarm systems. The system shall be designed and installed in accordance with all local and national codes and ordinances as well as the approval of the Authority Having Jurisdiction. Only trained, qualified and competent individuals should install, program and/or service the POTTER FIRE POWER SUPPLY. Competent people would be aware of these warnings, limitations, and requirements.

High voltage electrocution hazard. Do not handle live AC wiring or work on the device while AC power is active.

This manual is designed to help with the specification, installation, and programming of the POTTER FIRE POWER SUPPLY. It is imperative that this manual be completely read and understood before the installation or programming of the power supply. Save this manual for future reference.

General Description

The Potter PSB series of Bulk power supplies provides continuous power to devices which require 24VDC power. The PSB supply features an efficient switch mode power supply design which is up to 50% more efficient than linear mode supplies. The PSB is used whenever power is needed to power a device which requires up to 10 amps continuously (PSB-10), which is best accomplished by mounting the PSB near the load being serviced, this minimizes voltage drops caused by long cable lengths. Backup power is provided via batteries which can range in size from 7-55 Ahr (17Ahr in cabinet, larger batteries require accessory battery box). Battery integrity is monitored via the built in charger which features a low battery cut-off circuit to protect against damage to the batteries during deep discharge.

Product Features

- Input voltage: 120/240VAC 50/60Hz
- Output voltage 27.3VDC @10A
- Supervised Battery Charger: 27.3 @ 1A (supports 7-55 Ahr batteries)
- Integrated battery cut-off circuitry to protect batteries from deep discharge
- Two Common Trouble Relays (5A at 30VDC)
 - General System Trouble (programmable for AC delay via dip-switch)
 - Low AC Trouble
- Diagnostic LED's
 - Status LED's for Active NAC and NAC trouble conditions
 - Status LED's for Earth Fault (Amber), AC (Green), Battery Fault (Amber)
- Trouble Memory feature captures troubles which have previously restored.

Mounting Instructions

The standard mounting is a surface mount cabinet. The unit must be securely attached to a permanent partition using suitable fasteners. Five mounting holes are provided to accept ¼ inch diameter screws maximum. There are seven knockouts provided.

Operating Instructions

Normal Operation

The PSB-10 provides constant power to the devices which are connected to it. In the event of a loss of AC the PSB-10 will switch to battery backup and indicate a trouble condition.

Trouble Condition

NOTICE

If the trouble memory feature has been enabled the L.E.D. will provide two brief pulses every second to indicate a trouble condition has occurred but is now restored. This can be useful when troubleshooting brief trouble conditions that come and go over a period of time.

AC:

When the Power supply detects the A.C. power input has fallen below an acceptable level the AC Power L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type and after a programmed delay the Low AC relay will also activate. When the trouble condition has been restored the L.E.D. and trouble relays will return to their normal state. (See notice.)

Low Battery:

When the Power supply detects the Battery is no longer functioning properly the Low Battery L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

Ground Fault:

When the Power supply detects a ground Fault condition which indicates a short between the Power Supply ground and the Earth Ground circuits the Ground Fault L.E.D. will flash at a 50% rate to indicate a trouble condition, the trouble relay will also activate during a trouble condition of this type. When the trouble condition has been restored the L.E.D. and trouble relay will return to their normal state. (See notice.)

Testing and Maintenance

System Testing should be performed periodically to insure proper operation.

Standby batteries and AC transfer are tested by interrupting the AC power line while an alarm condition exists.

Battery Maintenance

The PSB-10 should be tested at least once a year for proper operation as follows:

Output Voltage Test: Under normal load conditions, the DC output voltage should be checked for proper voltage level. Refer to the Power Supply Output Specifications Chart).

Battery Test: Under normal load conditions, check that the battery is fully charged. Check specific voltage both at the battery terminal and at the board terminals marked [+BAT-] to ensure there is no break in the battery connection wires.

Note: Maximum charging current is 1 amp.

Note: Expected battery life is 5 years; however it is recommended changing batteries in 4 years or less if needed.

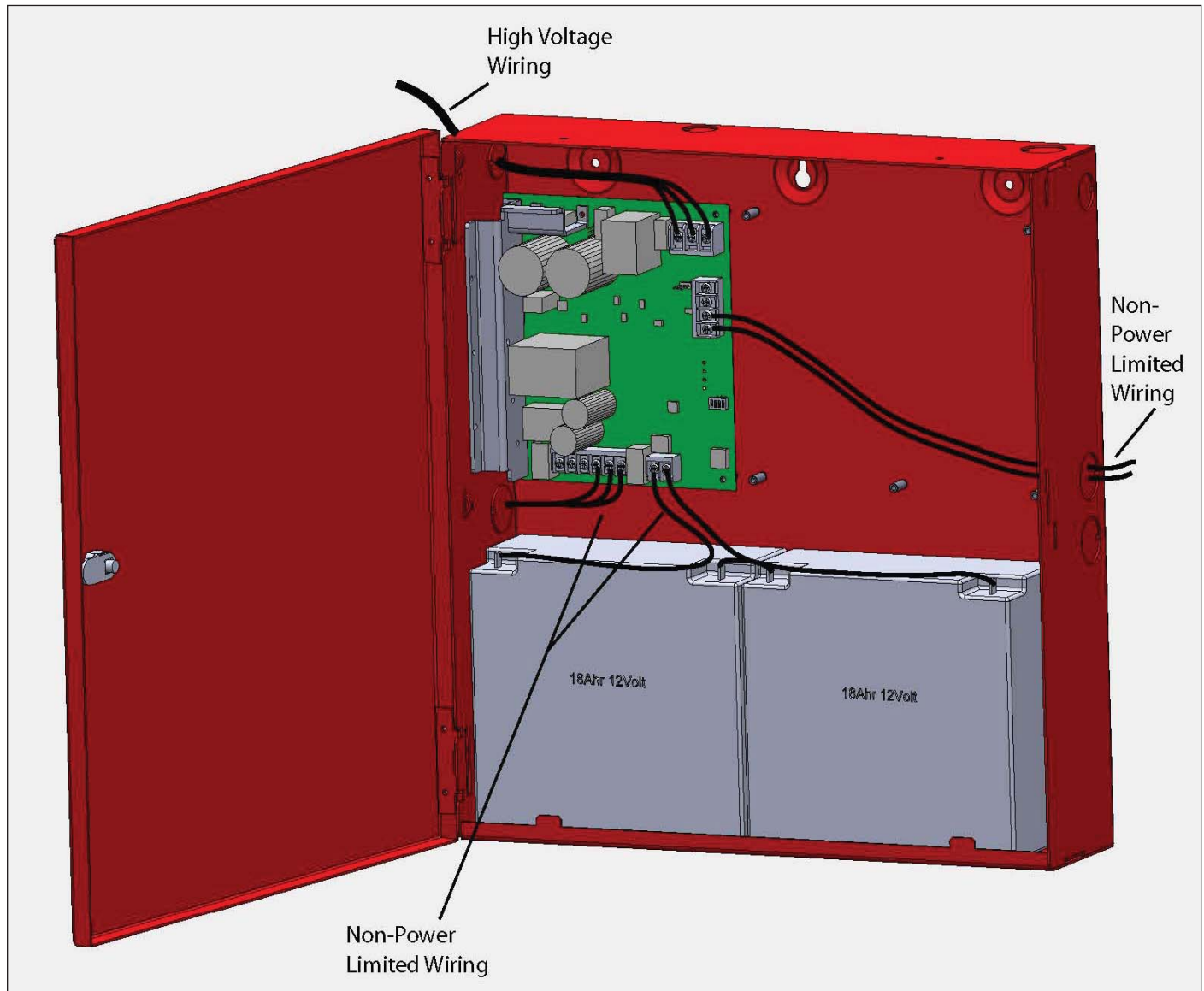
Electrical Operating Characteristics

Input Voltage	120 VAC @ 5.1 Amps or 240 VAC @ 2.5 Amps (Jumper selected) 50/60 Hz
Output Voltage	24 VDC @ 10 Amps
Total System Current	PSB-10 = 10 Amps

The system uses a "Sealed Lead Acid" or "Gel-Cell" type of battery with a capacity of from 7 to 55 amp-hours. Fuse must be replaced with same size and rating (8A-250VAC, Time Lag).

Wire Routing

A minimum of ¼ inch separation must be maintained between Power Limited, Non-Power Limited, and High Voltage wiring. See illustration for suggested wire routing



Note: The output of the bulk power supply is not power limited. All field wiring must be a minimum of 18 AWG and installed in conduit. All wiring connections must be made within 20 feet (6.1 meters) of the bulk supply.

Dip Switch Programming

⚠ WARNING

Remove power before servicing or changing DIP switch programming selections

Bulk Supply Options

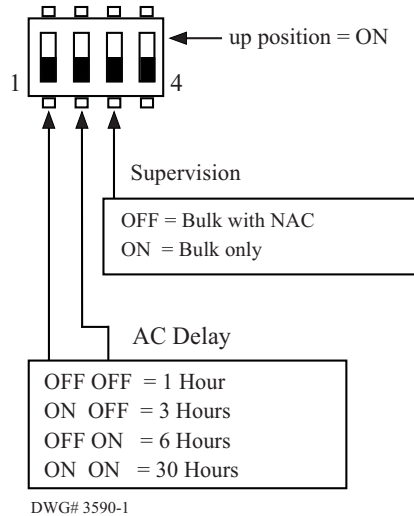
AC Report Delay:

Selects number of hours to delay before activating the general trouble relay in response to a low AC condition. Note that the Low AC relay is activated immediately.

Supervision:

This should always be in the OFF position to allow supervision of the wiring between the 24 VDC bulk supply board and the NAC control board.

NAC control board global options



Indicator LED Behavior

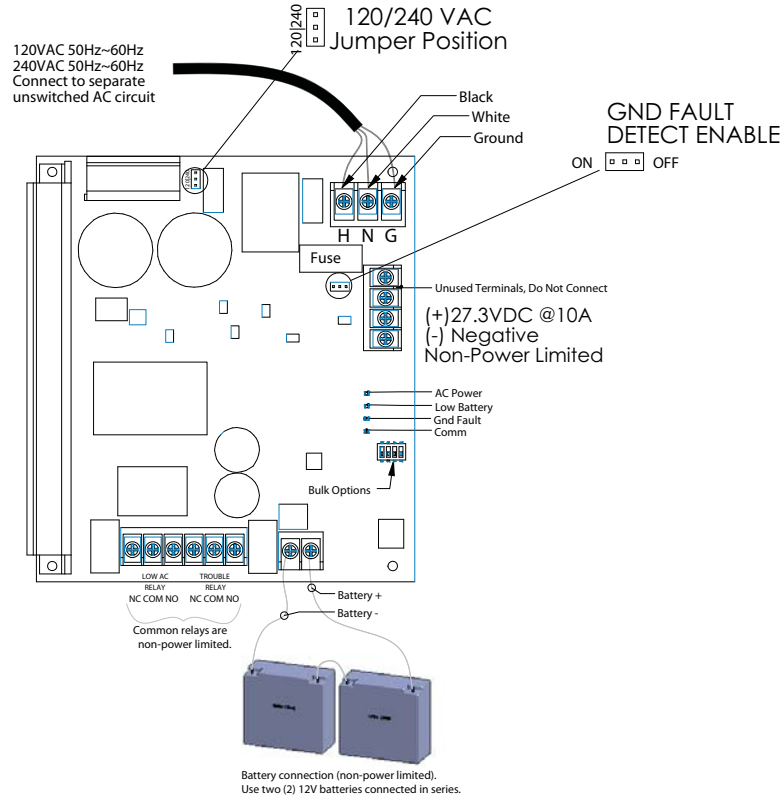
The bulk supply board contains four indicator LEDs:

- AC Power: ON = AC Present, OFF = AC not present).
- Low Battery: Fast Flashing = Low battery condition. ON = Battery Charger Failure
- Earth Ground Fault: Flashing = Earth fault detected.
- Comm: Not Used

- — AC Power
- — Low Battery
- — Gnd Fault
- — Comm

DWG# 3590-18

Bulk Power Supply



Primary AC

120VAC 50Hz~60Hz, 5.1AMP
 Min Low AC Detect 97VAC
 240VAC 50~60Hz 2.5AMP
 Min Low AC Detect 190VAC

Common Relays

3A @ 125VAC (Resistive)
 3A @ 30VDC (Resistive)

Battery Charging

27.3VDC @ .75A
 Low Battery Detect @20.4VDC

Earth Fault to Any Terminal

0 Ohms

Output Power

20.4VDC-27.3VDC @10A Non-Power Limited
 Special Application RSG-DH1224
 Listed Door Holder

Fuse Specification

8A-250VAC Time-Lag

F.C.C.

This device has been verified to comply with FCC Rules Part 15, Class A Operation is subject to the following conditions:

1. This device may not cause radio interference.
2. This device must accept any interference received including any that may cause undesired operation.

Requirements

System must be fully tested after installation.
 Intended for indoor use in dry locations only.
 Separation of power limited wiring from non-power limited wiring must be at least 1/4".

Install in accordance with installation manual Part Number 5403590 Rev A, NFPA 70, and NFPA 72

Battery Calculation Worksheet

Standby current for both the PSB-10 is 30 milli-amps.

Secondary Power Supply Requirements Table

Service Use	Standby Time	
NFPA 72 - Central Station (PPU) - Local	24 hours 24 hours	

Calculation Table

1	2	3	4
Module/Device	Quantity	mA Per Unit	Total Current
PSB-10	1	30	30
Total mA			
Convert to A			x 0.001
(* Refer to Maximum allowable standby current)Total A			
Multiply by hours			x ____
Total AH			
Efficiency Factor			÷ 0.85
Required AH			

Use a battery with a higher AH rating than Required AH

* Maximum Allowable Standby Current (24-hour standby time)

Battery Size	UL 24-hour	ULC 24-hour
7 AH	.213 Amps	.213 Amps
18 AH	.603 Amps	.603 Amps
33 AH	1.134 Amps	.603 Amps
55 AH	1.913 Amps	.603 Amps



WARRANTY INFORMATION

The essential purpose of any sale or contract for sale of any of the products listed in the POTTER catalog or price list is the furnishing of that product. It is expressly understood that in furnishing said product, POTTER does not agree to insure the Purchaser against any losses the Purchaser may incur, even if resulting from the malfunction of said product.

POTTER warrants that the equipment herein shall conform to said descriptions as to all affirmation of fact and shall be free from defects of manufacture, labeling and packaging for a period of one (1), one and one half (1.5), three (3), or five (5) year(s), depending on the product, from the invoice date to the original purchaser, provided that representative samples are returned to POTTER for inspection. The product warranty period is stated on the exterior of the product package. Upon a determination by POTTER that a product is not as warranted, POTTER shall, at its exclusive option, replace or repair said defective product or parts thereof at its own expense except that Purchaser shall pay all shipping, insurance and similar charges incurred in connection with the replacement of the defective product or parts thereof. This Warranty is void in the case of abuse, misuse, abnormal usage, faulty installation or repair by unauthorized persons, or if for any other reason POTTER determines that said product is not operating properly as a result of causes other than defective manufacture, labeling or packaging.

The Aforesaid Warranty Is Expressly Made In Lieu Of Any Other Warranties, Expressed Or Implied, It Being Understood That All Such Other Warranties, Expressed Or Implied, Including The Warranties Of Merchantability And Fitness For Particular Purpose Are Hereby Expressly Excluded. In No Event Shall Potter Be Liable To Purchaser For Any Direct, Collateral, Incidental Or Consequential Damages In Connection With Purchaser's Use Of Any Of The Products Listed Herein, Or For Any Other Cause Whatsoever Relating To The Said Products. Neither Potter Nor Its Representatives Shall Be Liable To The Purchaser Or Anyone Else For Any Liability, Claim, Loss, Damage Or Expense Of Any Kind, Or Direct Collateral, Incidental Or Consequential Damages Relative To Or Arising From Or Caused Directly Or Indirectly By Said Products Or The Use Thereof Or Any Deficiency, Defect Or Inadequacy Of The Said Products. It Is Expressly Agreed That Purchaser's Exclusive Remedy For Any Cause Of Action Relating To The Purchase And/or Use Of Any Of The Products Listed Herein From Potter Shall Be For Damages, And Potter's Liability For Any And All Losses Or Damages Resulting From Any Cause Whatsoever, Including Negligence, Or Other Fault, Shall In No Event Exceed The Purchase Price Of The Product In Respect To Which The Claim Is Made, Or At The Election Of Potter, The Restoration Or Replacement Or Repair Of Such Product.

Potter Electric Signal Company, LLC
St. Louis, MO • 314-595-6900 • 800-325-3936

This page intentionally left blank.



Remote Fire Annunciator **→ FDU-80** **Instruction Manual**

Document 51264

12/28/2006

Rev:

C1

P/N 51264:C1

ECN 06-069

Fire Alarm System Limitations

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

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

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premise following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

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

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

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

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

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

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

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

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

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

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

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

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

Telephone lines needed to transmit alarm signals from a premise to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of fire alarm malfunction is inadequate maintenance. To keep the entire fire alarm system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional fire alarm installers only. Adequate written records of all inspections should be kept.

Limit-C-9-2005

Installation Precautions

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

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

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

This system meets NFPA requirements for operation at 0-49° C/32-120° F and at a relative humidity 93% ± 2% RH (noncondensing) at 32° C ± 2° C (90° F ± 3° F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27° C/60-80° F.

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

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

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

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

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

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

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

Precau-D1-9-2005

FCC Warning

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

Canadian Requirements

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

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Acclimate Plus™, HARSH™, NIS™, Notifier Integrated Systems™, NOTI-FIRE-NET™, and ONYXWorks™ are all trademarks; and **FlashScan®, NION®, NOTIFIER®, ONYX®, UniNet®, VeriFire®, and VIEW®** are all registered trademarks of Honeywell International Inc. **Echelon®** is a registered trademark and **LonWorks™** is a trademark of Echelon Corporation. **ARCNET®** is a registered trademark of Datapoint Corporation. **Microsoft®** and **Windows®** are registered trademarks of the Microsoft Corporation. **LEXAN®** is a registered trademark of GE Plastics, a subsidiary of General Electric Company.

©2007 by Honeywell International Inc. All rights reserved. Unauthorized use of this document is strictly prohibited.

Documentation Feedback

Your feedback helps us keep our documentation up-to-date and accurate. If you have any comments or suggestions about our online Help or printed manuals, you can email us.

Please include the following information:

- Product name and version number (if applicable)
- Printed manual or online Help
- Topic Title (for online Help)
- Page number (for printed manual)
- Brief description of content you think should be improved or corrected
- Your suggestion for how to correct/improve documentation

Send email messages to:

FireSystems.TechPubs@honeywell.com

Please note this email address is for documentation feedback only. If you have any technical issues, please contact Technical Services.

Table of Contents

Section 1: Overview.....	6
1.1: Introduction	6
1.2: UL 864 Compliance.....	6
1.2.1: Products Subject to AHJ Approval	6
1.2.2: Programming Features Subject to AHJ Approval	6
1.3: Related Documentation	7
Section 2: The FDU-80 Annunciator	8
2.1: Compatible Panels	8
2.2: Features of the FDU-80	8
2.3: Components	10
2.4: SW1 DIP Switch Settings.....	10
Section 3: Operation.....	13
3.1: Display Patterns.....	13
3.2: Switch Functions	14
3.2.1: Key-switch	14
3.2.2: Acknowledge/Step	14
3.2.3: Silence.....	14
3.2.4: Drill: Hold 2 Sec.	15
3.2.5: Reset.....	15
3.3: LED Indicators	15
3.3.1: AC Power.....	15
3.3.2: Alarm	15
3.3.3: Supervisory	15
3.3.4: Trouble.....	15
3.3.5: Alarm Silenced.....	16
Section 4: Mounting	17
4.1: Annunciator Preparation.....	17
4.2: Semi-flush Mount Backbox.....	19
4.3: Surface Mount Backbox	21
Section 5: Electrical Connections	22
5.1: Power Connections	22
5.2: EIA-485 Connections	23
Section 6: EIA-485 Shield Termination	25
6.1: Shield Not in Conduit	25
6.2: Shield in Full Conduit	26
Appendix A: UL 864 8th Edition Applications.....	28
A.1: Power Connections	28
A.2: EIA-485 Connections	29

Section 1: Overview

1.1 Introduction

This document contains information for installing, programming, and operating the FDU-80 Remote Fire Annunciator.

1.2 UL 864 Compliance

1.2.1 Products Subject to AHJ Approval

This product has been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 9th Edition.

The following products have not received UL 864 9th Edition certification and may only be used in retrofit applications. Operation of the FDU-80 with products not tested for UL 864 9th Edition has not been evaluated and may not comply with NFPA 72 and/or the latest edition of UL 864. These applications will require the approval of the local Authority Having Jurisdiction (AHJ).

- FireWarden NFW-100
- AFP-300/400
- NFS-640

1.2.2 Programming Features Subject to AHJ Approval

This product incorporates field-programmable software. The features and/or options listed below must be approved by the local AHJ.

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.

Program feature or option	Permitted in UL 864 (Y/N)	Possible settings	Settings permitted in UL 864
Piezo Enable/Disable	Y	SW1-2 ON = Piezo Enabled SW1-2 OFF = Piezo Disabled	SW1-2 ON = Piezo Enabled

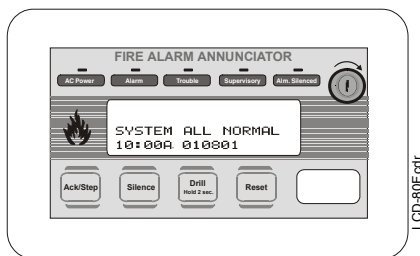
1.3 Related Documentation

Table 1.1 provides a list of document sources (manuals) containing additional information regarding the fire alarm control panels and components that ACS annunciators can be connected to. The NOTIFIER document (DOC-NOT) chart provides the current document revision.

Document Name	P/N
Notifier Device Compatibility Document	15378
NFS2-640 Fire Alarm Control Panel	52741, 52742, 52743
NFS-320 Fire Alarm Control Panel	52745, 52746, 52747
FireWarden NFW-100-2 Instruction Manual	52778
FCPS-24S6/8 Instruction Manual	51977
VeriFire™ Tools CD help file	VERIFIRE-TCD
NFS-640 Fire Alarm Control Panel (UL 8th)	51332, 51333, 51334
AFP-300/AFP-400 Installation Manual (UL 8th)	50253
FireWarden NFW-100 Instruction Manual (UL 8th)	52299

Table 1.1 Related Documentation

Section 2: The FDU-80 Annunciator



The FDU-80 Annunciator is a compact, 80-character, backlit LCD fire annunciator designed for use with compatible FACP's (Fire Alarm Control Panels). *It should be noted that the FDU-80 Annunciator display will mimic the FACP display.*

The FDU-80 is capable of displaying English-language text of system point status including device type, independent point alarm, trouble or supervisory, zone and custom alpha labels programmed into the control panel. The FDU-80 also provides system status LEDs to display Power, Alarm, Trouble, Supervisory and Alarm Silenced conditions. The FDU-80 is capable of performing system acknowledge, silence, drill and reset remotely.

Communication between the FACP and the FDU-80 is accomplished over a two-wire serial interface employing the EIA-485 communication standard. Up to 32 annunciators may be connected to the two-wire EIA-485 circuit. The annunciators may be powered from the host FACP or remote UL listed, filtered, power supplies.

2.1 Compatible Panels

- NFS2-640
- NFS-320
- NFW2-100
- NFS-640
- NFW-100
- AFP-300/400

2.2 Features of the FDU-80

- 80-character LCD display (20 characters x 4 lines) is backlit under normal and alarm conditions
- System Status LEDs for AC Power (green), Alarm (red), Trouble (yellow), Supervisory (yellow) and Alarm Silenced (yellow)
- No programming necessary — duplicates messages at control panel display.



NOTE: The FACP may require programming to function with the FDU-80. Refer to the specific FACP manual for programming information.

- Local piezo sounder with alarm and trouble resound
- Device type identifiers from the control panel
- Device & zone custom alpha labels from the control panel
- Time/date and device address from the control panel
- EIA-485 connects to control panel terminal port
- Plug-in terminal blocks for ease of installation and service
- DIP switches control piezo enable/disable, transmit/receive mode, FACP selection, function switches and key-switch enable/disable.
- Up to 32 FDU-80 Annunciators per FACP
- Mounting options:
 - Surface mounting in SBB-3 (2.75" depth) or three electrical boxes ganged together
 - Semi-flush mounting in three-gang electrical box (P/N 10103) with a minimum depth of 2.187" or three electrical boxes ganged together
 - Can be located up to 6,000 feet (1,829 m) from the panel
- Backlight turns off during AC loss to conserve battery power but will turn back on if an alarm condition occurs.
- Enable/Disable key-switch
- Function switches for:
 - Acknowledge/Step
 - Alarm Silence
 - Drill
 - System Reset/Lamp Test

2.3 Components

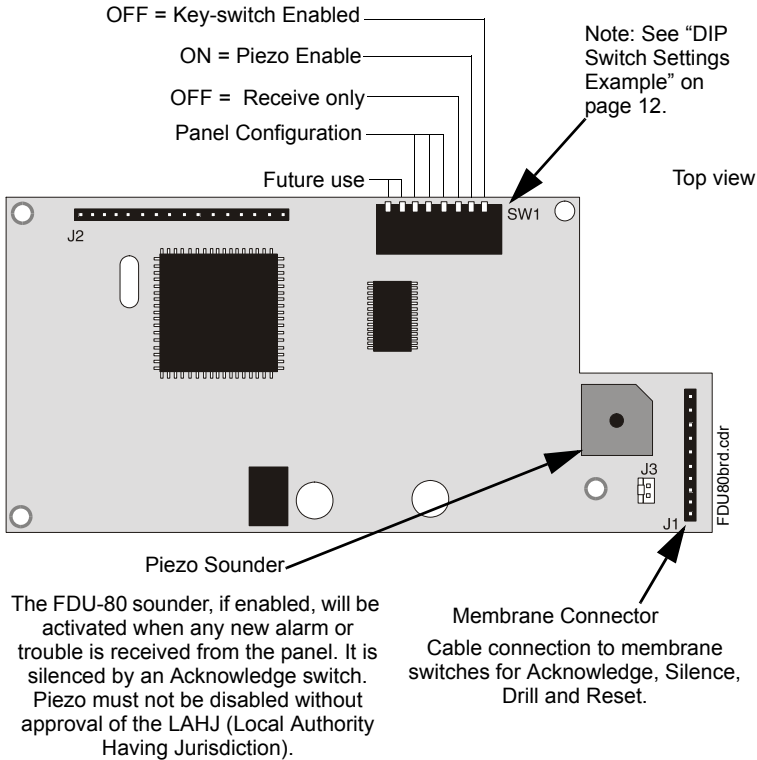


Figure 2.1 Components of the FDU-80

2.4 SW1 DIP Switch Settings

Refer to "DIP Switch Settings Example" on page 12, for an explanation of DIP switch positions. SW1 switch settings follow:

1 -ON = Key-switch disabled, OFF = Key-switch enabled.

Switch 1 set to the OFF position enables key-switch operation. The key-switch may now be used to enable the FDU-80 membrane switches, allowing remote switch functions, or lockout the switches, preventing remote switch functions.

Switch 1 set to the ON position disables the key-switch operation. Refer to "Switch Functions" on page 14, for key-switch function description.

2 -ON = Piezo sounder enabled, OFF = Piezo sounder disabled.



CAUTION:

The Piezo sounder must not be disabled without prior approval of the local Authority Having Jurisdiction (AHJ).

3 -ON = Supervision Receive/Transmit, OFF = Supervision Receive Only.

- **One Annunciator** - if a single FDU-80 is the only annunciator connected to the EIA-485 loop, Switch 3 must be set to the ON position to allow the FACP to supervise the annunciator.
- **Multiple Annunciators** - if multiple FDU-80 annunciators are connected to the EIA-485 loop, the annunciator physically connected as the last device on the loop (farthest from the 'OUT' terminals on the FACP) must have Switch 3 set to the ON position in order to supervise all annunciators on the loop. All remaining annunciators must have Switch 3 set to the OFF position for proper supervision and operation.

It is important to note that the function switches on all FDU-80 annunciators will operate regardless of the setting of Switch 3.

A break (open circuit) in the power or EIA-485 connections creates an FDU-80 Annunciator fault at the control panel. All annunciators before the break will continue to display information (*but the function switches on these FDU-80s will no longer operate*).

4 through 6 = Configuration for use with a particular FACP.

Switches 4, 5 and 6 are used to select the FACP (Fire Alarm Control Panel) which is being connected to the FDU-80. Refer to the following table for the appropriate switch settings.

Fire Alarm Control Panel	SW1-4	SW1-5	SW1-6
Use This Setting for: NFS2-640, NFS-320, NFS-640 (all releases) AFP-300/400 (with FACP software Version 3.62 or higher) FireWarden2-100/FireWarden-100 (all releases)	OFF	OFF	OFF
Future Use	OFF	OFF	ON
Future Use	OFF	ON	OFF
Future Use	OFF	ON	ON
Future Use	ON	ON	OFF
Future Use	ON	OFF	ON
Future Use	ON	ON	OFF
Future Use	ON	ON	ON

Table 2.1 Dip Switch Settings



NOTE: Depending on the FACP which is connected to the FDU-80, it may be necessary to enable communication with the annunciator in the FACP programming. Refer to the appropriate FACP manual for programming information.

7 and 8 = Future use.

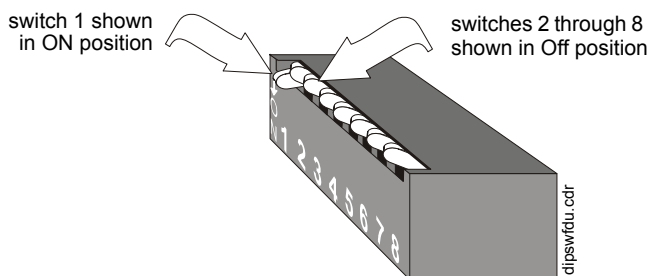


Figure 2.2 DIP Switch Settings Example

SW1 DIP switch settings as illustrated in Figure 2.2 are as follows:

DIP switch 1: ON = Key-switch disabled (membrane function switches are always enabled with key-switch having no effect on their function).

DIP switch 2: OFF = piezo sounder disabled (requires approval of AHJ)

DIP switch 3: OFF = Receive Only. This setting is used for all annunciators except the last or only FDU-80 Annunciator on the EIA-485 line

DIP switches 4 through 6: OFF = Configured correctly for operation with the available FACP

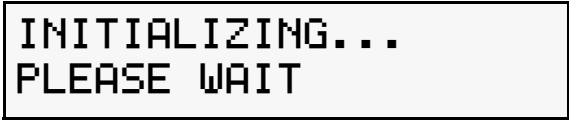
DIP switches 7 and 8: OFF (these switches are not used)

Section 3: Operation

3.1 Display Patterns

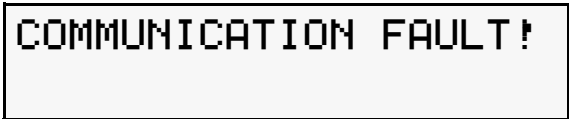
The FDU-80 Annunciator directly displays (mimics) the information on the FACP display with the following exceptions:

Upon Power-up, the FDU-80 may display the following message until a valid message is received from the FACP:



INITIALIZING...
PLEASE WAIT

If an FDU-80 Annunciator fails to receive communications from the panel for a period of over 30 seconds, it will activate its local sounder (if so programmed) and display the following message:



COMMUNICATION FAULT!

A Communication Fault may be due to one of the following conditions:

- FACP has not been programmed to communicate with the FDU-80. Refer to the appropriate FACP manual programming section.
- EIA-485 wiring between the FDU-80 and FACP has an open.
- Polarity of the EIA-485 wiring between the FDU-80 and FACP has been reversed. EIA-485 (-) on the FDU-80 must be connected to EIA-485 (-) on the FACP and EIA-485 (+) on the FDU-80 must be connected to EIA-485 (+) on the FACP.

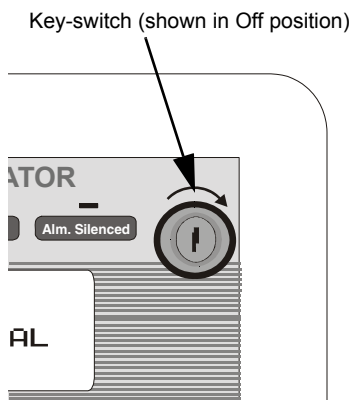
3.2 Switch Functions

3.2.1 Key-switch

The key-switch is used to enable and disable the operation of the function switches if switch 1 on DIP switch SW1 has been placed in the OFF position.

To enable the Acknowledge, Silence, Drill and Reset function switches, insert key into key-switch located at the top right corner of the FDU-80. Make certain the key is inserted completely before attempting to turn it. Turn the key clockwise until it stops. Leave the key inserted while pressing the function switches. When finished with the function switches, turn key-switch counterclockwise to disable function switches.

Note that the key-switch should normally be in the disabled position (fully counterclockwise), with the key removed and access to the key restricted to authorized personnel only. Do not leave the key unattended in the FDU-80.



3.2.2 Acknowledge/Step

When the Acknowledge/Step switch is pressed and released, the FDU-80 sends an Acknowledge command to the control panel. Pressing the Acknowledge switch silences the local piezo sounder, the sounders located in all other system annunciators and the sounder located on the Fire Alarm Control Panel's main circuit board. Only one press is necessary regardless of the number of new alarms, troubles or supervisory signals.

An acknowledge message is also sent to the printer and the history files in the FACP. Multiple active events (alarms, troubles, supervisorys) are scrolled on the display at a one second rate, but may be held for sequential display by pressing and holding the Acknowledge switch.

When more than one event exists, the first press of the Acknowledge switch silences system piezo sounders. The second press of the switch stops the scrolling and holds the event on the display for one minute. Subsequent pressing of the switch 'steps' through each active event.

3.2.3 Silence

When the Silence switch is pressed and released, the FDU-80 sends an alarm silence command to the control panel. The Silence switch performs the same functions as the Acknowledge switch. In addition, if an alarm exists, it turns off all silenceable NACs and causes the FACP Alarm Silenced LED to turn on while the FDU-80 will display a 'silenced'

message. It also sends an 'Alarm Silenced' message to the printer and the history file within the FACP. A subsequent new alarm will resound the appropriate NACs (Notification Appliance Circuits) and local sounders.

3.2.4 Drill: Hold 2 Sec.

When the Drill switch is pressed and held for at least two seconds (time required to prevent accidental activations), the FDU-80 will transmit a drill command to the control panel. This command causes the FACP to turn on all NAC outputs and all silenceable circuits (all control modules/NACs that are programmed silenceable). In the event that the system was previously silenced, the drill command will also turn off the Alarm Silenced LED. The 'Manual Evacuate' message is shown on the FDU-80 display. The same message is sent to the FACP display, printer and history files. The Silence switch operates on *silenceable* NAC outputs only.

3.2.5 Reset

When the System Reset switch is pressed and released, the FDU-80 sends a Reset command to the control panel. This will turn off all control modules and Notification Appliance Circuits, temporarily turns off resettable power to 4-wire detectors, causes a 'System All Normal' message to be displayed on the FDU-80 and sends a 'System Reset' message to the FACP display, printer and FACP history files. It also turns on all system LEDs, piezo sounders and LCD display segments as long as the Reset switch is held (lamp test). Any alarm or trouble that exists after a Reset will resound the system.

3.3 LED Indicators

3.3.1 AC Power

This is a green LED which illuminates if AC power is applied to the host FACP. The green LED will turn off if AC power to the host FACP is lost.

3.3.2 Alarm

This is a red LED that turns on steady when one or more fire alarms occur. The Alarm LED turns off when the Reset switch is pressed.

3.3.3 Supervisory

This is a yellow LED that turns on steady when one or more supervisory conditions occur, such as a sprinkler valve tamper condition. It turns off when the Reset switch is pressed.

3.3.4 Trouble

This is a yellow LED that turns on steady when one or more trouble conditions occur. The LED turns off when all trouble conditions are cleared. This LED will also illuminate if the microprocessor watchdog circuit within the FDU-80 is activated.

3.3.5 Alarm Silenced

This is a yellow LED that turns on when the Silence switch is pressed to turn off the Notification Appliance Circuits. The LED turns off when the NACs turn back on or when the alarm condition is cleared and the FACP is reset back to a normal condition.

Section 4: Mounting

4.1 Annunciator Preparation

The FDU-80 Annunciator can be surface mounted in a three-gang electrical box such as the P/N SBB-3 (2.75" depth) or semi-flush mounted in a three-gang electrical box, P/N 10103 or equivalent, with a minimum depth of 2 3/16". The FDU-80 Annunciator can also be mounted in three gangable electrical switch boxes connected together. Select and remove the appropriate knockout(s), pull the necessary wires through the knockouts and mount the box in or on the wall depending on the type of installation desired. *Be certain that power is not applied to the wiring during the installation procedure.*



NOTE: To ensure static protection, all enclosures, including the FDU-80 electrical box, must be connected to earth ground! Never use the shield for grounding purposes.

To mount the FDU-80 Annunciator in an electrical box, the trim ring must first be removed. The trim ring is held in place by two screws inserted through the top and bottom edge as illustrated in Figure 3-1. Removal of the trim ring will expose a metal flange with mounting holes. Refer to "Hardware and Backboxes" on page 18.

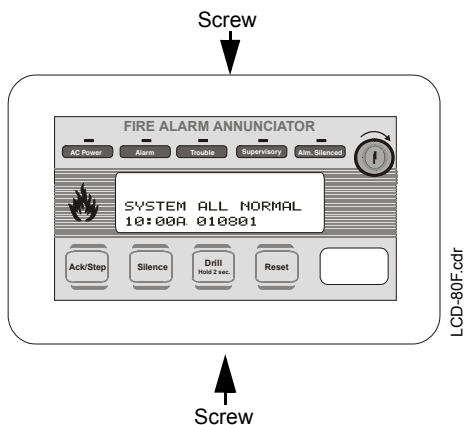


Figure 4.1 Trim Ring Removal

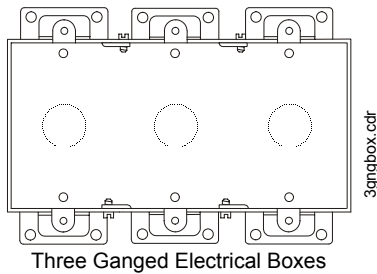
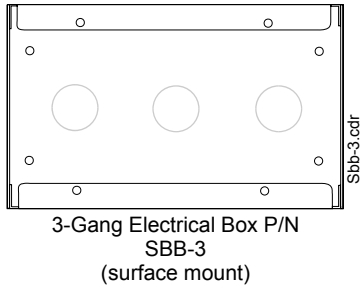
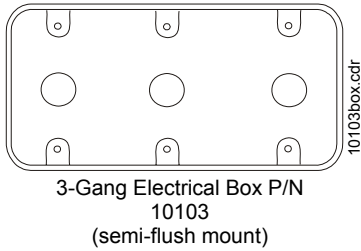
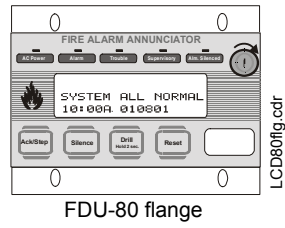
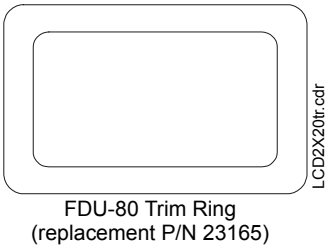


Figure 4.2 Hardware and Backboxes

4.2 Semi-flush Mount Backbox

Mounting in SBB-3 Three Gang Electrical Box

Remove the plug-in terminal blocks from the FDU-80 circuit board. Connect the EIA-485 and power wiring into the terminal block positions illustrated in Figure 5.1 on page 22 through Figure 5.5 on page 24. Plug the terminal blocks back into the P2 and P1 connectors on the back of the annunciator. Set DIP switch SW1 for the desired options. Refer to Figure 2.2 on page 12.

Carefully insert the FDU-80 into the three-gang electrical box P/N: 10103 or three electrical boxes ganged together and attach it using the four mounting holes on the FDU-80 flange and the four screws provided for this purpose. Replace the trim ring and secure with the two screws which were previously loosened. Adjust the plastic trim ring to the surface of the wall before tightening the screws. *Do not overtighten.*

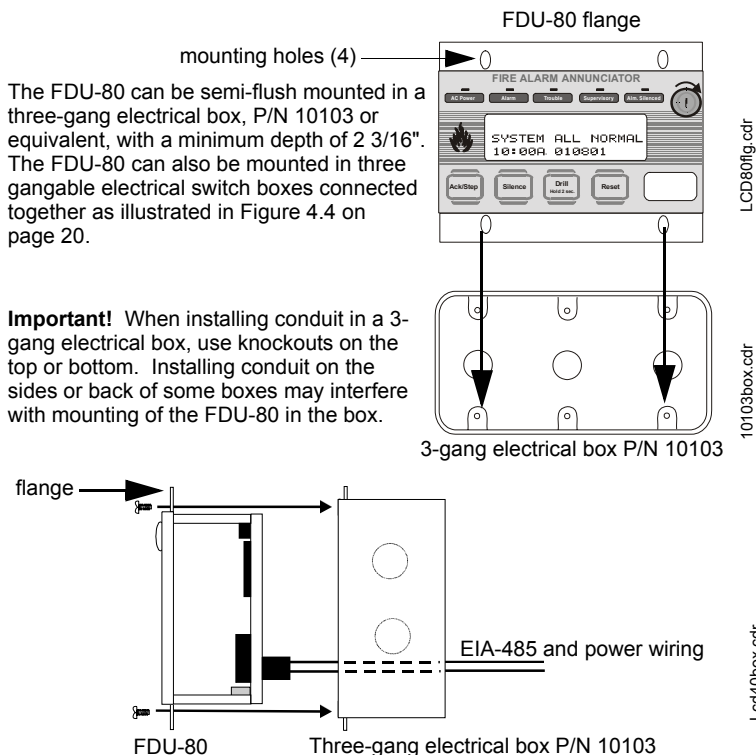


Figure 4.3 Mounting in SBB-3 Box

Mounting in Three Electrical Boxes Ganged Together

Remove the plug-in terminal blocks from the FDU-80 circuit board. Connect the EIA-485 and power wiring into the terminal block positions illustrated in Figure 5.1 on page 22 through Figure 5.5 on page 24. Plug the terminal blocks back into the P2 and P1 connectors on the back of the annunciator. Set DIP switch SW1 for the desired options. Refer to Figure 2.2 on page 12.

Carefully insert the FDU-80 into the three electrical boxes ganged together and attach it using the four mounting holes on the FDU-80 flange and the four screws provided for this purpose. Replace the trim ring and secure with the two screws which were previously loosened. Adjust the plastic trim ring to the surface of the wall before tightening the screws. *Do not overtighten.*

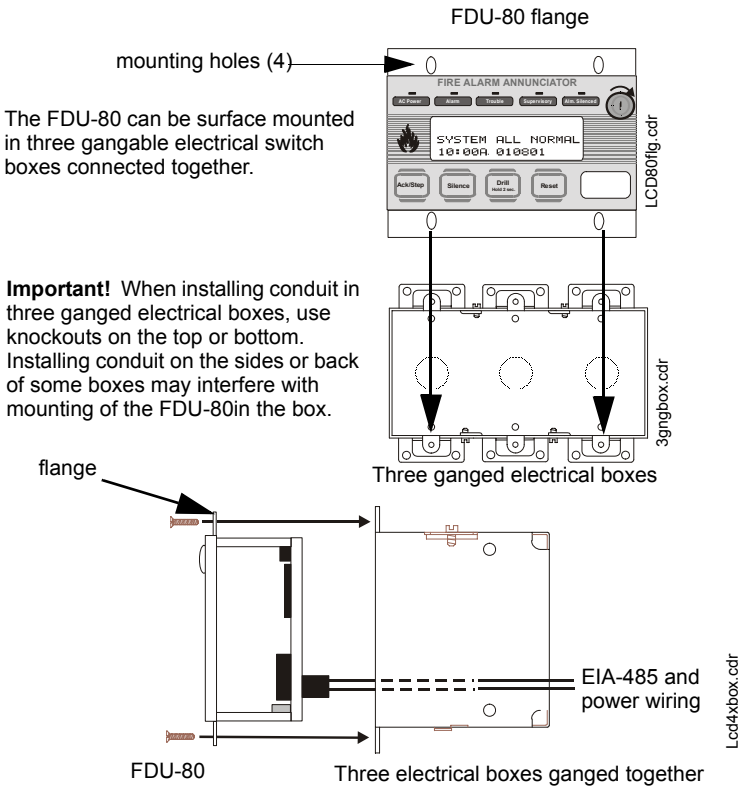


Figure 4.4 Mounting in 3 Ganged Electrical Boxes

4.3 Surface Mount Backbox

Remove the plug-in terminal blocks from the FDU-80 circuit board. Connect the EIA-485 and power wiring into the terminal block positions illustrated in Figure 5.1 on page 22 through Figure 5.5 on page 24. Plug the terminal blocks back into the P2 and P1 connectors on the back of the annunciator circuit board. Set DIP switch SW1 for the desired options. Refer to Figure 2.2 on page 12.

Carefully insert the FDU-80 into the three-gang electrical box and attach it using the four mounting holes on the FDU-80 flange and the four screws provided for this purpose. Replace the trim ring and secure with the two screws which were previously loosened. *Do not overtighten.*

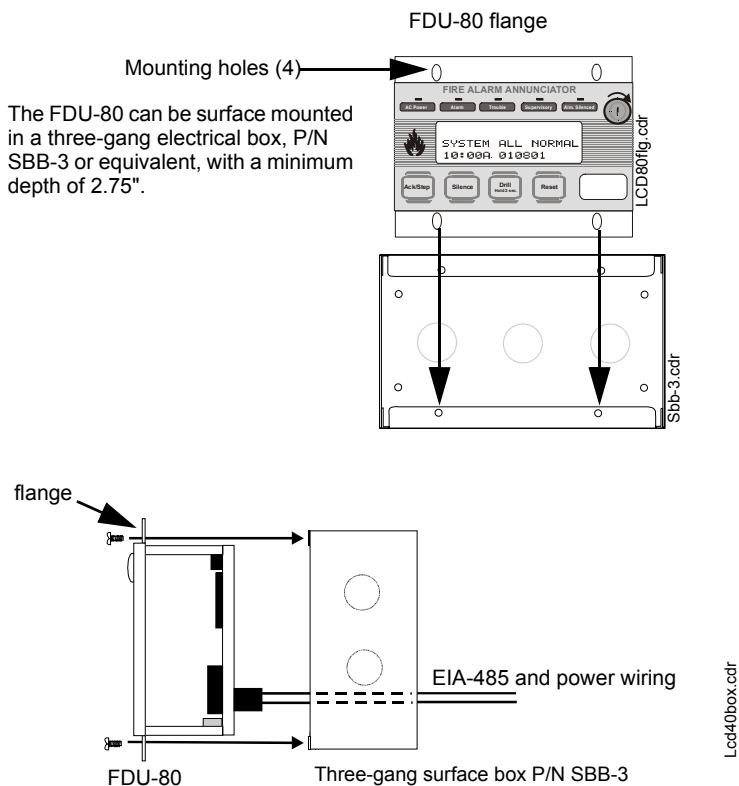


Figure 4.5 Surface Mounting

Section 5: Electrical Connections

5.1 Power Connections

The FDU-80 Annunciator can be powered by the FACP (refer to the specific technical manual for the proper connection of the FDU-80) or from a remote UL listed, filtered power supply such as the FCPS-24S6/8. The power run to the annunciator must be power-limited but need not contain a power supervision relay since loss of power is inherently supervised through loss of communication with the annunciator. Maximum FDU-80 current draw from the power supply (under normal and alarm conditions) is 64.3 mA. Maximum current draw from the control panel's secondary power source (batteries) under loss of AC power is 25 mA, since the LCD backlight is turned off during AC loss. Backlighting is turned back on during AC loss only for alarm conditions in the system. 12 - 18 AWG (0.75 - 3.25 mm²) wire for 24 VDC circuit is acceptable. Power wire distance limitation is set by 1.2 volt maximum line drop from source to end of circuit.

Specifications for the FDU-80

- Operating Voltage Range: 18 VDC to 28 VDC
- Current Consumption @ 24 VDC nominal (filtered and nonresettable):
- Normal/Standby (no activity): 64.3 mA
- Trouble Condition: 64.3 mA
- Alarm: 64.3 mA
- AC Fail (not backlit): 25 mA

Refer to the illustrations on the following pages for FDU-80 connections to the FireWarden NFW2-100, NFS2-640, NFS-320, and FCPS-24S6/8.



NOTE: These connections must be power-limited and the +24 VDC nominal power input must be filtered and nonresettable.

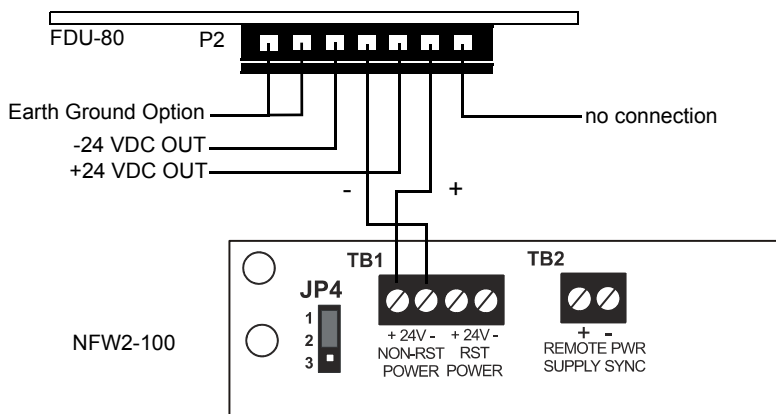


Figure 5.1 Power Wiring to the NFW2-100

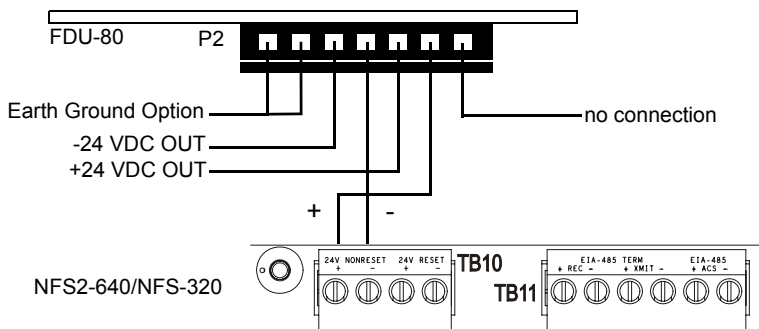


Figure 5.2 Power Wiring to the NFS2-640/NFS-320

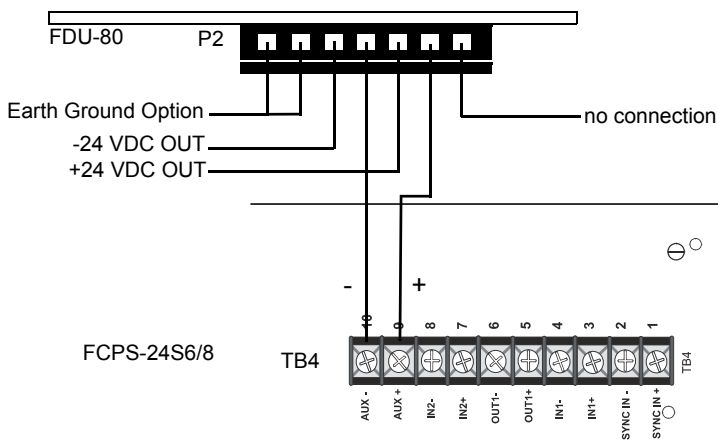


Figure 5.3 Power Wiring to the FCPS-24S6/8

5.2 EIA-485 Connections

EIA-485 connections are made to P1 on the FDU-80. All connections must be power-limited and supervised. Enable FACP communication with the FDU-80 in the FACP programming if appropriate (refer to FACP manual). A maximum of 32 FDU-80 annunciators may be connected to this circuit. A maximum distance of 6,000 feet (1,829 m) @ 18 AWG (0.75 mm²) is allowed between the FACP and first FDU-80, between each FDU-80 and return to the FACP from last FDU-80. Use overall foil/braided-shielded twisted pair cable suitable for EIA-485 applications (refer to “EIA-485 Shield Termination” on page 25, for shield termination information). Six conductor overall shielded wire may be used for the four EIA-485 wires and the two power wires. It is, however, strongly recommended that the power and communication wires be separate

whenever possible. A Ferrite Core P/N FBD-1 is required to meet FCC Part 15 requirements if the EIA-485 wiring is not in conduit. The EIA-485 circuit is rated at 5.5 VDC maximum and 60 mA maximum. The FDU-80 annunciator has resistors built into the circuit board at the In (Terminals 2 & 4) and the Out (Terminals 1 & 3) for impedance matching. There is no need for the installer to add impedance matching resistors.

Refer to the illustrations on the following pages for FDU-80 connections to the FireWarden NFW2-100, NFS2-640, and NFS-320.

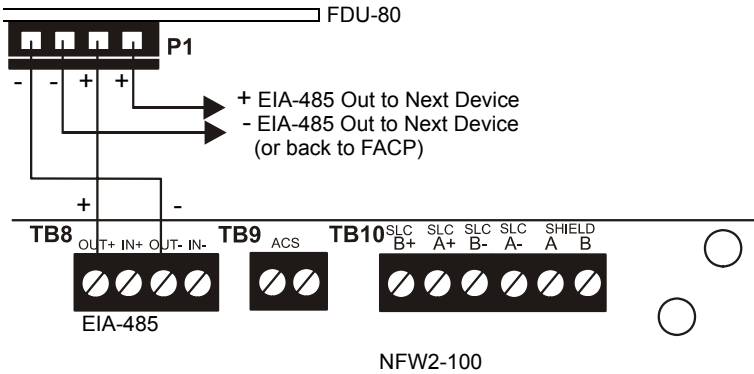


Figure 5.4 EIA-485 Wiring to the NFW2-100

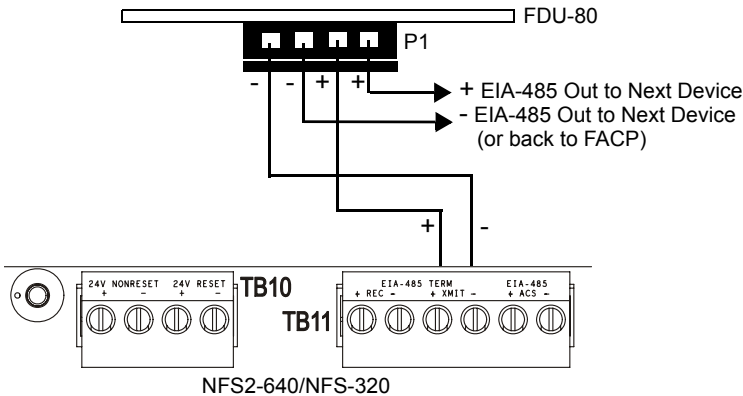


Figure 5.5 EIA-485 Wiring to the NFS2-640/NFS-320

Section 6: EIA-485 Shield Termination

The EIA-485 circuit must be wired using a twisted, shielded pair cable with a characteristic impedance of 120 ohms (+/- 20%). Do not run cable adjacent to or in the same conduit as 120 VAC service, noisy electrical circuits that are powering mechanical bells or horns, audio circuits above 25 V_{RMS}, motor control circuits or SCR power circuits.



NOTE: To ensure static (ESD - electrostatic discharge) protection, all enclosures, including the FDU-80 electrical box, must be connected to earth ground! Never use the EIA-485 shield for this purpose. The EIA-485 shield is for radiated noise emission protection (RFI, EMI). Refer to the following figures for details on EIA-485 shield termination.

6.1 Shield Not in Conduit

The EIA-485 line allows the FACP to communicate with the FDU-80 Annunciator. The shield for the EIA-485 line must be connected to earth ground at the FACP but must be left floating (no connection) at the annunciator if it is the first or only device on the EIA-485 line. If a second annunciator is connected, the shield leaving the first annunciator must be left floating. The shield entering the second annunciator must be connected to the three-gang box or Earth Ground terminal (P2-7) on the second annunciator. If additional annunciators are connected, the shield leaving each enclosure must be left floating and the shield entering each must be connected to the three-gang box or the Earth Ground terminal (P2-7) on the annunciator.

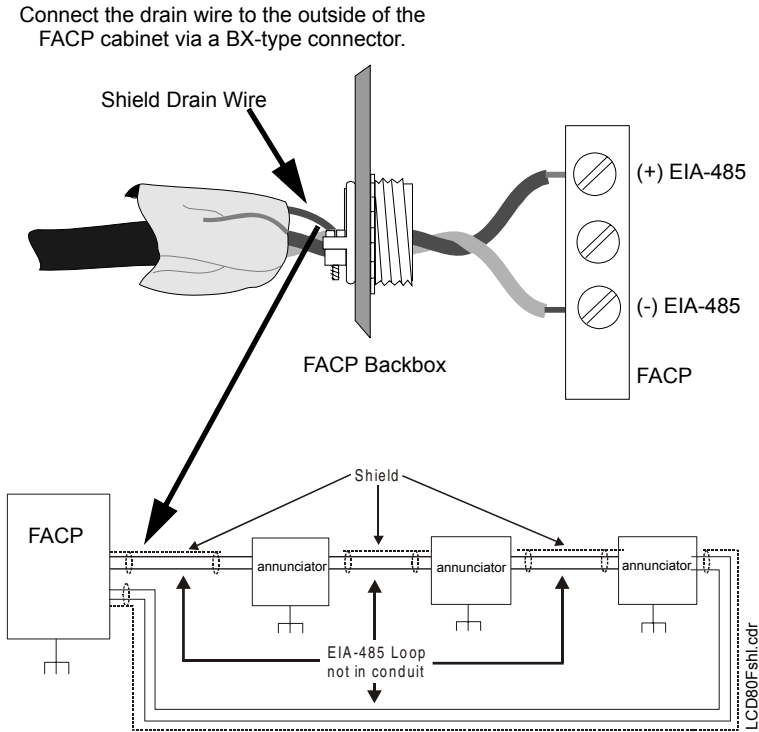


Figure 6.1 EIA-485 Without Conduit

6.2 Shield in Full Conduit

The EIA-485 line allows the FACP to communicate with the FDU-80 Annunciator. The shield for the EIA-485 line must be connected to earth ground at the FACP (both exiting and entering the FACP) but must be left floating (no connection) at the annunciator if it is the first or only device on the EIA-485 line. If a second annunciator is connected, the shield leaving the first annunciator must be floating. The shield entering the second annunciator must be connected to the Earth Ground terminal (P2-7) on the second annunciator. If additional annunciators are connected, the shield leaving each annunciator must be left floating and the shield entering the following unit must be connected to the Earth Ground terminal (P2-7) on the annunciator.



CAUTION:

Do not allow the floating shield end (no connection) to contact the conduit. The floating end should be insulated from earth ground.

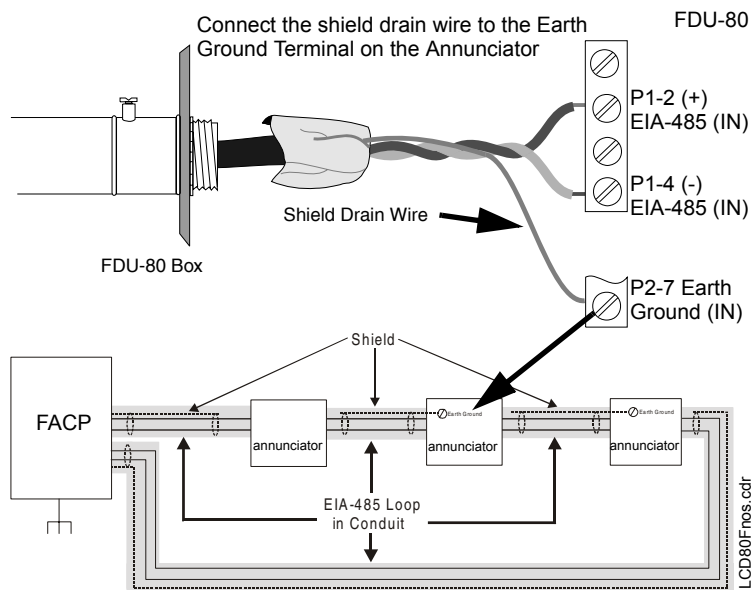


Figure 6.2 EIA-485 in Conduit

Notes:

1. Power-limited 24 VDC power may be run in the same conduit as the EIA-485 wiring
2. Twisted, shielded wire is recommended for the EIA-485 communications loop
3. Each electrical backbox is connected to earth ground via the conduit
4. Shield is connected to the FACP cabinet (earth ground) leaving and entering the FACP

Appendix A: UL 864 8th Edition Applications



WARNING:

The NFS-640, AFP-300/400, and FireWarden NFW-100 have not been certified to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL 864 9th Edition. Operation of these products with products tested for UL 864 9th Edition has not been evaluated. Such operation requires the approval of the local Authority Having Jurisdiction (AHJ).

A.1 Power Connections

The power run to the annunciator must be power-limited and supervised. Maximum FDU-80 current draw from the power supply (under normal and alarm conditions) is 64.3 mA. Maximum current draw from the control panel's secondary power source (batteries) under loss of AC power is 25 mA. Use 12-18 AWG (0.75-3.25 mm²) wire for 24VDC circuit connections. Power wire distance limitation is set by 1.2 volt maximum line drop from source to end of circuit.

Refer to the following illustrations for power connections (24 VDC, Non-Resettable Power) to UL 8th edition panels: NFS-640, AFP-300/400, and FireWarden NFW-100.

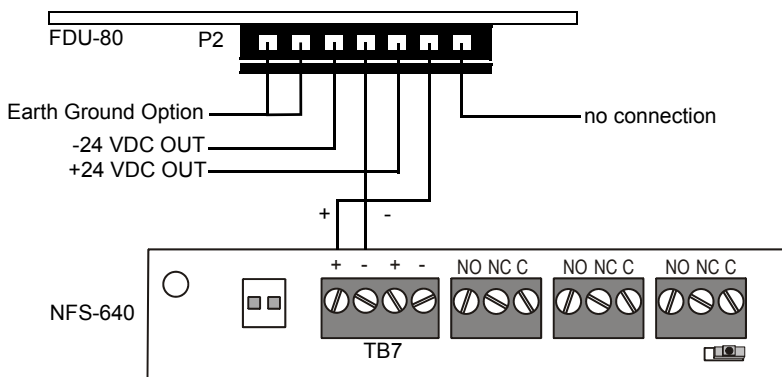


Figure A.1 Power Wiring to the NFS-640

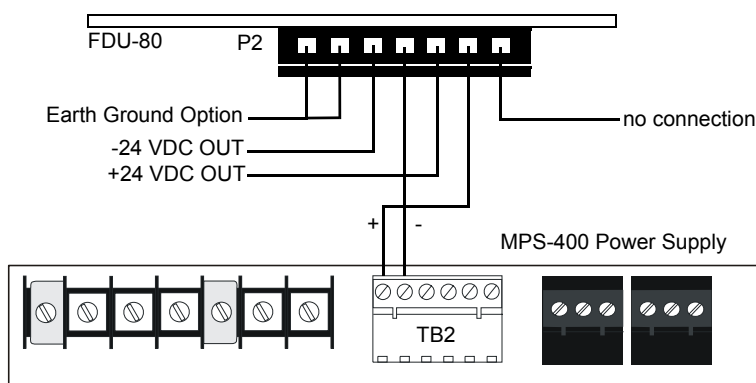


Figure A.2 Power Wiring to the AFP-300/400

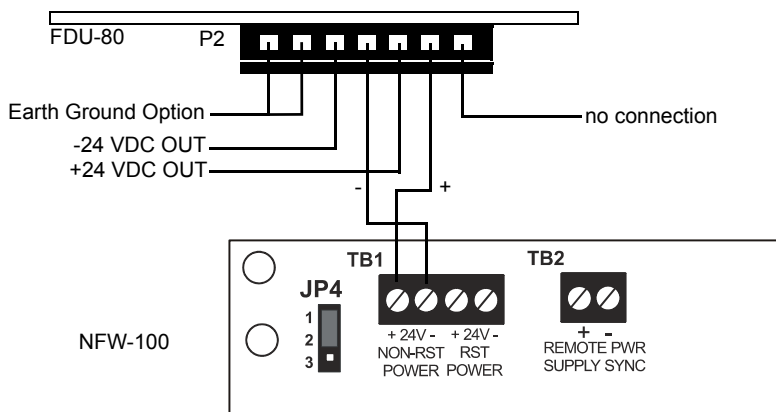


Figure A.3 Power Wiring to the NFW-100

A.2 EIA-485 Connections

EIA-485 connections to the annunciator must be power-limited and supervised. A maximum distance of 6,000 feet (1829 m) @ 18 AWG (0.75mm²) twisted, shielded cable is allowed between the FACP and first FDU-80, between each FDU-80 and return to the FACP from the last FDU-80. The EIA-485 circuit is rated at 5.5 VDC maximum and 60 mA maximum. Programming at the FACP may be required to enable EIA-485 communication. Refer to the appropriate FACP Programming Manual.

Refer to the following illustrations for EIA-485 connections to UL 8th edition panels: NFS-640, AFP-300/400, and FireWarden NFW-100.

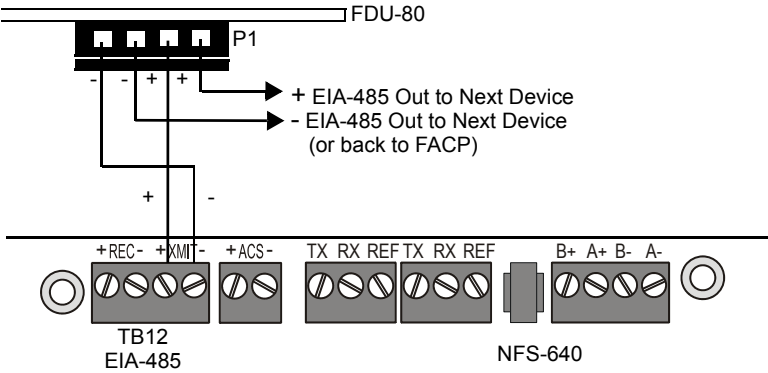


Figure A.4 EIA-485 Wiring to the NFS-640

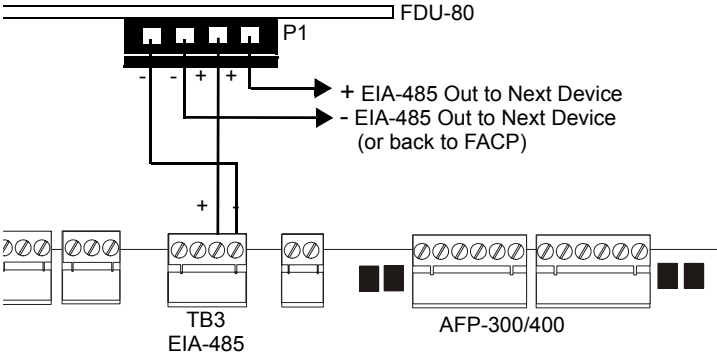


Figure A.5 EIA-485 Wiring to the AFP-300/400

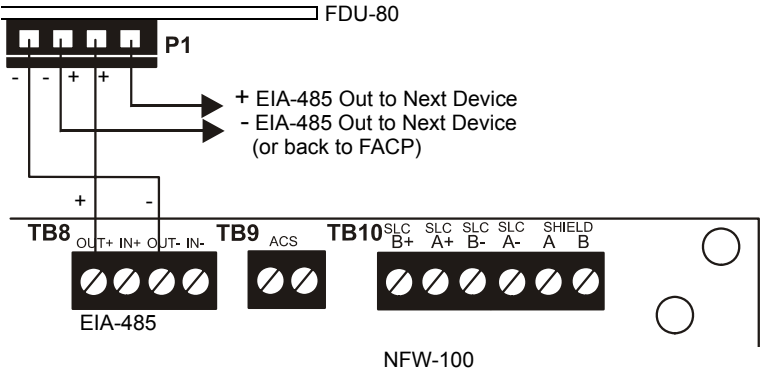


Figure A.6 EIA-485 Wiring to the NFW-100

Limited Warranty

NOTIFIER® warrants products manufactured by it to be free from defects in materials and workmanship for eighteen (18) months from the date of manufacture, under normal use and service. Products are date stamped at time of manufacture. The sole and exclusive obligation of **NOTIFIER®** is to repair or replace, at its option, free of charge for parts and labor, any part that is defective in materials or workmanship under normal use and service. All returns for credit are subject to inspection and testing at the factory before actual determination is made to allow credit. **NOTIFIER®** does not warrant products not manufactured by it, but assigns to the purchaser any warranty extended by the manufacturer of such products. This warranty is void if the product is altered or repaired by anyone other than **NOTIFIER®** or as expressly authorized by **NOTIFIER®** in writing, or is serviced by anyone other than **NOTIFIER®** or its authorized distributors. This warranty is also void if there is a failure to maintain the products and systems in which they operate in a proper and workable manner. In case of defect, secure a Return Material Authorization form from our Return Authorization Department.

This writing constitutes the only warranty made by **NOTIFIER®**, with respect to its products. **NOTIFIER®**, does not represent that its products will prevent any loss by fire or otherwise, or that its products will in all cases provide the protection for which they are installed or intended. Buyer acknowledges that **NOTIFIER®**, is not an insurer and assumes no risk for loss or damages or the cost of any inconvenience, transportation damage, misuse, abuse, accident or similar incident.

NOTIFIER® GIVES NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR OTHERWISE WHICH EXTENDS BEYOND THE DESCRIPTION ON THE FACE HEREOF. UNDER NO CIRCUMSTANCES SHALL **NOTIFIER®** BE LIABLE FOR ANY LOSS OF OR DAMAGE TO PROPERTY, DIRECT, INCIDENTAL OR CONSEQUENTIAL, ARISING OUT OF THE USE OF, OR INABILITY TO USE **NOTIFIER®**'S PRODUCTS. FURTHERMORE, **NOTIFIER®** SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY OR DEATH WHICH MAY ARISE IN THE COURSE OF, OR AS A RESULT OF, PERSONAL, COMMERCIAL OR INDUSTRIAL USE OF ITS PRODUCTS.

This warranty replaces all previous warranties and is the only warranty made by **NOTIFIER®**. No increase or alteration, written or verbal, of the obligation of this warranty is authorized.

"**NOTIFIER**" is a registered trademark.

Warn-NL-04-2005.fm



World Headquarters
12 Clintonville Road
Northford, CT 06472-1653 USA
203-484-7161
fax 203-484-7118

www.notifier.com

ISO 9001
CERTIFIED
ENGINEERING & MANUFACTURING
QUALITY SYSTEMS



➔ NBG-12LX Addressable Pull Station

Patented, U.S. Patent No. Des. 428,351; 6,380,846; Other Patents Pending

Document 52131

156-3511-000

Description

The NBG-12LX Addressable pull station is a non-coded, dual-action manual pull station with a key-lock reset feature. It provides NOTIFIER intelligent fire alarm control panels (FACP) with one addressable alarm initiating input. The addressable module is housed inside the pull station. The NBG-12LX is compatible with all Notifier intelligent panels and will automatically operate in either FlashScan™ or CLIP (Classic Loop Interface Protocol) mode. FlashScan™ is a patented (U.S. Pat. No. 5,539,389) High Speed Communications Protocol. Refer to the FACP Installation Manual to determine if FlashScan™ protocol is supported. FlashScan™ or CLIP operating mode must be selected in the FACP. (This selection is not available or required in FACP's that do not support FlashScan™, therefore CLIP mode is enabled by default.) No selection is required in the Pull Station. The NBG-12LX meets the ADAAG controls and operating mechanisms guidelines (section 4.1.3[13]), and the ADA requirement for a 5 lb. maximum pull force to activate the pull station. Operating instructions are molded into the pull station handle along with Braille text. Molded Terminal numbers are also present.

Ratings

Normal Operating Voltage: 24 VDC.

Average Operating Current (LED Flash): 300 µA.

Temperature Range: 32° F – 120° F (0° C – 49° C).

Relative Humidity Range: 10% - 93% non-condensing.

Installation

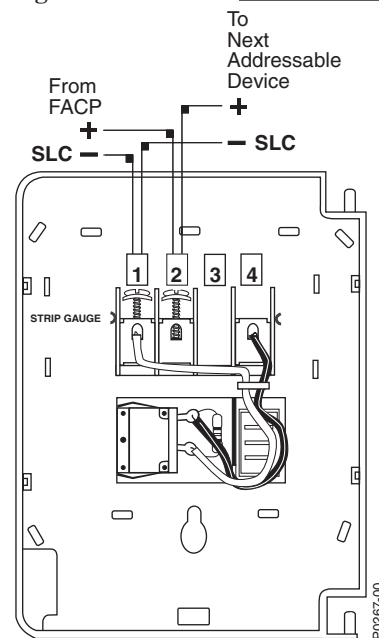
The NBG-12LX Addressable pull station can be surface mounted to an SB-10 or SB-I/O surface backbox or semi-flush mounted on a standard single-gang, double-gang or 4" (10.16 cm) square electrical box. The optional BG-TR trim ring can be used if the NBG-12LX is to be semi-flush mounted.

Operation

To activate the dual-action pull station, push in and pull down on the handle. The word 'ACTIVATED' appears after the handle is pulled down. This will remain until the pull station is reset.

The pull station includes one Single Pole, Single Throw (SPST) Normally Open (N/O) switch which closes upon activation of the pull station.

Wiring



NBG-12LX Addressable Pull Station

Document 52131

156-3511-000



Resetting the Pull Station

1. Insert the key into the lock and rotate 1/4 turn counterclockwise.
2. Open the door until the handle returns to normal.
3. Close and lock the door.

NOTE: Closing the door automatically resets the switch to the 'Normal' position. Opening the door will not activate or deactivate the alarm switch.

CAUTION! Do not detach the door of the pull station during installation. The door of the pull station cannot be reattached to the backplate after the backplate has already been installed onto an electrical box.

CAUTION!

Install the Notifier NBG-12LX addressable pull station in accordance with these instructions, applicable NFPA standards, national and local Fire and Electrical codes and the requirements of the AHJ (Authority Having Jurisdiction). Regular testing of the devices should be conducted in accordance with the appropriate NFPA standards. Failure to follow these directions may result in failure of the device to report an alarm condition. Notifier is not responsible for devices that have been improperly installed, tested or maintained.

ADA Compliance

For ADA compliance, if the clear floor space only allows forward approach to an object, the maximum forward reach height allowed is 48 inches (121.92 cm). If the clear floor space allows parallel approach by a person in a wheelchair, the maximum side reach allowed is 54 inches (137.16 cm).

(over for Programming Information) ➔

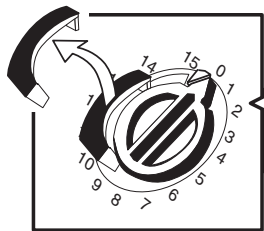
Setting the NBG-12LX Address

The NBG-12LX Addressable pull station is factory preset with address '00.' Set the address for the pull station by turning the rotary address switches on the addressable module mounted inside the pull station. Only one device per address is allowed. Multiple modules may not be set to the same address on the Signaling Line Circuit. Once the address is set, record it in the space provided on the product ID label located inside the pull station.

Software Note for AM2020/AFP1010 Programming

The NBG-12LX is an Alarm Initiating Module of software type 'mpul'. If you have an older system that does not support the 'mpul' software type, the software type 'mon' may be used.

To use the NBG-12LX with panels capable of supporting up to 159 addresses, pry off the 'break-away' address block using a flat-bladed screwdriver. The break-away piece is illustrated below.

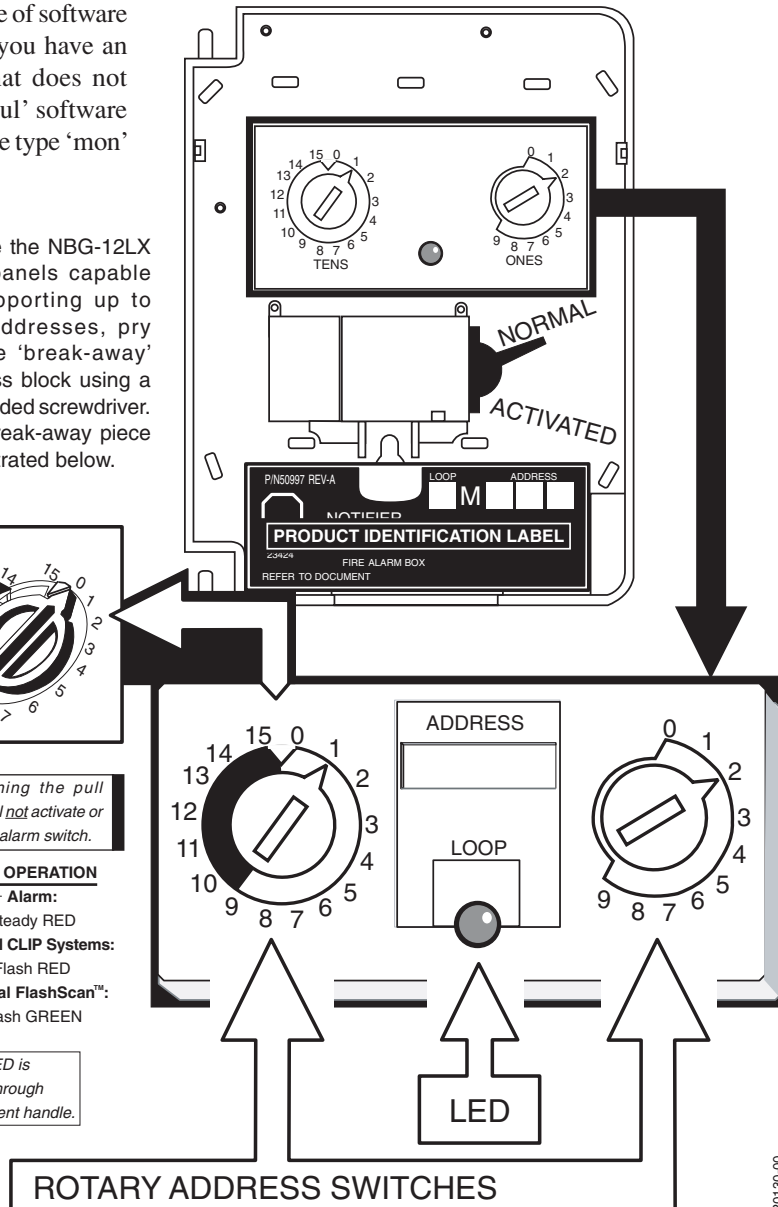


Note – Opening the pull station door will not activate or deactivate the alarm switch.

LED OPERATION

- **Alarm:**
Steady RED
- **Normal CLIP Systems:**
Flash RED
- **Normal FlashScan™:**
Flash GREEN

Note: LED is visible through translucent handle.



PO130-00

The background of the page is a dark blue gradient with a faint, light blue circuit diagram. The diagram includes various electronic components such as batteries labeled 'BATT', resistors labeled 'R', capacitors labeled 'C', a variable resistor 'VR', a relay 'RY', a transistor 'Tr', a diode 'ZD', a fuse 'NVR', and a load labeled 'LOAD'. There are also labels for transistors 'TR1' and 'TR2' and resistors 'R1' and 'R2'.

→ Sealed Lead-Acid Batteries Technical Manual

POWER  SONIC

Table of Contents

Features of Power-Sonic Sealed Lead Acid Batteries	1
Battery Construction	2
Theory of Operation	3 & 4
Battery Capacity	5 & 6
Battery Capacity Selector.....	7
Performance Data.....	8
Discharge.....	8
Open Circuit Voltage.....	8
Temperature	9
Shelf Life and Storage	10
Battery Life	10-11
Over Discharge	12
Charging.....	12
Charging Techniques Summary	13
Charging Characteristics.....	13
Charging Methods.....	13
Constant Voltage Charging	14
Constant Current Charging.....	15
Taper-Current Charging.....	15
Overcharging	16
Undercharging	16
Charging for Cycle Operation.....	16
Charging for Standby Operation	16
Two-Step Constant Voltage Charging	17
Charging in Series	17
Charging in Parallel	18
Temperature Compensation.....	18
Top Charging.....	18
Charging Efficiency.....	19
Important Do's and Don'ts.....	20
Handling.....	20
Installation.....	20
Charging.....	21
Notes	22
Glossary	24

Features of Power-Sonic Sealed Lead Acid Batteries

Sealed/Maintenance-Free

The valve regulated spill proof construction allows trouble-free safe operation in any position. There is no need to add electrolyte, as gases generated during the charge phase are recombined in a unique "oxygen cycle".

Power-Sonic sealed lead acid batteries can be operated in virtually any orientation without the loss of capacity or electrolyte leakage. However, upside down operation is not recommended.

Long Shelf Life

A low self-discharge rate, up to approximately 3% per month, may allow storage of fully charged batteries for up to a year, depending on storage temperatures, before charging becomes critical. *However, we strongly recommend that all batteries should be recharged within six months of receipt as it will enhance their long term life.*

Please refer to this Technical Manual and individual battery specification sheets for more details.

Design Flexibility

Same model batteries may be used in series and/or parallel to obtain choice of voltage and capacity. The same battery may be used in either cyclic or standby applications. Over 80 models available to choose from.

Deep Discharge Recovery

Special separators, advanced plate composition and a carefully balanced electrolyte system ensure that the battery has the ability to recover from excessively deep discharge.

Economical

The high watt-hour per dollar value is made possible by the materials used in a sealed lead-acid battery; they are readily available and low in cost.

Easy Handling

No special handling precautions or shipping containers, surface or air, are required due to the leak-proof construction. Please refer to the declaration of non restricted status for D.O.T. and I.A.T.A. as listed in the Literature section of our website: www.power-sonic.com.

Compact

Power-Sonic batteries utilize state of the art design, high grade materials, and a carefully controlled plate-making process to provide excellent output per cell. The high energy density results in superior power/volume and power/weight ratios.

Low Pressure Valve Regulators

All batteries feature a series of low pressure one-way relief valves. These valves safely release any excessive accumulation of gas inside the battery and then reseal.

High Discharge Rate

Low internal resistance allows discharge currents of up to ten times the rated capacity of the battery. Relatively small batteries may thus be specified in applications requiring high peak currents.

Wide Operating Temperature Range

Power-Sonic batteries may be discharged over a temperature range of -40°C to +60°C (-40°F to +140°F) and charged at temperatures ranging from -20°C to +50°C (-4°F to +122°F).

Rugged Construction

The high impact resistant battery case is made of non-conductive ABS plastic. The case materials impart great resistance to shock, vibration, chemicals and heat. Flame Retardant (FR) battery cases and lids are available where the end application dictates.

Long Service Life

PS/PSH and PSG Series: Have a design life of up to five years in standby applications. In cyclical applications up to 1,000 charge/discharge cycles can be expected depending on average depth of discharge.

PG Series: Have a design life of up to 10 years in float applications.

Please consult this Technical Manual and product specifications to become aware of the many factors that effect product life.

The information contained within is provided as a service to our customers and is for their information only. The information and recommendations set forth herein are made in good faith and are believed to be accurate at the date compiled. Power-Sonic Corporation makes no warranty expressed or implied.

Battery Construction

Terminals

Depending on the model, batteries come either with AMP Faston type terminals made of tin plated brass, post type terminals of the same composition with threaded nut and bolt hardware, or heavy duty flag terminals made of lead alloy.

A special epoxy is used as sealing material surrounding the terminals.

Relief valve

In case of excessive gas pressure build-up inside the battery, the relief valve will open and relieve the pressure. The one-way valve not only ensures that no air gets into the battery where the oxygen would react with the plates causing internal discharge, but also represents an important safety device in the event of excessive overcharge.

Vent release pressure is between 2-6 psi; the seal ring material is neoprene rubber.

Plates (electrodes)

Power-Sonic utilizes the latest technology and equipment to cast grids from a lead-calcium alloy free of antimony. The small amount of calcium and tin in the grid alloy imparts strength to the plate and guarantees durability even in extensive cycle service. Lead dioxide paste is added to the grid to form the electrically active material.

In the charged state, the negative plate paste is pure lead and that of the positive lead dioxide. Both of these are in a porous or spongy form to optimize surface area and thereby maximize capacity. The heavy duty lead calcium alloy grids provide an extra margin of performance and life in both cyclic and float applications and give unparalleled recovery from deep discharge.

Electrolyte

Immobilized dilute sulfuric acid: H_2SO_4 .

Separators

Power-Sonic separators are made of non-woven glass fiber cloth with high heat and oxidation resistance. The material further offers superior electrolyte absorption and retaining ability, as well as excellent ion conductivity.

Case Sealing

Depending on the model the case sealing is ultrasonic, epoxy or heat seal.

Container

Case and lid material is ABS, high impact, resin with high resistance to chemicals and flammability. Case and cover are made of non-conductive ABS plastic to UL94-HB or UL94 V-0.

This case has molded-in dividers for each 2 volt cell.

Leakproof Design & Operational Safety

The leak proof construction of Power-Sonic batteries has ensured that our batteries have been approved for shipment by air, both by D.O.T. and I.A.T.A. Copies of these approvals are available on our website: www.power-sonic.com.

U.L.'s component recognition program for emergency lighting and power batteries lists Power-Sonic under file number MH20845

Theory of Operation

The basic electrochemical reaction equation in a lead acid battery can be written as:



Discharge

During the discharge portion of the reaction, lead dioxide (PbO₂) is converted into lead sulfate (PbSO₄) at the positive plate. At the negative plate sponge lead (Pb) is converted to lead sulfate (PbSO₄). This causes the sulfuric acid (2H₂SO₄) in the electrolyte to be consumed.

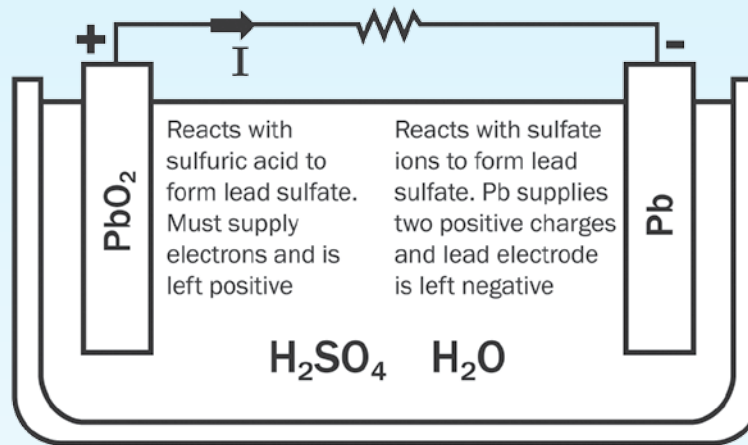


Figure 1: Chemical reaction when a battery is being discharged

Charge

During the recharge phase of the reaction, the cycle is reversed. The lead sulfate (PbSO₄) and water are electrochemically converted to lead (Pb), lead dioxide (PbO₂) and sulfuric acid (2H₂SO₄) by an external electrical charging source.

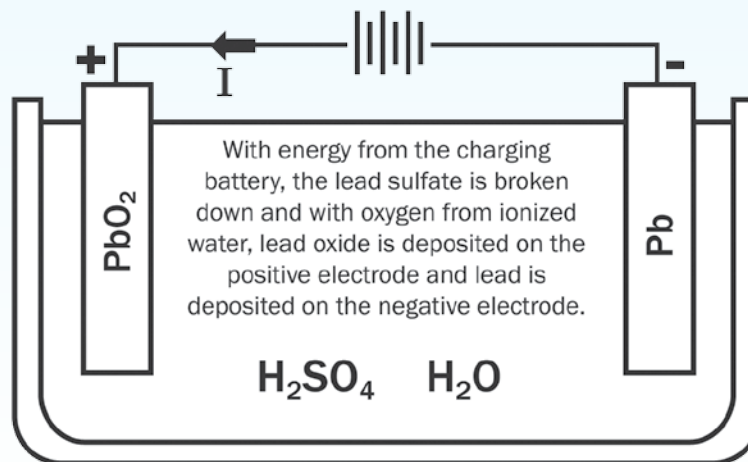


Figure 2: Chemical reaction when a battery is being charged

Theory of Operation

Oxygen Recombination

To produce a truly maintenance-free battery, it is necessary that gases generated during overcharge are recombined in a so-called “oxygen cycle”. Should oxygen and hydrogen escape, a gradual drying out would occur, eventually affecting capacity and battery life.

During charge, oxygen is generated at the positive and reacts with and partially discharges the sponge lead of the negative. As charging continues the oxygen recombines with the hydrogen being generated by the negative, forming water. The water content of the electrolyte thus remains unchanged unless the charging rate is too high.

In case of rapid generation of oxygen exceeding the absorbing capacity of the negative plate, the pressure relief valve will open to release excessive gas.

Deep Discharge

Power-Sonic batteries are protected against cell shorting by the addition of a buffering agent that ensures the presence of acid ions even in a fully discharged state.

Power-Sonic defines “deep discharge” as one that allows the battery voltage under load to go below the cut-off (or “final”) voltage of a full discharge. The recommended cutoff voltage varies with the discharge rate. Table 1 shows the final discharge voltages per cell.

It is important to note that deep discharging a battery at high rates for short periods is not nearly as severe as discharging a battery at low rates for long periods of time. To clarify, let’s analyze two examples:

- **Battery A** – Discharged at the 1C rate to zero volts.
“C” for a 4 AH battery, for example, is 4 amps. Full discharge is reached after about 30 minutes when the battery voltage drops to 1.5V/cell. At this point, only 50% of rated capacity has been discharged ($1\text{ C amps} \times 0.5\text{ hrs} = 0.5\text{C Amp. Hrs}$). Continuing the discharge to zero volts will bring the total amount of discharged ampere-hours to approximately 75% because the rapidly declining voltage quickly reduces current flow to a trickle. The battery will recover easily from this type of deep discharge.
- **Battery B** – Discharged at the 0.01 C rate to zero volts.
0.01C for a 4 AH battery is 40mA. Full discharge is reached after 100+ hours when the terminal voltage drops to 1.75 V/cell. At this point, the battery has already delivered 100% of its rated capacity ($0.01 \times 100\text{ hrs} = 1\text{C Amp. Hrs.}$). Continuing the discharge to zero volts will keep the battery under load for a further period of time, squeezing out every bit of stored energy.

This type of “deep” discharge is severe and is likely to damage the battery. The sooner a severely discharged battery is recharged, the better its chances to fully recover.

Discharge Current	Final Discharge Voltage Per Cell
0.1C or below, or intermittent discharge	1.75
0.17C or current close to it	1.75
0.6C or current close to it	1.70
From 1C to 2C or current close to it	1.50
3C or current close to it and above	1.37

Table 1: Final discharge voltage per cell

Capacity

The capacity of a battery is the total amount of electrical energy available from a fully charged cell or cells. Its value depends on the discharge current, the temperature during discharge, the final (cut-off) voltage and the general history of the battery.

Table 2 shows capacities for various multiples of the 20-hour discharge current for PS, PSH and PSG models.

Rated Capacity	20 Hour Rate		10 Hour Rate		5 Hour Rate		1 Hour Rate	
	Amps	AH	Amps	AH	Amps	AH	Amps	AH
0.5 AH	0.025	0.50	0.045	0.45	0.08	0.40	0.30	0.30
0.8 AH	0.04	0.80	0.072	0.72	0.13	0.65	0.48	0.48
1.1 AH	0.055	1.10	0.10	1.00	0.19	0.95	0.68	0.68
1.4 AH	0.07	1.40	0.13	1.30	0.24	1.20	0.85	0.85
2.0 AH	0.10	2.00	0.19	1.90	0.34	1.70	1.24	1.24
2.3 AH	0.115	2.30	0.225	2.25	0.39	1.95	1.38	1.38
2.5 AH	0.125	2.50	0.22	2.20	0.40	2.00	1.50	1.50
2.8 AH	0.14	2.80	0.25	2.50	0.48	2.40	1.70	1.70
2.9 AH	0.145	2.90	0.26	2.60	0.49	2.45	1.80	1.80
3.2 AH	0.16	3.20	0.30	3.00	0.54	2.70	2.00	2.00
3.4 AH	0.17	3.40	0.33	3.30	0.58	2.90	2.20	2.20
3.5 AH	0.175	3.50	0.33	3.40	0.59	2.95	2.17	2.17
3.8 AH	0.19	3.80	0.35	3.50	0.64	3.20	2.40	2.40
4.5 AH	0.225	4.50	0.41	4.10	0.64	3.20	2.75	2.75
5.0 AH	0.25	5.00	0.43	4.30	0.80	4.00	3.00	3.00
5.4 AH	0.27	5.40	0.50	5.00	0.90	4.50	3.60	3.60
5.5 AH	0.275	5.50	0.54	5.40	0.95	4.75	3.70	3.70
6.0 AH	0.30	6.00	0.56	5.60	0.98	4.90	3.60	3.60
6.5 AH	0.325	6.50	0.61	6.10	1.10	5.50	4.03	4.03
7.0 AH	0.35	7.00	0.63	6.30	1.19	5.95	4.34	4.34
7.2 AH	0.36	7.20	0.70	7.00	1.30	6.50	4.60	4.60
8.0 AH	0.40	8.00	0.78	7.75	1.40	7.00	4.80	4.80
8.5 AH	0.425	8.50	0.81	8.10	1.50	7.50	6.50	6.50
9.0 AH	0.45	9.00	0.83	8.30	1.54	7.70	5.60	5.60
10.0 AH	0.50	10.00	0.93	9.30	1.70	8.50	6.20	6.20
10.5 AH	0.53	10.50	0.98	9.80	1.87	9.35	6.82	6.82
12.0 AH	0.60	12.00	1.15	11.50	2.10	10.50	7.30	7.30
13.0 AH	0.65	13.00	1.22	12.20	2.30	11.50	8.00	8.00
14.0 AH	0.70	14.00	1.30	13.00	2.50	12.50	8.45	8.45
18.0 AH	0.90	18.00	1.70	17.00	3.20	16.00	11.10	11.10
20.0 AH	1.00	20.00	1.85	18.50	3.40	17.00	12.40	12.40
21.0 AH	1.05	21.00	2.00	20.00	3.70	18.50	13.00	13.00
26.0 AH	1.30	26.00	2.40	24.00	4.40	22.00	16.10	16.10
28.0 AH	1.40	28.00	2.62	26.20	5.00	25.00	18.60	18.60
35.0 AH	1.75	35.00	3.30	33.00	6.20	31.00	25.00	25.00
36.0 AH	1.80	36.00	3.35	33.50	6.12	30.60	22.30	22.30
40.0 AH	2.00	40.00	3.80	38.00	6.70	33.50	24.00	24.00
55.0 AH	2.75	55.00	5.10	51.00	8.80	44.00	30.60	30.60
75.0 AH	3.75	75.00	7.20	72.00	13.60	68.00	47.00	47.00
100.0 AH	5.00	100.00	9.20	92.00	15.80	79.00	55.20	55.20
110.0 AH	5.50	110.00	10.30	103.00	17.70	88.50	61.80	61.80
140.0 AH	7.00	140.00	13.50	135.00	24.00	120.00	84.00	84.00
210.0 AH	10.50	210.00	20.00	200.00	36.00	180.00	168.00	168.00

Table 2: Capacities for various multiples of the 20-hour discharge current - PS, PSH and PSG models.

Capacity

Table 3 shows capacities for various multiples of the 20-hour discharge current for PG models.

Rated Capacity	20 Hour Rate		10 Hour Rate		5 Hour Rate		1 Hour Rate	
	Amps	AH	Amps	AH	Amps	AH	Amps	AH
28.0 AH	1.50	30.00	2.80	28.00	5.10	25.50	18.60	18.60
35.0 AH	1.80	36.00	3.50	35.00	6.50	32.50	27.00	27.00
42.0 AH	2.25	45.00	4.20	42.00	7.20	36.00	25.20	25.20
56.0 AH	3.00	60.00	5.60	56.00	9.50	47.50	33.00	33.00
65.0 AH	3.53	70.60	6.50	65.00	11.20	56.00	39.00	39.00
75.0 AH	4.00	80.00	7.50	75.00	12.90	64.50	45.00	45.00
92.0 AH	4.90	98.00	9.20	92.00	15.80	79.00	55.20	55.20
103.0 AH	5.55	111.00	10.30	103.00	17.70	88.50	61.80	61.80
124.0 AH	6.45	129.00	12.40	124.00	21.30	106.50	74.40	74.40
144.0 AH	7.70	154.00	14.40	144.00	24.08	120.40	84.00	84.00
153.0 AH	8.30	166.00	15.30	153.00	26.30	131.50	91.80	91.80
210.0 AH	11.30	226.00	21.00	210.00	36.10	180.50	126.00	126.00

Table 3: PG-Series batteries, by industry convention, are rated at their 10 hour rate.

Capacity, expressed in ampere-hours (AH), is the product of the current discharged and the length of discharge time. The rated capacity (C) of a Power-Sonic battery (PS, PSH and PSG-Series) is measured by its performance over 20 hours of constant current discharge at a temperature of 20°C (68°F) to a cut off voltage of 1.75 volts/cell.

As an example, model PS-610, with a rated capacity of 1.1 AH will deliver 55mA (1/20 of 1.1 AH, or 0.05C) for 20 hours before the voltage reaches an end voltage of 5.25 volts.

By cycling the battery a few times or float charging it for a month or two, the highest level of capacity development is achieved. Power-Sonic batteries are fully charged before leaving the factory, but full capacity is realized only after the battery has been cycled a few times or been on float charge for some time.

When a battery discharges at a constant rate, its capacity changes according to the amperage load. Capacity increases when the discharge current is less than the 20 hour rate and decreases when the current is higher.



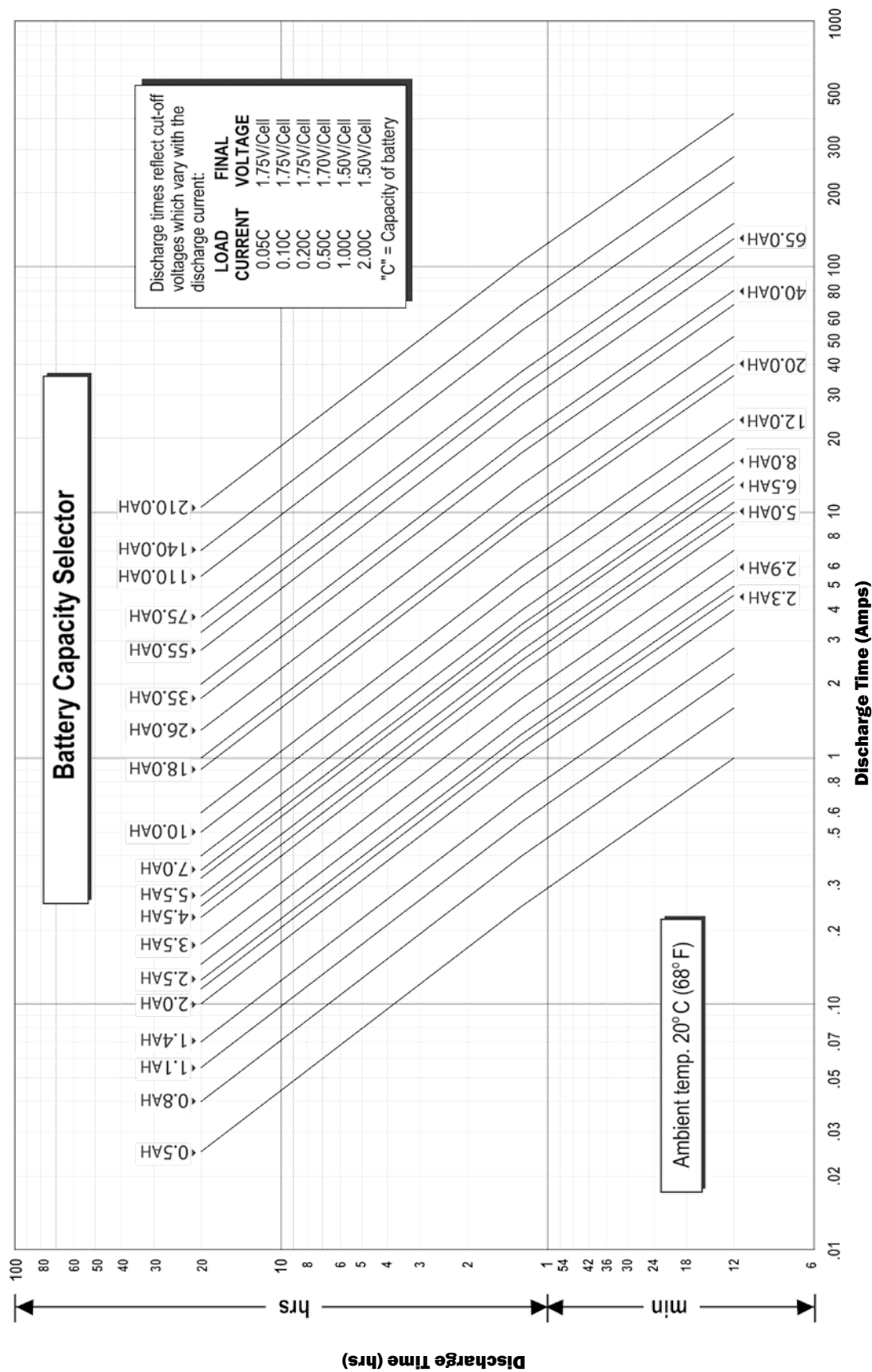


Figure 3: Capacity lines for Power-Sonic batteries

Figure 3 shows capacity lines for major Power-Sonic battery models with different ampere-hour ratings. Amperage is on the horizontal scale and the time elapsed is on the vertical scale; the product of these values is the capacity.

Proper battery selection for a specific application can be made from this graph if the required time and current are known. For example, to determine the proper capacity of a battery providing 3 amps for 20 minutes, locate the intersection of these values on the graph. The line immediately above that point represents the battery which will meet the requirement.

Performance Data

Discharge

During discharge the voltage will decrease. The graphs in Figure 4 illustrate this for different discharge rates and ambient temperatures. "C" is the rated capacity of a battery: "C" for model PS-610 (6V – 1.1 AH) is 1.1AH. By convention the rating of nearly all sealed-lead acid batteries, is based on a 20-hour (0.05C) discharge rate. For larger batteries used for telecom and large UPS systems (our PG-Series) the convention is to use a 10-hour rate (0.1C).

An important feature of Power-Sonic batteries is shown in the discharge curves; namely, the voltage tends to remain high and almost constant for a relatively long period before declining to an end voltage.

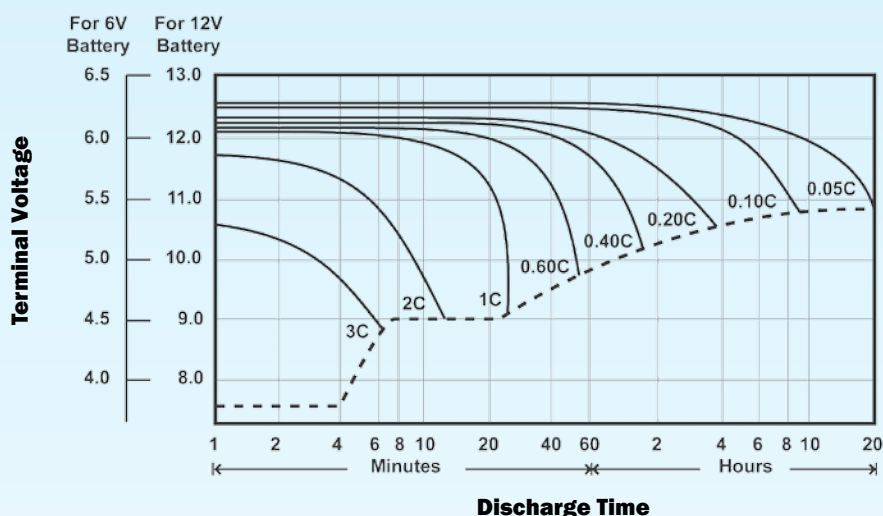


Figure 4: Discharge Characteristic Curves at 20°C (68°F)

Open-Circuit Voltage

Open circuit voltage varies according to ambient temperature and the remaining capacity of the battery. Generally, open circuit voltage is determined by the specific gravity of the electrolyte. Discharging a battery lowers the specific gravity. The open circuit voltage of a Power-Sonic battery is 2.16 V/cell when fully charged and 1.94 V/cell when completely discharged.

As seen in Figure 4, under load, the battery can deliver useful energy at less than 1.94 V/cell, but after the load is removed the open circuit voltage will "bounce back" to voltages shown in Figure 5, dependent upon residual capacity.

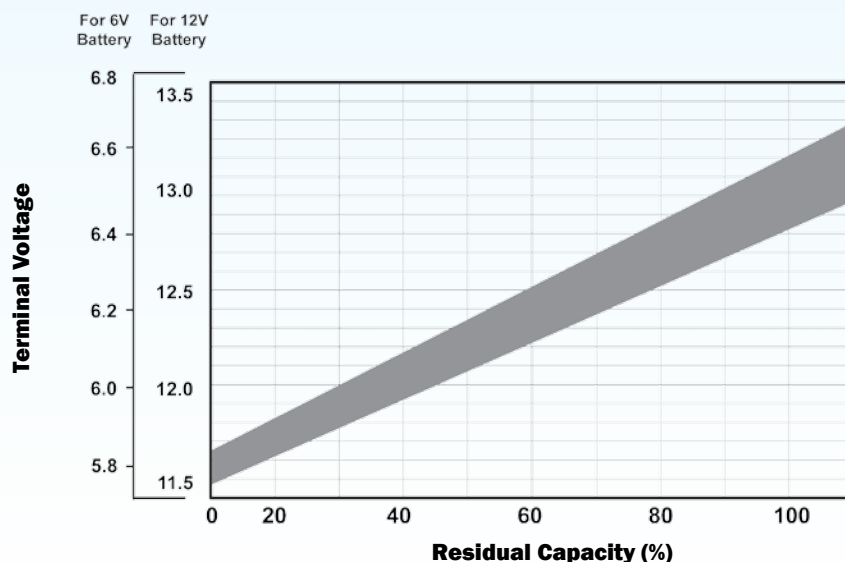


Figure 5: Open-Circuit Voltage Characteristics

Performance Data

Temperature

Actual capacity is a function of ambient temperature and rate of discharge. At 20°C (68°F) rated capacity is 100%. The capacity increases slowly above this temperature and decreases as the temperature falls. Even at -40°C (-40°F), however, the Power-Sonic battery will still function at better than 30% of its rated capacity when discharged at the 20-hour rate (0.05C). At any ambient temperature, the higher the rate of discharge, the lower the available capacity. This relationship is shown in Figure 6.

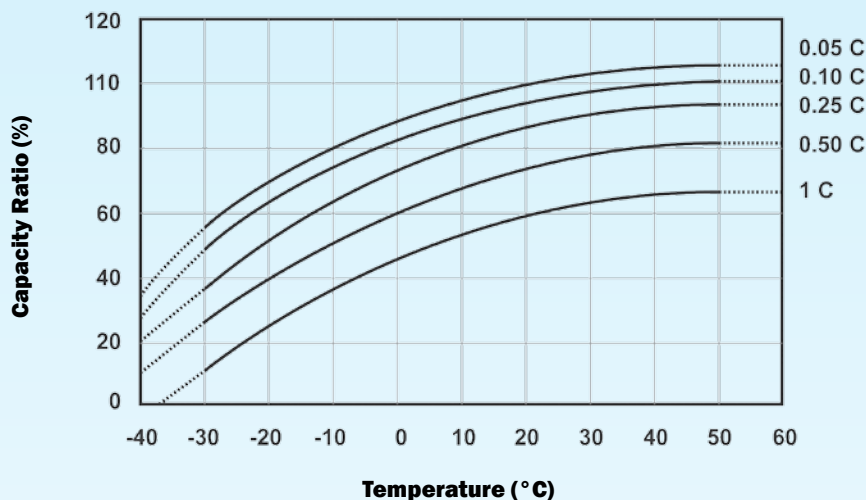


Figure 6: Effect of Temperature on Capacity

Power-Sonic batteries may be discharged at temperatures ranging from -40°C to 60°C (-40°F to 140°F) and charged at temperatures from -20°C to 50°C (-4°F to 122°F).

While raising ambient temperature increases capacity, it also decreases useful service life. It is estimated that battery life is halved for each 10°C (18°F) above normal room temperature.

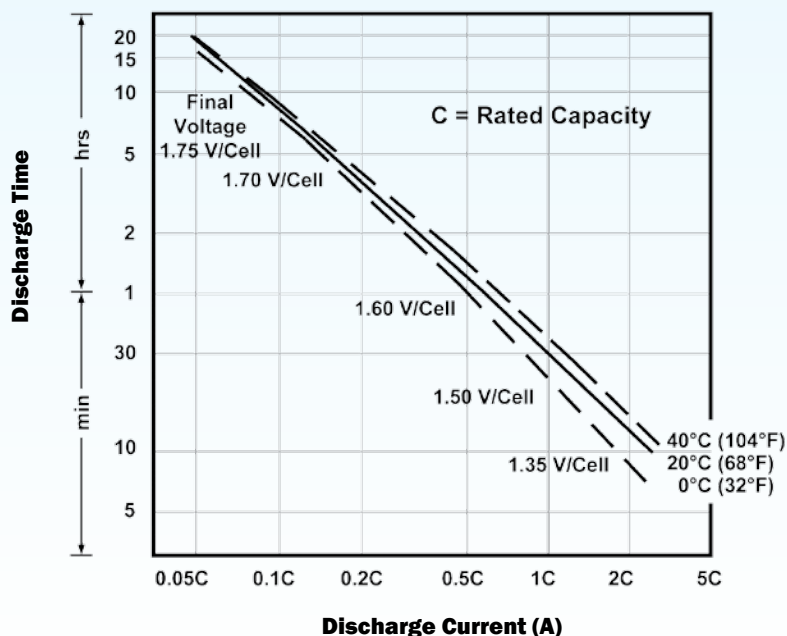


Figure 7: Relationship between current and discharge time for different ambient temperatures

Performance Data

Shelf Life & Storage

Low internal resistance and special alloys in the electrodes assure a low self discharge rate and, consequently, a long shelf life. If kept at 20°C (68°F), about 60-70% of the nominal capacity remains after one year of storage. Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged within 6 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation.

The rate of self discharge varies with the ambient temperature. At room temperature (20°C (68°F)) it is about 3% per month. At low temperatures it is nearly negligible; at higher ambient temperatures self discharge increases. To obtain maximum battery life and performance, batteries should be recharged as soon as possible after each use and not stored in a discharged state. If possible batteries should be stored at 20°C (68°F) or lower, and recharged every six months when not in use.

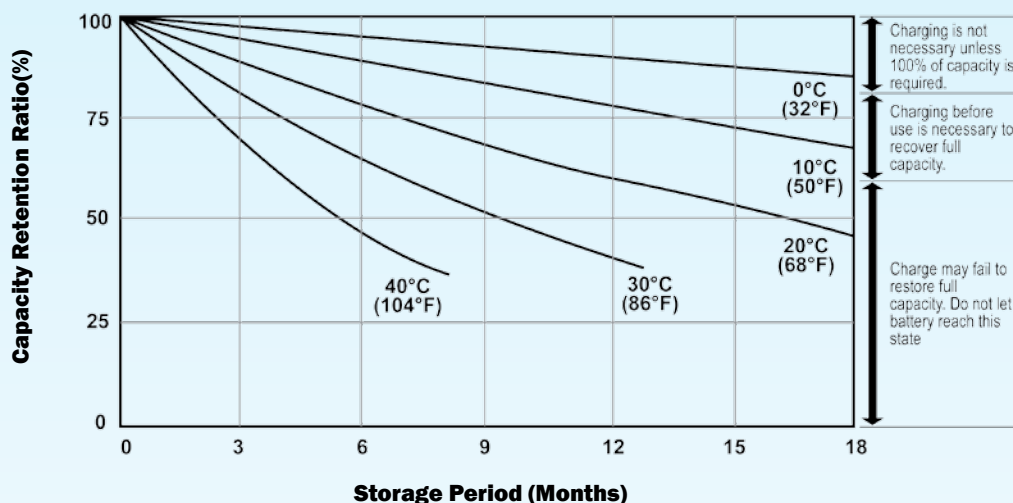


Figure 8: Self Discharge Characteristics

Battery Life

Cyclic Use: The number of charge/discharge cycles depends on the capacity taken from the battery (a function of discharge rate and depth of discharge), operating temperature and the charging method.

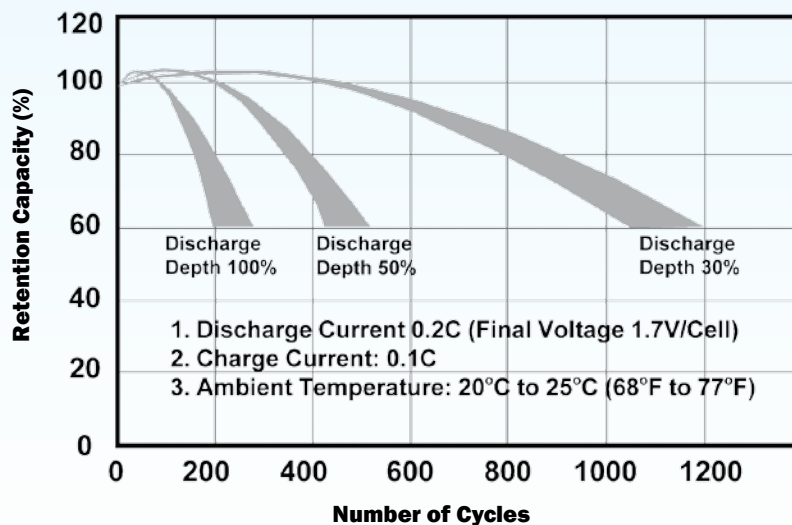


Figure 9: Relationship between depth of discharge and number of cycles as well as increases of capacity during the early cycles.

Performance Data

Battery Life (continued)

Standby Use: The float service life, or life expectancy under continuous charge, depends on the frequency and depth of discharge, the charge voltage, and the ambient temperature. At a float voltage of 2.25V to 2.30V/cell and an ambient temperature of 20°C to 25°C (60°F to 77°F) Power-Sonic batteries should last four to five years before the capacity drops to 60% of its original rating.

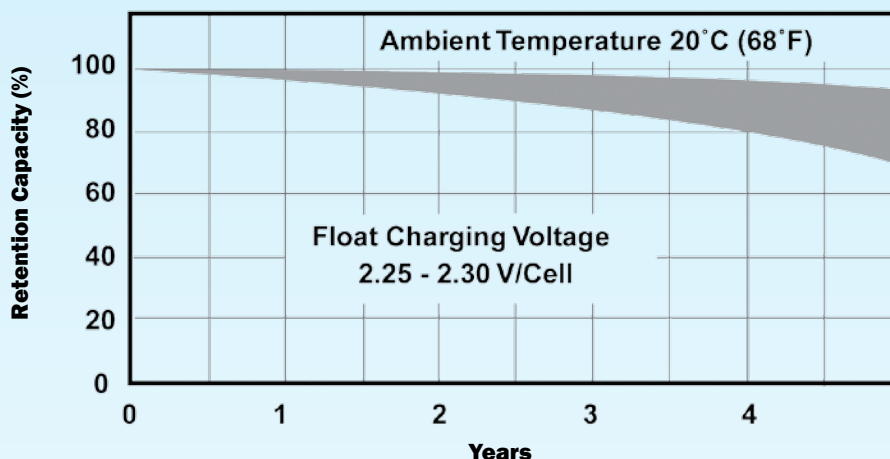


Figure 10: Indicates how capacity changes over time.

The graph in Figure 11 shows life characteristics in float (standby) service for ambient temperatures ranging from 15°C to 55°C (60°F to 130°F). If prevailing ambient temperatures are well above 20°C to 25°C (68°F to 77°F) the life expectancy of this type of battery in float service depends greatly on temperature compensated charging. The typical temperature coefficient is 2mV/cell/20°C and under.

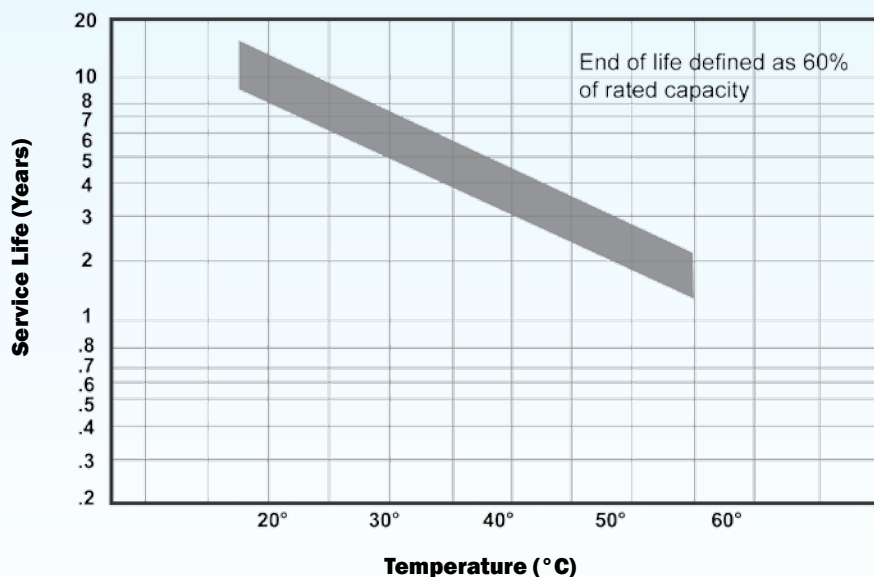


Figure 11: Service life at various ambient temperatures

Performance Data

Over Discharge

To optimize battery life, it is recommended that the battery be disconnected from the load (either electronically or manually) when the end voltage - a function of the discharge rate - is reached. It is the voltage point at which 100% of the usable capacity of the battery has been consumed or continuation of the discharge is useless because of the voltage dropping below useful levels. The final discharge voltages per cell are shown in Table 1 (Page 4).

Discharging a sealed lead-acid battery below this voltage or leaving a battery connected to a load will impair the battery's ability to accept a charge. To prevent potential over discharge problems, voltage cut off circuits as shown in Figure 12 may be used.

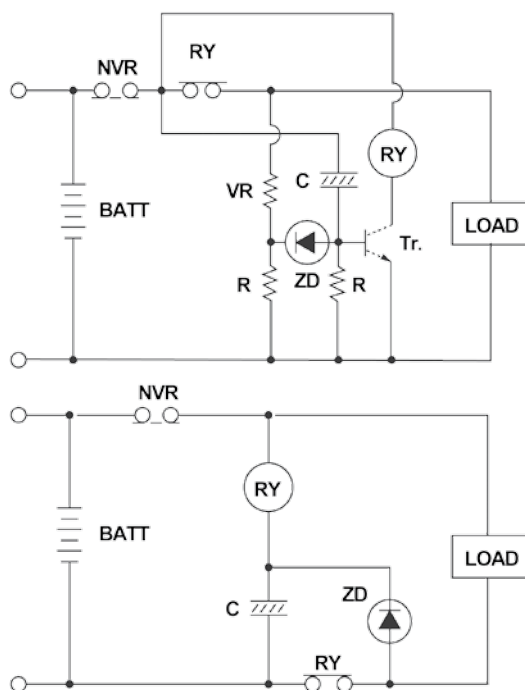


Figure 12: Circuits of Over-Discharge Preventative Device

Charging

Dependable performance and long service life depend upon correct charging. Faulty procedures or inadequate charging equipment result in decreased battery life and/or unsatisfactory performance. The selection of suitable charging circuits and methods is as important as choosing the right battery for the application.

Power-Sonic batteries may be charged by using any of the conventional charging techniques:

- Constant Voltage
- Constant Current
- Taper-Current
- Two Step Constant Voltage

To obtain maximum service life and capacity, along with acceptable recharge time and economy, constant voltage-current limited charging is recommended.

To charge a Power-Sonic SLA battery, a DC voltage between 2.30 volts per cell (float) and 2.45 volts per cell (fast) is applied to the terminals of the battery. Depending on the state of charge, the cell may temporarily be lower after discharge than the applied voltage. After some time, however, it should level off.

During charge, the lead sulfate of the positive plate becomes lead dioxide. As the battery reaches full charge, the positive plate begins generating dioxide causing a sudden rise in voltage due to decreasing internal resistance. A constant voltage charge, therefore, allows detection of this voltage increase and thus control of the current charge amount.

Additional information regarding charging methods can be found on pages 13 through 19.

Charging

Charging Characteristics

During constant voltage or taper charging, the battery's current acceptance decreases as voltage and state of charge increase. The battery is fully charged once the current stabilizes at a low level for a few hours. There are two criteria for determining when a battery is fully charged: (1) the final current level and (2) the peak charging voltage while this current flows.

Charging Methods

Selecting the appropriate charging method depends on the intended use (cyclic or float service), economic considerations, recharge time, anticipated frequency and depth of discharge, and expected service life. The key goal of any charging method is to control the charge current at the end of the charge.

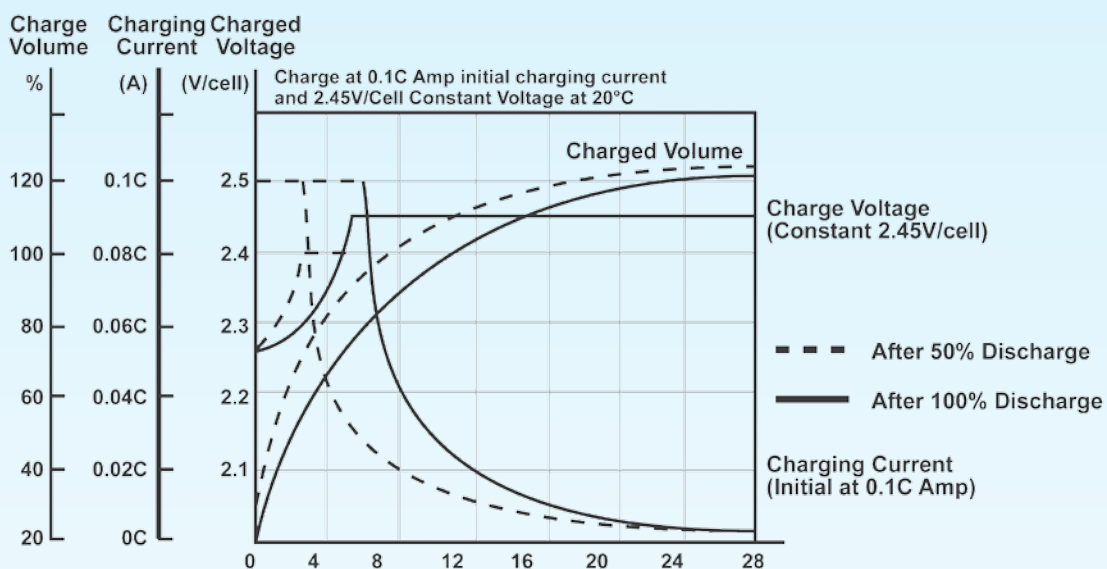


Figure 13: Typical charge characteristics for cycle service where charging is non-continuous and peak voltage can be higher.

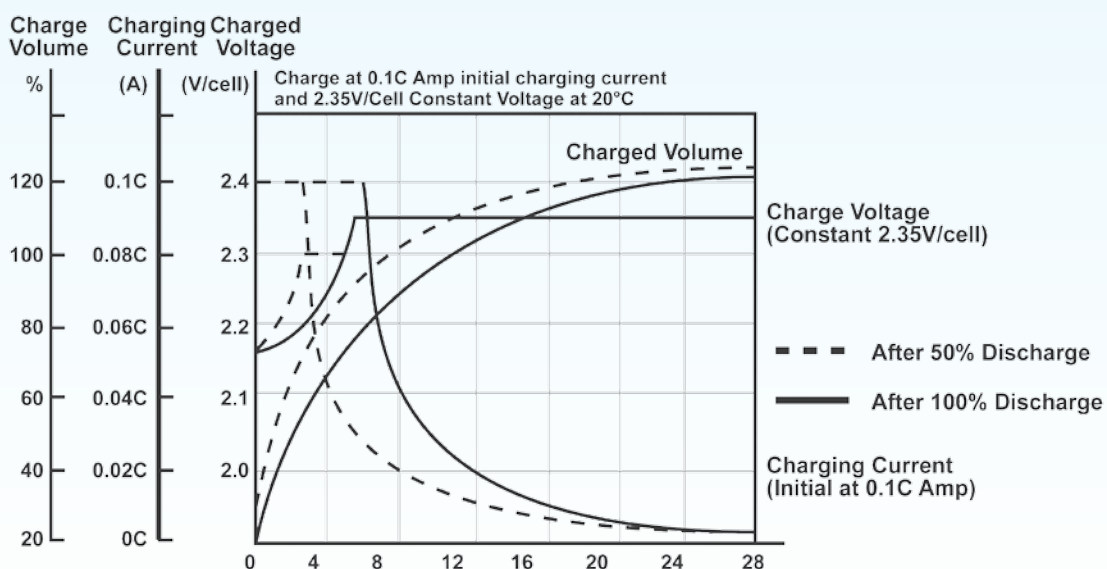


Figure 14: Typical characteristics for standby service type charge. Here, charging is continuous and the peak charge voltage must be lower.

Charging

Constant Voltage Charging

Constant voltage charging is the best method to charge Power-Sonic batteries. Depending on the application, batteries may be charged either on a continuous or non-continuous basis. In applications where standby power is required to operate when the AC power has been interrupted, continuous float charging is recommended. Non-continuous cyclic charging is used primarily with portable equipment where charging on an intermittent basis is appropriate.

The constant voltage charge method applies a constant voltage to the battery and limits the initial charge current. It is necessary to set the charge voltage according to specified charge and temperature characteristics. Inaccurate voltage settings cause over- or under-charge. This charging method can be used for both cyclic and standby applications.

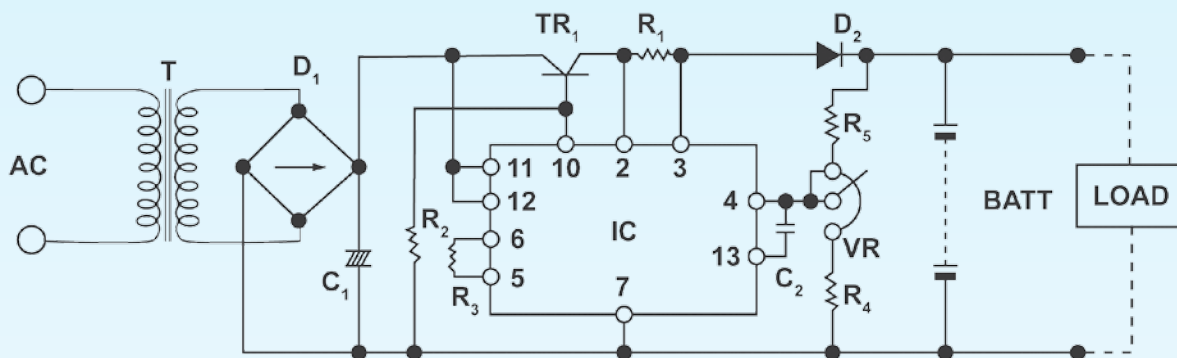


Figure 15: Constant voltage charging circuit

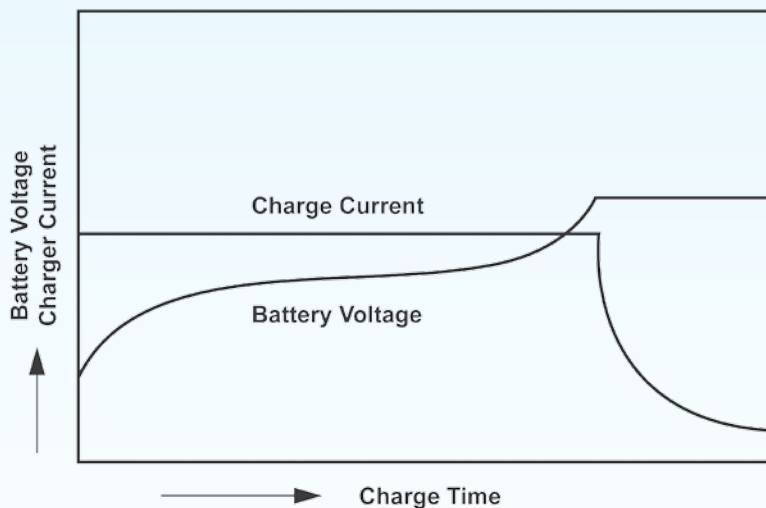


Figure 16: Constant voltage charging characteristics

Charging

Constant Current Charging

Constant current charging is suited for applications where discharged ampere-hours of the preceding discharge cycle are known. Charge time and charge quantity can easily be calculated, however an expensive circuit is necessary to obtain a highly accurate constant current. Monitoring of charge voltage or limiting of charge time is necessary to avoid excessive overcharge.

While this charging method is very effective for recovering the capacity of a battery that has been stored for an extended period of time, or for occasional overcharging to equalize cell capacities, it lacks specific properties required in today's electronic environment.

Taper-Current Charging

This method is not recommended as it is somewhat abusive of sealed lead acid batteries and can shorten service life. However, because of the simplicity of the circuit and low cost, taper-current charging is extensively used to charge multiple numbers and/or for cyclic charging.

When using a taper-current charger the charger time should be limited or a charging cut-off circuit be incorporated to prevent overcharge. Please contact our technical department if you need assistance with this.

In a taper-current charging circuit, the current decreases in proportion to the voltage rise. When designing a taper charger always consider power voltage fluctuations. In this event the internal resistance drop will convert to heat. Heat generated by the circuit should be measured and if required a heat sink should be incorporated in the design.

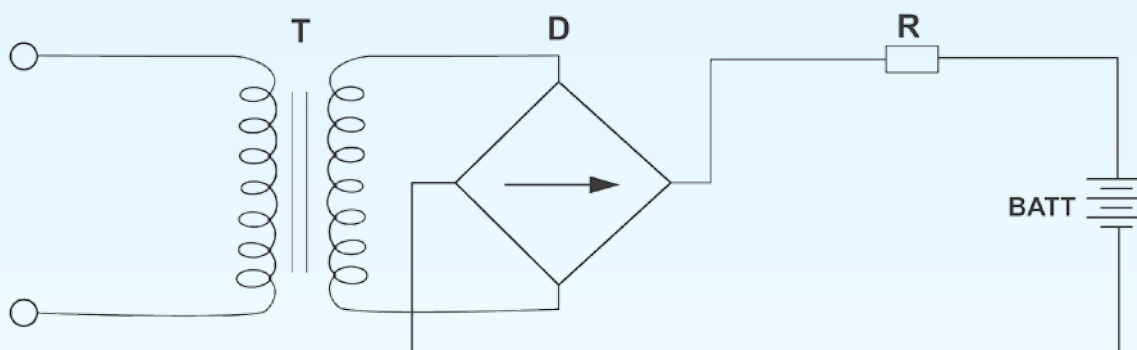


Figure 17: Taper-current charging circuit

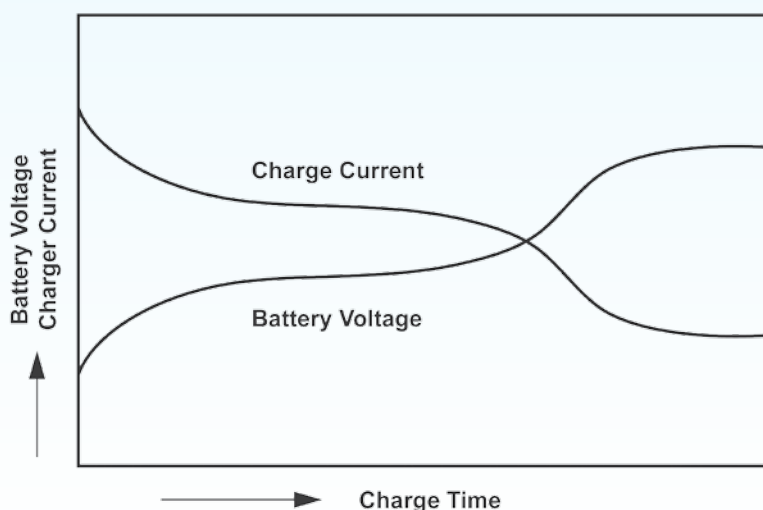


Figure 18: Taper-current charging characteristics for this type of basically unregulated charger.

Charging

Overcharging

As a result of too high a charge voltage excessive current will flow into the battery, after reaching full charge, causing decomposition of water in the electrolyte and premature aging.

At high rates of overcharge a battery will progressively heat up. As it gets hotter, it will accept more current, heating up even further. This is called thermal runaway and it can destroy a battery in as little as a few hours.

Undercharging

If too low a charge voltage is applied, the current flow will essentially stop before the battery is fully charged. This allows some of the lead sulfate to remain on the electrodes, which will eventually reduce capacity.

Batteries which are stored in a discharged state, or left on the shelf for too long, may initially appear to be “open circuited” or will accept far less current than normal. This is caused by a phenomenon called “sulfation”. When this occurs, leave the charger connected to the battery. Usually, the battery will start to accept increasing amounts of current until a normal current level is reached. If there is no response, even to charge voltages above recommended levels, the battery may have been in a discharged state for too long to recover.

Caution! Never charge or discharge a battery in a hermetically sealed enclosure. Batteries generate a mixture of gases internally. Given the right set of circumstances, such as extreme overcharging or shorting of the battery, these gases might vent into the enclosure and create the potential for an explosion when ignited by a spark.

If in any doubt, or if concepts of proper use and care are unclear, please ensure that you contact Power-Sonic's technical department.

Charging for Cycle Operation

Cyclic applications generally require that recharging be done in a relatively short time. The initial charge current, however, must not exceed $0.30 \times C$ amps. Just as battery voltage drops during discharge, it slowly rises during charge. Full charge is determined by voltage and inflowing current. When, at a charge voltage of 2.45 ± 0.05 volts/cell, the current accepted by the battery drops to less than $0.01 \times C$ amps (1% of rated capacity), the battery is fully charged and the charger should be disconnected or switched to a float voltage of 2.25 to 2.30 volts/cell. The voltage should not be allowed to rise above 2.45 ± 0.05 volts/cell.

Charging for Standby Operation

Standby applications generally do not require that the battery be charged as fast or as frequently as in cycle operation. However, the battery must be kept constantly charged to replace the energy that is expended due to internal loss and deterioration of the battery itself. Although these losses are very low in Power-Sonic batteries, they must be replaced at the rate the battery self discharges; at the same time the battery must not be given more than these losses or it will be overcharged. To accomplish this, a constant voltage method of charging called “float charging” is used.

The recommended constant float voltage is 2.25 - 2.30 volts per cell. Maintaining this float voltage will allow the battery to define its own current level and remain fully charged without having to disconnect the charger from the battery. The trickle current for a fully charged battery floating at the recommended charge voltage will typically hover around the $0.001C$ rate (10mA for a 10AH battery, for example.)

The float charger is basically a constant voltage power supply. As in cycle chargers, care must be exercised not to exceed the initial charge current of $0.30 \times C$ amperes.

Charging

Two-Step Constant Voltage Charging

This method uses two constant voltage devices. In the initial charge phase the high voltage setting is used. When charging is nearly complete and the charge voltage has risen to a specified value (with the charge current decreased), the charger switches the voltage to the lower setting. This method allows rapid charging in cycle or float service without the possibility of overcharging, even after extended charging periods.

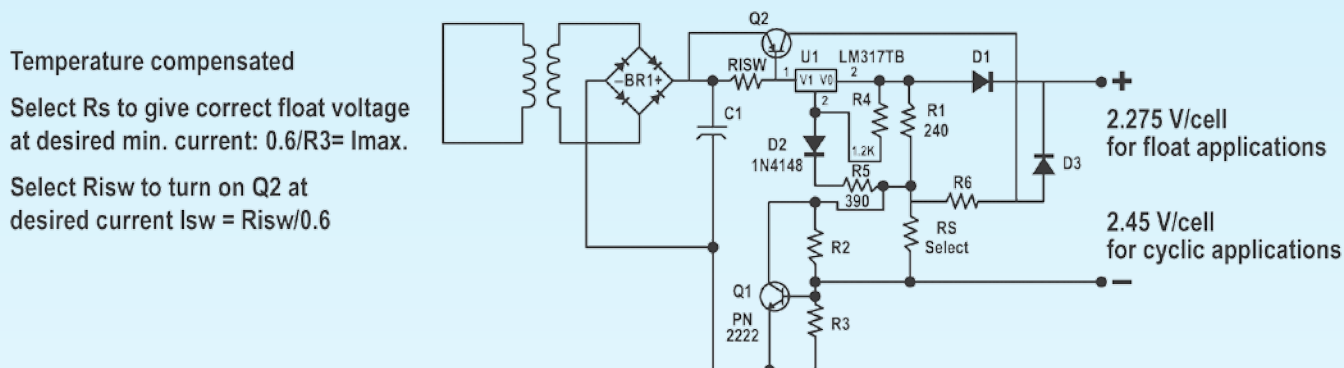


Figure 19: Dual stage current limited battery charger.

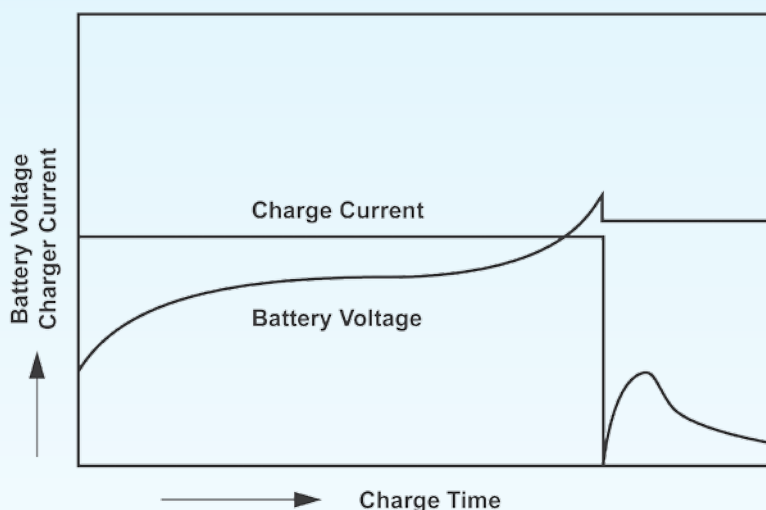


Figure 20: Two-step constant voltage charging characteristics.

Charging in Series

Lead-acid batteries are strings of 2 volt cells connected in series, commonly 2, 3, 4 or 6 cells per battery. Strings of Power-Sonic batteries, up to 48 volts and higher, may be charged in series safely and efficiently. However, as the number of batteries in series increases, so does the possibility of slight differences in capacity. These differences can result from age, storage history, temperature variations or abuse.

Fully charged batteries should never be mixed with discharged batteries when charging in series. The discharged batteries should be charged before connection.

When a single constant voltage charger is connected across an entire high voltage string, the same current flows through all cells in the string. Depending on the characteristics of the individual batteries, some may overcharge while others remain in a slightly undercharged condition.

To minimize the effects of individual battery differences, use batteries of the same age, amp hour, and history and, if possible, charge in strings of no greater than 24 or 48 volts.

Charging

Charging in Parallel

Power-Sonic batteries may be used in parallel with one or more batteries of equal voltage.

When connected in parallel, the current from a charger will tend to divide almost equally between the batteries. No special matching of batteries is required. If the batteries of unequal capacity are connected in parallel, the current will tend to divide between the batteries in the ratio of capacities (actually, internal resistances).

When charging batteries in parallel, where different ratios of charge are to be expected, it is best to make provisions to assure that the currents will not vary too much between batteries.

Temperature Compensation

Power-Sonic batteries perform well both at low and high temperatures. At low temperatures, however, charge efficiency is reduced; at temperatures above 45°C (113°F), charge efficiency increases so rapidly that there is a danger of thermal runaway if temperature compensation is not precise.

The effect of temperature on charge voltage is less critical in float applications than in cyclic use, where relatively high charge currents are applied for the purpose of short recharge times.

Temperature effects should definitely be considered when designing or selecting a charging system. Temperature compensation is desirable in the charging circuit, especially when operating outside the range of 5°C to 35°C (41°F to 95°F). The temperature coefficient is -2mV/cell/°C below 20°C (68°F) in float use and -6mV/cell/°C below 20°C in cyclic use. For higher temperatures the charge voltage should be correspondingly decreased.

Ambient Charge Voltage Per Cell

Temperature	Cyclic Use (V)	Float Use (V)
-40°C (-40°F)	2.85 – 2.95	2.38 – 2.43
-20°C (-4°F)	2.67 – 2.77	2.34 – 2.39
-10°C (14°F)	2.61 – 2.71	2.32 – 2.37
0°C (32°F)	2.55 – 2.65	2.30 – 2.35
10°C (50°F)	2.49 – 2.59	2.28 – 2.33
20°C (68°F)	2.43 – 2.53	2.26 – 2.31
25°C (77°F)	2.40 – 2.50	2.25 – 2.30
30°C (86°F)	2.37 – 2.47	2.24 – 2.29
40°C (104°F)	2.31 – 2.41	2.22 – 2.27
50°C (122°F)	2.25 – 2.35	2.20 – 2.25

Table 4: Recommended charge voltages for different temperatures.

Top Charging

All battery lose capacity through self-discharge, it is recommended that a “top up charge” be applied to any battery that has been stored for a long period of time, prior to putting the battery into service.

To successfully top charge a battery stored for more than 12 months, the open circuit voltage must be higher than 2.0 volts per cell, in this case, always confirm open circuit voltage prior to attempting top up charging.

Charging

Charging Efficiency

The charging efficiency (η) of a battery is expressed by the following formula:

$$\eta = \frac{\text{AH Discharged After Fully Charged}}{\text{AH Delivered to Battery During Charge}}$$

The charging efficiency varies depending upon the state of charge of the battery, temperatures, and charging rates. Figure 21 illustrates the concept of the state of charge and charging efficiency. As shown in Figure 22, Power-Sonic batteries exhibit very high charging efficiency, even when charged at low charging rates.

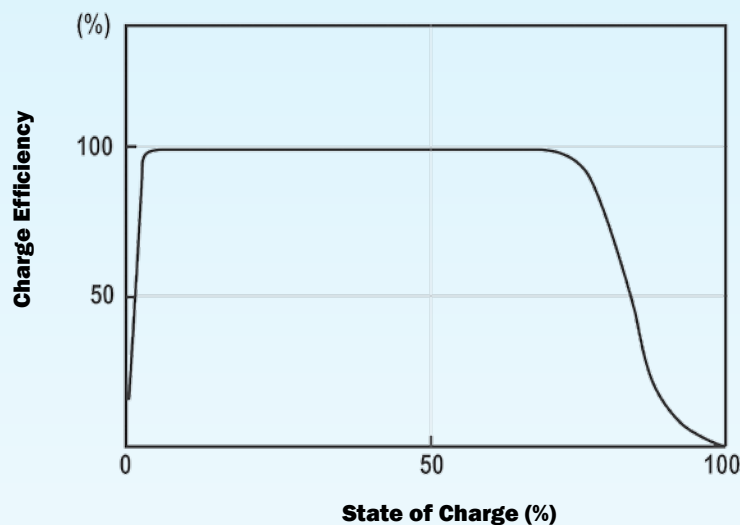


Figure 21: Charge efficiency vs. state of charge.

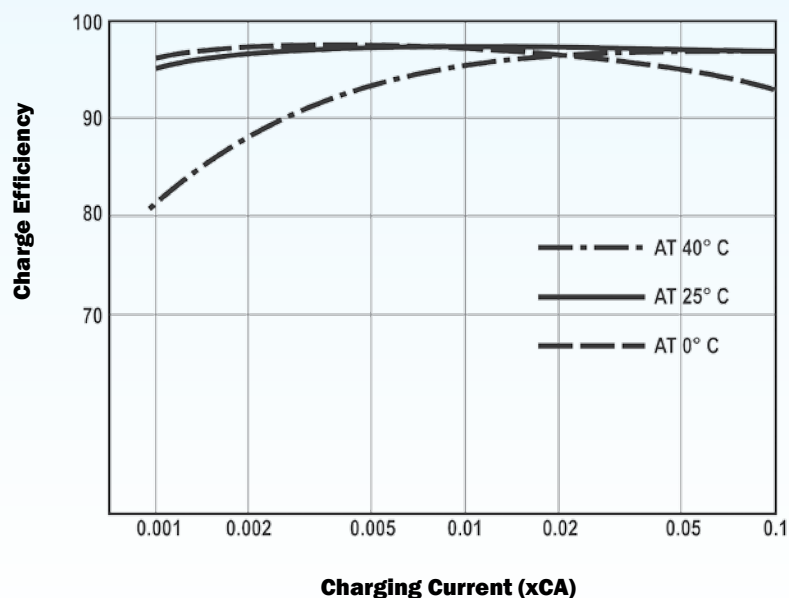


Figure 22: Charge efficiency vs. charging current.

Important Do's and Don'ts

Power-Sonic rechargeable sealed lead-acid batteries are designed to provide years of dependable service. Adherence to the following guidelines will ensure that battery life is maximized and operation is trouble-free.

Material Safety Data Sheets (MSDS)

- It is important that you familiarize yourself with these prior to handling, installing and disposing of all batteries. If there are any questions raised from these please contact Power-Sonic's technical department.

Handling

- Always wear insulated gloves when handling batteries; especially when connecting series and parallel groups of batteries.
- Follow all precautions as described in our Materials Safety Data Sheets (MSDS). This information is subject to change depending upon government legislation. Visit our website: www.power-sonic.com for up-to-date copies of these.
- If equipment is to be stored for a long period of time the batteries should be disconnected to avoid undue drain on the batteries and any potential for damage to the equipment.

Installation

- Fasten batteries tightly and make provisions for shock absorption if exposure to shock or vibration is likely.
- When installing the battery within a piece of equipment, fix it securely at the lowest practicable point.
- The battery should not be attached to any piece of equipment during "burn-in" testing.
- Do not apply undue force to the terminals or bend them. Avoid applying heat to the terminals through processes such as soldering.
- If soldering to the battery terminals is unavoidable it must be accomplished within 3 seconds, using a soldering iron no greater than 100 watts.
- Do not place batteries in close proximity to objects which can produce sparks or flames, and do not charge batteries in an inverted position.
- Avoid exposing batteries to heat! Care should be taken to place batteries away from heat-emitting components. If close proximity is unavoidable, provide ventilation. Service life is shortened considerably' at ambient temperatures above 30 °C (86 °F).
- To prevent problems arising from heat exchange between batteries connected in series or parallel, it is advisable to provide air space of at least 0.4" (10mm) between batteries.
- Do not mix batteries with different capacities, different ages or of different makes. The difference in characteristics will cause damage to the batteries and possibly to the attached equipment.
- Battery cases and lids made of ABS plastic can sustain damage if exposed to organic solvents or adhesives.
- For best results and generally acceptable performance and longevity, keep operating temperature range between -40 °C (-40 °F) and 60 °C (140 °F).
- It is good practice to ensure that the connections are re-torqued and the batteries are cleaned periodically.
- Do not attempt to disassemble batteries. Contact with sulfuric acid may cause harm. Should it occur, wash skin or clothes with liberal amounts of water. Do not throw batteries into a fire; batteries so disposed may rupture or explode. Disassembled batteries are hazardous waste and must be treated accordingly.

Important Do's and Don'ts

Charging

- Batteries should not be stored in a discharged state or at elevated temperatures. If a battery has been discharged for some time, or the load was left on indefinitely, it may not readily take a charge. To overcome this, leave the charger connected and the battery should eventually begin to accept charge.
- Continuous over-or undercharging is the single worst enemy of a lead-acid battery. Caution should be exercised to ensure that the charger is disconnected after cycle charging, or that the float voltage is set correctly.
- Although Power-Sonic batteries have a low self-discharge rate which permits storage of a fully charged battery for up to a year, it is important that a battery be charged within 6 months after receipt to account for storage from the date of manufacture to the date of purchase. Otherwise, permanent loss of capacity might occur as a result of sulfation. To prolong shelf life without charging, store batteries at 10°C (50°F) or less.
- Although it is possible to charge Power-Sonic batteries rapidly, i.e. in 6-7 hrs. it is not normally recommended. Unlimited current charging can cause increased off-gassing and premature drying. It can also produce internal heating and hot spots resulting in shortened service life. Too high a charge current will cause a battery to get progressively hotter. This can lead to "thermal runaway" and can destroy a battery in as little as a few hours.
- Caution: Never charge or discharge a battery in an airtight enclosure. Batteries generate a mixture of gases internally. Given the right set of circumstances, such as extreme overcharging or shorting of the battery, these gases might vent into the enclosure and create the potential for an explosion when ignited by a spark. Generally, ventilation inherent in most enclosures is sufficient to avoid problems.
- When charging batteries in series (positive terminal of one battery is connected to the negative terminal of another) the interconnecting cables must all be of equal length and resistance to insure equalization of the load. All batteries in the string will receive the same amount of charge current, though individual battery voltages may vary.
- When charging batteries in parallel (positive terminals are connected to the positive terminal and negative terminals to the negative), all batteries in the string will receive the same charge voltage, but the charge current each battery receives will vary until equalization is reached.
- High voltage strings of batteries in series should be limited to twenty 6 volt or ten 12 volt batteries when a single constant voltage charger is connected across the entire string. Differences in capacity can cause some batteries to overcharge while others remain undercharged thus causing premature aging of batteries. It is, therefore, not advisable to mix batteries of different capacities, make, or age in a series string.
- To minimize the effects of cell or battery differences, charge the string in 24 volt battery groups through a constant current source with zener diode regulation across individual batteries or battery groups.
- Recharge time depends on the depth of the preceding discharge and the output current of the charger. To determine the approximate recharge time of a fully discharged battery, divide the battery's capacity (amp. hrs) by the rated output of the charger current (amps) and multiply the resulting number of hours by a factor of 1.75 to compensate for the declining output current during charge. If the amount of amp. hrs. discharged from the battery is known, use it instead of the battery's capacity to make the calculation.



Notes

This image shows a single sheet of white paper with horizontal blue lines, resembling notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Notes

Glossary

Active Material

The active electro-chemical materials used in the manufacture of positive and negative electrodes.

Ambient Temperature

The prevailing surface temperature to which a battery is exposed.

Ampere

Unit of measurement for electric current.

Ampere-Hour

The product of current (amperes) multiplied by time (hours). Used to indicate the capacity of a battery. Also Amp. Hr. or A.H.

Battery

Two or more cells connected together, most typically in series.

C

Used to signify a charge or discharge rate equal to the capacity of a battery divided by one hour. Thus C for a 1600 mAh battery would be 1.6 A. C/5 for the same battery would be 320 mA and C/10 would be 160 mA.

Capacity

The electrical energy available from a cell or battery expressed in ampere-hours.

- **Available capacity:** ampere-hours that can be discharged from a battery based on its state of charge, rate of discharge, ambient temperature, and specified cut-off voltage.
- **Rated capacity ("C"):** the discharge capacity the manufacturer states may be obtained at a given discharge rate and temperature.
- **Capacity fade:** the loss of capacity due to inadequate recharging.

Cell

The basic building block of a battery. The nominal voltage of a lead-acid cell is 2 volts.

- **Cell reversal:** the act of driving a cell into reverse polarity by excessive discharge.
- **Primary cell:** cell or battery that can be discharged only once.
- **Secondary cell:** the process is reversible so that charging and discharging may be repeated over and over.

Charge

The conversion of electrical energy to chemical energy; the process which restores electrical energy to a cell or battery.

- **Charge retention:** a battery's ability to hold a charge. It diminishes during storage.
- **Charge acceptance:** quantifies the amount of electric charge that accumulates in a battery.
- **Float charge:** maintains the capacity of a cell or battery by applying a constant voltage.

Charge (Continued)

- **Trickle charge:** maintains the capacity of a cell or battery by applying a small constant current.
- **Charge equalization:** brings all of the cells in a battery or string to the same state of charge.

Closed Circuit Voltage Test

A test method in which the battery is briefly discharged at a constant current while the voltage is measured.

Cutoff Voltage

The final voltage of a cell or battery at the end of charge or discharge.

Cycle

A single charge and discharge of a cell or battery.

Deep Cycle

A cycle in which the discharge continues until the battery reaches its cut-off voltage, usually 80% of discharge.

Direct Current (DC)

The type of electrical current that a battery can supply. One terminal is always positive and the other always negative.

Discharge

The process of drawing current from a battery.

- **Deep Discharge:** the discharge of a cell or battery to between 80% and 100% of rated capacity.
- **Depth of Discharge:** the amount of capacity - typically expressed as a percentage - removed during discharge.
- **Self Discharge:** the loss of capacity while stored or while the battery is not in use.
- **Self Discharge Rate:** the percent of capacity lost on open circuit over a specified period of time.

Drain

The withdrawal of current from a battery.

Electrode

Positive or negative plate containing materials capable of reacting with electrolyte to produce or accept current.

Electrolyte

Conducts ions in a cell. Lead acid batteries use a sulfuric acid solution.

End of Charge Voltage

The voltage reached by the cell or battery at the end of charge, while the charger is still attached.

Energy Density

Ratio of battery energy to volume or weight expressed in watt-hours per cubic inch or pound.

Glossary

Gas Recombination

The process by which oxygen gas generated from the positive plate during the final stage of charge is absorbed into the negative plate, preventing loss of water.

High Rate Discharge

A very rapid discharge of the battery. Normally in multiples of C (the rating of the battery expressed in amperes).

Impedance

The resistive value of a battery to an AC current expressed in ohms (Ω). Generally measured at 1000 Hz at full charge.

Internal Resistance

The resistance inside a battery which creates a voltage drop in proportion to the current draw.

Negative Terminal

The terminal of a battery from which electrons flow in the external circuit when a battery discharges. See Positive Terminal

Nominal Voltage / Nominal Capacity

The nominal value of rated voltage / the nominal value of rated capacity. The nominal voltage of a lead-acid battery is 2 volts per cell.

Open Circuit Voltage

The voltage of a battery or cell when measured in a no load condition.

Overcharge

The continuous charging of a cell after it achieves 100% of capacity. Battery life is reduced by prolonged overcharging.

Parallel Connection

Connecting a group of batteries or cells by linking all terminals of the same polarity. This increases the capacity of the battery group.

Polarity

The charges residing at the terminals of the battery.

Positive Terminal

The terminal of a battery toward which electrons flow through the external circuit when the cell discharges. See Negative Terminal.

Rated Capacity

The capacity of the cell expressed in amperes. Commonly, a constant current for a designated number of hours to a specified depth of discharge at room temperature.

Recombination

The state in which the gasses normally formed within the battery cell during its operation are recombined to form water.

Series Connection

The connection of a group of cells or batteries by linking terminals of opposite polarity. This increases the voltage of the battery group.

Self Discharge

The loss of capacity of a battery while in stored or unused condition without external drain.

Separator

Material isolating positive from negative plates. In sealed lead acid batteries it normally is absorbent glass fiber to hold the electrolyte in suspension.

SLA Battery

Sealed lead-acid battery, generally having the following characteristics: Maintenance-free, leak-proof, position-insensitive. Batteries of this type have a safety vent to release gas in case of excessive internal pressure build-up. Hence also the term: Valve regulated battery.

“Gel Cells” are SLA batteries whose dilute sulfuric acid electrolyte is immobilized by way of additives which turn the electrolyte into a gel.

Service Life

The expected life of a battery expressed in the number of total cycles or years of standby service to a designated remaining percentage of original capacity.

Shelf Life

The maximum period of time a battery can be stored without supplementary charging.

Standby Service

An application in which the battery is maintained in a fully charged condition by trickle or float charging.

State of Charge

The available capacity of a battery at a given time expressed as a percentage of rated capacity.

Sulfation

The formation or deposit of lead sulfate on the surface and in the pores of the active material of the batteries' lead plates. If the sulfation becomes excessive and forms large crystals on the plates the battery will not operate efficiently and may not work at all.

Thermal Runaway

A condition in which a cell or battery on constant potential charge can destroy itself through internal heat generation.

Valve Regulated Lead Acid Battery (VRLA)

See “SLA Battery” listed above.



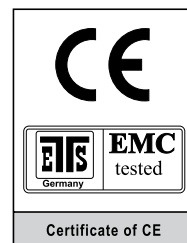
Quality is always #1

We employ IQC, PQC and ISO 9001 Quality Management Systems to test materials, monitor manufacturing processes and evaluate finished products prior to shipment. All our batteries are 100% tested with advanced computer equipment prior to being released for sale.

Power-Sonic management and staff are committed to providing the best possible service to satisfy our customer's needs, and fulfill our undertaking to deliver top grade products on time and at a competitive price.



Certificate of UL



Certificate of CE



Certificate of ISO9001

Our batteries are manufactured to international standards including JIS, DIN and IEC and have UL and CE certification.

Corporate Headquarters and Domestic Sales

Power-Sonic Corporation • 7550 Panasonic Way • San Diego, CA 92154 • USA
 Phone: (619) 661-2020 • Fax: (619) 661-3650
 Support: technical-support@power-sonic.com
 Sales: national-sales@power-sonic.com
 Customer Service: customer-service@power-sonic.com

International Sales

Power-Sonic Corporation • P.O. Box 5242 • Redwood City, CA 94063 • USA
 Phone: (650) 364-5001 • Fax: (650) 366-3662
 Sales: international-sales@power-sonic.com

European Sales

Power-Sonic Europe, Ltd. • 3 Buckingham Square, Hurricane Way • Wickford, Essex SS11 8YQ • England
 Phone: (1268) 560686 • Fax: (1268) 560902
 Sales: sales@power-sonic.co.uk
 Website: www.power-sonic.co.uk

www.power-sonic.com

RTS151

Remote Test Station

SPECIFICATIONS

Dimensions:	4.8" H × 2.90" W × 1.4" D
Weight:	.16 lbs.
Power Requirements	
Alarm LED:	2.8 – 32 VDC, 10 mA max.
Coil Current:	95 mA max.
Test Switch:	10 VA @ 32 VDC
Reset Switch:	10 VA @ 32 VDC
Alarm Response Time:	40 sec. max.
Temperature:	-10°C to 60°C (14°F to 140°F)
Humidity:	95% RH Non-condensing Max
Listing:	UL, FM, CE

NOTE: RTS151 replaces RTS451.

NOTICE: This manual shall be left with the owner/user of this equipment.

NOTE: A test coil is required only for use with D2/DNR/DH400/DH500 models. For D2 models order part #DCoil. For the DH400/500 models order part is #Coil.

GENERAL INFORMATION

System Sensor's RTS151 is an automatic fire detector accessory designed to test a remotely located detector. Consult detector installation instructions for additional information.

The National Fire Protection Association has published codes, standards, and recommended practices for the installation and use of the above product. It is recommended that the installer be familiar with these requirements, with local codes, and any special requirements of the local authority having jurisdiction.

RTS151 CONTENTS

- 1 RTS151 remote test station
- 1 screw pack (2 mounting screws)
- 1 M02-04 test magnet

WIRING OF RTS151

Consult the appropriate detector installation instructions for the applicable wiring diagram. The RTS151 mounts to a single gang box (2 1/2" minimum depth), or directly to the wall or ceiling.

See Figure 8 for wiring diagram of RTS151 with Duct Smoke Detectors.

In Canadian applications, the RTS151 is intended to be located in the same room as the smoke detector and within 60 feet of the unit.

OPERATION

Test Function

Place and hold the painted side of the magnet to the test location RTS151.

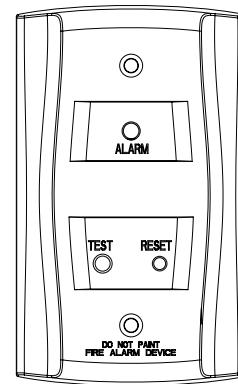
Alarm Indication

With the magnet in place some time will elapse (40 sec. maximum) depending on the detector type, before the alarm indicating LED will light.

Reset Function

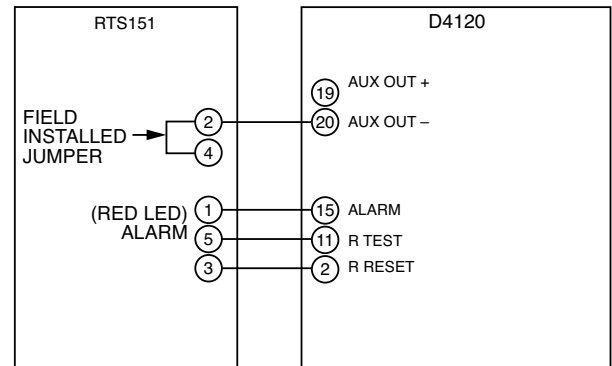
Gently insert a 1/8" maximum diameter tool into the hole until it stops and LED turns off. The RTS151 is capable of resetting only certain System Sensor models of detectors. Refer to detector installation instructions for additional information.

FIGURE 1. RTS151 REMOTE TEST STATION:



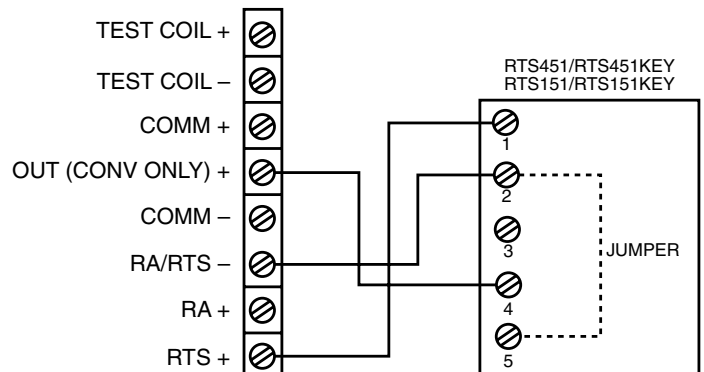
H0196-01

FIGURE 2. WIRING DIAGRAM FOR RTS151 TO D4120 4-WIRE DUCT SMOKE DETECTOR:



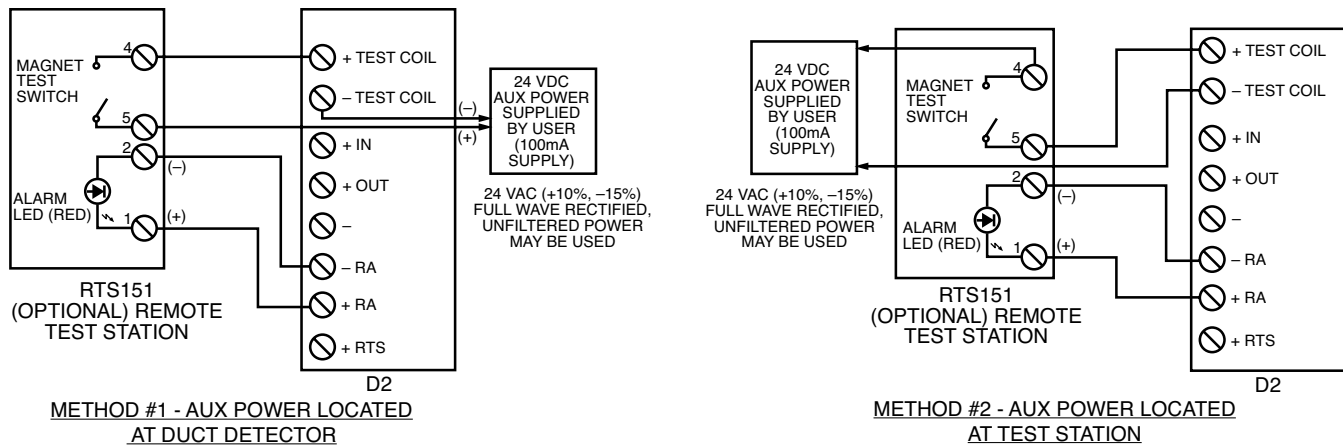
H0582-20

FIGURE 3. WIRING DIAGRAM FOR RTS151 TO DNR 2-WIRE DUCT SMOKE DETECTOR WITH REMOTE TEST CAPABLE HEAD:



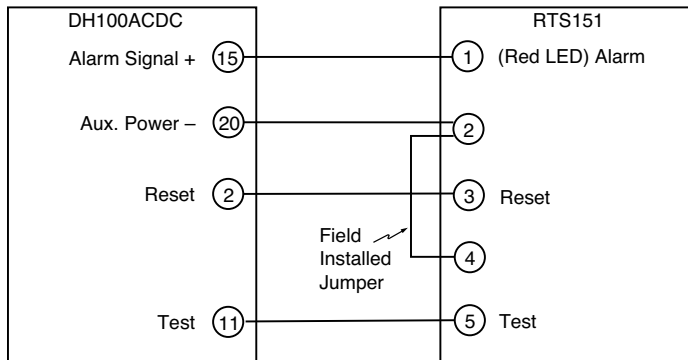
H0633-00

FIGURE 4. WIRING DIAGRAM FOR RTS151 TO D2-2WIRE DUCT SMOKE DETECTOR:



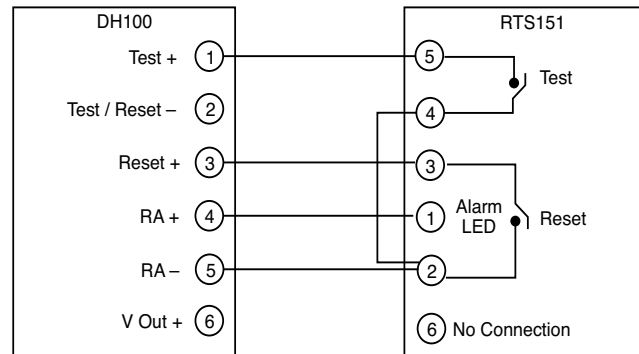
H0612-11

FIGURE 5. WIRING DIAGRAM FOR RTS151 TO DH100ACDC 4-WIRE DUCT SMOKE DETECTOR:



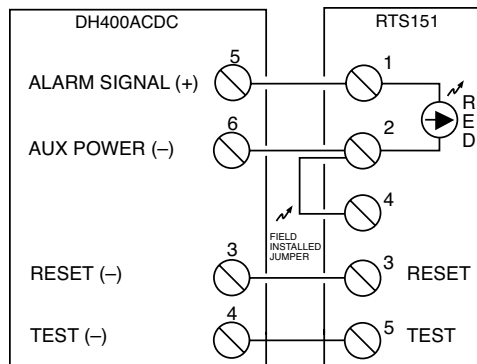
H0197-01

FIGURE 6. WIRING DIAGRAM FOR RTS151 TO DH100 2-WIRE DUCT SMOKE DETECTOR:



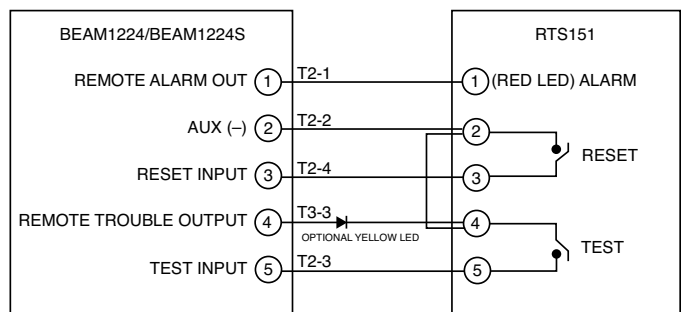
H0198-04

FIGURE 7. WIRING DIAGRAM FOR RTS151 TO DH400ACDC DUCT SMOKE DETECTOR:



H0149-02

FIGURE 8. WIRING DIAGRAM FOR RTS151 TO BEAM1224/ BEAM1224S SMOKE DETECTOR:



H0586-03

Three-Year Limited Warranty

System Sensor warrants its enclosed product to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for the enclosed product. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the replacement of any part of the product which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture. After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns Department, RA

_____, 3825 Ohio Avenue, St. Charles, IL 60174. Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture. In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other Warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.



3825 Ohio Avenue, St. Charles, Illinois 60174

1-800-SENSOR2, FAX: 630-377-6495

www.systemsensor.com

156-3051-007R

DNR Duct Smoke Detector

SPECIFICATIONS

Operating Temperature:	-4° to 158° F (-20° to 70° C); 32° F to 120° F (0° C to 49° C) with module installed in the DNR
Storage Temperature:	-22° to 158° F (-30° to 70° C)
Humidity:	0% to 93% Relative Humidity Non-condensing
Air Velocity:	100 to 4000 ft./min. (0.5 to 20.3 m/sec.)
Rectangular Footprint Dimensions:	14.38 in L × 5 in W × 2.5 in D (37 cm L × 12.7 cm W × 6.35 cm D)
Square Footprint Dimensions:	7.75 in L × 9 in W × 2.5 in D (19.7 cm L × 22.9 cm W × 6.35 cm D)
Weight:	1.6 pounds; 0.73 kg
Electrical (See applicable detector head installation manual for electrical specifications. Use the Base/Sensor Cross Reference chart at http://www.systemsensor.com to determine applicable sensor head.)	

Table of Contents

	Page
[1] Limitations of Duct Smoke Detectors	1
[2] General Description	1
[3] Contents of the Duct Smoke Detector Kit	1
[4] Detector Installation	1
[5] Sampling Tube Installation	2
[6] Measurement Tests	3
[7] Field Wiring	4
[8] Verification of Operation	4
[9] Detector Cleaning Procedures	5
[10] Sensor Replacement	5
[11] Optional Accessories	5
Warranty	6

BEFORE INSTALLING

Read the System Sensor Guide for *Proper Use of Smoke Detectors in Duct Applications* (A05-1004), which provides detailed information on detector spacing, placement, zoning, wiring, and special applications. Copies of this manual are available online at www.systemsensor.com. NFPA Standards 72 and 90A should also be referenced for detailed information.

NOTICE: This manual shall be left with the owner/user of this equipment.
IMPORTANT: This detector must be tested and maintained regularly following NFPA 72 requirements. The detector should be cleaned at least once a year.

[1] LIMITATIONS OF DUCT SMOKE DETECTORS



The National Fire Protection Association has established that DUCT DETECTORS MUST NOT BE USED AS A SUBSTITUTE FOR OPEN AREA DETECTOR PROTECTION as a means of providing life safety. Nor are they a substitute for early warning in a building's regular fire detection system.

System Sensor supports this position and strongly recommends that the user read NFPA Standards 90A, 72, and 101. The DNR Air Duct Smoke Detectors are listed per UL 268A.

This device will not operate without electrical power. Fire situations may cause an interruption of power. The system safeguards should be discussed with your local fire protection specialist.

This device will not sense smoke unless the ventilation system is operating and the cover is installed.

For this detector to function properly, it MUST be installed according to the instructions in this manual. Furthermore, the detector MUST be operated within ALL electrical and environmental specifications listed in this manual and the sensor head installation manual. Failure to comply with these requirements may prevent the detector from activating when smoke is present in the air duct.

ACCESSORY CURRENT LOADS AT 24 VDC

DEVICE	STANDBY	ALARM
RA400Z/RA100Z	0mA	12mA Max.
RTS451/RTS151	0mA	12mA Max.
RTS451KEY/RTS151KEY	0mA	12mA Max.

[2] GENERAL DESCRIPTION

Smoke introduced into this air duct system will be distributed throughout the entire building. Smoke detectors designed for use in air duct systems are used to sense the presence of smoke in the duct.

Model DNR Air Duct Smoke Detector utilizes photoelectric technology for the detection of smoke. This detection method, when combined with an efficient housing design, samples air passing through the duct and allows detection of a developing hazardous condition. When sufficient smoke is sensed, an alarm signal is initiated at the fire control panel monitoring the detector, and appropriate action can be taken to shut off fans, blowers, change over air handling systems, etc. These actions can facilitate the management of toxic smoke and fire gases throughout the areas served by the duct system.

The DNR incorporates a sensor cover tamper feature that provides a trouble signal at the panel immediately if the cover is removed or improperly installed. Proper installation of the sensor cover removes the trouble condition.

When programmed with the system control panel, two LEDs on each duct smoke detector light to provide local visible indication.

The DNR provides a remote alarm output for use with auxiliary devices, such as the RA400Z/RA100Z remote LED annunciator, as well as remote test capability with the RTS451/RTS151 or RTS451KEY/RTS151KEY Remote Test Stations.

[2.1] DETECTOR FEATURE SET

- Utilizes plug-in head
- Sampling tubes install from front and rear
- Compatible with existing accessories
- Able to address detector per code switches on sensor head.

[3] CONTENTS OF THE DUCT SMOKE DETECTOR KIT

1. Sensor/power side and covers (use appropriate sensor per the system control panel)
2. Three #10 sheet metal screws for mounting
3. Drilling template
4. One sampling tube end cap
5. One plastic exhaust tube

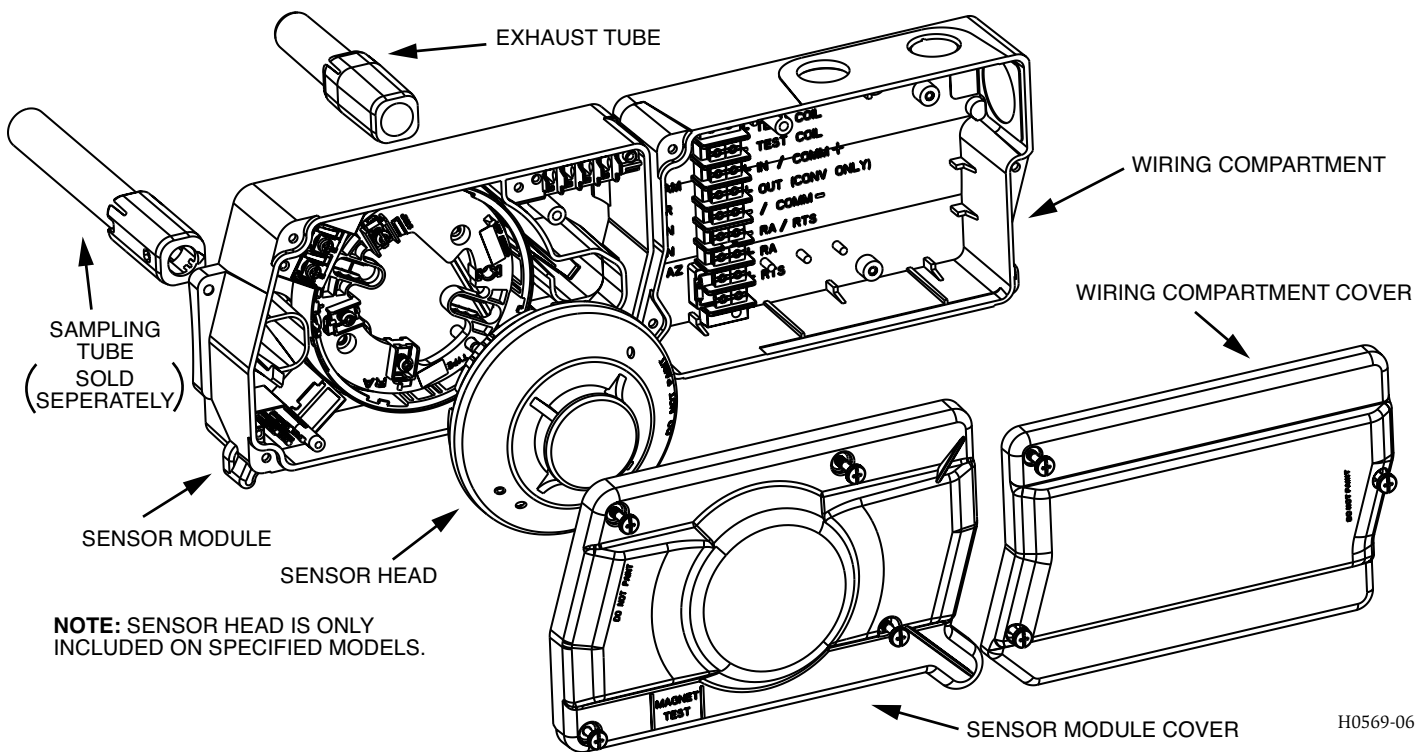
NOTE: A DST sampling tube must be ordered to complete the installation. It must be the correct length for the width of the duct where it will be installed. See Table 1 on page 3 to determine the inlet tube required for different duct widths.

[4] DETECTOR INSTALLATION

[4.1] VERIFY DUCT AIR FLOW DIRECTION AND VELOCITY

Model DNR detectors are designed to be used in air handling systems having air velocities of 100 to 4000 feet per minute. Duct widths from 6 inches to 12 feet can be accommodated. Be sure to check engineering specifications to ensure that the air velocity in the duct falls within these parameters. If necessary, use a velocity meter (anemometer) to check the air velocity in the duct.

FIGURE 1. EXPLODED VIEW OF DUCT SMOKE DETECTOR COMPONENTS:



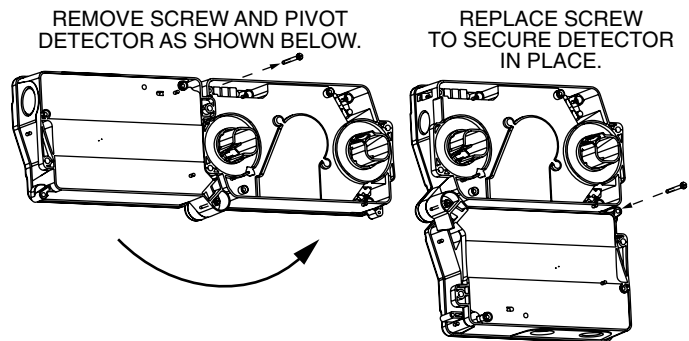
[4.2]DETERMINE MOUNTING LOCATION AND CONFIGURATION

On ducts wider than 18 inches it is recommended that the detector be mounted downstream of a bend, obstruction in the duct, or the supply or return air inlet.

Exception: Installation of duct detectors can be on or within a commercial packaged rooftop heating and air-conditioning system, fire/smoke dampers and economizers. They may be mounted in either the supply and/or return air section as determined by local code.

Once a suitable location is selected, determine if the detector is to be mounted in a side-by-side “rectangular” configuration or a top-over-bottom “square” configuration as shown in Figure 2. If mounting in the square configuration, remove the rear attachment screw, rotate the unit at hinge, and replace the screw into the new attachment hole as shown in Figure 2. Do NOT remove the hinge screw during this process. Final installation approval shall be based upon passing differential pressure and smoke entry tests described in the Measurement Tests section.

FIGURE 2:



[4.3]DRILL THE MOUNTING HOLES

Remove the paper backing from the mounting template supplied. Affix the template to the duct at the desired mounting location. Make sure the template lies flat and smooth on the duct.

[4.3.1]FOR RECTANGULAR SIDE-BY-SIDE MOUNTING CONFIGURATION:

Center punch at (4) target centers: (2) “A” for sampling tubes and (2) “B” for the rectangular configuration mounting tabs as shown on mounting template. Drill pilot holes at target “A” centers and cut two 1.375 inch diameter holes using a 1³/₈-inch hole saw or punch. Drill .156 inch diameter holes using a 5/32 inch drill at target “B” centers.

[4.3.2]FOR SQUARE TOP-OVER-BOTTOM MOUNTING CONFIGURATION:

Center punch at (4) target centers: (2) “A” for sampling tubes and (2) “C” for the square configuration mounting tabs as shown on mounting template. Drill pilot holes at target “A” centers and cut two 1.375 inch diameter holes using a 1³/₈-inch hole saw or punch. Drill .156 inch diameter holes using a 5/32 inch drill at target “C” centers. If desired, drill an additional .156 inch hole at the location of one of the mounting tabs on the lower housing.

[4.4]SECURE THE DUCT DETECTOR TO THE DUCT

Use two (rectangular configuration) or three (square configuration) of the provided sheet metal screws to screw the duct detector to the duct.

CAUTION: Do not overtighten the screws.

[5]SAMPLING TUBE INSTALLATION

[5.1]SAMPLING TUBE SELECTION

The sampling tube must be purchased separately. Order the correct length, as specified in Table 1, for width of the duct where it will be installed. The sampling tube length must extend at least 2/3 across the duct width for optimal performance.

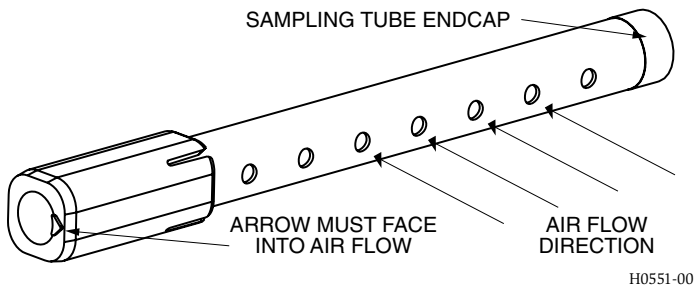
The sampling tube is always installed with the air inlet holes facing into the air flow. To assist proper installation, the tube’s connector is marked with an arrow. Make sure the sampling tube is mounted so that the arrow points into the airflow as shown in Figure 3. Mounting the detector housing in a vertical orientation is acceptable provided that the air flows directly into the sampling tube holes as indicated in Figure 3. The sampling tube and exhaust tube can be mounted in either housing connection as long as the exhaust tube is mounted downstream from the sampling tube.

TABLE 1. SAMPLING TUBES RECOMMENDED FOR DIFFERENT DUCT WIDTHS:

Outside Duct Width	Sampling Tube Recommended*
Up to 1 ft.	DST1
1 to 2 ft.	DST1.5
2 to 4 ft.	DST3
4 to 8 ft.	DST5
8 to 12 ft.	DST10 (2-piece)

*Must extend a minimum of $\frac{2}{3}$ the duct width

FIGURE 3. AIR DUCT DETECTOR SAMPLING TUBE:



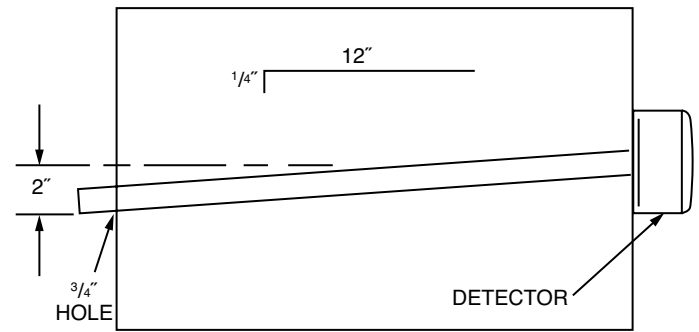
CAUTION: The sampling tube end cap, included with the detector, is critical to proper operation of the duct smoke detector. The end cap is needed to create the proper air flow to the sensor of the duct smoke detector. Once any sampling tube length adjustments are made, plug the end of the sampling tube with the provided end cap.

A plastic exhaust tube is included with the unit to be installed if needed. Install into the housing connection that is downstream from the sampling tube connection. The exhaust tube can be installed from the front of the detector or the back. A longer 1 foot exhaust tube, model ETX, is available as an accessory in cases where the molded exhaust tube does not extend at least 2 inches into the duct.

[5.2] SAMPLING TUBE INSTALLATION

- For tubes shorter than the width of the duct, slide the sampling tube, with installed end cap, into the housing connection that meets the air-flow first. Position the tube so that the arrow points into the airflow as shown in Figure 3. Per NFPA sampling tubes over 3 feet long should be supported at the end opposite of the duct detector. In ducts wider than 8 feet, work must be performed inside the duct to couple the other section of the sampling tube to the section already installed using the $\frac{1}{2}$ inch conduit fitting supplied. Make sure that the holes on both sections of the air inlet sampling tube are lined up and facing into the airflow.
- For tubes longer than the width of the air duct, the tube should extend out of the opposite side of the duct. Drill a $\frac{3}{4}$ inch hole in the duct opposite the hole already cut for the sampling tube. Ensure that the sampling tube is angled downward from the duct smoke detector to allow for moisture drainage away from the detector. The sampling tube should be angled at least $\frac{1}{4}$ " downward for every 12" of duct width per Figure 4. There should be 10 to 12 holes spaced as evenly as possible across the width of the duct. If there are more than 2 holes in the section of the tube extending out of the duct, select a shorter tube using Table 1. Otherwise, trim the tube to leave approximately 1 to 2 inches extending outside the duct. Plug the end with the end cap and tape closed any holes in the protruding section of the tube. Be sure to seal the duct where the tube protrudes.

FIGURE 4.



H0215-00

NOTE: Air currents inside the duct may cause excessive vibration, especially when the longer sampling tubes are used. In these cases, a 3 inch floor flange (available at most plumbing supply stores) may be used to fasten the sampling tube to the other side of the duct. When using the flange/connector mounting technique, drill a 1 to 1 $\frac{1}{4}$ inch hole where the flange will be used

[5.3] MODIFICATIONS OF SAMPLING TUBES

There may be applications where duct widths are not what is specified for the installation. In such cases, it is permissible to modify a sampling tube that is longer than necessary to span the duct width.

Use a 0.193-inch diameter (#10) drill and add the appropriate number of holes so that the total number of holes exposed to the air flow in the duct is 10 to 12. Space the additional holes as evenly as possible over the length of the tube.

CAUTION: This procedure should only be used as a temporary fix. It is not intended as a permanent substitute for ordering the correct length tubes.

[5.4] REMOTE SAMPLING TUBE INSTALLATION

The detector arrangement can also incorporate the remote mounting of the sampling tube and/or exhaust tube. In this case both the detector, sampling tube and exhaust tube (if included) should be rigidly mounted to withstand the pressure and vibrations caused by the air velocity. The location of the detector's sampling tube should be such that there is uniform airflow in the cross section area.

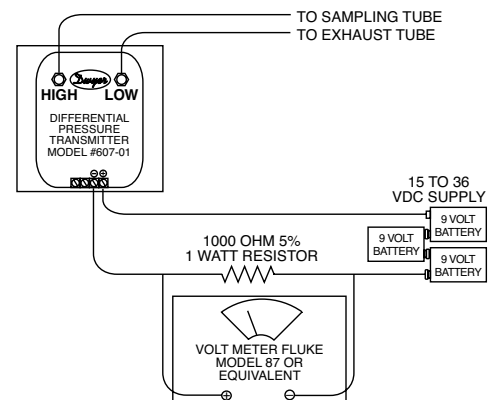
Pressure differential across the sampling and exhaust ports in the detector housing shall be verified to be between 0.01 and 1.11 inches of water. Do so by measuring the pressure difference between the inlet and outlet ports on the detector housing using a manometer as described in the Measurement Tests section of this manual.

[6] MEASUREMENT TESTS

[6.1] AIR FLOW

The DNR is designed to operate over an extended air speed range of 100 to 4000 FPM. To verify sufficient sampling of ducted air, turn the air handler on and use a manometer to measure the differential pressure between the two sampling tubes. The differential pressure should measure at least 0.01 inches of water and no more than 1.11 inches of water. Because most commercially available manometers cannot accurately measure very low pressure differentials, applications with less than 500 FPM of duct air speed may require one of the following: 1) the use of a current-sourcing pressure transmitter (Dwyer Series 607) or 2) the use of aerosol smoke, see below for test descriptions.

FIGURE 5. PROCEDURE FOR VERIFYING AIR FLOW:



H0163-01

[6.2] LOW FLOW AIR FLOW TEST USING DWYER SERIES 607 DIFFERENTIAL PRESSURE TRANSMITTER

Verify the air speed of the duct using an anemometer. Air speed must be at least 100 FPM. Wire the Dwyer transmitter as shown in **Figure 5**. Connect the leads of the meter to either side of the 1000Ω resistor. Allow unit to warm up for 15 seconds. With both HIGH and LOW pressure ports open to ambient air, measure and record the voltage drop across the 1000Ω resistor (measurement 1), 4.00 volts is typical. Using flexible tubing and rubber stoppers, connect the HIGH side of the transmitter to the sampling tube of the duct smoke detector housing, and the LOW side of the transmitter to the exhaust tube of the duct smoke detector housing. Measure and record the voltage drop across the 1000Ω resistor (measurement 2). Subtract the voltage recorded in measurement 1 from the voltage recorded in measurement 2. If the difference is greater than 0.15 volts, there is enough air flow through the duct smoke detector for proper operation.

[7] FIELD WIRING; INSTALLATION GUIDELINES

All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction. Proper wire gauges should be used. The conductors used to connect smoke detectors to control panels and accessory devices should be color-coded to prevent wiring mistakes. Improper connections can prevent a system from responding properly in the event of a fire.

For signal wiring (the wiring between detectors or from detector to auxiliary devices), it is usually recommended that single conductor wire be no smaller than 18 gauge. The duct smoke detector terminals accommodate wire sizes up to 12 gauge. Flexible conduit is recommended for the last foot of conduit; solid conduit connections may be used if desired.

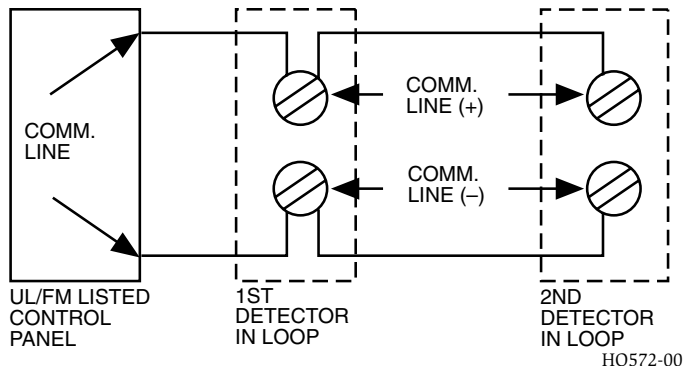
Duct smoke detectors and alarm system control panels have specifications for Signaling Line Circuit (SLC) wiring. Consult the control panel manufacturer's specifications for wiring requirements before wiring the detector loop.

[7.1] WIRING INSTRUCTIONS

Disconnect power from the communication line before installing the DNR duct smoke detector.

The DNR detectors are designed for easy wiring. The housing provides a terminal strip with clamping plates. Wiring connections are made by sliding the bare end under the plate, and tightening the clamping plate screw. See **Figure 6** on below for system wiring.

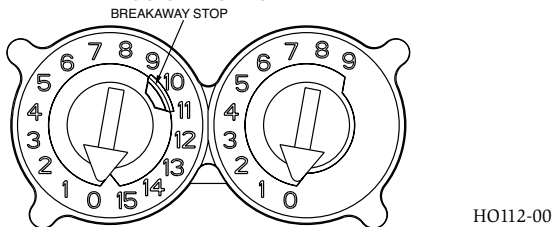
FIGURE 6. SYSTEM WIRING DIAGRAM FOR DNR:



[7.2] SET THE ADDRESS

Set the desired address on the sensor head code wheel switches. on the back of the sensor head.

FIGURE 7. ROTARY ADDRESS SWITCHES



Note: Some panels support extended addressing. In order to set the sensor above the address number 99 on compatible systems, carefully remove the stop on the left hand rotary switch with pliers as shown in **Figure 7**.

NOTE: Verify sensor cover gasket is properly seated on cover prior to cover installation

[8] VERIFICATION OF OPERATION

[8.1] INSTALL THE COVER

Install the covers making sure that the cover fits into the base groove. Tighten the seven screws that are captured in the covers. Note that the cover must be properly installed for proper operation of the sensor.

[8.2] POWER THE UNIT

Activate the communication line on terminals COM + and COM -.

[8.3] DETECTOR CHECK

Standby - If programmed by the system control panel, look for the presence of the flashing LEDs through the transparent housing cover. The LED will flash with each communication.

Trouble - If programmed by the system control panel and the detector LEDs do not flash, then the detector lacks power (check wiring, missing or improperly placed cover, panel programming, or power supply), the sensor head is missing (replace), or the unit is defective (return for repair).

[8.4] DUCT SMOKE DETECTOR TEST & MAINTENANCE PROCEDURES

Test and maintain duct smoke detectors as recommended in NFPA 72. The tests contained in this manual were devised to assist maintenance personnel in verification of proper detector operation.

Before conducting these tests, notify the proper authorities that the smoke detection system will be temporarily out of service. Disable the zone or system under test to prevent unwanted alarms.

[8.4.1] TEST THE UNIT

1. M02-04-00 Magnet Test (not included) - This sensor can be functionally tested with a test magnet. The test magnet electronically simulates smoke in the sensing chamber, testing the sensor electronics and connections to the control panel.
2. Remote Test Accessory - The use of a remote accessory for visible indication of power and alarm is recommended.

Verify system control panel alarm status and control panel execution of all intended auxiliary functions (i.e. fan shutdown, damper control, etc.).

Two LEDs on the sensor are controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, can cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED operation and expected delay to alarm.

[8.4.2] THE DETECTOR MUST BE RESET BY THE SYSTEM CONTROL PANEL

[8.4.3] SMOKE RESPONSE TEST

To determine if smoke is capable of entering the sensing chamber, visually identify any obstructions. Close cover tamper terminals on sensor side of housing to ensure communication to panel. Plug the exhaust and sampling tube holes to prevent ducted air from carrying smoke away from the detector head, then blow smoke such as cigarette, cotton wick, or punk directly at the head to cause an alarm. REMEMBER TO REMOVE THE PLUGS AFTER THIS TEST, OR THE DETECTOR WILL NOT FUNCTION PROPERLY.

[8.4.4] SMOKE ENTRY TEST USING AEROSOL SMOKE

This test is intended for low-flow systems (100-500 FPM). If the air speed is greater than 500 FPM, use a conventional manometer to measure differential pressure between the sampling tubes, as described under Measurement Tests on Page 3.

Drill a 1/4-inch hole 3 feet upstream from the duct smoke detector. With the air handler on, measure the air velocity with an anemometer. Air speed must be at least 100 FPM. Spray aerosol smoke* into the duct through the 1/4-inch hole for five seconds. Wait two minutes for the duct smoke detector to alarm. If the duct smoke detector alarms, air is flowing through the detector. Remove the duct smoke detector cover and blow out the residual aerosol smoke from the chamber and reset the duct smoke detector at the panel. Use duct tape to seal the aerosol smoke entry hole. Remember to replace the cover after the test or the detector will not function properly.

*Aerosol smoke can be purchased from Home Safeguard Industries at home-safeguard.com, model 25S Smoke Detector Tester, and Chekkit Smoke Detector Tester model CHEK02 and CHEK06 available from SDi. When used properly, the canned smoke agent will cause the smoke detector to go into alarm. Refer to the manufacturer's published instructions for proper use of the canned smoke agent.

CAUTION

Canned aerosol simulated smoke (canned smoke agent) formulas will vary by manufacturer. Misuse or overuse to these products may have long term adverse effects on the smoke detector. Consult the canned smoke agent manufacturer's published instructions for any further warnings or caution statements.

[9] DETECTOR CLEANING PROCEDURES

Notify the proper authorities that the smoke detector system is undergoing maintenance, and that the system will temporarily be out of service. Disable the zone or system undergoing maintenance to prevent unwanted alarms and possible dispatch of the fire department.

[9.1] DETECTOR SENSOR

1. Remove the sensor to be cleaned from the system.
2. Remove the sensor cover by pressing firmly on each of the four removal tabs that hold the cover in place.
3. Vacuum the screen carefully without removing it. If further cleaning is required continue with Step 4, otherwise skip to Step 7.
4. Remove the chamber cover/screen assembly by pulling it straight out.
5. Use a vacuum cleaner or compressed air to remove dust and debris from the sensing chamber.
6. Reinstall the chamber cover/screen assembly by sliding the edge over the sensing chamber. Turn until it is firmly in place.
7. Replace the cover using the LEDs to align the cover and then gently pushing it until it locks into place.
8. Reinstall the detector.

[9.2] REINSTALLATION

1. Reinstall the detector in its housing.
2. Restore system power.
3. Perform Detector Check.
4. Notify the proper authorities testing has been completed and the smoke detector system is back in operation.

[10] SENSOR REPLACEMENT

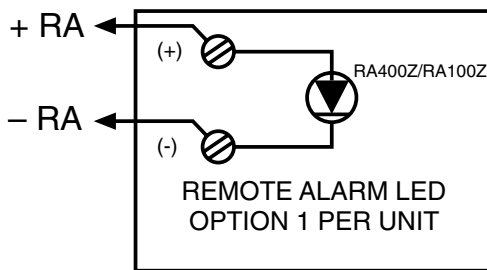
1. Remove the sensor head by rotating counterclockwise.
2. Pull gently to remove it.
3. To replace the sensor head, align the mounting features and rotate clockwise into place.

[11] OPTIONAL ACCESSORIES

Optional accessories include RA400Z/RA100Z, RTS451/RTS151 and RTS451KEY/RTS151KEY.

NOTE: Ensure blue wire always remains connected to RA+ on the field connector side of the terminal block.

FIGURE 8. WIRING DIAGRAM FOR DNR TO RA400Z/RA100Z:



H0570-03

Note: If using a RA400Z, the tab should be broken for use with the intelligent duct smoke detector. If using RA100Z, ensure that jumper is removed.

The RTS451/RTS151/RTS451KEY/RTS151KEY Remote Test Station facilitates test of the alarm capability of the duct smoke detector. These accessories provide the stimulus to initiate an alarm condition at the detector. The DNR duct smoke detector must be reset by the system control panel.

[11.1] OPTION 1:

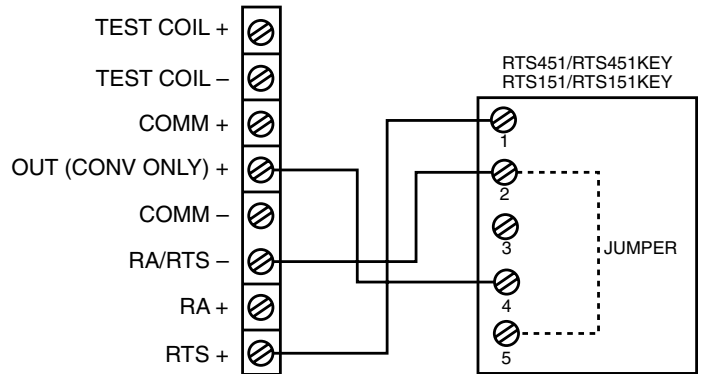
REMOTE TEST USING SENSOR WITH REMOTE TEST CAPABILITY (WITHOUT A TEST COIL):

A sensor with suffix "R" is available for use inside the DNR. Suffix "R" represents a head with Remote Test Capability. Using this head inside the DNR eliminates the need for a test coil when wired to a RTS451/RTS151/RTS451KEY/RTS151KEY Remote Test Station.

To install the RTS451/RTS151/RTS451KEY/RTS151KEY, using the sensor with remote test capability connect the device as shown in **Figure 9**; wire runs must be limited to 25 ohms or less per interconnecting wire.

NOTE: Resistor assembly must be in place between RA+ and OUT+ inside the DNR for Remote Test function to operate.

FIGURE 9. RTS451/RTS451KEY/RTS151/RTS151KEY USING SENSOR WITH REMOTE TEST CAPABILITY



H0633-00

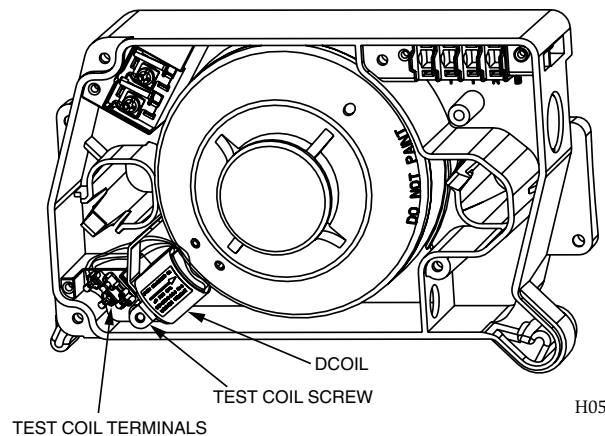
[11.2] OPTION 2:

REMOTE TEST USING A TEST COIL:

The use of a remote test station requires the installation of an accessory coil, part number DCOIL, sold separately.

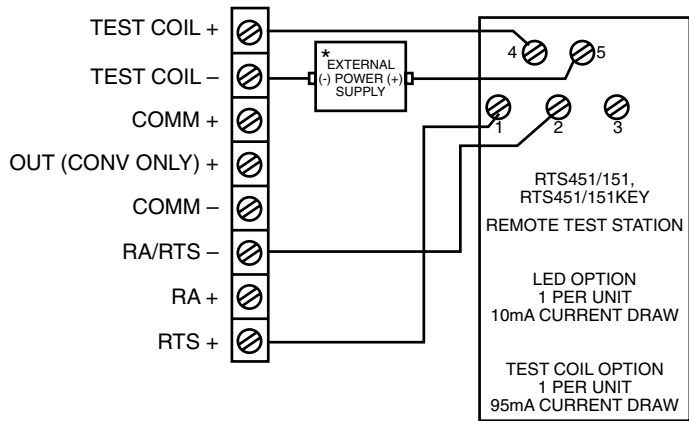
- 1) Install DCOIL in housing pocket insuring that arrow is pointing toward detector
 - 2) Install DCOIL mounting screw
 - 3) Connect each DCOIL lead to a Test Coil Terminal
- See **Figure 10** below for reference.

FIGURE 10. DNR USING A TEST COIL



H0561-01

FIGURE 11. WIRING DIAGRAM FROM DNR TO RTS451/RTS151/RTS451KEY/RTS151KEY USING A TEST COIL:



H0571-07

NOTE: The RTS451/151, RTS451/151KEY test coil circuit requires an external 24 VDC power supply which must be UL listed.

[11.3] ADDITIONAL MODULE OPTION

The DNR can also accommodate a relay or control module (sold separately) within the power board side of the housing. The relay or control module must be listed as compatible to the fire alarm control panel.

Physical Module Mounting

- 1) Remove the breakaway tabs at the four corners of the module
- 2) Locate the module at right most corner of the power board. The upper left corner mounting hole of the module will align with a screw boss in the housing.
- 3) Install a #8 $\times \frac{3}{8}$ " Plastite screw at the screw boss location

Note: See the corresponding module Installation Instructions for general description, control panel compatibility, wiring and ratings.

Please refer to insert for the Limitations of Fire Alarm Systems

THREE-YEAR LIMITED WARRANTY

System Sensor warrants its enclosed product to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for the enclosed product. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the replacement of any part of the product which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture. After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns Department, RA

#_____, 3825 Ohio Avenue, St. Charles, IL 60174. Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture. In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other Warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

➔ C01224T/C01224TR Carbon Monoxide Detector

SPECIFICATIONS

Electrical Specifications

System Voltage	Nominal: 12/24 VDC
	Min: 10 VDC
	Max: 33 VDC
Avg. Standby Current:	20 mA
Max Alarm Current:	40 mA (75 mA test)
Alarm Contact Ratings:	30 VDC @ 0.5 A
Trouble Contact Ratings:	30 VDC @ 0.5 A
Audible Signal (temp 4 tone):	85 dBA min. in alarm (at 10ft)
Max. Start-up Capacitance:	20 uF

Physical Specifications

Operating Temperature Range:	0° to 40°C (32° to 104°F)
Operating Humidity Range:	22 – 90% %RH
Diameter:	6.0"
Height:	1.25"
Weight:	7 oz
Wire Gauge Acceptance:	14-22 AWG

NOTICE: This manual shall be left with the owner/user of this equipment.
This product is intended for use in ordinary indoor locations.

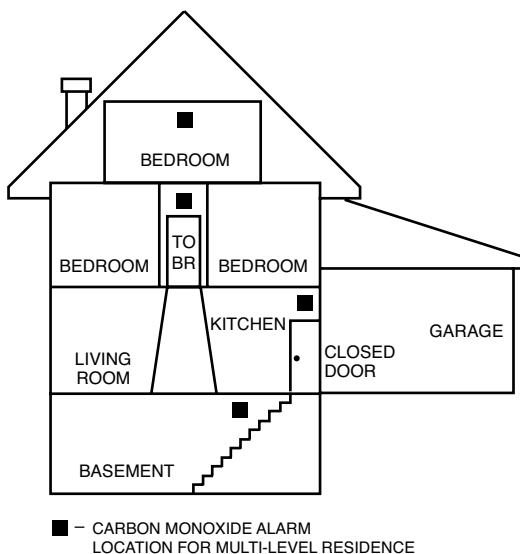
GENERAL DESCRIPTION

- Listed to  standard 2075
- Round shape allows for mounting in aesthetically demanding areas
- 4 wire, system monitored
- Optional CO detector replacement plate for previously installed detectors
- Local sounder
- Low current draw
- Alarm relay, Form C
- Trouble relay, Form A
- Dual LED's
- Test/Hush button
- SEMS wiring terminals
- Mount to single gang electrical box or surface mount to wall or ceiling
- Optional drywall anchors included

TABLE 1. DETECTOR OPERATION MODES:

OPERATION MODE	GREEN LED	RED LED	SOUNDER
Normal (standby)	Blink 1 per minute	OFF	OFF
Alarm	OFF	Temp 4* pattern	Temp 4* pattern
Alarm Test	OFF	Temp 4 pattern	Temp 4 pattern
RealTest Mode	Blink 1 per second	OFF	Temp 4 pattern (after CO is sprayed)

FIGURE 1. ALARM LOCATION DIAGRAM:



Alarm Test: Will send alarm signal to panel.

Hush feature/Alarm Silence: If required, the audible alarm can be silenced for 5 minutes by pushing the button marked “Test/Hush”. The red alarm light will continue to flash in temp-4 pattern. If carbon monoxide is still present after the 5 minute hush period, the audible alarm will sound. The hush facility will not operate at levels above 350 ppm (parts per million) carbon monoxide.

RealTest Alarm Silence: Alarm will automatically silence after about 20 seconds of alarm from spraying canned CO into the detector. Alarm Reset: Alarm automatically resets after CO has cleared from the sensor.

Trouble feature: When the sensor supervision is in a trouble condition (such as a sensor that has been tampered with), the detector will send a trouble signal to the panel. The detector must then be replaced. There is no local audible signal when detector is in trouble.

End of Life Timer feature: When the detector has reached the end of its life, the trouble contact will open. This indicates that the CO sensor inside the detector has passed the end of its life and must be replaced. This detector's lifespan is approximately six years from the date of manufacture. There is no local audible signal when detector is in trouble. Periodically check the “Replace by” sticker located under the detector cover. The detector must be replaced by this date. Refer to Detector Replacement on page 3.

Per UL 2075, it is mandatory that a trouble signal be sent to the panel upon CO cell trouble or cell end of life. Refer to Figure 4 for wiring of the trouble relay.

S0295-00

INSTALLATION GUIDELINES

Ceiling: Detector should be at least 12 inches from any wall.

Wall: Detector should be at least as high as a light switch, and at least six inches from the ceiling.

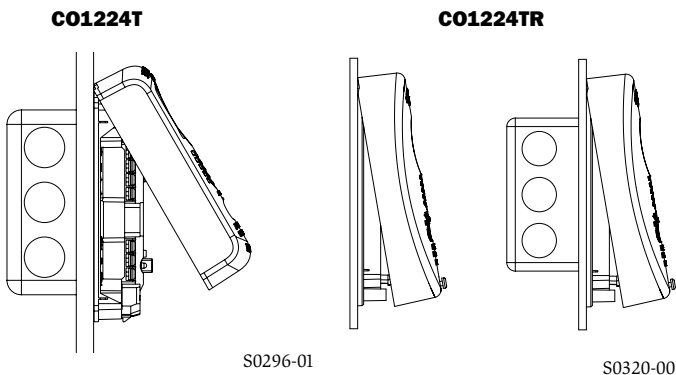
- Do not install in any environment that does not comply with the detector's environmental specifications
- Install in accordance with NFPA 720—the Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment
- As of 2009, NFPA 720 defines standards for both commercial and residential installations of CO detectors. If the installation can be interpreted as a commercial application, consult the section of NFPA 720 that outlines commercial applications.
- For example, Chapter 5.5.5.3.1 states that carbon monoxide detectors shall be installed in accordance with manufacturers published instructions in the following locations:
 - (1) On the ceiling in the same room as permanently installed fuel burning appliances
 - (2) Centrally located on every habitable level and in every HVAC zone of the building
- If the installation can be interpreted as residential, consult the section of NFPA 720 that outlines residential applications.
- For example, chapter 9.4.1.1 states that carbon monoxide alarms or detectors shall be installed as follows:
 - (1) Outside each separate dwelling unit sleeping area in the immediate vicinity of the bedrooms
 - (2) On every level of a dwelling unit, including basements
 - (3) Other locations where required by applicable laws, codes or standards

MOUNTING

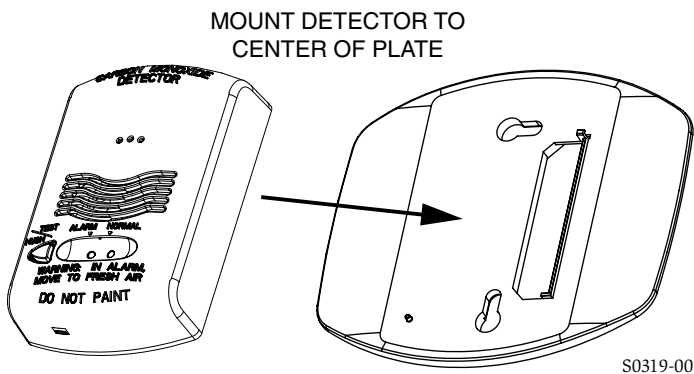
The CO1224T/CO1224TR can be ceiling-mounted or wall-mounted:

1. To a single gang box.
2. Direct mount to ceiling or to wall using drywall fasteners.
3. Mounted with optional replacement plate model CO-PLATE*.

FIGURE 2. MOUNTING OF DETECTOR:



**FIGURE 3: MOUNTING OF CO1224T DETECTOR TO CO-PLATE*
CO DETECTOR REPLACEMENT PLATE**



*NOTE: The CO-PLATE has not been evaluated or approved by a NRTL.

INSTALLATION

WIRING INSTALLATION GUIDELINES

All wiring must be installed in compliance with the NFPA 70, National Electrical Code, applicable state and local codes, and any special requirements of the local Authority Having Jurisdiction (AHJ).

Proper wire gauges should be used. The conductors used to connect carbon monoxide detectors to the alarm control panel and accessory devices should be color-coded to reduce the likelihood of wiring errors. Improper connections can prevent a system from responding properly in the event of a CO.

The screw terminals in the mounting base will accept 14-22 gauge wire. Wire connections are made by stripping approximately 1/4" of insulation from the end of the feed wire, inserting it into the proper base terminal, and tightening the screw to secure the wire in place. Do not put wires more than 2 gauge apart under the same clamping plate.

WARNING: This product does not have a local audible trouble signal, and may fail without supervision if trouble loop remains unconnected.

WARNING: Gas detectors on a zone that is bypassed may not signal a trouble condition. Do not bypass zones used for gas detectors.

Wiring diagrams located on page 4, Figure 4.

WARNING

Remove power from alarm control unit or initiating device circuits before installing detectors.

1. Using a small, flat head screw driver, push in the small tab located on the underside of the detector. Once the snap is loosened, lift the bottom end of the cover up and unhinge the top to remove the cover.
2. Wire the detector base screw terminals per **Figure 5**.
3. Screw the base of the detector onto a single gang electrical box, or to the surface of the wall or ceiling. Use the hardware included in the packaging.
4. If mounting with the System Sensor replacement plate model CO-PLATE*:
 - * Hold replacement plate over desired mounting area.
 - * Use hook feature to hold CO1224T onto the replacement plate.
 - * Mount detector and plate together using hardware provided with the CO1224T.
5. Hinge the top portion of the cover onto the base; with the cover at a 45 degree angle, fit the hinges into the slots of the base.
6. Push the unhinged bottom portion of the cover down until it snaps into place.
7. After all detectors have been installed, apply power to the alarm control unit.
8. Test each detector as described in Testing.
9. Notify the proper authorities that the system is in operation.

CAUTION

Airborne dust particles can enter the detector. System Sensor recommends the installation of detectors before beginning construction or any other dust producing activity. Carbon monoxide detectors are not to be used with detector guards unless the combination has been evaluated and found suitable for that purpose.

TESTING

Detector must be tested after installation.

NOTE: Before testing, notify the proper authorities to avoid any nuisance alarms.

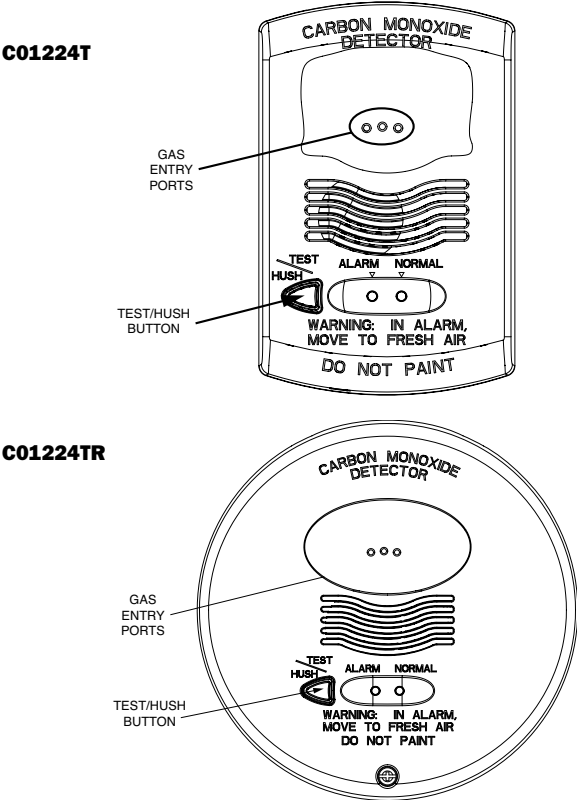
Ensure proper wiring and power is applied. After power up, allow 80 seconds for the detector to stabilize before testing.

Test the CO1224T/CO1224TR detector as follows:

1. A test button is located on the detector housing (See Figure 4).
2. Use the tip of your finger to press and hold the test button.
3. If the sounder beeps and the LED's light up after 1-4 seconds, the detector is operational.

If a detector fails the above test method, its wiring should be checked. If the detector still fails after rewiring, it should be replaced.

FIGURE 4. TEST BUTTON LOCATION AND OPERATION:



S0298-00

S0321-00

FUNCTIONAL GAS TEST

NOTE: Check with local codes and the AHJ to determine whether or not a functional gas test is desired for an installation. A canned CO testing agent may be used to verify the detector’s ability to sense CO by utilizing the RealTest™ feature of the CO1224T/CO1224TR as follows:

1. Press the test button as described in Testing above. Release the test button after the sounder beeps and the LED’s light up.
2. The detector will enter the speed-up test mode, indicated by a quick flashing green LED.
3. Within 20 seconds, apply a UL approved CO agent within 1/4” of the detector’s gas entry ports (see Figure 3). The detector will quickly go into alarm if gas entry is successful.
4. The detector will automatically exit the speed-up test mode 20-60 seconds after entering speed-up test mode.

Testing the detector will activate the alarm relay and send a signal to the panel.

CAUTION: This carbon monoxide detector is designed for indoor use only. Do not expose to rain or moisture. Do not knock or drop the detector. Do not open or tamper with the detector as this could cause malfunction. The detector will not protect against the risk of carbon monoxide poisoning if not properly wired. The detector will only indicate the presence of carbon monoxide gas at the sensor. Carbon monoxide gas may be present in other areas. This carbon monoxide detector is NOT:

- Designed to detect smoke, fire or any gas other than carbon monoxide
- To be seen as a substitute for the proper servicing of fuel-burning appliances or the sweeping of chimneys.
- To be used on an intermittent basis, or as a portable alarm for the spillage of combustion products from fuel-burning appliances or chimneys.

Carbon monoxide gas is a highly poisonous gas which is released when fuels are burnt. It is invisible, has no smell and is therefore impossible to detect with the human senses. Under normal conditions in a room where fuel burning appliances are well maintained and correctly ventilated, the amount of carbon monoxide released into the room by appliances should not be dangerous.

Symptoms of carbon monoxide poisoning: Carbon monoxide bonds to the hemoglobin in the blood and reduces the amount of oxygen being circulated in the body. The following symptoms are examples taken from NFPA 720. They represent approximate values for healthy adults:

Concentration (ppm CO)	Symptoms
200	Mild headache after 2-3 hours of exposure
400	Headache and nausea after 1-2 hours of exposure
800	headache, nausea, and dizziness after 45 minutes of exposure; collapse and unconsciousness after 2 hours of exposure

Many causes of reported carbon monoxide poisoning indicate that while victims are aware that they are not well, they become so disoriented that they are unable to save themselves by either exiting the building or calling for assistance.

Also young children and pets may be the first to be affected.

Per UL standard 2075, the CO1224T/CO1224TR has been tested to the sensitivity limits defined in UL standard 2034.

Alarm thresholds are as follows:

Parts Per Million	Detector response time, min.
30 ± 3ppm	No alarm within 30 days
70 ± 5ppm	60-240
150 ± 5ppm	10-50
400 ± 10ppm	4-15

What to do if the carbon monoxide detector goes into alarm:

Immediately move to a spot where fresh air is available, preferably outdoors. Find a phone in an area where the air is safe and call your security service provider. Tell your provider the detector alarm status, and that you require professional assistance in ridding your home of the carbon monoxide.

IMPORTANT: This detector should be tested and maintained regularly following National Fire Protection Association (NFPA) 720 requirements.

MAINTENANCE

Occasionally clean the outside casing with a cloth. Ensure that the holes on the front of the alarm are not blocked with dirt and dust.

Do not paint, and do not use cleaning agents, bleach, or polish on the detector.

DETECTOR REPLACEMENT

This detector is manufactured with a long-life carbon monoxide sensor. Over time the sensor will lose sensitivity, and will need to be replaced with a new System Sensor carbon monoxide detector. This detector’s lifespan is approximately six years from the date of manufacture.

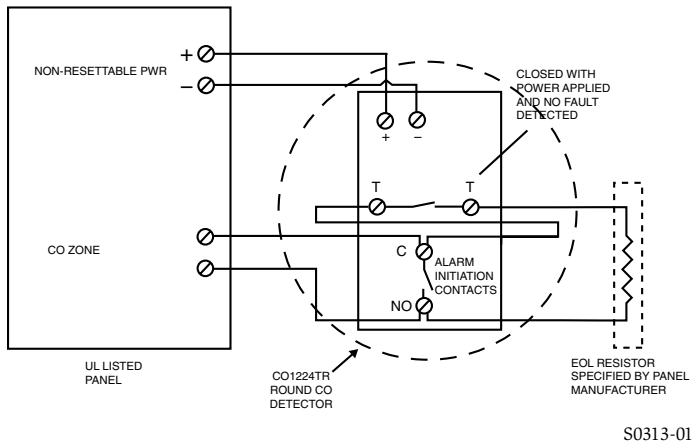
Periodically check the detector’s replacement date. Remove the detector cover and refer to the sticker placed on the inside of the detector. The sticker will indicate the date that the detector shall be replaced.

This detector is also equipped with a feature that will open the trouble relay once it has reached the end of its useful life. If this occurs, it is time to replace the detector.

NOTE: Before replacing the detector, notify the proper authorities that maintenance is being performed and the system will be temporarily out of service. Disable the zone or system undergoing maintenance to prevent any unwanted alarms. Dispose of detector in accordance with any local regulations.

FIGURE 5. WIRING DIAGRAM:

SINGLE UNIT, SINGLE ZONE, 4 CONDUCTOR CABLE

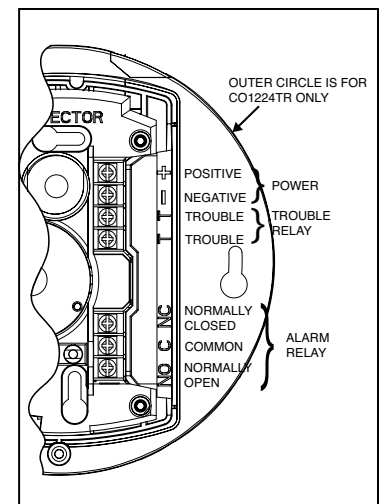
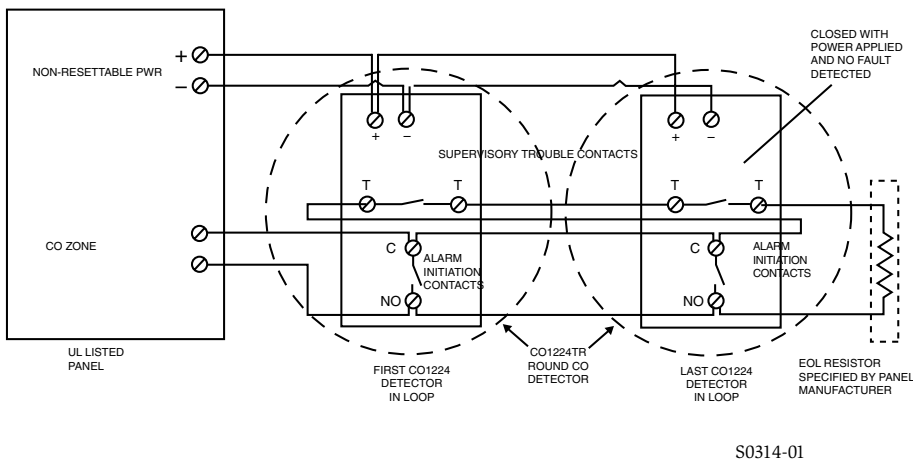


CAUTION

It should be noted the installation, operation, testing and maintenance of the CO1224T/CO1224TR is different than System Sensor conventional 4-wire smoke detectors, such as the i3 Series. Below are specific installation requirements for the CO1224T/CO1224TR:

- Connect to a non-resettable power supply
- Connect to a non-fire zone: Per NFPA 720 section 9.6.7.2 the CO1224T/CO1224TR shall not be connected to a zone that signals a fire condition
- Per NFPA 720 section 9.6.7, do not connect the CO1224T/CO1224TR on a zone with other fire or intrusion initiating devices - i.e. do not connect on the same zone as smoke detectors
- Wiring of the trouble relay is mandatory: Per UL Standard 2075 section 17.1.1 a detector shall send a trouble signal to the control panel upon an open circuit, a ground fault, sensor removal or sensor end of life
- If wiring one CO1224T/CO1224TR per zone: Use 4 conductors
- If wiring multiple CO1224T/CO1224TR detectors per zone: Use 4 conductors from panel to first CO1224T/CO1224TR, then use 6 conductors from the second CO1224T/CO1224TR to other detectors on the zone

MULTIPLE UNIT, SINGLE ZONE, 6 CONDUCTOR CABLE



Input powered (12 or 24 VDC) from UL Listed Fire/Burg Control Panel (Class 2).

Please refer to insert for the limitations of Carbon Monoxide Detectors

FCC STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

THREE-YEAR LIMITED WARRANTY

System Sensor warrants its enclosed product to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for the enclosed product. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the replacement of any part of the product which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture. After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns

Department, RA # _____, 3825 Ohio Avenue, St. Charles, IL 60174. Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture. In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other Warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

→ FSP-851, FSP-851T and FAPT-851 Intelligent Photoelectric Smoke Sensors

12 Clintonville Road
Northford, CT 06472-1653
Phone: 203.484.7161

SPECIFICATIONS

Operating Voltage Range:	15 to 32 VDC
Standby Current:	300µA @ 24 VDC (one communication every 5 seconds with LED blink enabled)
Maximum Alarm Current (LED on):	6.5 mA @ 24 VDC
Operating Humidity Range:	10% to 93% Relative Humidity, Non-condensing
Operating Temperature Range:	32°F to 120°F (0°C to 49°C), FSP-851
Air Velocity:	0 to 4000 ft/min (FSP-851 & FAPT-851 only); 32°F to 100°F (0°C to 38°C), FSP-851T and FAPT-851
Height:	2.0" (51 mm) installed in B710LP Base
Diameter:	6.1" (155 mm) installed in B710LP Base; 4.1" (104 mm) installed in B501 Base
Weight:	5.2 oz. (147 g)

This sensor must be installed in compliance with the control panel system installation manual. The installation must meet the requirements of the Authority Having Jurisdiction (AHJ). Sensors offer maximum performance when installed in compliance with the National Fire Protection Association (NFPA); see NFPA 72.

GENERAL DESCRIPTION

Models FSP-851, FSP-851T and FAPT-851 are plug-in type smoke sensors that combine a photoelectronic sensing chamber with addressable-analog communications. The sensors transmit an analog representation of smoke density over a communication line to a control panel. Rotary decade switches are provided for setting the sensor's address.

Two LEDs on the sensor are controlled by the panel to indicate sensor status. An output is provided for connection to an optional remote LED annunciator (P/N RA400Z). Models FAPT-851 and FSP-851T combines a photoelectronic sensing chamber and 135°F (57.2°C) fixed temperature heat detector.

Notifier panels offer different features sets across different models. As a result, certain features of the FSP-851, FSP-851T and FAPT-851 may be available on some control panels, but not on others. The possible features available in the FSP-851, FSP-851T and FAPT-851, if supported by the control unit are:

1. The panel controls the LED operation on the sensor. Operational modes are RED blink, RED continuous, GREEN blink, and off.
2. The remote output may be synchronized to the LED operation or controlled independent of the LEDs.

Please refer to the operation manual for the UL listed control unit for specific operation of the FSP-851, FSP-851T and FAPT-851.

The FSP-851, FSP-851T and FAPT-851 require compatible addressable communications to function properly. Connect these sensors to listed-compatible control panels only.

SPACING

Notifier recommends spacing sensors in compliance with NFPA 72. In low air flow applications with smooth ceilings, space sensors 30 feet apart. For specific information regarding sensor spacing, placement, and special applications, refer to NFPA 72 or the System Smoke Detector Application Guide, available from Notifier.

Duct Applications: FSP-851 and FSP-851T are listed for use in ducts.

See Duct Applications Guide A05-1004 for details on pendant mount applications.

NOTE: These products are not listed for use inside duct smoke detectors.

WIRING GUIDE

All wiring must be installed in compliance with the National Electrical Code, applicable local codes, and any special requirements of the Authority Having Jurisdiction. Proper wire gauges should be used. The installation wires should be color-coded to limit wiring mistakes and ease system troubleshooting. Improper connections will prevent a system from responding properly in the event of a fire.

Remove power from the communication line before installing sensors.

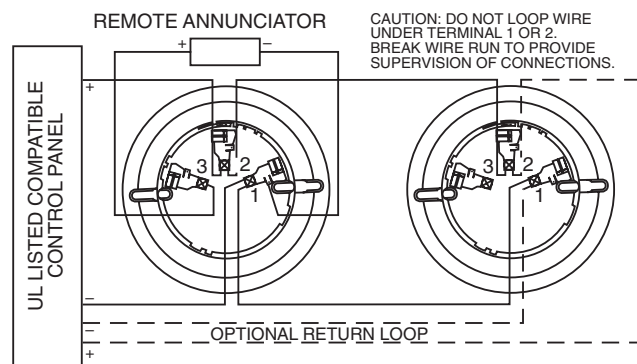
1. Wire the sensor base (supplied separately) per the wiring diagram, Figure 1.
2. Set the desired address on the sensor address switches, see Figure 2.

3. Install the sensor into the sensor base. Push the sensor into the base while turning it clockwise to secure it in place.
4. After all sensors have been installed, apply power to the control unit and activate the communication line.
5. Test the sensor(s) as described in the TESTING section of this manual.

CAUTION

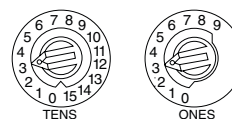
Dust covers provide limited protection against airborne dust particles during shipping. Dust covers must be removed before the sensors can sense smoke. Remove sensors prior to heavy remodeling or construction.

FIGURE 1. WIRING DIAGRAM:



C0100-02

FIGURE 2. ROTARY ADDRESS SWITCHES:



C0162-00

TAMPER-RESISTANCE

Models FSP-851, FSP-851T and FAPT-851 include a tamper-resistant capability that prevents their removal from the bracket without the use of a tool. Refer to the base manual for details on making use of this capability.

TESTING

Before testing, notify the proper authorities that the system is undergoing maintenance, and will temporarily be out of service. Disable the system to prevent unwanted alarms.

All sensors must be tested after installation and periodically thereafter. Testing methods must satisfy the Authority Having Jurisdiction (AHJ). Sensors offer maximum performance when tested and maintained in compliance with NFPA 72.

The sensor can be tested in the following ways:

A. Functional: Magnet Test (P/N M02-04-01 or M02-09-00)

This sensor can be functionally tested with a test magnet. The test magnet electronically simulates smoke in the sensing chamber, testing the

sensor electronics and connections to the control panel.

1. Hold the test magnet in the magnet test area as shown in Figure 3.
2. The sensor should alarm the panel.

Two LEDs on the sensor are controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, can cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.

B. Smoke Entry: Aerosol Generator (Gemini 501)

The GEMINI model 501 aerosol generator can be used for smoke entry testing. Set the generator to represent 4%/ft to 5%/ft obscuration as described in the GEMINI 501 manual. Using the bowl shaped applicator, apply aerosol until the panel alarms. Additionally, canned aerosol simulated smoke (canned smoke agent) may be used for smoke entry testing of the smoke detector. Tested and approved aerosol smoke products are the Smoke Detector Tester model 25S available from Home Safeguard Industries and Chekkit Smoke Detector Tester models CHEK02 and CHEK06 available from SDi. When used properly, the canned smoke agent will cause the smoke detector to go into alarm. Refer to the manufacturer's published instructions for proper use of the canned smoke agent.

CAUTION

Canned aerosol simulated smoke (canned smoke agent) formulas will vary by manufacturer. Misuse or overuse of these products may have long term adverse effects on the smoke detector. Consult the canned smoke agent manufacturer's published instructions for any further warnings or caution statements.

For FAPT-851, smoke entry testing should be performed immediately following the magnet test. Magnet test initiates an approximately 10 minute period when the detector's signal processing software routines are not active. Failure to first perform the magnet test will introduce a time delay before the detector alarms.

C. Direct Heat Method (Hair dryer of 1000-1500 watts). FSP-851T and FAPT-851 only.

A hair dryer of 1000-1500 watts should be used to test the thermistors. Direct the heat toward either of the two thermistors, holding the heat source approximately 12 inches from the detector in order to avoid damaging the plastic housing. The detector will reset only after it has had sufficient time to cool. Make sure both thermistors are tested individually.

A sensor that fails any of these tests should be cleaned as described under CLEANING, and retested. If the sensor fails after cleaning, it must be replaced and returned for repair.

When testing is complete, restore the system to normal operation and notify the proper authorities that the system is back in operation.

HIGH SENSITIVITY SETTING (Applies to FSP-851 and FSP-851T only)

The use of the 0.2% to 0.5% per foot sensitivity setting requires a 90-day test period to ensure that the detector's environment is suitable for this setting. The following steps must be followed to meet Notifier and UL requirements for this high sensitivity application:

1. Each detector intended for 0.2% to 0.5% per foot alarm application shall have its initial alarm setting set for 0.5% obscuration per foot alarm level. The initial pre alarm setting for the detector shall be set to the intended alarm setting of the system. Pre alarm shall be set for non latching operation.
2. Detectors set at 0.2% to 0.5% per foot are intended for use in smoke-free, environmentally controlled applications, such as computer rooms and clean rooms. In order to determine if an environment is suitable for installation, the detectors shall be operated continuously for 90 days with all environmental factors, including temperature, humidity, air flow, occupancy, etc., similar to the intended application for these detectors. An

electronic history file or printer shall be used to record all events associated with the detectors under testing.

3. At the end of 90 days, the results of the test shall be inspected by an authorized Notifier representative or the end user, if trained by an authorized Notifier representative. If no alarms or pre alarms are recorded for the detectors under testing, the system may be set to the tested pre alarm level in the 0.2% to 0.5% per foot range.

CLEANING

Before removing the detector, notify the proper authorities that the smoke detector system is undergoing maintenance and will be temporarily out of service.

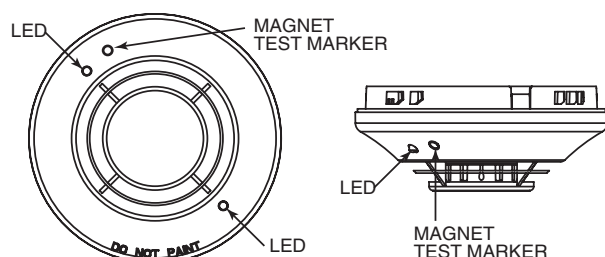
Disable the zone or system undergoing maintenance to prevent unwanted alarms.

1. Remove the sensor to be cleaned from the system.
2. Remove the sensor cover by pressing firmly on each of the four removal tabs that hold the cover in place.
3. Vacuum the screen carefully without removing it. If further cleaning is required continue with Step 4, otherwise skip to Step 7.
4. Remove the chamber cover/screen assembly by pulling it straight out.
5. Use a vacuum cleaner or compressed air to remove dust and debris from the sensing chamber.
6. Reinstall the chamber cover/screen assembly by sliding the edge over the sensing chamber. Turn until it is firmly in place.
7. Replace the cover using the LEDs to align the cover and then gently pushing it until it locks into place. Make sure that the thermistors do not become bent under the cover on the FSP-851T and FAPT-851 models.
8. Reinstall the detector.
9. Test the detector as described in TESTING.
10. Reconnect disabled circuits.
11. Notify the proper authorities that the system is back on line.

SPECIAL NOTE REGARDING SMOKE DETECTOR GUARDS

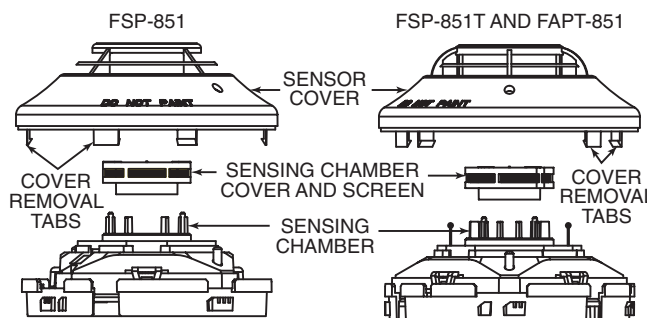
Smoke detectors are not to be used with detector guards unless the combination has been evaluated and found suitable for that purpose.

FIGURE 3:



C0196-00

FIGURE 4:



C1014-00

Please refer to insert for the Limitations of Fire Alarm Systems

FCC STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

INSTALLATION AND MAINTENANCE INSTRUCTIONS



**SYSTEM
SENSOR®**

3825 Ohio Avenue, St. Charles, Illinois 60174

800/736-7672, FAX: 630/377-6495

www.systemsensor.com

Selectable Output Strobes, Horns, and Horn/Strobes

For use with the following: P2R, P2RH, P2RK, P2RHK, P2W, P2WK, P2WH, P2WHK, P4R, P4RH, P4RK, P4W, SR, SRH, SRK, SRHK, SW, SWK, SWH, SWHK, SW-CLR-PC2R, PC2RH, PC2RK, PC2RHK, PC2W, PC2WK, PC2WH, PC2WHK, PC4R, PC4RH, PC4W, PC4WK, PC4WHK, SCR, SCRH, SCRK, SCRHK, SCW, SCWK, SCWH, SCWHK, SCW-CLR-ALERT, HR, HRK, HW, SR-P, SW-P, SRH-P, SWH-P, P2R-P, P2W-P, P2WH-P, P4R-P, P4W-P, SCW-P, PC2R-P, PC2W-P, PC2WH-P, SRK-P, SRHK-P, P2RK-P, P2RHK-P, SWK-P, SWHK-P, P2WK-P, P2WHK-P, SR-SP, P2R-SP, PC2W-SP, SRK-R, SWK-R, SRHK-R, SWHK-R, P2RK-R, P2WK-R, P2RHK-R, P2WHK-R, SBHK, SBK-R

NOTE: All -R models are specifically designed for use with the WTP Series of Weatherproof plates

NOTE: When replacing outdoor units; device and back box must be replaced

NOTE: Models SBHK, SBK-R are UL listed for General Signaling

SIGNALING



PRODUCT SPECIFICATIONS

Operating Temperature:	Standard Products	32°F to 120°F (0°C to 49°C)
	K Series	-40°F to 151°F
Humidity Range:	Standard Products	10 to 93% Non-condensing
	K Series	Meets NEMA 4X requirements
Strobe Flash Rate:		1 flash per second
Nominal Voltage:		Regulated 12VDC/FWR or regulated 24DC/FWR
Operating Voltage Range (includes fire alarm panels with built in sync):		8 to 17.5V (12V nominal) or 16 to 33V (24V nominal)
Operating Voltage with MDL3 Sync Module:		8.5 to 17.5V (12V nominal) or 16.5 to 33V (24V nominal)
Input terminal wire gauge:		12 to 18 AWG

NOTE: Strobes will operate at 12 V nominal for 15 & 15/75 candela settings only. Switching between ranges is automatic.

DIMENSIONS FOR PRODUCTS AND ACCESSORIES

WALL PRODUCTS	Length	Width	Depth	CEILING PRODUCTS	DIAMETER	DEPTH
Strobe and Horn/Strobes (including lens)	5.6"	4.7"	2.5"	Strobes and Horn/Strobes (including lens)	6.8"	2.5"
	142 mm	119 mm	64 mm		173 mm	64 mm
Horns	5.6"	4.7"	1.3"	SA-WBBC Red Weatherproof Back Box	7.1"	2.2"
	142 mm	119 mm	33 mm	SA-WBBCW White Weatherproof Back Box	180 mm	51 mm
SA-WBB Red Weatherproof Back Box	5.7"	5.1"	2.0"	SBBCR Red Surface Mount Box	6.9"	5.3"
SA-WBBW White Weatherproof Back Box	145 mm	130 mm	51 mm	SBBCW White Surface Mount Box	175 mm	135 mm
SBBR Red Surface Mount Box	5.6"	4.7"	4.3"	NOTE: SA-WBB, SA-WBBW, SA-WBBC and SA-WBBCW dimensions do not include the two mounting tabs		
SBBW White Surface Mount Box	142 mm	119 mm	109 mm			

MOUNTING BOX OPTIONS

2-Wire Indoor Products	4-Wire Indoor Products	K Series Products
4 × 4 × 1½", Single Gang, Double Gang, 4" Octagon SBBR/W (wall), SBBCR/W (ceiling)	4 × 4 × 1½", Double Gang, 4" Octagon	SA-WBB/W (wall), SA-WBBC/CW (ceiling)

NOTICE: This manual shall be left with the owner/user of this equipment.

GENERAL DESCRIPTION

The SpectrAlert Advance series of notification appliances offers a wide range of horns, strobes, and horn/strobes, for wall and ceiling applications, indoors and outdoors. They are designed to be used on 12 or 24 volt, DC or FWR (full wave rectified) systems. These products are electrically backward compatible with the previous generation of SpectrAlert notification appliances. Horn/strobe products are available in two versions. The 2-wire products fit systems where a single NAC controls both horn and strobe. The 4-wire products are intended for systems which have separate wiring circuits for the horn and strobe. All SpectrAlert Advance products are suitable for use in synchronized systems. The System Sensor MDL3 module may be used to provide synchronization.

K Series products are designed to be used over a wider range of temperatures and are suitable for use in wet environments with outdoor backbox supplied with product.

Wall and ceiling products may be used interchangeably (wall products may be used on the ceiling and ceiling products may be used on the wall.)

FIRE ALARM SYSTEM CONSIDERATIONS

The National Fire Alarm Code, NFPA 72, requires that all horns, used for building evacuation produce temporal coded signals. Signals other than those used for evacuation purposes do not have to produce the temporal coded signal. System Sensor recommends spacing notification appliances in compliance with NFPA 72.

LOOP DESIGN AND WIRING

The system designer must make sure that the total current drawn by the devices on the loop does not exceed the current capability of the panel supply, and that the last device on the circuit is operated within its rated voltage. The current draw information for making these calculations can be found in the tables within this manual. For convenience and accuracy, use the voltage drop calculator on the System Sensor website (www.systemsensor.com).

When calculating the voltage available to the last device, it is necessary to consider the voltage drop due to the resistance of the wire. The thicker the wire, the smaller the voltage drop. Wire resistance tables can be obtained from electrical handbooks. Note that if Class A wiring is installed, the wire length may be up to twice as long as it would be for circuits that are not fault tolerant.

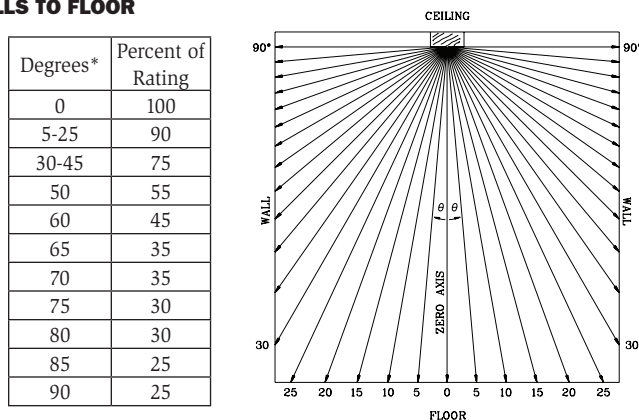
NOTE: The total number of strobes on a single NAC must not exceed 40 for 24 volt applications or 12 for 12 volt applications. Loop resistance on a single NAC should not exceed 120 ohms for 24 volt and 30 ohms for 12 volt systems.

CANDELA SELECTION

Adjust the slide switch on the rear of the product to the desired candela setting in the small window on the front of the unit. All products meet the light output profiles specified in the appropriate UL Standards. See Figures 1-3. Use Table 1 to determine the current draw for each candela setting. For K series products used outdoors at low temperatures, listed candela ratings must be reduced in accordance with Table 2.

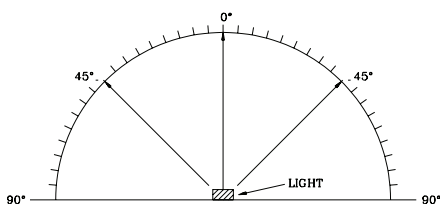
NOTE: SpectrAlert products set at 15 and 15/75 candela automatically work on either 12V or 24V power supplies. The products are not listed for 12V operating voltages when set to any other candela settings. For 4-Wire products, total current draw may be determined by adding current draw for the specific candela selection and the current draw for the specific horn selection use Table 1 and Table 3.

FIGURE 1. LIGHT OUTPUT - VERTICAL DISPERSION, CEILING TO WALLS TO FLOOR



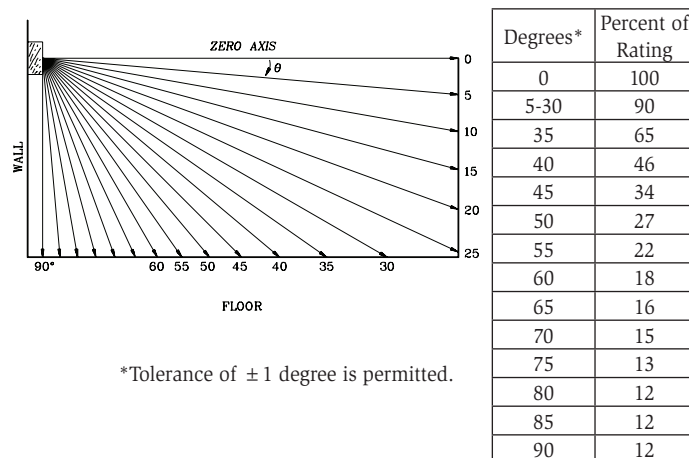
Figures 1-3 list the minimum light output requirements per UL1971.

FIGURE 2. LIGHT OUTPUT - HORIZONTAL DISPERSION



Degrees*	Percent of Rating
0	100
5-25	90
30-45	75
50	55
55	45
60	40
65	35
70	35
75	30
80	30
85	25
90	25
Compound 45 to the right	24
Compound 45 to the left	24

FIGURE 3. LIGHT OUTPUT - VERTICAL DISPERSION, WALL TO FLOOR



*Tolerance of ± 1 degree is permitted.

TABLE 1. STROBE CURRENT DRAW (mA) FOR S, SC, P4 & PC4 SERIES:

	Candela	8-17.5 Volts		16-33 Volts	
		DC	FWR	DC	FWR
Standard Candela Range	15	123	128	66	71
	15/75	142	148	77	81
	30	NA	NA	94	96
	75	NA	NA	158	153
	95	NA	NA	181	176
	110	NA	NA	202	195
High Candela Range	115	NA	NA	210	205
	135	NA	NA	228	207
	150	NA	NA	246	220
	177	NA	NA	281	251
	185	NA	NA	286	258

TABLE 2. CANDELA DERATING:

Listed Candela	Candela rating at -40°F (K Series Outdoor Applications Only)
15	Do not use below 32°F
15/75	
30	
75	44
95	70
110	110
115	115
135	135
150	150
177	177
185	185

HORN SELECTION

Turn the rotary switch on the back of the product to the desired setting. For horn and 4-wire horn/strobe products, the current draw for each setting is listed in Table 3. For 2-wire horn/strobe products (P2 series), current draws are listed in Tables 4 and 5. The sound output measurement for each horn setting is shown in Table 6.

TABLE 3. HORN CURRENT DRAW (mA) FOR H, P4 & PC4 SERIES:

Pos	Sound Pattern	dA Out	8-17.5 Volts		16-33 Volts	
			DC	FWR	DC	FWR
1	Temporal	High	57	55	69	75
2	Temporal	Medium	44	49	58	69
3	Temporal	Low	38	44	44	48
4	Non-temporal	High	57	56	69	75
5	Non-temporal	Medium	42	50	60	69
6	Non-temporal	Low	41	44	50	50
7	Coded	High	57	55	69	75
8	Coded	Medium	44	51	56	69
9	Coded	Low	40	46	52	50

NOTE: In positions 7, 8, and 9, temporal coding must be provided by the NAC. If the NAC voltage is held constant, the horn output will remain constantly on. Positions 7, 8, and 9 are not available on 2-wire horn/strobe products.

TABLE 4. 2-WIRE HORN/STROBE CURRENT DRAW (mA) FOR P2 AND PC2 STANDARD CANDELA SERIES:

DC Input	8-17.5 Volts		16-33 Volts						
	15 cd	15/75 cd	15 cd	15/75 cd	30 cd	75 cd	95 cd	110 cd	115 cd
Temporal High	137	147	79	90	107	176	194	212	218
Temporal Medium	132	144	69	80	97	157	182	201	210
Temporal Low	132	143	66	77	93	154	179	198	207
Non-temporal High	141	152	91	100	116	176	201	221	229
Non-temporal Medium	133	145	75	85	102	163	187	207	216
Non-temporal Low	131	144	68	79	96	156	182	201	210
FWR Input									
Temporal High	136	155	88	97	112	168	190	210	218
Temporal Medium	129	152	78	88	103	160	184	202	206
Temporal Low	129	151	76	86	101	160	184	194	201
Non-temporal High	142	161	103	112	126	181	203	221	229
Non-temporal Medium	134	155	85	95	110	166	189	208	216
Non-temporal Low	132	154	80	90	105	161	184	202	211

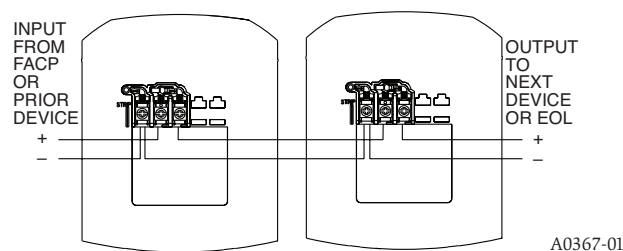
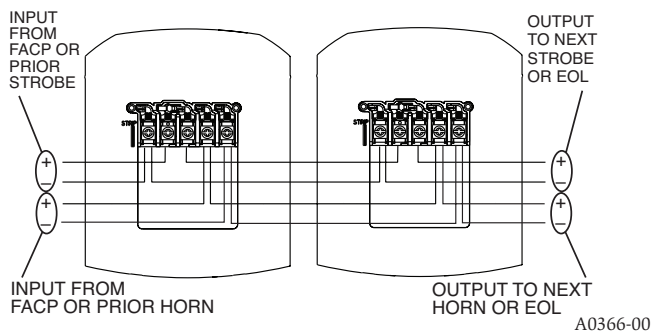
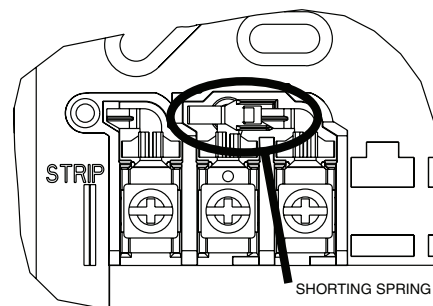
TABLE 5. 2-WIRE HORN/STROBE CURRENT DRAW (mA) FOR P2 AND PC2 HIGH CANDELA RANGE SERIES:

Sound Pattern	16-33 Volts Volts DC				16-33 Volts Volts FWR			
	135 cd	150 cd	177 cd	185 cd	135 cd	150 cd	177 cd	185 cd
Temporal High	245	259	290	297	215	231	258	265
Temporal Medium	235	253	288	297	209	224	250	258
Temporal Low	232	251	282	292	207	221	248	256
Non-temporal High	255	270	303	309	233	248	275	281
Non-temporal Medium	242	259	293	299	219	232	262	267
Non-temporal Low	238	254	291	295	214	229	256	262

TABLE 6. HORN OUTPUT (dBA) IN UL REVERBERANT ROOM:

Switch Position	Sound Pattern	dA	8-17.5 Volts**		16-33 Volts**		24 V Nominal Measurements			
							Reverberant		Anechoic	
			DC	FWR	DC	FWR	DC	FWR	DC	FWR
1	Temporal	High	78	78	84	84	88	88	99	98
2	Temporal	Medium	75	75	80	80	86	85	96	96
3	Temporal	Low	71	71	76	76	81	79	94	89
4	Non-temporal	High	82	82	88	88	93	92	100	100
5	Non-temporal	Medium	78	78	85	85	90	89	98	98
6	Non-temporal	Low	73	74	81	81	86	84	96	92
7*	Coded	High	82	82	88	88	93	92	101	101
8*	Coded	Medium	78	78	85	85	90	89	97	98
9*	Coded	Low	74	75	81	81	85	83	96	92

*Horn & 4-wire Horn/Strobe only. ** Minimum dB rating for Operational Voltage Range as per UL 464.

FIGURE 4. WIRING 2-WIRE PRODUCTS:**FIGURE 5. WIRING 4-WIRE PRODUCTS:****FIGURE 6. SHORTING SPRING:**

For 4-Wire installations, terminals 1, 2, and 3 connect to the strobe; terminals 4 and 5 connect to the horn. The horn and strobe circuits must be wired independently, and each circuit must be terminated with the appropriate EOL device. Removal of a notification device will result in an open circuit indication on the strobe loop.

NOTE: A shorting spring is provided between terminals 2 and 3 of the mounting plate to enable wiring checks after the system has been wired, but prior to installation of the final product. This spring will automatically disengage when the product is installed, to enable supervision of the final system. Only available on indoor products(non K-series).

MOUNTING INDOOR WALL OR CEILING PRODUCTS

1. Attach mounting plate to junction box as shown in Figure 7. The mounting plate is compatible with 4-inch square, double gang, and 4-inch octagon junction boxes (2-wire products may be used with a single gang box).
2. Connect field wiring to terminals, as shown in Figures 4 or 5.
3. If the product is not to be installed at this point, use the paint cover to prevent contamination of the mounting plate. (For indoor models only)
4. To attach product to mounting plate, remove the paint cover, then hook tabs on the product housing into the grooves on mounting plate.
5. Swing product into position to engage the pins on the product with the terminals on the mounting plate. Make sure that the tabs on the back of the product housing fully engage with the mounting plate.
6. Secure product by tightening the single mounting screw in the front of the product housing. For tamper resistance, the standard captivated mounting screw may be replaced with the enclosed Torx screw.

SURFACE MOUNT BACK BOX MOUNTING

1. The surface mount back box may be secured directly to the wall or ceiling. Grounding bracket provided if needed.
2. The wall mount box must be mounted with the up arrow pointing up.
3. Threaded knockout holes are provided for the sides of the box for $\frac{3}{4}$ inch and $\frac{1}{2}$ inch conduit adapter. Knockout holes in the back of the box can be used for $\frac{3}{4}$ inch and $\frac{1}{2}$ inch rear entry.
4. To remove the $\frac{1}{2}$ inch knockout, we recommend you use a flat head screwdriver, place the blade of the flat head screwdriver in the inner edge of the knockout. Strike the screwdriver as you work your way around as shown in Figure 9.

To remove the $\frac{3}{4}$ inch knockout place the blade of the screwdriver along the outer edge and work your way around the knockout as you strike the screwdriver, as shown in Figure 9.

NOTE: For both $\frac{1}{2}$ in. and $\frac{3}{4}$ in. installation, use caution not to strike the knockout near the top edge of the wall version of the surface mount back box.

5. V500 and V700 raceway knockouts are also provided. Use V500 for low profile applications and V700 for high profile applications.
6. To remove the knockout turn pliers up, as shown in Figure 9.

7. Attach the mounting plate to the surface mount back box using the four unpainted screws, as shown in Figure 8.
8. Follow steps 2-6 of the mounting indoor wall or ceiling products to wire and attach the product.

NOTE: For Outdoor Mounting Installation see included Outdoor Mounting Installation Document (I56-3222).

FIGURE 7. MOUNTING:

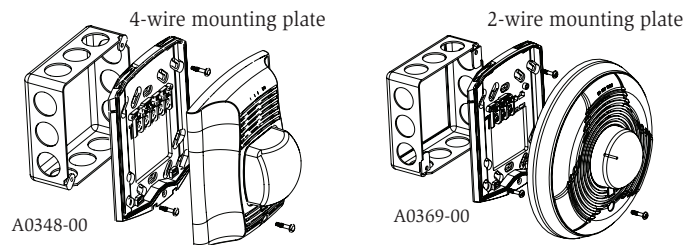


FIGURE 8. SURFACE MOUNT BACK BOX MOUNTING:

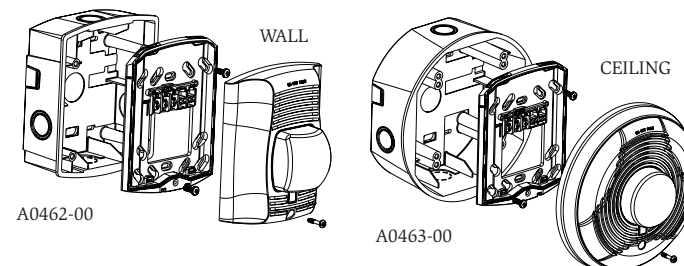
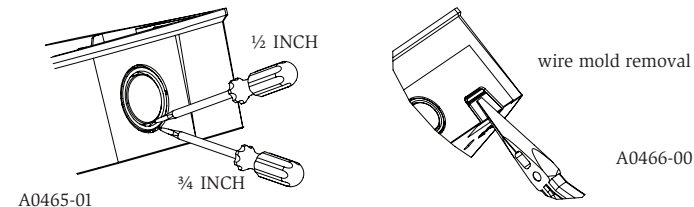


FIGURE 9. KNOCKOUT REMOVAL FOR SURFACE MOUNT BACK BOX:



Please refer to insert for the Limitations of Fire Alarm Systems

WARNING

THE LIMITATIONS OF HORN/STROBES

The horn and/or strobe will not work without power. The horn/strobe gets its power from the fire/security panel monitoring the alarm system. If power is cut off for any reason, the horn/strobe will not provide the desired audio or visual warning.

The horn may not be heard. The loudness of the horn meets (or exceeds) current Underwriters Laboratories' standards. However, the horn may not alert a sound sleeper or one who has recently used drugs or has been drinking alcoholic beverages. The horn may not be heard if it is placed on a different floor from the person in hazard or if placed too far away to be heard over the ambient noise such as traffic, air conditioners, machinery or music appliances that may prevent alert persons from hearing the alarm. The horn may not be heard by persons who are hearing impaired.

NOTE: Strobes must be powered continuously for horn operation.

The signal strobe may not be seen. The electronic visual warning signal uses an extremely reliable xenon flash tube. It flashes at least once every second. The strobe must not be installed in direct sunlight or areas of high light intensity (over 60 foot candles) where the visual flash might be disregarded or not seen. The strobe may not be seen by the visually impaired.

The signal strobe may cause seizures. Individuals who have positive photoic response to visual stimuli with seizures, such as persons with epilepsy, should avoid prolonged exposure to environments in which strobe signals, including this strobe, are activated.

The signal strobe cannot operate from coded power supplies. Coded power supplies produce interrupted power. The strobe must have an uninterrupted source of power in order to operate correctly. System Sensor recommends that the horn and signal strobe always be used in combination so that the risks from any of the above limitations are minimized.

THREE-YEAR LIMITED WARRANTY

System Sensor warrants its enclosed product to be free from defects in materials and workmanship under normal use and service for a period of three years from date of manufacture. System Sensor makes no other express warranty for this product. No agent, representative, dealer, or employee of the Company has the authority to increase or alter the obligations or limitations of this Warranty. The Company's obligation of this Warranty shall be limited to the replacement of any part of the product which is found to be defective in materials or workmanship under normal use and service during the three year period commencing with the date of manufacture. After phoning System Sensor's toll free number 800-SENSOR2 (736-7672) for a Return Authorization number, send defective units postage prepaid to: System Sensor, Returns Department, RA # _____, 3825

Ohio Avenue, St. Charles, IL 60174. Please include a note describing the malfunction and suspected cause of failure. The Company shall not be obligated to replace units which are found to be defective because of damage, unreasonable use, modifications, or alterations occurring after the date of manufacture. In no case shall the Company be liable for any consequential or incidental damages for breach of this or any other Warranty, expressed or implied whatsoever, even if the loss or damage is caused by the Company's negligence or fault. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

FCC STATEMENT

SpectrAlert Strobes and Horn/Strobes have been tested and found to comply with the limits for a Class B 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.