NOTIFIER®
A Pittway Company

July 13, 1998 CHICAGO

AFP-400
Analog Fire Panel

Section: Intelligent Fire Alarm Control Panels

GENERAL

The AFP-400 is a compact, cost-effective, intelligent fire alarm control with a capacity of 563 points and an extensive list of powerful features. The AFP-400 integrates conventional output circuits, such as notification, with the intelligent features of two signaling line circuits (SLC) and 396 intelligent/addressable points.

S635

CS 118/733

California State Fire Marshal
7170-0028:182
7165-0028:181

0B1A0.AY

MEA
17-96-E

City of Chicago
Class 1: 1291E
Class 2: 1792E

FEATURES

- The Fire VIEW™ System:
  - ✔ *Revolutionary new spot laser detection.*
  - ✔ *Advanced AWACS™ algorithms differentiate between smoke and non-smoke signals.*
  - ✔ *Addressable operation pinpoints the fire location.*
  - ✔ *No moving parts to fail or filters to change.*
  - ✔ *Early warning performance comparable to the best aspiration systems at a fraction of the lifetime cost.*
- Low pressure CO_2 support:
  - ✔ *Expanded soak timer - 0 to 9999 seconds.*
  - ✔ *Manual release delay (10 seconds) type ID.*
  - ✔ *"Second shot" monitor module type ID.*
  - ✔ *Triple-coded notification circuit type ID.*
- Combo zone. Connect tamper and waterflow detectors to a common monitor module.
- Modified California Code, pulsed on time.
- Simplified UDACT point reporting and programming.
- Verification Trouble counter. Trouble indication after a detector verifies 20 times.
- VeriFire™ 400 report option. Sort Maintenance Reports by dirty detector, peak value, or alarm level.
- Two intelligent Signaling Line Circuits (SLC) Style 4, 6 or 7.
- 396 intelligent device capacity (198 intelligent detectors and 198 monitor/control modules).
- Up to 68 internal circuits/relays, plus 99 programmable zone output relays for a total capacity of 563 points.
- Peer-to-peer network-ready *(refer to* **NOTI•FIRE•NET** *and NAM-232 catalog sheets for further information)*.
- Intelligent features:
  - ✔ *Manual sensitivity adjustment - 9 levels.*
  - ✔ *Pre-alarm AWACS™ 9 levels.*
  - ✔ *Day/Night automatic sensitivity adjustment.*
  - ✔ *Sensitivity windows:*
    ION – 0.5 to 2.5%/foot obscuration.
    PHOTO – 0.5 to 2.35%/foot obscuration.
    LASER – 0.03 to 1.0%/foot obscuration.
    MULTI-SENSOR – 0.71 to 4.0%/foot obscuration.
  - ✔ *Drift compensation (U.S. Patent Pending).*
  - ✔ *Multi-detector algorithm Involves nearby detectors in alarm decision (patent pending).*
  - ✔ *Auto detector test (meets NFPA 72).*
  - ✔ *Maintenance alert (two levels).*
  - ✔ *Self-optimizing pre-alarm adjusts pre-alarm level to environment automatically.*
  - ✔ *Activate local sounder base on pre-alarm.*
  - ✔ *LED blink control for sleeping areas.*
  - ✔ *Automatic device type check.*
- Releasing features:
  - ✔ *Ten independent hazards.*
  - ✔ *Sophisticated cross-zone (three options).*
  - ✔ *Delay timer and Discharge timers (adjustable).*
  - ✔ *Abort (four options).*

This document is not intended to be used for installation purposes. We try to keep our product information up-to-date and accurate. We cannot cover all specific applications or anticipate all requirements. All specifications are subject to change without notice. For more information, contact **NOTIFIER.** Phone: (203) 484-7161 FAX: (203) 484-7118

NOTIFIER® 12 Clintonville Road, Northford, Connecticut 06472

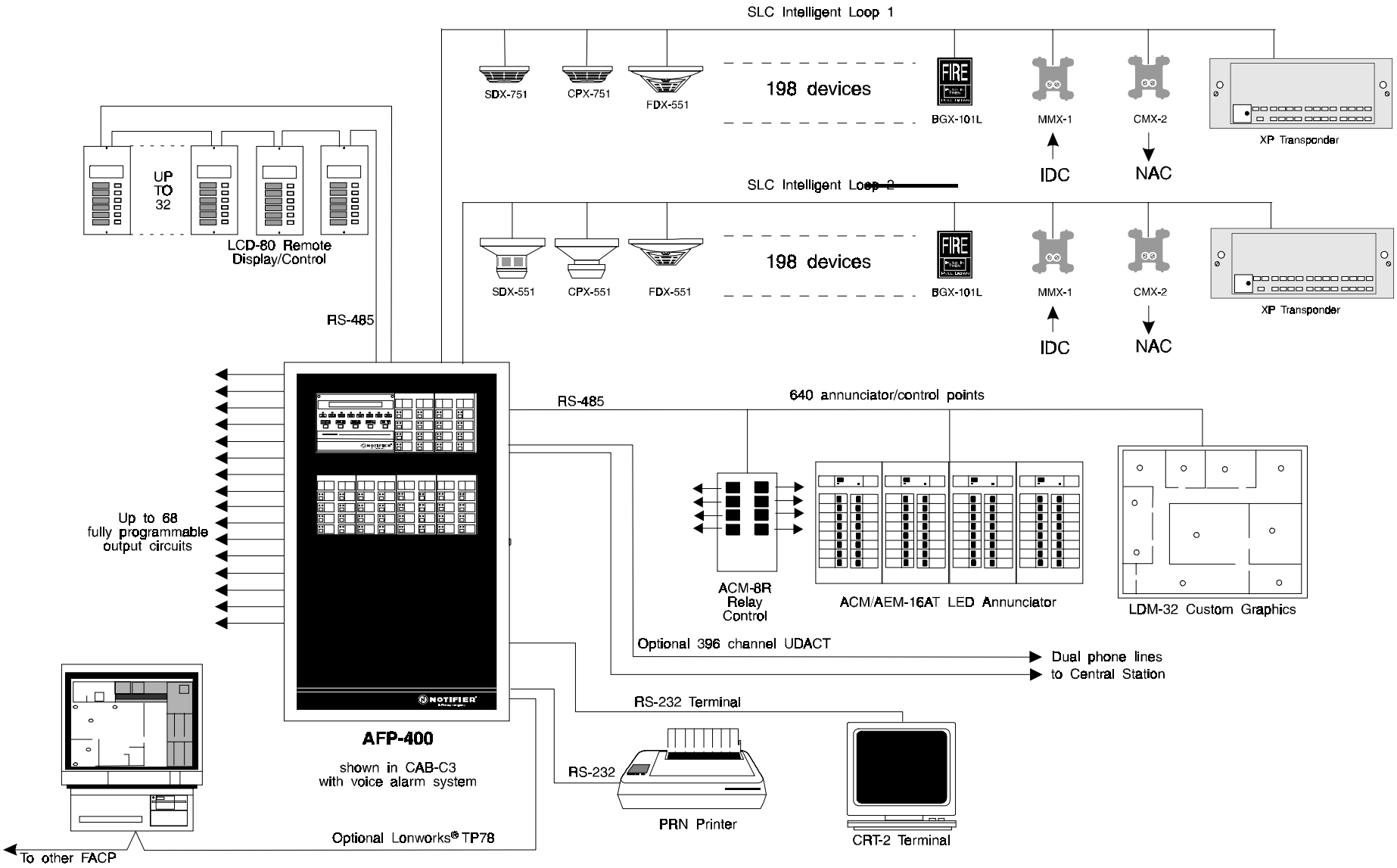
ISO-9001
Engineering and Manufacturing Quality System Certified to International Standard ISO-9001

Made in the U.S.A.

FEATURES, *continued*

- Optional universal 396 channel DACT, with AC fail delay.
- UL-listed modem interface allows remote/off-site system integration.
- LCD-80 remote 80-character displays (up to 32).
- ACS annunciators (EIA-485), including LDM custom.
- Printer interface (80-column and 40-column printers).
- 6.0 A usable regulated output power, plus 6.0 A expanders.
- 80-character LCD display, backlit (2 lines x 40 characters).
- History file with 800-event capacity in non-volatile memory, plus separate 200-event alarm-only file.
- VGAS graphic monitor system supports up to 8 AFP-400's.
- Waterflow or supervisory selection per point.
- Alarm Verification selection per point, with tally.
- Autoprograming and Walk Test reports 2 devices set to same address.
- Positive Alarm Sequence (PAS) Presignal per NFPA 72.
- Silence inhibit and Auto Silence timer options.
- March time/temporal/California/two-step code for bell circuits.
- Field-programmable on panel or on PC, with VeriFire™ program check, compare, simulate.
- Full QWERTY keypad behind flip-down door.
- MMX-2 two-wire detector interface provides compatibility with many non-NOTIFIER detectors for retrofit applications.
- Dual rate charger for up to 90 hours of standby power.
- Tornado Warning activates different Notification Circuit code.
- Non-alarm points for lower priority functions.
- Remote ACK/Silence/Reset/Drill via MMX modules.
- Automatic time control functions, with holiday exceptions.
- Rapid poll algorithm for manual stations. Responds in < 3 seconds.
- Operates with untwisted, unshielded wire (up to 1,000 feet) for retrofit applications (U.S. Patent 5, 210, 523).
- Surface Mount Technology (SMT) Electronics.
- High-speed RISC 16-bit Microprocessor.
- Extensive, built-in transient protection.

SYSTEM BLOCK DIAGRAM



The CPU-400

EIA-232 Printer Port
EIA-232 Terminal Port
EIA-485 "Terminal Mode" Port
EIA-485 Port
SLC Loop #1 (Style 4,6, or 7)
SLC Loop #2 (Style 4,6, or 7)
80-Character (2 x 40) Back-Lit LCD Display
Slide-in Label
Status LED's
Control Switches
EPROM
Programming Keypad
Flip-Down Door (covers the programming keypad)

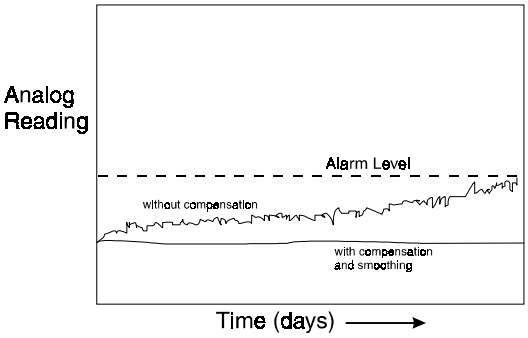
The MPS-400 Main Power Supply

Form-C Alarm, Trouble, Supervisory, and Security contacts. (3 amps @ 30 VDC) (Note: Supervisory and Security contacts can be converted to alarm contacts.)
2 non-resettable 24 VDC circuits rated 1.25 amps each*
Resettable 24 VDC @ 1.25 amps*
NAC or Releasing circuits 1 & 2. Class A or Class B, 24 VDC @ 2.5 amps each.*
AC Power 120/240 VAC (Field Selectable)
NAC or Releasing Circuits 3 & 4. Class A or B, 24 VDC @ 2.5 amps each.*
Battery (12-60 A.H.)
Status/Trouble LEDs
Optional Transmitter module (4XTM connector).
* The MPS-400 is a 6 amp power supply. Total power, including internal modules, cannot exceed 6 amps.
UZC Coder Input
Door Tamper Switch (STS-200)
Meter Module Option (MPM-2)

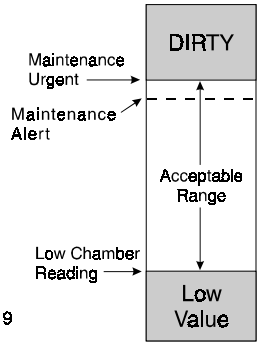
AWACS™ Advanced Warning Addressable Combustion Sensing

AWACS™ is a set of software algorithms that provide the AFP-400 with industry-leading smoke detection capability. The development of these sophisticated algorithms are made possible by the close cooperation between Notifier and System Sensor, the world leaders in fire detection and alarm technology. These complex algorithms require many calculations on each reading of each detector, and are made possible by the very high speed microcomputer used by the AFP-400 (16-bit RISC Reduced Instruction Set Computer).

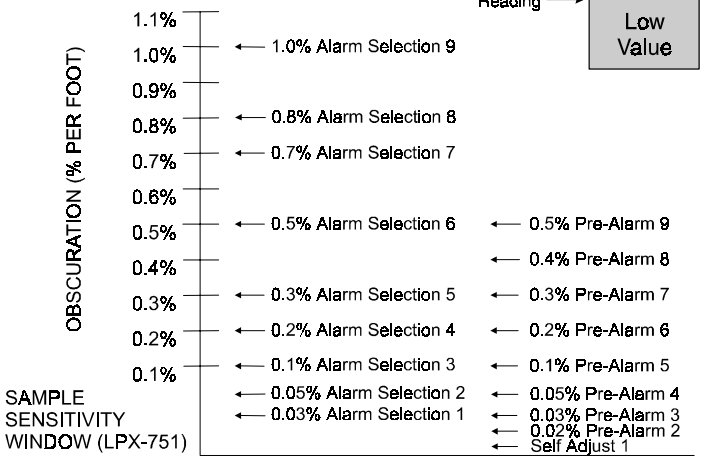
❶ Drift Compensation and Smoothing. These algorithms (U.S. patent pending) identify and compensate for long-term changes in the analog readings from each smoke sensor. Long-term changes are usually caused by dust accumulation inside the smoke chamber. Drift compensation allows the detector to retain its original ability to detect actual smoke, and resist false alarms, even as dirt accumulates. It reduces maintenance requirements by allowing the system to automatically perform the periodic sensitivity measurements required by NFPA Standard 72. Smoothing filters are also provided by software to remove transient noise signals, usually caused by electrical interference. Different smoothing algorithms are used, depending on the sensitivity selection of each detector.



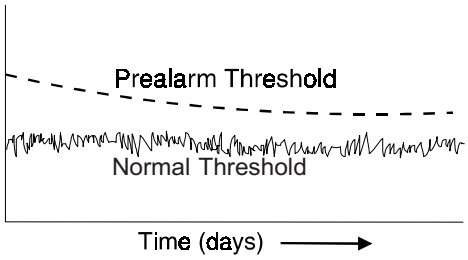
❷ Maintenance Warnings. When the drift compensation performed for a detector reaches a certain level, the performance of the detector may be compromised, and special warnings are given. There are three warning levels: (1) Low Chamber value, usually indicative of a hardware problem in the detector; (2) Maintenance Alert, indicative of dust accumulation that is near but below the allowed limit; (3) Maintenance Urgent, indicative of dust accumulation above the allowed limit. The Maintenance Alert level allows maintenance before the performance of the device is compromised.



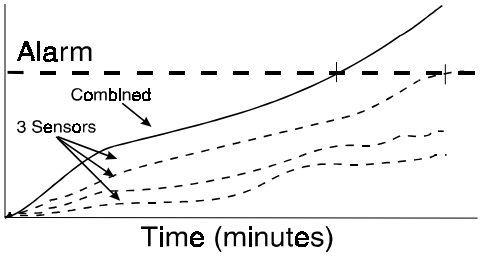
❸ Sensitivity Adjust. Nine sensitivity levels are provided for alarm detection. These levels can be set manually, or can change automatically between day and night. Nine levels of pre-alarm sensitivity can also be selected, based on predetermined levels of alarm. Pre-alarm operation can be latching or self-restoring, and can be used to activate special control functions that are a subset of the alarm control program.



❹ Self-Optimizing Pre-Alarm. Each detector may be set for "Self-Optimizing" pre-alarm. In this special mode, the detector "learns" its normal environment, measuring the peak analog readings over a long period of time, and setting the pre-alarm level just above these normal peaks. This allows extremely sensitive pre-alarm capability with reasonable protection against non-fire signals.



❺ Cooperating Multi-Detector Sensing. A unique feature of AWACS is the ability of a smoke sensor to consider readings from nearby sensors in making alarm or pre-alarm decisions. Using logic algorithms, each sensor can include up to two other sensors in its decision. Without statistical sacrifice in the ability to resist false alarms, it allows a sensor to increase its sensitivity to actual smoke by a factor of almost 2 to 1. Multi-detector sensing also allows the combination of ionization with photoelectric technology in reaching an alarm decision.



FIELD PROGRAMMING OPTIONS

AUTOPROGRAM

```
AUTOPROGRAM  PLEASE WAIT
```

```
L1:80 DETS, 15 MODS L2:93 DETS, 35 MODS
PANEL OUTPUTS:24  BELLS: 04
```

Autoprogram is a timesaving feature of the AFP-400. It is a special software routine that allows the AFP-400 to "learn" what devices are physically connected and automatically load them in the program with default values for all parameters. Requiring less than 30 seconds to run, this routine allows the user to have almost immediate fire protection in a new installation, even if only a portion of the detectors are installed. The routine will find all intelligent detectors and modules, and present them to the installer for edit of the default option selections, if desired. If a device is found that already exists in memory, autoprogram skips over that device (only new devices or missing devices are presented to the installer). Often the installer will perform autoprogram as a first step in a new installation, then upload the program into VeriFire to add all custom labels and other information, then download from VeriFire to the AFP-400.

KEYPAD PROGRAM EDIT

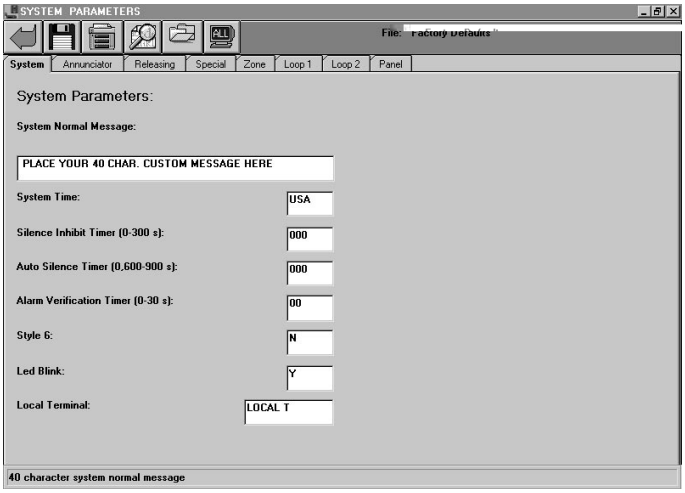
```
ENTER PROG OR STAT PASSWORD, THEN
ENTER (ESCAPE TO ABORT) ****
```

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

The AFP-400, like all NOTIFIER intelligent panels, has the exclusive feature of full program creation and edit capability from the front panel keypad, while continuing to provide fire protection. The architecture of the AFP-400 software is such that each point entry carries its own program, including control-by-event links to other points. This allows the program to be entered with independent per-point segments, while the AFP-400 simultaneously monitors other (already installed) points for alarm conditions.

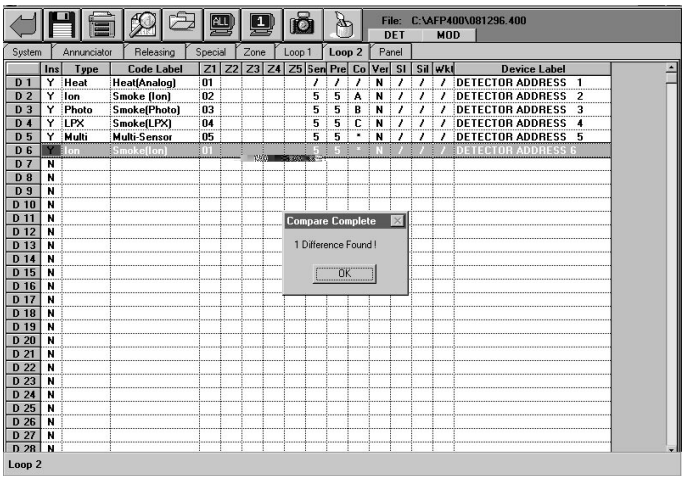
In addition to avoiding system shutdown, program edit from the panel keypad has the advantage of not requiring an on-site PC. This can save significant installation time for minor program changes. The AFP-400 site-specific program is password protected, and all information is stored in non-volatile memory. Menu "trees" are provided to lead the trained installer through the program steps without the necessity to refer to the programming manual.

VeriFire™



VeriFire is an off-line programing and test utility that can greatly reduce installation programming time, and increase confidence in the site-specific software. It is Windows® based and provides technologically advanced capabilities to aid the installer. The installer may create the entire program for the AFP-400 in the comfort of the office, test it, store a backup file, then bring it to the site and download from a laptop into the panel.

The program includes error checks for common programming mistakes, such as an input point that does not activate any outputs, or an output point that is not linked to any inputs. It also includes a simulation routine that will list all of the output points that are activated by a particular input point (alternatively, it will list all the input points that are linked to a particular output). Although this does not eliminate on-site testing, it greatly increases confidence in the final installation. For example, a 200-input and 100-output point system, without using VeriFire, could require 20,000 test observations to verify all possible I/O links.



VeriFire includes a compare routine, pictured at right, that can also greatly help the installer. When a new program is created, it may be compared with a previous version and differences are highlighted. If the program is modified from the panel keypad, it may be uploaded into VeriFire, and compared with the previous version stored on disk. The identification of program differences greatly helps the installer in testing the installation. NFPA 72 requires that reacceptance test of a fire alarm system be performed on 100% of all points that are "known" to be modified. VeriFire allows the installer to determine the exact points that are changed.

BASIC EQUIPMENT PACKAGES

There are two packages available to configure an AFP-400 system. The standard model, BE-400, is designed to mount in a NOTIFIER full-sized cabinet in the CAB-X3 Series. The BE-400AA is a miniature package designed for a smaller cabinet, the CAB-400AA. Order one of the following:

BE-400: *Base Equipment includes the CPU module (CPU-400), an 80-character display, programming keypad, MPS-400 main power supply, installation instructions, chassis and required hardware. Order CAB-X3 cabinet separately.*

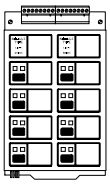
BE-400AA: *Base Equipment for use with CAB-AA mini cabinet. It is similar to BE-400 but for use in CAB-AA. Includes MPS-400RB and transformers. Supports one output option module. Order CAB-400AA cabinet separately.*

SYSTEM MODULES

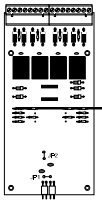
The AFP-400 includes the ability to communicate with up to 8 conventional modules each with up to 8 circuits. Any mix of notification or relay may be used.

Choose any combination of up to eight output modules: ICM/ICE or CRM/CRE.

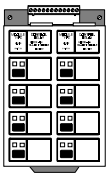
ICM-4: *Notification Appliance Circuit Module, provides four Style Y or Style Z alarm Notification Appliance Circuits. Maximum signaling current is 3.0 amps per circuit or 6.0 amps per module, subject to power supply limitations (includes auxiliary power harness, ELRs and slide-in labels). Includes ON/OFF controls and ON/OFF LEDs.*



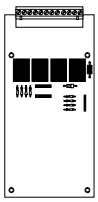
ICE-4: *Notification Appliance Circuit Expander, expands ICM-4 to provide a total of eight (8) Style Y or Style Z alarm Notification Appliance Circuits. Circuit ratings are same as ICM-4. (Maximum of one per ICM-4.) May also be used to add four Notification Appliance Circuits to VCM-4.*



CRM-4: *Control Relay Module, four (4) Form-C relay contacts, rated at 5.0 A, 120 VAC or 28 VDC (resistive) per circuit. Includes manual ON/OFF controls and LEDs.*

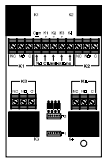


CRE-4: *Control Relay Expander, expands CRM-4 to provide a total of eight (8) Form-C relay contacts. (Maximum of one per CRM-4.) May also be connected to add four relays to ICM-4, TCM-2, TCM-4, or VCM-4.*

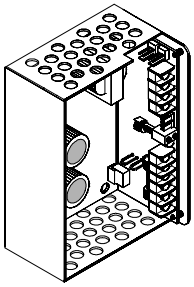


OTHER OPTION MODULES

ARM-4: *Auxiliary Relay Module, four (4) Form-C relays controlled by a relay module (CRM-4 or CRE-4). N.O. contacts rated 20 amps, N.C. contacts rated 10 amps at 125 VAC and 30 VDC. (Maximum of one for each CRM-4 or CRE-4.)*



APS-6R: *Auxiliary Power Supply (expander). Provides up to 6.0 amperes of regulated power for compatible Notification Appliance circuits. Includes battery input and transfer relay, and overcurrent protection. Mounts on one of four positions on a CHS-4L or CHS-4 chassis.*



FCPS-24: *The FCPS-24 is a remote 6-amp (4-amp continuous) repeater/power supply.*

UZC-256: *Programmable Universal Zone Coder provides positive non-interfering successive zone coding. Microprocessor-controlled, field-programmable from IBM-compatible PCs (requires optional programming kit).* (See UZC-256 catalog sheet.)

LCD-80/LCD-80TM: *80-character, backlit LCD display. Mounts up to 6,000 ft. from panel. Up to 32 per AFP-400.* (See LCD-80, LCD-80TM catalog sheets.)

ACS: *Annunciator Control Modules ACM-16AT, AEM-16AT, ACM-32A, and AEM-32A.* (See ACS catalog sheet.)

AFM: *Annunciator Fixed Modules AFM-16A, AFM-16AT, and AFM-32A.* (See AFM catalog sheet.)

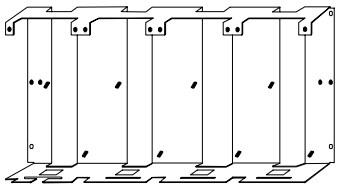
LDM: *Lamp Driver Modules LDM-32, LDM-E32, and LDM-R32.* (See LDM catalog sheet.)

ACM-8R: *Remote Relay Module with eight Form-C contacts. Can be located up to 6,000 ft. from panel on four wires.*

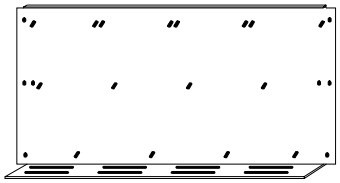
RPT-485: *Repeats EIA-485 over twisted pair or converts to fiber-optic medium.* (See RPT catalog sheet.)

XP: *The XP Series Transponder provides conventional monitor and control points.* (See XP catalog sheet.)

CHS-4: *Chassis for mounting up to four APS-6R.*



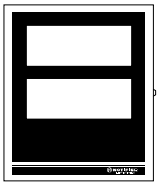
CHS-4L: *Low-profile four-position Chassis. Mounts two AA-30 amplifiers or one AMG-E and one AA-30.*



CHS-4M: *Expansion Chassis. Mounts up to four modules. Includes CHS-4, MP-1 (Module Dress Panel), and Expander Ribbon Cable.*

DP-1: *Blank Dress panel. Provides dead-front panel for unused tiers or to cover AA-30, AA-120, or AMG-E.*

CAB-X3 Series: *The CAB-X3 Series cabinets are fabricated from 16-gauge steel with unique full-front LEXAN®, reverse silk-screened for durability. The cabinet assembly consists of two basic parts: a Backbox (SBB-X3), and a Locking Door (DR-X3) that may hinge right or left. Cabinets are arranged in four (4) sizes, A through D. A trim ring option is available for semi-flush mounting.*



CAB-400AA: *Provides small cabinet for CPU-400 and MPS-400RB. Use with BE-400AA only. Space for one (only) output circuit module plus expander.*

MPS-400: *Power Supply module. The MPS-400 includes 4 Notification Appliance Circuits (NAC) that can connect four Class A (Style Z) or Class B (Style Y) circuits. The NAC also can be used for Releasing applications. Includes four built-in system relays (alarm, trouble, security, and supervisory). For BE-400 replacement only. The MPS-400 is included in the BE kits.*

MPS-400RB: *MPS-400 PC board only. Less transformers and mounting chassis.*

LEXAN® is a registered trademark of GE Plastics, a subsidiary of General Electric Company.

AGENCY LISTINGS AND APPROVALS

See the first page of this catalog sheet for listing agencies and file numbers. These listings and approvals apply to the basic AFP-400 control panel. In some cases, certain modules may not be listed by certain approval agencies, or listing may be in process. Consult factory for latest listing status.

The AFP-400 is UL listed, per Standards 864 (Fire) and 1076 (Burglary). It meets NFPA 72 Local, Auxiliary, Remote Station, Proprietary, and Emergency Voice/Alarm Fire System Requirements.

SPECIFICATIONS

- Primary input power, 120 VAC, 50/60 Hz, 3.0 Amps.
- Total output 24 V power — 6.0 A.*
- Standard Bell circuits (4) per MPS-400 — 2.5 A each.
- Four-wire detector power — 1.25 A.
- Two non-reset regulated power outputs — 1.25 A each.
- Battery charger range: 12 AH - 60 AH. (Use separate BB-55 cabinet for 60 AH batteries.)
- Charge high rate: 29.1 V. Float Rate: 27.6 V.

* Note*: The MPS-400 has a total of 6.0 Amps of available power. This is shared by all internal modules and each MPS-400 circuit.*

SYSTEM CAPACITY

- Intelligent Signaling Line Circuits 2
- Intelligent Detectors 198
- Addressable monitor/control modules 198
- Programmable internal hardware and output circuits (4 standard) 68
- Programmable software zones 99
- Special Programming zones 14
- Programmable remote relay/annunciator points 99
- LCD-80 annunciators per system (observe power) .. 32
- ACS annunciators per system...10 Address x 64 points

CONTROLS AND INDICATORS

Program Keypad: QWERTY type (keyboard layout).

8 LED indicators: AC Power; Fire Alarm; Pre-Alarm; Security Alarm; Supervisory Signal; System Trouble, Disabled points, Alarm Silenced.

Membrane Switch Controls: Acknowledge/Step; Silence; Evacuate; System Reset; Lamp Test.

LCD Display: 80 characters (2 x 40) with long-life LED back-light.

COMPATIBLE DEVICES, EIA-232 Port

Model	Description
PRN-4	80 column printer.
VS4095/S2	Printer, 40 column, 24 V. Mounted in external backbox *(Order from Keltron, Inc.).*
CRT-2	Video display terminal.
NAM-232W	Wire peer-to-peer **NOTI•FIRE•NET** network interface module *(see separate catalog sheet)*.
NAM-232F	Fiber peer-to-peer **NOTI•FIRE•NET** network interface module *(see separate catalog sheet)*.
***VGAS**	Video Graphic Annunciator System *(see separate catalog sheet).*

Note: * *Not UL 864 listed (ancillary device only).*

COMPATIBLE INTELLIGENT DEVICES

Model	Description
CPX-551	Ionization smoke detector.
SDX-551	Photoelectric smoke detector.
SDX-551TH	Photoelectric with thermal element.
FDX-551	Fixed thermal (heat) sensor.
FDX-551R	Fixed and rate-of-rise thermal sensor.
BX-501	Standard U.S. detector base.
B501BH	Sounder base.
B524RB	Relay base.
B524BI	Isolator base.
DHX-501	Duct housing with alarm relay.
DHX-502	Duct housing without alarm relay.
MMX-1	Monitor module.
MMX-2	Two-wire detector monitor module.
MMX-101	Miniature Monitor Module.
CMX-2	Control Module.
BGX-101L	Manual Fire Alarm Station, addressable.
ISO-X	Isolator Module.
XP Series	Transponder.

COMPATIBLE "LOW PROFILE" DEVICES

CPX-751	Low-profile ionization detector.
SDX-751	Low-profile photoelectric detector.
LPX-751	Low-profile laser photo detector.
IPX-751	Low-profile Advanced Multi-Sensor detector.
B224RB	Low-profile relay base.
B224BI	Isolator base for low-profile detectors.
B710LP	Low Profile base. Standard U.S. Style.

COMPATIBLE DEVICES, RS-485 Port

Model	Description (see catalog sheets)
ACS Series	Remote Serial Annunciator/Control systems.
LCD-80	Remote LCD display.
LDM Series	Remote custom graphic driver modules.
ACM-8R	Remote relay module. 8 Form-C relays.
NIB-96	Network Interface Board.
RPT-485 Series	Repeater, isolator and/or fiber optic modem.
UDACT	Universal Digital Alarm Communicator Transmitter.
UZC-256	Zone Coder. Up to 256 programmable codes.

PRODUCT LINE INFORMATION

Model	Description
BE-400	Basic Equipment package for an AFP-400 in a CAB-3 cabinet. Includes: CPU-400 with keypad, 80-character display, MPS-400 power supply, and all necessary cables and documentation.
BE-400AA	Basic Equipment package for an AFP-400 when mounted in a CAB-AA (cabinet ordered separately). Includes CPU-400 and an MPS-400RB power supply.
CAB-X3 Series	The AFP-400 utilizes **NOTIFIER** CAB-X3 Series cabinets *(see separate catalog sheet)*.
CAB-400AA	Mini cabinet for AFP-400. Supports one option card.
4XTM	Plug-in Transmitter Module. Provides municipal box & remote station connection.
PS-12120	Battery, 12 volt, 12.0 AH (two required).
PS-12250	Battery, 12 volt, 25.0 AH (two required).
PS-12600	Battery 12 volt, 60 AH (use 2 with BB-55).
BB-55	Battery Box (required for 60 AH).
VeriFire-400	Programming kit for PC. Includes diskette, cable, and instructions.

Other options as listed in previous sections.