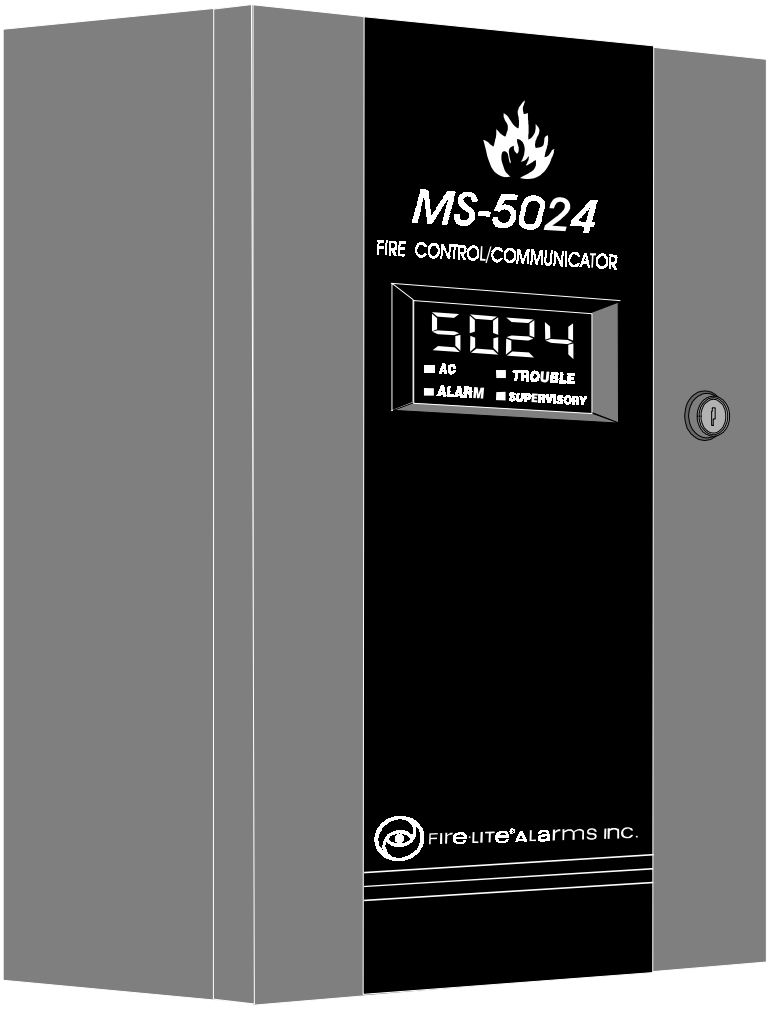
The MS-5024/MS-5024E Fire Control Communicator



Installation, Programming, Operation and Maintenance Manual

FIRE·LITE ALARMS INC.
One Fire-Lite Place, Northford, CT 06472

Document # 50066
7/20/99 Rev: D
P/N 50066:D1 ECN 99-233

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 this manual is read and understood.

CAUTION - *System Reacceptance Test after Software Changes:* To ensure proper system operation, this product must be tested in accordance with NFPA 72-1993 Chapter 7 after any programming operation or change in site-specific software. Reacceptance 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^{O} C/32-120^{O} F and at a relative humidity of 85% RH (non-condensing) at 30^{O} C/86^{O} 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 nominal room temperature of 15-27^{O} C/60-80^{O} 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 interferences, 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, and 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.

Fire Alarm System Limitations

While installing a fire alarm system may make lower insurance rates possible, 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 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.

Any fire alarm system may fail for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in walls, or 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. Furthermore, all types of smoke detectors - both ionization and photoelectric types, have sensing limitations. No type of smoke detector can sense every kind of fire caused by carelessness and safety hazards like smoking in bed, violent explosions, escaping gas, improper storage of flammable materials, overloaded electrical circuits, children playing with matches, or arson.

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.

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.

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.

Equipment used in the system may not be technically compatible with the control. 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.

The most common cause of fire alarm malfunctions, however, is inadequate maintenance. All devices and system wiring should be tested and maintained by professional fire alarm installers following written procedures supplied with each device. System inspection and testing should be scheduled monthly or as required by National and/or local fire codes. Adequate written records of all inspections should be kept.

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 device pursuant to Subpart B of Part 15 of FCC Rules, which is designed to provide reasonable protection against such interference when 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 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 present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la classe A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

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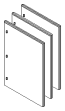
This control panel has been designed to comply with standards set forth by the following regulatory agencies:

- Underwriters Laboratories Standard UL 864
- NFPA 72-1993 National Fire Alarm Code for Local, Remote Station and Central Station Fire Alarm Systems
- CAN/ULC - S527-M87 Standard for Control Units for Fire Alarm Systems

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

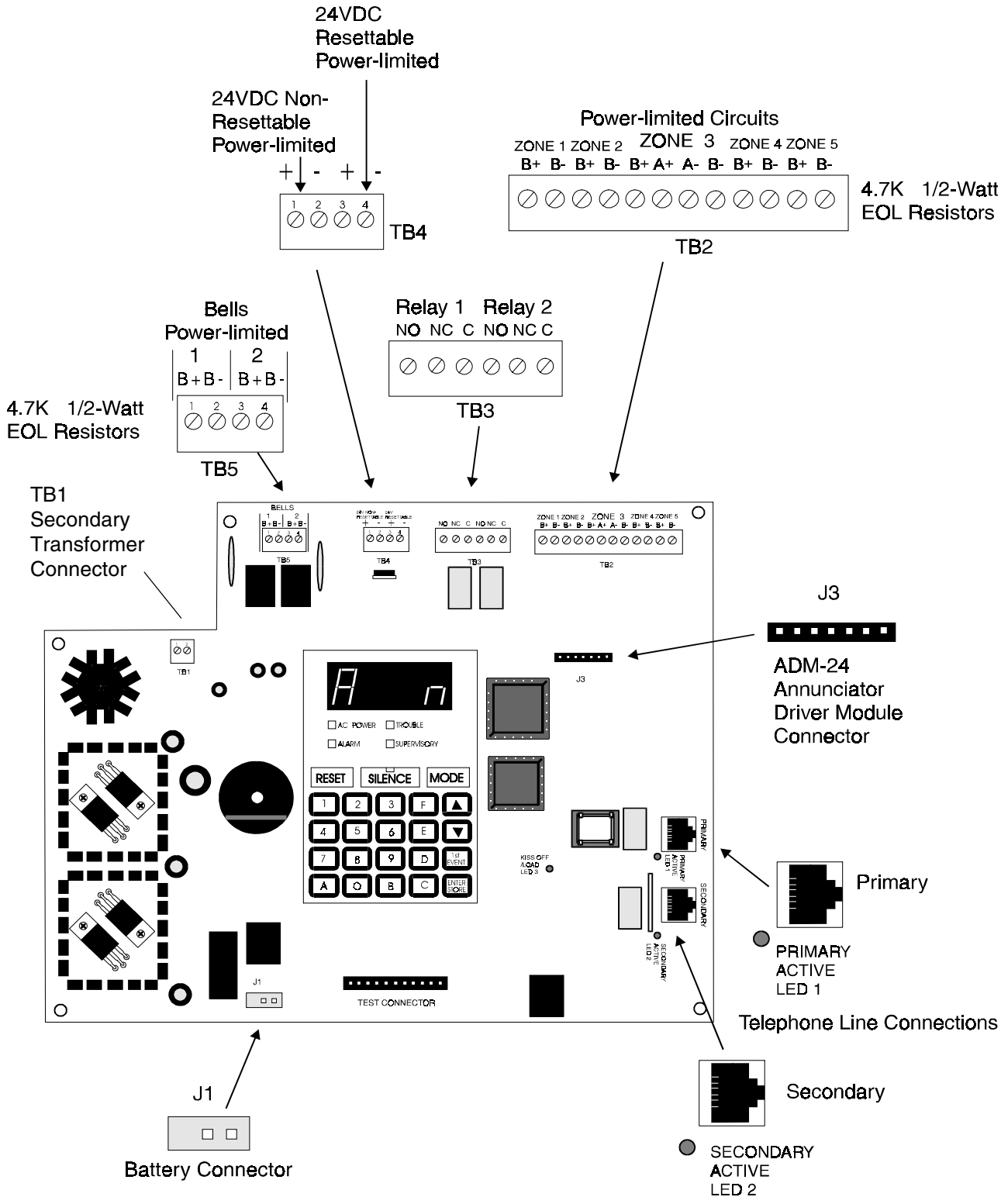
NFPA-1993 Standards:
NFPA 72-1993 National Fire Alarm Code

Underwriters Laboratories Documents:
UL 38 Manually Actuated Signaling Boxes
UL 217 Smoke Detectors, Single and Multiple Station
UL 228 Door Closers—Holders for Fire Protective Signaling Systems
UL 268 Smoke Detectors for Fire Protective Signaling Systems
UL 268A Smoke Detectors for Duct Applications
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 1638 Visual Signaling Appliances
CAN/ULC - S524-M91 Standard for Installation of Fire Alarm Systems



Other:
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

Fire-Lite Documents
Fire-Lite Device Compatibility Document, #15384



Note: <u>When dressing wires, maintain a minimum of a 1/4" distance between conductors to power limited and non-power limited circuits.</u>

1.0 Product Description

The MS-5024 is a combination control panel and digital communicator all on one circuit board. It is a five-zone panel which uses conventional input devices. The panel accepts waterflow devices, two-wire smoke detectors, four-wire smoke detectors, pull stations and other normally open contact devices. Outputs include two Notification Appliance Circuits, and two programmable relays.

The integral communicator transmits system status (alarms, troubles, AC loss, etc.) to UL-listed Central Stations via the public switched telephone network. The control panel has a built in programmer and may also serve as a slave communicator to a host panel. It also supervises all wiring, AC voltage, telephone line input voltage and battery level.

The MS-5024E offers the same features as the MS-5024 but allows connection to 220/240 VAC input.

1.1 Product Features

- Selectable as Fire Panel, Fire Panel/Communicator, or Slave Communicator
- Programmable Zone ID: 2 Wire Smoke; Pull Station; Normally Open Contact; Supervisory; Supervisory-Auto Silence; Waterflow-Silenceable; Waterflow-Non-Silenceable
- One Style D (Class A) Initiating Zone
- Four Style B (Class B) Initiating Zones
- 3.6 amps Usable Power
- Two NFPA Style Y (Class B) Notification Appliance (bell) Circuits
- Built-in Programmer
- Built-in Voltmeter
- Telephone Line Active LED Indicators
- Communication Confirmation (Kissoff) LED
- Disable report by event
- Programmable Event Codes
- 24 Volt Operation
- Real Time Clock
- Trouble Reminder
- Alarm Verification
- Alarm Presignal
- RZA-5F Remote Annunciator (requires ADM-24 Annunciator Driver Module)
- Small Size 14.5" x 12.5" x 2.875"
- History File with 32 Event Storage
- Silence Inhibit per Notification Appliance Circuit
- Auto-Silence per Notification Appliance Circuit
- Touchtone/Rotary Dialing
- Programmable Make/Break Ratio
- Fuseless
- Number of dial attempts (5 min, 10 max)
- Programmable Channel ID (slave)
- Programmable Zone Delay (waterflow only)
- Two Form-C Programmable Relays

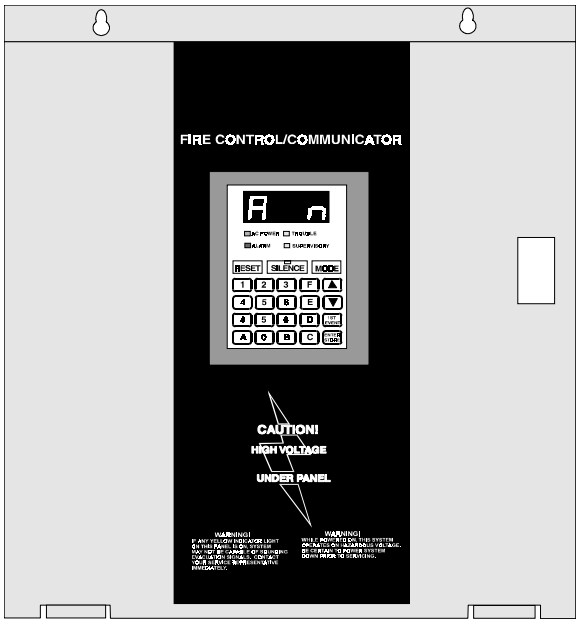


Figure 1-1: Optional DP-5024

- Low AC Voltage Sense
- One Man Walk Test
- Optional Dead Front cover (DP-5024)
- CAC-5F Class A Converter module for Initiating Device Circuits
- NACA-2F Class A Converter module for Notification Appliance Circuits

Note: Unless otherwise specified, MS-5024 shall be used in this manual to refer to both the MS-5024 and MS-5024E Fire Control Communicators.

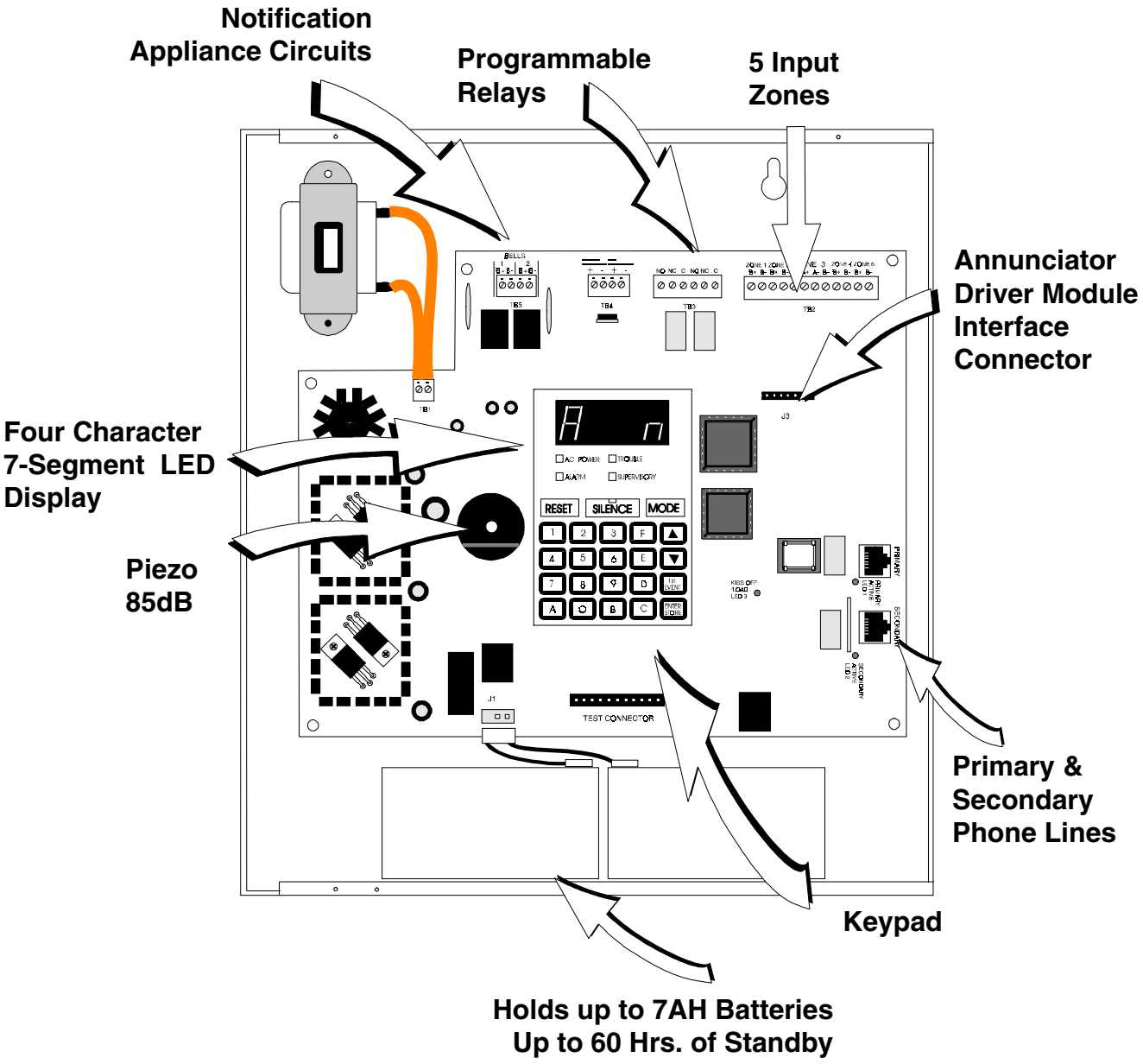


Figure 1-2: MS-5024 Panel

1.2 Controls and Indicators

Front Panel Switches

RESET	Digits 0-9
SILENCE	A
MODE	B
Up Arrow	C
Down Arrow	D
1st EVENT	E
ENTER/STOREF	

Displays

- Alarm - red LED
- Trouble - yellow LED
- Supervisory - yellow LED
- AC Power - green LED
- Four, Seven Segment Displays - red
- Primary Phone Line Active - red LED
- Secondary Phone Line Active - red LED
- 'Kissoff' Signal from Central Station - green LED
- Silence - yellow LED

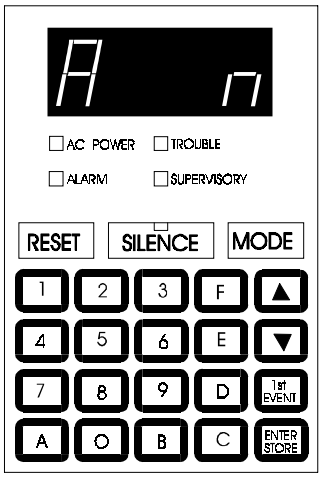


Figure 1-3: Controls and Indicators

Local Sounder - A piezo sounder provides separate and distinct sounds for alarm, trouble and supervisory conditions.

1.3 Circuits

Input Circuits

Five input circuits provide Style B configuration with one circuit also configurable for Style D. Input circuits may be used as standard fire control panel zones or slave communicator input channels.

Initiating Device Circuit 1 (Style B) accepts Normally Open contact devices and 2-wire smoke detectors.
Initiating Device Circuit 2 (Style B) accepts Normally Open contact devices and 2-wire smoke detectors.
Initiating Device Circuit 3 (Style B/D) accepts Normally Open contact devices, 2-wire smoke detectors and waterflow devices.
Initiating Device Circuit 4 (Style B) accepts Normally Open contact devices and 2-wire smoke detectors.
Initiating Device Circuit 5 (Style B) accepts Normally Open contact devices and 2-wire smoke detectors.

Output Circuits

- 24 Volt Resettable Power Output
- 24 Volt Non-Resettable Power Output
- Primary Telephone Line
- Secondary Telephone Line
- 24 Volt Battery Charger

Notification Appliance Circuits - Two Notification Appliance Circuits configurable for Style Y (Class B) with various programmable features.

Relays - Two dry Form-C relay contacts programmable for Alarm, Trouble, supervisory, and/or communications failure. Contacts are rated 2 amps at 30 VDC and 0.5 amps at 30 VAC resistive.

1.4 Digital Communicator

Two modular phone jacks allow easy connection to telephone lines. Modular jacks are labeled PH1 and PH2 for the Primary and Secondary phone lines. Telephone line active red LEDs are provided as well as a green 'Kissoff' LED. The integral digital communicator provides the following functions:

- Line Seizure - takes control of the phone lines disconnecting any premises phones.
- Off/On Hook - perform on and off-hook status to the phone lines.
- Listen for dial tone - 440 hertz tone typical in most networks.
- Dialing the Central Station(s) number - default is Touch-Tone®, programmable to rotary.
- For tone burst or touchtone type formats: Discern proper 'Ack' and 'Kiss-off' tone(s) - The frequency and time duration of the tone(s) varies with the transmission format. The control panel will adjust accordingly.
- Communicate in the following formats:
  ✓12 Tone Burst Types: 20 pps
  (3+1, 4+1, 4+2, 3+1 Exp., 4+1 Exp., 4+2 Exp.)
  ✓ 2 Touchtone Types:
  4 + 1 Ademco Express
  4 + 2 Ademco Express
  See Table 4-3 for list of compatible receivers.

1.5 Components

Main Circuit Board

The main circuit board contains the system's CPU, power supply, other primary components and wiring interface connectors. Optional modules plug in and are mounted to the main circuit board. The main circuit board is delivered pre-mounted in the cabinet.

Cabinet

The cabinet is red with an attractive navy blue front overlay. The backbox measures 14.5" x 12.5" x 2.875" and provides space for two batteries (up to 7 Amp Hours). Also available is an optional dress panel, DP-5024, which mounts inside the cabinet.

Transformer Assembly

One 100VA transformer is provided standard with the panel.

Batteries

The cabinet provides space for 7 Amp Hour batteries (for 12 Amp Hour to 17 Amp Hour batteries use the UL listed BB-17F battery box). Batteries must be ordered separately.

1.6 Optional Devices

ADM-24
The ADM-24 Annunciator Driver Module supports the RZA-5F Remote Annunciator module. Annunciator wiring is supervised for open circuits by this module. The Annunciator Driver Module mounts to connector J3 in the upper right corner of the main board. See Figure 1-2 and 2-10.

Remote Annunciator
The RZA-5F Remote Annunciator mounts on a standard single-gang box, and provides LED indication of the following:

Alarm Zone 1 (red)
Alarm Zone 2 (red)
Alarm Zone 3 (red)
Alarm Zone 4 (red)
Alarm Zone 5 (red)
System Trouble (yellow)

A Local Trouble Sounder and Tone Silence Switch are also provided. All LEDs and their wiring are supervised for open conditions. Any open condition will cause the System Trouble LED to illuminate. Slide in paper labels permit an easy change of zone information. See Figure 2-11. ***Note:*** *The RZA-5F Remote Annunciator requires the use of the ADM-24 Annunciator Driver Module. Only one ADM-24/ RZA-5F combination is allowed per system.*

CAC-5F
The CAC-5F Class A Converter module converts the Style B (Class B) Initiating Circuits to Style D (Class A). The CAC-5F mounts to terminal block TB2 located in the upper right corner of the main circuit board (refer to Figures 1-2 and 2-15). The removable terminal block on the CAC-5F module provides for ease of wiring.

NACA-2F
The NACA-2F Notification Appliance Circuit Class A Converter module converts the two NAC circuits from Style B (Class B) to Style D (Class A). The converter module mounts to terminal block TB5 located in the upper left corner of the main circuit board (refer to Figures 1-2 and 2-14). The removable terminal block on the NACA-2F module provides for ease of wiring.

Dress Panel
A red dead-front dress panel (DP-5024) is available as an option (required for Canadian installations). The dress panel restricts access to the system wiring while allowing access to the membrane switch panel. See Figure 1-1.

Battery Box
The BB-17F battery box may be used to house two 12 Amp Hour or 17 Amp Hour batteries. The battery box mounts directly below the main circuit board in the cabinet (refer to Figure 2-2). The BB-17F is red and is provided with knockouts.

1.7 Specifications

AC Power (Supervised) - TB1
MS-5024: 120 VAC, 60 Hz, 1.2 amps
MS-5024E: 220/240 VAC, 50 Hz, 0.6 amps
Wire size: minimum #14 AWG with 600V insulation

Battery (Supervised) - lead acid only - J1
Maximum Charging Circuit: Normal Flat Charge—27.6V @ .8 amp.
Maximum Charger Capacity: 17 Amp Hour battery. (MS-5024 cabinet holds max. 7 Amp Hour battery. Larger batteries require Fire-Lite #BB-17F or other UL listed battery cabinet).

Initiating Device Circuits TB2
Detector Zones 1, 2, 3, 4, 5
Power-limited Circuitry
Operation: All zones (NFPA Style B), Zone 3 (NFPA Style B or D). Use CAC-5F for Style D operation.
Normal Operating Voltage: 24 VDC (ripple = 100 mV max)
Alarm Current: 26 mA
Short Circuit Current: 42 mA max.
Maximum Loop Resistance: 100 ohms
End-of-Line Resistor: 4.7K, 1/2-Watt (part # 27072 UL listed)
Detector Loop Current sufficient to ensure operation of one alarmed detector/zone.
Standby Current: 7.26 mA (includes ELR and 2 mA maximum detector current)
Smoke Detector Identifier A
Refer to Fire-Lite Compatibility Chart for listed compatible devices.

Notification Appliance Circuits - TB5
Non-regulated special purpose power, Style Y supported. Use NACA-2F for Style Z operation.
Power-limited Circuitry
Operating Voltage Nominal 24 volts.
Current for all external devices: 3.0 amps.
Current Limit: PTC
Max. signaling current/circuit: 1.5 amps
End-of-line resistor: 4.7K, 1/2-Watt (part # 71252 UL listed) for Notification Appliance Circuits
Refer to Fire-Lite Compatibility Chart for listed compatible devices.

Programmable Relays - TB4
Contact rating: 2.0 amps @ 30 VDC (resistive), 0.5 amps @ 30 VAC (resistive)
Programmable: Form-C

Four-wire Smoke Detector Power - TB-4 Terminals 3 (+) & 4 (-)
Max. ripple voltage: 10 mV_{RMS} Operating Voltage nominal 24 volts
Up to 300 mA is available for powering 4-wire smoke detectors.
Power-limited Circuitry. Maximum Standby current is 50 mA.
Refer to Fire-Lite Compatibility Chart for compatible listed devices.

Non-resettable Regulated 24V Power - TB-4 Terminals 1 (+) & 2 (-)
Max. ripple voltage: 10 mV_{RMS} Operating Voltage nominal 24 volts
Total DC current available from this output is up to 300 mA.
Power-limited Circuitry. Maximum Standby current is 150 mA.
Refer to Fire-Lite Compatibility Chart for compatible listed devices.
Notes: 1) For power supply calculations, refer to Appendix A.
2) Total current for non-resettable power, four-wire smoke power, and two Notification Appliance Circuits *must not exceed 3.6 amps*.

1.8 Telephone Requirements and Warnings

1.8.1 Telephone Circuitry:

Ringer Equivalence Number (REN) = 1.3B
AC Impedance 10.0 Mega Ohm
Complies with FCC Part 68
Mates with RJ31X Male Connector
Supervision Threshold: less than 4.0 volts for 2 minutes

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's 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 REN's 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 REN's, contact the telephone company to determine the maximum REN for the calling area.

1.8.2 Digital Communicator:

Before connecting the control panel 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.
12 Clintonville Rd.
Northford, CT 06472

Product Model Number: MS-5024
FCC Registration Number: 1W6USA-20004-AL-E
Ringer Equivalence 1.3B

1.8.3 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 control panel. However, the telephone company is required to give advance notice of such changes or interruptions.

If the control panel 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 control panel activates, premise phones will be disconnected.

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

The control panel 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.

1.8.4 For Canadian Applications

The following is excerpted from CP-01 Issue 5:
"NOTICE: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

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

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

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

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

Industry Canada (IC) Compliance - "This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications."

IC Registration Number: 21325785A
Load Number: 2

2.0 Installation

2.1 General

Mounting Options

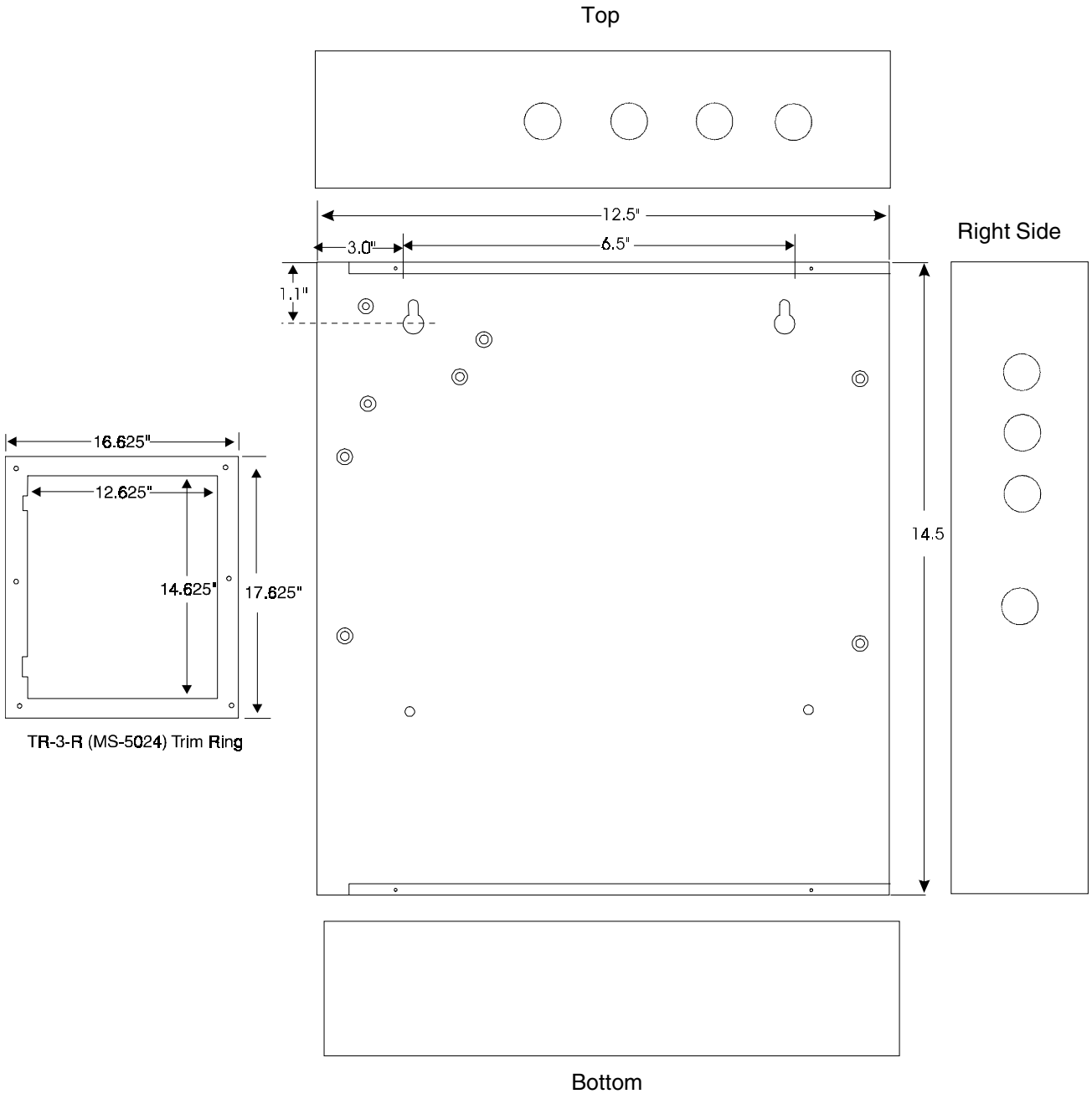
The cabinet may be either semi-flush or surface mounted. The door is removable during the installation period by opening and lifting off the hinges.

The cabinet mounts using two key slots and two additional 0.250" diameter holes located in the backbox. The key slots 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. Note that there are no knockouts on the left (hinged) side of the cabinet. All wiring should be in accordance with the National and/or Local codes for fire alarm systems.

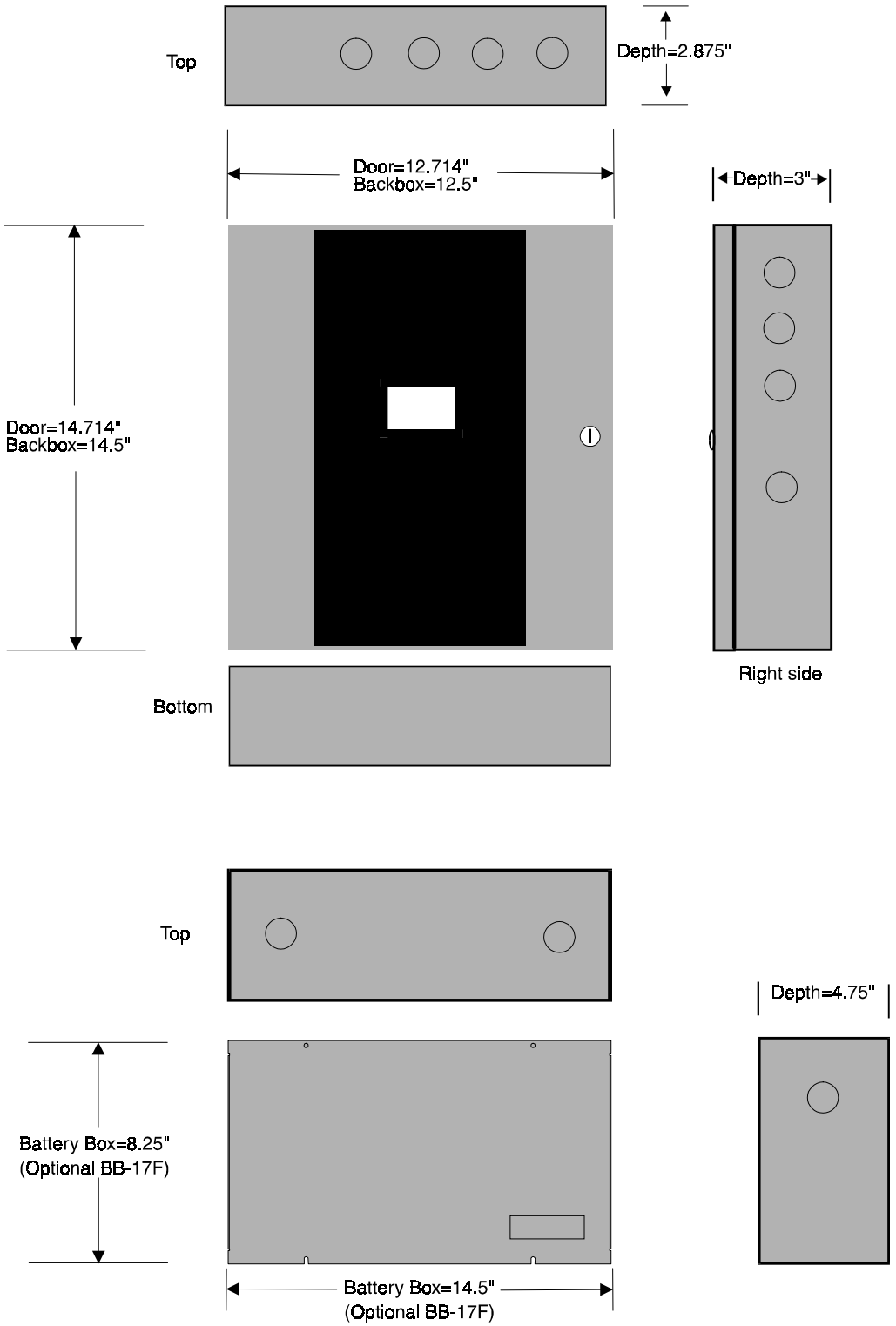
2.2 Backbox Mounting

- Refer to Figures 2-1 and 2-2.
- Open the door and lift the door off the pin hinges.
- Remove AC wiring.
- Remove the main PC board assembly by unscrewing the five screws in the corners of the board. Two standoffs support the board in the center. Set the board aside in a safe, clean place. Avoid static discharge which may damage the board.
- Mark and predrill holes for the top two keyhole mounting bolts using the dimensions shown.
- Install two upper fasteners in the wall with the screw heads protruding.
- Using the upper 'keyholes', mount the backbox over the two screws.
- Mark and drill the lower two holes.
- Mount backbox, install remaining fasteners and tighten.
- When the location is dry and free of construction dust, reinstall the main PC board.



Draw wires through the respective knockout locations.

Figure 2-1: Cabinet Dimensions & Knockout Locations



Notes:
1) Mount the MS-5024 cabinet to wall.
2) Remove appropriate knockouts from FACP cabinet and BB-17F.
3) Position BB-17F near MS-5024 cabinet and connect with conduit making sure there is at least 1/2" of clearance between the two cabinets.
4) Anchor BB17-F to wall.

Figure 2-2: Backbox and Battery Box

2.3 Operating Power

CAUTION: Several different sources of power can be connected to this panel. Disconnect all sources of power before servicing. The panel and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while this unit is energized.

Primary Power Source (AC) and Earth Ground Connections

AC power connections are made inside the control panel cabinet. Primary power source is 120 VAC, 60 HZ, 1.2 amps and for the MS-5024E is 220/240 VAC, 50 Hz, 0.6 amps. Run a pair of wires (with ground conductor) from the protected premises main breaker box to the orange and black primary leads of the MS-5024 transformer. As per the National Electric Code, use 14 AWG (1.6 mm O.D.) 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. Connect the Earth Ground wire (minimum 14 AWG) to the grounding stud indicated by the ground symbol label. Note: Do not use conduit for the Earth Ground connection since this does not provide reliable protection.

Secondary Power Source (Batteries)

Observe polarity when connecting the battery. Connect the battery cable to J1 on the main circuit board using the plug-in connector provided. The battery charger is current limited and capable of recharging sealed lead acid type batteries. The charger shuts off when the system is in alarm or if the battery voltage drops too low (below 14.2 VDC). See Appendix A for calculation of the correct battery rating. *CAUTION: 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.*

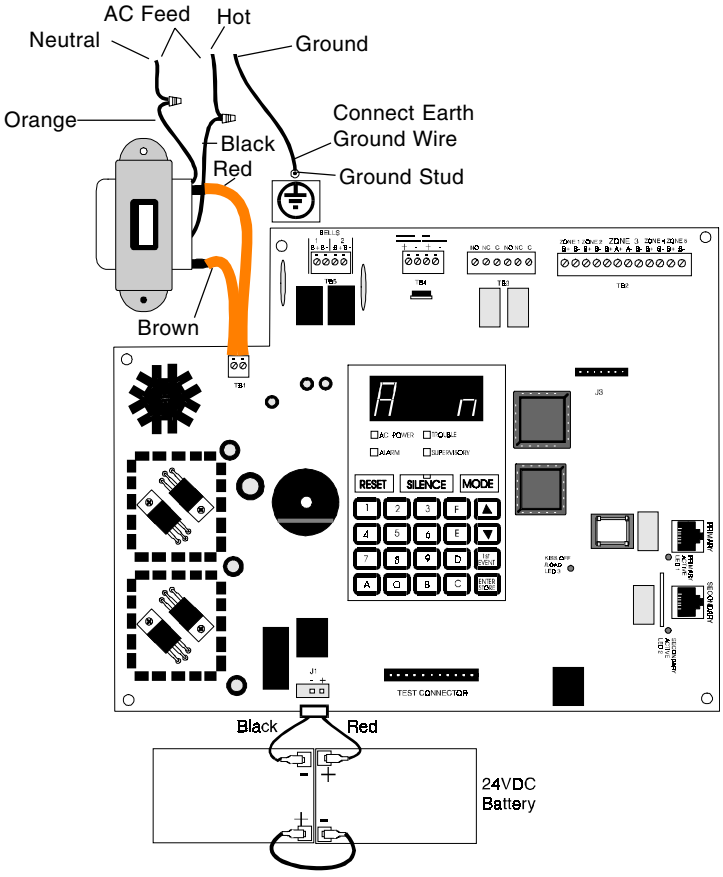


Figure 2-3: Operating Power Connections

DC Power Output Connections

All DC power outputs are power-limited

***Non-resettable Power** (300 mA) 24 VDC filtered, non-resettable power can be obtained from TB4 Terminals 1 (+) and 2 (-).*

***4-Wire Smoke Detector Power** (300 mA) 24 VDC filtered, resettable power for 4-wire smoke detectors can be obtained from TB4 Terminals 3 (+) and 4 (-).*

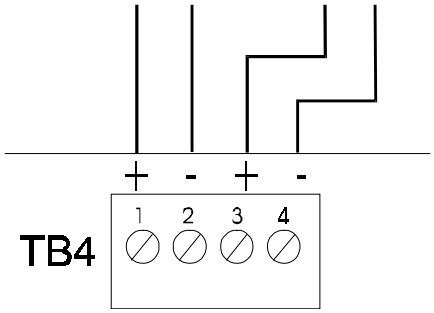


Figure 2-4: Auxiliary Power Connections

2.4 Input Circuits

The control panel has five zone input circuits. The maximum loop resistance limit for each is 100 ohms. All field wiring of each zone is supervised for opens and ground faults. Both conditions are visually and audibly annunciated as well as communicated to a Central Station.

Each zone is a Style B Initiating Device Circuit (IDC) designed to accept any Normally Open contact device and conventional 2-wire, 24 volt smoke detectors. Each zone is power limited to 7.26 mA in standby and 42 mA in alarm. Zone 3 may also be configured as a Style D Initiating Device Circuit. Figure 2-5 illustrates typical circuit connections.
Note: All five initiating zones may be converted to Style D (Class A) by using a CAC-5F Class A Converter module (refer to Figure 2-15).

Zones 1-5 may be programmed as shown below. The factory default is 2-wire smoke detector for all zones.

- 2-wire Smoke Detector (factory default)
- Pull Station
- Normally Open Contact Device(s)
- Supervisory
- Supervisory, Auto-Resettable

Zone 3 may also be programmed as:

- Waterflow Silenceable
- Waterflow, Non-Silenceable

Note: A maximum of five waterflow devices may be used on zone 3 per NFPA 72.

Four-wire smoke detectors may be connected to any zone. Resettable power is provided via terminals TB4, 3 and 4.

It is allowable to mix an assortment of device types (ie, smoke detectors, heat detectors, pull stations) on any zone. However, this is not recommended since specific and detailed reports will not be possible. For example, the report of general fire alarm versus pull station fire alarm or smoke detector fire alarm.

*Refer to the Fire-Lite Device Compatibility Document for a list of compatible smoke detectors, Notification Appliances and Auxiliary Devices.

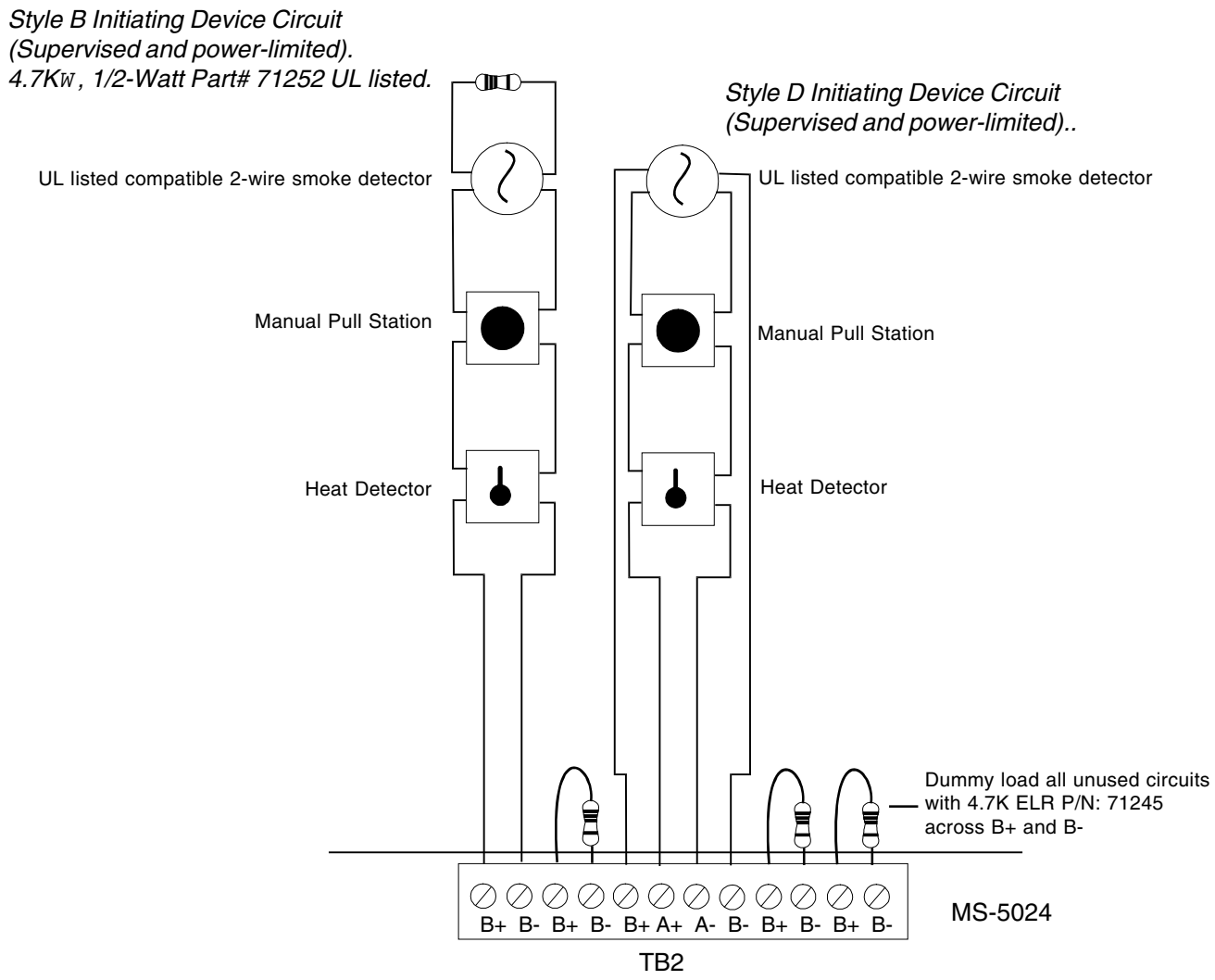


Figure 2-5: Typical Initiating Device Circuit Connections

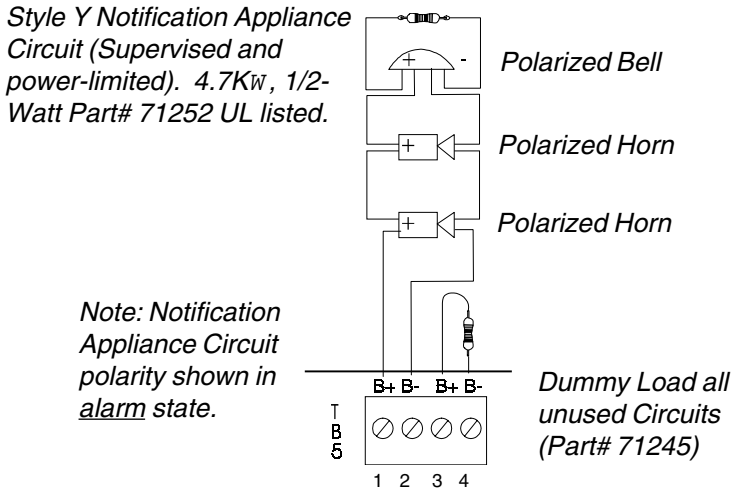
2.5 Output Circuits

Telephone Circuits

Provision to connect to 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. See Figure 2-9.

Notification Appliance Circuits (Full-wave Rectified)

The MS-5024 provides two Notification Appliance Circuits (Style Y), each circuit capable of 1.5 amps of current. Total current drawn from these as well as other DC power outputs cannot exceed 3.6 amps. Circuits are supervised and power-limited. Figure 2-6 illustrates a typical circuit connection. Refer to the Fire-Lite Device Compatibility Document for a listing of compatible Notification Appliances.
Note: Both Notification Appliance Circuits may be converted to Style Z (Class A) by using an NACA-2F Class A Converter module (refer to Figure 2-14).



Note: Both Notification Appliance Circuits may be programmed as follows:

- Silenceable
- Non Silenceable
- Enabled/Disabled
- Silence Inhibited
- Auto Silence, 5 to 30 minutes
- Coded (March Time, Temporal, California)

Figure 2-6: Typical Notification Appliance Circuit Connections

Programmable Relays

The control panel provides two sets of Form-C programmable relay contacts rated for 2.0 amps @ 30VDC (resistive). Each relay may be programmed for alarm, trouble supervisory, communications failure or any combination of these. Refer to Figure 2-7 for UL Power-limited wiring requirements.

Note: All relay connections must be power-limited or nonpower-limited. No mixing is permitted.

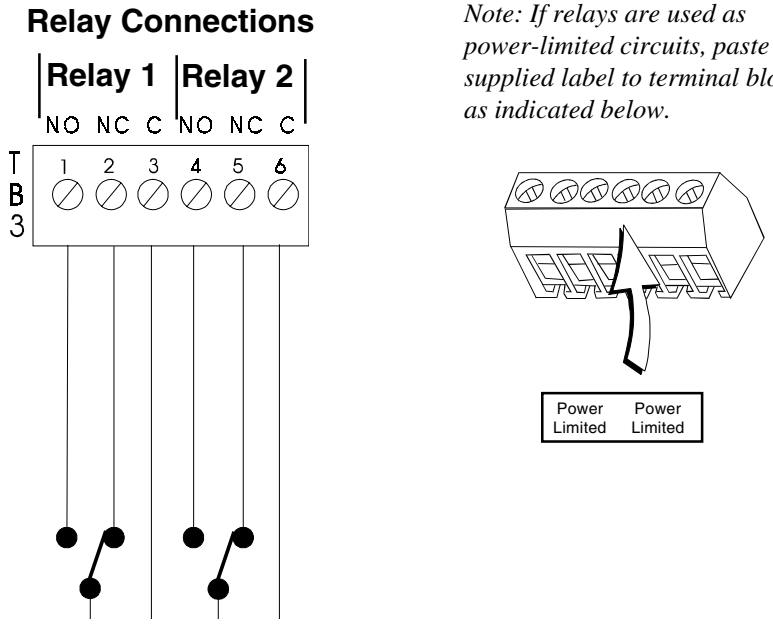


Figure 2-7: Programmable Relay Terminals

2.6 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 circuit wiring and nonpower-limited circuit wiring must enter and exit the cabinet through different knockouts and/or conduits. A typical wiring diagram for the MS-5024 is shown below.

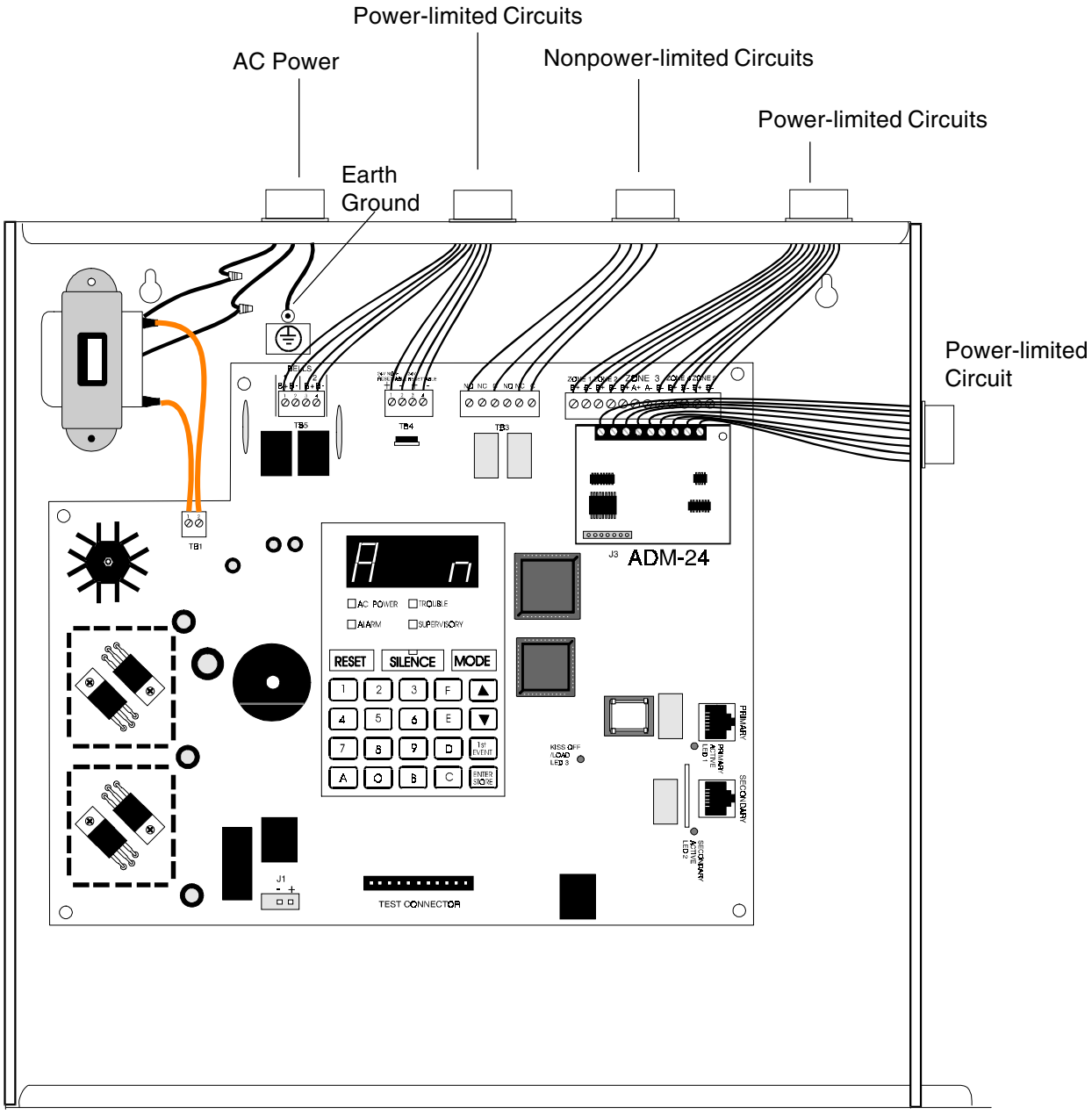


Figure 2-8: Typical Wiring Diagram for UL Power-limited Requirements

2.7 Digital Communicator

Two independent telephone lines can be connected to the control panel. Telephone line control/command is made possible via double line seizure as well as usage of an RJ31X style interconnection.

The control panel's digital communicator is built into the main board. Connection and wiring of two phone lines is required as shown below.
Note: It is critical that the digital communicator be located as the first device on the incoming telephone circuit to properly function.

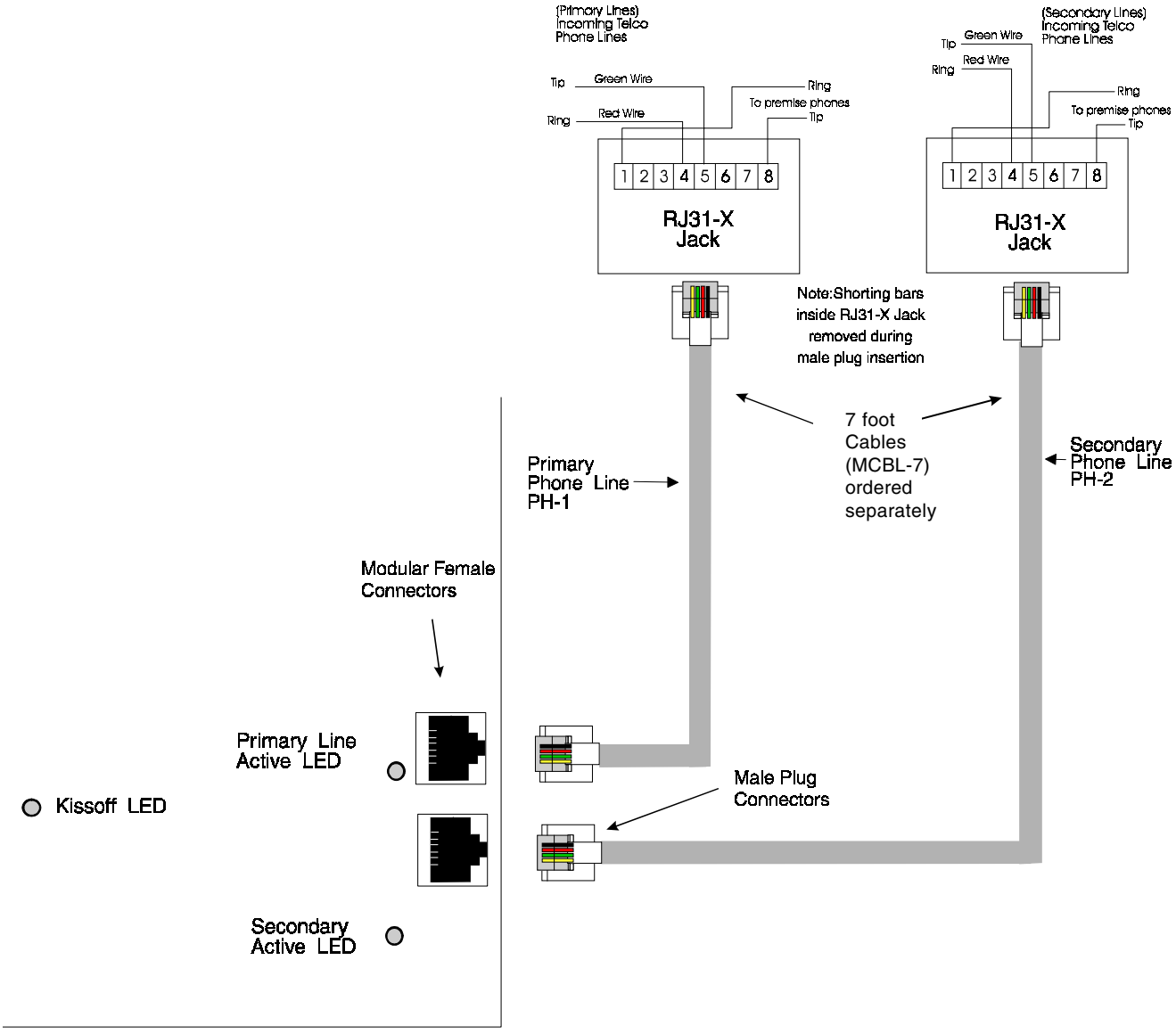


Figure 2-9: Wiring Phone Jacks

2.8 Optional Boards

ADM-24 Annunciator Driver Module

The Annunciator Driver Module supports the RZA-5F Remote Annunciator. Annunciator wiring is supervised for open conditions by this module. The Annunciator Driver Module mounts to J3 in the upper right corner of the main board.

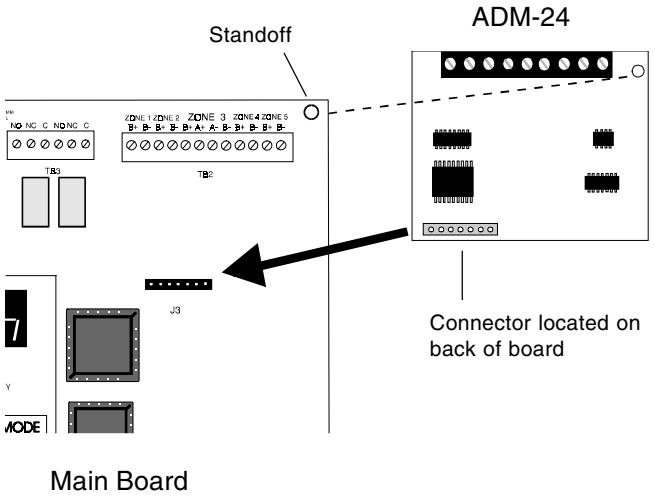


Figure 2-10: ADM-24

The **RZA-5F Remote Annunciator** mounts on a standard single-gang box, and provides LED indication of the following:

Alarm Zone 1 (red)
Alarm Zone 2 (red)
Alarm Zone 3 (red)
Alarm Zone 4 (red)
Alarm Zone 5 (red)
System Trouble (yellow)

The remote annunciator provides individual zone alarm LEDs, a system trouble LED, a piezo sounder and a remote sounder shut off switch.

A Local Trouble Sounder and Silence Switch are also provided. All LEDs and their wiring are supervised for open conditions. Any open condition will cause the System Trouble LED to illuminate.

NOTE: *The RZA-5F Remote Annunciator requires the use of an ADM-24 Annunciator Driver Module. Only one RZA-5F/ADM-24 combination is allowed per system.*

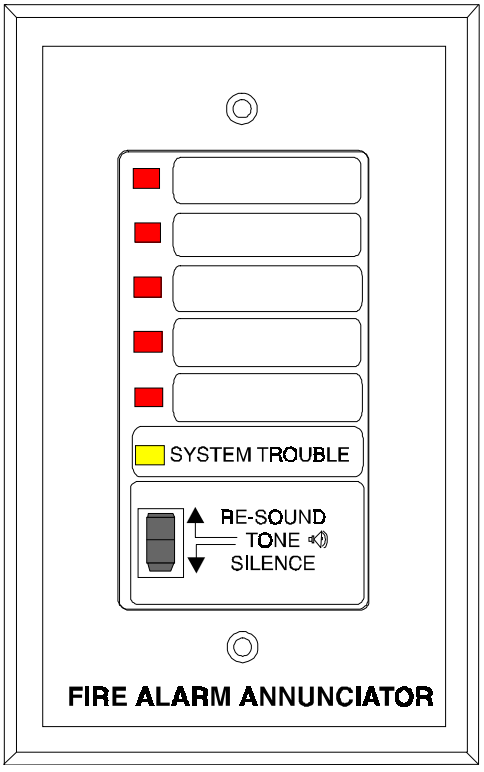


Figure 2-11: RZA-5F

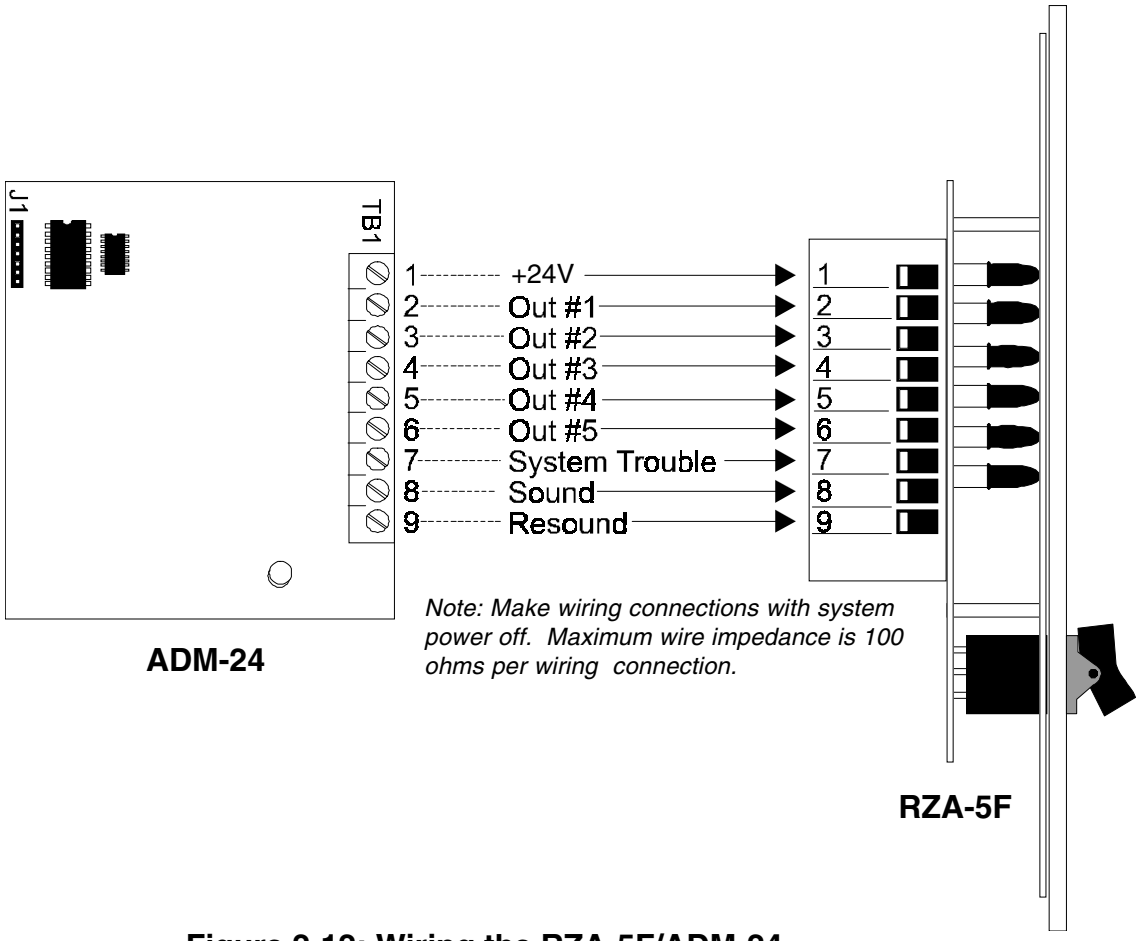


Figure 2-12: Wiring the RZA-5F/ADM-24

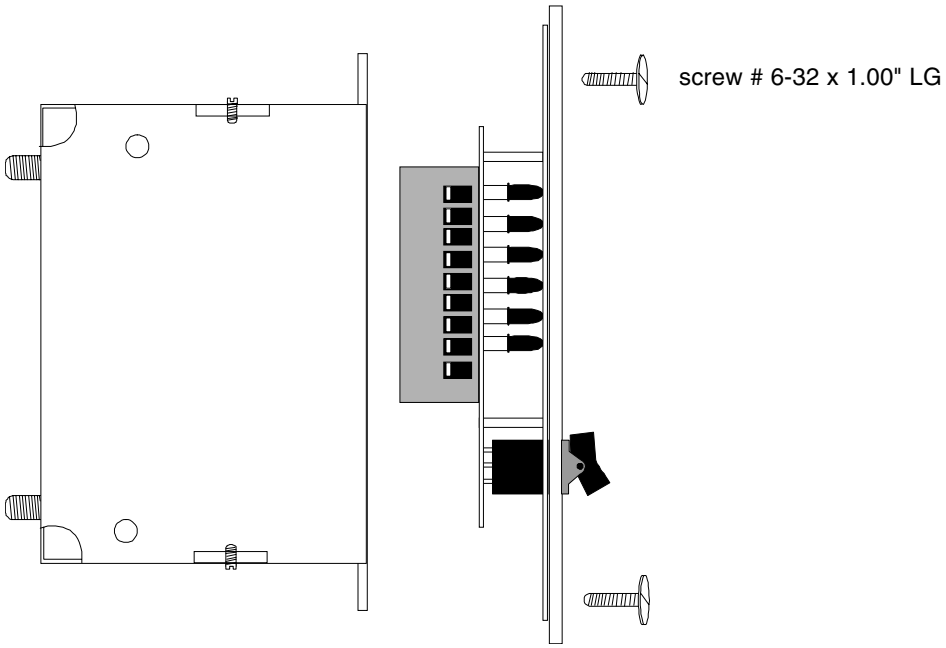


Figure 2-13: Installing the Annunciator (Single Gang Box)

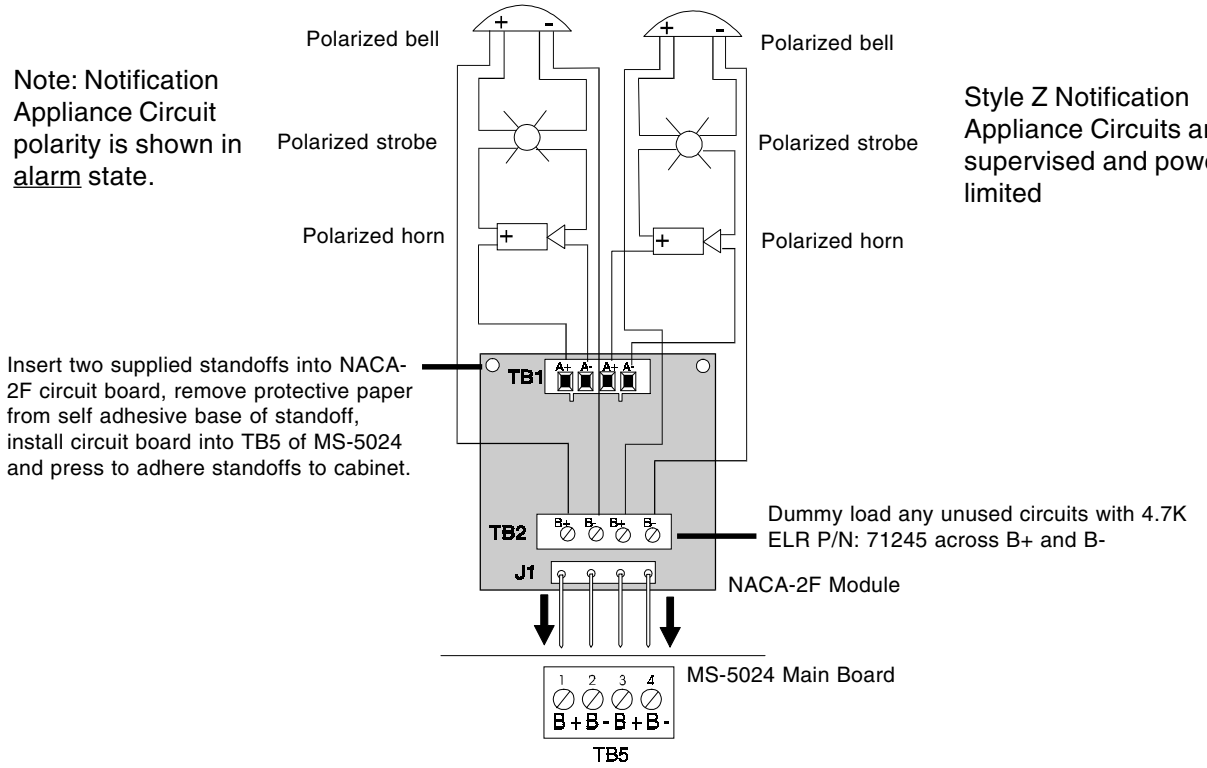
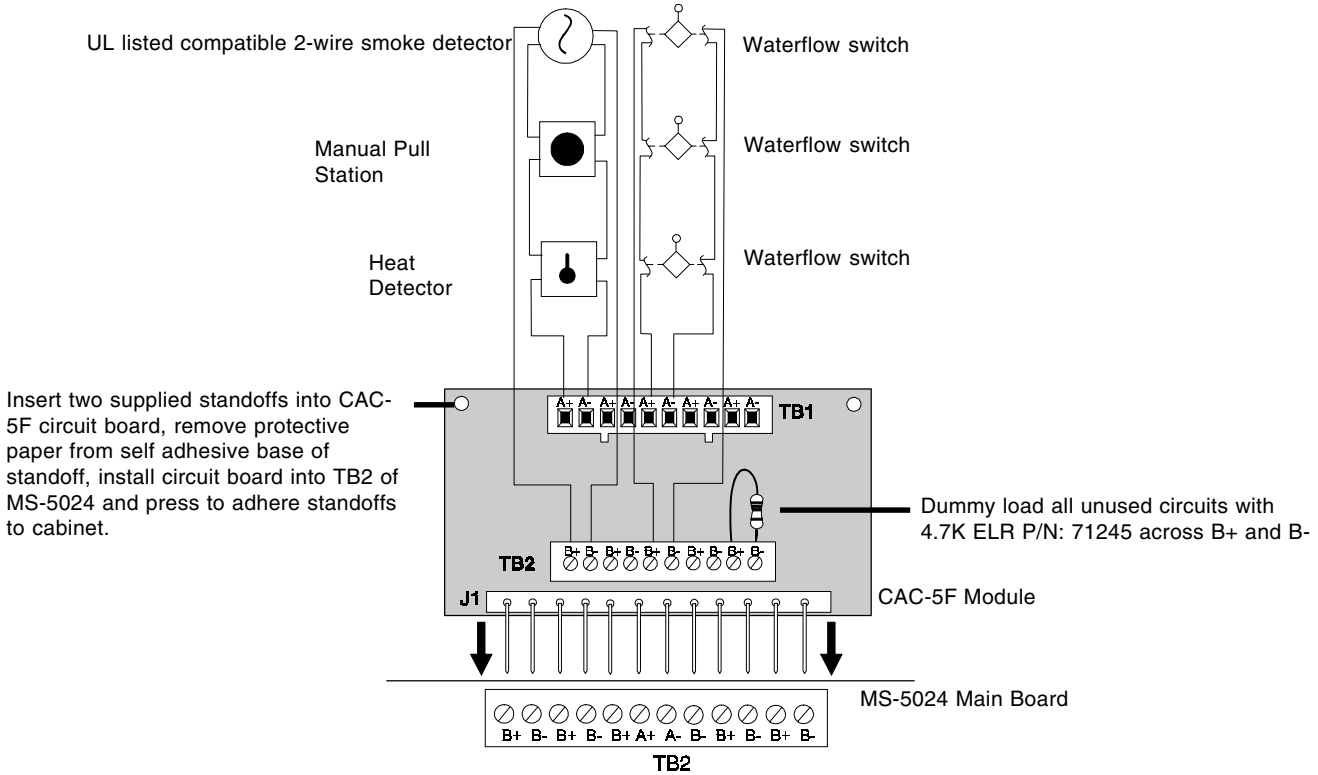


Figure 2-14: NACA-2F Style Z Converter



Note: 1) Circuits 1 through 5 can accommodate 2-wire smoke detectors, plus any N.O. contact device such as heat detectors or manual pull stations.
2) Only circuit 3 accommodates the non-silenceable waterflow function.

Figure 2-15: CAC-5F Style D Converter

3.0 Programming Instructions

Programming Mode

This section describes programming the panel from the onboard keypad. Programming of the control panel is possible at any time except when an alarm condition is present or during a fire drill.

The control panel has been designed for many different types of applications. After examining your specific application, review the programming options and choose the entries best suited for your system.

The control panel has a built-in intelligent programmer. All programming selections are stored in nonvolatile Electrically-Erasable Programmable Read-Only Memory (EEPROM). This ensures that the control panel will remember all entries made in programming mode even if both AC and battery power are removed. Invalid entries cause a 'beep' from the onboard piezo sounder.

The user **must** program the primary and secondary phone numbers, account numbers and 24 hour test report times for each Central Station account and the current time and date. The control panel comes with factory chosen options/features already programmed. Other options/features may be programmed if desired. If all factory default settings are acceptable, programming is complete.

Successful entry into Program Mode places the system into trouble. A 'System Off Normal' message is transmitted to the Central Station.

3.1 Entering Program Mode

To enter the Program Mode, press the **MODE** key once, (the display will go blank) you then have ten seconds to start entering the code (**7764**) .

☛ **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

___7
__77
_776
7764

Note that as you enter information into the control panel, the digits will scroll across the display from right to left

You are allowed a pause of up to 10 seconds in between each number while entering the code. After pressing the **[ENTER/STORE]** key, the control panel will be in Program Mode and display **00_F**. You are allowed up to ten minutes of idle time at this point before starting your programming, otherwise the control panel will go back to Normal Mode. You also have a maximum of 10 minutes between any key stroke. All entries made prior to the 10 minute time-out are valid and are stored.

Once in Programming Mode, the control panel will:

- Blink the trouble LED.
- Activate the relay(s) if programmed for trouble.
- Disable the Notification Appliance Circuit(s).
- Disable the relay(s) if programmed for alarm.
- The display shows: **00_F**
- Ignore all other keys other than those mentioned in this section.
- Continue to communicate any events not previously acknowledged at a Central Station prior to entering Programming Mode.

Note: Location 56 is factory defaulted to = 0, Control Panel only. This keeps the communicator off until location 56 is changed to: 1= slave communicator or 2 = panel/communicator. Once location 56 is set to 1 or 2 and a valid phone number is entered, entry into the program mode will cause transmission of the "System off Normal" report.

Throughout programming mode, the first three locations on the left of the display represent the memory address which can go from 00 to 313 (Alpha characters are not used). The last location (farthest right) represents the contents of the memory address. The first address displayed is shown below:

00_F
(address)(data)

3.2 Switch Functions

The Function of each switch in program mode is shown below:

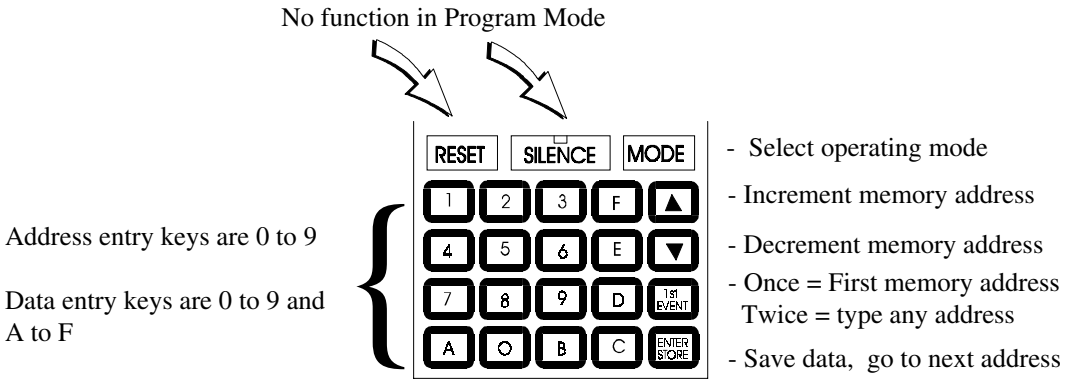


Figure 3-1: Control Panel Keypad

3.3 Programming Options

Primary Central Station phone number. (00-15)

The first sixteen addresses, 00-15, are factory set to 'F' (from **00_F** to **15_F**). Programming is typically done as follows: If your phone # is 484-7161, type **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:

4	**8**	**4**	**7**	**1**	**6**	**1**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15 .

Valid entries for both the primary and secondary phone numbers are 0 - F with the numeric digits as dialed numbers and hex digits representing the following functions:

A= * on a Touchtone phone keypad

B= # on a Touchtone phone keypad

C= look for secondary dial tone for up to 2 seconds (then, dial anyway)

D= 3-second pause

E= 5-second pause

F= end of phone number (Note: F must be entered)

Primary Central Station Number Communication Format. (16)

One location is needed to select the Communication Format to the primary phone number. Address 16 is used for this purpose. The default (factory setting) for this address is **16_A**, which is 4+2 Standard, 1800 Hz 'Carrier', 2300 Hz 'ack'. 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: Not Used
F: Not Used

Note: Consult your Central Station for proper selection or consult our factory representatives. For any format chosen, the control panel automatically programs all of the event codes. See Tables 3-1, 3-2, 3-3, and 3-4.

***Caution:** Default entries for event codes (as shown in Tables 3-1 through 3-4) are programmed into memory each time address 16 is altered. Be certain to double check entries after programming the Zone Functions, addresses 57 - 61. Program the Format first, then program the Zone(s) Function.*

3+1, 4+1 Express, 4+1 Standard and Expanded, 4+2 Expanded Formats

If '0, 2, 3, 4, 5, 6, 7, 8, 9, B or D' are entered for address 16, the following data is automatically programmed for the Primary Central Station phone number event codes. Enter '0' for the setting to disable the report.

Address	Description	Setting
82	Primary # Zone 1 Alarm Code	1
83	Primary # Zone 2 Alarm Code	1
84	Primary # Zone 3 Alarm Code	1
85	Primary # Zone 4 Alarm Code	1
86	Primary # Zone 5 Alarm Code	1
87	Primary # Zone 1 Disabled Code	F
88	Primary # Zone 2 Disabled Code	F
89	Primary # Zone 3 Disabled Code	F
90	Primary # Zone 4 Disabled Code	F
91	Primary # Zone 5 Disabled Code	F
92	Primary # Drill Code	9
93	Primary # AC Fault Code	F
94	Primary # Zone 1 Fault Code	F
95	Primary # Zone 2 Fault Code	F
96	Primary # Zone 3 Fault Code	F
97	Primary # Zone 4 Fault Code	F
98	Primary # Zone 5 Fault Code	F
99	Primary # Earth Fault Code	F
100	Primary # Low Battery Fault Code	F
101	Primary # No Battery Fault Code	F
102	Primary # Telco Pri. Line Fault Code	F
103	Primary # Telco Sec. Line Fault Code	F
104	Primary # NAC #1 Fault Code	F
105	Primary # NAC #2 Fault Code	F
106	Primary # Comm Trouble Pri. # Code	F
107	Primary # Comm Trouble Sec. # Code	F
108	Primary # Annunciator Fault Code	F
109	Primary # System Off Normal Code	F
110	Primary # Zone 1 Alarm Restore Code	E
111	Primary # Zone 2 Alarm Restore Code	E
112	Primary # Zone 3 Alarm Restore Code	E
113	Primary # Zone 4 Alarm Restore Code	E
114	Primary # Zone 5 Alarm Restore Code	E
115	Primary # Zone 1 Disabled Restore Code	E
116	Primary # Zone 2 Disabled Restore Code	E
117	Primary # Zone 3 Disabled Restore Code	E
118	Primary # Zone 4 Disabled Restore Code	E
119	Primary # Zone 5 Disabled Restore Code	E
120	Primary # Drill Restore Code	9
121	Primary # AC Fault Restore Code	E
122	Primary # Zone 1 Fault Restore Code	E
123	Primary # Zone 2 Fault Restore Code	E
124	Primary # Zone 3 Fault Restore Code	E
125	Primary # Zone 4 Fault Restore Code	E
126	Primary # Zone 5 Fault Restore Code	E
127	Primary # Earth Fault Restore Code	E
128	Primary # Low Battery Fault Restore Code	E
129	Primary # No Battery Fault Restore Code	E
130	Primary # Telco Pri. Line Fault Restore Code	E
131	Primary # Telco Sec. Line Fault Restore Code	E
132	Primary # NAC #1 Fault Restore Code	E
133	Primary # NAC #2 Fault Restore Code	E
134	Primary # Comm Trouble Pri. # Restore Code	E
135	Primary # Comm Trouble Sec. # Restore Code	E
136	Primary # Annunciator Fault Restore Code	E
137	Primary # System Off Normal Restore Code	E
138	Primary # System Test Report	9
139	Primary # System Abnormal Test Report	F

Table 3-1: Event Codes, Primary Central Station Number

4+2 Standard and 4+2 Express Format

If '1, A or C' are entered for address 16, the following data is automatically programmed for the Primary Central Station phone number event codes. Enter '00' for the setting to disable the report.

Address	Description	Settings
82-83	Primary # Zone 1 Alarm Code	11
84-85	Primary # Zone 2 Alarm Code	12
86-87	Primary # Zone 3 Alarm Code	13
88-89	Primary # Zone 4 Alarm Code	14
90-91	Primary # Zone 5 Alarm Code	15
92-93	Primary # Zone 1 Disable Code	F1
94-95	Primary # Zone 2 Disable Code	F2
96-97	Primary # Zone 3 Disable Code	F3
98-99	Primary # Zone 4 Disable Code	F4
100 - 101	Primary # Zone 5 Disable Code	F5
102 - 103	Primary # Drill Code	97
104 - 105	Primary # AC Fault Code	F6
106 - 107	Primary # Zone 1 Fault Code	F1
108 - 109	Primary # Zone 2 Fault Code	F2
110 - 111	Primary # Zone 3 Fault Code	F3
112 - 113	Primary # Zone 4 Fault Code	F4
114 - 115	Primary # Zone 5 Fault Code	F5
116 - 117	Primary # Earth Fault Code	F7
118 - 119	Primary # Low Battery Fault Code	F8
120 - 121	Primary # No Battery Fault Code	F9
122 - 123	Primary # Telco Pri. Line Fault Code	FA
124 - 125	Primary # Telco Sec. Line Fault Code	FB
126 - 127	Primary # NAC #1 Fault Code	FC
128 - 129	Primary # NAC #2 Fault Code	FC
130 - 131	Primary # Comm Trouble Pri. # Code	FD
132 - 133	Primary # Comm Trouble Sec. # Code	FE
134 - 135	Primary # Annunciator Fault Code	FC
136 - 137	Primary # System Off Normal Code	FF
138 - 139	Primary # Zone 1 Alarm Restore Code	E1
140 - 141	Primary # Zone 2 Alarm Restore Code	E2
142 - 143	Primary # Zone 3 Alarm Restore Code	E3
144 - 145	Primary # Zone 4 Alarm Restore Code	E4
146 - 147	Primary # Zone 5 Alarm Restore Code	E5
148 - 149	Primary # Zone 1 Disable Restore Code	E1
150 - 151	Primary # Zone 2 Disable Restore Code	E2
152 - 153	Primary # Zone 3 Disable Restore Code	E3
154 - 155	Primary # Zone 4 Disable Restore Code	E4
156 - 157	Primary # Zone 5 Disable Restore Code	E5
158 - 159	Primary # Drill Restore Code	98
160 - 161	Primary # AC Fault Restore Code	E6
162 - 163	Primary # Zone 1 Fault Restore Code	E1
164 - 165	Primary # Zone 2 Fault Restore Code	E2
166 - 167	Primary # Zone 3 Fault Restore Code	E3
168 - 169	Primary # Zone 4 Fault Restore Code	E4
170 - 171	Primary # Zone 5 Fault Restore Code	E5
172 - 173	Primary # Earth Fault Restore Code	E7
174 - 175	Primary # Low Battery Fault Restore Code	E8
176 - 177	Primary # No Battery Fault Restore Code	E9
178 - 179	Primary # Telco Pri. Line Fault Restore Code	EA
180 - 181	Primary # Telco Sec. Line Fault Restore Code	EB
182 - 183	Primary # NAC #1 Fault Restore Code	EC
184 - 185	Primary # NAC #2 Fault Restore Code	EC
186 - 187	Primary # Comm Trouble Pri. # Restore Code	ED
188 - 189	Primary # Comm Trouble Sec. # Restore Code	EE
190 - 191	Primary # Annunciator Fault Restore Code	EC
192 - 193	Primary # System Off Normal Restore Code	EF
194 - 195	Primary # System Test Report	99
196 - 197	Primary # System Abnormal Test Report	91

Table 3-2: Event Codes, Primary Central Station Number

Primary Central Station Number Account Code (17-20) Four locations at addresses 17-20 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 16, enter 3 digits. (location 20 is ignored). If programming '0, 1, 6, 7, 8, 9, A, B, C, or D' into address 16, enter 4 digits.

Primary Central Station Number 24 Hour Test Time (21-24).
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 21-24. The default is 00:00 (12:00 midnight). The limits for each location are as follows: 21: enter 0, 1, 2; 22: enter 0-9; 23 : enter 0-5; 24: enter 0-9. Note: Do not use A-F.

Primary Central Station Number 24/12/8/6 Hour Test Time Interval (25). 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 zero. If other test report times are needed, enter 1=12, 2=8 and 3=6.

Secondary Central Station Phone Number (26-41). Programming is similar to programming the primary phone number located at addresses 00 - 15. The defaults are also all 'F's.

F	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**	**F**
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41 .

Secondary Central Station Number Communication Format (42). Programming is the same as the primary number's Comm Format at address 16. Default entry is 'A', 4+2 Standard. Choose one entry from the list 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: Not Used
F: Not Used

Note: Consult your Central Station for proper selection or consult our factory representatives. For any format chosen, the control panel automatically programs all of the event codes. See Tables 3-1, 3-2, 3-3, and 3-4.

***Caution:** Default entries for event codes (as shown in Tables 3-1 through 3-4) are programmed into memory each time address 42 is altered. Be certain to double check entries after programming the Zone Functions, addresses 57 - 61. Program the Format first, then program the Zone(s) Function.*

3+1, 4+1 Express, 4+1 Standard and Expanded, and 4+2 Expanded Formats

If '0, 2, 3, 4, 5, 6, 7, 8, 9, B or D' are entered for address 42, the following is automatically programmed for the Secondary Central Station phone number event codes. Enter '0' for the setting to disable the report.

Address	Description	Setting
198	Secondary # Zone 1 Alarm Code	1
199	Secondary # Zone 2 Alarm Code	1
200	Secondary # Zone 3 Alarm Code	1
201	Secondary # Zone 4 Alarm Code	1
202	Secondary # Zone 5 Alarm Code	1
203	Secondary # Zone 1 Disabled Code	F
204	Secondary # Zone 2 Disabled Code	F
205	Secondary # Zone 3 Disabled Code	F
206	Secondary # Zone 4 Disabled Code	F
207	Secondary # Zone 5 Disabled Code	F
208	Secondary # Drill Code	9
209	Secondary # AC Fault Code	F
210	Secondary # Zone 1 Fault Code	F
211	Secondary # Zone 2 Fault Code	F
212	Secondary # Zone 3 Fault Code	F
213	Secondary # Zone 4 Fault Code	F
214	Secondary # Zone 5 Fault Code	F
215	Secondary # Earth Fault Code	F
216	Secondary # Low Battery Fault Code	F
217	Secondary # No Battery Fault Code	F
218	Secondary # Telco Pri. Line Fault Code	F
219	Secondary # Telco Sec. Line Fault Code	F
220	Secondary # NAC #1 Fault Code	F
221	Secondary # NAC #2 Fault Code	F
222	Secondary # Comm Trouble Pri. # Code	F
223	Secondary # Comm Trouble Sec. # Code	F
224	Secondary # Annunciator Fault Code	F
225	Secondary # System Off Normal Code	F
226	Secondary # Zone 1 Alarm Restore Code	E
227	Secondary # Zone 2 Alarm Restore Code	E
228	Secondary # Zone 3 Alarm Restore Code	E
229	Secondary # Zone 4 Alarm Restore Code	E
230	Secondary # Zone 5 Alarm Restore Code	E
231	Secondary # Zone 1 Disabled Restore Code	E
232	Secondary # Zone 2 Disabled Restore Code	E
233	Secondary # Zone 3 Disabled Restore Code	E
234	Secondary # Zone 4 Disabled Restore Code	E
235	Secondary # Zone 5 Disabled Restore Code	E
236	Secondary # Drill Restore Code	9
237	Secondary # AC Fault Restore Code	E
238	Secondary # Zone 1 Fault Restore Code	E
239	Secondary # Zone 2 Fault Restore Code	E
240	Secondary # Zone 3 Fault Restore Code	E
241	Secondary # Zone 4 Fault Restore Code	E
242	Secondary # Zone 5 Fault Restore Code	E
243	Secondary # Earth Fault Restore Code	E
244	Secondary # Low Battery Fault Restore Code	E
245	Secondary # No Battery Fault Restore Code	E
246	Secondary # Telco Pri. Line Fault Restore Code	E
247	Secondary # Telco Sec. Line Fault Restore Code	E
248	Secondary # NAC #1 Fault Restore Code	E
249	Secondary # NAC #2 Fault Restore Code	E
250	Secondary # Comm Trouble Pri. # Restore Code	E
251	Secondary # Comm Trouble Sec. # Restore Code	E
252	Secondary # Annunciator Fault Restore Code	E
253	Secondary # System Off Normal Restore Code	E
254	Secondary # System Test Report	9
255	Secondary # System Abnormal Test Report	F

Table 3-3: Event Codes, Secondary Central Station Number

4+2 Standard and 4+2 Express Formats

If '1, A or C' are entered for address 42, the following is automatically programmed for the Secondary Central Station phone number event codes. Enter '00' for the setting to disable the report.

Address	Description	Setting
198 - 199	Secondary # Zone 1 Alarm Code	11
200 - 201	Secondary # Zone 2 Alarm Code	12
202 - 203	Secondary # Zone 3 Alarm Code	13
204 - 205	Secondary # Zone 4 Alarm Code	14
206 - 207	Secondary # Zone 5 Alarm Code	15
208 - 209	Secondary # Zone 1 Disable Code	F1
210 - 211	Secondary # Zone 2 Disable Code	F2
212 - 213	Secondary # Zone 3 Disable Code	F3
214 - 215	Secondary # Zone 4 Disable Code	F4
216 - 217	Secondary # Zone 5 Disable Code	F5
218 - 219	Secondary # Drill Code	97
220 - 221	Secondary # AC Fault Code	F6
222 - 223	Secondary # Zone 1 Fault Code	F1
224 - 225	Secondary # Zone 2 Fault Code	F2
226 - 227	Secondary # Zone 3 Fault Code	F3
228 - 229	Secondary # Zone 4 Fault Code	F4
230 - 231	Secondary # Zone 5 Fault Code	F5
232 - 233	Secondary # Earth Fault Code	F7
234 - 235	Secondary # Low Battery Fault Code	F8
236 - 237	Secondary # No Battery Fault Code	F9
238 - 239	Secondary # Telco Pri. Line Fault Code	FA
240 - 241	Secondary # Telco Sec. Line Fault Code	FB
242 - 243	Secondary # NAC #1 Fault Code	FC
244 - 245	Secondary # NAC #2 Fault Code	FC
246 - 247	Secondary # Comm Trouble Pri. # Code	FD
248 - 249	Secondary # Comm Trouble Sec. # Code	FE
250 - 251	Secondary # Annunciator Fault Code	FC
252 - 253	Secondary # System Off Normal Code	FF
254 - 255	Secondary # Zone 1 Alarm Restore Code	E1
256 - 257	Secondary # Zone 2 Alarm Restore Code	E2
258 - 259	Secondary # Zone 3 Alarm Restore Code	E3
260 - 261	Secondary # Zone 4 Alarm Restore Code	E4
262 - 263	Secondary # Zone 5 Alarm Restore Code	E5
264 - 265	Secondary # Zone 1 Disable Restore Code	E1
266 - 267	Secondary # Zone 2 Disable Restore Code	E2
298 - 269	Secondary # Zone 3 Disable Restore Code	E3
270 - 271	Secondary # Zone 4 Disable Restore Code	E4
272 - 273	Secondary # Zone 5 Disable Restore Code	E5
274 - 275	Secondary # Drill Restore Code	98
276 - 277	Secondary # AC Fault Restore Code	E6
278 - 279	Secondary # Zone 1 Fault Restore Code	E1
280 - 281	Secondary # Zone 2 Fault Restore Code	E2
282 - 283	Secondary # Zone 3 Fault Restore Code	E3
284 - 285	Secondary # Zone 4 Fault Restore Code	E4
286 - 287	Secondary # Zone 5 Fault Restore Code	E5
288 - 289	Secondary # Earth Fault Restore Code	E7
290 - 291	Secondary # Low Battery Fault Restore Code	E8
292 - 293	Secondary # No Battery Fault Restore Code	E9
294 - 295	Secondary # Telco Pri. Line Fault Restore Code	EA
296 - 297	Secondary # Telco Sec. Line Fault Restore Code	EB
298 - 299	Secondary # NAC #1 Fault Restore Code	EC
300 - 301	Secondary # NAC #2 Fault Restore Code	EC
302 - 303	Secondary # Comm Trouble Pri. # Restore Code	ED
304 - 305	Secondary # Comm Trouble Sec. # Restore Code	EE
306 - 307	Secondary # Annunciator Fault Restore Code	EC
308 - 309	Secondary # System Off Normal Restore Code	EF
310 - 311	Secondary # System Test Report	99
312 - 313	Secondary # System Abnormal Test Report	91

Table 3-4: Event Codes, Secondary Central Station Number

Secondary Central Station Number Account Code (43-46) is programmed in addresses 43 - 46 in the same manner as the primary phone number Account Code. Default entries are all '0s'.

Secondary Central Station Number 24-Hour Test Time (47-50) is programmed in addresses 47-50 in the same manner as the primary number 24-Hour Test Time. Default is 00:00 (12:00 midnight).

Secondary Central Station Number 24/12/8/6 Hour Test Time (51) The test message 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 zero. If other test report times are needed, enter 1=12, 2=8 and 3=6.

Alarm Verification (52)
Alarm verification works only on zones programmed as 2-wire smoke detector zones. After detecting an alarm, the panel removes power from all zones for 6 seconds, resetting all 2-wire smoke detectors. Power is reapplied and a 12 second retard period allows detectors to stabilize. During the retard/reset period of 18 seconds, subsequent alarms by the same initiating zone are ignored. An alarm detected on any other 2-wire detector zone during the retard 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 2-wire smoke zones is not recommended.*

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

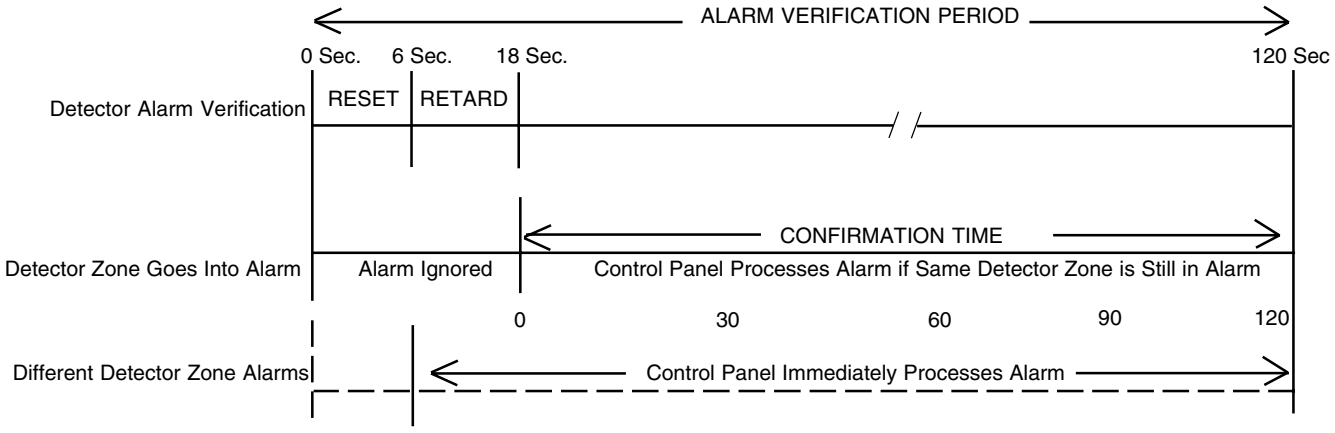


Figure 3-2: Verification Timing Diagram

Factory Default selection is no verification which is '0'. Entering a '1' enables verification. *Note: Consult local Authority Having Jurisdiction (AHJ) prior to altering this address.*

Programmable Relay 1 (53)
Programmable Relay 1 may be programmed to activate on alarm, trouble, supervisory, communications failure, or any combination of the four conditions. The default (factory setting) for this address is **'1'** for activation on alarm only. Valid entries for address 53 are 0 through F as listed below:

0 = Disable
1 = Alarm
2 = Supervisory
3 = Alarm or Supervisory
4 = Trouble
5 = Alarm or Trouble
6 = Supervisory or Trouble
7 = Alarm or Supervisory or Trouble
8 = Communication Failure
9 = Alarm or Communication Failure
A = Supervisory or Communication Failure
B = Alarm or Supervisory or Communication Failure
C = Trouble or Communication Failure
D = Alarm or Trouble or Communication Failure
E = Supervisory or Trouble or Communication Failure
F = Alarm or Supervisory or Trouble or Communication Failure

Programmable Relay 2 (54)
Programmable Relay 2 is programmed in address (54). The default (factory setting) for this address is **'4'** for activation on trouble only. Valid entries for address 54 are 0 through F as listed above.

Future Use (55)

Slave Communicator/Fire Panel Selection (56)
Leaving address 56 at '0' causes the control panel to operate as a *fire panel only.* Selecting '1' will make it operate as a *slave communicator only.* Selecting '2' will make it operate as a *Fire panel/communicator.*

Zones 1-5 Function Selection (57-61)
The five zones on the control panel may be programmed as shown below. Program entries alter zone function and transmittal priority.

Program Entry	Function
0	Operates 2-wire smoke detectors
1	Pull Station
2	Normally Open Contact Device
3	Supervisory
4	Supervisory, auto-resettable. Self restore function, is not latched by the control panel.
5	Waterflow, silenceable. Silencing of Silenceable Notification Appliance Circuits allowed. Affects zone 3 only.
6	Waterflow, non-silenceable. Silencing of Silenceable Notification Appliance Circuits not allowed. Must clear waterflow alarm condition and press reset key. Affects zone 3 only.

Zone 1 Function Selection (57)
Factory default for zone 1 is '0', 2-wire smoke detector. Enter 1 for pull station, 2 for Normally Open contact device, 3 for Supervisory or 4 for Supervisory, auto resettable.

Zone 2 Function Selection (58)
Factory default for zone 2 is '0', 2-wire smoke detector. Enter 1 for pull station, 2 for Normally Open contact device, 3 for Supervisory or 4 for Supervisory auto resettable.

Zone 3 Function Selection (59)
Factory default for zone 3 is '0', 2-wire smoke detector. Enter 1 for pull station, 2 for Normally Open contact device, 3 for Supervisory or 4 for Supervisory auto resettable, 5 for Waterflow silenceable or 6 for Waterflow non-silenceable.

Zone 4 Function Selection (60)
Factory default for zone 4 is '0', 2-wire smoke detector. Enter 1 for pull station, 2 for Normally Open contact device, 3 for Supervisory or 4 for Supervisory auto resettable.

Zone 5 Function Selection (61)
Factory default for zone 5 is '0', 2-wire smoke detector. Enter 1 for pull station, 2 for Normally Open contact device, 3 for Supervisory or 4 for Supervisory auto resettable.

Note: Programming any zone to function as supervisory or supervisory auto-resettable will cause the defaulted event codes (note in Tables 3-1 through 3-4) to be automatically changed. The defaulted code of '1' is changed to '8' for formats 3+1 and 4+1 Standard and Expanded, 4+2 Expanded and 4+1 Express. The defaulted codes of 11, 12, 13, 14, and 15 are changed to 81, 82, 83, 84, and 85 accordingly for formats 4+2 Standard and 4+2 Express.

Waterflow Retard Timer (62-63)
A delay may be added prior to declaring a Waterflow type of alarm. Delays up to 89 seconds are allowed. The default for addresses 62 and 63 are '00' (no additional delay). Valid keys for 62 are 0-8 and for 63, 0-9. Program an entry into this address only if entering a '5 or 6' in address 59. *Be careful to include any built in delays of the waterflow device.*

AC Loss Reporting Delay (64) Enter a digit of 1-F corresponding to the number of hours to be delayed in reporting loss of AC power. Factory default is 6-hour delay. If 24 hour battery backup is being employed, select from choices 0-6. If 60 hour battery backup is used, select from choices 7-F. Selections are: 0=6 hours, 1=7 hours, 2=8 hours, 3=9 hours, 4=10 hours, 5=11 hours, 6=12 hours, 7=15 hours, 8=16 hours, 9=17 hours, A=18 hours, B=19 hours, C=20 hours, D=21 hours, E=22 hours and F=23 hours.

Alarm Presignal - (65)
Positive Alarm Sequence is used to delay Notification Appliance Circuit(s) activation while allowing for visual verification by a person. Once a zone triggers an alarm, the mainboard piezo and the annunciator piezo turn on steady, the display indicates the activated zone, the alarm LED blinks, and the Notification Appliance Circuits are held off for 15 seconds. During this time, if the silence switch is pressed, the Notification Appliances may be held off for up to 3 minutes. (See Alarm Presignal Delay Timer Address 66-68). After the programmed delay period, the Notification Appliances will activate. *Alarm Presignal does not function for zones defined as Waterflow or Supervisory.* Factory default is '0' for no Alarm Presignal. Enter '1' to select Alarm Presignal. During Alarm Presignal, access to other modes is prevented and the communicator will <u>not</u> transmit a signal to the Central Station signifying that the Alarm Presignal has been initiated.

Alarm Presignal Delay Timer (66-68)
The Alarm Presignal timer is factory set to 120 seconds (2 minutes), address 66=1, 67=2 and 68=0. The timer may be programmed from 0 to 179 seconds. Location 65 must be set to '1'.

Notification Appliance Circuit #1 Enable (69)
Notification Appliance Circuit #1 may be programmed as 0=silenceable, 1=non-silenceable or 2=disabled. Factory default is '0', silenceable. *Note: Consult local Authority Having Jurisdiction (AHJ) prior to altering this address.*

Silence Inhibit Notification Appliance Circuit #1 (70)
Setting address number 70 equal to '1' prohibits silencing of Notification Appliance Circuit #1 and the on board piezo for 1 minute. Factory default is zero, no silence inhibit of Notification Appliance Circuit #1.

Auto Silence Notification Appliance Circuit #1 (71)
Notification Appliance Circuit #1 may be auto-silenced after a programmed time interval between 5 and 30 minutes. Enter 1=5 minute autosilence, 2=10 minutes, 3=15 minutes, 4=20 minutes, 5=25 minutes and 6=30 minutes. The factory default is '0' no autosilence.

Coding, Notification Appliance Circuit #1 (72)
Coding of Notification Appliance Circuit #1 is selectable for 1=March Time (120ppm), 2=California (10 seconds on, 5 seconds off) or 3=Temporal (.5 seconds on, .5 seconds off, .5 seconds on, .5 seconds off, .5 seconds on, 1.5 seconds off) Factory default is '0', steady, no coding.

Notification Appliance Circuit #2 Enable (73)
Notification Appliance Circuit #2 may be programmed as 0=silenceable, 1=non-silenceable or 2=disabled. Factory default is '0', silenceable. *Note: Consult local Authority Having Jurisdiction (AHJ) prior to altering this address.*

Silence Inhibit Notification Appliance Circuit #2 (74)
Setting address number 74 equal to '1' prohibits silencing of Notification Appliance Circuit #2 and the on board piezo for 1 minute. Factory default is zero, no silence inhibit of Notification Appliance Circuit #2.

Auto Silence Notification Appliance Circuit #2 (75)
Notification Appliance Circuit #2 may be auto-silenced after a programmed time interval between 5 and 30 minutes. Enter 1=5 minute autosilence, 2=10 minutes, 3=15 minutes, 4=20 minutes, 5=25 minutes and 6=30 minutes. The factory default is '0' no autosilence.

Coding, Notification Appliance Circuit #2 (76)
Coding of Notification Appliance Circuit #2 is selectable for 1=March Time (120ppm), 2=California (10 seconds on, 5 seconds off) or 3=Temporal (.5 seconds on, .5 seconds off, .5 seconds on, .5 seconds off, .5 seconds on, 1.5 seconds off) Factory default is '0', steady, no coding.

Trouble Reminder (77) Factory default '0' disables the trouble reminder feature. Selecting '1' will cause a reminding beep (after the silence switch is pressed) every 15 seconds during an alarm and beep every two minutes during a trouble condition. The beeps from the on board piezo sounder will occur until the alarm or fault is cleared.

Annunciator Supervision (78) Factory default is '0' no annunciator present. Set address 78 to a '1' if an annunciator is present.

Backup Reporting (79) Leaving address 79 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 the secondary Central Station phone number.

Touchtone/Rotary Select (80) A '0' programmed in this address by the factory triggers Touchtone dialing over both phone lines. Select '1' for rotary dialing.

Make Break Ratio (81) Use this address only if you have chosen '1' for address 80. The make/break ratio is factory set to '0' which is 67/33, but may be changed to '1' which is a 62/38 ratio.

Programming Event Codes (82-313)
The type of reports and 'event codes' that are sent to the Central Station are in the preceding Tables. The selections made for the Primary Central Station Number Communication Format (address 16) and the Secondary Central Station Number Communication Format (address 42) automatically program addresses 82-313 with factory default selections.

Any of the event codes may be changed. *Consult your Central Station prior to altering the event codes.* Entering an event code of '0' will cause the communicator to NOT transmit the report. For the 3+1, 4+1 and 4+1 Express formats or the 4+2 expanded format enter a single zero. For the 4+2 standard or 4+2 Express formats enter two zeros. Transmission of reports to *either or both* Central Station phone numbers may be disabled.

Note the special 'System Abnormal Test Report' event code. This report was added per new UL DACT requirements. This report is generated in place of the normal test report when an alarm and/or trouble condition exists at the time the test report is due to be sent.

Programming the Real-Time Clock
Entering an address greater than 313 will cause a display of the current time. On initial power up, the clock will start running from the factory setting of 00:01 (military time). The far left digit will be flashing, indicating that this is the first digit to be programmed.

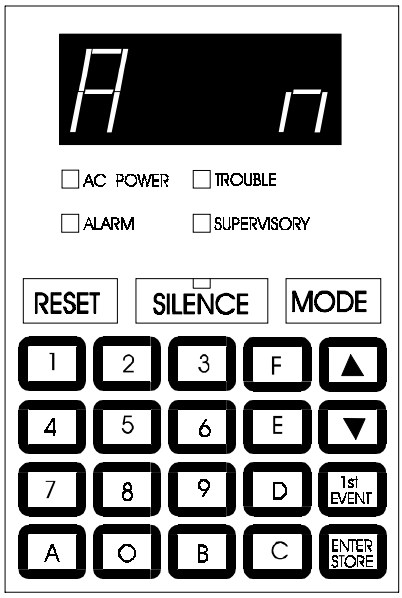
Hours/Minutes
Select a digit then press **[ENTER/STORE]**. The digit 2nd from the left will start flashing. Select a digit then press **[ENTER/STORE]**. Hours setting is complete. With the digit 2nd from the right flashing, select a digit then press **[ENTER/STORE]**. The digit on the far right will start flashing. Select a digit then press **[ENTER/STORE]**. Minutes setting is complete. Once the last digit corresponding to the minutes is entered, the display will show the contents of address '00'. Note: If an invalid digit is selected (i.e. 3 or higher for the first digit) the FACP piezo will beep and the digit will continue to blink until a valid entry is made.

Note that the software for the MS-5024 operates the internal clock based upon 60 Hz. The software for the MS-5024E operates the internal clock based upon 50Hz.

End Programming
Exit Programming Mode by pressing **MODE**, followed by the 4-digit code corresponding to an alternate mode of operation, then press **[ENTER/STORE]**.

During Program Mode, if no key is pressed within 10 minutes, the panel will revert to normal mode.

4.0 Operating Instructions



Normal Mode The MS-5024 has five Modes of operation; Normal, Program, Walk Test, Troubleshoot, and History. *Upon initial power up, the system will be in Normal Mode. This section discusses operation of the control panel in the Normal Mode.*

4.1 Switches

Below is a description of the function switches in Normal Mode:

RESET The Reset Switch resets the system and any smoke detectors. If the Reset Switch is pressed, the control panel will:

- Clear the display and status LEDs
- Turn off the Notification Appliance Circuits
- Reset all zones by temporarily removing power
- Silence the on board piezo sounder
- Store 'reset' message in the History file
- Restore the Programmable relays to normal
- Temporarily remove power from the resettable power output TB4 terminals 3+4.

Upon release of the Reset Switch, the display will read **rES_** for six seconds.

Any alarm, supervisory or trouble condition that exists after a system reset, will resound the system, reactivating normal system activity.

SILENCE If the Silence Switch is pressed:

- The silenceable Notification Appliance Circuits will be turned OFF.
- The silence LED will be turned ON.
- The piezo sounder will be shut OFF.
- 'System Silenced' message will be stored in the History file.

Upon the occurrence of a subsequent event (alarm or trouble), System Silence is overridden and the control panel will respond to the new event. *The System Silence switch will be ignored for silenceable waterflow type alarms.*

MODE Pressing the Mode Switch followed by a valid 4-digit numerical code and **[ENTER/STORE]** selects one of the six modes of operation.

☛ To enter normal mode from any other mode press **MODE** then **6676 [ENTER/STORE]. 6676** spells NORM on a Touch-Tone® phone.

1st EVENT This switch along with the Up Arrow and Down Arrow keys, is used to display any **presently** active alarm and/or fault conditions present in the system. Press the 1st Event switch at any time to display the first event (alarm and/or trouble) that occurred.

DOWN ARROW Use the Down Arrow key to view other events (older) that have occurred and are active - not cleared yet.

UP ARROW Use the Up Arrow key to view other events (newer), that have occurred and are active - not cleared yet.

[ENTER/STORE] See individual mode descriptions in other sections of this manual.

4.2 Displays

Four 7-segment red LED characters provide visual annunciation of status, events and messages. A list of messages that may appear on the display in normal mode is shown below:

d__1	**Zone 1 Disabled**	**F__4**	**Trouble Zone 4**
d__2	**Zone 2 Disabled Zone**	**F__5**	**Trouble Zone 5**
d__3	**3 Disabled**	**F__A**	**Annunciator Fault**
d__4	**Zone 4 Disabled**	**F__E**	**Earth Fault**
d__5	**Zone 5 Disabled Zone**	**Lo_b**	**Low Battery**
E__1	**1 Enabled**	**no_b**	**No Battery**
E__2	**Zone 2 Enabled**	**PH_1**	**Primary C. S. Number Communication Fault**
E__3	**Zone 3 Enabled**	**PH_2**	**Secondary C. S. Number Communication Fault**
E__4	**Zone 4 Enabled**	**bEL1**	**Bell 1 Fault**
E__5	**Zone 5 Enabled**	**bEL2**	**Bell 2 Fault**
A__1	**Alarm Zone 1**	**no_1**	**Primary Phone Line Fault**
A__2	**Alarm Zone 2**	**no_2**	**Secondary Phone Line Fault**
A__3	**Alarm Zone 3**	**SUP1**	**Supervisory Alarm Zone 1**
A__4	**Alarm Zone 4**	**SUP2**	**Supervisory Alarm Zone 2**
A__5	**Alarm Zone 5**	**SUP3**	**Supervisory Alarm Zone 3**
F__1	**Trouble Zone 1**	**SUP4**	**Supervisory Alarm Zone 4**
F__2	**Trouble Zone 2**	**SUP5**	**Supervisory Alarm Zone 5**
F__3	**Trouble Zone 3**	**_AC_**	**AC Power Loss**
rES_	**System Reset**		

Individual LEDs are provided for:

System Alarm—A red LED that turns on steady when an alarm condition is detected and blinks during alarm Positive Alarm Sequence period.

System Trouble—This yellow LED blinks to indicate that a fault or abnormal condition exists and that the fire alarm system may be inoperative. It turns on steady when the silence switch is pressed.

AC Power On—A green LED that remains on while the A.C. power supply is within correct limits. *If this indicator fails to light under normal conditions, service the system immediately.*

Supervisory—A yellow LED that blinks to indicate the need for action in connection with the supervision or maintenance of sprinklers, extinguishing systems or other protective systems.

System Silence—A yellow LED that turns on to indicate that an Alarm or Trouble condition exists in the system, but both Notification Appliance Circuits (if programmed as silenceable) and local piezo have been silenced.

Primary Line Active—A red LED that indicates the primary phone line is active.

Secondary Line Active—A red LED that indicates the secondary phone line is active.

Kiss-Off —A green LED that blinks when a Central Station has acknowledged receipt of each transmitted message.

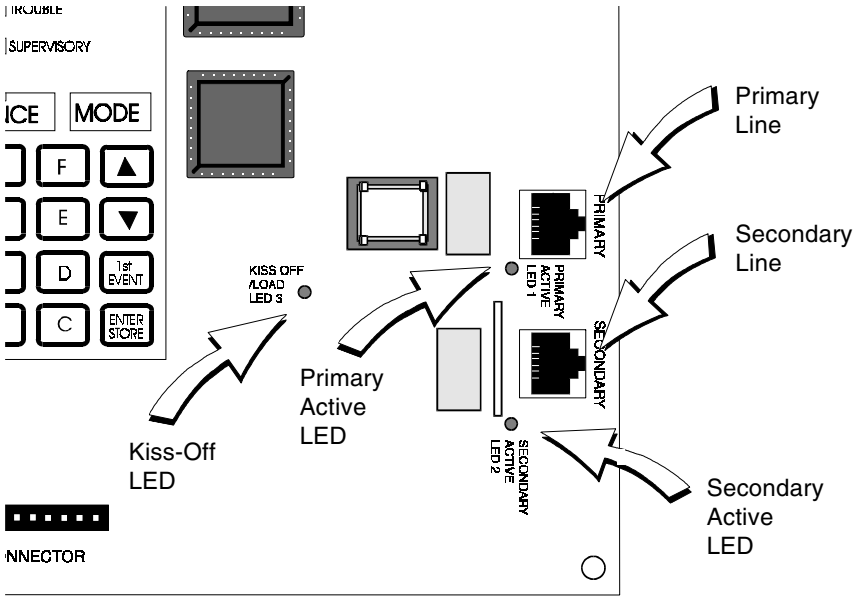


Figure 4-1: Phone Connectors and LEDs

4.3 Operation

Normal mode is the standard mode of operation. In this mode, the panel continuously monitors system status. When no alarm or trouble conditions exist, the display will be blank and all LEDs will be off (except the AC Power LED). The Notification Appliance Circuits will be off all relays are normal and the onboard piezo sounder will be off. (The communicator is not active, primary and secondary active LEDs are off).

All alarm and system trouble conditions are annunciated on the control panel's display. The control panel will maintain an 'active event list' which will consist of all alarms, supervisory alarms and system troubles currently active, and not cleared, requiring immediate service. When the system is cleared and restored to normal, the display will be blank. All alarms and troubles are stored in a history file and may be recalled at any time.

Higher priority events take precedence over lower priority events. Display and reporting of System Status is done on a priority basis. Priorities are, from highest to lowest:

1. Alarms
2. Supervisory Alarms
3. System Troubles

If the events to be displayed consist of alarms and disabled zones only, (no troubles), the control panel will scroll them on the display. Pressing the 1st Event key will stop the scrolling and cause display of the *First* alarm that occurred after the panel was last reset, cleared of all active events and placed into normal mode. Operation of the Up and Down arrow keys will display all remaining events in sequence.

If events to be displayed include system troubles, only one event is displayed at a time and there is no scrolling. The event displayed is the highest priority. Pressing the 1st Event key will cause the display of the first event that occurred after the panel was last reset, cleared of all active events and placed into normal mode. Operation of the Up and Down arrow keys will display all remaining events in order of their occurrences.

4.3.1 Alarm Response

The control panel will, upon detection of an alarm condition:

- Turn the alarm LED on.
- Activate relay(s) programmed for alarm.
- Display the alarm message, for example, **A__1** Alarm on zone 1.
- Communicate the alarm to the central station.
- Store the alarm in the History file.
- Turn the Notification Appliance Circuits on.
- Turn the piezo sounder on.
- Turn on the annunciator zone LED and annunciator piezo sounder.

Note that when any zone is programmed as a supervisory zone, it will not be processed in the same manner as a conventional alarm zone. ***See Supervisory Condition later in this section.***

4.3.2 Alarm Restoral

The control panel only returns to normal after all alarms have been cleared and the Reset switch has been pressed (pull stations reset, smoke detectors reset and no smoke is present, waterflow has stopped). The control panel will perform the following upon restoral of all active alarms:

- Turn off the alarm LED.
- Deactivate the alarm relay(s) if programmed.
- Clear the 4-character display .
- Send all 'Zone Restoral' messages to the central station.
- Turn off the Notification Appliance Circuits.
- Turn off the Piezo Sounder.
- Turn off the annunciator zone LED and annunciator piezo sounder.

4.3.3 System Supervisory Condition Response

Program zones for Supervisory in applications where a waterflow sensing device has been employed and the wiring to the waterflow valve and/or a tamper switch is to be monitored. If the wiring has been cut or the tamper switch has been activated, a supervisory alarm condition will occur.

When a supervisory condition occurs, the control panel will:

- Blink the supervisory LED (.5 seconds on, .5 seconds off).
- Activate the supervisory relay(s) if programmed.
- Display the following message: (SUPX) (X=Zone Number).
- Communicate the supervisory condition to the central station.
- Store the 'supervisory' message in the History file.
- Pulse the piezo sounder at 0.5 sec on 0.5 sec off rate.
- Turn on the annunciator zone LED and pulse annunciator piezo sounder.

4.3.4 System Supervisory Restoral Response

When the supervisory condition has been cleared (condition is restored and the reset switch has been pressed) the control panel will perform the following:

- Turn off the supervisory LED.
- Deactivate the supervisory relay(s) if programmed.
- Clear the display of the 'SUP' message.
- Communicate a supervisory restoral message to the central station.
- Shut off the piezo sounder.
- Turn off the annunciator zone LED and annunciator piezo sounder.

Note: For any zone programmed for Supervisory auto resettable, the Reset key does not need to be pressed to clear the zone (Supervisory condition).

4.3.5 Trouble Condition Response

The control panel will perform the following upon detection of one or more trouble conditions:

- Blink the trouble LED (one second on, one second off).
- Activate the trouble relay(s) if programmed.
- Display the appropriate trouble message(s) in priority fashion from the highest priority to the lowest. **Note:** (Must press Up Arrow, Down Arrow, or 1st Event key to view).
- Communicate the trouble conditions to the central station.
- Store the trouble conditions in the history file.
- Sound the piezo sounder one second on, one second off.
- Blink the annunciator trouble LED and pulse the piezo sounder.

Note: When AC Brownout occurs the AC LED is turned off, and the Trouble LED blinks. Should the brownout condition remain, it will be transmitted to the central station after a delay (See Program Address number 64).

Possible trouble messages that may appear on the display are as follows:

_AC_	**AC Loss (shown only when requested)**		
d__1	**Zone 1 disabled**	**F__E**	**Ground fault**
d__2	**Zone 2 disabled**	**Lo_b**	**Low battery**
d__3	**Zone 3 disabled**	**no_b**	**No battery**
d__4	**Zone 4 disabled**	**no_1**	**Primary Phone Line Fault**
d__5	**Zone 5 disabled**	**no_2**	**Secondary Phone Line Fault**
F__1	**Trouble on zone 1**	**bEL1**	**Bell 1 circuit fault**
F__2	**Trouble on zone 2**	**bEL2**	**Bell 2 circuit fault**
F__3	**Trouble on zone 3**	**PH_1**	**Primary C. S. Number Communication Fault**
F__4	**Trouble on zone 4**		
F__5	**Trouble on zone 5**	**PH_2**	**Secondary C. S. Number Communications Fault**
		F__A	**Annunciator Fault**

4.3.6 Trouble Condition Restoral

The control panel performs the following upon restoral of all trouble conditions.

- The trouble LED is shut OFF.
- Deactivate the trouble relay(s) if programmed.
- If the trouble was loss of AC power, the control panel will turn on the AC LED upon restoral.
- Clear the display of the trouble message(s).
- Communicate the restored trouble condition(s) to the central station.

4.3.7 OFF Normal Reporting

Removing the panel from Normal Mode and placing it into any other mode causes a transmission of an 'off normal' fault message. Returning the panel to Normal Mode causes a transmission of a 'return to normal' restoral message.

4.3.8 Zone Disable/Enable

The zone disable feature may be used to disable any zone in the system. Zones may be disabled if they are normal, in trouble or alarmed. *Zones may only be disabled during the normal mode of operation when the fire protection is active.*
If the panel is in alarm, the silence switch must be pressed first before zone disable will function.

To disable a zone, press the **MODE** key once, (the display will go blank) you then have 10 seconds to start entering the code **3472**. Next press the **[ENTER/STORE]** key.

☛ **3472** spells DISA on a Touch-Tone® phone

A flashing lower case **d** will appear on the far left of the display. Next, press the zone number to be disabled. The number will appear on the far right display character. Press **[ENTER/STORE]**. The zone is disabled. Note that the relay (if programmed for trouble) is activated and the trouble LED blinks.

The zone disable message will remain on the display until the zone is re-enabled. To re-enable a zone, press the **MODE** key once, (the display will go blank) you then have 10 seconds to start entering the code **3622**. Next, press the **[ENTER/STORE]** key.

☛ **3622** spells ENAB on a Touch-Tone® phone

A flashing upper case **E** will appear on the left of the display. Next, press the zone number to be enabled. The number will appear on the far right display character. Press **[ENTER/STORE]**. The zone is re-enabled. Note that the relay (if programmed for trouble) is restored to normal and the trouble LED is off.

4.3.9 Fire Drill

The **DRILL** (manual evacuate) feature turns on both Notification Appliance Circuits (if programmed as enabled) and turns off the silence LED. To perform a fire drill, press the **MODE** key followed by the code **3745** then enter. The display will read **dril**. The relay (if programmed for alarm) is not activated. There is an option to transmit the fire drill report code to the Central Station.

☛ **3745** spells **dril**

During a fire drill, the **SILENCE** key will silence both Notification Appliance Circuits and the **RESET** key restores the panel to normal. *All zones remain active during a fire drill.*

4.3.10 No Battery/Low Battery

This panel detects two levels of battery fault conditions, low battery and no battery. The low battery condition is 20.4 volts per NFPA and UL requirements. The no battery condition can occur (1) if no battery is installed or (2) the battery voltage drops below the 'no battery threshold' voltage limit. The no battery threshold voltage is the minimum voltage required to operate the system fully under loss of AC power. This voltage must be high enough to (1) power initiating devices, (2) power notification appliances and (3) provide internal power to system components including the microprocessor. Both the no battery and low battery condition may be reported to the central station.

When AC power is lost and the system is running on battery, the panel will report 'loss of AC power' to the central station after a programmed delay period. The panel will report 'low battery' when the low battery threshold is reached. If AC power is not restored and the 'no battery' threshold is reached, the panel will power off. This prevents false alarms, nuisance reports and incorrect panel operation when the battery falls to dangerous levels. After the AC power is restored, the no battery (no_b) message will appear. The battery must be disconnected from the system and either replaced or allowed to restore itself before being reinstalled.
CAUTION!: *Be certain to clear the no battery condition since the battery will not recharge from this condition and the panel will not clear itself. The low battery condition will self-clear when the battery recharges (provided the battery is good).*

4.4 Central Station Communications

The control panel transmits zone and system status reports to Central Stations via the public switched telephone network. Two supervised telephone line connections are made to interface the control panel to the telephone lines. Two 7-foot telephone cables are optional for this purpose.

The control panel supervises both telephone lines for proper voltage. A delay of two minutes will occur before a fault on 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 blink, the 4 character display will show either 'no 1' or 'no 2' (depending upon which telephone line has the fault. 'no 1' = Primary Line, 'no 2' = Secondary Line) and the trouble condition will be reported to a Central Station over the remaining good phone line.

The control panel comes with line seizure capability provided for both the primary and secondary telephone line interfaces. Any time that the control panel 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. All system reports will be transmitted to the Primary Central Station phone number. Reports will automatically be sent to the Secondary Central Station phone number if attempts to transmit to the Primary Central Station phone number are unsuccessful. If 10 total attempts to communicate are unsuccessful, the relay(s) will activate if programmed for Communications Failure. Note that as an option, *all* reports may also be sent to the Secondary Central Station phone number.

The MS-5024 meets NFPA 72-1993 National Fire Code reporting requirements for: (a) the type of signal (b) condition and (c) location of the reporting premises. The general priority reporting structure is:

1. Zone Alarms and Restores
2. Zone Troubles and Restores
3. System Troubles and Restores
4. 24-hour test

The control panel is capable of reporting detailed messages depending upon the format in use. Table 4-1 shows the reporting structure for all formats.

	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
Alarm	SSS(S) A	SSS(S) A AAA(A) Z	SSSS AA2	SSSS AZ
Alarm Restore	SSS(S) RA	SSS(S) RA RARARA(RA) Z	SSSS RARA2	SSSS RAZ
Zone Trouble (Zone Open)	SSS(S) TZ	SSS(S) TZ TZTZTZ(TZ) Z	SSSS TZTZ2	SSSS TZZ
Zone 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
Zone Disable	SSS(S) DZ	SSS(S) DZ DZDZDZ(DZ)Z	SSSS DZDZ2	SSSS DZZ
Zone Disable Restore	SSS(S) RDZ	SSS(S) RDZ RDZRDZRDZ(RDZ)Z	SSSS RDZRDZ2	SSSS RDZZ
Low Battery	SSS(S) L	SSS(S) L	SSSS LL2	SSSSLL2
Low Battery Restore	SSS(S) RL	SSS(S) RL	SSSS RLRL2	SSSS RLRL2
AC Loss	SSS(S) P	SSS(S) P	SSSS PP2	SSSS PP2
AC Loss Restore	SSS(S) RP	SSS(S) RP	SSSS RPRP2	SSSS RPRP2
Fire Drill	SSS(S)Fd	SSS(S)Fd	SSSSFdFd2	SSSSFdFd2
Fire Drill Restore	SSS(S)RFd	SSS(S)RFd	SSSSRFdRFd2	SSSSRFdRFd2
Supervisory Condition	SSS(S) V	SSS(S) V VVV(V) Z	SSSS VV2	SSSS VZ
Supervisory Condition Restore	SSS(S) RV	SSS(S) RV RVRVRV(RV) Z	SSSS RVRV2	SSSS RVZ
Test Report	SSS(S) X	SSS(S) X	SSSS XX2	SSSS XX2

Table 4-1: Format Selection Addresses (16+42)

Refer to Table 4-2 for an explanation of each letter code in Table 4-1.
Refer to Table 4-3 for a list of compatible receivers.

Where:

SSS 0r
SSSS = Subscriber ID
A = Alarm (1st digit)
A2 = Alarm (2nd digit)
Z = Zone Number
RA = Alarm Restore (1st digit)
RA2 = 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)
DZ = Zone Disable (1st digit)
DZ2 = Zone Disable (2nd digit)
RDZ = Zone Disable Restore (1st digit)
RDZ2 = Zone Disable Restore (2nd digit)
L = Low Battery (1st digit)
L2 = Low Battery (2nd digit)
RL = Low Battery Restore (1st digit)
RL2 = Low Battery 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)
FD = Fire Drill (1st digit)
FD2 = Fire Drill (2nd digit)
RFD = Fire Drill Restore (1st digit)
RFD2 = Fire Drill Restore (2nd digit)
V = Supervisory Condition (1st digit)
V2 = Supervisory Condition (2nd digit)
RV = Supervisory Condition Restore (1st digit)
RV2 = Supervisory Condition Restore (2nd digit)
X = Test Report (1st digit)
X2 = Test Report (2nd digit)
Y = A Trouble Corresponding to The Following:

- 7 = Ground Fault
- 8 = Low Battery
- 9 = No Battery
- A = Telco Primary Line Fault
- B = Telco Secondary Line Fault
- C = Main Bell Fault, Annunciator Fault
- D = Communication Fault to Primary Number
- E = Communication Fault to Secondary Number
- F = System Off Normal Fault/System Fault (Slave Operation, See Section 6.0)

***Note**: For Expanded Reporting, the control panel automatically adds the digit corresponding to the zone number, and the second digit corresponding to any system trouble condition. Only the first digit is programmable.*

Table 4-2: Format Selection Address Explanation

4.4.1 Transmittal Priorities

The integral communicator transmits highest priority events first. Events in terms of priority are listed below in descending order:

1: Alarms (Highest Priority Level)
- Pull Stations
- Waterflow
- Smoke Detector
- Other Alarm Types

2: Supervisory Zone

3: System Troubles
- Zone Disabled
- Fire Drill
- AC Fail (After Delay)
- Zonal faults
- Earth fault
- Low battery/No battery
- Telephone line fault
- Notification Appliance Circuits fault
- Communication Trouble
- Annunciator Trouble
- System off Normal

4: Restoral Reports
- Zone Alarm
- Supervisory
- Zone(s) Enabled
- Fire Drill
- AC
- Zone Fault
- Earth
- Battery
- Telephone Line
- Notification Appliance Circuits
- Communication
- Annunciator Trouble
- System off Normal

5: 24 Hour Test (Lowest Priority)

Red LEDs are provided on the control panel circuit board to identify which telephone line is activated. Also a green LED (labeled 'Kissoff') will turn on whenever the control panel has successfully transmitted reports to the Central Station. The 'Kissoff' LED may turn on several times during communications with a Central Station.

The chart below shows UL listed receivers compatible with the MS-5024:

	Format # (Addresses 16 & 42)	Ademco 685 (1)	Silent Knight 9000	ITI CS-4000 (3)	FBI CP220FB	Osborne Hoffman Models 1 & 2	Radionics 6000/6500 (5)	Sescoa 3000R (7)	Surguard MLR-2 (9)
0	4+1 Ademco Express	✔			✔				✔
1	4+2 Ademco Express	✔			✔	✔(8)			✔
2	3+1/Standard/1800/2300	✔	✔ (2)	✔	✔ (4)	✔	✔(5,6)	✔	✔
3	3+1/Expanded/1800/2300	✔	✔ (2)	✔	✔ (4)	✔		✔	✔
4	3+1/Standard/1900/1400	✔	✔ (2)		✔ (4)	✔		✔	✔
5	3+1/Expanded/1900/1400	✔	✔ (2)		✔ (4)	✔		✔	✔
6	4+1/Standard/1800/2300	✔	✔ (2)	✔	✔ (4)	✔	✔ (5)	✔	✔
7	4+1/Expanded/1800/2300	✔	✔ (2)		✔ (4)	✔		✔	✔
8	4+1/Standard/1900/1400	✔	✔ (2)		✔ (4)	✔		✔	✔
9	4+1/Expanded/1900/1400	✔	✔ (2)		✔ (4)	✔		✔	✔
A	4+2/Standard/1800/2300	✔	✔ (2)	✔	✔ (4)	✔	✔ (5)	✔	✔
B	4+2/Expanded/1800/2300	✔	✔ (2)		✔ (4)	✔		✔	✔
C	4+2/Standard/1900/1400	✔	✔ (2)		✔ (4)	✔		✔	✔
D	4+2/Expanded/1900/1400	✔	✔ (2)		✔ (4)	✔		✔	✔
E	Not Used								
F	Not Used								

(1) With 685-8 Line Card with Rev 4.4d software.
(2) With 9002 Line Card Rev 9035 software or 9032 Line Card with 9326A software.
(3) Rev. 4.0 software.
(4) FBI CP220FB Rec-11 Line Card with Rev 2.6 software and a memory card with Rev 3.8 software.
(5) Model 6500 with Rev 600 software.
(6) Model 6000 with Rev 204 software.
(7) With Rev B control card at Rev 1.4 software and Rev C line card at Rev 1.5 software.
(8) Model 2 only.
(9) Version 1.62 software.

Table 4-3: Compatible UL Listed Receivers

5.0 Servicing

5.1 Walk Test Mode

The MS-5024 provides the capability to perform a one-man walk test of the system without triggering the communicator, or the alarm relay (if programmed). Walk Test allows for testing of the five zones (initiating circuits). The first initiating device activated on a zone will cause the Notification Appliance Circuits to turn on for four seconds. Subsequent device activations on the same zone will cause the Notification Appliance Circuits to turn on for one second. Any smoke detectors that are activated will be reset. Zonal faults (open circuits) will cause the appliance circuit to remain on steadily. Prior to entering Walk Test Mode, check to be certain that all system faults have been cleared. *Note: The trouble relay will be activated (if programmed) while the control panel is in this mode. Placing the control panel into walk test mode will only be possible if the system has no active alarms.*

Pressing the **MODE** key followed by the 4-digit code **9255 [ENTER/STORE]** will place the control panel into Walk Test Mode.

☛ **9255** spells 'WALK' on a Touch-Tone® phone.

Once in Walk Test Mode, the control panel will immediately:

- Blink the trouble LED.
- Activate the trouble relay(s) if programmed.
- Turn on the Notification Appliance Circuits for four seconds for the first alarm on a zone. Subsequent alarms will sound for one second. Troubles cause the Notification Appliance Circuits to remain on.
- Disable the alarm relay(s) if programmed.
- Display all alarm conditions as they occur.
- Display all zone troubles as they occur.
- Display ground faults as they occur.
- Transmit 'off normal' message to Central Station(s).
- Continue to communicate any events not acknowledged at a Central Station prior to entering Walk Test Mode.

During Walk Test Mode, zonal activity is displayed in real time as it occurs. At the end of Walk Testing the system, the display will show the last event that occurred. To view all events stored during Walk Test, use the Up Arrow, Down Arrow and 1st Event keys. The Down Arrow key moves the Walk Test list to show older - previous events. The Up Arrow key moves the Walk Test list to show newer - most recent events. Pressing the 1st Event key at any time will cause the display of the first event stored upon initial entry into Walk Test Mode. While in Walk Test Mode, the control panel will store up to 128 events in the Walk Test File for future recall and display.

To return the control panel to normal mode, press the mode key, the numbers **6676** and the **[ENTER/STORE]** key. Any delay between key entries greater than 10 seconds causes the control panel to remain in Walk Test Mode.

The control panel will automatically revert back to Normal Mode if no system activity has occurred for 60 minutes. This would include pressing any keys or activity on any zone.

5.2 History Mode

All Normal Mode events are stored in a History File list for future recall. Recall is possible via the 4-character display. See the following page for a list and description of each event displayed.

The History File list is a first-in first-out (FIFO). In this manner, only the most recent events may be called up from memory. Old events will be overwritten i.e., pushed out of the FIFO.

The number of stored events is 32. The History File is kept in E^2 memory. Complete power loss will not erase the list.

Pressing the **MODE** key followed by **4478 [ENTER/STORE]** places the control panel into History Mode. *This will not occur if there are any active alarm conditions present.* The event displayed, is the most recent event.

☛ **4478** spells HIST on a Touch-Tone® phone.

Once in History Mode, the control panel will:

- Blink the trouble LED.
- Activate the trouble relay(s) if programmed.
- Disable the Notification Appliance Circuit(s).
- Disable the alarm relay(s) if programmed.
- Display all events as they occurred since the last time the History File list was cleared. The most recent event will be displayed first.
- Ignore all other keys other than those mentioned in this section.
- Transmit the 'off normal' message to the Central Station(s).
- Continue to communicate any events not previously acknowledged at the Central Station prior to entering History Mode.

The Down Arrow key moves the History File to show older-previous events. The Up Arrow key moves the History file to show newer-most recent events.

Shown below is the list of messages as they will appear on the display:

DISPLAY	EVENT
A__1	Zone 1 Alarm
A__2	Zone 2 Alarm
A__3	Zone 3 Alarm
A__4	Zone 4 Alarm
A__5	Zone 5 Alarm
SUP1	Supervisory 1 Alarm
SUP2	Supervisory 2 Alarm
SUP3	Supervisory 3 Alarm
SUP4	Supervisory 4 Alarm
SUP5	Supervisory 5 Alarm
_AC_	AC Loss
F__1	Zone 1 Fault
F__2	Zone 2 Fault
F__3	Zone 3 Fault
F__4	Zone 4 Fault
F__5	Zone 5 Fault
bEL1	Bell 1 Fault (open or short)
bEL2	Bell 2 Fault (open or short)
F__E	Earth Fault
F__A	Annunciator Fault
d__1	Zone 1 disabled
d__2	Zone 2 disabled
d__3	Zone 3 disabled
d__4	Zone 4 disabled
d__5	Zone 5 disabled
E__1	Enable Zone 1
E__2	Enable Zone 1
E__3	Enable Zone 1
E__4	Enable Zone 1
E__5	Enable Zone 1
PH_1	Primary C. S. # Communication Fault
PH_2	Secondary C. S. # Communication Fault
no_b	No Battery
Lo_b	Low Battery
SILE	Silence Switch pressed
no_1	Primary Phone Line Fault
no_2	Secondary Phone Line Fault
rES_	Reset Switch pressed

To erase the list from E^2 memory, press the **SILENCE** key twice before exiting the History Mode. A lack of keyboard activity for a period of 10 minutes will cause the control panel to return to normal mode.

5.3 Troubleshoot Mode

In this mode, system voltages may be displayed on the 4-character display. An internal voltmeter measures the voltage present at: (1) the zone inputs, (2) the AC power input (3) the battery terminal leads, (4) NAC #1, (5) NAC #2 and (6) Resettable 24 volt power. A lack of keyboard activity for a period of 20 minutes will cause the control panel to return to normal mode.

To get into the Troubleshoot Mode, press **MODE 8768** and **[ENTER/STORE]**.

☛ **8768** spells TROU on a Touch-Tone® phone.

Once in this mode, the control panel will:

- Blink the trouble LED.
- Activate the trouble relay(s) if programmed.
- Disable the Notification Appliance Circuits.
- Disable the alarm relay(s) if programmed.
- Transmit the 'off normal' message to the Central Station(s).
- Continue to communicate any events not yet acknowledged at the Central Station prior to entering Troubleshoot Mode.

Pressing **A [ENTER/STORE]** displays the AC input voltage. Pressing **B [ENTER STORE]** will display the Battery Voltage. Pressing **1** through **5** followed by **[ENTER/STORE]** displays the zone voltage of the selected zone. Pressing **b1** followed by **[ENTER/STORE]** displays the voltage on NAC #1. Pressing **b2** followed by **[ENTER/STORE]** displays the voltage on NAC #2. Pressing the **RESET** key followed by **[ENTER/STORE]** displays the resettable 24volt power. The **UP Arrow key, Down Arrow key** and **1st EVENT** keys do not function in this mode.

Zones

Below is listed the nominal threshold voltages for each zone:

Zone #	Normal w/E.O.L.	Shorted	Open CKT.
1	23.5V	0.00V	25.4V
2	23.5V	0.00V	25.4V
3	23.5V	0.00V	25.4V
4	23.5V	0.00V	25.4V
5	23.5V	0.00V	25.4V

Readings will vary proportionately depending upon system load and AC line voltage.

AC Line

Listed below is the AC line voltage range. The AC ON indicator will turn off when the AC line voltage drops below the Low Line threshold, and the trouble LED will turn on.

AC Line Voltage:	Low Line	Normal	High Line
MS-5024	102VAC	115VAC	132VAC
MS-5024E	204VAC	220VAC	264VAC

Battery

Below is shown the critical battery threshold conditions:

	Normal	Low Battery	No Battery
Battery Voltage:	27.6V	20.4V	<14.2V

IMPORTANT: The battery charger will turn off when the battery voltage drops to 14.2 VDC or less (No Battery condition). A battery with a higher voltage must be installed to turn the charger back on.
Note: Make measurements after allowing 48 hours to charge depleted batteries. If batteries do not show normal readings, replace them.

NAC 1 & 2

NAC voltage readings are nominally -2.32 volts when an EOL resistor of correct value is in place. A reading of 0.00 volts appears for shorts, -4.50 volts for opens. Intermediate readings are also available.

Telephone Lines

Pressing **C** for touchtone dialing or **D** for rotary dialing, followed by **[ENTER/STORE]** causes seizure of the Primary phone line which in turn lights the red LED signifying Primary phone line active. After a delay of three seconds, the control panel goes off hook to acquire a dial tone.

The control panel 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 digit to be dialed on the farthest right display position. Continue to press the phone numbers to be dialed. Successive depressions of the **[ENTER/STORE]** 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 as indicated in Figure 5-1. The handset, when connected across T1, may be used only as an amplifier/speaker and telephone with the control panel used for number dialing.

Resettable Power

Resettable 24 volt power must read 24 volts + or - 10%.

5.4 Lamp Test

To perform a Lamp Test, press **MODE** then **5267** followed by **[ENTER/STORE]**. This will test all system LEDs except the Primary Active LED, Secondary Active LED and Modem LED. The LEDs will stay on for five seconds, then the control panel will return to normal mode.

☛ **5267** spells LAMP on a Touch-Tone® phone.

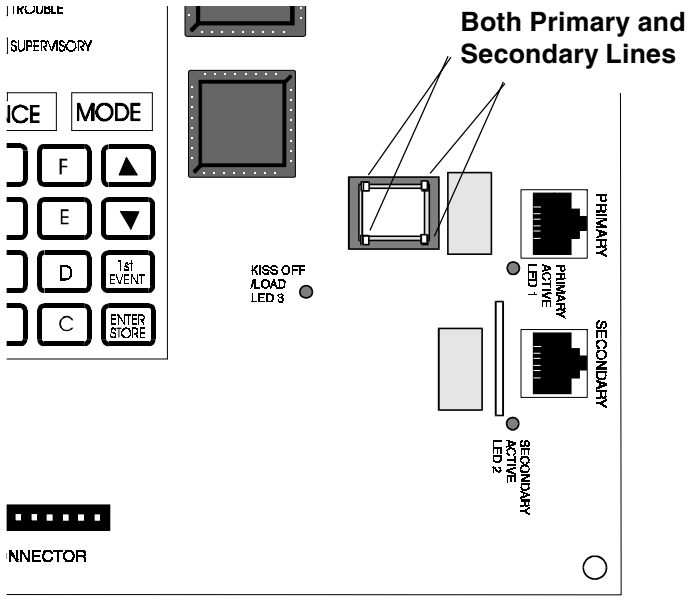


Figure 5-1: Handset/Speaker Connection

6.0 Slave Communicator Configuration

The MS-5024 may be used as a slave communicator to a host or Master fire alarm control panel (FACP).

All wiring between the Master and the slave communicator is supervised. End of line resistors, 4.7K, should be connected.

In slave configuration, the five zones become five channels that may be triggered by the relay outputs of any host FACP. Zone 1/Channel 1 is used for general alarm, Zone 2/Channel 2 is used for general trouble, Zone 4/ Channel 4 is used for supervisory, and Zones 3 & 5/Channels 3 & 5 may be programmed to match the FACP relay function.

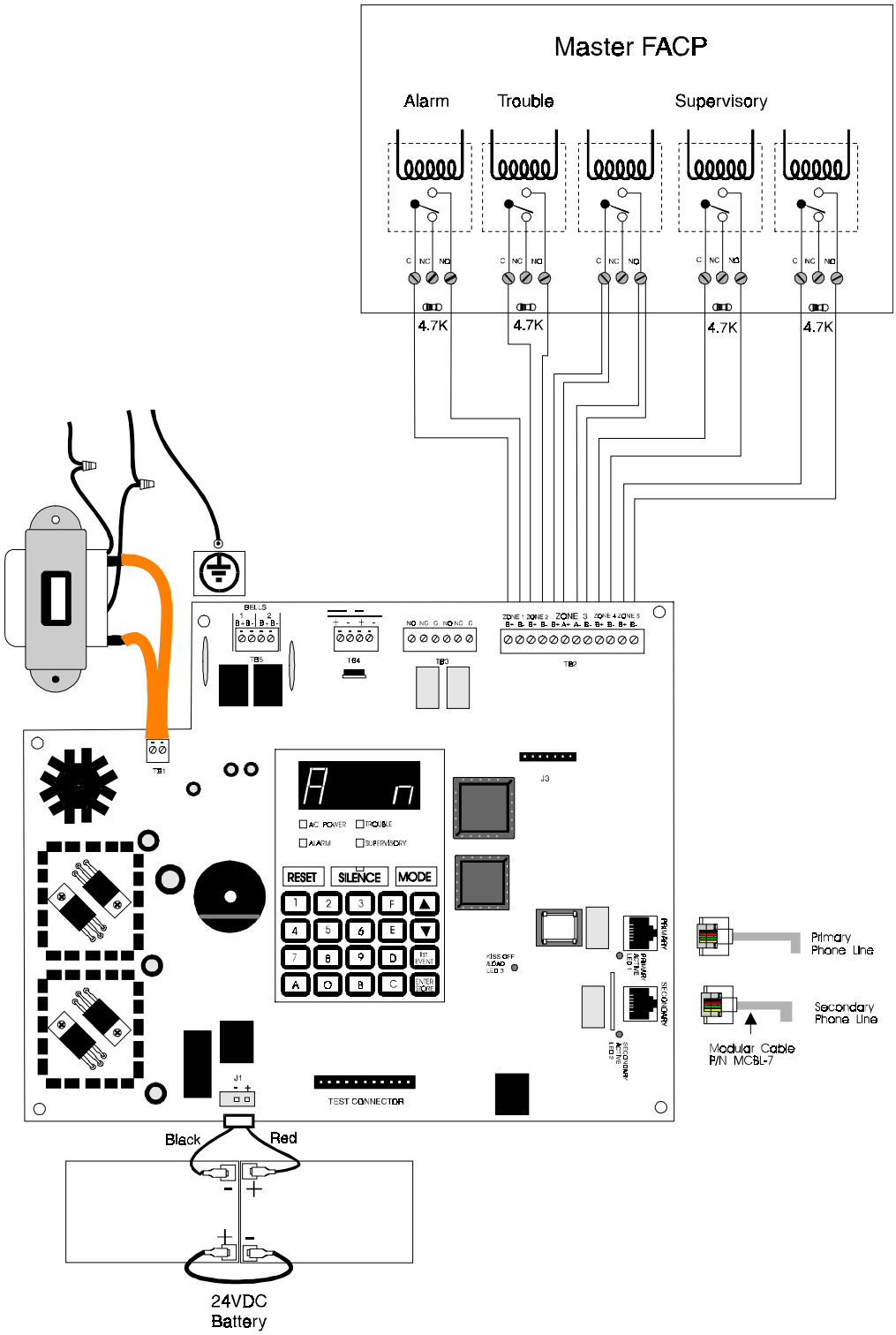
The factory settings for Zone 2/Channel 2 alarm and restoral are altered as follows: If 0, 2, 3, 4, 5, 6, 7, 8, 9, B or D is entered for address 16 or 42, the report code for Zone 2 Alarm Code (address 83,199) = F, Zone 2 Restoral Code (address 111, 227) = E. If '1, A or C' are entered for address 16 or 42, the report code for Zone 2 Alarm Code (addresses 84-85, 200-201) = FF, Zone 2 restoral code (addresses 140-141, 256-257) = EF.

The factory settings for Zone 4/Channel 4 alarm and restoral are altered as follows: If 0, 2, 3, 4, 5, 6, 7, 8, B, or D is entered for address 16 or 42, report code for Zone 4/ Channel 4 alarm code address (85, 201) = 8. Zone 4/Channel 4 restoral code (113, 229) = E. If 1, A or C are entered for addresses 16 or 42, the report code for Zone 4 alarm code addresses (88-89, 204-205) = 84, Zone 4 restoral code addresses (144-145, 260-261) = E4.

Location 56 must be programmed to a '1' to enable the control panel as a slave communicator.

Be certain to connect the slave communicator's primary AC power to the same branch circuit as the host FACP.

Note: Alarm Presignal and Alarm Verification do not function in Slave Communicator Mode.



Relays in Master FACP activate various input circuits on the slave communicator. Messages (event codes) programmed for a particular input circuit (channel) will be transmitted to the central station upon relay activation.

Figure 6-1: Slave Communicator Connections

Appendix A: Battery Calculations

Use the Total Standby and Alarm Load Currents calculated in Tables A-2A and A-2B for the following battery calculation.

Standby Load Current (Amps) [ ]	X	Required Standby Time in Hours (24 or 60 Hours) [ ]	=	_____
Alarm Load Current (Amps) [ ]	X	Required Alarm Time in Hours (i.e. 5 min. = 0.084) [ ]	=	_____
Add Standby and Alarm Load for Required Ampere Hour Battery			=	_____
Multiply by the Derating Factor of 1.2			=	_____
Total Ampere Hours (AH) Required			=	_____

Note:

1) 7 Ampere Hour battery can be located in the Backbox.
2) 12 Ampere Hour and 17 Ampere Hour batteries require the BB-17F Battery box.

The Main Power Supply

The MS-5024 provides regulated power for operating the fire alarm control panel, operating external devices, and operating the standby battery. The power for operating external devices is limited. Use Table A-2A (standby or non-alarm) and Table A-2B (alarm) to determine if external loading is within the capabilities of the power supply.

Concerning 4-wire smoke detectors: Be sure to power detectors from TB-4, Terminals 3 and 4.

Table A-2A: Regulated Load in Standby @24 VDC

External Devices connected to TB-4 only

Device Type	# of Devices		Current (Amps)		Total Current (Amps)
Main Circuit Board	1	X	0.123	=	0.123
ADM-24	(1 max.)	X	0.006	=	
RZA-5F	(1 max.)	X	0	=	0
CAC-5F	(1 max.)	X	0	=	0
NACA-2F	(1 max.)	X	0	=	0
2-wire Detector Heads	[ ]	X	[ ][1]	=	
4-wire Detector Heads	[ ]	X	[ ][1]	=	
Power Supervision Relays[2]	[ ]	X	0.025	=	
Additional Current Draw from TB-4 (non-alarm)				=	
Sum Column for Standby Load				=	Amps

Note:

1. Refer to the Device Compatibility Document for 2-wire smoke detector standby current.

2. Must use compatible listed Power Supervision Relay.

Table A-2B: Regulated Load in Alarm @24 VDC

Device Type	# of Devices		Current (Amps)		Total Current (Amps)
Main Circuit Board	1	X	0.255	=	0.255[5]
ADM-24	(1 max.)	X	0.006	=	
RZA-5F	(1 max.)	X	0.046[4]	=	
CAC-5F	(1 max.)	X	0	=	0
NACA-2F	(1 max.)	X	0	=	0
4-Wire Smoke Detector	[ ]	X	_____	=	
Power Supervision Relay[3]	[ ]	X	0.025	=	
Programmable Relay(s)[6]	[ ]	X	0.01	=	
Notification Appliances	[ ]	X	_____	=	
Additional Current Draw from TB-2 and TB-4 (alarm current)				=	
Sum Column for Alarm Load				=	Amps

Notes:

1) Current limitations of terminals:
   - TB-4, Terminals 1 and 2 = 0.300 amp, regulated filtered, 24VDC +/- 5%, 120HZ ripple @ 10 mV_{RMS}. Non-Resettable Power (100 Hz ripple for MS-5024E).
   - TB-4, Terminals 3 and 4 = 0.300 amp, regulated filtered, 24VDC +/- 5%, 120HZ ripple @ 10 mV_{RMS}. Resettable Power (100 Hz ripple for MS-5024E).
   - TB-5, terminals 1 and 2 = 1.5 amps.
   - TB-5, terminals 3 and 4 = 1.5 amps.

2) Total current draw listed above cannot exceed 3.6 amps.

3) Must use compatible listed Power Supervision Relay.

4) The current shown for the RZA-5F is for all five zones in alarm. For one zone in alarm, the RZA-5F current draw is 16 mA.

5) The current shown represents one zone on the Main Circuit Board in alarm. For all five zones in alarm, the current draw increases to 0.39 amps.

6) Relays may be programmed for alarm, trouble, supervisory, communications failure or any combination of these.

Appendix B: Programming Reference Sheet

--- To enter Programming, press Mode: 7 7 6 4, Enter

❑$_{00}$ ❑$_{01}$ ❑$_{02}$ ❑$_{03}$ ❑$_{04}$ ❑$_{05}$ ❑$_{06}$ ❑$_{07}$ ❑$_{08}$ ❑$_{09}$ ❑$_{10}$ ❑$_{11}$ ❑$_{12}$ ❑$_{13}$ ❑$_{14}$ ❑$_{15}$

Addresses 00 to 15 store the Primary Central Station Phone Number. *Enter 'F' to represent the end of the number.*

❑$_{16}$ Primary Central Station Comm Format: *Enter 0 - D.*

❑$_{17}$ ❑$_{18}$ ❑$_{19}$ ❑$_{20}$ Primary Central Station Account Code: Valid keys are 0-F.

❑$_{21}$ ❑$_{22}$ ❑$_{23}$ ❑$_{24}$ Primary Central Station 24-Hour Test Time. *Enter military time(i.e. 1400 for 2 pm).*

❑$_{25}$ Primary Number Test Time Interval. Enter '0' for 24-hour; '1' - 12-hour; '2' - 8-hour; '3' for 6-hour.

❑$_{26}$ ❑$_{27}$ ❑$_{28}$ ❑$_{29}$ ❑$_{30}$ ❑$_{31}$ ❑$_{32}$ ❑$_{33}$ ❑$_{34}$ ❑$_{35}$ ❑$_{36}$ ❑$_{37}$ ❑$_{38}$ ❑$_{39}$ ❑$_{40}$ ❑$_{41}$

Addresses 26-41 store the Secondary Central Station Phone Number. *Enter 'F' to represent the end of the number.*

❑$_{42}$ Secondary Central Station Comm Format: Enter 0 - D.

❑$_{43}$ ❑$_{44}$ ❑$_{45}$ ❑$_{46}$ Secondary Central Station Account Code: Valid keys are 0-F.

❑$_{47}$ ❑$_{48}$ ❑$_{49}$ ❑$_{50}$ Secondary Central Station 24-Hour Test Time. Enter military time (i.e. 1400 for 2 pm).

❑$_{51}$ Secondary Central Station Number Test Time Interval. Enter '0' for 24-hour; '1' - 12-hour; '2' - 8-hour; '3' for 6-hour.

❑$_{52}$ Alarm Verification. Enter '0' for no verification; '1' for verification of all 2- wire smoke zones

❑$_{53}$ Programmable Relay 1: Enter '0' for Disable; '1' for Alarm; '2' for Supervisory; '3' for Alarm or Supervisory; '4' for Trouble; '5' for Alarm or Trouble; '6' for Supervisory or Trouble; '7' for Alarm or Supervisory or Trouble; '8' for Communication Failure; '9' for Alarm or Communication Failure; 'A' for Supervisory or Communication Failure; 'B' for Alarm or Supervisory or Communication Failure; 'C' for Trouble or Communication Failure; 'D' for Alarm or Trouble or Communication Failure; 'E' for Supervisory or Trouble or Communication Failure; 'F' for Alarm or Supervisory or Trouble or Communication Failure

❑$_{54}$ Programmable Relay 2: Enter '0' for Disable; '1' for Alarm; '2' for Supervisory; '3' for Alarm or Supervisory; '4' for Trouble; '5' for Alarm or Trouble; '6' for Supervisory or Trouble; '7' for Alarm or Supervisory or Trouble; '8' for Communication Failure; '9' for Alarm or Communication Failure; 'A' for Supervisory or Communication Failure; 'B' for Alarm or Supervisory or Communication Failure; 'C' for Trouble or Communication Failure; 'D' for Alarm or Trouble or Communication Failure; 'E' for Supervisory or Trouble or Communication Failure; 'F' for Alarm or Supervisory or Trouble or Communication Failure

❑$_{55}$ Future Use.

❑$_{56}$ Slave Communicator/ Fire Panel Selection. Enter '0' for fire panel only; '1' for slave communicator only; '2' for fire panel/communicator operation.

❑$_{57}$ Zone 1 Function Select. Enter '0' for 2-wire smoke detectors; '1' for pull station; '2' for normally open contact devices; '3' for supervisory devices; '4' for supervisory devices (auto resettable).

❑58 Zone 2 Function Select. Enter '0' for 2-wire smoke detectors; '1' for pull station; '2' for normally open contact devices; '3' for supervisory devices; '4' for supervisory devices (auto resettable).

❑59 Zone 3 Function Select. Enter '0' for 2-wire smoke detectors; '1' for pull station; '2' for normally open contact devices; '3' for supervisory devices; '4' for supervisory devices (auto resettable); '5' for water-flow (silenceable); '6' for waterflow (non-silenceable).

❑60 Zone 4 Function Select. Enter '0' for 2-wire smoke detectors; '1' for pull station; '2' for normally open contact devices; '3' for supervisory devices; '4' for supervisory devices (auto resettable).

❑61 Zone 5 Function Select. Enter '0' for 2-wire smoke detectors; '1' for pull station; '2' for normally open contact devices; '3' for supervisory devices; '4' for supervisory devices (auto resettable).

❑62 ❑63 Waterflow Retard Timer. Enter 0-89 additional seconds.

❑64 AC Loss Reporting Delay. Enter '0' for 6 hours; '1' for 7 hours; '2' for 8 hours; '3' for 9 hours; '4' for 10 hours; '5' for 11 hours; '6' for 12 hours; '7' for 15 hours; '8' for 16 hours; '9' for 17 hours; 'A' for 18 hours; 'B' for 19 hours; 'C' for 20 hours; 'D' for 21 hours; 'E' for 22 hours or 'F' for 23 hours.

❑65 Alarm Presignal. Enter '0' to disable; '1' to enable.

❑66 ❑67 ❑68 Alarm Presignal Delay Time. Enter 0-179 additional seconds (default = 120 seconds).

❑69 Notification Appliance Circuit #1 Selection: Enter '0' for enabled (silenceable); '1' for enable (non-silenceable); '2' to disable.

❑70 Silence Inhibit NAC #1. Enter '0' for no silence inhibit; '1' to inhibit silencing of NAC #1 for one minute.

❑71 Auto Silence NAC #1. Enter '0' for no auto silence; '1' for 5 minutes; '2' for 10 minutes; '3' for 15 minutes; '4' for 20 minutes; '5' for 25 minutes; '6' for 30 minutes.

❑72 Coding NAC #1. Enter '0' for steady; '1' for March Time (120 ppm); '2' for California (10 seconds on, 5 seconds off); '3' for Temporal (0.5 on, 0.5 off, 0.5 on, 0.5 off, 0.5 on, 1.5 off).

❑73 Notification Appliance Circuit #2 Selection: Enter '0' for enabled (silenceable); '1' for enable (non-silenceable); '2' to disable.

❑74 Silence Inhibit NAC #2. Enter '0' for no silence inhibit; '1' to inhibit silencing of NAC #2 for one minute.

❑75 Auto Silence NAC #2. Enter '0' for no auto silence; '1' for 5 minutes; '2' for 10 minutes; '3' for 15 minutes; '4' for 20 minutes; '5' for 25 minutes; '6' for 30 minutes.

❑76 Coding NAC #2. Enter '0' for steady; '1' for March Time (120 ppm); '2' for California (10 seconds on, 5 seconds off); '3' for Temporal (0.5 on, 0.5 off, 0.5 on, 0.5 off, 0.5 on, 1.5 off).

❑77 Trouble Reminder. Enter '0' to disable; '1' to enable.

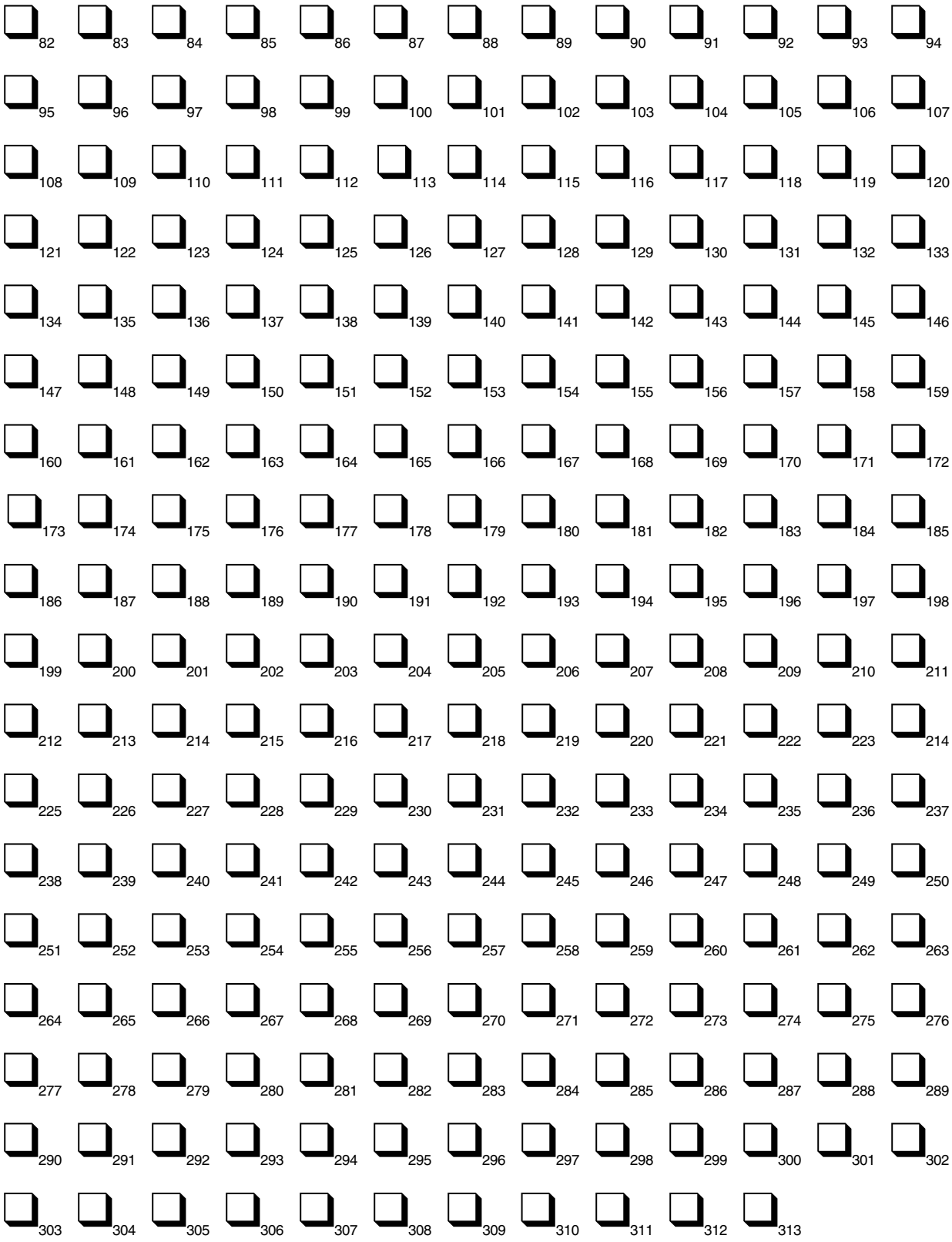
❑78 Annunciator Supervision. Enter '0' for annunciator not present; '1' for annunciator present.

❑79 Backup Reporting. Enter '0' to report to secondary phone # as backup only; '1' to report to secondary phone number for all reports/messages.

❑80 Touchtone/Rotary Select. Enter '0' for touchtone dialing; '1' for rotary dialing.

❑81 Make/Brake Ratio. Enter '0' for 67/33; '1' for 62/38.

Programming Reference Sheet



Programming Reference Sheet Factory Default Settings

--- To enter Programming, press Mode: 7 7 6 4, Enter

F00 F01 F02 F03 F04 F05 F06 F07 F08 F09 F10 F11 F12 F13 F14 F15

Addresses 00 to 15 store the Primary Central Station Phone Number. *Enter 'F' to represent the end of the number.*

A16 Primary Central Station Comm Format: *(4+2 Standard 1800/2300).*

017 018 019 020 Primary Central Station Account Code.

021 022 023 024 Primary Central Station 24-Hour Test Time. *0000 = 12:00 midnight.*

025 Primary Central Station Number Test Time Interval. '0' for 24-hour.

F26 F27 F28 F29 F30 F31 F32 F33 F34 F35 F36 F37 F38 F39 F40 F41

Addresses 26-41 store the Secondary C. S. Phone Number. *Enter 'F' to represent the end of the number.*

A42 Secondary Central Station Comm Format: (4+2 Standard 1800/2300).

043 044 045 046 Secondary Central Station Account Code.

047 048 049 050 Secondary Central Station 24-Hour Test Time. 0000 = 12:00 midnight.

051 Secondary Central Station Number Test Time Interval. '0' for 24-hour.

052 Alarm Verification. 0 = no alarm verification.

153 Programmable Relay 1 (Alarm Only).

454 Programmable Relay 2 (Trouble Only).

055 Future Use.

056 Slave Communicator/ Fire Panel Selection. 0 for panel only operation.

057 Zone 1 Function Select. '0' for 2-wire smoke detectors.

058 Zone 2 Function Select. '0' for 2-wire smoke detectors.

059 Zone 3 Function Select. '0' for 2-wire smoke detectors.

060 Zone 4 Function Select. '0' for 2-wire smoke detectors.

061 Zone 5 Function Select. '0' for 2-wire smoke detectors.

062 063 Waterflow Retard Timer. 00 for no delay.

064 AC Loss Delay. '0' for 6 hours.

065 Alarm Presignal. '0' for no Positive Alarm Sequence.

166 267 068 Alarm Presignal Delay Time. 120 second Positive Alarm Sequence delay.

069 Notification Appliance Circuit #1 Selection: '0' for enabled (silenceable).

070 Silence Inhibit NAC #1. '0' for no silence inhibit.

071 Auto Silence NAC #1. '0' for no auto silence.

0 72 Coding NAC #1. '0' for steady, no coding.

0 73 Notification Appliance Circuit #2 Selection: '0' for enabled (silenceable).

0 74 Silence Inhibit NAC #2. '0' for no silence inhibit.

0 75 Auto Silence NAC #2. '0' for no auto silence.

0 76 Coding NAC #2. '0' for steady, no coding.

0 77 Trouble Reminder. '0', no trouble reminder.

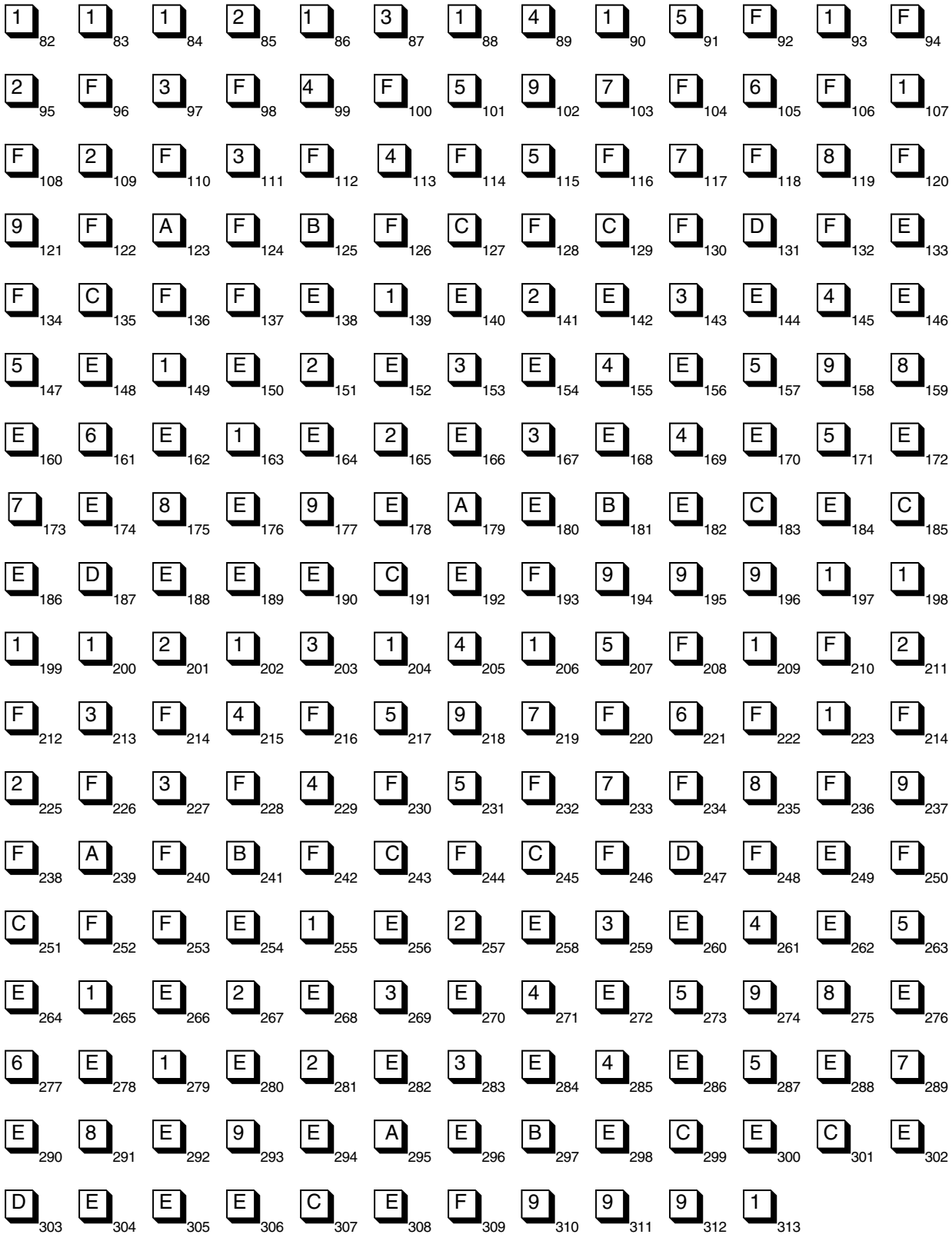
0 78 Annunciator Supervision. '0' for no annunciator present.

0 79 Backup Reporting. '0' to report to secondary Central Station phone # as backup only.

0 80 Touchtone/Rotary Select. '0' for touchtone dialing.

0 81 Make/Brake Ratio. Enter '0' for 67/33.

Programming Reference Sheet Factory Default



Appendix C: Wire Requirements

Connecting external system accessories to the MS-5024 main circuits must be carefully considered to ensure proper operation. It is important to use the correct type of wire, wire gauge and wire run length per each MS-5024 circuit. Reference the chart below to specify wire requirements and limitations for each MS-5024.

CIRCUIT CONNECTIONS		WIRE REQUIREMENTS		
CIRCUIT TYPE	**CIRCUIT FUNCTION**	**WIRE TYPE AND** LIMITATIONS	**RECOMMENDED** MAX DISTANCE (FEET)	**WIRE GUAGE**
Initiating Device Circuit (power-limited)	Connects to Initiating Devices	Untwisted, unshielded wire (Do not exceed 100 ohms)	10,000 8,000 4,875 3,225	12AWG Belden 9582 14AWG Belden 9580 16AWG Belden 9572 18AWG Belden 9571
24 VDC Regulated Resettable, Nonresettable (power-limited)	Connects to annunciators and other accessories	No more than 1.2 volt drop allowed from supply source to end of any branch	Distance limitation set by 1.2 volt maximum line drop	12-18 AWG

Appendix D: Operation and Function Modes

OPERATION MODES

CODE	ACTIVITY	NOTES
6676 (NORM)	Returns to normal operation	Fire protection on
7764 (PROG)	Enters Program Mode	4 levels of programming may be entered. Fire protection is off.
9255 (WALK)	Enters Walktest Mode	Audible walktest function. Fire protection is off.
4478 (HIST)	View History File	Use display to view History File. Fire protection is off.
8768 (TROU)	Activates internal system voltmeter for troubleshooting and diagnosing problems	Fire protection is off while voltmeter function is enabled.
5267 (LAMP)	Turns on all LEDs on the main PCB for 5 seconds	Fire protection is on.

FUNCTION MODES

CODE	ACTIVITY	NOTES
3472 (DISA)	Allows disabling of any input zone	May only disable one zone at a time. Places system into trouble.
3622 (ENAB)	Allows enabling (return to normal) of any zone	May only enable one zone at a time.
3745 (DRIL)	Performs drill function by turning on both NAC outputs	Transmission of drill function to central station is defaulted to ON.

Notes

Notes

Limited Warranty

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