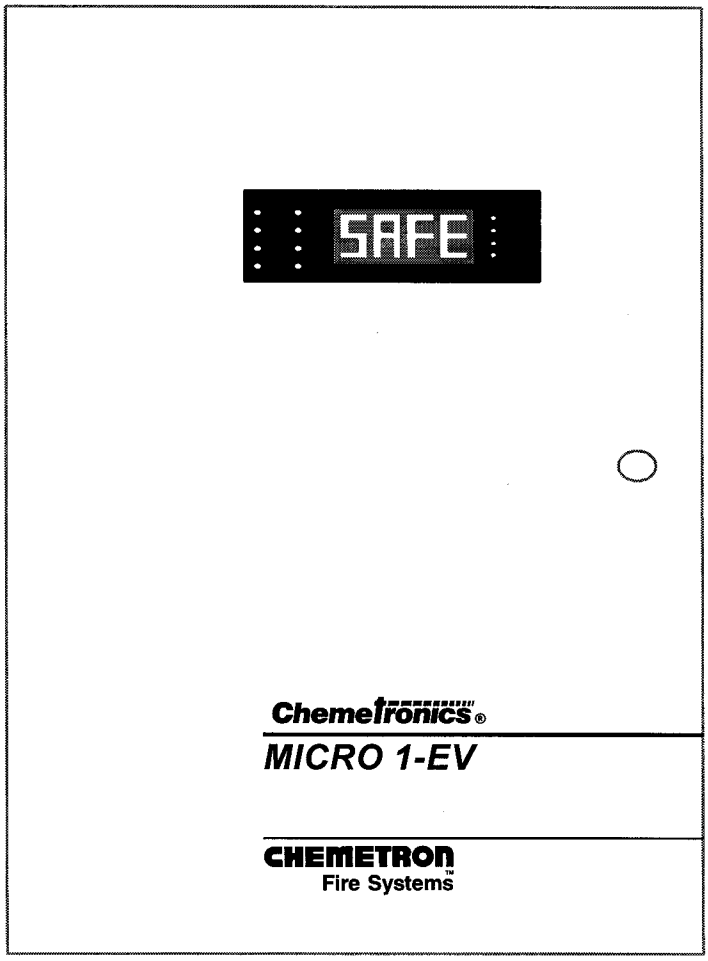
Chemetronics®

MICRO 1-EV

Control Panel



Installation & Operation Manual

■ *LOW PRESSURE* ■

CHEMETRON
Fire Systems

Revised October 15, 1997
Part Number 70000231

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Contents

FOREWORD

Chemetron Fire Systems reserves the right to revise and improve its products as it deems necessary without notification. This publication is intended to describe the state of this product at the time of its publication, and may not reflect the product at all times in the future.

This technical manual provides the necessary information for the installation and operation of a Chemetronics Micro 1-EV Control Panel.

This is a single volume technical manual arranged in 14 sections.

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Any questions concerning the information presented in this manual should be addressed to the Chicago Sales Office.

MICRO 1-EV CONTROL PANEL
Stock No. 70100557

WARRANTY

All equipment described herein is warranted to be free from defects in all material and workmanship, and ***this express warranty is in lieu of and excludes all other warranties, whether expressed or implied by operation of law or otherwise, including any warranty of merchantability and fitness for a particular purpose.*** Warranty is for a period of one (1) year from the date equipment is placed in service or date equipment is ready for test, whichever date occurs first. The Purchaser agrees that he will inspect the goods upon delivery. Any claim on Account of Damages — either as received or during subsequent unloading, any storage handling, or where items of equipment may not agree in quantity, identification number or description with the shipping documents — shall be deemed waived by the Purchaser unless made in writing within fifteen (15) days of the date of shipment.

Defective equipment for which a valid claim has been made shall be returned to the Seller in accordance with the return material policy; defective equipment goods so returned will be replaced without charge. The Seller will credit **only standard freight charges** prepaid by Purchaser (**not air freight or any other express delivery charge**.) The Seller shall not be liable for any other loss, damage, or expense, including any consequential damages directly or indirectly arising from the condition or use of the equipment, or from any other cause; the exclusive remedy against the Seller being to require the replacement or repair of defective goods.

Seller makes no warranty with respect to equipment manufactured by others and sold to Purchaser. However, Seller shall extend to Purchaser any warranties which it receives from such vendors.

1 INTRODUCTION

The Chemetronics® Micro 1-EV Control Panel has been designed as a control center for use in automatic fire suppression systems.

The Micro 1-EV Control Panel is a feature packed microprocessor based control unit suitable to perform detection and control functions associated with the release of Low and High Pressure CO_2, Halon, FM-200™, and Water Fire Suppression Systems. The panel is designed for maximum reliability with 100% solid state circuitry and isolated relay contacts for outside interfacing.

Programmable auxiliary outputs are provided for interfacing using a plug-in relay (S/N 70150179) or an auxiliary relay board (S/N 70100446) and a customer supplied 24 VDC listed relay assembly mounted remote to the Micro 1-EV.

The Micro 1-EV incorporates Class B 2-wire supervised circuits, which also provide ground fault indication. These circuits are:

Inputs	Outputs
■ Detection Zone 1 ■ Detection Zone 2 ■ Auxiliary Input 1 ■ Auxiliary Input 2 ■ Manual Discharge Station ■ Abort Station	■ Alarm 1 ■ Alarm 2 ■ Solenoid 1 ■ Solenoid 2 ■ Solenoid 3 ■ Auxiliary Output 1 ■ Auxiliary Output 2

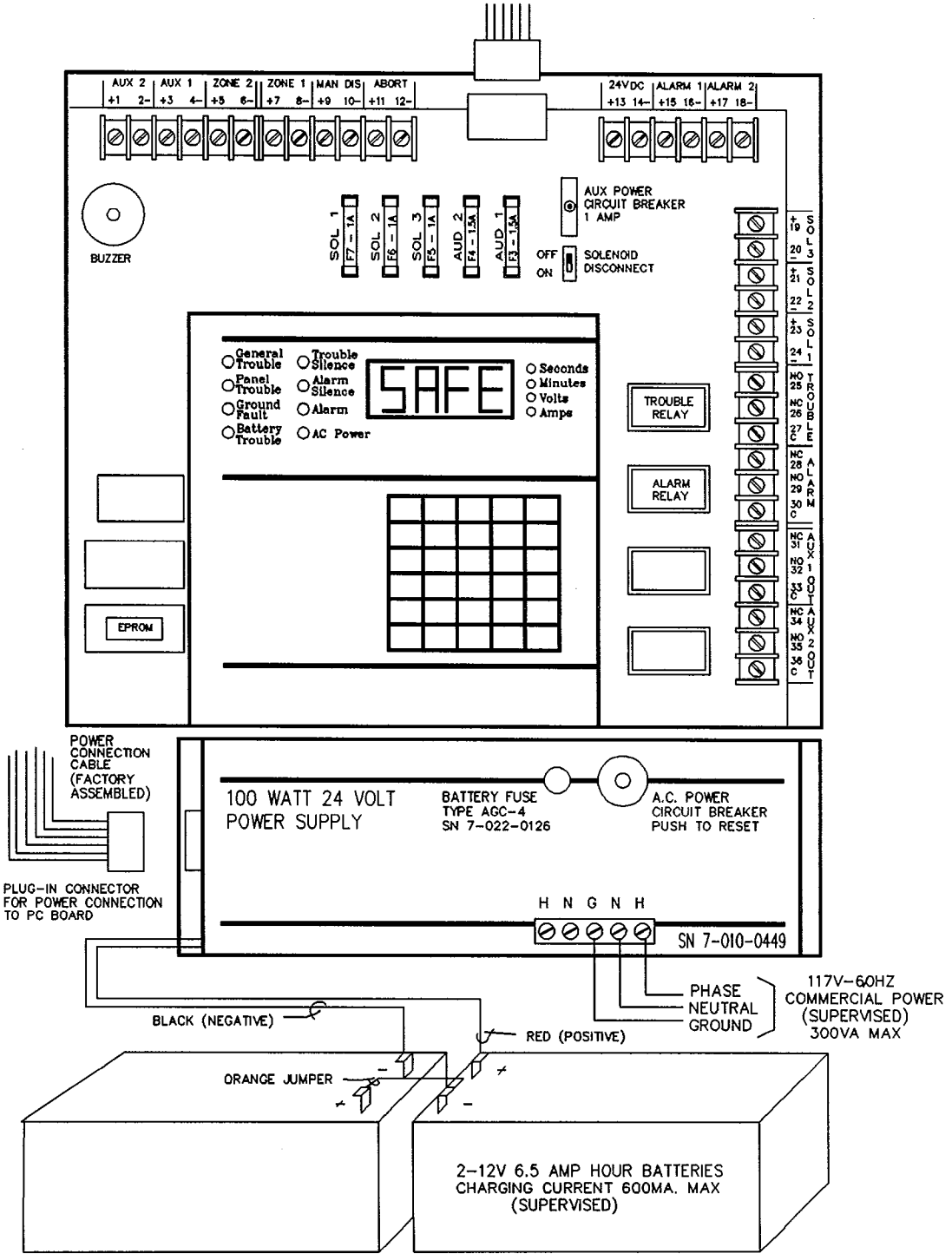
An alpha-numeric display is visible through a window on the front of the enclosure. During normal standby conditions, this display will be illuminated and the word **SAFE** will be visible. System trouble and/or alarm conditions are signalled at the panel audibly (by buzzer), visually (by an LED), and by the alpha-numeric display. When an alarm or trouble condition is present, the display will exhibit an alpha-numeric code. This code can then be interpreted using a chart affixed to the inside of the door to pinpoint the circuit affected by the trouble or alarm condition.

A series of keypad switches are provided near the alpha-numeric display to facilitate the programming, testing, monitoring, and troubleshooting of the control panel and the associated external devices.

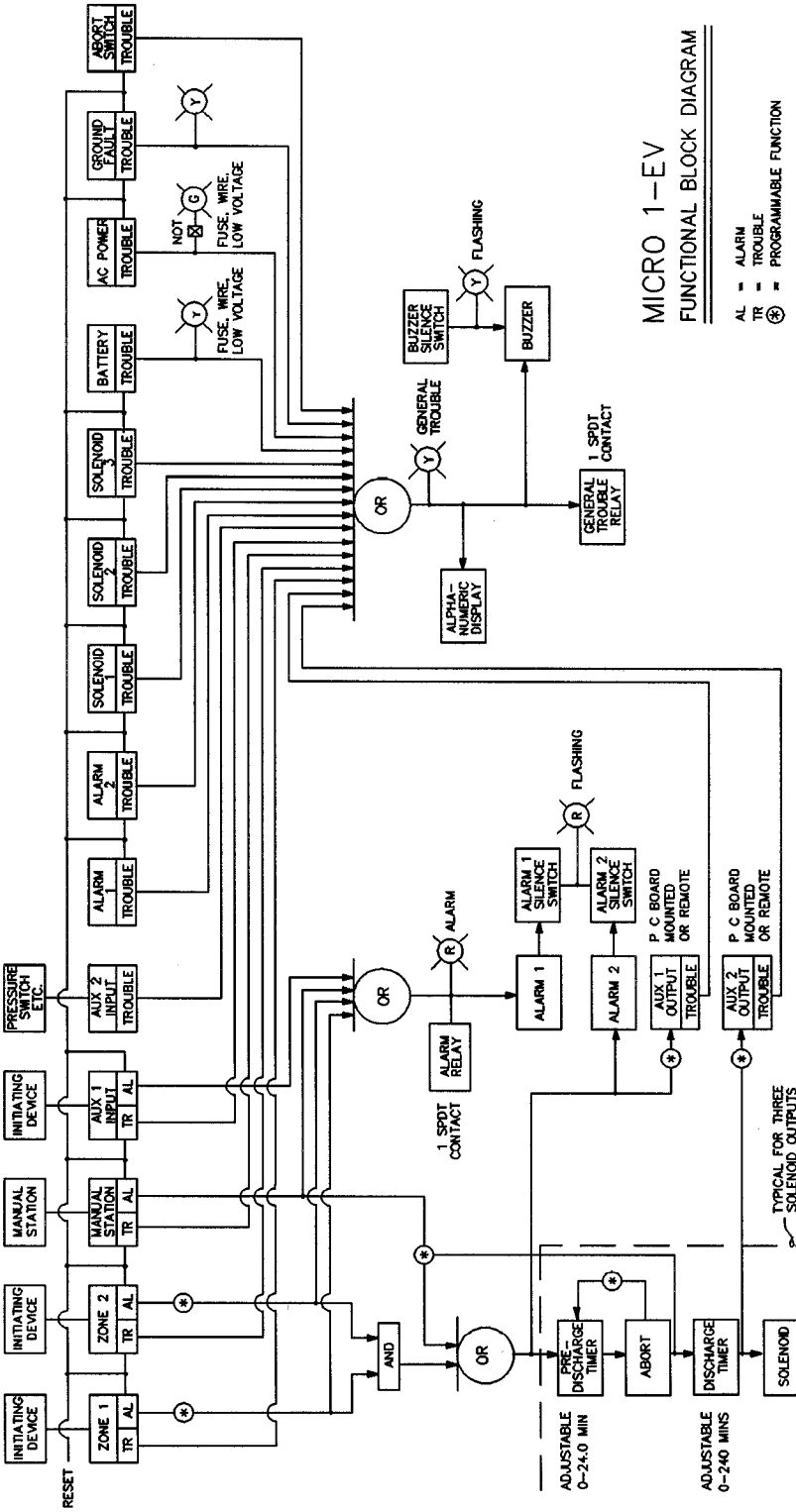
An integral standby battery system, with charger, is provided. In case of commercial AC power interruption, automatic switchover to the battery system will provide power to the panel for a minimum of 24 hours.

2 AGENCY APPROVAL

1. Underwriter's Laboratories, Inc.
   Non-coded local fire alarm control unit, also suitable for releasing (UL File S-2355).
2. Factory Mutual Research Corp. (J.I. 0T8A8.AY)
3. California State Fire Marshal.



▲ **Figure 1A** — Micro 1-EV Control Panel - Stock Number 70100557
Batteries are supplied separately.

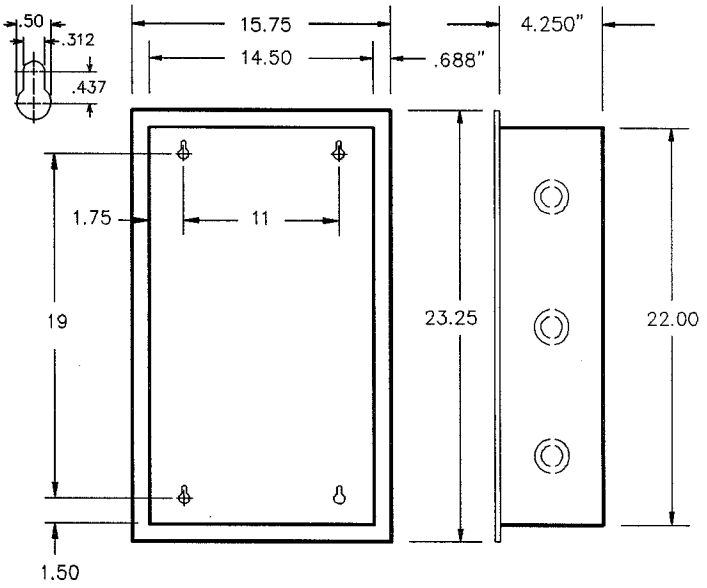


▲ **Figure 1B** — Micro 1-EV Functional Block Diagram

3 INSTALLATION INSTRUCTIONS

3.1 Mounting

The entire unit is housed in a standard NEMA 1 enclosure with 1/2" and 3/4" conduit knockouts available on the top, bottom, and sides. It must be securely mounted in a dry area using the mounting holes provided. The selection of a suitable mounting surface is extremely important to avoid exposure to shock and vibration, moisture, dust, etc.



PANEL MOUNTING DETAIL

STOCK NO.	MODEL	COLOR
7-010-0448	SINGLE HAZARD ENCLOSURE	TAN
7-010-0447	SINGLE HAZARD ENCLOSURE	RED

▲ **Figure 3.1** — Panel Mounting Detail

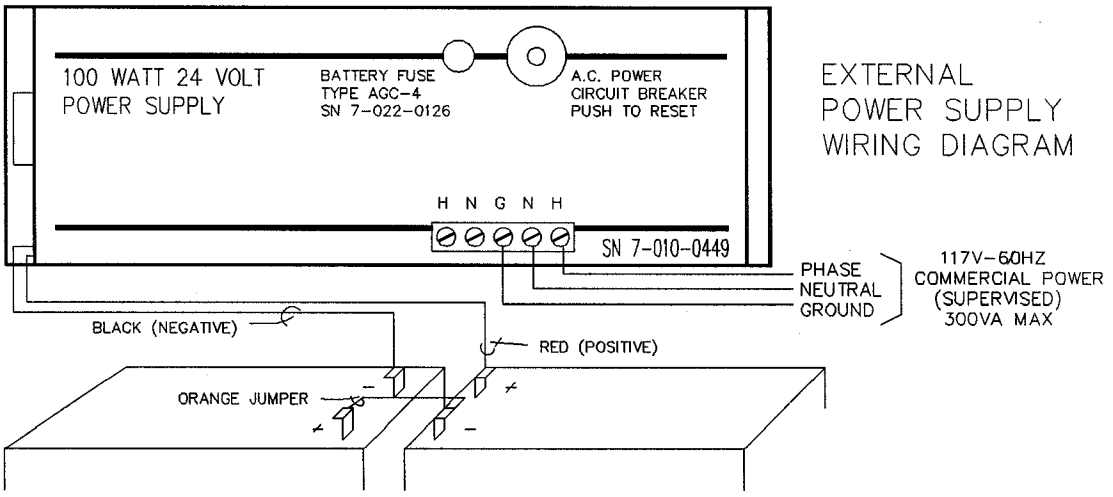
The panel must be located where it will be easily accessible for maintenance. A minimum of 16" clearance must be provided to open the hinged door. When the semi-flush mounting option is employed, the door will open to a maximum of 90°.

The printed circuit board, power supply, batteries, and enclosure are shipped separately and should be mounted only after the enclosure has been installed, the conduit connected, and all wiring has been pulled, tested, and is ready to be terminated.

Refer to Section 3.3 for mounting instructions for the printed circuit board.

3.2 Power Connections

The Chemetronics® Micro 1-EV Control Panel must be installed and wired in accordance with the latest edition of NFPA Standards 72, 12, 12A-B, 2001, and 70 (The National Electrical Code), all Local Codes, and Authorities having jurisdiction. For installations requiring NFPA 17 and/or 17A, optional Class A Module (S/N 70100686) must be installed.



▲ **Figure 3.2** — External Power Supply Wiring Diagram

The power supply is designed to operate on 120 VAC, 60 Hz single phase with a solid earth ground. Total input power requirements to the system power supply should not exceed 300 watts during fully loaded panel operation. An optional 220 VAC, 50/60 Hz power supply is also available (S/N 70100502). Refer to Micro 1-EV Addendum A.

Brown-out supervisory circuitry is provided to annunciate degradation of the incoming AC voltage supply. A brown-out condition is annunciated when the AC power decreases to a nominal 101 volts ±5%.

When the brown-out threshold is reached, the green AC Power LED is extinguished and the battery backup supply automatically provides power for operation of the control panel functions. Should the voltage remain below this threshold for a period of approximately 45 seconds, the following will occur:

a. General Trouble Relay contacts transfer.
b. Alpha-Numeric Display extinguishes.
c. Yellow General Trouble LED illuminates.
d. Trouble Buzzer sounds.

When the AC voltage returns or increases by three or more volts above the brown-out threshold, the Alpha-Numeric display will indicate F-24 and the green AC Power LED will illuminate. The power supply circuitry will return to primary power functions and will automatically begin to recharge the battery backup supply.

The reset switch must be depressed to clear the trouble condition and restore the Alpha-Numeric display to the SAFE normal operating condition.

The same sequence occurs upon total loss of AC Power.

The power supply will operate normally and the panel will be fully operational from 102-132 VRMS. However, to keep the batteries fully charged, input power must be maintained at nominal 120 VAC. A separately fused and protected power connection to the panel should be supplied to prevent voltage fluctuation and interruption of power.

3.2.1 Power Supply Installation and Wiring

Power Supply S/N 70100449 is shipped in a separate container. The unit must be mounted on the four studs in the lower section of the enclosure using the four 6/32 nuts provided.

WARNING

Prior to handling any wiring, it should be tested to insure that no voltage is present.

The power feed must use a minimum (3) No. 14 AWG copper conductors having a minimum insulation value of 600 volts. The conductors should be solidly connected for their respective hot, neutral, and ground terminals at the main or branch distribution panel.

The phase hot conductor must originate at an appropriate overcurrent device having a maximum capacity of 15 amps at 120 VAC 60 Hz. Chemetron Fire Systems recommends that the phase hot conductor be colored red or black, the neutral conductor white, and the earth ground green.

The feed for the power supply of this unit, as well as all fire protection control equipment, should be a dedicated source independent of excess noise inducing devices such as motor generators, ballasted lighting fixtures, air conditioning compressors, etc. If possible, the power feed should originate from a filtered power source.

Remove protective cover, note warning. Terminate the load end of the high voltage wiring on the AC input terminal block. (Refer to Figure 3.2 for proper wiring placement.) Replace protective cover.

Do not close the circuit breaker. Leave open and tag "*Out of Service.*" Refer to ***Power Up Procedure*** (beginning on page 10) prior to closing AC breaker.

3.2.2 Battery Installation

Install two (2) 12 volt, 6.5 AH batteries, S/N 70100320, using brackets and four 6/32 nuts provided with enclosure.

Battery terminals must be arranged such that terminals are adjacent and located in the center of the enclosure between mounting brackets. (Refer to Figure 14 on page 59.)

3.3 Printed Circuit Board Mounting and Wiring

Remove the printed circuit board from the protective packaging. Use care when handling the PC board. Do not expose to high magnetic fields, x-rays, or ultra violet lights. Mount the PC board on the enclosure stand-offs using the four 6/32 x 5/8" RHM screws provided.

CAUTION

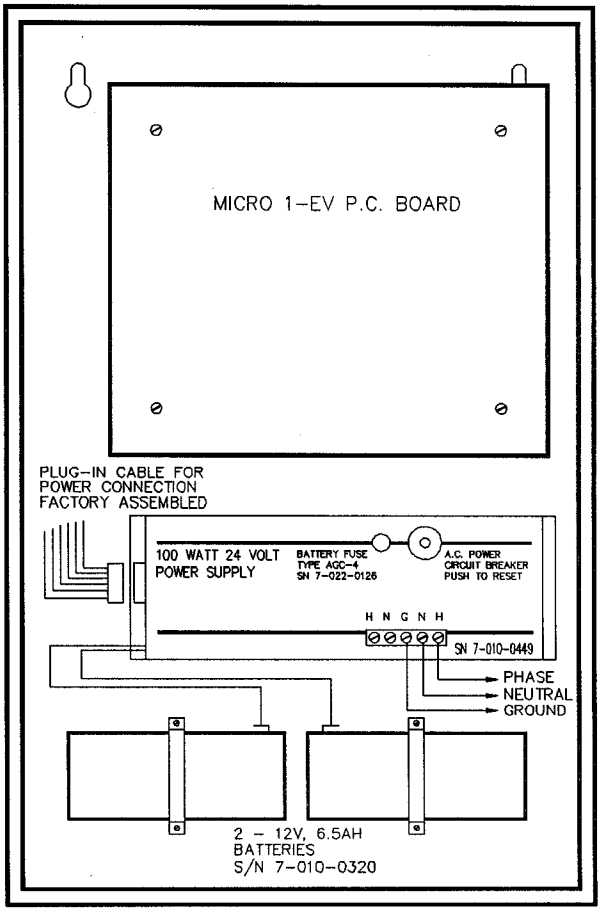
AC power must be deactivated and locked out at the appropriate overcurrent protection device. In addition, DC voltage (batteries) must remain disconnected. The printed circuit board may be damaged if the power-up procedure is not followed. ***Do not connect or disconnect the power supply cable while any voltage sources are present.***

Connect one end of the 6-wire power supply cable to the J1 connection at the top of the PC board. The other end is connected to the left side of the power supply.

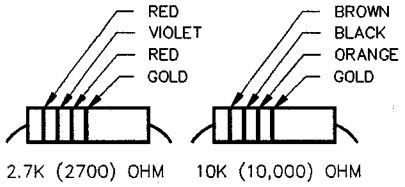
Install the end-of-line resistors as outlined in Chart #3.3.

NOTE

The Solenoid Outputs do not require an end-of-line resistor.



RESISTOR VALUE	RESISTOR COLOR CODE
2.7K (2700) OHM, 1/2W	RED/VIOLET/RED/GOLD
10K (10,000) OHM, 1/2W	BROWN/BLACK/ORANGE/GOLD



▲ **Figure 3.3** — Circuit Board Mounting and End-of-Line Resistor Identification Information

Chart No. 3.3

Input Circuits	Terminal No.		End-of-line Resistor Value
Auxiliary Input 2	1	2	2.7K (2700) Ohm, ½ watt
Auxiliary Input 1	3	4	2.7K (2700) Ohm, ½ watt
Detection Zone 2	5	6	2.7K (2700) Ohm, ½ watt
Detection Zone 1	7	8	2.7K (2700) Ohm, ½ watt
Manual Discharge Circuit	9	10	2.7K (2700) Ohm, ½ watt
Abort Circuit	11	12	2.7K (2700) Ohm, ½ watt

Audible Output Circuits	Terminal No.		End-of-line Resistor Value
Alarm 1	15*	16	10K (10,000) Ohm, ½ watt
Alarm 2	17*	18	10K (10,000) Ohm, ½ watt

Solenoid Output Circuits	Terminal No.		End-of-line Resistor Value
Solenoid 3	19	20	**
Solenoid 2	21	22	**
Solenoid 1	23	24	**

Auxiliary Output	End-of-line Resistor Value
Auxiliary 1	2.7K (2700) Ohm, ½ watt resistor w/spade connectors
Auxiliary 2	2.7K (2700) Ohm, ½ watt resistor w/spade connectors

* Polarity referenced in supervisory condition, positive lead from device should be connected to this terminal.

** No End-of-line resistor is required for this circuit. Supervision is directly through releasing coil. Also refer to paragraph 3.5.8, Installation of Solenoid Valves.

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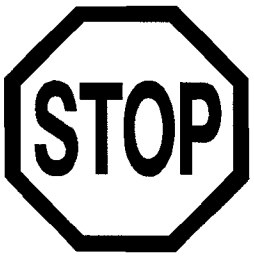


IMPORTANT

***WARNING*: Check to insure that release devices (i.e. solenoids) are mechanically and electrically disabled to negate the possibility of inadvertent agent discharges.**

***CAUTION**: Prior to proceeding, make sure steps previously outlined in this manual are followed **precisely**, especially paragraphs 3.1, 3.2, and 3.3.*

3.4 Power-Up Procedure

The following procedure covers initial power-up of this control panel and must be followed each time thereafter.

IMPORTANT

***WARNING:* Prior to energizing this panel, notify all applicable personnel and authorities, as well as any personnel who may be working on, around, or near this unit and in the hazard area.**

***CAUTION:** Do not connect battery leads until instructed to do so as per power-up procedure. System will be operational and could damage the PC board or result in injury to personnel.*

1. The solenoid disconnect switch (SW-1) located on the PC board below the auxiliary power circuit breaker must be in the off (up) position. Refer to Figure 14 on page 59.

2. Energize AC Power. The display will illuminate and indicate a checksum, which is part of the self-diagnostic procedure, and PASS or FAIL.

3. Connect the Orange Battery Jumper from the positive (+) red terminal of battery A to the negative (-) black terminal of battery B.

NOTE

Observe Polarity of Batteries. Improper connection will **cause damage to the power supply AND VOID WARRANTY.**

4. Connect the red lead from the power supply to the red (+) terminal of battery B. Connect the black (-) lead from the power supply to the black (-) terminal on battery A.

5. Depress the red reset key in the upper right corner of the keypad.

6. The Alpha-Numeric display may indicate F-15, F-16, F-17, indicating that the solenoid disconnect switch has been correctly maintained in the off position. The on-board trouble buzzer may be silenced by depressing the trouble silence key.

NOTE

F-15, F-16, and F-17 will only appear if the discharge timer for the associated solenoid circuit is set to a value other than zero (0). If other fault codes are present, check the end-of-line resistor placement using the Fault Code Chart (see Chart #4.3 on pages 33 & 34) and the Fault Code Chart contained in the PC board package. If 90 Series fault codes appear, refer to Section 9.0, Trouble-shooting, beginning on page 44 of this manual.

WARNING

Remove release solenoid assembly from device to be activated.

7. Using an ohmmeter, determine the resistance of the coil to be connected to Solenoid 1 terminals 23(+), 24(-). Resistance should be between 50 and 75 ohms. If wiring resistance is within tolerance, connect it to appropriate terminals. Repeat for Solenoid 2 and Solenoid 3 connections (if used).

8. Transfer the solenoid disconnect switch to the on (down) position.

9. Depress the red reset key on the keypad to clear all trouble codes.

10. The letters SAFE should be illuminated on the alpha-numeric display.

3.5 Field Wiring Connections

CAUTION

Prior to terminating any field wiring, check each conductor to be sure that no AC or DC voltages, or continuity to earth ground, are present.

Each of the following subsections identifies the various inputs and outputs of this control panel. If an input or output is not used, the appropriate end-of-line resistor must be connected across the terminals of that circuit to complete the supervisory circuit.

NOTE

All low voltage DC supervised field wiring MUST be isolated from AC wiring. Do not run DC wiring in the same conduits as AC wiring. Induced voltages can mimic ground faults and potentially cause erroneous panel operation. Where codes permit listed plenum/fire alarm cables, use caution during installation. **Do not route these cables within 18" of high voltage cables, ballasted lighting fixtures, motor generators, or other noise-inducing devices**.

Wiring should be color coded or tagged for ease of installation and troubleshooting.

Due to the nature of supervised circuitry, the following resistance chart should be employed to insure that loop resistance is within specifications.

Chart No. 3.5

Circuit	Maximum Loop Resistance (each)	Maximum Conductor Lengths Stranded Copper Wire	
		16 Gauge	14 Gauge
Auxiliary 1 Input	50 Ohms	12,400 ft.	19,841 ft.
Auxiliary 2 Input	75 Ohms	18,640 ft.	29,761 ft.
Zone 1, 2	50 Ohms	12,400 ft.	19,841 ft.
Manual & Abort Inputs	75 Ohms	18,640 ft.	29,761 ft.
Alarm 1, 2	2.5 Ohms	620 ft.	992 ft.
Solenoid 1, 2, 3	2.5 Ohms	620 ft.	992 ft.
Auxiliary Output 1, 2*	2.5 Ohms	620 ft.	992 ft.

* Applies only when Auxiliary Output substitution board (S/N 70100446) is used to power a remote relay.

Copper Wire Resistance Per 1000 Feet	
16 Gauge	4.02 ohms
14 Gauge	2.52 ohms
12 Gauge	1.59 ohms

NOTE

When installing wiring and devices, do not mount the last device on each circuit to facilitate installation of appropriate end of line resistors.

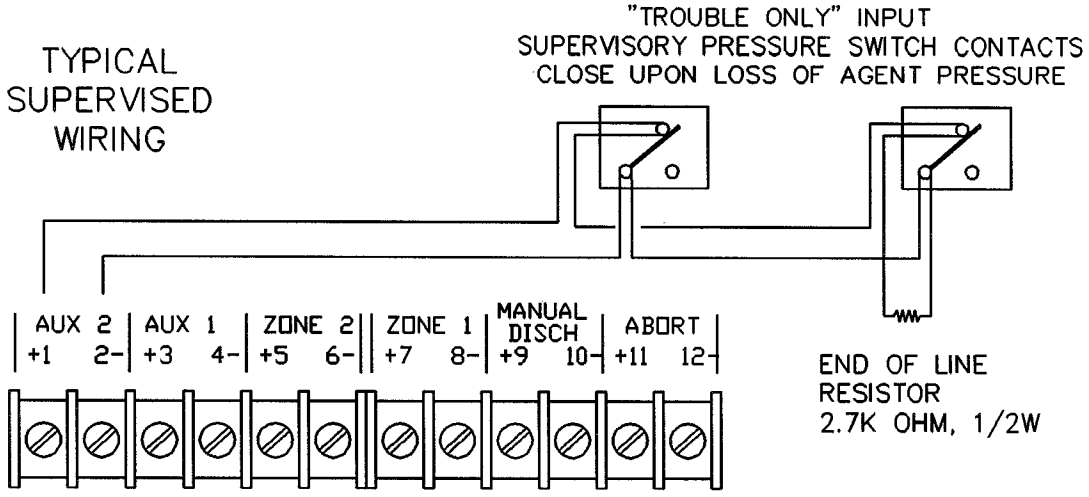
3.5.1 Auxiliary 2 Input

Trouble Condition	Short Condition
F-03	F-10

Activation of the Auxiliary 2 loop will initiate a trouble signal only. The loop is supervised Class B (2-wire) with open and activated code indications on the Alpha-Numeric display. The Auxiliary 2 input can be used for devices such as supervisory switches.

To supervise the loop, install the end-of-line resistor (ELR-2700 — packaged separately) in parallel to the last device to be supervised. Maximum loop resistance cannot exceed 75 ohms.

Trouble indications are non-latching.



▲ **Figure 3.5.1** — Typical Supervised Wiring ■ Auxiliary 2 Input

3.5.2 Auxiliary 1 Input

Trouble Condition	Alarm Condition
F-05	A-08

The Auxiliary 1 Input is designed for Class B (2-wire) operation and can be programmed to perform in either of the following modes:

A. ***Alarm Only* Input**

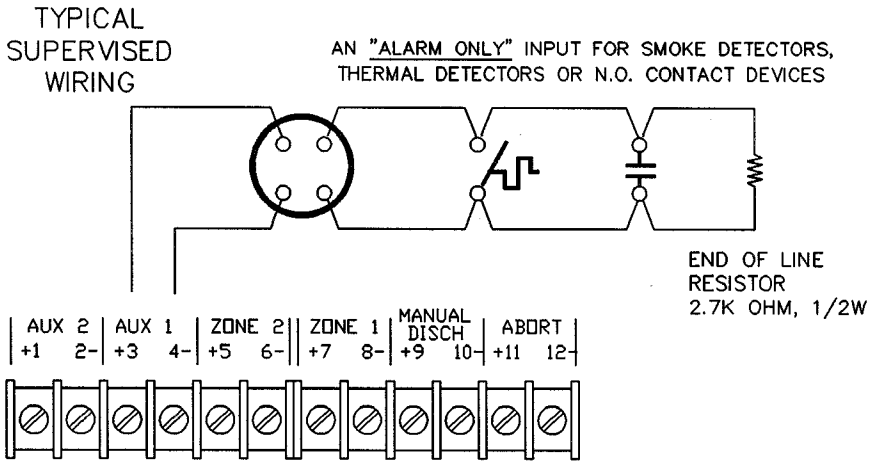
The Auxiliary 1 Input is used to sound the Audible 1 Output only and is designed for operation of smoke detectors, thermal detectors, or any number of normally open contact devices. For the maximum number of compatible smoke detectors listed by manufacturer, refer to Table 3.5.3. The maximum loop resistance cannot exceed 50 ohms.

The alarm current trip level can be adjusted from 35 mA to 60 mA. (For current level adjustment, see Section 5, **Programming**, page 35)

Upon activation of the Auxiliary 1 loop, the following sequence of events will take place.

1. Red Alarm LED will illuminate.
2. Audible 1 Output Circuit will energize.
3. The alarm relay will transfer.

All events are latching and will return to normal when the reset key is depressed.



▲ **Figure 3.5.2A** — Typical Supervised Wiring ■ Alarm Only Input

B. ***Spurt* Operation**

When programmed to the *Spurt* mode, operation of the Auxiliary 1 Input allows the end user to selectively energize any or all of the three solenoid outputs instantaneously and continuously as long as the input is manually held in the activated condition. There is no automatic timing function associated with the spurt option.

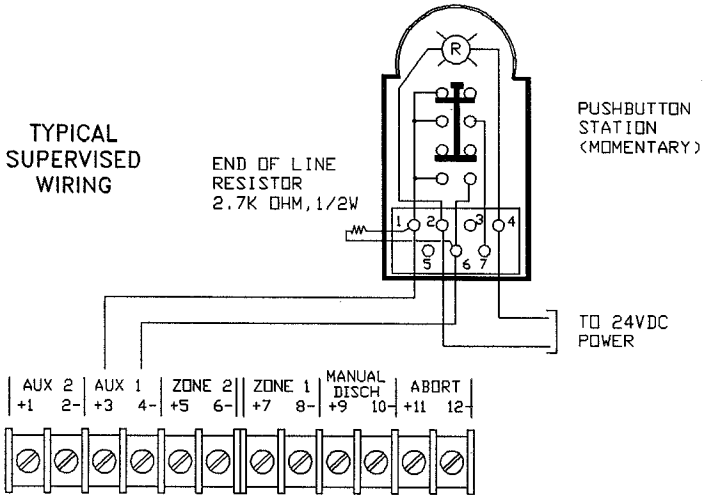
Only momentary/spring-return type contact devices, or normally open contacts which automatically reset, should be used.

Upon activation of the Auxiliary 1 Input loop, the following sequence of events will take place:

1. Red Alarm LED will illuminate.
2. Audible 1 Output Circuit will energize.
3. Audible 2 Output Circuit will energize.
4. The alarm relay will transfer.

5. The selected solenoids programmed for spurt operation will energize.
6. The Auxiliary 1 Output Circuit (if programmed to transfer upon spurt operation) will energize. (See Section 5, **Programming**, page 35.)

All events are non-latching and will return to the previous mode of operation upon deactivation of the Auxiliary 1 Input. All Spurt mode operations will be stored within the Alarm Recall Storage Area.



▲ **Figure 3.5.2B** — Typical Supervised Wiring ■ Spurt Operation

3.5.3 Detector Circuit Wiring

Zone 1

Trouble Condition	Alarm Condition
F-07	A-04

Zone 2

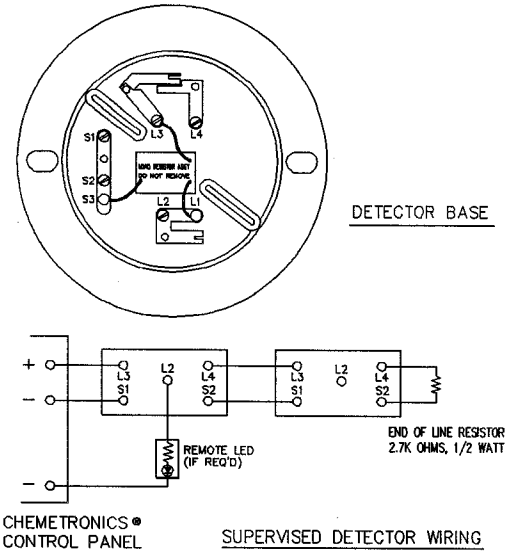
Trouble Condition	Alarm Condition
F-09	A-06

Zone 1 and Zone 2 inputs are designed for Class B (2-wire) operation. For Class A (4-wire) operation, optional Class A Module (S/N 70100686) must be installed.

Detector wiring and installation must be in accordance with NFPA 70 (The National Electrical Code), NFPA 72, and the authority having jurisdiction. For installations requiring NFPA 17 and/or 17A, optional Class A Module (S/N 70100686) must be installed. Maximum loop resistance cannot exceed 50 ohms.

The Detection Loop Trip Current is factory set at 40 mA to interface with most smoke detectors. However, the alarm currents can be programmed to trip from 35 mA up to 60 mA. (Refer to Section 5, **Programming**, page 35 for alarm current adjustment.)

The maximum number of compatible smoke detectors of the same make and model number which can be used in any one loop is listed in Table 3.5.3. The total detector load (maximum detectors) on a single zone or cross zone system must not exceed 2.4 mA. Any number of rate-of-rise thermal devices, thermostats, and manual stations can be used in one loop. In order to complete the supervision, no parallel branching is allowed.



▲ **Figure 3.5.3** — Detector Circuit Wiring

Table 3.5.3
Compatible Smoke Detectors For Use With Chemetronics Micro 1-EV Control Panel
For Single Zone and Cross Zone Use Only

NOTE: Do not combine different model number smoke detectors on the same initiating circuit. Micro 1-EV Control Panel UL Smoke Detector Compatibility Identifier is "**A**".

Original Manufacturer	Model Number	UL Identifier	Base Number	UL Identifier	Chemetron Assembly S/N	Maximum Number Per Zone
Hochiki	SIH-24F	HD-2	HS-220D	HB-3	70100681	60
Hochiki	SIH-24F	HD-2	HS-220RB	HB-12	*	60
Hochiki	SIH-24F	HD-2	HS-224D	HB-5	70100524	60
Hochiki	SIH-24F	HD-2	HS-224RB	HB-14	70100528	60
Hochiki	SLK-24F	HD-3	HS-220D	HB-3	70100680	50
Hochiki	SLK-24F	HD-3	HS-220RB	HB-12	*	50
Hochiki	SLK-24F	HD-3	HS-224D	HB-5	70100523	50
Hochiki	SLK-24F	HD-3	HS-224RB	HB-14	70100526	50
Hochiki	SLK-24FH	HD-3	HS-220D	HB-3	70100684	50
Hochiki	SLK-24FH	HD-3	HS-220RB	HB-12	*	50
Hochiki	SLK-24FH	HD-3	HS-224D	HB-5	70100525	50
Hochiki	SLK-24FH	HD-3	HS-224RB	HB-14	70100527	50

* No Chemetron stock number has been established at this time.

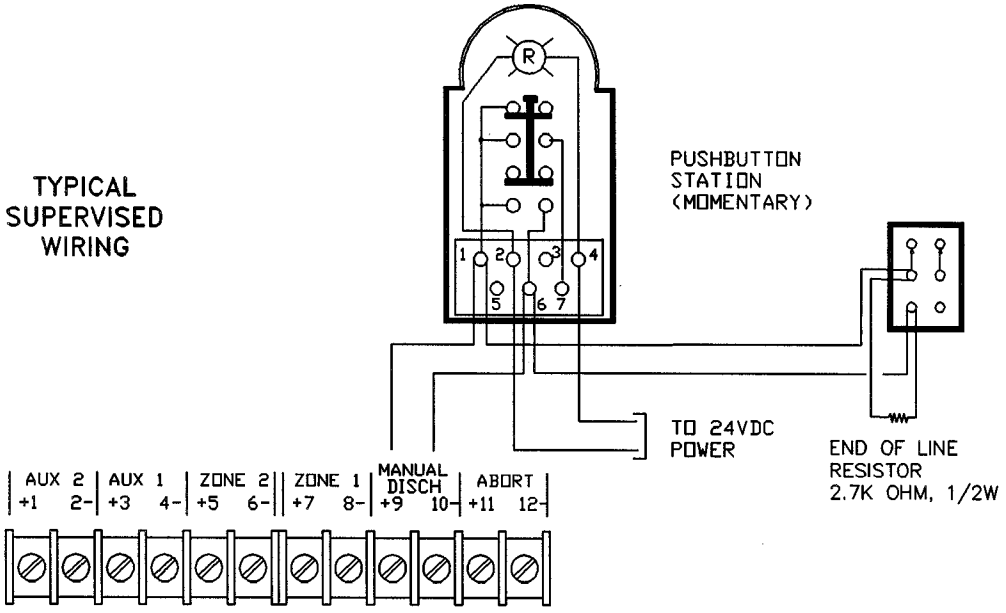
3.5.4 Manual Station Circuit Wiring

Trouble Condition	Alarm Condition
F-11	A-12

The manual station input circuit is designed for Class B (2-wire) operation. For Class A (4-wire) operation, optional Class A Module (S/N 70100686) must be installed.

Chemetron Manual Station Model Nos. 20100139, 20100140, 20100141, and 20100142 are compatible with the panel, as are other listed contact type devices.

The manual station circuit is programmable to initiate a discharge immediately upon activation or with an adjustable predischarge time delay. (Refer to Section 5, **Programming**, page 35 for programming options.)



▲ **Figure 3.5.4** — Typical Supervised Wiring ■ Manual Station Circuit

3.5.5 Abort Switch

Trouble Condition	Alarm Condition
F-13	F-14

A spring return momentary type switch shall be used as an abort switch at a remote location. Operation of the abort switch when no alarm conditions are present will initiate a trouble condition. The abort circuit can be programmed to perform in any of the following three modes.

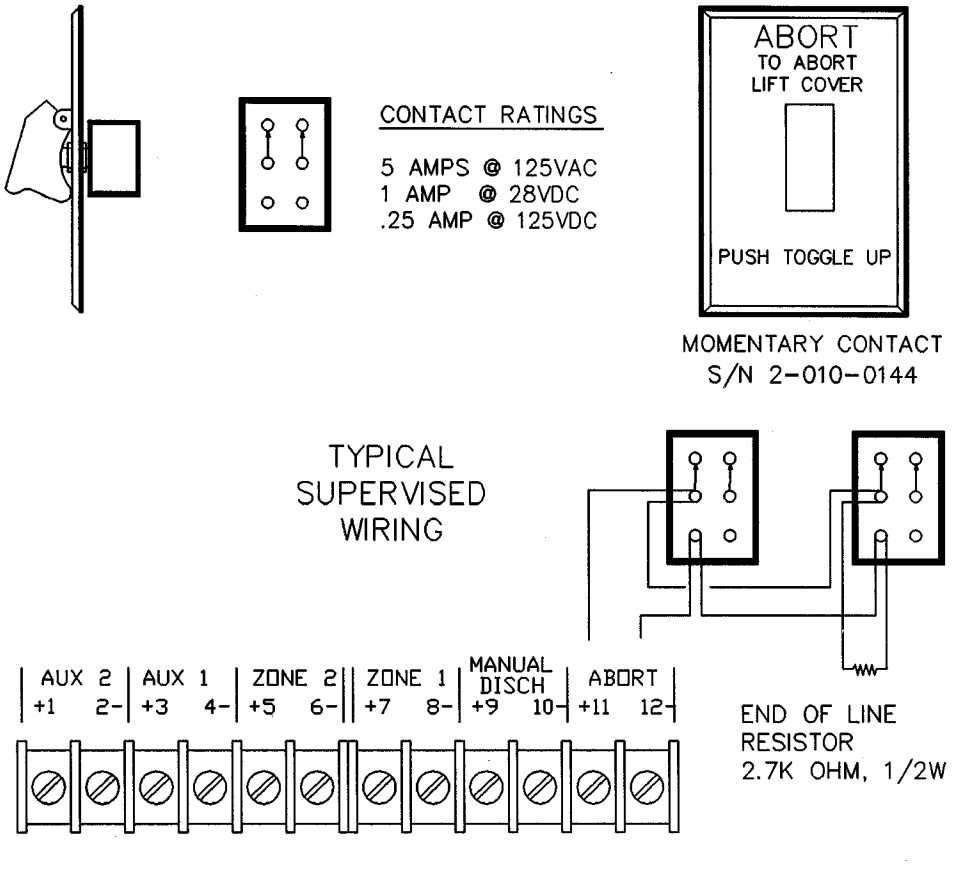
1 **"Deadman" Abort**
When activated, this mode allows the predischarge timer to run until the preset time period elapses. The timer will remain at zero (0). If the contact is reopened prior to depressing the reset switch, agent discharge will occur immediately. Should the contact open during the predischarge countdown period, the normal sequence will occur.

2 **"Deadman" Abort** (with 10 seconds remaining)
When activated, this alternate mode allows the predischarge timer to run until 10 seconds remain before the discharge. During this sequence, the timer will remain at 10 seconds until the abort switch is released or the panel is reset.

3 **IRI Abort Mode**
This mode of abort must be initiated when the first zone or first detector goes into alarm. Should a first zone alarm condition occur, the abort contact must be closed prior to initiation of a second detector. When a second detector alarms, the predischarge timer will begin countdown to zero (0). If the contact is reopened after the start of the predischarge countdown, the discharge can only be interrupted by the panel reset. Should the contact reopen after the predischarge time period elapses, the agent will immediately discharge.

NOTE

All abort modes are overridden by use of the manual station input.



▲ **Figure 3.5.5** — Typical Supervised Wiring ■ Abort Switch

3.5.6 Auxiliary 24 VDC Output Power

Trouble Condition
F-48

A filtered and regulated 24 VDC output is provided at the terminals labeled 13(+) and 14(-). This circuit is intended to be used to power remote equipment such as graphic annunciators and other 24 VDC resistive type devices.

CAUTION

The use of this circuit for inductive loads, such as DC motors, is ***NOT recommended.***

The circuit has a maximum rating of 1 amp @ 24 VDC and is protected by a supervised onboard circuit breaker.

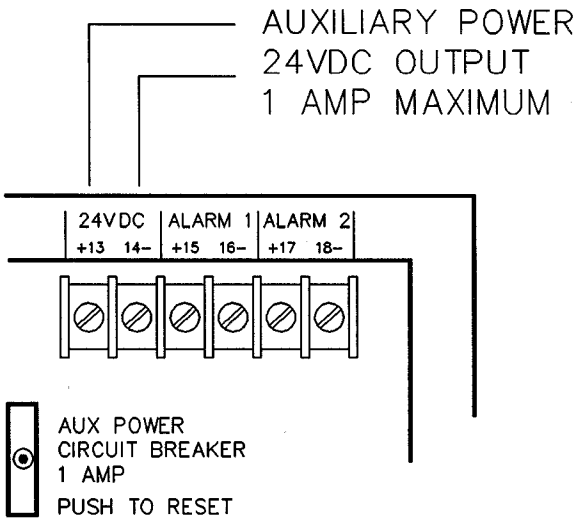
In the event of a short circuit or overload, the black plunger on the circuit breaker will rise, and a fault code (F-48) and the general trouble LED will be illuminated.

CAUTION

If the circuit breaker is tripped, check the external wiring for short circuits and/or overloads prior to depressing (resetting) the black plunger. **Do not forcibly restrain the plunger or irreparable damage to the PC board may occur.**

The circuit is supervised for the presence of 24 VDC power, but does not supervise external devices and therefore, does not require an end-of-line resistor.

The 24 VDC auxiliary power momentarily de-energizes each time the red reset key on the keypad is depressed.



▲ **Figure 3.5.6** — Auxiliary 24 VDC Output Power

CONTENTS

3.5.7 Alarm Circuit Wiring

Alarm 1

Trouble Condition	Short Condition
F-18	F-39

Alarm 2

Trouble Condition	Short Condition
F-19	F-40

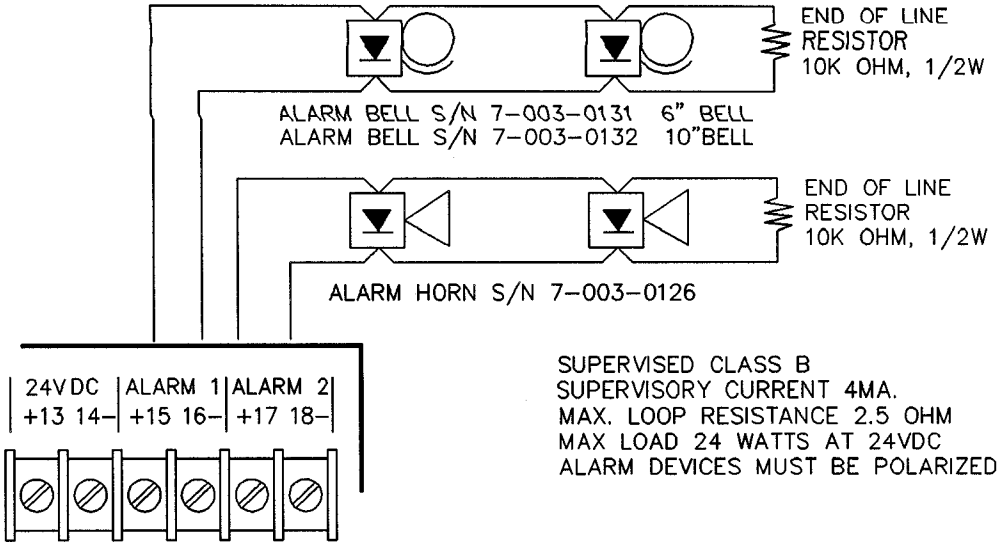
The Micro 1-EV Control Panel is designed with two independently supervised, Class B (2-wire) reverse polarity alarm circuits. For Class A (4-wire) operation, the optional Class A Module (S/N 70100686) must be installed.

Alarm wiring and installation must be in accordance with NFPA 70 (The National Electrical Code), NFPA 72, and the authority having jurisdiction. For installations requiring NFPA 17 and/or 17A, optional Class A Module (S/N 70100686) must be installed.

Only devices which have rated voltages of 18-31 VDC may be used.

Maximum available alarm power and voltage on each loop is 24 watts (1 amp) @ 24 VDC (nom.) Loop resistance must not exceed 2.5 ohms for proper operation.

The polarity of the audible output terminals in Figure 3.5.7, is shown in the alarm condition. When the alarm circuit is energized, the polarity of the circuit reverses. The negative terminal will change to positive and the positive to negative.



▲ **Figure 3.5.7** — Typical Alarm Circuit Wiring

Therefore, when connecting the external wiring of the alarm device to either alarm circuit, the positive lead of the device must be terminated to the positive terminal block connection of the printed circuit board, and the negative lead to the negative terminal block.

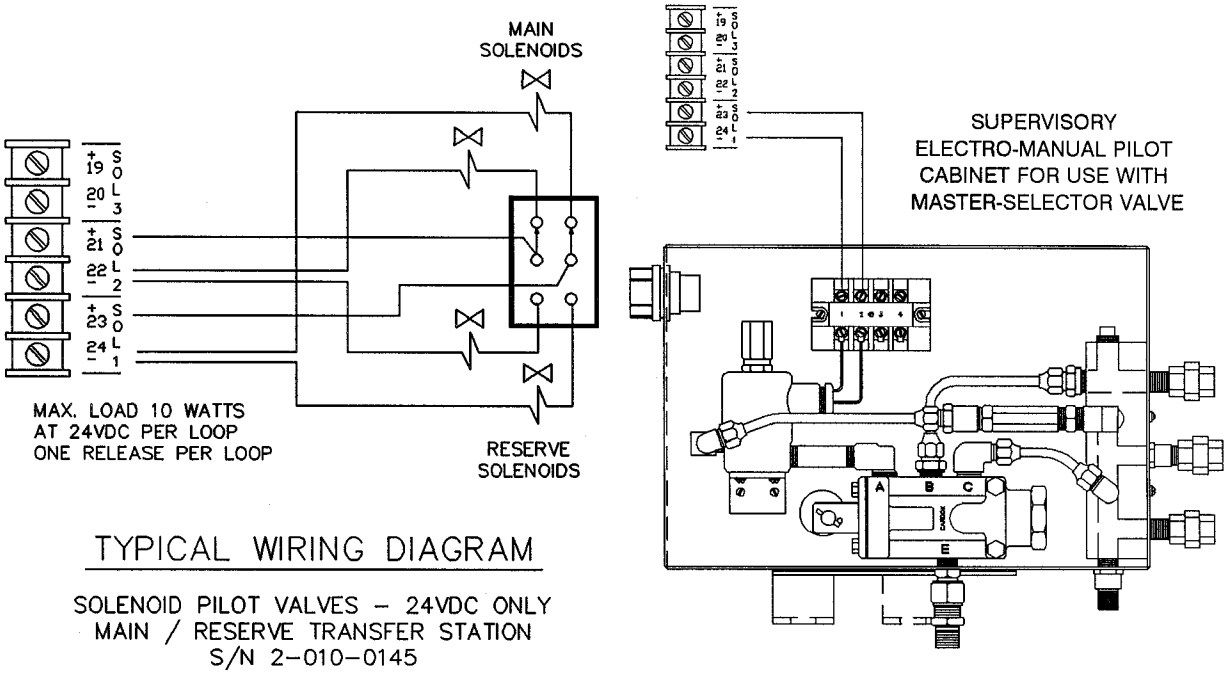
The Alarm Outputs are programmable as described in the Programming Option List beginning on page 37.

3.5.8 Installation of Solenoid Valves

Solenoid 1		Solenoid 2		Solenoid 3	
Trouble Condition	**Short Condition**	**Trouble Condition**	**Short Condition**	**Trouble Condition**	**Short Condition**
F-15	F-25	F-16	F-26	F-17	F-27

WARNING

Prior to connecting solenoids, or when performing troubleshooting or maintenance operations, make sure that all solenoids ARE REMOVED from the devices which they activate and the solenoid disconnect switch is in the OFF position.



▲ **Figure 3.5.8** — Installation of Solenoid Valves

The Micro 1-EV Control Panel is designed to operate a maximum of three independent Class B (2-wire) supervised solenoid valves. Maximum allowable solenoid valve power and voltage must not exceed 10 watts at 24 VDC (nom.) per solenoid.

For proper operation, loop resistance must not exceed 2.5 ohms.

Reference Section 5, **Programming**, for the solenoid valve predischarge and discharge timer adjustment procedure.

Refer to Figure 3.5.8 for external wiring connections.

End-of-line devices are not required in the solenoid valve loop. Supervision is accomplished directly through the solenoid coil. The timer setting for all unused solenoid loops must be zero (0), which will bypass the supervision and eliminate the associated trouble conditions.

3.5.8.1 Solenoid Valve Timer Adjustment

The predischarge time and discharge time are independently field adjustable for each solenoid valve.

Six keypad switches are provided for predischarge and discharge time delays for Solenoid Valves 1, 2, and 3.

The predischarge timers are adjustable from 0 to 24.0 minutes.

The discharge timers are adjustable from 0 to 24.0 minutes or from 0 to 240 minutes.

Operation of the keypad switches will confirm the individual settings of each of the solenoid timers. Refer to Section 5, **Programming**, page 35

IMPORTANT

Be sure that the solenoid valve with the shortest predischarge time is connected to the **Solenoid 1 Output.**

3.5.8.2 Solenoid Disconnect Switch

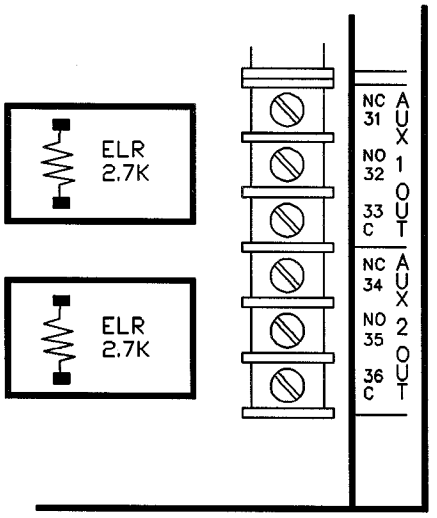
When in the off position, this switch, located below the 24 VDC power circuit breaker, will disconnect power from all of the three solenoid circuits. The appropriate open circuit trouble code(s) will be displayed if a non-zero discharge time is programmed for the associated solenoid circuit.

3.5.9 Auxiliary Outputs

Auxiliary 1	Auxiliary 2
Trouble Condition	**Trouble Condition**
F-22	F-23

The convertible auxiliary outputs are programmable in nature and are used as an onboard relay contact, or to supervise and power a remotely mounted relay. Each output is capable of accepting a relay (S/N 70150179) for mounting directly in the socket on the printed circuit board, which provides 1 Form C contact per output; or use an *Auxiliary Output Relay Substitution Board* (S/N 70100446), which provides a .25 amp 24 VDC current limited, supervised loop to drive a remotely mounted coil operated device.

Refer to Section 5, **Programming**, page 35 and the Micro 1-EV Programming Option List, pages 37 & 38.



ORIGINAL
SHIPPING CONFIGURATION

AUXILIARY OUTPUT
RELAY SUBSTITUTION BOARD
(S/N 70100446)

▲ **Figure 3.5.9** — Auxiliary Outputs

Each Micro 1-EV PC board is shipped with two 2700 ohm, ½ watt end-of-line resistors, terminating in a male spade connector to provide a supervisory resistance if the auxiliary outputs are not used.

If a relay is to be mounted in the socket, the end-of-line resistor must be removed, at which time a fault condition will occur — F-22 or F-23. Insert the auxiliary relay (S/N 70150179) into the socket. Prior to installing the relay, observe the contact ratings 5A 28VDC/120VAC. The relay coil provides enough resistance to complete the supervisory loop.

In the event that a remotely mounted device is required, an Auxiliary Output Relay Substitution Board (S/N 70100446) must be used. The substitution board provides fusing, supervision, and current limiting of the wiring loop. To connect a remote device, the following instructions apply.

1. Remove the end-of-line resistor from either or both relay sockets.
2. Insert the Auxiliary Relay Board (S/N 70100446) into the appropriate socket.
3. Check wiring from the remote relay for grounds, shorts, or voltage.
4. Connect wiring to terminals 31 and 33 for Auxiliary Output No. 1, or 34 and 36 for Auxiliary Output No. 2.

CONTENTS

Using this approach, interconnecting wiring and the relay coil are Class B supervised. Relay coil resistance must not exceed 650 ohms at 24 VDC, nor draw more than ¼ amp at 24 VDC.

CAUTION

Any wiring short circuits will cause the fuse of the auxiliary output substitution board to open. This fuse is **NOT** user replaceable; therefore, another Auxiliary Output Relay Substitution Board must be installed.

Wiring guidelines as outlined in Section 3.5, **Field Wiring Connections**, must be followed. The conductors for these circuits must be segregated from other conductors — which may be carrying AC voltage — to protect against induced voltage spikes, which may cause spurious ground fault conditions.

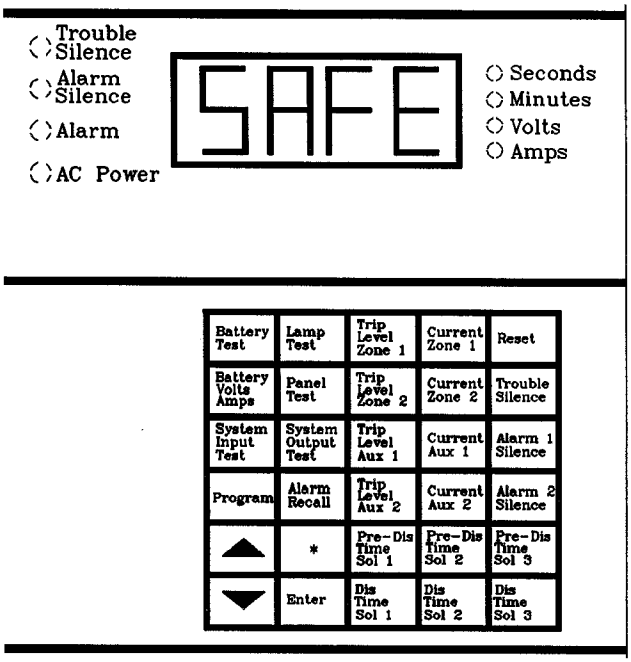
4 Panel Switches and Indicators

The following is a brief description of the basic keyboard commands of the Micro 1-EV control panel.

4.1 Keypad Switches - Description

4.1.1 Battery Test

The **Battery Test** key initiates an automatic battery test, in which a 25 ohm load is applied across the battery for a 10 second period. The control panel will display a battery test message ***batt*** in the display for this 10 second period, then display ***Pass*** or ***Fail*** depending on the outcome of the test. This function has an automatic time-out and returns the panel to normal operation. **Battery Test** can also be cancelled by depressing the **Reset** switch.



▲ **Figure 4.0** — Panel Switches and Indicators

4.1.2 Battery Volts/Amps

This key, when used in conjunction with the **Battery Test** key, will display the battery voltage with the 25 ohm load applied. After about 10 seconds, the display will also read a ***Pass*** or ***Fail*** message in this mode. If the key is depressed a second time, the display will show the current through the load.

4.1.3 Lamp Test

This key illuminates all display LEDs and Alpha-Numeric display segments for approximately 5 seconds. This command has an automatic time-out and returns the panel to normal operation. **Lamp Test** can also be cancelled by depressing the **Reset** switch.

4.1.4 Trouble Silence

This key silences the onboard trouble buzzer in the event of a system fault. Whenever this key has been depressed, the **Trouble Silence** LED will flash to indicate that the Trouble Silence function has been initiated. All **Trouble Silence** conditions are cleared when the panel is reset or upon additional trouble conditions.

4.1.5 Alarm 1 Silence

The **Alarm 1 Silence** key silences the Audible Alarm 1 circuit during an alarm condition. The **Alarm Silence** LED will flash after this key has been pressed. All alarm silence conditions will cancel when a system reset occurs or upon subsequent alarms.

4.1.6 Alarm 2 Silence

This key silences Alarm 2 during an alarm condition. The **Alarm Silence** LED will flash after this key has been pressed. All alarm silence conditions will be cancelled when a system reset occurs or upon subsequent alarms.

4.1.7 Reset

This key resets the panel and clears all fault trouble and alarm conditions. The panel cannot be reset during the agent discharge cycle of the panel. **Reset** will also clear any other keyboard function, except **Panel Test**, which times out automatically.

NOTE

When activated, the System Input Test **cannot be reset until the input device is in the normal, non-alarm condition.**

The **Reset** key also resets input zone loops and auxiliary 24 VDC power. If the trouble or alarm conditions have not been removed, the panel will go back into trouble or alarm and the faults or alarms will again be displayed.

4.1.8 Panel Test

This key tests the internal microcircuitry for proper operation. This is done by a ROM Checksum routine and RAM check routine. These routines are standard routines used to check the integrity of the system's memory.

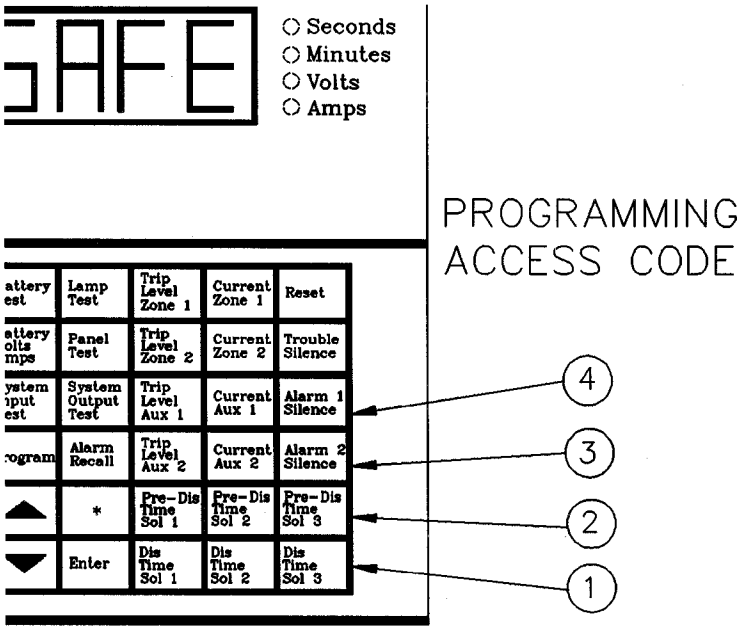
At the end of these tests, a ***Pass*** or ***Fail*** message will appear.

4.1.9 System Input Test

To enter this testing feature, the user must press the **Input Test** Key. This will cause the display to respond with a series of four dashed lines. At this time, the access code for programming should be entered. Upon entering the System Input Test mode, the display will read ***SYS 2***, a general trouble condition will be annunciated, and the trouble relay contacts will transfer.

WARNING

After Accessing the System Input Testing mode, the solenoid disconnect switch MUST be transferred to the OFF (up) position.



Press the appropriate keys in the following order:

① Dis Time Sol 3

② Pre-Dis Sol 3

③ Alarm 2 Silence

④ Alarm 1 Silence

▲ **Figure 4.1.9** — Programming Access Code

In this mode all inputs (Auxiliary 1, Auxiliary 2, Zone 1, Zone 2, Manual Discharge, and Abort can be operated individually. The alarm condition causes the Alarm 1 Output to pulsate in a coded sequence for as long as the device or switch is in an alarm condition.

The alarm will pulsate only as long as the device is in an alarm condition, which allows a technician to test all the input devices without having to return to the control panel, except to exit the testing mode.

NOTE

After 3 rounds of any coded testing sequence, the panel will automatically reset all the input loops to reset any latching type devices such as smoke detectors.

The System Input Test mode is used to verify that all field installed devices are operating. It is used for initial start-up as well as semi-annual system inspections. Each input device can be exercised to give the appropriate pulsed signal.

The following is a listing of the pulsing sequences:

Number of Pulses	Condition	Number of Pulses	Condition
2	Zone 1 Activated	5	Auxiliary 2 Input Activated
3	Zone 2 Activated	6	Manual Discharge Activated
4	Auxiliary 1 Input Activated	7	Abort Activated

When exiting the input test mode, and to diminish the possibility of accidentally exiting the input test mode and possibly causing an accidental discharge, the user must first press the **Reset** switch and then enter the access code. The panel will return to the normal SAFE condition.

WARNING

The System Input Testing Mode will automatically time-out and return to the normal SAFE operating condition 30 minutes after the last system input testing operation. This is to prevent the system from being inadvertently left in this testing mode.

Reconnect the solenoids.

4.1.10 System Output Test

Upon operation of this key switch, a series of four dashes will be displayed. At this time, the access code for programming should be entered (see Figure 4.1.9). Upon entering the Output Test Mode, the display will read ***SYS 1***. This switch activates Alarm 1 and Alarm 2 and all relay contacts for testing of all equipment shutdown and remote annunciation functions.

If this is not desirable, this function is selectable for alarms only. (Refer to Section 5, **Programming**, on page 37.) The System Output Test function is preset to time-out in 30 minutes, but it can be cancelled by depressing the **Reset** key.

4.1.11 Solenoid 1 Predischarge and Discharge Time
(Also Solenoid 2 and Solenoid 3)

This key allows the user to confirm the Solenoid 1 timer settings. The digital display will indicate the current adjusted timer setting, as well as minutes or seconds. When used in conjunction with the **Program** key, the timer may be adjusted as required. Refer to Section 5, **Programming**, page 35, for the programming sequence.

4.1.12 Zone 1 Trip Level (Also Zone 2, Auxiliary 1, and Auxiliary 2)

Displays the current trip level as programmed. Refer to Section 5, **Programming**, page 35, for the programming sequence as well as options. This function may be exited by pressing **Reset**, another function key, or by the automatic time-out feature.

4.1.13 Zone 1 Current (Also Zone 2, Auxiliary 1, and Auxiliary 2)

This key displays the actual current in Zone 1 input loop to the nearest milliamp. This function can be exited by pressing **Reset**.

4.1.14 Program, * and Arrow Keys

Used only in programming and testing.

4.1.15 Alarm Recall

The software of the Micro 1-EV includes a dedicated alarm recall storage area. This section of memory will accurately recall to the display the alarm/status code messages that occur ***when associated with a discharge***, in the order that they occurred, beginning with the first code stored. Refer to the Status Code Chart and the Alarm/Fault Code Chart on page 35 for code interpretations.

To recall the status code messages, press the **Alarm Recall** key on the keypad. To display the next status code messages, press the **Down Arrow** key as often as required. The **Alarm Recall** of the Micro 1-EV utilizes a first-in, first-out type of memory storage; therefore, the most recent discharge sequence will be the last discharge sequence stored in memory. Each discharge sequence will be separated by a series of four dashed lines.

Due to the limited size of the memory storage space, only occurrences associated with discharges are stored. Trouble and alarms which occur, but do not occur with a discharge, are displayed on the alpha-numeric display, but are not stored in the alarm recall storage area.

Because each alarm occurrence may use as many as 30 different entries of the entry memory, the memory may be filled upon completion of installation and testing. To eliminate this problem, an access code was developed to clear the memory space.

NOTE

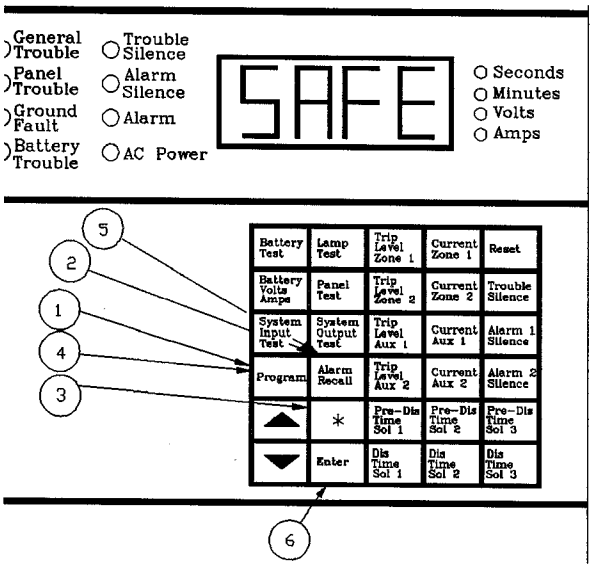
After initial installation, the Alarm Recall Memory **must be cleared and checked periodically** to maintain adequate storage area.

To clear the Alarm Recall memory, press the **Program** key, then the **Alarm Recall** key. The display will then respond with a series of four dashed lines. To clear the memory, a special Alarm Recall Clearing Code must be entered (see Figure 4.1.15). Upon completion of the code, the panel will automatically return to the SAFE condition and the Alarm Recall Storage Area should be cleared. To confirm this, press the **Alarm Recall** key and a series of four dashes should appear to indicate a successful operation.

To Clear the Alarm Recall Storage Area

Press the appropriate keys in the following order:

① Program
② Alarm Recall
③ *
④ Program
⑤ Alarm Recall
⑥ Enter



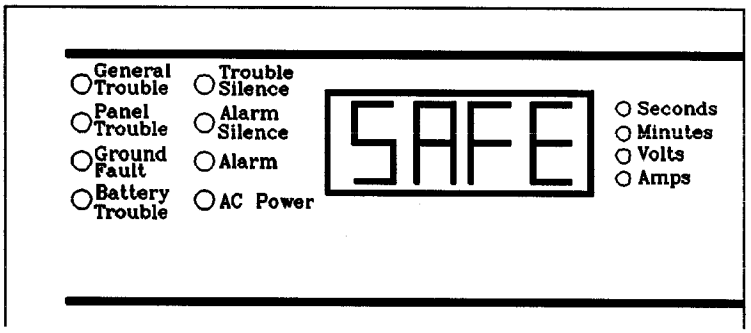
▲ **Figure 4.1.15** — Clearing the Alarm Recall Storage Area

Chart #4.1.15
Alarm Recall Status Code Chart

S-01	Alarm 1 Output On	S-12	Solenoid 1 Output Off
S-02	Alarm 2 Output On	S-13	Solenoid 2 Output Off
S-03	Solenoid 1 Output On	S-14	Solenoid 3 Output Off
S-04	Solenoid 2 Output On	S-15	Auxiliary 1 Output Off
S-05	Solenoid 3 Output On	S-16	Auxiliary 2 Output Off
S-06	Auxiliary 1 Output On	S-17	Trouble Relay De-energized
S-07	Auxiliary 2 Output On	S-18	Trouble Relay Energized
S-08	Alarm 1 Output Silenced	S-19	Alarm Relay De-energized
S-09	Alarm 2 Output Silenced	S-20	Alarm Relay Energized
S-10	Alarm 1 Output Off	S-99	Reset Complete
S-11	Alarm 2 Output Off		

4.2 Micro 1-EV Status/Trouble LEDs

General Trouble LED
The yellow General Trouble LED will illuminate when there is any supervised trouble condition in the panel.



▲ **Figure 4.2** — Status and Trouble LEDs

Panel Trouble LED
This yellow Panel Trouble LED will illuminate only if there is trouble associated with the internal panel circuitry as interpreted by a ROM Checksum routine and Ram Check Routine.

Ground Fault LED
This yellow Ground Fault LED will illuminate only if any of the external 24 volt DC wiring, either positive or negative, is earth grounded. A flickering LED indicates the presence of an induced AC voltage from a source external to the panel.

Battery Trouble LED
The yellow Battery Trouble LED, in conjunction with the Alpha-Numeric display, will illuminate when there is a problem with the battery. The trouble condition can be as a result of an open fuse (F2), loose battery wiring, or low battery voltage - less than 22 VDC.

Trouble Silence LED
If a General Trouble is silenced by depressing the Trouble Silence key, the red Trouble LED flashes.

Alarm Silence LED
When an alarm is silenced by depressing the Alarm Silence key, the red Alarm Silence LED flashes.

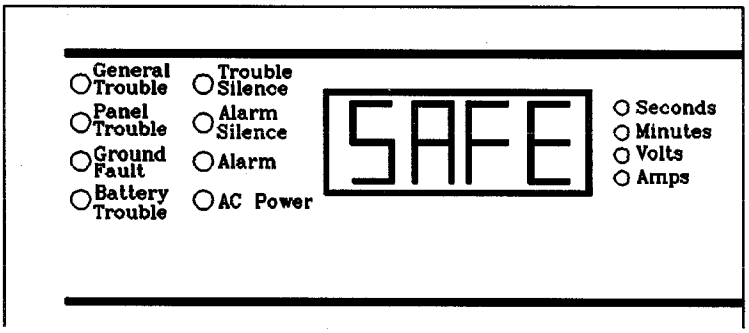
Alarm LED
The Alarm LED illuminates when any of the following alarm conditions occur:

- Zone 1
- Zone 2
- Manual Discharge Station
- Auxiliary 1

AC Power LED
The green LED is normally illuminated. The absence or a degradation of incoming AC power causes this LED to extinguish.

4.3 Alpha-Numeric Display

The Alpha-Numeric display illuminates the word SAFE in the normal standby condition. If a trouble or alarm occurs, the display transfers from SAFE to an Alpha-Numeric code. The decal affixed to the inside of the cabinet door will pinpoint the supervised circuit in the trouble or alarm condition.



▲ **Figure 4.3** — Alpha-Numeric Display

If the AC power input is interrupted, the control panel will automatically switch to battery power, and after 45 seconds, the display will extinguish to conserve battery power. The onboard trouble buzzer will also sound and the General Trouble LED will illuminate.

When AC power is restored, the Alpha-Numeric Display will again illuminate and display F-24 (AC power off) in addition to any other fault conditions that might have occurred during the AC power interruption.

Reset the panel to return the system to the standby condition.

Chart #4.3
Fault Code Chart
Alpha-Numeric Codes

■ **Alarm/Fault Code Chart**

Alarm/Fault Number	Condition	Alarm/Fault Number	Condition
SAFE	Normal Operating Condition	F-18	Alarm 1 Output Trouble
F-01	No Battery Voltage [Battery Failure/Low(1)]	F-19	Alarm 2 Output Trouble
F-02	Battery Charger Circuit Failure	F-20	Trouble Relay Coil Trouble
F-03	Auxiliary 2 Input Loop Open	F-21	Alarm Relay Coil Trouble
A-04	Zone 1 Input Loop Alarm	F-22	Auxiliary 1 Output Trouble
F-05	Auxiliary 1 Input Loop Open	F-23	Auxiliary 2 Output Trouble
A-06	Zone 2 Input Loop Alarm	F-24	AC Power Failure
F-07	Zone 1 Input Loop Open	F-25	Solenoid 1 Output Shorted
A-08	Auxiliary Input Loop Activated	F-26	Solenoid 2 Output Shorted
F-09	Zone 2 Input Loop Open	F-27	Solenoid 3 Output Shorted
F-10	Auxiliary 2 Input Loop Activated	F-38	Ground Fault Trouble
F-11	Manual Discharge Loop Open	F-39	Alarm 1 Output Shorted
A-12	Manual Discharge Loop Activated	F-40	Alarm 2 Output Shorted
F-13	Abort Switch Loop Open	A-44	Zone 1 Input Loop Alarm (over 65 mA)
F-14	Abort Switch Activated	A-46	Zone 2 Input Loop Alarm (over 65 mA)
F-15	Solenoid 1 Output Trouble	F-48	Auxiliary Power Output Failure
F-16	Solenoid 2 Output Trouble	F-80	Insufficient Power to Operate
F-17	Solenoid 3 Output Trouble		

(1) In the event of AC power loss, this fault condition may exist upon recovery of AC power until the batteries are fully charged.

Chart #4.3 Continued
Fault Code Chart
Alpha-Numeric Codes

■ Internal Component Fault Conditions

If any F-90 series (F-90, F-91, etc.) codes appear, contact your Local Chemetron Fire Systems Distributor.

■ Miscellaneous Code Indications

Code Number	Condition	Code Number	Condition
rCHg	Recharge - Signals the end of the discharge timing period	batt	Battery Test - Indicates batteries are in a Battery Test Mode
SYS1	System Output Test Mode	SYS2	System Input test Mode
S1P	Solenoid 1 Predischarge Time	S2P	Solenoid 2 Predischarge Time
S3P	Solenoid 3 Predischarge Time	S1D	Solenoid 1 Discharge Time
S2D	Solenoid 2 Discharge Time	S3D	Solenoid 3 Discharge Time
trL1	Trip Level Zone Loop 1	trL2	Trip Level Zone Loop 2
trA1	Trip Level Auxiliary Input 1	trA2	Trip Level Auxiliary Input 2
Prog	Signals the beginning of the programming sequence for trip levels, solenoid timers, and other options		

5 PROGRAMMING

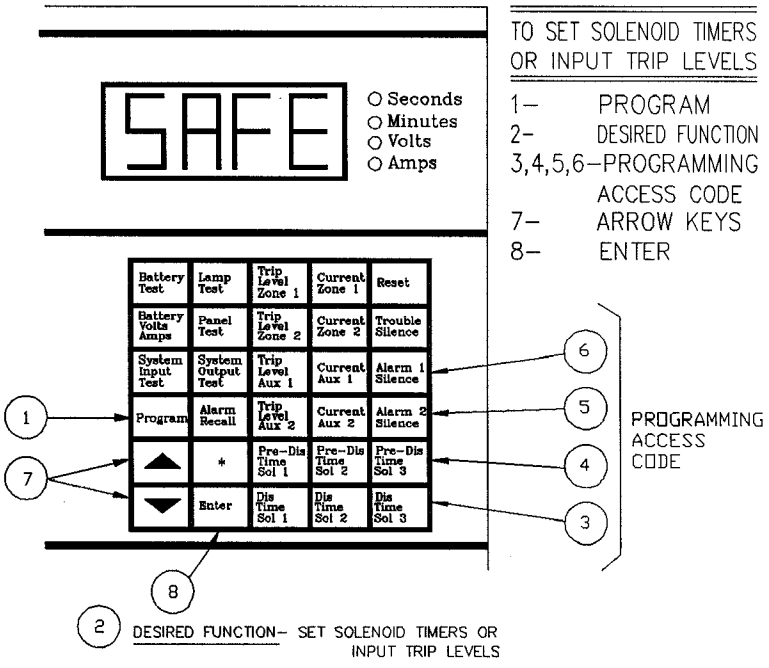
The Micro 1-EV is programmed without the use of bit switches, potentiometers, or wire jumpers, which are prone to error or unauthorized tampering. Instead, the Micro 1-EV utilizes a memory device called an EEPROM. This memory, once programmed, will store the desired program information permanently, even if power is removed; yet it will allow the user to change the programmed features to adapt the panel to the system's special requirements.

The programming is divided into two areas:

— Programming input trip levels and solenoid timers.
— Programming all other options.

5.1 Programming Input Trip Levels and Solenoid Timers

Programming of all functions involves first pressing the **Program** key on the keypad. The display will then respond with the letters **Prog** to indicate the panel is in the program mode. Then, simply press the key associated with the function you wish to program (Trip Level Zone 1, Trip Level Zone 2, etc.). The display will respond with a series of four dashed lines. The access code for programming should be entered and the display will indicate the current setting for that function. By using the **Up Arrow** and **Down Arrow** keys, you can change the function's value until the desired value is displayed. The value will then be permanently stored in the EEPROM memory when the **Enter** key is pressed.



▲ **Figure 5.1** — Programming Input Trip Levels and Solenoid Timers

CAUTION

If the **Enter** key is not depressed, the program will default to the original setting.

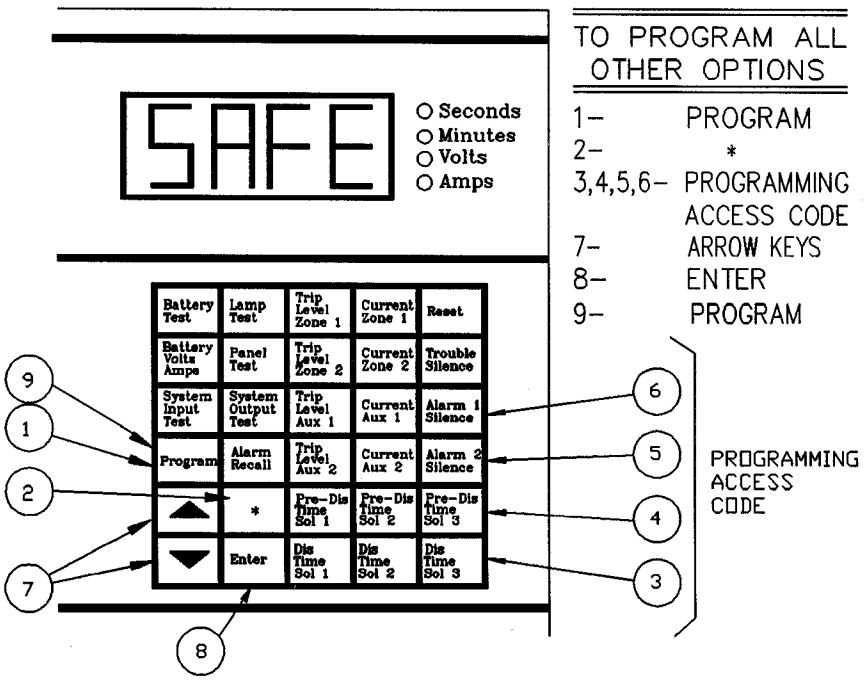
5.2 Programming All Other Options

Programming all the other functions of the Micro 1-EV are accomplished in much the same way as the above options. Press the **Program** key to access the program mode. Press the * key and then enter the programming access code. The first option will appear on the display - **OPTION 01: Method of Detection**. By using the **Up Arrow** and **Down Arrow** keys, the method of detection may be altered as required. To advance to the next option, press the **Enter** key; the display will advance to the next option. All the options are reprogrammed in a similar manner. Refer to the Programming Options List on pages 37 & 38.

After reaching the end of the option list, the next press of the **Enter** key will repeat the first option. This feature is useful in reviewing the options selected.

WARNING

At this time, NO OPTIONS HAVE BEEN PERMANENTLY STORED into memory. To permanently store the selected options, press the PROGRAM key. The panel will return to the normal SAFE condition.



▲ **Figure 5.2** — Programming All Other Options

Chart #5 - Micro 1-EV Programming Options List

01 Method of Detection	
Option 1	**Single Zone**, either of the 2 input zones in alarm will begin the predischarge/discharge sequence.
Option 2	**Cross Zone**, both zones in alarm will begin the predischarge/discharge sequence
Option 3	**Sequential Verification**, either zone in alarm at 2nd trip level (65mA) will begin the predischarge/discharge sequence, but the system will indicate only an alarm at the first trip level (40 mA).
Option 4	**Cross Sequential Verification**, both zones in alarm at 1st trip level (40 mA) or either zone in alarm at 2nd trip level (65 mA) will begin the predischarge/discharge sequence.

02 Manual Discharge Input Operation	
Option 1	Releases agent immediately upon activation.
Option 2	Releases agent after completion of predischarge time-out.

03 Abort Switch Input Operation	
Option 1	Activation of Abort Input continues to count down predischarge timer, but prevents discharge until abort input is deactivated.
Option 2	Activation of Abort Input continues to count down predischarge timer, but will hold the predischarge time with 10 seconds remaining until the abort input is deactivated.
Option 3	Operates as in Option 1 if abort input is activated before 2nd zone (IRI Abort).

04 Auxiliary Output Operation	
Option 1	Auxiliary Output 1 and 2 activate on 1st zone in alarm or on manual discharge activation.

04 Auxiliary Output Continued	
Option 2	Auxiliary 1 Output activates on 1st zone in alarm, Auxiliary 2 Output activates on 2nd zone in alarm, or both activate on manual discharge activation.
Option 3	Auxiliary 1 Output activates on 1st zone in alarm, Auxiliary 2 Output activates on start of discharge timer.
Option 4	Auxiliary 1 Output activates on 2nd zone in alarm (beginning of the predischarge timer cycle), Auxiliary 2 Output activates on start of discharge timer.

05 Alarm Output Operation	
Option 1	Alarm 1 Output activates steady on 1st zone in alarm. Alarm 1 will pulsate on start of predischarge time (2nd zone alarm). Alarm 1 & 2 Outputs activate steady on start of discharge.
Option 2	Alarm 1 Output activates steady on 1st zone in alarm, Alarm 2 Output activates steady on 2nd zone in alarm.

06 System Output Test Operation	
Option 1	Alarm 1 and 2, Auxiliary 1 and 2, Trouble relay, and Alarm relay outputs activate on System Output Test.
Option 2	Alarm 1 and 2 only.

07 Battery Backup Function	
Option 1	Battery Supervision enabled, batteries installed.
Option 2	Battery Supervision disabled, batteries not installed.

08 Manual Station Repeat Discharge Function	
Option 1	Manual station only allows 1 discharge.
Option 2	Manual station allows multiple discharges.

09 Remote Reset Function

Chart #5 - Micro 1-EV Programming Options List - Continued

S1 Solenoid Spurt Function
Option 1 Solenoid 1 not actuated during spurt.
Option 2 Solenoid 1 actuated during spurt.
S2 Solenoid Spurt Function
Option 1 Solenoid 2 not actuated during spurt.
Option 2 Solenoid 2 actuated during spurt.
S3 Solenoid Spurt Function
Option 1 Solenoid 3 not actuated during spurt.
Option 2 Solenoid 3 actuated during spurt.
S4 Auxiliary 1 Output Function
Option 1 Auxiliary 1 Output not transferred during spurt.
Option 2 Auxiliary 1 Output transfers during spurt.
t1 Solenoid 1 Predischarge Timer Range
Option 1 Timer range 0 to 240 seconds.
Option 2 Timer range 0 to 24.0 minutes.

t2 Solenoid 2 Predischarge Timer Range
Option 1 Timer range 0 to 240 seconds.
Option 2 Timer range 0 to 24.0 minutes.
t3 Solenoid 3 Predischarge Timer Range
Option 1 Timer range 0 to 240 seconds.
Option 2 Timer range 0 to 24.0 minutes.
t4 Solenoid 1 Discharge Timer Range
Option 1 Timer range 0 to 24.0 minutes.
Option 2 Timer range 0 to 240 minutes.
t5 Solenoid 2 Discharge Timer Range
Option 1 Timer range 0 to 24.0 minutes.
Option 2 Timer range 0 to 240 minutes.
t6 Solenoid 3 Discharge Timer Range
Option 1 Timer range 0 to 24.0 minutes.
Option 2 Timer range 0 to 240 minutes.

6 OPERATING INSTRUCTIONS

6.1 Standby Condition

In the standby mode with commercial power and battery connected, the control panel will illuminate SAFE on the display.

The Green LED (AC power on) will be illuminated. All other LEDs (trouble and alarm) are off.

6.2 General Trouble Condition

Interruption of any of the electrically supervised circuits will illuminate the General Trouble LED. The local buzzer will start sounding and the General Trouble relay contacts will transfer. At the same time, the word SAFE will be replaced with a code number on the alpha-numeric display.

Match the code on the display with the alarm/fault code chart to pinpoint the trouble area. The local buzzer can be silenced by depressing the trouble silence keypad switch. At the same time, the General Trouble LED will start flashing. The panel will remain in the trouble state until the trouble condition has been cleared and the panel reset.

A maximum of six trouble conditions can be displayed on the readout — one at a time on a priority basis. In case of a Ground Fault or a Battery Trouble Condition, individual fault light LEDs will illuminate in addition to the general trouble condition.

6.3 Single Zone in Alarm (Cross-Zone) Condition

Upon actuation of a single zone initiating device, the SAFE display will change into code A-04 or A-06, depending upon which zone, 1 or 2, is in alarm.

In addition to the alarm code display, a single zone alarm will activate the Alarm Relay, Red Alarm LED, the local buzzer, and remote Alarm #1 will start sounding. The audible Alarm #1 and the local buzzer may be silenced by pressing the associated silence switches, and at the same time alarm LEDs will start flashing. If the fire is extinguished before a second zone alarm is activated, the reset switch inside the panel must be used to return the system to a normal standby condition.

6.4 Both Zones in Alarm (Cross Zone) Condition

When both zones are in the alarm condition, the following sequence of events will take place.

1. First zone in the alarm condition shall have the same sequence as in Paragraph 6.3.
2. When the second zone goes into alarm, the second alarm will begin to sound. At the same time, the predischarge timer will be activated.
3. The alpha-numeric display will start the countdown of the predischarge time [P - (time)].
4. At the end of the predischarge timer cycle, the discharge timer is activated and the display will start the countdown of discharge time [D - (time)]. The solenoid valve(s) will be energized and the release of the fire suppressant agent will begin.
5. At the end of the discharge timer cycle, the solenoid valves will be de-energized. The display will indicate **rCHg**.

6.5 Manual Discharge Station Alarm Condition

A. Without Predischarge Timer

If a manual station is used to initiate the alarm condition, the following will take place:

1. Red Alarm LED will illuminate.
2. Alarms #1 and #2 and the local buzzer will be activated.
3. Alarm Relay, Equipment Shutdown Relays (Auxiliary Outputs #1 and #2) shall be activated.
4. The solenoid valves will activate as programmed.
5. The Alpha-Numeric Display will start counting down the discharge time.
6. At the end of the discharge cycle, the solenoid valves will de-energize, ending the release of fire suppressant. The display will indicate **rCHg**.

B. Manual Discharge Station Alarm Condition (With Predischarge Time)

The panel shall be set at the factory without the predischarge time. To change the manual zone with predischarge time, see Section 5, **Programming**, on page 35.

1. Upon initiation of the manual zone in the alarm condition with a predischarge time, the sequence of operation is the same, except the system will activate the predischarge time delay prior to the release of the fire suppressant.

NOTE

In all cases, operation of a Manual Discharge Station will **override all abort conditions.**

7 TESTING

7.1 Inspection

Once installation has been completed, a careful visual inspection should be made before applying power to the system.

Check the actual wiring hookup with Figure 14, Wiring Diagram, on page 59. Insure that no pieces of wire have fallen into the circuitry. Check for missing or damaged parts.

7.2 Alarm Test

An initial alarm test should be conducted following installation to determine that all parts of the system are functioning properly. The panel should remain powered for 24 to 36 hours prior to connecting the solenoids. This precaution will avoid false discharges of gas in case of faulty or improperly placed detectors.

To perform an alarm test on the Chemetronics Micro 1-EV Panel, follow this procedure:

1. Disconnect AC and battery power.

2. Disconnect the installed solenoid valve circuit leads and connect spare solenoid valves or connect end-of-line device to serve as dummy load.

3. Reconnect the AC and battery power. The alpha-numeric display should read SAFE for standby conditions and the green LED should be illuminated.

4. Initiate a first zone alarm condition by blowing smoke into one of the Zone 1 detectors. This should cause the first zone alarm condition.

   a. General Trouble relay and Alarm relay will switch over.

   b. Alarm LED will be illuminated.

   c. First zone remote audible alarm and the local buzzer will start sounding.

8 MAINTENANCE

A regular schedule of inspection, testing, and maintenance is vital to insure proper and reliable operation of the Micro 1-EV Control Panel. The procedures should be performed at the following intervals, or as required by the local authority having jurisdiction.

8.1 Every Month

Each month, the standby battery system should be checked to determine that the batteries are fully charged and ready to be used in case of AC power interruption.

Battery Test

Perform the battery test as described in paragraph 4.1.1.

A reading of PASS indicates that the batteries are fully charged.

8.2 Every Six Months

In addition to the monthly battery test, the following should be done every six months.

1. Inspect all smoke detectors for dust accumulation, and clean if necessary. Check detector sensitivity with sensitivity meter.

2. Perform all alarm tests as outlined in paragraph 8.1.

3. Perform panel test and lamp test.

8.3 Annually

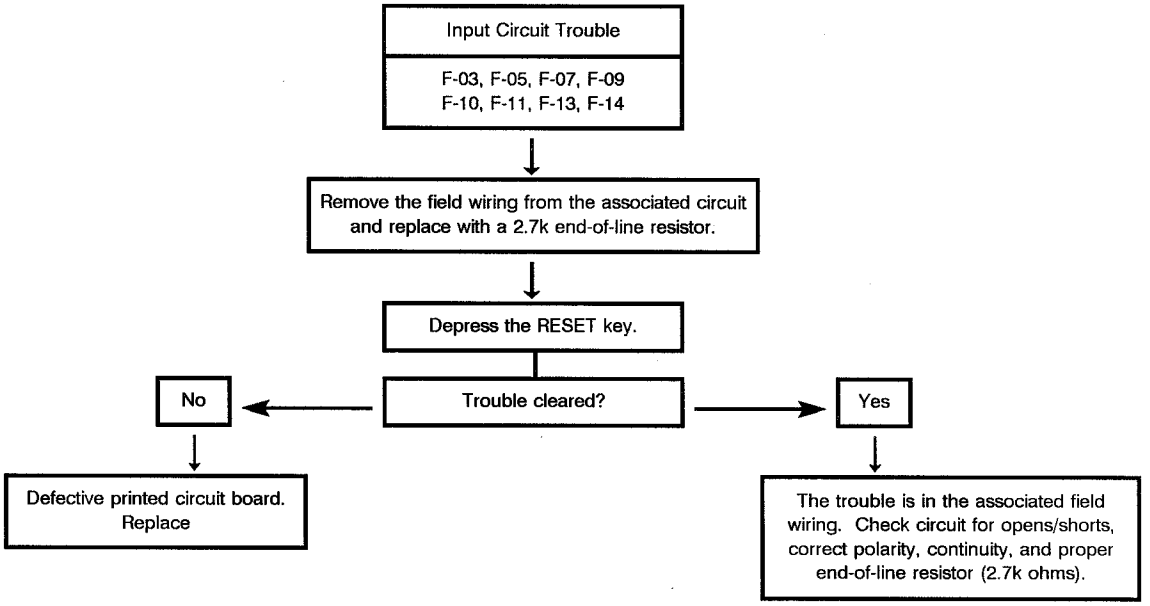
The annual test should include all the steps listed above for the six month interval. Any accumulations of dust inside the panel enclosure should be removed, using care to avoid damaging components or loosening wires.

9 TROUBLESHOOTING

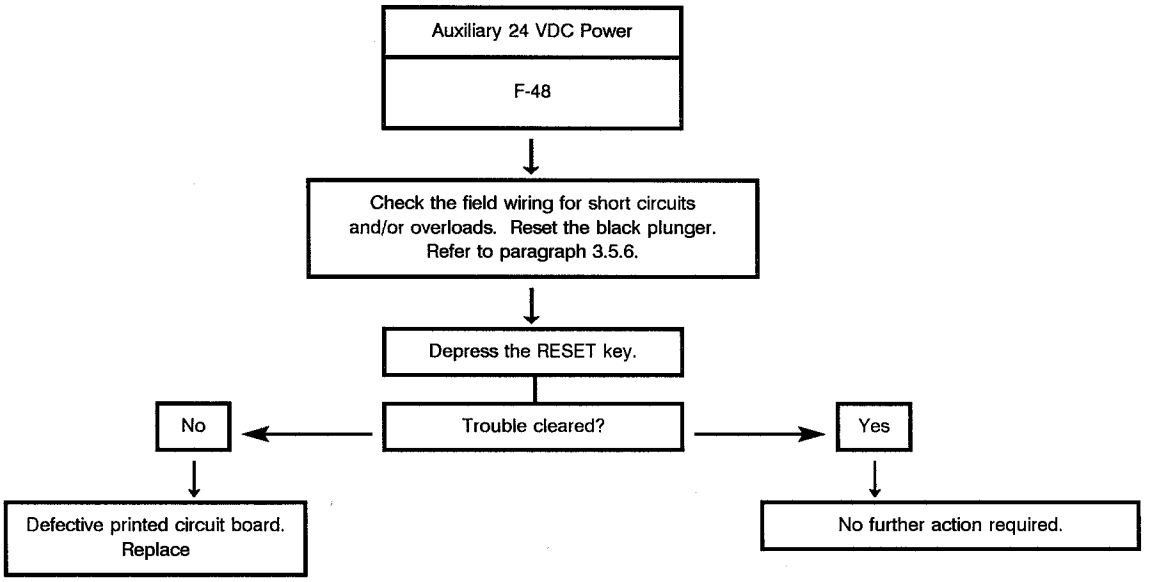
The following flow charts should be used to troubleshoot all fault conditions associated with circuits and wiring external to the Micro 1-EV Control Panel.

If internal component fault conditions (represented by the F-90 Series Codes) occur, contact your local authorized Chemetron Fire Systems Distributor.

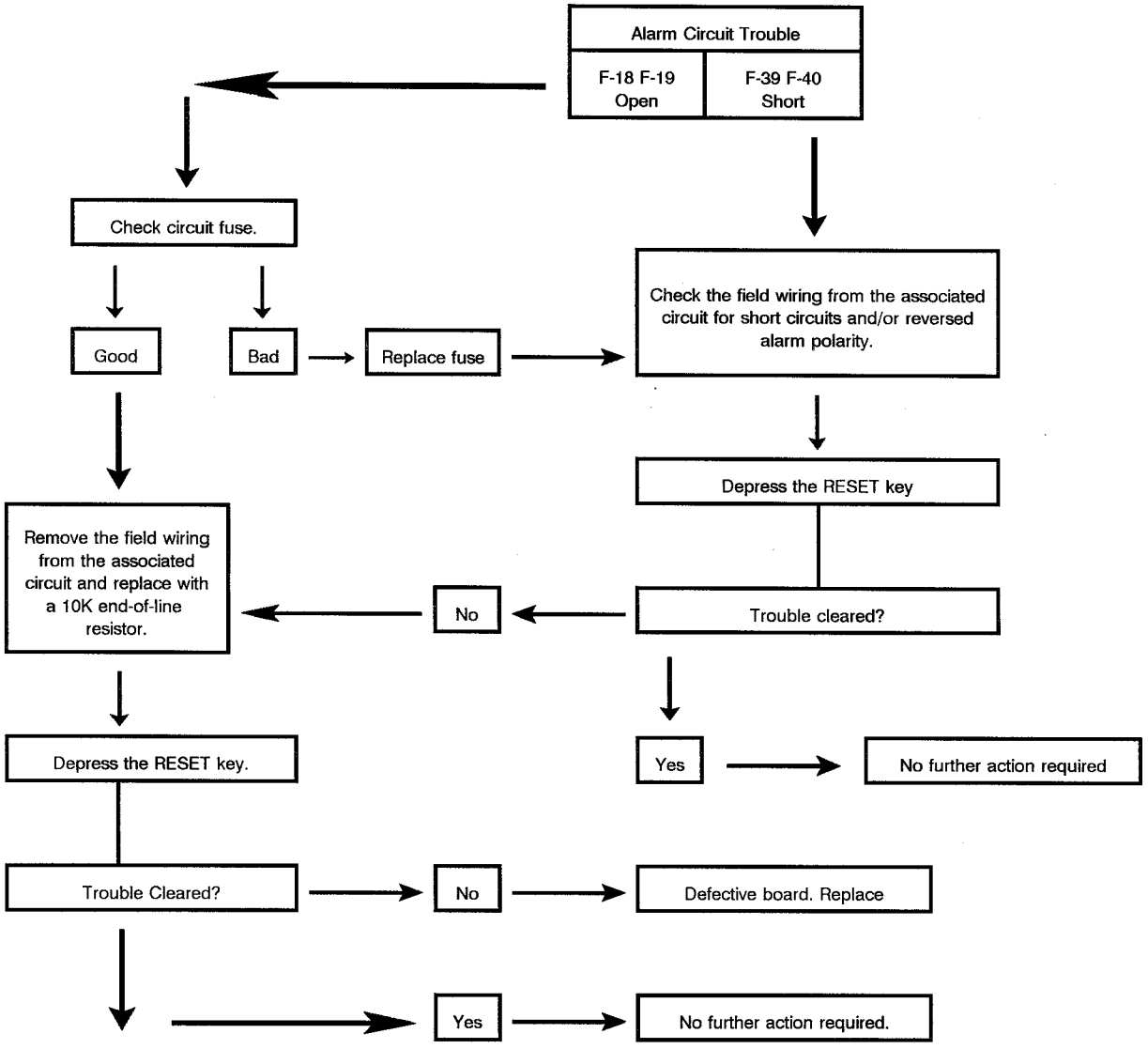
9.1 Input Circuit Trouble



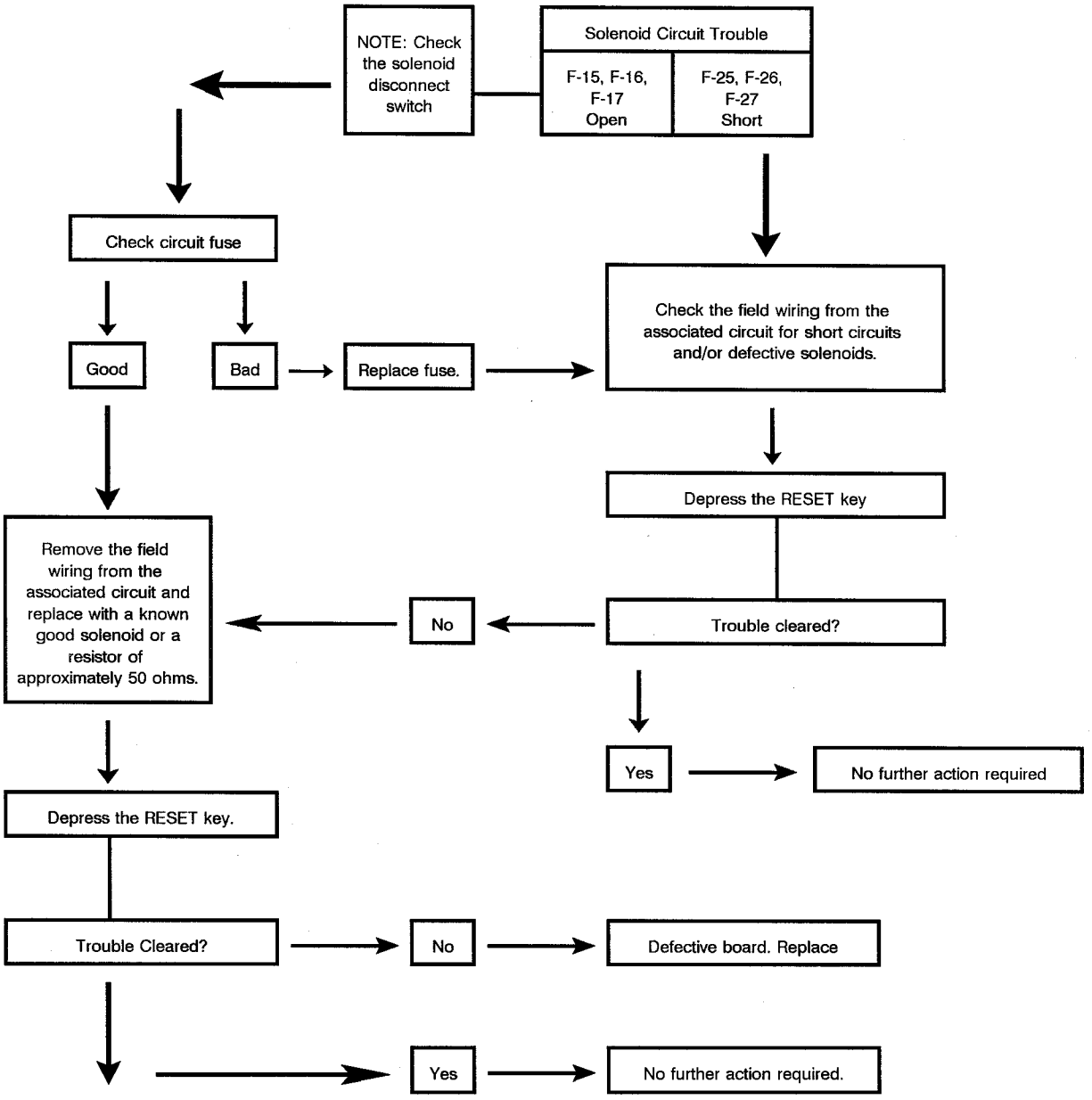
9.2 Auxiliary 24 VDC Output Power Trouble



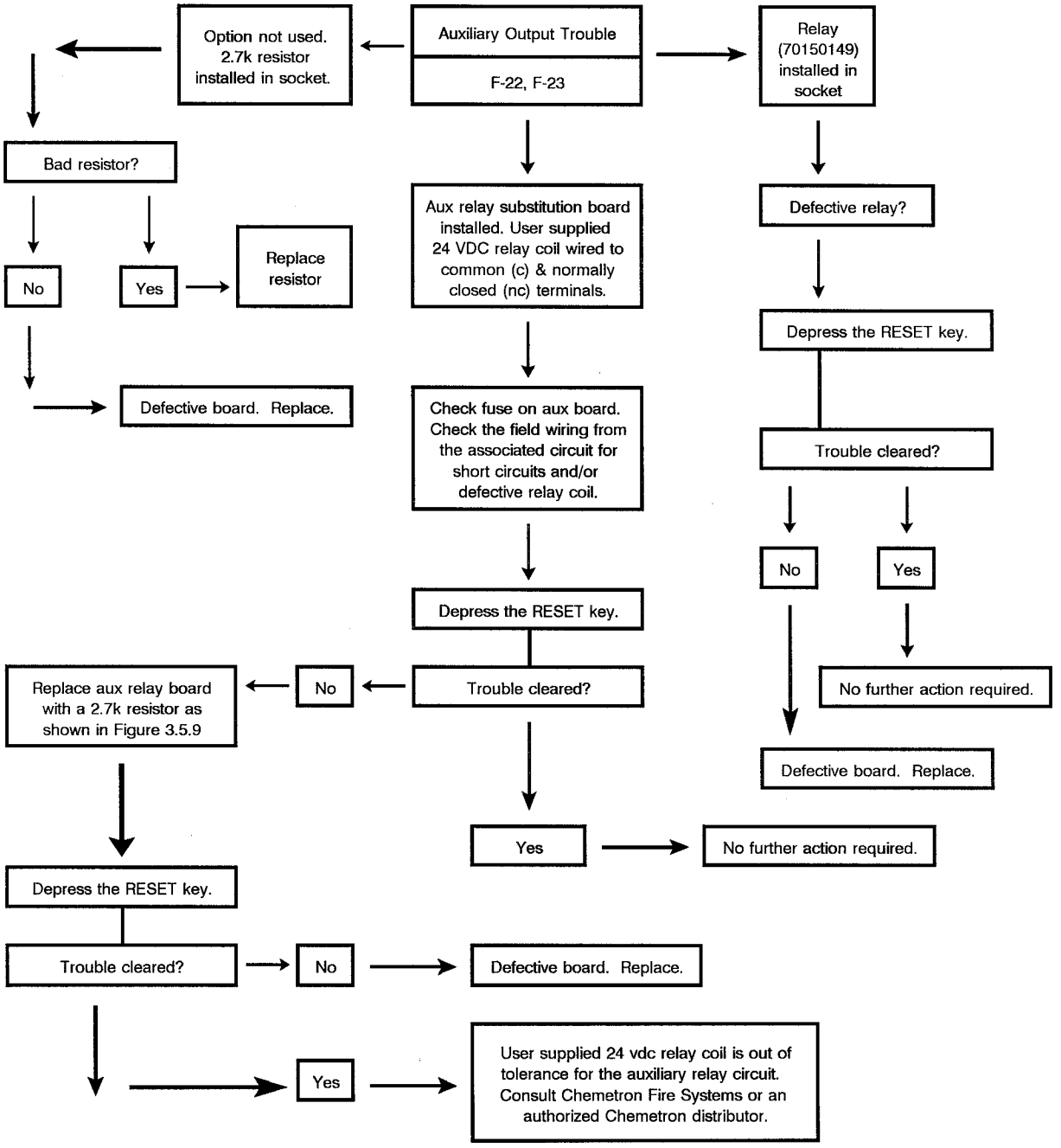
9.3 Alarm Circuit Trouble



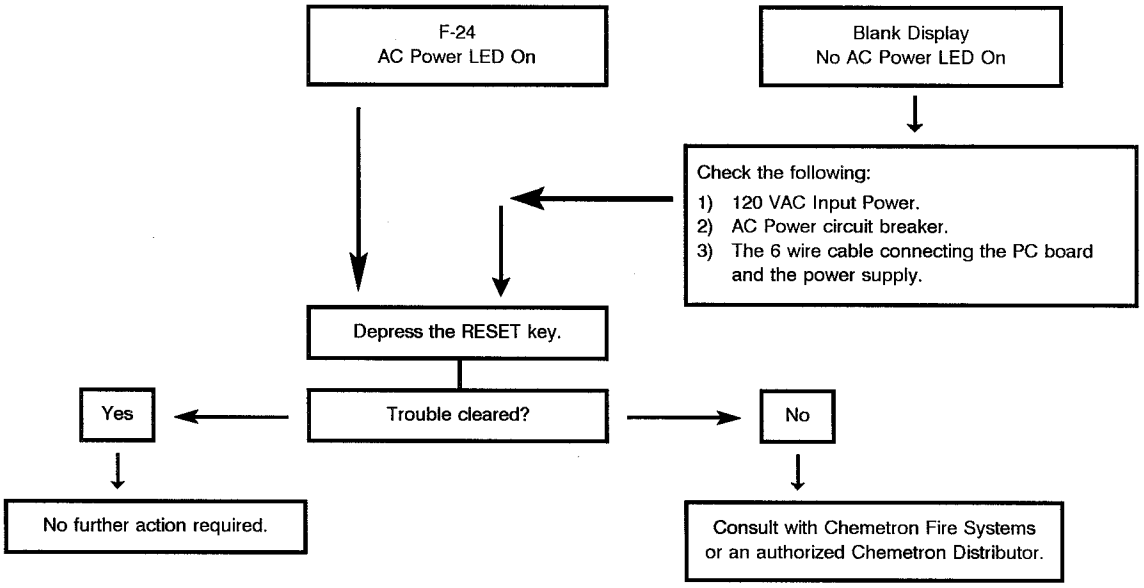
9.4 Solenoid Circuit Trouble



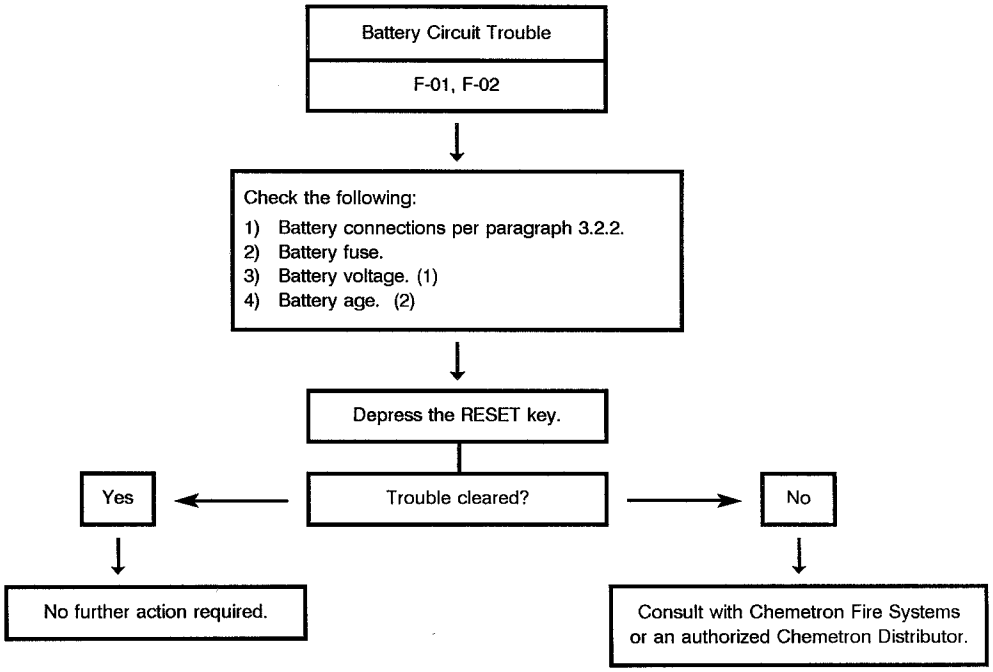
9.5 Auxiliary Output Trouble



9.6 120 VAC Input Power Trouble



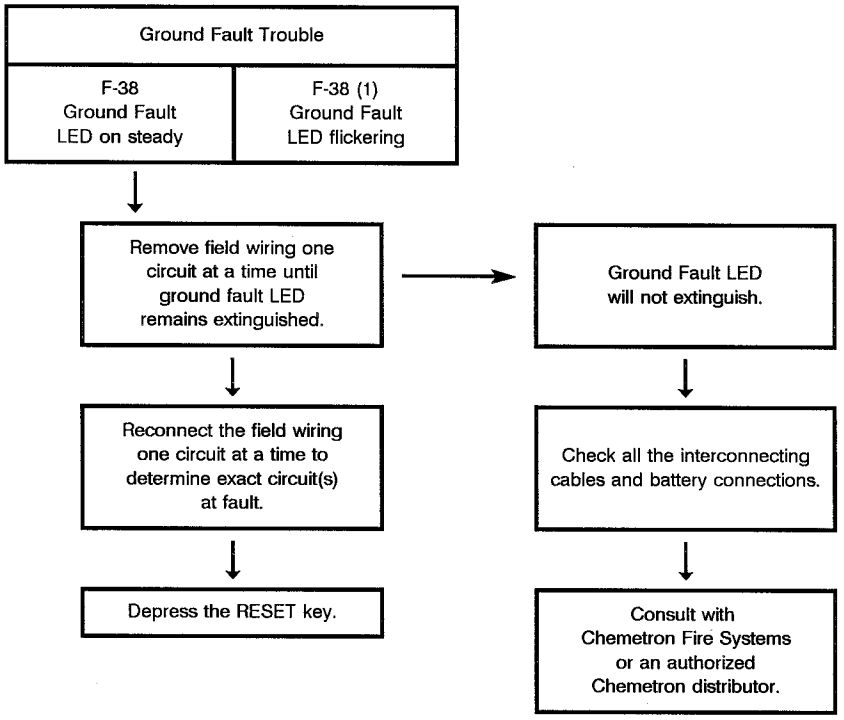
9.7 Battery Circuit Trouble



(1) In the event of AC power loss or new batteries, this condition may exist until the batteries are fully charged.

(2) As a general "rule-of-thumb," gel-cell type batteries will remain effective for a period of 3 to 4 years maximum.

9.8 Ground Fault Trouble



(1) In the case of a flickering ground fault LED, isolate the exact circuit at fault as above and measure wiring for an induced AC voltage.

10 BILL OF MATERIAL

Printed Circuit Board Assembly	70100557
Power Supply	70100449
Optional 220 VAC, 50/60 Hz Power Supply	70100502
Auxiliary Relay	70150179
Class A Module	70100686

Enclosure Options

Single Hazard Red Enclosure	70100447
Single Hazard Tan Enclosure	70100448

Fuse Sizes and Location

Battery Fuse (4A), Power Supply Module F2	70220126
Solenoid Fuses (1A), PC Board F5 & F7	70220100
Alarm Fuses (1.5A), PC Board Module F3 & F4	70220120

10.1 Selected Compatible Components

The following is a list of compatible initiating, indicating, and releasing devices.

10.1.1 Initiating Devices

NOTE

When connecting initiating devices to an initiating circuit, the **same model number device** must be used throughout the circuit.

Single Zone and Cross Zone Detectors	
■ **Ionization Detectors** *For Cross Zone and Single Zone Detection Only*	
70100524	Ionization detector w/standard base
70100528	Ionization detector w/relay base (two Form C contacts)
■ **Photoelectric Detectors**	
70100523	Smoke detector w/standard base
70100526	Smoke detector w/relay base
70100525	Smoke detector with 135°F fixed temperature heat detector with standard base
70100527	Smoke detector with 135°F fixed temperature heat detector with relay base (two Form C contacts)
■ **Thermal Heat Detectors**	
10500117	140°F Self-Restoring thermostat
10500093	160°F Self-Restoring thermostat
10500131	190°F Self-Restoring thermostat
10500094	225°F Self-Restoring thermostat
10500100	325°F Self-Restoring thermostat
10500999	450°F Self-Restoring thermostat
10500123	725°F Self-Restoring thermostat

Electromagnetic Door Holders	
70170188	120 VAC Surface Mount
70170187	120 VAC Flush Mount
70170189	24 VDC Flush Mount
70170190	24 VDC Surface Mount
70170193	24 VDC Double Door Holder, Floor Mount
70170195	24 VDC Double Door Holder, Floor Mount

10.1.2 Audible and Visual Alarm Devices

■ **Bells - Vibrating**	
70030137	6" Alarm bell - 24 VDC, polarized
70030132	10" Alarm bell - 24 VDC, polarized
70030138	Weatherproof box
■ **Vibrating Horns**	
70030126	Vibratone horn - 24 VDC, polarized
70100346	Explosionproof 24 VDC polarized horn
70030131	Weatherproof box
■ **Strobe Lights** *(**Note:** Strobe lights can be mounted on the standard Vibratone horns, or as a stand-alone using the mounting plate S/N 70030130.)*	
70100138	Strobe - 24 VDC, polarized with plain lens
■ **Accessories for Standard Vibrating Horns & Strobes**	
70030131	Weatherproof box, surface mount
70030130	Surface plate for strobe mounting
70030129	Flush mounting plate for combination horn/strobe
70030113	Projector for vibrating horn only
■ **Breakglass Stations**	
70100326	Halon dual action breakglass
70100327	Fire dual action breakglass
70100367	Back box for surface mounting
■ **Manual Stations**	
20100142	Momentary contact Halon discharge station
20100140	Momentary contact CO_2 discharge station
20100144	Deadman abort station
20100145	Main/reserve transfer station
20100207	Surface mount box for stations

11 TECHNICAL SPECIFICATIONS

Operating Temperature	30° to 120°F
Commercial Power Input Voltage	117 VAC, 60 Hz 1.8 amps
Internal Power Supply	24 VDC
Alarms Circuit (maximum)	24 VDC at 1 amp (each)
Release Circuit (maximum)	24 VDC at .4 amp
General Trouble Relay Contacts (1 Form C)	5 amps @ 28 VDC/120 VAC
Alarm Relay Contacts (1 Form C)	5 amps @ 28 VDC/120 VAC
Auxiliary 1 Output Relay Contacts (1 Form C)	5 amps @ 28 VDC/120 VAC
Auxiliary 2 Output Relay Contacts (1 Form C)	5 amps @ 28 VDC/120 VAC
Enclosure	NEMA 1
Initiation Mode	Single Zone or Cross Zone Sequential Verification, Cross Sequential Verification
Time Delay (Predischarge)	0 to 240 seconds, or 0.0 to 24.0 minutes
Time Delay (Discharge)	0.0 to 24.0 minutes, or 0 to 240 minutes

12 ARCHITECT'S/ENGINEER'S SPECIFICATIONS

The fire detection and suppression system control panel shall be a Chemetronics Micro 1-EV. It shall be listed by Underwriters Laboratories and Factory Mutual Research and shall be suitable for releasing purposes in accordance with NFPA Standards 72, 12, 12A, 12B, and 2001.

All solid state circuitry and a very large scale integrated microprocessor shall permit the unit to be field-programmed to meet the needs of the specific application.

Programming for the various functions shall be accomplished with a menu-driven keyboard entry system. Programming shall be protected by an access code.

An Alpha-Numeric display shall be visible through a window on the front of the enclosure. The Alpha-Numeric display shall read the word SAFE during normal standby condition. In the event of a trouble or alarm condition, the display will switch to an Alpha-Numeric code. A chart affixed to the inside of the door shall be employed to interpret the code, thereby pinpointing the exact location of the trouble condition.

Up to six trouble codes shall be displayed on a priority basis. A predischarge timer shall be employed to allow evacuation of the hazard area. A programmable discharge timer shall be used to release the extinguishing agent for the appropriate time period.

The digital readout shall display the trip level and standby current of the detection loops, as well as predischarge and discharge timer settings, when the appropriate keys are depressed.

Class B (2-wire) supervision shall be provided for all automatic detection, manual station, external alarm, and releasing devices. The detection circuits shall accommodate products-of-combustion, optical, thermal, and open-contact devices. A maximum of 60 Chemetronics products-of-combustion detectors and/or any number of thermal devices or manual stations may be installed in one detection loop.

Two Class B supervised auxiliary inputs must be provided for supervision of products-of-combustion detectors, or contact-type devices such as pressure switches or tamper switches. One circuit shall be configured to initiate trouble signals; the other, a fire alarm.

A Class B supervised manual station input shall be capable of initiating an immediate or delayed agent discharge.

A Class B supervised abort switch shall be capable of being programmed in accordance with the guidelines of the insurance underwriter or authority having jurisdiction.

CONTENTS

Two individually supervised reverse polarity alarm outputs shall be provided. Each shall have a capacity of 1 amp at 24 VDC. Annunciation of ground fault and short circuit conditions shall be provided. Each circuit shall be individually protected by a supervised overcurrent device.

Three individually supervised solenoid circuits shall be provided. They shall have a rated capacity of .75 amp at 24 VDC, and shall be fitted with appropriate fuses to protect against damage from external electrical sources. Short circuit detection and ground fault indication shall also be provided to assure proper operation of the release circuits at all times.

A Form C trouble and alarm relay contact shall be provided. In addition, two programmable auxiliary outputs shall permit a choice of remote or onboard relays. All dry contacts shall be rated to 5 amps at 28 VDC/120 VAC.

A dedicated 120 VAC, 60 Hz commercial power source shall be supplied to the panel. It shall be converted to 24 VDC by internal circuitry.

A 45-second trouble delay on loss of AC power shall provide time for an alternate AC power source to take over, reducing unwanted trouble indication.

A supervised battery and charger circuit shall automatically provide power for detection, alarm, and release devices upon loss of primary AC power. Batteries shall be kept fully charged by the integral charger when AC power is present. A battery test switch, capable of supplying a full 1 amp load shall be provided. This test shall generate a PASS or FAIL reading on the Alpha-Numeric display. Battery volts and amps shall also be displayed by depressing the appropriate keys on the keypad.

A semi-flush or surface-mount enclosure shall be provided. It shall have a minimum NEMA 1 rating and a lock shall be provided to prevent unauthorized access to the control panel.

13 STANDBY BATTERY CALCULATIONS

The following is a listing of the maximum power consumption for the Chemetronics Micro 1-EV and other associated devices. This listing is to be used in conjunction with the battery calculation chart found on the next page.

PART I

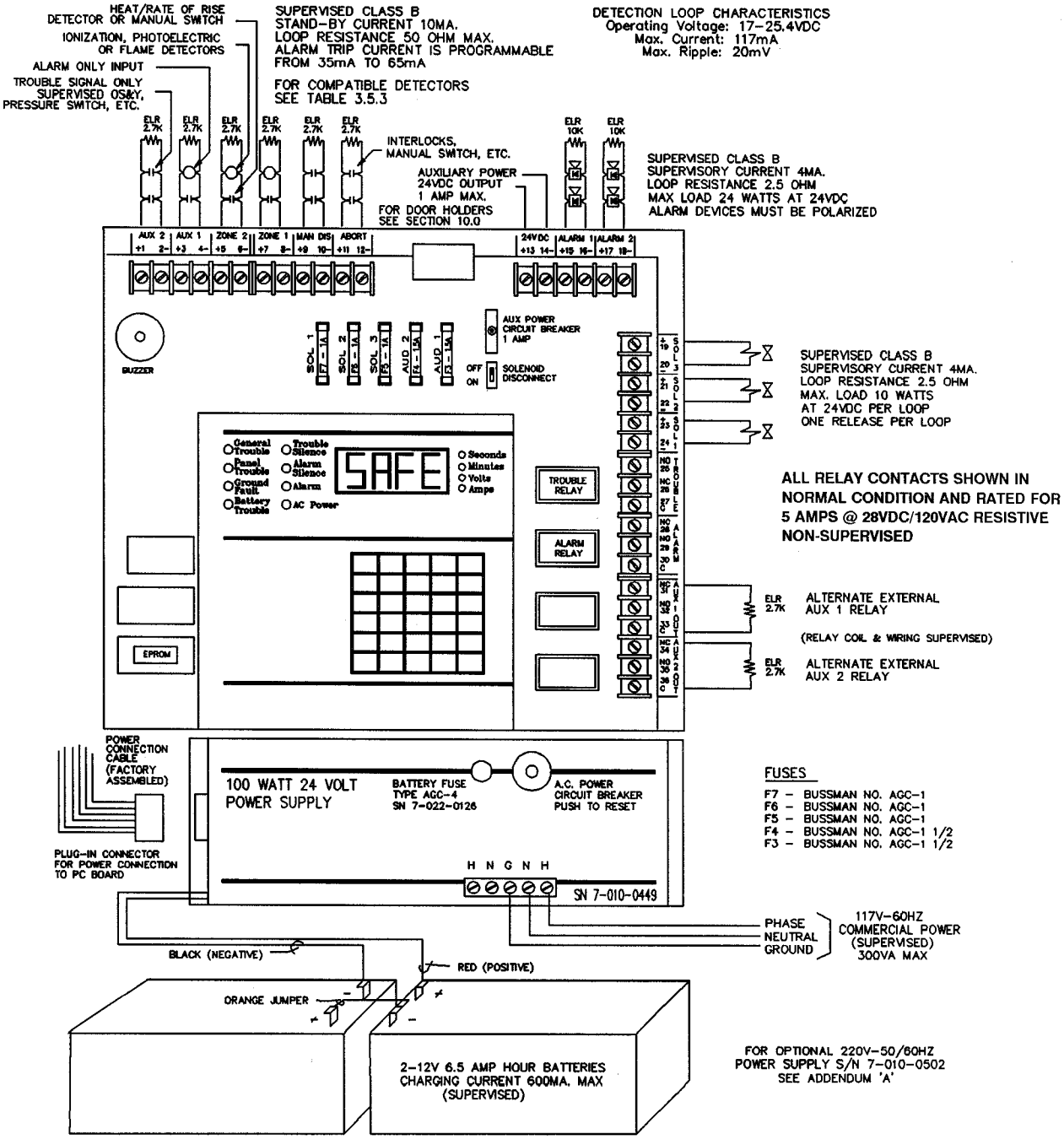
Description	Quantity of Devices	Power Consumption Per Device	Total Power Consumption
1. Micro 1-EV (Standby Condition)[1]	1	.200A	.200A
2A. Micro 1-EV (Alarm Condition)	1	.610A	.610A
B. Alarm Bell 6" & 10"		.075A	
C. Alarm Horn (S/N 70030126)		.035A	
D. Selectone Alarm (S/N 70100311)		.085A	
E. Strobe - all		.033A	
F. Auxiliary 1 Relay (Panel Mounted or Remote)			
G. Auxiliary 2 Relay			
H. Other Devices			
Note: Maximum audible output power per alarm loop is 1 amp (1.00A). Maximum Auxiliary Relay output power per output is ¼ amp (.250A).		**Total Power Consumption → (Alarm Condition)**	
3A. Solenoid Valve (S/N 70610005)		.400A	
B. Solenoid Valve (S/N 70610006)		.400A	
C. Solenoid Valve (S/N 70610343)		.400A	
D. Other			
Note: Maximum actuator/solenoid output power is 10 watts (.4A) per output.		**Total Power Consumption → (Discharge Condition)**	

[1] Not including auxiliary power supply.

PART II	Total Power Consumption	Battery Amp Hours
1A. Micro 1-EV (Standby Condition)[1]	.200A	
B. Standby Time Required (in hours)		
C. Amp Hours Required (Standby Condition) (Multiply 1A X 1B)		
2A. Total power consumption (Alarm Condition) (Total from Part I, Section 2)		
B. Alarm time required (in hours) (5 minutes = .084 hours; 10 minutes = .168)		
C. Amp hours required (Alarm Condition) (Multiply 2A x 2B)		
3A. Total power consumption (Discharge Condition)		
B. Discharge time (in hours) (1 minute = .017 hours; 2 minutes = .034		
C. Amp hours required (Discharge Condition) (Multiply 3A x 3B)		
Total Amp Hours Required (Add 1C + 2C + 3C) Total amp hours must not exceed 6.4 AH.		

[1] Not including auxiliary power supply.

14 INSTALLATION WIRING DIAGRAM



▲ **Figure 14** — Micro 1-EV Installation Wiring Diagram

NOTES

- See Pages 33 & 34 for Fault Code Chart.
- Install per NFPA 70, 72, 12, 12A-B, and 2001. For installations requiring NFPA 17 and/or 17A, optional Class A Module (S/N 70100686) is required.
- For installation instructions and electrical ratings, refer to Section 3 of this manual.