Electrical Control Panel,

p/n 15780

DESIGN AND INSTALLATION MANUAL,
p/n 15827, Revision Level A, October 10th, 2002

AMEREX CORPORATION INC. - 7595 GADSDEN HIGHWAY - TRUSSVILLE, AL 35173 - February 6, 2002

Amerex Electric Control Panel
Installation, Operation and Maintenance Manual

Features
- 24 VDC Operation
- All System Diagnostic Conditions indicated through a single Trouble LED and Internal Audible
- Audible Alarm Silence, Alarm Reset, and Test Buttons
- Detection and Remote Audible Alarm Circuits Ground Fault Supervision
- Internal Compartment for Back-up Batteries
- Internal, Rechargeable, 15 in^3 Nitrogen Cylinder, pressurized to 1,800 psi @ 70^oF
- Automatic Detection through Contact Closure Type Devices
- Manual Actuation through Electric Manual Pull Station
- Mechanical Gas Valve Shut-Off Capable
- User Selectable Immediate or Delayed Discharge Actuation
- Immediate Transfer Dry Relay Contacts available for Fan Shutdown or Other Device
- One Dry Contact SPDT Microswitch available for Optional Auxiliary use; provisions for two additional SPDT Microswitches, either for Immediate Transfer, or Timed (in conjunction with 15 second Discharge Delay)

Approval
This Control Panel is UL Listed with Amerex Industrial Suppression Systems, and Complies Electrically with the Requirements of the Standard for Control Units for Fire-Protective Signalling Systems, UL Standard 864.

I) General:

This single hazard Control Panel supervises and controls one Fire Suppression System. Proven, rugged mechanical components are reliably set into motion with a simple electrical interface. The Control Panel is compatible with Amerex IS Industrial Pre-Engineered Fire Suppression Systems, agent cylinder model numbers: 16206, 16207, and 16208. It meets the requirements of NFPA 72 and is UL Listed per Standard 864. The Control Panel is approved for use in Fire Suppression Systems covered by NFPA codes 96, 17, and 17A.

Alarm
The Control Panel provides a single, Class “B”, Style “Y” supervised alarm output circuit for operating polarized signaling devices. An Alarm Silence button located inside the enclosure on the operator interface board will silence the alarm signal output. If a Trouble Alarm is silenced, a subsequent Fire Alarm will override the Silenced Trouble Alarm, turning on both the internal and Remote Audibles and the Fire LED. A Silenced LED is visible from the outside of the panel.

Detection
The Control Panel has a single, Class “B”, Style “A” initiating circuit. UL-Listed, Contact-Closure type devices such as Amerex Rate of Rise heat detectors are connected to this circuit.

The Amerex part numbers for detectors are:

P/N	Temperature Rating
16194	190°F (88°C)
16236	194°F (90°C)
16195	225°F (107°C)
16196	325°F (163°C)

Manual Release

The Control Panel provides terminals for Electric Manual Pull Stations (Class "B", Style "A").

Fire Suppression – Agent Release

Upon either a manual or automatic response to a fire, an internal Nitrogen Cylinder will expel 15 in^3 of dry Nitrogen which is pressurized to 1,800 psig (12,411 kPa) at 70°F (21°C). The nitrogen gas is used to open the Agent Cylinder Valves, which in turn, releases the agent (see the applicable Amerex Installation Manual). If a discharge time delay is required, press the Discharge Delay Selection button on the operator interface module to select either zero seconds (as shipped from Amerex) or 15 seconds. This will allow time for exhaust fan wind-down prior to system discharge. A built-in Discharge Verification Delay of ½ second reduces the chance of accidental system actuation in the event of detection wires being cut or and electrical transient being transmitted in the detection wiring. [**Note**: If the Discharge Delay button is set for 15 seconds, then the plate-mounted microswitches will be delayed from transferring for 15 seconds.]

Supervision

This Control Panel is fully supervised. Supervision includes the following:

- A/C Power (Line or Neutral Open, or a drop below 85% of Rated Voltage)
- Remote Audible Alarm Output Continuity, and Wire to Wire Short
- Automatic Detection Circuit Continuity
- Manual Release Circuit Continuity
- Battery Connection

The Control Panel provides four LED indicators which are visible with the front door closed (Power, Fire, Trouble, and Silenced). Any Trouble condition, such as any of the above circuits, will result in an audible signal and illumination of the Trouble LED annunciator. The audible signal may be silenced by activating the Alarm Silence button on the operator interface module. A Trouble condition will also result in the activation of the Trouble Relay SPDT contacts.

Power Supply / Backup Batteries

The Control Panel contains a 24 VDC power supply with overload protection provided by electronic current limiting. The Control Panel includes a built in battery charger and space for a pair of 12 VDC, 1.3 (minimum) to 10.0 (maximum) ampere-hour, sealed lead acid batteries to be housed within the enclosure to provide 24 hours of standby operation. The unit also includes an auxiliary 24 VDC output for connection to a UL Listed notification appliance. A trouble signal is generated if battery voltage falls below acceptable levels, or if the batteries become disconnected. Since the Control Panel uses "intelligent" logic to maintain the charge on the back-up batteries, charging only occurs when required. The Control Panel provides continuous supervision of the internal battery circuit and voltage levels. Every 24 hours, the electronic circuitry will provide a 6 minute charge to the backup batteries. The green System OK LED will pulse (flicker) $1/10^{th}$ second every 15 seconds indicating the internal batteries are being charged. A Trouble Condition will be indicated in the event of low voltage (< 20.5 VDC), batteries other than 12 VDC, or defective batteries. To "force" an hour-long charge on a set of batteries, or to verify the integrity of the charging circuit, simultaneously press the Silence and Reset buttons, then release. The green System OK LED will flicker, indicating the internal back-up batteries are being charged. Press the Reset Button to stop the forced charge.

Enclosure

The panel enclosure is constructed of rugged, 16 gauge steel, painted red. A sliding, steel door is held closed by a key lock. All operator interface switches and indicators are located on the operator interface module behind the locked cover. The enclosure is of sufficient size to house the two 12 V, 1.3 Ah (minimum) to 10.0 Ah (maximum) batteries required for standby power operation.

II) Basic Operating Instructions:

Standby Condition (Normal)

- Green **Power On LED** is on, all other LED's and internal **Audible Sounder** are off.
- Activating the **Test** Button performs the following:
  - Activates internal **Audible Sounder**.
  - Transfers the **Trouble Relay** SPDT contacts.
  - Transfers the **Immediate Relay** SPDT contacts.
  - Activates **Remote Audible Device**. (The **Test** Button will not activate the **Fire Suppression System**.)
  - Activates all LED's

Alarm Condition

- Red **Fire LED** and internal **Audible Sounder** is on. **Remote Audible Device** is activated.
- Alarm sequence is initiated by actuation of **Detection Circuit** or by **Manual Pull Station**.
- **Fire Suppression System** discharges.
- **Alarm Silence** Button turns yellow **Silenced LED** on, internal **Audible Sounder** off, and deactivates the **Remote Audible** circuit.
- Yellow **Trouble LED** is on and pulses six (6) times.
- **Panel Reset** Button clears Alarm condition provided the following events occur:
  - The **Detection Device** re-opens (if automatically initiated), or
  - The **Manual Pull Station** has been reset (if manually initiated).
  - The spring-loaded lever and the collapsible column have been reset inside the panel. (See **Figures A** and **B** for resetting diagrams.)

Trouble Condition

- Yellow **Trouble LED** is on.
- Internal **Audible Sounder** pulses 1 second every 10 seconds.
- Activation of the **Alarm Silence** Button turns on the **Silence LED** and turns off the internal **Audible Sounder**. If a prior alarm condition has been silenced, the **Silence LED** remains on.
- The **Trouble LED** and internal **Audible Sounder** turn off when all trouble is cleared. **Silenced LED** turns off except if alarm condition exists.
- In the event of a Fault Condition, the **Trouble LED** will go through a diagnostic flash sequence which repeats every 15 seconds. Diagnostic LED indications are as follows:

Fault Condition	**Trouble LED Flash Count**
*Input Power Failure	1
Heat Detector Input Failure	2
Manual Electric Pull Station Failure	3
Remote Audible Alarm Output Fault	4
Backup Battery Fault (missing, dead, backwards, or not connected)	5
Microswitch Fault (open or not reset)	6
Solenoid Open	7

***Note:** In the event of an Input Power Failure, the Trouble LED will not illuminate and the Audible Alarm will not sound until after a period of 60 seconds. The purpose of this feature is to eliminate problems associated with a temporary power failure.

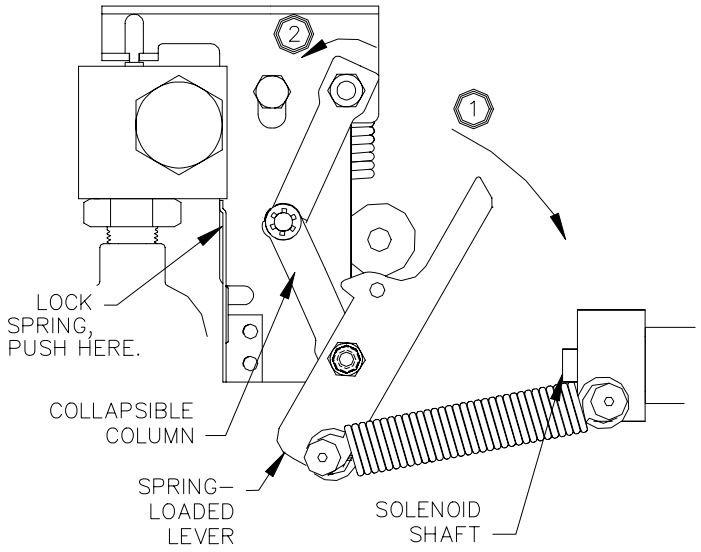

FIGURE A: RESETTING RELEASING MECHANISM

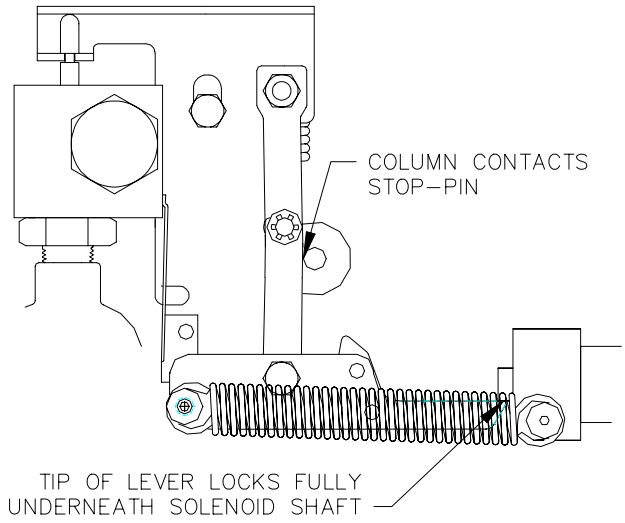

FIGURE B: RELEASING MECHANISM PROPERLY SET

Resetting Steps, Following Panel Activation / System Release: (if a manual actuation has occurred, first reset the Manual Pull Station)

1) Rotate the spring loaded lever clockwise, until its tip is latched under the solenoid shaft.
2) Using the Amerex Cocking Tool, p/n 13341 in conjunction with a 3/8" drive socket wrench and extension, re-cock the Collapsible Column. This is accomplished by simultaneously pushing in on the Lock Spring while turning the Cocking Tool counterclockwise.
3) Follow Recharge Instructions in the applicable Amerex Installation, Operation, and Maintenance Manual.
4) Replace the 15 in^3 Nitrogen Cylinder (p/n 09956).
5) Press the Reset Button to Clear the Alarm Indication.
6) Ensure that the Panel indicates a green System OK LED.

III) Installation:

Recommended Wiring Color Code for Fire Suppression System Installations:

Black = BK
White = WH
Green = GR

Wire Sizes

AC power feed	#18 minimum / #14 AWG
All others	#14, 16, or 18

Battery Power

Batteries provide 24 hour standby supervision, plus 5 minute alarm load at the end of that time, contingent upon detection and output limitations stated herein. Panel loading and battery standby comply with NFPA 72. Batteries (quantity: 2) must be sized according to the Battery Calculation Worksheet (p. 12). Amerex offers 2.6 A/h batteries as p/n 16202.

Caution: Before servicing batteries, disconnect AC power. Batteries should be replaced at least **once every 36 months**, or as directed by the local authority having jurisdiction. Battery sets whose open circuit voltage is less than 24 volts after charging for a minimum of 25 hours must be replaced.

Installation Instructions (Must be Surface-Mounted, Only)

Instructions for mounting (see Figure C).
All installation wiring shall adhere to NFPA 70 (NEC) and all State and Local codes.

1) Remove necessary knockouts on metal enclosure.
2) Insert mounting hardware (not provided) into wall, spaced to match key holes on back of box, see Figure C, below.
3) Mount box on to the screws.
4) Tighten all screws.
5) See installation wiring diagram for further instructions.

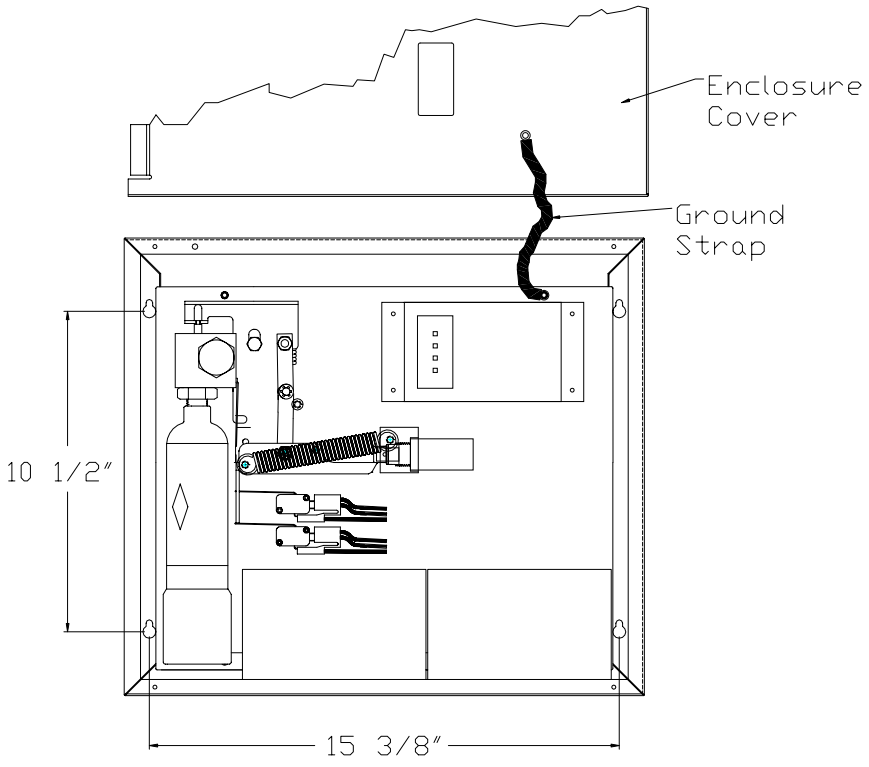

Figure C

Field Wire Routing Instructions

The wiring for the Solenoid, Supervisory Microswitch, and Back-up Battery has been routed at the factory. However, field wiring should be routed according to the figure below:

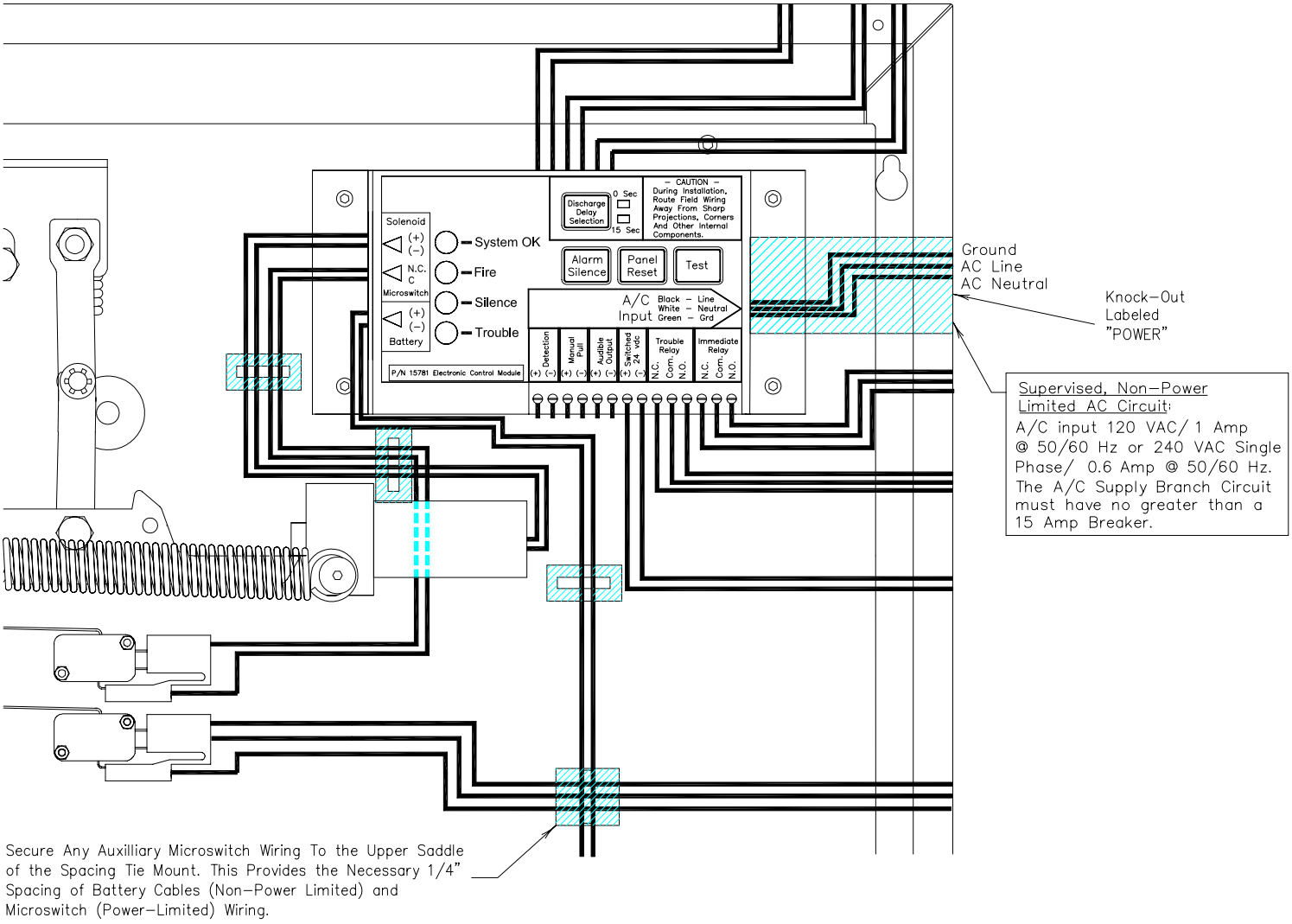

Figure D: Field Wire Routing

The AC input is routed through the knock-out marked “POWER”. This circuit is classified as non-power limited. All other field wiring is classified as power limited and can be routed through any of the remaining eight knockouts. As shown, the Detection, Manual Pull, and Audible Output wiring is routed through the channel underneath the electronics module. Adhere to NFPA 70 National Electric Code for all wiring practices.

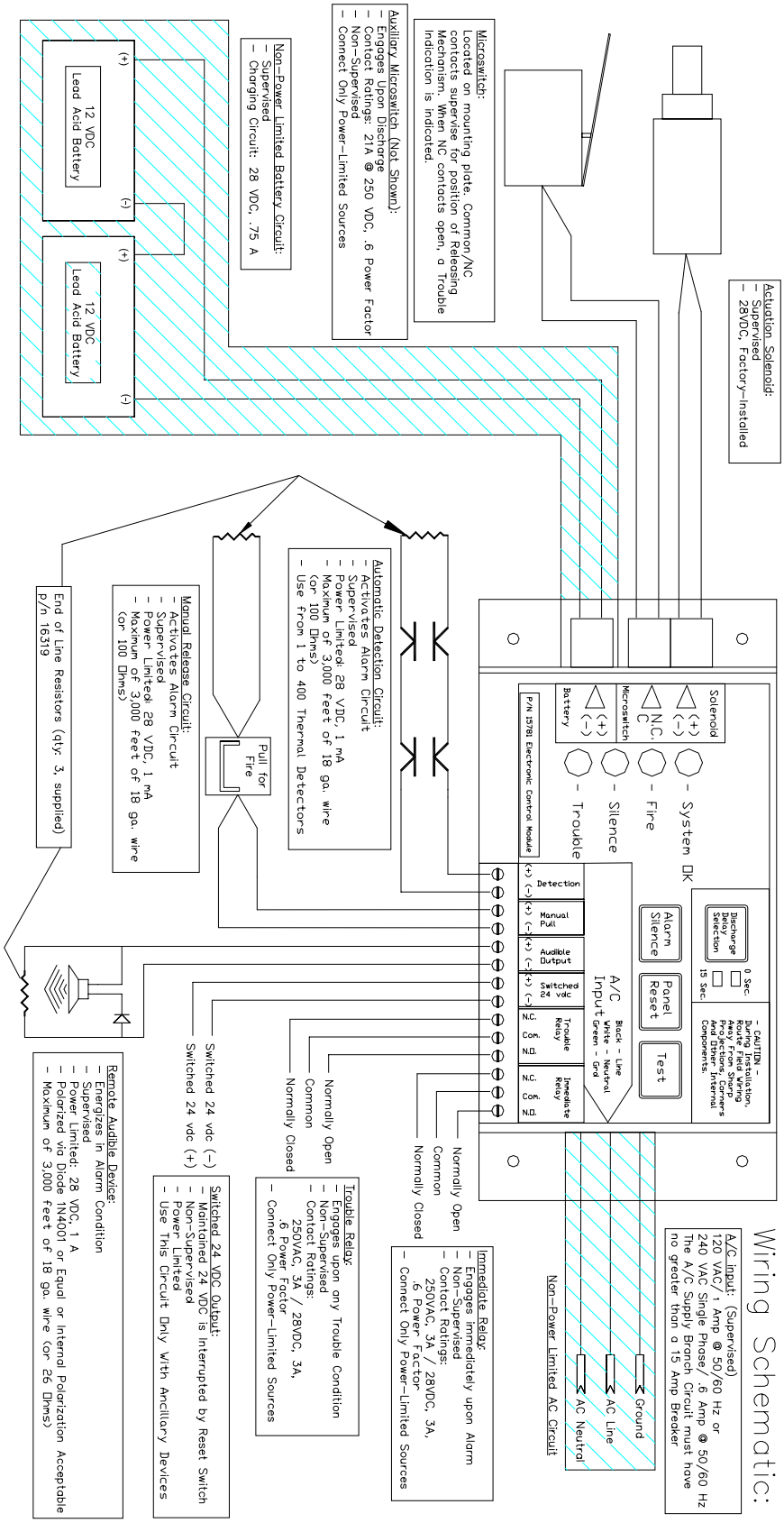

Figure E: Installation Wiring Diagram

IV) Technical Specifications:

Input Power:

120 VAC, 50/60 Hz 1 A max.
240 VAC, 50/60 Hz 0.6 A max.

Panel 24 VDC Power Requirements:

Normal Standby Current (Minimum Current Draw): 15 mA
(Includes End of Line Devices; does not include any field-wired devices)

Switched 24 VDC Circuit:

Maximum Current Output not to exceed 290 mA (with 10 A/h Batteries); Use this connection only with ancillary devices; Maximum field wiring voltage is 28 VDC

Remote Audible Output Circuit:

One Class "B", Style "Y" signal circuit, Maximum Circuit Power Consumption: 1.0 Amp.; 4.7k ohm End of Line Resistor (provided), Rated at ¼ watt minimum; Steady output; Maximum of 3,000 ft of 18 AWG wire, or maximum line resistance of 26 Ohms; Maximum field wiring voltage is 28 VDC

Relay Outputs:

Immediate Relay, Trouble Relay, Three SPDT Microswitches (one provided, two optional) Relays are form C, rated 3A @ 250 VAC/30 VDC, Microswitches rated at 21A @ 250 VAC. Note: Connect only Power-Limited Sources to the Immediate and Trouble Relays; 0.6 Power Factor; Maximum field wiring voltage is 28 VDC / 250 VAC

Detection Circuit:

Supervised, Class "B", Style "A", Maximum Circuit Power Consumption: 1 mA; 4.7k Ohms End of Line Resistor (provided), rated at ¼ watt min.; Use from one to 400 detectors on this circuit; Maximum of 3,000 ft of 18 AWG wire, or maximum line resistance of 100 Ohms; Maximum field wiring voltage is 28 VDC

Manual Electric Pull Station Circuit:

Supervised, Class "B", Style "A", Maximum Circuit Power Consumption: 1 mA; 4.7k Ohms End of Line Resistor (provided), rated at ¼ watt min.; Maximum of 3,000 ft of 18 AWG wire, or maximum line resistance of 100 Ohms; Maximum field wiring voltage is 28 VDC

IV) Technical Specifications (Continued):

Standby Batteries:

Requires (2) 12 VDC sealed lead acid batteries for 24 hour standby operation / 5 minutes alarm operation at maximum rated load. Minimum and Maximum range of A/h Batteries available: 1.3 to 10.0 A/h. Amerex offers 2.6 A/h Batteries (order separately).

Battery Charger Output:

Maximum Charging Current: 0.75 A

Dimensions (nominal):

15" high x 17" wide x 5.02" deep

Warning: The total device power consumption must not exceed 1.35 Amps.

Battery Requirement Calculation Worksheet

Warning: Individual device power consumption must not exceed 1.0 Amp. Total system power consumption must not exceed 1.35 Amps. Use the table below to calculate power consumption of system devices. The sum of the Column (D) Maximum Supervisory Current, **or** the sum of Column (E) must not exceed 1.0 Amps. Power Supply failure may occur if either of these two columns exceed 1.0 Amps.

Detection Circuit, Not To Exceed 1 mA	(A) # of Devices		(B) Max Device Supervisory Power (A)	(C) Max Device Alarm Power (A)		(D) Max Supervisory Power (A)	(E) Max Alarm Power (A)
		x			=		
		x			=		
Manual Release Circuit, Not to Exceed 1 mA							
		x			=		
		x			=		
Remote Audible Alarm Circuit, Not to Exceed 1.0 Amp.							
		x			=		
		x			=		
		x			=		
		x			=		
		x			=		
		x			=		
Switched 24vdc Circuit, Not to Exceed .29 Amp							
		X			=		
		X			=		
		X			=		
		X			=		
		X			=		
		X			=		
Control Panel Internal Circuitry	1	x	0.015	0.060	=		
Total Power Required							
						(F)	(G)

Use the following formula to calculate Backup Battery Power Requirements:

H = # of Standby Hours required
J = # Alarm Hours required
F = Max. Supervisory Power (A)
G = Max. Alarm Power (A)

$$\frac{(H \times F) + (J \times G)}{.75} = \text{Backup Battery Amp/Hours}$$

Range of Backup Batteries: Minimum = 1.3 A/h; Maximum = 10 A/h

Instruction for Calculating System Power Requirements and Backup Battery Capacity Requirements:

1) Determine the number, type and power consumption of the devices intended for use with the system. Enter the variables in the chart above.
2) When the device variables are determined, calculate the total power consumed by each type of device in both a supervisory (normal) condition and an alarm condition. **Ensure that the power consumption requirements listed do not exceed 1.0 amp per circuit**.
3) Total the power consumption for both supervisory and alarm conditions at the bottom of columns D & E. Enter the results as F and G in the formula above.
4) Determine the required number of hours in a standby battery backup condition. Enter this as H in the formula above. Determine the required number of hours in an alarm condition. Enter this as J in the formula above. Both of these figures are to be obtained by the authority having jurisdiction. Typically the values will be a minimum of 24-hours in battery backup standby and a minimum of 5 minutes (0.083 hours) in a full alarm condition.
5) Select a battery that has an Amp/Hour rating greater than the value calculated in the above formula.

Reference Formulas:	Units of Measure:
Watt = Voltage x Current	Power = Watts (W)
Current = Watt / Voltage	Current = Amps (A or mA)
Current = Voltage / Resistance	Resistance = Ohms (Ω)

V) Replacement Parts:

P/N	Description
15781	Module, Electric Control Panel
15839	Microswitch, Plug-Terminated (supervising the Release Mechanism)
12524	Microswitch, unterminated, for auxiliary field wiring
15554	Solenoid with Plunger
16202	Back-Up Batteries, 2.6 A/hr (determine A/hr requirements from battery calculation worksheet, page 12)
16319	End of Line Resistor

Warranty Statement:

Amerex warrants its Electric Control Panel to be free from defects in material and workmanship for a period of three (3) years from the date of purchase. During the warranty period, any defective part will be repaired or replaced (at Amerex option). This warranty is valid only if each system is installed, serviced, and maintained by an Amerex factory trained Authorized Distributor in strict accordance with Amerex Manual No. 15827; all work must be performed using genuine Amerex replacement parts. This Warranty does not cover defects resulting from modification, alteration, misuse, exposure to corrosive conditions or improper installation or improper maintenance. Warranties on component items not manufactured by Amerex are provided by others whose warranty, evaluation, and judgement will be final. **ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF FITNESS FOR PURPOSE AND MERCHANTABILITY, ARE LIMITED TO THE TIME PERIOD AS STATED ABOVE. IN NO EVENT SHALL AMEREX CORP. BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so that the above limitations or exclusions may not apply to you. Amerex Corp. neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than as expressly set forth herein. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state. To obtain performance of the obligation of this Warranty, write to Amerex Corp., P.O. Box 81, Trussville, AL 35173-0081, U.S.A. for instructions.