



**Fire Suppression Systems**

# Modular Control Panel III

## AUSTRALIAN STANDARDS

### Installation, Operation, and Instruction Manual

P/N 22522 – Jan. 2014

Revision A



## Vehicle Fire Suppression System

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## SECTION 1 INTRODUCTION

### 1.1 DOCUMENT SCOPE

The purpose of this manual is to provide operating instructions for the Australian Standards Modular Control Panel III P/N 22408. This document must be used in conjunction with the Modular Dry Chemical Vehicle Fire Suppression Systems Installation, Operation and Maintenance Manual (P/N 13980) for electrical actuation, NFPA Standard no. 17 Dry Chemical Extinguishing Systems, and all other standards deemed applicable to an installation by local authorities having jurisdiction.

 **IT IS THE RESPONSIBILITY OF INDIVIDUALS WHO INSTALL, OPERATE, INSPECT, RECHARGE OR MAINTAIN THESE SYSTEMS TO READ THIS ENTIRE MANUAL.**

As with all electrical and mechanical equipment, all AMEREX systems require periodic care to provide maximum assurance that they will operate effectively and safely. Inspection frequency should be based on the requirements of the equipment on which the equipment will operate. Inspection and maintenance schedules are shown in this manual and must be followed to ensure reliable system performance. Equipment operating continually and/or in harsh environments will require more frequent inspection and maintenance.

Updated manuals will be available online at [www.amerex-fire.com](http://www.amerex-fire.com). It is important that these changes and additions be added to this manual according to the instructions that will accompany them. By doing this, you are assured of always having the latest information concerning your system from the AMEREX factory.

The application and use of the AMEREX Vehicle Fire Suppression Systems are limited to the applications and uses described in this manual. Technical data contained herein is based on controlled laboratory testing deemed appropriate by Factory Mutual Research Corp. and other listing agencies, and is intended for informational purposes only. The data presented is accurate for the testing performed, but is published with no guarantee relative to a given hazard where factors are different from those encountered during actual test. AMEREX disclaims any liability for any use of the data and information contained herein by any and all other parties. Please direct questions concerning information in this manual to:

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## 1.2 PRODUCT DESCRIPTION

The Modular Control Panel III (P/N 22408) is designed specifically for mobile equipment vehicle applications. The panels provide electrical supervision for an integrated fire detection and suppression system.

## 1.3 MODULAR CONTROL PANEL FEATURES

The Modular Control Panel (P/N 22408) provides electrical supervision of the power, detection and releasing circuits. The Control Panel features visual LED system status indicators and an audible alarm that can be silenced. The Control Panel is supplied with a self-recharging back-up battery to provide protection to the vehicle in the event of temporary power loss for up to 24 hours, and also includes a time adjustable relay circuit. The test mode for the Control Panel verifies LED, alarm function and relay function.



## SECTION 2 SYSTEM COMPONENTS

Please refer to the Modular Dry Chemical Vehicle Fire Suppression Systems Installation, Operation and Maintenance Manual (P/N 13980) for complete installation and system test.

**⚠ A THOROUGH HAZARD ANALYSIS PRIOR TO LOCATING COMPONENTS IS CRITICAL TO PROPER SYSTEM PERFORMANCE. AN IMPROPER OR INCOMPLETE HAZARD ANALYSIS CAN LEAD TO UNWANTED SYSTEM DISCHARGES OR FAILURE TO SUPPRESS A FIRE. AT NO TIME SHOULD AN AMEREX FIRE SUPPRESSION SYSTEM BE INSTALLED WITHOUT FIRST COMPLETING AND DOCUMENTING A COMPLETE HAZARD ANALYSIS.**

**⚠ AMEREX ELECTRONIC DISPLAY PANELS ARE TO BE USED ONLY WITH AMEREX SYSTEM COMPONENTS AND WIRING ASSEMBLIES. THE USE OF OTHER THAN APPROVED COMPONENTS WILL VOID AMEREX WARRANTY ON ALL SYSTEM COMPONENTS AND THE FACTORY MUTUAL LISTING.**

### 2.1 Panel Placement

The Modular Control Panel III (P/N 22408) should be mounted in a dry protected area such as a vehicle cab in a location clearly visible and within reach of the vehicle operator. The panel should not be placed in environments where the temperature is outside the range of -40°F (-40°C) to +150°F (66°C). The panels can be mounted with #10 hardware or equivalent.

Please refer to Figure 3 for mounting details.

### 2.2 Wiring Considerations

All wiring installed in conjunction with Amerex Vehicle Fire Suppression Systems should incorporate best practices, and shall be secured using the same clamping methods used by the original equipment manufacturer or an approved equivalent. Wiring should not be installed such that tension is placed on cables. A minimum bend radius of 2 inches should be maintained at all bends when installing. Dielectric grease shall not be used on any Amerex components.

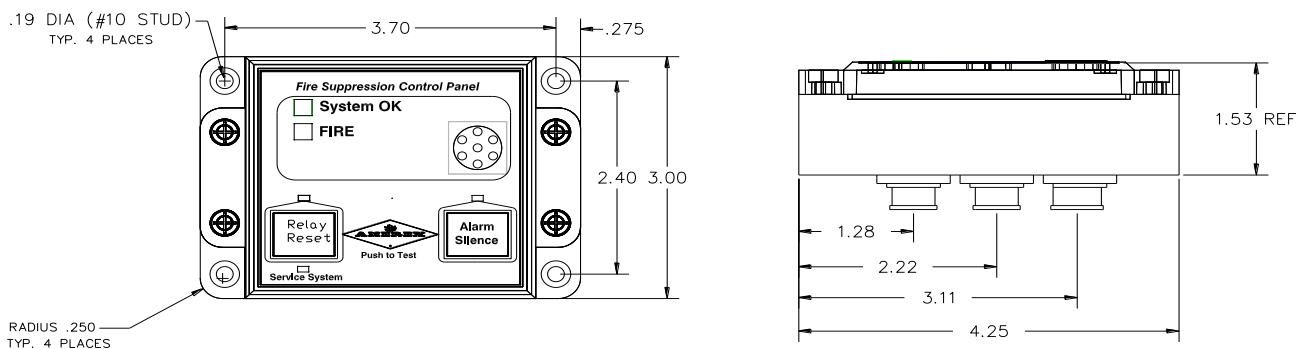


Figure 3 Panel Layout

### 2.3 Detection Network

The detection network consists of a number of spot thermostats and / or linear detection circuits wired together in series beginning at the panel and ending with an End of Line Module (P/N 14010). The End of Line Module allows the panel to supervise the integrity of the detectors and wiring of the detection circuit.

The detection network is identified by the green color coded connectors, and uses Amerex Hazard Wire Modular Lead Assemblies. Two Class B detection network circuits are provided.

### 2.4 Manual Actuation Switch

All systems require at least one electrical (P/N 14053) or pneumatic (P/N 10210) manual actuation device as a means of manually activating the suppression system.

Multiple manual actuation devices can be used if more than one is required. If the electrical switch is connected to the panel on a circuit that is shared with heat detectors it must be the first circuit in line (closest to the panel). An End of Line Module (P/N 14010) is connected to the last component in the circuit to allow the panel to supervise the integrity of the entire circuit.

### 2.5 Power Supply Lead

The Power Supply Lead is used to bring power from the vehicle battery (12 or 24vdc) to the panel. It is supplied with a fuse holder and a 10 Amp fuse to protect the panel and associated circuits. The power lead is connected to the red color coded connector.

**⚠ WARNING: USE OF THE AMEREX SUPPLIED POWER LEAD IS CRITICAL TO PROPER FUNCTIONING AND PROTECTION OF ALL SYSTEMS ELECTRICAL COMPONENTS. USE OF POWER SUPPLY LEADS OTHER THAN THE TYPE AND RATING SPECIFIED IN THIS AND ALL OTHER ASSOCIATED MANUALS WILL VOID FACTORY MUTUAL APPROVALS.**

**⚠ WARNING: AT NO TIME SHOULD THE BACK-UP BATTERY BE USED AS THE MAIN POWER SOURCE. THE SYSTEM MUST BE CONNECTED DIRECTLY TO THE VEHICLE BATTERY AS A MAIN POWER SOURCE.**

### 2.6 Electrical Actuation

The Linear Actuator, when activated, causes the release of suppression agent. The panel energizes the actuator when either the Manual Release Switch (P/N 14053) has been pressed or the detection circuit has detected a fire. The actuator circuit is attached to the yellow color coded connector. The actuator circuit is supervised by the panel for integrity of the actuator and associated wiring. See Amerex manual (P/N 13980) for electric actuation or manual actuation applications.

**⚠ WARNING: DO NOT CONNECT ACTUATOR LEAD TO THE ACTUATOR UNTIL SYSTEM TEST HAS BEEN COMPLETED! FAILURE TO DO SO MAY RESULT IN UNWANTED SYSTEM DISCHARGE.**

### 2.7 Relay Connections

The Modular Control Panels (P/N 22408) include a connection lead for engine shutdown equipment or auxiliary safety equipment such as air dampers, warning horns or lights.

The relay circuit provides a normally open and normally closed contact to allow wiring for “energized to run” or “energized to stop” configurations. It is the responsibility of the installer to gain sufficient understanding of vehicle operation to determine:

If the device or equipment is “energized to run” or “energized to stop” (Power supplied to terminate normal operations). The relay is rated for maximum of 5 Amps and can be used with either 12 VDC or 24 VDC systems. If the relay is connected to a vehicle multiplex system or shutdown device, ensure the device program allows a delay or logic algorithm for mechanical contact bounce of 30 milliseconds.

 **WARNING: THE RELAY CONTACTS ARE RATED FOR A MAXIMUM OF 5 AMPS. THIS VALUE MUST NOT BE EXCEEDED.**

Any device that is wired to the relay contacts must draw its own current from an independent power lead fused with a 5 Amp type AGC fast blow fuse. In addition, the internal relay “common” contact is also protected with an internal self- resetting circuit breaker.

The color code for the relay wiring is as follows:

- Common – Red
- Normally Closed – Black
- Normally Open – White

Use Amerex Hazard Wire or other insulated wire of AWG 18 or equivalent for connection purposes.

## **2.8 Pressure Switch**

The Modular Control Panels (P/N 22408) includes a connection lead for the wiring of a pressure switch (or switches in the case of multiple agent cylinders). Pressure inside the agent cylinder holds electrical contacts normally closed. Loss of agent cylinder pressure will result in a pressure switch fault signal. The audible alarm will beep once approximately every ten seconds followed by seven flashes of the amber “Service System” LED indicating a pressure switch fault.

**SECTION 3 MODULAR CONTROL PANEL OPERATIONS (P/N 22408)**

**3.1 System OK**

When the panel is plugged in to an operational configuration the system will illuminate the green “System OK” LED.

**3.2 System Alarm**

When either the heat detection circuit has detected fire or the Manual Actuation Switch has been depressed, the following sequence will occur:

- The green “System OK” LED will turn off.
- The audible alarm will sound steady on and then change to a rapid pulsing before relay transfer.
- The red “FIRE” LED will illuminate.
- The relay will engage after programmed delay (default is approximately 15 seconds).
- The audible alarm will change to steady on.
- The amber “Relay Reset” LED will illuminate.
- The amber “Service System” LED will illuminate.
- The amber “Service System” LED will flash four times to indicate actuator discharge.

Alarm Source	Number of Service System LED
Heat Zone 1 Alarm	1
Heat Zone 2 Alarm	2
Both Zones in Alarm	3

The system will remain in alarm until the system has been serviced and the actuator has been replaced.

**3.3 Service System**

In the event of a system fault:

- The amber “Service System” LED will illuminate.
- The alarm will pulse approximately once every ten seconds.
- The amber “Service System” LED will flash to signify the fault source.

The source of the fault can be determined as follows:

Trouble Source	Number of Service System LED Flashes
Main Power Trouble	1
Heat Zone 1 Trouble	2
Heat Zone 2 Trouble	3
Actuator Trouble	4
Backup Battery Trouble	5
Pressure Switch Trouble	7

When a system fault is detected there is an approximate five second delay before notification. For main power trouble, the delay for notification is approximately 20 seconds



### 3.4 Alarm Silence

In the event of a system alarm or system service the audible alarm can be silenced with the “Alarm Silence” button. When the “Alarm Silence” button is depressed, the “Alarm Silence” LED will illuminate and the other LEDs will continue to show the alarm or service system fault status. The alarm will remain silent for 6 hours and will then resound to remind personnel that a problem condition is present.

### 3.5 Push to Test

Momentarily pressing the “Push to Test” (Amerex diamond) button will illuminate all LEDs and sound the audible alarm. Pressing and holding the “Push to Test” button will illuminate all LED’s, sound the audible alarm and engage the shutdown relay after any programmed delay has timed out. This allows verification of system notification and relay functions. The “Push to Test” function will not cause a system discharge.

The Control Panel will also signify the programmed relay (default delay is approximately 15 seconds). The relay delay is shown by the number of flashes of the “Relay Reset” LED displays.

#Flashes	Relay Delay
0	0 sec
1	5 sec
2	10 sec
3	15 sec

### 3.6 Relay Reset

In the event of an alarm condition, pressing the “Relay Reset” button will reset the relay reset delay to the programmed delay time. The relay function can be also be maintained by continuously depressing the “Relay Reset” button.

If the system is in an alarm condition and the system has been serviced and recharged the reset button will reset the relay to allow normal vehicle operation.

### 3.7 Relay Delay Programming

The delay for fire relay can be programmed on the Modular Control Panel (the default delay is approximately 15 seconds). The delays can be set from 0 to 15 seconds in 5 second intervals. To program delay use the following procedure:

- 1.) Press and Hold the “Relay Reset” and “Alarm Silence” buttons for 20 seconds.
- 2.) The panel will chirp once and the “System OK” LED will flash.
- 3.) Press the “Relay Reset” button “x” times for the relay delay.
- 4.) After 10 seconds has lapsed, the panel will chirp twice and the “System OK” LED will stop flashing.

## Fire Relay Delay Values

Number of Times Button is Pressed	Seconds of Delay
1	0
2	5
3	10
4	15

After programming sequence is completed, verify correct value by pressing and holding the “Push to Test” button. Audible Alarm with pulse continuously until countdown reaches relay transfer. After transfer Audible Alarm changes to steady on.

### 3.8 Setting Delay to Factory Default Value

To return the fire activation relay to factory default value enter programming mode as described in section 3.7, press and hold the “Push to Test” button (located under the Amerex logo) for five seconds. The alarm will sound and the “Relay” and “Silence” LED’s will flash once to acknowledge that the delay has been reset to factory default value of approximately 15 seconds.

## SECTION 4 TROUBLE SHOOTING THE ELECTRICAL CIRCUITS

### 4.1 Power Circuit Diagnostics

Condition: No Green System OK LED on the panel. Amber “Service System” LED flashes one time.

Possible Cause:

No electrical power is being supplied to the panel. Vehicle battery power to the panel may be interrupted, and the system is in the panel back-up battery mode. After 24 hours the back-up battery will drain, and the “Service System” LED will no longer be illuminated.

Troubleshooting:

Install the Alarm Test Module (P/N 21447) into yellow color coded actuation circuit.

Inspect the Amerex main power fuse located in line on the red positive (+) lead at the battery. Replace fuse if necessary with a 10 Amp fast blow fuse. Do not use a fuse of a higher or lower amp rating, as system will not function properly.

Unplug the red color coded main power lead from the panel pig-tail lead and see if 12 to 24 Volts DC is being supplied to the system. If vehicle battery power is lost, restore vehicle battery power. If more than 50 volts is being applied to the panel, the panel’s internal circuit breaker will trip, and shut the panel down. The breaker will automatically reset when 12 to 24 Volts DC is supplied to the panel.

Insure that all the circular locking pigtail lead plugs on the back of the panel are securely attached and locked.

Plug power lead back into panel pigtail. Check for green System OK LED.

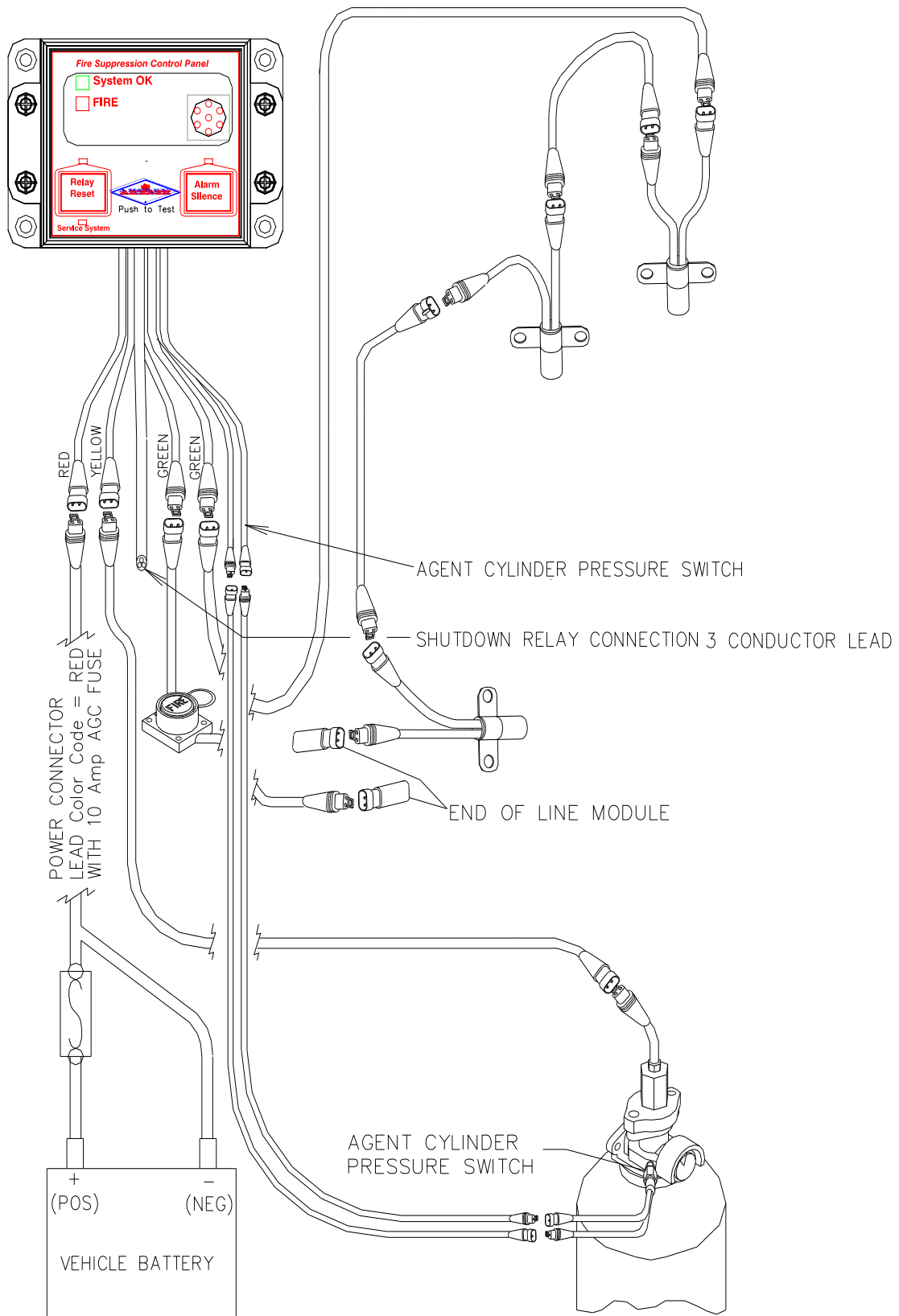


Figure 5 Control Panel System Typical Configuration

**4.2 Detection Circuit Diagnostics**

Condition: No Green System OK LED on the panel. Amber “Service System” LED flashes two or three times.

Possible Cause:

Open or short in thermostat, electric actuation button (P/N 14053), linear heat detection circuit, and/or thermostat circuit green color coded wiring.

Troubleshooting:

1. Determine from the Amber Service System LED which zone is in failure (2 flashes for Zone 1, 3 flashes for Zone 2).
2. Install alarm test module (P/N 21447) into yellow color coded actuation network.
3. Insure that all the circular locking pigtail lead plugs on the back of the panel are securely attached and locked.
4. Unplug both the green color coded detection circuits from the green color coded panel pigtail leads at the panel. Plug an End of Line Module (P/N 14010) into each green color coded pig-tail lead from the panel. Verify that the green “System OK” LED is now illuminated. If green LED is illuminated, the panel is good.
5. To find the faulty circuit or component, remove the End of Line Module from one of the green color coded pig-tail leads. Plug the first circuit component back into the corresponding green color coded pig-tail from the panel. Now, plug the End of Line Module into the male plug at the end of that component. If the green LED on the panel again illuminates, that component is good. Repeat this process one component at a time until the faulty component(s) is (are) found, and the circuits are connected with EOLs in place. Note: there are two green color coded circuits. See Fig. 5.
6. After the faulty component is found and replaced, the detection circuits should have a green OK LED illuminated on the panel.

**4.3 Actuator Circuit Diagnostics**

Condition: Red “FIRE” LED is illuminated, audible alarm is sounding, and internal relay is engaged. Amber “Service System” LED is on and flashing.

Alarm Source	Number of Service System LED-Flashes
Heat Zone 1 Alarm	1
Heat Zone 2 Alarm	2
Both Zones in Alarm	3

Possible causes:

1. System has discharged.

Solution:

- Recharge system as per instructions in Section 9 of manual P/N 13980 or P/N16400.
- Place system back in service.

2. Open or short in actuation circuit, open or blown electric actuator.

Solution:

- Insure that proper vehicle battery power is being supplied to the panel as per section 5.1.

- Ensure that all the circular locking pigtail lead plugs on the back of the panel are securely attached and locked.
- Unplug the yellow color coded actuation lead from the yellow color coded panel pigtail lead at the panel. Plug a Fire Alarm Test Module (P/N 21447) into the yellow color coded pigtail lead from the panel. If the red “FIRE: LED on the panel turns off and the green “System OK” LED illuminates, the panel is good.
- To find the faulty circuit or component, remove the Fire Alarm Test Module from the yellow color coded pig-tail lead, plug the first circuit component back into the corresponding yellow color coded pig-tail from the panel. Now plug the Fire Alarm Test Module into the female plug at the end of that component. If the red “FIRE” LED on the panel turns off, that component is good. Repeat this process, testing one component at a time until the faulty component is found.

#### 4.4 Backup Battery Diagnostics

The Modular Control Panel III (P/N 22408) contains a Nickel Metal Hydride 8.4 Volt back up battery to maintain vehicle protection in the event of loss of the main vehicle power source. The backup battery will maintain operation of the fire suppression system for 24 hours without the vehicle main power source.

After 20 seconds of removing all field wiring from the panel, trouble condition will stop and unit will go into hibernation mode to maximize backup battery life.

Condition: The amber Service System LED flashes five times.

Solution: Replace Backup Battery (Refer to Backup Battery Replacement 5.2). The Backup Battery must be replaced after two years of service

#### 4.5 Pressure Switch Circuit Diagnostics

Condition: No Green System OK LED on the panel. Amber “Service System” LED flashes 7 times.

Possible causes:

1. System is equipped with agent cylinder pressure switch, and agent cylinder has depressurized.

Solution:

- Ensure that all the circular locking pigtail lead plugs on the back of the panel are securely attached and locked.
  - Verify the agent cylinder is equipped with an agent cylinder pressure switch. Verify switch is connected to the pressure switch circuit. The agent cylinder pressure switch circuit must be closed. If the circuit is open, the panel registers a fault condition. If switch is unplugged or the circuit is otherwise broken, the circuit is open.
  - Verify that the agent cylinder has proper pressure indicated by the green pie area of the pressure gauge. Repair and re-pressurize agent cylinder.
2. System is not equipped with agent cylinder pressure switch, and unused agent cylinder pressure switch circuit is open.

Solution:

- Repair unused agent cylinder pressure switch wire. Plug the unused leads together. The switch leads are single conductor equipped with a blue color coded male/female pluggable connector. They exit the panel in the same circular connector as the red, black and white relay leads. See Fig. 5.

## SECTION 5 Backup Battery

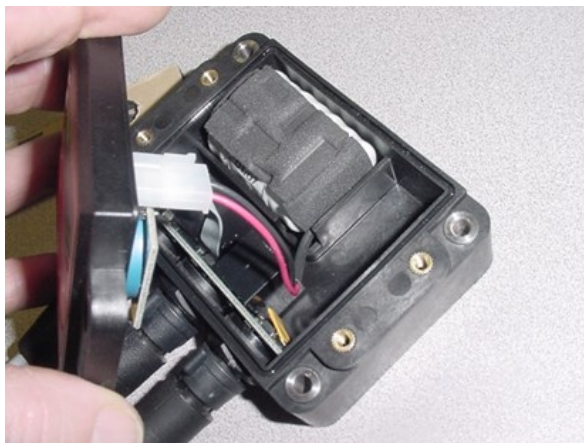
**⚠ WARNING: AT NO TIME SHOULD THE BACK-UP BATTERY BE USED AS THE MAIN POWER SOURCE. THE SYSTEM MUST BE CONNECTED DIRECTLY TO THE VEHICLE BATTERY AS A MAIN POWER SOURCE.**

### 5.1 Battery Maintenance

The backup battery should be replaced every two years to ensure proper system function. The battery should also be replaced if the "System Service" LED indicates Backup Battery Trouble. Replacement batteries are available from Amerex (P/N 18156).

### 5.2 Battery Replacement

Replace the battery as follows:



1.) Remove four screws to open front cover.



2.) Disconnect battery connector



3.) Replace battery.

4.) Reconnect battery connector.

5.) Replace front cover.

**SECTION 6 SYSTEM SPECIFICATIONS**

<b>ELECTRICAL SPECIFICATIONS</b>		
Operating Voltage	12-VDC	24 VDC
Current Requirements	Normal Operation	18 mA      47 mA
	Fault condition	10-18 mA      47-52 mA
	Alarm condition	66 mA      78 mA

<b>MECHANICAL SPECIFICATIONS</b>	
Dimensions	4.25"L x 3.00"W x 1.53"H (109mm x 77mm x 38mm)
Weight (includes cables)	19 oz. (590g.)

<b>TEMPERATURE SPECIFICATIONS</b>	
Temperature Specifications	-40° F to 150°F (-40°C to +66°C)

<b>SUPERVISED CIRCUITS</b>	
Supervised Circuits	Power Source Actuation Circuit Two Detection Circuits Battery Charging Circuit Pressure Switch Circuit

<b>BACKUP BATTERY</b>	
Battery Backup	24 hours of Fire Suppression Capability
Battery Composition	Nickel Metal Hydride (NiMH)

<b>AUDIBLE ALARM</b>	
Type	Output-Continuous Signal
Sound Level	85dB @ 36" @ 12 VDC
Frequency	Resonant Frequency: 2800 Hz contin-

<b>HEAT DETECTION</b>	
Heat Detection	Modified Class B 2-wire, N.O. Detectors
End of Line Device	2.2k Ohms

## **SECTION 7 AGENCY APPROVAL STANDARDS**

Factory Mutual Corporation

UL 1254 Environmental Test Standards

Society of Automotive Engineers

SAE J1211 Recommended Environmental Practices for Electronic Equipment Design

SAE J1113 Electromagnetic Susceptibility Measurement Procedures for Vehicle Components

CE Type Approval

Approval No. 10R-047734

Approval Tests Conducted:

Radiated narrow band electromagnetic emissions

Radiate broad band electromagnetic emissions

Annex X1 Immunity

Transients (emissions and immunity)