

APPROVAL REPORT

MODELS ARC-1 FIRE ALARM CONTROL FOR AUTOMATIC RELEASE OF EXTINGUISHING SYSTEMS

Prepared for:

FireFlex Systems Inc.
1935 Lionel-Bertrand Blvd.
Boisbriand, QC J7H 1N8
CANADA

Project ID: 3021612

Class: 3010

Date of Approval:

Authorized by:

6 DECEMBER 2004
R. L. Martell
R. L. Martell, Assistant Vice President

**MODELS ARC-1
FIRE ALARM CONTROL FOR AUTOMATIC RELEASE
OF EXTINGUISHING SYSTEMS**

from

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I INTRODUCTION

- 1.1 FireFlex Systems Inc. requested an Approval examination of their Model ARC-1 Analog Release Controller for automatic release of extinguishing systems. This control is normally interfaced or part of an integrated compressed air foam system that has been evaluated separately under FM Approval 3019601.
- 1.2 This Approval is limited to the Model ARC-1 when used with software version 1.0.
- 1.3 This Report may be freely reproduced only in its entirety and without modification.
- 1.4 **Standards:**

Title	Class Number	Date
National Fire Alarm Code	ANSI/NFPA 72	2002
National Standard of Canada	ULC-S527	1999

- 1.5 **Listing:** The product will appear in the *Approval Guide*, a publication of FM Approvals:

LOCAL PROTECTIVE SIGNALING

Model ARC-1 Analog Release Controller: (S/W Rev. 1.0), Minimum system configuration provides one Class B (Style B) alarm signal initiating device circuit, two Class B (Style B) supervisory signal initiating device circuits, two voltage reversing Class B (Style Y) notification appliance circuits (rated @ 1.5A ea.), five dry contact form C relay output circuits (rated 30 V dc @ 1 A) and one current-limited re-settable auxiliary power circuit rated 24 V dc @ 100 mA max. Optional SIA module provides two additional Class A/B (Style D/B) initiating circuits and two Class B (Style B) initiating circuits; optional SOA Class A/B (Style Z/Y) notification appliance module provides three additional output circuits and the optional ARA auxiliary relay module provides an additional 4 form C relay outputs. May be used with the following Approved compatible 2-wire smoke detection devices: System Sensor 1451/2451 detectors with B406B, B401B base; Siemens DI - (A,B)3 detectors with AD - 3(R)I or DB - 3S bases. 24V dc battery array available in 26, 78 or 104 AH batteries provide the required 24 or 90 hours of emergency operation.

AUTOMATIC RELEASES FOR EXTINGUISHING SYSTEMS

Model ARC-1 Analog Release Controller. 24 V dc battery array available in 26, 78 or 104 AH batteries provide the required 24 or 90 hours of emergency operation. (See also LOCAL PROTECTIVE SIGNALING.)

- 1.6 Except as described in this report, components and applications described in the manual and literature are not covered by this Approval.

II DESCRIPTION

- 2.1 This section briefly describes the features and functions of the Model ARC-1 electronic fire alarm control panel. A more detailed description may be found in the Installation, Operation and Instruction Manual, Document No. FM-072Z-0-01 Rev. C. Portions of that manual are attached to this report.
- 2.2 This ARC-1, or Analog Releasing Control panel is intended to be integrated with the FireFlex Systems family of Integrated Fire Protection Systems. FM Approvals Project ID 301901 provides information specific to the extinguishing system components.
- 2.3 The ARC-1 is a modular microprocessor based control consisting of an enclosure with integral (LAA) local alpha-numeric annunciator display and user interface. The internal (PSA) power supply module and (BCA) battery charger module are independent of an internal rack enclosure and (MBA) mother board. The MBA accepts modular components such as (SCA/GIA) system control and galvanic isolation module, (SSA) system supervisory module, (TIA) transducer interface module, (SIA) system input modules, (SOA) system output modules and (ARA) auxiliary relay module. (see Fig 1 for a typical system layout)

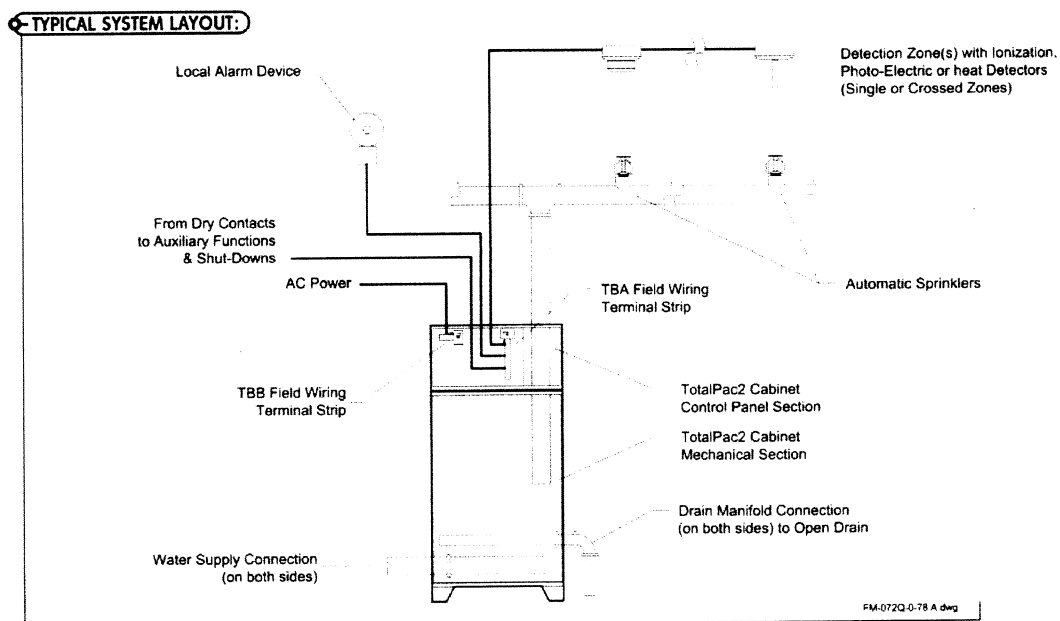


Fig 1

- 2.4 **Enclosure** – The ARC-1 is enclosed within a red, 14 gauge metal enclosure {915mm (36in) x 508mm (20in.) x 406mm (16in) or 1168mm (46in) x 610mm (24in) x 406mm (16in)} of dead front construction. When integrated with the FireFlex extinguishing system, it mounts on top of

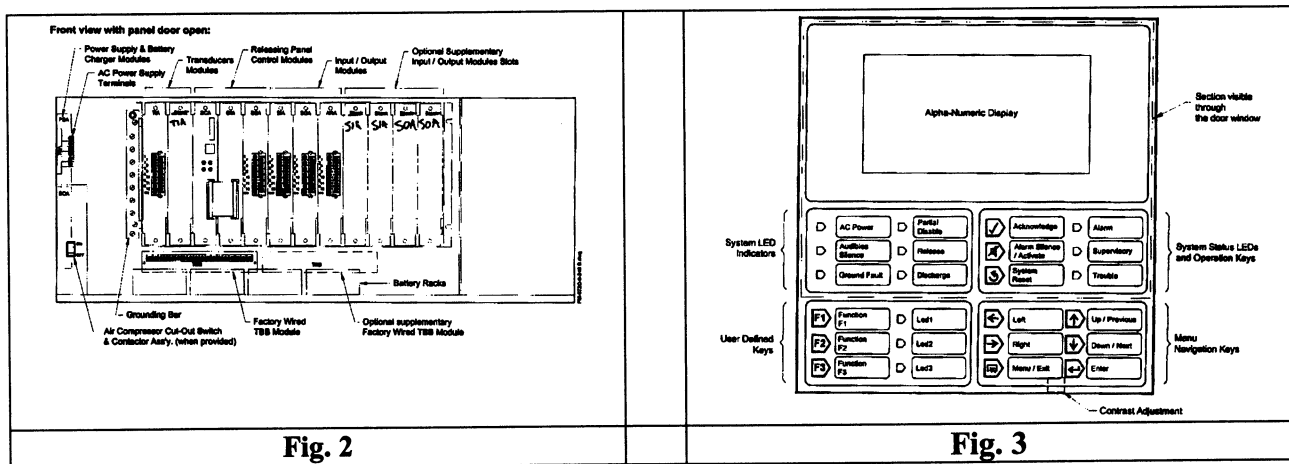
the enclosure housing the releasing components and is isolated via a solid metal panel. No accessible openings of any type existed on the top or sides of the enclosure. Entry to any circuits was suitably protected via a keyed lock.

- 2.5 **LAA, Local Alphanumeric Annunciator** – Is visible on the front door of the control and is the main human interface with separate areas for displaying common system indicators, LED's and operator keys. The large alphanumeric display provides additional information via plain text.
- 2.6 **PSA, Power Supply** – A dual voltage 120/240VAC supply that provides up to 7.5A of filtered and regulated 24VDC power to the ARC-1 control and connected peripherals.
- 2.7 **BCA, Battery Charger** – Provides connection and supervision circuitry for secondary power source consisting of a 24VDC battery array available in 26, 78 or 104 amp hour ratings.
- 2.8 **MBA, Mother Board** – Provides the main system communications bus as well as the card cage that accepts up to twelve standard ARC-1 system plug-in modules. The three slots (A, B and C) are occupied with the minimum system configuration boards, SCA, GIA and SSA boards. The remaining nine slots are available to house additional the input and output boards TIA, SIA, SOA and ARA.
- 2.9 **SCA & GIA, System Control and Galvanic Isolation Modules** – The main processor board (SCA) and galvanic isolation module (GIA) are required for each ARC-1 system. The SCA controls general communication and power while the GIA provides isolation circuitry and additional protection from electro-magnetic forces.
- 2.10 **SSA, System Supervisory Module** – Provides form C common system trouble contacts rated 30VDC @ 1.0A, a current-limited auxiliary power circuit rated 24V dc @ 1.5A, a 100ma re-settable 24VDC power for connection of 4-wire smoke detectors and a RS485 data communication line for supplemental use only.
- 2.11 **TIA, Transducer Interface Module** – Provides three independent circuits that monitor 0-100mv analog pressure transducers for monitoring compressed air and other supervisory related circuits of fixed extinguishing systems.
- 2.12 **SIA, System Input Module** – Provides connection points for conventional 2-wire smoke detector as well as N.O. dry-contact type devices. Two class A or B (Style B or D) smoke detection zones and two class B (Style B) dry-contact zones are provided.
- 2.13 **SOA, System Output Module** – Provides three outputs configurable for either releasing or notification appliance circuits. NAC's can also be configured as Class B (Style Y) or Class A (Style Z) circuits. Overall ARC-1 system is limited to 6A max for all output circuits combined, each SOA module is limited to a max of 3A per module and no more than 1.5A per circuit when used as NAC's and 1.0A per circuit when used for releasing applications.
- 2.14 **ARA, Auxiliary Relay Module** – Provides four Form C user-definable relay functions rated 30VDC @ 1A.
- 2.15 **Restricted/Limited Access** - In addition to the key-locked enclosure protecting the user interface, four separate levels of password protection restrict access to the user definable option. Pressing and holding the "MENU/EXIT" key for more than two seconds is required to gain access.

- 2.16 **Cross-Zone Applications** – The ARC-1 is capable of software definable cross-zone applications limited to the first two detection zones of the each SIA module.

III EXAMINATIONS AND TESTS

- 3.1 One sample of the Model ARC-1 was submitted and examined at FM Approvals in Norwood, MA. The sample was considered to be representative of the product line and included as a minimum, one sample of each plug-in module with additional optional modules used to complete the enclosure at its maximum capacity. As configured, the system plug-in modules in order from left to right included; TIA, TIA, SCA, GIA, SSA, SIA, SOA, ARA, SIA, SIA, SOA, SOA (Fig. 2 & 3). The equipment as supplied and tested was compared to the manufacturer's documentation and drawings. All data is on file at FM Approvals along with other documents and correspondence applicable to this program.



- 3.2 **Normal Operation** – The Model ARC-1 fire alarm control was tested to verify proper operation under normal conditions. The system performed as described below and in the Installation, Operation and Instruction Manual. A “Normal” indication is the steady illumination of a single Green “AC Power” LED and the alphanumeric display of “System Normal”.
- 3.3 **Trouble Signals** – Trouble signals and their restoration to normal shall be indicated within 200 seconds. A switch for silencing the audible trouble signal is permitted only if it transfers the trouble indication to a lamp or other acceptable visible indicator adjacent to the switch. The visual indication shall persist until the trouble has been corrected. The audible trouble signal shall sound if the switch can be placed in the “silence” position and no trouble exists.
- 3.3.1 Fault conditions (single open, single ground, and wire to wire shorts) were introduced on external circuits. The trouble signal was annunciated audibly at the control and visually by the illumination of the yellow “Trouble” LED with the individual problem identified on the alphanumeric display. Both audible and visual indications were intermittent or flashing until “Acknowledged”, silencing the local audible and changing the state of the LED to steady. The visual indication remained until the trouble condition was corrected.
- 3.3.2 It was verified that the manual means for de-activating the “Trouble” signal resides behind a key-locked door.

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- 3.3.3 It was verified that a silenced audible trouble signal re-sounded automatically within the required 24 hours. One of the leads to the back-up batteries was disconnected. A trouble signal ensued, was silenced, and resounded 24 hours later. This was satisfactory.
- 3.4 **Alarm Signals** – Alarm signals and their restoration to normal shall be annunciated within 10 seconds and produce a distinctive signal. A switch for silencing the alarm signal sounding appliances shall be permitted only if it is key operated or located within a locked cabinet. Such a switch shall be permitted only if it transfers the alarm indication to a lamp or other acceptable visual indicator, and subsequent alarms in other zones will operate the alarm signal sounding devices.
- 3.4.1 Alarm conditions were introduced on the initiating device circuits. The alarm signal was annunciated audibly (via a steady tone) and visually indicated on the control by the flashing or intermittent illumination of the red “Alarm” LED. Additional text appeared on the alpha numeric display indicating the affected zone and type of device as well as the operation of output circuits as required.
- 3.4.2 Operation of the “Acknowledge” switch transferred the red “Alarm” LED to a steady state and silenced the local audible. Once “Acknowledged”, operation of the “Alarm Silence/Activate” switch cancelled all output signals.
- 3.4.3 It was verified that the manual means for de-activating the “Alarm” signal operated properly silencing the local audible and notification appliance circuits, provided a visual indication and resided behind a key-locked door.
- 3.4.4 Operation of the Alarm Silence/Activate switch (press and hold for more than two seconds) after initial silencing caused re-activation of the notification appliance circuits.
- 3.4.5 It was verified that subsequent alarm signals from different zones were properly displayed and caused re-activation of the notification appliance circuits.
- 3.5 **Supervisory Signals** – Supervisory signals and their restoration to normal shall be annunciated within 90 seconds and produce a distinctive signal. A switch for silencing the supervisory signal shall be permitted only if it is key operated or located within a locked cabinet. Such a switch shall be permitted only if it transfers the alarm indication to a lamp or other acceptable visual indicator.
- 3.5.1 Supervisory alarm conditions were introduced on the initiating device circuits. The supervisory signal was annunciated audibly (via a steady tone) and visually indicated on the control by the flashing or intermittent illumination of the yellow “Supervisory” LED. Additional text appeared on the alpha numeric display indicating the effected zone and type of device as well as the operation of output circuits as required.
- 3.5.2 Operation of the “Acknowledge” switch transferred the yellow “Supervisory” LED to a steady state and silenced the local audible.
- 3.6 **Environmental Tests** – The sample Model ARC-1 as configured in section 3.1 were conditioned at the following temperature extremes:
- 3.6.1 4 hours at 32°F (0°C);
- 3.6.2 4 hours at 120°F (49°C);

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- 3.6.3 24 hours at 100°F (38°C) and 90% relative humidity.
- 3.6.4 Proper operation was observed both during and after each of these environmental exposures.
- 3.7 **Voltage Variation Tests** – The sample was operated at voltages of 93 V ac to 132 V ac (transfer point to 110% of nominal voltage) and 20.4 V dc to the battery float voltage of 27.2 V dc. The control operated as intended over these entire voltage ranges. Because it is possible that output circuits drop below 20.4V dc (19.8 observed), care should be used to specify Notification Appliances Circuits and Release Devices that are suitably rated.
- 3.8 **Circuit Performance** – The initiating device circuits, the notification appliance circuits, and the releasing circuits were tested to verify that they met the appropriate performance requirements as described in ANSI/NFPA 72-2002 National Fire Alarm Code. Open, ground, wire to wire short, combination open and ground faults were introduced through the appropriate circuit.
- 3.8.1 **Initiating Device Circuits** – The four initiating device circuits of the SIA module (two conventional and two shorting type) were verified to meet the criteria for Class B (Style B) and class A (Style D) operation as defined by Table 6.5 of NFPA 72-2002.
- 3.8.2 Although the manufacturer claims supervision capability of the initiating type circuits of the TIA or Transducer Input Module, it was not verified in this exam. All transducer wiring is intended to remain within the common enclosure of the FireFlex Systems and is exempt from supervision requirements.
- 3.8.3 **Notification Appliance Circuits** – It was verified that the output circuits of the SOA module when configured as NAC's met the criteria for Class B (Style Y) and class A (Style Z) operation as defined by Table 6.7 of NFPA 72-2002.
- 3.8.4 **Releasing Circuit** – It was verified that the release circuits of the SOA module were properly supervised for open, short and single ground fault conditions.
- 3.8.5 **RS 485 Communication Line** – The RS 485 signaling line is only intended for supplemental use and not that of a primary means of fire alarm annunciation. No tests were run on this port since its access is suitably restricted via a key-locked enclosure and only intended for use by trained service personnel.
- 3.9 **Secondary Power Supply Test** – The secondary (standby) power supply shall automatically supply the energy to the system within 10 seconds, and without loss of signals, whenever the primary supply is incapable of providing the minimum voltage required for proper operation.
- 3.9.1 Transfer to the secondary power supply was accomplished automatically and in less than 10 seconds upon loss of primary power to the control. The loss of primary AC power was indicated within 60 seconds by the steady illumination of the yellow "Trouble" LED, the flashing illumination of the green "AC Power" LED and the sounding of the local audible annunciator
- 3.9.2 The transfer to secondary power was observed at 93V ac. The equipment continued to operate properly down to the transfer point and after transfer while on secondary power.
- 3.9.3 It was verified that secondary power is properly supervised from accidental disconnect (line break) and operation/failure of the battery charger circuit protection fuse (F1). Each induced fault was indicated as a "Trouble" condition as described previously.

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- 3.9.4 It was verified that return to primary power occurred at approximately 102V ac and the “Trouble” cleared automatically (non-latching)
- 3.10 **Battery Discharge and Recharge Test** – After a fully charged battery is subjected to a single discharge cycle (90 hours standby and 10 minutes in full alarm load), the charging current shall be such that after 48 hours, the battery is returned to a fully charged condition.
- 3.10.1 The eight 12 V dc 26AH batteries (a series/parallel combination = 104AH) were charged for more than 48 hours and the battery voltage was observed to be 27.2 V dc, and the charging current was observed to be 0.010 A.
- 3.10.2 The power supply was configured to draw 0.950 A (the maximum standby load specified by the manufacturer), and the primary power supply was disconnected. The battery voltage decreased to 23 V dc after 90 hours of discharge. A 10 minute Alarm load of 6.0 A was then applied to the control. All output circuits remained above 20 V dc.
- 3.10.3 The primary power was then reconnected, and the initial charging current was 0.6 A. The batteries were allowed to charge for 48 hours. At the end of 48 hours, the trickle current was measured to be 0.020 A., and the float voltage of the batteries was measured at 27.2 V dc, which indicated a fully recharged battery.
- 3.11 **Electrical Safety Tests**
- 3.11.1 **Protective Grounding** – Accessible conductive parts of the equipment that are likely to become energized in the event of a fault shall be properly grounded. A suitably sized and properly labeled ground connection is provided in the control panel. The resistance from all surfaces likely to be energized was measured to the ground connector. The maximum resistance was less than one ohm in all cases.
- 3.11.2 **Electrical Shock** – Examination showed that accessibility to the 120 V/ 240 V ac power supply was suitably restricted by the locked steel cabinet.
- 3.11.3 **Nameplate Rating** – With the maximum loading on the power supply, the input load drawn must not exceed 110% of the marked input load rating of 2.8A at 120 Vac and 1.4A at 240 Vac. Testing showed that the maximum input load was 1.75A at 132 Vac, which is acceptable.
- 3.11.4 **Dielectric Test** – A test voltage of 1,500 Vac was applied for one minute between the power terminals and system ground. There was no dielectric breakdown observed during this test.
- 3.11.5 **Battery Circuit Reverse Polarization** – The batteries were connected with the polarity reversed. The battery fuse, F1, operated and a trouble signal immediately resulted. The fuse was replaced and the system powered up and resumed normal operation. There was no damage to the equipment, and the result was satisfactory.
- 3.12 **Solenoid Compatibility Tests**
- 3.12.1 The Model ARC-1 control was tested for compatibility with solenoid valves with a nominal rating for 24Vdc operation.
- 3.12.2 The voltage delivered to the solenoid valves remained within the required voltage range of 20.4 to 26.4 V dc except when the battery voltage was below 21 V dc. This result is acceptable; because

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the 90 hour standby battery (104AH) test verified that the batteries remained above 23 Vdc for the duration and would successfully operate the connected valves.

- 3.13 **Vibration Test** – One sample of the PSA was mounted in it's normal position and subjected to a four-hour vibration test of 0.02 inches (0.5 mm) displacement at a frequency sweep of 10 to 30 Hz. The equipment operated properly during and after this vibration test, and there was no loosening of parts or permanent deformation as a result of this test.
- 3.14 **Radio Frequency Interference (RFI)** – Although not an Approval requirement, the following test was performed on the Model ARC-1 controls: The powered control was subjected to voice modulated and un-modulated radio signals having frequencies of 154 MHz, 467 MHz, and 854 MHz with radiation power levels equivalent to 5.0 Watts from a distance of 0.61 m (24 in.). The controls did not false alarm or display any signs of instability as a result of this test.
- 3.15 **Surge Transient Tests** – Although not a requirement for Approval, protection against surge line transients was considered on the ARC-1. Representative initiating device circuits, notification appliance circuits, releasing circuits, and auxiliary 24 V dc output terminals were subjected to 60 pulses consisting of five different transient waveforms having peak voltage levels of 100; 500; 1,000; 1,500; and 2,400 V as delivered into a 200 ohm load. No failure or instability was observed during or after these tests. This is satisfactory.
 - 3.15.1 It was shown that the PSA power supply was able to withstand surge line transients of 6 kV superimposed on the main power line input.
 - 3.15.2 Protection against internally induced transients was also verified. The power to the control was cycled 500 times while monitoring the releasing circuits for instability. The test results showed that the equipment did not false alarm, operated as intended, and retained its required stored memory.
- 3.16 **Two-wire Smoke Detector Compatibility** – Data was submitted, reviewed, and placed on file to verify that the following two-wire smoke detectors are compatible with the Model ARC-1: System Sensor 1451/2451 detectors with B406B, B401B bases and Siemens DI - (A,B)3 detectors with AD - 3(R)I or DB - 3S bases.
- 3.17 **Additional Testing Based on ULC S527-99** – At the manufacturers request, additional tests were performed for compliance to ULC S527-99. These tests exceed the routine FM Approval requirements, but when combined with the NFPA 72 test outline, should adequately address the test requirements of ULC S529-99. The appropriate ULC S529-99 paragraph reference is shown in parentheses at the start of each section for reference.
 - 3.17.1 (3.11.1.6) **Visual Displays, General** - It was verified that a separate yellow LED was provided for indication of ground fault conditions.
 - 3.17.2 (3.11.2.1) **Visual Displays, Sequential** - It was verified that a minimum of eight input zones could be displayed simultaneously on the alpha numeric display; that the initial "Alarm" was continuously displayed; displayed information including the total number of events of Alarm, Trouble and Supervisory signals and included a manual scroll button to advance the display to show additional information when it existed.
 - 3.17.3 (5.1 & 5.2) –**Software Controls** - It was verified that the software (firmware) of the ARC-1 was identified by revision level (1.0) on the alpha numeric display, and was monitored by an integral

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watchdog supervisory feature that operated within 30 seconds of a failure of the operating system and displayed as a "Trouble" condition on the main control.

- 3.17.4 (7.2) **Operating Controls** – The ARC-1 is only available with a false or dead front construction so that access to the operator controls does not allow for accidental contact with either live parts or unintentional damage to the electronic equipment.
- 3.17.5 (9.13) **Endurance** – The ARC-1 was operated through 6,000 on/off/reset cycles and showed no sign of instability or failure in accordance with an "occasional use" piece of equipment.
- 3.17.6 (9.14) **Overload** - The ARC-1 was operated through 50 on/off/reset cycles and showed no sign of instability or operational failure while powered at 115% of it's rated input voltage with the output circuits loaded to their maximum system rating of 7.5A.
- 3.17.7 (9.15.4) **Static Discharge** – The ARC-1 control was subjected to 20 discharges, generated by a 30mm long Van Der Graph generator held 2000mm from the enclosure. No instability or loss of stored information was observed during or after completion of this test.
- 3.17.8 (9.19) **Abnormal Operation** – The ARC-1 was operated continuously at its maximum load with cheesecloth draped loosely over the entire enclosure until the internal temperature had stabilized. At the end of the test, the cotton had not ignited indicating that there was no emission of flame, molten metal or glowing particles, or any other manifestation of fire or risk.

IV MARKING

- 4.1 The following information appears on the equipment identified in Section 1.5 and meets Standard requirements:
- Manufacturer's name and manufacturing location.
 - Serial number and date code (on separate adhesive label)
 - Maximum electrical input and output ratings
 - The FM Approval Mark
- 4.2 The software/firmware version (1.0) and serial number are displayed on the Alpha-numeric display by accessing the "System Info" level via the password protected keypad. Refer to Installations Manual for more information.

V REMARKS

- 5.1 Extreme care should be taken with the installation of this equipment. The latest edition of the manufacturer's instruction manual must be followed completely, and any problems should be resolved by consultation with the factory or the authorized representative.
- 5.2 All installation wiring shall be in accordance with the appropriate national electrical code. (ANSI/NFPA 70 or CEC, C22.1, Part 1, section 32).
- 5.3 An Approval examination of programmable equipment such as this can only evaluate typical configurations. Although those components identified in this report have been tested, it is beyond the scope of such an examination to test all possible configurations. It is necessary, therefore, that those responsible for the setup and acceptance of specific installations take special care to

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verify that the equipment, including programmable functions, is configured to operate properly for the required performance of that installation.

- 5.4 Control panels for automatic release of extinguishing systems are not considered Approved by FM Approvals if they incorporate an accessible disable or abort switch. A key operated test switch, or a disable switch behind a lockable cover, or a manually operated momentary switch is permitted, but not recommended, by FM Approvals for providing an intentional interruption of operation for servicing and testing.
- 5.5 When disconnecting the extinguishing system discharge for testing and/or maintenance, the extinguishing system must be isolated mechanically and not solely by electrically disconnecting the equipment and not by the software programming.

VI FACILITIES AND PROCEDURES AUDIT

The manufacturing site in Boisbriand, QC, Canada is currently included in the FM Approvals Facilities and Procedures Audit (F&PA) program. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

VII MANUFACTURERS RESPONSIBILITIES

- 7.1 The manufacturer shall provide instructions for installation, operation, and maintenance with each unit.
- 7.2 As part of the listing requirements, FM Approvals requires assurance that subsequent systems produced will present the same quality and reliability as the system examined. The manufacturer shall maintain a Quality Assurance Program, which includes as a minimum: incoming, in-process, and final inspection and testing; equipment calibration, and drawing change control. The specific procedures used to control quality are best determined by the manufacturer.
- 7.3 Documentation considered critical to this Approval is on file at FM Approvals and listed in the Documentation File, Section VIII of this report. No changes of any nature shall be implemented unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The Approved Product Revision Report, Form 797, shall be forwarded to FM Approvals as notice of proposed changes.
- 7.4 Since the power supply (PSA) is rated above 30 Vrms, it is required that the final assembly of all ARC-1 controls be dielectric tested on 100% of production. The power input connections shall withstand, for one minute and with no insulation breakdown, the application of 1000 V ac (or 1400 V dc) with respect to the protective ground. Alternatively, a test potential of 1200 V ac (or 1700 V dc) may be applied for at least one second.

WARNING: The dielectric test required may present a hazard of injury to personnel and/or property and should only be performed under controlled conditions, and by persons knowledgeable of the potential hazards of such testing to minimize the likelihood of shock and/or fire.

- 7.5 The ARC-1 shall be tested for continuity of the protective grounding system.

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VIII DOCUMENTATION

The following drawings describe the ARC-1 and are filed under Project 3021612:

Drawing No	Drawing Title	Revision
FM-061M-1-49	ARC1B02036 – Enclosure Assembly	A
FM-061M-1-44	ARC1B02036 – Front Door Assembly	B
FM-061M-1-73	ARC1B02446 – Enclosure Assembly	A
FM-061M-1-72	ARC1B02446 – Front Door Assembly	A
Version 1.0	System Program	0
TOTPR STDA0	Factory Setup	0
FM-072Z-0-01	ARC-1 Installation And Operation Manual	C
ARA 040727	Auxiliary Relays Module - Schematic & Parts List	A
ARA 040727	PCB Layout	A
FM-061M-1-63	Assembly Drawing	A
BCA 040727	Battery Charger Module - Schematic & Parts List	A
BCA 040727	PCB Layout	A
FM-061M-1-56	Assembly Drawing	A
CCA 040727	Communication Converter Module - Schematic & Parts	A
CCA 040727	PCB Layout	A
FM-061M-1-65	Assembly Drawing	A
GIA 040727	Galvanic Isolation Module - Schematic & Parts List	A
GIA 040727	PCB Layout	A
FM-061M-1-59	Assembly Drawing	A
LAA 040727	Local Annunciator Module - Schematic & Parts List	A
LAA 040727	PCB Layout	A
FM-061M-1-57	Assembly Drawing	A
MBA 040727	Mother Board Module - Schematic & Parts List	A
MBA-040727	PCB Layout	A
FM-061M-1-54	Assembly Drawing	A
PSA 040727	Power Supply Module - Schematic & Parts List	A
PSA 040727	PCB Layout	A
FM-061M-1-55	Assembly Drawing	A
SCA 040727	System Control Module - Schematic & Parts List	A
SCA 040727	PCB Layout	A
FM-061M-1-58	Assembly Drawing	A
SIA 040727	Supervised Inputs Module - Schematic & Parts List	A
SIA 040727	PCB Layout	A

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FM-061M-1-61	Assembly Drawing	A
SOA_040727	Supervised Outputs Module - Schematic & Parts List	A
SOA_040727	PCB Layout	A
FM-061M-1-62	Assembly Drawing	A
SSA_040727	System Supervisory Module - Schematic & Parts List	A
SSA_040727	PCB Layout	A
FM-061M-1-60	Assembly Drawing	A
TIA_040727	Transducers Interface Module - Schematic & Parts List	A
TIA_040727	PCB Layout	A
FM-061M-1-64	Assembly Drawing	A

IX CONCLUSION

The system described in 1.5 meets FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

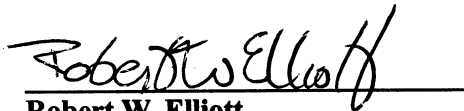
EXAMINATION AND TESTING BY: R. W. Elliott

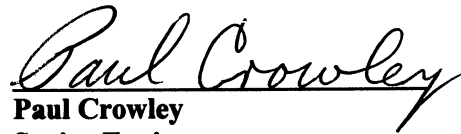
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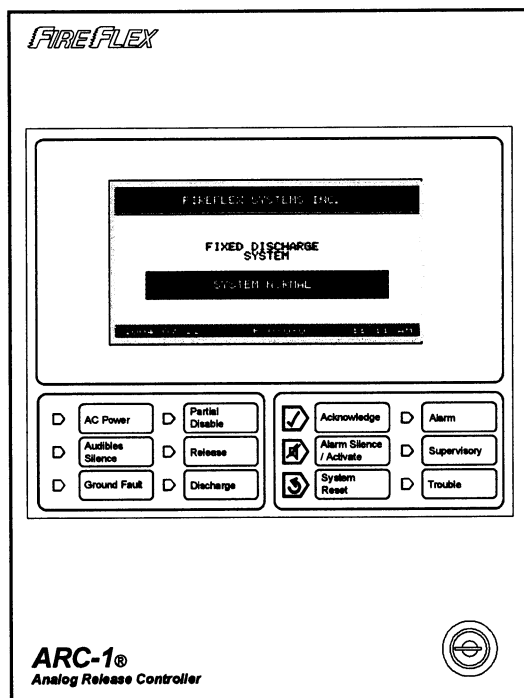
ATTACHMENTS ARC-1 Installation & Operation Manual
(Cover, Pgs 1-10 and Operating Instructions, 12pgs total)

REPORT BY:

REPORT REVIEWED BY:


Robert W. Elliott
Senior Engineering Specialist
Electrical Systems


Paul Crowley
Senior Engineer
Electrical Systems



Analog Release Controller

ARC-1

INSTALLATION & OPERATION MANUAL

ARC-1 Analog Release Controller

Operating Instructions

NORMAL – Only the green "AC POWER" LED is on. All other LED's are Off.

PANEL KEY – The key to open the panel can be found at this location:

WHEN AUDIBLE DEVICES ARE SOUNDING – Discharge has occurred if "RELEASE" LED is on. Discharge timer has timed out if "RELEASE" LED is flashing.

FOR AN ALARM:

1. Evacuate the protected premises
2. Notify the monitoring service and/or the Fire Department Service immediately. Tell them briefly what happened and what your current status is.

Phones: _____

Fire Department

Monitoring Service

3. If the Fire Department is responding, be prepared to provide directions to arriving firefighters.

FOR TROUBLE ONLY:

1. Notify the monitoring service and/or Fire Department if this panel is connected to either one, and tell them what is happening.
2. Silence audible buzzer by pressing on the "ACKNOWLEDGE" key. The SYSTEM TROUBLE LED's will remain on. Contact authorized service personnel immediately! (See below)

WARNING !

DO NOT ALLOW TROUBLE CONDITIONS TO REMAIN LOGGED IN THE SYSTEM. THE PROTECTION OFFERED BY THE SYSTEM HAS BEEN COMPROMISED, OR ELIMINATED WHEN A TROUBLE CONDITION EXISTS !

To return to normal after an alarm:

1. Do not enter the protected area until safe to do so.
2. Clear all initiating devices. Smoke detectors will not reset if there is still smoke in the area.
3. Reset the control panel (PRESS the "SYSTEM RESET" key).

Power failure or brownout:

If AC power drops too low or fails, the "AC POWER" LED will flashe, the "SYSTEM TROUBLE" LED will turn on and any other audible trouble devices will sound. Contact authorized service personnel immediately. See below.

FIRE FLEX
Systems Inc.

In the event of trouble,
contact your local Service
Representative

Name: _____

Company: _____

Address: _____

Tel. No.: _____

Manual activation (Fire Drill or otherwise):

Alarm Signalling Circuits can be activated by pressing on the "ALARM ACTIVATE" key for more than 2 seconds.

Alarm Silencing:

Alarm Signalling Circuits may be silenced by pressing on the AUDIBLE SILENCE key. Both the "AUDIBLES SILENCED" and "SYSTEM TROUBLE" LED's will turn on. Subsequent alarms will reactivate circuits. Press on the "SYSTEM RESET" key to clear the "Silenced" condition

To test the lamps:

Press and hold the "SYSTEM RESET" key and check all the LED's. Every one should be on as long as the key is held on. For more information, refer to the ARC-1 manual. Manual is kept at the following location:

FRAME AND POST ADJACENT TO THE PANEL

ARC-1 ANALOG RELEASING CONTROLLER**SECTION 1*****General Description***

The ARC-1 Analog Releasing Controller is a microprocessor based dynamic control panel specifically designed for fire protection systems release. The system is modular in design and consists of a power supply module, battery charger, general processor board, set of contractor wiring terminals cards, emergency batteries and a door mounted local alphanumeric annunciator, all included in a sturdy gauge 14 steel cabinet painted fire red.

The control panel is resistant to electromagnetic interference and has been designed and tested to meet stringent EMI shielding requirements. The panel architecture is designed for future expansion and is based on a standard 19" rack configuration with slide-in cards.

The ARC-1 control panel is an Analog Releasing Controller, intended to be used as the releasing panel of fire extinguishing systems. This controller will generally be integrated with FireFlex Systems' family of Integrated Fire Protection Systems (such as the TotalPac2 integrated automatic sprinkler systems or the new ICAF Integrated Compressed Air Foam fire extinguishing systems).

Alternately, this controller could also be used independently with non-integrated type systems to control the release of supervised gaseous or water mist type fire extinguishing systems.

The system's detection zones are intended to be used with either compatible conventional type smoke detectors (refer to the detector compatibility chart provided with this manual) or any listed dry contact type detection device.

1. NFPA Standards

The ARC-1 panel complies with the following standards:

NFPA-11 Standard for Low, Medium and High-Expansion Foam;

NFPA-13 Sprinkler Systems;

NFPA-15 Water Spray Systems;

NFPA-16 Foam-Water Deluge and Foam-Water Spray Systems;

NFPA-72 Local (Automatic, Manual and Water flow) Fire Alarm Systems.

2. Additional Information

Before the installation, the contractor installing the panel should be familiar with all applicable documents and standards and the requirements of the Local Authority Having Jurisdiction (AHJ).

Also refer to the list of compatible devices provided with this manual.

Panel Features

- Slot Cards configuration on standard 19" rack (5U) installed in steel cabinet 36" wide by 20" deep by 14" high or 46" wide by 24" deep by 14" high.
- Standard input / output layout:
- 2 Style B/D initiating device circuits
- 2 Style B dry contacts supervisory circuits

- 3 pressure transducer circuits
- 3 Style Y/Z notification appliance circuits (signalling or releasing mode)
- 4 User-definable auxiliary relays.
- Additional space for 5 plug-in I/O cards.
- Microprocessor based 'Plug & Play' distributed architecture.
- Watchdog supervised microprocessor.
- Power limited on all circuits.
- All output circuits protected against false activation.
- Dynamic over current protection on all notification appliance circuits.
- Alarm and trouble subsequent signal (resound).
- Local RS-232 Serial Communication Output for technician's PC interface.
- Remote RS-485 Serial Communication Output for remote PC interface.
- Dynamic integrated digital battery Volt./Amp. meter.
- Local alphanumeric annunciator with up to 16 lines of 40 characters.
- Supervised 24VDC regulated output power, up to 7.5A
- Standard 26Ah batteries for 24 hours standby, with 104Ah option for up to 90 hours.
- Automatic battery test feature.
- Resettable and non-resettable regulated power outputs.
- Extensive transient protection on all circuits.
- Last events recall with up to 500 events in memory.
- 3 levels of password protected user menus.
- User-definable standard timers (4) and counters (4) for time-in, time-out, soak timer, etc.
- Slide-in identification labels for easy custom identification of user defined keys.

Special features

Many special features have been integrated in the system's design to enhance its level of system integrity supervision for the various fire protection applications. One of the most interesting features of the ARC-1 is the fact that although the system is factory programmed, it still allows the user to define input zones and / or output circuits without any consequence on the system's initial programming, making retrofits and site modifications very safe. Other special features include the following:

1. Pressure transducers

This system has been designed to operate with factory installed pressure transducers. Those pressure transducers can be used to dynamically supervise fire protection systems water or air pressures and improve the level of supervision for the system's integrity.

Up to 6 pressure transducers can be connected to the ARC-1 control panel. All wires connecting the transducers are electrically supervised against opens or short circuits.

Different set points can be defined per transducer, able to generate low and high pressure supervisory status.

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For example, one point can be set at 20 psi for low air pressure supervisory while another point is set at 40 psi for high air pressure supervisory on the same transducer. Pressure information from the transducers is available at the alphanumeric display and can also be transmitted remotely via the RS-485 communication port.

2. Air compressor control

Pressure transducer no. 1 can be used to control the start and stop function of the air compressor often provided with integrated preaction systems. In such applications, normal and differential pressures are factory set to meet the specific needs of the configuration used (ie: single or double interlocked).

3. Automatic emergency batteries test

The ARC-1 control panel is configured so that once every 30 days, power is automatically transferred to the batteries in order to perform a good verification of their backup capacity. Batteries sometimes will indicate a normal voltage reading when a float current is applied to them but will actually show a substantial voltage drop when the AC power is lost and an actual load is applied.

Before performing the battery test, the system will save their voltage reading in memory and will then transfer power to the batteries for a pre-determined period of time. At the end of this test period the system will compare the actual batteries voltage reading to the one in memory and if an important voltage drop is registered, will generate a trouble condition.

At all times during the test, should the batteries voltage drop below a specific voltage value, power will be transferred back to the AC source and system will generate a trouble condition.

Panel Modules**1. Standard Modules**

- Motherboard, Model MBA: Provides the system main bus and card cage with slots to receive all the standard system plug-in modules.
- Power Supply, Model PSA: Provides up to 7.5A of filtered 24VDC and switched output for optional power relay and air compressor control.
- Battery Charger, Model BCA: Provides charging power for 24VDC emergency batteries at 26, 78 and 104Ah with brownout detection circuitry.
- CPU Module, Model SCA: Controls general communication and power between the various components of the panel. Also provides internal serial communication port (RJ45) for PC control via RS-232 and local alphanumeric display.
- Transducer Interface Module, Model TIA: Provides the interface circuitry for 3 pressure transducers, giving dynamic supervision of both air and water pressures.
- Galvanic Isolation Module, Model GIA: Provides the isolation circuitry against electro-magnetic interference with opto-data and ground fault detection.
- System Supervisory Module, Model SSA: Provides the supervisory and supply circuitry with resettable and non-resettable 24VDC power outputs, plus one set of trouble

operated Form C dry contacts and one RS-485 serial output for remote equipment.

- Supervised Inputs Module, Model SIA: Provides 2 user-definable detection zones and 2 linear impedance supervisory zones.
- Supervised Outputs Module, Model SOA: Provides 3 user-definable output circuits with FireFlex' exclusive coil-sense circuitry.
- Auxiliary Relay Module, Model ARA: Provides 4 SPDT user-definable relays for auxiliary functions.
- Local Alphanumeric Display, model LAA: Back-lit alphanumeric display with 16 lines of 40 characters mounted on the front door of the unit. Provides user-friendly textual indications of all system status and various user menus plus a control and navigation membrane type keyboard.

2. Optional Modules

- Data Communication Converter Module, Model CCA: Connected to the RS-485 external serial output of the SSA System Supervisory Module, converts the serial output from RS-485 to RS-232 for remote PC connection. Provides indication and control directly from a Windows™ based Personal Computer. Dedicated software provides many useful features such as live system air data logging, events history, and dynamic batteries supervision. All reports can also be printed for archival purposes.
- Factory Wired Supplementary Module, Model TBB: Provides wiring terminals for linear impedance, factory wired release system supervisory devices.

Specifications**AC Power:**

Panel requires a supply of 2.8A - 120VAC at 60 Hz (1.4A - 220VAC at 50/60Hz) from an independent branch circuit breaker, lockable and identified for its purpose. Minimum wire size: #14 AWG with 600V insulation.

Batteries (lead acid only):

Maximum Charging Circuit: 27.6V, 4A

Maximum battery capacity: 60Ah

Standard batteries provided with the unit are two 12VDC 26Ah, providing 5 minutes of alarm after 24 hours of standby, as per UL & ULC requirements. 104Ah batteries are also available for a standby period of up to 90 hours meeting Factory Mutual (FM) requirements.

Initiating Device Input zones (2 per module):

Dynamic power limited circuitry

Operation: Class B (Style B) / Class A (Style D)

Normal Operating Voltage: 21VDC

Alarm current: 15mA minimum

Short Circuit current: 50mA maximum

Maximum detector current in standby: 3mA (max) per zone

Maximum loop resistance: 200 ohms

End-of-line resistor: 4.3K - ¼W (3.6K for ProtectoWire detection)

Resettable time: 10 seconds minimum

Each heat/smoke detectors and/or manual pull station detection zone is supervised against shorts, grounds and

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cross-zone operation and for normally open or closed detection devices. Refer to APPENDIX A for the list of compatible devices.

4-Wire Smoke Detector Power:

Up to 100mA resettable power is available for powering 4-wire smoke detectors from the SSA Card.

Maximum ripple voltage: 100mV p/p.

Refer to APPENDIX A for the list of compatible devices.

Linear Impedance Supervisory zones (2 per module):

Dynamic power limited circuitry

Operation: Class B (Style B) only

Max. Operating Voltage: 4.5VDC

Open loop voltage: 12VDC

Supervisory current: 1mA

Maximum loop resistance: 39 Ohms Max.

End-of-line resistor: 4.3K - 1/4W

Each zone is supervised against grounds and opens. Normally open devices such as pressure, tamper or flow switches are used on these zones to supervise the extinguishing system status. They are factory wired to the TBB Module or wired on-site by the user when not factory wired.

Transducer Interface Circuit (3 per module):

Bridge Voltage: 5.0V Nominal.

Differential Input Voltage: 0 – 100mV.

This option is used for FireFlex exclusive sprinkler Digital Pressure Sensor, DPS Series and supervises the system air and / or water pressure and control the air compressor when one is provided.

Notification Appliance and Releasing Circuits (3 per module):

Dynamic power limited circuitry.

Maximum allowable voltage drop due to wiring: 2VDC

Normal operating Voltage: 24VDC

Total current available to all external devices: 6.0A

Maximum signalling current per circuit: Up to 3A per module or 1.5A per circuit.

End-of-line resistor: 4.3K - 1/4W.

Refer to the list of compatible devices.

Auxiliary Relays:

User-definable Dry Form-C contacts rated at 2A @ 30VDC (resistive), 0.5A @ 30VAC (resistive). All relays must be connected to a power limited circuit.

Non-resettable Power Circuit:

Normal operating Voltage: 24VDC.

Total current available from this output is up to 1.5A 24VDC Regulated Power available for powering external devices (subtracted from the allowable 6A available to all external devices).

Resettable Power Circuit:

Normal operating Voltage: 24VDC

Total current: up to 100mA

Reset time: 10 seconds minimum.

External RS-485 Serial Communication Loop:

Maximum distance to remote equipment: 4000 ft.

Bit rate: 19,200 bauds.

Local RS-232 Serial Communication Loop:

Maximum allowable distance: 25 ft.

Bit rate: 19,200 bauds

Used for servicing the unit through P3 connector on SCA Module with local computer (using an RJ-45 cable with an RJ-45 to DB-9 adapter).

Contractor Wiring:

Many of the modules provide easily accessed front mounted sturdy compression type connectors for contractor field wiring, with every terminal identified directly on the front plate of the module itself.

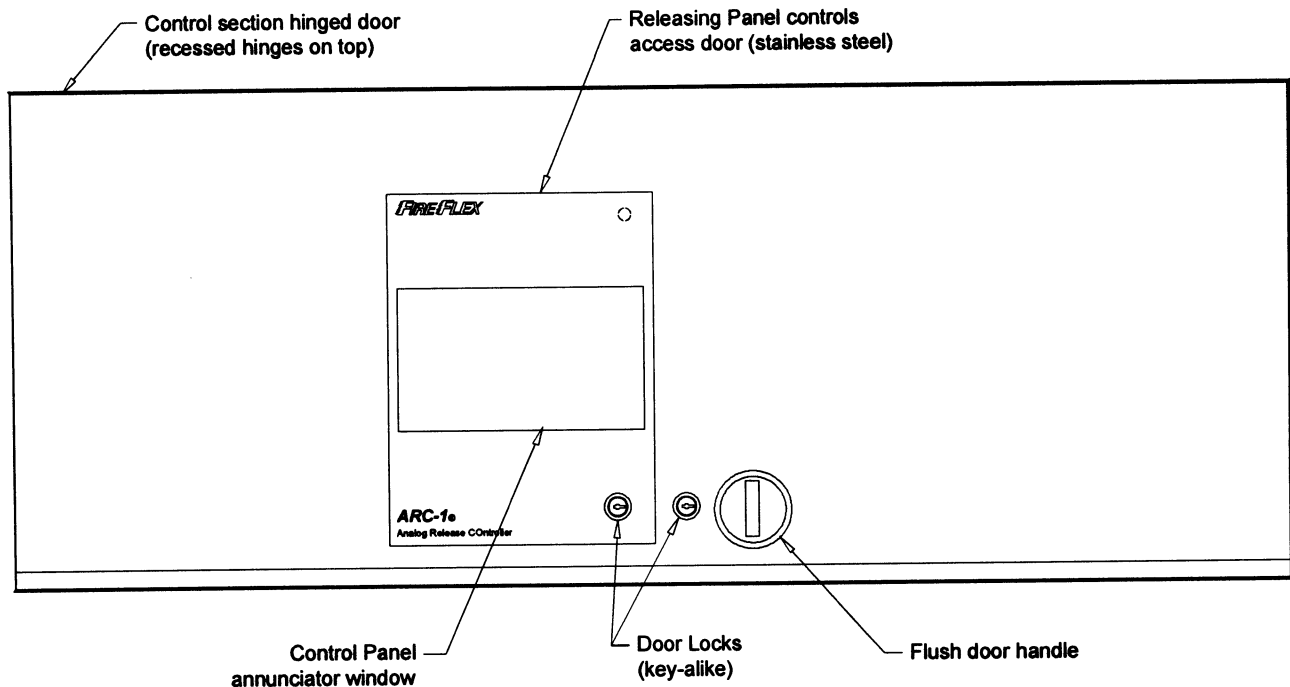
Maximum wire size: 14AWG.

Note: For EMC Compliant systems, wiring **MUST** be shielded type with the shield mechanically connected to the grounding bar.

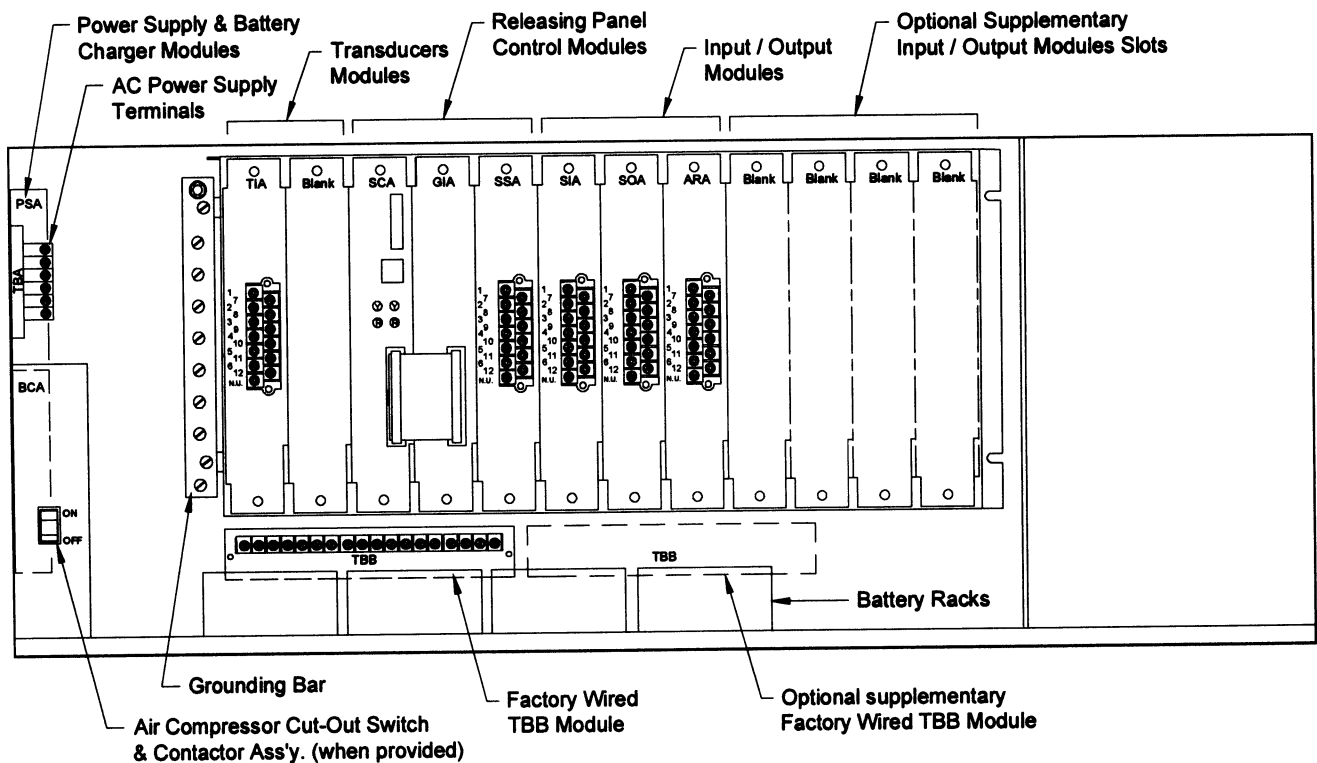
SECTION 1 - GENERAL DESCRIPTION

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Front view with panel door closed:



Front view with panel door open:



ARC-1 ANALOG RELEASING CONTROLLER

SECTION 2

Modules Description & Wiring

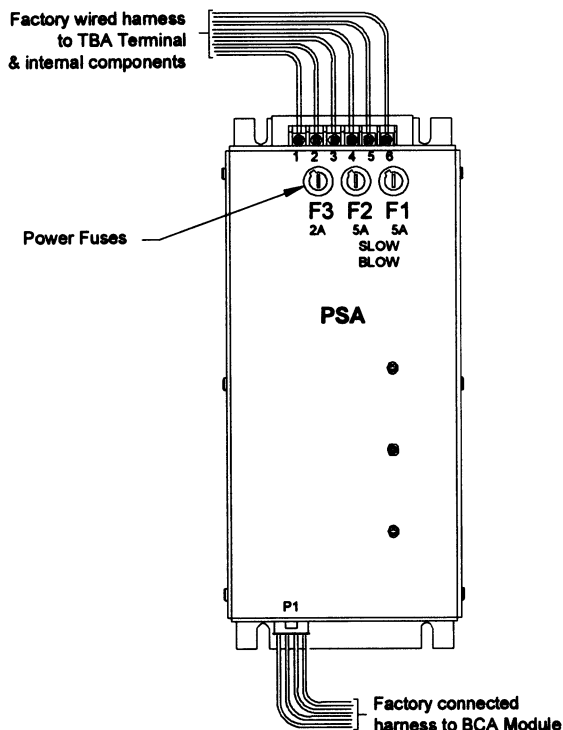
1. PSA Power Supply Module:

The PSA Power Supply Module is installed directly inside the ARC-1 Enclosure, near the TBA wiring terminal to which it is factory wired. The module contains all the circuitry necessary for powering the system and connects directly with the BCA Battery Charger Module (see description below) to provide regulated system power along with extensive EMI protection circuitry.

The module also automatically transfers power to emergency batteries via the BCA Module when AC power is lost or falls below 85% of its nominal value (120 or 220VAC), and provides up to 7.5A of current at 24VDC.

System power fuses (F1, F2 & F3) are located on the front of the module for ease of servicing (see detail below). F1 and F2 protect the PSA module against high surge transients, F3 protects the unit against shorts on the internal components wiring.

Detail of PSA Module:

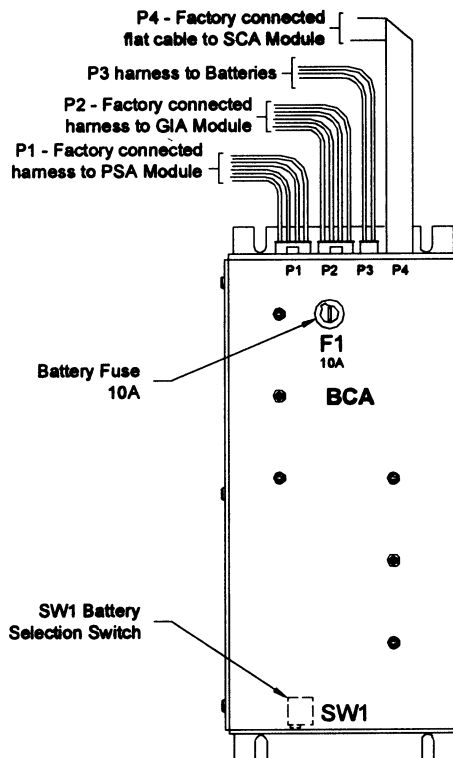


2. BCA Battery Charger Module:

The BCA Battery Charger Module is installed directly next to the PSA Module and provides battery charging capability for the system. The module can charge 24VDC batteries rated at 26, 78 or 104Ah (user selectable through both the SW1 selector switch on the circuit board itself and with the user menu) and provides integrated automatic battery testing circuitry.

Power to the MBA Motherboard for system power and automatic emergency power transfer in case of power loss or brownout condition is also provided by the module. F1 fuse protects the BCA module against battery connection shorts or polarity reversal.

Detail of BCA Module:



Control signals are exchanged internally with the SCA Module for features such as battery test, power switching on AC and emergency batteries, etc.

SW1 Switch must be adjusted as per battery capacity provided with the system. Refer to APPENDIX B for battery sizing calculations.

3. MBA Motherboard:

The MBA Motherboard is mounted at the back of the card cage holding all the control and slide-in modules of the system. It is built to accept the various system slide-in modules and provides the system main bus to which all modules are connected.

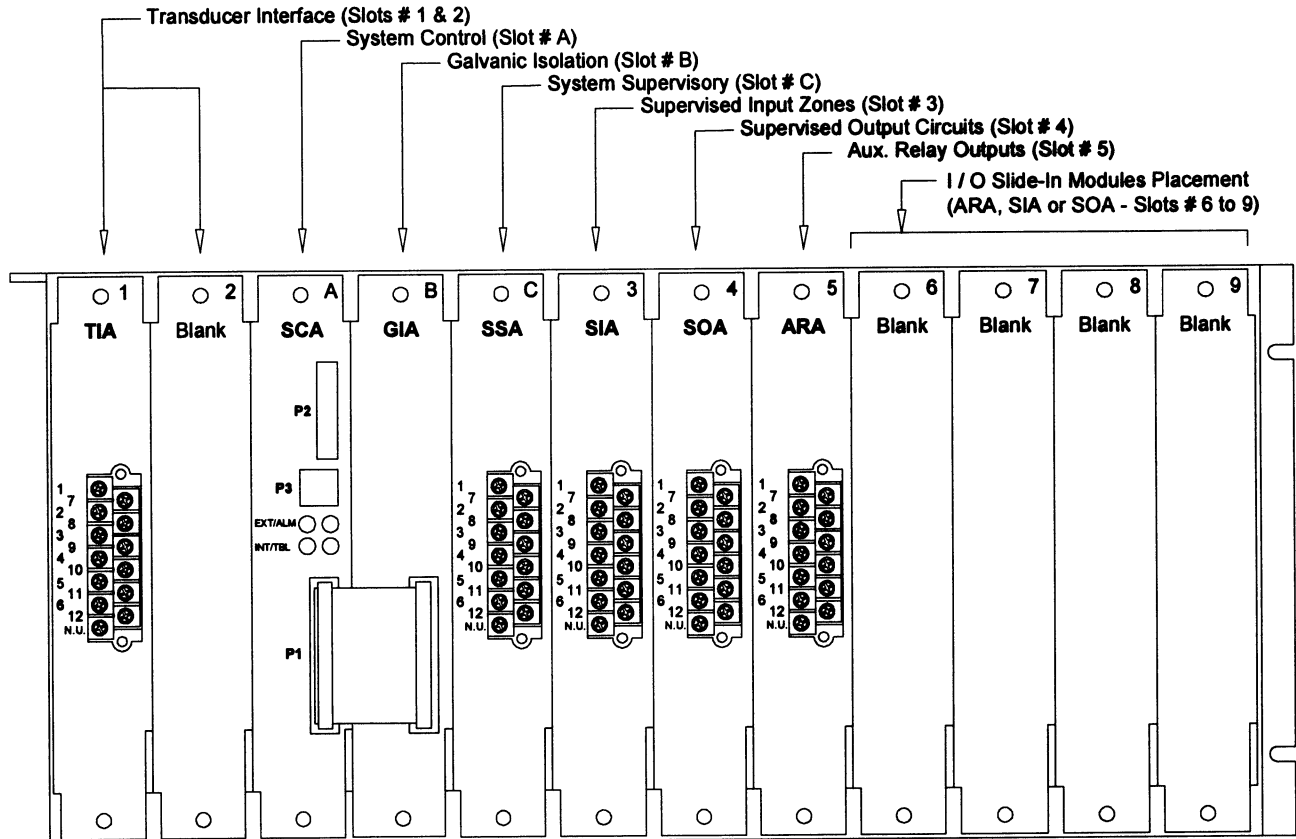
The MBA Motherboard is built as to be compatible with 19" rack mounting and uses a standard '5U' height space. It has connecting slots for 12 slide-in modules which are key-protected against false slot insertion. Field wiring terminals are provided at the front of the various modules.

Note: When laying down field wiring, care should be taken to route the wires so removal of slide-in modules is not hampered by the wiring.

Refer to APPENDIX C, Wiring Routing detail for more information.

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MBA Motherboard Detail : (with Basic Configuration Slide-In Modules shown in their default location)



4. SCA System Control Module:

The SCA System Control Module is always mounted in Slot #A of the MBA Motherboard. It offers the following features:

- Dual microprocessor based.
- Watchdog circuitry.
- Flash memory (for Event Recall library and system's configuration parameters).
- 4 system status lamps: Alarm, Trouble, Internal & External Data Communication.
- Connected to the GIA Module via front mounted flat cable (P1).
- Interface with the LAA Local Annunciator Module (P2).
- RS-232 Port for connection to local PC Interface (P3).
- Connectors are supervised and system will go on trouble condition if disconnected while system is powered.

5. GIA Galvanic Isolation Module:

The GIA Galvanic Isolation Module is mounted in Slot #B of the MBA Motherboard. It handles the required isolation between the system's two grounds (chassis ground and system ground - 0V) in order to manage the EMI protection of the system.

6. SSA Serial Output Module:

The SSA Serial Output Module is mounted in Slot #C of the MBA Motherboard. It provides the following circuitry:

- Common Trouble Relay, Form C contacts rated at 30V 1A DC / 0.5A AC. This contact is watchdog supervised and provides closure for any kind of troubles in the system.
- RS-485 Serial Port connection and required power source for connection to RS-485 based devices.
- Supervised Non-resettable 24VDC Power Supply (1.5A).
- Supervised Resettable 24VDC Power Supply (100mA).

The SSA Module also provides a maximum of 100mA resettable power source to power 4-Wire type smoke detectors. Refer to the Input Zones Wiring Diagram (SIA Module) and APPENDIX A, Table 3 for the device compatibility chart.

Calculation of the maximum allowable resistance in the 24VDC detector power wiring is done using the following formula:

$$R_{MAX} = \frac{(20.4 - V_{om}) \times 1000}{(N \times I_s) + (Na \times I_a) + I_r}$$

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Where:

R_{MAX} is the maximum resistance of the 24V wires, in Ohms.

V_{om} is the minimum operating voltage of the detector or end-of-line relay, whichever is greater, in volts.

N is the total number of detectors on the 24V supply loop.

I_s is the detector current in standby (mA).

N_A is the number of detectors on the 24V power loop which must function at the same time in alarm.

I_A is the detector current in alarm (mA).

I_R is the end-of-line relay current (mA).

To calculate the maximum quantity of smoke detectors allowable per system, use the following formula:

$$D_{MAX} = \frac{(100mA - I_R)}{I_s}$$

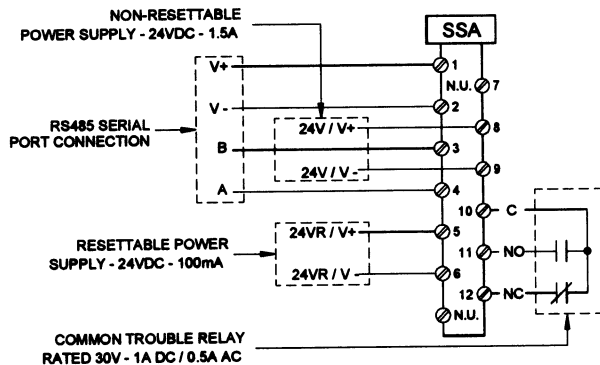
Where:

D_{MAX} is the maximum number of 4-wire type smoke detectors

I_R is the end-of-line relay current (mA).

I_s is the detector current in standby (mA).

SSA Module wiring detail:

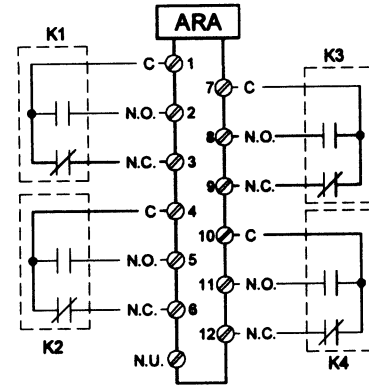


7. ARA Auxiliary Relay Module:

The ARA Auxiliary Relay Module provides 4 DPST auxiliary relays that can be assigned for Alarm, Trouble, Supervisory, Water Flow, etc., for use with power-limited circuits only.

The ARA Module is mounted on Slot #5 of the MBA Motherboard. Additional slide-in modules can also be mounted on Slots #6 to #9. Relays activation can be user-defined. Refer to USER MENUS for the list of available functions and configurations.

ARA Module wiring detail:



CONTACTS RATED 30V - 1A DC / 0.5A AC

8. SOA Supervised Output Circuit Module:

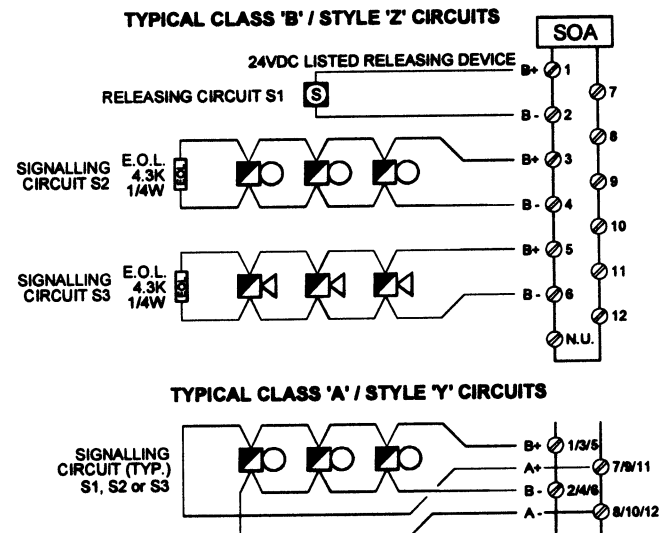
The SOA Supervised Output Circuit Module provides 3 circuits for signaling or releasing devices, circuit #1 being a releasing circuit by default. It is mounted on Slot #4 of the MBA Motherboard. Additional slide-in modules can also be mounted on Slots #6 to #9. Circuits can be user-defined. Refer to USER MENUS for the list of available functions and configurations.

Standard configuration circuits include:

- Class B (Style Z) releasing circuits with dynamic coil supervision circuitry, providing trouble condition if coil is physically separated from the solenoid body;
- Class A or B (Style Z or Y) signaling circuits;
- Dynamic current limiting circuitry.

IMPORTANT: Observe polarity when connecting polarized devices !

SOA Module typical wiring detail:

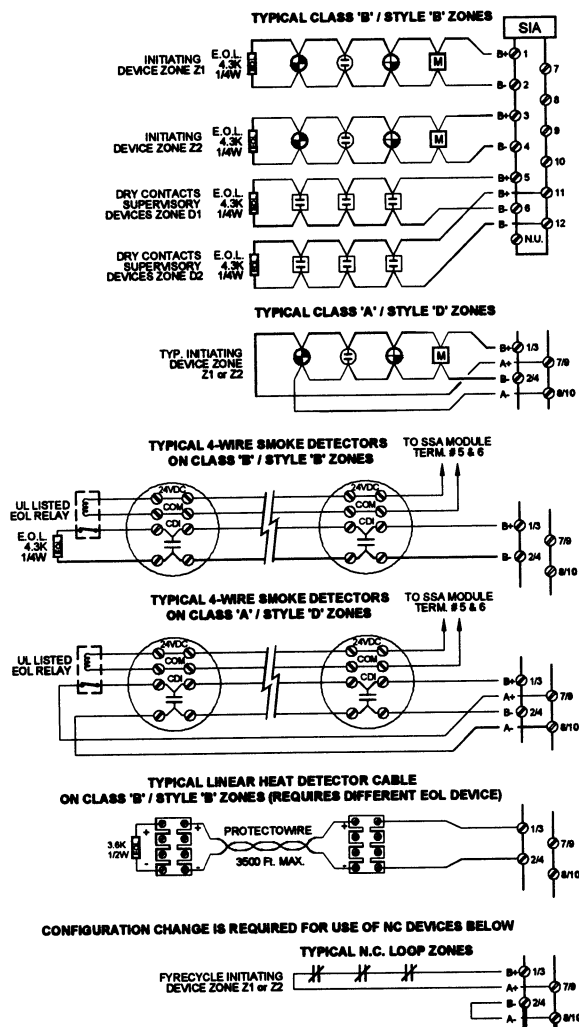


9. SIA Initiating Circuit Module:

The SIA Initiating Circuit Module provides 2 detection input zones and 2 Linear Detection zones for supervisory. In the standard configuration, one module is mounted on Slot #3 of the MBA Motherboard. Additional slide-in modules can also be mounted on Slots #6 to #9. Zones can be user-defined. Refer to USER MENUS for the list of available functions and configurations. Zones include:

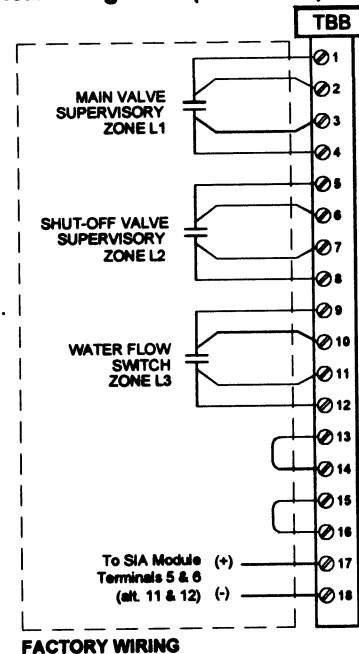
- 2 Smoke detection zones, class A or B (Style B or D) that can also be used for N.O. contact initiating devices.
- 2 Linear Detection zones for N.O. dry contact supervisory devices (in 'DET' or 'LIN' modes).

SIA Module typical wiring detail ('DET' mode):



Depending on the system configuration, SIA zones D1 and D2 can be factory configured and internally wired as Linear Detection zones (in 'LIN' mode). When provided, zones D1 & D2 will be factory wired to the TBB Module which in turn will be factory wired to the sprinkler system supervisory devices (not provided with 'DET' mode shown above).

TBB Module typical wiring detail ('LIN' mode):

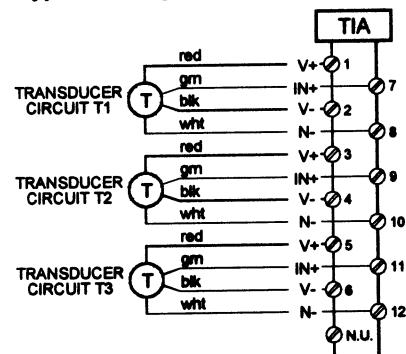


10. TIA Transducer Input Module:

The TIA Transducer Input Module provides 3 circuits for transducers rated 0-100mV. This module is used when the Analog Pressure Transducers are used for supervisory of the system and provides dynamic air supervisory of the system. It is also used for compressor control when one is provided.

By default, the TIA Module mounts in Slot #1 of the MBA Motherboard. One additional TIA slide-in module can also be mounted on Slot #2. Transducers wiring is supervised and will cause a trouble condition if shorted, grounded or mis-connected.

TIA Module typical wiring detail:



11. LAA Local Alphanumeric Annunciator:

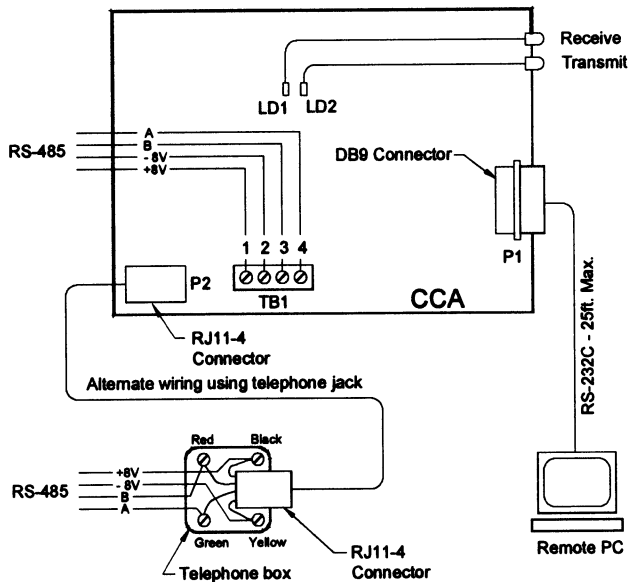
The LAA Local Alphanumeric Annunciator is mounted in the door assembly of the ARC-1 and is factory connected to the SCA System Control Module. Refer to USER INTERFACE section for additional details.

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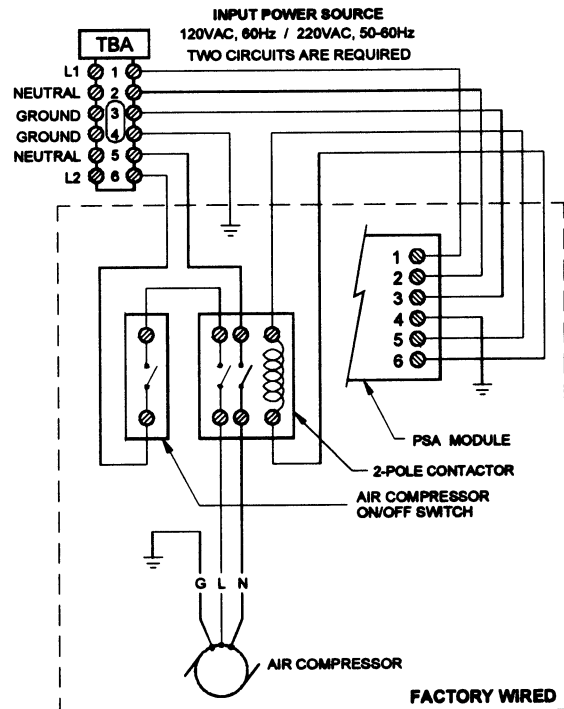
12. CCA Communication Converter Module:

The CCA Communication Converter Module is an RS-485 / RS-232 Converter Interface that is installed next to the user's computer. This module is hard wired to the ARC-1 with a shielded cable of 2 twisted pairs of 24AWG wires (max. of 4000 ft. – 1219 m.) having a maximum impedance of 100 Ohms and capacitance of 12.5pF per foot (Belden Type 8102). This interface is required with the Computer Interface Software package and is connected to the user's computer with a standard DB-9 serial cable (provided with module).

CCA Module typical wiring detail:



TBA Terminal typical wiring detail:



NOTES:
CONTROL PANEL (L1) 2A @ 120V / 1A @ 220V
AIR COMPRESSOR (L2) 1HP MAXIMUM
WIRING SIZE: MIN. 14AWG - 600V INSULATION

13. TBA Power Input Terminal:

The TBA Terminal Strip provides contact points to the contractor to feed the system with AC power. The strip is also factory wired to the PSA Module and the Air Compressor Contactor when one is used.

When initially connecting power to the panel, it is recommended to connect AC supply first, then connect the batteries. Observe polarities. When removing power from the unit, disconnect batteries first, then the AC power.

Primary power required for 120VAC is 2.8A at 60Hz and 1.4A for 220VAC at 50 or 60Hz. Over-current protection for this circuit must comply with Article 760 of the National Electrical Code (NEC) and / or local applicable electrical codes. Use 14AWG wire or larger with 600V isolating rating.

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

Preliminary inspection before putting the system into operation

1. Open cabinet door to gain access to the wiring terminals. Verify that all detection and audible devices are properly connected according to electrical schematics.
2. Connect the 120VAC (220VAC) power on TBA for the control panel (L1) and for the optional air compressor power relay (L2) on two separate branch circuit breakers in the electric distribution panel.

Note: Do not use these circuits breakers for other parallel applications. If necessary, equip each circuit breaker with a security seal or lock in order to avoid accidental closing.

3. Connect battery cable to connector provided on BCA Module. Always observe polarity when connecting batteries. A blown F1 fuse indicates a short circuit of batteries connection or a polarity reversal connection. Refer to APPENDIX B for battery sizing calculations.

CAUTION ! Although batteries provided with the system are sealed, if fractured they can release sulfuric acid which can cause severe burns to the skin and eyes, and can also destroy fabrics. If contact is made with sulfuric acid, immediately flush skin or eyes with water for 15 minutes and seek immediate medical attention.

4. Upon powering up, the panel will go through its start-up routine. The green lamp identified AC POWER should be illuminated and the Alphanumeric Display will show a scrolling SYSTEM RESET indication, then PnP IN PROGRESS and finally show its default screen (see USER INTERFACE section for additional details).