



FireVac®7200 Emergency Voice Evacuation System
Architect / Engineering Specification
Part No. 9020-0443

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SECTION ONE: GENERAL

1.1 Scope of this Document

This specification document provides the requirements for the Fire Control Instruments, Inc. FireVac7200 analog addressable, multiprocessor-based emergency voice/alarm communication system. This system shall include, but not be limited to, system cabinets, control and communication equipment, distributed power amplifiers, Switching Power Supply Unit-Vertical, System Control Unit, Analog Loop Unit, Keyboard Display Unit, Audio Evacuation Unit, audio control modules, loudspeaker and visual notification appliances, together with associated peripheral devices, programming, wiring, and other relevant components.

1.2 Work Included

1.2.1 General Requirements

The contractor shall furnish and install a complete 24 VDC, FireVac7200 analog/multiplex/multiprocessor-based emergency voice/alarm communication and/or auxiliary control system as specified herein and indicated on the drawings. The system shall include, but not be limited to, all control equipment, power supply, initiating devices, loudspeaker and visual notification appliances as appropriate, conduit, wiring, fittings, and all other accessories necessary to provide a complete and operable system.

1.2.2 Labeling

All equipment shall be labeled with the manufacturer's name and logotype to assure the integrity of the complete system. "Hybridized" systems (containing equipment from several different manufacturers) shall not be considered acceptable.

1.2.3 Agency Approvals

All equipment shall be listed by Underwriters Laboratories, Inc., or approved by Factory Mutual Research, or as accepted by the Authority Having Jurisdiction (AHJ). The model designations specified are those of Fire Control Instruments, Inc., and are indicative of the quality and type of equipment to be furnished. Accessory components as required shall be catalogued by the manufacturer and Listed to operate with the manufacturer's control panel.

1.2.4 Wiring

Wire and cable shall be U.L. Listed for fire alarm use and shall be a minimum of 18 AWG or as required by local codes and Authority Having Jurisdiction. Raceways containing conductors identified as "Fire Alarm Control Panel" conductors shall not contain any other conductors. No AC current carrying conductors shall be allowed in the same raceway with the emergency voice alarm communication detection and signaling conductors.

1.3 Submittals

The owner or his designated representative shall approve all equipment submittals.

1.3.1 General Requirements

Manufacturers original catalog data and descriptive information shall be provided for all major components of the equipment to be supplied. Supplier's qualifications shall indicate years in business, service policies, warranty definitions, and a list of similar installations. Contractor qualifications shall indicate years in business and prior experience with installations that include the type of equipment that is to be supplied. All pertinent information shall be furnished regarding the reliability and operation of the equipment to be supplied. Delivery dates of the equipment to be supplied shall be furnished. Installation and final test/acceptance dates of the equipment shall be furnished. Sufficient information shall be furnished so that the exact function of each installed device is known.

NOTE: DOCUMENTATION

Submittal of shop drawings shall contain at least one (1) booklet of original manufacturer specification and installation instruction sheets. Subsequent booklets may be copies. All equipment and devices on the shop drawings to be furnished under this contract shall be clearly marked in the specification sheets.

1.3.2 Other than Specified Equipment

If equipment other than that specified is supplied, it shall be the contractor obligation to furnish appropriate documentation and submit the following in writing to the engineer ten (10) days before the bid date:

- A. Complete lists, descriptions and drawings of materials to be used.

B. A complete list of current drain requirements during normal supervisory condition, trouble conditions, and alarm conditions.

C. Battery standby calculations showing total standby power needed to meet the system requirements as specified.

1.3.3 Satisfying the intent of these specifications

It is the contractor's responsibility to meet the entire intent of these specifications. Deviations from specified items shall be at the risk of the contractor until the date of final acceptance by the architect, engineer, and owner's representative. All costs for removal, relocation, or replacement of a disapproved substituted item shall be borne by the electrical contractor.

1.4 Codes and Standards

1.4.1 Codes

The system in its entirety shall be in compliance with all applicable fire and electrical codes and comply with the requirements of the local Authority Having Jurisdiction over said systems.

1.4.2 U.L. Standards

The system shall comply with the applicable provisions of the following U.L. Standards and Classifications:

UL STD 864, Control Units, Fire Protective Signaling Systems

UOJZ, Control Units, System

UOXX, Control Unit Accessories, System

SYZV, Control Units, Releasing Device

UOQY, Emergency communication and relocation equipment.

1.4.3 NFPA Standards

The FireVac 7200 system shall comply with the applicable provisions of the following current National Fire Protection Association (NFPA) Standards:

NFPA 70, National Electrical Code

NFPA 72, National Fire Alarm Code

Life Safety Code NFPA 101, Safety to Life from Fire in Building and Structures

SECTION TWO: SYSTEM OPERATION

2.1 Multiprocessor-Based

The system shall be modular and of multiprocessor design to allow each functional module to hold and execute its own microprocessor and software program under the control of the main system microprocessor. A common FCINET communications network shall tie all functional modules in an integrated network affording true "Distributed Processing" of all system operations. Each network interconnected module shall have its own processor and memory.

Alarm initiation, distributed amplifier activation, two-way telephone communication service and manually controllable auxiliary functions shall occur by way of multiplexed communication among the FireVac 7200 control system and peripheral devices.

2.2 Field Programmable

The system shall be capable of being field programmed through the use of a computer and FCP (Field Configuration Program) dedicated software package. The system configuration shall be saved to disk for easy access and field program modification without the addition of programming hardware. A hard-copy of the final system configuration showing all inputs, outputs, descriptions, addresses, programming matrixes, etc. shall be furnished at no extra cost.

2.3 RS-232C Serial Output

A supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals to provide an 80-column readout of all alarms, troubles, location descriptions, time, date, etc. The communication shall be standard ASCII code operating at a 1200 baud rate.

2.4 Control-by-Event (CBE) Program

2.4.1 Automatic System Operation

The operation of a manual station or automatic activation of any sensor shall cause the execution of the building fire evacuation plan and control functions.

2.5 Firefighters Command Center

2.5.1 The Command Center

Provide a firefighter's one-way communication control located where indicated. The Command Center shall be available in two configurations, single channel or dual channel, and shall provide manual control, signal transmission and supervision as herein specified. The system shall be capable of supporting up to five (5) remotely located Command Centers. The Command Center shall include:

An "All Call" Switch which activates all system speaker circuits for system-wide broadcast of any automatically or manually selected alarm tone, alert tone, pre-recorded message, voice instructions, or phone patch.

A "Manual Select" Switch which deactivates currently active speaker circuits that were automatically activated. This shall allow the operator to activate or reactivate circuits to carry desired messages, tones or instructions.

An "Alarm Tone" Switch that can toggle the primary alarm tone off and on.

An "Alert Tone" Switch that can toggle the secondary alarm tone off and on. The secondary alert tone may provide non-fire signaling (i.e. all-clear, tornado alert, bomb evacuation, etc.)

A "Lamp Test" Switch that shall light all LEDs on switch input modules and status indicator boards.

2.5.2 Firefighters Two-way Telephone System

The system shall provide a Telephone Control Unit (TCU) that shall provide manual control of simultaneous communication to multiple zones from a master telephone handset. Wiring shall be monitored and communications between the command center and the telephone jacks/warden stations shall be controlled by means of addressable Telephone Monitor Modules, (AOM-TEL). Remote Telephone Control Units (TCU-R) may be installed in the remote Command Centers. Operation shall be as follows:

Removing an installed phone from its cradle or insertion of a portable handset into a jack shall sound a call signal and light an individual line call-in LED within the fire command center. A "busy" tone shall be heard at the remote phone.

Acknowledging the call-in at the main display shall silence the audible call signal.

Placing the corresponding phone circuit switch in the "ON" position shall light the individual phone connection LED and put the remote phone in direct private contact with the master phone. Additional remote phones may be switched in by the operator for common "party line" operation.

Any remote telephone shall have the capability of operating in a remote command or paging mode at the operator's discretion by activating the "Phone Patch" switch.

2.5.3 Firefighters Auxiliary Control System.

The auxiliary control system shall consist of Switch Input Modules, Auxiliary (SIM-A), each containing five (5) software addressable/programmable switches which shall provide activation/deactivation of automatic control functions (i.e. fans, dampers, door holders, etc.). Each auxiliary function shall have:

"ON/AUTO/OFF" switches to provide automatic programming from the fire alarm panel with manual override capability by the system operator.

A green "ON" LED and yellow "OFF" LED shall be provided for each switch to give a positive indication of actual auxiliary circuit operation. The green LED shall not light until the remote module(s) controlling the auxiliary circuit has successfully executed the activation command.

Remote Command and main displays shall indicate the microphone is in use.

2.6 Supervision

2.6.1 Trouble Indicators

Circuit trouble shall be indicated by the Keyboard Display Unit. Audible trouble and alarm devices shall be supervised. Control panels with incandescent lamps or control panels without supervised alarm LEDs will not be accepted. Failure of normal power, opens or short circuits on the loudspeaker appliance, phone or signaling line circuits, disarrangements in system wiring, failure of the microprocessor or any identification module, or system ground faults shall be indicated on the Keyboard Display Unit. A short circuit on a speaker circuit wiring will automatically disconnect the affected circuit thereby ensuring the ability of all other speaker circuits to receive an alarm signal and protect the system amplifiers, preamplifiers and tone generators.

The occurrence of any fault will be displayed on the Keyboard Display Unit but will not interfere with the proper operation of any circuit, which does not have a fault condition. Speaker circuits shall be capable of being wired using Class A, Style Z or Class B, Style Y.

2.6.2 Switch Supervision

The system control panel shall supervise all control switches, sound a trouble condition and indicate on the Keyboard Display Unit whenever the switch is left in a position other than normal.

2.6.3 Trouble Acknowledgment

A trouble signal may be acknowledged by pressing the "ACKNOWLEDGE" switch on the Keyboard Display Unit. This shall silence the panel trouble sounder. If additional trouble conditions occur, the trouble circuitry will resound. During an alarm condition, all trouble signals shall be suppressed with the exception of lighting the yellow "COMMON TROUBLE" LED.

2.7 Alarm Verification

Smoke detector alarm verification shall be a standard option on all zones while identifying any dry contact device (i.e.: manual stations, heat detectors, etc.) as an immediate alarm. This feature shall allow those smoke detectors that are installed in environments prone to nuisance or unwanted alarms to operate according to the following sequence:

System Ready - prior to smoke detector alarm.

Smoke Detector Alarm - @ time = 0.

Pre-Alarm Window - 15 seconds; a distinctive pre-alarm indication shall be displayed.

Zone Reset - 5 seconds (occurs at end of pre-alarm window).

Alarm Verification Window - 90 seconds; the system shall respond to a second alarm from the same smoke detector or zone as a system alarm.

System Ready - no alarm verification.

NOTE: The verification sequence is suspended once a system alarm is activated.

2.8 Drift Compensation - Analog Smoke Sensors

System software shall automatically adjust each sensor approximately once each week for changes in sensitivity due to the effects of component aging or environment (i.e.: dust). Each smoke sensor shall maintain its actual sensitivity under adverse conditions to respond to actual alarm conditions while ignoring the factors, which generally contribute to nuisance alarms. The system trouble circuitry shall activate, display "DIRTY DETECTOR" and "VERY DIRTY DETECTOR" indications and identify the individual sensor when a sensor has been compensated beyond its acceptable limits.

2.9 Analog Smoke Sensor Test

System software shall automatically test each analog smoke sensor a minimum of three times daily. The test shall be a recognized functional test of each ionization chamber (analog ionization sensors) and photocell (analog photoelectronic sensors) as required annually by NFPA 72. Failure of a sensor shall activate the system trouble circuitry, display a "Test Failed" indication, and identify the individual unit.

2.10 Walk Test

The control unit shall provide a Walk Test program which shall enable an individual to test the alarm/supervision status of each initiating device connected to the system. During walk test, the control unit shall automatically reset after an alarm condition enabling the technician to continue testing the system without requiring a return to the control panel. The Walk Test will record on a printer for reference while not activating the loudspeakers.

2.11 Printed Circuit Boards, Control Panel Components

All control units shall be housed in a 16-gauge steel cabinet. All groups of circuits or common equipment shall be clearly marked and shall be expandable by inserting interchangeable units. The control unit shall be red in color and shall include the following features:

OR

The control unit shall be beige in color and shall include the following features:

- a. Auxiliary circuitry in the control panel to operate remote relays for control of air handling equipment.

b. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls 15% below normal ("brown out" conditions). This circuit shall allow the batteries to be effectively "floated" on the operating system to avoid upsetting normal microprocessor operation and minimize resultant nuisance troubles and/or alarms. This circuit shall be physically isolated from the power supply to facilitate service.

d. A ground fault detector to detect positive or negative grounds on the signaling line circuits, power circuits, and telephone line circuit. A ground fault LED shall light and the general trouble devices shall operate as specified herein but shall not cause an alarm to sound.

e. Lightning protection shall be a standard feature of the fire alarm control panel and shall be incorporated in the power supply circuit, common control circuits and telephone line circuit. Systems that require an optional module to provide this protection shall not be considered equal.

f. A common reset and lamp test switch, labeled "RESET/LAMP TEST" shall be provided to reset the control panel.

2.12 City Connection

The fire alarm system shall be connected via leased telephone lines to a central station or remote station.

OR

The fire alarm system shall be connected to a local energy city master box.

The panel shall contain a disconnect switch to allow testing of the system without notifying the fire department.

2.12.1 Central Station Option

The fire department shall be consulted as to the authorized central station companies serving the municipality. The fire alarm system shall transmit both alarm and trouble signals with the alarm having priority over the trouble signal. The contractor shall be responsible for all installation charges and the owner shall be responsible for the line lease charges.

2.12.2 Remote Station Option

The fire department shall be consulted as to the authorized remote station serving the municipality. The fire alarm system shall transmit both alarm and trouble signals with the alarm having priority over the trouble.

The contractor shall be responsible for all installation charges and the owner responsible for line lease charges.

2.12.3 Local Energy City Master Box Option

The city master box shall be coded and timed in accordance with fire department requirements. The box shall be mounted and located as specified by the building engineer and the fire department.

2.13 Multiplex Configuration

The system shall be designed to accommodate module placement at either a central location or from one to fifteen remote locations. System integration shall utilize the FCINET multiplex communications with a true "Distributed Processing" of system intelligence.

The system shall be capable of maintaining two degrade modes to assure maximum survivability of the system in the event of either the loss of system communications or failure of any or all microprocessors.

The first degrade mode shall serve as an emergency backup alarm reporting system for the microprocessor-based alarm reporting system in the control unit. In the event of main microprocessor failure or loss of communication to remotely located circuit boards, the backup alarm reporting system shall allow the execution of a programmed alarm sequence following the receipt of an alarm initiating signal. This degrade mode capability shall be present in the head end and in each remotely located part of the control system.

The second degrade mode shall apply to all remotely located amplifiers. The remotely located distributed amplifiers shall have the ability to transmit a default evacuation tone in the event of loss of communication with the fire alarm control unit during an alarm.

SECTION THREE: SYSTEM COMPONENTS

3.1 System Components

The emergency voice/alarm communication system shall be FCI Model FireVac7200. It shall be of dead-front construction and shall contain all necessary controls to operate the entire system, including the fire alarm control, from one location. The system shall consist of the following units, components, and peripheral devices, each of which is described in detail in this section:

- System Cabinet
- Switching Power Supply Unit, SPSU-V)
- System Control Unit (SCU)
- Analog Loop Unit (ALU)
- Keyboard Display Unit (KDU)
- Audio Evacuation Unit (AEU)
- Command Center
- Distributed Multiplexed Amplifiers

OPTIONAL:

- Distributed Intelligent Unit (DIU)
- Remote Command Centers

3.2 The System Cabinet

The system cabinet shall be designed for either surface or semi-flush mounting with a texture finish and shall contain a back plane with card cage for audio modules, backplate, and two doors. The system cabinet houses the 7200 Series microprocessor and related system units together with the audio modules and the primary tone message amplifier(s).

The cabinet shall be of dead-front construction and 16-gauge steel. The doors shall be field removable swing type with locks keyed alike with other FCI controls and manual stations. Wiring shall be terminated on removable terminal blocks to allow field servicing of all modules without disrupting system wiring.

3.3 Switching Power Supply Unit, Vertical (SPSU-V)

The main power shall be converted via the transformerless power supply to rectified and filtered 24 VDC (nominal) for system operation. Power supplies requiring a step-down power transformer shall not be acceptable.

The system shall contain an integral, filtered, nominal 24 VDC at 6 amps power supply, which shall comply with UL Standard 864 for power limited operation.

3.3.1 LED Indicators and Outputs

The Switching Power Supply Unit shall contain the following:

- A green "AC POWER" LED
- A green "DC POWER" LED
- A yellow "BATTERY FAULT" LED
- A yellow "HIGH RATE" LED
- A "HIGH RATE" charging switch

Power supply outputs shall be as follows:

- 24 VDC Non-Resettable, 1.75 amp. max., power limited.
- 24 VDC Resettable, 1.75 amp. max., power limited.
- NOTE: Maximum combined output for both shall be 3.0 amp.

3.3.2 Battery Charger

The power supply unit shall contain a charger with a maximum average charging current of 1.0 or 2.0 amperes. If the system loses AC power, a System Trouble shall occur. The charger output shall be supervised and overcurrent protected. The battery charger shall be capable of maintaining sealed lead-acid batteries of up to 55 ampere/hours capacity.

3.3.3 Batteries

The batteries for emergency voice/alarm communication service shall be capable of operating the system under maximum normal load for 24 hours and then during a fire or other emergency condition for a period of 2 hours. Fifteen minutes of evacuation alarm operation at maximum connected load shall be considered the equivalent of 2 hours of emergency operation.

3.4 System Control Unit, (SCU)

Enclosed within the main cabinet, the SCU shall contain the microprocessor, memory, system operating software stored on a non-volatile EPROM, system configuration memory stored on a non-volatile EEPROM, and the circuits necessary to support the emergency voice/alarm communication system. The SCU shall function as the system information and control center, processing all messages from the field devices (supervisory, trouble, alarm).

3.4.1 SCU Microprocessor

The SCU microprocessor shall execute all supervisory programming to detect and report the failure or disconnection of any module or peripheral device. An isolated "watchdog" circuit shall monitor the microprocessor and upon failure shall activate the system trouble circuits and the "DEGRADE" LED. The SCU microprocessor shall access the system program for all control-by-event (CBE) functions. The system program shall not be lost upon failure of both primary and secondary power. Volatile memory shall not be acceptable. A common FCINET network shall tie the SCU microprocessor on-line with all other microprocessors within the multiprocessor network to afford rapid response to all alarm or trouble conditions within the system.

3.4.2 Programming/Diagnostic Center

A two-character, seven-segment Programming Diagnostic Center Display shall be provided to annunciate system operation, programming and internal trouble-shooting features.

3.4.3 Visual Displays

Individual status LEDs shall be provided for the following functions:

LED	Function
Red	System Alarm
Yellow	Supervisory
Yellow	System Trouble
Yellow	Ground Fault
Yellow	Trouble Municipal
Yellow	Signal Silence
Yellow	Program 1 - To be programmed as needed for project application
Yellow	Program 2 - To be programmed as needed for project application
Yellow	Degrade

3.4.4 Real-Time Clock

The SCU module shall contain a real-time clock capable of monitoring all real-time programming and all time control functions.

3.4.5 Trouble Dry Contacts

Trouble dry contacts (Form A or Form B; jumper selectable) shall be provided, rated 2 amps @ 24 VDC (resistive), and shall transfer whenever a system trouble occurs.

3.4.6 Alarm Dry Contacts

Alarm dry contacts (Form C) shall be provided, rated 2 amps @ 24 VDC (resistive), and shall transfer whenever a system alarm occurs.

3.5 Analog Loop Unit, (ALU)

Each Analog Loop Unit shall provide communication with analog/addressable devices (initiation/control) connected to the system through two (2) signaling line circuits. Each circuit shall communicate with a maximum of ninety nine (99) analog sensors and ninety eight (98) addressable monitor/control devices. The first ninety nine device addresses (1-99) on each circuit shall be dedicated to analog sensors, while addresses 101-198 shall be reserved for addressable monitor/control devices.

The system shall be capable of accommodating fifteen (15) ALU units.

3.5.1 Analog/Addressable Signaling Line Circuits

Analog Addressable signaling line circuits (initiating/control) shall be wired as either Class A, Style 6 or 7 or Class B, Style 4.

3.5.2 FCI Approved Analog Sensors

Only FCI approved compatible two-wire analog sensors, which are UL Listed or FM Approved for use with the FireVac 7200 system, shall be used. The table below identifies by model designation those approved, acceptable models.

Model	Description
ASD-I, IL	Analog ionization sensor
ASD-, -PL	Analog photoelectronic sensor
2551T	Analog photoelectronic sensor with 135o F thermal unit
ATD, -L	Addressable thermal sensor, Fixed Temperature
ATD-R, RL	Addressable thermal sensor - Rate of Rise
ADB-F, -FL	Standard analog plug-in base
B501BH	Base/Horn assembly
DH500	Analog duct housing (Use with ASD-I or ASD-P)
B524RB, B224RB	Relay Base
B524BI, B224BI	Isolator Base
M500X	Isolator Module

It shall be possible to program smoke sensors for multiple alarm levels, and to set the sensors for day/night sensitivities.

3.6. Keyboard Display Unit, (KDU)

The Keyboard Display Unit (KDU) shall serve as the system display and shall furnish audible and visual annunciation of all alarms and trouble signals. Dedicated LED displays shall be provided for:

LED	Function
Red	Alarm
Yellow	Supervisory
Yellow	Trouble
Yellow	Silenced

The KDU shall contain an 80-character alpha-numeric display which shall provide status of all analog/addressable sensors, monitor and control points, and a 12-key keypad which shall permit selection of functions. The display shall be of the liquid crystal type (LCD), clearly visible in the dark and under poor light conditions. The KDUs shall contain six (6) functional keys:

1. Menu
2. Reset
3. Silence
4. Acknowledge
5. Previous Event
6. Next Event

The system shall accommodate a maximum of fifteen (15) fully functional KDU units.

3.7 Audio Evacuation Unit (AEU)

The Audio Evacuation Unit (AEU) shall contain the logic in its firmware to support all switch input modules and remote command/control modules. It shall contain a signaling line circuit that can monitor and communicate with up to 20 Switch Input Modules and up to 99 remote command/control modules, for a total of 199 points. The system shall be capable of accommodating fifteen (15) AEU units.

3.8 Command Center

The Command Center shall serve as the processing center for all signaling and supervisory functions. All manually operable modules for control of speaker circuits, 2-way communication circuits and auxiliary control circuits shall be pluggable and insert into the audio system back plane. All modules shall be addressable and software programmed. Addresses shall be set by the combination of a ten-position code switch and a two-position jumper. Systems that use DIP switches for addressing are not acceptable. Single or dual-channel operations shall be provided as required by local codes. Primary alarm controls shall be highlighted to simplify operation.

Each module shall have five (5) toggle switches for manual control and operations, and shall be capable of mounting in any back plane mounting position. Systems that use pressure sensitive, push-button or membrane type switches for speaker circuit, two-way communication or auxiliary control circuits shall not be acceptable.

Each toggle switch shall have an associated LED to indicate the activation of its associated remote module(s). The LED shall not light until the remote module(s) have successfully executed the activation command. Systems that activate visual indicators without confirming the on/off status of the controlling devices shall not be acceptable. It shall be possible to use a common remote module to control speaker circuits, 2-way communication circuits and auxiliary control circuits. Systems that employ specialized modules to control different functions shall not be acceptable.

The Command Center shall include the following:

1. Command Control Unit, Single Channel (CCU-S)
OR
2. Command Control Unit, Dual Channel (CCU-D)
3. Main Tone/Message Amplifier(s)
4. Telephone Control Unit (TCU)
5. Switch Input Module, Speaker (SIM-S)
6. Switch Input Module, Phone (SIM-P)
7. Switch Input Module, Auxiliary (SIM-A)
8. Status Indicating Board, 10 LED (SIB-10)

3.8.1 Command Control Unit - Single Channel (CCU-S)

The Command Control Unit - Single Channel (CCU-S) shall contain the following two-position switches with associated red LED to indicate their activation:

All Call (Alarm/Normal)
Manual Select (On/Normal)
Alarm Tone (On/Normal)
Aux. Tone (On/Normal)
Lamp Test

The system shall accommodate up to five (5) additional remotely located Command Control Units.

3.8.2 Command Control Unit - Dual Channel (CCU-D)

The Command Control Unit - Dual Channel CCU-D is similar to the Single Channel Command Control Unit except the "All Call" Switch is a three-position switch (Channel 1 - Alarm/Normal Channel 2 - Alert). The Alarm tone is broadcast when the switch is moved to the "Alarm" position, and the Alert tone is broadcast when the switch is moved to the "Alert" position.

The system shall accommodate up to five (5) additional remotely located Command Control Units.

3.8.3 Main Tone/ Message Amplifier

The Main Tone/Message Amplifier shall contain the following:

Message Center Mother Board
Audio Amplifier Module

The Message Center Mother Board shall contain the amplifier assembly central processor, tone generators, digital message generator, microphone input and preamplifier, together with circuitry to distribute power to the amplifier(s). The microprocessor shall be able to store one pre-recorded message of up to 60 seconds, or two (2) messages of up to 30 seconds. In the event of primary tone generator failure, any one of three backup generators shall become enabled.

Power amplifiers shall be in 25 watt increments and power limited. A second message center mother board shall be required for dual channel operation.

Tone/message sequences shall be determined by DIP switch arrangement on the Message Center Mother Board.

All speaker appliance circuits shall have short circuit protection built-in to automatically disconnect the individual speaker appliance circuit from the system amplifier(s) when a short circuit is detected, to assure the integrity of all other speaker appliance circuits. A dedicated wiring area shall be provided for all circuits to simplify contractor interconnections.

The main tone message amplifier(s) shall broadcast the alarm/alert tones, pre-recorded messages, and voice instructions to all the remotely located, distributed amplifiers. Signals shall be broadcast at the 25 VRMS level. Systems that broadcast information below the 25 VRMS level for retransmission shall not be acceptable.

3.8.4 Telephone Control Unit (TCU)

The Telephone Control Unit (TCU) shall be available in standard (TCU) or remote configuration models (TCU-R). Up to five (5) remote units may be installed in remote command centers. The TCU shall provide preamplification for the two-way telephone system and shall have a two-position toggle switch with associated red LED to permit selective or All-Call paging from remote handsets.

3.8.5 Switch Input Module, Speaker (SIM-S)

The Switch Input Module, Speaker (SIM-S) shall be available for either single channel (SIM-SS) or dual channel (SIM-SD) operation and each module shall contain five (5) independent, field programmable switch inputs for the control of single or multiple distributed speaker circuits. Single channel modules shall have two-position speaker switches, "ON/AUTO", with an associated red LED to assure positive indication of circuit status. Dual channel modules shall have three-position "ALARM/AUTO/ALERT" control switches for manual control of Channel 1 "ALARM" or Channel 2 "ALERT" tones with each channel having its own LED for positive status indication.

3.8.6 Switch Input Module, Phone (SIM-P)

The Switch Input Module, Phone (SIM-P) shall provide five (5) independent, field programmable switch inputs for the control of single or multiple firefighter telephone circuits. Each switch input shall have a two-position switch "CONNECT/NORMAL" for manual control of the distributed firefighter telephone circuit with a yellow LED for incoming telephone call indication. A red LED shall light to confirm the connection of the remote caller to the 2-way communication bus. It shall be possible to install a fully supervised, 2-way communication bus with redundant wiring.

3.8.7 Switch Input Module, Auxiliary (SIM-A)

The Switch Input Module, Auxiliary (SIM-A) shall provide five (5) independent, field programmable switch inputs for activation or deactivation of command/control modules or other devices. Each switch input shall have a three-position switch (ON/AUTO/OFF) with associated LEDs to confirm device activation/deactivation.

3.8.8 Status Indicating Board (SIB-10)

Status Indicating Boards Shall provide ten (10) independent, field programmable LEDs to provide status indication for any system initiating group. LEDs shall be available in red (SIB-10R) or yellow (SIB-10Y).

3.8.9 Connections and Circuits

Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Electrical Code (NEC). The circuit and connections shall be mechanically protected. The circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked "FIRE ALARM CIRCUIT CONTROL."

3.9 Distributed Amplifier Assembly

Power for the loudspeaker appliances shall be supplied by modular, remotely located and distributed amplifier assemblies. The design of the distributed amplifier assembly shall closely parallel the design of the main tone/message amplifier assembly at the Command Center. This power shall be provided by 25-watt amplifier modules and each distributed amplifier assembly shall accommodate two (2) 25-watt amplifier modules for a maximum audio output of 50 watts.

Each distributed amplifier assembly shall be housed in a separate cabinet and shall contain the following components:

- Transformer and power supply with integral battery charger
- Mother board
- 25-watt audio amplifier modules (max. 2)
- Standby batteries

The battery charger shall be sufficient to maintain batteries of up to 17 AH capacity.

The system shall be capable of detecting the loss of 25 watts of system power. Systems incapable of detecting a loss of 25 watts shall not be acceptable.

It shall be possible to provide fully redundant audio power for each 25-watt segment of the audio system. Systems employing partial redundancy, or system incapable of providing full redundancy for each 25-watt segment of the audio system, shall not be acceptable.

It shall be possible to divide the audio output of a distributed amplifier assembly into smaller evacuation zones by means of standard control modules. Systems that employ specialized modules to distribute audio power shall not be acceptable.

The same set of remotely located, distributed amplifier assemblies shall be used for the audio portion of the system regardless whether the system is single or dual-channel. A duplicate set of amplifier assemblies for dual-channel systems shall not be acceptable.

OR

3.9.2 Bulk Amplification

Power for the loudspeaker appliances shall be supplied by high power, bulk amplifiers, controlled by the Bulk Amplifier Unit (BAU) in conjunction with the Audio Driver Card (ADC).

The BAU shall be capable of connecting as many as six (6) Model PA-120R 120 watt, or PA-250R 250 watt amplifiers to the FireVac7200 control. Output shall be either 25 or 70 V RMS. The BAU shall contain AC power loss and brownout detection with automatic transfer to standby batteries.

Single Channel Operation

Up to five of these amplifiers can be connected to separate audio risers for a single channel system, with the sixth amplifier used as a shared backup amplifier for any of the five main amplifiers.

OR

Dual Channel Operation

Up to four of the six amplifiers can be connected to individual audio risers for a dual channel system, with one of the two remaining amplifiers serving as a shared backup amplifier for the primary audio channel and the other serving as a shared backup amplifier for the secondary audio channel. The alarm tone and/or recorded voice message to be transmitted to each evacuation zone shall be controlled by means of addressable Multiplex Output Modules (AOM-MUX).

The BAU shall allow for fully redundant (one-for-one) backup amplification in addition to the shared redundant backup feature. Even-numbered amplifiers serve as backup for odd numbered amplifiers with fully redundant amplification.

3.10 Audio Driver Card (ADC)

The Audio Driver Card shall act as a preamplifier for the bulk amplifiers. It shall have a redundant driver circuit that shall operate in the event of a primary driver failure. It shall also provide a Class A or B reverse polarity circuit to activate the Bulk Amplifier Unit. The ADC shall replace the Audio Amplifier Module, (FCI-AAM-25) in the Mother Board.

3.11 Distributed Intelligent Unit (DIU) (Optional)

The Distributed Intelligent Unit (DIU) shall be capable of being located remotely, up to 4,000 feet, from the main control and shall be capable of supporting as many optional units as the SCU. It communicates with the SCU via the FCINET and shall be capable of independent operation in the event of loss of communication with the main control. The DIU contains status and system control switches for system "RESET", "SILENCE" and "ACKNOWLEDGE". The remote DIU enclosure shall be equipped with its own power supply, consisting of a Switching Power Supply Unit, Vertical (SPSU-V) and batteries.

3.12 Auxiliary Command Centers

The system shall be capable of supporting up to five (5) auxiliary Command Centers. The auxiliary command Center shall either duplicate exactly the manually-operable switches and controls at the main Command Center, or duplicate user-specified subsets of these switches and controls. Communication between the auxiliary Command Center and the system control unit shall be accomplished by the FCINET.

SECTION FOUR: PERIPHERAL DEVICES:

(Specifier choose as required)

4.1 Analog Photoelectronic Smoke Sensors, FCI Models ASD-PL, ASD-PTL

- a. Analog photoelectronic sensors shall have a low profile and be capable of being set at four sensitivity settings of "LOW, MEDIUM, NORMAL, and HIGH" levels, with a predefined setting of LOW.
- b. Automatic and manual functional sensitivity and performance tests shall be possible without the necessity of generating smoke. This test method shall test all sensor circuitry and a "Failed Test" indication shall display on the KDU for any failed test.
- c. Two LEDs providing 360 degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is being supplied. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. An alarm output shall be available for remote annunciation.
- d. The system shall check the sensitivity of each sensor periodically. If alarm threshold sensitivity has changed, due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).
- e. Each sensor shall allow for the setting of two sensitivity levels. These levels may be programmed so that when the building is occupied, a sensor will be less sensitive than when the building is unoccupied. This feature permits sensors to be more reliable and at the same time

reduces/minimizes unwanted alarms. This feature shall also provide for programmable weekend days, where the sensor will remain at an unoccupied sensitivity level throughout the day.

f. The sensor screen and cover assembly shall be removable for field cleaning. Wire connection shall be made by clamping plate and screw.

g. Each sensor shall be interchangeable with the ASD-IL and ATD-L series sensors via twistlock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being protected. In all cases the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

A Model ASD-PTL shall contain an integral 135o F heat detector that shall operate independently of the smoke detector circuitry.

OR

4.2 Analog Ionization Smoke Sensor, FCI Model ASD-IL

a. Analog ionization sensors shall be low profile and contain a dual chamber ionization sensor of the dual unipolar type. Each sensor shall be capable of being set at seven (7) sensitivity settings ranging from 3.0 to 1.0 %/ft equivalent obscuration, with a predefined setting of 3.0%.

b. Automatic and manual functional sensitivity and performance tests shall be possible on all sensors without the necessity of generating smoke. This test method shall test all sensor circuitry and a “Failed Test” indication shall display on the KDU for any failed test.

c. Two LEDs providing 360 degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is being supplied. This feature shall be field programmable. Upon alarm, these LEDs shall light continuously. An alarm output shall be available for remote annunciation.

d. The system shall check the sensitivity of each sensor periodically. If a sensor’s alarm threshold sensitivity has changed, due to aging and/or dust accumulation, the system shall automatically compensate for this change (drift compensation).

e. Each sensor shall allow for the setting of two sensitivity levels. These levels may be programmed so that when the building is occupied, a sensor will be less sensitive than when the building is unoccupied. This feature permits sensors to be more reliable and at the same time reduces/minimizes unwanted alarms. This feature shall also provide for programmable weekend days, where the sensor will remain at an unoccupied sensitivity level throughout the day.

f. The sensor screen and cover assembly shall be removable for field cleaning. Wire connection shall be made by clamping plate and screw.

g. Each sensor shall be interchangeable with the ASD-PL and ATD-L series sensors via twistlock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being protected. In all cases the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

4.3 Addressable Thermal Sensor, FCI Model ATD-L Series

a. Addressable thermal sensors shall be low profile and operate on the combination “rate-of-rise” and “fixed temperature” principles with the fixed temperature setpoint at 135o F. FCI Model ATD-RL. The sensor shall contain state-of-the-art dual thermistor sensing circuitry for fast response.

OR

Addressable thermal sensors shall operate on the “fixed temperature” principle with the sensor having a setpoint of 135o F. FCI Model ATD. The sensor shall contain state-of-the-art dual thermistor sensing circuitry for fast response.

- b. Two LEDs providing 360 degree visibility of operating status and alarm indication shall be provided on each sensor. The LEDs shall pulse periodically indicating that the sensor is receiving power and communication is being supplied. This feature shall be field programmable. Upon alarm, the LEDs shall light continuously. An alarm output shall be available for remote annunciation.
- c. Each sensor shall be interchangeable with the ADS-PL and the ASD-IL sensors via twistlock mounting base, to ensure matching the proper sensor to the potential hazards of the areas being protected. In all cases the system shall recognize when an improper sensor type has been installed in a previously programmed sensor type location.

4.4 Addressable Monitor Module, AMM-2

An addressable monitor module with an initiating circuit wired Class B, Style B shall be furnished to provide an address for individual, normally open (N.O.) contact devices.

4.5 Addressable Monitor Module, AMM-4

An addressable monitor module with an initiating circuit capable of being configured either Class A, Style D or Class B, Style B shall be furnished to provide an address for an individual, normally open (N.O.) contact device, or a collective address for a group of such devices.

The AMM-4 module shall contain a yellow status LED which shall flash when in a quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.

4.6 Addressable Subloop Monitor Module, AMM-4S

An addressable monitor module with an initiating circuit capable of being configured Class B, Style B shall be furnished to provide a collective address for up to ten (10) compatible, conventional two-wire smoke detectors.

The AMM-4S module shall contain a yellow status LED which shall flash when in a quiescent mode and light continuously when in alarm. The LED shall be field programmable not to provide quiescent status indication, if so desired.

4.7 Addressable Output Module, AOM-2

An addressable output module shall be connected to the same signaling line circuit as the analog/addressable monitor devices and shall provide a relay output (Form "C" 2 amp @ 24 VDC, resistive only), or a notification appliance circuit output (1 amp @ 24 VDC, requiring separate power input). The AOM-2 module shall contain a yellow status LED which shall flash when in a quiescent mode and light continuously when activated. The LED shall be field programmable not to provide quiescent status indication, if so desired.

4.8 Telephone Monitor Module, AOM-TEL

The telephone monitor module shall monitor the wiring to one or more telephone jacks or warden stations for systems with two-way telephone service. It also shall control the communications between the command center and telephone jacks/warden stations.

4.9 Multiplex Output Module, AOM-MUX

The multiplex output module shall be used in dual-channel bulk audio systems to select the alarm tone and/or recorded voice message to be transmitted to each evacuation zone. It shall connect the selected alarm tone and/or recorded voice message to its output speaker circuit.

4.10 Fault Isolator Module, M500X

This module enables part of the signaling line circuit to continue operating when a short circuit occurs on a section of it. An LED flashes in the normal condition and lights during a short circuit condition. The module automatically restores the entire circuit to the normal condition when the short circuit is removed. This module may be used in multiple, in any combination with other modules, providing circuit operation similar to that of NFPA Style 7, and does not require an address on the signaling line circuit.

4.11 Manual Fire Alarm Stations:

a. Double Action Manual Station, MS-2

Furnish and install a manual station (MS-2) at each location indicated on the drawings or called for within this specification. Each station shall be of the non-coded double action type, requiring an outer door to be lifted to expose the actuator door. Upon pulling forward of the actuator door, the unit shall lock into a readily observable "alarm" position. The station shall be constructed of aluminum (6063/T5), equipped with a break glass rod feature, and require a key to reset. This key shall be keyed alike with the control cabinet. The stations shall employ a highly reliable action to activate an alarm. This feature shall provide an exceptionally high resistance to accidental operation.

OR

Single Action Manual Station, MS-6

Furnish and install a manual station (MS-6) at each location indicated on the drawings or called for within this specification. Each station shall be a non-coded single action type requiring the act of pulling forward an actuator door to activate the alarm switch. The actuator door shall lock into a readily observable "alarm" position. The station shall be constructed of aluminum (6065/T5), equipped with a break glass rod feature, and require a key to reset. This key shall be keyed alike with the control cabinet. The stations shall employ a highly reliable action to activate an alarm. This feature shall provide an exceptionally high resistance to accidental operation.

OR

b. Presignal Manual Station, MS-2P

Furnish and install a presignal manual station (MS-2P) at each location indicated on the drawings or called for within this specification. Each station shall be of the non-coded double action type, requiring an outer door to be lifted to expose the actuator door. Upon pulling forward of the actuator door, the unit shall lock into a readily observable "alarm" position. The station shall be constructed of aluminum (6063/T5), equipped with a break glass rod feature, and require a key to

reset. This key shall be keyed alike with the control cabinet. The station shall also provide an additional key operated switch (keyed differently) mounted on the front of the lower door which shall be used for "general alarm" signaling.

OR

c. Institutional Manual Station, MS-2L

Furnish and install an institutional manual station (MS-2L) at each location indicated on the drawings or called for within this specification. Each station shall require a special key to release the outer door before it can be activated. After unlocking the actuator door and pulling it forward, the unit shall lock into a readily observable "alarm" position. The station shall be constructed of aluminum (6063/T5), and equipped with a break glass rod feature. Each station shall require the same key to reset.

OR

d. Multiple Contact Manual Station, MS-2D

Furnish and install a multiple contact manual station (MS-2D) at each location indicated on the drawings or called for within this specification. Each station shall be of the non-coded double action type, requiring an outer door to be lifted to expose the actuator door. Upon pulling forward of the actuator door, the unit shall lock into a readily observable "alarm" position. The station shall be constructed of aluminum (6063/T5), equipped with a break glass rod feature, and require a key to reset. This key shall be the keyed alike with the control cabinet. Upon operation of the station, a contact shall be available for remote control or annunciation. Contact rating shall be 6 amperes @ 30 VDC.

OR

e. Weatherproof Manual Station, MS-WS

Furnish and install a weatherproof manual station (MS-WS) at each location indicated on the drawings or called for within this specification. Each station shall be of the non-coded single action type, requiring the pulling of the actuator door outward, so that the station can be operated even though encrusted with ice. Upon pulling outward of the actuator door, it shall remain forward to give visual indication that the station has been operated.

The station shall be NEMA 3 and constructed of cast aluminum with a bright red finish and raised white "FIRE" letters to assure fast recognition in a fire emergency. Each station shall also be equipped with a break glass rod feature, and shall require a key to reset the actuated station. This key shall be keyed alike with the control cabinet.

Indoor style stations mounted on a gasket shall not be acceptable.

4.12 Automatic Initiating Devices

a. Photoelectric Area Smoke Detector, FCI Models PSD-7155, PSD-7156

Smoke detectors shall be of the solid state photoelectric type, operate on the light scattering, photodiode principle and be designed for two-wire installations. The detector shall be factory set to detect smoke at a nominal 3.0% light obscuration per foot. A special sensitivity tester shall allow a direct readout of actual detector sensitivity in percent obscuration per foot using a digital voltmeter. To minimize nuisance alarms, detectors shall contain an integral screen protecting the sensing chamber from dust and insects, and equipped with self-compensating circuitry to provide maximum stability against the effects of aging, dust, and film accumulation. The detector shall be equipped with a pulsed LED power supervisory indicator and full functional test feature. The detector shall be interchangeable with the CPD-7051 detector via twistlock mounting base to ensure matching the

proper detection to the potential hazards of the areas being protected. An alarm output shall be available for remote annunciation.

A Model PSD-7156 shall contain an integral 135o F heat detector that shall operate independently of the smoke detector circuitry.

OR

Photoelectronic Area Smoke Detector, FCI Models 301P-L, 301PT-L

Smoke detectors shall have a low profile and be of the photoelectronic type. The sensor shall have a nominal sensitivity of 3.0%/ft. and a signal to noise ratio of 2.0 nominal. It shall be possible to perform a functional sensitivity and performance test on these detectors without the necessity of generating smoke. The test method shall test all detector circuits. A visual indication of an alarm shall be provided by a latching LED which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation.

A special test meter shall be available to check the sensitivity of the detectors. Metering points for the test meter shall be accessible on the exterior of the detectors.

The detectors shall not alarm when exposed to wind gusts up to 2500 feet per minute. The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

The detectors shall be interchangeable with the 301IL detector via twistlock mounting base, to ensure matching the proper detection to the potential hazards of the areas being protected.

A Model 301PT-L shall contain an integral 135o F, heat detector that shall operate independently of the smoke detector circuitry.

OR

Photoelectronic Area Smoke Detector, FCI Models SBS-1201, 1201T

Smoke detectors shall be of the photoelectronic type. The sensor shall have a nominal sensitivity of 3.0%/ft. It shall be possible to perform a functional test on these detectors without the necessity of generating smoke. The test method shall test all detector circuits.

Alarm indication shall be provided by a latching LED which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation.

The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

A Model SBS-1201T detector shall contain an integral 135o F heat detector that shall operate independently of the smoke detector circuitry.

b. Ionization Area Smoke Detector, FCI Model CPD-7051

Smoke detectors shall be of the dual chamber, solid state ionization type and shall operate on 0.7 microcurie or less of Americium 241 and shall be designed for two-wire installations. The detector shall have 360 degree angle orientation (circumference) smoke entry characteristics, permitting maximum response to both visible and invisible products of combustion from any direction. A special sensitivity tester shall allow a direct readout of actual detector sensitivity in percent per foot using a standard digital voltmeter. The detector shall be capable of operation in air velocities up to 2,000 FPM and at altitudes up to 7,500 feet without adjustments.

To minimize nuisance alarms, the detector shall be equipped with gated output circuitry requiring three different and simultaneous signals before detector actuation. The detector shall be interchangeable with the PSD-7155/7156 detectors via twist-lock mounting base to ensure matching the proper detection to the potential hazards of the areas being protected.

OR

Ionization Area Smoke Detector, FCI Model 301I-L

Smoke detectors shall have a low profile and be dual chamber ionization sensors of the dual unipolar type. The sensor shall have a nominal sensitivity of 1.5%/ft. It shall be possible to perform a calibrated sensitivity and performance test on the detector without the necessity of generating smoke. The test method shall test all detector circuits. A special test meter shall be available to check the sensitivity of the detectors. Metering points for the test meter shall be accessible on the exterior of the detectors.

Alarm indication shall be provided by a latching LED which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation. The detectors shall not alarm when exposed to wind gusts up to 2,500 feet per minute, and shall be capable of operation at altitudes up to 10,000 feet above sea level without adjustment. The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

The detectors shall be interchangeable with the 301PL detectors via twistlock mounting base to ensure matching the proper detection to the potential hazards of the areas being protected.

OR

Ionization Area Smoke Detector, FCI Model SBS-1101

Smoke detectors shall have a dual chamber ionization sensor of the dual unipolar type. The sensor shall have a nominal sensitivity of 1.5%/ft. It shall be possible to perform a functional test on these detectors without the need of generating smoke. The test method shall test all detector circuits.

Alarm indication shall be provided by a latching LED which shall pulse periodically indicating that power is being supplied to the detector. An alarm output shall be available for remote annunciation. The detectors shall not alarm when exposed to wind gusts up to 300 feet per minute.

The detector screen and cover assembly shall be removable for field cleaning. Wire connections shall be made by a clamping plate and screw.

c. Duct Smoke Detector, FCI Model DH-60

The contractor shall furnish and install where shown on plans photoelectric (DH-60/PSD-7155D) or ionization(DH-60/CPD-7051D) duct smoke detectors wired in a two or four-wire configuration. The detector shall be UL Listed under UL Standard 268A for duct smoke detectors and allow remote functional testing without generating smoke.

OR

Four-wire Duct Smoke Detector, Model DH-100

The contractor shall furnish and install where shown on plans, duct smoke detectors equipped with photoelectronic heads wired in a 4-wire configuration. The unit shall have Continuous Electronic Monitoring to ensure that the sensor board is installed, powered and operating above its minimum sensitivity level. The detector shall be UL Listed under UL Standard 268A for duct smoke detectors and allow remote functional testing without generating smoke.

d. Rate of Rise Heat Detector, FCI Model 600 Series

Rate of rise heat detectors shall function on both the rate of rise and fixed temperature principles of operation. These detectors shall be of low profile design, white in color and be provided with locking base for mounting on a standard electrical box.

These detectors shall be installed where located on plans.

OR

Rate of rise Heat Detector, FCI Model 500 Series

Rate of rise heat detectors shall function on both the rate of rise and fixed temperature principles of operation. These detectors shall also be available in an explosion-proof and combined weather/moisture-proof version depending upon application. The explosion-proof models shall be UL and FM approved/listed for Class I, Groups C and D, and Class II, Groups E, F and G. These detectors shall be installed where located on plans.

e. Fixed Temperature Heat Detector, FCI Model 600 Series

Fixed temperature detectors shall function on the fixed temperature principle of operation. Depending upon location and use, the units shall be provided with SPST or DPST contact arrangements and temperature set points of 135 or 200o F. These detectors shall be of low profile design, white in color and be provided with locking base for mounting on a standard electrical box. The detectors shall be installed where located on plans.

OR

Fixed Temperature Heat Detector, FCI Model 500 Series

Fixed temperature detectors shall function on the fixed temperature principle of operation. Depending upon location and use, the units shall have temperature set points of 136 or 190o F. These detectors shall also be available in an explosion-proof and combined weather/moisture-proof version depending upon installation location. The explosion-proof models shall be UL and FM approved/listed for Class I, Groups C and D, and Class II, Groups E, F & G. The detectors shall be installed where located on plans.

OR

Fixed Temperature Heat Detector, FCI Model FL Series

Fixed temperature detectors shall function on the fixed temperature principle of operation. Depending upon location and use, the units shall have set points of 135 or 200o F. These detectors shall be installed where located on plans.

SECTION FIVE: VISUAL ANNUNCIATION

5.1 Graphic Annunciator

Furnish and install a remote zone graphic annunciator as shown on plans. The annunciator shall be capable of being flush or surface mounted and suitable for indoor or outdoor applications.

One zone of annunciation shall be dedicated for system trouble. Furnish FCI Model RZA-GA# in a black textured enclosure. Removal of the front cover shall provide easy access to replace lamps/LEDs. The number of zones shall be as shown on the drawings. All alarm lamps/LEDs and wiring shall be supervised.

OR

5.2 Back-lit Tabular Annunciator

Furnish and install a remote zone backlit annunciator as shown on plans. The annunciator shall be capable of being flush or surface mounted for indoor or outdoor applications. One zone of annunciation shall be for system trouble. Furnish FCI Model RZA-A# in a black textured enclosure. Removal of the front cover shall provide easy access to replace lamps/LEDs. The number of zones shall be as shown on the drawings with two additional spares provided. All alarm lamps/LEDs and wiring shall be supervised.

OR

5.3 LED type Annunciator

Furnish and install a remote LED type annunciator as shown on plans. The annunciator shall be capable of being flush or surface mounted for indoor or outdoor applications. One zone of annunciation shall dedicated for system trouble. Furnish FCI Model M08 or M16 in a black textured enclosure. Removal of the front cover shall provide easy access to replace LEDs. The number of zones shall be as shown on the drawings with two additional spares provided. All alarm LEDs and wiring shall be supervised.

SECTION SIX: AUXILIARY FUNCTIONS

6.1 HVAC Control

1. Designated HVAC units shall be controlled through the programmable auxiliary control functions of the system.

OR

2. Designated HVAC units shall be controlled through the auxiliary contacts of the control panel after an alarm has been initiated from any point as shown on the plans.

6.2 Magnetic Door Holders

Electromagnetic door holders shall be provided to hold fire and smoke barrier doors open until released by an alarm condition. The door holders shall have approximately 35 lb. (15.9 kg) holding power and offer fail safe operation. Furnish and install FCI Model FM-900 series where shown on plans. All holders shall release through the contacts of the control panel after an alarm has been initiated from any zone on the plans. All circuits shall be separately fused.

SECTION SEVEN: WIRING

7.1 Installers Responsibilities

The installer shall coordinate the installation of the fire alarm equipment with the manufacturer or his authorized distributor. All conductors and wiring shall be installed according to the manufacturer's recommendations. It shall be the installer's responsibility to coordinate with the supplier, regarding the correct wiring procedures, before installing any conduits or conductors.

7.2 System Component Installation

System components shall be installed in accordance with the latest revisions of the appropriate NFPA codes, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ). All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per the National Electrical Code, Article 760.

SECTION EIGHT: WARRANTY AND FINAL TEST

8.1 General

The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for one year (365 days) from the date of final acceptance.

8.2 Final Test

Before the installation shall be considered completed and acceptable by the awarding authority, a test of:

1. The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.
2. At least one half of all tests shall be performed on battery standby power.
3. Where application of heat would destroy any detector, it may be manually activated.
4. The signaling line circuits and loudspeaker appliance circuits shall be opened in at least two (2) locations to check for the presence of supervision.
5. When the testing has been completed to the satisfaction of both the contractor's job foreman and the representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.
6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.
7. Prior to final test, the fire department must be notified in accordance with local requirements.

8.3 Operating and Instruction Manuals

Operating and instruction manuals shall be submitted prior to testing of the system. Four (4) complete sets of operating and instruction manuals shall be delivered to the owner upon completion.

8.3.1 "As-Built" Drawings

A complete set of reproducible "as-built" drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system.

8.3.2 Testing Instructions

Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment, and a complete trouble shooting manual explaining how to test the primary internal parts of each piece of equipment shall be delivered to the owner upon completion of the system.

8.3.3 Maintenance Instructions

Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instructions for replacing any components of the system, including internal parts.
2. Instructions for periodic cleaning and adjustment of equipment with a schedule of these functions.
3. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.
4. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with UL Standard 864.