Part Number 06-236005-401
Document Number 77.100
February 2006

ORION™ XT

High-Sensitivity Smoke Detector

Installation, Operation and Maintenance Manual

FM APPROVED
UL LISTED
ULC LISTED
NEW YORK CITY DEPARTMENT OF BUILDINGS MEA Listed
CSFM Listed STATE FIRE MARSHAL

Kidde Fire Systems

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FOREWORD

This manual is intended to clearly and accurately reflect the ORION™ XT High-Sensitivity Smoke Detection system. This manual is to be used by trained distributors only. This publication describes the operation, installation and maintenance for the ORION XT High-Sensitivity Smoke Detection system.

TERMS AND ABBREVIATIONS

AC	Alternating Current	ISOL	Isolate
AH	Ampere Hour	LED	Light Emitting Diode
CPU	Central Processing Unit	MEA	Materials and Equipment Acceptance Division of the Department of Buildings. City of New York
CSFM	California State Fire Marshal	mA	Milliamperes
DC	Direct Current	NFPS	National Fire Protection Association
DIA	Diameter	OCS	ORION Configuration Software
DIP	Dual In-line Position	PALM	PEGAsys Addressable Loop Module
ESC	Escape	PC	Personal Computer
EOL	End-of-Line	P/N	Part Number
ESP	Extended Sampling Point	PSU	Power Supply Unit
FM	Factory Mutual	RAM	Random Access Memory
ft.	Feet or Foot	RH	Relative Humidity
ft./sec	Feet per Second	sq. ft.	Square Feet
GND	Ground	UL	Underwriters Laboratories
HSSD®	High Sensitivity Smoke Detection	VAC	Voltage Alternating Current
HVAC	Heat, Ventilation and Air-Conditioning	VDC	Voltage Direct Current
IIM	Intelligent Interface Module	vs.	Versus

Note: The following notice applies to the Intelligent Interface Module option with modem, part number 77-297114-002

NOTICE
FCC Part 68 Information

1. This equipment complies with Part 68 of the Federal Communication Commission (FCC) rules. This unit bears a label which contains the FCC registration number and ringer equivalence number (REN). If requested, this information must be provided to the telephone company.
2. This equipment contains an FCC compliant modular jack. It is designed to be connected to the telephone network or premises wiring using compatible modular plugs and cabling which comply with the requirements of FCC Part 68 rules.
3. The Ringer Equivalence Number, or REN, is used to determine the number of devices which may be connected to the telephone line. An excessive REN may cause the equipment to not ring in response to an incoming call. In most areas, the sum of the RENs of all equipment on a line should not exceed five (5.0).}
4. In the unlikely event that this equipment causes harm to the telephone network, the telephone company can temporarily disconnect your service. The telephone company will try to warn you in advance of any such disconnection, but if advance notice isn't practical, it may disconnect the service first and notify you as soon as possible afterwards. In the event such a disconnection is deemed necessary, you will be advised of your right to file a complaint with the FCC.
5. From time to time, the telephone company may make changes in its facilities, equipment, or operations which could affect the operation of this equipment. If this occurs, the telephone company is required to provide you with advance notice so you can make the modifications necessary to maintain uninterrupted service.

Repair and warranty information can be obtained in the U.S. from Kidde-Fenwal (508) 881-2000

Industry Canada Information

"NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate."

"NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence Numbers of all the devices does not exceed 5."

Revised March 27, 2001

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SAFETY SUMMARY

INSTALLATION PRECAUTIONS

Note: Adherence to the following will aid in problem-free installation with long-term reliability:

⚠ WARNING

Several different sources of power can be connected to this ORION™ XT High-Sensitivity Smoke Detector. Disconnect all sources of power before servicing. The ORION XT system and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until this manual is read and understood.

⚠ CAUTION

Application of the system: To reduce the possibility of inadvertent alarms caused by "normal" ambient conditions, the ORION XT system must be monitored before final commissioning. Special attention should be given to systems installed where elevated levels of background ambient smoke or particulate concentrations are present within the protected area. Examples of such applications would be: kitchens, boiler rooms, manufacturing or other processes where open flames or unprotected heating surfaces are present.

This monitoring must be conducted for a minimum of two weeks and be conducted during all normal situations which may cause an elevated level of smoke or particulate to occur in the protected area. This monitoring process will determine the most appropriate detector sensitivity, alarm threshold and delay settings for the application.

⚠ CAUTION

Use with fire suppression systems: Under no circumstances should the ORION XT Detector be used to directly initiate the release of a fire suppression system. When used as detection for a fire suppression system, the ORION XT Detector should provide one initiation signal of a crossed-zoned detection system.

⚠ CAUTION

Static Electricity: Electronic components and modules can be damaged by small amounts of static electricity. When handling these components or modules, wear an antistatic wrist strap or grounding device.

GENERAL SAFETY NOTICES

Note: The following must be observed to maintain personnel safety.

The following general safety notices supplement specific warnings and cautions appearing in the manual. The safety precautions in this section must be understood and applied during operation and maintenance.

TEST EQUIPMENT

Make certain test equipment is in good operating condition. Do not touch live equipment or personnel working on live equipment while holding a test meter. Some types of measuring devices should not be grounded; these devices should not be held when taking measurements.

FIRST AID

Any injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

GENERAL PRECAUTIONS

The following general safety precautions are to be observed at all times:

1. All electrical components associated with equipment shall be installed and grounded in accordance with NEC, NFPA-72 and local regulation requirements.
2. Special precautionary measures are essential to prevent applying power to equipment at any time when maintenance work is in progress.
3. Before working on electrical equipment, use a voltmeter to ensure that system is not energized.
4. When working near electricity, do not use metal rules, flashlights, metallic pencils, or any other objects having exposed conductive material.
5. When connecting a meter to terminals for measurement, use range higher than expected voltage.

CHAPTER 1
GENERAL INFORMATION

1-1 INTRODUCTION

This manual contains operation, installation, maintenance, troubleshooting and parts list information for the ORION™ XT High Sensitivity Smoke Detection system.

The ORION XT Detector is a smoke detector which is thousands of times more sensitive than a standard photoelectric spot detector. With detection levels as low as 0.00075%/ft., the ORION XT Detector is sensitive enough to detect invisible products of combustion such as the outgassing of plasticizers from overheating PVC wire insulation and electrical components, or small changes in the ambient level of obscuration during the incipient stage of a fire. Detection during the incipient stage allows time for corrective action, possibly preventing an escalation of the fire condition, and thus minimizing fire damage. Typical early warning smoke detection applications for the ORION XT Detector are telecommunications facilities, data processing facilities, museums and warehouses.

The core of the ORION XT HSSD system consists of an air sampling pipe network, a laser based high sensitivity detector head and a high-efficiency centrifugal fan. Smoke detection is accomplished by using the fan to draw air from the protected area through the sampling pipe network, back to the detector head, where the air is analyzed for the presence of smoke.

1-2 FEATURES

The following is a list of major features of the ORION XT system.

- Programmable sensitivity range of 0.00075%/ft. to 0.3%/ft. (0.0025%/m to 1%/m) obscuration
- Laser particle counting technology
- Particle size discrimination—no filter
- Up to 20,000 sq. ft. of coverage
- Two programmable alarm levels and two programmable pre-alarm levels
- Configuration and history data stored in non-volatile memory
- History buffer storage of up to 28 days of smoke history
- Advanced signal processing features
- Full configuration using ORION Configuration Software
- Modular design for fast and easy servicing
- Networked systems of up to 127 detectors through an Intelligent Interface Module
- SmartOne® compatible when used with the PEGAsys Addressable Loop Module

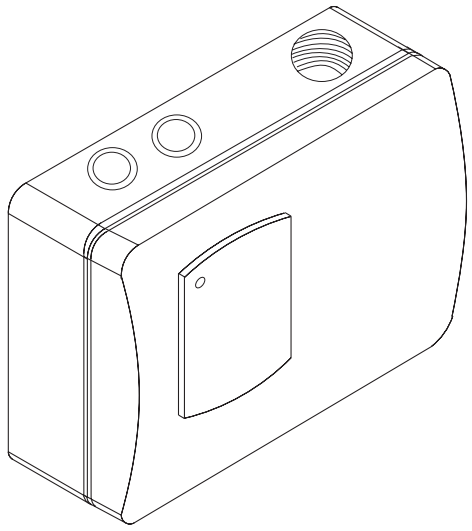

Figure 1-1. Detector

Table 1-1. Detector Technical Specification

DESCRIPTION	SPECIFICATION
Detector Sensitivity Range	0.00075%/ft. to 0.3%/ft. (0.0025%/m to 1%/m)
Maximum Coverage	20,000 sq. ft. (2000 sq. m)
Input Voltage	24 Vdc nominal (18 to 30 Vdc)
Input Current	310 mA standby, 342 mA alarm
Operating Temperature	32º to 120ºF (0º to 49º C)
Operating Humidity	10 to 93% RH non-condensing
Enclosure Rating	NEMA-1 (IP-31)
Finish	Light Grey Polycarbonate with Painted Steel Backbox
Dimensions	12.6" W x 8.98" H x 4.25" D (32.0 cm W x 22.8 cm H x 10.8 cm D)
Alarm & Pre-Alarm Relays	Four relays; each has normally open contacts, 2 Amp @ 28 Vdc, resistive
Trouble Relay	Form C, 2 Amp @ 28 Vdc, resistive (energized on power-up)
Isolate Relay	Optional: Form C, 2 Amp @ 28 Vdc, resistive
Electrical Connections	18 to 12 AWG (0.75 to 2.5mm ^{2}) wiring to removable terminal blocks
Service Port Connection	RS232 communications with modular RJ12 jack. Requires Orion Configuration Software
Remote Display Connection	Optional: 1 pair RS485 communications, 1 pair power
Power Supply Supervision Input	Optional: Monitors normally closed contact on power supply
Air Inlet Port	3/4" NPT threaded
Exhaust Port	Side exhaust, optional rear exhaust with supplied adapter, optional 1" NPT threaded exhaust pipe connection with supplied adapter
Weight	8.0 lb. (3.6 kg)

CHAPTER 2
SYSTEM FUNCTIONAL DESCRIPTION

2-1 GENERAL

This chapter provides a functional description and overall operation of the system, as well as functional descriptions of the major components that together make up the ORION™ XT system.

2-2 OVERALL FUNCTIONAL DESCRIPTION

The ORION XT Detector was designed with the flexibility to interface with any fire alarm control panel. Figures 2-1 and 2-2 show the two different configurations to choose from depending on the type of control panel in the system.

The typical stand-alone system is an ORION XT Detector interfacing to a fire alarm control panel by using the relay contacts inside the Detector (see Figure 2-1). Each ORION XT Detector is equipped with six relays: Pre-Alarm 1, Pre-Alarm 2, Alarm 1, Alarm 2, Trouble and Isolate. Figure 2-1 shows the Detector receiving power from a Self-Contained Power Supply, but a 24 Vdc power supplied by the fire alarm control panel or Multi-Zone Power Supply may also be used.

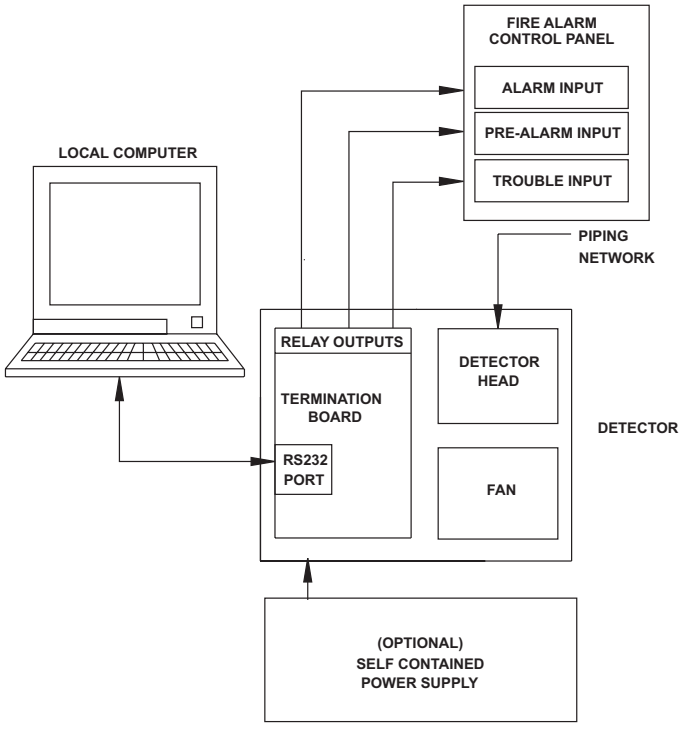

Figure 2-1. Typical Stand-Alone System

Figure 2-2 illustrates a typical system with a Stand-Alone Intelligent Interface Module (IIM). In this configuration, all ORION XT Detectors which are interfaced to a fire alarm control panel with relays can also be networked together with a Stand-Alone IIM. This allows up to 127 ORION XT Detectors to be monitored and configured from a central location. The IIM is available in two models:

- P/N 77-297114-001 (without modem)
- P/N 77-297114-002 (with modem)

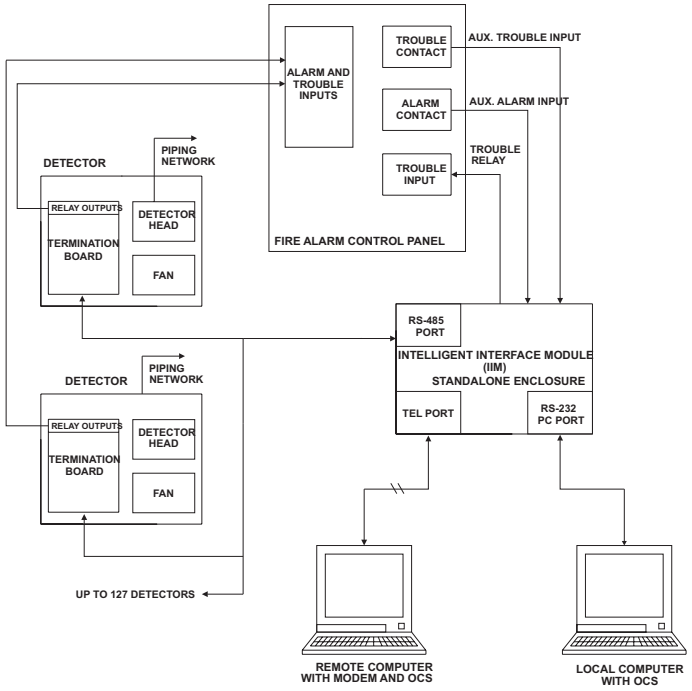

Figure 2-2 Typical System with Stand-Alone Intelligent Interface Module

Alternatively, the same IIM can be connected to the Kidde ARIES Control Panel as shown in Figure 2-3. All alarms, pre-alarms and trouble conditions are reported to the ARIES panel through the IIM and therefore do not require additional wiring to the Detector relay contacts.

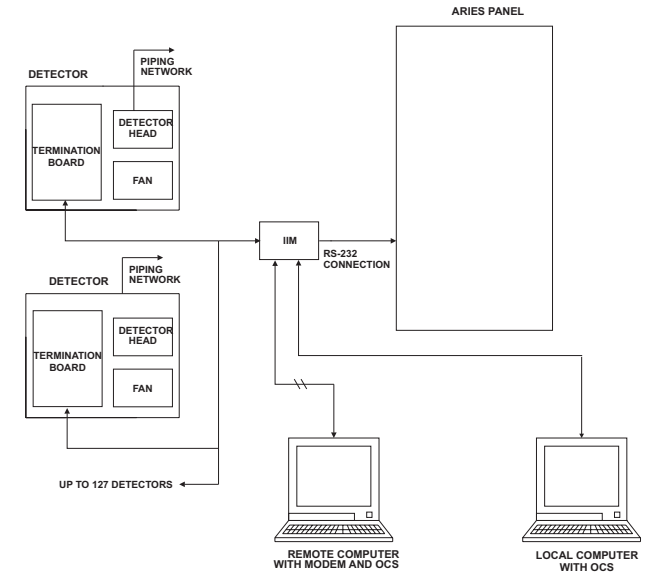

Figure 2-3 Typical System with an IIM Connected to an ARIES Control Panel

The ORION XT Detector can be connected to the addressable loop of the PEGAsys or ARIES Panel using a PEGAsys Addressable Loop Module (PALM) (see Figure 2-4). With the PALM, the ORION XT Detector operates as one of up to 255 SmartOne® devices on the addressable loop.

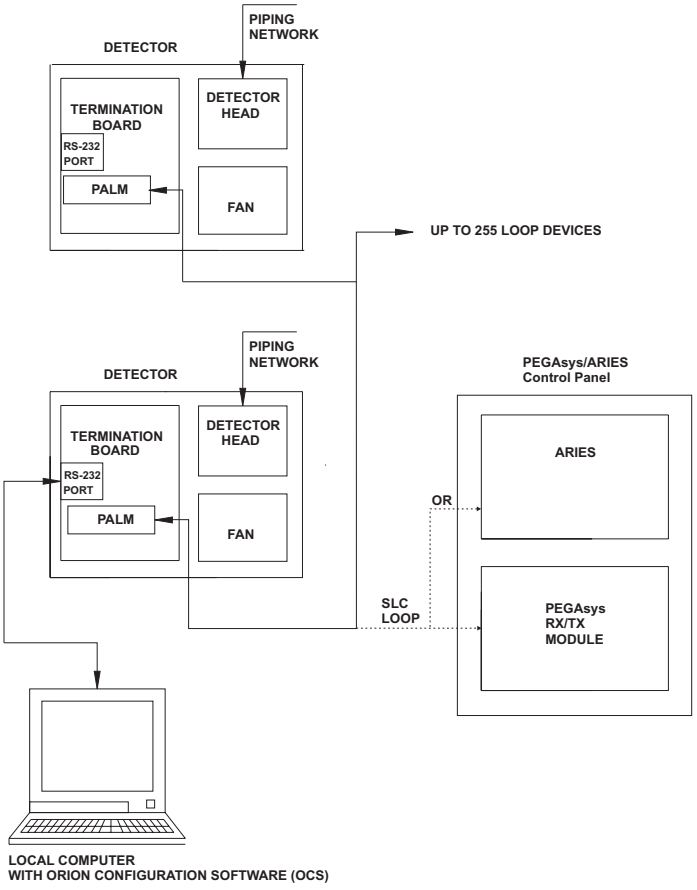

Figure 2-4 Typical System with PEGAsys Addressable Loop Module and Control Panel

Optional display and power supply configurations are also available in an ORION XT system. The standard display configuration of an ORION XT Detector has an installed status LED faceplate. For applications where more detailed visual indication of the detector status is required, an optional Display Module with a backlit LCD screen can be connected to the Detector. The Display Module allows the user to access information such as area smoke levels, sampling pipe airflow rate and selected configuration settings and to perform detector control functions such as reset, test, silence and isolate.

The ORION XT Detector has four different power supply configurations. The Self-Contained Power Supply is designed to provide 24 Vdc power to a Detector from 120 or 240 Vac. For systems with multiple ORION XT Detectors, a Multi-Zone Power Supply can provide 24 Vdc power for up to eight Detectors from 120 or 240 Vac. Detectors can also have 24 Vdc power supplied by the fire alarm control panel or any listed or approved power supply.

2-3 DETECTOR

The ORION XT High-Sensitivity Smoke Detector, (P/N 77-297101-000) consists of a laser particle counter detector head, a high-efficiency fan module and a termination board (see Figure 2-5). All detector components can be replaced without removing the detector from its installation. One ORION XT Detector, when connected to a pipe network designed using “SNIFF” Version 3 software, provides coverage for an area up to 20,000 sq. ft.

2-3.1 Detector Head

The detector head measures particles of combustion in the protected area with a laser particle counter. At measurable levels as low as 0.0015%/ft., the laser particle counter is sensitive enough to detect invisible products of combustion such as the outgassing of plasticizers from overheating PVC wire insulation and electrical components, or small changes in the ambient level of obscuration during the incipient stage of fire. The Detector head has a dynamic sensitivity range of 0.00075%/ft. to 0.3%/ft. (0.0025%/m to 1%/m). Two alarm and two pre-alarm levels are programmable within this range through ORION Configuration Software (OCS).

Smoke concentration is determined by counting the number of discrete particles of a specific size in a given time period. As air from the protected area is drawn through the detector head, particles in the drawn air pass through a 100-micron infrared laser beam. The beam is reflected off of the particles onto a receiver that measures the intensity of the reflection. The intensity of the reflection determines the size of the particle. The detector head’s particle size discrimination feature allows only a specific range of particles (between 0.01 and 10 microns) to be measured and counted as products of combustion. Anything above or below this range is generally ignored and does not contribute to smoke signal calculations. This discrimination band corresponds

to the center of the particles of combustion range. Dust particles, which are typically larger than 10 microns, are ignored. Since air can flow through the detector head without filtration or flow restriction, filter maintenance and loss of sensitivity due to filter clogging is eliminated.

The Detector head also has an airflow monitoring circuit that measures the amount of air flowing through the detector head with differential zener diodes. An airflow trouble is generated if the flow of air through the detector exceeds a high-airflow threshold or falls below a low-airflow threshold. The thresholds are programmable through OCS.

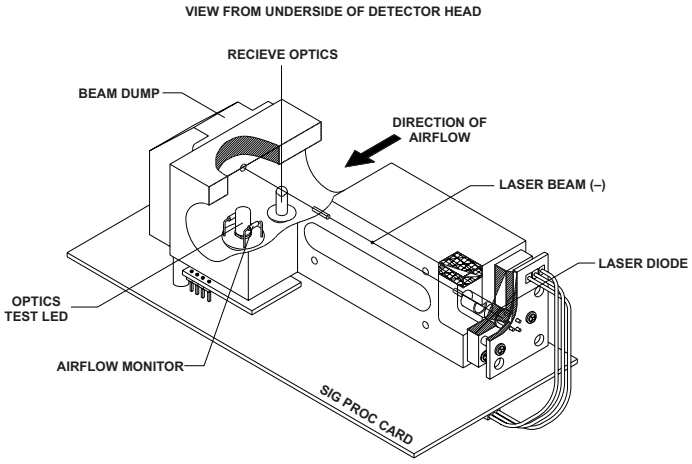

Figure 2-5. Detector Head

2-3.2 Termination Board

The termination board is the central control unit of the Detector. Key features of the termination board include the following:

- Network-ready connector and address switch
- PEGAsys Addressable Loop Module connector
- Alarm, Pre-Alarm, Trouble and Isolate Relays
- Internal and External component connectors
- On-board memory storage

The Detector has three options for connecting to a fire alarm control panel.

If the Detector is connected to an ARIES control panel, it can interface to the panel through an Intelligent Interface Module (IIM). The termination board is network ready for connection to an IIM with a pre-installed RS-485 connector and network address DIP switch. (See Paragraph 2-5 for IIM details).

The Detector can also be connected to a PEGAsys or ARIES control panel with a PEGAsys Addressable Loop Module (PALM). The termination board has a plug-in connector for the PALM (see Paragraph 2-6 for PALM details).

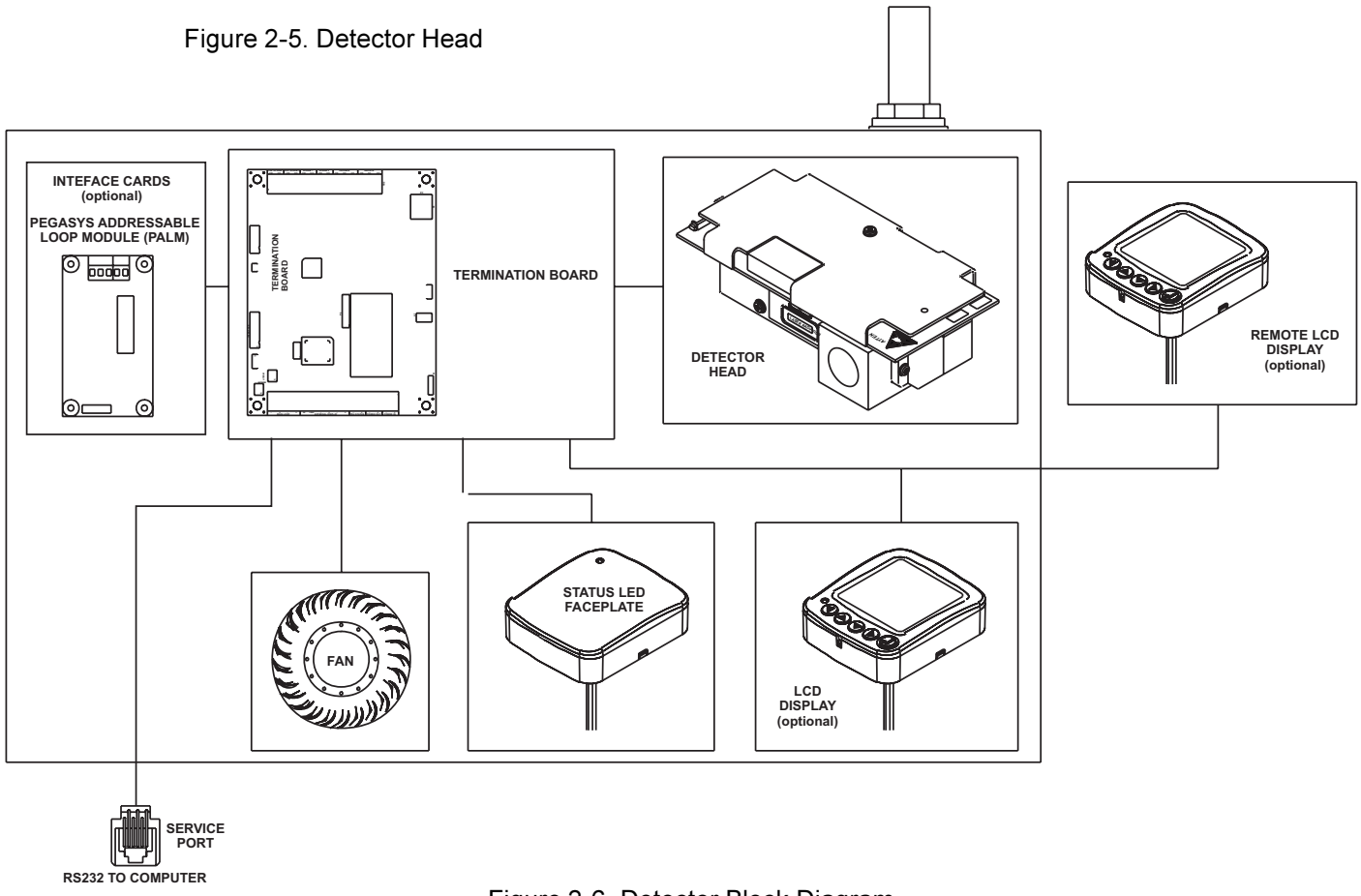

Figure 2-6. Detector Block Diagram

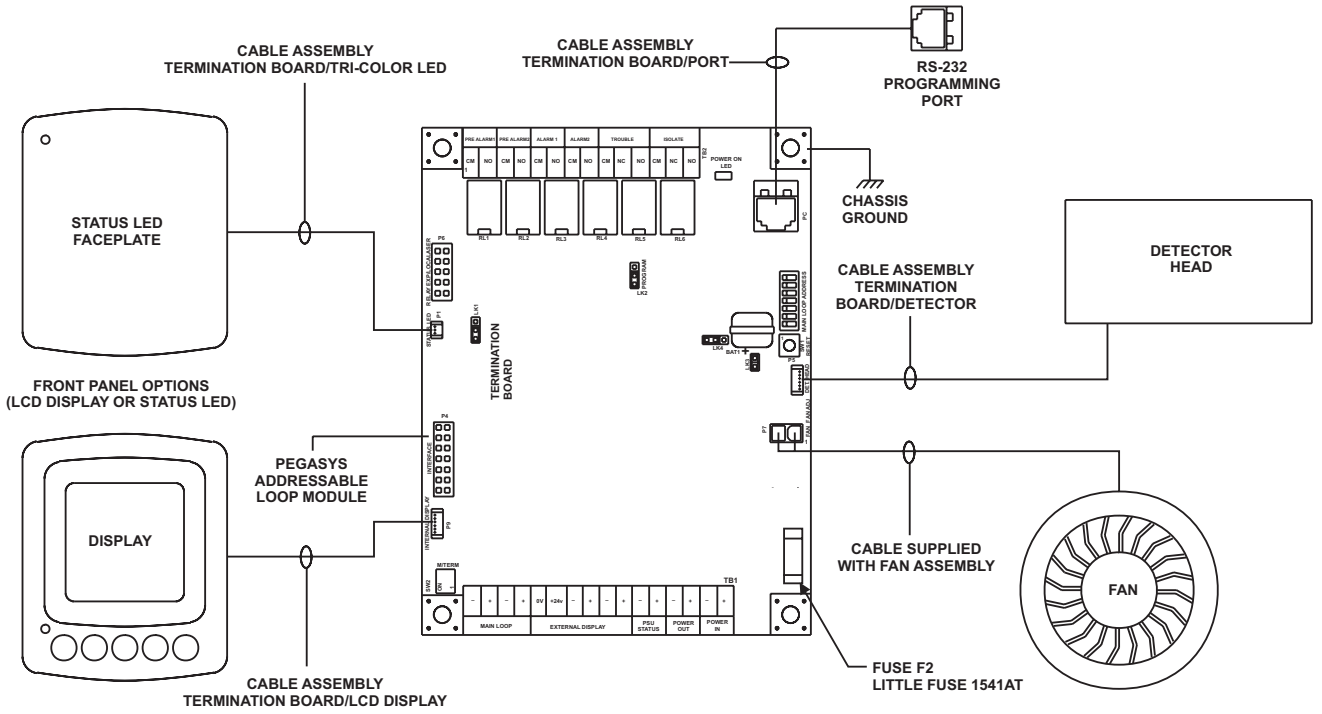

Figure 2-7. Termination Board Internal Wiring Diagram

To connect to panels other than a PEGAsys or ARIES, the Detector can interface to the panel through the termination board relays. The termination board has six relays that can be used for interfacing to a fire alarm control panel: two alarm, two pre-alarm, one trouble and one isolate. All relays are normally open except for the trouble relay. The trouble relay is normally closed so it will transfer to the active state if the Detector loses power.

Note: 1. Relays are deactivated when using a PEGAsys Addressable Loop Module (PALM).

2. The IIM is not PEGAsys compatible

For ease of installation and maintenance, all internal and external components are connected to the Detector through the termination board. The termination board has removable terminals for field wiring to all external components such as the external display module and power supply. Internal components such as the detector head, fan, status LED or integrated display module are connected to the termination board through plug-in connectors (Figure 2-5).

The termination board on-board memory stores the Detector configuration settings, smoke history and event log. In the event of a power failure, a battery backs up the memory for approximately one month.

Note: The battery back-up jumper (LK3) must be connected for the memory back-up to function properly (see Figure 4-3). If the jumper is not connected, all configuration settings and other on-board memory will be lost if the Detector loses power.

2-3.3 Fan Module and Exhaust Options

The ORION XT Detector uses a high-efficiency centrifugal fan to draw air continuously from the protected area, into a piping network and through the detector head. A regulated voltage is supplied to the fan module from the termination board to insure that it runs at the optimal speed to meet the performance calculated by “SNIFF” software.

The Detector can be configured for side or rear exhaust ports. The Detector is shipped from the manufacturer with a side exhaust port configuration. Two optional exhaust adapters are supplied with the Detector–rear exhaust adapter and 1” NPT threaded exhaust pipe adapter (see Paragraph 4-2.6 for exhaust port details).

2-3.4 Status LED Faceplate

The standard configuration of an ORION XT Detector is equipped with a status LED faceplate. The status LED face-

plate is a plastic molded insert with a tri-color LED that indicates the following conditions:

Continuous Green	Normal
Flashing Green	Auto-Setup™
Continuous Yellow	Trouble/Isolated
Flashing Red	Pre-Alarm
Continuous Red	Alarm

2-3.5 RS-232 Port

The ORION XT Detector has an RS-232 programming port located on the left side of the Detector. A computer running OCS is connected via a programming cable to the RS-232 port. OCS provides the ability to monitor, configure and download history from the Detector.

2-4 DISPLAY MODULE

The Display Module is an optional user interface that provides visual indication of the Detector alarm and trouble status on a LCD screen. It consists of a backlit monochrome LCD screen, a multicolored status LED and an internal sounder. The Detector transmits data via an RS-485 communications link and supplies 24 Vdc power to the Display Module (see Table 2-1).

Key features of the Display Module include the following:

- Backlit LCD Display
- Menu Navigation through four cursor keys and one enter key
- LCD Screen Indication of Detector Alarm and Trouble Status
- Reset, Test, Isolate and Silence Functions
- Multi-colored LED Indication of Normal, Trouble, Pre-Alarm and Alarm Conditions
- Programmable Audio Alert of Alarm, Pre-Alarm and Trouble Conditions
- Password Protection
- Mounts to Standard 2-Gang Box or 4” Backbox
- Available in English, Spanish, French and Portuguese

On the LCD screen, real-time detector data is displayed in an easy-to-use, uncluttered format, where only the active conditions are displayed. Using the module’s control keys, the user can navigate through menus to view detector information and perform detector control functions. Menu accessible data includes real-time smoke level and airflow level, alarm, pre-alarm and airflow thresholds and trouble conditions. The available detector control functions are detector test, isolate, reset and silence. All control functions are password protected.

The internal sounder can be programmed through OCS to provide an audible indication when an alarm, pre-alarm or trouble condition occurs on the system. The audible indication will continue until the user silences the sounder using the control keys. The conditions that can be selected to activate the sounder are:

- Alarm Condition: Continuous tone
- Pre-Alarm Condition: Intermittent tone
- Trouble Condition: Intermittent tone

A multicolored LED provides a visual indication of the current detector status. The LED reports the following conditions:

Continuous Green	Normal
Flashing Green	Auto-Setup™
Continuous Yellow	Trouble/Isolated
Flashing Red	Pre-Alarm
Continuous Red	Alarm

The Display Module has two installation options. The module can either be integrated into an ORION XT Detector or mounted remotely, up to 1000 ft. away from the detector, to a standard 2-gang or 4” backbox.

The Display Module is available in English, Spanish, French and Portuguese. P/N 77-297102-000 contains English, Spanish and French; P/N 77-297102-200 contains English, Spanish and Portuguese.

Table 2-1. Display Module Specifications

DESCRIPTION	SPECIFICATION
Input Voltage:	24 Vdc nominal (powered from Detector)
Maximum Input Current:	30 mA (normal) 104 mA (with backlight ON)
Operating Temperature:	32° to 120°F (0° to 49°C)
Operating Humidity:	10 to 93% RH, non-condensing
Electrical Connections:	
Detector Mounting:	Via supplied plug-in harness
Remote Mounting:	18 to 16 AWG (0.75 to 1.32 mm ^{2}) wiring to terminal block, mounted up to 1000 ft. (300 m) from Detector
Shipping Weight:	1.6 lb. (0.7 kg)
Dimensions:	4.76" W x 5.74" H x 1.56" D (12.1 cm W x 14.6 cm H x 4.0 cm D)

2-5 INTELLIGENT INTERFACE MODULE (IIM)

The Intelligent Interface Module (IIM) provides a communication link to network up to 127 ORION XT Detectors. A computer running OCS software can communicate with the IIM, either through a local computer or a remote computer via a modem. This allows the ORION XT Detectors to be completely configured and monitored from a central location. Connection of an optional telephone line allows interrogation of the system with a remote computer or automatic dial-out to a remote computer on the occurrence of any ORION XT Detector alarm or trouble condition.

Alarm and trouble conditions, detector configuration, real-time smoke and airflow levels and smoke history is transmitted from each Detector over the RS-485 network to the IIM. All network data can be monitored or controlled from a central location using OCS software on either a local computer or a remote computer via a modem.

IIM parameters are stored in non-volatile memory to ensure that no programming will be lost during a complete power failure. The following field-programmable parameters are configured through the OCS software.

- Three telephone numbers for auto-dial sequence
- Twenty character owner location message
- Installer password
- Owner password
- Dial tone supervision enable/disable
- Auto dial function enable/disable
- Configuration of RS-485 network for Style 4 or Style 6
- Trouble report delay
- Security call back scheme enable/disable
- Call back phone number

2-5.1 RS-485 Network

An RS-485 network connects up to 127 ORION XT Detectors to the IIM. Each Detector is assigned an address on the RS-485 loop via a DIP switch located inside the Detector. The RS-485 network can be wired for either Style 4 (Class B) or Style 6 (Class A) with a maximum loop length of 4,000 feet. The RS-485 network wiring connects directly to the network terminals located in the Detector without the need for additional hardware or software.

2-5.2 Fire Alarm Panel Interface

The IIM is available as a Stand-Alone/ARIES compatible configuration in a red enclosure. It communicates through a fully supervised, bi-directional RS-232 data loop that provides a link allowing the two alarm levels, two pre-alarm levels and multiple trouble conditions to be transmitted from each ORION XT Detector and displayed on the control panel display. When an alarm or trouble condition is received, the panel will activate pre-programmed outputs associated with the alarm or trouble inputs. Refer to the ORION Configuration Software (OCS) Manual, P/N 06-236012-401 and ARIES Configuration Tool (ACT) User's Guide, P/N 06-236530-002.

When not used with an ARIES Control Panel that is in stand-alone mode, the IIM does not report detector alarm and trouble conditions to the fire alarm panel and therefore, each ORION XT Detector alarm and trouble contact must be wired to the fire alarm panel initiating zone. A trouble relay on the IIM allows the fire alarm panel to monitor any fault in the IIM or its RS-485 network. The trouble relay will also activate if the IIM loses power. The supervised Auxiliary Alarm and Trouble contact inputs on the IIM can be used to monitor the relay contacts on any fire alarm panel for ancillary annunciation of common alarm and trouble conditions. These inputs can be displayed on a local computer or on a remote computer running OCS software. (See Table 2-3.)

Table 2-2. IIM Specifications

DESCRIPTION	SPECIFICATION
Input Voltage:	24 Vdc nominal (20.4 to 28 Vdc)
Maximum Input Current:	70 mA (normal) 80 mA (alarm)
	200 mA (with modem active)
Operating Temperature:	32° to 120°F (0° to 49°C)
Operating Humidity:	10 to 93% RH, non-condensing
Enclosure Finish:	Painted steel enclosure with keylock, Red
Trouble Relay:	Form C, 2 A at 30 Vdc
Auxiliary Inputs:	Auxiliary alarm and trouble inputs, Class B
Electrical Connections:	18 to 12 AWG (0.75 to 2.5 mm ^{2}) wiring to removable terminal block. PC and TEL connections via RJ-12 jack.
Shipping Weight:	3.9 lb. (1.8 kg)
Dimensions:	8.4" W x 8.25" H x 2.5" D (213 mm W x 210 mm H x 64 mm D)

2-5.3 Telephone Port (with optional modem)

The IIM is available with an optional FCC Approved modem for remote monitoring and control via a telephone line. This feature provides the ability to dial into the IIM from a remote computer, to view real-time smoke and airflow levels, check detector configurations and download history from each ORION XT Detector. The IIM can be programmed to automatically dial a remote computer using up to three preset telephone numbers on the occurrence of any ORION XT Detector alarm or trouble condition, or a fire alarm control panel alarm or trouble input. If a successful connection is not established at the first number, a second and third alternate telephone number will be used if programmed.

2-6 PEGASYS ADDRESSABLE LOOP MODULE (PALM)

The PEGAsys Addressable Loop Module is an intelligent loop device that allows an ORION XT High-Sensitivity Smoke Detector to be directly connected to a PEGAsys/ARIES SLC addressable loop. The PALM provides increased flexibility in installing high-sensitivity smoke detection, by providing data from the Detector back to the PEGAsys/ARIES fire alarm control panel.

Note: The PEGAsys panel must use Firmware Version 80.0 or higher.

The PALM sits on the addressable SLC loop, among other SmartOne sensors or modules. Up to 255 addressable devices of any combination, including the PALM, may be connected to the SLC loop. One PALM is required for each ORION XT Detector that is to be connected to the PEGAsys/ARIES SLC loop.

The PALM transmits pre-alarm, alarm and up to six trouble messages to the PEGAsys/ARIES. The PALM is fully supervised and continuously monitors all aspects of the PALM and ORION XT Detector. Using the menu functions of the PEGAsys/ARIES panel, real-time smoke and airflow levels can be transmitted from the PALM and displayed on the panel. In addition, detector sensitivity tests can be performed from commands on the panel.

The PALM is a single circuit board that plugs into a socket on the termination board inside an ORION XT Detector. The easy-to-install PALM "snaps" effortlessly into its mounting hardware and requires no extra hardware to install. After mounting the PALM, only five field wiring connections are needed for the SLC loop and ground. Power is provided to the PALM via the termination board. The installation of one PALM can be completed within minutes (see Figure 2-6 and Table 2-3).

Programming of the PALM (including defining the ARIES address) and history downloading are done with a computer running OCS Version 2.3 that is connected directly to the Detector RS-232 port.

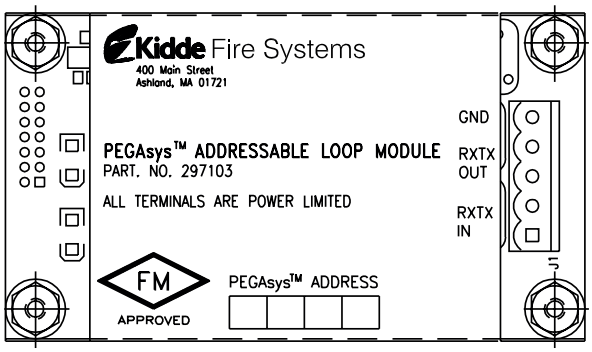

Figure 2-8. PEGAsys Addressable Loop Module

Table 2-3. PEGAsys Addressable Loop Module Specifications

DESCRIPTION	SPECIFICATIONS
Input Voltage:	5 Vdc (supplied by termination board)
Maximum Input Current:	125 mA at 5 Vdc (supplied by termination board). Adds 20 mA at 24 Vdc to Detector current
Operating Temperature:	32° to 120°F (0° to 49°C)
Operating Humidity:	10 to 93% RH, non-condensing
Electrical Connections:	18 to 12 AWG (0.75 to 2.5 mm ^{2}) wiring to removable terminal block
Shipping Weight:	0.3 lb. (0.2 kg)
Dimensions:	3.94" W x 2.17" H x 1.56" D (10 cm W x 5.5 cm H x 4.0 cm D)

2-6.1 Termination Board Interface Connections

Terminals on PALM connector P4 are used to carry 5 Vdc power and signals to and from the termination board. Table 2-4 describes them in more detail.

Table 2-4. PALM/Termination Board Interface Connections

Terminal Number	Signal Name	Function
1	I/O Port RX	Communications
2	I/O Port TX	Communications
3	Loopback	PALM Connected
4	PCI-RST	Reset
11	5 Vdc (-)	Power
13	5 Vdc (+)	Power

2-7 POWER SUPPLIES

The ORION XT Detector has four different power supply configurations. The Self-Contained Power Supply is designed to provide 24 Vdc power to a Detector from 120 or 240 Vac. For systems with multiple ORION XT Detectors, a Multi-Zone Power Supply can provide 24 Vdc power for up to eight Detectors from 120 or 240 Vac. Detectors can also have 24 Vdc power supplied by the fire alarm control panel or any listed or approved power supply.

2-7.1 Self-Contained Power Supply

The Self-Contained 120/240 Vac Power Supply Assembly provides supervised 24 Vdc power with 4-hour backup for a single ORION XT Detector. The universal input accepts either 120 Vac or 240 Vac input voltage and does not require manual voltage selection to operate in either range (see Figure 2-9 and Table 2-5).

The enclosure holds the power supply/battery charger and two sealed lead-acid batteries. This will provide power with 4 hours battery back-up for an ORION XT Detector, making it ideal for single zone detection applications in a facility with emergency power systems.

The power supply/battery charger supervises the input AC power, the batteries and the battery charger. A trouble signal provides power supply supervision to the ORION XT Detector. There are no controls on the power supply.

The Self-Contained ORION XT Detector Assembly is designed for surface mounting with a painted steel backbox and a light gray polycarbonate cover. All wiring from the power supply to the Detector is routed through matching knockouts on the top of the power supply and on the bottom of the ORION XT Detector.

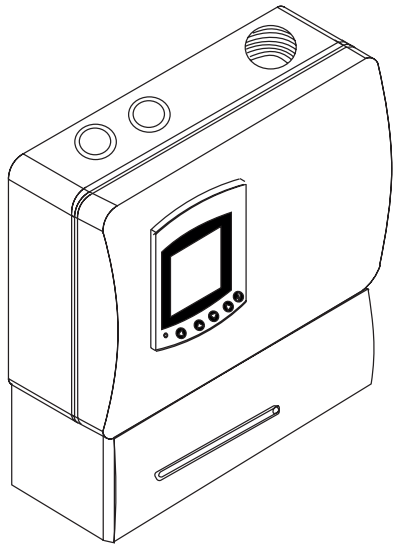

Figure 2-9. Self-Contained Power Supply Diagram

To comply with NFPA-72 requirements, the Self-Contained Power Supply must be powered from an emergency power circuit that is backed up by an automatic starting, engine-driven generator.

Table 2-5. Self-Contained Power Supply Specifications

DESCRIPTION	SPECIFICATION
Input Voltage:	120 or 240 Vac 50/60 Hz. Must be fed from an emergency power circuit.
Maximum Input Current:	333 mA at 120 Vac, 200 mA at 240 Vac
Operating Temperature:	32º to 120º F (0º to 49ºC)
Operating Humidity:	10 to 93% RH, non-condensing
Output Voltage:	28.75 Vdc
Output Current:	1 A maximum
Battery Charge Voltage:	27.3 Vdc
Battery Charging Circuit:	500 mA
Trouble Output:	Normally closed TTL logic
Electrical Connections:	18 to 14 AWG (0.75 to 2.08 mm ^{2}) wiring to terminal block
Shipping Weight:	7.4 lb. (3.4 kg)
Dimensions:	12.6" W x 4.55" H x 4.25" D (32 cm W x 11.5 cm H x 10.8 cm D)

Table 2-6. Self-Contained Power Supply Battery Specifications

DESCRIPTION	SPECIFICATION
Nominal Voltage:	12 Vdc
Capacity:	2 AH
Construction:	Sealed Lead-Acid
Termination:	0.187 quick disconnect terminals
Dimensions:	5.91" W x 3.50" H x 0.79" D (15 cm W x 8.9 cm H x 2 cm D)
Shipping Weight:	1.54 lb. (0.7 kg)

2-7.2 Multi-Zone Power Supply

The Multi-Zone Power Supply is a switching supply with battery backup that delivers up to 4.0 Amps at a nominal 24 Vdc from a 120 or 240 Vac input. It consists of three components: the power supply/battery charging module, 12 Vdc, 33 Amp-Hour batteries, and the enclosure that holds the power supply and two batteries. In the maximum configuration, two additional batteries in a second enclosure could be used, for a total of 66 Amp-Hours.

The Multi-Zone Power Supply provides battery presence and voltage supervision, battery charger output supervision and ground fault supervision. For installations with high vibration, the optional Battery Strap Kit is recommended. The Multi-Zone Power Supply is UL1481 Listed, FM Approved, and ULC Listed as a power supply for fire protective signaling use (see Tables 2-7, 2-8 and 2-9).

Table 2-7. Multi-Zone Power Supply Specifications

DESCRIPTION	SPECIFICATION
Input Voltage:	120 or 240 Vac 50/60 Hz
Maximum Input Current:	2.4 A at 120 Vac 1.4 A at 240 Vac
Operating Temperature:	32º to 120º F (0º to 49ºC)
Operating Humidity:	10 to 93% RH, non-condensing
Output Voltage:	27.3 Vdc with 0.28 Vpp ripple
Output Current:	Up to 4 A. Actual current depends on configuration. (See Table 2-10).
Battery Charge Voltage:	27.3 Vdc
Battery Charging Circuit:	Two, each protected by a 6.0 A PTC and 1.5 A current limit.
Trouble Relay:	Normally closed contacts (selectable for normally open) 1 A @ 28 Vdc, resistive
Electrical Connections:	18 to 12 AWG (0.75 to 2.5 mm ^{2}) terminal wiring
Shipping Weight:	3.5 lb. (1.6 kg)

Table 2-8. Multi-Zone Power Supply Battery Specifications

DESCRIPTION	SPECIFICATION
Nominal Voltage:	12 Vdc
Capacity:	33 AH
Construction:	Sealed Lead-Acid
Termination:	1/4” ring lugs
Dimensions:	7.75” W x 6.4" H x 5.2” D (19.7 cm W x 16.3 cm H x 11.7 cm D)
Shipping Weight:	26 lb. (11.8 kg)

Table 2-9. Multi-Zone Power Supply Enclosure Specifications

DESCRIPTION	SPECIFICATIONS
Dimensions:	17.25” W x 14” H x 6.25” D (43.8 cm W x 35.6 cm H x 15.9 cm D)
Shipping Weight:	12.1 lb. (5.5 kg)

2-7.2.1 Battery Selection

Battery size is based on the number of back-up hours required and the system current draw. Typical back-up requirements are four hours with an emergency generator, or 24 hours. In some circumstances, 60 or 90 hours could be required. The alarm current draw is typically five minutes, except when 90 hours of back-up is required. In that case, 10 minutes of alarm current is needed. See Table 2-10 and 2-11 to calculate battery sizes and maximum standby current.

Note: There are two output circuits on the power supply. The total combined load cannot exceed 4.0 Amps. The maximum load for each individual circuit is 2.5 Amps.

Table 2-10. Back-up Battery Specifications

Backup Hours and Battery Size (Two 12V connected in series)		UL and FM (48 Hour Battery Recharge)		ULC (24 Hour Battery Recharge)	
		Standby (Normal Operation)	Alarm	Standby (Normal Operation)	Alarm
24	66 AH (2 x 33AH)	2.5 A	4.0 A	2.0 A	4.0 A
24	33 AH	1.2 A	4.0 A	1.2 A	4.0 A
4	33AH	3.6 A	4.0 A	3.4 A	4.0 A

Note: Alarm current is the total current draw; that is standby current plus additional current during an alarm condition.

Table 2-11. Battery Load Requirements Formula

Total Standby Load ( )	x	Required Standby Time ____ hr.	=	
Total Alarm Load ( )	x	Required Alarm Time (for 5 minutes or for 10 minutes) 0.084 or 0.167	=	
		Basic Amp Hours (Add the results)	=	
		X 0.1 (Basic AH x Derating)*	=	
		Minimum Amp Hours Required (more is OK) Add the Basic AH + Derated AH	=	

* This is based on an average battery temperature of 68ºF. The battery manufactuer should be consulted for further derating information. In order to have batteries meet the full backup period after two years of operation, a minimum of a 10% derating has been included.

2-8 ELUTRIATOR

The optional elutriator is an inertial particle separator that allows air and small particulate such as smoke to flow freely through, while separating out large particulate. The elutriator is recommended for use in areas where heavy amounts of non-combustion particulate is expected, such as warehouses.

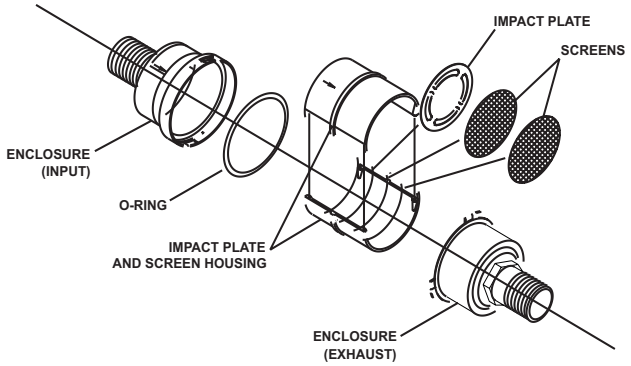

Figure 2-10. Elutriator Cut-Away View

CHAPTER 3
OPERATIONS

3-1 DISPLAY MODULE

The ORION™ XT Display Module is an optional user interface that provides visual indication of the Detector alarm and trouble status on a LCD screen. It is ideal for applications where a user needs to access detailed detector status information and perform basic detector control functions without the use of a computer.

3-1.1 LCD Screen Display

The Display Module contains a backlit monochrome LCD screen display. The LCD screen displays real-time detector data in an easy-to-use, uncluttered format, where only the active conditions are displayed.

The Display Module backlight only appears during active conditions, such as Alarm or Trouble, or when a key is pressed. The backlight will turn off after the display or keys are inactive for one minute.

The following screen displays when the system powers up and when no Alarms or Troubles are detected.

Figure 3-1. Normal Display

3-1.2 LED Status Indicator

A three-color LED, located on the front of the Detector or on the bottom left corner of the Display Module, indicates the detector status as listed in Table 3-1.

Table 3-1. LED Status

LED INDICATION	SYSTEM STATUS
Continuous Green	Normal
Flashing Green	Auto-Setup™
Continuous Yellow	Isolate/Trouble
Flashing Red	Pre-Alarm
Continuous Red	Alarm

3-2 MENU SYSTEM

Display the menu by pressing any key. The following menu items display:

Table 3-2. Menu Description

MENU	DESCRIPTION
Silence	Silences the internal sounder. (Displays only when an Alarm or Trouble condition is detected.)
Reset	Resets the Detector after latching alarms or latching troubles have been cleared. (Displays only when an Alarm or Trouble condition is detected.)
Status	Displays the current detector status.
Smoke	Displays alarm sensitivity settings, pre-alarm settings, and current smoke level.
Airflow	Displays airflow thresholds and settings.
Isolate	Allows the user to isolate and de-isolate the detector.
Test Menu	Options for detector test.
Exit	Returns to Normal Display

To make a selection from the menu, do the following:

1. Use the up (▲) and down (▼) arrow keys to highlight your choice.
2. Press enter (↵).

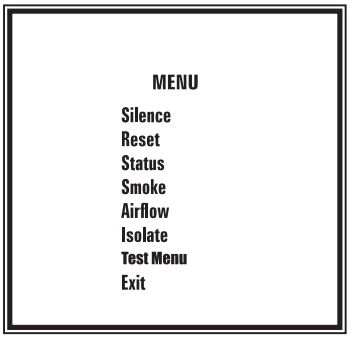

Figure 3-2. Menu Display

3-3 CONTROL KEYS

The Display Module's control keys allow the user to navigate through menus to view detector information and perform detector control functions. The control keys are defined as follows:

Figure 3-3. Control Keys

Use the right (▶) or down (▼) keys to scroll down the menu. Use left (◀) or up (▲) to scroll up the menu.

Press enter (↵) to select the highlighted menu item.

3-4 ALARMS AND SILENCING

When an alarm or trouble condition is detected, the following screen is displayed and the internal sounder will activate, if previously enabled through ORION Configuration Software (OCS) Version 3.0.

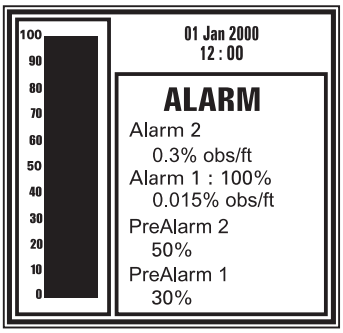

Figure 3-4. Alarm Display

3-4.1 Silencing the Buzzer

The internal sounder can be programmed to provide an audible indication when an alarm, pre-alarm or trouble condition occurs on the system. The audible indication will continue until the user silences the sounder using the control keys.

The sounder tones are described as follows:

- Alarm Condition: Continuous tone
- Pre-Alarm Condition: Intermittent tone
- Trouble Condition: Intermittent tone

To silence the sounder, do the following:

1. Press any key to display the menu.
2. Highlight "Silence" and press enter (↵). The password display appears as in Figure 3-5.

Figure 3-5. Password Display

3-4.2 Entering the Password

All detector control functions are password protected. Two levels of passwords are available on the Display Module, owner and installer. The default passwords and function access are as follows:

Table 3-3. Password Access Levels

ACCESS LEVEL	MENU ACCESS	DEFAULT PASSWORD
Monitoring	Status, Smoke, Airflow	No password required
Owner	All monitoring menu access plus Silence, Isolate and Reset	1234
Installer	All owner menu access plus Test	5678

To enter the default owner password, do the following:

1. When the Password Display (Figure 3-5) initially appears, the 1 is already highlighted. Press enter (↵). As each digit is entered, an asterisk (*) displays at the bottom of the screen. Use backspace (the arrow symbol below the 7) to delete a previous entry.
2. Use the arrow keys to highlight the second digit of the password. Press enter (↵).
3. Repeat Step 2 to enter the third and fourth digits of the password.
4. When you are finished entering the password, highlight the check mark and press enter (↵).

The message "Password Valid" displays and the screen returns to the menu.

If you entered the password incorrectly, the message "Password Invalid" displays and the screen returns to the menu.

If a key is not pressed for 30 seconds, the password will become invalid and the user will have to re-enter the password to activate a password protected function.

The display module passwords can be changed through OCS.

3-5 RESET

The “Reset” menu item resets the Detector after latching alarms or latching troubles have been cleared. The reset menu item appears during alarm or trouble conditions only. A password is required to reset the Detector.

To reset alarms, do the following:

1. Press any key to display the menu.
2. Highlight "Reset" and press enter (↵).
3. Enter your password as described in Paragraph 3-4.2. When the message "Password Valid" displays, the Detector is reset and the screen returns to the menu.

3-6 DISPLAYING SYSTEM STATUS

To display system status, do the following:

1. Press any key to display the menu.
2. Highlight "Status" and press enter (↵). The following screen displays:

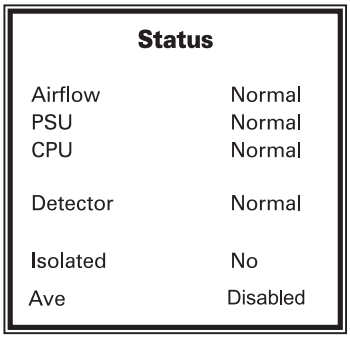

Figure 3-6. Status Display

3. When you are finished with the status display, press any key to return to the menu.

The status display monitors the airflow, power supply unit (PSU), central processing unit (CPU), PALM communication to the PEGAsys (PC Line), Detector and Display Module for trouble conditions. Status display also indicates whether the Detector has been isolated and if signal averaging has been enabled.

Signal averaging is normally disabled and can be enabled via OCS. The Detector can be isolated through the Display Module or OCS.

3-7 SMOKE DISPLAY

The smoke display is automatically displayed whenever an alarm or trouble is detected or when it is accessed through menu options.

To activate the smoke display, do the following:

1. Press any key to display the menu.
2. Highlight "Smoke" and press enter (↵). The following screen displays:

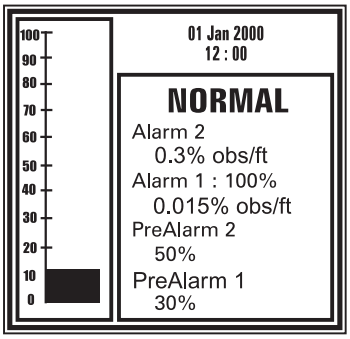

Figure 3-7. Smoke Display

3. When finished with the smoke display, press any key to return to the menu.

The smoke display screen displays the smoke level bar graph, current date and time and the alarm and pre-alarm threshold settings. The smoke level bar graph, located on the left side of the screen, indicates the current smoke level as a percentage (0% to 100%) of the Detector’s programmed sensitivity range. All enabled alarm and pre-alarm thresholds are displayed to the right of the bar graph.

Under normal operating conditions, the word NORMAL appears above the alarm thresholds. Other conditions that are displayed here are ALARM, PRE-ALARM, TROUBLE, ISOLATE and TEST. When the Detector is isolated, any alarm, pre-alarm or trouble conditions will not be displayed on the Display Module.

3-8 DISPLAYING AIRFLOW

To display airflow thresholds and settings, do the following:

1. Press any key to display the menu.
2. Highlight Airflow and press enter (◢). The following screen displays:

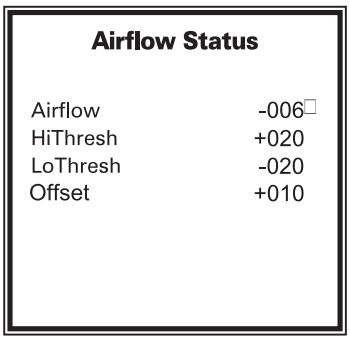

Figure 3-8. Airflow Display

3. When you are finished with the airflow display, press any key to return to the menu.

The first line displays real-time airflow deviation. Lines 2 and 3 show the programmed high and low airflow thresholds. Default high threshold is 20% and default low threshold is –20%. Line 4 shows the current airflow offset. The low and high airflow thresholds and airflow normalization can be programmed via OCS.

3-9 ISOLATE

Isolating the Detector disables the alarm outputs, allowing the Detector to be tested without generating alarms on the fire alarm panel. The trouble output will be activated when this feature is enabled.

To Isolate or De-Isolate the Detector, do the following:

1. Press any key to display the menu.
2. Highlight Isolate and press enter (◢).
3. Enter your password as described in Paragraph 3-4.2. The following screen displays:

Figure 3-9. Isolate

4. Select De-Isolate or Isolate. The screen returns to the menu.

3-10 TEST MENU

Selecting Test Menu from the main menu provides the following options for performing diagnostic tests on the Detector:

Table 3-4. Test Menu Description

MENU	DESCRIPTION
Detector	Performs a detector sensitivity test.
Airflow	Disables the fan to perform a low airflow test.
Trouble	De-energizes the trouble relay to test trouble reporting.
Status	Performs a test to verify all inputs are working.
Exit	Returns to normal display.

To perform a test, do the following:

1. Press any key to display the main menu.
2. Highlight Test Menu, and press enter (◢).
3. Enter your password as described in Paragraph 3-4.2. The following screen displays:

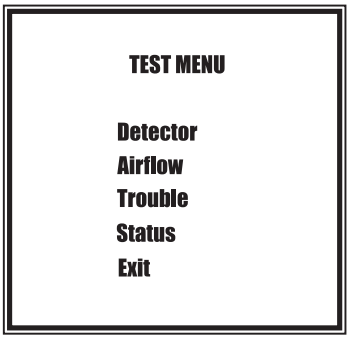

Figure 3-10. Test Menu

To make a selection from the Test Menu, do the following:

1. Use the up (▲) and down (▼) keys to scroll down to highlight the selection.
2. Press enter (◢).

3-10.1 Detector Test

To perform a detector sensitivity test, do the following:

1. Highlight Detector and press enter (↵).
2. The following screen displays:

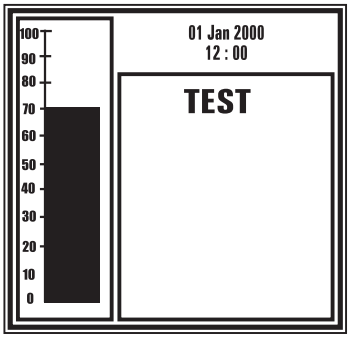

Figure 3-11. Test

3. The bar graph increases to 70% of full scale. The display will show TEST PASSED if the detector passes the sensitivity test. If the detector fails the test, the display will show TEST FAILED.

3-10.2 Airflow Test

To disable the fan to perform a low airflow test, do the following:

1. Highlight Airflow and press enter (↵).
2. The test menu will display "Disable" after "Airflow".
3. Power will be removed from the fan and airflow should drop to -50. A Low Airflow Trouble will be generated when the airflow drops below the threshold.
4. The "Smoke" Screen will display "Test".
5. The "Status" Screen will display "Airflow Low".
6. Return to the Test Menu. Highlight Airflow Disable and press enter (↵). The fan will restart, the airflow trouble will clear and the Detector will return to normal.

3-10.3 Trouble Test

To de-energize the trouble relay to test trouble reporting to a control panel, do the following:

1. Highlight Trouble and press enter (↵).
2. The test menu will display "Test" after "Trouble", and the trouble relay will transfer for 10 seconds.
3. At the end of 10 seconds, the Detector will automatically return to normal.

3-10.4 Status Test

To perform a Monitored Input Test to verify that the Detector head inputs to the termination board are functioning correctly, do the following:

1. Highlight Status and press enter (↵).
2. The test will run and after several seconds, the display will show "Passed" after "Status".
3. The Detector will automatically return to normal.

3-11 LANGUAGE SELECTION

The Display Module is available in English, French, Spanish (P/N 77-297102-000) or English, Spanish, Portuguese (P/N 77-297102-200). When the display module is turned on the Language Selection Screen appears. The Language Selection Screen can also be accessed at any time by pressing the left (◀) and right (▶) keys at the same time while in the Normal Screen.

To select a language, do the following:

1. Use the cursor keys to highlight the language of your choice.
2. Press enter (↵).

Figure 3-12. Language Selection Screen

Note: The software version of the display module is shown in the lower right corner of the Language Selection Screen.

3-12 OCS SOFTWARE

OCS Version 3.0 is explained in the ORION XT Configuration Software User's Guide, (P/N 06-236012-401).

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CHAPTER 4
INSTALLATION

4-1 INTRODUCTION

This chapter provides information necessary to install the ORION™ XT System. Installation consists of the following steps:

1. Unpack from shipping carton.
2. Determine optimum location for Detector.
3. Install the exhaust port adapter (optional).
4. Make the knockouts for field wiring and battery connections.
5. Mount the Detector.
6. Install the Elutriator (optional)
7. Connect the Detector to the sampling pipe network.

Note: At this time the optional PALM may be installed, if used.

8. Connect field wiring to the Detector

At this time you may install the optional IIM, if one is being used. This would also be the correct time to install the Self-Contained or Multi-Zone Battery system if this option is being used.

9. Install the Self-Contained or Multi-Zone Battery system if this option is being used.
10. Power-up and program the Detector

Note: If the PALM is being used, it should be programed first.

The optional Display Module should be installed in the Detector cover before reinstalling the cover. Also, the optional Remote Display Unit may now be installed.

Installation should only be done by factory trained technicians in accordance with applicable installation requirements. These include:

- NEC 760 (National Electrical Code)
- NFPA-72 (National Fire Protection Association).
- Any other local installation requirements.

Note: Power should be turned off during installation.

⚠ CAUTION

ANTISTATIC PRECAUTIONS

When handling any electric components or circuit boards, antistatic precautions must be carried out. Failure to do so may result in component damage.

Static discharge can be reduced by adhering to the following guidelines:

1. Always use conductive or antistatic containers for transportation and storage, if returning any item.
2. Wear a wrist strap while handling devices and ensure a good ground is maintained throughout.
3. Never subject a static sensitive device to sliding movement over an ungrounded surface and avoid any direct contact with the pins or connections.
4. Avoid placing sensitive devices onto plastic or vinyl surfaces.
5. Minimize the handling of sensitive devices and Printed Circuit Boards (PCBs).

Note: The following caution and warning must be observed throughout this chapter.

⚠ CAUTION

LASER HAZARD

The detector in the enclosure is a factory-sealed unit containing a Class-3B laser product with invisible radiation.

⚠ WARNING

AVOID EXPOSURE TO LASER

Extended exposure to a Class-3B laser directly or indirectly may cause severe damage to the human eye.

4-2 INSTALLING THE DETECTOR

4-2.1 Unpacking the Detector

Follow the procedure below to unpack the Detector from its shipping carton.

1. Check that the shipping carton contains the following:
   - ORION XT Detector
   - Extra Kidde label for use when mounting in an "upside-down" orientation
   - Parts kit containing the exhaust port adapter and rear exhaust port
   - Commissioning Check Sheet
2. Remove the Detector from the carton.
3. Inspect the Detector to ensure that no damage occurred during shipping.
4. Set the Detector on a stable surface.

4-2.2 Removing the Detector Cover

Follow the procedure below to remove the detector cover:

1. The detector cover is secured to the detector enclosure by two cover locking screws at the bottom of the Detector and two notched tabs in the top of the Detector. Turn the cover locking screws a quarter turn, until perpendicular to the cover face, to unlock the detector cover.
2. Lift the bottom end of the detector cover until the two tabs unhook from the notches in the top of the detector enclosure. The cover is attached to the Detector by a white plastic cord and the cable to the status LED or detector mounted display module.
3. To detach the cord from the Detector, line up the open notch of the cord connector with the notch in the keyed hole. If the cord does not come off easily, rotate the connector until it can be pulled off.
4. Unplug the status LED cable or the display module cable from the termination board. The cover is now detached from the Detector. Set the cover aside.

4-2.3 Detector Mounting Location

Consider the following guidelines when choosing an appropriate location for mounting the Detector:

- The Detector should be mounted as close as possible to the protected areas to minimize transport time and air resistance in the air sampling pipe network.
- The Detector should be mounted to minimize the number of 90 degree bends needed to connect the Detector to the piping network. The system drawings should accurately depict the Detector location and all piping distances and bends required for connection to the unit.
- The Detector must be located in an area where the air pressure surrounding the unit is the same, or lower than the atmospheric pressure around all the sampling ports in the sampling pipe network. A building's HVAC fans may positively pressurize a space within the building. If the Detector is located in an area where the pressure is greater than the sampling pipe, a resistance to the normal airflow through the pipe will occur.
- The Detector should be mounted in an area where it can be accessed for routine maintenance.
- The Detector should be mounted in an area suitable for the chosen detector mounting options such as detector orientation, flush mounting option, display module visibility, self-contained power supply option, exhaust port or elutriator.

4-2.4 Detector Mounting Options

Detector mounting options must be considered prior to choosing a detector mounting location. The following paragraphs explain how each detector mounting option can affect the detector mounting location.

4-2.4.1 DETECTOR ORIENTATION

The Detector may be mounted in two orientations. It can be mounted right-side up with the inlet pipe at the top of the unit or "upside-down" with the inlet pipe at the bottom of the unit. The "upside-down" orientation is convenient for sub-floor applications.

In the "upside-down" orientation, the extra Kidde Fire Systems label should be applied to the Detector, over the existing label. Also, if a display module is installed, the display module should be installed "upside-down" as well (refer to Paragraph 4-5.1).

4-2.4.2 SURFACE MOUNTING OPTION

The Detector may be mounted to any surface with four #10 screws. If the Detector is mounted to a dry wall, use four dry wall anchors for the mounting screws. For additional support, aligning at least two mounting screws with a wall stud is recommended. When mounting to a wall stud, take note of any knockouts or exhaust options that may be blocked by the stud and plan on using an alternate knockout or exhaust option.

4-2.4.3 FLUSH MOUNTING OPTION

The Detector may be flush mounted with a wall by using a flush mount trim-ring (P/N 77-297111-000). For additional support, aligning one side of the trim-ring with a wall stud is recommended. If the Detector is flush mounted, the following mounting constraints apply:

- The Detector can only be exhausted through the rear exhaust port.
- A maximum drywall thickness of 5/8-inch.
- Self-Contained Power Supply cannot be used with a flush mounted Detector.

- The wall must be accessible from the rear to attach the sampling pipe network and electrical conduit to the Detector.
- An elutriator cannot be connected directly to the sampling pipe inlet of the Detector.

4-2.4.4 DETECTOR MOUNTED DISPLAY MODULE OPTION

If a display module is mounted in the Detector, it should be mounted in an area and height where the display module is easily viewed and accessible. If this is not possible, remote mounting of the display module is recommended (refer to Paragraph 4-5.2).

4-2.4.5 SELF-CONTAINED POWER SUPPLY OPTION

The Self-Contained Power Supply is designed to be mounted adjacent to the bottom of the Detector. It cannot be flush mounted and the Detector cannot be mounted "upside-down" when attached to a Self-Contained Power Supply.

Access to the IIM RS-485 Network connector and remote display module connector is recommended through the rear or top knockouts because the bottom knockouts are used for the Self-Contained Power Supply connection.

4-2.4.6 EXHAUST PORT OPTIONS

The Detector can be exhausted through the side or rear of the Detector. If the Detector is mounted to a wall stud that covers the rear exhaust port, the Detector must be exhausted through the side exhaust. If the Detector is flush mounted, the Detector must be exhausted through the rear exhaust port.

4-2.4.7 ELUTRIATOR OPTION

If installing an elutriator directly into the sampling pipe inlet of the Detector, the Detector cannot be flush mounted. The Detector should also be mounted in an area that allows enough clearance for the elutriator.

4-2.5 Knockouts for Electrical Connections

The Detector has eight conduit knockouts to run field wiring through. Each knockout is a concentric ½-inch (12.7 mm) and ¾-inch (19.5 mm) size. If attaching a Self-Contained Power Supply to the Detector, use the left knockout at the bottom of the Detector for Self-Contained Power Supply wiring.

4-2.6 Exhaust Port Adapter Installation (Optional)

The Detector has two exhaust options, side exhaust or rear exhaust. Choose the exhaust option which best suits the particular application.

4-2.6.1 SIDE EXHAUST INSTALLATION

The Detector is shipped from the factory with the side exhaust port pre-installed. If it is not installed, follow the procedure below to install the side exhaust port adapter.

1. Remove the rear exhaust port adapter, if necessary. Pull the rear exhaust port adapter to the side of the Detector until it is detached from the fan and the adapter tabs are detached from the retaining clips. Pull the rear exhaust port adapter away from the Detector to remove.
2. Place the side exhaust port adapter in its place, aligning the adapter tabs to the right of the retaining clips.
3. Attach the side exhaust port adapter to the fan while making certain that the adapter tabs are sliding under the retaining clips.
4. Use the 1-inch NPT exhaust port fitting, supplied with each Detector, to attach the exhaust port to the exhaust pipe network.

4-2.6.2 REAR EXHAUST INSTALLATION

Follow the procedure bellow to install the rear exhaust port adapter.

1. Remove the side exhaust port adapter. Pull the side exhaust port adapter to the side of the Detector until it is detached from the fan and the adapter tabs are detached from the retaining clips. Pull the side exhaust port adapter away from the Detector to remove.
2. Place the rear exhaust port adapter in its place, aligning the adapter tabs to the right of the retaining clips.
3. Attach the side exhaust port adapter to the fan while making certain that the adapter tabs are sliding under the retaining clips.
4. Use the 1-inch NPT exhaust port fitting, supplied with each Detector, to attach the exhaust port to the exhaust pipe network.

4-2.7 Mounting the Detector

The Detector has two mounting options, surface mounting and flush mounting.

4-2.7.1 SURFACE MOUNTING INSTALLATION

Follow the following procedure to surface mount the Detector.

1. Remove the detector cover.
2. Prepare the Detector for installation, removing knockouts and installing rear exhaust port adapter, as required.

3. Hold the Detector in the mounting location, ensuring correct orientation, and mark the four mounting holes and rear exhaust port or knockouts, as required.
4. Drill four mounting holes sized for #10 (5 mm) screws and insert dry wall anchors, as required.
5. Drill holes for all rear knockouts and, if necessary, the rear exhaust port.
6. Insert #10 (5 mm) screws or other mounting hardware in the wall until the screws are protruding from the wall at least ½-inch. If an elutriator is installed on the Detector, slide the four nylon washers over each of the four screws and allow the screws to protrude from the wall at least 3/4-inch.
7. If necessary, connect rear entry conduit to rear knockouts and exhaust pipe to rear exhaust port.
8. Place the Detector against the wall, lining up the screws with the mounting holes. When flush with wall, slide Detector down until it rests in the mounting slots.
9. Secure the Detector in position by tightening the four screws.

4-2.7.2 FLUSH MOUNTING INSTALLATION

Flush mounting the Detector requires the flush mount trim-ring (P/N 77-297111-000). Follow the following procedure to flush mount the Detector.

1. Cut a 12 3/4-inch x 9 1/8-inch square hole in the wall for the trim-ring.
2. Loosen the trim-ring clamp screws, and slide the trim-ring clamps to the back of the trim-ring. If mounting the trim-ring against a wall stud, remove the trim-ring clamp that will be closest to the stud.
3. Place trim-ring in wall. If mounting “upside-down”, make sure the screw access slots are at the top of the trim-ring.
4. Cut wall with knife at screw access slots until there is enough space for the detector cover lock screws to be accessed with a screwdriver.
5. If mounting the trim-ring against a wall stud, drill a self-tapping screw into the wall stud through the trim-ring clamp slot.
6. Secure to wall by sliding the trim-ring clamps against the back of the wall. Tighten the clamp screws.
7. Prepare the Detector for installation, removing knock-outs and installing rear exhaust port adapter.
8. With the detector cover removed, place the Detector in the trim-ring.
9. Secure the Detector to the trim-ring with two #10-32 x ½-inch mounting screws.

4-2.8 Connecting to the Sampling Pipe Network

If installing the exhaust option, connect the exhaust pipe network to the 1-inch NPT exhaust port fitting.

Note: In countries where NPT threaded fittings are not available, use 3/4-inch BSP threaded pipe with a backnut (P/N 06-117911-001) and washer (P/N 06-117912-001).

4-2.9 Termination Board Field Wiring

The termination board has two rows of terminal blocks for detector relay, remote display module and power supply connections (see Figure 4-4). All field wiring must be brought into the Detector through the electrical knockouts. For wiring directions, refer to individual component sections.

⚠ CAUTION

For system supervision of Alarm terminals, do not use one continuous loop of wire under the terminals. Separate, distinct sections of wire must be run between connections.

If required, connect earth ground to the ground post located in the bottom left hand corner of the Detector. If earth ground is not easily accessible, run a wire from the power supply to the detector ground post.

4-2.10 Detector Software Configuration

To configure the Detector, connect a computer that has OCS Version 3.0 installed to the computer port located on the side of the Detector. Use the RS-232 programming cable (P/N 74-100016-003) to connect the computer to the Detector. For Detector configuration details, refer to the ORION XT Configuration Software (OCS) User's Guide (P/N 06-236012-401).

4-2.10.1 DETECTOR MEMORY BATTERY LINK JUMPER

The Detector has on-board memory that stores all detector configuration settings, smoke history and event history data. To retain all settings and data in memory when the detector is powered down, the battery link jumper (location shown in Figure 4-4) must be installed as shown in Figure 4-1.

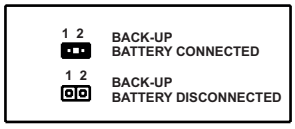


Figure 4-1. Memory Back-Up Jumper Installation

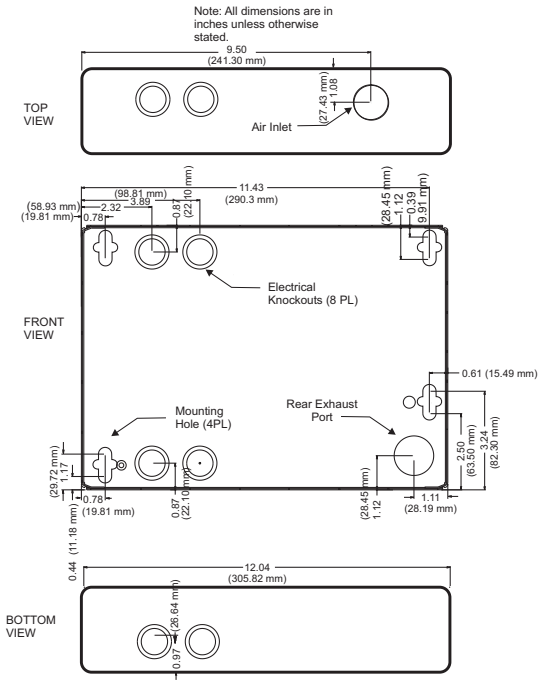


Figure 4-2. Detector Mounting Diagram

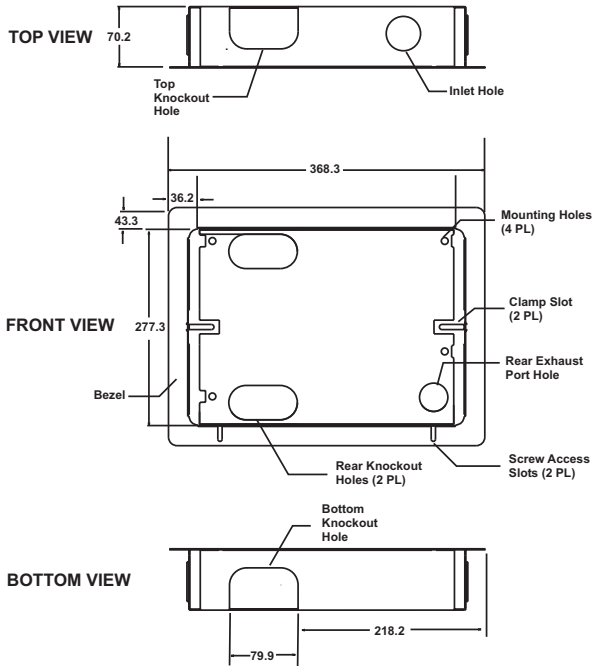


Figure 4-3. Flush Mount Trim-Ring

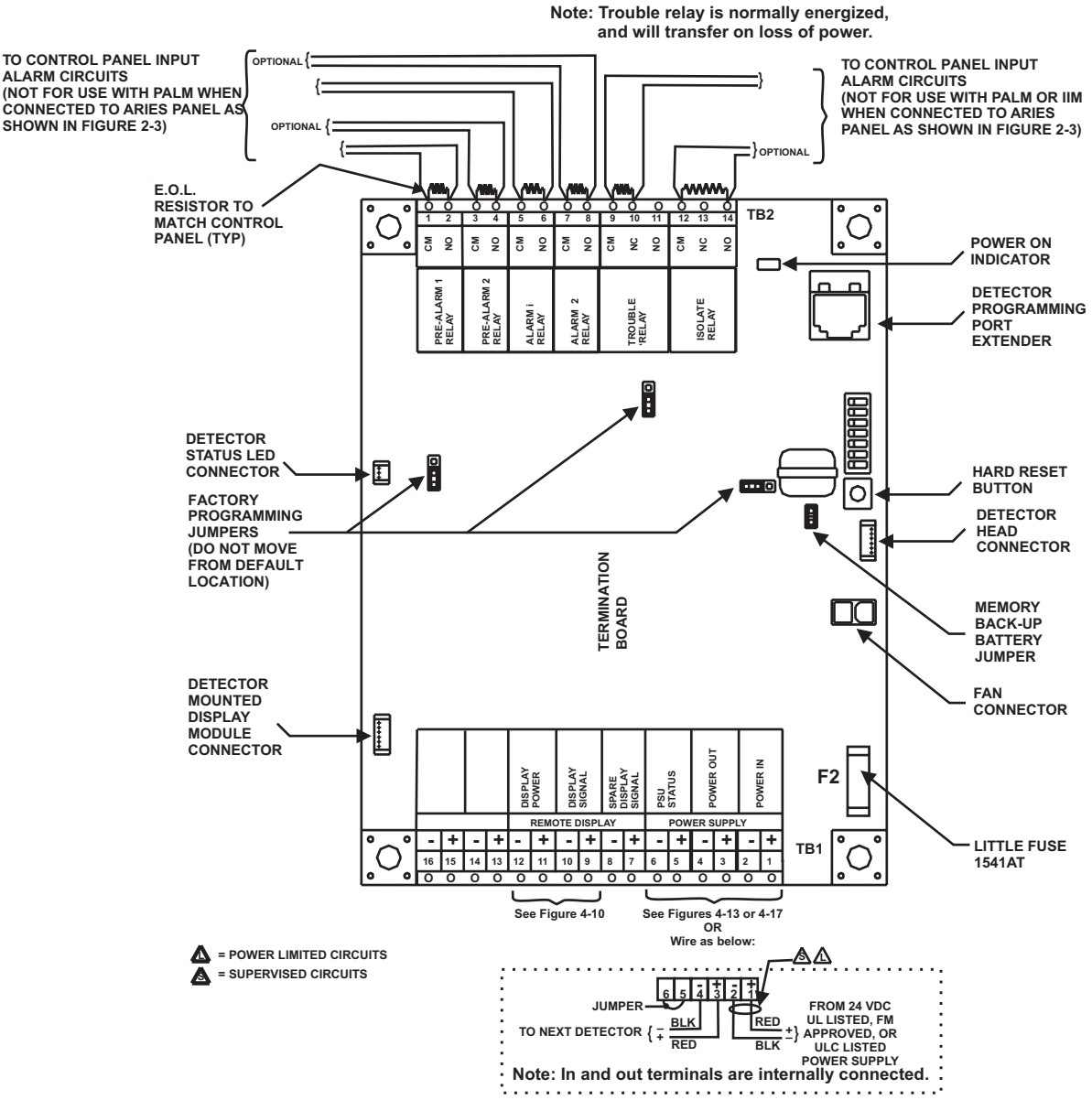


Figure 4-4. Termination Board External Wiring Diagram

4-2.11 Attaching the Detector Cover

Before closing up the Detector, use the following checklist to be sure that all necessary installation steps have been completed.

- Have you installed the detector mounted display module? (optional)
- Have you installed the PALM? (optional)
- Is the inlet cam in the locked position?
- Have you connected the detector memory back-up battery link jumper?
- Is all of your field wiring to the termination board secure?
- Is the status LED connector (optional), display module (optional), computer port, detector head and fan connector cables connected to the termination board?
- Is the proper exhaust adapter for your application installed?
- Are all of the jumpers in the proper position?
- Have you set the IIM network detector address on the dip switches? (optional)
- Is the detector cover safety cord connected to the Detector?

Use the following procedure to attach the detector cover to the detector enclosure:

1. Place the top edge of the Detector cover on the top edge of the Detector enclosure.
2. If the unit has a Display Module in the cover, plug the Display Module connector in the 6-pin connector on the termination board marked Internal Display (see Figure 2-7 for location). If the unit has the blank plate and LED on the Detector cover, plug the connector in the 3-pin connector on the termination board marked Status LED (see Figure 2-7 for location).
3. Reattach the white plastic cord from the Detector cover to the Detector (the plug should be at the center of the Detector). Place the connector in the plug, and turn the connector until it goes down in the receptacle. Turn the connector 90 degrees to lock it in the receptacle.
4. Carefully tuck the wires in the unit and close the lid.
5. Turn the locking screws at the bottom of the Detector 90 degrees to their locking position.

4-3 INSTALLING THE ELUTRIATOR (OPTIONAL)

The elutriator can connect directly into the detector inlet or as part of the pipe network. The elutriator must be mounted vertically with the side marked “AIRFLOW” connected to the pipe network. For ease of maintenance, a union is recommended on the pipe network end of the elutriator.

4-3.1 Detector Inlet Installation

The elutriator can be connected directly into the ¾-inch NPT threaded detector inlet for surface mount detector installations (see Figure 4-5). Use the four nylon washers, supplied with the elutriator, on the detector mounting screws. This will space the Detector away from the wall to allow enough room to install the elutriator.

To secure the elutriator to the detector inlet, rotate the elutriator clockwise by hand until it is secure. Using a 1-1/8-inch open ended spanner, tighten the bottom of the elutriator another quarter-turn. Do not overtighten.

4-3.2 Pipe Network Installation

The elutriator may be installed as part of the pipe network (see Figure 4-6). The elutriator may be installed anywhere between the Detector and the first branch point. This installation option is recommended for ease of service and maintenance.

4-4 INSTALLING THE PEGASYS ADDRESSABLE LOOP MODULE (OPTIONAL)

4-4.1 PALM Hardware Installation

The instructions below are used to install the optional PEGAsys Addressable Loop Module (PALM). Installation consists of mounting the module to the termination board in the Detector and wiring the module to the system (see Figure 4-7).

Note: The PEGAsys panel must use Firmware Version 80.0 or higher.

Note: The PALM cannot be used with IIM option.

1. Remove the PALM from the packaging.
2. Inspect the unit to ensure that no damage occurred during transit.
3. Attached to the PALM are four nylon mounting posts which are held in place by four nuts that are inserted on the posts (see Figure 4-7). Ensure that these nuts are only finger tight.

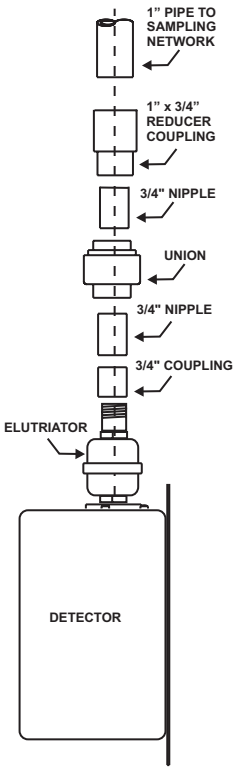


Figure 4-5. Typical Connection with Elutriator Installed Directly into Detector

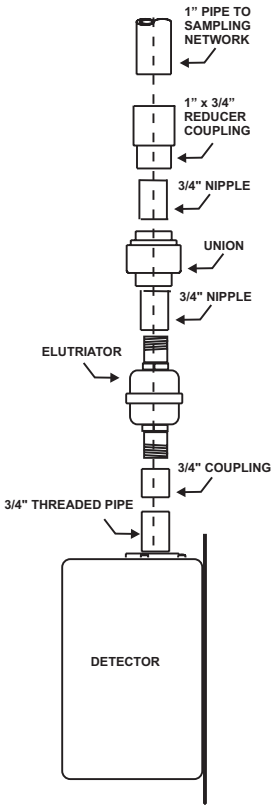


Figure 4-6. Typical Connection with Elutriator Installed as Part of Pipe Network

4. Remove the detector cover as described in Paragraph 4-2.2
5. Place the PALM over the termination board in the Detector. Align the mounting posts with the four PALM mounting holes on the termination board. This will also align the receptacle on the underside of the PALM with the connector P4 on the termination board (see Figure 4-7 for location of mounting holes).
6. Press the PALM down firmly on all four corners until the posts snap and lock into the termination board. The 14-pin connector on the underside of the PALM board should now be connected to receptacle P4 on the Detector termination board.
7. Pull the SLC wiring through a detector conduit knockout until 6 to 8 inches of wiring is inside the Detector.
8. Strip off 1/8-inch (3 mm) of insulation from the end of the wires.
9. Connect terminals 1 and 2 on the PALM plug to the SLC wiring from the preceding SmartOne device or ARIES/PEGAsys SLC module, if first device on the SLC loop (see Figure 4-8).
10. Connect terminals 3 and 4 on the PALM plug to the SLC wiring to the next SmartOne device or PEGAsys/ARIES module, if last device on the SLC loop.
11. Connect terminal 5 on the PALM plug to earth ground on the detector ground post. Ground wire is supplied with PALM. If earth ground is not easily accessible, run a wire from the power supply (multi-zone, self-contained, PEGAsys or other UL Listed power supply) to the detector ground post.
12. Insert 5-pin PALM plug into the PALM wiring connector.

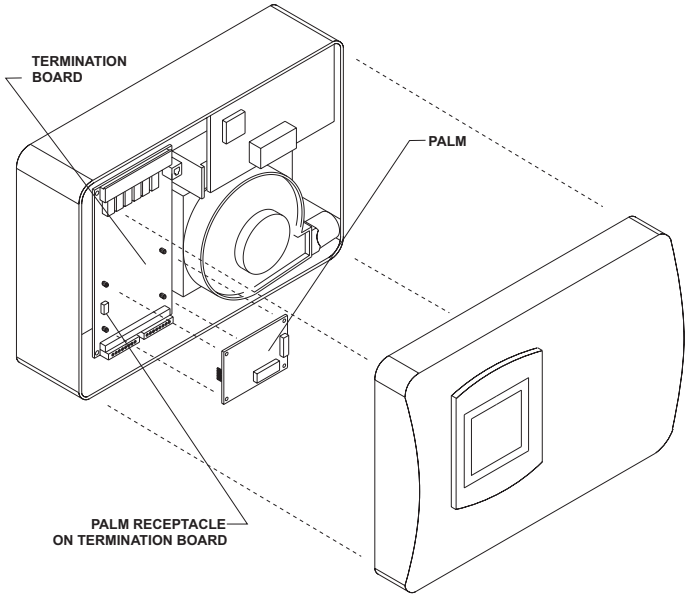


Figure 4-7. PEGAsys Addressable Loop Module Installation Diagram

4-4.2 Addressing and Registering the PALM

Addressing the PALM is a two step process:

4-4.2.1 ADDRESSING THE PALM WITH THE PEGASYS/ARIES PANEL

To address the PALM, refer to the ORION Configuration Software User's Guide (P/N 06-236012-401) and the PEGAsys Manual (P/N 76-100016-001) or the ARIES Manual (06-236530-001) and ARIES Configuration Software User's Guide (06-236530-002).

Write the address on the PALM module with permanent marker.

4-4.2.2 REGISTERING THE PALM WITH THE PEGASYS/ARIES PANEL

The PALM must be registered with the PEGAsys/ARIES panel to operate properly. There are two ways to register the PALM:

1. Register using the panel menu screens. Refer to Chapter 2 of the PEGAsys Manual or Chapter 2 of the ARIES Manual.
2. Register by entering the PALM address using PEGAsys Configuration Software (PCS) as described in the manual (P/N 06-235766-001) or in the ARIES Configuration Sofware (ACT) as described in the manual (P/N 06-236530-002).

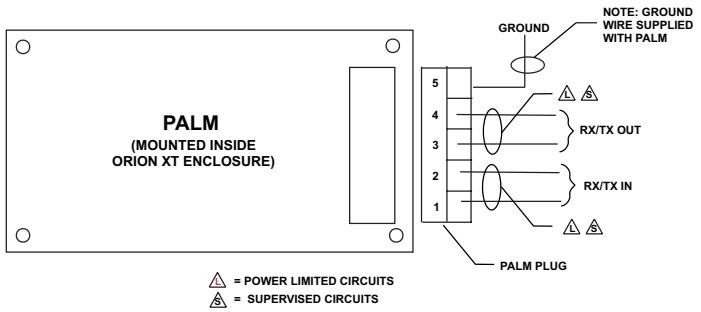


Figure 4-8. PEGAsys Addressable Loop Module Wiring Diagram

4-5 INSTALLING THE DISPLAY MODULE (OPTIONAL)

The Display Module can be integrated into an ORION XT Detector or mounted remotely.

4-5.1 Detector Mounted Display Module Installation

1. Remove the Display Module from its carton.
2. Inspect the unit to ensure that no damage occurred during transit.
3. If the cover is on the Detector, remove it now according the instructions in Paragraph 4-2.2.
4. Remove the status LED plate in the Detector cover by pushing the two retaining clips, one each side, inward and pushing the plate to the front.
5. Fit the Display Module into the opening. If mounting the Detector upside-down, the buttons of the display module will not line up with the Detector label.
6. Push the Display Module into position until it engages with the two retaining clips.

See Paragraph 4-2.11 before replacing the cover on the Detector.

4-5.2 Installing the Remote Display Module

The Display Module can be mounted remotely to a standard 2-gang or 4" backbox, up to 1000 ft. away using 2-pair cable. The mounting plate of the module is attached to an electrical box by mounting screws (not supplied). A four conductor communications and power cable is run between the termination board in the Detector and the terminals within the Display Module (see Figure 4-10).

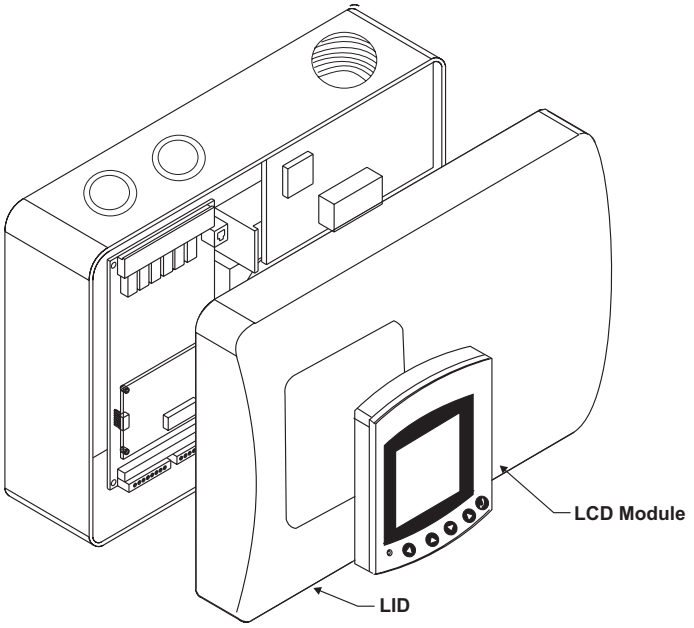


Figure 4-9. Installing the Display Module

Follow the procedure below to mount the Display Module:

1. Mount a 4" or 2-gang electrical box at the desired location.
2. Install screws in the front mounting holes of the electrical box, leaving the screws sticking out 1/4-inch (6 mm). Two screws are required for 4-inch box mounting and four are required for 2-gang box mounting.
3. Run two pairs of wires from positions 9-12, 0-24 V, and Ext Disp +/- on termination board in the Detector to the electrical box (see Figure 4-3 for locations on the termination board).
4. Pull wires from the Detector through the conduit in the electrical box leaving six inches to one foot of wire inside the box.
5. Remove the Display Module from its carton.
6. Inspect the unit to ensure that no damage occurred during transit.
7. Remove the screw at the bottom of the Display Module, and separate the cover from the back. Note which is the inside and the outside of the backbox. Set aside the Display Module and screw.
8. Pull the wires from inside the electrical box through the rubber grommet of the backbox. Be sure to pull the wires from the back side of the backbox to the inside.
9. Take the backbox and place the back of the box over the electrical box, matching the mounting holes on the backbox with the screws in the electrical box. The backbox should be oriented such that the rubber grommet and the mounting hole for the Display Module cover are at or near the bottom. Tighten the screws to secure the backbox to the electrical box.
10. Remove and discard the wiring harness supplied with the Display Module. The harness is only needed when the Display Module is installed in the Detector cover.
11. Connect the wires from the Detector to the terminal block on the Display Module in the following manner (see Figure 4-10):

    Connect TB1-12 0V, Display power (-), to position 1, labeled 0V in the Display Module. (Push wires into the terminal block and tighten screws.)

    Connect TB1-11 +24 V, Display power (+), to position 2, labeled 24 Vdc in the Display Module.

    Connect TB1-9 Display signal (+) to position 3, labeled (+) in the Display Module.

    Connect TB1-10 Display signal (-) to position 4, labeled (-) in the Display Module.

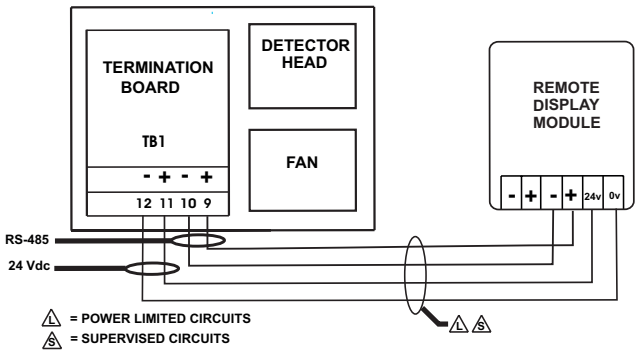


Figure 4-10. Remote Display Wiring Diagram

12. Mount the Display Module on to the backbox. Make certain the top of the backbox slides under the mating tab on the Display Module. Push the wires back through the grommet as needed to make room in the Display Module (see Figure 4-11).
13. Reinsert the screw at the bottom of the Display Module cover and tighten. If the screw does not line up easily with the hole in the cover, then the Display Module was not installed on the backbox correctly.

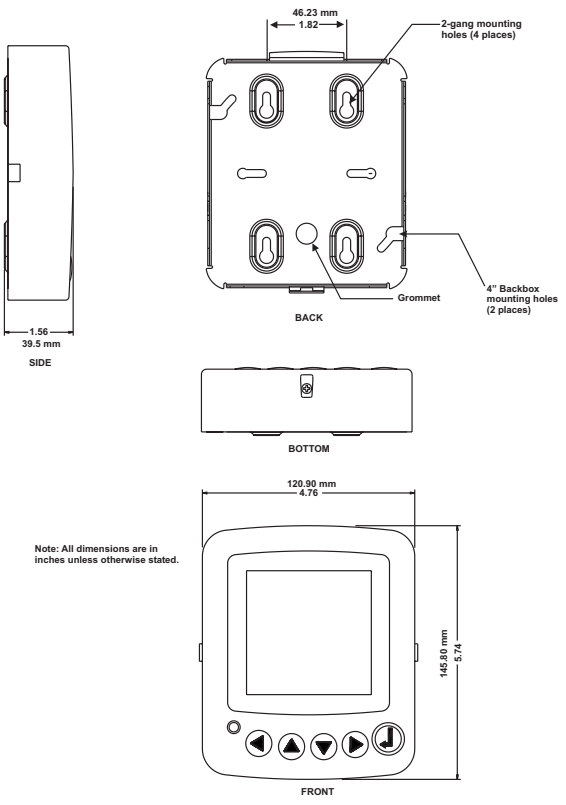


Figure 4-11. Remote Display Module, Mounting Details

4-5.3 Display Module Software Setup (Registering the LCD)

The Display Module must be registered with the Detector through the OCS Version 3.0. If the Display Module is not registered, an “Unreg LCD” trouble will appear on the Display Module. Refer to the ORION Configuration Software User's Guide (P/N 06-236012-401), for details on registering the LCD.

4-6 INSTALLING SELF-CONTAINED POWER SUPPLY (OPTIONAL)

Note: Remove the power supply terminal strip from the Detector before installing the power supply.

The Self-Contained Power Supply must be mounted directly below the Detector as follows:

1. Remove the Self-Contained Power Supply from its packaging.
2. Inspect the unit to ensure that no damage occurred during transit.
3. Remove the crosshead screw in the recess of the cover. Remove the cover and set it aside.
4. Remove one or two knockouts on the bottom of the Detector for the AC voltage wiring, as needed.
5. Install a ½-inch (19 mm) or ¼-inch (6 mm) nipple in the knockout of the Detector.
6. Remove matching knockouts on the top of the power supply (the top is the side with the ventilation holes) and appropriate knockouts for AC input wiring.
7. Place the power supply under the Detector and slide the nipple installed in step 4 into the knockout of the power supply. The power supply, without the cover, should not restrict access to the locking screws on the bottom of the Detector. The power supply should fit between these two screws to allow the detector cover to be secured and removed. Check the position of the two small posts on the top of the power supply on each side of the ventilation holes. When the power supply is mounted the correct distance from the Detector, these two posts should just touch the Detector.
8. Mark the location of the mounting holes on the wall (see Figure 4-12 for mounting details).
9. Drill holes and screw the power supply to the wall at the mounting holes. (Screws are not supplied.)
10. Screw the conduit fitting nut to the nipple on the inside of the power supply.
11. Loosen power supply module retaining screw and shift the power supply module to connect AC wiring (refer to Figure 4-13 for wiring diagram).
12. With the AC power switched off, bring AC input wiring through appropriate knockout and connect AC wiring to neutral (N) and line (L). The AC power must be an emergency power circuit that is backed up by an automatic starting, engine-driven generator.
13. Reposition module and replace retaining screws.
14. Take the wiring harness with the red/black/blue wires and one green/yellow wire and feed them through the conduit, into the Detector.
15. Connect the red wire to TBl-1 and the black wire to TB1-2 on the termination board.
16. Connect the blue wire to TB1-5 marked PSU Status +. (If you are installing a power supply other than the Self-Contained or Multi-Zone power supply, and the power supply does not provide a normally low supervisory signal, a jumper must be placed across PSU status +/-.)
17. Place the ground lug over the stud (lower left hand corner of the Detector) and secure it with a nut (provided).

⚠ WARNING

Use extreme care when installing batteries. The terminals are exposed, and contact with metal may initiate a discharge/reaction which could cause severe bodily injury.

18. Unwrap the two 2 AH batteries and place them inside the power supply with the terminals facing the wiring and conduit.
19. Connect the blue wire to the inside most battery terminals, i.e., one end of the blue wire connects to the negative (-) terminal of the top most battery and the other end attaches to the positive (+) terminal of the bottom battery.
20. Connect the red wire to the positive (+) terminal on the top battery.
21. Connect the black wire to the negative (-) terminal of the bottom battery.
22. Check all wiring connections and switch on power.
23. Replace the cover back on the power supply. Secure it with the crosshead screw.

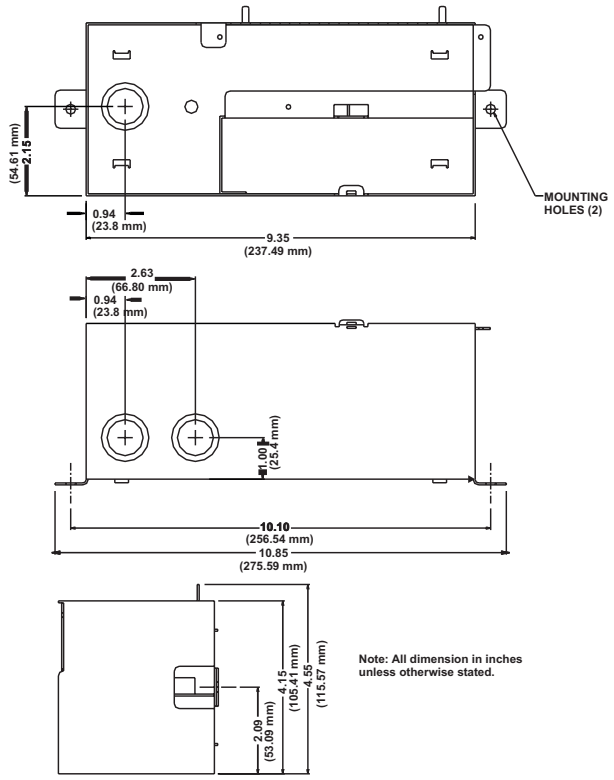


Figure 4-12. Self-Contained Power Supply Back-Box Mounting Details

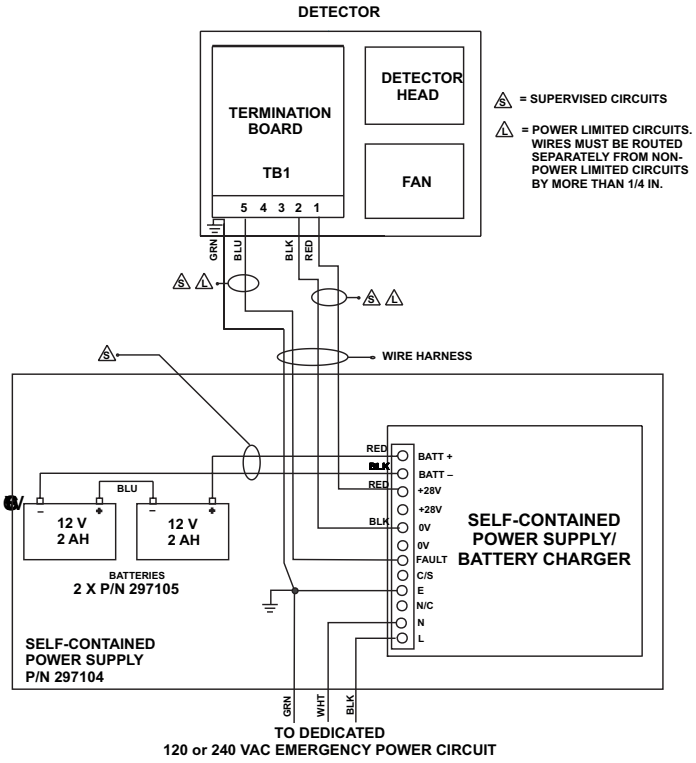


Figure 4-13. Self-Contained Power Supply Wiring Diagram

4-7 INSTALLING THE MULTI-ZONE POWER SUPPLY (OPTIONAL)

ATTENTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

ANTISTATIC PRECAUTIONS

When handling any electric components or circuit boards, antistatic precautions must be carried out. Failure to do so may result in component damage.

4-7.1 Mount the Power Supply Enclosures

The enclosure (P/N 77-297107-000) is designed for surface mounting and has four mounting holes, as shown in Figure 4-14. Mount the enclosure before installing the power supply module or the batteries. Because of the weight of the power supply, ¼-inch mounting hardware is recommended. If using a secondary enclosure, it should be mounted immediately adjacent to the primary enclosure. After the enclosure is mounted, connect the conduit and pull in the field wiring.

Note: For ULC Listed installations, locate the power supply enclosure adjacent to a control unit that will show power-on with a green indicator.

⚠ CAUTION

The power supply enclosure is designed for surface mounting and should be mounted before assembly. The weight of the assembly with batteries is substantial. Be sure that the wall-loading limit is not exceeded and the weight can be supported when the completed assembly is mounted.

4-7.2 Configuring the Power Supply for a Second Battery Bank

A system may include two additional batteries in a second enclosure. The power supply module is shipped from the factory configured for supervising the two batteries in the main enclosure. If using the second pair of batteries, jumpers W1 and W2 must be moved from position BC to position AB. See location in Figure 4-15.

Note: Failure to place W1 and W2 in the correct positions will disable battery supervision or give a false battery trouble indication.

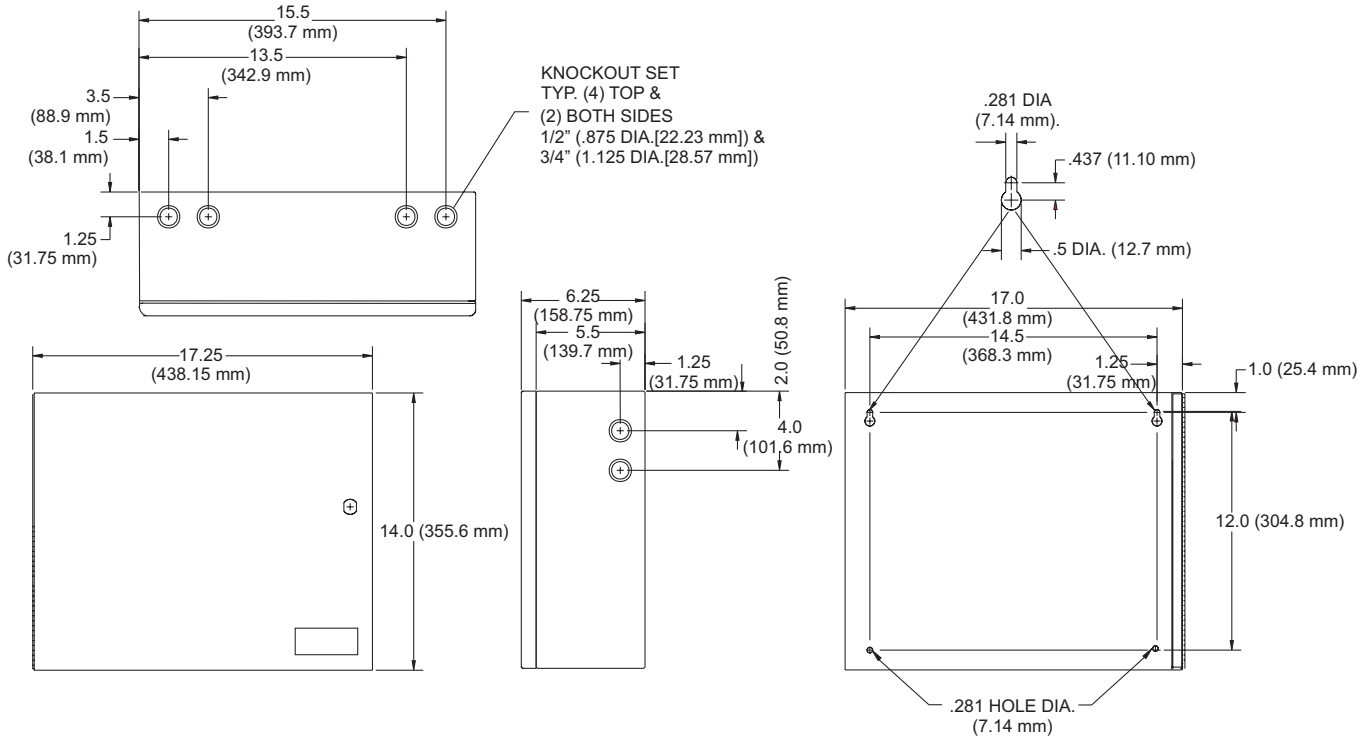


Figure 4-14. Multi-Zone Enclosure Mounting Details

4-7.3 Configuring the Trouble Relay

The power supply is factory set for Normally Closed trouble relay contacts as this is that is required for terminals 5 and 6 on the Detector. IF the power supply will be monitored by a control unit with Normally Open contacts, a specific EOL (End-of-Line) resistor to match the control unit must be installed. For Normally Open trouble relay contacts, move jumper W3 from N.C. to N.O. See location in Figure 4-15.

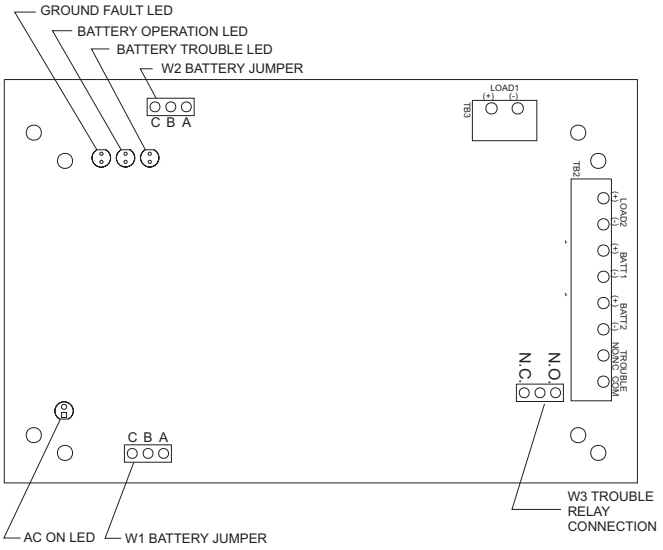


Figure 4-15. Multi-Zone Power Supply Configuration Jumpers

4-7.4 Installing and Wiring the Multi-Zone Power Supply Module and Batteries

Do not proceed with this step until after the power supply enclosure has been mounted and the configuration jumpers have been correctly set. Refer Figures 4-16 and 4-17.

Note: Remove the power supply terminal strip from the Detector before installing the power supply.

1. Mount the P/N 77-297106-000 power supply module in the enclosure using the four #6-32 screws provided with the enclosure.
2. Securely fasten the green ground wire on the power supply module to the ground lug on the enclosure using the #8-32 screws and the two washers provided with the enclosure.
3. Remove the cover on the AC terminal block.
4. With the **AC power switched OFF**, connect the AC wiring to the terminal block HOT, NEUT and GND as shown in the wiring diagram.
5. Replace the cover on the AC terminal block.
6. Connect Load1 and Load2 wiring to terminals as shown in the wiring diagram.
7. Connect the Trouble Relay wiring and EOL resistor to terminals as shown in the wiring diagram.
8. If the Battery Strap Kit (P/N 77-297113-000) is being used, install them at this time. With the Velcro® side of the strap facing you, thread each strap down through the front slot and then up through the rear slot in the bottom of the enclosure.
9. Place the two batteries(P/N 77-297108-000) in the cabinet, but **do not make any connections at this time.**

Note: Do not install a battery set with an open-circuit voltage less than 22 Vdc.

10. If the Battery Strap Kit (P/N 77-297113-000) is being used, wrap a strap around the battery so that the plastic buckle is in front of the battery. Making certain that there are no kinks or twists in the strap, thread the end through the plastic buckle, and tighten it. Secure the end of the strap by mating the two Velcro sides. Repeat for the other battery.
11. Securely fasten the Red and Black battery cables from the batteries to the power supply module as shown in the wiring diagram. Battery cables with bolts and locknuts are supplied with the enclosure.

Note: Exercise caution and do not touch the battery terminal or bare end of the connected battery cable to any metal surface.

12. Securely fasten the center link between the batteries as shown in the wiring diagram. The center link with bolts and locknuts is supplied with the enclosure.

Note: Exercise caution and do not touch the battery terminal or bare ends of the connected center link to any metal surface.

13. Check all wiring connections.
14. Switch on AC power. The green AC ON LED will light. Note that the battery will not power the system until AC power is supplied.

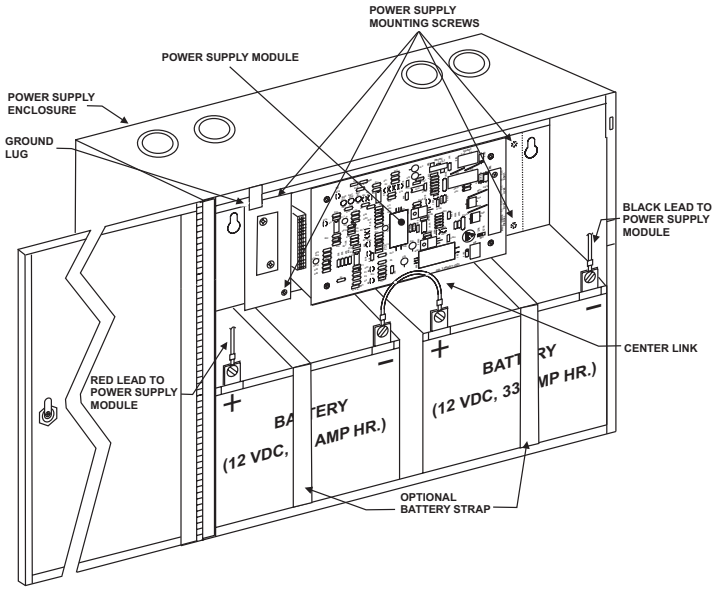


Figure 4-16. Multi-Zone Power Supply/ Battery Mounting

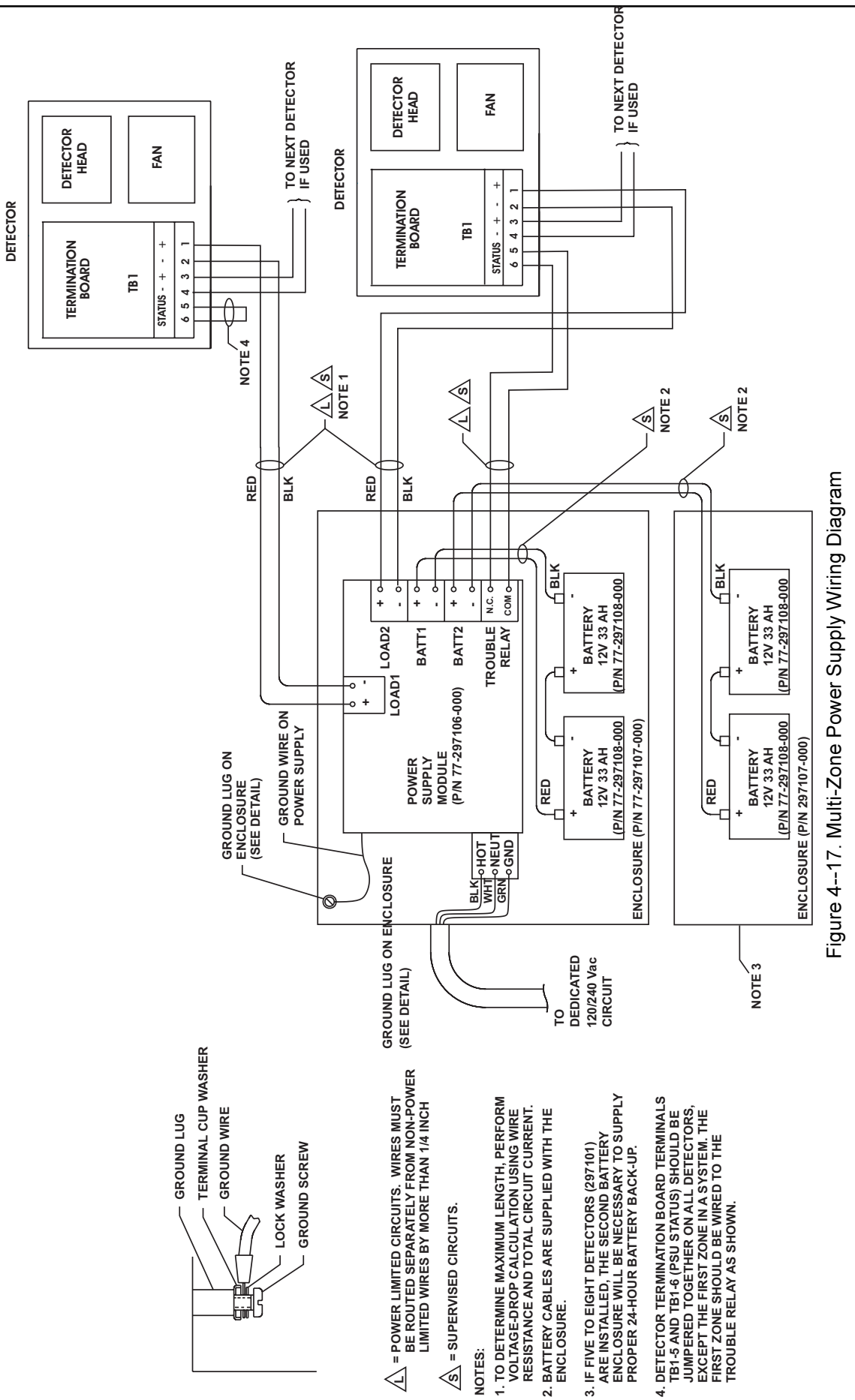


Figure 4--17. Multi-Zone Power Supply Wiring Diagram

4-8 INSTALLING THE INTELLIGENT INTERFACE MODULE (OPTIONAL)

The Intelligent Interface Module (IIM) can be connected directly to the ARIES Panel via the RS-232 connection or to other control units via its relays. To connect the IIM to the ARIES Panel, see Paragraph 4-8.2.1, Figures 4-19 and 4-20, and the instructions in the ARIES Installation, Operation, and Maintenance Manual (P/N 06-236530-001). To connect the IIM via relays, see Paragraph 4-8.2.2.

Note: All installation work should be performed by factory trained technicians and installed in accordance with applicable installation requirements.

4-8.1 Mounting the Intelligent Interface Module

Follow these steps to install an IIM.

1. Remove the IIM with enclosure from the shipping carton.
2. Inspect the hardware to insure that no damage occurred during transit.
3. Ensure that the kit contains the following items:

   2 - E.O.L Resistors (5.6k ohm 0.5 W)

   1 – Ground Lug Washer

   2 – Ground Lug Nut

   1 – IIM in a key locked enclosure, with 2 lugs

⚠ CAUTION

All personnel installing or servicing the IIM equipment must wear a grounding strap when working with the module to avoid generating static electricity which can destroy integrated circuits.

⚠ WARNING

Do not connect or disconnect any wiring on the IIM with the power supply connected.

4. Mount the enclosure using No.10 (5 mm) hardware as close as possible to the control unit cabinet. This enclosure is designed to be surface mounted.
5. Connect the conduit to concentric 1/2" (19 mm) or 3/4" (25 mm) knockouts in the enclosure, as needed, and pull in field wiring.
6. Connect the 24 Vdc power supply cable to the IIM.
7. Power must be supplied from a UL Listed, FM Approved or ULC Listed power supply for fire protection signalling use or the ARIES Control Unit Auxillary output.
8. Connect ground wire to grounding lug and fasten with the ground lug nut.
9. Terminate grounding shield to the IIM enclosure ground lug.

4-8.2 Connecting the IIM to a Control Unit

4-8.2.1 RS-232 CONNECTION TO ARIES CONTROL UNIT

Connect the RS-232 cable from J1 CCM on the IIM to the RS-232 PC port on the ARIES Control Unit as shown in Figure 4-19 and Figure 4-20.

4-8.2.2 RELAY CONTACT WIRING TO OTHER FIRE ALARM UNITS

Connect the relay wiring as described in the procedure below and 4-21 and Figure 4-22.

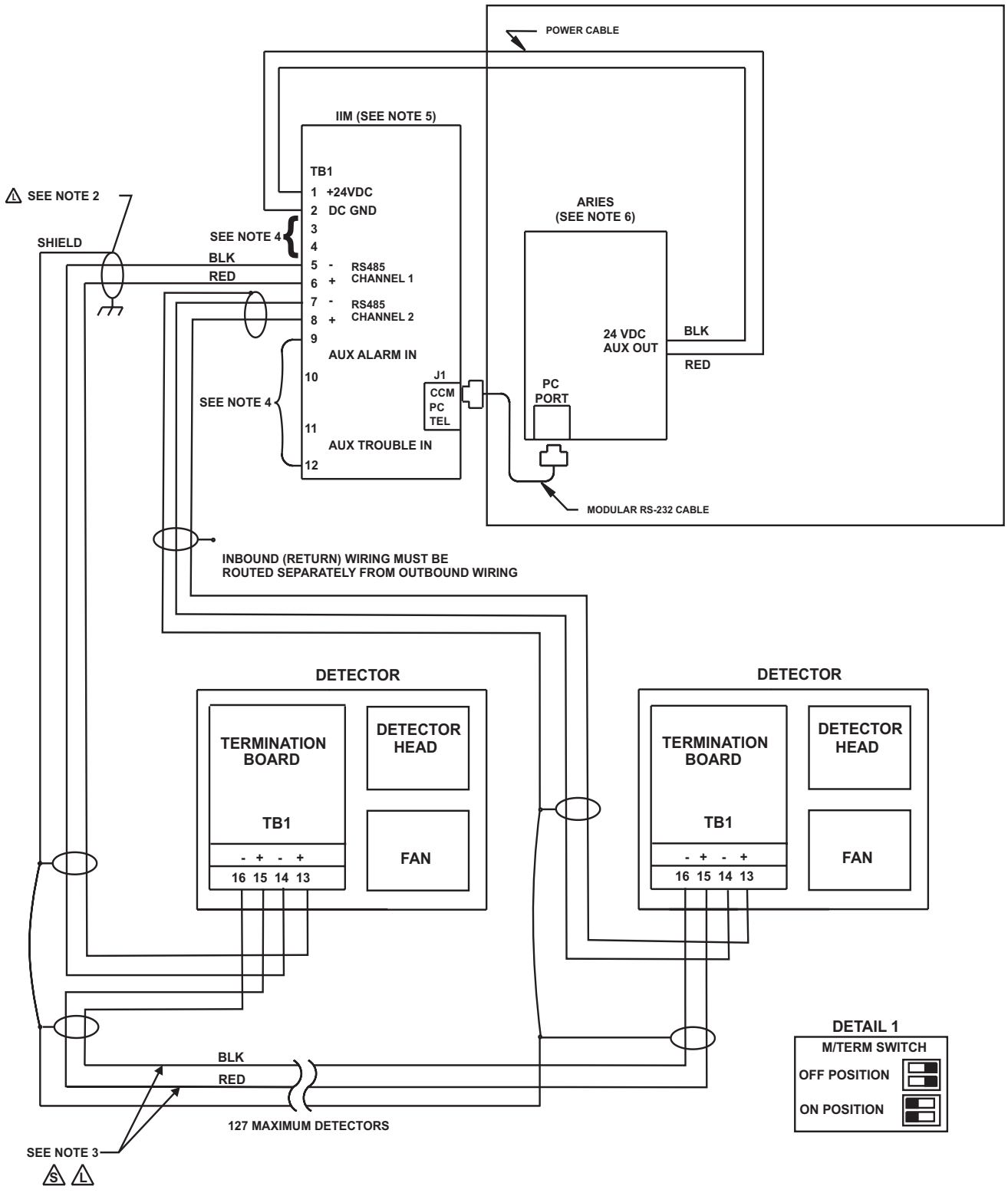
1. Connect the wiring from trouble relay to a trouble monitoring circuit.
2. If used, terminate the wiring at the IIM and install the resistors at the devices connected to the Auxiliary inputs, as shown in Figure 4-21. Install 5.6k ohm (0.5 W) resistors on the "Auxiliary Alarm In" and "Auxiliary Trouble In" terminals, if these inputs are not used.

4-8.3 Wiring the RS-485 Network to Detectors

The following is a list of RS-485 network design parameters.

1. Style 6 wiring, as shown in Figure 4-19 and Figure 4-21, is the preferred wiring because it provides the greatest reliability. For Style 6 each pair of wires must be in separate conduit.
2. If the IIM is installed in a Style 4 configuration to the detectors (see Figure 4-20 and Figure 4-22), the RS-485 termination load on the last Detector should be connected. This is done by setting both sides of the M/TERM switch on the termination board to the ON position.
3. The network cable must be twisted, shielded pair with a minimum gauge of 18 AWG (0.75 mm²) and a maximum of 12 AWG (2.5 mm²) wire.
4. Maximum distance for entire vertical loop is 4000 ft. (1200 m).
5. Up to 127 detectors may be connected to the network. Each detector must have its unique address set on its DIP switches. (See Figure 4-18.)

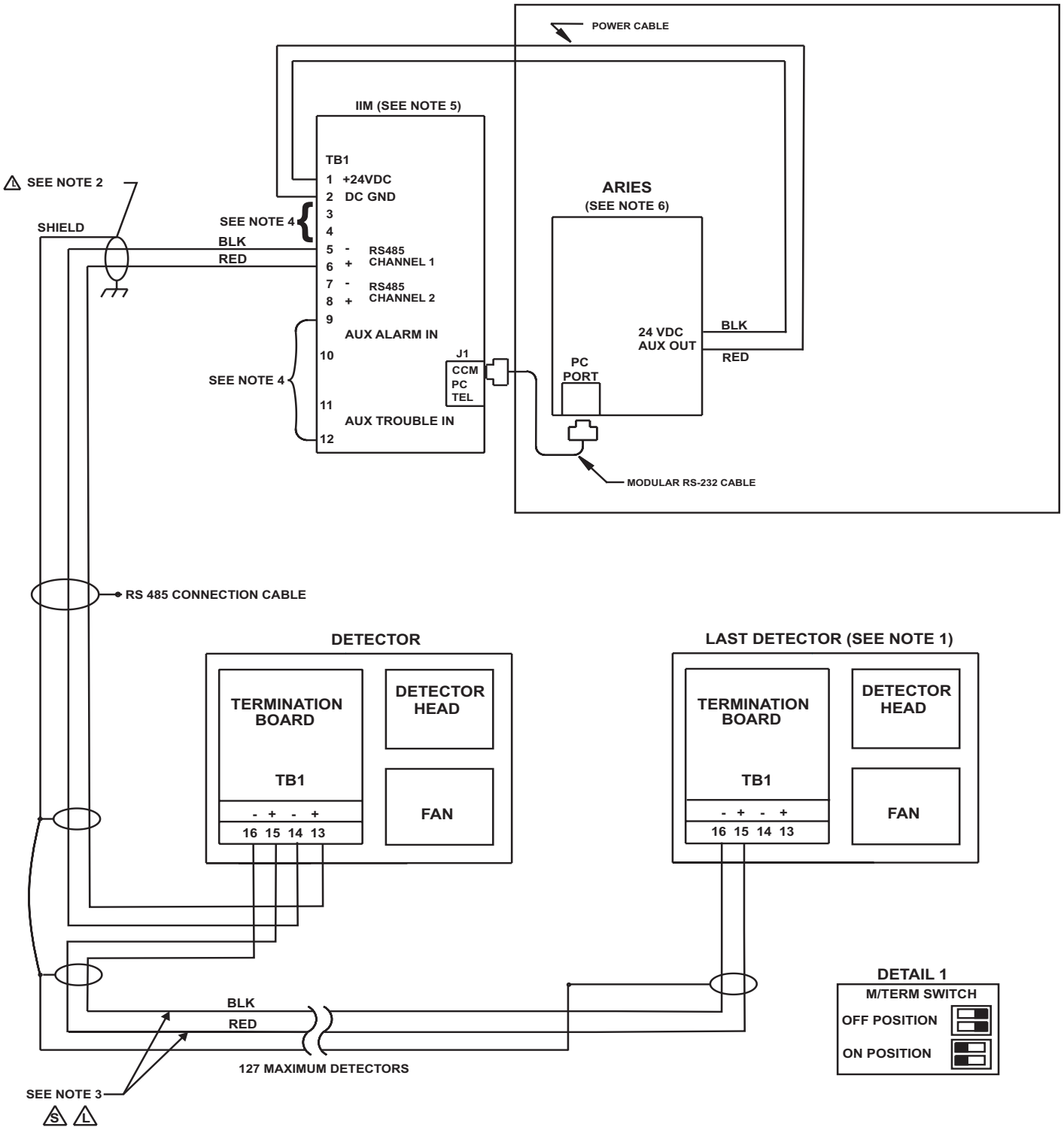
Figure 4-18. RS-485 Network Address Examples



NOTES:

1. TERMINATION BOARD M/TERM SWITCHES 1 AND 2 TO OFF FOR ALL DETECTORS.
2. ONE END OF SHIELD IS TO BE CONNECTED TO EARTH GROUND AT ARIES PANEL.
3. CABLE IS TO BE 2 CONDUCTOR, TWISTED SHIELDED PAIR. 18 AWG. MIN. MAX DISTANCE FOR ENTIRE LOOP IS 4000 FT.
4. THESE INPUTS ARE NOT USED WHEN CONNECTING TO THE KIDDE ARIES PANEL.
5. IIM PART NUMBERS: 77-297114-001 OR 77-297114-002.
6. FOR MORE INFORMATION ON THE ARIES FACP, REFER TO THE ARIES MANUAL (P/N 06-236530-001).

Figure 4-19. Intelligent Interface Module, Connected to ARIES FACP with Detectors in Class A, Style 6 Wiring



L = POWER LIMITED CIRCUITS

S = SUPERVISED CIRCUITS

NOTES:

1. EOL RESISTORS TO BE SET ON LAST DETECTOR BY SETTING TERMINATION BOARD M/TERM SWITCHES 1 AND 2 TO ON, AND OFF FOR ALL OTHER DETECTORS (SEE DETAIL 1).
2. ONE END OF SHIELD IS TO BE CONNECTED TO EARTH GROUND AT ARIES PANEL.
3. CABLE IS TO BE 2 CONDUCTOR, TWISTED SHIELDED PAIR. 18 AWG. MIN. MAX DISTANCE FOR ENTIRE LOOP IS 4000 FT.
4. THESE INPUTS ARE NOT USED WHEN CONNECTING TO THE ARIES FACP.
5. IIM PART NUMBERS: 77-297114-001 OR 77-297114-002.
6. FOR MORE INFORMATION ON THE ARIES FACP, REFER TO THE ARIES MANUAL (P/N 06-236530-001).

Figure 4-20. Intelligent Interface Module, Connected to ARIES FACP, Class B, Style 4 Wiring

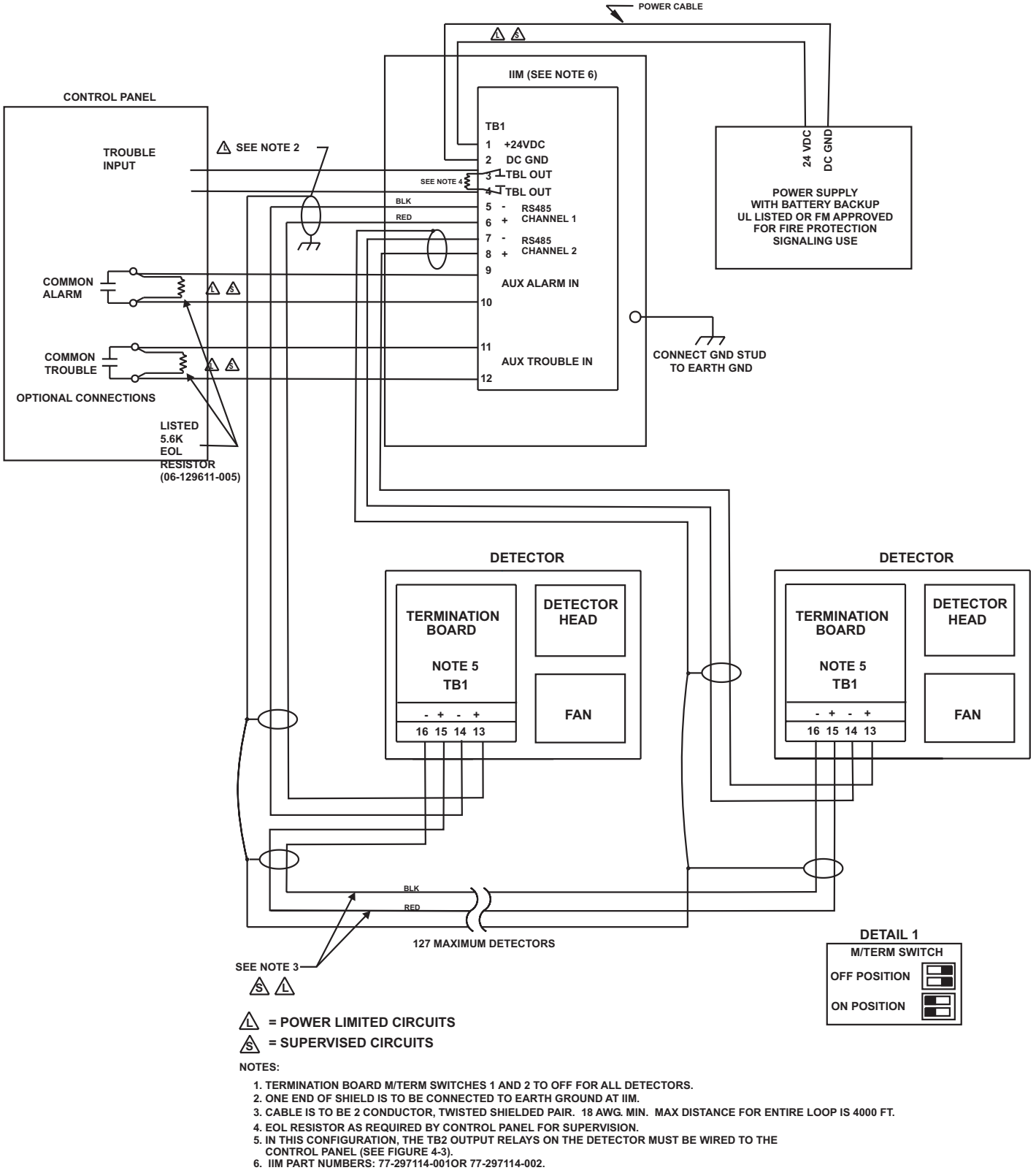
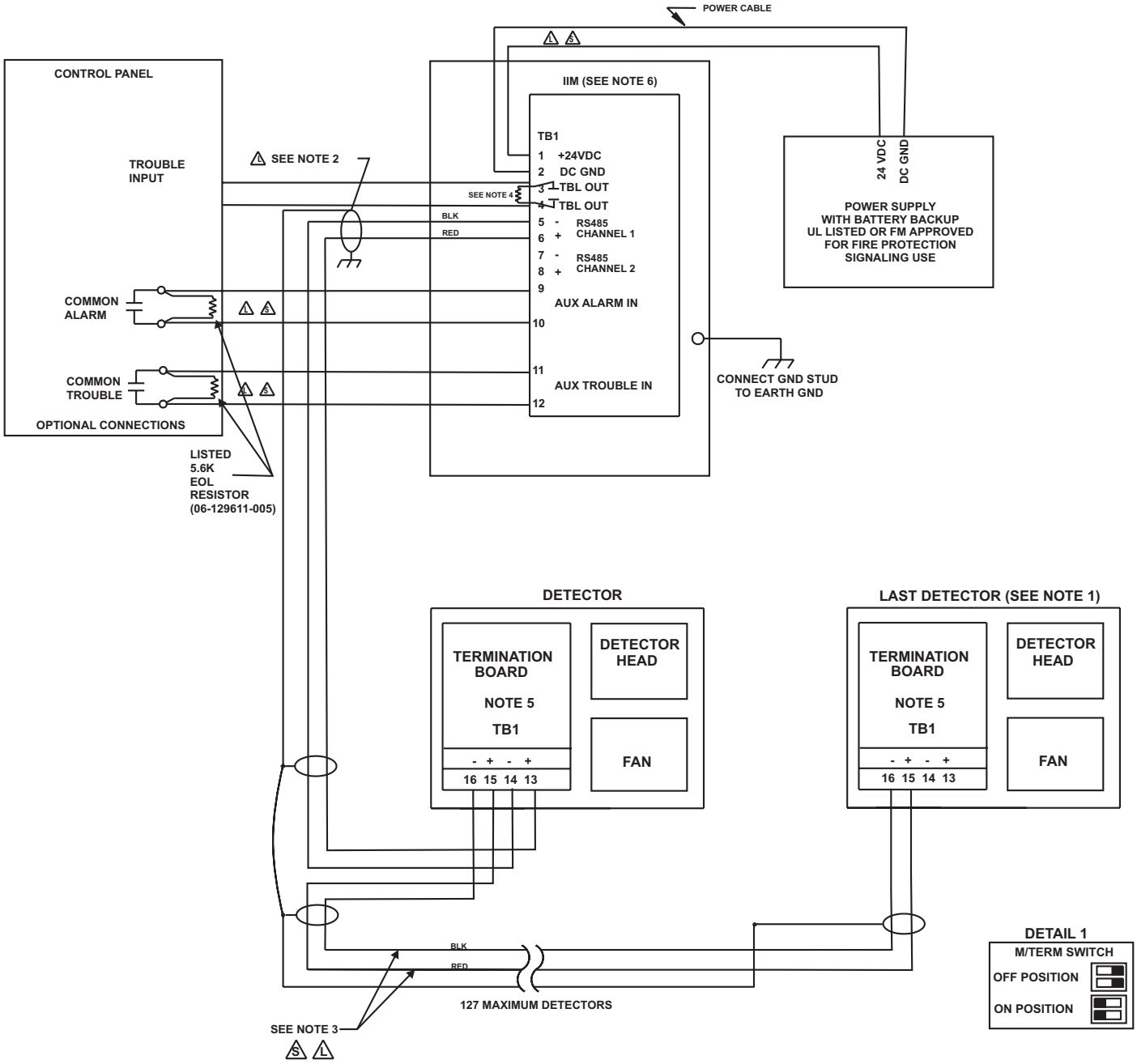


Figure 4-21. Intelligent Interface Module Connected to FACP in Stand Alone Mode with Detectors in Class A, Style 6 Wiring



L = POWER LIMITED CIRCUITS

S = SUPERVISED CIRCUITS

NOTES:

1. EOL RESISTORS TO BE SET ON LAST DETECTOR BY SETTING TERMINATION BOARD M/TERM SWITCHES 1 AND 2 TO ON, AND OFF FOR ALL OTHER DETECTORS.
2. ONE END OF SHIELD IS TO BE CONNECTED TO EARTH GROUND AT IIM.
3. CABLE IS TO BE 2 CONDUCTOR, TWISTED SHIELDED PAIR. 18 AWG. MIN. MAX DISTANCE FOR ENTIRE LOOP IS 4000 FT.
4. EOL RESISTOR AS REQUIRED BY CONTROL PANEL FOR SUPERVISION.
5. IN THIS CONFIGURATION, THE TB2 OUTPUT RELAYS ON THE DETECTOR MUST BE WIRED TO THE CONTROL PANEL (SEE FIGURE 4-3.)
6. IIM PART NUMBERS: 77-297114-001 OR 77-297114-002.

Figure 4-22 Intelligent Interface Module Connected to FACP in Stand Alone Mode with Detectors in Class B, Style 4 Wiring

4-8.3 Setting Detector Address

With the Detector network address DIP switches, set each detector on the network with a unique address. See Appendix A for the Detector Addresses.

4-8.4 Installation Checks

Before powering up the IIM for the first time ensure that the following checks have been completed:

1. The IIM is secured correctly.
2. The IIM wiring is connected correctly.
3. The DIP switch on each termination board in the Detector is set to the correct address.

4-8.5 Connecting a Telephone Line to the Intelligent Interface Module (Optional)

If the IIM has an optional modem, follow these steps to install a telephone line to the IIM.

1. A standard telephone line terminating in an RJ-11 jack should be installed adjacent to the IIM.
2. Connect an RJ-11 cable from the "TEL" connector on the IIM to the telephone jack.

4-8.6 Software Configuration

To configure the IIM, refer to the OCS Version 3.0 Software Manual.

4-9 INITIAL POWER-UP

After all wiring is completed and checked, the system can be powered-up as described below. If a computer running OCS can be connected to the Detector, it will be easier to determine and diagnose trouble conditions if any.

Note: OCS is an integral part of the ORION XT configuration and power-up. Ensure that the necessary programming procedures for OCS are followed (see Chapter 4).

1. Check that all piping has been installed according to the design drawings and all joints and connections are sealed.
2. Remove the detector cover in accordance with Paragraph 4-2.2. Place a jumper on LK3 located on the termination board. This will connect the memory backup battery.
3. Connect the PSU terminal strip to the termination board to power-up.
4. The “POWER ON LED” on the termination board should now be lit.
5. The Detector will be in trouble and the yellow LED will be lit.
6. If the Display Module is attached, it will indicate trouble and the internal sounder will operate intermittently.
7. Trouble conditions must be viewed by using the OCS software. Refer to the ORION Configuration Software User's Guide (P/N 06-236012-401).
8. A RAM configuration trouble will still be present and can only be cleared by operating Reset from OCS.
9. If a Display Module is used , it must be registered using OCS.
10. Correct any other trouble conditions. Trouble conditions are non-latching and will clear automatically. Refer to the chapter titled Trouble Shooting and Corrective Maintenance for further information
11. Ensure the Detector is now at Status Normal.

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CHAPTER 5
SYSTEM DESIGN

5-1 INTRODUCTION

This chapter contains instructions required for a proper system design. Most of this chapter covers the pipe network design, which must be accomplished prior to installation of any components of the ORION™ XT High-Sensitivity Smoke Detector system.

5-2 DETECTOR

The ORION XT Detector has a dynamic sensitivity range of 0.00075 to 0.30%/ft. (0.0025 to 1.0%/m) obscuration. The maximum protected area for one ORION XT system is 20,000 square feet (2000 square meters). Typical applications for these sensitivity ranges are listed below.

Table 5-1. Sensitivity Ranges

SENSITIVITY RANGES	
%/ft.	%/m
0.30000 - 0.07500	1.00000 - 0.25000
0.24000 - 0.04800	0.80000 - 0.16000
0.18000 - 0.04000	0.60000 - 0.13000
0.16000 - 0.03000	0.55000 - 0.10000
0.15000 - 0.02400	0.50000 - 0.08000
0.13000 - 0.02000	0.45000 - 0.06500
0.12000 - 0.01600	0.40000 - 0.05500
0.11000 - 0.01500	0.35000 - 0.05000
0.10000 - 0.01500	0.32500 - 0.04500
0.09000 - 0.01200	0.30000 - 0.04000
0.08250 - 0.01000	0.27500 - 0.03500
0.75000 - 0.00900	0.25000 - 0.03000
0.06750 - 0.00750	0.22500 - 0.02500
0.06000 - 0.00600	0.20000 - 0.02000
0.05250 - 0.00450	0.17500 - 0.01500
0.04500 - 0.00300	0.15000 - 0.01000
0.03750 - 0.00225	0.12500 - 0.00750
0.03000 - 0.00150	0.10000 - 0.00500
0.02250 - 0.00110	0.07500 - 0.00375
0.01500 - 0.00075	0.05000 - 0.00250

5-3 PIPE NETWORK DESIGN TERMS AND DETAILS

The terms in the following paragraphs are used in the design of a pipe network for the ORION XT system. It is important to become familiar with these terms and their meanings prior to designing the pipe network.

5-3.1 Air Sampling Pipe Network

An air sampling pipe network is an arrangement of pipes located within the protected area through which air is drawn back to the detector to be analyzed. Piping may be metallic or non-metallic and must be smooth bore.

Note: It is important to ensure that all joints in the sampling pipe network are airtight and that the system is adequately supported to prevent air leakage, as this could affect system performance.

Clear pipe should not be used within 10 feet (3 meters) of the Detector input. This is to prevent light from penetrating the pipe walls and causing a false obscuration reading.

5-3.2 Air Velocity

Air velocity is the velocity of air that passes a sample hole. The air velocity can be measured with a hand held anemometer (see Figure 5-1). Hold the meter near the proposed position of the sampling point and rotate the meter to obtain the maximum reading. All related building systems that may have an effect on the airflow patters of the protected area, such as HVAC systems, should be operating when the measurements are taken. These measurements must be recorded for use when designing the pipe network in “SNIFF” Version 3.

Figure 5-1. Anemometer

5-3.3 Branch Point

A branch point is the point where a pipe segment has been divided into two or more pipe segments by a tee connector or a junction box.

5-3.4 Elutriator

An elutriator (P/N 77-297112-000) is an inertial particle separator that may be used on the pipe intake of an ORION XT Detector. It will remove heavier particulate from the sampled air before it enters the Detector.

5-3.5 Elbow, Standard 45 Degree

A standard 45 degree elbow is similar to that used in the plumbing industry. Two 45 degree elbows can be used as a substitute for one 90 degree elbow to reduce the resistance of the system and decrease the system transport time.

5-3.6 Elbow, Standard 90 Degree

A standard 90 degree elbow is similar to that used in the plumbing industry. Each elbow increases the resistance of the system. Systems should be designed to minimize the number of elbows.

5-3.7 Sweep Elbow

A sweep elbow is the type used in making electrical conduit bends. Sweep elbows have a longer radius than standard elbows. A sweep elbow will minimize the friction loss when making a 90 degree bend resulting in quicker transport times. The sweep elbow is preferred for air sampling systems (available in electrical conduit fittings).

5-3.8 Equivalent Feet

A method used to determine relative efficiencies of different types of plumbing. 1 foot (3 meters) of straight pipe equals 1 equivalent foot (3 equivalent meters). The following table gives the equivalent measurement for different size and types of elbows. This data becomes critical when the maximum allowed pipe lengths are being approached (see Table 5-2).

Table 5-2. Elbow Equivalent Feet

Elbow ID	1 in. (32 mm)	0.75 in. (25 mm)	0.5 in. (20 mm)
Standard 90° Elbow	2.25 ft. (0.69 meters)	2.00 ft. (0.61 meters)	1.50 ft. (0.46 meters)
Standard 45°/ Sweep Elbow	1.40 ft. (0.43 meters)	1.00 ft. (0.31 meters)	0.75 ft. (0.23 meters)

5-3.9 Extended Sampling Point (ESP)

Extended sampling points are extensions of pipe from the pipe segment to the area being protected. A typical use of an extended sampling point would be to drop a sampling point down from the main pipe segment into the protected area.

5-3.10 Sampling Point (SP)

Sampling Points are plastic pipe network fittings designed for drop ceiling installations and flame retardant to meet UL 268 flame tests. The sample point is connected to the pipe network by 3/8-inch (9.5 mm) capillary tubing and is pre-drilled with a 1/32-inch sample hole. This is the smallest hole that “SNIFF” Version 3 uses in pipe network calculations.

The Sampling Point Kit (P/N 77-297109-000) contains 25 sets of sample points, female and male 1/2-inch NPT capillary tube adapters and sample point labels. Capillary tubing is available in a 250 ft. roll (P/N 77-297110-000) and is UL 1820 rated for use in plenum applications.

5-3.11 Junction Boxes

For sampling systems with more than three pipe segments, it is recommended that a junction box be used in place of standard tees. A square type electrical junction box is recommended and should be the outdoor variety with a gasket between the cover and the box. The box must have a total volume limit of 144 cubic inches (2371 cubic centimeters) and must be completely sealed to prevent air leakage. Up to seven pipes can be connected to the junction box. The pipes should be laid out in a symmetrical arrangement with no pipe connected to either the top or bottom of the junction box (see Figure 5-2).

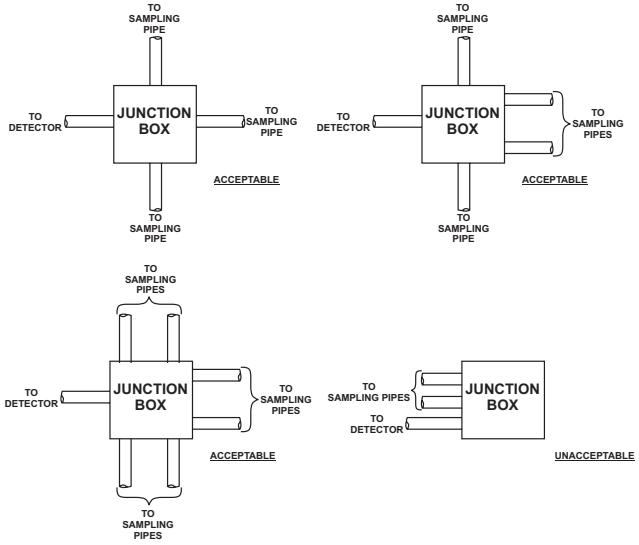

Figure 5-2. Junction Boxes for Pipe Segments

5-3.12 Pipe Segment

A length of pipe with or without sampling holes with nominal internal diameters of 1-inch, 3/4-inch or 1/2-inch (32 mm, 25 mm or 20 mm). A pipe segment is defined as the total length of pipe in any of the following:

1. From Detector to pipe end.
2. From Detector to branch point.
3. From branch point to another branch point.
4. From branch point to pipe end.

5-3.13 Sampling Hole

Sampling holes are strategically located penetrations into a pipe segment through which air is drawn into the sampling system. Refer to NFPA-72 or other local authorities for sample hole spacing requirements. The sampling hole size is calculated using "SNIFF" Version 3 software.

5-3.14 System Transport Time

System Transport Time is the time required for smoke to travel from the farthest sampling hole in the system to the Detector.

Note: NFPA-72 requires 120 second maximum transport time. Any UL Listed, ULC Listed or FM Approved system must have a transport time of 120 seconds.

5-3.15 UL Listing for Open Area Protection

For installations that require spot detectors to meet UL Open Area Protection Listing, an ORION XT system may be used as a substitute for spot detection where each spot detector is replaced with an ORION XT sampling hole. To meet UL requirements for Open Area Protection, the detector sensitivity setting must be in accordance with Table 5-3.

Table 5-3. Minimum Detector Sensitivity Setting for UL Open Area Listing

PROTECTED AREA		MINIMUM SENSITIVITY SETTING	
Square feet	**Square meters**	**%/ft.**	**%/m**
< 3500	< 350	0.2400 - 0.0480	0.8000- 0.1600
3500 - 8999	350 - 849	0.1800 - 0.0400	0.6000 - 0.1300
9000 - 10999	850 - 999	0.1600 - 0.0300	0.5500 - 0.1000
11000 - 11499	1000 - 1099	0.1500 - 0.0240	0.5000 - 0.0800
11500 - 13999	1100 - 1299	0.1300 - 0.0200	0.4500 - 0.0650
14000 - 14999	1300 - 1399	0.1200 - 0.0160	0.4000 - 0.0550
15000 - 16499	1400 - 1499	0.1100 - 0.0150	0.3500 - 0.0500
16500 - 17499	1500 - 1599	0.1000 - 0.0150	0.3250 - 0.0450
17500 - 18499	1600 - 1699	0.0900 - 0.0120	0.3000 - 0.0400
18500 - 19499	1700 - 1799	0.0825 - 0.0100	0.2750 - 0.0350
19500 - 20000	1800 - 2000	0.0750 - 0.0090	0.2500 - 0.0300

5-3.16 Suction Pressure

Suction Pressure is the amount of suction, measured in inches of water column, available at each sample hole. Suction pressure can be measured with a magnehelic pressure gauge, P/N 77-297122-000 (see Figure 5-3).

Suction pressure of each sampling hole should be measured and recorded at commissioning. The suction pressure of the last sample hole in each pipe branch should be measured during periodic follow-up maintenance visits and compared to the commissioning data. If the suction pressure has significantly changed since commissioning, check the pipe network for any blockages or breaks and check the functionality of the fan. Suction pressure measurement instructions are covered in Paragraph 5-4.

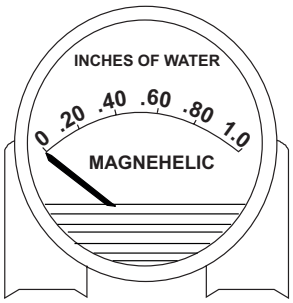

Figure 5-3. Magnehelic Gauge

5-4 ZONES OF VARYING STATIC PRESSURE

ORION XT Detectors should not be installed in areas where the ambient pressure is positive relative to the ambient pressure surrounding the piping. However, the Detectors may be installed in areas containing static pressures that are negative with respect to where the piping is installed. One ORION XT Detector can protect multiple areas of differing static pressures. “SNIFF” Version 3 software can size the sampling holes to compensate for protected areas with different static pressures.

5-4.1 Measuring Static Pressure Differential

Static pressure differential can be measured with a magnehelic pressure gauge, P/N 77-297122-000. To measure differential pressure, connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports. Read the static pressure differential on the gauge, making certain that the magnehelic gauge is held parallel to the floor.

5-5 PIPE NETWORK SAMPLING TYPES

The ORION XT Detector can be designed with three basic pipe network sampling types: distributed pipe network sampling, return air grill sampling or return air duct sampling.

5-5.1 Distributed Pipe Network Sampling

Distributed pipe network sampling is the most common type of sampling system. A distributed pipe network is a network of pipes that extend into the protected area with strategically located sampling holes for drawing air into the system.

All ORION XT distributed pipe networks are designed with "SNIFF" Version 3. The piping network can be symmetrical or non-symmetrical with open or closed pipe ends. "SNIFF" calculates the maximum transport time of the system and suction pressures and holes sizes for all sample holes in the pipe network. The hole sizes are calculated to a specific size to ensure balanced sensitivity for all sample holes in the system.

5-5.2 Return Air Grill Sampling

Return Air Grill Sampling is air sampling through a pipe network in front of, or near the return air grill. This method can be designed with "SNIFF" Version 3. One ORION XT Detector can be designed with both distributed pipe network sampling and return air grill sampling in the same pipe network.

5-5.3 Return Air Duct Sampling

Return Air Duct Sampling is air sampling through a pipe inside the return air duct. This method can be designed with "SNIFF" Version 3. The ORION XT system is well suited for duct detection because it provides excellent detection and minimizes installation costs.

The Detector must be located no more than 388 equivalent feet (118 meters) from the sampling points. The Detector is UL and ULC listed for duct applications of 300 to 4000 ft./min. (1.5 to 20.3 meters/sec.)

Note: Return Air Duct sampling pipe must be UL 1820 rated for use in return air plenums.

5-6 SELECTING A SAMPLING METHOD

The application often dictates the sampling method for the ORION XT system. The following list of typical applications can be used as a guideline for sampling method selection.

5-6.1 Telephone Central Offices

Distributed pipe network sampling combined with return air grill sampling is recommended for telephone central offices. If the offices have cable trays above the equipment racks, two levels of distributed pipe network sampling is recommended. One level of extended sampling points would be at ceiling level and a second level would be below the cable trays just above the equipment racks. The two levels can be designed two ways. One option is to run a main pipe above the ceiling with drilled sample holes into the pipe for the first level and extended sampling points dropped down below the cable tray for the second level. Another option is to install a second level of piping below the cable trays. In either case, a second detector is not required unless the square footage of the protected area exceeds 20,000 square feet (2000 square meters).

5-6.2 Computer Rooms

Distributed pipe network sampling or return air grill sampling is recommended for computer room applications. A distributed pipe network can be installed above the dropped ceiling with capillary tube sampling points installed in the drop ceiling tiles. If using return air grill sampling, the return air is usually monitored at the top of the air handling units, before the air enters the units. Both methods are equally effective, however if the air handling units are shut off, the overall smoke detection effectiveness will be affected. A combination of both methods will provided the quickest response to particles of combustion.

If sub-floor detection is required, a distributed pipe network is recommended with the sampling holes facing down or perpendicular to the airflow.

5-6.3 Cleanrooms

Return air grill sampling or return air duct sampling is recommended for cleanroom applications. The best sampling design will depend on the air handling equipment and location of the filters.

5-6.4 Atriums

Distributed pipe network sampling is recommended for protecting atriums. Multiple level sampling may be required depending on the height of the atrium ceiling. Monitoring the return air grill in combination with a distributed pipe network may significantly reduce detector response time.

5-6.5 Office Areas

Distributed pipe network sampling with capillary tube sampling points is recommended for protecting office areas. Refer to local codes for pipe type requirements. Many office areas consider the volume above the ceiling tiles as a return air plenum.

5-6.6 Warehouse Storage

Distributed pipe network sampling is recommended for warehouse applications. To overcome smoke stratification, two or more levels of sampling may be required depending on the ceiling height of the warehouse. ORION XT Detectors can be used in freezer warehouse applications though it may be necessary to condition the air before it enters the Detector. Also the Detector must be mounted outside of the low temperature area. Refer to Chapter 1 for the Detector environmental specifications.

5-7 SAMPLING PIPE NETWORK DESIGN

After choosing a sampling method, the pipe network needs to be designed. Basic criteria such as hole spacing and other recommended practices for sampling pipe network designs are detailed in the following paragraphs. All sampling pipe network systems (distributed pipe network sampling, return air grill sampling and return air duct sampling) can be designed with “SNIFF” Version 3 software.

5-7.1 Using “SNIFF” Version 3 Software

“SNIFF” Version 3 software is a Windows application that is used for designing air sampling pipe networks for all ORION High-Sensitivity Smoke Detectors. “SNIFF” designs a dynamically balanced pipe network by calculating the suction pressure of each sample hole in the pipe network. Then, “SNIFF” calculates each sample hole diameter in order to equalize the suction pressure for the entire network. Based on code or local authority requirements, actual pipe layout and hole spacing must be determined and entered into “SNIFF” by the designer.

Refer to “SNIFF” Version 3 User’s Guide, 06-235984-401, for details on “SNIFF”.

5-7.2 Distributed Pipe Network Sampling Design

A distributed pipe network is a network of pipes that extend into the protected area with strategically located sampling holes for drawing air into the system. The pipe network should be designed to meet the needs of a specific installation in order to provide optimal coverage for the protected area.

The following is a list of distributed pipe network design parameters:

1. Maximum number of sampling holes is 100.
2. Maximum number of pipe segments is 40.
3. Maximum sample hole spacing is 30 feet (9.1 meters). 20 foot (6 meter) spacing is recommended in high value areas.
4. For close-ended systems, all end caps must be no more than 6 inches (150 mm) from the last sample hole in the pipe branch.
5. Extended sample point (ESP) drops must be 1-inch, 3/4-inch or 1/2-inch (32 mm, 25 mm or 20 mm) diameter and less than 25 feet (7.6 meters) long.
6. Capillary tube sample points (SP) must be 3/8-inch(10 mm) capillary tube and less than 12 feet (3.7 meters) long.
7. Maximum static pressure differential is 0.2 inches of water.

Note: Static pressure differential **must be** measured for use with "SNIFF" software. Refer to "SNIFF" manual, P/N 06-235984-401, Chapter 2, for details on static pressure measurement.

8. Exhaust port must have at least 6 inches of clearance.

5-7.3 Return Air Grill Sampling Design

Return Air Grill Sampling systems are designed with the "SNIFF" Version 3 software. The same basic rules apply with the exception of the hole spacing requirements. The return air grill sampling method and the distributed pipe sampling method can be used in the same detection zone.

Sampling pipes should be centered in the front of the return air grill. Sampling holes should be spaced so that a minimum of three holes is used for each grill. Larger grills will require more sampling holes. The sampling holes should be at 90 degrees to the airflow with a closed end pipe (capped) (see Figure 5-4).

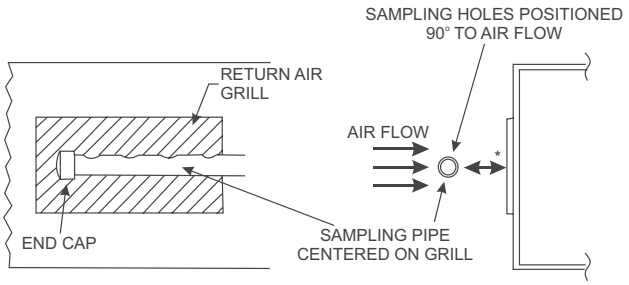

Figure 5-4. Return Air Grill Sampling Method

5-7.4 Return Air Duct Sampling Design

Duct sampling is the most cost-effective method of air sampling since the pipe runs are minimal and a single Detector may be used to cover a large area. The speed of response of the Detector to smoke will be given by the exchange rate in the rooms ventilated by the duct ventilation system. This tends to be rapid, giving early warning of any smoke present. This type of sampling is particularly suited to high-sensitivity devices since the smoke content in the air will tend to be diluted to a level below that of point type detectors. Also, the relatively high airflow in the duct would reduce the effectiveness of point-detection devices.

The duct sampling method does have one major disadvantage. If the ventilation becomes inoperative, the airflow through the duct system ceases and the smoke-detection system becomes ineffective.

The Detector is UL 268A and ULC Listed for duct applications with an operating air velocity range of 300 to 4000 feet/min. (1.52-20.32 meters/sec.).

“SNIFF” Version 3 software is used to design duct detection for ORION XT systems and calculate hole sizes and transport time according to the following guidelines:

1. Only one duct can be monitored per detector.
2. If the ORION XT system is used as the primary smoke-detection system, methods should be employed to annunciate stoppage of airflow in the duct(s).
3. The exhaust air from the Detector **must be** returned back to the duct using an exhaust-port adapter and associated piping. This requirement assures positive airflow through the Detector.
4. Locate sampling pipe in the main supply duct return side, down stream of the filters a minimum of six duct widths from any source of turbulence (bends, inlets or deflection plates) to reduce the effects of stratification. In installations where the filter is capable of removing smoke, install the sampling tube upstream of the filter.

Note: Where it is physically impossible to locate the sampling pipe in accordance with guideline 4, the sampling pipe may be positioned closer than six duct widths, but as far as possible from inlets, bends or deflection plates.

5. Locate the sampling pipe such that dampers do not restrict airflow at the sampling pipe.
6. The sampling pipe should be located before air exhausts from the building or before diluting return air with outside air.
7. Locate sampling pipe if close identification of the source of alarm is required.
8. Locate sampling pipe on the downstream side of the filter to sense fire in the filters.

Note: If filters are blocked, sufficient airflow may no longer be present for proper operation.

9. Do not locate sampling pipe near outside air inlets except to monitor smoke entry to the handling system for adjacent areas.
10. Whenever possible, locate sampling pipe upstream of air humidifiers and downstream of dehumidifiers.

5-7.4.1 DUCT SAMPLING PIPE REQUIREMENTS

1. The intake sampling tube must face into the airflow.
2. The intake sampling tube must go through the duct and be closed-ended (capped).
3. Holes in the sampling tube must be spaced approximately every 4 inches (100 mm).
4. The exhaust tube must extend a minimum of 2 inches (60 mm) into the duct.
5. The total pipe network, including the return, must not exceed 388 equivalent feet (188 meters).
6. Intake and exhaust tubes should be UL 1820 rated for return air plenums.

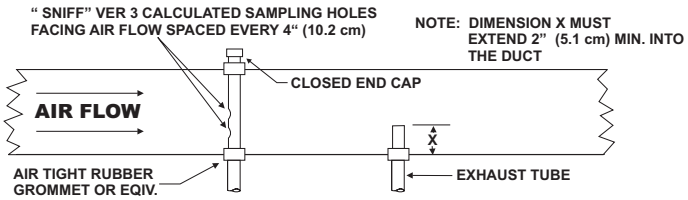

Figure 5-5. Return Air Duct Sampling Method

5-8 PIPE NETWORK INSTALLATION

⚠ CAUTION

Do not drill sample holes until verifying that the installed pipe network matches the "SNIFF" designed pipe network used for calculations. Deviations of the installed pipe network from the "SNIFF" designed network may not result in "SNIFF" calculated transport time, airflow and suction pressure measurements.

A sampling pipe network is an arrangement of pipes within the protected area through which air is drawn back to the Detector to be sampled. Piping may be metallic or non-metallic. The pipe must be smooth bore with internal diameters of 1/2-inch, 3/4-inch or 1-inch (20 mm, 25 mm, or 32 mm) depending upon the design criteria.

The sample pipe must be installed according to the system drawings developed from the criteria detailed in the "SNIFF" Version 3 User's Manual.

Note: Any major deviations of the installation from the design drawings or the "SNIFF" designed pipe network must be brought to the attention of the system designer.

The sample pipe must be suspended using standard pipe hangers and the joints secured with solder or cement according to standard plumbing practices. It is important to ensure that all joints are airtight and that the system is adequately supported to prevent any leakage, as this would affect system performance.

5-8.1 Sampling Point Installation

There are two types of sampling points: extended sampling points and capillary tube sampling points.

5-8.1.1 EXTENDED SAMPLING POINT

Extended Sampling Points (ESP) are constructed from standard plumbing supplies. An ESP consists of a tee, drop pipe and end cap (see Figure 5-6). The sampling hole must be drilled into the end cap and labeled with an extended sampling point label (see Paragraph 5-8.2.3). Maximum ESP length is 25 feet (8 meters).

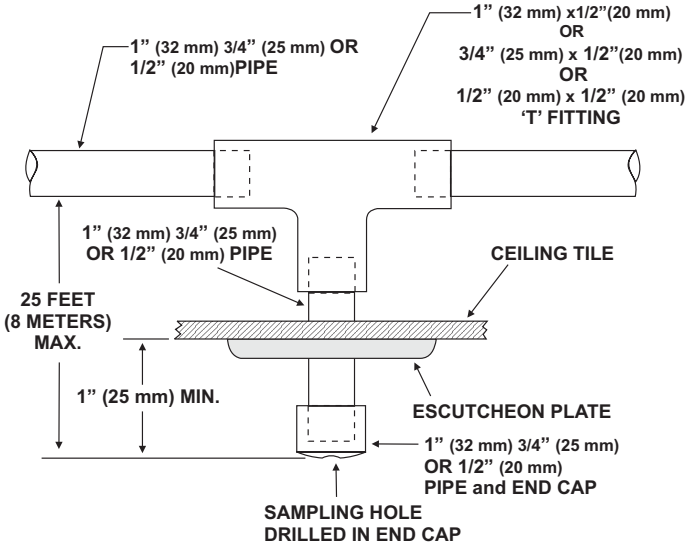

Figure 5-6. Extended Sampling Point

6-8.1.2 SAMPLING POINT

A Sampling Point (SP) consists of a tee, male 1/2-inch NPT capillary tube adapter, female ½-inch NPT capillary tube adapter, 3/8-inch capillary tube and sampling point. The sampling hole must be drilled into the sampling point. A sampling point kit (P/N 77-297109-000) is available with 25 sets of hardware (see Figure 6-7). The capillary tube is sold separately in rolls of 250 feet (P/N 77-297110-000).

The sampling point is made of a flame retardant, self-extinguishing plastic, and carries a UL 5VA flammability rating. It is also UV stabilized to inhibit yellowing over time. The capillary tube is UL 1820 Listed for use in plenum areas. It is also flame retardant with a UL 94V-2 Listing.

To install a SP, use the following step-by-step procedure.

1. Drill or punch a 7/8-inch hole into ceiling tile or other sampling point surface.
2. Insert the sample point, thread end first, into hole until the sample point is flush with surface.
3. Install thumbscrew onto sample point threads and tighten until snug.
4. Install and tighten male capillary tube adapter to tee fitting.
5. Place capillary tube on the male capillary tube adapter. Cut tubing to size.
6. Place sized tubing into male connector and tighten compression nut.
7. Place tubing into female capillary tube adapter. Insert female capillary tube adapter onto sampling point thread and tighten while using a wrench to prevent the sampling point from rotating.
8. While using the wrench, tighten female capillary tube adapter to nut.

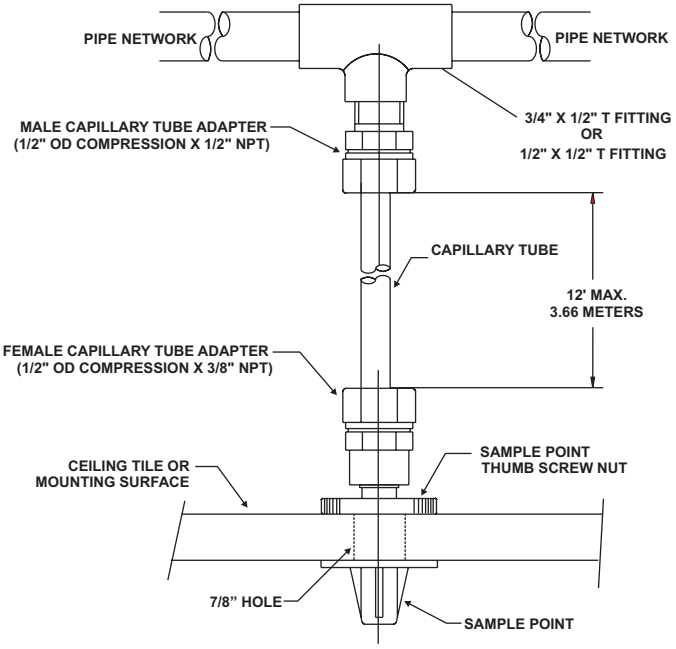

Figure 5-7. Sample Point Kit

5-8.2 Pipe Network Labels

The following labels should be applied for reference and warning.

5-8.2.1 SAMPLING PIPE LABELS

The air-sampling pipe network must be marked with identification labels. These labels should be applied to the pipe network at least every ten feet (3 meters). Sample pipe labels come in a roll of 100 (P/N 77-297023-000, see Figure 5-8).

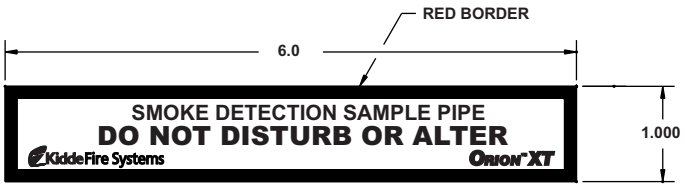

Figure 5-8. Sampling Pipe Label

6-8.2.2 SAMPLING PORT LABELS

This label is placed adjacent to sample holes drilled directly into the sampling pipe network. Each sampling port must be labelled. Sampling port labels come in rolls of 100 (P/N 77-297022-000, see Figure 5-9).

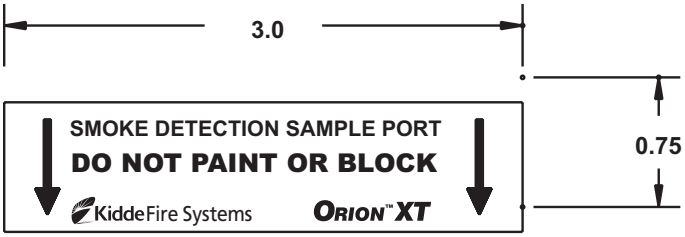

Figure 6-9. Sampling Port Label

5-8.2.3 EXTENDED SAMPLING POINT LABELS

This label is used to identify sample holes drilled into the end cap of an extended sample point. Each extended sampling point must be labelled. Sampling point labels come in rolls of 100 (P/N 77-297021-000, see Figure 5-10).

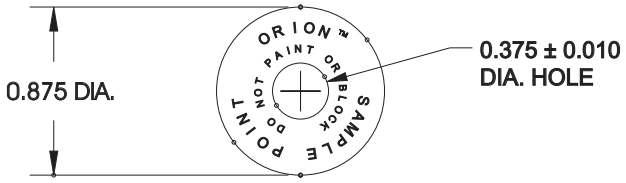

Figure 5-10. Extended Sampling Point Label

5-8.2.4 SAMPLING POINT LABELS

This label is used to identify a sampling hole drilled into the sampling point. Each sampling point must be labelled. Sampling point labels come as part of the sampling point kit in rolls of 25, (P/N 77-297109-000, see Figure 5-11).

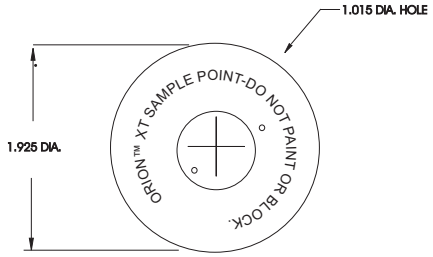

Figure 5-11. Sampling Point Label

CHAPTER 6
SYSTEM COMMISSIONING

6-1 INTRODUCTION

This chapter covers the commissioning procedures for the ORION™ XT HSSD system. All commissioning results must be recorded on the Commissioning Check Sheet.

6-1.1 Commissioning Check Sheet

The Commissioning Check Sheet (P/N 06-235516-402), must be completed upon commissioning of every ORION XT HSSD system. The purpose of this sheet is to document proper system operation and acceptance by the owner, to provide reference data for future testing and maintenance of the system, and to register serial numbers for warranty. Completed and signed copies of the commissioning check sheets should be distributed as directed on the sheet.

6-2 PRE-COMMISSIONING PREPARATION

After the ORION XT HSSD system has been completely installed, the system must be inspected and tested and all configuration and ambient conditions can be recorded.

Before starting the commissioning tests, go through the following pre-commissioning preparation steps:

1. Perform a visual inspection of all ORION XT system hardware. Check that all HSSD equipment has been mounted properly and wired correctly.
2. Leave all Detectors in operation for a period of time to allow the remaining particulate matter that may have been left during installation in the pipe network and/or ducts to clear out of the system.
3. Check that all Detectors in the system are cleared of all trouble conditions.
4. Isolate all Detectors or disconnect all alarm and trouble circuits to prevent communication of alarms and troubles to ancillary equipment.
5. (Optional) Normalize the Detector airflow. See the OCS, Manual (P/N 06-236012-401)for airflow normalization instructions.

Commissioning is recommended after all construction has been completed and cleaned of any lingering post-construction dirt. If ambient monitoring conditions are recorded before the installation is cleaned up, they may not accurately reflect actual normal operating conditions that need to be used as reference data for follow up maintenance procedures and tests.

6-3 AMBIENT MONITORING

Ambient monitoring should be recorded for a recommended time period of one week during normal operating conditions. All air handling units, thermostats and other systems that can have an effect on the operating environment should be turned on to simulate normal operating conditions as closely as possible.

After the ambient monitoring time period has ended, download the detector smoke history through OCS and record the normal background obscuration from the graph. Record the maximum and minimum obscuration and airflow levels of the detector using OCS as well.

6-4 AIRFLOW TEST

The detector airflow monitoring circuit should be tested for proper indication of a low airflow fault and a high airflow fault.

6-4.1 Low Airflow Test

Use the following procedure to verify the low airflow fault operation.

1. Select **Options>Test Options>Airflow Test** to turn the fan off.
2. Allow up to 60 seconds plus airflow delay time for the trouble to activate.
3. Record the test result on the Commissioning Check Sheet, P/N 06-235516-402.
4. Select **Options>Test Options>Airflow Test** to turn the fan on and return the detector back to normal operating mode.

6-4.2 High Airflow Test

Use the following procedure to verify the high airflow fault operating.

1. Increase the airflow to the detector by opening the pipe.
2. Allow up to 60 seconds plus airflow delay time for the trouble to activate.
3. Record the test result on the Commissioning Check Sheet. P/N 06-235516-402.
4. Reattach the pipe to return the detector back to normal operating mode.

6-5 SUCTION PRESSURE VERIFICATION

All sample hole suction pressures should be measured and recorded on the commissioning check sheet along with the calculated suction pressures from "SNIFF" Version 3. Measured suction pressures greater than the calculated value are acceptable.

Use the following method to measure sampling point suction pressures (see Figure 6-1):

1. Attach a flexible hose onto the suction side of the magnehelic pressure gauge.
2. Place the hose against the sampling hole and hold in place.
3. Hold the gauge in the plane in which it was calibrated and read the suction pressure from the gauge.

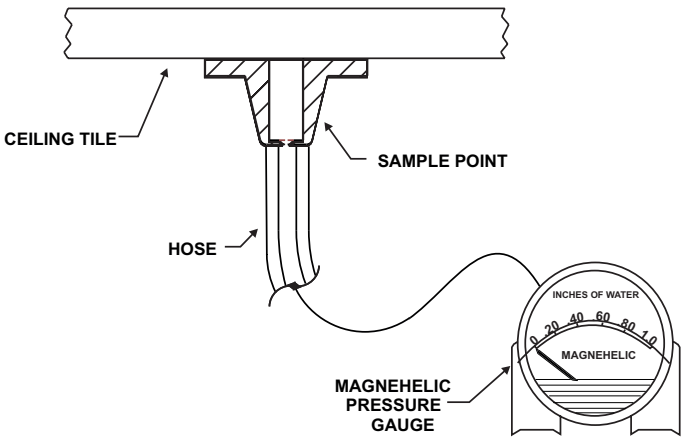

Figure 6-1. Magnehelic Test Set-Up

6-6 TRANSPORT TIME VERIFICATION

Maximum transport time verification test is the measurement of the amount of time it takes for the Detector to respond to smoke that enters the pipe at the sampling point furthest from the Detector. The results of this test and the calculated maximum transport time from "SNIFF" Version 3 must be recorded on the commissioning check sheet. Measured transport time less than the calculated time is acceptable.

Follow these steps to measure the maximum transport time of the system:

1. Determine the furthest sampling point from the Detector.
2. Allow test smoke to enter pipe at the furthest sampling point.
3. Record the amount of time for the Detector to respond. This is the actual maximum transport time

6-7 GROSS SMOKE TESTING

The gross smoke test is a measurement of the amount of time elapsing from the activation of the smoke generating medium, until Pre-Alarm 1 and Alarm 1 is reached. This test should be repeated at least three times with consistent results. Recommended smoke generating medium is aerosol simulated smoke or wire burner.

6-7.1 Aerosol Smoke Spray

There are a number of commercially available aerosol smoke sprays or "canned smoke". Please refer to your supplier for a recommended product. When using canned smoke, introduce only enough smoke into the protected area that will cause an Alarm 1 condition. This may require a number of practice sprays.

6-7.2 Wire Burner Test

The wire burner test is considered the most representative test of incipient fire hazard detection in telecommunications or computer room environments. The test is performed by applying a voltage to a piece of PVC insulated cable. Smoke is produced from the overheated PVC insulation by evaporation and condensation of the plasticizer. As the wire becomes hotter, hydrochloric acid (HCL) gas is emitted from the insulation. The by-products of overheated PVC insulation can be detected by the ORION XT Detector.

⚠ CAUTION

Oil based canisters that are used to test point detectors are not suitable for testing aspirating systems as the particulate is heavy and tends to drop out in the pipe, never actually reaching the Detector. Also, the oily residue that is left behind may affect the functionality of the Detector.

6-7.2.1 WIRE BURNER TEST 1 (OPTIONAL)

The following test is considered unlikely to produce HCL vapor. This test may be undertaken in underfloor spaces or ceiling voids.

Note: The wire is subject to cooling if positioned in direct contact with air flows and may need to be shielded.

Connect a 6.5 foot (2 meter) length of 10/0.004 inches (10/0.1 mm) 0.017 $ft.^2$ (0.078 mm^2) wire with a total radius of 0.012 inches (0.3 mm) including the PVC insulation to a 6 Vac source of at least 16 Amps rating per wire for a period of 3 minutes. The system should respond within 120 seconds of cessation of energization.

Note: After this period very little smoke is given off.

6-7.2.2 WIRE BURNER TEST 2 (OPTIONAL)

⚠ WARNING

The following test is considered to product sufficiently high temperatures to generate small quantities of hydrochloric acid.

This test may be undertaken in under floor spaces or ceiling voids where rapid air flow may render Test 1 unsuitable.

Connect a 3.25 foot (1 meter) length of 10/0.004 inches (10/0.1 mm) 0.017 $ft.^2$ (0.078 mm^2) wire with a total radius of 0.012 inches (0.3 mm) including the PVC insulation to a 6 Vac source of at least 16 Amps rating per wire for a period of one minute. The system should respond within 120 seconds of cessation of energization.

Note: After this period most of the insulation should be burnt off.

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CHAPTER 7
ROUTINE MAINTENANCE

7-1 INTRODUCTION

This chapter contains maintenance instructions for the ORION™ XT system. These procedures should be performed on a scheduled basis. In the event that system problems are found during routine maintenance, refer to Trouble Shooting and Corrective Maintenance, Chapter 8 of this manual.

7-2 SCHEDULED MAINTENANCE

The scheduled maintenance of the system should be performed at an established interval. The interval between performance of maintenance procedures should not exceed any imposed regulations (see NFPA-72 or other local requirements).

7-3 MAINTENANCE PROCEDURES

The following paragraphs outline general scheduled maintenance procedures to be performed on an "as necessary" basis.

7-3.1 Visual Check

The visual check must be performed every six months. This check is to insure pipe network integrity.

To perform the visual check observe the entire piping network and check for abnormalities in the pipes including any breaks, blockages, crimps, etc.

7-3.2 Battery Status Check

The battery backup used in the power supply to power the detector must be tested every six months.

A battery status check is best accomplished by running the load with the batteries for about one hour. While the load is still on, measure the individual battery voltages. If any battery reads 1.5 Volts or more below its rated voltage, that battery should be replaced.

Generally, if one of a series set of batteries is low, the others will soon fail. Therefore, it is advisable to replace all the batteries of a series set when one requires replacement.

Note: Any battery that has been in service for 48 months or more must be replaced.

7-3.3 Gross Smoke Test

The gross smoke test is a Go/No-Go test which ensures that the detector responds to smoke. This test must be performed at system commissioning and every year thereafter.

To perform this test, smoke must be introduced into the last sampling hole in each branch of the pipe network and the proper response must be verified by the Detector. Smoke from a punk or cotton wick may be used. Aerosol test smoke may also be used.

Note: For cleanroom applications consult with supplier for gross smoke test methods.

7-3.4 Suction Pressure Verification Test

The sampling hole airflow verification test insures the pipe network is drawing air from the protected area. This test must be done at commissioning and within one year after installation and every year thereafter.

To perform this test, the suction pressure of the last sampling hole in each pipe branch must be checked. See Chapter 6 of this manual for the procedure to check suction pressures. Suction pressures should be compared to the original measurements. If any differences are noted, the cause of the deviation must be determined.

7-3.5 Transport Time Verification Test

The maximum transport time of the pipe network must be measured and compared to the recorded transport time at commissioning. Refer to Paragraph 6-5 for test details. The transport time verification test must be done at commissioning and every year thereafter.

7-3.6 Detector Sensitivity Test

The Detector sensitivity test must be performed within one year of installation and every alternate year thereafter. The test can be performed via ORION Configuration Software (OCS), ORION XT Display Module or if an PALM is installed, from the ARIES/PEGAsys panel. After the second required sensitivity test, if the sensitivity test indicates pass, the length of time between calibration tests can be extended for up to five years.

Example**:** Year-one check

Year-three check

If years one and three are OK,

Go to five-year interval

The Detector employs a self-monitoring, automatically adjusting calibration for the system. The inspection only requires a periodic visual inspection for a Detector fault indication and performing the Detector sensitivity test function.

If the self-monitoring feature of the system senses that the operation of the detector head is outside its normal range, a trouble condition will be generated.

7-3.7 Clean Detector

The Detector optics should be cleaned as necessary, in accordance with the following the step-by-step procedure.

1. Remove the detector head in accordance with Paragraph 8-4.2.
2. The inlet cam is fitted with wire gauze. This should be inspected and cleaned if required. To remove the cam, rotate fully counterclockwise and pull off. Replace when complete.
3. Blow through the detector head with dry photographic quality compressed air being careful not to damage the internal components.
4. Reinstall the detector head in accordance with Paragraph 8-4.2.

7-3.8 Clean Elutriator

1. Open Elutriator by rotating enclosure 1/8 turn clockwise.
2. Remove and separate the two halves of the housing.
3. Clean impact plate and two screens using compressed air or mild cleaning solution.
4. Refer to Figure 2-8. Reassemble the Impact Plate and Screens. Note airflow orientation.

CHAPTER 8
TROUBLESHOOTING AND CORRECTIVE MAINTENANCE

8-1 INTRODUCTION

Reading the previous chapters will help you a great deal in understanding the purpose and operation of the Detector before attempting corrective maintenance.

The following paragraphs contain instructions to aid you in identifying and replacing faulty components. ORION™ Configuration Software (OCS) should be used as a diagnostic tool.

8-2 STANDARD FAULT ISOLATION TECHNIQUES

The following error messages will display on the Display Module or in OCS:

- CPU Trouble
- Airflow Trouble
- PSU Trouble
- Detector Trouble
- PC Line Trouble
- Unregistered Display Module Trouble
- Communications Trouble

Some of these troubles may indicate that the termination board or detector head are not functioning properly. Such failures are usually caused by one or more of the following:

- Failure of the power supply
- Damaged wiring or corrosion
- Component failure
- Wiring not properly terminated at the Detector.
- Problems associated with the piping system.

When a failure occurs and the cause is not known, check as many of these items as is practical before starting a detailed check. If possible, obtain information about any changes that have taken place that may affect the system.

8-2.1 Visual Inspection

When troubleshooting, the fault may often be discovered through visual inspection alone. Check for burned or overheated parts. Check for loose connections.

8-2.2 Power Checks

Ensure that all modules in the ORION XT System are receiving the correct power supply voltages before disassembling the system.

8-3 TROUBLESHOOTING

The Detector is continuously monitoring itself for errors. Most system faults can be isolated by using either the Display Module or OCS. If any of the Detector modules are defective, it is recommended that the module be replaced, as they cannot be serviced in the field. Refer to Tables 8-1 to 8-6 for troubleshooting tips and references.

⚠ CAUTION

When handling any electric components or circuit boards, antistatic precautions must be carried out. Failure to do so may result in component damage.

Static discharge can be reduced by adhering to the following guidelines:

- Always use conductive or antistatic containers for transportation and storage, and when returning any item.
- Wear a wrist strap while handling devices and ensure a good ground is maintained throughout.
- Never subject a static sensitive device to sliding movement over an ungrounded surface.
- Avoid any direct contact with the pins or connections.
- Avoid placing sensitive devices onto plastic or vinyl surfaces.
- Minimize the handling of sensitive devices and printed circuit boards.

Table 8-1. Troubleshooting Guide

MODULE/DEVICE	DETAILED ILLUSTRATION	FUNCTIONAL DESCRIPTION PARAGRAPH	REPLACEMENT PROCEDURE
Detector head	8-1	2-3.1	8-4.2
Termination board	8-2	2-3.2	8-4.3
Fan module	8-4	2-3.3	8-4.4
Display Module	8-5	2-4	8-4.5 and 8-4.6
Intelligent Interface Module	-	2.5	8.4.7
PEGAsys Addressable Loop Module	8-6	2-5	8-4.8
Self Contained Power Supply	8-7	2-6.1	8-4.9
Multi-Zone Power Supply	8-8	2-6.2	8-4.10

Table 8-2. Intelligent Interface Module to Computer Communication Fault

INTELLIGENT INTERFACE MODULE TO COMPUTER COMMUNICATION FAULTS	
Symptom	**Corrective Action**
No communication between the IIM and the computer when using a direct IIM to computer connection (Local IIM connection)	Ensure that the computer to IIM cable is plugged in to the port marked "PC" on the IIM.
	Check the configuration of the OCS under the Setup/System Computer/Configuration menus. The serial port must be set to the same COM port as the communications cable is plugged in to. Connection type must be set to "Local IIM".
	Ensure that the IIM is powered and operating. Depress the hard reset on the IIM. It should momentarily engage the trouble relay and extinguish all LEDs. The orange (lower) LED will come back on for about 1 min while the IIM resets. If no action occurs, the IIM may be defective or not receiving power
	Check the DB9 to RJ12 connector by separating the DB9 section from the plastic housing. The wire configuration must be as follows: White - Pin 2 Blue - Pin 3 Black - Pin 4 Yellow - Pin 5 Red - Pin 6 Green - Pin 8
No communication between the IIM and the computer when using a modem and phone lines to connect to the IIM (Remote IIM Connection)	Check for proper operation of the IIM using a local IIM connection. If this fails, refer to local IIM troubleshooting section above. If the local IIM connection functions correctly, check that the correct phone number is being used and that the phone line is properly connected and operating.
	Check the configuration of the OCS under the Setup/System Computer/Configuration menus. The serial port must be set to same COM port as the communications cable is plugged into. Connection type must be " Remote IIM".
	Check that the characters "ATSO=1" appear in the initialisation string box of the configuration screen. For a very few modems this string may require modification. Consult supplier if problems persist in this area.
	If the previous three steps do not resolve the problem, the IIM may be defective.

Table 8-3. General System Faults

GENERAL SYSTEM FAULTS	
Symptom	**Corrective Action**
Low Suction Pressure	If the system is new, ensure that the actual piping system corresponds with the layout as calculated by the "SNIFF" design software. Items such as pipe diameters, elbows, sampling hole diameter and junction configurations should be checked.
	Check for proper operation of the fan module.
	Check the screens located in the union, inside the detector head chamber and Elutriator. Clean if required.
	Check for broken pipes, loose joints, leaky junction boxes, or missing pipe caps.
	Check for blockages within the pipes. The blockage can be located by checking the suction pressure at points closest to the detector head(s) and working outward. The suction pressure will drop downstream from the blockage.
High Suction Pressure	If the system is new, ensure that the actual piping system corresponds with the layout as calculated by the "SNIFF" design software. Items such as pipe lengths, pipe diameters, elbows, sampling hole diameters and junction configurations should be checked.
	Check for blockages within the pipes and blockage of sampling ports. Pipe blockage can be located by checking the suction pressures on the points closest to the detector head(s) and working outward. The suction pressures will be higher upstream of the blockage.
Long Transport Times	Perform checks as outlined for low suction pressure.
Low Sensitivity to Smoke	Perform the sensitivity test by selecting the "sensitivity test" option from the OCS graphic display's options menu. OCS will either PASS or FAIL.
	Perform checks as outlined for low suction pressure.
Detector configuration is not saved after Detector is powered down	Ensure that the battery backup memory jumper is installed. (See Paragraph 4-2.10.1)

Table 8-4. Intelligent Interface to Detector Communication Problems

SYMPTOM	CORRECTIVE ACTION
Loss of Communication between IIM and Protected Zones	Check the LK1, LK2 and LK4 jumpers on the termination board. They may be shorting the two pins closest to the center of the board.
	Check the RS485 loop wiring.
	If using an IIM connected to an ARIES panel, be sure that the "Intelligent Interface Module" has been selected from the "Topic" screen in the Configuration Software. Once "Intelligent Interface Module" is selected be sure to check off the "IIM Enable" box to ensure that the IIM is present in the configuration. If non-latching operation for alarm inputs is desired, select the "Non-Latching" check box. Next review the termination board address screen. Here ensure that all termination board addresses existing on the RS-485 loop are enabled.
	If using a stand-alone IIM, be sure that the LOCSs set to monitor each Detector correctly. From the Setup menu select "Setup Detectors."The address of each Detector must be selected. Also, the Alarm and Trouble Monitoring box should be checked in the "Detector Window."
	Check the programmed address of each termination board to ensure that it corresponds to the binary equivalent of the address. Zero is not a valid address.

Table 8-5. Faults Indicated on the Display Module or OCS Graphic Display

DISPLAY MODULE OR OCS GRAPHIC DISPLAY MESSAGE	INDICATION	CORRECTIVE ACTION
Detector Trouble	Detector Head Trouble	Check connections at the termination board.
		Clean the detector head.
		If these two steps do not resolve the problem, return the detector to the supplier.
Display Module (if installed) • COMM TR on Display Module • Sounder was on even though the Display Module is not configured for sound. • Date displayed was 00 JAN 2000 and time was 00:00. This does not change over time. • No other troubles are shown on the Display Module STATUS menu. OCS can communicate with the termination board • Troubles shown: Detector, Airflow and Display • Time and Date are correct on the top of the Detector graphic. • Airflow is -50, but the fan is operating.	Detector Head Trouble	Insure that the cable from the detector head to the termination board is correctly installed.
		If the cable is correctly installed and the symptoms persist, return the detector head to the supplier.
• Fan is not operating.	Termination Board Power Supply Failure	Verify the DC input voltage to the termination board is within the specified range of 18 to 30 Vdc at terminals 1 and 2 on TB1. Resolve probelm with source if necessary.
• Display Module has power but is displaying COMM trouble.		Check the termination board fuse F2 and replace if necessary. It is located on the lower right corner of the board. Replace with Littlefuse® 1541AT.
• Unable to communicate to the Detector via OCS, shows "device not found"		If these two steps do not solve the problem, then the converter on the termination board is not functioning. Return the termination board to the supplier.
Full-Scale deflection for no apparent reason	No specific event is logged for this fault	Check that no ambient light is penetrating the pipe and entering the detection chamber. This can happen in brightly lit areas, especially when white PVC is used as the sampling pipe.
		Disconnect the sampling pipe and connect an absolute filter to the Detector. If the deflection goes to zero, there is particulate in the sampled area. If not proceed.
		Clean the detector head.
		If these three steps do not resolve the problem, return the unit to the supplier.
Airflow Trouble	Low or High Airflow Level	Check the real-time airflow level (see Chapter 4). Ensure that the airflow thresholds are set according to the manual.
		Check for proper operation of the Fan Module.
		Check for blockages or breaks in the sampling pipe network.
		Check for rapid temperature fluctuations in the protected area. If found, widen the airflow thresholds.
		Ensure that inlet cam is in the locked position.
Unregistered Display Module Trouble	Unreg LCD	Enable disply in OCS.
Power Supply Trouble	PSU Trouble	Measure the output voltage of the supply. It must be above 24 Vdc.
		Check the power supply fault lights (only if powered by multi-zone power supply, not the PEGAsys panel supply). Check the indicated circuit as described in the four steps below.
		Check the connections and continuity of the wires connected between the power supply and the termination board.
		Check that the AC voltage at the power supply input terminals is within operating range.
		Check the battery wiring connections and continuity.
		Check the batteries for low output voltage.
		Check for ground fault problems throughout all associated system wiring.
Fails Sensitivity Test	Detector Trouble	Return Detector to supplier.
RX/TX Communication Problems	PC Line Trouble	Check RX/TX wiring connectors.

Table 8-6. Detector to Computer Communcations Problems

SYMPTOM	CORRECTIVE ACTION
No communication between the Detector and the computer running OCS.	Check the configuration of OCS under the Setup/System Computer/Configuration menus. The serial port must be set to the same COM port as the communications cable is plugged in to.
	Check the DB9 to RJ-12 connector by separating the DB9 section from the plastic housing. The wire configuration must be as follows: White - Pin 2 Blue - Pin 3 Black - Pin 4 Yellow - Pin 5 Red - Pin 6 Green - Pin 8

8-4 REPLACEMENT

The following paragraphs describe how to replace various components in the ORION XT System.

⚠ CAUTION

LASER HAZARD

The detector in the enclosure is a factory-sealed unit containing a Class-3B laser product with invisible radiation.

⚠ WARNING

AVOID EXPOSURE TO BEAM

Extended exposure to a Class-3B laser directly or indirectly may cause severe damage to the human eye.

8-4.1 Replacing the Detector

Follow the procedure below when replacing the Detector cover.

1. Remove the replacement Detector from its carton and inspect to ensure that no damage occurred during transit.
2. Remove the Detector cover as described in Paragraph 4-2.2.
3. Disconnect the 24 Vdc power supply from Termination Board.
4. Disconnect all external cable connections.
5. Disconnect piping network from sample inlet port.
6. Disconnect piping from the exhaust port adapter, if used.
7. Back off the four enclosure mounting screws.
8. Slide the Detector from the pipe network system.
9. Install the new Detector as described in Paragraph 4-2.

8-4.2 Replacing the Detector Head

To remove the detector head from the Detector proceed as follows:

1. Remove the Detector cover as described in Paragraph 4-2.2.
2. Disconnect the 6-conductor interconnecting harness at the lower left-hand corner of the detector head. (The other end of the interconnecting harness is labeled Det Head on the termination board.)
3. Rotate the inlet cam one quarter turn to the unlocked position.
4. Release the four retaining clips located at each corner of the detector head.
5. Lift the detector head out of the Detector.

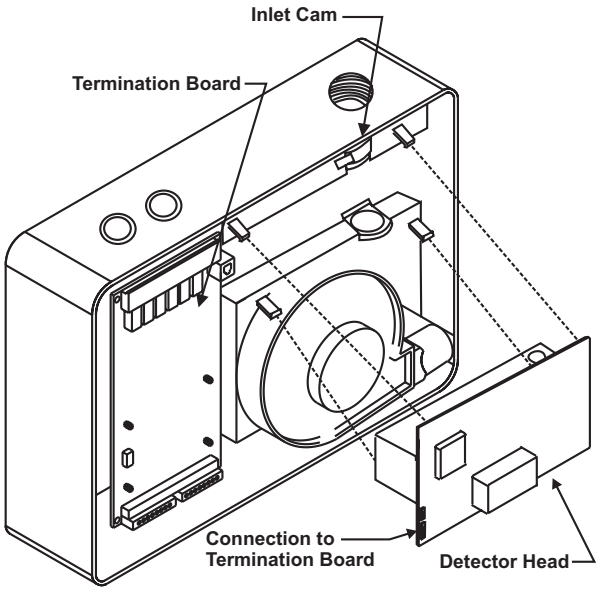

Figure 8-1. Replacing the Detector Head

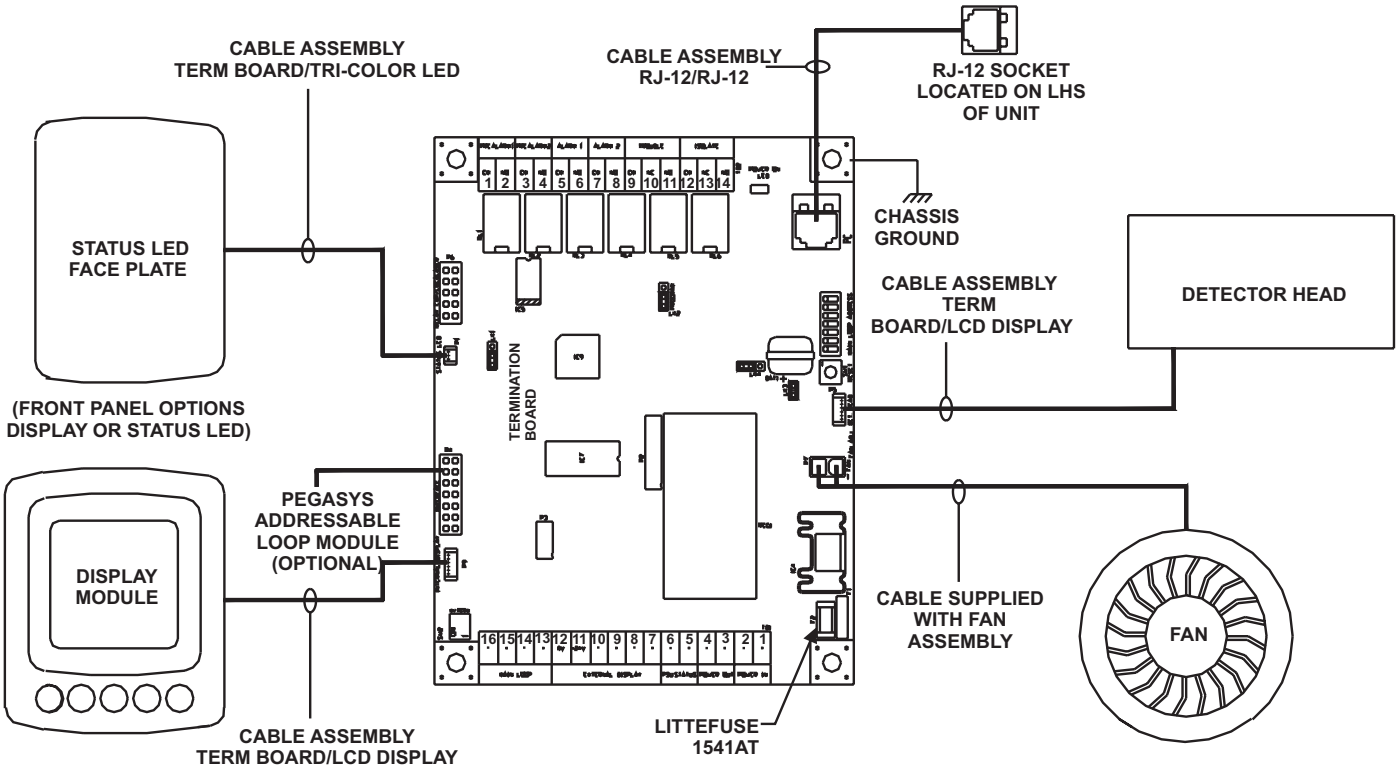

Figure 8-2. Termination Board Internal Wiring Diagram

To reinstall the detector head, do the following:

1. Remove the replacement Detector head from its carton and inspect the unit to ensure no damage occurred during transit.
2. Place the detector head in position and press down firmly on all four corners until it locks into place with the retaining clips.
3. Rotate the inlet cam one quarter turn to the locked position.
4. Reconnect the 6-conductor cable to detector head.
5. Install the Detector cover as described in Paragraph 4-2.11.

8-4.3 Replacing the Termination Board

If the default settings have been changed, save configuration and download all history data from the Detector using OCS before removing the termination board.

To remove the termination board from the Detector proceed as follows:

1. Remove the Detector cover as described in Paragraph 4-2.2.
2. Remove the 24 Vdc power supply to the Termination Board.
3. If used, remove PALM module.
4. Remove terminals from connectors TB1, TB2 and TB3 (the external connections).
5. Remove connector from RJ-12 PC connection.
6. Remove the connection to the detector head.
7. Remove the FAN connection from P7 on the Termination Board.
8. Remove the screw located in the top right corner of the termination board.
9. Release the four retaining clips and remove the termination board from the Detector Enclosure.

To reinstall the termination board do the following:

1. Remove the termination board from its carton and inspect to ensure that no damage occurred during transit.
2. Place the termination board in position, ensuring that it snaps into place by the four retaining clips.
3. Insert the screw in the top right hand corner of the board and tighten.
4. Replace terminals to connectors TB1, TB2 and TB3 (the external connections).
5. Replace connector to the RJ-12 PC connection.
6. Replace the connection to the detector head.
7. Replace the FAN connection to P7.
8. If used, replace PALM module.
9. Connect the 24 Vdc power supply connection.

10. Set the network address using the DIP switch.

    The RS-485 network supports up to 127 unique addresses that are used to identify each zone of the ORION XT system. The hardware address on each termination board must be set for correct operation of the communications network. Each termination board contains a DIP switch for setting the network address for each Detector.

11. Load the saved configuration to the new termination board using OCS. See the ORION Configuration Software User's Guide (P/N 06-236012-401) further details.
12. Install the Detector cover as described in Paragraph 4-2.11.

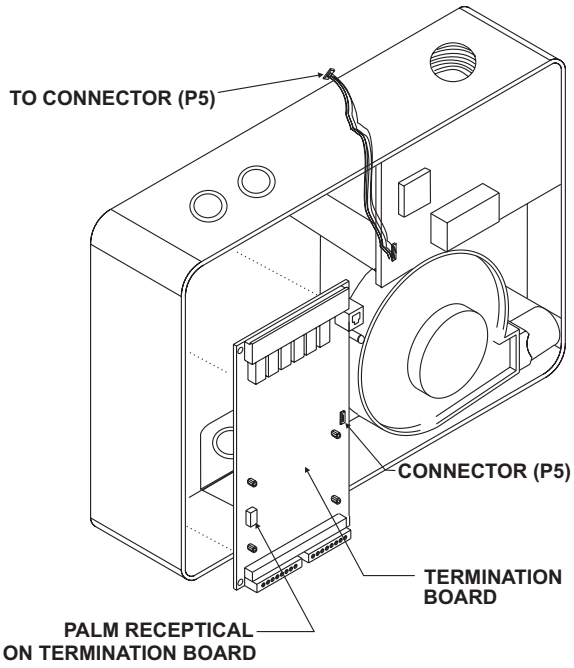

Figure 8-3. Replacing the Termination Board

8-4.4 Replacing the Fan Module

To remove the fan module proceed as follows:

1. Remove the Detector cover as described in Paragraph 4-2.2.
2. Remove the 24 Vdc power from the Termination Board.
3. Disconnect piping to the exhaust port if used.
4. Remove the side or back exhaust port by sliding the adapter away from the fan module
5. At the termination board, disconnect the fan connection, P7, that runs from the fan module to the termination board.
6. Release the three retaining clips around the outside edges of the fan module housing.
7. Lift the fan module from the Detector. The fan module is removed as a complete unit.
8. Remove the FAN Module from its carton and inspect to ensure that no damage occurred during transit.
9. To replace the fan module simply push one into position and secure it with the three retaining clips.
10. Reinsert the side or back exhaust port.
11. Reconnect exhaust piping fan if used.
12. Reconnect the fan to the Fan.
13. Reconnect the fan to the termination board. The connector is labeled Fan.
14. Install the Detector cover as described in Paragraph 4-2.11.

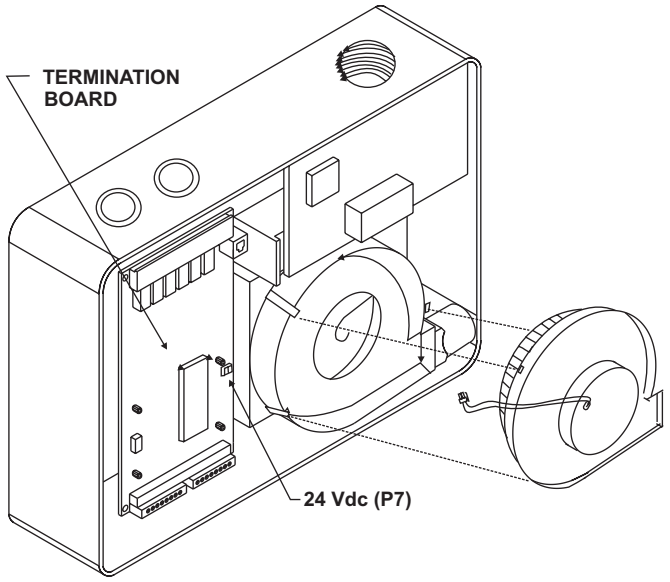

Figure 8-4. Replacing the Fan Module

8-4.5 Replacing the Display Module in the Detector Cover

To replace the Display Module when it is installed in the cover of the Detector proceed as follows:

1. Remove the Detector cover as described in Paragraph 4-2.2.
2. Remove the Display Module by pushing the two retaining clips, one each side, and pushing from the rear.
3. Remove the replacement Display Module from its carton and inspect to ensure that no damage occurred during transit.
4. Install the Display Module as described in Paragraph 4-5.
5. Install the detector cover as described in Paragraph 4-2.2.

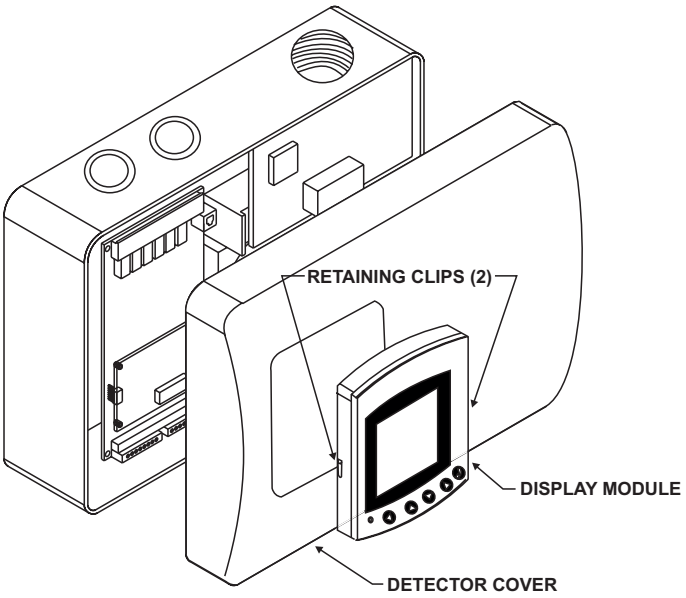

Figure 8-5. Replacing the Display Module

8-4.6 Replacing the Remote Display Module

To replace the Remote Display Module proceed as follows:

1. Remove the screw at the bottom of the installed Display Module and separate the cover from the back box.
2. Remove the 24 Vdc supply from the Remote Display terminal block.
3. Disconnect all remaining electrical connections from the terminal blocks.
4. Remove the replacement Display Module from its carton and inspect it to ensure that no damage occurred during transit.
5. Remove the screw at the bottom of the new Display Module, and separate the cover from the back box. Discard the new back box if the current box is in good condition.
6. Install the new Display Module as described in Paragraph 4-5.2.

8-4.7 Replacing the Intelligent Interface Module

To replace the Intelligent Interface Module, proceed as follows:

8-4.7.1 Replacing the Stand Alone Intelligent Interface Module

1. Remove the terminals from TB1 located on the Intelligent Interface Module (IIM). This will disconnect 24 Vdc, RS-485, auxiliary troubles and alarms.
2. Remove any RJ11 connectors from the three jacks, if used.
3. Remove the replacement IIM from its carton and inspect to ensure that no damage has occurred during transit.
4. Secure the IIM with the four mounting screws.
5. Reconnect any RJ11 connectors and then the TB1 terminations. When the power connector is reattached to the IIM, the orange (lower) LED will illuminate for about one minute during IIM initialization and then extinguish.

8-4.8 Replacing the PEGAsys Addressable Loop Module

The PALM is located on the termination board on four nylon mounting posts and is secured by four nuts that screw into these mounting posts.

To remove the PEGAsys Addressable Loop Module (PALM) proceed as follows:

1. Remove the Detector cover as described in Paragraph 4-2.2.
2. Remove field wiring plug J1 from the PALM board.
3. Remove the four nuts that secure the PALM to the mounting posts.
4. Carefully unplug connector P14 from the termination board and lift the PALM off the four posts and out of the Detector. The four posts should be left in place on the Termination Board.

To install the replacement PALM proceed as follows:

1. Remove the PALM from the packaging.
2. Inspect the unit to ensure no damage occurred during transit.
3. Remove the four nylon nuts and posts.
4. Place the PALM over the termination board in the Detector. Align the mounting holes on the PALM with the four nylon posts on the termination board. Keep the paper insulator on the PALM and ensure the holes in the insulator line up with the nylon posts. Also, ensure the receptacle on the underside of the PALM is aligned with the connector P4 on the termination board.
5. Press the PALM down firmly on all four corners until the posts protrude through the mounting holes in the PALM. The 14-pin connector on the underside of the PALM board should make a connection with its mating receptacle P4 on the Detector termination board. Screw the nuts on top of the four posts.
6. Insert field wiring plug into the connector on the PALM board.
7. Install the Detector cover as described in Paragraph 4-2.2.
8. Set the proper device loop address using OCS or directly from the Display of the ARIES/PEGAsys Control Panel. Programming the PALM is discussed in OCS User's Guide.

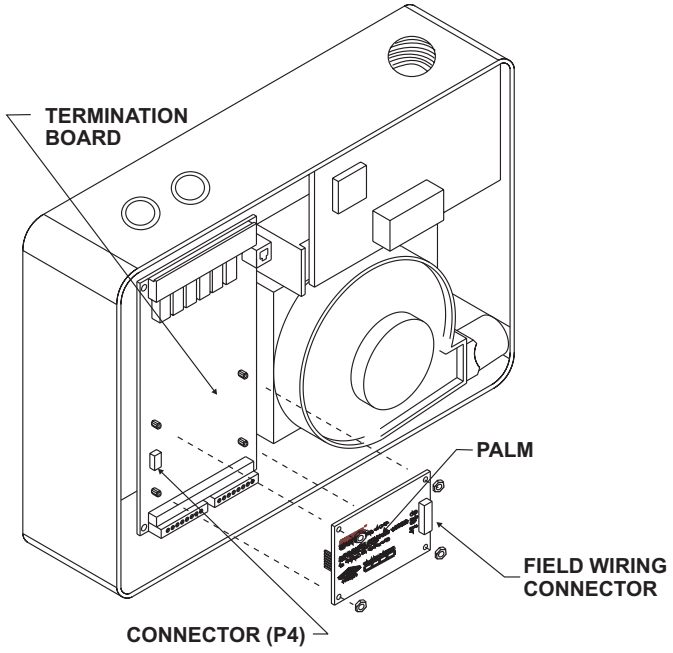

Figure 8-6. Replacing the PEGAsys Addressable Loop Module

8-4.9 Replacing the Self-Contained Power Supply

To remove the Self-Contained Power Supply proceed as follows:

⚠ CAUTION

Before proceeding shut off main power to unit.

1. Disconnect AC power from the Self-Contained Power Supply and at the main breaker box.

⚠ WARNING

Use caution when removing batteries from unit. Do not use metal tools, and remove jewelry before attempting to disconnect battery lead wires. Accidental contact with the connection posts may cause damage to equipment or bodily injury.

2. Remove the crosshead screw in the recess of the cover. Remove the cover and set it aside.
3. Disconnect all interconnecting cables to the Power Supply Module.
4. Remove the two power supply module retaining screws on each side of the module.
5. Remove the power supply by sliding outwards.

To replace the Self-Contained Power Supply proceed as follows:

1. Remove the replacement Power Supply Module from its packaging.
2. Inspect the unit to ensure that no damage occurred during transit.
3. Wire the power supply module as described in Paragraph 4-6.
4. Place the Power Supply Module into the Self-Contained Power Supply enclosure.
5. Insert and tighten the two power supply mounting screws.
6. Replace the cover on the power supply. Secure it with the crosshead screw.

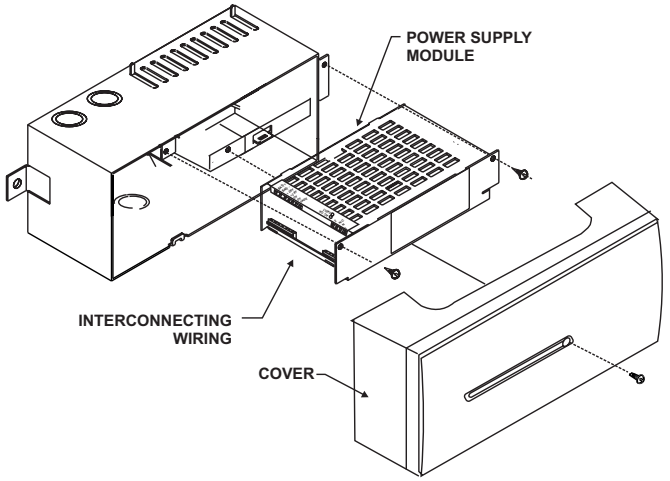

Figure 8-7. Replacing the Self-Contained Power Supply

8-4.10 Replacing the Multi-Zone Power Supply

1. Remove/turn off AC power and all battery power before replacing the Multi-Zone Power Supply Module.
2. Remove batteries from enclosure and place batteries in a safe place.
3. Remove all connections from the TB2 and TB3 terminal blocks. Remove the AC terminals from the terminal block mounted on the metal back plate.
4. Remove the four screws holding the power supply module to the power supply enclosure and remove the power supply module.
5. Remove the replacement power supply from its packaging and inspect the unit to ensure no damage has occurred during transit.
6. Install the new power supply module as described in Paragraph 4-7.4.
7. Reinstall the batteries and seismic straps if applicable.
8. Turn on the AC power.

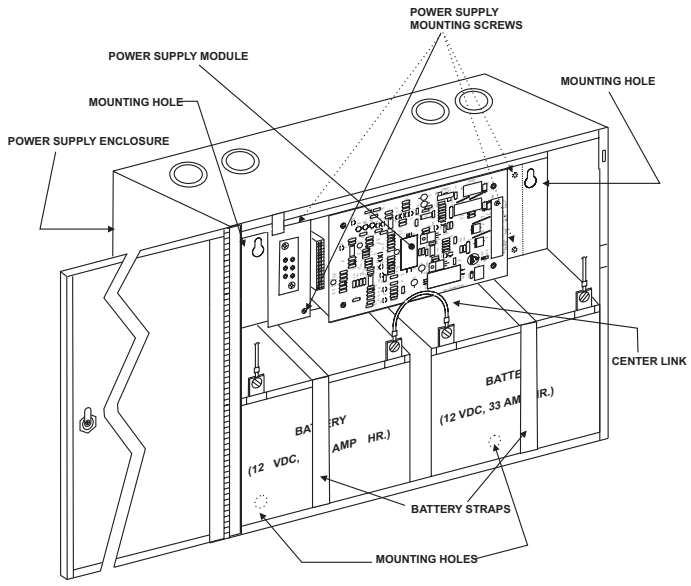

Figure 8-8. Replacing the Multi-Zone Power Supply

CHAPTER 9
PARTS LIST

9-1 INTRODUCTION

The table below provides a complete list of ORION™ XT assembly parts, subassemblies and associated equipment of the ORION XT system.

Table 9-1. Parts List

DETECTOR	
Detector, 0.00075 to 0.3%/ft. (0.0025 to 1.0%/m)	77-297101-000
OPTIONAL DISPLAY	
Display Module, English/Spanish/French	77-297102-000
Display Module, English/Spanish/Portuguese	77-297102-200
NETWORK OPTIONS	
PEGAsys Addressable Loop Module, connects to a PEGAsys /ARIES SLC loop	77-297103-000
Stand-Alone/ARIES Compatible IIM without Modem in Red Enclosure	77-297114-001
Stand-Alone/ARIES Compatible IIM with Modem in Red Enclosure	77-297114-002
OPTIONAL SELF-CONTAINED POWER SUPPLY	
Self-Contained 120/240 Vac Power Supply with Enclosure Only	77-297104-000
One 12 Vdc, 2.0 AH Battery Only	77-297105-000
OPTIONAL MULTI-ZONE POWER SUPPLY	
Multi-Zone Power Supply/Battery Enclosure Only	77-297107-000
Multi-Zone 120/240 Vac Power Supply Module Only	77-297106-000
One 12 Vdc, 33 AH Battery Only	77-297108-000
MISCELLANEOUS INSTALLATION PARTS	
Sampling Point Kit - Set of 25. Consists of (25) each: Sampling Point, Male 1/2-inch NPT Capillary Tube Adapter, Female 3/8-inch NPT Capillary Tube Adapter, Label for Sample Point	77-297109-000
Capillary Tube, 3/8-inch - 250 ft. Roll	77-297110-000
Sampling Point Label - Roll of 100 (for Extended Sampling Points)	77-297021-000
Sampling Port Label - Roll of 100	77-297022-000
Sampling Pipe Label - Roll of 100	77-297023-000
Elutriator (Inertial Separator)	77-297112-000
Flush Mount Trim Ring for Detector	77-297111-000
Battery Strap Kit for Seismic Zone 4 Installation (Multi-Zone Power Supply)	77-297113-000
RS-232 Programming Cable Assembly - 9 Pin Connector to RJ-12	74-100016-003
Magnehelic Pressure Gauge Kit, 0 to 1.0- inch H2O, with Carrying Case	77-297122-000
ORION XT Manual Doc, # 77.100	06-236005-401
ORION XT Check Sheet, Doc # 77.102	06-235516-402
ORION XT SNIFF Manual, Doc # 77.101	06-235984-401
OCS User's Guide, Doc # 77.103	06-236012-401
SOFTWARE	
"SNIFF" (Version 3.0) Design Program Software CD-ROM and User's Guide	77-297121-000
OCS (Version 3.0) Software CD-ROM and User's Guide	77-297120-000

Table 9-1. Parts List (cont.)

DEMONSTRATION KIT	
Complete ORION XT Demonstration Kit. Consists of: Detector, Hard-sided Case w/ Wheels, Stand, Sample Pipe Network, Power Supply, and Computer Interface Cord (74-100016-003)	77-297123-000
SPARE PARTS	
Spare Detector Head, Standard	06-129896-001
Spare Fan Assembly	06-129897-001
Spare Self-Contained Power Supply Module for 77-297104-000	06-129898-001
Spare Termination Board	06-129899-401
Extra Multi-Zone Power Supply Key	06-118013-001
Spare Cable, Detector Head to Termination Board	06-129995-001
Spare Cable, Display Module to Termination Board	06-129995-002
Spare Cable, Display Module to Termination Board	06-129995-003

TECHNICAL MANUAL USER FEEDBACK FORM

(Use this report to indicate deficiencies, user remarks and recommendations relating to the publication. Fold on dotted line, tape and mail to **KIDDE-FENWAL, Inc., 400 Main Street, Ashland, MA 01721, Attn. Documentation Manager** or FAX to 508-881-8920)

DATE:

1. PART NUMBER	2. VOLUME NO.	3. TITLE (NOMENCLATURE)

4. CHANGE NO. OR REV. DATE	5. SYSTEM/EQUIPMENT	6. PRIORITY OF COMMENT

7. USER EVALUATION

MANUAL IS: ❑ EXCELLENT ❑GOOD ❑ FAIR ❑ POOR ❑ COMPLETE ❑ INCOMPLETE

8. ❑ PROBLEM ❑ QUESTION ❑ SUGGESTION ❑COMMENT: (check one)

9. RECOMMENDED CHANGE TO PUBLICATION

PAGE NO.	PARAGRAPH NO.	LINE NO.	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Use Blank Continuation Sheets as Required)

10. ORIGINATOR	11. COMPANY NAME

12. ADDRESS

13. KIDDE-FENWAL USE ONLY

a. Received	b. Action Necessity	c. Priority	d. Comments

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Kidde Fire Systems
400 Main Street
Ashland, MA 01721
Ph: (508) 881-2000
Fax: (508) 881-8920
http://www.kiddefiresystems.com

06-236005-401 Rev. BA Printed in USA