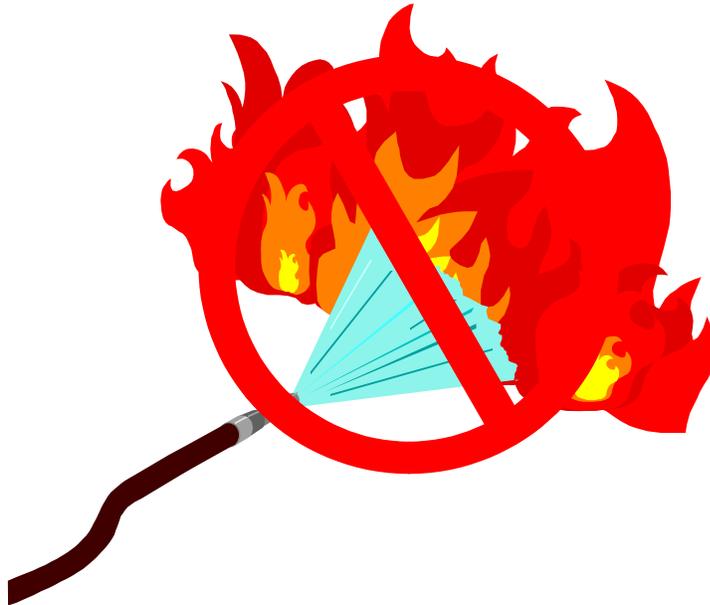
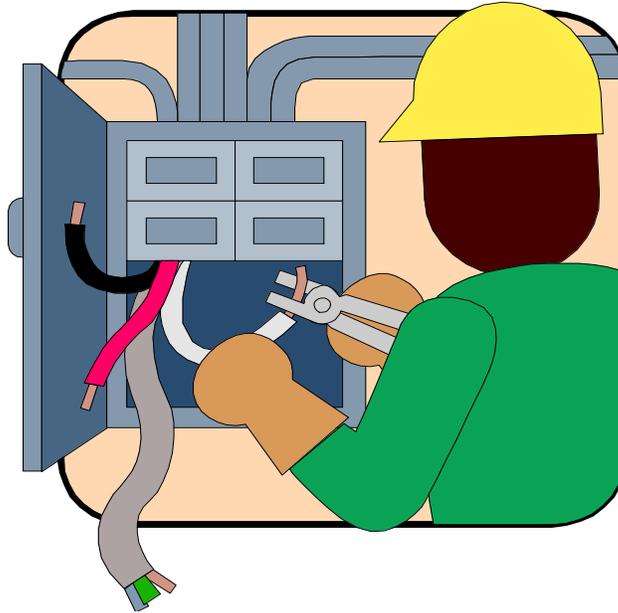


Siemens MXL Preventative Maintenance Manual



OBO/OM/FIR
PREVENTIVE MAINTENANCE
MANUAL
For MXL Fire Alarm Systems

INTRODUCTION

The purpose of this manual is to assist in the inspection, testing, and preventive maintenance of Siemens/Pyrotronics MXL microprocessor fire alarm systems commonly found in OBO buildings overseas. Although the Siemens/Pyrotronics microprocessor based system has self-diagnostic abilities, it is still advisable to inspect the system devices by the schedule provided to ensure the correct operation of the system.

The manual is divided into eight sections for your convenience:

- 0 – Introduction and Table of Contents
- 1 - Fire alarm operations procedures
- 2 – Maintenance, Inspection and Testing Frequency matrix
- 3 - Visual Inspection Procedures
- 4 - Equipment Testing Procedures
- 5 – Equipment Preventative Maintenance Procedures
- 6 – Troubleshooting guidelines
- 7 - Inspection and Test Forms

The second section is a chart of the inspection, testing and preventive maintenance schedule. The year is divided into initial/reacceptance, monthly, quarterly, semi-annually, and annually for each device. The inspections are visual and the tests involve activation of the equipment.

The third and fourth sections are the procedures for performing the inspection or tests. Additional information can be found in the manufacturers' manuals or contact OBO/OM/FIR for further guidance.

The fifth section provides preventive maintenance procedures.

The sixth section offers troubleshooting guidance should problems occur during the scheduled maintenance of the system. For detailed information refer to manufacturers manual.

The seventh section consists of forms to be used during both the inspection and testing procedures. Please complete and date the forms, and store the records in an accessible location along with any notes pertaining to deficiencies or idiosyncrasies found in the systems. Note the location of the inspection records in the panel for inspection by the visiting Fire Marshals or technicians. The fifth section is a troubleshooting section, which provides general trouble message,

**and possible solutions to the indicated trouble. If any questions arise concerning any part of the information, please contact OBO/OM/FIR at (703) 875-6988
With the initiation of these maintenance procedures, your system will provide years of dependable, trouble-free fire protection.**

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1.0 FIRE ALARM SYSTEM OPERATIONS FOR FOLLOWING PROCEDURES

During the following procedures, the fire alarm system will indicate “alarm”, “supervisory” and “trouble” conditions depending on preventative maintenance or testing being done. To eliminate nuisance alarms the following operating recommendations are provided to assist maintenance personnel in completing the testing and maintenance requirements.

Maintenance By-pass - Maintenance By-pass is a programmed function that is usually provided at the initial installation. Address the fire control panel, recognize the “ALT” and “F-1 –F-4” buttons center control panel. By simultaneously pressing the selected ALT button and corresponding ‘F’ button (should be labeled “Maint bypass”), all controlled devices (bells, elevator interface, slave fire panel interface, HVAC control etc.) will be turned off for 4 hours, or until panel reset.

This sequence must be followed after each panel reset. Upon completion of the test/maintenance, panel must be reset to restore system to normal operation. (Note: the manual pull station at Post 1 will override the by-pass function and sound the bells)

Turn device off - By turning off a specific device prior to any work, it will be taken off line. The device and not associated circuitry will be turned off and will not impact normal operation of the system. This feature may be utilized during construction of an area that may cause dust and debris and the possibility of nuisance alarms. *Note* – when work creating dust is performed in areas with smoke detectors, protect detectors with detector covers or plastic.

Sequence is as follows:

- ◆ Press “enter” button on key board
- ◆ Press right directional arrow until the cursor is placed under “ control” on LCD, press enter
- ◆ When queried for password, press 22222 enter
- ◆ Move cursor right until placed under “Arm/Disarm” and press enter
- ◆ Enter the 6 digit address of device you want to turn off (e.g.: if device is marked 3/11, the correct six digit address is 003/011), press enter
- ◆ Select “arm/disarm” by moving cursor, and press enter
- ◆ A trouble audible will sound on system, and “partial system disabled” will appear on control panel.
- ◆ Reverse the process to rearm device.
- ◆ Press the upward directional arrow to move back to main screen
- ◆ Refer to owners manual, MXL menu, for details of this and other options

Walktest mode: The system provides capabilities to test the system without impacting various aspects of the systems operations. The system can provide 6 different options to include or exclude the systems notification appliances as a testing aide. Refer to

“walktest” operations in maintenance support book. Below is the sequence for testing each loop of the system “without audible”.

- ◆ Press “enter” button on key board
- ◆ Press right directional arrow until the cursor is placed under “WALKTEST” on LCD, press enter
- ◆ When queried for password, press 33333 enter
- ◆ Move cursor to “loop silence” and press enter
- ◆ Insert loop 3 digit address number (first set of digits of marking on initiation device – e.g.: device 3/11, three digit address for walktest would be 003).
- ◆ Press “ENTER”.
- ◆ “Partial system disabled” light should appear on control board.
- ◆ LCD will indicate “Normal operation disabled, press “enter” to continue – press “ENTER”
- ◆ Your test period will be for 4 hours. To cancel at anytime, perform following procedures:
 - ◆ Press ‘Enter’
 - ◆ Select ‘Walktest’
 - ◆ Enter password (33333)
 - ◆ Select ‘Cancel’
 - ◆ Wait 60 seconds, walktest will end
 - ◆ Press ‘Reset’
 - ◆ Press ‘Up’ directional arrow on keyboard until original screen is displayed

WARNING - *Do not test any devices that are not in ‘walktest’ range. Doing so will initiate a system alarm.*

VISUAL INSPECTION and PM PROCEDURES

3.0 CONTROL EQUIPMENT

3.1 Control Panel trouble: Ensure the power light is illuminated. A visual inspection of the functions includes ensuring the trouble indicators (trouble lights and buzzers) are not activated on the control unit or panel modules.

- Perform a "Lamp test" all lamps and LED's to insure illumination.
- Inspect primary power source and any surge suppression and/or voltage regulating equipment for electrical or mechanical damage.
- Inspect for mechanical damage to the equipment.
- Cycle primary power at circuit breaker, and confirm system identifies power outage. Insure location of circuit breaker is clearly identified at FACP.

3.2 Fuses: Inspect all fuses ensuring proper integrity, and verify correct size based on manufacture requirements.

3.3 Networked Fire alarm control panels: Inspect for trouble indications on control panel for modules monitoring the interfaced equipment and system networks. Inspect connections to equipment for mechanical damage.

3.4 Batteries: - General tests

- a. Batteries: Inspect batteries for corrosion or leakage. Check and ensure tightness of connections. Where necessary, clean and coat the battery terminals or connections.
- b. Battery Replacement: Batteries shall be replaced in accordance with the recommendations of the alarm equipment manufacturer (generally every five years), or when the recharged battery voltage or current falls below the manufacturers recommendations causing trouble conditions identifying battery fault.

3.5 Remote Annunciator/RCC: Ensure the power light is illuminated. A visual inspection of the functions includes ensuring the trouble indicators (trouble lights and buzzers) are not activated on the RCC. Perform a "Lamp test" all lamps and LED's to insure illumination. Inspect primary power source and any surge suppression and/or voltage regulating equipment for electrical or mechanical damage. Inspect for mechanical damage to the equipment.

3.6 Duct detector:

- a. Verify all duct detectors are properly installed.

- b. Verify the circuits monitoring the devices are in normal condition.
- c. Check devices for mechanical damage.
- d. Verify remote lamps are properly installed and circuit integrity.

3.7 Manual Pull Stations:

- a. Verify the circuits monitoring the devices are in normal position.
- b. Check devices for mechanical damage.

3.8 Heat Detectors:

- a. Verify all heat detectors are properly installed.
- b. Verify the circuits monitoring the devices are in normal condition.
- c. Check devices for mechanical damage.

3.9 Smoke Detectors:

- a. Verify all smoke detectors are properly installed.
- b. Verify the circuits monitoring the devices are in normal condition
- c. Check devices for mechanical damage.

3.10 Supervisory Devices:

- a. Control valve switch:
 - 1. Inspect valves for proper positioning.
 - 2. Verify the circuits monitoring the interface devices are in normal condition.
 - 3. Check devices for mechanical damage.
- b. High/low air pressure switch:
 - 1. Inspect any gauges attached to the equipment.
 - 2. Verify circuits monitoring the interface devices are in normal condition.
 - 3. Inspect devices for mechanical damage.
- c. Water level switch:
 - 1. Visually check water level.
 - 2. Verify the circuits monitoring the interface devices are in normal condition.
 - 3. Inspect devices for mechanical damage.
- d. Water temperature switch:

1. Inspect any gauges attached to the equipment.
2. Verify the circuits monitoring the interface devices are in normal condition.
3. Inspect devices for mechanical damage.

3.11 Waterflow Devices:

- a. Verify the circuits monitoring the interface devices are in normal condition.
- b. Check devices for mechanical damage.

3.12 Systems Interface (Slave and subslave -system Interface):

3.12.1 Slave FACP FIRE SYSTEM:

- a. Perform fire system visual inspection on the Slave FACP control panel and devices.
- b. Verify that both the main building panel and the Slave FACP are in normal condition and no trouble signals are evident.
- c. Verify that sub-panels in the Slave system area are in normal condition and no trouble signals are evident.

3.12.2 Sub-Fire System:

- a. Perform fire system visual inspection on the slave fire system control panel and devices.
- b. Inspect main building fire system and the slave system panel ensuring they are in normal condition and no trouble signals are evident.
- c. Inspect sub-panels in the slave system are in normal condition and no trouble signals are present.
- d. Check power and sync indicators on fiber modules to verify they have power and are communicating.

3.13 Associated Control Functions:

3.13.1 Elevator Recall:

- a. Verify that devices monitoring the interface are in normal position and normal condition.
- b. No trouble indications should be evident on either panel.

3.13.2 HVAC Shutdown:

- a. Verify that devices monitoring the interface are in normal position and normal condition.
- b. No trouble indications should be evident on either panel.

3.14 Audible Inspection:

- a. Verify the circuits monitoring the devices are in normal condition.
- b. Inspect devices for mechanical damage.

3.15 Disconnect Switches:

- a. Where the control unit (panel) has disconnecting or isolating switches, verify that each switch is in normal condition and check for mechanical damage.

3.16 Ground fault:

- a. Where the system has a "ground fault" detection feature, verify that a ground fault indication is in normal condition (not illuminated).

4.0

EQUIPMENT TESTING PROCEDURES

4.1 Control Panel (MMB & MKB)

Tools required:

- Ladder
- 9/64th hex head wrench
- Compressed smoke, or a smoke detector tester

4.1.1 Performance of an **alarm** function test, an alarm condition shall be initiated. Directions are as follows:

Test procedure:

- a. Pull nearest manual pull station, or provide smoke to a smoke detector
- b. The notification appliances (bells) shall sound.
- c. HVAC systems shall shut down*
- d. Fire doors shall release*
- e. The slave systems shall sound their notification appliances.
- f. If test is being performed on a Sub-system, a supervisory signal should be indicated on master fire alarm system.
- g. Press “**ALARM ACK**” on control panel or remote control panel (this will silence system audible, but bells will remain on)
- h. Press “**AUD SIL**” on control panel or remote control panel (this will silence the bells).
- i. Reset manual pull station with a manual pull station key (9/64 hexed head wrench), open the manual station cover. The operating handle should snap back to normal position, if not, assist it. Once the handle has been restored, secure the door. INSURE the door is tightly secured.
- j. Press the “**RESET**” button to reset the FACP. The system should restore to normal operation.

4.2 Control Panel **trouble** and LCD indications

Tools required:

- Ladder
- Adjustable wrench
- Regular screwdriver
- Phillips screwdriver
- Multimeter
- Flashlight
- Fuse removal tool
- Magnehelic Duct detector test or other type of pressure differential meter
- Smoke detector tester

4.1.2 Performance of a **trouble** function test, a trouble condition shall be initiated. Preliminary trouble function test is as follows:

Test procedure:

- a. Remove a smoke detector from its base, (with the palm of your hand, push up on the detector and twist counter clockwise). Note: some systems have detectors, which lock into the base. The detector should fall out on to your hand.
- b. A yellow light shall illuminate on the FACP control panel and/or remote control panel.
- c. A trouble audible will sound.
- d. Press the "**TRBL ACK**" button on control panel or remote control panel to silence the system audible.
- e. Reinstall the smoke detector. Look closely at the smoke detector base. Next to terminal 1a, you will see a symbol for an LED light (it looks like a star). Match that symbol with the LED light on the smoke detector, press up and twist until it locks into place.
- f. The trouble light should extinguish.

4.2 Performance of a **fuse** function test, all fuses shall be inspected. Directions are as follows:

- a. Remove power from fire alarm control panel. **REMOVE BATTERY FIRST, THEN SWITCH OFF CIRCUIT BREAKER PROVIDING POWER TO THE SYSTEM (DC first, then AC).**

- b. Inspect all fuses on power supply (located lower right bottom of cabinet). Remove the power supply cover.
- c. Inspect the fuses. Verify all ratings correspond with the device specification sheets.
- d. Inspect the fuse and insure they are not faulty.

Fuse ratings & locations:

- MPS-12 – 15A fuse, 250V, AGC, under cap, in front
- MMB-2 has 5 fuses; F-1, AC input is 8 amp, F-2, battery 15amp, F-3, IAC-1, 2 amp, F-4, IAC-2, 2 amp, CZM-1, 2 amp.

- e. Restore power to system. Switch on circuit breaker (AC) then connect batteries (DC). **(AC first, then DC)**

4.3 Performance of a **Lamp test** function test, a test shall be initiated testing all systems indicator lamps. Directions are as follows:

- a. Open the fire system cabinet door.
- b. Press the “**ENTER**” button center bottom of keyboard. Press **right** arrow until the cursor falls under “**TEST**” – press enter. Move right arrow to move cursor to “**lamp test**” and press **enter**.

4.4 Performance of a primary **Power Supply** function test, a test shall be initiated testing emergency power of the fire alarm system. Directions are as follows:

- a. Locate the fire alarm systems power source. Identify the circuit breaker supplying power to the system.
- b. Turn circuit breaker off.
- c. A loss of power indication should be illuminated on the system and a system audible should sound (unless your system is configured with an UPS system).

4.5 Performance of Networked Fire Alarm Control Panels

- a. Verify the LCD does not indicate “network communication error”

3.9 Performance of the backup battery power equipment test is as follows:

Test procedure:

- a. Disconnect primary power from the batteries.

- b. Press the "**TRBL ACK**" button on control panel or remote control panel to silence the system audible
- c. Meter the voltage on the battery. Should not be less than 21.5 vdc.
- d. Restore primary power to the batteries.

4.7 Perform **REMOTE ANNUNCIATORS** test of the Air sample Fire Alarm Control Panel (FACP). Directions are as follows:

Test procedure:

- a. When the system is located in a remote area, it will have a remote annunciator of some type. Perform the necessary tests to the system to insure the annunciator and its controls and indications are functioning correctly. The same features and controls that are on main FACP should be on RCC-1.
- b. Verify each initiation circuit to insure the indication on the FACP correlates with the same zone on the RCC-1 LCD.
- d. Utilizing the control panel buttons on the RCC-1, insure the systems trouble and alarm conditions can be silenced when the signals are initiated.
- e. If your system IS NOT configured with an RCC-1, but has a graphic annunciator, perform tests and insure corresponding zone locations illuminate on annunciator. Insure the control switches or keys, provide correct response to indicate conditions (trouble silence silences annunciator when in trouble, and alarm silence silences the building bells).

4.8 Perform **Duct detector** test on all duct detectors on the fire alarm system. Directions are as follows:

Test procedure:

- a. All devices shall be tested in accordance with manufacturer recommendations.
- b. Perform a sensitivity test on the detector. Insure it is in the sensitivity parameters outlined by the manufacturer. If it is a

Cerberus/Pyrotronics device, the voltage range is printed on the label on the back of the detector.

- c. Initiate an alarm test on each duct detector to verify proper alarm sequence (e.g. HVAC shutdown, smoke control, notification appliance activation etc.)
- d. Press "**ALARM ACK**" on control panel or remote control panel (this will silence system audible, but bells will remain on).
- e. Press "**AUD SIL**" on control panel or remote control panel (this will silence the bells).
- f. Remove a smoke detector from each circuit. Follow procedures as outlined in "trouble" test. A trouble light with system trouble audible shall signal at the FACP.
- g. Press the "**TRBL ACK**" button on control panel or remote control panel to silence the system audible.
- h. Reinstall the smoke detector. Look closely at the smoke detector base. Next to terminal 1a, you will see a symbol for an LED light (it looks like a star). Match that symbol with the LED light on the smoke detector, press up and twist until it locks into place.
- i. The trouble light should extinguish.
- j. Perform a pressure differential test of air duct (only required if changes were done to mechanical system design). Pressure differential shall meet manufacturers specifications.

4.9 Perform **Manual pull station** test on all manual pull stations on the fire alarm system. Directions are as follows:

Test procedure:

- a. Test ALL manual pull stations.
- b. Pull operating lever down.
- c. The notification appliances (bells) should sound.
- d. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.

- e. Reset the manual pull station by using a 9/64-hexed head wrench, opening the manual pull station cover.
- f. Press the operating lever upwards (it may go upwards on its own).
- g. **IMPORTANT!!** Insure you tightly secure pull station to its normal operating position, otherwise the system will not clear from alarm mode.
- h. Reset fire alarm system by pressing the "**RESET**" button.
- i. Repeat all steps for each manual pull station.
- j. Verify actual location description on LCD upon each alarm.

4.10 Perform **Heat detector** test on all heat detectors on the fire alarm system. Directions are as follows:

Test procedure:

- a. Identify the location of all heat detectors. A thermal element coming out of the detector can identify them. **Insure you only test this type of heat detector. The other type is non-restorable and would have to be replaced if tested.**
- b. Using a hair dryer, apply heat to the end of the detector.
- c. The heat detector should activate. A red LED light will illuminate on the device and the appliances throughout the premises will sound.
- d. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
- e. Reset fire alarm system by pressing the "**RESET**" button.
- f. Repeat all steps for each heat detector.
- g. Verify actual location description on LCD upon each alarm.

4.11 **Smoke detector** test on all heat detectors on the fire alarm system. Directions are as follows:

Note: Your system may be configured with a reconfirmation period in the panel and it may take 15-20 seconds before an alarm is registered at the FACP.

Test procedure:

- a. Visually inspect detector for excessive dirt or insect accumulation.
- b. Using canned smoke, test all smoke detectors in the protected premises. Ensure manufacturer's instructions are followed. Alternative smoking methods (i.e. bee smokers, smoke detector testers) are allowed.
- c. The system will alarm, and the red LED light should illuminate on the smoke detector
- d. The FACP and RCC-1 will identify the particular activated zone.
- e. Notification appliances (building bells) should sound.
- f. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
- h. Reset fire alarm system by pressing the "**RESET**" button.
- i. Repeat all steps for each smoke detector.
- j. Verify actual location description on LCD upon each alarm.
- k. Reset at the panel and remove detector head from base to verify a trouble indication in the panel.

4.11.1 To perform a **smoke detector sensitivity test**:

The FACP has an environmental compensation feature, which allows the system to interrogate the smoke detectors sensitivities. As the smoke detector becomes dirty, the detector will continue to adjust the threshold alarm voltage to a certain point, at which time a trouble condition will occur to the system, indicating "dirty detector".

4.12 Perform **Supervisory** tests (if applicable) on all supervision devices on the fire alarm system. Directions are as follows:

Test procedure:

- a. Identify location of all tamper switches. They are generally located at every location of a sprinkler control valve.

- b. Test each control valve by rotating the wheel two complete turns. (General rule for OS&Y control valves - if the stem is fully exposed, the valve is open. If the valve stem is inward, the valve is closed).
- c. Upon activation of a tamper switch, a local fire system audible should sound and a yellow light should illuminate on the fire system and location of the activated device should be displayed on LCD of FACP and RCC-1 (The bells will not sound).
- d. Once these signals are confirmed, press the **“SUPV ACK”** button on FACP and RCC-1, and restore the control valve. Once control valve has been restore press the **“RESET”** button on FACP or RCC-1.
- e. Perform this test on all supervised control valves.
- f. Perform tests on other supervised devices including water level switch, water temperature switch, and High/low air pressure switch. Perform a simulated activation of each supervised device to insure its operability.
- g. Perform supervisory test on fire pump controllers (where applicable). System indications and controls mention in ‘c’ and ‘d’ of this section apply.

Engine driven fire pump:

1. Switch position off normal
2. Engine run
3. Engine trouble

Electric Driven fire pump:

1. Phase reversal
2. Loss of phase
3. Switch off normal

4.13 Perform **Water flow** test (if applicable) on all Water flow devices on the fire alarm system. Directions are as follows:

Test procedure:

- a. Identify the location of all water flow switches. They are normally located in stairwells, or when located above ceiling tiles, have a placard identifying their location.

- b. If the sprinkler system has an "Express drain" for the sprinkler system, open the shut-off valve. Water should flow through the express drain.
 - 1. Within 40 seconds, an **alarm condition** should occur to the fire alarm system
 - 2. The **fire pump** should turn on.
- c. FACP and RCC-1(if applicable) should indicate the following:
 - ◆ Fire pump run (supervisory)
 - ◆ Fire condition with notification appliances (bells) sounding
 - ◆ LCD indicating location of water flow alarm
- d. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
- e. Reset fire alarm system by pressing the "**RESET**" button.
- f. Repeat all steps for each water flow switch.
- g. Verify actual location description on LCD upon each alarm.

Note: If the system does not have an Express Drain, DO NOT open the shut-off valve unless you have a means to capture the water from the express drain. Test the Waterflow switch by removing the cover and pulling back the 'paddle stem' which is a long (3") stem that is perpendicular and enters the sprinkler pipe. It will be delayed 15-20 seconds before activation. Once activated, all activation's as noted in item 3 will occur.

4.14 Perform **Systems interface** tests (if applicable) on all supervision devices on the fire alarm system. Directions are as follows:

4.14.1 Perform **Slave Interface** test.

Test procedure:

- a. Directions on the ***Building fire alarm system and its interface to the Slave fire alarm system*** are as follows:
 - 1. Initiate a "general" alarm on the building system by pulling the nearest manual pull station.

2. The building notification appliances (bells) will sound and a signal will be sent to the slave FACP.
 3. Go to slave FACP location. A signal indicating "building fire" and "building fire reset" should be illuminated on a specific zone module. The slave **SHALL NOT** transmit a subsequent signal back to the building FACP (e.g. building FACP control panel should not indicate slave system in alarm on LCD).
 4. The slave notification appliances (bells) shall sound. Insure you have confirmation from the occupants that the ABCD office space has notification appliances sounding. **Note - the occupants of the slave WILL NOT have control of the bells, only the Main system controls the operation of the bells.**
 5. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
 6. Reset the manual pull station by using a 9/64-hexed head wrench, opening the manual pull station cover.
 7. Press the operating lever upwards
 8. **IMPORTANT!!** Insure you tightly secure pull station to its normal operating position.
 9. Reset fire alarm system by pressing the "**RESET**" button.
 10. The slave system shall indicate a "Building Reset" indication. Press the '**Reset/Lamp test**' switch to reset the system.
- b. Directions on the **slave FACP to Building fire alarm system** are as follows:
1. Initiate a manual pull station in the slave.
 2. The slave system shall annunciate the activated zone, concurrently transmit a signal to the main building fire alarm system. The main building system shall annunciate a slave zone as the source of activation on the system display, and sound the facility notification appliances.
 3. The notification appliances shall sound throughout the protected premises.

4. Each fire system shall have **independent** controls (the occupant of the slave system shall be able to silence his system and the main building system shall be capable of being silenced).
5. Verify the notification appliance is operating in the occupants' sub-slave system office.
6. Press 'alarm silence' on the slave to silence the bells in the slave. Press 'alarm silence' switch on the main building fire system to silence the bells in the building.
7. Reset the systems. Insure the slave panel is reset **FIRST**. Reset the system by pressing the "**lamp test/reset**" switch. Once the slave system is restored reset the main building fire system following the same procedures as PCC reset.
8. All systems should be restored to normal operation.

4.14.2 Perform **Sub-system Fire system interface** test (where applicable) on the building fire alarm system. Directions are as follows:

- a. When Annex fire alarm systems are interfaced to the building fire alarm system, a test shall be conducted on the Annex system to insure proper signaling at the building FACP.
- b. Initiate an alarm condition on the Annex FACP. The appliances will sound throughout the Annex premises. Concurrently, a signal should be received on the Main FACP (Main Building system) and initiate a supervision alarm indicating the Annex is in alarm. The main building bells should not ring.
- c. The Annex system should be silenced and reset.
- d. Once the Annex is reset, resetting the FACP should clear the supervision alarm at the main building.
- e. If the Sub-system has network communication with the master fire alarm system, all communication occurring on the sub-system, should also be identified on master system (e.g. LCD text identifying location of alarm, local audible), but only the notification appliances (bells) sound at sub-system location. No appliances shall sound at master fire alarm system.

- f. Audible silence and reset controls should be conducted at the sub-slave system or master fire alarm system

4.15 Perform test on the Associated Control functions of building fire alarm system. Directions are as follows:

4.15.1 Elevator Recall

Test procedure:

- a. Initiate an alarm condition on any smoke detector located in elevator foyer except for primary floor.
- b. The elevator (when configured) will recall to the primary floor of recall. (The primary floor is defined as the floor, which is used by the fire department as the main level of access for the building.)
- c. The system will alarm, and the red LED light should illuminate on the smoke detector
- d. The FACP and RCC-1 will identify the particular activated zone.
- e. Notification appliances (building bells) should sound.
- f. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
- g. Reset fire alarm system by pressing the "**RESET**" button.
- h. Repeat all steps for each smoke detector.
- i. Verify actual location description on LCD upon each alarm
- j. Reset the alarm activation. The elevator should restore to normal operation.
- k. Initiate an alarm condition in the elevator foyer of the primary floor. The elevator should recall to the secondary floor of recall. (The secondary floor is defined as the floor, which can be used as an alternate level for fire department access.)
- l. Follow operational steps as mentioned above.

4.15.2 HVAC Shutdown

Test procedure:

- a. Initiate an alarm condition.
- b. Upon alarm activation, the HVAC assemblies should shut down (if system is configured to do so).
- c. The system will alarm, and the red LED light should illuminate on the smoke detector
- d. The FACP and RCC-1 will identify the particular activated zone.
- e. Notification appliances (building bells) should sound.
- f. Inspect all HVAC assemblies to insure they were shut down.
- g. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
- h. Reset fire alarm system by pressing the "**RESET**" button.
- i. Verify actual location description on LCD upon each alarm
- j. Reset the alarm activation. The HVAC units should restore to normal operation.
- k. Inspect all HVAC assemblies to insure they have been re-instated.

4.15.3 Door Release

Test Procedure

- a. Initiate and alarm condition on a smoke detector on either side of the controlled door.
- b. Upon alarm activation, the door magnets should release door (if system is configured to do so).
- c. The system will alarm, and the red LED light should illuminate on the smoke detector
- d. The FACP and RCC-1 will identify the particular activated zone.

- e. Notification appliances (building bells) should sound.
- f. Verify door was released.
- g. Silence the appliances by pressing "**ALARM ACK**" and "**AUD SIL**" button on the fire alarm system or RCC-1.
- h. Reset fire alarm system by pressing the "**RESET**" button.
- i. Verify actual location description on LCD upon each alarm
- j. Reset the alarm activation. The door magnets should energize.
- k. Push door open and it should catch on magnet.

4.16 Perform **Audible test** on the building fire alarm system. Directions are as follows:

Test procedure:

- a. Inspect the location of each notification appliance (Bell, horn, etc.). Insure all are physically located where design identifies.
- b. Initiate an alarm activation of the building fire alarm system by activating the nearest manual pull station.
- c. Press "**ALARM ACK**" on fire alarm control panel.
- d. Physically verify that all appliances are sounding throughout the protected premises.
- d. Once all appliances are verified, press "**AUD SIL**" switch on the FACP.
- e. Restore the manual pull station, which initiated the alarm.
- f. Reset fire alarm system by pressing the "**RESET**" button.

4.17 Perform **Visual notification appliance test** on the building fire alarm system. Directions are as follows:

Test procedure:

- a. Inspect the location of each visual notification appliance. Insure all are physically located where design identifies.
- b. Initiate an alarm activation of the building fire alarm system by activating the nearest manual pull station.
- c. Press "**ALARM ACK**" on fire alarm control panel (this silences the system audible).
- d. Physically verify that all appliances are flashing throughout the protected premises.
- d. Once all appliances are verified, press "**AUD SIL**" switch on the FACP.
- e. Restore the manual pull station, which initiated the alarm.
- f. Reset fire alarm system by pressing the "**RESET**" button.

4.18 Perform **Disconnect switch** test of the Fire Alarm Control Panel (FACP). Directions are as follows:

- a. If your system is configured with disconnect switches for specific functions, perform test verifying proper operation.
- b. Switch the disconnect switch to a 'off normal' position. A supervision alarm should occur to the fire alarm system.
- c. Initiate an alarm condition. The function that the switch controls should not occur.
- d. Reset the fire alarm system and restore the disconnect switch to normal position.
- e. Perform this test for each individual disconnect switch.

4.19 Perform **Ground fault** test of the Fire Alarm Control Panel (FACP). Directions are as follows:

- a. Initiate a ground fault condition.
- b. Utilizing a conductor wire, place it on the positive "+" side of the initiation circuit control.

- c. Place the other end of the conductor to the system Chassis assembly.
- d. A ground fault indication should appear on the FACP and a system audible should sound.
- e. Once this is verified, remove the test conductor wire from the system.

5.0 Equipment Preventive Maintenance Procedures

Tools and material requirement

- ◆ Ladder
- ◆ Clean towel
- ◆ Cleaning chemical
- ◆ Vacuum cleaner
- ◆ Compressed air
- ◆ Screwdriver(s)
- ◆ Soft bristle paint brush (small)
- ◆ Abrasive material (Emory cloth, sandpaper, wire brush)

5.1 Perform preventive maintenance to the CONTROL PANEL. Procedures are as follows:

- a. Vacuum inside of fire alarm system cabinet.
- b. Dust all module cards with soft bristle brush.
- c. Insure all screw terminals are securely fastened.
- d. Clean battery terminals with abrasive material.
- e. Clean cabinet door window with cloth and cleaner.
- f. Insure terminal screws are securely fastened on all Transient Surge protectors.
- g. Perform Lamp Test on system, and replace any lights or LED's that do not illuminate.
- h. Insure all connectors are securely fastened on the Fiber Optic connections. Insure proper strain relief is on fiber to insure proper tension on the fiber assembly.

5.2 Perform preventive maintenance on system batteries.

- a. Remove battery connectors.
- b. Clean contact points with abrasive paper.
- c. Insure all screw terminals are securely fastened.
- d. Reconnect connectors.

- 5.3 Perform preventive maintenance on remote annunciator/RCC –1.
 - a. Vacuum inside of fire alarm system cabinet.
 - b. Dust all module cards with soft bristle brush.
 - c. Insure all screw terminals are securely fastened.
 - d. Clean cabinet door window with cloth and cleaner.

- 5.4 Perform preventive maintenance on Duct detectors.
 - a. Inspect and clean air holes in inlet sampling tubes.
 - b. Vacuum inlet chambers of smoke detectors.
 - c. Clean smoke detector exterior with window type cleaner.
 - d. Thoroughly clean duct detector housing.
 - e. Remove and replace smoke detector if fire alarm control panel identifies device as being dirty.

- 5.5 Perform preventive maintenance on Manual Pull stations.
 - a. Clean exterior of appliance thoroughly with cleaner and cloth.
 - b. Remove manual station and vacuum inside mounting enclosure (insure device is turned off prior to cleaning – opening pull station will initiate alarm condition).
 - c. Inspect terminals for corrosion, and clean as required.
 - d. Insure terminals are securely fastened.
 - e. Replace device address marking on manual pull station (e.g. 03/10 etc).

- 5.6 Perform preventive maintenance on Detectors.
 - 5.6.1 Heat detectors
 - a. Clean exterior with window type cleaner and towel.
 - b. Clean electrical contacts on mounting surface with abrasive material.
 - c. Remove and replace detector if system is indicating “dirty device”.

- d. Replace device address marking on heat detector (e.g. 03/10 etc).

5.6.2 ILLI smoke detectors

- a. Clean exterior with cleaner and towel.
- b. Clean electrical contacts on mounting surface with abrasive material.
- c. Remove exterior, (use screwdriver between base and outer shell, and pry apart) clean chamber with vacuum and insure insect screen is clean.
- d. Remove and replace detector if system is indicating "dirty device".
- e. Replace device address marking on heat detector (e.g. 03/10 etc).

5.6.3 Fire print smoke detectors (FPT-11)

- a. Clean exterior with cleaner and towel
- b. Clean electrical contacts on mounting surface with abrasive material
- c. Remove detector cover and clean chamber with vacuum and insure insect screen is clean.
- d. Remove and replace detector if system is indicating "dirty device".
- e. Replace device address marking on smoke detector (e.g. 03/10 etc).

5.7 Perform preventive maintenance on interface modules for tamper and Waterflow switches, and fire pump interface modules.

- a. Clean exterior with cleaner and towel.
- b. Clean electrical contacts on mounting surface with abrasive material.
- c. Insure all terminal connections are securely fastened.
- d. Perform same tasks on the devices the interface modules are monitoring.

5.8 Perform preventive maintenance on Notification Appliances (bells and strobes)

- a. Clean exterior of appliance thoroughly with window type cleaner and cloth.
- b. Replace device address marking on appliance (e.g. B – 03/10 etc.)

6.0 Troubleshooting Fire Alarm Problems that may occur during *Inspection, Testing* or performance of *Preventative Maintenance*.

Troubleshooting Table of problems and possible solutions:

LCD Display on Fire Alarm Control Panel	Possible solutions to fault
24 VDC on Battery Back-up	System has switched to battery due to following: <ul style="list-style-type: none"> ◆ Low or no 120 vac at MPS power supply ◆ MPS power supply circuit breaker tripped ◆ MPS 15 amp circuit breaker blown ◆ Plug P-10 or P-12 disconnected on PSR
AC Fail or Brownout	Fire system has switch to battery due to: <ul style="list-style-type: none"> ◆ Low or no 120 vac at MPS power supply ◆ MPS power supply circuit breaker tripped ◆ MPS 15 amp circuit breaker blown ◆ Plug P-10 or P-12 disconnected on PSR
Aux. RS232 Transmit Failure	NET-7 has detected a P-1 programming port failure due to: <ul style="list-style-type: none"> ◆ CSGM programming cable is faulty ◆ Lap top Com port is faulty ◆ Telco connector on MMB is bad
Battery Back-up is invalid	MMB has detected a battery fault due to: <ul style="list-style-type: none"> ◆ Battery installed but no selected on CSGM
Battery Fuse/Wiring open	MMB has detected a battery fault due to: <ul style="list-style-type: none"> ◆ Wiring from battery to MMB is faulty ◆ Fuse F-2 on MMB is blown/missing
Device Communicator Error	Intelligent device whose response has failed checking due to: <ul style="list-style-type: none"> ◆ Loose connection at ALD or device ◆ Induced “noise” on wiring ◆ Simultaneous ground faults on multiple ALD loops ◆ Inductive load on TRI relay needs suppression
Device LED Turned ON	Intelligent device LED was turned on Test Menu
Device Multiple Response	Two or more intelligent devices reporting in at the same address during normal supervision due to: <ul style="list-style-type: none"> ◆ Two or more devices programmed at same address ◆ Forgetting to disconnect device from loop during program ◆ Bad device reporting in at multiple addresses
Event Log 80% full	History log has reached 80% capacity <ul style="list-style-type: none"> ◆ Trouble will clear on reset
Event Log 90% full	History log has reached 90% capacity <ul style="list-style-type: none"> ◆ Trouble will clear on reset
Ground Fault Minus	Low resistance from negative DC to earth ground due to:

	<ul style="list-style-type: none"> ◆ Wire fault 														
Ground Fault Positive	<p>Low resistance from positive DC to earth ground due to:</p> <ul style="list-style-type: none"> ◆ Wire fault 														
High Battery Voltage	<p>System battery voltage too high due to:</p> <ul style="list-style-type: none"> ◆ Bad batteries – put panel on batteries. Connect voltmeter across battery and make sure it matches voltage reading on “test” menu. If readings differ more than .5vdc, MMB must be replaced. 														
IEC Limit reached – Service req.	<p>Intelligent environmental compensation has reached UL limit. Panel can no longer compensate for chamber being dirty due to:</p> <ul style="list-style-type: none"> ◆ Detector requires cleaning ◆ Detector beyond cleaning and must be replaced 														
Incorrect Device ID	<p>Conflict between CSGM and type or usage of device that is reporting in from field due to:</p> <ul style="list-style-type: none"> ◆ FP-11 device ID does not correspond to what is assigned in CSGM (program) ◆ TRI series device is not set for proper usage: <p>⇒ Settings:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">⇒ <u>MXL/CSGM</u></td> <td style="width: 50%; text-align: right;"><u>FPI-32</u></td> </tr> <tr> <td>⇒ Alarm</td> <td style="text-align: right;">Alarm</td> </tr> <tr> <td>⇒ Waterflow</td> <td style="text-align: right;">Alarm</td> </tr> <tr> <td>⇒ Supervisory</td> <td style="text-align: right;">Trouble</td> </tr> <tr> <td>⇒ Status</td> <td style="text-align: right;">Status</td> </tr> <tr> <td>⇒ OS&Y</td> <td style="text-align: right;">Trouble</td> </tr> <tr> <td>⇒ Trouble</td> <td style="text-align: right;">Trouble</td> </tr> </table> <ul style="list-style-type: none"> ◆ Device usage was set correctly, but is set to wrong address ◆ Wrong type of device was programmed and connected into system at particular address ◆ Switch S3/S4 or jumper G1/G2 set incorrectly on CSM 	⇒ <u>MXL/CSGM</u>	<u>FPI-32</u>	⇒ Alarm	Alarm	⇒ Waterflow	Alarm	⇒ Supervisory	Trouble	⇒ Status	Status	⇒ OS&Y	Trouble	⇒ Trouble	Trouble
⇒ <u>MXL/CSGM</u>	<u>FPI-32</u>														
⇒ Alarm	Alarm														
⇒ Waterflow	Alarm														
⇒ Supervisory	Trouble														
⇒ Status	Status														
⇒ OS&Y	Trouble														
⇒ Trouble	Trouble														
Input Device Response Too Low	<p>Intelligent device whose analog voltage is too low due to:</p> <ul style="list-style-type: none"> ◆ Device/appliance wiring on a TRI module is faulted ◆ EOL missing or incorrect value ◆ Low or no 24 vdc input to CZM/ICP ◆ Verify correct polarity on circuit ◆ Intelligent detector sensitivity out of range ◆ Intelligent detector whose smoke chamber is defective 														
Input Device Not Responding	<p>Intelligent device is not responding from field due to:</p> <ul style="list-style-type: none"> ◆ Wiring from module to field device is incorrect or faulted ◆ CSGM device address is programmed incorrectly 														

	<ul style="list-style-type: none"> ◆ Device address is set incorrectly with FPI
Log Full, Events Will be Lost	<p>History file is full. Use CSGM to extract history to laptop and clear events from log.</p> <ul style="list-style-type: none"> ◆ Trouble will not clear on reset until extraction is complete
Low Battery Voltage	<p>System has detected low battery condition due to:</p> <ul style="list-style-type: none"> ◆ Battery voltage is below 24 vdc when system is operating from 120 vac ◆ Battery is below 21 vdc when operating on battery power
Low IEC Voltage, Service Req.	<p>Intelligent environmental compensation is too low due to:</p> <ul style="list-style-type: none"> ◆ Detector requires cleaning ◆ Detectors are beyond cleaning and require replacement
Missing Device ID Response	<p>ALD module has not returned an ID poll response for any detectors or devices due to:</p> <ul style="list-style-type: none"> ◆ ALD module has not reported its ID poll in specified time ◆ ALD module is not responding
Module Not Responding	<p>Module is not responding from the field due to:</p> <ul style="list-style-type: none"> ◆ Module not installed ◆ Low or no 24 vdc at module ◆ CSGM module address is programmed incorrectly ◆ Module switch address is set incorrectly ◆ Wiring from MNET is missing or faulted ◆ Ribbon cable from P-6 on MMB to P-7/10 on MOM board
MXL Network Failure	<p>MKB/RCC has not communicated with the MMB in specified time due to:</p> <ul style="list-style-type: none"> ◆ Uploading large CSGM file ◆ Wiring from MNET to PSR is incorrect or faulted ◆ MKB/RCC address is not configured in the CSGM ◆ Ribbon cable from P-1 on ANN to P5 on PSR, P8 on MMB or P1 on PS5N7 is missing or faulted (refer to wiring diagrams in tech manual)
Pre-Dirty Analog Volt. Reached	<p>Intelligent environmental compensation (IEC) is nearing its UL limit (replace dirty device).</p>
Printer Off Line/fault	<p>PIM-1 has detected a supervised peripheral device fault due to:</p> <ul style="list-style-type: none"> ◆ Printer is offline or powered down ◆ CSGM programming error; incorrect device communication parameter settings ◆ Switch SW-1 on PIM-2 is incorrect ◆ Wiring from PIM-2 is incorrect or faulted
Relay Supervision Failure	<p>MMB has detected a relay coil supervision fault due to:</p>

	<ul style="list-style-type: none"> ◆ Low or no 24 vdc power at module (verify power input to module and MOM board)
Signal Circuit Disarmed	CSM output was by-passed via “Control Menu”
Signal Circuit Loop Open	<p>System has detected an open circuit due to:</p> <ul style="list-style-type: none"> ◆ Wiring is incorrect or faulted ◆ EOL is missing or incorrect ◆ Class A jumper is not installed for Class B system
Signal CKT Loop Shorted	<p>System has detected a short circuit due to:</p> <ul style="list-style-type: none"> ◆ Wiring is incorrect or faulted ◆ EOL is incorrect ◆ Notification appliances are not polarized or connected reverse polarity
Unspecified Dev. Responding	<p>System has detected a field device that is not programmed in CSGM due to:</p> <ul style="list-style-type: none"> ◆ Device programmed incorrectly ◆ Device is connected to wrong loop
Walktest Activated	System was placed in walktest mode via “TEST” menu

SECTION 7

INSPECTION FORMS

Weekly Inspection

FORM 7-A

Quarterly Inspection

FORM 7-B

Semiannual Tests and Maintenance

FORM 7-C

Annual Tests and Maintenance

FORM 7-D

FIRE DETECTION AND ALARM SYSTEMS

Weekly Visual Inspection

FORM 7-A

DATE:

POST:

BUILDING:

SYSTEM:

INSPECTOR:

YES = SATISFACTORY

NO = UNSATISFACTORY (EXPLAIN ON REVERSE)

N/A = NOT APPLICABLE

Fire alarm panel appears operational. _____

If no, please provide details:

Lights and LEDs on fire alarm and annunciator panels are operational. _____

If no, please provide details:

Any trouble conditions identified on LCD?. _____

If no, please provide details:

Power supplies appear operational. _____

If no, please provide details:

If physical damage appears on any device listed, perform physical test as indicated in Section 2.1.1-7 and explain damage and repairs made.

**If any "No's" are listed above, please fax to:
OBO/OM/FIR/FPS at 703-812-2302**

FIRE DETECTION AND ALARM SYSTEMS

Quarterly Visual Inspection

FORM 7-B

DATE:

POST:

BUILDING:

SYSTEM:

INSPECTOR:

YES = SATISFACTORY

NO = UNSATISFACTORY (EXPLAIN ON REVERSE)

N/A = NOT APPLICABLE

The waterflows were visually inspected for mechanical damage and correct settings and were found satisfactory. _____

If no, please provide details:

The valve tamper switches were visually inspected for mechanical damage and correct settings and were found satisfactory. _____

If no, please provide details:

If physical damage appears on any device listed, perform physical test as indicated in Section 3.4.6 & 7 and explain damage and repairs made.

If no, please provide details:

COMMENTS:

**If any "No's" are listed above, please fax to:
OBO/OM/FIR/FPS at 703-812-2302**

FIRE DETECTION AND ALARM SYSTEMS

Semiannual Tests and Maintenance

FORM 7-C

DATE:

POST:

BUILDING:

SYSTEM:

INSPECTOR:

YES = SATISFACTORY

NO = UNSATISFACTORY (EXPLAIN ON REVERSE)

N/A = NOT APPLICABLE

The waterflows were physically tested and are satisfactory. _____

If no, please provide details:

The valve tampers were physically tested and are satisfactory. _____

If no, please provide details:

A visual inspection of the PCC panel and its interface with the building panel was made and was found satisfactory. _____

If no, please provide details:

A visual inspection of the elevator recall interface was made and was found satisfactory. _____

If no, please provide details:

A visual inspection of the HVAC shutdown interface was made and was found satisfactory. _____

If no, please provide details:

A visual inspection of the slave panel(s) was made and was found satisfactory. _____

If no, please provide details:

COMMENTS:

**If any "No's" are listed above, please fax to:
OBO/OM/FIR/FPS at 703-812-2302**

FIRE DETECTION AND ALARM SYSTEMS

]

Annual Tests and Maintenance

FORM 7-D

DATE:

POST:

BUILDING:

SYSTEM:

INSPECTOR:

YES = SATISFACTORY

NO = UNSATISFACTORY (EXPLAIN ON REVERSE)

N/A = NOT APPLICABLE

Alarm indicating appliances (visual and audible) were tested and are operational. _____

If no, please provide details:

The primary power supply was tested and is operational. _____

If no, please provide details:

The secondary power supply was tested and is operational. _____

If no, please provide details:

The lamp and LED circuits were tested and are satisfactory. _____

If no, please provide details:

Smoke detectors were recalibrate and operate correctly.* _____

If no, please provide details:

Batteries were discharged for two hours and remain operational. _____

If no, please provide details:

Battery charging devices were tested for proper operation. _____

If no, please provide details:

Battery voltage was measured under full load with charger disconnected. _____

If no, please provide details:

Batteries had the float voltage measured in each cell and are satisfactory. _____

If no, please provide details:

The PCC interface was tested and was satisfactory. _____

If no, please provide details:

The elevator recall functions, primary and secondary, were tested and were satisfactory. _____

If no, please provide details:

The HVAC shutdown interface was tested and was satisfactory. _____

If no, please provide details:

The Slave Fire System(s) was tested and was satisfactory. _____

If no, please provide details:

Bell or horns (notification appliance circuits) were tested and are operational. _____

If no, please provide details:

Annunciators were tested and are operational. _____

If no, please provide details:

Control units were tested and all functions are operational. Voice alarm system components were tested and are operational. _____

If no, please provide details:

Each initiating and signaling circuit was tested for trouble signals. _____

If no, please provide details:

The following test must be conducted at 15 years and every 5 years thereafter.

Two fixed temperature heat detectors for every 100 present were removed and satisfactorily tested by a testing laboratory. The two fixed temperature detectors were replaced with new fixed temperature heat detectors. _____**

DATE THE SYSTEM WAS INSTALLED:

DATE THE FIXED TEMPERATURE HEAT DETECTORS WERE LAST TESTED:

*NOTE: Detector sensitivity shall be checked within one year after installation and every alternate year thereafter. After the second required calibration test, where sensitivity tests indicate that the detector has remained within its listed and marked sensitivity range, the length of time between calibration shall be extended to a maximum of 5 years. Where the frequency is extended, records of detector-caused nuisance alarms and subsequent trends of these alarms shall be maintained. In zones or areas where nuisance alarms show any increase over the previous year, calibration tests shall be performed. (NFPA 72 – 7 – 3.2.1)

**NOTE: If the tested fixed temperature heat detectors fail, all fixed temperature heat detectors in the building must be replaced.

**If any “No’s” are listed above, please fax to:
OBO/OM/FIR/FPS at 703-812-2302**

