Overview of Fire Alarm Systems and Maintenance

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Why use a Fire Alarm System?

- A fire alarm system is intended to enable a fire to be detected at a sufficiently early stage so that people who are at risk can be made safe either by escaping from the fire, or by the fire being extinguished (also to prevent extensive property damage). Neither of these measures can be used until people are made aware of fire.

- The effectiveness of the fire detection and alarm system depends on the stage of the fire at which it is operated. In order for all the occupants to escape without too much difficulty, an early alarm should operate before the escape routes becomes smoke-logged to such an extent as will cause occupants to have difficulty finding their way out of the building.

Why use a Fire Alarm System?

Fire Alarm Systems are used to protect life and property.

It protects by:

a. detecting a fire at an early stage

b. alerting and evacuating occupants

c. notifying the relevant personnel

d. activating auxiliary functions e.g. smoke controls, lift homing etc

e. identifying and guiding fire fighters

Is Fire Alarm System a mandatory requirement?

Mandatory - By the relevant authority

Non-mandatory - By Building Owner, Landlord & Insurance etc.

The requirements are specified in :

- Code of Practice for Fire Precautions in Buildings 2007 (Fire Code 2007) – by SCDF

- Code of Practice for Installation and Servicing of Electrical Fire Alarm System (SS CP10-2005) – by Spring Singapore

What is a Fire Alarm System made up of?

Components forming the System- 9 Items

1. **Smoke / Heat Detectors (Fire Detectors)**

2. **Alarm Panels (Control and Indicating Equipment)**

3. **Alarm Bells (Fire Alarm Devices)**

4. **Manual Call Points**

5. **DECAM Panel (Fire Services Signalling Transmitter)**

6. **DECAM Station (Alarm Monitoring Station)**

7. **Extinguishing Panels (Control for automatic fire protection equipment)**

8. **Gas/Sprinkler (Automatic fire protection equipment)**

9. **Charger/Battery (Power Supply Equipment)**

What is a Fire Alarm System made up of?

Fire Detectors

Control & Indicating Equipment

Fire Alarm Device

Main Fire Alarm Panel

Fire Service SignallingTransmitter

Alarm Monitoring Station

Fire Alarm Signal

Fault Signal

DECAMS

Manual Call Points

FIRE

Control for Automatic Fire Protection Equipment

Automatic Fire Protection Equipment
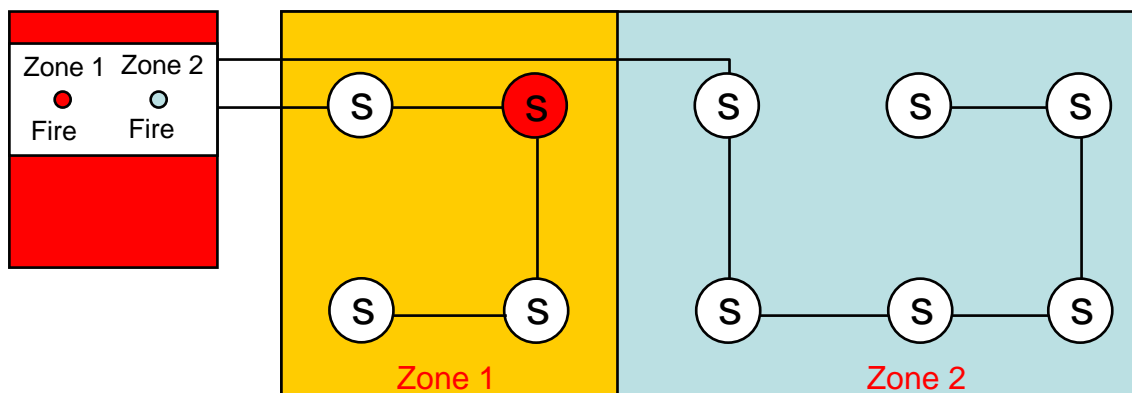
Power Supply Equipment
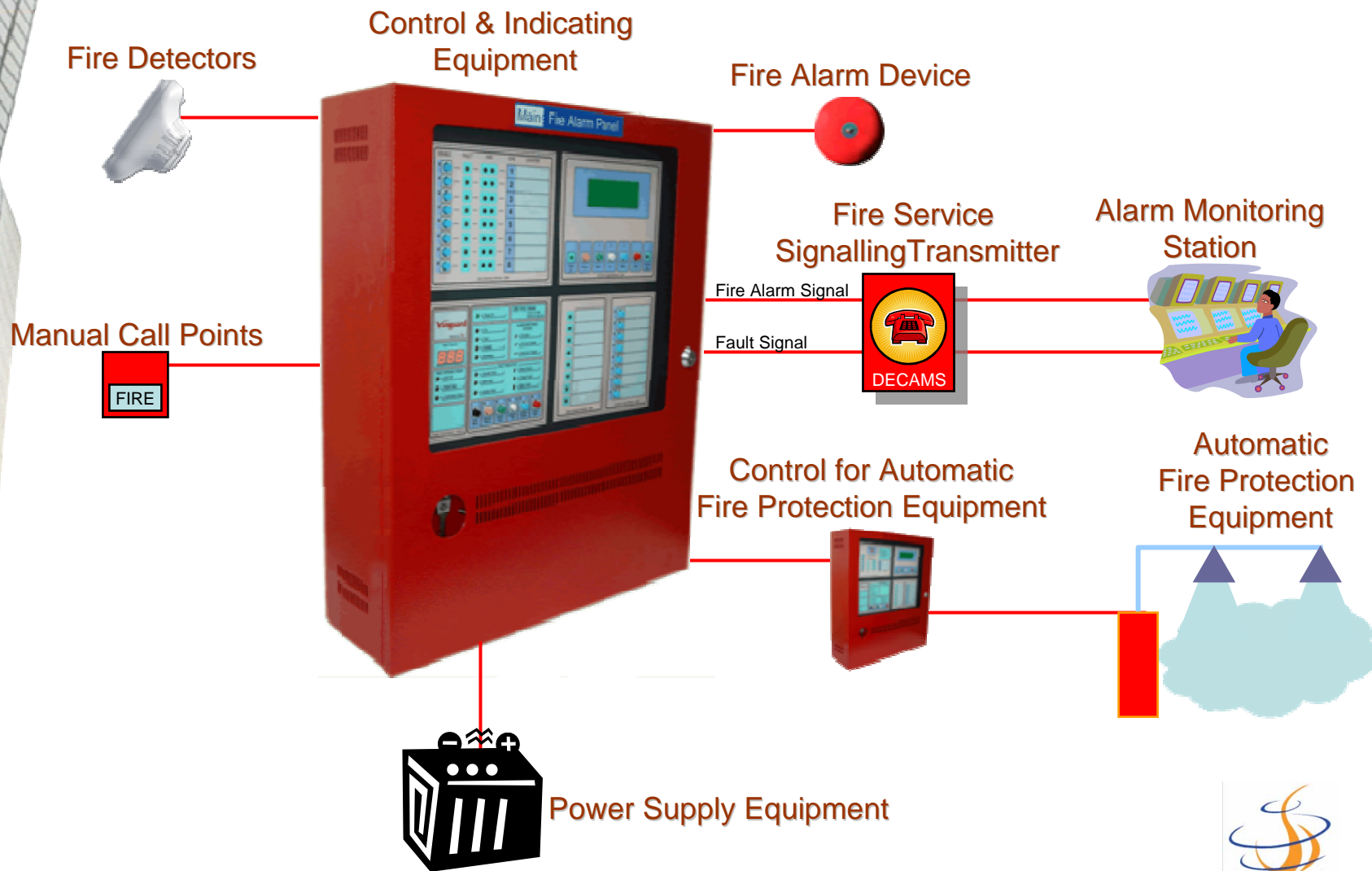
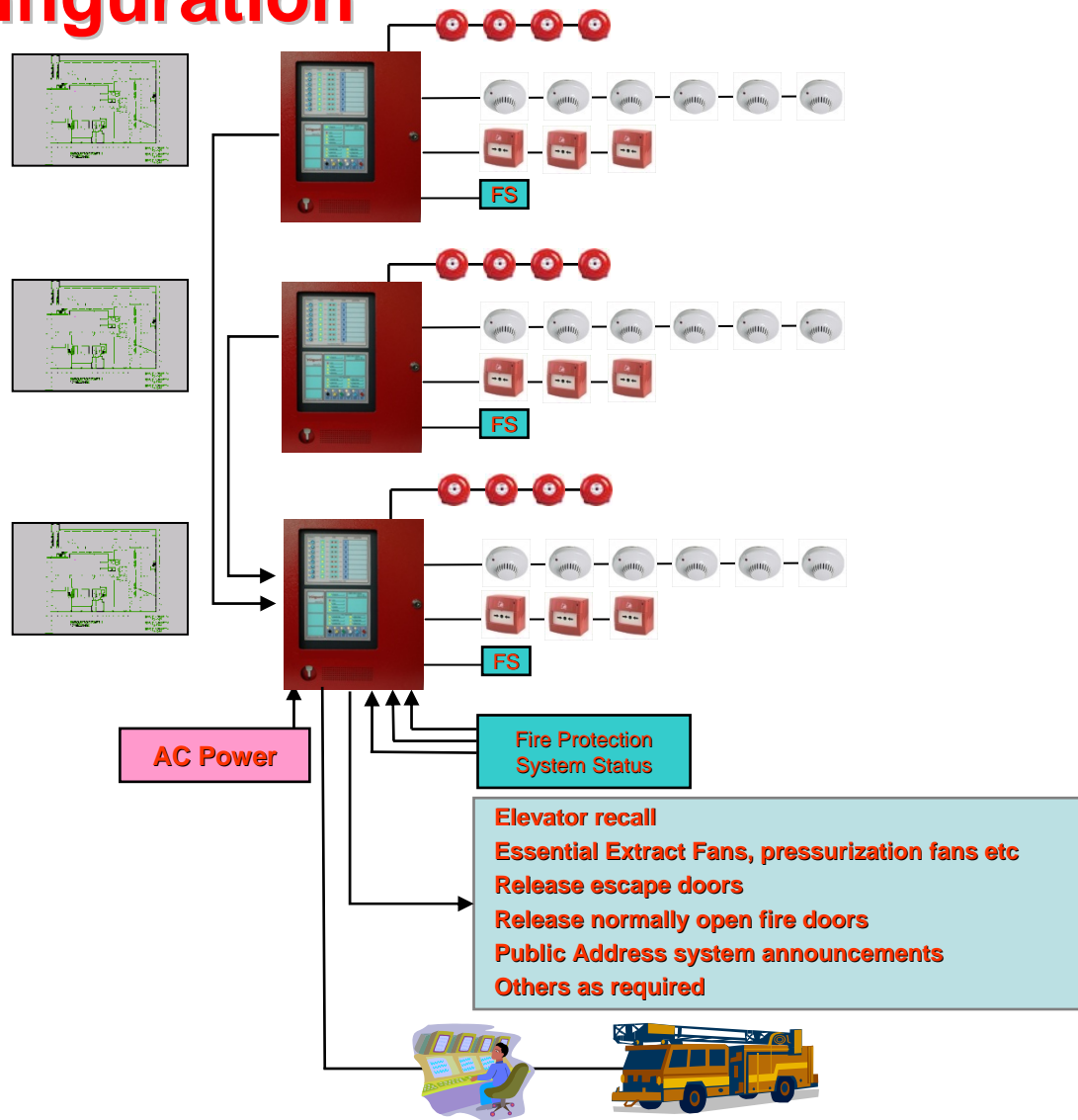# Types of Fire Alarm Systems in use today

Non-Addressable System

- also commonly known as "conventional"

- fire detectors are wired to the panel in groups known as zone

- identification of alarm status by zone

- fire detectors indicates either "Fire" or "Normal" status only

- system only indicate events but without event recording feature

Typical Non-Addressable Fire Alarm System Configuration

FS

AC Power

Fire Protection
System Status

Elevator recall

Essential Extract Fans, pressurization fans etc

Release escape doors

Release normally open fire doors

Public Address system announcements

Others as required

Addressable System

- each fire detector is provided with an address

- identification of alarm status by zone and by address

- fire detectors indicates various condition such as smoke level

- indicates and records system events
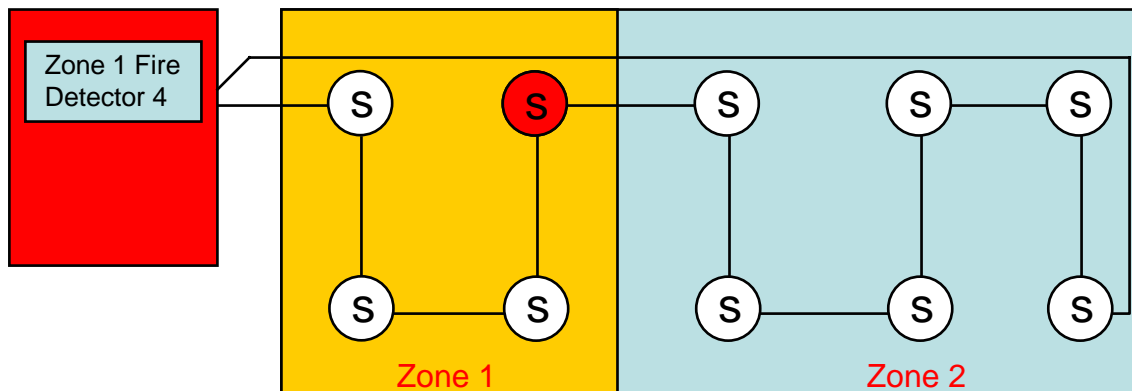
Typical Addressable Fire Alarm System Configuration

AC Power

Fire Protection System Status

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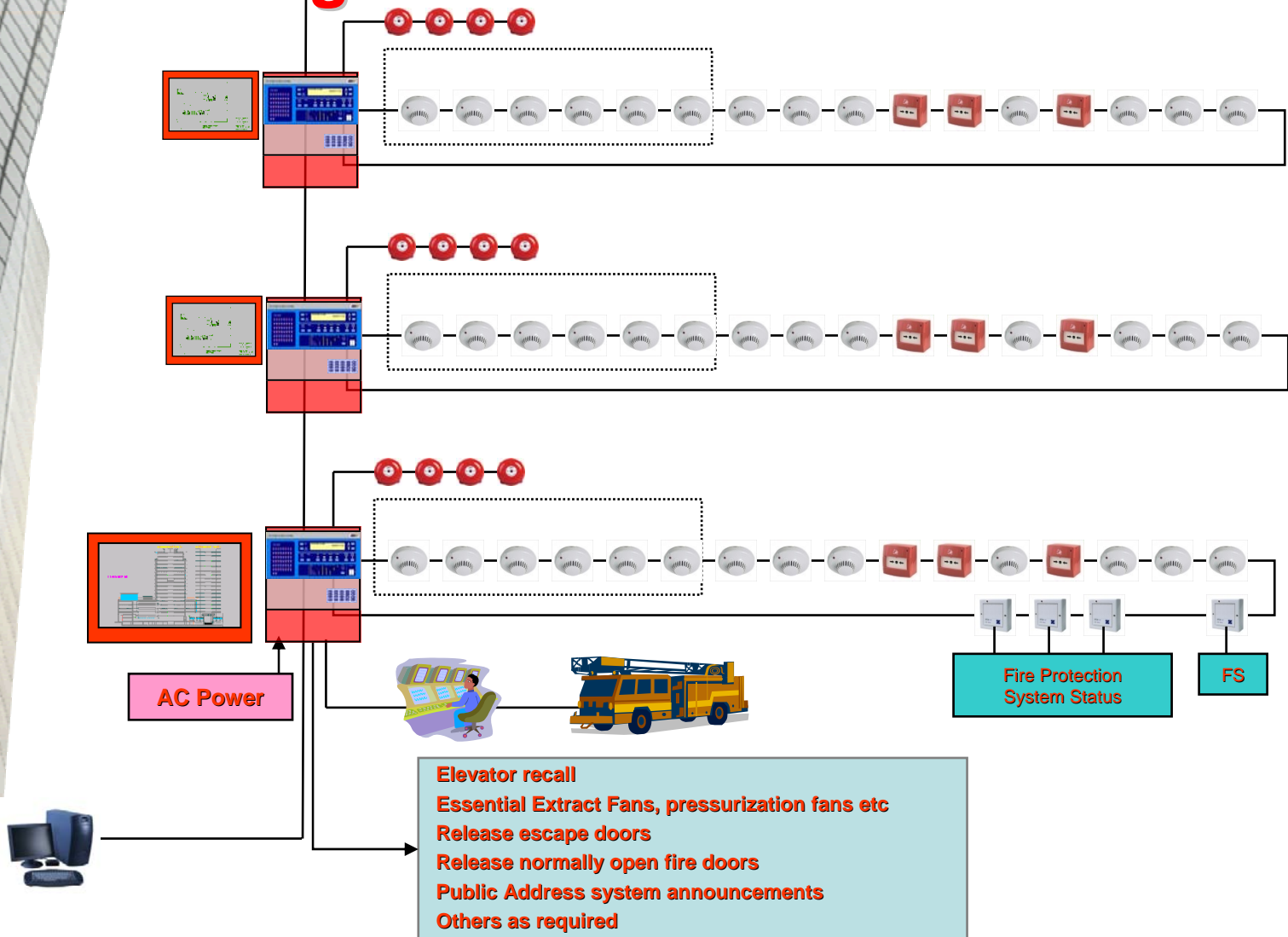
Hybrid System
(conventional + addressable)

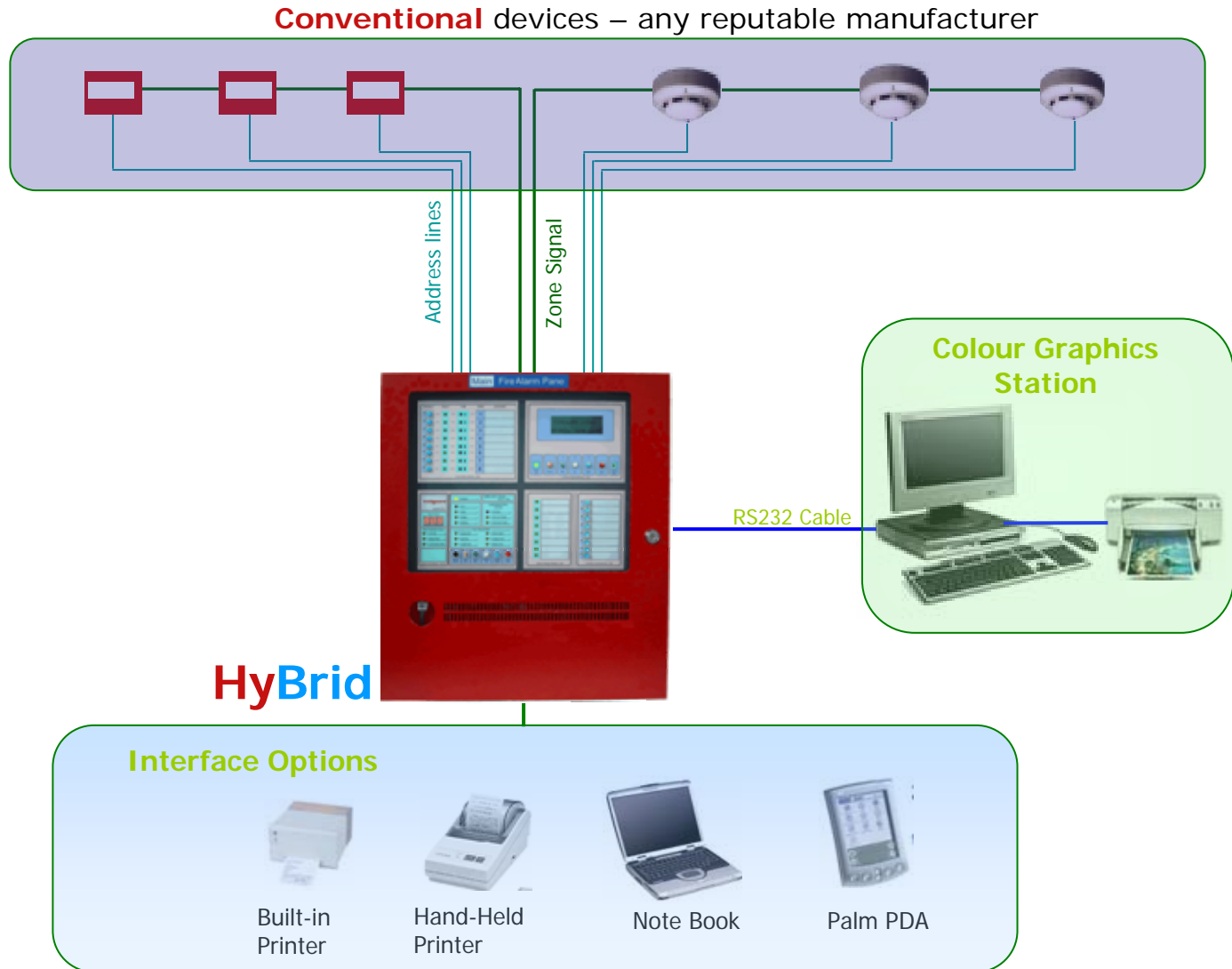- a combination of features from both addressable and non-addressable systems

- either built from a basic conventional system with add-on hardwire addressable features

- or built from an addressable system with conventional module

- event recording and alarm management feature

Typical Hybrid Fire Alarm System Configuration (conventional with hardwire addressable add-on)

Conventional devices – any reputable manufacturer

Address lines

Zone Signal

Colour Graphics Station

RS232 Cable

HyBrid

Interface Options

Built-in Printer

Hand-Held Printer

Note Book

Palm PDA

Typical Hybrid Fire Alarm System Configuration (conventional with hardwire addressable add-on)

FS

FS

FS

AC Power

Fire Protection
System Status

Elevator recall
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Release escape doors
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Public Address system announcements
Others as required
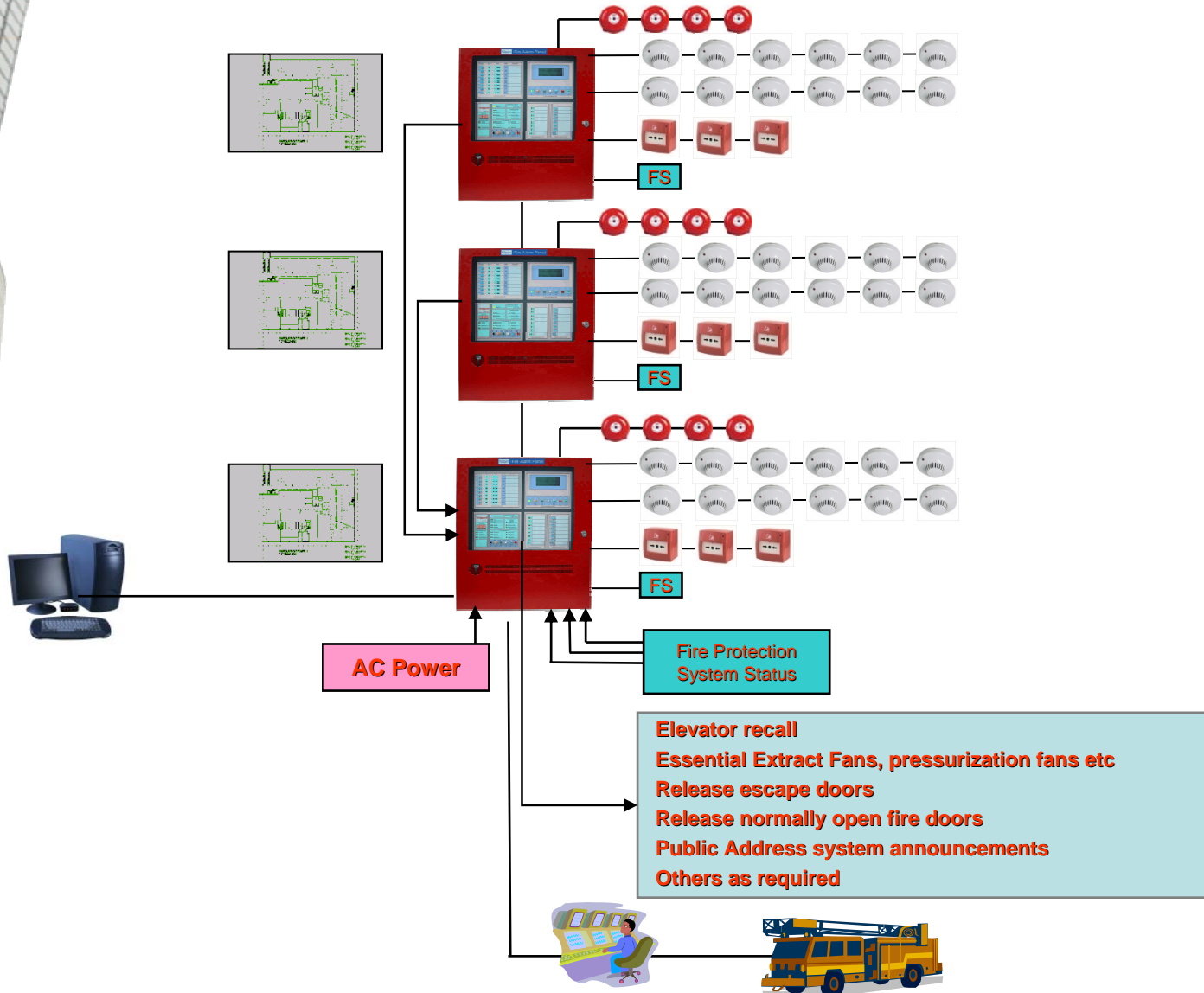
Typical Hybrid Fire Alarm System Configuration (addressable with conventional module add-on)

AC Power

Fire Protection System Status

FS

Elevator recall
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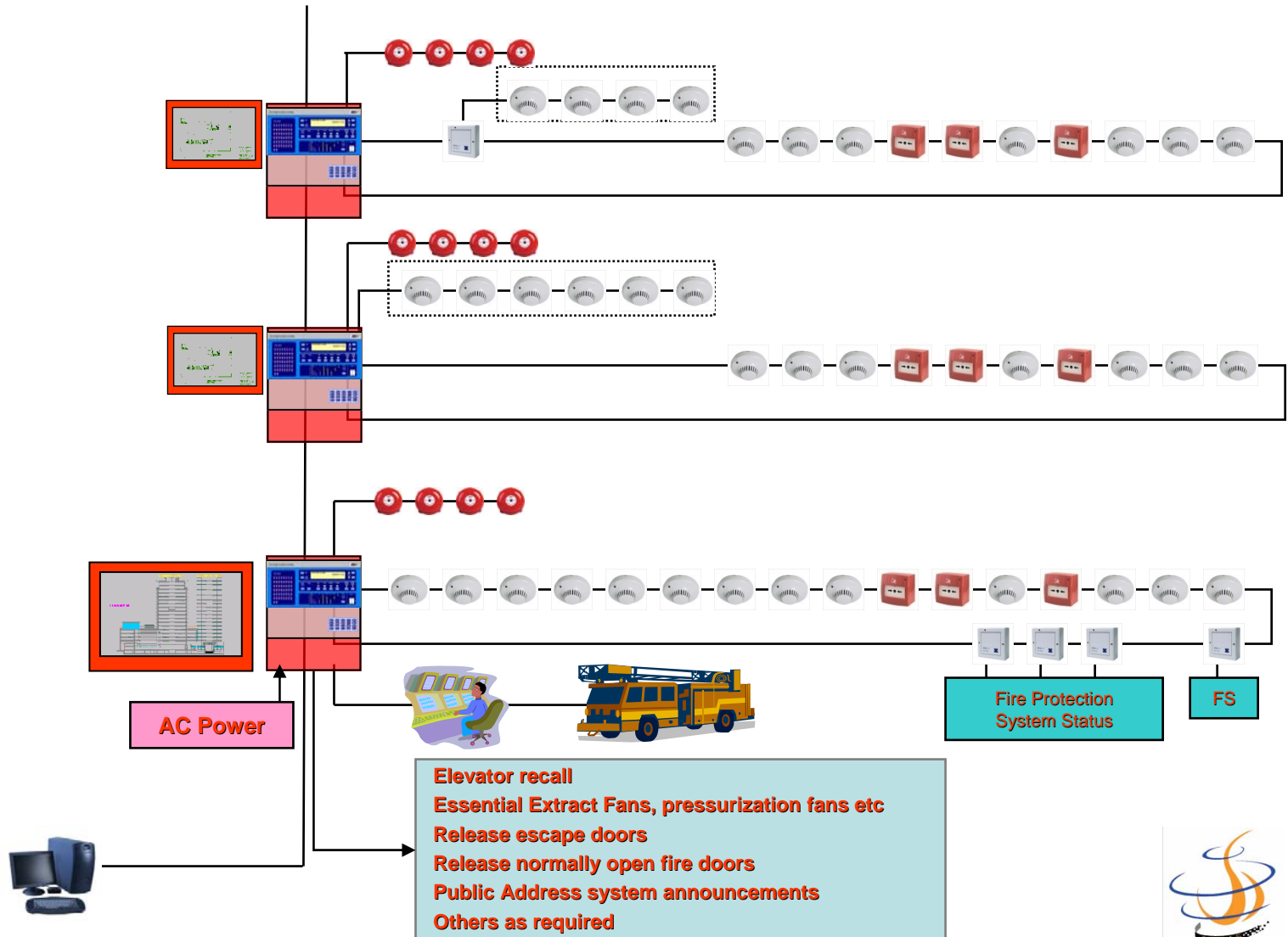
Maintenance

Maintenance

- **Regular Testing and Inspection**

- **False Alarm Management**

- **Common Maintenance Problems And Troubleshooting**

Maintenance

Objectives

a. to ensure continuous reliability of the fire alarm system

Responsibility

a. building owner or owner representatives

- to engage manufacturer's representative or

- competent contractor

- owner representative with suitable experience and special training

Regular Testing and Inspection
As per SS : CP10-2005 Requirements

- **Daily Check**

- **Weekly Test**

- **Monthly Test**

- **Annual Test**

Regular Testing and Inspection

Daily Checks

- Checks to ensure system is operating normally.
- Rectify and record any faults found

Weekly Tests

- Checks to ensure signal to monitoring station are functioning
- Check battery and voltage conditions
- Rectify and record any faults

Monthly Tests

- Simulate fire and fault conditions on all zones
- Check that power supply, indicator, alarm outputs etc are operating correctly
- Rectify and record any faults

Yearly Tests

- All monthly tests
- Test 20 percent of all detectors over as many zones as possible such that all detectors will be check over a 5 year period
- Test interlocking circuits to ancillary equipment
- Check and cleaning of dirty detectors
- Rectify and record any faults

Log Record

Building Name _____

Address _____

DATE	TIME	DESCRIPTION OF EVENTS	REMARKS	INITIALS	FOLLOWUP ACTION	DATE COMPLETED	INITIALS

False Alarm Management

1. false alarm causes disruption to the normal operation of business and create a drain to the fire services

2. responsibility for reducing false alarms rest with every party involved in

   - specification

   - design

   - installation

   - commissioning

   - management at the operation level

   - maintenance

   of the fire alarm system

False Alarm Management

Category of False Alarms

Unwanted Alarms / False Alarm

a.   environmental influences

b.   fire like phenomena

c.   inappropriate action by people in building

d.   accidental damage

e.   alarms arising out of faulty equipment

False Alarm Management

Common Causes of False Alarms

- fumes from cooking process
- steam from bathrooms, showers etc
- tobacco smoke
- dust (whether built up over time or not)
- insects
- incense, candle
- high humidity
- accidental damage (manual call point)
- aerosol spray
- high air velocities
- water egress
- testing or maintenance of the system without proper disablement.
- arises from fault in equipment

False Alarm Management

Recommendations

a. system designer should ensure that that the system design takes into account of the guidance provided the Code of Practices

b. installer identifies any circumstances that might lead to a high rate of false alarm and inform the designer, or user accordingly

c. at commissioning, checks should be carried out to ensure there is no obvious potential for an unacceptable level of false alarms

d. the designer and supplier should jointly provide sufficient information to user who may not be familiar with the technology of the Fire Alarm system.

False Alarm Management

Recommendations – cont'd

e. the user should arrange for suitable investigation and if appropriate, action to be taken on every occasion that a false alarm occurs and record the details which should include the following details :

- date & time

- identity and location of device

- category of false alarm

- reason for false alarm (if known)

- activity in the area (if the reason of false alarm is unknown)

- action taken

- the person responsible for recording the information

False Alarm Management

Some Useful Tools to help

minimize False Alarms

False Alarm management

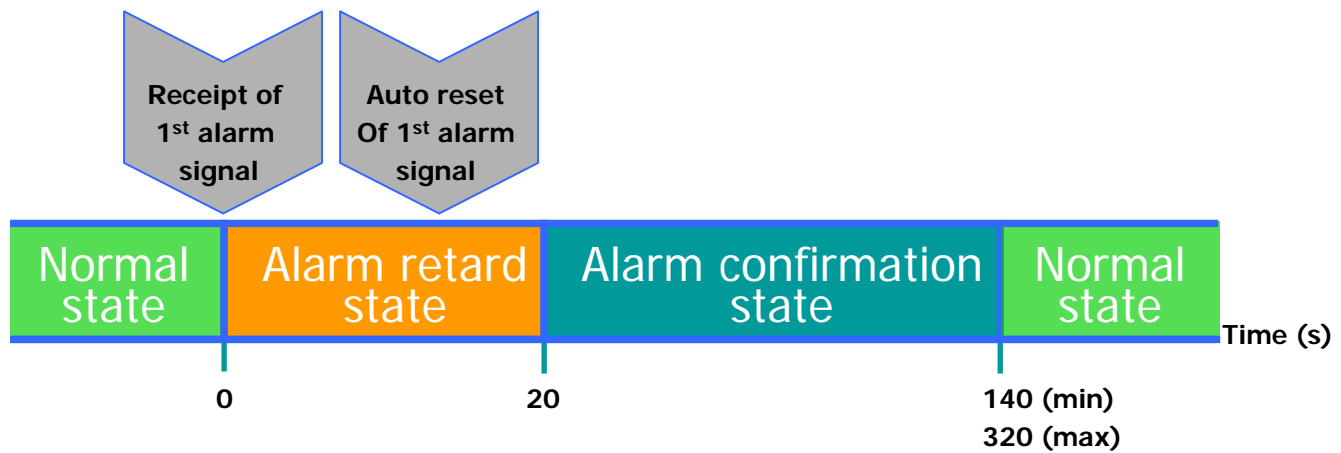## Sensitivity Settings

- **This is a feature normally in both addressable and non addressable type Fire Alarm System.**

- **Addressable – Adjusted from Panel**

- **Non-Addressable – Physical Device Selection**

False Alarm Management

To reduce the effects of transient environmental conditions which may cause various types of detectors to be activated, an automatic fire alarm system may be provided with an alarm verification feature, subject to the approval of the relevant authority.

Receipt of 1st alarm signal	Auto reset Of 1st alarm signal		
Normal state	Alarm retard state	Alarm confirmation state	Normal state

Time (s)

0 20 140 (min) / 320 (max)

The following components of the fire alarm system shall not be subject to this feature;

    a) Alarm Zone facilities containing only manual call points;
    b) Circuit between sub-alarm panels and the main alarm panels;
    c) Detectors used to activate fire suppression systems;
    d) Detectors installed in high risk areas; and
    e) Alarm zone circuits from fire suppression systems.

False Alarm Management

Sensor Auto Contamination Adjustments
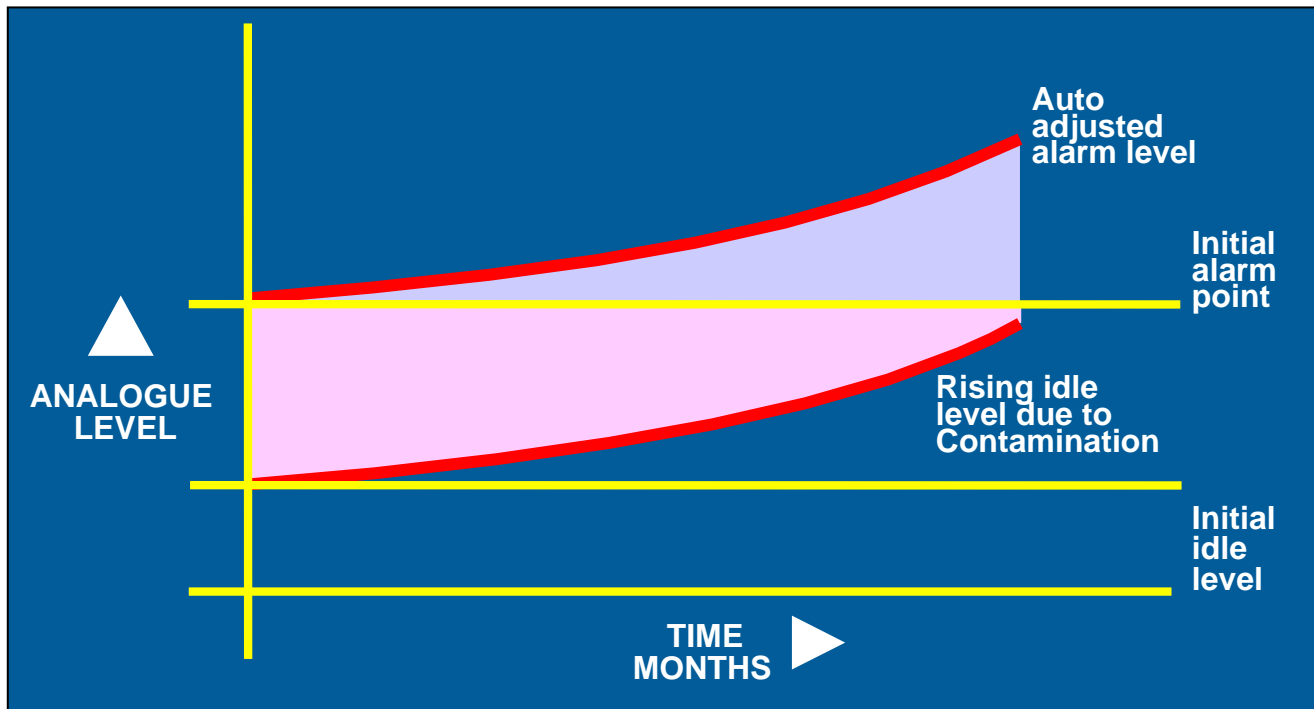
Common Maintenance Problems

Common Maintenance Problems

4 Storey High Atrium that is protected by point type smoke detectors

Problem:

Detectors cannot be tested

Faulty detectors cannot be reach for replacement

Detector insensitive due to the mounting height exceeding 10metre

Solution :

Select an alternative detection system

Able to comply with the Listed Installation Requirements

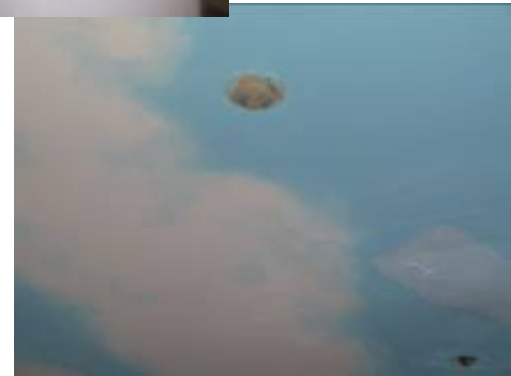Easy to maintain without having to access from the atrium Floor

Thank You
for
your attention