

**FIRE SAFETY ENGINEERING**

UPDATED CONTENT WHICH ORIGINALLY  
APPEARED IN JUNE AND JULY/AUGUST 2005

[www.fseonline.co.uk](http://www.fseonline.co.uk)

THE DEFINITIVE MAGAZINE  
FOR THE FIRE SAFETY COMMUNITY



United Business Media

# FSE

**“The choice is between good maintenance and criminal negligence”**

Bill Rossiter and Dave Bartlett detail the tasks and duties involved in maintenance of automatic fire detection systems



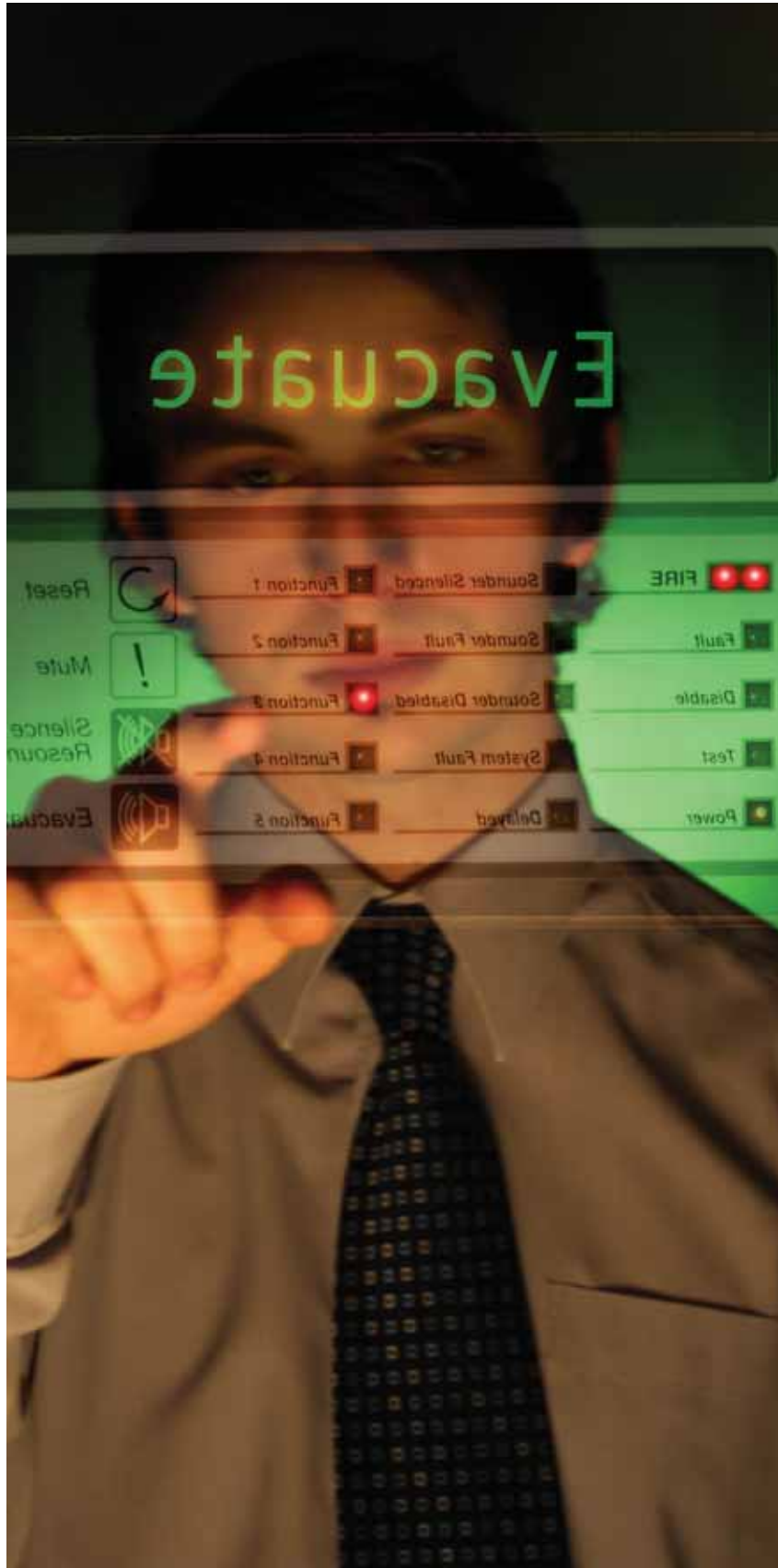
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# THE VALUE OF GOOD MAINTENANCE

## PART I: RESPONSIBILITIES AND KEY ASPECTS

Testing detection systems is a key part of satisfying the new regulations and makes good business practice too



To ensure the reliability of fire detection and alarm systems good maintenance is vital. In the first of two articles **Bill Rossiter** managing director of Detectortesters and **Dave Bartlett** managing director of Trinity Protection Systems, explain the responsibilities of users and the key issues involved.

today the fire precautions (Workplace) Regulations 1997 places a clear legal responsibility on the 'user' of a building for the fire safety of that building (and its occupants) including the maintenance of fire safety equipment and, within this, the fire detection and alarm system.

Soon, however, there will be newer and even clearer legislation by way of the Regulatory Reform (Fire Safety) Order (commonly referred to as the RRO, occasionally as the FSO and, in this article, the 'Order'). The draft was laid before Parliament on the 10th May 2004 and the final Order is anticipated to come into effect early next year. When it does, it will amend or replace 118 pieces of legislation, the most significant being the repeal of the Fire Precautions Act 1971 and the revocation of Fire Precautions (Workplace) Regulations 1997 (which, in many ways, it develops and extends).

In reality however, the responsibilities for good maintenance exist now and do not change under the Order. Further, now and under the Order, the responsibilities of the 'user' in current and impending legislation are focussed on the 'Responsible Person'.

Today, it must be true to say that relatively few users and even fewer responsible persons (or perhaps even the other way round!) are truly clear on their responsibilities (either pre or post

the Order).

The responsibilities are however, both clear and significant. Moreover, under the Order (which applies to the majority of premises and workplaces in the UK) there is, in addition to clear responsibilities, endorsement for the enforcing authority – normally the fire brigade but possibly also the HSE, MOD or local authority – to ensure it is enacted. Should the responsibilities not be met, the penalties range from fines to prison sentences.

### Specialist help

The Order is not, however, an unrealistic piece of legislation. Recognising that the Responsible Person cannot be expected to "do the whole job himself and alone" the Order indicates that the "the Responsible Person must ... appoint one or more Competent Persons to assist him..." while explaining that the competent person must have "... sufficient training, experience and knowledge..."

The Competent Person could be anyone from a company fire warden to a fire alarm service engineer. They may be directly employed or be a subcontractor but the important word is competent (see panel for definitions).

In the case of fire alarm systems, Competent Persons are (or should be) more often than not in the form of organisations which specialise in the

business of fire detection and alarm systems.

### Fire brigade support

On top of the Order comes the recently launched Model Agreement for Remotely Monitored Fire Systems from the Chief Fire Officers' Association. This document recognises that false alarms now represent 25% of all calls to the Fire and Rescue Service and aims to reduce both the quantity and impact of them. A cornerstone of achieving this is the generation of a register of unique reference numbers (URNs) for fire systems and a requirement that (only) third party accredited competent persons or companies carry out installation and maintenance of them.

Similar to the experience of the security industry and the police, this will be followed by the introduction of different response and attendance levels dependent on past history (as well as a risk-based approach). The different levels range from an immediate response to no response from automatic calls unless confirmed by a 999 call. The policy will be gradually implemented over a three year period from April 2005 to enable systems and management strategies to be brought up to the required standards [Now superseded by a revised policy launched in October 2008 – see: [www.fia.uk.com](http://www.fia.uk.com)].

### Benefits of maintenance

The benefits that flow from good and proper maintenance are not, however, limited to the avoidance of prison sentences under the Fire Safety Order or an assurance that the brigade will still attend. Fire alarm systems operate day and night, keeping watch over buildings and their occupants. While they are often better known for false alarms than saving lives, this 'reputation' serves to mask the threat that inadequate systems may fail to alarm on time or, perhaps, at all. A fire alarm system that functions as designed does not make its presence known until it needs to and, at this point, needs to be relied upon to detect a

fire and alarm those in a position to respond. When a fire alarm system is called upon to work, there is an emergency at hand and we need it to work totally reliably. There is no time to perform maintenance or repairs during the emergency.

Fire alarm system reliability does not happen on its own. It is affected by four key variables: system design, equipment, installation, and maintenance. After the design and installation are completed, the only variable we can easily control is the level of maintenance provided to the system but through this we can identify and remedy so much more. Proper maintenance allows not only system (even original design) problems to be highlighted and remedied, but also environment changes to be identified so that appropriate system changes can be implemented. Realistically, in modern fire alarm systems suffering false alarms, the equipment is usually not at fault. Instead, the match of equipment to environment (and vice versa) needs attention. Planned, proper and thorough maintenance will highlight such mismatches, enable remedial measures to be implemented and problems to be avoided.

A proper maintenance programme achieves two goals. On the one hand it addresses false alarm problems (actual and incipient) and is probably the single most powerful weapon in the battle against false alarms. Victory in the battle brings more resources for brigades, regained productivity gains for the economy and rebuilding of confidence in fire alarm systems from those who very lives may depend upon them. In addition, it helps assure that the system can be relied on to alert to fire and save lives. All in all, powerful reasons for good maintenance.

### Cheap maintenance or good maintenance?

The difficulty for the User and/or Responsible Person is to establish what they are getting for their money: how do they know who to ask for maintenance prices; how do they know



Products from Detectortesters allow easy testing and maintenance of fire detection systems



## “Good maintenance requires the individual doing the work to have the time, knowledge and equipment to do the work properly”

what to expect; and how, for example, do they ensure that they are getting the right service level? The answer lies in the word ‘competence’. But what is competence? The BFPSA [now FIA] Installers and Maintainers Commercial Section has developed a definition as follows:

“Competency is a measure of the overall ability of a person or organisation to deliver a best practice, qualitative solution to a task. The assessment of competency is complex and draws on:

- the individual’s or organisation’s skill level;
- the extent and understanding of knowledge available;
- the ability to prove these facets.

An individual’s or organisation’s skill level depends on their experience and knowledge, and how these are applied. The extent, understanding and use of knowledge available depends on training in the use of equipment, methods of work, assessment of risk and health and safety issues. The ability to prove these facets depends on training qualifications, optimised reporting procedures, auditing (regular checks) and third party certification. A competent individual or organisation will demonstrate their competency by understanding these different aspects and bringing them together in a structured, cohesive approach.”

Good maintenance requires the individual doing the work to have the time, knowledge and equipment to do the job properly. This carries a price tag. It involves proactive prevention of problems as well as attention to problems that are apparent.

Traditionally a high percentage of fire detection systems have been ‘maintained’ by having someone visit the premises a number of times a year, having a look at the control panel to see if there are any obvious faults, walk around and test a few items, and then move on. That is not maintenance even though it may be cheap.

Good maintenance requires the measurement of electrical parameters, the testing of every detection device

over the course of a year, a review of the building arrangements and the notification of any issues that may lead to unwanted alarms or premature failures.

### Benefits of good maintenance.

Under the various pieces of legislation that were discussed earlier, the User and/or Responsible Person has increasing responsibility to show their own competence. That will involve ensuring that quality measures are in place to minimise the risk to the building users, to limit the likelihood of disruption through unwanted alarms, and to show that these measures are valid.

A fire detection system maintained by an organisation with a high degree of provable competence will maximise the life of the system, prevent many breakdowns through proactive attention, optimise the protection value of the system and reduce the disruption of unwanted alarms.

### Key aspects of good maintenance

The following summary gives an indication of the key issues required to ensure good maintenance occurs:

1. Ensure that the maintaining company is a professional fire detection company. Membership of the BFPSA is an indication that the company is a recognised fire company and will have, or be working on, third party certification.
2. Ensure that the maintenance technician has experience, preferably validated in the sort of system installed, and has relevant training. This would usually be by both the manufacturer and a ‘Code of Practice’ trainer such as the BFPSA.
3. Ensure that the maintenance technician is properly equipped with recognised and professional test equipment, approved for the job and has access to spares
4. Ensure that a contract is in place to provide at least two inspections a year and to provide a 24hr call out facility for use in event of a breakdown.
5. Ensure that drawings,

specifications and O & M manuals are available to provide crucial knowledge of where all devices are installed.

6. Keep accurate and comprehensive records in the log book of all alarm, fault, maintenance and modification activities.

7. Make sure that, in addition to the scheduled maintenance visits, weekly tests are carried out and recorded as required. This keeps the building users aware of the system and will often highlight any developing problems.

8. Advise all building users of any maintenance or test activities in advance, using several different methods of communication such as notices, e-mails, voice announcements etc.

9. Arrange for other trades to attend whenever interfaces to other equipment require testing for correct operation.

### Conclusion

New legislation and a changing approach to managing risk is bringing sharply into focus the need for competent, quality maintenance of all fire detection, alarm and suppression systems. The User/Responsible person needs to know that his protection systems are optimised and prepared for action and may be required to prove that to be the case. This requires a good working partnership between the User and the maintaining company, and requires good, not cheap, maintenance.

### WHO’S WHO UNDER THE REGULATIONS

1. User: Person or organisation having control of the building (or part of the building) in which the fire detection and alarm system is installed (3.61: BS 5839-1:2002).
2. Responsible Person: Person having control of the building and / or premises, whether as occupier or otherwise, or any person delegated by the person having control of the building and/or premises to be responsible for the fire alarm system and the fire procedures (3.49: BS 5839-1:2002).
3. Competent Person: Person with the necessary training and experience, and with access to the requisite tools, equipment and information, and capable of carrying out a defined task (3.11: BS 5839-1:2002).

# PART II: GOOD MAINTENANCE

**“The forthcoming Regulatory Reform Order makes the responsibilities clear – the choice is between good maintenance and criminal negligence.”**

IT IS THE DUTY OF THE ‘RESPONSIBLE PERSON’ to ensure the highest possible quality of maintenance (inspection, servicing and repair) to maintain the efficient and reliable operation of a fire alarm system, while avoiding false alarms. To achieve this requires a close and effective relationship between him or her and the occupants and users of the premises on the one hand, and with the ‘competent person’ on the other.

While some organisations fill the role of competent person from in-house, the role is more likely to be filled by a specialist third party servicing or maintenance contractor. Further, as identified in the previous article, in the case of monitored systems that organisation will soon have to be accredited as competent for the task. In either case, the competent person needs to have such expertise and spare part support as may be required so that the fire detection and alarm system can be maintained in a full working condition and, if found to be defective, can be quickly and competently returned to good order.

On a day to day basis, the responsible person is on the spot and needs to ensure that the system can function unencumbered (freedom from obstruction of, and to, the system and its parts must be maintained at all times). This ranges from, for example, ensuring that a clear space of 500mm is preserved in all directions around and below every detector and that all manual call points remain unobstructed and conspicuous, to ensuring that free and clear access is maintained to the control and any repeater panels.

On a wider note, this person is also the liaison with those responsible for changes to, or maintenance of, the building fabric or the environment in which the system is installed and which it protects. This covers a wide range of events, ranging from redecoration or repair on the one hand to structural changes or another. In all of them there is the potential to cause faults on – or otherwise interfere with – the operation of the fire alarm, with debilitating

results.

When it comes to regular maintenance of the system, however, the list begins to look rather daunting. This includes everything from weekly activation of call points to an annual check of all detectors (almost certainly by the competent person). It includes a visual check to ascertain whether structural, occupancy or usage changes have affected the requirements for the siting of manual call points, detectors or sounders. It incorporates regular checks of the control panel for normal operation (and the recording and rectification of faults here and elsewhere) and the need, at the appropriate times, to test ancillary functions where practical. It comprises the requirement for fault indicators and their circuits to be checked (preferably by simulation of fault conditions) and the control and indicating equipment itself visually inspected for signs of moisture ingress and any other deteriorating conditions.

On a practical note, keys and access codes need to be made available, standby power (generators and batteries) need to be started or otherwise checked (by simulation of failure of the normal power supply) and operated on load. In the case of vented batteries, connections and electrolyte level must be verified (for which – as with much else – special care and competence is required). Even printers need to be tested to ensure that they operate correctly and that printed characters are legible and that consumables are sufficient in quantity or condition to ensure that the printer can be expected to operate until the next planned maintenance visit.

All detectors – whether they are point, beam, aspirating, linear, conventional, analogue, or addressable (be they smoke, heat, CO, or combination) – need to be physically and functionally tested for correct operation (and any accumulation of dirt or other potential problem resolved). Likewise, all fire alarm devices (sounders, sirens, strobes, etc) need to

be inspected for correct operation (including confirmation of sound pressure levels and audibility), while visual fire alarm devices must be confirmed as clear from obstruction from view and that their lenses are clean.

Signalling should not be forgotten, so cable fittings and equipment need to be confirmed as secure, undamaged and adequately protected. Radio signal strengths in radio-linked systems should also be checked to ensure that they are adequate. Links to alarm receiving centres should be tested, notifying the centre before and after the test. The list looks long because fire alarm systems can be complex beasts and, vitally, because they interact with their environment, both affecting it and being affected by it.

The regularity of these checks will differ according to a number of factors. Special mention is needed for the word “periodically”: this is best defined as “such interval that the fire risk assessment, type of system, its

### **RESPONSIBLE PERSON**

Person having control of the building and/or premises, whether as occupier or otherwise, or any person delegated by the person having control of the building and/or premises to be responsible for the fire alarm system and the fire procedures. This definition relates to the responsible person under BS 5839 Part 1. The responsible person under the Regulatory Reform (Fire Safety) Order is the person who owns the premises or business or the person with control over the premises, business or activity. Where two or more responsible persons share responsibility (e.g. tenant/landlord, multiple tenancy building or adjacent premises) the responsible persons must co-operate, share information and collaborate to provide measures. Under the Regulatory Reform (Fire Safety) Order the responsible person must provide and maintain clear means of escape, signs, notices, and emergency lighting, as well as the fire detection and alarm system and extinguishers.

### **COMPETENT PERSON**

Person with the necessary training and experience, and with access to the requisite tools, equipment and information, and capable of carrying out a defined task.

### **USER**

Person or organisation having control of the building (or part of the building) in which the fire detection and alarm system is installed.

environment, and any other factors which may affect the system and its long term operation suggests". The British Standard BS 5839 Part 1: 2002 (updated December 2004) allows for it to stretch to six monthly, and it will typically be between three and six months subject to agreement between all interested parties.

## Remedial action and records

As well as the routine maintenance that we always think about, there is the need to keep the fire alarm system optimised. This depends heavily on the competence of the maintenance technician, and his familiarity with the many issues that can detrimentally affect a fire alarm/detection system. Some of the areas that need consideration are:

- change of use of a room or rooms or whole building
- refurbishing/re-decoration
- building alterations
- obstruction of air flow
- introduction of hazardous materials
- change of tenant
- change of escape arrangements
- ageing equipment
- addition of sound insulation
- causes of false alarms

In addition, there is the general deterioration of pieces of equipment that can occur due to normal operation. For instance, the electrochemical cell used in CO detectors deteriorates at different rates depending on the environment to which it is exposed.

The point about all this is that the fire alarm and detection system is a 'living' system and as such, it needs to be constantly reviewed to make sure it is ready and able to fulfil its purpose. If, for instance, some new offices are installed in an open plan area without detection being installed, a fire could start in one of the offices and would not be detected until it burst out of the room at an already advanced stage of development. This could then result in people being trapped and even killed by having their escape route cut off.

Competent maintenance technicians should be trained at least to have a working knowledge of all of the things that can affect the performance of the system, and be able to make recommendations to the responsible person for changes that may be required. The maintenance company should also have the ability to undertake remedial works in a timely and professional manner if required. The responsible person cannot be expected to know all of the technical issues that may affect the system performance, so he or she must rely on the competency of his/her selected maintainer to provide support and advice relating to any potential increase of risk. Conversely, however, the maintainer depends on the responsible person to provide timely advice of any

changes or alterations that have taken place.

Even the best fire protection systems might expect to be serviced by competent technicians only every three months or less. In between visits, the only test is the weekly test conducted by the responsible person. As a result, no one has an ongoing awareness of the 'health' of the system, or will necessarily pick up on any deterioration. The system records and log book are, therefore, absolutely essential factors in the process and all too often they are seriously neglected.

Every single fire detection and alarm system should, at the very least, have readily accessible in a known place near to the fire control panel, the following information:

- A fire log book that is completed every week with weekly tests and, whenever appropriate, to record all other events (fire alarms, false alarms, faults, maintenance visits, changes to the system, etc).
- A zone plan showing the fire zone arrangements of the building
- A set of layout drawings showing the building and the location of each and every system component, preferably marked with the zone data for cross referencing.
- In the case of an addressable system, a full list of all devices with their associated 'message' if appropriate. The address should also be shown next to the device on the drawings.
- A manual relating to the operation of the particular fire alarm system installed.
- Details of the maintenance company, their emergency call-out details and any relevant documentation to prove their competency to undertake the work.
- A copy of the design, installation and commissioning certificates from the original installation, plus any other modification certificates for changes, upgrades and so on.

The keeping of full and accurate records is essential to ensure that maintenance is thorough, and that any trends or changes are known to everyone involved with the system. They are also a mandatory part of the audit trail that would be required to prove the competence of the responsible person, should issues arise that question this.

We have endeavoured to review the extensive requirements and responsibilities for good maintenance. Good maintenance is essential to the safety of building users and occupants, while poor maintenance increases risk and could ultimately lead to injury or even death. The forthcoming Regulatory Reform (Fire Safety) Order makes the responsibilities clear: the choice is between good maintenance or criminal negligence.

**"The system records and log book are, therefore, absolutely essential factors in the process and all too often they are seriously neglected."**

## ABOUT THE AUTHORS

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**Further reading:**  
**British Standard BS 5839 Part 1: 2002** (updated December 2004) available from **BSI**  
**BFPSA Guide to Fire System Maintenance (WG26)** available from the **FIA** on 0208 549 5855