

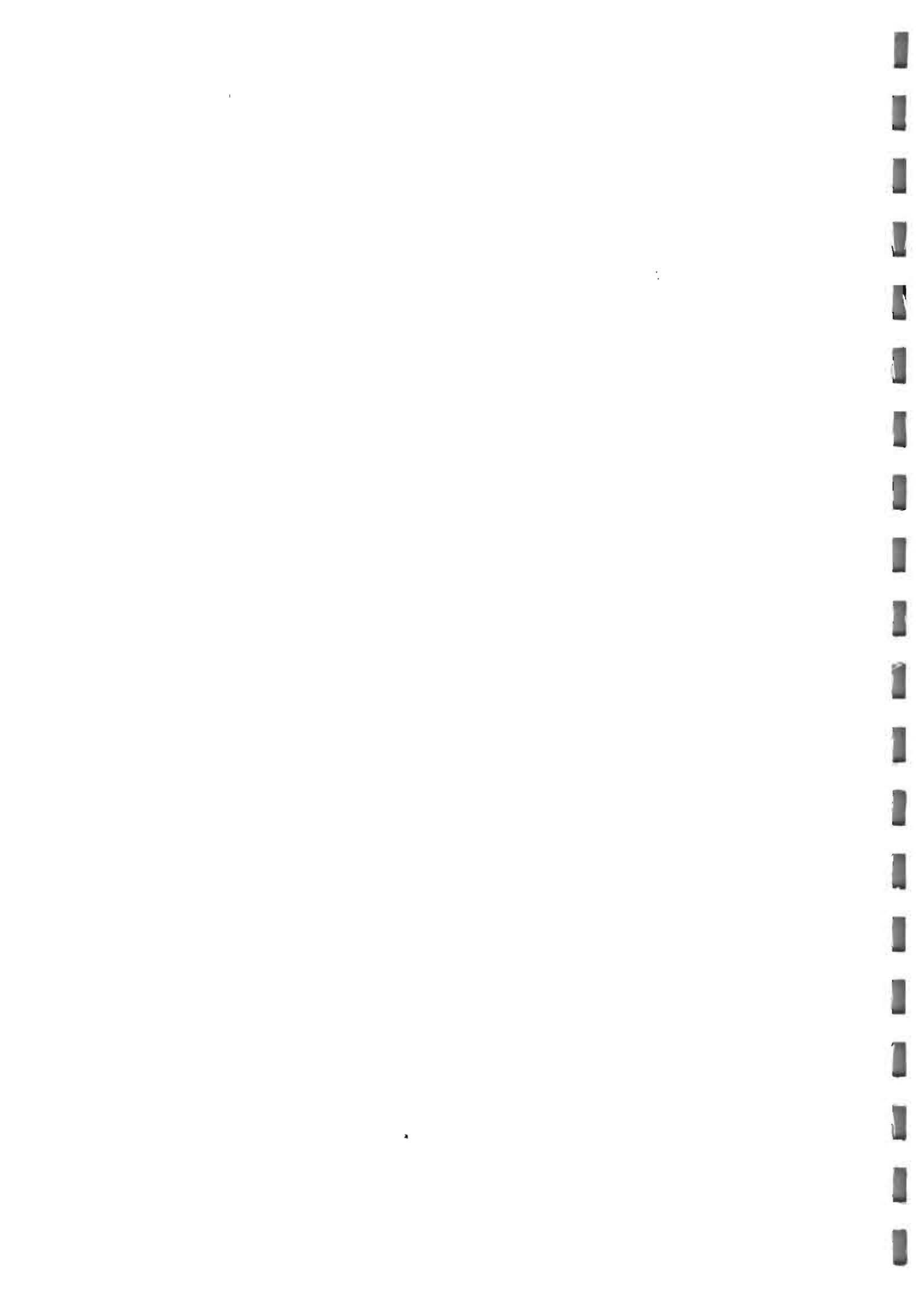


HOME OFFICE

# **A Guide to Evacuation Management Principles: Internal Report**

**Miss C. A. Reynolds**

**FIRE  
RESEARCH &  
DEVELOPMENT  
GROUP**



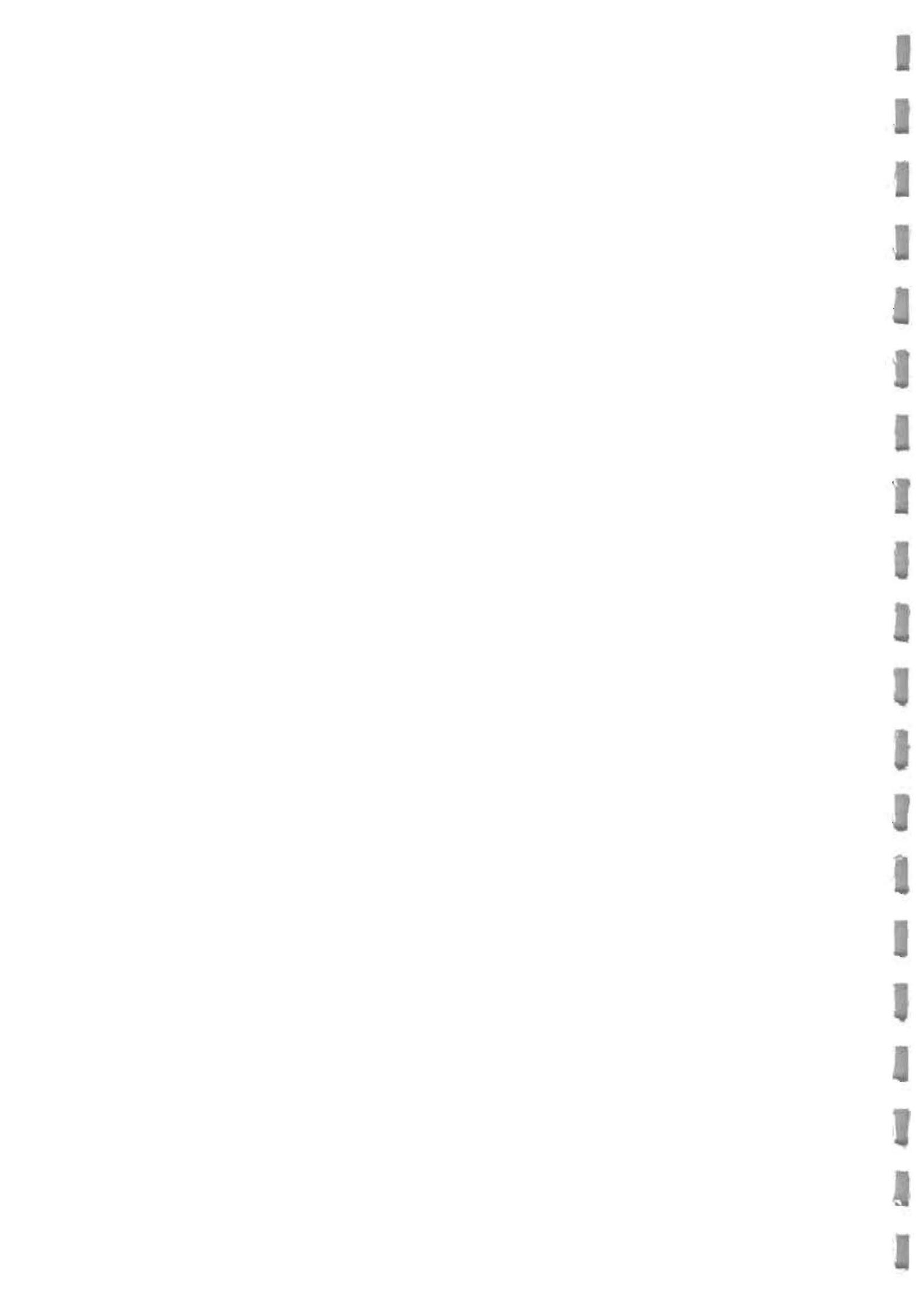
**HOME OFFICE**  
**FIRE RESEARCH AND DEVELOPMENT GROUP**  
**A GUIDE TO EVACUATION MANAGEMENT PRINCIPLES**  
**INTERNAL REPORT**

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#### **ABSTRACT**

There is a lack of guidance for managers of buildings which explains their responsibilities with respect to fire safety and, in particular, evacuation and how they should discharge those responsibilities. FRDG (previously SRDB) were asked to undertake a project in two parts: first to assess the information available and second to distil this into an effective guidance document. Because the regulatory framework changed, only the first part of the project was undertaken. Consequently the report is a survey with comments and implies no Home Office endorsement for the opinions stated. In addition, as the report comprises a literature search from many sources, where references are quoted the style and terminology used may vary.

The report represents the findings of the FRDG project F 14.02: "Guidance Documents for Evacuation Management".



## MANAGEMENT SUMMARY

This work attempts to collate proposals from relevant published literature in the field of evacuation management into one document. Naturally there are some "gaps" where appropriate information has not been found in the literature. In these cases the views of the author have been added for completeness.

The document contains general principles for management of evacuation of people from public buildings. Four main areas of importance to evacuation are covered: warning systems, making an evacuation plan, training of staff and building features.

### Warning Systems

The purpose of a warning system is to alert, inform and instruct the occupants of the building during an emergency. Three main types of warning system exist;

- \* **Bell or Siren.** Suitable for smaller premises or buildings where all occupants have been thoroughly trained and know what to do when the alarm sounds.
- \* **Public Address System.** Common in larger buildings and buildings where occupants may not be familiar with the building. This type of system is very flexible and fulfils all the requirements of a warning system in that it will alert occupants to an incident, inform them of the nature of the incident and instruct them in what action to take.
- \* **"Informative" Warning System.** These systems consist of a network of displays situated throughout a building which are linked to a main control centre. The displays may be text or graphics and may also incorporate synthesised speech. The displays give information on the type of incident, its location within the building and any action required. These systems may prove to be of most use in larger buildings where partial evacuation may be necessary (eg. hospitals).

### Making an Evacuation Plan

An evacuation plan should be drawn up by<sup>1</sup> an Emergency Control Committee, chaired by the building manager. (30, p251, two) The evacuation plan should be as simple as possible and should consider: human behaviour, escape routes, lifts and escalators, people with a disability and assembly areas.

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1. The original work that each statement is drawn from is referenced in standard format throughout, for example, (30, p251, two) refers to reference 30 (references are listed at the end of this document), page 251, section 2.

The Emergency Control Committee should appoint staff within the building to take key roles during an emergency. These staff are Chief Warden and Deputy Chief Warden, Communication Officer, Floor or Area Wardens and Wardens. They each have a number of duties to perform during an emergency. The Chief and Deputy Chief Wardens will co-ordinate other members of staff, take decisions on the seriousness of an incident and initiate an evacuation if necessary. The Communications Officer will be responsible for all communications between the Chief Warden and the Floor Wardens and will also be in charge of the Public Address System. The Floor or Area Wardens will be responsible for a floor or area of the building. They will contact the Chief Warden as soon as an incident develops and keep him informed of any developments. Wardens should be trained in first line fire-fighting, should be familiar with the layout of the floor or area they are responsible for and should know of any disabled staff that work in their area.

### Training

Training is a vital area for any successful evacuation plan. Staff need to know what to do when they first discover an incident, how to raise the alarm, how to respond to an alarm and how to safely evacuate the building.

Human behaviour during an emergency plays a major role in all training. Research has found that people rarely panic during an emergency and that the main problem during an evacuation is that people will spend vital time gathering information rather than evacuating the building. People will also use familiar routes from the building rather than utilising emergency exits and will travel in social groups and follow those in authority. (3, p716, Disc)

Staff training should include instruction in human behaviour. Training schemes should include all members of staff; new staff, part-time staff, cleaners, building workers, temporary staff, contract workers and shift workers.

Evacuation drills should be held to evaluate the effectiveness of the evacuation plan and the staff training. Multi-storey buildings and especially multi-occupancy buildings require detailed planning and effective liaison between the various occupiers. In smaller premises an evacuation drill may only be a matter of sounding the alarm and seeing that all occupants walk to the assembly area. All should be briefed on

- \* The identity and location of their Wardens.
- \* The alarm system.
- \* Actions they must take in response to an alarm signal.
- \* The evacuation routes they are to take.
- \* Assembly areas.
- \* What is required after completion of a drill.

After each evacuation drill a meeting of all Emergency Control staff should be held to evaluate the effectiveness of the current emergency procedures, highlighting any problem areas and suggesting improvements to any part of the system. Regular evaluation and revision of all training procedures should also be incorporated into the development of the emergency procedures.

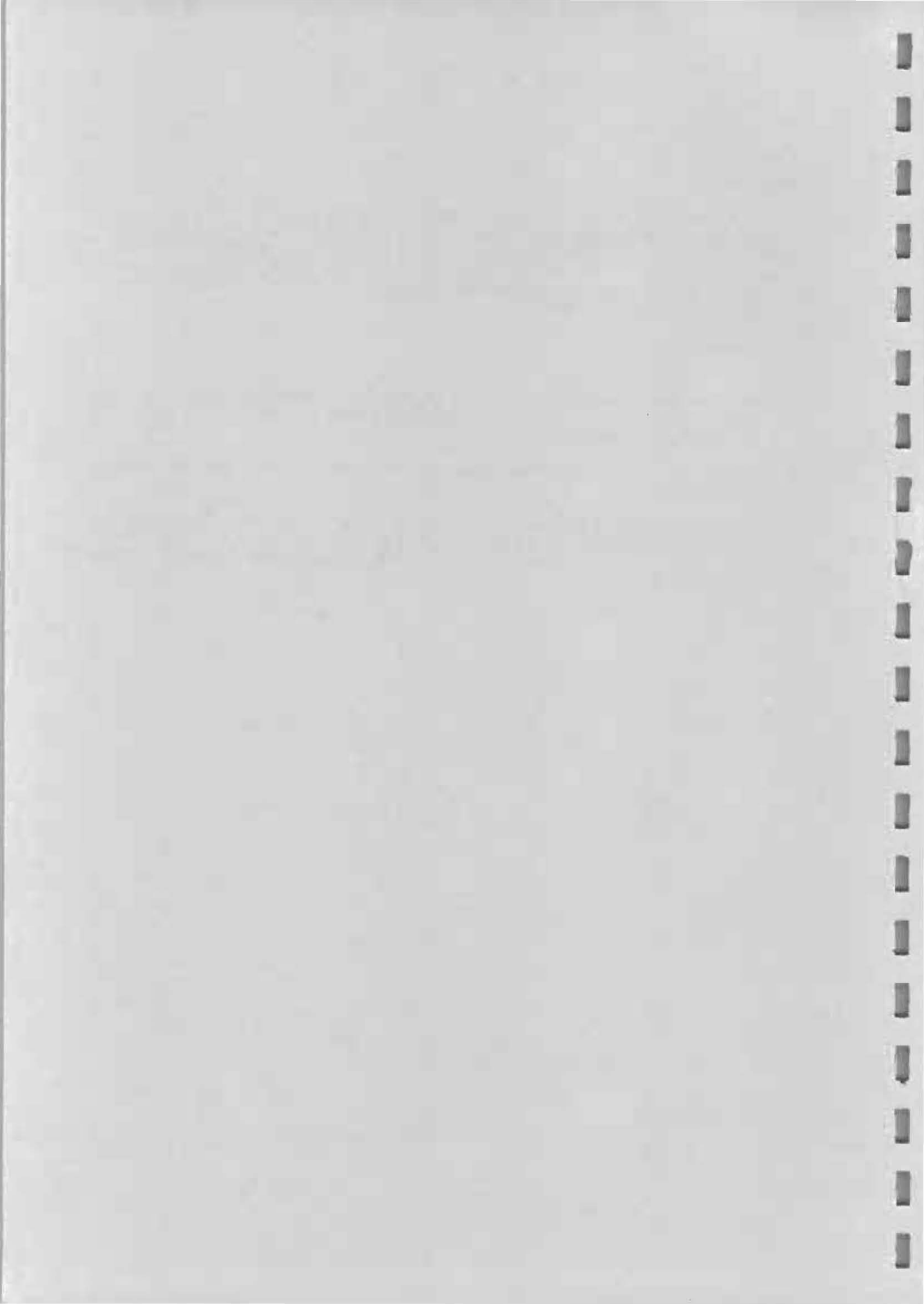


## **The Building**

It is important to make the evacuation of a building as simple as possible to ensure that all occupants can escape quickly and easily from a potentially dangerous situation. There are many factors which should be considered when planning the safe evacuation of a building. The main ones are exit routes, sign posting, notices, temporary works, fire fighting equipment, automatic fire detection and places of safety.

## **Conclusions**

1. FRDG was asked to prepare a source document on evacuation management as a basis for a "user-friendly" evacuation management handbook. This report represents the result.
2. The report draws on previous research and emphasises the need for planning and training.
3. There is still a requirement for a "user-friendly" document to advise building managers on evacuation management and more specialised documents are required for the managers of particular types of buildings, eg. shopping malls and museums.



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## INTRODUCTION

This document contains general principles of evacuation management of people from buildings. It contains four main sections which deal with the basics of warning systems, the planning required for safe evacuation of a building, the training of staff and finally the features of the building that will affect its safe management.

The requirement for this document resulted from recent research into human behaviour during emergencies. The conclusions of this research supplemented the established ideas on evacuation. There is also a deficit of informative documents detailing the role of management in evacuation. This document therefore provides a framework of principles upon which a user-friendly guide can be based.

The document represents a collation of the relevant research that has been carried out in the field of evacuation management. It includes the findings of recent research into human behaviour in emergencies, Home Office recommendations on safety systems in buildings and conclusions which have been drawn by reports on major incidents in the past.

There are some terms used throughout this document which may benefit from clarification.

**Building Manager** The person who is responsible for the safety of the occupants of a building.

**Chief Warden** (in the UK, this position may be known as **Fire Safety Officer**, or equivalent) The person with responsibility for the implementation of the Emergency Plan and for decision-making during an emergency.

**Control Centre** The site of the control panel for the communications and/or alarm system within the building. The Chief Warden and the Communications Officer should oversee all Emergency Procedures from within the Control Centre. The Control Centre should be contactable by Floor or Area Wardens and ideally should be easily accessible and on the ground floor.

**Emergency Control Organisation** The organisation of staff into structured and trained groups to deal effectively with an emergency.

**Emergency Planning Committee** A Committee chaired by the building manager and made up of the building owner (where this is different from the Building Manager), representatives of all tenants, the Chief Warden and Communications Officer.

**Emergency Plan** The plan drawn up by the Emergency Planning Committee for implementation during an emergency.

## 2 WARNING SYSTEMS

The warning system in a building provides the first alert for most of the occupants that something dangerous is occurring in the building. It is generally the prime motivator in an evacuation of a building for an emergency. The warning system therefore performs a vital role in the safe evacuation of any building. (0)<sup>2</sup>

### 2.1 The Purpose of the Warning System

The main purposes of any warning systems in a building are to alert, inform and instruct the occupants. The prime requirement of a warning system is that it should alert occupants to any hazardous situation or event within the building. For certain types of building or specific occupancies an alert may be the only requirement of a system. However it is more common to find that more information is required by occupants as to the nature of the alert and appropriate action that should be taken. (1, p21, para 3).

The requirements to inform and instruct are therefore vitally important and any system that performs one but not the other will have limited effectiveness. Occupants of a building who have been alerted by an alarm will generally try to find out why the alarm has been raised and what, if anything, they should do. (2, p28, Section 7)

### 2.2 The Types of Warning System

There are three main types of warning system available. These are

- \* Bell or Siren
- \* Public Address system
- \* "Informative" warning system (although all warning systems are informative to some extent, systems that offer, for example, text or graphics displays have been called "Informative warning systems").

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2. Where a statement is followed by a reference number of zero, the statement reflects the views of the author.

### 2.2.1 Bell or Siren

This is the most common system and consists of a bell or siren that sounds throughout the building. The system is linked to a series of alarm points placed in all areas of the building so that when one alarm point is activated the bell or siren will be heard throughout the building.

A bell or siren system

- \* will be recognised by the majority of occupants as an alarm, but not necessarily indicative of an emergency, (23, p25, para 5)
- \* can, in some circumstances, be connected directly to the Fire Brigade so that a call will be placed automatically to the emergency services when the alarm is activated, (8)
- \* is relatively simple to install, maintain and use. (8)

This type of system, however, has a number of disadvantages;

- \* The bell or siren gives no information to the occupants of the building other than an alert. It gives no instruction on the appropriate action to take, the nature of the incident or the reliability of the alert. (22, p18, Alarms)
- \* The alarm is not immediately apparent to occupants of the building who are hard of hearing or deaf. (11, p16, 8.8)
- \* The level of noise may be disorientating to blind or visually handicapped people who rely on their hearing for information on location. (0)
- \* Because no additional information is given by the alarm, this system requires extensive staff training on what to do when the alarm sounds, to be effective. (10, p238, 3)

A bell or siren system may be appropriate to small premises where all occupants can be pre-warned of the action necessary when an alarm sounds and where evacuation can be quickly and successfully effected. (0)

### 2.2.2 Public Address System

This is a common form of warning system in larger buildings where the need to evacuate may not be necessary for all occupants ie a phased evacuation. It is often used in conjunction with a bell or siren which provides the initial alert. The public address system necessitates the founding and manning of a Control Centre where information on the nature of the incident and required action can be gathered.

Messages for broadcast may be pre-recorded but there should be several recordings available so that different messages can be played during differing incidents. No evidence in the literature has been found of the effectiveness or otherwise of pre-recorded messages in comparison to live broadcasts. Messages may be broadcast live by staff in the Control Centre. This is a much more flexible approach but care must be taken to avoid misleading or ambiguous messages. (18, p39, col. 3)

Ideally a script will be provided in advance to cover the incidents most often encountered.

These systems are most useful for larger buildings where some of the occupants may be unfamiliar with the surroundings. (6, p104, 9.6) In these situations staff inside the building may be alerted to an incident by the use of code words so that they can take up emergency stations to aid the general evacuation of the building when this is initiated. (13)

Where intercommunication or public address equipment is used in lieu of conventional sounders to transmit a general alarm, the signal should take priority and override all other facilities of the system. The alarm signal should be distinct from other signals which may be in general use on the system. (6, p105, 9.10)

### 2.2.3 "Informative" Warning Systems

"Informative" warning systems provide the occupants of the building with information about the nature of an incident using text messages or graphics displays. Displays are sited throughout the building and can give information on the type of incident, its location within the building and any necessary action. The systems can be linked directly to alarm points and also to the Command Centre so that appropriate messages can be displayed. (7, pix, para 3)

These systems have showed promise during tests in informing occupants of a building of an incident and motivating immediate evacuation. Care must be taken to ensure the accuracy of the information displayed and to avoid ambiguity in instructions. (7, pxxix, 3)

This type of system will generally be more useful in larger buildings where progressive evacuation may be necessary to limit disruption (for example, hospitals) or to avoid exit route congestion (for example, high rise buildings). (26, p5)

Whatever type of warning system is employed in a building, all members of staff should be fully aware of what the alarm means and what to do when the alarm sounds. For this purpose alarm notices should be distributed throughout the building, giving details of what the alarm sounds like, what to do when the alarm sounds and the nearest exit. Additionally, specific members of staff may be trained to perform specific functions when the alarm sounds, eg. help disabled colleagues, guide members of the public or co-ordinate emergency procedures. Staff training is a vital part of any evacuation and is explained in more detail later.



### 2.3 Maintenance and Testing

Any warning system is useful only if it is in good working order and is reliable. Regular maintenance checks should be carried out, by someone competent, on all components of the warning system.

A log should be kept of all maintenance checks and work carried out. The log should give details such as :

- \* the date of the maintenance check,
- \* the person carrying out the check,
- \* the tests performed,
- \* any fault found, and
- \* the action taken to remedy the fault. (14, p81, 26)

Maintenance checks should be made regularly, in agreement with the manufacturers recommendations but at least once a year (4, p22, 71). Any mechanism that disables the system so that maintenance can be carried out should be clearly marked and illuminated on the system control panel, and should have a protective cover to prevent accidental operation. (6, p105, 9.13) (14, p81, 29)

Warning systems should be fail-safe, so that any failure of the equipment or its components will produce an alarm rather than render the system inoperative. (14, p81, 27)

Back-up warning systems that operate when the main system has failed for any reason are beneficial to the safe operation of any emergency evacuation initiative. (0)

### 2.4 The Types of Messages and their Wording

- \* The speaker should identify themselves as someone in authority. (13)
- \* A message should be closely scrutinised before it is read to check for any ambiguities or misleading information. (1, p21, para 2)
- \* The message should not contain the words 'test' or 'drill' unless there is a test or drill (even if the word is negated to emphasise the reality of an incident. For example, "This is not a drill - evacuate the building", should not be used.) (2, p21, para 7)
- \* A script should be placed by the microphone to the PA system to be read out in the case of an emergency. More specific messages can be

tailored to the situation. These messages should be written down and approved by the Chief Warden before broadcast. (0)

- \* The message should be brief and simple. (18, p39, col. 3)
- \* The message should
  - alert occupants to a potential hazard within the building.
  - inform occupants of the nature of the incident.
  - instruct occupants on what action they should take.  
(1, p21, para 3)
- \* The message should be repeated completely at least once. (18, p39, col. 3)
- \* Voice inflection should be used to emphasize important aspects of a message. (18, p 39, col. 3)
- \* The message should be prefaced with a few preliminary words before the main address so that people can become accustomed to the sound of the Public Address system before important information is given. (7, p69, para 3)
- \* Where children are separated from their parents, the PA message should include information on which assembly point staff will take children to, so that parents will know that their children are safe and leave the building immediately. (14, p81, 32)

### 3 MAKING A PLAN

Making an evacuation plan is one of the most important steps in the safe and effective evacuation of a building. Staff must be aware of all the main aspects of the plan and what responsibilities they have. Building managers therefore have a major responsibility for the creation and implementation of an evacuation plan. (31, p61, para 4)

#### 3.1 Planning Principles

The main principles on which an emergency plan should be based are:

- \* The plan should clearly identify its purpose and scope. (8, p5)
- \* The plan should be based on a practical assessment of possible hazards eg. smoke. (21, p28, 13.)
- \* The plan should be appropriate to the size and complexity of the premises and the number and type of occupants. (21, p28, 13.)
- \* The plan should define overall control and co-ordination arrangements and the roles and responsibilities of all persons expected to be involved. (8, p5)
- \* The plan should be flexible enough to deal with rapidly changing developments, like the penetration of smoke into stairways. (8, p5)
- \* The plan should be reviewed and revised. (8, p5)

In brief, the plan should be .....

- \* simple
- \* written
- \* disseminated
- \* tested
- \* reviewed. (8, p5)

#### 3.2 Emergency Planning Committee

The manager of larger single-occupied or multi-tenancy buildings should

establish an Emergency Planning Committee to set up an Emergency Control Organisation, where this does not already exist, and to prepare and evaluate an Emergency Plan. For smaller buildings or occupancies, an Emergency Plan is still required but a single person may be responsible for its execution.

The Building Manager must act as co-ordinator of this committee. Leases for space should require all tenants to participate in the activities of the Emergency Control Organisation.

The Emergency Planning Committee should have authority to establish and implement emergency procedures. During emergencies, instructions given by personnel of the Emergency Control Organisation should overrule normal management structure. This authority should be kept in mind when selecting emergency control personnel. (8, p6)

### 3.3 Making the Plan

The plan should be as simple as possible and should consider the following, as appropriate:

- \* Human behaviour. Thought should be given to the likely behaviour of staff and public during an emergency, and provision made for this in the plan. (3, p699, para 3) Information about likely behaviour is given in Section 4.1.
- \* Escape routes. Escape routes and exits, as well as normal routes for leaving a building, should be assessed for the likely effect an emergency may have on them. In particular the possibility of one or more of the escape routes becoming blocked by smoke, fire or any other hazard, should be taken into account.
- \* Lifts and escalators. The evacuation should be planned on the assumption that lifts and escalators will not be used, except lifts which are designed to be used during fire. However, lifts have been used to evacuate disabled people under the control of the Emergency Services. (27, p231, para 1)
- \* Disabled People. An up-to-date list of the names, workplaces and other necessary information about disabled people (including temporarily disabled) should be kept at the Control Centre. The procedures for helping disabled people should be discussed in detail with the individuals concerned. Other evacuees will generally try to help disabled people, (32, p8, para 2). However, all emergency control personnel should be trained in the methods of assisting disabled people during emergencies, where practical. (19, p6, G Allanson)

Note: People with impaired hearing or sight should be considered

in this group.

- \* Search. An essential duty of emergency control personnel is to ensure that all people are cleared from the floor or area of their responsibility. This is more important than a later physical count of those evacuated. Searchers should move quickly and ensure that all areas are checked, but only if it is considered safe to do so. (8, p6)
- \* Assembly areas. In general the assembly areas for evacuated personnel should be far enough away from the building to ensure that everyone is safe from flying glass or debris. Ideally the area selected would be sheltered from the affected building by other buildings and should allow for further movement away from the source of danger. The movement of a large number of people has its inherent risks, particularly in heavy traffic. Careful thought should be given to the safest routes from the building to the assembly areas. (8, p7)
- \* Special duties. The plan should provide for the performance of other necessary activities, for example, escorting the public from the premises, safe-guarding cash and valuables and meeting the emergency services on arrival. (8, p7)

### 3.4 Emergency Control Organisation

The primary role of the Emergency Control Organisation would be to organise and supervise the safe movement of all occupants of a building in an emergency situation. The Emergency Control Organisation should consist of a number of people at a specified location (the master emergency control point), preferably at ground floor level together with trained people at each separate level or location consistent with the functional layout of the building.

The Emergency Control Organisation should consist of the following positions:

- a) Chief Warden (different terminology may be used in different countries).
- b) Communication Officer.
- c) Floor Warden or Area Warden.
- d) Warden.

The tasks which need to be undertaken have been grouped together and assigned to four levels of command. The proposals will need to be

tailored to match individual premises.

#### 3.4.1 Chief Warden and Deputy Chief Warden

The person selected to head the organisation should be mature and responsible with a personality which will command respect and give confidence to personnel. Ideally the person should have a background with experience in decision-making under stress, occupy a position which does not require frequent absences and have a good knowledge of building layout and safety. A deputy Chief Warden should also be appointed to cover absences of the Chief Warden. He should attend all incidents and assist where possible. (8, p7)

The responsibilities of the Chief Warden on becoming aware of an emergency are to:

- a) Proceed to the master emergency control point. (8, p8)
- b) Ascertain the nature of the emergency and determine appropriate action. (8, p8)
- c) Ensure that the appropriate emergency services have been notified. (8, p8)
- d) Communicate with Floor or Area Wardens and advise them of the situation. (8, p8)
- e) If necessary, initiate the evacuation procedure, although it must be made clear that the most senior member of staff at the emergency control point has the authority and duty to initiate evacuation, if events warrant it, without waiting for the arrival of the Chief or Deputy Chief Warden. (8, p8)
- f) Meet Fire Brigade or other emergency services on arrival. The Communications Officer should appoint and brief one Warden to meet the Fire Brigade. The person should know the location of the fire, the current state of evacuation of the premises, persons not accounted for, details of the immediate area surrounding the fire and the building layout generally. (17, p65, 7)

#### 3.4.2 Communications Officer

The Communications Officer should be competent in the use of the communication system in the building and should have a clear, commanding voice. An additional Communication Officer may be required to assist.

The duties of the Communications Officer, on hearing the alarm, will be

to:

- a) Proceed to the Alarm Indicator Panel, if any, and ascertain the origin of the alarm. (8, p8)
- b) Take up position and be responsible for operating the control console of the buildings emergency communication equipment. (8, p8)
- c) Contact the Wardens of the floor or area from which the alarm has originated. (8, p8)
- d) Transmit and record instructions and information between the Chief Warden and the Floor Wardens. (8, p8)
- e) Record the progress of an evacuation and any action taken by the Floor Wardens. (8, p8)

#### 3.4.3 Floor or Area Wardens

The Emergency Control Committee should appoint personnel to the Emergency Control Organisation consistent with the level of their day-to-day supervisory responsibility and should take into account the following,

- \* Availability - they should be people who spend most of their time at, or near, their work stations.
- \* Ability to organise others in an emergency.
- \* Reliability.

Floor wardens should control the emergency procedure and evacuation of their floors. On hearing the alarm or on receipt of advice of an emergency, the Floor Warden should direct Wardens to check the floor or area for any abnormal situation, then contact the Chief Warden by whatever means available and act on his/her instructions. Floor Wardens (and Wardens) should act on their own initiative and commence evacuation if the circumstances on their floor warrant this and advise the Chief Warden of the circumstances and action taken as soon as possible. (8, p9)

Floor Wardens should arrange immediate replacement of Wardens who are no longer available and nominate suitable persons to cover short term absences. (8, p9)

#### 3.4.4 Wardens

A number of activities may be required of Wardens, including

- \* Call the Fire Brigade by operation of a Manual Alarm point or

telephone. (11, p12)

- \* Operate first attack firefighting equipment eg. portable fire extinguishers, hose reels and fire blankets. (8, p9)
- \* Communicate with Floor Wardens and/or Master Emergency Control Point. (8, p9)
- \* Check to ensure fire doors and smoke doors are properly closed. (11, p18)
- \* Direct evacuation of members of the public who may be unfamiliar with the building. (13)
- \* Search the floor or area to ensure all persons are accounted for. (8, p9)
- \* Act as stair monitors to ensure orderly flow of persons into protected area, for example stairwells. (8, p9)
- \* Assist disabled persons. (19, p6, G Allanson)
- \* Act as leader of groups moving to nominated assembly areas. (8, p9)
- \* Prevent people from re-entering the building until it is safe to do so. (10, p92, para 2)

Wardens should be appointed to assist the Floor Wardens on the basis of one for each twenty people on the floor or in the area, with a minimum of two wardens. (8, p8)



## 4 TRAINING

Training is a vital part of any evacuation. Staff must be aware of all that is expected of them during an emergency. Members of the public must be escorted to safety with the minimum of delay. It is important to realise that all members of staff require some level of training for an emergency and that some staff may need to be trained for specialist roles. The principles of training remain the same for everyone and should build upon positive aspects of human behaviour during an emergency.

### 4.1 Human Behaviour During an Emergency

The behaviour of all occupants of a building during an emergency will have an important effect on the drawing-up and ultimate success or otherwise of an evacuation plan. General principles of human behaviour which are relevant in an emergency situation are highlighted below.

- \* People will try to find enough information on which to base a rational decision about what action they should take. Vital evacuation time is often lost in this preliminary information gathering and confirmation exercise - of the total time taken for a person to evacuate a building, only one third of the time is spent actually moving towards or into an exit. The other two thirds is spent clarifying the situation, communicating with other people and deciding to evacuate. The Building Manager should ensure that the alarm system provides as much information as possible about what the problem is and what action should be taken by occupants. (2, p28, Section 7)
- \* The more information people are given, (up to a saturation point), the more likely they are to respond as requested to an emergency. If they are told the reason for an evacuation and the location of the incident, people are more likely to evacuate quickly via appropriate emergency exit routes. (7, pxxix, 3.)
- \* Information given should be understandable by all occupants of the building, whether they are familiar with the building or not. Abbreviations should be avoided if possible in any messages as they tend to confuse the recipients of the information. Directions should be clear and concise. Ambiguity should be avoided at all costs as this tends to delay evacuation. (1, p21, para 4)
- \* Occupants within a building will generally use the most familiar exit route. Occupants who are not familiar with the building will tend to go out the way they came in, rather than use emergency exits. People will also generally follow those they know or those who appear to be in authority. (16, p574, 1)
- \* Members of the public in a building will look to authority for

information and guidance during an emergency. Similarly, members of staff are likely to continue in their staff role of serving/caring for the public. Thus it becomes vital that members of staff are well trained to understand their responsibilities and can therefore fulfil their roles adequately. (2, p21, Section 9)

- \* Where children or OAP's are separated from their relatives, separate evacuation plans must be made for them and amalgamated into the overall evacuation plan. These plans should be made clear to all occupants. People tend to evacuate in familiar social groups. Groups or families which are separated when the alarm is given will try to contact each other. Thus if children are in a play area for example, parents must be reassured at the time of the alarm that their children are being evacuated by members of staff and advised not to hinder evacuation plans by crossing the building. (16, p574, 2)
- \* Panic is very rarely a feature of an emergency - most people will act rationally upon the information given to them but basing their decisions on their own understanding and experience. (5, p318) They may, however, fail to appreciate both the toxic nature of smoke in confined spaces and the actions of others.
- \* Special consideration should be given to disabled occupants of a building. People will generally try to help any disabled or injured person to safety during an evacuation, but staff who have been pre-trained to assist will be able to provide the most effective help. (25, p12, Rec 1)

The human behaviour of all occupants of a building should be taken into consideration when emergency plans are drawn up. Staff training and education should also be planned and executed with the human behaviour of all occupants of the building in mind. Wardens should be appraised of their role and responsibilities in directing staff and public from the building quickly and safely.

#### 4.2 Staff Training

During an emergency the smooth operation of the Emergency Plan can only be achieved if all members of the Emergency Organisation and the other staff in the building are thoroughly familiar with what is expected of them. (2, p21, Section 9)(32, p39, para 4) It is therefore necessary to institute a system of education and periodically have evacuation drills.

The Chief Warden must ensure that Area and Floor Wardens are taught the following:

- \* The layout of the area or floor for which they are responsible. They should know the existence of and positions of strong rooms, secure rooms, rooms leading off blind passages, doors leading to dead ends, and other concealed areas in which people could be located. (8, p9)

- \* The operation of, and procedures for use, of the communications equipment installed to assist evacuation of people from the building. (14, p80, 22)
- \* The number and location of disabled, deaf and blind people on their floor or in their area. (24, p3-5)
- \* The operation of all fire detection and/or suppression systems that may be installed in their area or on their floor. (11, p8)
- \* The operation of portable fire extinguishers, hose reels, fire blankets and fire alarms. (17, p65, 10)
- \* Any special procedures that may exist to protect strategically significant items, eg. safes, located on their floor or in their area. (8, p10)

The Chief Warden should ensure that each member of staff in the building is advised of the procedure to be followed in the event of an emergency and each should be given the names, locations and telephone numbers of the Wardens of the floor on which they work. Staff should be encouraged to approach their Wardens for information and clarification of procedures. (8, p10)

Managers should ensure that all new staff are advised of the relevant procedures and are shown the location of fire equipment and the evacuation routes as part of their induction training.

It is particularly important that all members of staff are included in the training regime including,

- \* part-time staff
- \* cleaners
- \* building workers
- \* temporary staff
- \* contract workers
- \* shift workers. (20, p23, 13.)

Arrangements should be made for regular short demonstrations explaining the various types of first-attack fire fighting appliances, their uses and limitations, and the correct methods for operating them. (2, p21, Section 9)

Emergency Organisation personnel should meet together at regular intervals as determined by the Chief Warden, in accordance with the Fire Regulations Act. These meetings could also be used as short training sessions to maintain the interest of personnel and to improve their knowledge and skills. (8, p10)

#### 4.3 Evacuation Drills

After emergency procedures have been written, at least one practice is required to ensure that the plans are satisfactory. Once the organisation has established that they are satisfactory and workable, a programme of evacuation drills should be established to take place at least one year ahead. (8, p10)

Multi-storey buildings and especially multi-occupancy building evacuation drills require detailed planning. In smaller premises an evacuation drill may only be a matter of sounding the alarm and checking that people walk to the assembly area. (8, p10)

It is particularly useful to use escape routes not in common use during such exercises.

The first evacuation drill should not be a "no notice" drill. Adequate warning should be given of a proposed drill and Wardens should be briefed to give extra assistance to staff during the initial evacuation. Before the evacuation takes place, all occupants must be briefed by the Wardens on the following:

- \* The identity and location of their Wardens. (8, p10)
- \* The alarm system. (11, p8)
- \* Actions they are to take in response to the alarm signals. (8, p10)
- \* The evacuation route(s) they are to take. (11, p9)
- \* Assembly areas. (11, p9)
- \* What is required at the completion of the drill. (8, p10)

This briefing is best performed through the Warden system, thus enabling the occupants to identify their Warden(s) and become aware of their duties. In buildings where large numbers of the public are generally found, Building Managers may find it useful to conduct evacuation drills without members of the public present initially so that the evacuation plan and staff training can be evaluated without external influences. (8, p10)

With the experience gained from the first evacuation, subsequent drills can become more realistic (eg. limited notice and partial evacuations can be employed).

The size and configuration of the premises, together with the type of occupancy, will determine the time interval between practice evacuations. The period between full evacuations can vary between one and three years.

The period between partial evacuations can vary between quarterly and yearly. (8, p10)

#### 4.4 Regular Evaluation and Revision

The Emergency Procedure and Organisation should be regularly revised and evaluated. The initial evacuation after an emergency plan can provide vital practical information on the effectiveness of the organisation and the appropriateness of the alarm system. (8, p11) Where possible, a questionnaire should be provided for each participant in the drill, asking whether they were aware of the emergency procedures and what could be done to improve on them.

A meeting of all Emergency Control staff should follow a full or partial evacuation for the purpose of evaluating the effectiveness of the current emergency procedures, highlighting any problem areas, and suggesting improvements to any part of the system.

Regular evaluation and revision of all training procedures should also be incorporated into the evolution of the emergency procedures. (14, p80, 21) A detailed record should be kept of all training given to all staff. (15, p170, 80-85)

### Fire Procedure Guidelines

Fire procedures have three essential requirements, which in most cases will be carried out concurrently, (11, p12)

- \* **Call the Fire Brigade.** On suspicion or sight of fire, the Fire Brigade should be alerted. Anyone discovering a fire should call the Fire Brigade immediately and should not need another person's permission to do so.

Where the Fire Brigade has been called by automatic means or by breaking a manual call point, a telephone call should follow to confirm receipt of alarm and provide further information. (8, p11)

- \* **Fight the Fire.** Wardens and any other occupants trained in the use of first attack firefighting equipment may attempt to fight the fire. However, immediately it becomes obvious that there are unnecessary risks involved in attempting to control the fire, occupants should withdraw, closing doors behind them. (8, p11)
- \* **Evacuate.** Simultaneously evacuate the area and inform the Chief Warden of the action taken and the current situation. Further evacuation should follow the evacuation plan drawn up by the Emergency Planning committee. (8, p11)

## 5 THE BUILDING

It is important to make the evacuation of a building as simple as possible to ensure that all occupants can escape quickly and easily from a potentially dangerous situation. There are many factors which should be considered for the safe evacuation of a building. The main criteria are explained below.

### 5.1 Building Features

#### 5.1.1 Sign posting

All fire safety signs, notices and graphic symbols should conform with British Standard 5499: Part 1, and British Standard 2560 for internally illuminated exit signs. Self luminous exit signs should comply with the requirements of British Standard 5499: Part 2. Existing signs and notices which do not meet the British Standard need not be replaced if they are effectively fulfilling their purpose. They should however be examined and replaced if they are found to be inadequate.

Self luminous safety signs are adequate only if the viewing distance is less than 24m. Maintained internally illuminated exit signs will be required when the lighting may be dimmed or extinguished. Exit signs should be illuminated whenever members of the public are in the building and should be visible in both normal and emergency light.

Exit signs should be posted above the door where possible or otherwise in a position such that the notice can be seen and is least likely to be obstructed. If an exit cannot be seen or a person evacuating from the building may be in doubt as to its location, exit signs should include a directional arrow. (6, p66, 5.112-5.118)

#### 5.1.2 Notices

Printed notices should be displayed at conspicuous positions in the building stating in concise terms the essentials of the action to be taken upon discovering a fire and on hearing the alarm. The notices should be permanently fixed in position and suitably protected to prevent loss or defacement. The content of the fire notice will normally be specified in the fire certificate for the building. An example fire notice can be found in Appendix A. (11, p12)

#### 5.1.3 Fire fighting equipment

Wardens and Floor Wardens should be trained in the use of all common fire fighting equipment. All staff should be aware of the position of fire fighting equipment in their area of work, of their correct method of operation and know which equipment is appropriate to a particular fire. (11, p7)

#### 5.1.4 Automatic Fire Detection

If a manually operated electrical system and an automatic fire alarm system are installed in the same building, they should preferably be incorporated into a single integral system for the purposes of providing a general alarm. Generally fire detection systems should be appropriate to the type of building or occupancy, larger buildings with high fire loads will require a more advanced fire detection system in order to minimise the risk of fire. (6, p107, 9.19-9.21)

### 5.2 Means of Escape

#### 5.2.1 Exit routes

Compliance with Building Regulations and the Fire Precautions Act will ensure that there are adequate means of escape. It is the Building Manager's responsibility to ensure that exit routes are kept clear of obstructions at all times. (17, p64, 4)

Travel distances to exits, or places of safety (see below) can depend on the fire and occupancy loads of the building, the type of occupant (staff, public, disabled, familiar with the building, etc). In general, occupants of a building will try to leave the building by the most familiar route, generally the way they came in. They will also travel in social groups, families will travel together and usually colleagues from the same area of work will leave together. This will tend to reduce the walking speed of individuals within the crowd and prolong evacuation. (28, p36, 1) Where possible, therefore, all exits from the building should be in general use, so that people become aware of alternative exits. Where it is not possible to employ an exit in normal use it should be clearly marked as an emergency exit. (6, p66, 5.112-5.118)

Where possible entrance doors should double as exits for use in an emergency. Emergency exit doors that normally remain locked, should be easily opened in the event of an emergency. (14, p82, 34) It is also desirable to avoid placing mirrors in positions which could mislead people about the directions of corridors and exits. (29, p5, para 2)

#### 5.2.2 Places of assembly

Meeting points should be chosen with the safety of evacuees in mind. Fire notices within the building should clearly display the nearest meeting point. Ideally meeting points will be at some distance from the building and shielded from the building. Where heavy traffic is often encountered, provision should be made for evacuees to cross major roads in safety. Wardens should guide people to assembly points and then maintain calm until it is safe to re-enter the building. (8, p9)



### 5.2.3 Places of safety

A place of safety means a place in which a person is no longer in danger from fire. (6, p10)

The building should only be re-entered when the fire authorities have said it is safe to do so, and where possible those outside the building should be kept informed. (0)

### 5.3 Temporary works

Where building or decorating work is in progress and would affect the means of escape, extra provision should be made for occupants to evacuate the building, particularly if the work blocks or restricts a means of escape. Staff working in the area should be made aware of alternative exit routes. Temporary notices should direct occupants to the nearest available exits. The evacuation plan should be amended to take account of the work. Building workers should also be made aware of the layout of the building and their nearest exit route. If the work involves hot work, it must be ensured that adequate fire precautions are adopted and the availability of fire extinguishers checked. In addition arrangements should be made to ensure that the equipment does not set off automatic fire detection equipment unnecessarily. The Chief Warden should nominate a Warden or Floor Warden for this purpose. (6, p149, 13.7-13.8) (9, p29, 3.6)

**CONCLUSIONS**

1. FRDG was asked to prepare a source document on evacuation management as a basis for a "user-friendly" evacuation management handbook. This report represents the result.
2. The report draws on previous research and emphasises the need for planning and training.
3. There is still a requirement for a "user-friendly" document to advise building managers on evacuation management and more specialised documents are required for the managers of particular types of buildings, eg. shopping malls and museums.

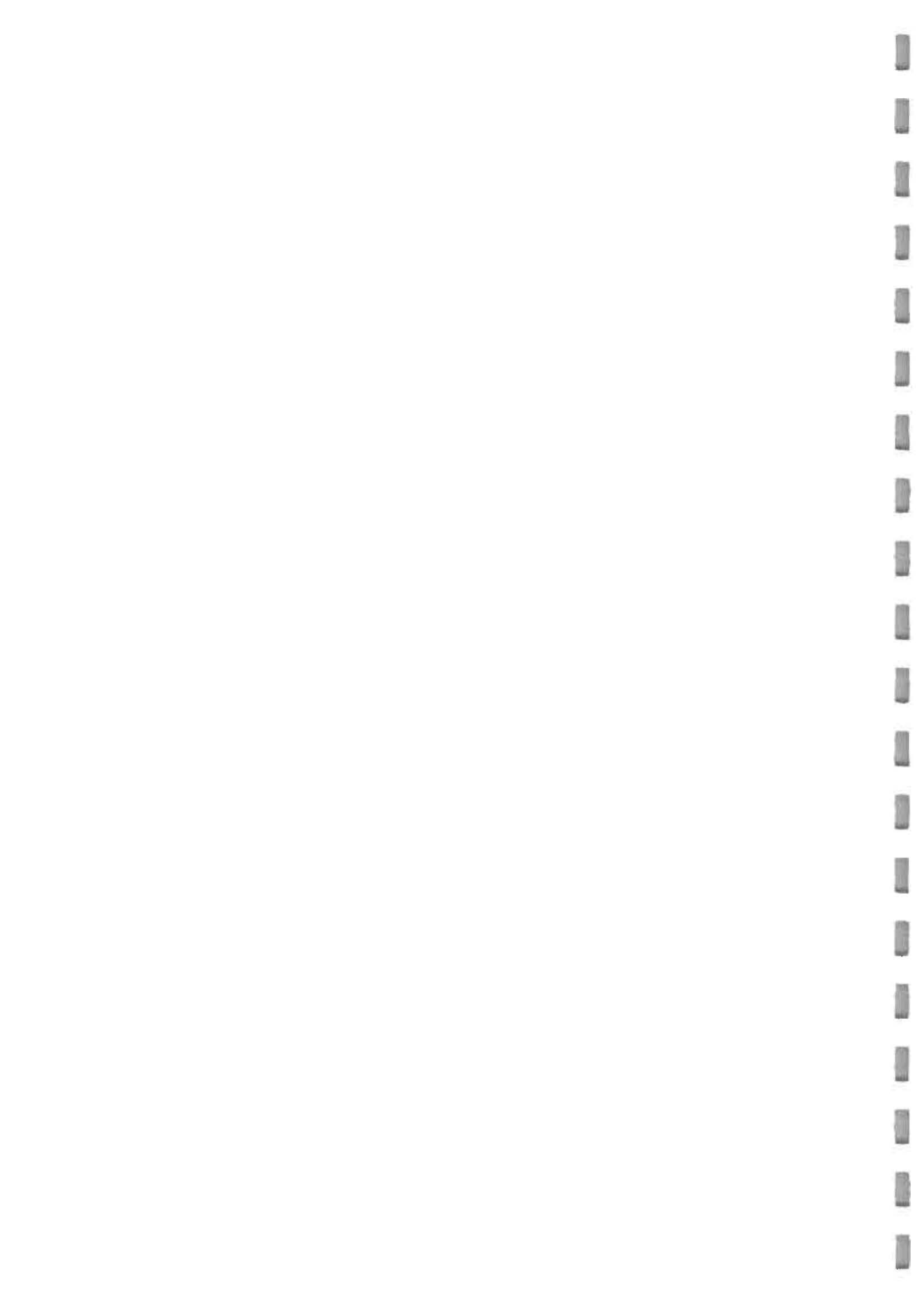
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Appendix A

FIRE INSTRUCTIONS

If you discover a fire

1. Raise the alarm
2. Attack the fire, if possible, with the fire appliances provided but without taking personal risks

On the alarm being raised

3. Call the fire brigade immediately
4. Evacuate the premises

All occupants assemble at

.....

Do not stop to collect belongings

Do not re-enter the building





## ACTION CHECKLIST

1. Set up an Emergency Planning Committee.
2. Appoint a Chief Warden, deputy Chief Warden and Communications Officer. These key people may then recommend suitable Floor or Area Wardens and Wardens.
3. Draw up an Evacuation Plan (or review the current plan).
4. Draw up a staff training plan, to include all staff. Keep a log of all training undertaken.
5. Publicise the meaning of alarms throughout the building and ensure all occupants know what to do on hearing the alarm.
6. Undertake a maintenance check on the alarm system and initiate a maintenance routine and log (or review the current maintenance program).
7. Ensure that emergency exits and emergency routes are well sign posted, kept clear at all times and known to all occupants of the building.
8. Organise an Evacuation Drill, with advance warning, to evaluate the Emergency Procedures.
9. Evaluate the Emergency Plan, Procedures and Organisation in the light of the drill. Collect feedback from those who took part in the drill and incorporate useful suggestions into the plan.
10. Draw up an Evacuation Drill plan for the next year, with evaluation sessions after each drill.





