

AS 4607—1999

**Australian Standard™**

**Personal response systems**

This Australian Standard was prepared by Committee TE/16, Personal Alarm Systems. It was approved on behalf of the Council of Standards Australia on 20 August 1999 and published on 5 November 1999.

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The following interests are represented on Committee TE/16:

Association of Social Support Monitoring Services  
Australian Association of Occupational Therapists  
Australian Chamber of Commerce and Industry  
Australian Council of Social Service  
Australian Council of Healthcare Standards  
Australian Nursing Federation  
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Australian Standard <sup>TM</sup>

## Personal response systems

Originated as AS 2999 — 1989.  
Revised and redesignated as AS 4607 — 1999.

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## PREFACE

This Standard was prepared by the Standards Australia Committee TE/16, Personal Response Systems, to supersede AS 2999—1989, *Alarm systems for the elderly and other persons at risk*.

The objective of this revision is to present the requirements for personal response systems as performance-based requirements. The requirements in AS 2999—1989 were prescriptive requirements which tends to be too narrowly focused.

The Standard applies to personal response systems technology which may be used in private dwellings and residential care facilities.

The term 'normative' has been used in this Standard to define the application of the appendix to which it applies. A 'normative' appendix is an integral part of a Standard.

## CONTENTS

|                  | <i>Page</i>  |
|------------------|--|
| <b>SECTION 1</b> | <b>SCOPE AND GENERAL</b>   |
| 1.1              | SCOPE ..... 5  |
| 1.2              | APPLICATION ..... 5  |
| 1.3              | NEW DESIGN AND INNOVATIONS ..... 5   |
| 1.4              | REFERENCED DOCUMENTS ..... 5   |
| 1.5              | DEFINITIONS ..... 6  |
| <b>SECTION 2</b> | <b>PLANNING</b>  |
| 2.1              | GENERAL ..... 10   |
| 2.2              | CONSULTATION ..... 10  |
| 2.3              | SELECTION OF OPTIONS ..... 10  |
| <b>SECTION 3</b> | <b>TECHNICAL PERFORMANCE REQUIREMENTS</b>                                  |
| 3.1              | GENERAL ..... 11   |
| 3.2              | REGULATIONS ..... 11   |
| 3.3              | ELECTROMAGNETIC CONFORMANCE (EMC) COMPATIBILITY AND<br>PROTECTION ..... 11 |
| 3.4              | ENVIRONMENT ..... 11   |
| 3.5              | ADDITIONAL DESIGN CONSIDERATIONS ..... 12                                  |
| 3.6              | WIRING ..... 12  |
| 3.7              | TRIGGER DEVICES ..... 12   |
| 3.8              | MONITORING PERSONAL ACTIVITY AND ACCESS CONTROL<br>(OPTIONAL) ..... 13     |
| 3.9              | ENVIRONMENTAL MONITORS ..... 14  |
| 3.10             | THE LOCAL UNIT ..... 14  |
| 3.11             | THE LONG-RANGE COMMUNICATIONS LINK ..... 16                                |
| 3.12             | LOCAL UNIT TO CENTRAL EQUIPMENT SIGNALLING ..... 16                        |
| 3.13             | THE CENTRAL MONITORING FACILITY ..... 16                                   |
| 3.14             | CALL LOCKOUT ..... 17  |
| 3.15             | REMOTE BACKUP FACILITY ..... 17  |
| 3.16             | DATA INTEGRITY ..... 17  |
| <b>SECTION 4</b> | <b>MAINS POWER AND BATTERY SYSTEMS</b>                                     |
| 4.1              | LOCAL UNITS ..... 19   |
| 4.2              | BATTERY-POWERED TRIGGER DEVICES ..... 20                                   |
| 4.3              | CENTRAL MONITORING FACILITY ..... 20                                       |
| 4.4              | BATTERY REQUIREMENTS ..... 20  |
| 4.5              | BATTERY REPLACEMENT ..... 22   |
| <b>SECTION 5</b> | <b>CENTRAL MONITORING FACILITY'S RESPONSIBILITIES AND<br/>PROCEDURES</b>   |
| 5.1              | CMF STAFF ..... 23   |
| 5.2              | CMF RESPONSIBILITIES ..... 23  |
| 5.3              | PROCEDURES ..... 24  |
| 5.4              | RESPONSE TIME AND ACTIONS ..... 25   |
| 5.5              | DATA MANAGEMENT OF USER INFORMATION ..... 27                               |
| 5.6              | INFORMATION TO BE PROVIDED TO THE USER ..... 27                            |
| 5.7              | INFORMATION TO BE PROVIDED TO THE NOMINATED CONTACT(S) 27                  |

|            | <i>Page</i>   |    |
|------------|---|----|
| SECTION 6  | INSTALLATION  |    |
| 6.1        | PRE-INSTALLATION .....  | 28 |
| 6.2        | INSTALLATION AND COMMISSIONING .....                          | 28 |
| 6.3        | LOCAL UNIT REFURBISH PROCEDURES .....                         | 29 |
| 6.4        | BATTERY DISPOSAL .....  | 30 |
| 6.5        | INSTALLATION STAFF TRAINING AND COMPETENCY .....              | 30 |
| SECTION 7  | RECORD KEEPING  |    |
| 7.1        | USER INFORMATION.....   | 31 |
| 7.2        | CONFIDENTIALITY .....   | 31 |
| 7.3        | EQUIPMENT USAGE—LOCAL UNIT.....                               | 31 |
| 7.4        | EQUIPMENT FAULTS—LOCAL UNIT .....                             | 31 |
| 7.5        | EMERGENCY CALLS .....   | 31 |
| 7.6        | RECORD KEEPING.....   | 31 |
| APPENDIX A | STANDARDS RELATING TO BATTERIES AND BATTERY<br>CHARGERS ..... | 32 |

## STANDARDS AUSTRALIA

### Australian Standard Personal response systems

#### SECTION 1 SCOPE AND GENERAL

##### 1.1 SCOPE

This Standard specifies the minimum performance, design and operation requirements for telecommunications based personal response systems (PRSs). It also provides guidelines for the selection of such systems.

A personal response system is a communication system that facilitates the connection of a user requiring assistance to a central monitoring facility (CMF) using a local unit. This Standard is not intended to cover intruder alarm systems which are covered by AS 2201 (all Parts) or hard wired patient alarm systems which are covered by AS 3811.

##### 1.2 APPLICATION

The requirements of this Standard shall not circumvent any legal requirements such as Trade Practices Act, Occupational Health and Safety Act, Privacy Act, Australian Communications Authority (ACA) Regulations, or insurance obligations.

##### 1.3 NEW DESIGN AND INNOVATIONS

This Standard does not preclude the use of materials, designs, methods of assembly, procedures, and the like, that do not comply with a specific requirement of the Standard, or that are not mentioned in it, but which can be shown to give equivalent or superior results to those specified.

##### 1.4 REFERENCED DOCUMENTS

AS

- 1939 Degrees of protection provided by enclosures for electrical equipment
- 2201 Intruder alarm systems (all parts)
- 3100 Approval and test specifications — General requirements for electrical equipment
- 3811 Hard-wired patient alarm systems
- 4252 Electromagnetic compatibility — Generic immunity standard
- 4252.1 Part 1: Residential, commercial and light industry
- 4268 Radio equipment and systems
- 4268.2 Part 2: Technical characteristics and test methods for radio equipment to be used in the 25 MHz to 25 GHz frequency range with power levels ranging up to 1 W AS/NZS
- 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)
- 3009 Electrical installations — Emergency power supplies in hospitals
- 3260 Approval and test specification — Safety of information technology equipment including electrical business equipment
- 3548 Limits and methods of measurement of radio disturbance characteristics of information technology equipment
- 4083 Planning for emergencies — Health care facilities

## **1.5 DEFINITIONS**

For the purpose of this Standard, the definitions below apply.

### **1.5.1 Access control**

A means of allowing controlled access into the user's premises. This may include remote activation of electric door latches.

### **1.5.2 Activated condition**

The condition that exists from the time the local unit is manually or automatically triggered until the time the local unit is cleared down.

### **1.5.3 Activity monitor**

An alarm-triggering device that operates automatically with the local unit when a routine activity being monitored is modified or ceases within a specified period. An inactivity monitor oversees an activity of a person or equipment. When, after a pre-determined period, an activity has not taken place an alarm signal is triggered.

### **1.5.4 Alarm signal**

A signal sent from a local unit to the central monitoring facility (CMF) to indicate that an alarm condition exists.

### **1.5.5 Call lockout**

A method of preventing subsequent emergency calls from the same local unit from being registered at the CMF within a predetermined period.

### **1.5.6 Cancelling system**

The mechanism by which the alarm is cancelled.

### **1.5.7 Central monitoring facility (CMF)**

A facility that contains the monitoring equipment and a user information system for the receipt of alarm signals from the local unit and is staffed 24 h, every day of the year by personnel who can initiate and verify the appropriate responses.

### **1.5.8 Clear down**

Disconnection between the monitoring facility and the local unit.

### **1.5.9 CMF**

See central monitoring facility.

### **1.5.10 Community-based facility**

A monitoring facility whose purpose is to monitor local units in the community.

### **1.5.11 Confirmation signal**

The signal indicating to a user that the alarm signal has been received and logged at the CMF.

### **1.5.12 Customer**

The person, agency or company that pays for the service, not necessarily the user.

### **1.5.13 Data collection device**

A device that provides a means of entering data into the local unit for transmission to the CMF.

### **1.5.14 Disconnection**

An act that breaks a communication link.



**1.5.15 Environmental monitors**

Devices that trigger the local unit in the event of incidents that affect the user's environment, such as over/under temperature, gas level, smoke, fire or similar.

**1.5.16 Fault condition**

The condition that occurs when the local unit or CMF recognizes that itself or another part of the system is faulty.

**1.5.17 Fault signal**

A signal that indicates a fault condition (see Clause 1.5.16).

**1.5.18 Handshaking**

A process where data transmission is acknowledged.

**1.5.19 Inactivity monitor (See also activity monitor)**

An alarm-triggering device that operates automatically with the local unit when a routine activity being monitored is modified or ceases within a specified period. An inactivity monitor oversees an activity of a person or equipment. When, after a pre-determined period, an activity has not taken place an alarm signal is triggered.

**1.5.20 Installer**

The installer is the person who takes responsibility for installing the local unit and testing that the equipment/services are working.

**1.5.21 Level 1 first aid certificate**

A qualification obtained through a recognized training authority, e.g. Red Cross, St John Ambulance and similar.

**1.5.22 Local equipment**

Equipment comprising the local unit, trigger devices and any other associated equipment.

**1.5.23 Local unit**

The equipment that responds to triggering and other signals and communicates with the CMF. The local unit receives the signal from the trigger, processes and transmits the alarm or other signal to the CMF via a long range communications link, and provides audible and visual indications to the user.

**1.5.24 Long-range communication link**

The transmission medium between the local unit and the CMF.

**1.5.25 Low dependency care**

Users living in supported accommodation without 24 hour supervision.

**1.5.26 May**

Indicates the existence of an option.

**1.5.27 Mode connection**

A telephone line connection configuration which allows the local unit to take priority over all extensions on the same telephone service line.

**1.5.28 Nominated contact**

A person whom the user has nominated to respond to a call for assistance.

**1.5.29 Non-critical**

A design feature of a system which allows it to maintain its function without periodic adjustments.

**1.5.30 Non-volatile**

A design feature that ensures the system retains essential information when powered down.

**1.5.31 Normal condition**

The state of the system in which—

- (a) all parts and signal paths required for correct function of the system are operational;
- and
- (b) it is not in the pre-alarm, alarm, fault, disconnection, cancellation or test condition.

**1.5.32 Open space**

The situation where the signal path between the transmitter and receiver is not affected by obstructions or reflections.

**1.5.33 Operator**

An operator is a staff member of the CMF whose role is to action a response and implement a follow up procedure on behalf of the user.

**1.5.34 Power supply**

The source that normally delivers the necessary electrical power to the system.

**1.5.35 Pre-alarm**

A condition initiated within the local unit by the receipt of a triggering signal. The pre-alarm period is maintained for a pre-determined time during which visible and audible indication may be given to the user that this condition exists. The user can cancel the pre-alarm condition within this time in order to avoid transmission of the alarm to the CMF.

**1.5.36 Pre-alarm signal**

The signal that indicates the local unit is in the pre-alarm condition.

**1.5.37 Primary battery**

A battery that does not need charging and which cannot normally be recharged.

**1.5.38 Reassurance signal**

An audible or visual indication, or both, that the local unit is in the process of communicating with the CMF.

**1.5.39 Redundancy**

A concept used in personal response systems in which more functional units or services are provided in the system than are strictly needed to handle the planned workload. The units or services are arranged such that each is easily substituted for any other.

**1.5.40 Remote trigger device**

Any device that communicates with the local unit via a short range communication link.

**1.5.41 Residential-based facility**

A monitoring facility whose purpose is to monitor local units in residential care facilities, other than where 24 h care services are provided.

**1.5.42 Response time**

The time taken between a call being received and acknowledged by the CMF system and an operator responding to that call.

**1.5.43 Service provider**

Any business or department or individual that provides personal response services for users.

**1.5.44 Shall**

Indicates that a statement is mandatory.

**1.5.45 Short-range communication link**

The transmission medium between the trigger device and the local unit.

**1.5.46 Should**

Indicates a recommendation.

**1.5.47 Test condition**

A manually or automatically initiated condition during which system functions or parts thereof are tested.

**1.5.48 Test signal**

An automatically initiated signal that verifies the correct function of parts of the system thereof.

**1.5.49 Trigger device**

Any remote alarm button or sensor device that is used to transmit a triggering signal to the local unit.

**1.5.50 Triggering signal**

A signal received by the local unit from an associated trigger device.

**1.5.51 User**

The person who uses the triggering devices and local unit.

## SECTION 2 PLANNING

### 2.1 GENERAL

Planning an appropriate personal response system (PRS) should commence as early as practicable in the development of a project.

### 2.2 CONSULTATION

#### 2.2.1 General

Consultation should be conducted with the user or users' representative in order to provide a PRS that meets the needs of the user.

#### 2.2.2 Residential-based facilities

Persons living in Group Homes, Retirement Villages and other low dependency care facilities may be at risk of personal injury. Such persons should have access to a personal trigger device that is monitored continuously.

Where a PRS is chosen for this application, consideration should be given to the range of the trigger devices to provide suitable coverage on the site.

In the initial stage of planning, the planner should consult with the user or users' representatives and manufacturers or suppliers to establish the appropriate type of system required. Further planning should include consultation with the user or users' representatives, manufacturers or suppliers and their installers, architects, developers, and electrical contractors and communications contractors, as applicable.

#### 2.2.3 Individual user

The service provider should consult with the user or the users' representative in order to provide a PRS that meets the needs of the individual.

### 2.3 SELECTION OF OPTIONS

Consideration should be given to the selection of options listed in Clause 3.1.2.

A user may consider a number of trigger devices. Care should be taken when selecting or recommending a certain PRS type for specific usage.

## SECTION 3 TECHNICAL PERFORMANCE REQUIREMENTS

### 3.1 GENERAL

#### 3.1.1 Mandatory requirements

The personal response systems shall include the following hardware components:

- (a) A remote trigger device consisting of a method to summon assistance.
- (b) A local unit with a means of hands-free voice communications.
- (c) A long range communications link.
- (d) A central monitoring facility (CMF).
- (e) An information system.

#### 3.1.2 Optional features

Other equipment/functions may include—

- (a) inactivity monitors;
- (b) environmental monitors;
- (c) data collection devices;
- (d) a telephone device and handset;
- (e) access control;
- (f) electromedical equipment; or
- (g) other equipment.

### 3.2 REGULATIONS

All equipment shall comply with relevant Australian Communications Authority (ACA) regulations.

### 3.3 ELECTROMAGNETIC CONFORMANCE (EMC) COMPATIBILITY AND PROTECTION

#### 3.3.1 Emission

Electronic equipment shall meet the Australian Communications Authorities emission requirements and AS/NZS 3548. Radio trigger devices shall meet the requirements of AS 4268.2, Low interference potential devices, and other relevant requirements of the Australian Communication Authority (ACA).

#### 3.3.2 Immunity

All local unit inputs and outputs shall be suitable for their intended purpose. They shall be resistant to high voltage transients, which may be caused by lightning and other induced voltages, or disturbances, which are likely to cause damage or malfunction of the local unit.

The local unit shall comply with the requirements of AS 4252.1.

### 3.4 ENVIRONMENT

Local unit and trigger devices shall be capable of operation under the following conditions:

- (a) Ambient temperature range 0°C to +50°C.
- (b) Relative humidity 20% to 90% (non condensing ) at 30°C.

### 3.5 ADDITIONAL DESIGN CONSIDERATIONS

Equipment for trigger devices and the local unit shall —

- (a) have local indication of fault conditions;
- (b) be subject to individual unit testing in the factory;
- (c) have operating parameters loaded into non-volatile memory to ensure that in the event of a complete power failure the system shall repower and automatically reset to the normal condition without loss of information;
- (d) have a watchdog function in all microcomputer-based equipment other than trigger devices to check for correct operation of the equipment and automatically reset if necessary;
- (e) use handshaking protocols on long range communications links between the local unit and the CMF; and
- (f) continue alarm call attempts to the maximum allowed under Australian Communications Authority (ACA) regulations or until appropriate acknowledgment is received.

Equipment for trigger devices and the local unit should —

- (i) be designed in a non-critical manner by allowing a safety margin for the effect of environmental variations;
- (ii) employ sound jointing techniques or connections that are not liable to degrade due to corrosion or vibration;
- (iii) minimize the use of electromechanical components and, where this is not possible, employ appropriate contact types, e.g. gold-plated for low current; and
- (iv) be manufactured to a recognized quality system.

### 3.6 WIRING

Any wiring of fixed devices used during installation shall be in accordance with AS/NZS 3000, the requirements of the Australian Communications Authority (ACA), and any additional requirements of the relevant energy supply authority and the manufacturer's requirements.

### 3.7 TRIGGER DEVICES

#### 3.7.1 General

A trigger device should be distinctly visible and readily identifiable.

Knobs, handles, buttons and the like used to initiate the alarm shall be fit for their intended purpose and shall be readily identified from the surrounding surface by a tactile surface and a contrasting colour. They shall be arranged so that there is a separation of at least 10 mm between buttons. They should not be prone to false activation.

Portable trigger devices shall have a readily identifiable reassurance signal.

Trigger devices shall reset after activation so as to be ready to send a repeat signal.

Trigger devices shall be constructed so they can be cleaned without compromising their design function or becoming hazardous.

A selection of trigger devices should be available for people with different needs.  
(i.e. pendants, pressure pads, blow switches and the like.)

A trigger device activation delay of no less than 0.25 s and no more than 0.75 s should be incorporated in personal trigger devices.

### 3.7.2 Range of radio trigger devices

A portable trigger device using radio waves shall be tested for effective range at the time of installation, in accordance with the installation instructions.

NOTE: Effective range under emergency conditions in a building may be a small fraction of the open space range due to the attenuation caused by walls and floors, proximity of the pendant to the floor after a fall, body shielding, and unfavourable signal cross-polarization or reflection.

The design of radio trigger devices and radio receivers shall be such that they have a successful reliable minimum trigger range of 50 m in open space. Range testing shall be carried out to the following requirements:

- (a) During range testing the trigger device shall be held or worn by a standing person consistent with its intended mode of operation.
- (b) During range testing the trigger device shall successfully trigger the receiver when the trigger device is operated in any orientation.
- (c) During range testing the receiver and its associated antenna shall be mounted 1 m above the ground.

### 3.7.3 Portable personal trigger devices

Portable trigger devices shall be designed to be lightweight and shall have a water resistance classification of at least IP 67 as defined in AS 1939.

Portable trigger devices shall survive a free fall test of  $1.0 \pm 0.1$  m five times onto a smooth concrete surface not less than 10 mm thick, after which they shall function correctly and shall show no signs of physical damage.

A pendant neckband shall break when subjected to a force greater than 50 N.

### 3.7.4 Fixed personal trigger devices

Fixed trigger devices in wet areas shall meet the requirements of at least IP 65 as specified in AS 1939.

Where personal portable trigger devices are not provided, wet areas should have sufficient fixed trigger devices within easy reach of the bath/shower and toilet.

If wet area trigger devices are ceiling-mounted with a pull cord, the pull cord shall be fitted with a weak link within 50 mm of the switch and shall break on the application of any force equal to or greater than 200 N force. A momentary action on the pull cord shall be sufficient to activate the alarm and subsequent pulling of the cord shall not cancel the alarm.

Where a fixed personal trigger device is supplied, except where it is part of the local unit, it should be easily accessible.

## 3.8 MONITORING PERSONAL ACTIVITY AND ACCESS CONTROL (OPTIONAL)

### 3.8.1 Personal activity

#### 3.8.1.1 Predetermined activity

When a predetermined activity is not performed within a given time frame, the local unit shall signal a visual and audible pre-alarm condition for an appropriate time period before an alarm condition is triggered. During the pre-alarm condition the user may perform the required activity which resets the activity monitor automatically.

This type of activity monitoring has the potential to cause false alarms to be received at the CMF and should not be used to summon initial help from the emergency services.

Means shall be available to de-activate the activity monitoring process at the local unit and from the CMF.

### 3.8.1.2 *Predetermined boundaries*

The local unit shall allow for the monitoring of an activity within defined parameters, with the capacity to signal an alarm to the CMF when the user breaches the boundaries.

### 3.8.2 **Access control**

Where a remote access control service is provided and or key hide and lock combination details are held by the CMF confidential procedures for the management and use of this information shall be in place.

## 3.9 **ENVIRONMENTAL MONITORS**

Environmental monitors shall have a local alarm and a means of triggering the local unit. If the alarm condition is not immediately hazardous the monitor may warn the occupant of the deteriorating situation before triggering the local unit, in order to allow the occupant time to rectify the situation.

## 3.10 **THE LOCAL UNIT**

### 3.10.1 **General**

The local unit shall be located at the premises of the user.

The local unit or trigger device shall be capable of being placed in a test mode that provides a means of providing at least a 6 dB margin of safety when determining radio trigger range.

If the local unit has been placed into any test mode that is not the normal condition, the local unit shall automatically reset into its normal condition within 15 min.

The local unit shall include a cancel button to allow the user to cancel an accidental call. It shall be possible to cancel the call only during the pre-alarm period. If the cancel and emergency buttons are pushed simultaneously, the emergency button shall take priority and shall initiate a call.

Emergency and cancel buttons shall be at least 15 mm across their diagonal and arranged so they are at least 10 mm away from adjacent ones.

The local unit shall be constructed so it can be cleaned without compromising its design or becoming hazardous.

Knobs, handles, buttons and the like used to initiate the alarm shall be readily identified by a tactile surface and a contrasting colour.

### 3.10.2 **Lightning protection**

In Australia a major cause of field failure of wired telecommunication devices is lightning damage to the local unit. Equipment should be designed with the maximum practical isolation voltage between the telecommunications networks and the mains power supply.

Protective devices should be provided between each telecommunications line conductor to a protective earth.

### 3.10.3 **Receiver design**

The passband shall be the fundamental frequency of operation ( $f_0$ )  $\pm \pm \pm 5\%$ . Receivers shall provide an out of band rejection of at least 30 dB for all frequencies outside the passband and shall have a dynamic range of at least 60 dB.

### 3.10.4 **Audible alarms**

Audible alarms sound levels should be appropriate to the situation. Where used, they should be within the frequency band of 400 Hz and 3 kHz. They shall be either a pulsing or a swept frequency tone at a minimum sound level of 70 dB(A) at 1 m.



### **3.10.5 Recognition of trigger signals**

Trigger signals shall be identified and shall activate the pre-alarm condition within 2 s.

The transmitter and receiver pair shall incorporate a coding system capable of recognizing at least 32 000 uniquely identifiable codes.

A recognized technique such as checksum or CRC error correction shall be used for the differentiation and validation of the coded signals from each other and from background noise.

### **3.10.6 Pre-alarm conditions**

The local unit shall have an audible pre-alarm period of no more than 60 s from activation during which time the user can cancel the alarm sequence.

### **3.10.7 Reassurance**

Reassurance signals shall be audible and shall be given at the local unit in the period between start of dialling and until a confirmation signal has been received from the CMF.

This signal may be by an open audio channel during the dialling sequence or by an audiovisual indicator.

### **3.10.8 Confirmation**

A confirmation shall be audible and shall be given from the local unit after the CMF has registered the call. This signal may be in the form of a voice message from the operator or an audiovisual indication.

### **3.10.9 Clear down/reset**

The CMF shall clear down the local unit after a call sequence. After clear down the local unit shall immediately return to its stand-by condition ready for another activation.

If the local unit does not receive any command from the CMF for more than 90 s, it shall automatically terminate the call and perform subsequent call attempts to the maximum number allowed under ACA regulations.

### **3.10.10 Local unit condition indication**

Indications of fault conditions shall be visual and clearly distinguished from other indicators. Audible indication may also be used.

NOTE: Audible indication should be used with caution as users may be woken in the night by a brief service outage.

Visual indications may be in the form of a single light that changes colour, or separate lights for each function, or other visual display.

A fault condition shall be identified within 2 min of the occurrence of the fault.

A visual indication shall remain until the fault condition has been cleared.

The indicator light(s) shall be readily visible from a wide viewing angle from the front of the unit.

The following functions shall be indicated:

- (a) Normal condition.
- (b) Mains supply fail.
- (c) Alarm activated.

Indication of the following functions is optional:

- (i) Reassurance signal.
- (ii) Phone line failure
- (iii) Other functions and conditions.

### **3.10.11 Voice-to-voice**

The audio circuitry in the dialler shall be designed to enable voice communication with a person at least one room removed from the local unit.

### **3.10.12 Privacy**

The local unit shall not be capable of being used as a listening device without a call being initiated by the user in accordance with the ACA regulations.

## **3.11 THE LONG-RANGE COMMUNICATIONS LINK**

### **3.11.1 General**

The long-range communication link generally will be by the public switched telephone network but may also be by leased line, PABX, switched data link, cellular phone network, PCS network, or a radio data link.

Where the local unit has access to the telecommunications line, it shall be configured to take priority over any other telecommunications equipment connected to that line.

### **3.11.2 Communications redundancy**

A local unit shall be programmed to dial at least two alternate phone numbers and, if unsuccessful, shall continue to make call attempts to the maximum number of attempts allowed under ACA regulations.

A radio communicator shall continue to attempt transmission of data until a confirmation handshake from the CMF is received; that is, it shall incorporate a two-way facility.

### **3.11.3 Network redundancy**

For community monitoring, the emergency phone numbers shall be selected to provide some degree of network redundancy. In addition, a mix of local exchange and 'out of area' services, or analogue or ISDN services where available, shall feed the CMF.

## **3.12 LOCAL UNIT TO CENTRAL EQUIPMENT SIGNALLING**

The local unit to central equipment signalling systems may use any suitable protocol and shall comply with the following requirements:

- (a) Data from the local unit is transmitted to and validated by the CMF.
- (b) If correct data is not detected, the local unit shall clear down and make subsequent call attempts to the maximum number allowed under ACA regulations.
- (c) Handshaking protocols shall be used on long-range communications links between the local unit and the CMF.

## **3.13 THE CENTRAL MONITORING FACILITY**

### **3.13.1 General**

The sophistication of the CMF shall be appropriate to the local unit employed, the service provided and the size of the installation. The following features shall be provided in the CMF:

- (a) An indication that an alarm has been triggered.
- (b) A means of identifying the origin of the alarm signal.
- (c) An acknowledgment signal to the initiating local unit.
- (d) A means of logging alarms.
- (e) An indication of the type and priority of alarm.

- (f) A means of recording action taken in response to an alarm.
- (g) A signalling device for indicating mains failure in the CMF.
- (h) A signalling device for indicating failures in the receiving system or long range communications link.
- (i) Battery back-up facilities.
- (j) A means of recording and acting on calls from local units resulting from mains failure.
- (k) System test functions and procedures.
- (l) Information management technology for user details retrieval and logging of calls and action taken.
- (m) Back-up paper file system recording user details.
- (n) Remote backup facility.
- (o) Off-site data retention.

### **3.13.2 Alarm acknowledgment**

Alarm presentation shall be in audible or audible/visual form.

The audible alarm presentation may only cease when the operator acknowledges the alarm.

The alarm presentation shall be audible to an operator throughout the CMF.

### **3.14 CALL LOCKOUT**

All personal response alarm calls shall be presented to the operator as if they are an initial emergency call. Call lockout shall not be used.

NOTE: Subsequent alarm calls may mean the situation has deteriorated.

### **3.15 REMOTE BACKUP FACILITY**

The backup facility shall be remote from the main site to reduce the risk of local power or telecommunications network failure or other disasters affecting both sites. In addition, if a telephone line based on long-range communications link is used, the remote backup facility shall be located in a different telephone exchange area.

The remote backup site shall be operational within 4 hours.

The backup site shall be permanently equipped with central monitoring and information management technology equipment. Access to the cellular telephone network shall be available in the monitoring room.

The telecommunications capacity of the backup site shall be provided in accordance with Table 3.15.

Backup sites with more than one telecommunications link shall not be dependent on any one piece of equipment in order to receive and action a call.

NOTE: Procedures should be in place to minimize the telecommunication congestion at the backup CMF. Incoming test and non-urgent calls should be kept as short as possible.

### **3.16 DATA INTEGRITY**

User information data shall be backed up off-site every day and shall be available for use at the remote backup site.

**TABLE 3.15**  
**BACKUP SITE CAPACITY**

| Number of incoming links at the main CMF | Backup site minimum requirement |                |
|--|---------------------------------|----------------|
|  | Incoming links                  | Outgoing links |
| 1  | 1                               | 1              |
| 2  | 2                               | 2              |
| 3  | 2                               | 2              |
| 4 or more                                | *                               | *              |

\* 50% of the incoming and outgoing telecommunications capacity of the main CMF, rounded up to the nearest integer.

## SECTION 4      MAINS POWER AND BATTERY SYSTEMS

### 4.1      LOCAL UNITS

#### 4.1.1    General

This Section sets out requirements for all power supply equipment incorporated into a PRS, including separate supplies and those fitted as an integral part of any trigger device.

The requirements of this Section do not apply to trigger devices that are powered by batteries only.

#### 4.1.2    Performance

The power supply system shall consist of a battery complying with the requirements of Clause 4.4 and regulating circuitry designed to provide a nominal output voltage within the limits specified by the manufacturer under each of the following conditions:

- (a) Operation from an external supply input, or from battery power for the period specified in Table 4.4.1(B).
- (b) All current loads demanded by the system or device.
- (c) Any input voltage variation from the supply source (mains or solar or similar) within the range of 0V up to the nominal voltage +10%, including changeover to battery operation where applicable.

#### 4.1.3    Operation on mains supply

Mains-operated power supply equipment shall comply with the relevant requirements of AS 3100 or AS/NZS 3260 as appropriate, and shall be suitable for operation from a mains supply having the following characteristics:

- (a) Nominal voltage .....  $\pm 10\%$ .
- (b) Nominal frequency .....  $\pm 2$  Hz.

#### 4.1.4    Mains supply isolation

All equipment shall operate on extra low voltage as defined in AS 3000. Mains-powered equipment shall be powered by an external step-down transformer such as a plug pack.

Mains power shall not enter the equipment housing.

#### 4.1.5    Charger design

The charger design for rechargeable batteries shall comply with the requirements of the appropriate Standard for mains-operated systems and shall have charging characteristics appropriate for the battery it is intended to charge.

#### 4.1.6    Charger rating

Battery charging equipment shall be capable of recharging the battery sufficiently to achieve the capacity requirements of Table 4.4.1(B) as appropriate, with a total charging period not exceeding 24 h to charge from a 20% charged state to a 90% charged state.

#### 4.1.7    Mains power failure

In the event of a mains power failure, the local unit shall report the fault condition to the CMF after a random time delay in accordance with the time scale in Figure 4.1.

#### **4.1.8 Automatic battery testing**

The power supply circuitry in the local unit shall perform automatic testing of the battery to detect the occurrence of any battery failure or low battery capacity condition.

A low battery capacity condition shall be signalled to the CMF prior to the battery discharging to 20% of its rated capacity. A failed battery condition shall be signalled to the CMF immediately on detection.

#### **4.1.9 Battery capacity**

All batteries shall conform to the capacity requirements specified in either Table 4.4.1(A) or Table 4.4.1(B), as applicable.

### **4.2 BATTERY-POWERED TRIGGER DEVICES**

#### **4.2.1 General**

This Clause sets out requirements for battery power systems in trigger devices and associated equipment without any power system other than primary batteries.

#### **4.2.2 Performance**

Batteries shall comply with the requirements of the relevant Standard (see Appendix A).

The system shall be designed to provide a continuous steady voltage within the limits specified by the manufacturer under each of the following conditions:

- (a) Operation from battery power for the period specified in Table 4.4.1(B).
- (b) All current loads demanded by the system or device.

#### **4.2.3 Battery testing**

When manually activated, trigger devices using primary batteries shall report low battery status to the local unit prior to the battery discharging to 20% of its rated capacity. In addition, the design shall be such that when a low battery is signalled, the battery shall contain sufficient capacity to trigger the local unit for at least 20 operations. The local unit shall signal low trigger device battery status to the user and the CMF.

### **4.3 CENTRAL MONITORING FACILITY**

A policy and procedure shall be in place for the regular testing and replacement of stand-by batteries in the CMF.

If a stand-by power generator is used, procedures shall be in place for its routine maintenance and testing.

The CMF shall include a minimum of 12 h uninterrupted power supply (UPS) or 1 h UPS and a stand-by power generator.

The CMF procedure manual shall contain information for the UPS supplier's procedure for regularly testing the UPS battery capacity. The power generator shall be selected, installed and maintained in accordance with AS/NZS 3009.

For residential aged care facility monitoring, where PABX extensions are used for local unit connection or for the CMF connection, PABX battery backup shall be provided for a minimum of 4 h operation in the event of mains power failure.

### **4.4 BATTERY REQUIREMENTS**

Batteries shall not require any maintenance within their normal life expectancy. Batteries shall be designed to operate within the temperature range of 0°C to 50°C at full system load conditions.

The characteristics of a battery shall be chosen such that it will be suitable for the application having regard to the expected load variation, operating temperature, and charge requirements of the system.  
 Rechargeable batteries shall be capable of withstanding the charge rate specified in Clause 4.1.6.

**TABLE 4.4.1(A)**

**BATTERY CAPACITY REQUIREMENTS FOR NON-MAINS-POWERED EQUIPMENT WITH NON-RECHARGEABLE BATTERIES IN TRIGGER DEVICES**

| Battery type                       | Capacity requirement             |
|------------------------------------|----------------------------------|
| All batteries                      | 4000 four second operations      |
| Minimum battery service life ..... | 2 years min. shelf life at 20°C. |

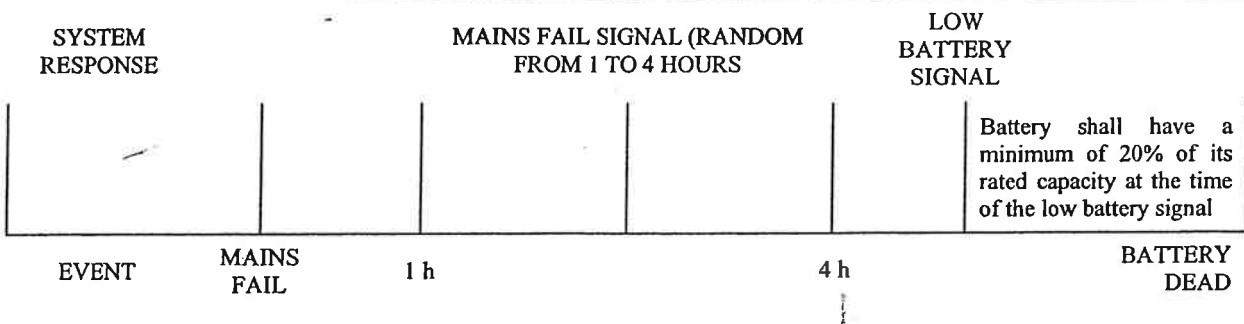
**TABLE 4.4.1(B)**

**BATTERY CAPACITY REQUIREMENTS FOR EQUIPMENT CONNECTED TO MAINS OR EXTERNAL POWER SOURCE IN TRIGGER DEVICES AND LOCAL UNIT**

| Battery type  | Capacity requirement  |
|---|---|
| Rechargeable batteries with permanently connected mains             | 40 h plus 5 emergency call sequences at the end of the time period    |
| Rechargeable batteries with intermittent charging, e.g. solar cells | 30 days plus 5 emergency call sequences at the end of the time period |
| Non-rechargeable batteries with permanently connected mains         | 30 days plus 5 emergency call sequences at the end of the time period |
| Minimum battery service life .....                                  | 5 years at 20°C.  |

NOTES: Working environments vary significantly due to factors such as temperature, humidity, and usage. Battery life greatly decreases under elevated temperature conditions and usage. The above times are specified for equipment at 20°C.

Battery shall have capacity for a minimum of 36 hours in a quiescent state and 5 call sequences between mains fail signal and battery failure.



**FIGURE 4.1 SEQUENCE OF EVENTS FOLLOWING A MAINS POWER FAILURE WHERE MAINS POWER IS NOT RESTORED**