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# 1. INTRODUCTION

- (1) This User Requirement describes safety equipment for use by operational firefighters to provide remote signalling functions, primarily but not exclusively, for use by wearers of breathing apparatus. It should be read in conjunction with Home Office Type Approval Technical Specification MG-41<sup>1</sup> and Home Office Technical Standard MG-41A<sup>2</sup>
- (2) This requirement envisages two types of equipment:
  - (a) base stations: at least one of which would be deployed outside the risk area at an incident, and
  - (b) portable units: which would, primarily, be allocated one to each BA wearer at an incident.
- (3) The equipment described in this Requirement is additional to and not in substitution for the procedures and equipment described in Technical Bulletin 1/1997<sup>3</sup>. However, the portable unit described in this Requirement may be a separate unit or may also provide the functionality of an Automatic Distress Signal Unit (ADSU) conforming to specification JCDD/38<sup>4</sup>.
- (4) Where the portable unit is provided in addition to equipment meeting JCDD/38, it shall not detrimentally affect the operation of any ADSU worn by the user of a portable unit.
- (5) To achieve the functionality described in this Requirement, each base station and each portable unit shall be identified by a single unique identity and that it shall be possible at an incident for each portable unit which is to be used to be initialized (by base station operator election) onto the base station (or one of the base stations) deployed at an incident at any stage of an incident.
- (6) It shall be possible to de-initialize each portable unit from the base station as the user withdraws from the risk area (and in the case of a BA wearer, collect the BA tally from the Entry Control Board).
- (7) Whilst it is expected that a single base station will initially be deployed at an incident, it is likely that at major incidents more than one base station will be brought into use, especially in circumstances where more than one BA Entry Control Point is in use.
- (8) In the remainder of this Requirement the following definitions apply:
  - (a) **EVACUATION SIGNAL:** An audible evacuation warning, similar to the sound produced by an Acme Thunderer whistle, described in paragraph 3 of JCDD/39<sup>5</sup>;
  - (b) **SELECTIVE EVACUATION ALARM:** An audible warning, defined in Appendix 2 to this User Requirement, having an operational effect similar to that of the EVACUATION SIGNAL but directed exclusively to the recipient of the alarm, and
  - (c) **DISTRESS SIGNAL:** An audible warning identical to the Full Alarm Signal produced by an ADSU meeting the requirements of specification JCDD/38.

## 2. BASE STATION PRIMARY FUNCTIONS

The base station shall provide the following functions:

- (1) the initialization (logging-on) of portable units on a specific base station in accordance with the provisions of clause 4(2) of this Requirement. Initialization should be possible at any stage of an incident. It should not be possible to initialize a portable unit on more than one base station. (It is envisaged that use might involve a maximum of 50 portable units at any one time and up to 100 portable units during the duration of a single incident.) It shall be possible for the base station operator to confirm that a portable unit has been successfully initialized on to the base station and to reject the initialization of an unwanted portable unit initialization request. There shall be safeguards to prevent the unwanted initialization of a portable unit which initiates a "Distress Signal" alarm message;
- (2) to cause:
  - (a) an "EVACUATION SIGNAL" to actuate remotely on all portable units within range that have been initialized on that base station and any portable units which are within range and are not initialized on any base station, and
  - (b) a SELECTIVE EVACUATION ALARM to actuate remotely on any specific portable (or series of portable units) within range which is initialized on that base station which have been manually selected by an operator;

Where these functions are offered to the operator on a menu, the SELECTIVE EVACUATION ALARM shall be offered as the first option.

- (3) to receive acknowledgement of the receipt of a radio message initiating an "EVACUATION SIGNAL" or a "SELECTIVE EVACUATION ALARM" from each portable to which such a message has been transmitted;
- (4) to receive an alarm message that the user of the portable unit is withdrawing for reasons of personal safety from any portable initialized on the base station or not initialized on any base station and to identify automatically the portable unit from which the alarm message transmission originates and, in respect of portable units initialized on the base station only, to allow the manual initiation by the base station operator of a message to the originating portable unit confirming acknowledgement of the alarm message (the inability to acknowledge the receipt of an alarm message from a portable unit not initialized on the base station shall not inhibit any other base station functions);
- (5) to receive a "DISTRESS SIGNAL" alarm message (whether actuated manually or automatically) from any portable initialized on the base station or not initialized on any base station, to identify automatically the portable unit from which the distress alarm message transmission originates, and in respect of portable units initialized on the base station only, to allow the manual initiation by the base station operator of a message to the originating portable unit confirming acknowledgement of the alarm message (the inability to acknowledge the receipt of an alarm message from a portable unit not initialized on the base station shall not inhibit any other base station functions);

- (6) in the event that no acknowledgement is received from any portable unit to which a message initiating an "EVACUATION SIGNAL" is transmitted, to re-transmit the message automatically at least five times at random but no less frequently than every 5 seconds and additionally to initiate a "no acknowledgement" display (see clause 2(8)(f) of this Requirement) after at least three unsuccessful attempts (the no acknowledgement display should continue until the transmission is acknowledged);
- (7) to permit deletion (subject to safeguards designed to prevent accidental deletion) of the initialization of any portable unit initialized on the base station;
- (8) to display promptly the following information to the base station operator:
  - (a) the receipt of a signal from an identified portable unit requesting initialization and the identities of all the portable units currently initialized on the base station;
  - (b) that the base station operator has manually initiated the operation of the "EVACUATION SIGNAL" on all portable units initialized on the base station or,
  - (c) that the base station operator has manually initiated the operation of the "SELECTIVE EVACUATION ALARM", the display identifying the portable units to which a message initiating this alarm has been sent,
  - (d) the receipt of an alarm message indicating that a portable unit has signalled that the user of the portable unit is withdrawing for reasons of personal safety and identifying that portable unit,
  - (e) the receipt of a "DISTRESS SIGNAL" alarm message from a portable unit identifying that portable unit and list of all portable units initialized on the base station which have initiated a "DISTRESS SIGNAL" alarm message and, in each case, the time receipt of that message by reference to the clock,
  - (f) the identity of any initialized portable which has not acknowledged a message initiating an "EVACUATION SIGNAL" or a message initiating a "SELECTIVE EVACUATION ALARM"
  - (g) the time,
  - (h) for each portable unit initialized on the base station; the elapsed time since the portable unit was switched on (see clause 4(1) of this requirement) and the time of the latest message from that portable unit relating to one of the primary functions described in clauses 4(2), 4(3), 4(4) or 4(5) of this requirement, and
  - (i) battery condition

Where the base station is incapable of simultaneous display of all the functions described in this clause, they may be operator selected save that (a), (b), (c), (d), (e), (f), (g), (h) and (i) must be displayed (or queued for display) when the described mode is selected and/or the appropriate alarm is operating. (Where the base station is incapable of simultaneously displaying all the data under any of the modes, it shall be sufficient to display part of the data allowing the operator to scroll through the complete data. Additionally, where the list of portable units initialized on the base station contains multiple entries some of which

cannot be displayed simultaneously, the total number of portable units initialized on the base station shall be indicated in the display and the data entries shall be listed in order by brigade and thereafter in the numerical order of their identities.) Whenever a message is received by the base station the appropriate audible (and visual) alarm shall operate immediately but the data shall not automatically over-write the current display but shall be temporarily stored in a queue. The earliest data in any queue(s) shall be displayed on operator selection or automatically when the operator has dealt with the current display, priority being given to alarm messages;

- (9) to transmit a "TEST SEQUENCE" as described in clause 2(13);
- (10) to provide audible alarms to warn the operator of displays under the headings 2(8)(a) (b),(c), (d),(e),(f) and (i);
- (11) to provide an internal clock, recording day, month, year, hour (24 hour clock) minutes and seconds. This clock shall be accurate (deviation shall not exceed 1 second in a 24 hour period). Provision shall be made for operators to adjust the clock and to accommodate changes from BST to GMT and GMT to BST.
- (12) to create automatically a timed log file of all base station activity and portable unit acknowledgements received by the base station which occur after the first portable unit has been initialized at an incident with events (and failures to acknowledge) recorded against real time in a form that permits the file to be saved and subsequently transferred on to an industry-standard personal computer. The file is to be retained in the base station until it is transferred or is manually deleted. The file shall be suitably protected against accidental deletion and it shall not be deleted by power loss or the switching-off of the base station and the base station shall automatically restore to the state immediately prior to power-loss or switching-off when power is restored.
- (13) to provide a test sequence to validate satisfactory communications between a portable unit and the base station on which it is initialized. There is no objection to the test sequence being initiated by a portable unit or by a base station. If the test sequence causes the actuation of the "EVACUATION SIGNAL", the "SELECTIVE EVACUATION ALARM" or the "DISTRESS SIGNAL" or the radio message associated with any of these alarm messages, the audibles and visual alarms at the portable unit and the base station should be muted so that initiation of the test sequence at an incident does not result in a warning which might be mistaken for a real alarm.

### 3. BASE STATION DESIGN REQUIREMENTS

- (1) The base station will be used by firefighters at operational incidents as a self-contained unit. It shall therefore have its own low voltage power supply which shall be sufficient to power the unit under all operating conditions for a period of not less than eight hours from when switched on starting from a fully charged condition. The electrical power supply to the base station may be integral or may be derived from a separate battery unit. Any such separate power supply shall in all other respects conform to clauses 3(1) to 3(2), the size requirements of 3(3) and clause 3(5), shall be capable of durable connection to the base station by a connector and cable that is suitable for the purpose, and shall be designed to be body-worn by the base station operator, stood directly on the ground or otherwise located or secured in a manner suitable for the application. The base station shall be provided with an alarm and visual warning (see clause 2(8)(i)) and the alarm shall operate when less than one hour of full operation of the base station is possible. The base station shall continue to operate satisfactorily throughout the battery discharge cycle until the battery is exhausted. Where the base station electrical power supply utilises re-chargeable cells, it shall be provided with:
- (a) a battery charging arrangement which allows the base station to be continuously re-charged without damage whilst carried on a fire appliance; and
  - (b) a battery charging arrangement for use at fire stations which allows the cells in the base station to be fully recharged from fully discharged in a period not exceeding 8 hours and thereafter continuously without damage.

Rechargeable cells shall be capable of easy replacement when they no longer function satisfactorily.

Where a base station utilises primary cells, these shall be of standard, commercially available, type that can readily be replaced without the use of tools or specialist knowledge.

- (2) The base station, its controls and displays, shall be of rugged construction and shall, as a minimum, meet the standard IP54 specified in the current edition of BSEN 60529°. External connections shall be provided with robust protective covers that prevent damage and maintain the integrity of the casing when not in use. Controls may incorporate programmed operating delays to minimise the risk of unwanted or accidental operation, but where these are used successful operation must be confirmed by an appropriate audible tone.
- (3) The base station shall be handportable (the total of external dimensions, excluding any external devices connected to the base station and any external antenna, [length + depth + height], shall not exceed 1100mm and total weight shall not exceed 10kgs.) and shall be capable of being fitted to a suitable tripod base or of being body worn by the operator by means of a suitable harness.

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- (4) Displays shall be clear, unambiguous and self explanatory. Facilities shall be provided so that the displays can be read in darkness, under street lighting and in bright sunlight. (It is not a requirement that displays be permanently illuminated.)
- (5) Controls shall be robust, durable, clearly labelled and capable of being readily identified in darkness and capable of operation by gloved hands.
- (6) Audible alarms shall be distinctive and readily distinguishable from each other. They shall be capable of being manually acknowledged and manually cancelled by the operator. This may be combined with the function described in clauses 2(4) or 2(5), as appropriate.  
  
A remote headset may be provided for connection to the base station to facilitate the perception of audible alarms in noisy operating environments.
- (7) Base stations shall have a unique identity and shall be marked accordingly.
- (8) Portable unit initialization may be achieved by means of a keyboard, bar code reader or otherwise. Whichever method is used to facilitate initialization of portable units it shall also be possible to achieve this manually.
- (9) The antenna of the base station may be internal or external. The base station shall also be provided with an external antenna connection by which the base station can be connected (by means of appropriate connectors and interface unit if required etc.) to a leaky feeder or other remote antenna. Where the external antenna connection is provided by the removal of an antenna, no damage must be caused if the base station is operated without an antenna being connected.
- (10) Log file transfer [see clause 2(12)] shall be achieved by a standard serial port and achieved physically by means of a compatible connector located in a suitable position on the base station.
- (11) The base station shall continue to operate satisfactorily and in accordance with this Requirement in and after prolonged storage at ambient temperatures ranging from -15°C to +55°C.
- (12) The base station shall be fully functional within 10 seconds of being switched on.
- (13) The base station shall be provided with an external data connector conforming to the specification in clause 6(8) of this User Requirement to permit interconnection with equipment providing facilities not described in clauses 1 - 7 of this User Requirement.

## 4. PORTABLE UNIT PRIMARY FUNCTIONS

Each portable unit shall provide the following functions:

- (1) to permit the portable unit to be switched "on" or "off" and, when the unit is switched on, to provide the indications described in Appendix 2 to this Requirement indicating to the user that the unit is turned "on" and is operational (the portable unit shall have a clock which counts elapsed time from when it is switched-on to the until it is initialized on a base station and then transmits these data to the base station);
- (2) to have a unique identity and to be capable of being initialized on to a specific base station (it is envisaged that this unique identity shall be programmable by the supplier);
- (3) to receive and acknowledge automatically the receipt of an alarm message initiating an "EVACUATION SIGNAL" or "SELECTIVE EVACUATION ALARM" addressed to that portable unit, but no other, and to emit the appropriate audible and visual alarms and indications described in Appendix 2 to this Requirement;
- (4) to allow the user to initiate the transmission of a radio message indicating that the user of the portable unit is withdrawing for reasons of personal safety by user election (this message shall be automatically re-transmitted at random but no less frequently than every 5 seconds, until acknowledged);
- (5) to transmit automatically a radio alarm message indicating the local operation of the "DISTRESS SIGNAL" either
  - (a) when the portable unit does not also perform the functions of an ADSU, by detecting the actuation of a distress full alarm signal from an ADSU conforming to specification JCDD/38, or
  - (b) where the portable unit also performs the functions of an ADSU conforming to specification JCDD/38, when the distress full alarm signal is actuated;

The radio alarm message indicating the local operation of the "DISTRESS SIGNAL" shall be automatically re-transmitted at random but no less frequently than every 5 seconds until the portable unit is re-set. Where the portable unit is also an ADSU, re-setting shall be analogous to the procedure described in clause 2 of JCDD/38.

The portable unit originating a radio alarm message indicating the operation of the "DISTRESS SIGNAL" shall also receive the manual acknowledgement of the receipt of a "DISTRESS SIGNAL" alarm message which has been transmitted by the base station (see clause 2(5) of this Requirement) and provide the a visual indication to the wearer described in Appendix 2 to this Requirement that the message has been satisfactorily transmitted to the base station and has been manually acknowledged by the base station operator.

It shall not be possible to mute or switch-off the audible "DISTRESS SIGNAL" other than by using the mechanism described in JCDD/38 (Where the portable unit is combined with

a JCDD/38 compliant ADSU, supplier's instructions shall specifically warn against the use of a key for this purpose other than at the base station since doing so will start the de-initialization of the portable unit.)

- (6) to allow, where the portable unit is combined with a JCDD/38 ADSU, the test (at an incident or otherwise) of the JCDD/38 functionality without causing the transmission of a (radio) "DISTRESS SIGNAL" alarm message. This facility shall be enabled in such a way that it requires the continuous and positive action of the wearer and so that that the portable unit automatically reverts to its normal operating mode at the end of the test.

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## 5. PORTABLE UNIT DESIGN REQUIREMENTS

The portable unit shall incorporate the following design requirements:

- (1) Where the portable unit also performs the functions of an ADSU it shall, in addition to meeting this Requirement, also meet specification JCDD/38 with the exception of clauses 7 and 8 of that specification.
- (2) The portable unit shall be designed to be capable with fully charged batteries of operating continuously for a period of not less than 3 hours assuming that a "DISTRESS SIGNAL" is actuated for half this period.

Where powered by a re-chargeable battery, the portable unit shall:

- (a) be designed to permit the easy removal and replacement of the rechargeable cells,
- (b) be provided with external contacts allowing the rechargeable cells to be charged in situ and be capable of being supplied with a battery charging arrangement which allows the unit to be continuously recharged without damage whilst the unit is carried on a fire appliance, and
- (c) be capable of being supplied with a charging arrangement which allows the cells (whether fitted to the portable unit or not) to be fully recharged from a fully discharged state in a period not exceeding 8 hours and thereafter continuously without damage and permits, by user election, the selection of a mode that permits the cells to be fully discharged prior to recharging.

Where replaceable primary cells are used to power the portable unit, these shall be of a type that is readily available from a range of commercial suppliers and shall be capable of being easily changed by users. Where the intrinsic safety certification of the unit is limited to specified battery types, these shall be clearly listed on the inside of the battery compartment.

- (3) The portable unit shall be designed to be safe for use in potentially flammable or explosive dusts, gases or vapours. The portable unit shall, as a minimum, be intrinsically safe to British Standard 5501:Part 7:1977 (EN50 020) and certified by an approved body to "EEx ib IIC T4". Any attachments approved by the manufacturer for connection to the unit in accordance with the Requirements shall result in a system that maintains this level of intrinsic safety. (NB: It is intended that the standard of explosion protection in this specification will be revised to reflect the *Equipment and Protective Systems Intended for Use in Potentially Explosive Atmosphere Regulations 1996 - SI 1996/192* by not later than the end of the transitional period specified in those Regulations, viz. 30 June 2003.)

- (4) Equipment shall be clearly and durably marked with :
  - a) the makers name, model number, identity and serial number.

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- b) the appropriate markings confirming compliance with the standards for intrinsic safety, described in clause 5(3).
- (5) The controls of the portable unit shall be capable of being easily operated with a gloved hand and the controls shall be so arranged:
- (a) to facilitate the easy identification (by touch and location as well as by view) by the user in darkness, and
  - (b) to prevent the accidental operation of any control which would have the effect of detrimentally affecting the user's safety; in particular the portable unit should be designed so that it cannot be switched off accidentally.
- (6) The portable unit shall be provided with the visual indications and audible warnings described in Appendix 2 to this Requirement. ~~Audible warnings shall have the equivalent continuous A-weighted sound pressure level described in Appendix 2 to this Requirement. (Tests shall be conducted in accordance with the procedure in set out in JCDD/38.)~~ A headset or remote display conforming to the standard defined in clause 5(3) of this Requirement may be provided to facilitate the users perception of alarms and warnings in noisy environments.
- (7) The portable unit shall be capable of being readily and durably attached to either the harness of a breathing apparatus or alternatively to the tunic of the user. The case of the portable unit shall be such that the likelihood of the unit becoming snagged on obstructions whilst in use and the possibility of audible alarms being muffled is minimized.
- (8) The total external dimensions of the portable unit, excluding any external devices attached to the unit and any external antenna (length + depth + height) shall not exceed 300mm and the total inclusive weight shall not exceed 0.8kg. Any external antenna shall be as small as practicable. It shall be designed to minimise the chance of snagging and causing injury. The antenna shall not be designed to fold or telescope.
- (9) The portable unit shall be rugged in construction and shall as a minimum meet the standard IP64 specified in the current edition of BSEN 60529. Where the portable unit is not also an ADSL it shall provide equivalent standards of watertightness, fire resistance and impact to those described in clauses 10, 11 and 12 of JCDD/38.
- (10) The portable unit shall continue to operate satisfactorily and in accordance with this Requirement when tested in accordance with clause 9 of JCDD/38.
- (11) The portable unit shall be fully functional within 5 seconds of being switched on.
- (12) The portable unit shall be provided with an external data connector conforming to the specification in clause 6(8) of this Requirement to permit interconnection with equipment providing any additional functions or facilities, not described in clauses 1 to 7 of this User Requirement.

## 6. COMMUNICATIONS ARRANGEMENTS

The communications link between a base station and a portable unit will be achieved by radio. The following are relevant to that radio element of this Requirement:

- (1) Base station and portable units will operate on a frequency (or frequencies) assigned to fire brigades for this purpose by the Home Office Radio Frequency and Communications Planning Unit (RFCPU). It is expected that the bandwidth of the assignment will be 25kHz.
- (2) Base stations, portable units and repeaters shall be Type Approved by the Home Office RFCPU to operate on these frequencies and for this purpose. It is expected that type approval will, amongst other things, include operation using an over the air signalling system and signalling protocol that will be defined by the Home Office RFCPU and which will specify maximum transmit powers for equipment. Equipment shall therefore be compliant with the following:
  - (a) Home Office Type Approval Specification MG 41, and
  - (b) Home Office Technical Standard MG 41A.
- (3) Blocks of numbers defining identities for base stations and portable units will be allocated to brigades by the Home Office RFCPU.
- (4) There will not be a requirement for base stations or portable units to transmit or receive speech.
- (5) There will not be a requirement for any portable unit to communicate directly with another portable unit. There will be no requirement for any base unit to communicate directly with another base unit.
- (6) Communications between portable units and base stations (and the reverse) shall be afforded the levels of priority defined in Appendix 1 to this Requirement.
- (7) Communications having a specified priority shall be transmitted and received by base stations or portable units (as appropriate) within range within the following maximum times:

(a) Where no radio repeaters are in use:

Priority 1	-	1 second
Priority 2	-	5 seconds
Priority 3	-	10 seconds
Priority 4	-	Unspecified

(NB The time for the transmission by a portable unit of the acknowledgement of receipt of a message initiating an "EVACUATION SIGNAL" shall be measured from the time when the base station

initiating the message requests confirmation that the message has been received.)

- (b) Where radio repeaters are in use the maximum times specified in (a) shall be increased by an average of 1 second for each radio repeater in the transmission path. (Repeaters must share the air interface with other repeaters and portable units. Any message received by a repeater must be re-transmitted in a randomised manner to minimise the possibility of data collisions. To avoid unnecessary congestion, each repeater shall repeat each data message once only)
- (8) Transmission times in the context of this specification are to be measured from the time of the activity leading to the transmission to the time of receipt and processing of the resulting message. The specified times assume no significant interference and no conflicting use of the channel.
- (9) Portable units and base stations shall be provided with a standard external data connector as described in MG-41A. Additionally, the base station shall be provided with a connector of the type described in clause 3(10).

## 7. FUNCTIONAL SAFETY

- (1) Suppliers of equipment designed to meet this Requirement shall be certified to ISO 9000 (or an equivalent) standard in respect of the supply of equipment and shall be required to satisfy purchasers that in relation to the design of portable units and base stations and their interaction as a system they have adhered to the recommendations of BS IEC 61508: 1998 *Functional Safety of Electrical/Electronic Programmable Electronic Safety Related Systems*, or to an equivalent standard.
- (2) An auditable record of the software and its associated source code shall be kept by the manufacturer for a minimum of 20 years from the time the product enters the market.
- (3) If requested by the purchaser, the supplier of equipment meeting this Requirement shall furnish certificates to show that the equipment conforms to the Requirement.

## 8. ADDITIONAL FUNCTIONS

- (1) In addition to the functions specified elsewhere in clauses 1 to 7 of this Requirement, purchasers may specify equipment providing additional telemetry functions which may include any or all of the following additional functions. Equipment which provides these additional functions may comprise equipment which is not integral with either a base station or a portable unit and which may be connected to the base station or the portable unit, as appropriate, by means of the external connectors described in clause 6(8) to 6(10) of this Requirement.
- (2) Any such separate unit intended for connection to a portable unit shall comply with the appropriate parts of clauses 5(2) to 5(11) of this Requirement.
- (3) Where provided, any additional functions shall not detrimentally affect any of the primary functions of either portable units or base stations. Any audible alarms provided in connection with additional functions shall be different to and distinct from the alarms described in Appendix 2.
- (4) Additional functions may include:
  - (a) monitoring and transmission of data regarding the performance of any breathing apparatus worn by the user of the portable unit,
  - (b) monitoring and transmission of data regarding the environment in which the user of the portable unit is operating,
  - (c) the assignment of the identity or name of a user of a portable unit to the initialization record of each portable unit initialized on the base station and its display in relation to the display of data regarding that unit. (This identity may be added by means of a keyboard, bar code reader or otherwise);
  - (d) the provision to transmit "CONTACT SIGNALS, as follows:
    - (i) to transmit automatically a "CONTACT SIGNAL" to every portable unit initialized on a base station at a rate (within a range of every 10 seconds to every 120 seconds in increments of not less than 10 seconds) determined by the operator and to receive acknowledgement from the portable unit;
    - (ii) to transmit a "CONTACT SIGNAL" by base station operator election to a specific portable unit and to receive acknowledgement from the portable unit.

The timing of automatic "CONTACT SIGNALS" shall commence from the time of the last acknowledged "CONTACT SIGNAL";

In the event that no acknowledgement is received from any portable unit to which an "CONTACT SIGNAL" is transmitted the base station shall re-transmit the message at random but no less frequently than every 5 seconds until acknowledged or until the addressed portable unit is

manually deleted from the base station (see clause 2(7) of this Requirement) and additionally to initiate a "no contact" display after three unsuccessful attempts (the no contact display should continue until the transmission is acknowledged);

The base station shall display the operator-selected period between automatic "CONTACT SIGNAL" transmissions and the identity of any initialized portable unit which has not acknowledged a "CONTACT SIGNAL" in a manner analogous to that described in clause 2(8)(e),

The portable unit shall acknowledge automatically a "CONTACT SIGNAL" transmitted by the base station on which it is initialized and to provide a visual and audible warning that no "CONTACT SIGNAL" has been received during the preceding 150 seconds (this audible and visual warning shall continue until it is self-cancelled by subsequent receipt of a valid "CONTACT SIGNAL" or the mobile unit is switched off).

In addition to meeting the requirements described above, portable units may be configured so that by means of connection to appropriate sensors, a range of data may be included in the acknowledgement of a "CONTACT SIGNAL". Any such data shall be accepted by the base station and added to the data relating to the portable unit in the log file and may be displayed, and where appropriate, alarmed as specified by the purchaser. Where alarms are used, the threshold level shall be capable of being set by the operator, and at selection, cancelled. It is envisaged that such facilities might include wearer heart rate, respiration rate, exhaled temperature or ambient temperature of the environment in which the wearer is operating.

(e) for a base station operator to be able to format text messages of up to 80 characters and to transmit such messages selectively and to all portable units initialized on the base station so that the message is displayed on a suitable display on the portable unit such that it can be read by the user in darkness. An audible warning shall be provided to alert the user of a portable unit to receipt of such a message. A message received on the portable unit shall be capable of being retained and re-read by the user until it is over-written by a subsequent message or the portable unit is switched off;

(f) to make available portable self-contained radio repeaters, operating on the assigned frequency, which will have the effect of receiving transmissions from the base station and re-transmitting them, without material alteration, onwards to the addressed portable unit. The repeater shall also repeat messages from portable units addressed to an identified base station. It shall be possible to insert up to 7 repeaters in any given transmission path without detrimentally affecting communications between portable units and the base station on which they are initialized but, to avoid unnecessary congestion, each repeater shall only repeat each data message once only;

In order to facilitate the operational location of a repeater in the most effective position it shall be provided with a clear visual or audible

indication that it is within range of the base station on which it is initialized. (It is expected that it will be necessary for repeaters to be initialized on to a base station before they are deployed for this purposes but suppliers are open to make other suggestions for achieving this objective.) Repeaters shall meet similar standards of robustness and safety for use in flammable dusts, gases or vapours as are specified in this Requirement for portable units.

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## TRANSMISSION PRIORITIES

### PRIORITY 1

A radio alarm message confirming operation of a Distress Signal

A radio alarm message initiating an Evacuation Signal

A radio alarm message initiating the operation of a Selective Evacuation Alarm

User Withdrawal Signal

### PRIORITY 2

Acknowledge Distress Signal message

Acknowledge Evacuation Signal message

Acknowledge Selective Evacuation alarm

Contact Signal

Acknowledge Contact Signal

### PRIORITY 3

Initialize portable unit

Acknowledge initialization

Transmit Text Message

### PRIORITY 4

Transmit Test Sequence

## PORTABLE UNIT ALARM/DISPLAY REQUIREMENTS

ACTIVITY	VISUAL INDICATION	AUDIBLE INDICATION*
Initialization and self test	Green LED (flashes 3 times)	One $96 - 102 L_{eq}$ dBA 80dBA-short and one $96 - 102 L_{eq}$ dBA 80 dBA-long pulse
Normal operation after initialization	Green LED (flashes every 5 seconds or on movement)	None
Low battery	Yellow LED - flashes	Regular $96 - 102 L_{eq}$ dBA 80dBA pulse
Failed battery	None	None
Radio systems failure	Red and Yellow LEDs flash repeatedly (for JCDD/38 equipment, the green LED will flash normally to indicate that the equipment is still functioning as an ADSU)	None
ADSU Pre-alarm	None	Swept tone with a sound pressure level of -not less than that of the pre-alarm signal described in JCDD/38.
ADSU full alarm	Red LED (flashes every second)	DISTRESS SIGNAL as JCDD/38
ADSU full alarm (manual acknowledgement by Entry Control Officer)	Red LED	DISTRESS SIGNAL as JCDD/38
User withdrawing	None (Green LED continues to flash)	3 x $96 - 102 L_{eq}$ dBA 80dBA short pulses on button press one $96 - 102 L_{eq}$ dBA dBA-long pulse to confirm auto-acknowledgement
Receipt of Evacuation message	Red LED flashes once every 2.5 seconds	EVACUATION SIGNAL as described in JCDD/39 but with 3 bursts transmitted every 20 seconds with the sound pressure level averaged over the 3 bursts

ACTIVITY	VISUAL INDICATION	AUDIBLE INDICATION*
Receipt of Selective Evacuation alarm message	Red LED, 2 x 0.25 second flashes every 2.5 seconds	<i>SELECTIVE EVACUATION SIGNAL (letters "EX" sounded in <math>L_{pa}</math> dBA <del>80dBA</del> morse groups of 3 and repeated every 20 seconds) (morse sent at speed equivalent to between 8 and 12 w.p.m.)</i>

\*Tested in accordance with the Sound Level Test Procedure described in Annex B to JCDD38.

## ENDNOTES

1. Home Office Radio Frequency and Communications Planning Unit Type Approval Technical Specification MG-41 - Performance and Regulatory Standards for Radio Telemetry System for use by the fire service in the 862 - 863 MHz band.
2. Home Office Radio Frequency and Communications Planning Unit Technical Standard - At-Incident Telemetry Common Air Interface Document - Air and Serial port interface standards for radio telemetry system for use by the Fire Service.
3. Central Fire Brigades Advisory Council, Joint Committee on Appliances Equipment and Uniform Specification for an Automatic Distress Signal Unit JCDD 38(Revised) - Home Office Fire Services Unit 1999
4. Central Fire Brigades Advisory Council, Joint Committee on Appliances Equipment and Uniform, Specification for a manually operated Evacuation Signal Unit - Fire Services Unit, Home Office 1994
5. BSEN 60529:1991 Specification for degrees of Protection Provided by Enclosures (IP Code)
6. BS 5501:Part 7:1977 (EN50 020)

END OF USER REQUIREMENT

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