

Category 1 Standard

1-142 Operational information systems



Please read the Written Notices
attached to this standard

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1 Purpose

- 1.1 The purpose of this Standard is to define technical and safety requirements for the station operational information delivery systems (audio and visual) used for the dissemination of information and instruction throughout public and non-public areas of the LU network.

2 Scope

- 2.1 This standard applies to all customers and staff facing aspects of audio and visual information delivery used and operated by LU or its partners and shall apply throughout public and non-public areas of the LU network to the following:

- a) manual instigated audio announcements;
- b) automated audio announcements;
- c) manual and automated emergency audio announcements;
- d) manually delivered electronic visual information;
- e) automated electronic visual information.

Note: It is noted that Depots are not at present an LU operational asset but in certain cases i.e. completion of contract, failure of contract, installation in sidings and any other organisational change may result in the depots reverting to LU. This standard will apply to Depot P.A. Systems used for general information and emergency fire evacuation announcements.

- 2.2 This standard also applies to all non-station premises protected by fire alarm panels linked to Public Address Voice Alarm (PAVA) and where PAVA systems are fitted but not linked to a fire alarm panel.

Note: Non-station premises fitted with simple paging systems should comply with industry good practice including relevant standards.

- 2.3 This issue of the standard replaces 1-142 A3.

3 Requirements

3.1 General and System Requirements

- 3.1.1 The design, procurement, installation, operation, and maintenance of all elements of the audio and visual information delivery systems shall comply with the requirements stated in the Railway Safety Principles and Guidance (RSPG), part 2, section B.
- 3.1.2 All elements of the audio and visual information delivery systems within the scope of this standard shall be designed, procured, installed, and maintained fit for purpose under the following modes of LU railway operations as defined in the RSPG.

Modes of LU railway operations	Audible information System (AIS)	Breakdown Broadcast Messaging System (BBMS)	Emergency help facilities (Help Points (HP))	Time Displays/ Timing Devices	Variable Information Displays (VIDs)
Normal	Yes	Yes	Yes	Yes	Yes



Abnormal	Yes	Yes	Yes	Yes	Yes
Degraded	Yes		Yes		
Emergency	Yes		Yes		

- 3.1.3 Any safety risk that arises due to the deterioration of the performance of the audio and visual information delivery systems within the scope of this standard shall be controlled to ALARP for the systems whole life cycle.
- 3.1.4 All operational information systems within the scope of this standard except PAVA systems shall remain operational during periods of primary mains power failure, for not less than 4 hours. These systems shall have the option for battery support such that if the mains supply fails, the system (including the charge circuits) is totally supported and kept fully operational for a minimum of 4 hours. Power supply arrangements for PAVA systems shall comply with BS 5839-8:2008.
- 3.1.5 All elements of the audio and visual information delivery systems shall automatically restart to an operational state following restoration or reconnection of power supplies.

3.2 Systems Functions Audio Information Systems (AIS)

- 3.2.1 The Supplier shall design the AIS to BS 6259
- 3.2.2 AIS that are required to provide emergency voice evacuation shall be to BS 5839 – 8 and BS 60849
- 3.2.3 Speech intelligibility shall be determined in accordance with BS 60849 and shall meet a minimum level equivalent to 0.7 CIS (Common Intelligibility Scale) unless the risk as identified in 3.2.4 below is greater than marginal, in which case the level shall be reduced until the risk becomes marginal.
- 3.2.4 The Supplier shall assess the risk of complaints from neighbours as a result of noise from the AIS in accordance with BS 4142 and satisfy the feasibility requirement of BS 6259. The risk shall be marginal or below as identified in BS 4142. Guidance with respect to PA Noise management is provided in LU Guidance G-148.
- 3.2.5 In some areas of both surface and subsurface stations as defined in LU Standard 1-086 the minimum CIS level may not be achievable due physical limitations of the AIS acoustic environment. In such cases a risk-based assessment shall be carried out to graduate areas of relatively higher levels of risks. CIS values shall be optimised in these areas with the objective of reducing the overall risk to ALARP.
- 3.2.6 A methodology for carrying out an acceptable risk assessment is given in Attachment 1. This shall be carried out when minimum CIS values cannot achieved in sub-surface stations.
- 3.2.7 All non-compliant zones identified as high risk shall be subjectively assessed for speech intelligibility at system acceptance using the method set out in Attachment 2
- 3.2.8 A concession shall be sought from the Head of Telecommunications where the project is unable to reduce the risks from non-compliance to ALARP and or where the PA system fails to pass the subjective assessment given in Attachment 2.
- 3.2.9 Regardless of whether a concession is required or not the project team shall demonstrate as part of the risk assessment that the PA system design has been optimised for speech intelligibility. The assurance evidence that shows this must be clear and support the project's case for non-compliance with LU and or referenced BS standards.



- 3.2.10 Controls introduced to manage noise nuisance shall not affect emergency arrangements.
- 3.2.11 The AIS supplied shall allow audio information and instructions to be broadcast, under normal, abnormal, degraded, and emergency modes of LU railway operations, to the customers and staff via one of the following input devices and comply with BS 6259 and LU Rule Book 11:
- a) emergency Control Microphone;
 - b) local and remote master console input device;
 - c) emergency Digital voice announcer (DVA);
 - d) platform station announcement points (SAPs).
- 3.2.12 The supplier of the AIS shall comply with BS 5839 - 8 (for AIS connected to a fire alarm system), BS 6259, BS EN 60268-16 and BS EN 60849 to provide broadcast coverage for the following, for all operational areas of stations and depots:
- a) local and remote manual announcements.
 - b) local and remote recorded announcements.
 - c) fire alarm activation, evacuation instructions (on stations as defined in LU standard 1-086, Fire safety classification of stations).
 - d) assisted hearing facilities (where applicable).
- 3.2.13 The AIS design for a station as defined in LU Standard 1-086, PA system connected to a fire alarm system shall incorporate fire hardened and redundant equipment arrangements. This equipment shall meet the required standard and shall be fit for purpose under normal, abnormal, degraded and emergency modes of LU railway operations as defined in the RSPG and BS 5839-8, BS 6259 and BS EN 60849.
- 3.2.14 The AIS central control equipment unit shall provide audio switching as required to meet operational requirements.
- 3.2.15 The AIS shall be zoned and permit relevant zone assignments as per the following criteria:
- a) platform areas;
- Note:** Island platforms are one zone regardless of system owner.
- b) each separate lower circulating area;
 - c) each escalator shaft or bank of escalators;
 - d) each separate upper circulating area;
 - e) interchange route ways and subways;
 - f) station entrances and exits, ticket hall and associated gate line;
 - g) staff accommodation on stations, (sub-surface);
 - h) other areas that may be specified;
 - i) depot (workshops, stores, sheds, offices and outdoor locations).
- 3.2.16 The design of the P.A. zoning shall relate to the fire alarm zoning.
- 3.2.17 The design of the AIS shall permit live or pre-recorded announcements to any combination of zones as defined in 3.2.15.
- 3.2.18 The AIS design shall provide appropriate zone separation, where practicable, to minimise the confusion of announcements between adjacent zones, refer to 3.2.15.



- 3.2.19 The priority of live and pre-recorded announcements shall be in descending order as per the following table:



Priority Station Type		Input	Note
Surface	Priority		
1	1	Live Announcements from SOR, SCP or OP. From Master Console or Emergency Control Microphone (fireman's microphone).	Priority 1 when initiated, interrupt any lower priority announcements currently in progress. The Emergency Control Microphone (Fireman's microphone) shall have the highest level of priority for access to all PA system zones on the station, with the provision to override all other broadcasts
N/A unless specified	2	Station fire alarm system and pre-recorded emergency initiated by SOR/SCP OP.	when initiated, interrupt any lower priority announcements currently in progress.
2	3	Pre-recorded non-emergency announcements initiated from the SOR/SCP OP	
3	4	Localised live announcements via the platform SAPs or radio microphone (broadcast only to their respective platform.)	when initiated, interrupt any lower priority announcements currently in progress.
4	5	Live announcements from SCC. Activated pre-recorded announcements i.e. Mind the Gap"	
5	6	Pre-recorded centralised announcements	
6	7	Background music	Back ground music shall not give a busy indication and shall be interruptible at any time
7	8	Spare	
8	9	Spare	

- 3.2.20 The AIS design shall incorporate "automatic ambient noise sensing" volume adjustment in all areas where the ambient background noise is subject to large fluctuations in noise level.
- 3.2.21 The AIS shall incorporate an instantaneous self-checking, monitoring facility to provide the operator with a constant visual display of the current system health to comply with BS 5839-8, BS EN 60849.
- 3.2.22 The AIS shall incorporate a Digital Voice Auto-announcer (DVA) for routine announcements. All DVAs shall have a pre-recorded message library, be capable of storing locally recorded messages and have message edit facilities.
- 3.2.23 The AIS installed on stations as defined in LU standard 1-086, shall incorporate a separate emergency DVA facility activated from the main station fire alarm system and comply with BS 5839 and BS EN 60849.

- 3.2.24 The AIS shall provide a point on each platform from which only staff can make audio announcements. These AIS points shall have an associated speaker zone(s) to which local audio announcements can be permitted.
- 3.2.25 It shall be possible for platform staff to make local platform announcements to their respective platform zone over the AIS, by using a hand-held microphone linked by radio to the AIS.
- 3.2.26 The AIS design shall take due regard to the variations among the individual constructional and architectural features of the sites and hence the acoustic characteristics, properties and background noise of all areas where AIS is to be installed and operated.
- 3.2.27 For platform areas, ticket halls and other non-platform public areas the AIS shall maintain Sound Pressure Levels (SPLs) at 10 dB(A) above the respective ambient noise levels. These levels may be reduced for surface stations with local authority abatement notices. Sound levels in staff and public areas shall not exceed 90dB(A).
- 3.2.28 The AIS shall be designed to allow the SPL to be adjusted, by maintenance engineers only, to suit the local conditions.
- 3.2.29 The speech intelligibility provided by the AIS shall be set and maintained to levels that enable station evacuation times to be met consistently for normal, abnormal, degraded, and emergency modes of LU railway operations.(see section 3.11)
- 3.2.30 The AIS shall be designed to provide assisted hearing facilities, where practicable in the built environment in accordance with LU Standard 1-312. Should the assisted hearing facilities design use an Audio-frequency induction-loop system (AFILS) the design shall comply with BS 6259, BS 7594, BS 8300 and BS EN 60118-4.
- 3.2.31 The assisted hearing facilities design shall identify areas where the inherent problematic affects of structural metalwork and background magnetic noise would cause significant interference upon the user's equipment and make it impracticable to meet contractual and BS requirements.

3.3 Breakdown Broadcast Messaging System (BBMS)

- 3.3.1 The Breakdown Broadcast Messaging System (BBMS) shall be a system that provides a facility for the Network Control Centre (NCC) to instantly and concurrently broadcast messages to Ticket Offices, Station Operations Room (where applicable) and Service Control Centres at all sites.
- 3.3.2 The BBMS system currently broadcasts audio messages to disseminate the following information:
- a) Train service disruption;
 - b) Station closures;
 - c) Lift and escalator non-working;
 - d) Network wide emergency alert messages;
 - e) General information messages;
 - d) An hourly single tone audible signal.

3.4 Systems Functions Emergency help facilities, help points (HP)

- 3.4.1 The HP unit design, manufacture and installation across the entire network, shall comply with LU Standard 1-332 and TfL corporate design policies.



- 3.4.2 The HP system shall provide the following facilities and comply with LU Standard 1-332:
- a) an Information call point for audio purposes;
 - b) an emergency call point for audio purposes;
 - c) fire alarm activation point (on stations as defined in LU standard 1-086, Fire safety classification of stations);
 - d) assisted hearing facilities (where practicable);
 - e) HP unit status indication.
- 3.4.3 The HP system shall have a system Human Machine Interface (HMI) located either within the SOR/SCP, or a centralised communications room.
- 3.4.4 The HP system shall provide the following functions:
- a) Control of the connection of all HPs to the local staffed HMI;
 - b) Automatic switching all incoming emergency calls as defined in 3.11.2;
 - c) Automatic highest priority to incoming emergency calls;
 - d) "Emergency call waiting" Human Machine Interface indication;
 - e) Data logging of call type information.
- 3.4.5 HP systems shall be capable of providing a single station or a grouped configuration of operation. This will cater for GSCRs or other centrally located control points to meet any change in operational requirements.
- 3.4.6 The HP system shall have a HMI that shall provide both an audible and visual indicator for each of the following conditions:
- a) Emergency calls;
 - b) Enquiry for information calls;
 - c) HP fault indication.
- 3.4.7 The HP system HMI shall have operator-controlled functions to establish a full duplex link to the HP.
- 3.4.8 When the HMI is dealing with an enquiry call and an emergency call is received, the incoming emergency call shall be presented on the display and the operator shall have the facility to place the enquiry call on hold, and answer the emergency call. Multiple incoming emergency calls shall be displayed in the order in which calls are made, although the operator shall be able to select the order in which calls are answered. If there are no emergency calls registered on the system, multiple enquiry calls shall be displayed and answered in the order that they were made.
- 3.4.9 On activation of any call button or Fire Alarm Call Point (FACP) on the HP, the system shall automatically provide the appropriate pre-recorded message for broadcast when the HMI is busy or unavailable
- 3.4.10 It shall be possible to switch the HMI out of the system; this condition shall be indicated on the HMI display. These situations shall not affect either the diversion of emergency calls to the Police Information Room, or the output of the pre-recorded voice announcements.
- 3.4.11 The non-availability of the HP system HMI shall not affect the diversion of emergency calls to the Police Information Room, or the output of the pre-recorded voice announcements.
- 3.4.12 The HP system shall incorporate a self-checking, monitoring facility revealing the current condition of the system.

- 3.4.13 The speech intelligibility provided by the HP system shall be set and maintained to levels that enable LU and BTP personnel to communicate reliably and effectively with customers.
- 3.4.14 The HP systems sound pressure levels (SPL) shall permit preset adjustment of SPLs to compensate for local ambient noise levels.
- 3.4.15 Activation of an HP unit functions shall automatically cause the following functions to be triggered with priority of emergency calls over all others:
- a) The output of the associated image capture device shall be displayed on a pre-assigned image display device;
 - b) The captured audio and associated image shall be recorded until manual termination of the HP call;
 - c) Audio recording of the emergency voice call (for the duration of the call);
 - d) An audible and unique visible alarm presented to the operator.

3.5 Systems Functions Visual Information (Master and slave Clocks)

- 3.5.1 All timing, synchronisation, time and date information shall be derived from the Co-ordination Universal Time (UTC) via the master clock device.
- 3.5.2 Master time devices shall have the capability to be networked to provide resilience to local failure.
- 3.5.3 The master time device shall self-correct within 5 seconds upon resumption of the UTC source signal.
- 3.5.4 The master timing device shall incorporate a self-checking, monitoring facility revealing the present condition of the system.
- 3.5.5 The time display units shall comply with LU standard 1-361.
- 3.5.6 In the absence of the master timing source, the slave time display shall free run to accuracy better than 99.995% over a period of one hour, and self-correct in not greater than 15 seconds following resumption of valid control data.

Note: Analogue (heritage) slaves will take longer than 15sec to correct. Most master time systems are designed to cope with analogue slaves, and set a limit (usually 4hours) up to which they will self-correct, thereafter they suspend output until they catch up with the stopped master.
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- 3.5.7 There shall be a visible indication of the synchronisation status of the slave time display device.
- 3.5.8 Analogue Slave time display devices used in existing locations of specific architectural heritage or interest shall be retained.
- 3.5.9 Legacy analogue slave time display devices shall receive DC pulses from the master clock.

3.6 Systems Functions Variable Information Display systems

- 3.6.1 The supplier shall provide an electronic visual information display system (VIDs) for the visual dissemination of real time visual service information to customers and staff to comply with LU standard 1-321.

- 3.6.2 The supply of a VIDs shall be dependant upon a design process taking into account location and the type of use, complying with LU Standards 1-356 and 5-362.
- 3.6.3 The VID system shall use a defined character set containing all characters required to express LU generated messages using Standard English language in accordance with LU standard 1-312.
- 3.6.4 The VID system shall include a facility for the local or remote input of pre-programmed or operator generated service response, control, and emergency visual messages for display, and to set the priority of each input source as required.
- 3.6.5 All VIDs shall present information using yellow characters on a black background. Information of other colours that could be provided by the supplier using the type of electronic displays proposed shall initially be passed to LU for consideration and approval.

Note: The design of the Platform and public area VIDs should provide a display area, with capacity to allow the full display of information as outlined in LU Standard 5-315.
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- 3.6.6 All VID information shall be visible in all ambient lighting conditions inherent at their installed location.
- 3.6.7 Visual display devices now have the capability of displaying pictograms, the use of such devices shall be in accordance with LU standards 1-312 and 1-282.

3.7 System Security

- 3.7.1 All elements of the audio and visual information systems management, operations and users activities shall comply with LU standard 5-461.
- 3.7.2 Multi channel voice recording facilities shall be provided for control rooms that are involved in the running of train services and stations, or provide services to the railway.
- 3.7.3 The multi channel voice recording facilities shall directly interface with the systems listed below, recording voice conversations to and from these systems:
- a) telephone systems including automatic, direct line, Signal Post Telephones and Tunnel Telephones;
 - b) radio systems including train, station and LFEPA radio;
 - c) passenger Help Points;
 - d) audio Information System.

3.8 Transmission

- 3.8.1 All systems shall use appropriate transmission communication protocols predefined in LU standard 1-145.

3.9 Interfaces

- 3.9.1 Audio and visual information delivery system elements that involve human-machine interfaces shall be designed, procured, installed and maintained in accordance with all relevant human, ergonomic and environmental factors and shall comply with LU standards 1-217 and 1-218.



- 3.9.2 Audio and visual information delivery systems shall have interfaces available for those in the following table and comply with international and industry standards:

Interfaces	AIS	HP	Master Clock	VIDS
Local live information broadcasts.	Yes			
Remote live information broadcasts	Yes			
Local DVA information broadcasts	Yes			Yes
Remote DVA information broadcasts	Yes			Yes
Fire detection and alarm system	Yes	Yes		Yes (EDNEs) Yes (VIDs) emergency messages
SAP	Yes			
Radio Microphone AIS	Yes			
Visual Surveillance system		Yes	Yes (Output – Time/Date/Sync)	
Audio recording		Yes	Yes (Output – Time/Date/Sync)	
Police information room (PIR)		Yes		
Timing data (UTC) Input			Yes (Input – Timing source)	
Slave Time Displays			Yes (Output – Time/Date/Sync)	
Timing device elements of other systems			Yes (Output – Time/Date/Sync)	
External Passenger Information systems (TfL & Dti initiatives)				Yes

3.9.3 The audio and visual information delivery systems shall permit future interworking and interfacing with station LANs and Line WANs for concurrent audio and visual messaging.

3.9.4 Local and remote operators, within defined security parameters complying with LU standard 5-461, shall have access to the control and monitoring functionality of the audio and visual information delivery systems.

3.10 Environment

3.10.1 The design and installation of the audio and visual information delivery systems shall comply with LU standard 1-355. This applies to listed buildings and other structures of design or historical importance for use on LU properties which have:

- statutorily listed status;
- local listing designated by local government;
- protection due to being in a conservation area;
- Railway Heritage Features.