ASL Voice Alarm Systems

INTEGRA EN 54-16 DESIGN GUIDE

ASL Document Ref.: T-0667-0231.docx
Issue: 2.5 Complete/Approved - Date: 20/03/2023

CE
2831-CPR-F1885

The ASL equipment described in this Design Guide is designed and manufactured to conform to:

Construction Products Regulations:	305/2011 (formerly Construction Products Directive 89/106/EEC)
Applicable Standards:	EN 54-4:1997+A1:2002+A2:2006 Power Supply Equipment for CIE EN 54-16:2008 Voice Alarm control and Indicating equipment
Certificate Number:	2831-CPR-F1885
Manufacturer:	Application Solutions (Safety and Security) Limited Unit 17 Cliffe Industrial Estate Lewes East Sussex BN8 6JL UK

A copy of the Declaration of Performance is available on request and is also available for download from the ASL website "downloads" area.

Failure to follow the system design guidance provided by this document may adversely affect the EN 54 compliancy of the overall system.

Application Solutions (Safety and Security) Limited
Unit 17 Cliffe Industrial Estate
Lewes - East Sussex
BN8 6JL - UK
Tel: +44(0)1273 405411 Fax: +44(0)1273 405415

www.asl-control.co.uk

LOSS PREVENTION CERTIFICATION BOARD LPCB UKAS MANAGEMENT SYSTEMS 0007

Assessed to ISO 9001
LPCB Cert No: 1043QMS

Document History

Version	Description	Date	Author
1.0	Initial Version	23 Aug 2016	Paul Grimwood
1.1	Change to CPR approval number	1 Nov 2016	Paul Grimwood
1.2	Correction of last two digits of date for “Accompanying Documentation”. Correction of Integra EN 54 CE label and addition of footnotes about approval reference numbers. Minor improvements to text.	16 May 2017	Paul Grimwood
1.3	Changes to include Dante® Iss. 2 network card. (P108666)	17 Jan 2018	David Worth / Paul Grimwood
1.4	General editorial review	08/01/2020	John Rawlins
1.5	Editorial Review to align document with the updates to the Vipedia-12-based Voice Alarm System Design Guide	26/01/2022	John Rawlins
1.6	ASL/Zenitel logo added and document updated in line with Zenitel comments.	01/02/2022	John Rawlins
2.0	Updated to remove references to DBB and A/S Redundancy and clarify the EN 54 labelling requirements.	07/03/2022	John Rawlins
2.1	Updated to align with V5.6 of T-0667-185	05/07/2022	John Rawlins
2.2	Minor editorial updates following internal document review	30/11/2022	John Rawlins
2.3	References to the SDT replaced by HPC	05/01/2023	John Rawlins
2.4	Changes list moved to the front of the document	09/02/2023	John Rawlins
2.5	Note added to Section 6.8 re the non-inclusion of spare amplifiers within the V2000 frame. Paragraph added to Section 6.11 to to warn against storage of combustible materials within the Integra enclosure.		

Contents

Figures

Tables

1 Introduction

This document is intended for use by Professional Specifiers and Integrators of Voice Alarm equipment supplied by ASL for applications which are required to comply with EN 54-16 and/or ISO 7240-16. It provides guidance on the design and installation of both the ASL INTEGRA-based wall-mounted systems and systems which integrate both wall-mount and ASL-rack mounted equipment using the VIPEDIA-12 family of audio routers and V2000 Amplifier Frames. The document also provides information relating to both the EN 54-specific and the more general and best practice design principles associated with the design and build of ASL PAVA rack systems (see notes below).

It should be read and understood by anyone using ASL VA equipment to implement a Voice Alarm System.

It is important that:

i) Users of this guide for the design and build of EN 54-certified PAVA Systems have previously undergone formal training in the installation and configuration of the ASL Voice Alarm product range.

For a list of applicable training courses provided by ASL, please refer to Appendix D.

ii) EN 54-certified systems are designed and built under the auspices of a Factory Quality Control Plan forming part of a formal Quality System (e.g. in compliance with ISO9001).

Users of this Design Guide are expected to be familiar with Voice Alarm equipment standards (particularly EN 54-4 and EN 54-16) and specifications and, in Europe, with the requirements of the Construction Product Regulations.

The ASL INTEGRA is a wall mount Public Address and Voice Alarm System. When installed in accordance with the instructions given in the associated Installation Guide and User's Manual, it is compliant with the CE marking requirements of the Low Voltage and Electromagnetic Compatibility Directives. The instructions provided in this guide provide additional information as to how to design and install a Voice Alarm System using the INTEGRA such that it also meets the additional CE marking requirements of the Construction Product Regulations.

Note that the System Design requirements for the ASL Rack Mount Voice Alarm System, on which the INTEGRA product range is based, are described in the VIPEDIA-12-based Voice Alarm System Design Guide, T-0667-0185 and it is upon that document that this guide is based.

Notes:

1. For full information relating to the design of rack-based PAVA Systems, please refer to document "T-0667-0185 Vipedia-12-based Voice Alarm System Design Guide".
2. It is important to note that loudspeakers used for EN 54-compliant Voice Alarm systems must be certified to EN 54-24, although this aspect of the system design and installation is not described in this document.

This document is divided into the following key sections:

- An Introduction to the ASL INTEGRA / VIPEDIA-12 / V2000-based PAVA Equipment which has been certified to EN 54 including listing of:
  - the associated CE Certification
  - the ASL INTEGRA / VIPEDIA-12 / V2000-based Product Range.
- Examples of PAVA System Topographies featuring INTEGRA.
- System Design Principles inc.
  - Determination of the Overall System Requirements
  - EN 54 requirements
  - Understanding how ASL components are assembled into systems (to meet both mandatory and recommended guidelines)

  - Assembly Safety Requirements
- System Build, Configuration and Test.
- System Labelling Requirements inc. CE Marking

In addition to the above, this document also includes the following appendices:

Appendix A: Enhanced System Design

Appendix B: Listing of associated Product Documentation

Appendix C : Listing of Obsolete Products and those not listed in ASL's current EN 54 certification

Appendix D: List of ASL PAVA Training Courses

Appendix E: List of Abbreviations used in this document

Appendix F: Details of the Regulatory Requirements

2 CE Certification

In addition to compliancy with the requirements of EN 54-16 and ISO 7240-16, the INTEGRA-based product range described in this document conforms with EU Directives 2011/65/EU & 2015/863/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and conform with the provisions of the following EU Directives:

- Low Voltage Directive (LVD) 2014/35/EU
- Electromagnetic Compatibility Directive (EMC) 2014/30/EU

by application of the harmonised standards referenced in the table below which are correct at the time of publication of this document:

Table 1: Harmonised Standards associated with ASL product CE compliancy

No	Characteristic	Performance declaration			Standard Title
		Standard	Version	Class	
01	LVD Compliance	EN 62368-1	see note below	III	Audio/video, information and communication technology equipment – Part 1: Safety requirements
02	EMC Compliance	EN 55032	as above	A	Electromagnetic compatibility of multimedia equipment - Emission requirements
03	EMC Compliance	EN 55103-2	as above	E5	Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2 – Immunity.
04	EMC Compliance	EN 50130-4	as above	-	Alarm Systems Part 4. Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems
05	EMC Compliance	EN 50121-4	as above	-	Railway applications – Electromagnetic compatibility. Part 4: Emission and immunity of the signalling and telecommunications apparatus
06	EMC Compliance	EN 61000-6-2	as above	-	Electromagnetic compatibility – Part 6-2: Generic standards – Immunity for industrial environments
07	EMC Compliance	EN 61000-6-4	as above	-	Electromagnetic compatibility (EMC)- Part 6-4: Generic standards – Emission standard for industrial environments

In addition, this equipment has been tested and conforms to the following non-harmonised standard:

No	Characteristic	Standard	Version	Class	Standard Title
08	EMC Compliance	EN 55103-1	as above	E4-E5	Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1 – Emission.

Note:

The versions of the standards listed above applicable to the ASL product certification are listed in the associated certification documents which may be obtained from the "Downloads" area of the ASL website.https://asl-control.co.uk/downloads/?limit=&catid=764&ftags=Certificates. **N.B. in order to access documents from the download site, it will first be necessary to register and login in.**

2.1 ASL Products certified to EN 54-16

The following tables list the ASL products certified to EN 54-16 and include the power supply equipment components approved to EN 54-4 and are correct at the time of publication of this document. For the latest up-to-date listing please visit https://asl-control.co.uk/downloads/?limit=&catid=764&ftags=Certificates and download documents "EN-54-Wall-mount-Voice-Alarm-System-Certificate", EN-54-Rack-mount-Voice Alarm-System-Certificate" and "EN-54-and-LPCB-Certificate". **N.B. in order to access documents from the download site, it will first be necessary to login in.**

Although individual products may be certified to EN 54, it is important to understand that, in order for a VA system to comply with the requirements of the standard, the constituent products must be installed and configured in accordance with the design rules provided in this document and the instructions given in the individual product specific installation and user guides as listed in Appendix B of this document. N.B. Latest release versions of these documents are available via the ASL website, but please contact ASL if you require any further information or clarification.

If an INTEGRA and / or VIPEDIA-12/V2000-based VA System also includes ASL VAR-based equipment, it will also be necessary to refer to the VAR-Based System Design Guide T-0667-0016, as noted in the table below.

Table 2: EN 54 Certified ASL Wall-Mount, Rack-Mount and Peripheral Equipment

Product	Variants	Description
INTEGRA	INTEGRA-xx	INTEGRA Single BoxVoice Alarm System where: xx = number of amplifiers installed.
VIPEDIA-12	VIPEDIA-12	VIPEDIA-12 12*12 IP Voice Alarm Audio Router
	VIPEDIA-12-NET	VIPEDIA-12 with network card
	VIPEDIA-12-PRO	DSP Audio Processor with Dante® and network card
	VIPEDIA-NET	VIPEDIA-12 Network Card
	VIPEDIA-NET-4GB	VIPEDIA 12 Network Card with 4GB Audio Storage
	SFP-SM1G	SFP Module, Single-mode fibre.
	SFP-MM1GL	SFP Module, Multi-mode fibre.
	SFP-MM1GC	SFP Module, Multi-mode fibre
	SFP-CU1G	SFP Module, Copper Ethernet.
	BOA01	RJ45 DIN Terminal Breakout Adaptor – Single Port – With Terminations
	BOA02	RJ45 DIN Terminal Breakout Adaptor – Four Port – Straight Through
Modular Amplifier	V2000	V2000 Amplifier frame for housing D series amplifiers and amplifier interfaces
	D500	Amplifier Module 500W
	D150	Amplifier Module 150W
	LSZDC	Dual Line surveillance Interface card
	V2000-STBY	Standby Amplifier Interface card
EMS Series (see Note 1)	EMSxx(MK2)	Emergency Microphone which provide access to the EN 54 mandatory user interface (indications and controls). Where: xx = 01 : All call only xx = 10 : 10 button + PTT xx = 20 : 20 button + PTT xx = 30 : 30 button + PTT xx = 40 : 40 button + PTT xx = 50 : 50 button + PTT The suffix –EC may be added to indicate a euro-cylinder lock is fitted. Note: the Fire Emergency purposes EMS series of microphones

Product	Variants	Description
MPS Series (see note 1)	MPSxx-y0-AN	Paging and Emergency Microphone which provide access to the EN 54 mandatory user interface (indications and controls). Where: xx = 01 : All call only xx = 10 : 10 button + PTT xx = 20 : 20 button + PTT xx = 30 : 30 button + PTT xx = 40 : 40 button + PTT xx = 50 : 50 button + PTT y = G : Gooseneck Microphone; y = F : Fist Microphone An optional wall mount kit is available for MPS01/10/20.
BMB01	BMB01	RS485 Interfaced Analogue and Digital I/O Expansion Unit
Battery Packs and Chargers	BPC65	Battery Charger with Mounting Tray – 65Ah – Inc. Cables and Breakers
	BPC75	Battery Charger with Mounting Tray – 75Ah – inc. Cables and Breakers
	BPC130	Battery Charger with Mounting Tray – 130Ah – Inc. Cables and Breakers
	BPC65-BATT	Battery Pack for use with BPC65 – (2 x 12V 65Ah batteries)
	BPC75-BATT	Battery Pack for use with BPC75 and V2000 – (2 x 12V 75Ah batteries)
	BPC130-BATT	Battery Pack for use with BPC130 – (4 x 6V 65Ah batteries)
Network Switches	NETWORK-SWITCH-MM4	Multi-mode Secure Loop Switch (2*fibre, 2*RJ45)
	NETWORK-SWITCH-SM4	Single-mode Secure Loop Switch (2*fibre, 2*RJ45)
	NETWORK-SWITCH-MM8	Multi-mode Secure Loop Switch (2*fibre, 6*RJ45)
	NETWORK-SWITCH-SM8	Single-mode Secure Loop Switch (2*fibre, 6*RJ45)
	NETWORK-SWITCH-NF8	Secure Loop Switch (8*RJ45)
	NETWORK-SWITCH-LP01	Network Loop Switch (2*SFP, 8*RJ45)
VAR Routers (see notes 2 and 3)	VAR4 *EN 54)	Audio Router 4 x 4 DSP – EN 54
	VAR12(EN 54)	Audio Router 12x12 DSP – EN 54
	VAR20(EN 54)	Audio Router 20x20 DSP – EN 54
V400 Amplifier Mainframe (see notes 2 and 3)	V400	V400 Amplifier frame for housing M series amplifiers and amplifier Interfaces
M-series amplifiers (see notes 2 and 3)	M100	Amplifier Module 100W
	M200	Amplifier Module 200W
	M400	Amplifier Module 400W
Amplifier Interfaces for V400 mainframe (see notes 2 and 3)	LSDDC	Dual Line Surveillance Interface
	SSINT	Standby Surveillance Interface
X400 Amplifier Mainframe (see notes 2 and 3)	X400	X400 Amplifier frame for housing MX series amplifiers
MX Series amplifiers (see notes 2 and 3)	MX100	Amplifier Module 100W – MX Series
	MX200	Amplifier Module 200W – MX Series
	MX400	Amplifier Module 400W – MX Series

Notes:

1. *When used as Fire Microphones, the ASL EMS and MPS ranges must connect directly to the Integra/Vipedia-12 audio routers via a hard-wired connection. Use of an IP connection is not included in the EN 54 certification.*
2. *Use of these products is defined in the VAR System Design Guide (T-0667-0016).*
3. *These products are now obsolete and are not recommended for use on new projects (see Appendix C).*

2.2 ASL PAVA Ancillary Equipment

2.2.1 Ancillary Equipment Listing

The following ASL equipment may be provided as part of a PAVA system compliant to EN 54-16. These items are not listed on ASL's EN 54 Product certification either because:

a) their function falls outside the scope of the standard but may be necessary to support the EN 54-16 functionality (e.g., EOL10K and EOLZ end of line units).

or

b) they provide non-VA-related functionality (i.e., associated purely with PA applications) not defined in the EN 54 standards. N.B. in this case, the VA system must be configured such that these functions do not impact on its ability to meet all the performance requirements of a VA system.

Table 3: PAVA Ancillary Equipment

Product	Variants	Description
End-Of-Line Terminator and Line Blocking Capacitor Kits (see note 1)	EOL10K	End of Line Resistor: 10k 3W 1% 20PPM
	LBCs	Line blocking capacitor: 10% 250V DC polyester capacitors
Impedance Monitoring Terminator (see note 1)	EOLZ	End-of-Line Impedance Ballast
ANS Series	ANS04	IP65 Ambient Noise Sensor
	ANS04ES	Extended Temperature Ambient Noise Sensor
	ANS04E	Extended Temperature Shrouded Ambient Noise Sensor
DANS Sensors	DANS01	Dynamic Ambient Noise Sensor
VRMS	VRMS4-IP	Stainless steel, vandal resistant paging microphone (IP)
	VRMS4-C1	Stainless steel, vandal resistant paging microphone (hard-wired)
Station Announcement Point Microphones	SAP02	Single button paging microphone for rail applications. (Also supports the RMR02 Radio Microphone Receiver option for use with the RPA01 hand-held radio transmitter)
	SAP03	Paging microphone for rail applications with built-in 10 button zone selection panel.
Remote Radio Microphone Receiver	RRM02	Radio Microphone Paging Point (for use with the RPA01 hand-held radio transmitter)
Remote Control Unit	WMC01	Wall Mount Controller
Remote Volume Controls and Program Selectors	VC01-P	Single gang plastic panel mounted volume control
	VC01-M	Single gang metal panel mounted volume control
	PS01-P	Single gang plastic panel mounted program selector
	PS01-M	Single gang metal panel mounted program selector
	VCPS02-P	Double gang plastic panel mounted volume control and program selector
	VCPS02-M	Double gang metal panel mounted volume control and program selector
TS1 (see note 1)	VIPEDIA-TS1	Terminal Server module.
ILP Series	ILP02	Induction Loop Panel
Terminators are required to LMT Series	LMT100	Induction Loop Line matching transformer (100W)
	LMT200	Induction Loop Line matching transformer (200W)
	LMT100R	Induction Loop Line matching transformer (100W) with relay
	LMT200R	Induction Loop Line matching transformer (200W) with relay

Product	Variants	Description
Mains Distribution	MDIST-V2000	Mains distribution block for use with V2000
V2000 Cooling accessories	RAK-FAN-01	Fan tray for V2000 (standard flow)
	RAK-DUCT-01	Cooling Duct for V2000
DIN Rail Supply (see notes 1 and 2)	Hirschmann RPS80	120/240VAC input DIN rail supply adjustable to 28V
	Meanwell SDR-75-24	85- 264VAC input DIN rail supply adjustable to 28V.

Notes:

1. *These products have been submitted to ASL's notified body to demonstrate compliance with the requirements of EN 54-16. (e.g. EOL Terminators are not defined in EN 54-16 as a component of a VACIE but are required as part of an ASL VACIE to enable detection of an open/short-circuit failure of the transmission patch between the VACIE and the associated loudspeakers).*

2. *These products may be used to provide a mains-derived power source for EN 54-related equipment provided that an EN 54-4 compliant supply is available to take over in the event of a mains supply failure.*

2.2.2 Use of Ancillary Products within an EN 54-16 Compliant System

This section details the basic rules covering how the products listed in Table 3 above may be used within a Voice Alarm system.

- **Microphones**

  The microphone types listed in Table 3 above may be included in an EN 54 compliant system provided that are not defined as providing an emergency function and that their assigned priority is lower than that of all the emergency functions (e.g., Emergency Microphones (see note below) and Evacuation/Alert messages).

  Note: EN 54-16 uses the term “Emergency Microphone” to refer to what ASL have traditionally referred to as a “Fire Microphone”. This document refers to all such types as "Emergency Microphones".

- **Ambient Noise Sensors (ANS and DANS)**

  The system should be configured such that **only** non-emergency announcements are under ANS/DANS Control.

- **End of Line Devices (EOL10K, EOLZ, AEL01)**

  Use of these devices is required to enable loudspeaker lines to be monitored to end of line as required by UK Code of Practice BS5839 Part 8. They are not included in the EN 54 certification as EN 54-16 does not include any reference to such devices.

  Where End-of-Line monitoring is performed using the DC method (i.e. using the EOL10K option) loudspeakers must be fitted with series capacitors. These may be built-in to the loudspeakers or fitted prior to installation by use of the ASL LBC capacitor kit.

- **Audio Induction Loop-based products (ILP02, LMT series)**

  These devices are specifically designed to assist the hard-of-hearing to hear non-emergency announcements (e.g., travel information in railway stations or airports). They are not included in the ASL EN 54-16 certification as the standard does not reference these types of device. However, their connection to a Voice Alarm System may be monitored and they may assist with the broadcast of emergency announcements to the hard-of-hearing.

- **Other items listed in Table 3**

- The items listed in Table 3 which a**re** not specifically described **in this sub-section,** provide functionality within a VA system which is not directly defined within the requirements of EN 54.

- Other non-certified products not included in Table 3

Other non-certified products may be added to an EN 54 Voice Alarm system, but they must not adversely affect the ability of the system to meet any of the requirements defined by the associated EN 54 standards and, in particular, they must not be used to provide:

i) a sole dedicated VA transmission path,

ii) a sole VA dedicated power supply source,

iii) a display point for VA signals and mandatory indications.

2.3 EN 54 Optional Functions

EN 54-16 and its international (near) equivalent ISO 7240-16 define certain functions of the equipment, some of which are optional.

The table below lists the optional functions and identifies which of these are supported by the ASL INTEGRA and VIPEDIA-12/V2000-based range of PAVA equipment.

Table 4: EN 54 Certified Optional Functionality

Option	EN 54-16 Clause	ISO 7240-16 Clause	Supported?
Alert Signal	N/A	7.2	Yes (see note 1) (refer to Section 7.1.2.1)
Voice Alarm Audible Warning	7.3	7.5	No (see note 2)
Delay(s) to entering the Voice Alarm Condition	7.4	7.6	No (see note 2)
Phased Evacuation	7.5	7.7	No (see note 2)
Manual Silencing of Voice Alarm Condition	7.6.2	7.8.2	Yes, using a configured MPS/EMS button. (refer to Section 7.1.2.2)
Manual Reset of the Voice Alarm Condition	7.7.2	7.9.2	Yes, using a configured MPS/EMS button. (refer to Section 7.1.2.3)
Output to Fire Alarm Devices	7.8	7.10	No (see note 3)
Voice Alarm Condition Output	7.9	7.11	Yes, via a configured contact output. (refer to Section **Error! Reference source not found.**)
Indication of faults related to the transmission path to the CIE	8.3	8.2.6.1	Yes, using monitored contact (analogue) inputs to interface with the Fire Alarm Panel trigger/reset outputs. (refer to Section 7.1.2.5)
Indication of faults related to Voice Alarm Zones	8.4	8.2.6.2	Yes (refer to Section 7.1.2.6)
Disablement or Test Conditions	9.4	9	No
Voice Alarm Manual Control	10	11	Yes, using a configured MPS/EMS button (refer to Section 7.1.2.7
Interface to External Control Devices	11	12	No
Manual Control - Indication of emergency-loudspeaker zones in the fault warning condition	N/A	11.3	Yes, via the MPS/EMS button indicator LEDs.
Emergency Microphones	12	13	Yes, using EMS and MPS microphones. (refer to Section 7.1.2.8)
Microphone Priority	12	13.2	Yes (refer to Section 7.1.2.9)
Microphone emergency-loudspeaker-zone control	N/A	13.3	Yes (refer to Section 7.1.2.10)
Redundant Power Amplifiers	13.14	14.14	Yes (refer to Section 7.1.2.11)

Notes:

1) *Alert Messages may be included in EN 54-16 certified systems provided that that they are configured with a broadcast priority below that of the Voice Alarm Evacuation Messages.*

2) *This functionality may be supported via the Fire Panel.*

3) *"Fire Alarm Devices" are devices such as beacons, sounders, vibrating devices.*

3 Key components of an ASL INTEGRA-based PAVA System

The key components associated with an ASL Integra or Rack-mounted Voice Alarm System are:

Wall-Mounted Equipment-mounted equipment

INTEGRA integrated PAVA system incorporating versions of the following rack-based equipment:

- VIPEDIA-12 Audio Router
- V2000 Amplifier Mainframe
  - D150 / D500 Amplifier Modules
  - LSZDC Loudspeaker Line Interface modules
- EN 54 Charger and associated batteries

Rack-mounted Equipment (as applicable to the system requirements)

- VIPEDIA-12 Audio Router
- V2000 Amplifier Mainframe inc.
  - D150 / D500 Amplifier Modules
  - LSZDC Loudspeaker Line Interface modules
- EN 54 Chargers and associated batteries
- BMB01 GPIO Interface Units

Peripheral Equipment

- EMS Emergency Microphones
- MPS (Emergency/Paging Microphone Consoles

Systems incorporating INTEGRA Systems, VIPEDIA-12 audio routers and V2000 amplifier mainframes may be configured in a variety of ways to meet individual system requirements which may include both Public Address (PA) and Voice Alarm (VA) functionality.

The systems are based on centrally located or distributed wall- and rack-mounted amplifiers and control equipment with connections to remote peripheral Emergency Microphones and loudspeakers and standard interfaces are provided for connection to EN 54-2 certified Fire Alarm Panels.

All signal paths and functionality associated with emergency purposes within the systems can be monitored over and above the requirements defined by EN 54.

Examples of PA functionality, which are independent of the VA requirements, include the incorporation into the system of:

- Zoned paging microphones
- Background music sources
- Long Line PA interfaces
- Ambient Noise Control (ANS or DANS)
- WMC01 Wall Mount Controllers
- Control Systems (e.g., ASL iVENCS or VIPA-Workstations)

The INTEGRA-PRO provides support for Dante® audio networking for use in PA applications.

For systems including both PA and VA functionality, the system design and configuration must ensure that, under all circumstances, VA Alarm functionality takes priority over PA functionality.

3.1 General Description of the Integra Product

The INTEGRA incorporates elements of the ASL Rack Mount Voice Alarm System components into a convenient wall mount enclosure. As such, the INTEGRA is fully compatible with the ASL rack-mount system components and can be used in association with them in networked systems. The systems are based on central or distributed amplifiers and control equipment with remote peripheral emergency microphones and loudspeakers. Standard interfaces are provided for connection to EN 54-2 fire alarm panels.

Figure 1: The INTEGRA Wall-Mounted PAVA System

The main internal components of the INTEGRA comprise an integrated assembly incorporating a VIPEDIA-12 audio router and a V2000 amplifier frame. Space is provided internally for the installation of a DIN-rail-mounted BMB01 for I/O expansion and a network switch for networked applications where there is a requirement to interface with other INTEGRA units or VIPEDIA-12 based rack-mounted voice alarm systems.

The INTEGRA has 12 audio inputs and internal storage for up to 64 recorded messages, with a maximum audio output power capability of 2000W, integrated audio-over-IP networking, powerful audio processing, and integrated battery supply, all housed within a wall-mount enclosure.

Up to 32 INTEGRA units can be linked over IP to enable broadcasts from any location to any combination of zones in large decentralised systems. ASL's ethernet switches enable a voice alarm compliant ring network topology. INTEGRA and the rack mount equivalent VIPEDIA-12 interoperate seamlessly. Each INTEGRA can process up to 6 concurrent audio channels.

Three standard variants are available, providing either 3, 5, 7 or 10 channels of amplification: however, by the addition or removal of amplifiers any number of channels up to 10 is possible. One amplifier can be configured as either a standby or active amplifier. Each individual amplifier can deliver up to 500W, with a total maximum overall load on one INTEGRA of 2000W.

Each amplifier provides for the connection of single or dual isolatable A and B loudspeaker circuits and supports both DC and Impedance line surveillance. For applications which require maximum availability, two internal standby amplifiers are supported.

INTEGRA supports ASL MPS and EMS paging microphones. Two of the twelve audio inputs available for use as microphone inputs provide hardware bypass to ensure continued all-call emergency microphone operation even if the INTEGRA audio router's DSP or CPU have failed. Up to 64 monitored recorded messages can be stored internally, with a total duration of up to 40 minutes.

Powerful DSP-based audio processing includes input dynamics, individually adjustable digital output delays of up to 5 seconds and 10 band parametric equalisation.

In addition to providing voice alarm functionality, ASL Voice Alarm Systems may also be used to provide Public Address (PA). Some of the PA functions may be independent of the EN 54 voice alarm functionality. For instance, this may include the addition of zoned paging microphones, background music sources etc. The system design and configuration must ensure that voice alarm functionality takes priority over public address functionality.

4 Examples of PAVA System Architectures

The following sub-sections provide examples of typical system configurations using the Integra products. The associated diagrams, intentionally separate the EN 54 and non-EN 54 functionalities to identify the demarcation between the VA and PA functionality.

4.1 Centralised System

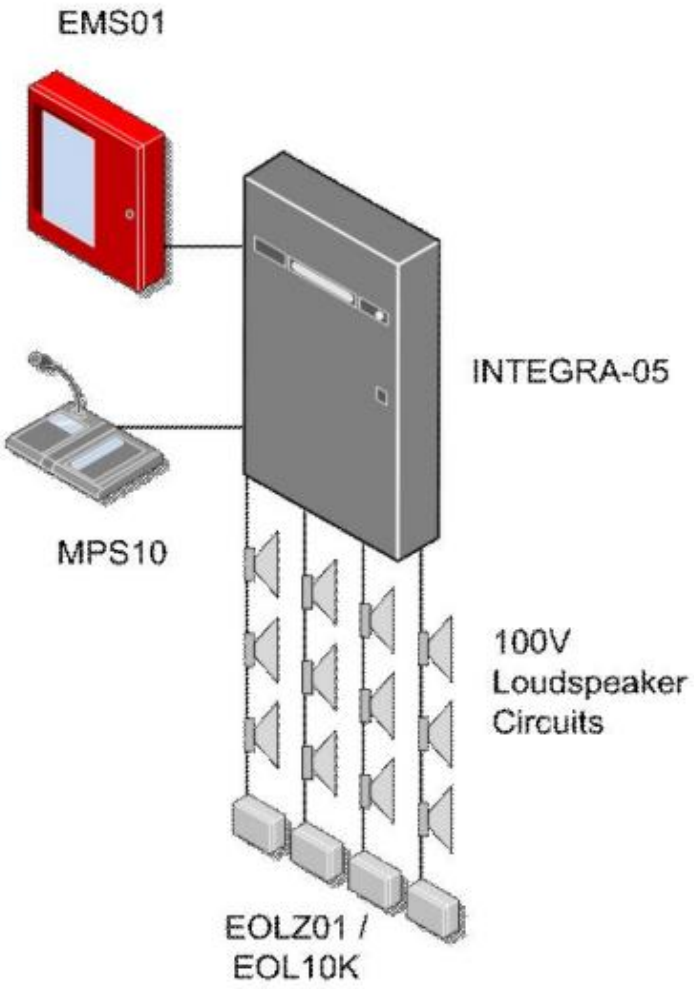

Figure 2: Example of a Centralised INTEGRA System

Figure 2 shows an INTEGRA-05 with 5 amplifier channels. Four channels are used to drive the 100V loudspeaker circuits; shown here with either end of line resistors or impedance monitoring terminations. The spare amplifier channel may be used to provide amplifier redundancy.

With 10 amplifier channels fitted, up to 10 voice alarm zones can be supported by a single INTEGRA.

The EMS01 is an emergency microphone and the MPS10 may be used for Emergency or Paging microphone operations. The MPS and EMS microphones provide all the required mandatory indications and controls. Contact inputs and outputs are available for interface to an EN 54-2 Fire Alarm Panel.

4.2 Distributed Systems

An example of a distributed system is given in Figure 3. It is capable of serving the needs of a large installation using distributed cabling. A network switch is installed in each INTEGRA to provide a secure fibre or copper loop. The network switch is powered from the INTEGRA's built-in EN 54-4 compliant power supply and raises a fault indication at access levels 1 and 2 if the network develops a fault. The fibre loop is not available for other functionality with the exception of associated public address functions that must always be configured to be over-ridden by the voice alarm.

With the inclusion of an Issue 2 or later VIPEDIA-NET network card, the network switch is not required for connection to a fibre loop. The Issue 2 hardware contains the necessary functionality to enable the internal network switch to connect directly within a secure loop architecture by use of SFP modules. Rapid Spanning Tree Protocol (RSTP) is used to provide a fully redundant network to protect against an interruption of part of the fibre loop.

ASL's SFP modules have been certified by a notified body for use with the VIPEDIA-12 audio router family of products within which the INTEGRA is a member. Only ASL modules may be used for EN 54-16 systems as they have been tested by a certified body and the internal software will reject third-party SFP modules. Any combination of copper, single-mode or multi-mode fibre can be used in a single network using the respective SFP modules. ETH port monitoring is a feature included on Issue 2 hardware thus faults relating to these transmission paths are indicated.

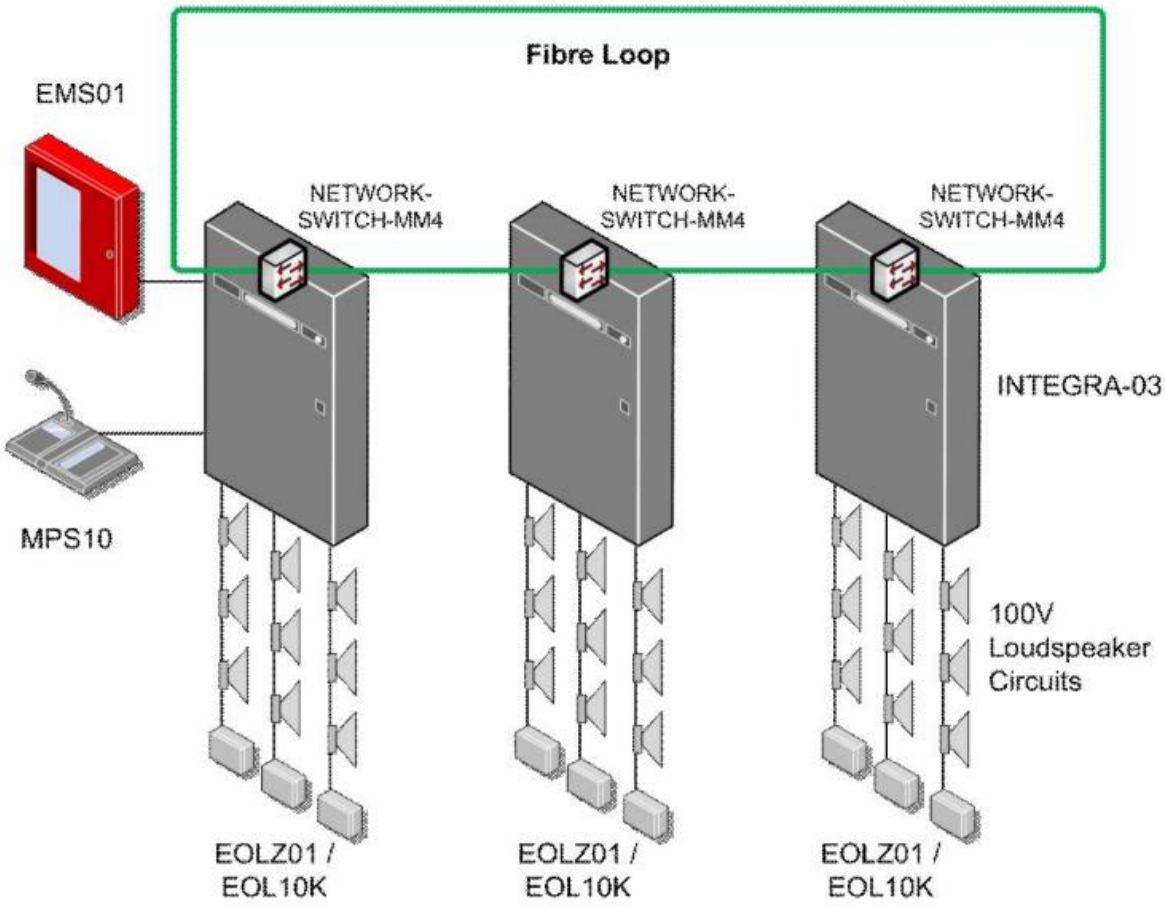

Figure 3: Simple Distributed System Implementation with Hirschman Switch.

In the case of an INTEGRA fitted with a VIPEDIA-PRO Dante® network card, it is not possible to use the onboard network switch RSTP functionality with Dante® audio. Therefore, in this case, the INTEGRA should use the Hirschmann network switch if EN 54-16 networking of DANTE® audio is desired.

The maximum number of INTEGRA nodes that can be connected in the secure loop is 32. Each INTEGRA can support 10 loudspeaker zones, so a system of up to 320 zones can be implemented. It is also possible to substitute any INTEGRA node with an ASL rack-based VIPEDIA-12 voice alarm system to provide for more zones at a given node.

Distributed systems may also incorporate a mixture of wall-mount and rack-based products as shown in the diagram below.

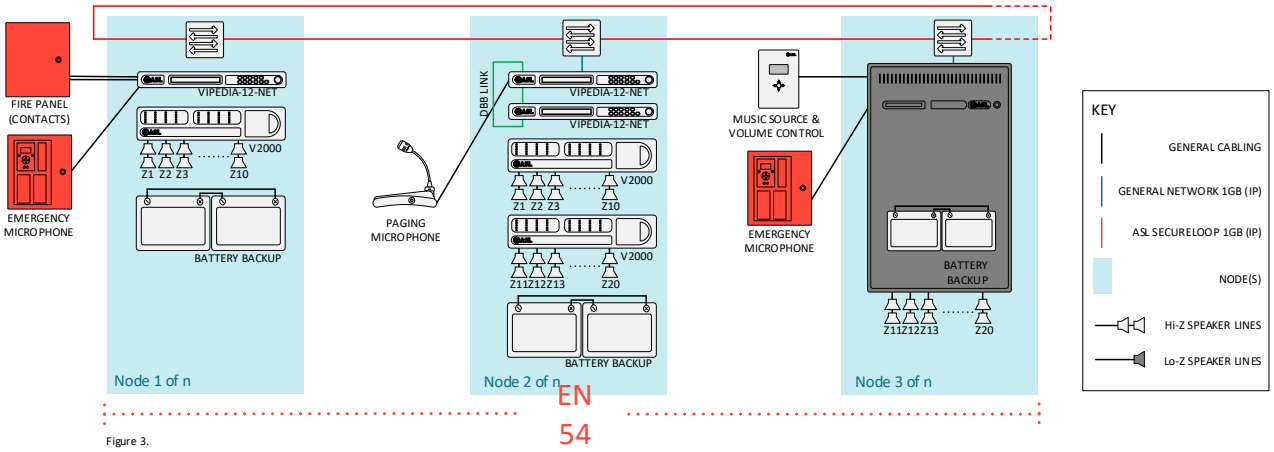

Figure 4: A typical Distributed System incorporating rack-based and INTEGRA nodes.

4.3 System Configurations incorporating Enhanced Redundancy

Redundancy may be designed into an ASL PAVA system to improve its resilience under fault conditions and methods to achieve this are detailed in Appendix A of this document.

4.4 Interfacing with Third-Party Control Systems

ASL INTEGRA/ VIPEDIA-12-based PAVA Systems can interface with external control systems via number of different techniques: e.g.

- Analogue audio + hardwired control interface.
- Analogue audio + host control interface (HCP).

Such techniques may be typically used to interface with PCDVA or LLPA Systems.

It is important to note that, any interface with third-party equipment must be configured such that it cannot jeopardise the ability of the VA System to make Emergency Broadcasts: i.e. LLPA/PCDVA route priorities must always be lower than those associated with Emergency usage. It is also recommended that non-emergency functionality should be disabled in the event of mains failure unless the back-up battery capacity of the system has been calculated to allow non-emergency broadcasts to continue under this condition.

4.4.1 Analogue audio + hardwired control interface

The typical Long Line PA/ PCDVA Interface using hard-wired control consists of:

- 0dBu$_{(nom)}$ audio signal
- Access Pairs (volts-free analogue or digital GPIO inputs)
- Busy Pairs (digital GPIO outputs via relays to provide a volts-free response to the LLPA system).

The busy response provided from the PAVA system needs to be configured to meet the specific requirements of the LLPA System: e.g.:

- No requirement for busy signalling
- Busy (PAVA System internal route busies only)
- Busy + LLPA Access Reassurance (PAVA System internal route busy including LLPA route busies)

N.B. Some LLPA systems require an instantaneous response to an access command, and in these cases, the ASL LLPA05 unit may be used to instantly report LLPA access without encountering the delay associated with the INTEGRA/VIPEDIA-12 routing functionality. However, as described in the notes to Section 4.4.1 below, the LLPA05 may also be used simply to provide a volts-free relay interface for the busy response to the LLPA/PCDVA system.

For further information regarding the LLPA05 module, please refer to the installation guide detailed in Appendix B, Section B.1.4.

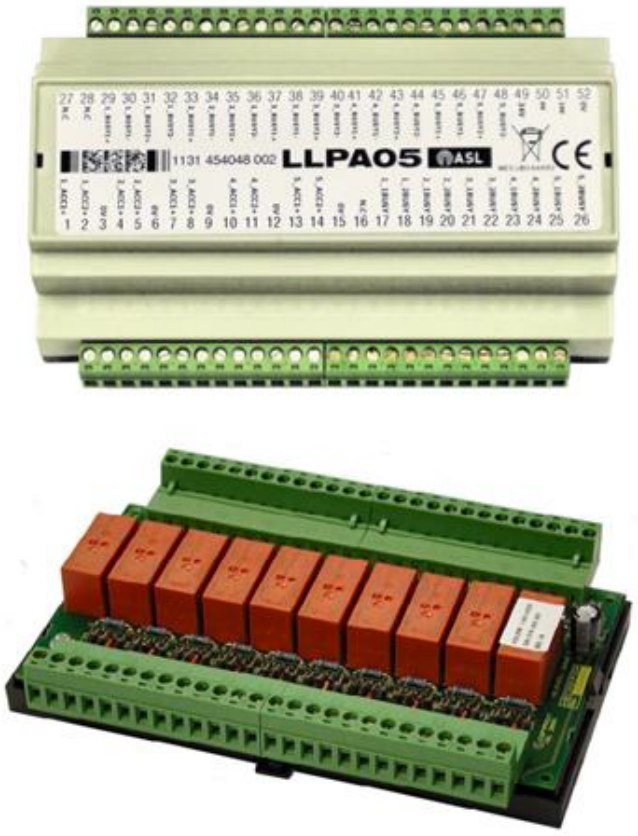

Figure 5: External and Internal Views of the LLPA05 Interface Unit

Figure 6 below shows a typical LLPA interface associated with the Plessey long-line PA system, including the ASL LLPA05 module.

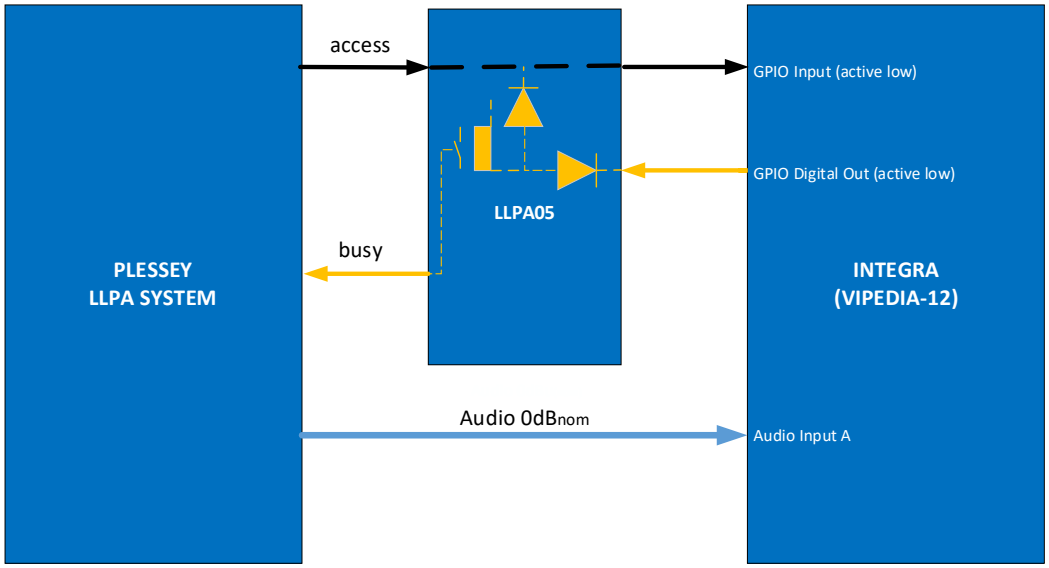

Figure 6: Typical Hard-wired Interface with an LLPA system

Notes:

1. Figure 6 shows the connection via an LLPA05 which incorporates a relay to provide each busy output to the LLPA/PCDVA System as a volts-free signal.

2. The access control interface at the VA system rack may either be connected directly to the VIPEDIA-12 GPIO input port or indirectly via a BMB01 GPIO Expansion module.

3. When connected through the LLPA05, the Access and Vipedia Route Busy signals are diode-ORed to provide a combined Busy output to the LLPA/PCDVA system.
   Where there is no need to generate a busy on receipt of an access signal, the access connection may bypass the LLPA05 module and be taken directly to the VIPEDIA-12 or BMB01 GPIO input port.

4.4.2 Analogue Audio + Host Control Interface

Another common interface incorporates the 0dBu(nom) audio signal with routing controlled using the ASL Host Control Protocol (HCP) and connected to the RS 485 terminations associated with an otherwise unused analogue input.

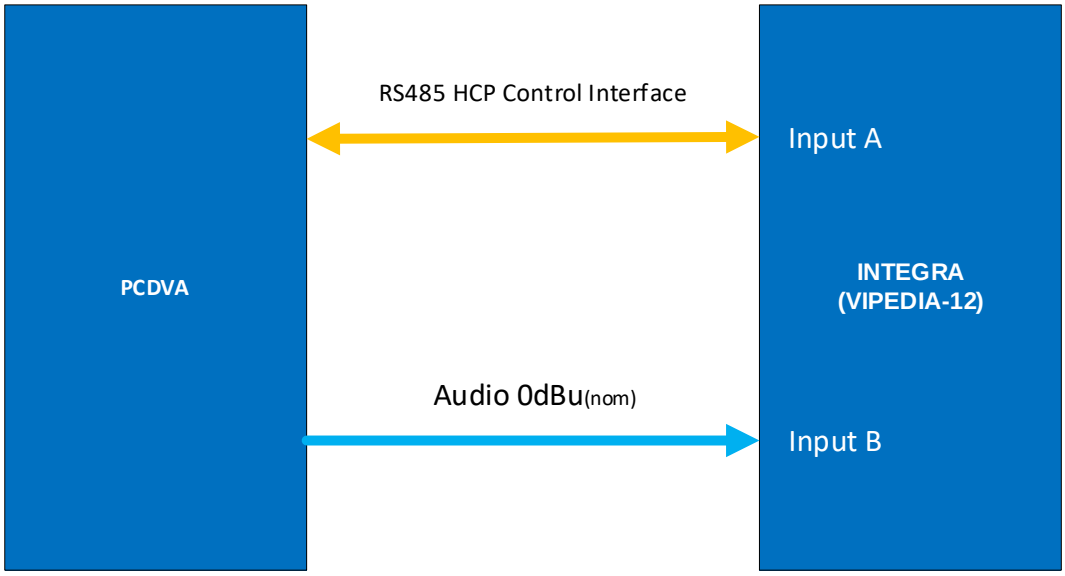

Figure 7: Interface with a PCDVA System using the ASL Host Protocol

For further details of the ASL Host Control Protocol, please contact ASL Technical Support Services.

5 Determination of the System Requirements

The system specifier will need to establish the relevant system requirements, to enable the integrator / distributor to design and build an appropriate EN 54 compliant system.

The process of defining the requirements is generally iterative and the list below provides initial guidance for their collection.

Only when all the requirements have been fully defined can they be reliably mapped to a design, prior to system build and test, in accordance with the design guidelines provided by this document.

1. System Type
    a. distributed / non-distributed (refer to Section 4).
2. Fire Panel Interface requirements.
    a. centralised / distributed (refer to Appendix A, Section A.5).
    b. voltage reversal or monitored from the VACIE.
3. Emergency Microphones (type and quantity).
    a. EMS wall-mount types.
    b. MPS desk-mount types.
    c. hosted by single or dual routers.
    c. Button Allocations for the above including options (e.g., Paging Zone(s) / Zone groups, Manual Emergency Broadcasts, Manual Silence).
4. Paging Microphones (type and quantity) (see note 1 below)
    a. Analogue/serial connection.
    b. IP-connection.
5. Equipment Locations.
    a. Core equipment (racks / wall-mounted)
    b. Peripheral equipment (e.g microphones, ANS and DANS)
6. Audio Zoning and Zone Power requirements
    a. the level of granularity needed for announcements.
    b. the need for individual control of levels/graphic equalisation.
    c. the sub-division of announcements zones into speaker zones.
    d. Ambient Noise Control (Latching or Dynamic)
    e. Loudspeaker Line lengths and loadings.
    f. Loudspeaker Line Surveillance technique (e.g., DC, Impedance, Loopback).
7. Redundancy
    a. Review to determine the effect of equipment failure on the overall system integrity.
    b. Use of standby amplifiers.
    c. Use of redundant equipment e.g.,
        i) dual A-B working amplifiers or single amplifiers feeding A-B loudspeaker circuits.
        ii) routers in redundant configuration.
    d. Use of redundant cabling e.g.,
        i) looped IP Network cabling.

ii) duplicated power feeds (between racks and for power feeds to Emergency Microphones).

iii) duplicated connections between Fire Alarm Panels and the PAVA System (where the cable length is greater than 10m (requirement of BS5839 Part 8:2013).

e. Calculation of system reliability (MTBF/MTTR/Availability) (see note 1 below).

8. Networking Requirements.
9. Battery backup requirements.
    a. If the mains supply fails, how long is the system required to remain functional?
    b. What functionality is required during the backup period (e.g., what equipment should be included in the battery backup calculation – see item 10 below)?
    c. How much time is required to complete a site evacuation?
    d. What is the required battery supply recharge time?
10. Equipment Types and Quantities (inc. incorporation of any non-Voice Alarm ancillary equipment).
11. Non-EN 54 related Interfaces (e.g., Background Music, Dante® Audio Equipment, Long-Line PA / PCDVA Control).
12. Electrical / Thermal Performance data of the installed equipment.
13. Equipment Housing / Rack Design
    a. Rack Selection (if appropriate)
    b. Equipment Placement.
    c. Electrical Safety.
    d. Ingress Protection (IP) requirements.
    e. Thermal Management.
    f. Access Levels (refer to Section 6.1 for further details).
    g. Internal Wiring and cabling (including labelling and fusing strategy).

Notes:

1. For product reliability data, please contact the ASL Sales or Technical Support Services.

6 INTEGRA System Design for EN 54-16

The guidance below explains how the INTEGRA can be implemented to meet EN 54-16.

6.1 Access Levels

For compliancy with EN 54-16, all voice alarm systems must incorporate the four access levels defined in the standard. These Access Levels are provided by an INTEGRA voice alarm system according to the table below.

Table 5: EN 54-16 Access Levels

EN 54-16 Acess Level	EN 54-16 Description	Purpose	Implementation on INTEGRA voice alarm
1	Visible without manual intervention.	For use by members of the general public or persons having a general responsibility for safety supervision who might be expected to investigate or initially respond to a fire alarm or fault warning.	At front panel of INTEGRA and/or at MPS or EMS microphones.
2	Access by special procedure	For use by persons with specific responsibility for safety and who are trained and authorised.	By PIN entry on INTEGRA front panel or key control on MPS/EMS.
3	Access by different special procedure.	For use by persons trained and authorised to re-configure the equipment and to maintain it.	By special software tools and DIP switches to permit product configuration.
4	Access by further special means.	For use by persons trained and authorised by ASL to repair or alter the equipment operation.	ASL personnel and other appropriately trained and approved third party personnel only. Special tools are required.

6.2 Audio Zoning and Zone Power Requirements

EN 54-16 does not mandate the number of zones or zone powers to be provided for any installation. Such considerations are outside the scope of the standard and hence of this document.

Ambient Noise Control is not recommended for voice alarm announcements as unusual circumstances could arise in an emergency situation that could compromise intelligibility. Therefore, it is recommended that Ambient Noise Control is disabled for all emergency class routes. This is easily achievable using ASL's PAVA System Configuration Tool.

6.3 Number of Microphones

EN 54-16 does not specify the number of microphones to be provided. Indeed, an Emergency microphone is optional with INTEGRA as all EN 54-16 mandatory controls and indications are provided on the INTEGRA front panel. If the system design requirements demand that these controls and indications are mimicked elsewhere in the system, then an EMS or MPS microphone must be used.

Each INTEGRA provides field terminals for up to two EN 54-16 emergency microphones and two paging microphones. Further MPS paging microphones can be provided over IP or using a BOA02 (see note 2) breakout adaptor to provide field wiring to additional microphone inputs. For a single INTEGRA, a maximum of 12 paging microphones can be connected or 10 if both emergency microphone connections are used.

Notes:

1. **It is important to note that although the overall number of emergency microphones is not defined by EN 54-16, there is a requirement that only a single Fire Microphone is permitted to be active within the system at any one time.**
2. The BOA02 must be DIN-rail-mounted and properly earthed. If the existing DIN rail location is used by a BMB01, then a supplementary DIN-rail must be used.

6.4 Interfacing with a Fire Alarm Panel

The number and type of fire panel interfaces is not mandated by EN 54-16. However, EN 54-16 clause 7.1.3 requires that an open or short circuit interface signalling from the fire panel to the voice alarm must either be reported by the voice alarm system or must not result in any loss of control or change of state of the voice alarm system.

In many cases, the interface between the Fire Alarm Panel and the INTEGRA system will be monitored for open- or short-circuit faults by the Fire Alarm Panel. However, where this is not the case. an open- or short-circuit in the interface between the fire panel and the INTEGRA can be reported by the INTEGRA when analogue monitored contacts are used. A simple contact closure can be used by the Fire Alarm Panel for signalling although, for monitoring purposes, it will need to be provided with series / parallel resistor network.

Bipolar signalling from the fire panel can also be used to prevent loss of control or change of state of the voice alarm system. In such a configuration fault monitoring of the interface is done by the fire panel.

The INTEGRA provides field terminals for a changeover relay, required by EN 54-16 (clause 8.8) to signal to the Fire Alarm Panel that a fault has occurred in the INTEGRA or the associated interface with the loudspeaker lines or other critical peripheral equipment (e.g. Emergency Paging Microphones)l.

A second changeover relay is also provided to signal to the Fire Alarm Panel that the VA System is in the Voice Alarm condition (note that this is an optional function within EN 54-16 and is not available if the system has been connected in A-S redundancy mode).

Internal and external BMB Outputs may also be configured to signal fault or VA status but these outputs should be considered as providing auxiliary functionality and must not be used to provide the primary mandatory / optional outputs as specified in EN 54-16.

There are two possible means of providing an EN 54 compliant interface with a Fire Alarm Panel:

- Voltage -Reversal (monitored from the Fire Alarm Panel
- Contact Closure (monitored by the PAVA System)

6.4.1 Voltage Reversal interface

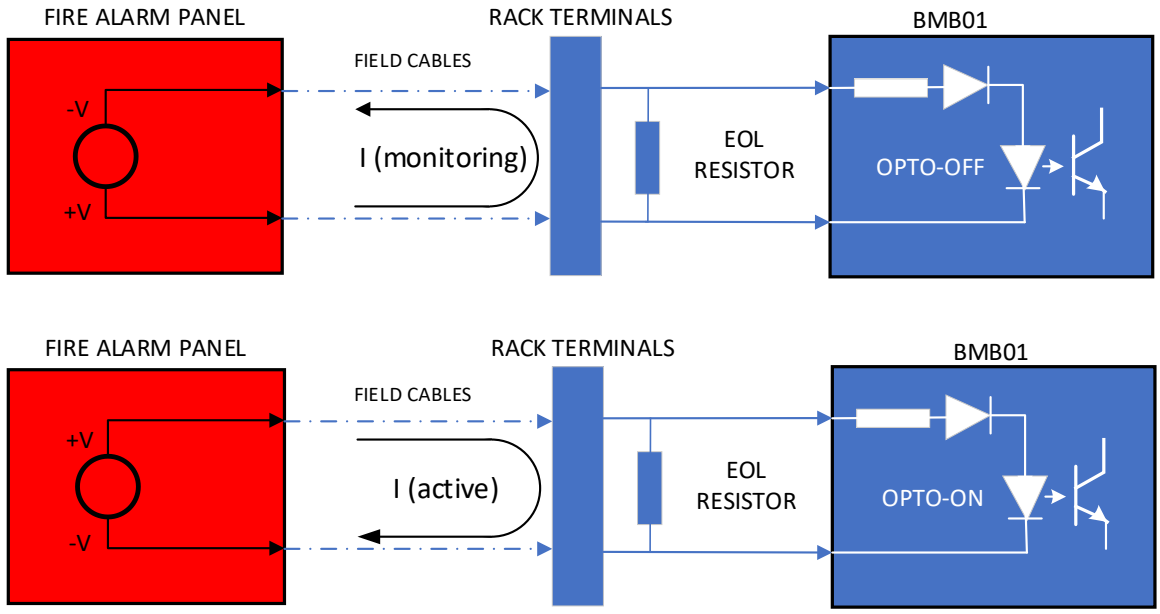

Figure 8: Volt-Driven Interfacing with the Fire Panel via the BMB01

The Voltage Reversal method required that the Fire Panel connects to GPIO inputs configured as Voltage Driven and requires the addition of an end-of-line resistor (the value of which will be specified by the manufacturer of the Fire Alarm Panel. To avoid the possibility of earth leakage faults being reported by the Fire Alarm Panel, it is recommended that the voltage reversal interface is connected via BMB01 digital inputs.

In order to reduce the power consumption of the Fire Alarm System, monitoring of the link may use a pulsed rather than dc voltage.

The Voltage Reversal method shall be used for:

- Evacuation Message Triggering
- Alert Message Triggering
- Emergency Message Reset
- Emergency Message Silencing (optional)
- Monitoring for the VA General Fault Output
- Monitoring of the VA Alarm Output (optional)

6.4.2 Contact Closure Interface

Although the interface between the Fire Alarm Panel and the PAVA System is normally monitored from Fire Alarm Panel, the connection to certain Fire Alarm Panels may require the link to be monitored by the PAVA System. In this case, the interface shall be via analogue GPIO input ports in conjunction with a resistor network installed at the Fire Alarm Panel control output (see **Figure 9** below).

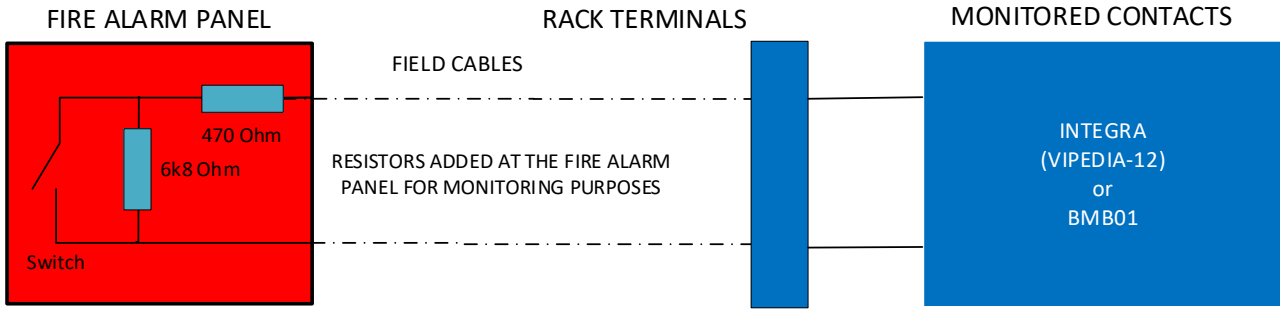

Figure 9: Monitoring the Fire Panel Interface from the BMB01 or VIPEDIA-12 Audio Router

6.5 Redundancy

Although not specifically associated with the requirements for EN 54 product certification, it is recommended that consideration is given to system redundancy. For further information, please refer to the Appendix A of this document.

6.6 IP Networking and Switch Configuration

Networking provides a method of reducing building wiring by distributing the amplifier functionality to where it is needed, e.g. one INTEGRA per building floor. Any of the switches listed in the INTEGRA Product certification may be installed within the INTEGRA housing to provide the required interface with the "Secure Loop" network.

For full information on networking configuration approved for use with ASL VA Systems, please refer to the following documents as listed in Appendix B, Section B.1.3.

Table 6: Network Design and Configuration Documentation

Description	Document Identifier
VIPEDIA – Multi-cluster Systems	ASL_Datasheet_VIPEDIA-12-Multi-cluster
Networking Design Guide	U-Tech_Doc_0031 (see note below)
Dante Configuration Guide	U-0461-3466
Hirschmann Switch Configuration Guide covering ASL part numbers: MM4, MM8, SM4 and NF8	U-0641-3488
ASL Network Switch-LP01 Configuration Guide	U-0641-3675

Note : The Networking Design Guide expected availability is 1st quarter of 2023,

6.7 Battery Back-up Requirements

For compliance to EN 54-16, a secondary battery supply must be fitted and maintained. The INTEGRA's EN 54-16 approval only applies if the units are installed with the following types of 12V batteries manufactured by Powersonic:

PS12750 (80 Amp-hour at 20hr rate)

PG12V80 (80 Amp-hour at 20hr rate)

PG12V65 (65 Amp-hour at 20hr rate)

Use of other battery types will invalidate the product EN 54 certification.

The INTEGRA requires two batteries connected in series to provide a nominal 24V supply. Battery types must not be mixed.

The INTEGRA is not suitable for interconnection to an external EN 54-4 compliant PSU.

EN 54-4 / 16 specifies the time within which the INTEGRA must recharge its batteries to reach 80% of charge (24 hours) and 100% of charge (72 hours) when the battery has been discharged to its final voltage. The INTEGRA easily achieves this.

EN 54-4/16 does not permit current to be taken from the batteries when the mains supply is present except for battery monitoring. Do not connect other equipment directly to the battery terminal wiring.

EN 54-4 / 16 does not dictate the time that the batteries must support the system in the event of a failure of the Primary (mains) supply. This will be defined by National Regulations or customer specific requirements. The total energy in Ampere-hours required by the INTEGRA for the required hold-up time must not exceed the Ampere-hours available from the batteries.

To assist with battery backup calculations, a Vipedia-12/V2000 Rack Heat and Power Calculator (HPC) is available on request from the Sales department.

6.8 Equipment Types and Quantities

Once the designer has produced a block diagram representation of the system, they can then produce a list of equipment types and quantities required.

This particular design step is not considered by EN 54-16 but it should be remembered that all equipment carrying voice alarm signals must have approval to EN 54-16. Products listed on the ASL Declaration of Performance to the Construction Products Regulations have been tested by LPCB (BRE) for compliance when used in a system of such approved components. Products from third parties must not be used to carry voice alarm signals in an ASL equipment-based voice alarm system.

(Clearly the use of any third party products in a public address system constructed of ASL equipment must still be assessed for effect on performance as well as EMC and Safety by the system designer and manufacturer.)

NOTE: In order to maximise system reliability, it is important that only the requisite number of working / standby amplifiers is installed in the V2000 frame. LSZDC interface modules should not be installed if the associated amplifier slot is unused ain which case, V2000 rear blanking plates should be fitted.

6.9 Equipment Housing

INTEGRA is supplied in its own EN 54-16 compliant (IP32) enclosure (see note). Ventilation slots and the space between the rear of the cabinet and the wall mounting surface must not be obstructed. The maximum rated operational ambient temperature is 40°C and the lowest is -10°C. Due regard must be made as to the location of the equipment to prevent overheating or excessively low temperatures, i.e. do not install out-of-doors, in direct sunlight or any other space in which the rated temperature range can be exceeded.

EN 54-16 approval is lost if the INTEGRA is not installed as described in the Install manual. Cable glands or other suitable cable entry fittings must be provided to maintain the IP30 integrity of the enclosure for external connections Removed knock-outs that are subsequently unused must be similarly blocked if they remain unused.

The INTEGRA door must be kept locked shut in normal use. (EN 54-16 Clause 13.6). The associated key must only be provided to those approved for access at level 3 and above.

The INTEGRA front panel provides access to level 1 and level 2 mandatory controls. Access level 2 permission is via a passcode that must only be provided to those with access level 2 training and authorisation. If the INTEGRA is not installed in an accessible area, then an EMS or MPS may be used to provide the mandatory controls and indications. If an EMS or MPS microphone is used, a key is required to gain access level 2 permissions. In normal operation, the key should be removed and provided only to those approved for access at level 2 and above.

Note: EN 54-16 requires that the INTEGRA enclosure meets the IP30 rating for ingress protection (EN 54-16 clause 13.3.1). It should be noted that the IP30 ingress protection standard is intended to protect against the entry of large insects and similar creatures. Hence the IP30 standard requires that no objects, capable of movement and larger than 2.5mm in diameter, can enter the rack.

6.10 Installation Wiring

Power cabling between cabinets, not mechanically joined containing mandatory indications, shall have at least two circuits that are separately routed. (EN 54-16 clause 13.5.4). They shall be connected in such a way that an open- or short-circuit fault on one cable shall not affect the integrity of the second supply path.

For INTEGRA, this is a requirement for peripheral equipment providing mandatory indications such as the MPS or EMS microphones. An MPS or EMS microphone used solely as a paging station or an emergency microphone (mandatory indications provided elsewhere) does not require dual power transmission paths.

6.11 Electrical Safety

ASL equipment is designed and manufactured to comply with appropriate international electrical safety standards. Important safety statements and precautions given in the equipment installation manuals must always be observed.

There may be additional Electrical Safety requirements applied by national rules. ASL are unable to advise or take responsibility for such requirements.

The INTEGRA internal mains and battery switches do not isolate the power to the unit and power may continue to be drawn by the unit even if both switches are in the "off" position.

The Battery circuit breaker in the right-hand side of the INTEGRA Cabinet can be used to isolate the battery from the INTEGRA electronics but be aware that the connections to the battery terminals are still hazardous.

A mains isolator must be provided externally to isolate the INTEGRA from the building's 230Vac mains supply.

Do not wire additional mains-powered equipment in parallel with the incoming INTEGRA mains supply.

For reasons of fire-safety, it is important that flammable materials (e.g. System Schematic diagrams or other documentation) are not stored in the Integra enclosure.

For a more complete list of safety instructions, please refer to the INTEGRA installation and User's manuals.

7 System Configuration

Once the system has been designed and the INTEGRA or networked INTEGRAs have been wall-mounted, it is ready for configuration in conjunction with any rack-based systems which may form part of the overall system.

This section focusses on the specific configuration requirements for compliance with EN 54-16. For full details regarding system configuration, refer to the "**PAVA System Configuration Tool User Manual**" (document U07010-1583) as listed in Appendix B, Section B.1.2.

N.B. ASL products are capable of configuration for multiple applications and target markets and it is important that product configuration is only performed by trained personnel.

In the information provided in this section, the Integra will be described in terms of a combination of a VIPEDIA-12 audio router and V2000 amplifier mainframe.

7.1 INTEGRA (VIPEDIA-12 and V2000) Static Configuration

The V2000 user's manual, document number U-0623-0383, provides general guidance on the configuration, basic operation and troubleshooting of the V2000 amplifier mainframe. It also provides guidance on setting up the VIPEDIA-12 to support the V2000. Always follow the instructions provided in this manual when configuring the V2000.

IMPORTANT NOTE: The V2000 is designed only for use with the VIPEDIA-12 and use with any other type of VA audio router is not EN 54 approved.

7.1.1 VIPEDIA-12 Static Configuration for EN 54-16 (standard functions)

7.1.1.1 Voice Alarm Zones and Amplification

For EN 54-16 compliance, the PAVA static system configuration must align the V2000 amplifier mainframes and associated amplifier slots with the associated VIPEDIA-12 audio output ports, so as to ensure that fault reporting regarding amplifiers and loudspeaker circuits correctly references the associated voice alarm zone(s).

7.1.1.2 Fault Master

Any VIPEDIA-12 Audio Router which is associated with any of the following functionality must be configured as a "Fault Master".

- Provides the VA System "General Fault" indication to the Fire Alarm System.
- Supports an Emergency Microphone providing the mandatory indications required of the VACIE.
- Provides the VACIE mandatory indications via its front panel GUI.

N.B. If required, a system may be configured to include multiple "Fault Masters".

7.1.1.3 Emergency Microphones (MPS/EMS)

For all Emergency Microphones:

1. EMS type (*BASIC SETTINGS)*

a) Select the "EN 54 Microphone Operation- Enabled" check box.

c) Select "Emergency Class" = "High"

d) Select "ANS" = "None"

e) Ensure that the "Night Volume Control" checkbox is not selected.

2. MPS type *(BASIC SETTINGS)*

a) Select the “Key Switch Controlled" check box.

b) Select the "EN 54 Microphone Operation- Enabled" check box.

c) Select "Hard-Wired" as applicable.

b) In the "MPS PTT (Switch On)" column:

i) Select "Emergency Class" = "High".

ii) Select "ANS" = "None"

iii) Select an appropriate priority to override the Emergency DVA messages.

iv) Ensure that the "Night Volume Control" checkbox is not selected.

3. EMS and MPS Microphones *(ADVANCED SETTINGS)*

For compliance with EN 54-16 and ISO 7240-16, the restrictions described in this section must be adhered to when configuring MPSXX and the EMSXX microphone units:

a) Select "PTT OPERATION" > "Store and Forward" = "Live Paging"

b) Select the "AUDIBLE NOTIFICATION" > "Fault" checkbox and set the "Fault Beep Level" to 100% or greater (see note)

Note: If the microphone is not intended to provide Control and Indicating functionality or is adjacent to the rack, the settings detailed regarding the "Fault" Indication and "Fault Beep Level" may be amended as required. However, it is important that these functions are activated in a least one location within the system.

c) Select "Dual Interface" if the microphone is dual-hosted on two VIPEDIA-12s.

d) Select "Stuck PTT Timeout (mins)" = 5

e) Deselect "Remote Priority Adjustment".

f) Audio Settings - It is recommended that " Audio Settings" should be set as default. i.e. 0dB and "Enable AGC" checked unless there is a specific requirements for them to be adjusted.

Notes:

i) Optionally the microphone can be configured to utilise a pre-announcement chime. If required, it should be configured under "Basic Settings" and the gain set as required under "Audio Settings".

ii) For early versions of VIPEDIA-12 Code, it was necessary to set up many of the microphone parameters directly via the MPS GUI. However, since the release of Release Package V3.TBD, these parameters are configured in the SCT and downloaded to the microphone at router power up.

4. EMS and MPS Microphones *(BUTTON CONFIGURATION)*

The following VA functions may also be assigned to Microphone buttons which may only be activated from an EMS multi-button microphone or MPS multi-button microphone with the key-switch activated:

- Manual Emergency Message Triggers and Resets
- VA "Manual Silence" and "Manual Silence Reset"

7.1.1.4 VA Trigger Inputs from the Fire Alarm Panel (CIE)

IMPORTANT NOTE: If the connection between the VIPEDIA-12 audio router and the Fire Alarm Panel uses the "Voltage Reversal" technique whereby the interface is monitored by the Fire Alarm Panel, it is important that the connection is made via digital inputs on a BMB01 rather than directly into the VIPEDIA-12 Control Ports. This is in due to the fact that some Fire Alarm Panels may report "Earth Leakage" faults if the VIPEDIA-12 Internal ports are used.
All VA Emergency DVA message trigger inputs from the Fire Alarm Panel (CIE) must be configured to:

1. have "High Emergency" Class
2. have appropriate priority to over-ride all lower priority announcements
3. have ANS disabled for the associated route.
4. have a method of reset from the Fire Alarm Panel (CIE).
5. provide a "Silence" function under control of the Fire Alarm Panel (CIE) (see note below)

and

6. If not monitored by the Fire Alarm Panel (CIE) (e.g., using a voltage-reversal interface), be connected via analogue contacts monitored at the VACIE (refer to Section 6.4.2, **Figure 9**)

Notes:

1. In the majority of cases, the mandatory "Silence" mode is controlled directly from the Fire Alarm System via the existing trigger and reset contacts. i.e., to silence the alarm, the Fire Alarm Panel will issue a reset and to reinstate the alarm broadcast, it will reactivate the message trigger.

2. If the method listed above is not considered suitable for use with a particular Fire Alarm Panel, ASL also offer a mode whereby the "Silence" mode can be activated using an additional pair of contacts driven from the Fire Alarm Panel specifically for this purpose. In this mode, "Silence" is reset either via a separate set of "Silence Reset" contacts activated from the Fire Alarm Panel or by reactivation of the emergency message trigger.

   Use of this EN 54 "Silence" mode requires that the route settings for each of the pre-recorded emergency messages are set as "Silenced Enabled" which also requires the "Lock to Emergency Class" padlock symbol to be unlocked to access this option.

7.1.1.5 Routing of Background Music or Other Non-Emergency Broadcasts

Although BGM and other non-Emergency broadcasts are not directly associated with EN 54 Emergency functionality, ASL strongly recommend that any ancillary equipment (e.g., BGM players, radio receivers etc.) and associated audio routing not associated with Voice Alarm functionality is deactivated in the event of a mains supply failure (i.e. they should not be provided with a EN 54-4 battery-backed supply in order to minimise the battery consumption while the mains supply is unavailable).

If this is not the case, the battery consumption of the ancillary device and any related power consumption (e.g. by the V2000 amplifier mainframes) must be included in the overall battery backup calculation for the system at the design stage.

N.B. Provision is included in the SCT, to configure a setting whereby, in the absence of a mains supply, amplifier routing is disabled for all routes with a priority below a defined value and/or which don't fall into the defined Class type. (follow **System>PA/VA Cluster>General Information**).

It is also highly recommended that when emergency broadcasts are in progress, other independent non-emergency broadcasts (e.g. BGM systems in retail units etc.) are overridden. In such cases, this may be facilitated by use of the VA Condition Output from the VIPEDIA-12 audio router (see Section **Error! Reference s ource not found.** below).

7.1.2 VIPEDIA-12 Static Configuration of EN 54-16 (optional functions)

As previously described in Section 2.3 of this document, the following optional functions are provided by the ASL VIPEDIA-12-based PAVA Systems:

7.1.2.1 "Alert" Signal

An "Alert" signal may be configured either to be triggered from the Fire Alarm Panel or Manually from an Emergency Microphone in a similar manner to that used for Evacuation announcements.

7.1.2.2 Manual Silencing of the Voice Alarm Condition

A microphone button may be configured for Emergency Microphones (EMSxx or MPSxx with keyswitch enabled) to provide "Silence" and "Silence Reset" functionality equivalent to that described in the notes to Section 7.1.1.4 above.

7.1.2.3 Manual Reset of the Voice Alarm Condition

The Voice Alarm activation may be reset at an Emergency Microphone by selecting a button as "Cancel" and configuring it to reset the Voice Alarm route(s) with which it is required to be associated.

7.1.2.4 VA Condition Output

A GPIO Output may be configurated to provide indication of VA broadcast activation, either directly or via an external relay, to the fire alarm panel or other equipment, as required.

7.1.2.5 Indication of Faults Related to the Transmission Path with the CIE

Please refer to Section 6.4 for details of this interface.

7.1.2.6 Indication of faults related to Voice Alarm Zones

This is provided as a standard feature of the EMS / MPS microphone LED indication.

7.1.2.7 VA Manual Control

This is provided as a standard configurable feature, using buttons on the EMS/MPS microphones.

7.1.2.8 Emergency Microphones

A VA System is not required to include manual control. This is provided as a standard feature of the ASL VIPEDIA-12-based PAVA system.

7.1.2.9 Microphone Priority

This a standard configurable feature of the ASL VIPEDIA-12-based PAVA System.

7.1.2.10 Microphone Emergency Loudspeaker Zone Control

Emergency Microphone zoned routing is provided by configurable Zone Select buttons provided on the Emergency microphones.

7.1.2.11 Redundant Power Amplifiers

The ASL VIPEDIA-12-based PAVA system provides the facility to configure standby amplifiers to take over in the event that one or more working amplifiers should fail in a system.

7.1.3 V2000 Static Configuration Settings

1. Add a Battery (24V version : BPC65 or BPC 75)(48V version : BPC130-48)
2. V2000 Amplifier Frame General Settings

   Set the required amplifier slot allocations to include:

   - Amplifier type : D150 / D500
   - Output Voltage : 50V / 75V / 100V
   - Output Power : loading (+ required safety margin)
   - Surveillance Type : Disabled / DC / Impedance / Loopback
   - Output Type : single or Dual (A/B) Loudspeaker circuit.
   - Audio Output : the associated VIPEDIA-12 output channel
   - Standby Amplifiers : internal / single / dual + location

3. Advanced General Frame Settings:

   - Frame Information Settings
     - Frame ID : **as required**
     - Frame IP Address : **as required**
     - DC Voltage : **24V / 48V**
   - Surveillance settings:
     - Temperature Alarm : **70°C (default)** (see Note iii) below)
     - Earth Leakage Detection : **Enabled**
     - Amplifier Input Surveillance **: Enabled**
     - Amplifier Output Surveillance : **Enabled**

- Amplifier Surveillance Frequency **: Low**
- Loop Return Frequency : **Low**

- Engineering Surveillance Settings:
  - Tone Interval : **85 secs or less**
  - Low Frequency Duration : **3.0 s**
  - High Frequency Duration : **3.0 s**
  - Residual Current Threshold : **disabled** (Not EN 54 critical)
  - Power Limiter : **enabled**

4. Advanced Miscellaneous Global settings:

   - Surveillance Tone Ramp Time : **1000ms**
   - DC EOL Delay : **4000ms**
   - DC EOL Window : **500ms**

5. Configure surveillance as required for each amplifier zone.

   Notes:

   i) Surveillance tone parameters required for the various surveillance techniques must first be configured using the VIPEDIA-12 Dynamic Configuration Tool.

   ii) For details regarding the setup and configuration of Loudspeaker Line Impedance Monitoring, please contact ASL Technical Support Services and request a copy of ASL Tech. Note #75. Please refer also to the EOLZ01 End of Line Impedance Device Installation Guide as listed in Appendix B, Section B.1.4..

   iii) The Temperature Alarm setting detailed in the above listing is a fixed default associated with versions of the SCT prior to V4.2.0.6P and defines the temperature at which a control port configured as "Fan" is activated .

   SCT V4.2.0.6P (and following versions of the tool) enable more detailed control of the Fan Control temperature ranges as follows:

Function	Default Setting (°C)	Adjustment Range (°C)	Notes
Fan Trip Temperature:	60	40 - 70	The Fan range assigns a hysteresis setting to control the temperature at which the fan is deactivated. E.g. for the default settings, the fan will activate at 60°C and run until the temperature falls to 50°C.
Fan Range	10	5 - 20	
Amp Fan Trip	60	40 - 70	
Amp Fan Range	10	5 - 20	

6. Configure Standby Amplifiers as required (optional EN 54-16 feature).

7.1.4 VIPEDIA-12 Dynamic Configuration

Microphone Input Surveillance : Must be configured for all Emergency Microphones.

Microphone Input Equalisation : The VIPEDIA-12 dynamic configuration settings for the input associated with the MPS/EMS used as an Emergency Microphone should be set to accept LF surveillance at -14dBu and provide 3.3dB attenuation at 251Hz with a Q of 1. All other settings must be set to default.

VIPEDIA-12 Output Surveillance Tones: Must be configured as required for the associated amplifier configuration (refer to the associated Installation manuals listed in Sections B.1.2 and B.1.3 of Appendix B).

VIPEDIA-12 Output Equalisation : Must be configured on an output-by-output basis when the EN 54 certification for the associated loudspeaker types requires it. For further information, refer to the published specifications for the loudspeaker types installed as part of the system.

7.1.5 V2000 Dynamic Configuration

The V2000 system surveillance must be set up using the dynamic configuration tool for all V2000 Amplifier Slots associated with Voice Alarm zone outputs.

Amplifier Input Surveillance : Not required for EN 54-16 if the VIPEDIA-12 and V2000 are in the same cabinet but ASL recommend that it is configured in all cases.

Amplifier Surveillance : Must be configured.

Loudspeaker Line Monitoring : Must be configured using DC-EOL or Impedance monitoring.

Earth Leakage : Must be configured.

Note : Instructions for configuration are given in the V2000 User's Manual (see Appendix B, Section B.1.2).

7.2 Voice Alarm Network Configuration

For information regarding Voice Alarm Network and Network Switch Configuration, please refer to the documents, listed in Section 6.6 of this document.

8 System Acceptance Test

After design and build of an EN 54-16 system using ASL voice alarm products, the system must be tested to ensure it meets the design requirements.

ASL has produced a guideline system check list for EN 54-16 racks designed and built in accordance with the VIPEDIA-12 Rack Design Guidelines. This may also be used as a basis for the generation of System Acceptance Test procedures for INTEGRA-based systems by considering the INTEGRA to be a rack consisting of a VIPEDIA-12 audio router and a V2000 amplifier mainframe. ASL customers building their own voice alarm systems can use this guideline to assist development of their own system acceptance test plans.

This document, filename T-0667-0117, is subject to change in accordance with ASL document control procedures. Please contact ASL to obtain the latest version.

9 CE Marking and Labelling

a) CE Mark label on Enclosure (EN 54-16 clause 15 and ZA.3).

Labelling equivalent to that shown in Figure 10: Sample EN 54 Label below should be applied to the outside of INTEGRA.(see notes below)

IMPORTANT NOTES:

The following information defines the labelling which may be applied to systems designed, assembled, configured and tested by Application Solutions (Safety and Security) Ltd.

i) For systems designed, assembled, configured and tested by system integrators/distributors, the responsibility for the decision to apply the requisite labelling shall lie with the associated company/organisation.

ii) Use of this label is invalid if the INTEGRA is not configured in accordance with the instructions in the installation manual and this design guide and under the auspices of a formal Factory Control Plan (FPC).

iii) This label should not be applied to the product if it is to be used purely for a Public Address (i.e. non-VA) application.

iv) The approval reference number, 2831-CPR-F1885, differs from that applied to the Rack Mount VACIE and should be replaced by the integrator/distributor's certification code, if applicable (please refer to note i) above.

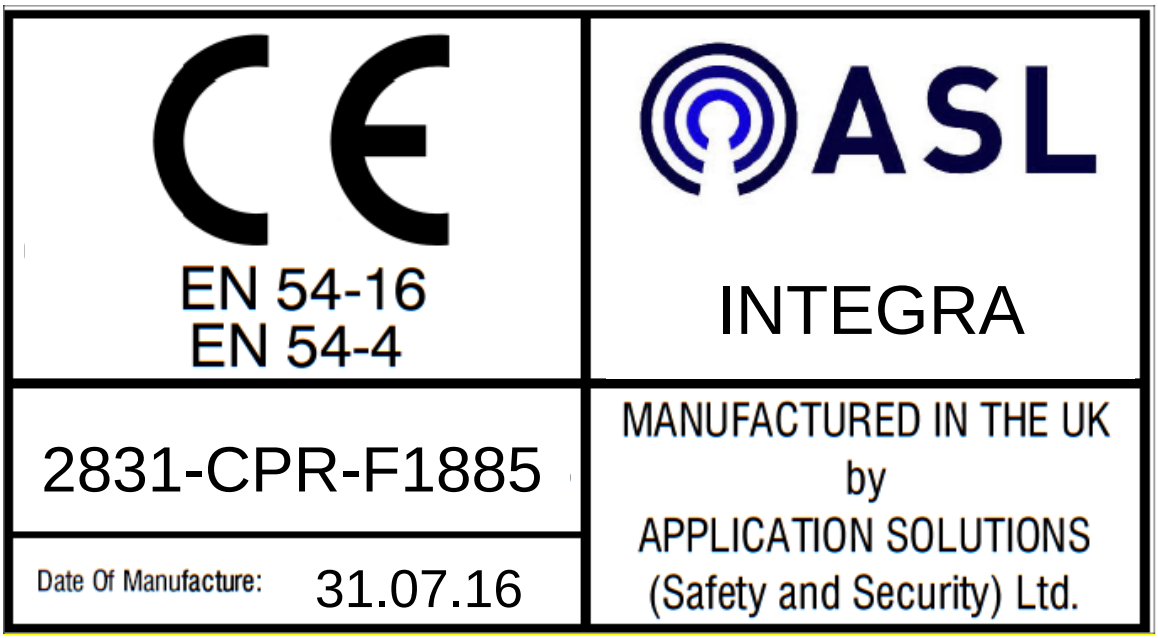

Figure 10: Sample EN 54 Label (inc. the ASL certification code for the INTEGRA product range)

b) CE Mark label on Microphones (EN 54-16 clause 15 and ZA.3)

All Emergency Microphone Stations and devices with mandatory EN 54-16 controls and indicators are required to have a label as below or equivalent affixed and viewable at Access Level 1. Applicable ASL products will have this label fitted at manufacture and it should not be removed. (see note below)

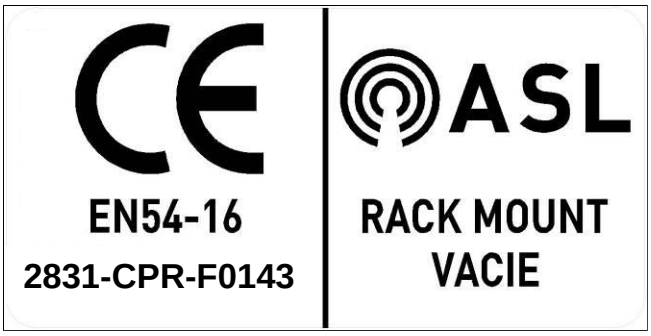

Figure 11: Sample Equipment Label

Note: The CPR approval reference number on such products is 2831-CPR-F0143 as the approval was originally granted as part of the Rack-Mount VACIE and is applied at manufacture. It may also carry the Integra approval reference, as these products appear on both approvals

c) LPCB Label

In addition to the CE label, the LCPB Label (see note) shown below is also fixed to the outside of the INTEGRA enclosure.

N.B. This label may only be applied to INTEGRA systems manufactured, configured and tested by ASL and is is invalid if the INTEGRA installation is not made in accordance with the instructions in the installation manual and this design guide.

Figure 12: Sample LPCB Label

Note: Note that the LPCB approval number for INTEGRA is different from that of the Rack Mount VACIE label.

10 Accompanying Product Documentation

In addition to the relevant manuals, the delivered INTEGRA must be accompanied by documentation that meets the requirements of both EN 54-16 and the Construction Product Regulations (see note 1). The content below is suitable and should be provided with the INTEGRA (see notes 2 and 4).

IMPORTANT NOTE: The list of "Provided Options" should only include the options configured for a particular project and as such should be individually compiled on a project-by-project basis.

CE 16	The CE mark followed by last two digits of the year in which the mark is first affixed.
2831	Identification number of notified body. *(see note 4)*
Application Solutions (Safety and Security) Ltd. Unit 17, Cliffe Industrial Estate, Lewes, East Sussex, BN8 6JL U.K.	Name and address of system manufacturer.
Voice Alarm Control and Indicating Equipment according to Declaration of Performance reference T-0667-0239	Product type designation and DofP reference (see note 2)
EN 54-16: 2008	European standard reference
Voice alarm control and indicating equipment for fire detection and fire alarm systems for buildings	Description of product
Provided Options *Manual Silencing of the Voice Alarm Condition* *Manual reset of the Voice Alarm Condition* *Voice Alarm condition output* *Indication of faults related to the transmission path to the CIE* *Indication of faults related to voice alarm zones* *Voice Alarm manual control* *Emergency Microphones* *Redundant Power Amplifiers*	List of optional functions with incorporated into the specific systemto which this notice relates. *(for further details refer to Section 2.3 of this document)*
EN 54-4:1997+A1+A2 Power supply equipment for fire detection and fire alarm systems for buildings.	European standard reference. Description of product
Refer to manufacturer's installation and product manuals for other technical data.	Other information.

Notes:

1. Reference: EN 54-16 clause ZA.3 and Construction Product Regulations article 9.
2. ASL provide this as a laminated document which accompanies the equipment on despatch.
3. If simplified procedures as defined by article 5 of the Construction Product Regulations are used, this can be replaced by the number of the EC Certificate of Conformance. For ASL products this is 2831-CPR-F18850143. Some optional modules, such as Emergency Microphones are included on both Certificates.
4. The Identification number of the notified body should match that associated with EN 54 label (see Section 9)

THIS PAGE IS INTENTIONALLY BLANK

Appendix A – Enhanced System Design

In order to comply with local Codes of Practice or customer requirements it may be necessary to incorporate some degree of redundancy in the system design. This appendix identifies common approaches to providing enhanced system redundancy.

In the examples below, the INTEGRA is defined in terms of a VIPEDIA-12 audio router and V2000 combination.

If, to achieve the required redundancy, it is necessary to link between INTEGRA units, it is important, in order to maintain the required IP rating for the enclosures, that the interconnecting cables are passed between the cabinets either via conduit or directly through the side panels of the associated units assuming that they are mounted directly alongside each other.

A.1 Hardware Bypass for Emergency Microphones

Inputs 1 and 2 of the VIPEDIA-12 audio router may be configured to host emergency microphones (EMSXX and MPSXX) so that in the event of loss of comms via the RS485 connection or a VIPEDIA-12 processor failure, they may continue to operate on an All-Call basis via a hard-wired PTT Control line.

IMPORTANT NOTE: The INTEGRA products do not support the linking of units using the DBB functionality and, for this reason, for this product range, the hardware bypass function is restricted to a single unit.

In "Hardwire Bypass" mode, Input 1 has priority over Input 2

Notes:

1. "Hardwire Bypass" functionality does not support audio broadcasts distributed between networked nodes.

   For further informatipn, please refer to the Installation and user guides as listed in Appendix B, Section B.1.2.

A.2 Standby Amplifiers

ASL PAVA system support the EN 54-16 Standby amplifier option and standby amplifiers may be installed and configured to automatically replace working amplifiers identified as faulty (refer to the V2000 Installation Guide for further information – see Appendix B, Section B.1.2).

A.3 A-B Interleaved Loudspeaker Circuits

Loudspeaker zones may be configured such that the broadcast area within a zone is covered by dual A-B interleaved loudspeaker circuits with alternate loudspeakers within the coverage area connected to the A and B circuits. Ideally, the loudspeaker cables should take diverse routes so that damage to one of the feeds is unlikely to affect the other.

This ensures that in the event of an open- or short-circuit on one of the loudspeaker lines, the average broadcast level in the zone will only reduce by approximately 3dB.

For loudspeaker line surveillance purposes:

a) Using DC surveillance, both the A and B lines must be installed with the same number of EOL units (up to an overall total of 10: i.e. 5 +5).

b) Using Impedance Monitoring, both lines should be of a similar length and loading and be equipped with the same quantity of EOLZ units

The following diagrams show various approaches towards providing A-B Circuit redundancy.

Figure 13 shows A-B circuits fed from a single amplifier using the A-B functionality designed into the LSZDC Amplifier Interface Card.

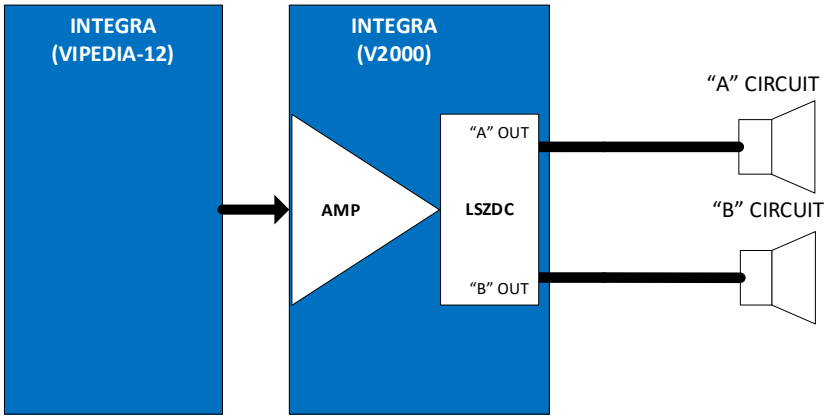

Figure 13: A-B Loudspeaker Circuit Redundancy (single amplifier)

Figure 14 shows an enhanced approach whereby the A-B circuits are separately fed from two amplifiers, one taking its audio feed from the VIPEDIA-12 "A" output and the other from the "B" output.

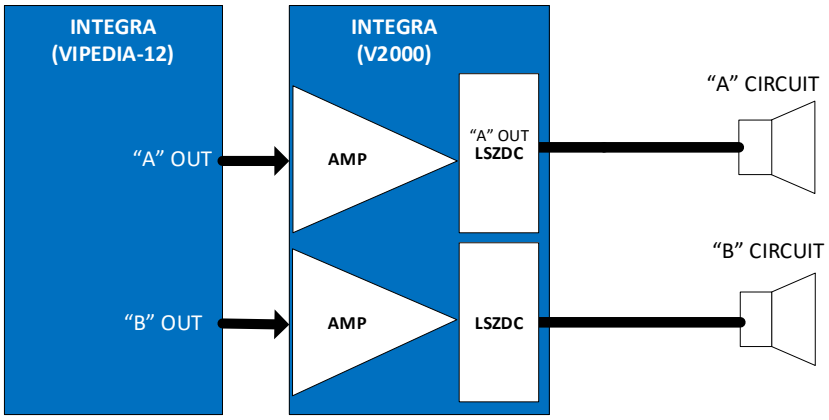

Figure 14: A-B Circuit Redundancy (dual amplifiers)

Further enhancements and adaptations to this approach are possible (e.g. see **Figure 15** and **Figure 16** below, which expand upon the approaches shown in **Figure 13** and **Figure 14** to provide further levels of redundancy). In the case of **Figure 15**, this configuration adds A, B, C and D interleaved circuits.

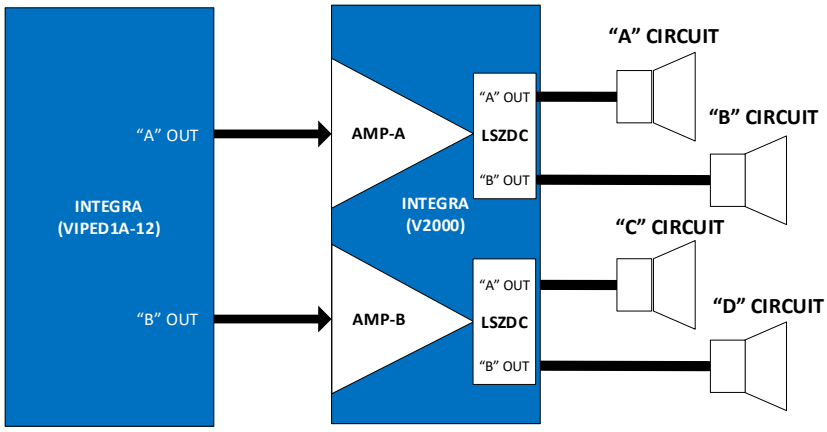

Figure 15: Enhanced A-B Amplifier/Loudspeaker Circuit Redundancy

In the case of Figure 16, redundancy is provided by use of dual VIPEDIA-12 audio routers. The system should be configured such that each amplifier receives the same audio signal simultaneously from both routers. In the event that one of the VIPEDIA-12 audio routers fails, the amplifiers will continue to receive signal from the remaining unit, albeit with the output level reduced by approximately 6dB.

Note: Implementation of this approach will require two or more INTEGRA units.

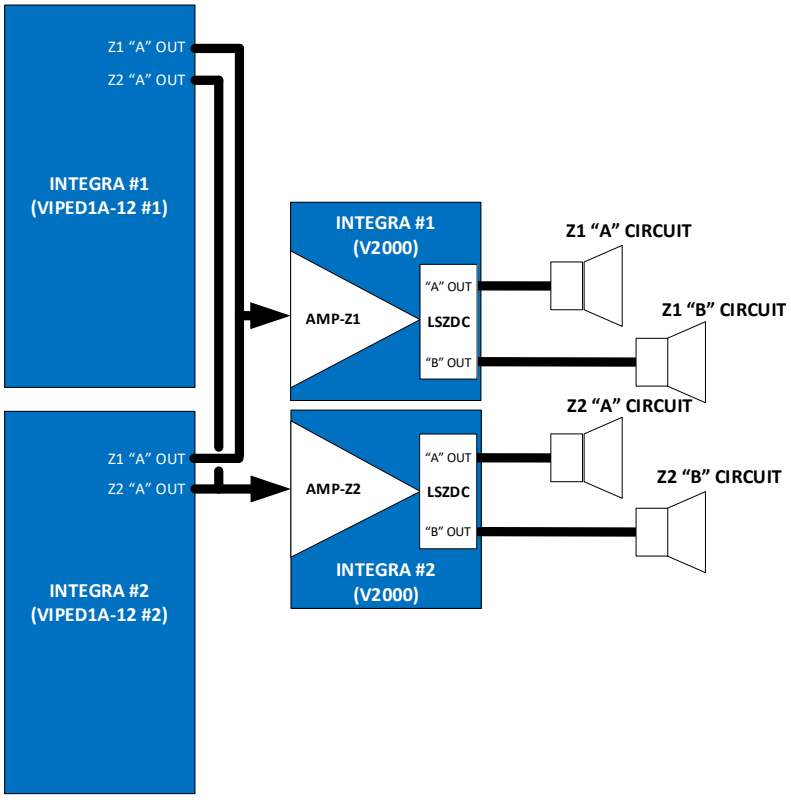

Figure 16: Further Enhanced A-B Amplifier/Loudspeaker Circuit Redundancy inc. Dual VIPEDIA-12s.

A.4 Dual-Hosted Microphones

In VA systems incorporating more than one INTEGRA / VIPEDIA-12, individual ASL Emergency (and non-emergency) microphones may be simultaneously connected to two audio routers to provide redundancy for both the audio and control functionality. Examples of the use of dual-hosted microphones are provided in Section A.6.

Note: It is important to be aware that the redundancy provided by dual-hosted microphones relies on the integrity of the network connection between the associated nodes.

A.5 Fire Alarm Panel Interface Redundancy

Fire Alarm Panels may be connected via one or more INTEGRAS / VIPEDIA-12 audio routers to ensure that the loss of a system node cannot jeopardise the Emergency broadcasts to continue to be made to all zones which remain available.

Normally this will be achieved by configuring the contacts for the duplicated inputs such that the Emergency DVA broadcasts activated from one of the routers will be assigned a higher priority than those activated via the second router.

It is also important to be aware that in the UK, Clause 9.3 of BS 5839 Part 8 states that:

"The fire alarm interface wiring should be arranged such that a single fault on the wiring cannot disable any part of the interface between the fire detection and the fire alarm system and the VAS, unless both the fire

detection and the fire alarm system CIE and the VACIE are separated by less than 10m and located in the same area of low fire risk".

An example of a system which incorporates Fire Panel interface redundancy is shown in Appendix A, Section A.6, Figure 17 overleaf.

A.6 Audio Router and V2000 A-B Redundancy Option

Networked systems can be configured to provide additional redundancy beyond that described above and allow the use of:

- Dual-hosted microphones

  To enable live broadcasts to be made in the event of the failure of the interface between the microphone and either of the two associated audio routers.

- Multiple Fire Panel interfaces

  To ensure that failure of the interface between the Fire Panel and a single audio router does not jeopardise the ability of the system to automatically broadcast a pre-recorded emergency message.

The A – B Redundancy mode is intended to ensure that a single fault, no matter how catastrophic, on either the Audio Router, Amplifier Frame or Amplifier module, cannot inhibit the reliable distribution of Voice Alarm broadcasts.

This architecture provides complete Audio Router, Amplifier and interleaved loudspeaker redundancy and also incorporates dual-hosted microphones and dual-Fire Alarm Interfaces.

For this option, two separate audio routers connected via a DBB interface are both configured identically (with the exception of IDs and IP addresses) and are both simultaneously active. In the event that a fault affects functionality on one of the two INTEGRA/VIPEDIA-12 audio routers, the remaining active router will continue to operate as intended.

The Fire Alarm Panel is connected to both the A and B VIPEDIA-12 audio routers

The Fire Microphone is hosted on both the both the A and B VIPEDIA-12 audio routers.

Interleaved loudspeaker circuits are provided such that, with either the A or B router in fault, the average broadcast SPL in the zone will be reduced by no more than 3dB, as described previously in A.3.

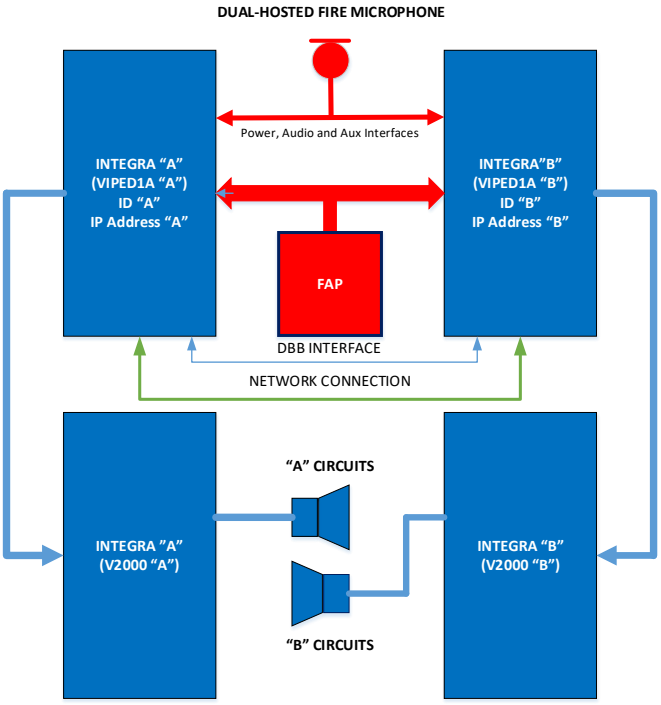

Figure 17: A-B Redundant System Configuration

Notes:

- The VIPEDIA-12 must be configured in the SCT as type VIPEDIA-12AB.
- Each zone is served by two loudspeaker circuits assigned separately to both A and B systems. Cables extending from the system to field devices should ideally follow diverse routes to maximise the system redundancy.
- The Active/Standby Redundancy Mode, described in the ASL Voice Alarm Systems, T-0667-185.docx, is not compatible with the INTEGRA product range.

Appendix B – Product Documentation

Please refer to the documents appropriate to the version of software installed on the system.

N.B. At the time of publication of this document, the documents highlighted in yellow are not available for download from the ASL website. Please contact the ASL Technical Support team, if you require copies of these documents.

B.1 INTEGRA, VIPEDIA-12 and V2000

B.1.1 System Design Guides

Category	Title	Filename
Integra (General)	Integra Wall-mount EN 54 System Design Guide	T-0667-0231 INTEGRA EN 54 System Design Guide
General	Rack-based EN 54 System Design Guide	T-0667-0185 VIPEDIA12-based EN 54 Rack Design Guide

B.1.2 Installation and User Guides

Category	Title	Filename
Integra (General)	Integra Installation Guide	U-732-0025
	Integra User Guide	U-732-0051
Vipedia (General)	VIPEDIA-12 Installation Guide	U-0641-0344_VIPEDIA-12_Install
	V2000 Installation Guide	U-0623-0291_V2000_Install
	V2000 STBY Installation Guide	U-0623-0413
	Event Logger User Manual	U-0641-3133
VIPEDIA S/W Release V3.X	VIPEDIA-12 Users' Manual	U-0641-3283
	PAVA System Configuration Tool User Manual	U-0701-1583_PAVA-SCT_V3.x_UMan
VIPEDIA S/W Release V2.1	VIPEDIA-12 Users' Manual	U-0641-2637_VIPEDIA-12-V2.1_UManual
	PAVA System Configuration Tool	U-0701-1093_PAVA-SCT_V2.1.2_UManual
VIPEDIA S/W Release V1.9	VIPEDIA-12 Users' Manual	U-0641-1605_VIPEDIA-12_UManual
	PAVA System Configuration Tool	U-0701-0110_V12-SCT_UManual
VIPEDIA S/W Release Pre-V3.X	V2000 Users' Manual	U-0623-0383_V2000_UManual
VIPEDIA S/W Release V3.X	V2000 User's Manual	U-0623-1005_V2000_UManual

B.1.3 INTEGRA, VIPEDIA and V2000 System Configuration Guides

Category	Title	Filename
General	VIPA – VIPEDIA-12 / INTEGRA Contact Inputs – Configuration Guide	U-0582-4644
	VIPEDIA-12 AS (Active / Standby) Redundant System Guide	U-0641-3090
	VIPEDIA – Multi-cluster Systems	ASL_Datasheet_VIPEDIA-12-Multi-cluster-V1.1
	Networking Design Guide	U-Tech_Doc_0031 (see note below)
	Dante Configuration Guide	U-0461-3466
V2000 S/W Release V2.1	VIPEDIA-12 / VIPEDIA-NET / V2000 / MPS / EMS Firmware and Configuration Load Procedures VIPEDIA-12 V2.1	U-0641-2585_FW_V2.1_Config_Load_03
VIPEDIA S/W Release V3.X	VIPEDIA-12 / VIPEDIA-NET / V2000 / INTEGRA / MPS / EMS Firmware and Configuration Load Procedures	U-641-3036_FW-Config-Load_V3.1_01
Network Switches (Hirschmann)	Hirschmann Switch Configuration Guide covering ASL part numbers: MM4, MM8, SM4 and NF8	U-0641-3488
Network Switch LP-01	ASL Network Switch-LP01 Configuration Guide	U-0641-3675

Note: At the time of publication of this design guide, these documents are not yet available and are expected to be released in the 3rd quarter of 2022.

B.1.4 Ancillary Product Documentation

Product	Title	Filename
EMS range	EMS10, EMS20 and EMS50 10, 20 and 50-Button Emergency Microphone Stations User's Manual Software V1.7.7 – ASL Serial Protocol	U-0664-0464_EMS10-20-50_UManual_VIPEDIA-12
	EMS01 Mk2 User Manual	U-0664-0465
	EMS10, EMS20 and EMS50 10, 20 and 50-Button Emergency Microphone Stations Installation Guide	U-0664-0404_EMS10-20-50_Install
	EMS01 Mk2 Installation Guide	U-0664-0405
	Button Label Insert Template	U-0664-0277_MPS10-20_Insert_Template
	Technical Note – Type B products	Type_B_Microphone_Note_U_0664-0994
	Microphone and Wall-Mount Controllers Type A and Type B Firmware Update Procedure	U-0664-1005_Type_AB_FW_Update
MPS range	MPS-Series Modular Paging Microphone Station User's Manual	U-0664-1007_MPS_V3.3_UManual
	MPS-Series Installation Guide	U-0664-0174_MPS01-10-20_Install
	Wall and Desk/Console Mounting Instructions for MPS01 / MPS10 / MPS20 Microphones	U-0664-0310_MPS_WallMountKit_Install
	Button Label Insert Template	See EMS range
	Technical Note – Type B products	See EMS range

Product	Title	Filename
	Microphone and Wall-Mount Controllers Type A and Type B Firmware Update Procedure	See EMS range
	VIPA Microphones ASL Serial Protocol Configuration Guide	U-0582-4379_VIPA-MIC_Guide
EAP01	EAP01 Product Manual	U-0464-0530_EAP01_Manual
	EAP01 Installation Guide	U-0464-0734_EAP01_Install
BOA01	Refer to the VIPEDIA-12 manuals	
BOA02		
BMB01	BMB01 Installation Guide	U-0450-1693_BMB01_Install
LLPA05	LLPA05 Installation Guide	U-0585-0005_LLPA0X_Install
D150	Refer to the V2000 manuals	
D500		
LSZDC		
V2000-STBY	V2000-STBY V2000/INTEGRA Standby Interface Card Installation Guide	U-0623-0413_V2000-STBY_Install
V2000 V3.0.2.	Technical Note IEL Detection	ASL0623-Tech-Note-IEL
EOLZ01	EOLZ01 End of Line Impedance Device Installation Guide	U-0623-0640_EOLZ01_Install
EOL10K	EOL10K and LBC2W to LBC63W End-Of-Line Terminator and Line Blocking Capacitor Kits Installation Guide	U-0398-0656_EOL10K_BLCx_Install
RAK-FAN01 Fan Tray	RAK-FAN-01/02 and RAK-DUCT-01 Cooling Duct Installation Guide	RAK-FAN01-Installation-Guide
RAK-DUCT-01 Cooling Duct		
BPC65	BPC65/BDIST/MDIST Installation Guide	U-0456-0142_BPC65_Install
	BPC65/BDIST/MDIST Product Manual	U-0456-0143_BPC65_Manual
BPC130	BPC130/BDIST/MDIST Installation Guide	U-0456-0144_BPC130_Install
	BPC130/BDIST/MDIST Product Manual	U-0456-0145_BPC130_Manual
BDIST-V2000	BDIST-V2000 + Battery Installation Guide	U-0456-0199_V2000_BDIST-BATT_Install
Battery Packs (general information)	Battery Requirements for EN 54 certified PAVA Systems	WP-0014-EN 54 Battery Requirements
	Recommended Battery Care and Maintenance Procedures	U0246-212
MDIST-V2000	MDIST-V2000 Installation Guide	U-0623-0420_MDIST-V2000_Install

B.1.5 Safety Leaflets

Category	Title	Availability
General	INTEGRA Safety Leaflet	Supplied with product and via ASL website "downloads".
	VIPEDIA-12 Safety Leaflet	As above
	V2000 Safety Leaflet	As above
	EMS10-20-50 Safety Leaflet	As above
	EMS01 Safety Leaflet	As above
	MPS Safety Leaflet	As above
	BMB01 Safety Leaflet	As above

B.1.6 Test Documentation

Category	Title	Filename
General	EN 54-16 System Tests Check List for ASL Rack-Mounted PAVA Systems	T-0667-0117 – EN 54 System Checklist

B.1.7 Design Tool

Category	Title	Filename
General	VIPEDIA-12/V2000 Rack Heat and Power Calculator (HPC)	T-0623-1400

Appendix C - Obsolete Products

Table 7: ASL Obsolete Products – EN 54 certified

The following products are obsolete and, although retaining EN 54 certification, are no longer recommended for use on new projects.

Product	Variants	Description
VAR Router range	VAR4 (EN 54)	Audio Router 4 x 4 DSP – EN 54
	VAR12 (EN 54)	Audio Router 12x12 DSP – EN 54
	VAR20 (EN 54)	Audio Router 20x20 DSP – EN 54
V400 Amplifier range	V400	V400 Amplifier frame for housing M series amplifiers and amplifier Interfaces
	M100	Amplifier Module 100W
	M200	Amplifier Module 200W
	M400	Amplifier Module 400W
	LSDDC	Dual Line Surveillance Interface
	SSINT	Standby Surveillance Interface
X400 Amplifier range	X400	X400 Amplifier frame for housing MX series amplifiers
	MX100	Amplifier Module 100W – MX Series
	MX200	Amplifier Module 200W – MX Series
	MX400	Amplifier Module 400W – MX Series

Table 8: ASL Obsolete Products – EN 54 Certification expired.

The following products are now obsolete and are no longer included within ASL's EN 54-16 certification.

Product	Variants	Description
DMS Microphone range	DMS5	5 Button paging Mic
	DMS10	10 button Paging Mic
	DMS20	20 button paging Mic.
SMS Microphone range	SMS02	Single Button paging microphone variants for rail applications.
	SMS03	As above
	SMS04	As above
SMC Microphone range	SMC01G	Station Masters Console – Desk Mount with gooseneck microphone 20 buttons + hardwired PTT
	SMC01GS	As above with soft PTT
	SMC01F	Station Masters Console – Desk Mount with fist microphone 20 buttons + hardwired PTT
	SMC01FS	As above with soft PTT
	SMC02F	Station Masters Console – 19" Panel Mount with fist microphone 20 buttons + hardwired PTT
	SMC02FS	As above with soft PTT
Active End of Line Units (see notes 1, 2 and 3)	AEL01	IP 55 rated alternative end of line device for fitting to systems where end of line resistors and line blocking capacitors cannot be used.
	AEL02	IP 65 rated alternative end of line device for fitting to systems where end of line resistors and line blocking capacitors cannot be used.
VAR8 Series	VAR8-ACU (EN 54)	Intellevac Audio Control Unit – Rack Mount – Base Unit – EN 54
	VAR8 (EN 54)	Audio Router 8x8 DSP – Base Model – A Audio Outs only (No B Outputs) EN 54
	VAR8-E (EN 54)	Audio Router 8x8 DSP – A & B Audio Out (Inc. VAR8-EXP-BOARD) EN 54

Product	Variants	Description
VAR8 options	EFI01	European Fire Interface Card – VAR8 – Analogue In & Digital out card (Mini-BMB)
	VAR-ANIC	VAR8 Intellevac Network Interface Card
	VAR8-EXP8	VAR8 Expansion Board – A & B Audio Outs + 10 more digital inputs
	GENT Fire Loop Interface	Interface for VAR8-E to GENT Fire Loop. It requires the VAR8-EXP8.
VAR-NIA (see note)	VAR-NIA	VAR Audio Router Intellevac Network Interface Adaptor
FMS Microphone Series	FMS1	All Call Fireman's Microphone All Call
	FMS5	Zone Selectable Fireman's Microphone 5 Buttons + PTT
	FMS10	Zone Selectable Fireman's Microphone 10 Buttons + PTT
	FMS20	Zone Selectable Fireman's Microphone 20 Buttons + PTT
All-Call Message Trigger Panel	MT-01	Facility to enable manual control of All-Call Voice Alarm Message broadcasts

Appendix D – ASL PAVA Training Courses

ASL can provide the following PAVA training courses designed to ensure that our customers are fully equipped with the necessary knowledge to design, manufacture, install and commission Voice Alarm systems based on the ASL product range.

Product Code	Description
TRAIN-ASL-00	INTRODUCTION TO PAVA. CARRIED OUT AT ASL (1 DAY – 1 TO 3 TRAINEES)
TRAIN-MAINT-01	PAVA COMMISSIONING AND MAINTENANCE OF ASL PA/VA PRODUCTS AT ASL (2 DAYS – 1 TO 3 TRAINEES)

Additionally, if required, ASL can offer bespoke versions of the above courses to meet specific customer requirements.

Please contact the ASL Sales Team, for prices and availability for both the standard and bespoke options.

Appendix E – List of Abbreviations

AC	: Alternating Current
ANS	: Ambient Noise System/Sensor
BDIST	: Battery Distribution
BGM	: Background Music
CAN	: Controller Area Network
CE	: Conformitè Europëenne
CIE	: Control and Indicating Equipment (i.e A Fire Alarm Panel as defined in EN 54)
CPR	: Construction Products Regulations
DANS	: Dynamic Ambient Noise System/Sensor
DC	: Direct Current
DIN	: Deutsches Institut fur Normung
DSP	: Digital Signal Processing
DVA	: Digital Voice Announcement/Announcer
EMC	: Electromagnetic Compatibility
EN	: Euro Norm (i.e. European Standard)
EOL	: End-of-Line (associated with loudspeaker line surveillance)
GPIO	: General Purpose Input/Output
GUI	: Graphical User Interface
HCI	: Human Control Interaction
HPC	: Vipedia-12/V2000 Rack Heat and Power Calculator
ID	: Identification
IEC	: International Electrotechnical Commission
IP	: intrusion Protection (refer to EN 60529 for further details)
IP	: Internet Protocol
I/P	: Input
LLPA	: Long Line Public Address
LPCB	: Loss Prevention Certification Board
MCB	: Miniature Circuit Breaker
MDIST	: Mains Distribution
MTBF	: Mean Time between Failures
MTTF	: Mean Time to Repair
O/P	: Output
PA	: Public Address
PCDVA	: PC-based Digital Voice Announcement System (typically associated with rail passenger announcements etc.)
PMC	: PMC: Portable Media Carrier
PSE	: Power Supply Equipment
PSU	: Power Supply Unit

PTT	: Press-to-Talk
PVC	: Polyvinyl Chloride
REACH	: Registration, Evaluation, Authorisation and Restriction of Chemicals
RoHS	: The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
SCT	: System Configuration Tool
SDK	: Software Development Kit
SFP	: Small Form-Factor Pluggable
SIL	: Software Interface Library
STBY	: Standby
VA	: Voice Alarm
Vac	: Volts (alternating current)
VACIE	: Voice Alarm Control and indicating Equipment (as defined in EN 54-16)
Vdc	: Volts (direct current)
VCT	: VIPA Configuration Tool

Appendix F - Regulatory Requirements

ASL supply Voice Alarm and Public Address products and systems that exceed the minimum legal requirements within the European Community (EC). The advice given in this section is intended for system integrators and Installers using ASL products in Voice Alarm and Public Address Systems of their own design and build.

It is important to note that the legal requirements of the Construction Product Requirements (CPR) within the EC apply to each "Economic Operator" in the supply chain and system integrators must ensure (taking legal advice if necessary) that they comply. ASL cannot take legal responsibility for value-add or product modifications applied after delivery from ASL and users of ASL products are advised to take appropriate advice.

Voice alarm products installed in buildings within the European Community must be compliant with the requirements of the Construction Products Regulations (CPR). ASL Voice Alarm System components listed in 2.1 are compliant but only when correctly configured in accordance with the instructions for use.

Because voice alarm systems come under the CPR's system 1 accreditation, a notified body is required to initially type test and to continually assess the factory production control of the manufacturing site. ASL Voice Alarm products have been assessed by our assigned notified body, BRE, in a representative system and BRE carry out regular assessments of ASL's factory production controls. In addition, ASL carries out product audits at least once per year on all products to ensure that the products remain compliant.

ASL has created a Declaration of Performance for all its EN 54 accredited products. This is in addition to the Declaration of Conformity required to demonstrate compliance with the Low Voltage and EMC directives.

The EN 54 series standards also require special product documentation to accompany the CE mark in commercial documentation.

ASL Voice Alarm products are also marked with an EN 54 specific CE label visible at access level 1.

System manufacturers producing a one off voice alarm system are exempt only from the need to produce a Declaration of Performance. All other documentation and labelling must be provided.

Because of the type 1 system of accreditation required by EN 54 harmonised standards, the CPR requires that a notified body accredit the system design documentation before the EN 54 CE marking can be applied to the system. At the time of writing, it is believed that so long as the system integrator is subject to a system of Factory Production Control which is subject to third party assessment by a notified body and follows the system design and test guidance provided in this document then this will be sufficient. If this is not the case, then the documents must be submitted to a notified body. It is not clear what level of documentation is required but the following is suggested as a minimum:

- Copies of Declarations of Performance for all system components associated with Voice Alarm (EN 54) functionality including Power Supply Equipment for the voice alarm system components.
- Declaration of Conformity to the EMC and LVD Directives by the system integrator[1].
- System Design documentation (schematics, layout drawings, maintenance instructions etc.).
- Statement(s) that the components used have been installed and configured in accordance with the installation instructions and restrictions on use as provided by ASL[2].
- Evidence of system functional test in accordance with EN 54-16.

The use of system components for voice alarm signal paths which are not included on ASL's Declaration of Performance will require that the system integrator obtain notified body approval for their design and this would require, as a minimum, the documentation detailed in the list above. For instance, ASL audio routers are not accredited for use with the amplifiers manufactured by a third party (even if there is a Declaration of Performance from the third party). e.g. combining them in a system to carry voice alarm signals could affect correct fault reporting as required by EN 54-16 and thus compliance would be invalidated.

[1] Evidence beyond supply of component Declarations of Conformity may also be required as CE+CE ≠ CE.
[2] And of any other manufacturer's components.


ASL
zenitel