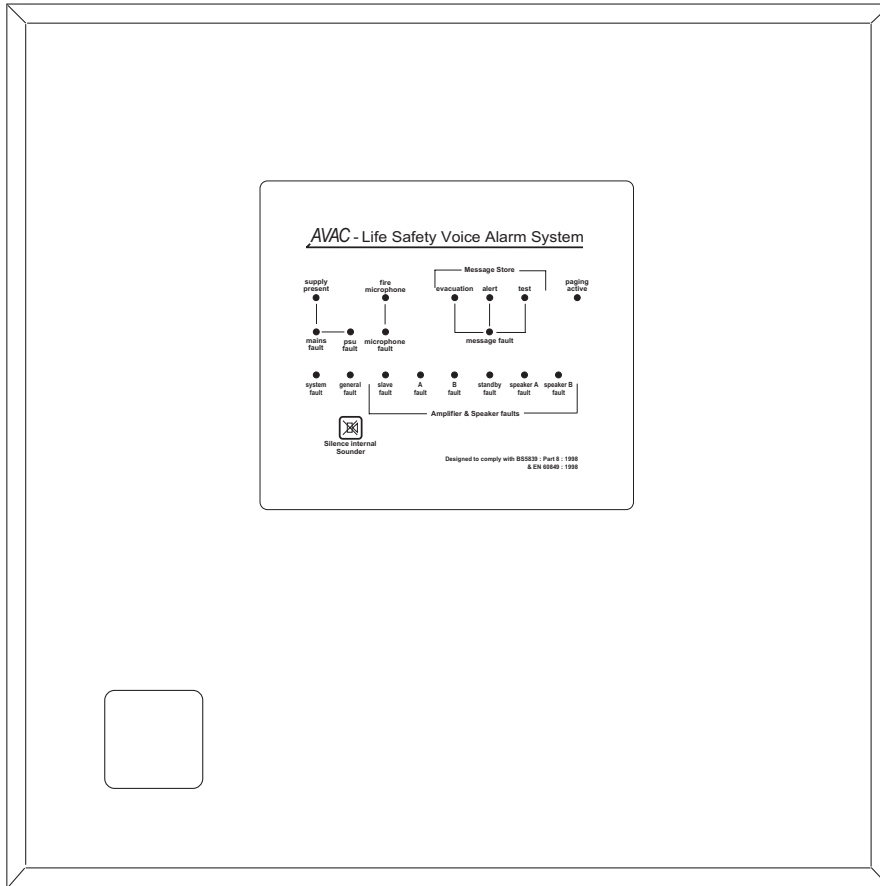


# AVAC

## VOICE ALARM SYSTEM



**ALWAYS** make sure the end of line devices (supplied) are fitted after the last loudspeaker. If they are not, calibration may succeed but loudspeaker circuit faults will not be detected.

**ALWAYS** measure the speaker circuit loads using a Loadmaster or LCR meter before calibration. The max. load for each circuit is 60 watts, which is equivalent to a min. impedance of 166 ohms. **DO NOT** use a multimeter as the results will be meaningless.

The most common installation problem on voice alarm systems is loudspeakers being tapped at too high a wattage and overloading the amplifier which causes clipping of the monitoring tone signal.

# Installation and Maintenance Manual

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## IMPORTANT NOTES



This equipment must be installed and maintained by a suitably skilled and technically competent person.

This equipment is a piece of Class 1 equipment and **MUST BE EARTHED**.

This equipment operates with hazardous voltages present inside its enclosure. **DO NOT** leave the enclosure door open during normal operation.

### Items supplied

This product is supplied with an installation and maintenance manual, a user manual, an allen key (for unfastening/securing the lid) and an electrical accessory pack containing a red battery lead, a black battery lead, a battery link lead, two loudspeaker end of line modules, a 6K8 0.25 W resistor, a spare primary mains fuse, a spare battery fuse and a selection of spare jumper links.

An AVAC master / slave record sheet (DAU0000407) is also provided in the AVAC's accessory pack. We strongly recommend the relevant side of this sheet (master or slave) is completed by the engineer for future reference. Should you experience any technical problems with AVAC our technical department will require information from this sheet in order to assist you.

### System design


Voice alarm system design is beyond the scope of this document. A basic understanding of general voice alarm system components and their use is assumed.

We strongly recommend that a suitably qualified and competent person is consulted in connection with the design of the voice alarm system and that the system is commissioned and serviced in accordance with the project specification and national standards. The client/fire officer concerned with the property should be contacted at an early stage in case he or she has any special requirements.

We recommend you read BS 5839 Part 8 (1998) : The code of practice for the design, installation & servicing of voice alarm systems and BS EN 60849 (1998) : Sound systems for emergency purposes (or any subsequent revisions) both of which are available at your local reference library or from the British Standards Institute, Customer Services Dept., 389 Chiswick High Road, London, W4 4AL. Tel: +44 (0)20 8996 9001. Web: [www.bsi-global.com](http://www.bsi-global.com).

### Equipment guarantee

This equipment is not guaranteed unless the complete system is installed and commissioned in accordance with national standards by an approved and competent person or organisation.

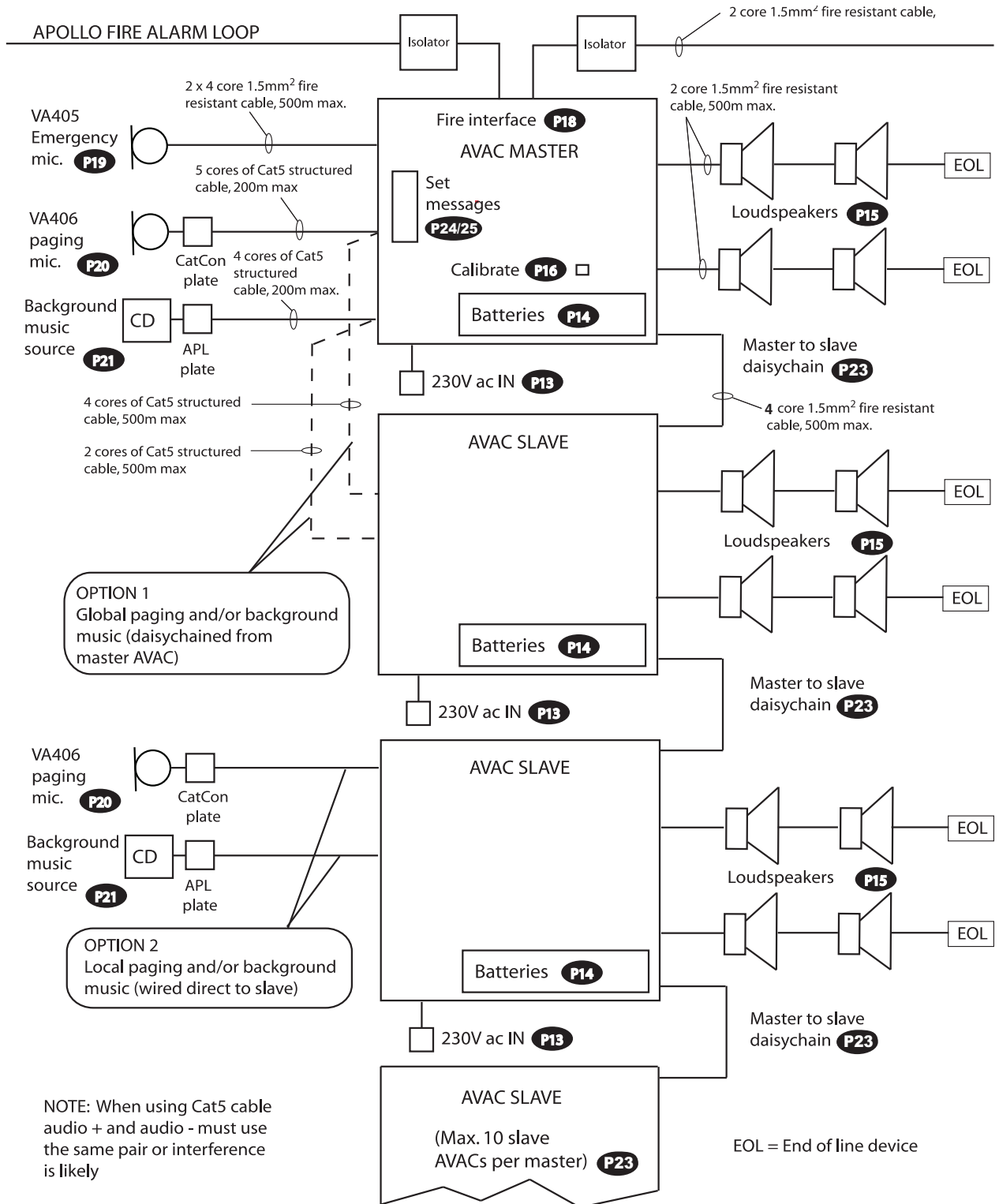
 This product has been manufactured in conformance with the requirements of all applicable EU Council Directives.

© 2004-2008. Errors and omissions excepted. The manufacturer of this product operates a policy of continuous improvement and reserves the right to alter product specifications at its discretion and without prior notice. All of the instructions covered in this manual have been carefully checked prior to publication. However, no responsibility can be accepted by the manufacturer for any inaccuracies or for any misinterpretation of an instruction or guidance note.

# SHORT FORM WIRING INSTRUCTIONS

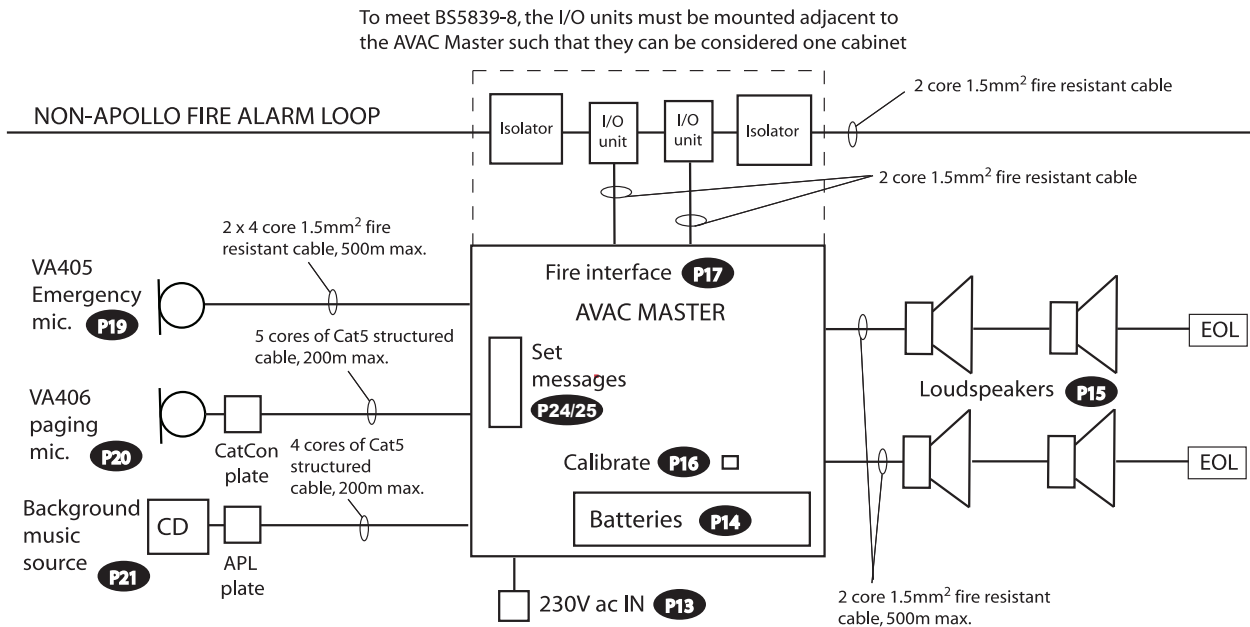
## AVAC connected to an Apollo analogue fire alarm loop

Circled numbers, i.e. **P22** refer to the pages you should read for further information



### AVAC connected to a non-Apollo analogue fire alarm loop

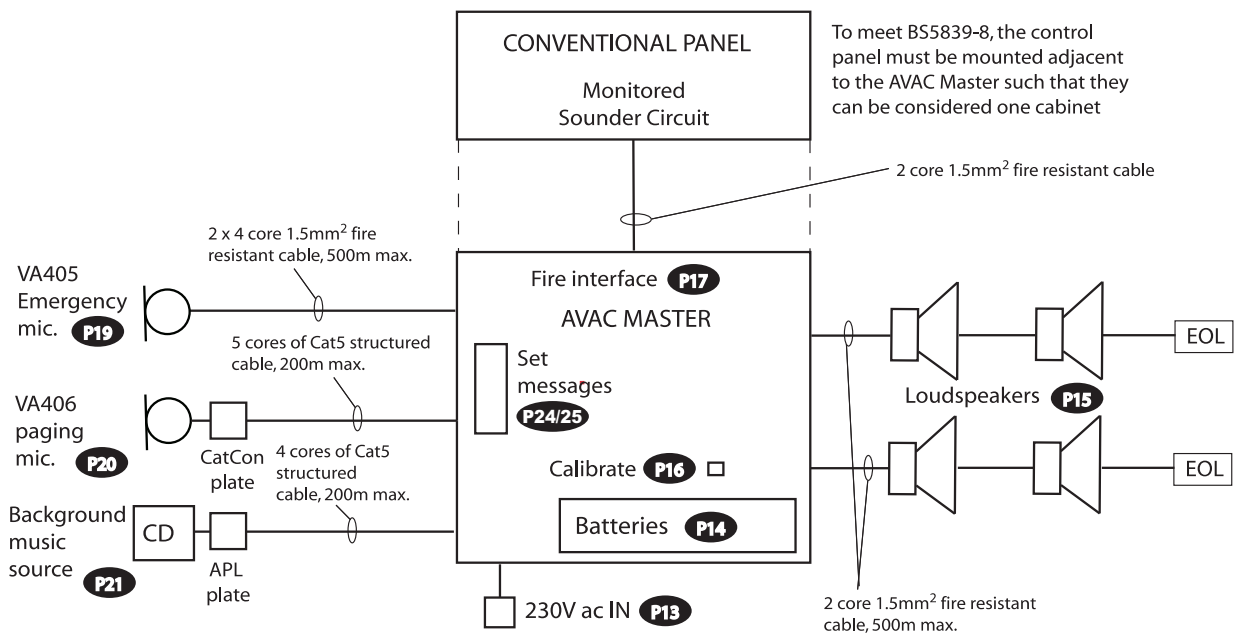
Circled numbers, i.e. **P22** refer to the pages you should read for further information



FOR SLAVE AVAC WIRING INFORMATION REFER TO SCHEMATIC ON PAGE 4

### AVAC connected to a conventional fire alarm panel

Circled numbers, i.e. **P22** refer to the pages you should read for further information



FOR SLAVE AVAC WIRING INFORMATION REFER TO SCHEMATIC ON PAGE 4

## AN OVERVIEW OF THE AVAC VOICE ALARM SYSTEM

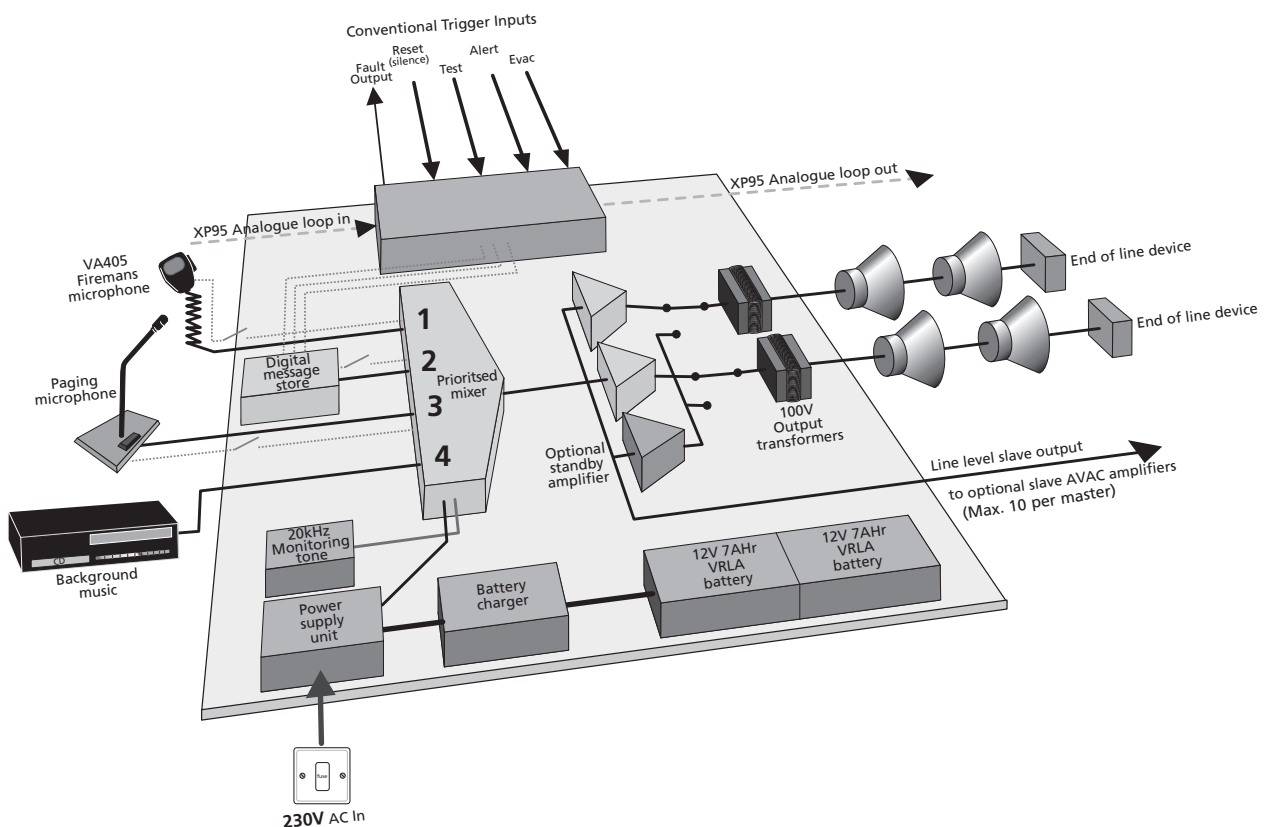
AVAC is a low-cost, high-quality modular voice alarm system specially designed to simplify the provision of a fully BS 5839 part 8 (1998) compliant voice alarm system.

In one compact wall-mountable enclosure, AVAC comprises:-

- Conventional and analogue (Apollo XP95/Xplorer/Discovery) fire alarm interfaces.
- A high-quality digital message store containing programmable Evacuate, Alert and Test messages.
- A prioritised mixer.
- Three balanced line level inputs for the (optional) connection of an emergency microphone, paging/public address equipment and a background music source.
- Two x 60 watt Class D amplifiers (plus an optional standby amplifier), each of which will accommodate up to 60 watts of loudspeaker load.
- An EN54-4 compliant switch-mode power supply and battery charger.
- Space for 2 x 7 AHr VRLA batteries typically providing at least 24 hours (standby) and 30 minutes (alarm running) time.
- A slave line level output allowing the connection of up to 10 slave AVACs.  
(Slave AVACs are typically used to extend loudspeaker coverage in areas such as warehouses. They also allow greater flexibility in the segregation of public address paging and background music distribution as they have their own paging and background music inputs).

The fact that multiple AVACs (and slaves) can be connected to one fire detection system makes the AVAC voice alarm system ideal not just for simple one zone installations but for virtually all small to medium sized applications, including phased evacuation projects, in areas such as hotels, leisure centres and licensed premises.

### *An overview of an AVAC Master*



## Operation

The principal function of the AVAC voice alarm system is to generate clear, intelligible voice messages to alert people to the presence of fire, normally under the control of a fire detection system.

When AVAC receives a message trigger from the host fire detection system, it responds by playing an appropriate message (**Evacuate, Alert or Test**) from its digital message store. This message is amplified and broadcast around the site via the system's loudspeakers.

Three balanced line level audio inputs are also provided for the connection of the following optional third-party equipment:-

- An emergency microphone (connected to the **Fire Mic. Input**) to allow live directive announcements by the emergency services
- A paging microphone (connected to the **Paging Input**) to allow non-life safety paging announcements and;
- A background music source such as CD player, radio tuner or class-change tone system (page 22) (connected to the **BGM Input**).

The Paging and BGM inputs have optional link-selectable attenuators so that a wide range of input levels can be used. The Fire Mic. input does not have an attenuator since it is designed for use with the **VA405** emergency microphone only. The level of all four audio channels (digital message store, fire mic., paging and BGM) can be adjusted using the four internal level controls.

If multiple inputs and/or digital message triggers are active at the same time, the prioritised mixer ensures that only the most urgent audio signal is broadcast, as indicated on the chart below:-

<b>Priority</b>	<b>Description</b>
<b>1</b>	<b>Emergency microphone</b>
<b>2</b>	<b>Evacuate, Alert or Test message (Evacuate overrides Alert, Alert overrides Test)</b>
<b>3</b>	<b>Paging microphone</b>
<b>4</b>	<b>Background music source</b>

## The fire alarm interface

A fire detection system can be connected to AVAC via three polarized, opto-isolated trigger inputs - Evacuate (**M1**), Alert (**M2**) and Test (**M3**). These inputs are designed to control the AVAC's digital message store and will activate when 24 V d.c. is applied to them (if an external voltage is not available, a local 24 V d.c. output is provided for switching into the inputs under the control of the fire detection system). All inputs are prioritised according to the messages they trigger and can be set for latching or non-latching operation via an internal link.

When set to latch (required by BS 5839-8), triggered messages will play continuously until a higher priority message/input is asserted or the AVAC's reset input (**RES**) is activated. When set for non-latching operation, messages will stop when the input stimulus is removed (please check with the approving authority that this is permissible prior to installation). This facility is provided to allow connection to fire detection systems without a silence output.

NB: AVAC cannot interpret a pulsing sounder input as Alert - all trigger inputs must be continuous.

AVAC can also be connected directly to any Apollo protocol XP95, Discovery or Xplorer analogue addressable fire alarm loop via its **LOOP** input. When connected in this way, AVAC emulates an Apollo sounder control module and must be given an individual (and optional 'group') address using the two DIP switches provided to allow it to be recognised by the analogue loop. Once addressed, AVAC responds to the fire panel's commands by activating its Evacuate message when it receives a continuous sounders command and its Alert message when it receives an intermittent sounders command. It also reports any fault conditions back to the analogue loop as a general fault allowing the host fire detection system to show the fault location accordingly.

Although Apollo's analogue protocols do not include a Test state in their output bit configurations, some fire detection systems, such as those using a C-TEC XFP fire panel, have a 'test' bit pattern built into their software. If this is the case, AVAC's 'test enable' facility allows compatible fire detection systems to put the AVAC into test.

If required, AVAC's conventional fire alarm interface (i.e. its M1, M2 and M3 triggers) and its analogue interface (i.e. its LOOP input) can be used at the same time. If conflicting stimuli are applied, the highest priority message always overrides other stimuli.

### Monitoring

In order to comply with British and European life safety standards, AVAC's loudspeaker lines, PSU, batteries, emergency microphone and digital message store are all monitored for short circuits, open circuits, earth faults, discharge, disconnection and data corruption as appropriate.

Non-critical inputs such as public address paging and background music are not monitored and, in the event of mains failure, are automatically cut off to conserve battery life. This contributes to the AVAC's extremely efficient standby time - typically 24 hours (plus 30 minutes running) using 2 x 7 A Hr VRLA batteries.

Provided the system is wired as detailed in this manual, a fault condition will be reported as a sounder fault on the fire detection system to which it is connected, with more detailed fault indication provided on the front of the AVAC.

### Digital message selection

All digital messages are stored in MP3 format on a monitored, non-volatile memory card that plugs directly onto the Main PCB.

The content of these messages can be adjusted to suit the application using a series of internal links. For example, the Evacuate message can be configured to state that 'a situation has arisen' or 'a fire has been reported' and to warn people - if appropriate - not to use the building's lifts.

### Amplifier and speaker circuits

AVAC is supplied with a minimum of two separate 60 watt Class D amplifiers (A and B). These are designed to drive two loudspeaker circuits, each of which will accommodate up to 60 watts of loudspeaker load, through 100 V line transformers, which step up the voltage for distribution around the site.

An end of line device must be connected across the terminals of the last loudspeaker on each circuit and both circuits must be calibrated at commissioning using the calibrate button to ensure correct monitoring.

Some AVACs feature an additional 'hot-swap' standby amplifier that will switch in if either of the regular amplifiers (A or B) fail, a requirement of some life safety voice alarm specifications.

### Multiple AVACs and slave amplifiers

There is no limit to the number of master AVACs that can be used per system. **Please note however that the VA405 emergency microphone can be daisy-chained to a maximum of 10 masters only.**

To increase audio coverage in areas such as warehouses, etc., up to 10 slave AVACs can be connected to one master.

Slaves repeat all emergency microphone and digital message broadcasts that are made at the master to which they are connected. They also feature their own paging and BGM inputs. Therefore, if multiple masters and/or slaves are used, localised paging and background music can be easily implemented.



## PLANNING THE WIRING

**All System wiring should be installed to meet the appropriate parts of BS 5839-8 (1998), BS EN 60849 (1998) and BS 7671 (Wiring Regulations). Other national standards of installation should be adhered to where applicable.**

To comply with BS5839-8 we recommend the use of fire-resistant cables for all life safety functions (loudspeaker, fire alarm interface, emergency microphone and master to slave wiring).

Non-life safety functions, such as paging and background music, can be wired using Cat 5 structured cable (always wire Audio + and Audio – in the same twisted pair).

Always give due consideration to voltage drop.

All wiring should come into the enclosure via the knockouts provided and be fixed tidily to the relevant terminals. For an overview of the connections required for the fire alarm interface, loudspeakers, emergency microphone, paging/background music equipment and slave AVACs, please refer to the relevant sections later in this manual (see Contents, page 2).

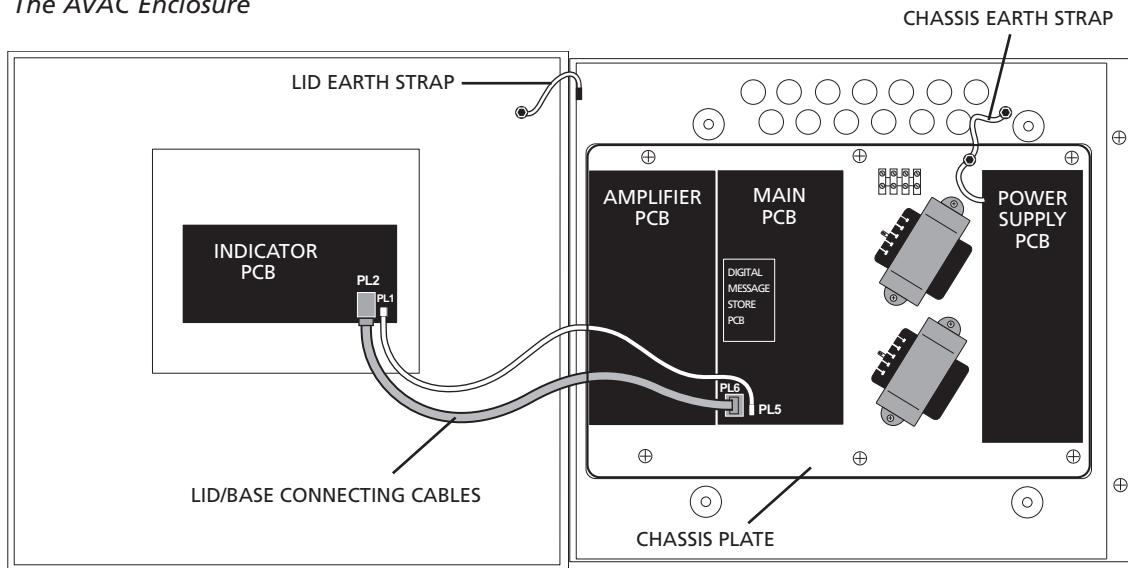
Note that correct cable glanding is essential and due regard should be paid to any system specifications which demand a certain cable type (providing it meets the appropriate national wiring regulations).

## MOUNTING AVAC

The enclosure can be surface or semi-flush mounted (see page 11). It comprises a hinged metal lid and metal back box containing all of the system's electronics. To protect the electronics against damage during first fix installation, most of the PCBs are located on a removable chassis plate, as shown below.

The enclosure must be sited internally in an area not subject to conditions likely to affect its performance, e.g. damp, salt-air, water ingress, extremes of temperature, physical abuse, etc. It should be positioned at a height where it is easily accessible and in a prominent position within the building. Ideally, the indicators on the front of the enclosure should be at eye level.

### The AVAC Enclosure



### Removing the lid and chassis plate

To expose all of the base mounting holes, the lid and chassis plate should be removed from the enclosure prior to first fix installation.



**Anti-static handling guidelines:** Prior to handling any of the AVAC's internal components, operators should rid themselves of any personal electro-static charge by momentarily touching any sound connection to safety earth, e.g. a radiator.

#### To remove the lid:

- Undo the two screws on the right hand side of the AVAC using the Allen key provided.
- Hinge the lid 180° to the left and remove the lid earth strap from the base earth connection (take care not to overbend the hinges).
- Disconnect the lid/base connecting cables (PL6 and PL5) from the Main PCB. Take care to depress the telecoms-style locking tab on the PL6 connector to prevent damage.
- Carefully remove the four wing nuts and washers that secure the hinges.

#### To remove the chassis plate:

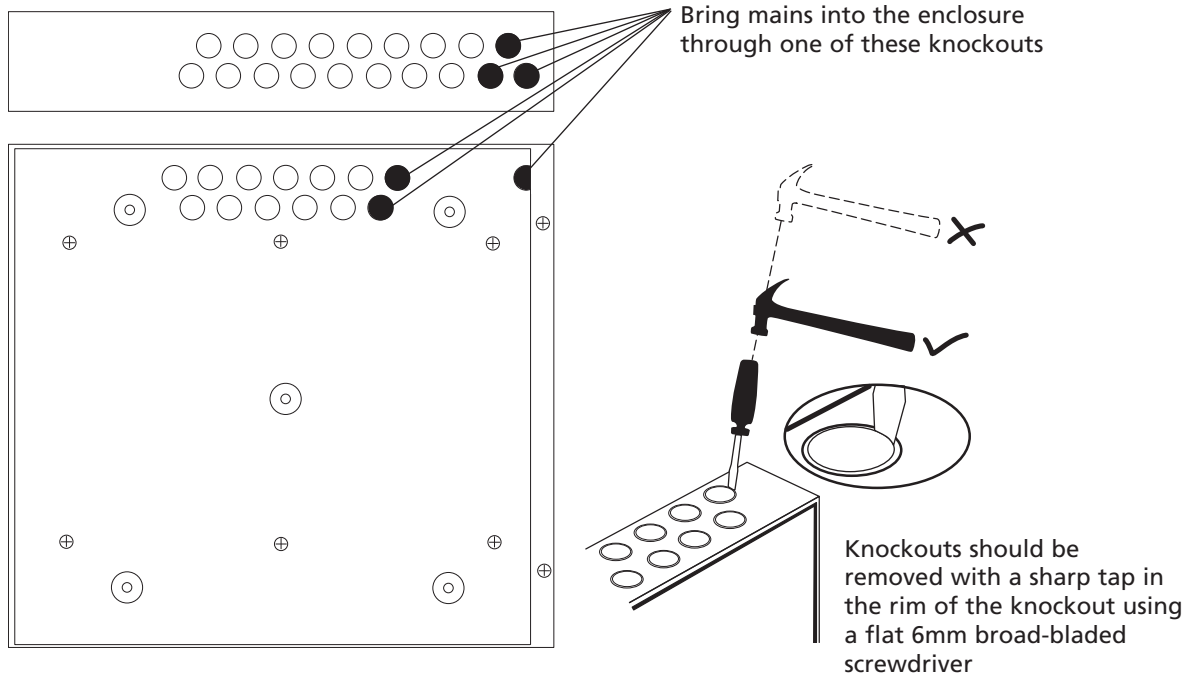
- Ensure power has been removed from the AVAC and that the Power Supply PCB is safe to handle (see page 13).
- Pull the chassis earth strap off the spade connector on the base earth point.
- Remove all of the chassis plate's retaining screws with the exception of the three keyhole retaining screws at the top of the chassis plate which should be loosened by about three turns.
- Push the chassis plate up and over the three keyhole retaining screws.

The lid and chassis plate can now be removed from site to prevent accidental damage. They should be stored in a clean, dry place which is free from vibration, dust and excessive heat.

**Planning the cable layout in the enclosure**

All low voltage wiring coming into the enclosure should be segregated away from the 100 V loudspeaker lines and incoming mains voltages. Refer to the diagram below for guidance and important information on how to remove the enclosure's knockouts. Always ensure that if a knock-out is removed, the hole is filled with a good quality cable gland. Any unused knock-outs must be securely blanked off.

*Location of knockouts for cable entry and knockout removal details*



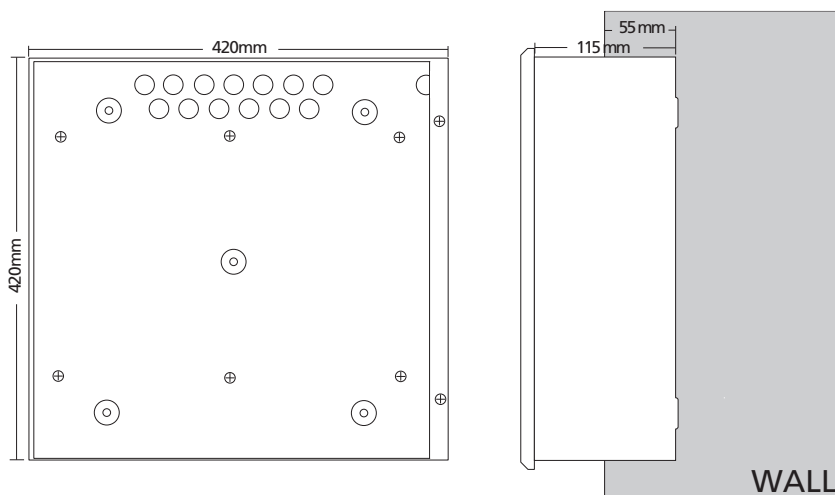
**Fixing the base to the wall**

Using the five mounting holes provided (see diagram below), fix the base securely onto/into the wall. The mounting holes are suitable for use with No.8-10 or 4-5mm countersunk screws.

Assess the condition and construction of the wall and use a suitable screw fixing.

Any dust or swarf created during the fixing process must be kept out of the enclosure and great care must be taken not to damage any wiring or components.

*Internal view of the back box with PCBs removed / side view for flush mounting*



**CAUTION**

If mounting multiple AVAC masters (or slaves) next to each other, take care to leave a gap of at least 80 mm between each of their bases to allow their lids to swing

## CONNECTING THE PANEL

Connect AVAC's internal wiring immediately prior to commissioning and after you have refitted the lid, chassis mounting plate, lid/base connecting cable and earth straps by reversing the process described on page 10.

Before connecting any wiring to the PCBs, we recommend you check all third-party equipment (loudspeakers, emergency microphone, paging panels, background music sources, etc) to ensure they are correctly fitted and that cable integrity is verified throughout the installation.

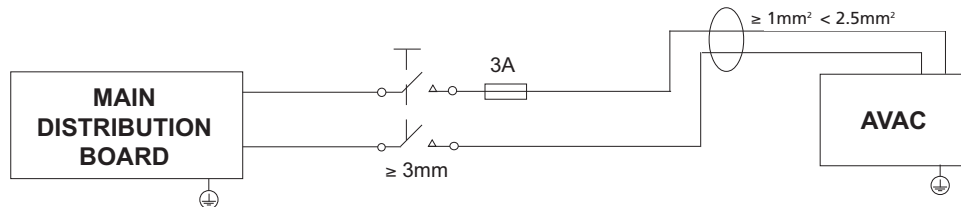
It is essential that the wiring and loudspeakers are tested with a Loadmaster or LCR meter to ensure that the total load connected to each of the loudspeaker circuits is not greater than 60 watts (not less than 167 Ohms) at 1 kHz. See page 15 for important information on the loading of loudspeaker circuits.

DO NOT use a high voltage insulation tester with any electronic devices connected.

## MAINS WIRING & CONNECTION DETAILS

The general requirement for the mains supply to AVAC's power supply PCB is fixed wiring, using three core cable (no less than 1mm<sup>2</sup> and no more than 2.5mm<sup>2</sup>) or a suitable three conductor system, fed from an isolating switched fused spur, fused at 3A. This should be secure from unauthorised operation and be marked 'FIRE ALARM SYSTEM: DO NOT SWITCH OFF'. The mains supply must be exclusive to the AVAC unit.

(As an alternative to a switched fused spur, a double pole isolating device may be used (see diagram below) providing it meets the appropriate national wiring regulations).



DO NOT attempt to connect mains to the AVAC until you are fully conversant with the layout and features of the power supply PCB, as described below.

The power supply PCB combines the functions of a mains to d.c. switched mode power supply unit, battery charging unit and battery monitoring unit.



**THE POWER SUPPLY PCB STORES VOLTAGES AT UP TO 400 Vd.c. AND MAY BE LETHAL IF TOUCHED. DO NOT TOUCH THE PCB WHILST THE RED 'HAZARDOUS VOLTAGES PRESENT' INDICATOR IS LIT.**

### The Power Supply PCB

#### PSU EARTH STRAPS

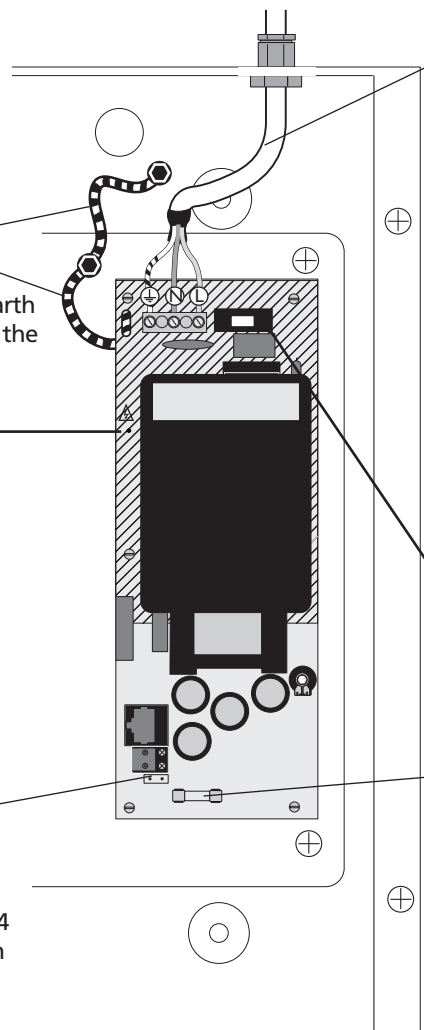
DO NOT operate AVAC without its earth straps connected in this exact configuration (The PSU earth strap connects the power supply PCB to the chassis earth post which in turn is connected to the base earth post).

#### HAZARDOUS VOLTAGES PRESENT LIGHT

When lit red, hazardous voltages are present on the components in the hatched area of the PCB and this charge is only bled away after the mains supply has been removed. When the red light extinguishes, the charge has leaked away to a safe level.

#### BATTERY LEAD CONNECTOR

(battery leads are supplied in the AVAC's accessory pack). See page 14 for battery position and connection details.



Incoming Mains cable must be segregated from other cables and should only enter the enclosure through one of the knock-outs on the right side of the enclosure. Good quality cable glands must be fitted.

The incoming mains earth wire **MUST** be connected to the terminal marked ⊕ and not to the chassis or base earth post.

**If connecting stranded mains cable (max 2.5mm<sup>2</sup>) we recommend the use of bootlace ferrules.**

#### PRIMARY FUSE (F1)

20 x 5 mm 1 A HRC Ceramic to IEC 127 (EN60127 Part 2).

Do not use any other type or size of fuse in this position.

#### BATTERY FUSE (F2)

20 x 5 mm 5 A F to IEC 127 (EN60127 Part 2).

Do not use any other type or size of fuse in this position.

## STANDBY BATTERY CONNECTION

We recommend two new, good quality and fully charged 7 AHr 12 V valve regulated lead acid batteries are used as the AVAC's emergency stand-by power supply. These will typically provide at least 24 hours standby time and 30 minutes alarm running time.

Note that batteries are required at **all** AVAC masters and slaves.

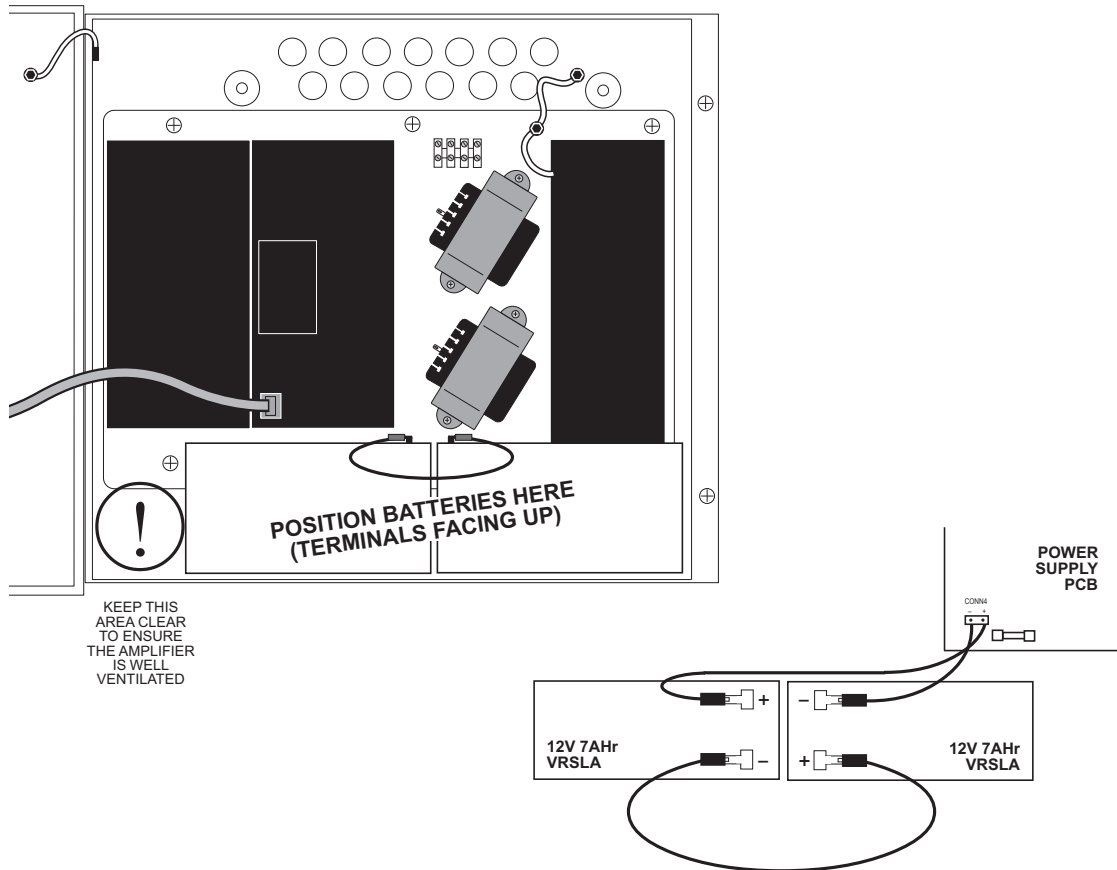
Caution: No other type of battery should be used due to risk of explosion and smaller batteries will reduce the standby time of the system considerably.

The batteries should be connected in series and located in the enclosure as shown in the diagram below. The battery leads and link wire are provided in the accessory pack.

A sophisticated battery monitoring unit protects the batteries against deep discharge by activating a cut off circuit when the stand-by supply voltage reaches 21 V approx. If batteries are not fitted, are discharged or in poor condition, a PSU fault will show at the AVAC.

Always dispose of used batteries according to the battery manufacturer's instructions.

### Standby battery location and connection



# LOUDSPEAKER CONNECTION

## Loudspeaker Tapping

The most common installation problem on a voice alarm system is the incorrect tapping of loudspeakers. If they are tapped at too high a wattage, the amplifier may be overloaded. If they are tapped at too low a wattage, the sound may be too quiet.

## Loudspeaker circuits

AVAC has two loudspeaker outputs, each of which can accommodate up to 60 watts of loudspeaker load. For example 20 loudspeakers tapped at 3 watts or 40 loudspeakers tapped at 1.5 watts. We recommend however that you allow 20% spare capacity on each loudspeaker circuit to accommodate future changes and/or tolerances within the circuit.

The continuous average output power of each circuit is 60 watts. Signals above this level will be compressed and the 'Audio Limit' LED will illuminate to indicate that the sound source is overdriving - see pages 19, 20 or 21 for further details.

To determine the actual loading (in watts) of a loudspeaker circuit with the speakers connected, disconnect the loudspeaker circuit at the main PCB and measure the impedance of the cable and loudspeakers using a Loadmaster or LCR meter. Remember that the maximum load for each circuit is 60 watts, which is equivalent to a minimum impedance of 166 ohms.

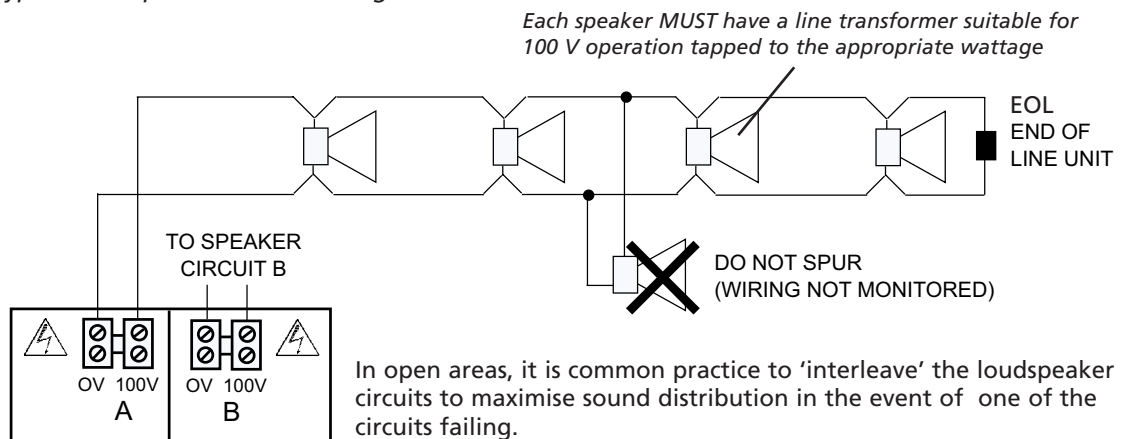
**To convert impedance into power, use the following equation:**  
 **$P$  (power in watts) =  $10,000 / Z$  (impedance in Ohms)**

Example:-  $Z$  (impedance in ohms) = 334 ohms.  
 $10,000 / 334 = 29.94$ . Therefore  $P = 30$  watts.

An end of line module (EOL) provided in the accessory pack must be physically secured and connected across the terminals of the last loudspeaker to allow the wiring to be monitored for open or short circuit fault conditions. In order to check that the loudspeaker line monitoring is operating correctly, fit the EOL in an accessible location.

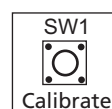
We recommend C-TEC voice alarm loudspeakers are used as these have been tested for correct operation with AVAC. All loudspeakers must be suitable for 100 volt line operation. Low impedance loudspeakers will not work, will overload the amplifier and may be seriously damaged. Note that a form is provided on page 30 where you can record the number, type, location and tapping of each loudspeaker used.

### Typical loudspeaker circuit wiring



### IMPORTANT

To ensure the loudspeaker circuits are monitored correctly, they MUST be calibrated using the SW1 button on the Indicator PCB inside the lid. See page 16 for details.



## CALIBRATING THE LOUDSPEAKER, FIRE MIC. AND MASTER TO SLAVE CIRCUITS

The loudspeaker circuits are monitored by an intermittent 20 kHz tone which is passed down the loudspeaker lines. Each circuit's end of line device absorbs the tone and the current taken is measured against the current drawn at system setup (known as the 'reference' value).

To store the reference value, the commissioning engineer must activate AVAC's calibration feature. Note that AVAC's Fire Mic and Master to Slave circuits will be calibrated at the same time and that prior to calibration the unit will always show a Fire Mic fault.



### **Calibration should ONLY be done when:-**

- 1) Both loudspeaker circuits are complete** i.e. all loudspeakers are connected, appropriately tapped and verified **and** when the end of line devices (supplied) are fitted after the last loudspeaker on each circuit.
- 2) Both loudspeaker circuits have been measured using a Loadmaster or LCR meter and you have confirmed that the load on each circuit is no greater than 60 watts** (equivalent to a minimum impedance of 166 ohms).
- 3) The Fire Mic's PTT input is in an untriggered state, i.e. only the 6k8 end of line is present.** If calibration is done with the Fire Mic's PTT input in a triggered state, AVAC will calibrate the Fire Mic. circuit incorrectly and the Fire Mic. may not work as expected.
- 4) The PLK2 Local Fault link has been temporarily removed from ALL slave AVACs.** Note you MUST refit the PLK2 Local Fault links to all slaves when calibration is complete.

To start the calibration procedure, press and continue to hold down the calibration button (SW1) on the Indicator PCB. The indicator light (IND1) on the Main PCB will pulse slowly. DO NOT LET GO OF THE CALIBRATION BUTTON UNTIL THE INDICATOR LIGHT STARTS TO FLASH MORE QUICKLY. Once the flashing speeds up, let go of the calibration button. When the indicator light goes out, the calibration procedure is complete.

### **Always test the system for correct operation after calibrating or recalibrating the circuits.**

If any changes are made to the loudspeaker, fire mic. or master to slave circuits at any time - for example, if a loudspeaker is added, removed or its tapping is changed - the calibration process should be repeated to establish a new 'reference' level.

For more specific loudspeaker wiring information, please refer to each loudspeaker's individual installation instructions for advice.



# FIRE ALARM INTERFACE CONNECTION

The fire alarm interface comprises two parts, a conventional system interface and an analogue system interface. It should be noted that BS5839-8 requires all controlling inputs to be latched and all links to be monitored. Depending on the facilities available at the controlling equipment, this is not always possible. In such cases it is acceptable to have unmonitored links provided they are very close and at least IP30 protected. One way to do this is to mount the control equipment next to AVAC so there is no gap between them.

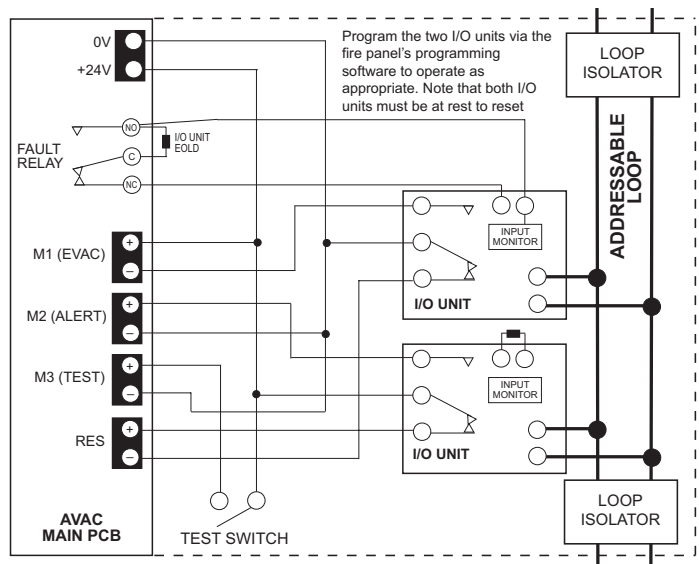
## The conventional interface

The conventional interface has four polarized inputs, Evacuate (M1), Alert (M2), Test (M3) and Reset (RES) plus a fault relay output. All four inputs are optically isolated and designed to be active when supplied with +24 V. For compliance with BS5839-8, all four conventional inputs are set to latch by default (i.e. Link 3 of the PLK4 option links is supplied fitted). When a steady voltage of +24 V is applied to an input, the relevant message plays until a higher priority message is asserted (note that pulsing inputs are not compatible with AVAC). When the trigger voltage is removed, the selected message will continue to play. Only when the AVAC's Reset input is asserted will the system return to normal. When the Reset stimulus is released no message will play unless other inputs are asserted. Note, the fire panel's Reset input should be set to activate when the fire detection system is SILENCED or RESET, not just when reset.

### Interfacing a non-Apollo analogue addressable fire system to AVAC's conventional interface

**Note that Apollo protocol analogue systems can be connected directly to AVAC's analogue interface, as described on page 18.**

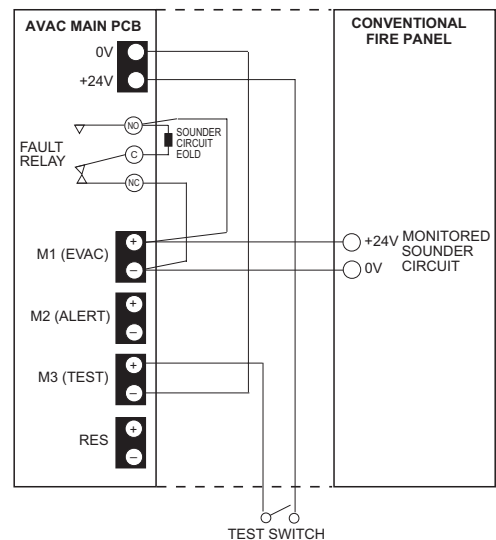
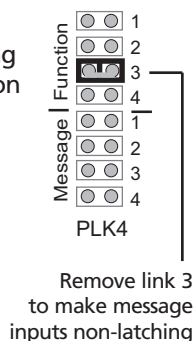
When interfacing a non-Apollo analogue addressable fire alarm system to the conventional interface, the M1, M2, M3 and RES inputs are usually triggered via one or more input/output units, as shown. The I/O units should be programmed via the fire panel's own programming software to operate as appropriate. To meet BS 5839-8, the I/O units should be mounted adjacent to the Master AVAC(s) such that they can be considered to be one cabinet.



### Interfacing a conventional fire system to AVAC's conventional interface

When interfacing a conventional fire alarm panel to the conventional interface, the M1 (Evacuate) input is normally triggered via a monitored sounder circuit or relay. The M2 (Alert) input is normally not used in this scenario as pulsing inputs are not compatible with AVAC. As most conventional panels do not have a monitored silence input that is capable of driving AVAC's reset input, removing Function Link 3 on AVAC's PLK4 option links will set all message inputs to non-latching.

For this arrangement to meet the spirit of BS5839-8, the control panel must be mounted adjacent to the Master AVAC(s) such that they can be considered to be one cabinet.



**The analogue interface**

AVACs analogue interface can be connected to any Apollo XP95, Discovery or Xplorer analogue loop (see right).

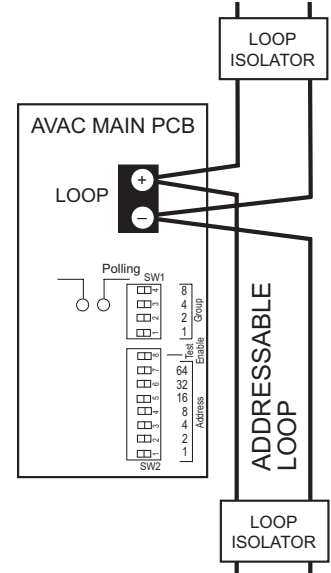
If using this method, AVAC should be given a unique ID address using the first seven segments of the eight way DIP switch (SW2) on the Main PCB. When polled, the green polling LED will illuminate momentarily to confirm the AVAC is working correctly.

Once on the loop, the AVAC emulates an Apollo sounder control module and responds to fire alarm system commands as such, playing an Alert message when an Alert (intermittent sounders) command is received and an Evacuate message when an Evacuate (continuous sounders) command is received.

In addition to its unique ID address, AVAC can be given a 'group' address using the four way DIP switch (SW1). A group address is used by the fire detection system to activate the outputs of multiple AVACs simultaneously.

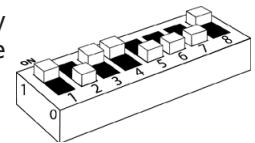
If this facility is used, note that individual AVACs will continue to report back their status to the host fire detection system using their unique ID address numbers as appropriate.

*Interfacing an Apollo protocol analogue panel to the AVAC's analogue interface*



**Setting AVAC's unique ID address**

Use bits 1 to 7 of the eight way DIP switch (SW2) to give AVAC a unique ID address (i.e.13 in the example shown right with test enabled). This can be any address between 1-126 (if group mode is not utilised) or 1-111 (if group mode is utilised (see bottom of page)).



SW2		SW2		SW2		SW2	
Address	1234567	Address	1234567	Address	1234567	Address	1234567
1	1000000	25	1001100	81	1000101	105	1001011
2	0100000	26	0101100	82	0100101	106	0101011
3	1100000	27	1101100	83	1100101	107	1101011
4	0010000	28	0011100	84	0010101	108	0011011
5	1010000	29	1011100	85	1010101	109	1011011
6	0110000	30	0111100	86	0110101	110	0111011
7	1110000	31	1111100	87	1110101	111	1111011
8	0001000	32	0000010	88	0001101	112	0000111
9	1001000	65	1000001	89	1001101	113	1000111
10	0101000	66	0100001	90	0101101	114	0100111
11	1101000	67	1100001	91	1101101	115	1100111
12	0011000	68	0010001	92	0011101	116	0010111
13	1011000	69	1010001	93	1011101	117	1010111
14	0111000	70	0110001	94	0111101	118	0110111
15	1111000	71	1110001	95	1111101	119	1110111
16	0000100	72	0001001	96	0000011	120	0001111
17	1000100	73	1001001	97	1000011	121	1001111
18	0100100	74	0101001	98	0100011	122	0101111
19	1100100	75	1101001	99	1100011	123	1101111
20	0010100	76	0011001	100	0010011	124	0011111
21	1010100	77	1011001	101	1010011	125	1011111
22	0110100	78	0111001	102	0110011	126	0111111
23	1110100	79	1111001	103	1110011	<i>(112-126 are not available if group addressing is used)</i>	
24	0001100	80	0000101	104	0001011		

**Setting AVAC's (optional) group address**

Use bits 1 to 4 of the four way DIP switch (SW1) to give an optional group address. A group address can be any address between 112-126. More than one AVAC can have the same group address.

SW2		SW2	
Address	1234	Address	1234
112	1111	120	1110
113	0111	121	0110
114	1011	122	1010
115	0011	123	0010
116	1101	124	1100
117	0101	125	0100
118	1001	126	1000
119	0001	OFF	0000

# EMERGENCY (FIRE) MICROPHONE CONNECTION

If an emergency (fire) microphone is required, you must use a VA405 microphone. Only one VA405 should be used per system. This can be daisychained to up to ten AVAC masters as illustrated below. Pressing the VA405's push to talk button will override all other audio signals on the system, including Evacuate and Alert messages, allowing live announcements to be made.

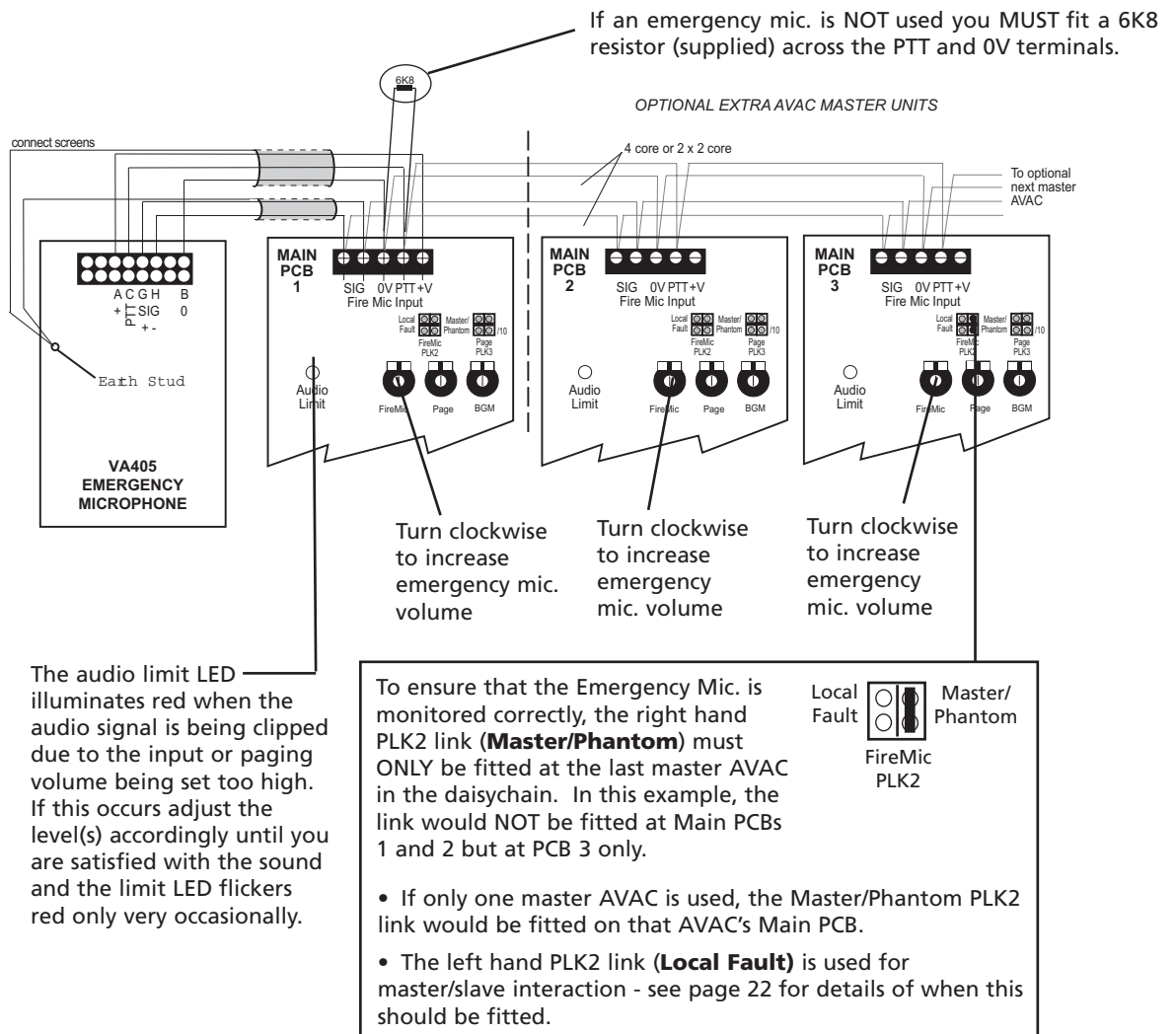
If an emergency microphone is NOT required, to prevent a fault condition occurring you must fit the 6K8 0.25 W resistor (supplied in the accessory pack) across the PTT and 0V terminals at the Fire Mic input.

If required, the volume of the microphone can be adjusted using the **Fire Mic** level control on the Main PCB. Please note, should its volume be set too high, the audio limit LED on the main PCB will illuminate red to indicate that the audio signal is being clipped. If this happens, re-adjust the **Fire Mic** level control until you are satisfied with the sound quality and the limit LED flickers red only very occasionally. Failure to do so could lead to poor sound quality.

If the microphone is too loud, too quiet or too distorted, the master output level of the VA405 may need to be adjusted. Refer to the VA405 instructions for details.

Please note, to ensure the microphone is monitored correctly, the right hand PLK2 link (**Master/Phantom**) must only be fitted at the last master AVAC in the daisychain - see below for details.

## Emergency microphone connection



Note that the Emergency Mic input will show a fault until the system has been calibrated as detailed on page 16

## PUBLIC ADDRESS PAGING CONNECTION

If required, a VA406 desk microphone console can be connected to the paging input for non-life safety public address announcements. Note that other balanced line level equipment, such as the output from a telephone system, may be connected instead. If in doubt, please contact your distributor for details.

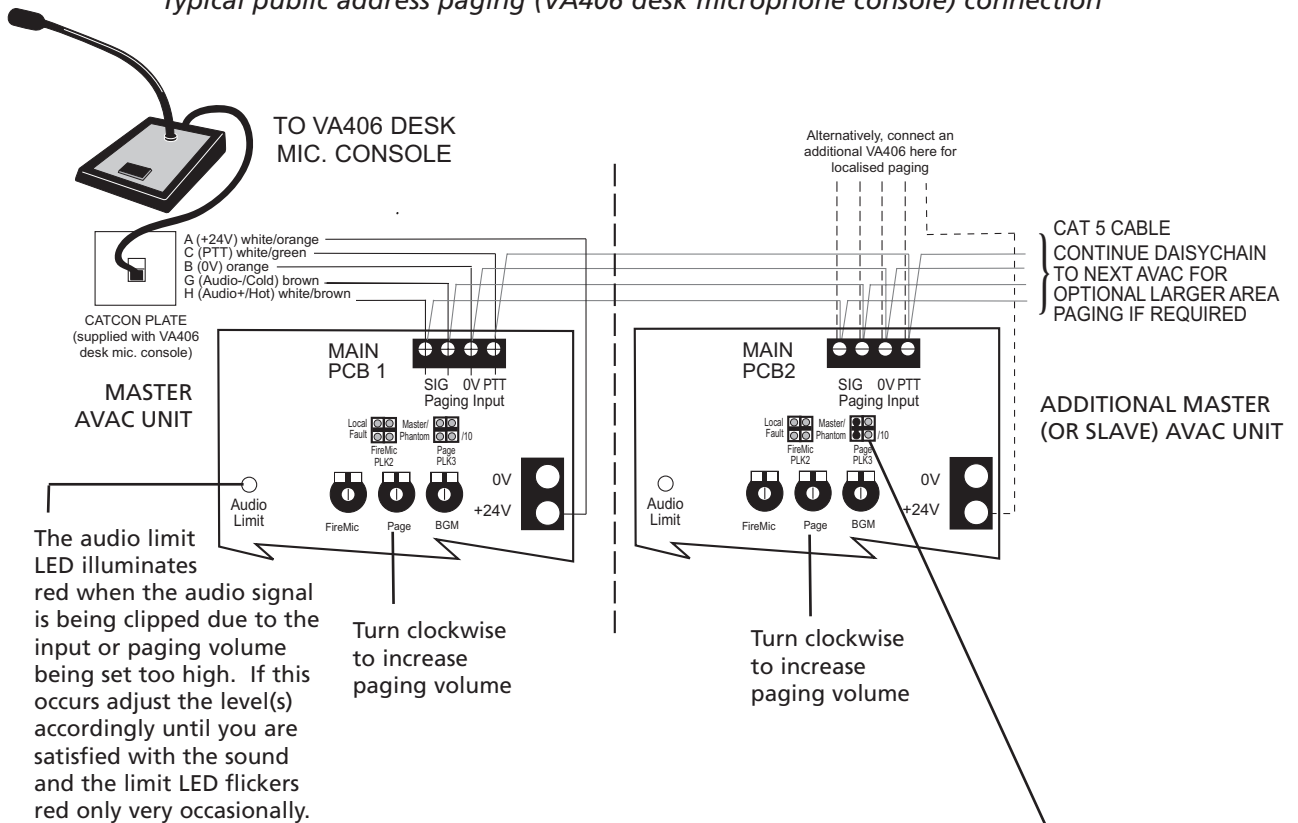
The paging input is designed to accept balanced line level signals of between 300 mV and 1.5 V rms. If you wish to connect a higher line level signal, fitting the right hand PLK3 link (**/10**) on the Main PCB will attenuate the input signal by a ratio of approximately 10:1.

The volume of the paging signal can be adjusted using the **Page** level control on the Main PCB. Please note, should the volume be set too high, the audio limit LED on the main PCB will illuminate red to indicate that the audio signal is being clipped. If this happens, re-adjust the **Page** level control until you are satisfied with the sound quality and the limit LED flickers red only very occasionally. Failure to do so could lead to audio distortion.

For global paging, simply daisychain the paging input to all relevant AVAC master and slave units. Note that if global paging is utilised, the left hand PLK3 link (**master/phantom**) must be fitted at the last AVAC in the daisychain only. If local paging is used, then the left hand PLK3 link should be fitted at every AVAC (master or slave) which has paging equipment connected directly to it).

Pressing the paging equipment's PTT (push to talk) button will override all relevant background music signals but have no effect on higher priority triggers (such as Alert messages, Evacuate messages or Emergency Mic broadcasts).

Typical public address paging (VA406 desk microphone console) connection



If global paging is utilised, the left hand PLK3 link (**Master/Phantom**) must **ONLY** be fitted at the last AVAC in the daisychain. In this example, the link would be fitted at Main PCB 2 only.

- If only one master AVAC is used, the Master/Phantom PLK2 link would be fitted on that AVAC's Main PCB.
- If localised paging is used, the Master/Phantom PLK2 link should be fitted at every AVAC (master or slave) which has localised paging.

Fit the right hand PLK3 link (**/10**) to attenuate the paging signal by 10:1, if required.

Master/Phantom /10  
Page PLK3

## BACKGROUND MUSIC (BGM) CONNECTION

Any background music source with a balanced line level output (CD player, radio tuner, etc.) can be connected to the AVAC. Background music is AVAC's lowest priority input and it will play continuously unless there are other audio inputs active on the system.

The BGM input, like the paging input, is designed to accept balanced line level signals of between 300 mV and 1.5 V rms. If you wish to connect a larger line level signal, fitting link PLK1 on the Main PCB will attenuate the input signal by a ratio of approximately 10:1.

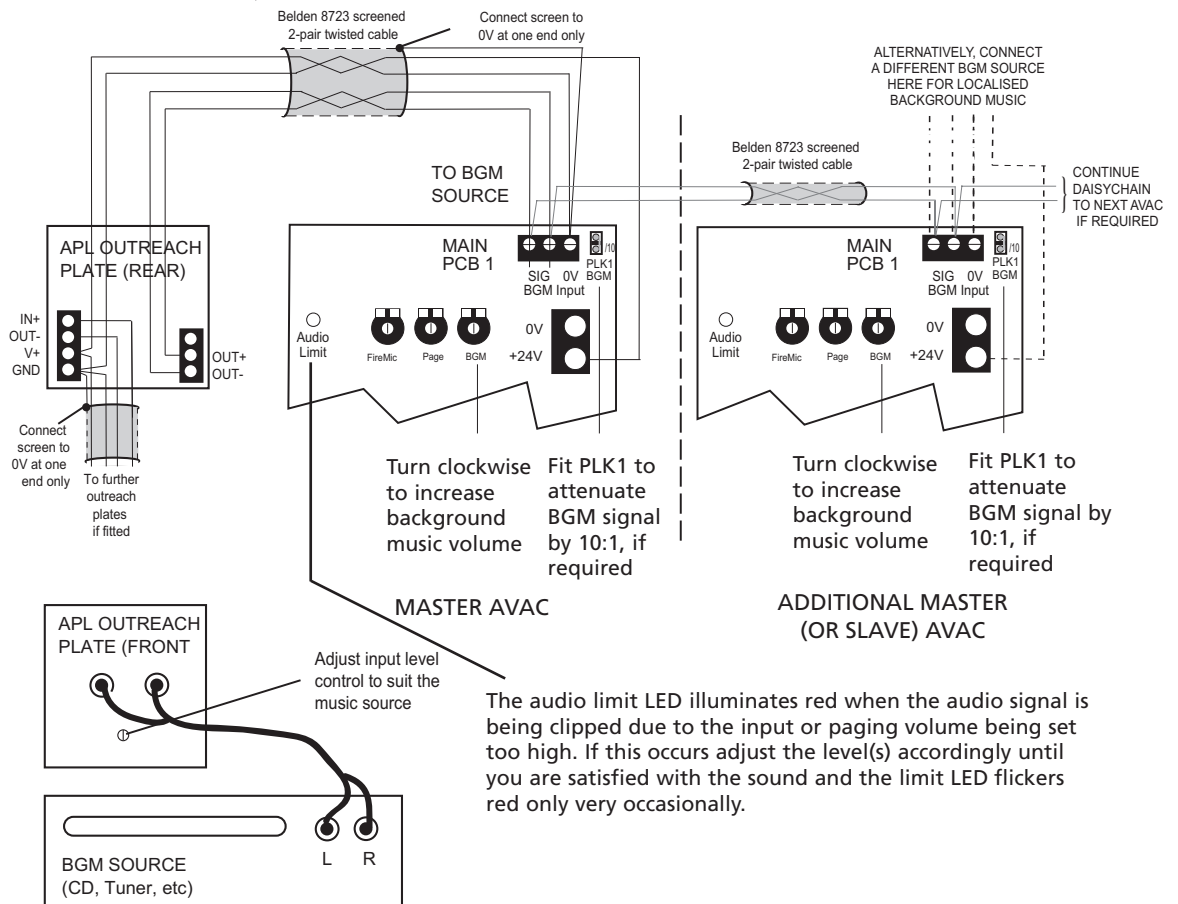
The volume of the background music signal can be adjusted using the **BGM** level control on the Main PCB. Please note, should the volume be set too high, the audio limit LED on the main PCB will illuminate red to indicate that the audio signal is being clipped. If this happens, re-adjust the **BGM** level control until you are satisfied with the sound quality and the limit LED flickers red only very occasionally. Failure to do so could lead to poor sound quality.

For global background music, simply daisychain the paging input to all relevant AVAC master and slave units. If multiple AVACs and/or slave amplifiers are used, different background music sources can be connected to play in different areas, i.e. local radio in warehouses, piped music (or silence) in offices, etc.

The simplest way to connect a background music source is via an APL double phono line level outreach plate which can be wall mounted in a location convenient for the user to change CDs, etc.

### Typical background music connection

Note, if you connect a stereo output directly to audio + and audio - the result will be very low level, distorted sound. You must use an APL outreach plate to convert stereo to balanced mono.

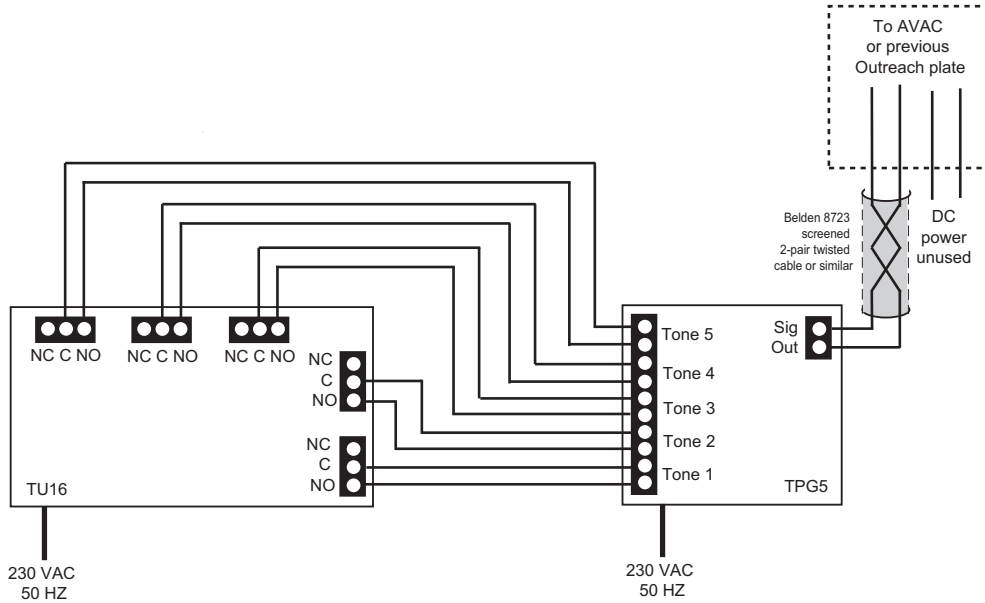


## CLASS CHANGE TIMER CONNECTION

If required, the AVAC's BGM input can also be used to provide a 'class change' function for schools, colleges, etc.

To utilise this feature you will need a TPG5 tone pulse generator with chime and a TU16 programmable seven day, multiple event timer unit. These should be connected to the AVAC's BGM input directly or via an outreach plate, as shown in the diagram below. Refer to to page 21 for additional information on how the BGM input works.

### *Class Change timer connection*



## SLAVE AVAC CONNECTION

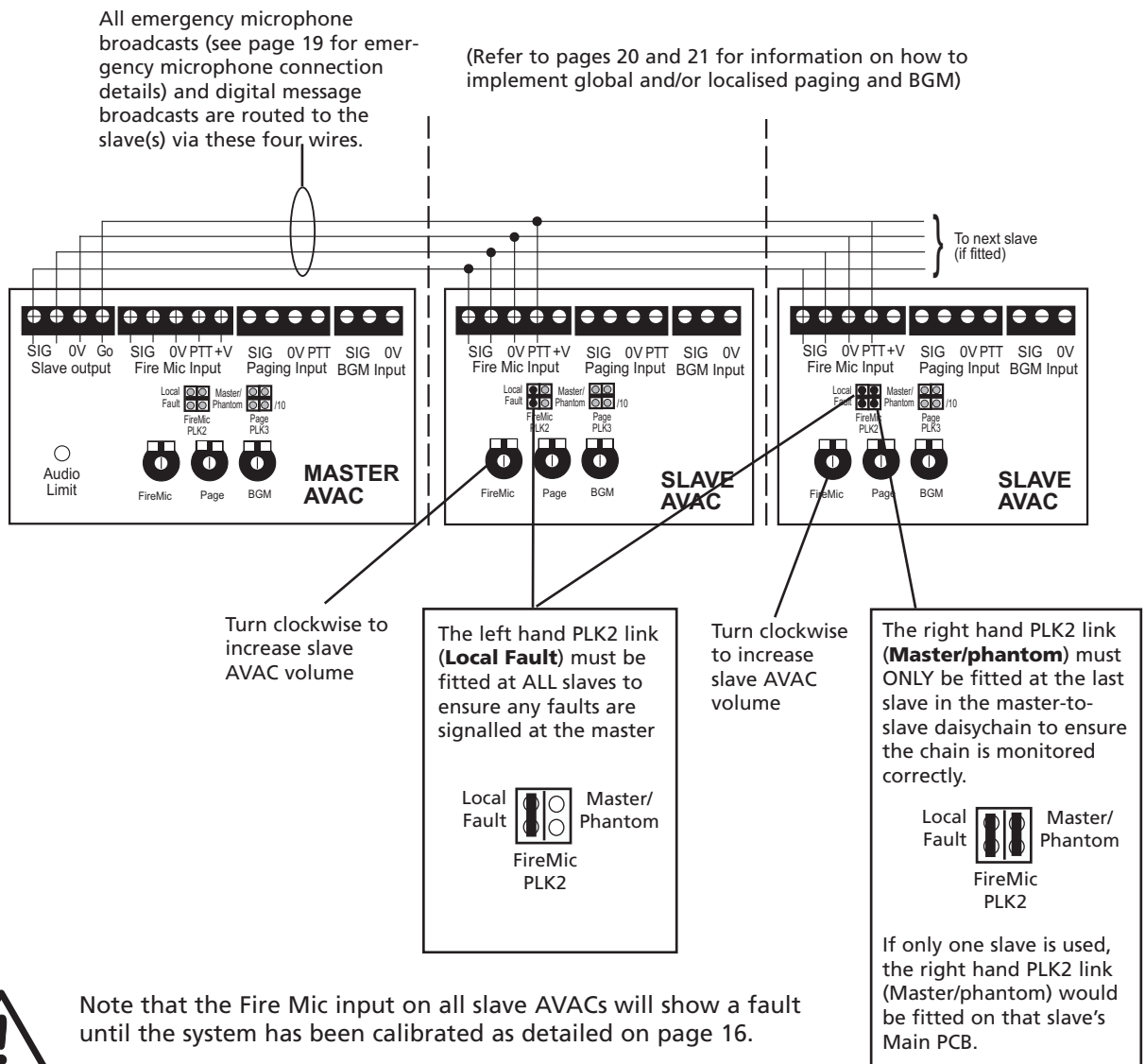
To increase audio coverage in large areas such as warehouses, shopping centres, etc, up to 10 slaves can be connected to one master.

For compliance with BS 5939-8, all critical life safety broadcasts made at the AVAC master (i.e. emergency microphone announcements, Evacuate, Alert and Test messages) are automatically passed to the relevant slave(s) for output.

To allow greater paging and background music flexibility, each slave has its own paging and BGM inputs. Alternatively, for global paging and background music, the audio source(s) at the master can be daisychained to the slave's inputs as explained on pages 20 and 21.

Slaves connect to masters as shown below. Please note, to ensure slave AVACs are monitored correctly, the right hand PLK2 link (**Master/Phantom**) MUST only be fitted at the LAST slave in the daisychain. The left hand PLK2 link (**Local Fault**) should be fitted at ALL slaves.

### Typical slave AVAC connection



## DIGITAL MESSAGE SELECTION

The digital message store PCB is located on the main PCB. It comprises a non-volatile solid state memory (on which the Evacuate, Alert and Test messages are stored in MP3 format), an MP3 player and a volume control.

### Message content

The general characteristics of the Evacuate and Alert digital messages meet BS 5839-8 (1998) and consist of a siren sound to attract attention, brief silence, the body of the message followed by another brief period of silence before the message is repeated.

The PLK4 option links on the Main PCB can be used to select different message arrangements to suit various applications. For example, in single storey buildings, fitting Message Link 1 will remove the statement "Do not use a lift" from all Evacuate messages whilst fitting Message Link 2 will report Evacuate or Alert conditions as 'situations' rather than fires. If the Test message facility is used, fitting Function Link 4 will prompt the system to broadcast "The fire alarm test is now complete" when the test trigger is removed. A full breakdown of the messages available can be found later in this section.

### Important:

To silence the Evacuate, Alert and/or Test Message:

- When the Conventional Interface is set to latching (PLK4 link 3 fitted) : Operate the reset input.
- When the Conventional Interface is set to non-latching (PLK4 link 3 not fitted) : Remove the Evacuate, Alert and/or Test input stimulus.

*Important: non-latching triggers are not fully compliant with BS 5839-8. However, if the triggers (e.g. loop driven I/O units) are mounted adjacent to AVAC so that they form, in effect, one cabinet, this is normally considered to be acceptable.*


- When the Apollo loop interface is used: Silence or reset the controlling FACIE which will issue the relevant control signal.

### Evacuate message selection

Listed below are the four Evacuate messages available at the AVAC together with details of the PLK4 option links you need to fit (or remove) to select them.

**Evacuate message 1**


**Siren** (three seconds silence),  
**Attention please, attention please.**  
**Fire has been reported in the building.**  
**Please leave the building immediately**  
**by the nearest available exit.**  
**Do not use a lift.**  
 (three seconds silence then repeat)



PLK4  
 Message links  
 1, 2, 3 & 4  
 not fitted

**Evacuate message 2**

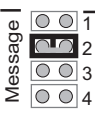
**Siren** (three seconds silence)  
**Attention please, attention please.**  
**Fire has been reported in the building.**  
**Please leave the building immediately**  
**by the nearest available exit.**  
 (three seconds silence then repeat)



PLK4  
 Message  
 link 1 fitted

**Evacuate message 3**

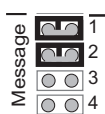
**Siren** (three seconds silence)  
**Attention please, attention please.**  
**A situation has arisen where we need**  
**to clear the building.**  
**Please leave the building immediately**  
**by the nearest available exit.**  
**Do not use a lift.**  
 (three seconds silence then repeat)



PLK4  
 Message  
 link 2 fitted

**Evacuate message 4**

**Siren** (three seconds silence)  
**Attention please, attention please.**  
**A situation has arisen where we need**  
**to clear the building.**  
**Please leave the building immediately**  
**by the nearest available exit.**  
 (three seconds silence then repeat)



PLK4  
 Message links  
 1 & 2 fitted



**Alert message selection**

Two Alert messages are available. The actual message played will depend on the position of Message Link 2 as shown in the diagrams below. Note altering the position of Message Link 2 will also affect the content of the Evacuate message (described previously).

**Alert message 1**

**Siren** (three seconds silence)  
**May I have your attention please, may I have your attention please**  
**Fire has been reported in the building, please listen for further instructions.**  
 (10 seconds silence) **Ding dong.**  
**You are reminded to remain at your workplace whilst the fire alert exists**  
 (repeat last two segments every 22 seconds).

Message  1  
 2  
 3  
 4  
 PLK4

Message link 2 not fitted

**Alert message 2**

**Siren** (three seconds silence)  
**Attention please, attention please**  
**A situation has arisen in the building, please listen for further instructions.**  
 (10 seconds silence) **Ding dong.**  
**You are reminded to remain at your workplace whilst the fire alert exists**  
 (repeat last two segments every 22 seconds).

Message  1  
 2  
 3  
 4  
 PLK4

Message Link 2 fitted

**Test message selection**

One test message is available, as detailed below:-

**Siren** (three seconds silence)  
**A fire alarm system is about to be tested.**  
**Please take no further action.**

However, if Function (not Message) Link 4 of the PLK4 option links is fitted, AVAC will also broadcast a "test complete" message when the system is returned to normal, as detailed below:-

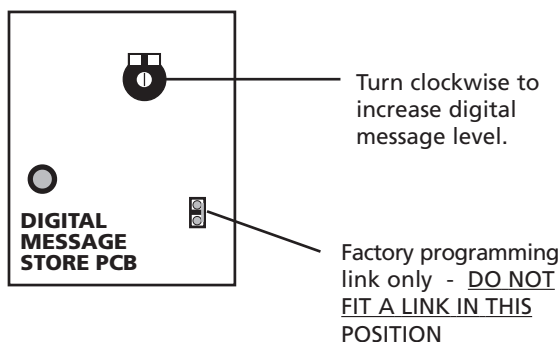
**Ding dong**  
**The fire alarm test is now complete.**  
**Thank you for your cooperation.**

Function  1  
 2  
 3  
 4  
 5

Function link 4 fitted

**Adjusting the MP3 player level**

If necessary, the level of the digital messages can be globally adjusted using the MP3 player's volume control which is located on the digital message store PCB, as shown below:-



**Test message**

The fire alarm system is about to be tested, please take no further action.  
 The fire alarm test is now complete.

**Custom messages**

Custom messages can be provided at extra cost but may have to be specially recorded. Please advise your requirements (prices on application).

# FAULT INDICATION

When a fault occurs, an intermittent fault buzzer sounds at AVAC and the relevant fault indicator illuminates. The fault relay also activates to report the fault to the fire detection system where, depending on the wiring configuration used, it is usually reported as a sounder fault.

Pressing the **Silence Internal Sounder** button on the front of AVAC will mute the fault buzzer. However, as all faults are also reported to the host fire detection system, removing link PLK5 (located below the buzzer on the Main PCB) will permanently disable the fault buzzer. Be sure to check with the approving authority that disablement of the internal sounder is acceptable before removing this link.

All faults should be recorded in the fire detection system's log book and appropriate action should be taken to correct them. An explanation of what each indicator means and the steps that can be taken to correct the faults they relate to can be found below. Note that all faults (except system faults and amplifier faults) are non-latching so when the fault is cleared, provided no other faults are present, the fault buzzer and all relevant fault indicators will clear.

### PSU fault

Illuminates when one or more of the following has occurred:

- 1) The battery fuse has blown.
  - 2) The battery supply voltage is too low.
  - 3) The battery charging circuitry is faulty.
  - 4) The switch mode power supply is faulty.
  - 5) The 24V output on the main PCB is shorted or overloaded.
- See also section 1.1 on page 27.

### Mains fault

Illuminates when the mains has failed or the primary mains fuse has blown. Note that when this light is lit the system will only operate for the standby period dictated by the size of the backup batteries fitted and to conserve battery life, BGM and public address paging is suppressed.

### System fault

Illuminates when one or more of the following has occurred:

- 1) The microprocessor has reset.
  - 2) The main PCB is faulty.
- These types of fault can only be cleared by pressing the Reset button (SW2) on the indicator PCB inside the panel. If the fault reoccurs the Main PCB may be faulty. See also section 1.2, page 28

### General fault

Flashes when there is a fault on any part of the voice alarm system. This light is always lit in tandem with at least one other fault light which will convey more precise information on the type of fault detected.

### Slave fault (this indicator does not appear on slave AVACs)

Illuminates when one or more of the following has occurred:

- 1) There is a fault on any (optional) slave(s) that are connected to the master - refer to the slave(s) for more precise details of the fault.
- 2) There is an open or short circuit fault on the slave wiring.

### Microphone fault (on master AVACs)

Illuminates when one or more of the following has occurred:

- 1) The emergency microphone is faulty
- 2) There is an open or short circuit fault on the fire mic. wiring
- 3) The master fire mic. link (PLK2) is not fitted at the last AVAC to which it is connected.

### Master fault (on slave AVACs)

Illuminates when one or more of the following has occurred:

- 1) The master AVAC is faulty
- 2) There is an open or short circuit fault on the master to slave wiring
- 3) The master fire mic. link (PLK2) is not fitted at the last slave AVAC in the master to slave chain.

### Message fault (this indicator does not appear on slave AVACs)

Illuminates when there is a problem with the digital message store. Check that the Digital Message Store PCB is plugged in correctly. If it is and the fault message reoccurs the PCB may be faulty.

### Speaker fault A Speaker fault B

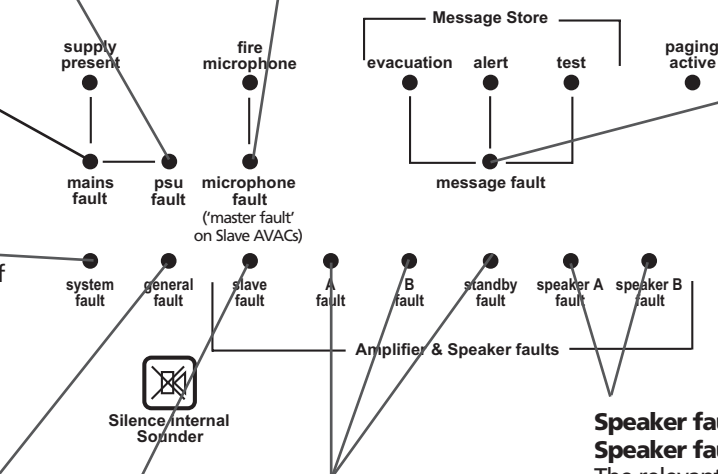
The relevant speaker fault indicator illuminates when one or more of the following has occurred:

- 1) There is an open or short circuit fault on a speaker circuit.
- 2) The speaker circuit's end of line device is missing.
- 3) There is a speaker earth fault. To ascertain if there is an earth fault, open the AVAC and check to see if either of the speaker earth fault lights on the Main PCB inside the panel are lit. If they are not, the fault is an open or short circuit.



Have you calibrated the speaker circuits (see page 16)? Failure to do so could also lead to speaker circuit faults

Refer also to section 1.3 on page 28.



## 1.1 Power Supply / Mains Faults

A power supply/mains fault is indicative of one or more of the following faults.

### **The mains supply is too low or has failed completely.**

Symptoms: AVAC runs on batteries, but not on mains. The red 'Hazardous Voltages Present' light on the Power Supply PCB may be lit (if Mains has failed the LED will be off) .

#### **Suggested action:**

- (a) Isolate the mains supply and probe the live and neutral connections with a multimeter.
- (b) Taking all due precautions, re-apply the mains and measure the voltage.
- (c) Isolate the mains supply again.

If the reading is incorrect (see Technical Specifications at the back of this manual) repair the mains supply. If the reading is correct, check to see if the primary mains fuse (F1) is ruptured. If the fuse is intact and the red hazardous voltages present light on the Power Supply PCB is lit, then the PSU is faulty and should be replaced.

### **The primary mains fuse (F1) is ruptured.**

Symptoms: AVAC runs on batteries, but not on mains. The red 'Hazardous Voltages Present' light on the Power Supply PCB is off.

#### **Suggested action:**

- (a) Isolate the mains supply and check the PSU's primary mains fuse (F1) for continuity.
- (b) If the fuse is ruptured it will be due to an excessive mains surge or a PSU fault. Check the components on the PSU for damage. If none is found replace the fuse with the correct type and reconnect the mains supply. If the red 'Hazardous Voltages Present' light does not come on then the PSU is faulty and should be replaced.

### **The battery fuse (F2) is ruptured.**

Symptoms: AVAC runs on mains, but not on batteries.

#### **Suggested action:**

- (a) Isolate the mains supply and disconnect the batteries.
- (b) Check the Battery Fuse (F2) on the Power Supply PCB for continuity.
- (c) If the fuse is ruptured check the Power Supply PCB and Main Control PCB for signs of damage. If none is found, replace the fuse with the correct type, ensuring that the fuse clip is not damaged when re-inserting the fuse.
- (d) Refit the Main PCB and reconnect the batteries.

If the green 'Supply Present' light is lit, reconnect the mains supply and check that the power supply fault has cleared. If the 'Supply Present' light is not lit, either the Power Supply PCB or the Main PCB is faulty and should be replaced.

- (e) If the Battery Fuse (F2) is intact, proceed to check the battery voltage (see below).

### **The battery voltage is too low.**

Symptoms: AVAC runs on mains, but may or may not run on batteries.

If the mains supply has failed and the battery supply has been discharged to the point where the voltage is too low (i.e less than 21 V), AVAC will automatically turn off to avoid damaging the batteries by allowing them to deep discharge. AVAC will not restart unless fresh, fully charged batteries are connected, or the mains supply is restored.

If the mains supply has not failed, but the total battery voltage is less than 21 V, the PSU will not charge the batteries to avoid damage to the charging circuit. If the battery terminal voltage is greater than 21 V, the batteries can be charged but AVAC will continue to show a power supply fault until they have sufficient charge, at which point the power supply fault will automatically be cleared. Depending on battery size and the depth of discharge, this may take several hours. If the batteries are in poor condition they must be replaced.

Please note that the charging circuit is set up during manufacturing, and is temperature compensated. There is no need to adjust the voltage.

If the batteries are in good condition and all the other checks have been performed and no faults found, the Power Supply PCB is faulty and should be replaced.

NB: batteries that are not connected, connected in reverse or with opposite polarities will also cause a power supply fault condition.

### Supply Present light not lit

If the 'Supply Present' light is not lit one of the following faults has occurred:

(1) Both the mains supply and the standby batteries have failed. This could be because the mains supply has failed and the batteries have been exhausted.

Suggested action: Restore the mains supply and the 'Supply Present' light should come back on. However, if the batteries are discharged this will be recognised as a fault and indicated as such. See "Battery voltage too low" above.

(2) The Power Supply PCB, the Main PCB and/or the cable that connects them is faulty.

If the mains supply is present (indicated by the red hazardous voltages light being lit on the Power Supply PCB), check that the connector cable between the Power Supply PCB and the Main Control PCB is fully inserted at both ends. If so, either the Power Supply PCB and/or the Main Control PCB and/or the connector cable are faulty and should be replaced.

### 1.2 System Faults

System faults are unique in that they do not automatically clear when rectified.

Suggested action: Press the Reset button on the indicator PCB (located inside the panel). This should clear the fault. If the fault persists, the Main PCB is faulty and must be replaced.

### 1.3 Amplifier/loudspeaker faults:-

#### **The AVAC shows a loudspeaker/amplifier fault after calibration or Adding or removing an End of Line Device (EOLD) is not detected.**

Suggested action:- Before starting these tests please ensure that you have a record of the number, type, location and tapping of each loudspeaker on each circuit. The form on page 29 can be photocopied and used for this

Check whether the fault is with the AVAC, EOLD(s) or in the wiring

Remove the loudspeaker wiring and connect the EOLD(s) at the AVAC. Press and hold calibrate until the light flashes quickly.

If the fault does not clear, check whether the fault is with the EOLDS or the AVAC by swapping the EOLDS and recalibrating.

If it is an EOLD or the AVAC, contact your supplier for assistance.

If the fault lies with the external wiring there may be several causes.

First refit the EOLDS at the end of line

(1) The Loudspeaker circuit may be overloaded

The absolute maximum loading for each amplifier module is 60 watts (not less than 167 ohms) at 1 KHz. If this is exceeded, the amplifier will shut down as announcements are made or audio is played. As the signal varies in loudness, the amplifier may operate intermittently.

The most common installation error is to leave loudspeakers tapped as supplied, which is normally the maximum load setting.

For example, a typical office environment may require 6 W ceiling loudspeakers to be tapped at 1.5 W each. A maximum of 40 x 1.5 W loudspeakers can be connected to one 60 W amplifier circuit (although we recommend you allow 20% spare capacity on each loudspeaker circuit). If the speakers are tapped at 6 W, the load will be 240 W and the amplifier will shut down and may fail.

To identify this problem, use an impedance meter to measure the line impedance; which should be no less than 167 ohms at 1 kHz or use an audio load meter to measure the load directly; it must not be more than 60 watts. See page 15 to calculate power from impedance.

If it is more than 60 watts (less than 167 ohms), the load must be reduced by removing loudspeakers or lowering the tapings of some loudspeakers.

(2) If the fault is intermittent or the loudspeakers cut out intermittently, one or more input sources may be set too high.

If this problem only occurs rarely, it is likely to be related to an audio source that is seldom used. Try each of the sources in turn to see if the problem occurs.

Unplug all input sources. Press the reset button. If the fault clears, this indicates that one of the inputs is overdriving the unit.

Re-attach the inputs one at a time and set the audio working. If the fault recurs, lower the level on that input

The remaining faults can be difficult to find so at this point it is best to check which loudspeakers are working and whether you think they are tapped correctly. continues >>>

Connect a pink noise (hiss) generator such as a PNGN across the audio + and – pins of the

BGM (background music) input.

Adjust the BGM input level so that it can be heard but is not annoying. If it is too loud, the amplifier will cut off intermittently.

Walk the circuit listening to each loudspeaker in turn and assessing whether it is working and if it is set to the correct level.

(3) There may be one or more bad connections on the loudspeaker circuit.

A loudspeaker may be off, intermittent or crackly

A loose contact/wire adds impedance to the circuit causing the EOL to be less effective.

(4) One or more loudspeakers may be mis-connected

A loudspeaker may appear to be connected but it doesn't work

100 volt loudspeakers have transformers with tapings and it is possible to connect them incorrectly. When the circuit is tested with an impedance meter, the reading is more than 167 ohms, which appears to be acceptable, but the load monitoring system will still detect the problem.

Apply the rule of halves.

Remove the end of line, split the circuit at the middle, connect the EOLD and attempt to recalibrate. If it does not recalibrate, split the line in half again and repeat. If it does recalibrate reconnect the line and split again at the three-quarter point.

Continue until the mis-connected loudspeaker is identified.

(5) One or more of the loudspeakers may be damaged or faulty

As section (4), look for uninsulated cores, water damage and physical damage.

### **Earth faults**

Earth fault indications only apply to loudspeaker circuits and are indicated on the front of the AVAC as speaker faults. (Note that the Speaker Fault A and Speaker Fault B indicators will also illuminate for open and/or short circuit faults). To ascertain if there is an earth fault, open the AVAC and check to see if the Speaker Earth Fault A or B indicators on the main PCB are lit.

### **Amplifier faults occur on the system but when reset they do not reoccur for some considerable time.**

An audio input which is not currently running may be set incorrectly, intermittently overdriving the amplifiers. See section (2) above.

If paging is installed has there been any feedback? Check for loudspeakers near telephones or microphones and move the equipment further apart.

The load may be changing due to bad connections – see section (4) above.

### **The emergency mic shows a fault.**

The last Master AVAC panel connected to the emergency microphone should have its Master/Phantom PLK2 link fitted. Check that no Local Fault links are fitted on any Master AVACs

The emergency mic that has been used is not compatible – you must use the VA405.

There is no emergency mic fitted and the EOL resistor has been omitted - see page 19.

### **Connecting some input sources causes noise.**

Use volt free switch contacts on the paging input.

Avoid multiple screen and multiple 0 V connections as circulating currents cause excessive noise. If a source is unbalanced and connected to signal + or - and 0 V try connecting across signal + and Signal - inputs instead.

### **Master to slave faults**

Are all AVAC masters and slaves Rev 4? If not, contact your distributor/technical support for advice.

Ensure all PLK2 Local Fault links are removed from Slave AVACs before calibration takes place and that the links are refitted AFTER calibration.

Is the PLK2 Master/Phantom link fitted at the last slave AVAC?

## APPENDIX 1

### Loudspeaker record sheet

This form is provided for you to record the number, type, location and tapping of each loudspeaker on the AVAC's circuits. On heavily populated systems you may wish to make multiple photocopies of this page before using it.

SPEAKER TYPE	LOUDSPEAKER LOCATION	SPEAKER TAPPING	AVAC LOCATION	AVAC CIRCUIT	ADDITIONAL COMMENTS

## APPENDIX 2

### **AVAC master / slave record sheet**

An AVAC master / slave record sheet (DAU0000407) is provided in the accessory pack supplied. We strongly recommend the relevant side of this sheet (master or slave) is completed by the engineer for future reference. Should you experience any technical problems with AVAC our technical department will require information from this sheet in order to assist you.

## TECHNICAL SPECIFICATION

### POWER SUPPLY AND CHARGER

AC input	.230 V a.c +/- 10% 50/60 Hz
Internal power supply	.27 V d.c. Nominal
Max continuous output current limited to	.5A @ 230 V a.c. (derate by 500 mA if batteries are charging)
Pulse peak output current limited to	.7A @ 230 V a.c.
Supply & battery charger monitored for failure	.YES (battery charger is also temperature compensated)
Batteries monitored for disconnection and failure	.YES
Batteries protected against deep discharge	.YES (Deep discharge cut off approx. 21 Volts)
Battery size and type	.2 x 12 V 7 AHr VRLA connected in series
Mains fuse	.240 V 1 A HRC ceramic 20 mm - compliant with IEC (EN60127 Pt2)
Battery fuse	.5 A F 20 mm - compliant with IEC (EN60127 Pt2)
Max Battery Charge current	.0.5 A

### INPUTS

Input level for 100 V RMS (1 kHz tone) with gain adjust set to Max. sensitivity	
BGM	.230 mV RMS
BGM with link	.2.3 V RMS
Page	.230 mV RMS
Page with link	.2.3 V RMS
Fire Mic input	.230 mV RMS
Page PTT Volt Free contacts non triggered state	.Open circuit
Page PTT Volt Free contacts triggered state	.Closed circuit
Fire Mic PTT non triggered state	.6K8
Fire Mic PTT triggered state	.1K in parallel with 6K8
Manual inputs M1,M2,M3,RES	.12 V 1mA to 25 V 2.5 mA (optically isolated)

### OUTPUTS

Max Output AUX 24 V (Master only)	.100 mA
Max Output Fire Mic 24 V	.100 mA
Max Speaker Output	.100 V 0.6 A RMS (60 W) x 2
Output power	.2 x 60 W continuous average power
Frequency response at 30 W load / line driven from the Fire Mic	.152 Hz to 12 kHz
Fault output relay single pole changeover	.1A 30 V

### BATTERY CALCULATIONS

Average standby current at full load	.97 mA
Average alarm current at full load (audio on Fire Mic)	.1.2 A
<i>AUX and Fire Mics will add to the current drain requirements</i>	

Loudspeaker Monitoring Tone .20 kHz

Frequency response .220 Hz to 6.2 kHz on Page and BGM.