



**PAM1-3G8**  
**AUDIO MONITORING**  
**UNIT**

**Handbook – Version 7**



**TSL**  
**Vanwall Road, Maidenhead, Berkshire, SL6 4UB**  
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## SAFETY

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### **Installation.**

Unless otherwise stated TSL equipment may be installed at any angle or position within an operating temperature range of 5° - 30°C.

All TSL equipment conforms to the EC Low Voltage Directive:

EC Low Voltage Directive (73/23/EEC)(OJ L76 26.3.73)(LVD). Amendment: (93/68/EEC) (OJ L220 30.8.93).
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In all cases the frame of the equipment must be earthed on installation.

Where appropriate, the earth pin on the IEC mains inlet connector is connected to the metal frame of the equipment, to 0 volts on the internal DC PSU and to signal ground unless otherwise stated. All metal panels are bonded together.

Check that the voltage selector setting (if fitted) and the fuse rating is correct for the local mains supply.

Due consideration for cooling requirements must be given when mounting the equipment. It is recommended that a 1RU of rack space, or a vent panel, should be left above and below the unit.

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## WARRANTY, MAINTENANCE AND REPAIR

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- All TSL product has a one year warranty period starting from the date it leaves the factory.
  - A repair warranty is to apply. That is, the product is to be returned for repair with no replacement and an exchange shipping policy is also to apply.
  - TSL offers a seven day DOA policy together with an exchange shipping policy. That is, if a product has been declared 'dead on arrival' within a seven day period a warranty replacement will be shipped.
  - A temporary replacement may be available where, for operational reasons, it is imperative that service is continued. The customer will be asked to enter into a 'loan agreement' for the duration of repair.
  - All faulty equipment returned to TSL for repair will, where possible, be returned to the customer within seven working days.

### **TSL Returns Procedure**

Please telephone +44 (0)1628 676200 (Fax: +44 (0)1682 676299) and ask for Customer Support, detailing the model and serial number of the equipment, who will provide a Returns Number. This will enable us to track the unit effectively and will provide some information prior to the unit arriving.

For each item, this unique Returns Number must be included with the Fault Report sent with the unit.

A contact name and telephone number are also required with the Fault Report sent with the unit.

#### **Fault report details required.**

- Company:
- Name:
- Address:
- Contact Name:
- Telephone number:
- Fax number:
- Email address:
- Returns Number:
- Symptoms of the fault (to include switch setting positions, input signals etc):

#### **Packing**

Please ensure that the unit is well packed as all mechanical damage is chargeable. TSL recommends that you insure your equipment for transit damage.

The original packaging, when available, should always be used when returning equipment.

**If returned equipment is received in a damaged condition, the damage should be reported both to TSL and the carrier immediately.**



**EC DECLARATION OF CONFORMITY**

Application of Council Directives Nos:  
EC Low Voltage Directive (73/23/EEC)(OJ L76 26.3.73)(LVD).  
Amendment: (93/68/EEC) (OJ L220 30.8.93).  
Conformity Standards Declared:  
EN 60950  
EMC Directive: 89/336/EEC, Amended 92/31/EEC.  
Conformity Standards Declared:  
EN 50081-1: 1992- EMC- Generic Emissions, Part 1.  
EN50082-1: 1997- EMC- Generic Immunity, Part 1.  
EN61000-3-2:1995- Current Harmonic Emissions.  
EN61000-3-3:1995- Voltage Fluctuations & Flicker.

Manufacturer's Name: TSL  
Manufacturer's Address: Vanwall Road  
Maidenhead SL6 4UB  
England  
United Kingdom

Type of Equipment: Audio Monitoring Unit

Model No: PAM1-3G8

Date CE Mark Affixed: 26/01/09

I, the undersigned, declare that the equipment specified above conforms to the quoted Directives and Standards.

Place: Maidenhead, England

Signature: \_\_\_\_\_

Date: 26/01/2009

Print: M Dyster

Position: PRODUCT MANAGER

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## 1.0 Introduction

The PAM1-3G8 is a 1RU x 320mm deep Audio Monitoring Unit with two OLED displays for audio level measurement and metadata status indication.

The following features are standard:

- Dual auto-sensing, 1080p (60, 59, 94 and 50Hz), HD/SDI video inputs
- De-embedded audio monitoring from video (HD/SDI) with intuitive selection from up to sixteen channels (four groups)
- ITU BS1770/71 loudness indication (**Q2 2010**)
- Dolby E and D decoding from HD.SDI signal sources
- Video confidence monitoring
- Re-clocked HD/SDI with down converted SDI or composite (PAL.NTSC) video outputs selected via rear panel Config. Switch.
- Dual high resolution OLED screens for 8 bargraphs, setup and metadata display.
- Choice of user selectable bargraph scales (BBC PPM, EBU PPM, EBU Digital, Nordic and DIN)
- User programmable presets. 3 by hardware buttons, 4 GPI and 12 internal, accessible by high level menu selection
- Fixed or variable analogue multichannel outputs (8 mono)
- Fixed or variable AES multichannel outputs (4pairs)
- Variable stereo analogue outputs
- High quality internal full range loudspeaker system
- Dual 12V DC inputs
- Serial remote control
- Headphone output with LS muting
- Compact, lightweight (3.6 Kg) 1RU case, 320mm deep

The TSL PAM1-3G8 offers the best sound quality and level ever obtained from a 1U box. It does this because the sonic properties have received the same attention to detail as the rest of the unit.

The PAM1-3G8 has a custom-designed woofer of extremely slim construction, despite which it out-performs many drive units built with no such constraint. The large aluminium voice coil and rare earth magnets make the unit relatively efficient and combined with the switched-mode amplifiers a remarkable sound pressure and wide frequency response can be obtained without excessive power dissipation. As a result of the efficiency, traditional techniques such as reflex ports are not needed, and the timing and phase errors these cause are eliminated.

The sound quality could easily be compromised if the enclosure were allowed to resonate. In the PAM1-3G8 the enclosure was designed from the outset to damp unwanted vibrations. Even the grill material was selected for the most transparent sonics. It is the same material that is used to protect many of the world's finest microphones.

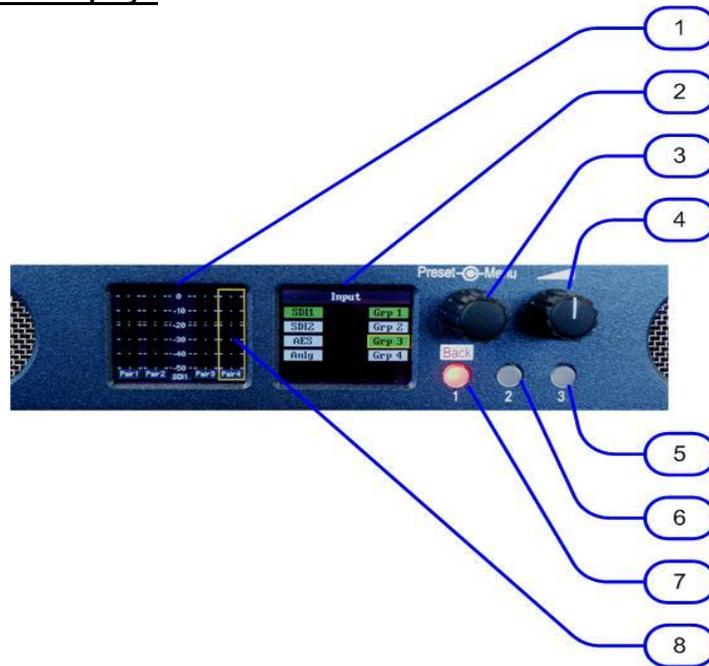
In traditional loudspeakers, the crossover is responsible for a lot of quality loss. A crossover should produce a pair of signals which, if added back together, should recreate the original input. In most loudspeakers, this doesn't happen, whereas in all of TSL's active speakers that performance is standard. In the PAM1-3G8 the crossover is performed in the digital domain and the accuracy obtained contributes to the smooth sound and fatigue-free listening characteristics.

John Watkinson, February 2009

## Operation.

The PAM1-3G8 is designed to be user friendly and intuitive to operate. The menus and functions will be familiar to both users of other TSL multichannel audio monitoring products and those buying a TSL solution for the first time.

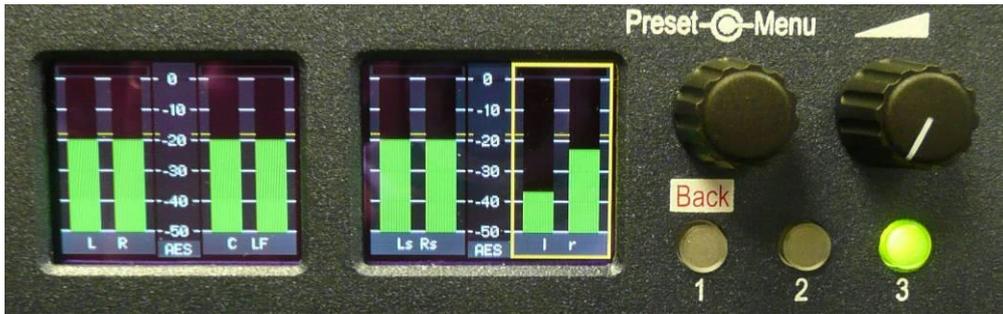
### 2.1 Controls and Displays



1. The left hand OLED screen displays bargraphs 1-4 in **Full-screen** mode and bargraphs 1-8 in **Menu** mode (shown).
2. The right hand OLED screen displays Bargraphs 5-8 in **Full-screen** mode, **Menu**, **Preset** and **Metadata** information in **Menu** mode (shown). The right hand OLED screen also displays the **Video Confidence Window**.
3. The rotary encoder performs multiple functions. Push and rotate activates the '**Scroll to Hear**' monitoring feature. Push and Release enter the **Menu** mode. Rotate is used to recall **Factory** and **User** presets.
4. The loudspeaker volume control varies the level of audio to the internal loudspeakers, external analogue and AES (on D25 connectors when set to **Variable** mode) and headphone socket.
5. **Hotkey** button 3 instantly recalls an assigned **User** or **Factory** preset state.
6. **Hotkey** button 2 instantly recalls an assigned **User** or **Factory** preset state. In **Menu** mode, button 2 is illuminated **green** and is used to activate the **Save to Preset** function.
7. **Hotkey** button 1 instantly recalls an assigned **User** or **Factory** preset state. In **Menu** mode, button 1 is illuminated **red** and is used to scroll **Back** through the **Menu** modes.
8. The bargraphs pertaining to the audio being routed to the internal and external loudspeakers is outlined by the yellow **Hear Box**.

## 2.2 Main Menu

The example below shows PAM1-3G8 in normal dual screen **Metering Mode** listening to the **LtRt Downmix** from a decoded **Dolby Digital** audio bitstream.



Press the **Encoder** to access **Main Menu**. The encoder is then used to highlight and select from the displayed **Menu** options. From any **Menu**, pressing **Hotkey 1** (illuminated red) will exit the current menu page.



The Main Menu screen also displays information about the current selected input signal as shown in the photo above.

### 2.2.1 Dolby E Timing and Rate Information

**From software version X06**, the top level menu of the PAM1-3G8 shows extended information about any **Dolby E** sources. This shows the frame rate of the Dolby E information and its timing relative to a video source where available.

For AES inputs, the frame rate information is displayed as a minimum, eg:  
**Dolby E 20bit 29.97** - or - **Dolby E 16bit 25Hz**

For embedded Dolby E sources, the start line position is displayed, eg:  
**Dolby E 16bit L11**

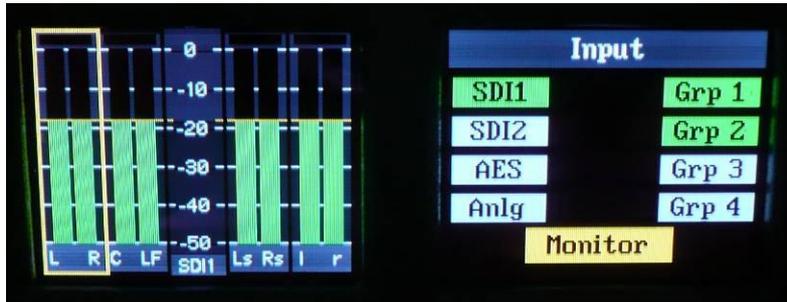
This functionality is also extended to mixed sources. If an AES source is selected for monitoring, whilst a video source is selected with the same frame rate, then the display will give the approximate line position of the AES **Dolby E** start relative to the video. This allows the timing of an AES signal to be checked either before embedding or after extraction (note the embedder / extractor delays need to be accounted for in a system). For sources of different frame rates, the display reverts to the **Dolby E** frame rate. The video frame rate is already displayed on the top level menu.

**Dolby Digital** sources are also identified, although no further information is provided without a decoder.

All of the above functions are available both with and without on-board **Dolby** decoding, providing the source has a correctly formatted **SMPTE 337M** header

## 2.3 Input Selection

By highlighting and selecting the **Input** option, **SDI**, **AES** and **Analogue** inputs can be accessed. A **shortcut** button enables the user to 'jump' to the **Monitor Menu** once the desired input is selected.



### 2.3.1 SDI Input and Video Confidence Window

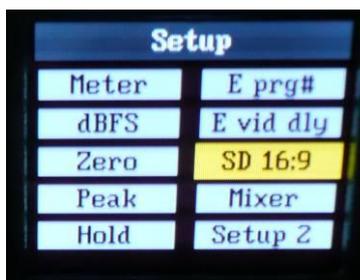
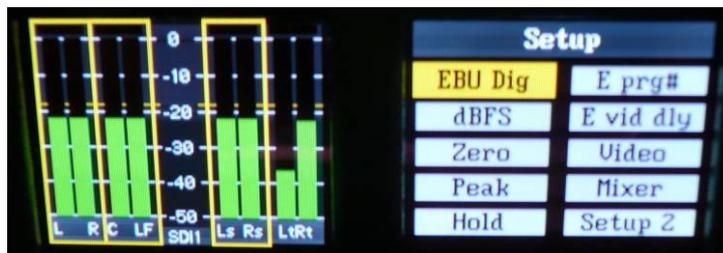
Select either **SDI** Input 1 or 2 and choose which pair of embedded groups is to be decoded and displayed. Default selection is **Group 1** and **Group 2**, by de-selecting a group and then selecting another choice, any pair can be decoded.

**Note:**

If a selected audio pair is encoded with either **Dolby E** or **Dolby Digital**, it will be decoded automatically and the discrete audio stems displayed.

A **Video Confidence Window** may be displayed on the right hand OLED screen. This feature is selected and enabled using the **Setup Menu** as shown on the following screen.

By selecting the **Video** menu option, the select **SDI** video source is displayed on the OLED screen. The **Video** button allows the user to manually select the input video aspect ratio. A **16:9** or **4:3** aspect ratio video output to the OLED screen and **Downconverted** output is selected using the appropriate DIP switch located at the rear of the unit.



Save your **SDI** input selection to a **User Preset** – See the **Using Presets** section of this Handbook.

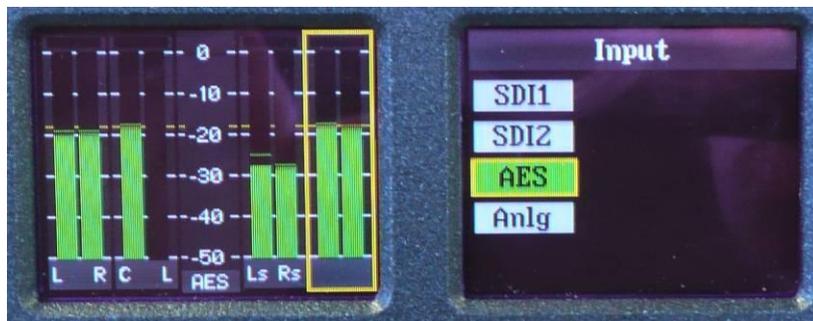
### 2.3.2 AES Inputs

Selecting **AES** simultaneously displays AES inputs 1, 2, 3 and 4.

**Note:**

If a selected audio pair is encoded with either **Dolby E** or **Dolby Digital**, it will be decoded automatically and the discrete audio stems displayed.

**PAM1-3G8** detects the channel coding information of a **Dolby E** or **Dolby Digital** bitstream and identifies the audio stems accordingly (as shown in the example below).



Save your **AES** input selection to a **User Preset** –  
See the **Using Presets** section of this Handbook.

### 2.3.3 Analogue Inputs

Selecting **Anlg** simultaneously displays stereo Analogue inputs 1 and 2

## 2.4 Monitoring and Monitor Menu

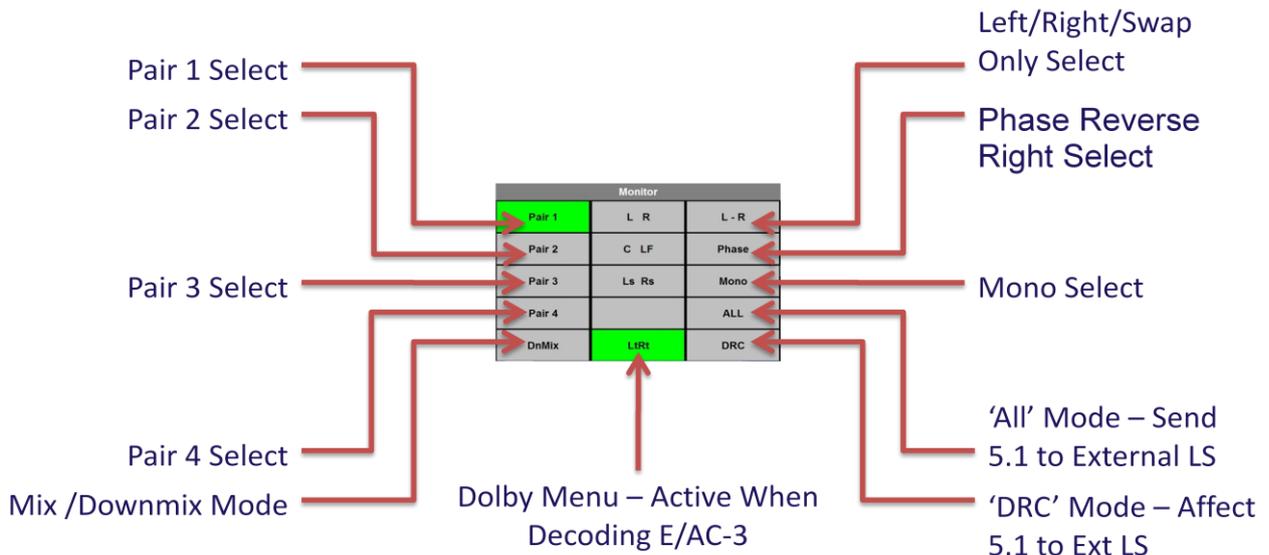
The **Monitor Menu** has been adapted since this Handbook was written and the images used to describe the menu are partially incorrect. The graphic below shows the revised Monitor Menu including adapted features described below.

The Monitor Menu includes a **'Phase Swap'** feature which enables the user to reverse the phase of the right signal of a selected audio pair. In order to accommodate this feature a fundamental change to mono audio selection functions has been implemented.

The former 'Left' button now becomes **"L – R"**. The choice of mode is selected by pushing the encoder and turning giving 'Left', 'Right' and 'Swap' to stereo outputs. The function is enabled when highlighted "green")

The former 'Right' button becomes **'Phase'**. When highlighted (green) this reverses the phase of the selected right audio signal through 180 degrees.

### PAM1-3G8 – Monitor Menu



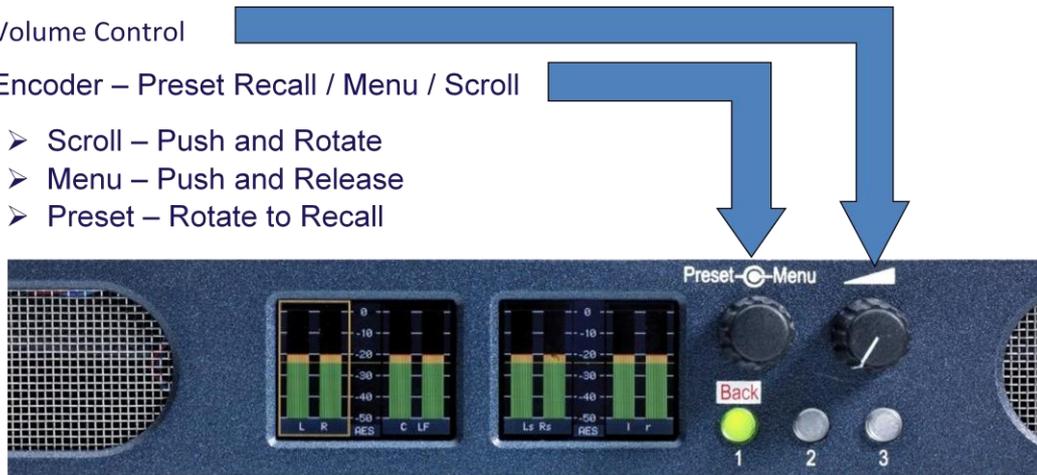
#### 2.4.1 Scroll to Hear

**!** Introduced on PAM1-3G8 from January 2010 via the X06 software release, the **Scroll to Hear** function fundamentally changes the way the navigation encoder works. Within previous versions the encoder was used to select presets and to activate and navigate through the PAM1-3G8 menu structure.

Note that the push and rotate action used to implement the **'Scroll to Hear'** feature is now active within some but not all of the PAM1-3G8 menu pages. Please take time to familiarise yourself with the new look and feel of PAM1-3G8.

The encoder may be used to move the **'Hear Box'** dynamically across the bargraph display without reverting to the monitor menu. The operation is described below.

- Volume Control
- Encoder – Preset Recall / Menu / Scroll
  - Scroll – Push and Rotate
  - Menu – Push and Release
  - Preset – Rotate to Recall



The **Scroll to Hear** function can only be activated when the PAM1-3G8 is operating at a top level view and is inoperative when the menu or metadata screens are active.

### Using ‘Scroll to Hear’ with Dolby encoded audio

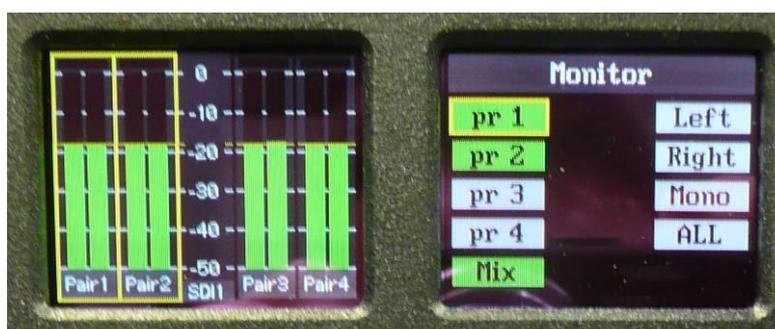
If the source audio pair selected is encoded with a **Dolby E** or **Dolby Digital** then the **PAM1-3G8** will automatically decode the signal and display the component parts of the **Dolby** signal as soon as the encoder is released. The individual components (as pairs) of the **Dolby** signal can then be selected using the ‘**Scroll to Hear**’ function and if the ‘**Hear Box**’ is scrolled to the right of the bargraph display, then an **Lt Rt** or **Lo Ro Downmix** will be automatically selected and represented on bargraph pair 4.

To deactivate the **Dolby** encoded screen, simply push and hold the rotary encoder for more than one second without turning it and the display will revert to display the associated top level or non decoded audio signals associated with the currently selected input type.

By highlighting and selecting the **Monitor** option from the **Main Menu**, bargraph pairs, multiple audio stems and downmixes may be routed to the internal and external loudspeakers.

### 2.4.2 Mono and Stereo Monitoring (Non Dolby or Discrete Multichannel)

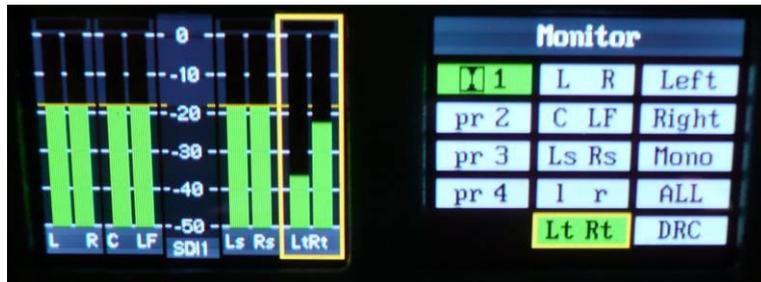
Individual bargraph pairs can be selected from the **Monitor Menu** as shown below. The Yellow **Hear Box** denotes which audio pair is routed to the internal loudspeakers and headphone socket. **Left/Right/Mono** options can be chosen so that individual stems can be isolated or mixed (shown).



### 2.4.3 Dolby E or Dolby Digital Monitoring

When a **Dolby E** or **Dolby Digital** encoded audio pair is selected, **PAM1-3G8** will automatically decode the signal into its component parts and name the stems according to the Channel Coding information carried within the **Metadata**. The **Monitor Menu** screen changes dynamically to reflect the selection of a **Dolby** encoded source and the **Monitor** buttons now include options pertinent to the **Dolby** signal (see below).

A **Dolby Lt/Rt** (or **Lo/Ro** if selected via the rear panel DIP switch) option appears and when selected, a **Dolby Downmix** is derived by **PAM1-3G8** and routed to the loudspeakers. The **Lt/Rt** (or **Lo/Ro**) level is displayed on the 4<sup>th</sup> bargraph pair (see below).



**Dolby** monitoring modes allow the user to select to hear individual audio pairs and stems. The example in the screenshot below shows how to 'solo' the **Centre Channel** and listen to it through the internal or external loudspeakers.

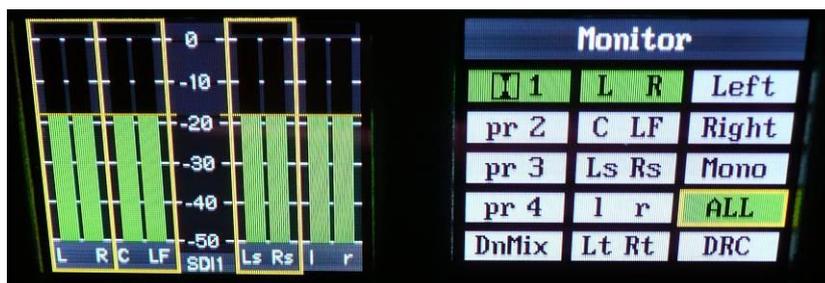
#### Monitoring using external loudspeakers

De-embedded or decoded multichannel audio (Dolby or discrete PCM) is automatically routed to the AES and analogue outputs connectors. The rear panel located **DIP Switch** includes a selection to mute internal loudspeakers and to set AES and analogue outputs to variable level (adjusted by the volume control).

Stereo or 5.1 external loudspeakers can be connected (see the application diagram below).

#### Dolby E and Dolby Digital

The Dolby monitoring menu includes options called **ALL** and **DRC**. When used with a 5.1 loudspeaker monitoring system **ALL** routes the decoded 5.1 audio to the multichannel outputs. In **DRC** mode, the Dolby decoded 5.1 output is affected by Dolby DRC metadata and adjusted accordingly. If the monitoring mode is switched away from **ALL** or **DRC** then the **Centre, Lfe, Ls** and **Rs** speaker channels are muted and only the **Left** and **Right** channels are active. The **5.1** monitoring selections enable a user to 'solo' individual surround sound signals to check the integrity of the audio mix.

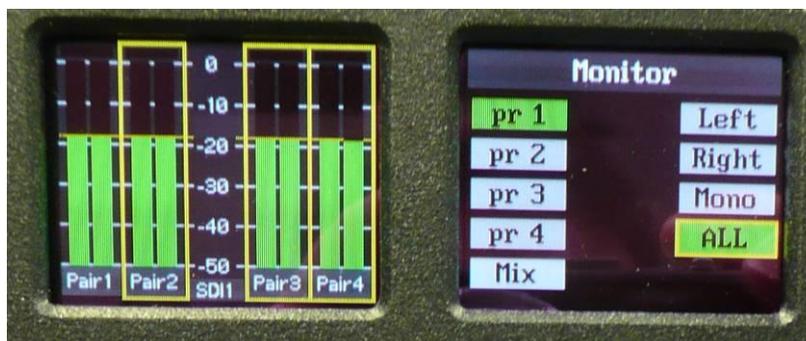


### Discrete PCM 5.1

The non-Dolby monitoring menu also includes an **ALL** option. By selecting **ALL** the operator can select the group of 6 audios from 2 groups which corresponds to the 5.1 audio signal. Once a 5.1 group has been defined, the 5.1 audio stems are routed to the external speaker outputs in the correct **SMPTE** order (L,R,C,Lfe,Ls,Rs). Monitoring selection options now function similarly to those within the Dolby Menu and include an **ITU775 Downmix** option similar to the **LtRt** mode.



By pressing **ALL** for a second time (illustrated below), the yellow **HEAR** box shifts to highlight an alternative group of 6 audio stems. This function ensures that an embedded discrete **5.1** signal can be monitored regardless of the location of the 5.1 stems. The user can store different settings for monitoring discrete 5.1 audio in their **User Presets**.



The **Downmix** listening mode is also useful when using the internal loudspeakers to monitor discrete 5.1 audio channels.

## 2.4.4 Internal and External Monitoring Modes

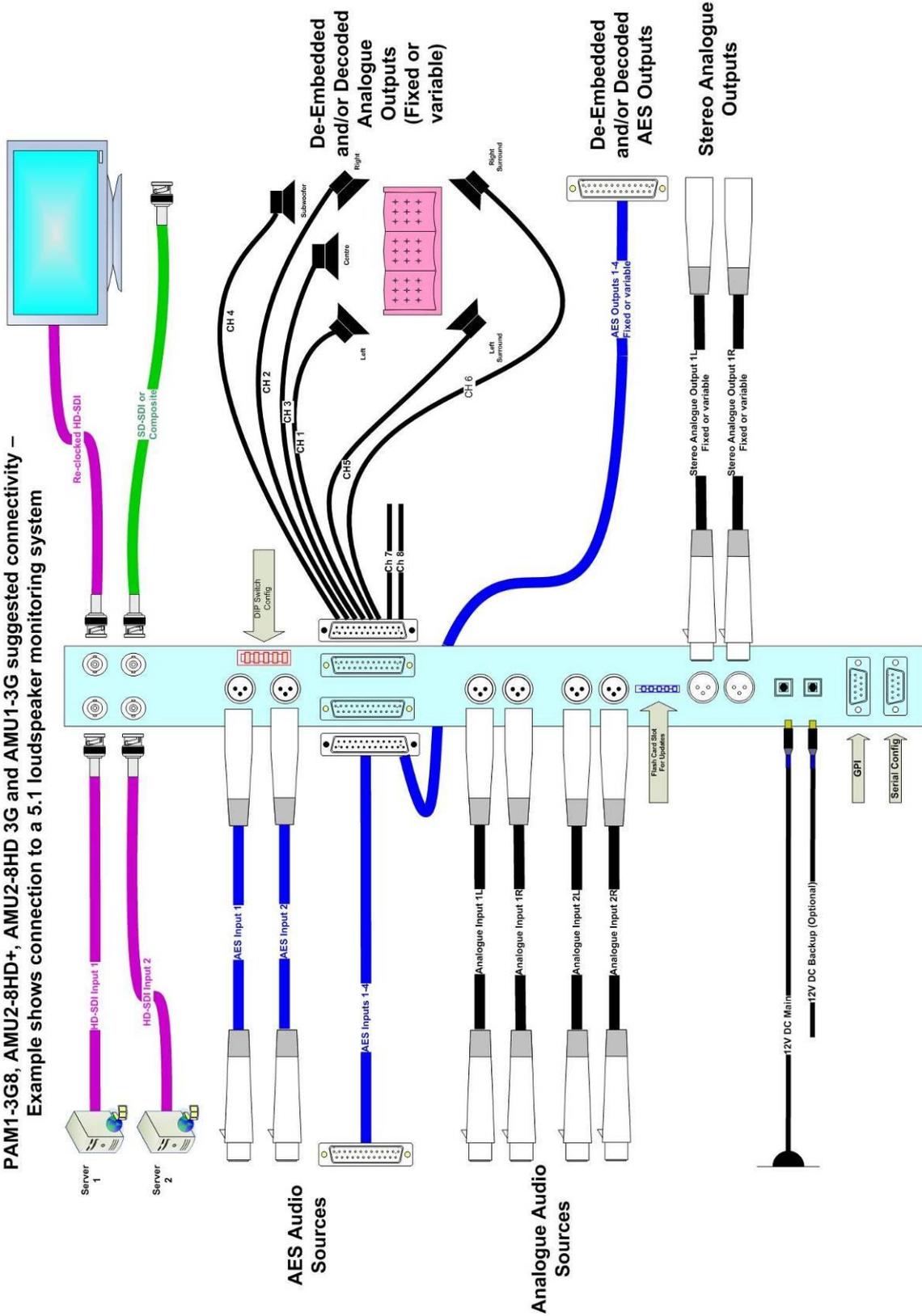
The table below indicates the various monitoring modes available to PAM1-3G8 users and the audio signals presented to internal loudspeakers and external connectors when each mode is selected.

Monitoring Mode	Dolby Encoded Audio				Discrete Audio			
	Internal LS	Ext Fixed - D25 (Int LS On)	Ext Fixed - D25 (Int LS Off)	External Variable	Internal LS	Ext Fixed - D25 (Int LS On)	Ext Fixed - D25 (Int LS Off)	External Variable
All	Muted	Full	Full	Full	Muted	Full	Full	Full
DRC	Muted	Full	Full	Full	Muted	Full	Full	Full
Lt Rt	Lt Rt	Full	Lt Rt (1st pair only) 2-4 muted	Lt Rt (1st pair only) 2-4 muted	N/A	N/A	N/A	N/A
Lo Ro	Lo Ro	Full	Lo Ro (1st pair only) 2-4 muted	Lo Ro (1st pair only) 2-4 muted	N/A	N/A	N/A	N/A
DMix	DMix	Full	DMix (1st pair only) 2-4 muted	DMix (1st pair only) 2-4 muted	DMix	Full	DMix (1st pair only) 2-4 muted	DMix (1st pair only) 2-4 muted
* Individual	Individual	Full	Indiv. (1st pair only) 2-4 muted	Indiv. (1st pair only) 2-4 muted	Individual	Full	Indiv. (1st pair only) 2-4 muted	Indiv. (1st pair only) 2-4 muted

\* **Individual** refers to single, paired or multiple audio channels selected from the monitoring menu.

See 5.1 Loudspeaker Application Diagram on following page

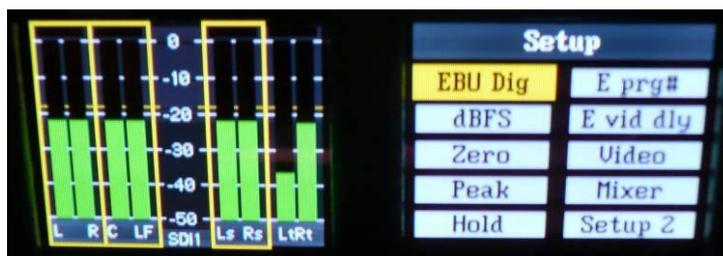
**PAM1-3G8, AMU2-8HD+, AMU2-8HD 3G and AMU1-3G suggested connectivity –  
Example shows connection to a 5.1 loudspeaker monitoring system**



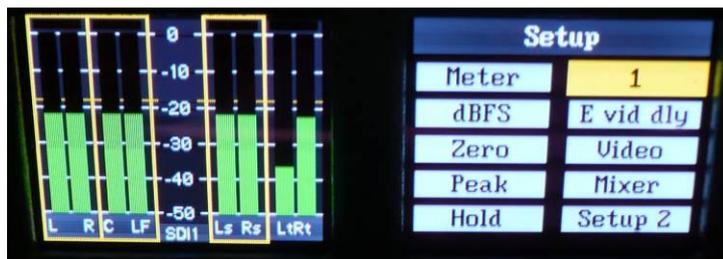
## 2.5 Metadata Menu

Primarily for use with **Dolby E** and **Dolby Digital** encoded audio signals, the **Metadata Menu** accesses a user selectable group of 7 Dolby Metadata parameters. By highlighting and selecting any of the 7 options, the user can use the encoder to scroll through a list of 25 commonly used Metadata settings for **Dolby E** and **Dolby Digital** audio and create their own Metadata monitoring view.

**Dolby E** signals might consist of up to 8 separate programmes (ie: 5.1+2 contains 2 programmes, 2+2+2+2 contains 4 programmes etc) and each programme may be configured with different Metadata parameters. The **Setup Menu** allows the user to select which programme the Metadata is read from. The screen below shows the **E prg#** selection on the Setup window. By selecting **E prg#** the user may scroll through **Dolby E** programme numbers 1 to 8 and select the appropriate programme number. This setting may be saved as part of a user preset.

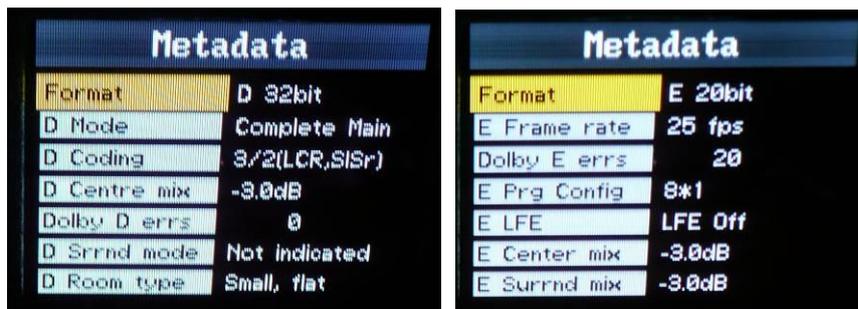


The example below shows the selection of Dolby E PGM 1 as the default for the Metadata screen associated with the selected 5.1 audio signal.



The examples below show Metadata displays configured to monitor Dolby Digital and Dolby E respectively.

**Metadata** screens can be customised and stored as **User Presets**.

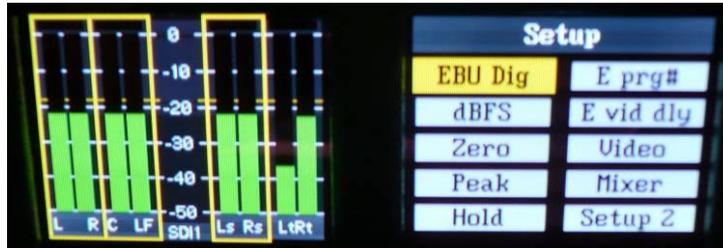


## 2.6 Setup Menu 1 and 2

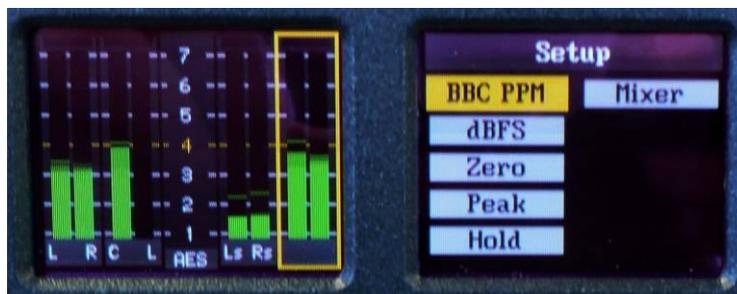
**Setup Menu 1** includes options for different **Scales**, **Reference Levels**, **Peak Hold**, **Dolby E programme**, **Dolby E Video compensation delay**, **Video Window**, **Mix mode select** and **Bargraph Styles**. By highlighting and selecting a parameter, the user can scroll through the available options and tailor PAM1-3G8 for their particular application.

### 2.6.1 Bargraph Settings

The bargraph example below shows a selected **EBU Digital** scale with **-18dBFS** reference level, **Peak Hold** is 'on'.



The example below shows the previous **EBU Digital** bargraph scale changed to display a **BBC PPM** bargraph.



The **dBFS** parameter can be used to alter the 0dB reference level from between -12 and -24 dBFS. The **Zero** parameter selects the offset level between the **Zero dBFS** setting and the onset of **Peak** indication (the point where the bargraph changes colour to red).

When set to **Block** mode, the **Peak** parameter enables the user to choose to illuminate the indication between zero **dBFS** and the peak level in yellow.

The **Hold** parameter activates a peak hold indication when switched on.

### 2.6.2 Dolby E Programme No.

The function of the **Dolby E Programme Number** selector is described in **Section 2.5**

### 2.6.3 Dolby E Video Delay

The **PAM1-3G8** features a **1 frame (40 ms) video delay** setting which can be inserted into the **Downconverted** video display to compensate for the latency caused by decoding a **Dolby E** signal. If selected and activated, the delay will be switched into the video signal path automatically when a **Dolby E** input signal is detected and decoded. The **Video Confidence** window on **PAM1-3G8** will be subject to a **1 frame delay** when the video delay mode is active.

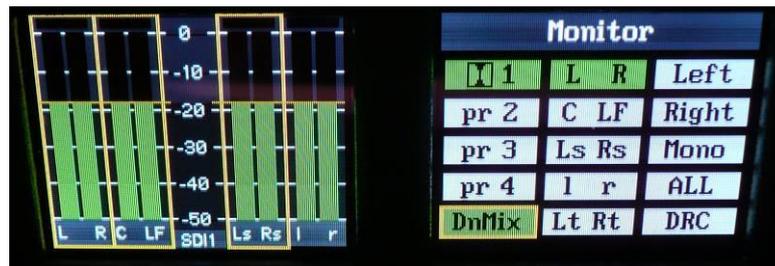
## 2.6.4 Video Confidence Monitor

The function of the **Video Confidence Monitor** selector is described in **Section 2.3.1**

## 2.6.5 Mixer / Downmix Mode Selector

When monitoring **Dolby** encoded or discrete surround sound audio, it is often desirable to listen to a **Downmix** (stereo fold down) of the multichannel signal. The **Mixer / Downmix Mode Selector** activates an **ITU-R BS.775-1** Downmix algorithm. The **Downmix** function is then made available on the **Monitor Menu** page for both **Dolby** and discrete applications. Where a **Dolby** encoded signal exists, the Downmix feature offers an alternative to the **Dolby Lt Rt** and **Lo Ro** fold down. In the case of a **discrete** 5.1 signal, the **Downmix** feature can be 'toggled' between the audio pairs 1/2/3 and pairs 2/3/4 giving complete flexibility when monitoring embedded signals with multiple audio 'programmes'.

In the example below, a **Dolby E** signal is **Downmixed** using the **ITU-R BS.775-1** algorithm instead of **Dolby Lt Rt**.

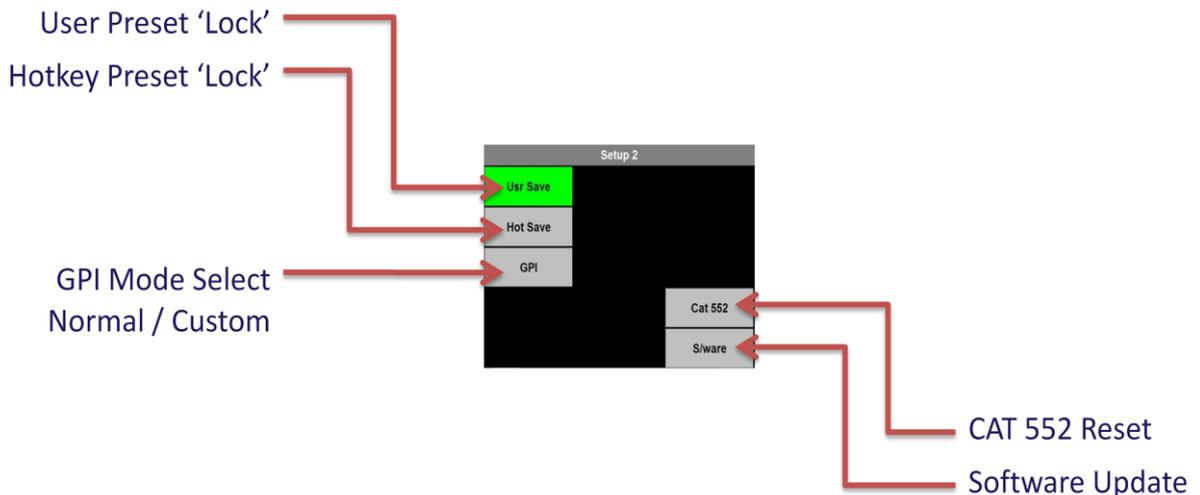


## 2.6.6 Setup Menu 2

**Setup Menu 2** is used to access the system software page described in **Section 2.8** and also to enable a supervisory user to lock **User** and **Hotkey** presets (see **Section 2.7.4**)

**From software version X06 onwards**, Setup 2 also provides access to **GPI** modes as described.

## PAM1-3G8 – Setup Menu 2



## 2.7 Preset Memories

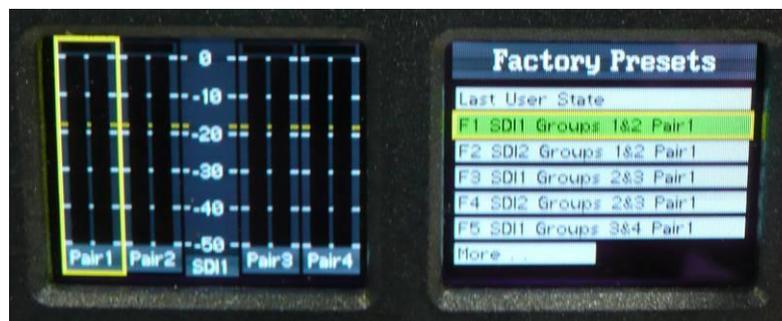
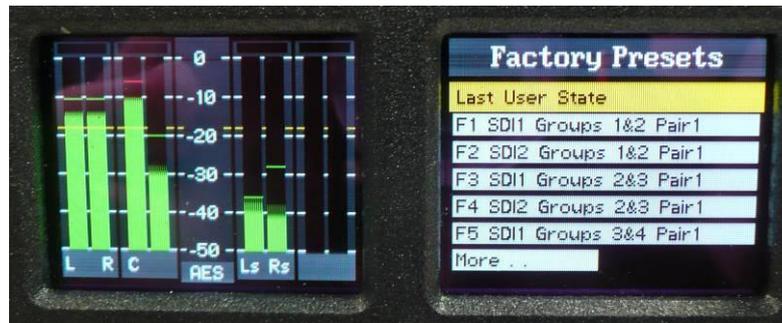
**PAM1-3G8** features **12 Factory** and **12 User** Programmable Presets, plus **3 Hotkey** buttons for fast save and instant recall of favourite settings.

### 2.7.1 Factory Presets

Rotating the **Encoder** counter-clockwise activates the **Factory Preset** window in the right hand OLED screen. Highlight and select a preset, **PAM1-3G8** will revert to **Full Screen** mode displaying the selected audio from the preset list shown below.

1. Last User State
2. HD/SDI Input 1, Group 1 (and 2) Pair 1
3. HD/SDI Input 2, Group 1 (and 2) Pair 1
4. HD/SDI Input 1, Group 2 (and 3) Pair 1
5. HD/SDI Input 2, Group 2 (and 3) Pair 1
6. HD/SDI Input 1, Group 3 (and 4) Pair 1
7. HD/SDI Input 2, Group 3 (and 4) Pair 1
8. HD/SDI Input 1, Group 1 (and 2) Pair 2
9. HD/SDI Input 2, Group 1 (and 2) Pair 2
10. HD/SDI Input 1, Group 2 (and 3) Pair 2
11. HD/SDI Input 2, Group 2 (and 3) Pair 2
12. AES Input

The picture below shows the **Factory Preset** list followed by the selection of **Factory Preset 1**



**Factory Presets** default to listening to Pair 1.  Edit a **Factory Preset** and save it to a **User Preset**.

### 2.7.2 User Presets

In any **Main Menu** mode, **Button 2** is illuminated **Green** and can be used to save the current monitoring condition to one of 12 **User Presets**. By pressing **Button 2** the **User**

Preset list is displayed in the right hand OLED screen. The images below show how a **User Preset** location may be selected from a **Main Menu** screen.



Once the **Green** save button is pressed the **User Save** menu is activated. Select and highlight a **User Preset** location from the list **U1** to **U12**.



The text boxes in the **User Save** menu can be used to name a **User Preset**. Up to 18 letters or numbers are available. The example below shows a memory being named as **Lt Rt**. Selecting and pressing **Done** saves the memory to the chosen location.



To recall a **User Preset**, rotate the **Encoder** clockwise to activate the **User Preset** window in the right hand OLED screen. Highlight and select to recall a **User Preset**.



### 2.7.3 Hotkeys

**Hotkeys** 1, 2 and 3 can be used to store and recall user settings instantly. By pressing and holding a **Hotkey** the current monitoring condition is saved to the **Hotkey** user memory. Momentarily pressing a **Hotkey** recalls a previously stored user memory instantly.

### 2.7.4 Locking Presets

Both **Hotkey** and **User Presets** can be locked to prevent them from being accidentally overwritten. To access the **Hot** and **User** preset **Lock** feature the operator must access Setup Menu 2 as described in **Section 2.6**

The example below shows the **Menu Setup 2** screen followed by the **User** and **Hot** save modes switched to '**Lock**' respectively. When **User Lock** is activated, the **Save** button is deactivated and the User Presets can only be recalled but not edited. Similarly, **Hot Lock** prevents the Hot Keys from being overwritten.

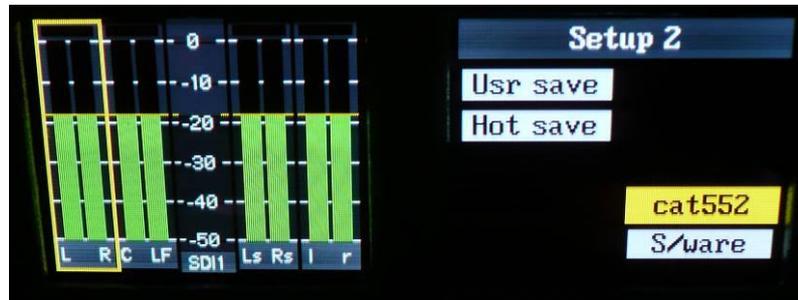


## 2.8 System Upgrade and CAT552 Reset

PAM1-3G8 is designed to be field upgradeable. The user will need an SD memory card, a PC and a card reader.

Format the memory card to FAT16 (or FAT as described in Windows XP). The update will be sent to you by TSL in the form of ZIP file. This **must** be extracted directly to the memory card in order to construct the correct file structure for upload.

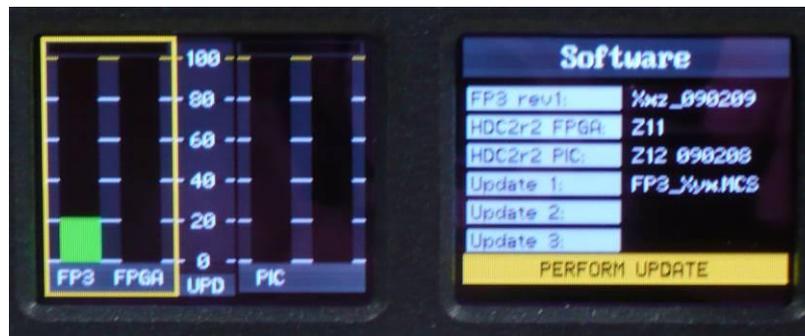
- Once the upgrade file is saved, select the **S/Ware** function from the **PAM1-3G8 Setup menu 2** and view the current **FP** (front panel) and **FPGA** software versions.



- Press button 1 to exit the **S/Ware** mode and insert the SD card.
- Then re-enter S/Ware mode, a new menu option should have appeared at the bottom of the screen. Highlight and select **Perform Update**.

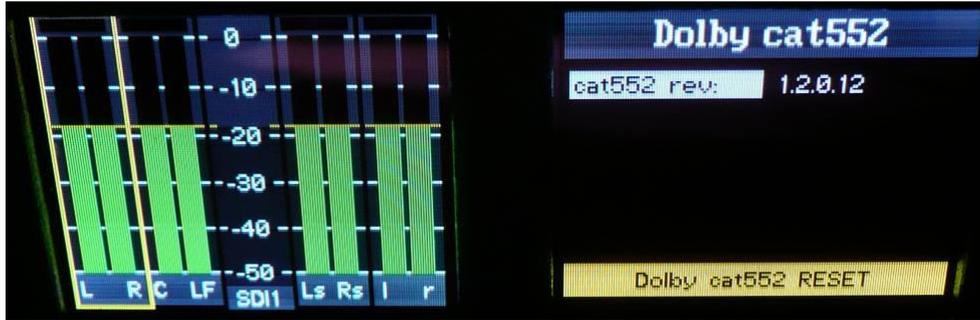


- The status of the update is shown by the rising 'bargraph' as shown below.



- Once the update is done, power cycle **PAM1-3G8** to complete the procedure.

The **Dolby CAT552** card may need to be reset in the event that it 'locks'. Select the **CAT552** option from the **Setup 2** menu and then reset the card.



## 2.9 GPI Application

The rear panel GPI connector functionality can be used to provide two basic modes of operation. The Setup 2 menu page now includes a button to access the GPI mode selector. The operator can choose to set the GPI connector to operate in either '**Normal**' or '**Custom1**' modes.

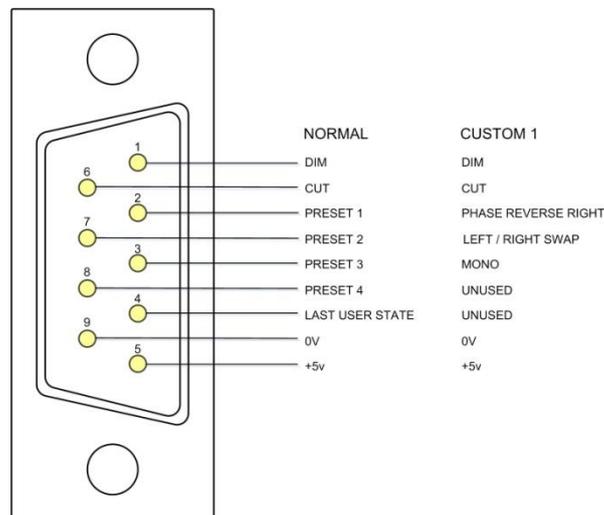
### GPI Mode Application

The two modes of GPI operation are described pictorially by the pin out diagram shown below.

All of the GPI's other than the preset recalls latch in a toggle manner, i.e. one closure to ground toggles the function ON; the next ground toggles it OFF. In an ON state; the GPI pin is driven low to allow an LED to be fed from the port. This LED drive is briefly pulsed high at about 100Hz to allow the port to be read whilst it is driving.

The preset recall GPI's in '**Normal**' are mutually exclusive.

**!** Note that the +5V power from this connector is intended to drive a "1-of-N" LED. If multiple LED's are to be used simultaneously, then a small external supply will be needed. An internal resistor within the PAM1-3G8 prevents the +5V rail from being shorted but limits the current available.



### Normal Mode

---

Normal mode is intended to enable instant remote recall of user presets 1-4 from an external manual or automated selector. The ability to remotely **Dim** or **Cut** the internal and external stereo loudspeaker outputs is also featured.

### **Custom 1 Mode**

Custom 1 mode enables remote access to some of the monitor menu features and additionally the ability to remotely **Dim** or **Cut** the internal and external stereo loudspeaker outputs.

**!** Note that within GPI mode select, the '**Normal**' operation is the default operational state. If an operator chooses to use the '**Custom1**' setting he/she must select and save this mode for each preset saved to memory.

### 3.0 Pin-out Details

#### 3.1 Analogue XLR Connectors

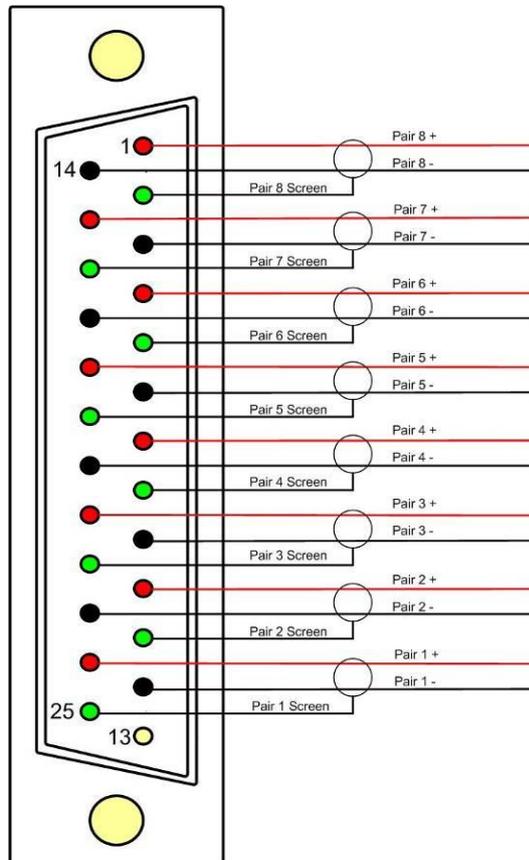
C	PIN	FUNCTION
ANALOG 1	1	GND
ANALOG 1	2	1 IN+
ANALOG 1	3	1 IN-
ANALOG 2	1	GND
ANALOG 2	2	2 IN+
ANALOG 2	3	2 IN-

#### 3.2 AES XLR Connectors

C	PIN	FUNCTION
AES1	1	GND
AES 1	2	1 IN+
AES 1	3	1 IN-
AES 2	1	GND
AES 2	2	2 IN+
AES 2	3	2 IN-

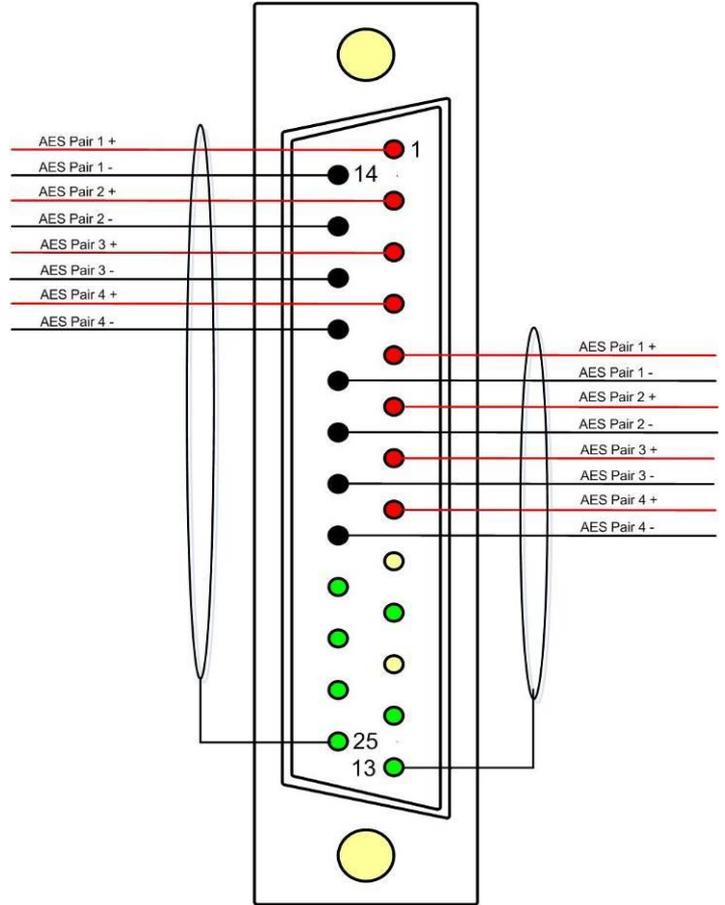
#### 3.3 Analogue Output Connector – D25 Socket Pinout on unit, Plug (shown) on mating cable.

D 25 SOCKET ON AMU	AUDIO OUTPUTS
PIN NO	FUNCTION
1	A8+ (7.1)
14	A8- (7.1)
2	Ground
15	A7+ (7.1)
3	A7- (7.1)
16	Ground
4	A6+ (RS)
17	A6- (RS)
5	Ground
18	A5+ (LS)
6	A5- (LS)
19	Ground
7	A4+ (LFE)
20	A4- (LFE)
8	Ground
21	A3+ (Centre)
9	A3- (Centre)
22	Ground
10	A2+ (FR)
23	A2- (FR)
11	Ground
24	A1+ (FL)
12	A1- (FL)
25	Ground
13	N/C



**3.4 AES Input/Output Connector – D25 Socket Pinout, Plug (shown) on mating cable.**

D 25 SOCKET ON AMU	AES INPUTS/OUTPUTS
PIN NO	FUNCTION
1	Ch1&2 Input 1+
14	Ch1&2 Input 1-
2	Ch3&4 Input 2+
15	Ch3&4 Input 2-
3	Ch5&6 Input 3+
16	Ch5&6 Input 3-
4	Ch7&8 Input 4+
17	Ch7&8 Input 4-
5	Ch1&2 Output 1+
18	Ch1&2 Output 1-
6	Ch3&4 Output 2+
19	Ch3&4 Output 2-
7	Ch5&6 Output 3+
20	Ch5&6 Output 3-
8	Ch7&8 Output 4+
21	Ch7&8 Output 4-
9	N/C
22	Ground
10	Ground
23	Ground
11	N/C
24	Ground
12	Ground
25	Ground
13	Ground



**3.5 DIP switch configuration functions**

SWITCH	FUNCTION
1	Video aspect ratio (4:3 Up/16:9 Dn)
2	AES Impedance (75R Up/110R Dn)
3	Internal speaker mute - Up
4	Analogue variable – Up
5	AES variable - Up
6	XLR fixed output (when set)
7	Stereo Mix LoRo Up/Lt Rt Dn
8	Composite Up/SDI Dn

---

## Notes

There are no user adjustable assemblies/components within this unit.

This unit requires rear support when rack mounted.

In order to affect status changes of the unit using the rear DIP switch, the unit will require re powering before the changes take effect.

Output analogue levels are adjustable over the following range:

0dBm = 0.775V into 600Ω i.e. 1mW power dissipation.

0dBu = 0.775V RMS = PPM 4.

Shipping condition, -18 dB ref 0FS = 0dBu output.

Typical European line up: -18 dBu

Typical American line: -20 dBu

### 5.0 General Notes

Please note that some American equipment has the function of the XLR pins 2 & 3 reversed.

TSL product is wired to the European standard

The screw locks on the D25 connectors use UNC 4-40 standard threads.

### 6.0 PAM1 - 3G8 Technical Specifications

#### Power Supply

Supply Voltage	12V DC
Power Consumption	50 watts.

#### Physical Dimensions

Height	44mm (1RU)
Width	483mm (19")
Depth	320mm
Weight	6900g

#### Analogue Inputs 1 - 2

Connector Type	XLR Female 3 pin. Pin 1 Gnd, Pin 2 hot, Pin 3 cold.
Signal	Balanced line level audio.
Frequency Response	30Hz to 25kHz
Impedance	>20kΩ

#### Inputs AES 1&2

Connector Type	XLR Female 3 pin. Pin 1 Gnd, Pin 2 hot, Pin 3 cold.
Standard	AES3 (1994) at 48kHz, 44.1kHz or 32kHz
Impedance	110 ohm (balanced.)

#### Inputs AES 1, 2, 3 & 4

AES I/O, 25 way D type (See section 3.4 for details)

---

**Input, HD/SDV 1 &2**

Connector Type BNC.  
Standard 4:2:2 component with embedded 48Khz audio.  
(SMPTE 259M, 292M and 424M)  
Impedance 75ohm

**Line Output.**

Connector XLR 3 pin Male  
Impedance 50Ω  
Output Levels Through level control with 0dB gain.  
Fixed Line O/P Available on D25 (If selected on front panel)

**Headphone Output.**

Connector Stereo Jack socket type A  
Impedance 50Ω  
Output Levels Through level control with 0dB gain.

**De embedded output**

Connector 25 way D type  
Impedance 110 Ohm  
Output Groups 1, 2, 3 and 4

**Video Output**

Connector BNC  
Impedance 75 Ohm  
Output Composite video or SDI (selectable)

**Re-clocked Output**

Connector BNC  
Impedance 75 Ohm  
Output Re-clocked serial output of the SELECTED input HD/SDV

**AES Output**

Connector AES I/O, 25 way D type (See section 3.4 for details)  
Impedance 110 Ohm  
Output Selected SDI Group. decoded Dolby signal or AES I/P 1-

**HD Standards Supported**

1080i/50	1080p/23.98	1035i/30
1080i/59.94	1080p/24	1035i/29.94
1080i/60	1080p/25	1080sf/30
1080P/50	1080p/29.97	1080sf/29.97
1080P/59.94	1080p/30	1080sf/25
1080P/60	1080i/25	1080sf/24
720p/50	1080i/24.94	1080sf/23.98
720p/59.94	1080i/30	
720p/60		
480i/30.00 (SD - NTSC)		
576i/25.00 (SD - PAL)		

---

**Performance**

Response	70Hz to 20KHz
Electrical Distortion	Better than 0.1%
Hum and noise	Better than -80dB
SPL	>98dB at 0.6 m
Amplifier Output	40 watts total power output
Digital Sample Rate	32 to 48KHz auto select

---

## Installed HDC-2T Audio Monitor Module Specification

### Overview

This specification describes the HDC-2T Audio Monitor Module.

This module has been designed to monitor a combination of analogue audio, AES3 digital audio and AES or Dolby E digital audio embedded in SMPTE 259M or SMPTE 292M video data streams, together with the video content which is output as composite and/or SDI. HD formats are passed through a simple down-conversion process to the monitoring output.

### Mechanical

PCB: 4 layer, 120mm x 376mm with integral BNC and XLR connectors  
Component Height: <30mm above pcb surface, <2mm below  
<65mm above pcb surface with Dolby E fitted

### Power

The module assumes the supply of regulated power will be made available via the power input connector. Poorly regulated or noisy supply rails may affect the quality of the analogue outputs. The HDC-2T will accept two feeds of +12V to +24V DC power, approximately 60W typical when using loudspeaker outputs. This allows dual redundant or external battery operation.

### Inputs

#### HD/SDI

Connector Type: BNC  
Receiver type: AC coupled, auto equalising with clock regeneration  
Impedance: 75 $\Omega$ , return loss  $\geq$ 15dB to 1.5GHz  
Standards: SMPTE 259M-C with embedded 48kHz audio per SMPTE 272M-A  
SMPTE 292M with embedded 48kHz audio per SMPTE 299M  
Performance:  $\geq$ 300m of high quality cable at 270Mbit (eg Belden 1694)  
 $\geq$ 100m of high quality cable at 1.5Gbit

#### AES 3 or AES 3id

Connector type: Inputs 1 & 2, XLR 3 pin. (can be built for unbalanced BNC input)  
Inputs 1, 2, 3 & 4. 25way D-type 4 stereo pairs, pin-out as per Yamaha  
Impedance: 75 $\Omega$  unbalanced or 110 $\Omega$  balanced. Impedance is switch selected via DIP Switch 2. To obtain an unbalanced connection one line of the input needs to be grounded at an electrically convenient point.  
Input Sensitivity: < 200mV p-p per AES3.  
Standards: AES3-1992 at 96 kHz, 48kHz, 44.1kHz or 32kHz

#### Analogue Inputs

Connector type: 4 x XLR 3 pin, (Two stereo pairs)  
Board header Further 4 stereo pairs (8 channels)

#### Remote control

Connector type: Header, 10way to connect to 9pin D-type (RS422)

### Outputs

#### Video

Connector Type: BNC  
Output 1 Equalised active loop-through  
Impedance: 75 $\Omega$   
Amplitude: 800mV p-p  $\pm$ 10%

Output 2 Composite SD (Down-converted when input is HD)  
Format: PAL or NTSC according to standard on SDI input  
Impedance: 75 $\Omega$   
Amplitude: 1V p-p  $\pm$ 5%

*Output 3 - Optional SDI version of image on composite output*  
*Impedance: 75 $\Omega$*   
*Amplitude: 800mV p-p  $\pm$ 10%*

---

## **AES**

Four AES (8 channels) may be output from analogue audio, embedded audio or from decoded Dolby E/D when the option is fitted

Connector type: 25way D-type 4 stereo pairs, pin-out as per Yamaha/Tascam Standard  
Impedance: 75 $\Omega$  unbalanced or 110 $\Omega$  balanced. Impedance is switch selected with on-board transformer balancing. To obtain an unbalanced connection one line of the output needs to be grounded at an electrically convenient point.  
Amplitude: 1V into 75 $\Omega$  or >2V into 110 $\Omega$

## **Analogue Audio**

Eight analogue channels (4 stereo pairs) that may be output from AES, embedded audio or from decoded Dolby E/D when the option is fitted

Connector Type: XLR one pair fixed or variable  
25 way D type 4 stereo pairs, pin-out as per Yamaha/Tascam  
Format: Electronically balanced, centre ground.  
D/A Conversion: 24 bit resolution.  
THD+N: >80dB referred to 0dBFS

## **Loudspeakers**

Connector Type: 0.156" board header  
Format: Two active cross-over or 4 broad-band loudspeaker outputs  
10 to 40W (4 $\Omega$ ) per channel into depending on input power supply

## **GPI inputs**

Connector type: Header to 9-way D-type plug

## **6.0 Control**

Connector type: Header for current AMU-1 operator control board  
Connector type: Header, serial bus for future operator control/display panels