Operating Manual

Studio Audio Monitoring

TSL Products

SAM1 3GM & SAM1 MADI

Combined Handbook 1. Issue 1

SAFETY

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).

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.

WARRANTY, MAINTENANCE AND REPAIR

- All TSL products have 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 676221 (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.

1.0 Introduction

SAM1 3GM and SAM1 MADI are deceptively simple yet highly sophisticated compact multichannel audio monitor units designed for use anywhere within a Broadcast environment that employs SDI, MADI, AES or analogue audio infrastructure. The flexible monitoring configuration system delivers a unique combination of bespoke audio monitoring and mix capabilities designed to simplify operations and workflow.

The SAM1 is a 1RU x 250mm Audio Monitoring Unit controlled via a simple hard/software user interface with dual fully assignable high resolution, LCD bargraph displays.

As with any new product which relies on software, it is possible that you may find minor bugs or perhaps think of enhancements which would improve the operation of SAM1. In the event of either scenario, please feel free to contact TSL Products via your local reseller or directly on +44 1628-676221, asking for the SAM series Product Manager.

TSL will be releasing upgrades and feature enhancements from time to time – as a purchaser of SAM1 3GM and/or SAM1 MADI you can receive these directly, free of charge, through your reseller or as a download from TSL Products. Please refer to www.tslproducts.com for announcements.

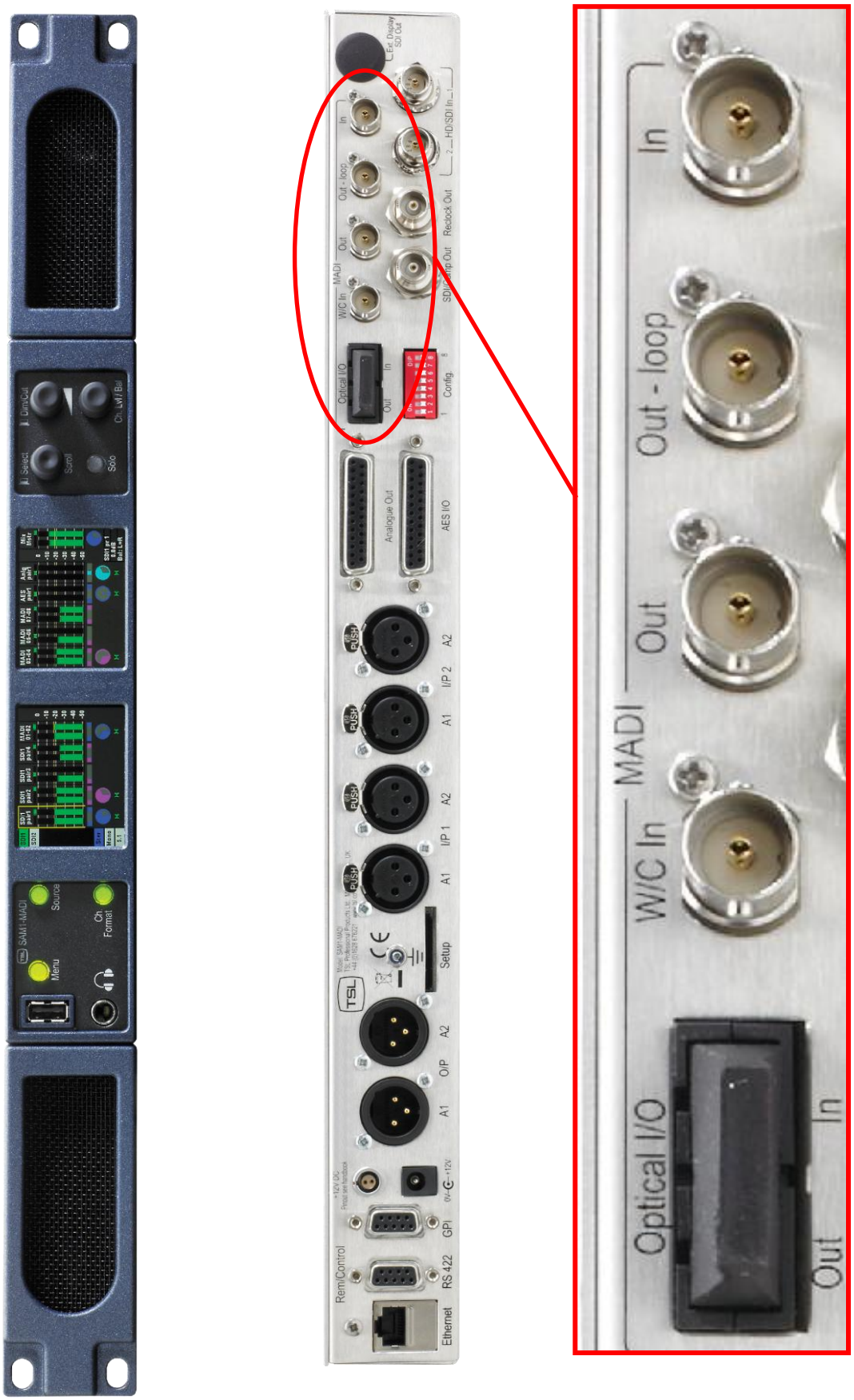
The following features are standard:

- Single or Dual (SD Only) Auto-sensing, 1080p (60, 59, 94 and 50Hz), HD/SDI video input
- De-embedded audio monitoring from video (HD/SDI) with intuitive selection from up to sixteen channels (SDI 1 only)
- Coaxial and Optical MADI monitoring of up to 64 channels at a sample rates of 48kHz (SAM1 MADI only)
- Coaxial and Optical MADI clocked outputs as well as passive Coaxial relay bypass (SAM1 MADI only)
- Single Mode Fibre MADI connection as standard, Multi Mode available on request (SAM1 MADI only)
- 64 Channel MADI Test Signal Generator (SAM1 MADI only)
- Wordclock reference (SAM1 MADI only)
- 4 AES (4 Pairs/8 Channel) Inputs – 110Ohm Balanced or 75 Ohm unbalanced via optional CAB-D25-BNC cable
- 2 Analogue Stereo Inputs
- 10 stereo/ 20 dual mono assignable input channel monitor/mixer
- One-touch downmix of discrete multichannel audio to stereo for compatibility monitoring
- Re-clocked HD/SDI video output.
- Choice of user selectable bargraph scales (BBC PPM, EBU PPM, EBU Digital, Nordic, VU and DIN)
- 18 User programmable presets.
- Manage, recall and save favourite configurations via USB stick or SD card
- User configurable ‘Hot Source List’ input select
- Virtual ‘Scribble Strip’ channel alias naming
- Unique input audio ‘Preview’ function
- Fixed and variable analogue stereo outputs
- Fixed and variable AES stereo outputs
- Variable stereo analogue outputs (Monitor Buss)
- High quality internal full range loudspeaker system
- GPI control of cut/dim and preset recall
- Dual 12V DC inputs
- Serial remote control
- Network ready
- Headphone output with LS muting
- Compact, lightweight (3.1Kg) 1RU case, 250mm deep

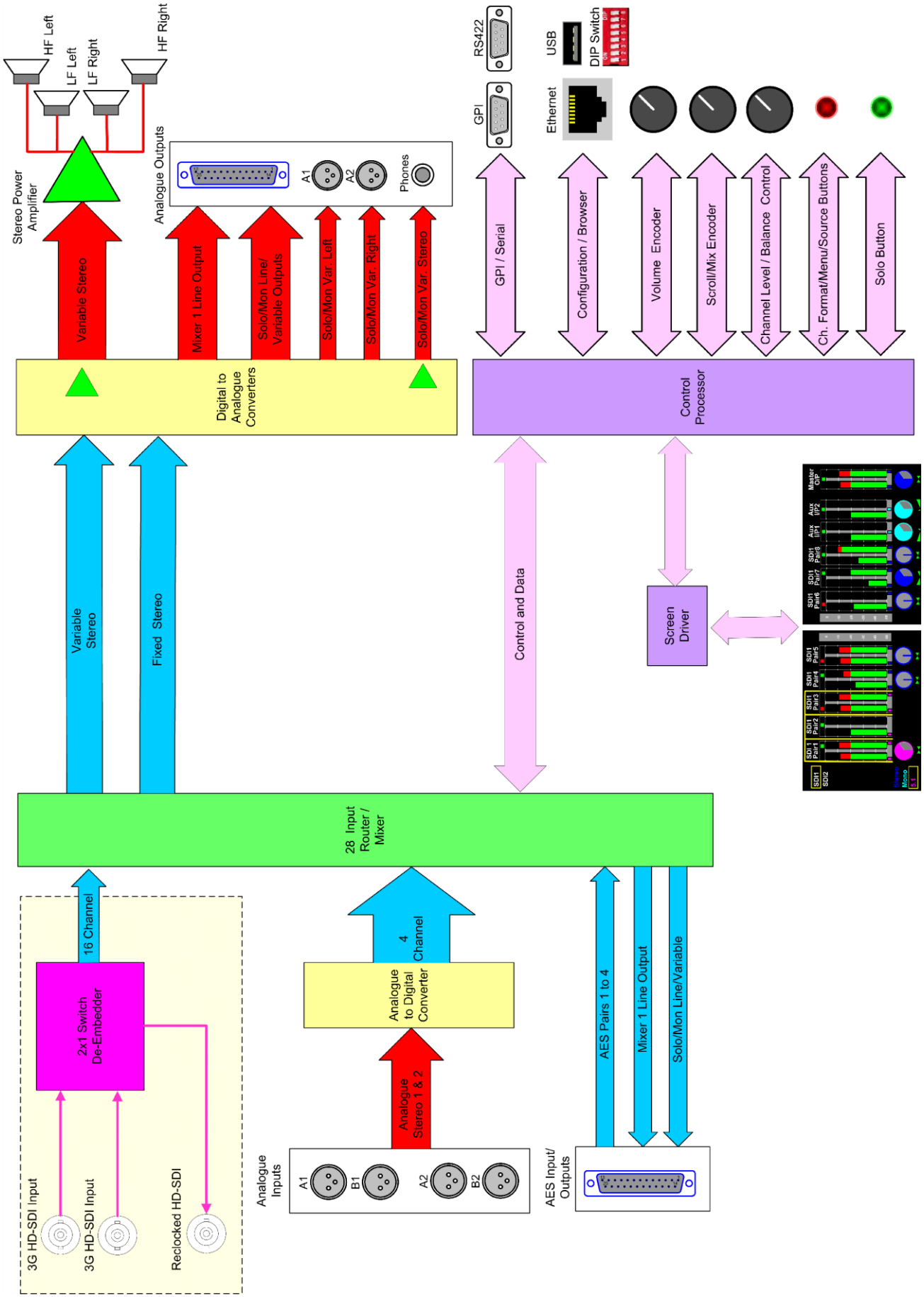
2.0 Control and Operation

2.1 Front and Rear Overview – SAM1 3GM

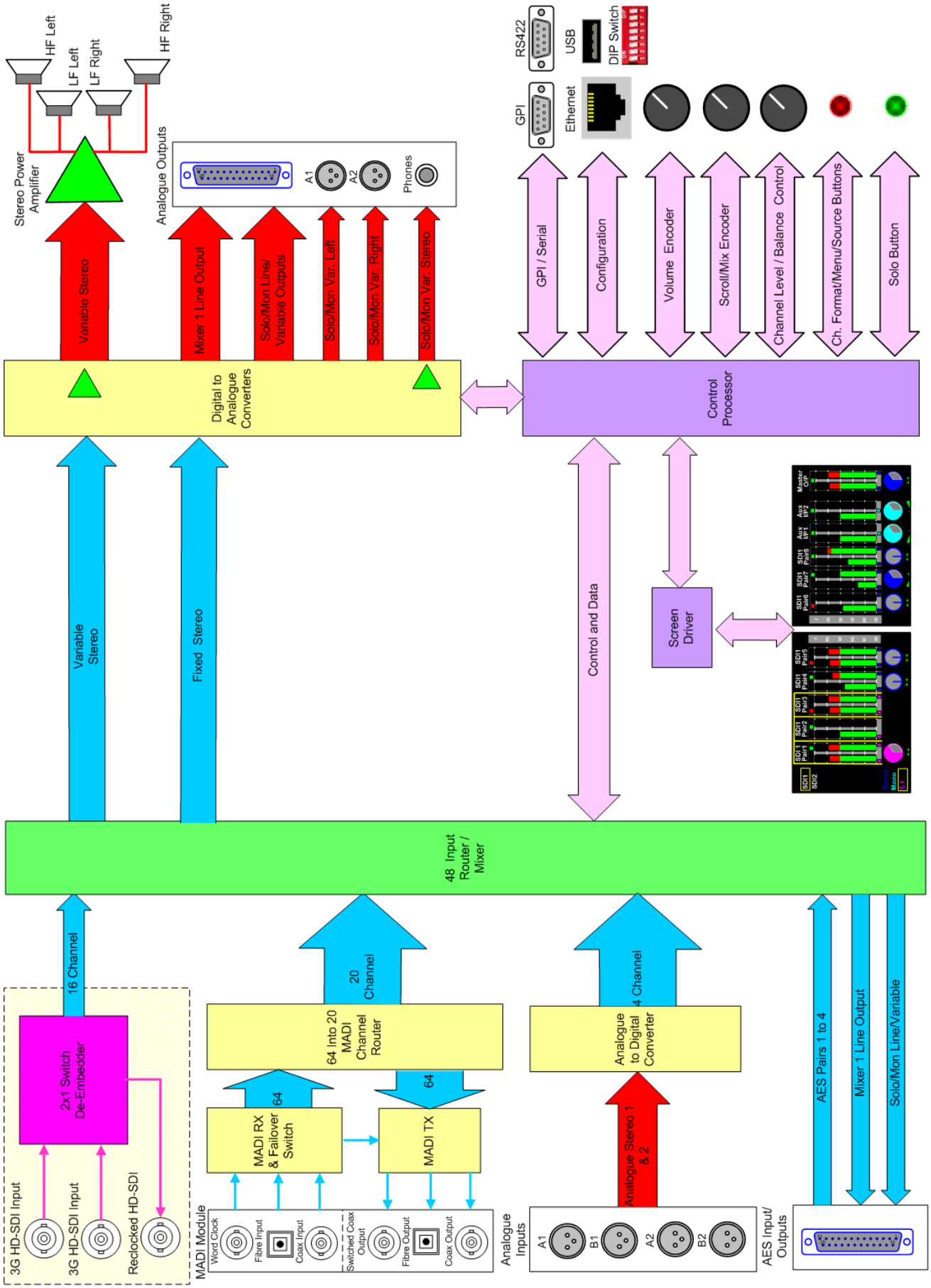
2.2 Front and Rear Overview – SAM1 MADI



2.3 Block Diagram – Signal and Control – SAM1 3GM

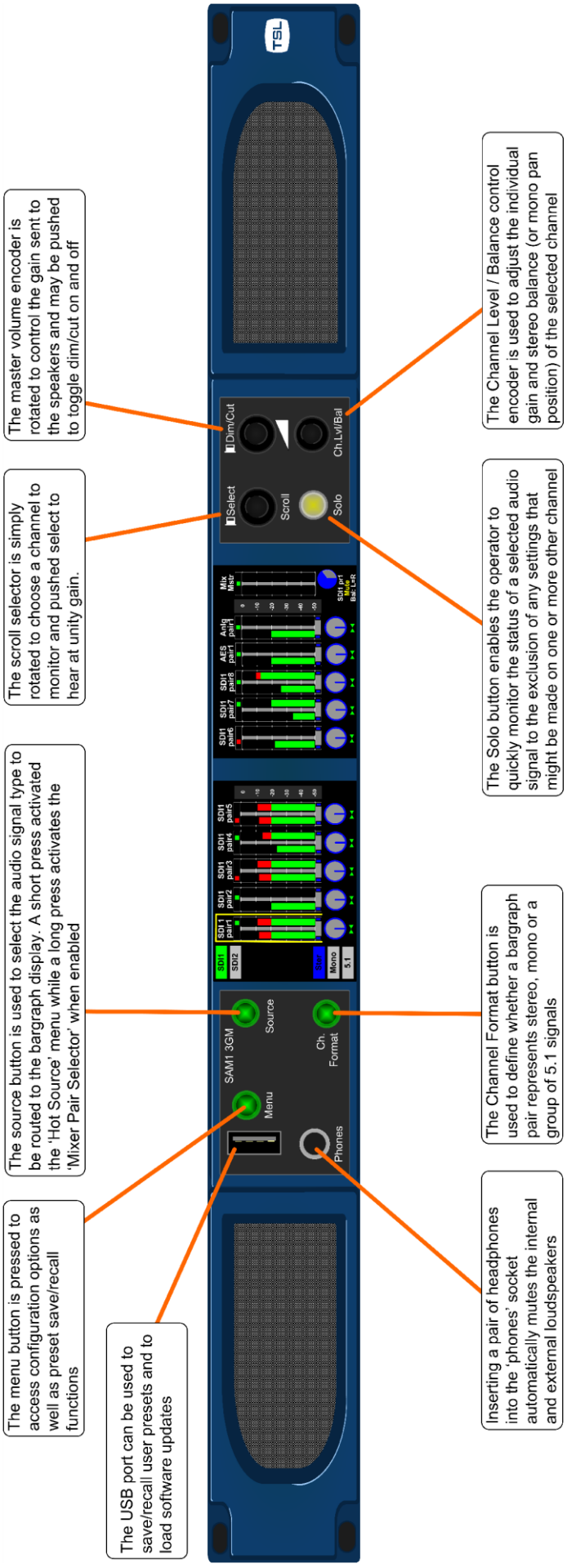


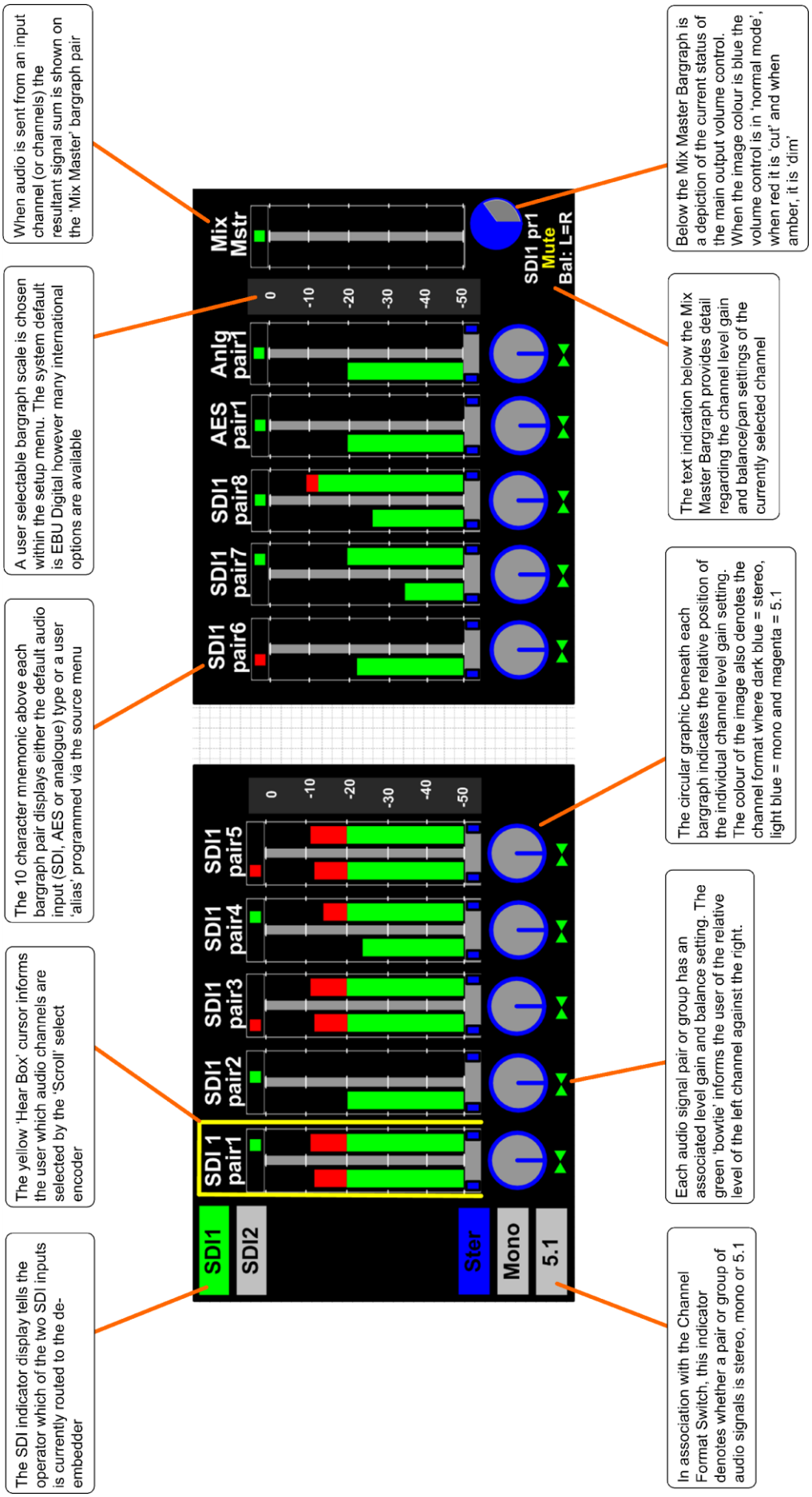
2.4 Block Diagram – Signal and Control – SAM1 MADI

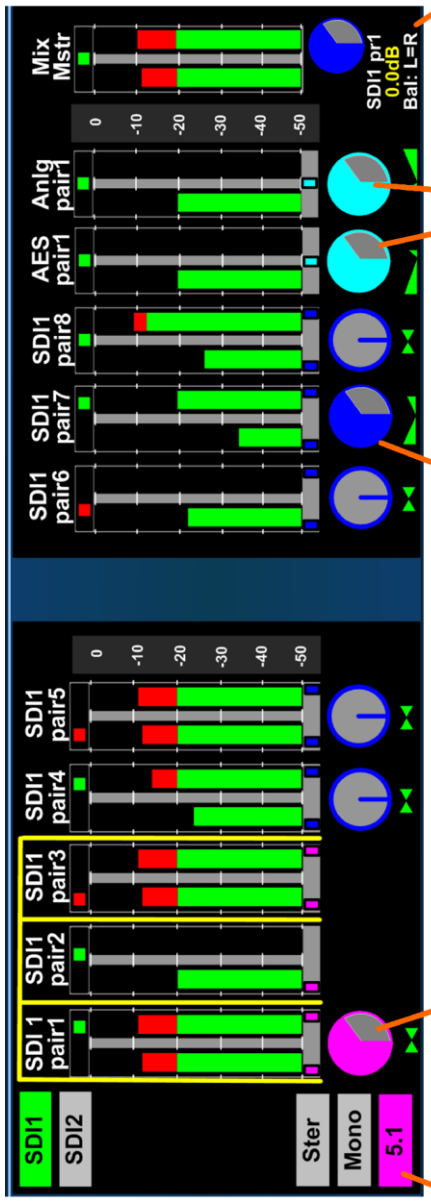


2.5 Quick Start – Front Panel Controls

The following three diagrams describe the basic functionality of the SAM1 3GM and SAM1 MADI hardware and screen controls, they also describe the onscreen icons and 'at a glance' features which make both SAM1 models amongst the simplest compact multichannel audio monitor to use on the market




When audio is sent from an input channel (or channels) the resultant signal sum is shown on the 'Mix Master' bargraph pair
A user selectable bargraph scale is chosen within the setup menu. The system default is EBU Digital however many international options are available
The 10 character mnemonic above each bargraph pair displays either the default audio input (SDI, AES or analogue) type or a user 'alias' programmed via the source menu
The yellow 'Hear Box' cursor informs the user which audio channels are selected by the 'Scroll' select encoder
The SDI indicator display tells the operator which of the two SDI inputs is currently routed to the de-embedder
Below the Mix Master Bargraph is a depiction of the current status of the main output volume control. When the image colour is blue the volume control is in 'normal mode', when red it is 'cut' and when amber, it is 'dim'
The text indication below the Mix Master Bargraph provides detail regarding the channel level gain and balance/pan settings of the currently selected channel
The circular graphic beneath each bargraph indicates the relative position of the individual channel level gain setting. The colour of the image also denotes the channel format where dark blue = stereo, light blue = mono and magenta = 5.1
Each audio signal pair or group has an associated level gain and balance setting. The green 'bowtie' informs the user of the relative level of the left channel against the right.
In association with the Channel Format Switch, this indicator denotes whether a pair or group of audio signals is stereo, mono or 5.1
Mix Mstr
SDI1 pr1
Mute
Bal: L=R
Anlg pair1
AES pair1
SDI1 pair8
SDI1 pair7
SDI1 pair6
SDI1 pair5
SDI1 pair4
SDI1 pair3
SDI1 pair2
SDI 1 pair1
0
-10
-20
-30
-40
-50
SDI1
SDI2
Ster
Mono
5.1



The Text Box below the Mix Master provides information about the selected channel (pairs 1,2 and 3). In this configuration it confirms that the gain is set to unity and that balance of left channel equals right channel

Channels 9 and 10 are each configured as a mono as depicted by the **Light Blue** colour code Note that the 'Bowtie' balance control is set to pan the two channels to the left and right respectively

Channel 7 is configured as a stereo pair as depicted by the **Electric Blue** colour code Note that the 'Bowtie' balance control is set to monitor slightly more left channel against right

Channels 1,2 and 3 of this SAM1 3GM are set to 5.1 mode and the group of 6 audio channels are automatically downmixed to stereo for compliance checking The **Magenta** colour code ensures that operators can instantly recognise that the audio is configured as a 5.1 group

Channel Format colour corresponds to the selected input bargraph **Magenta depicts a 5.1 group Electric Blue depicts a stereo channel Light Blue depicts a mono channel**

2.6 Source Selection

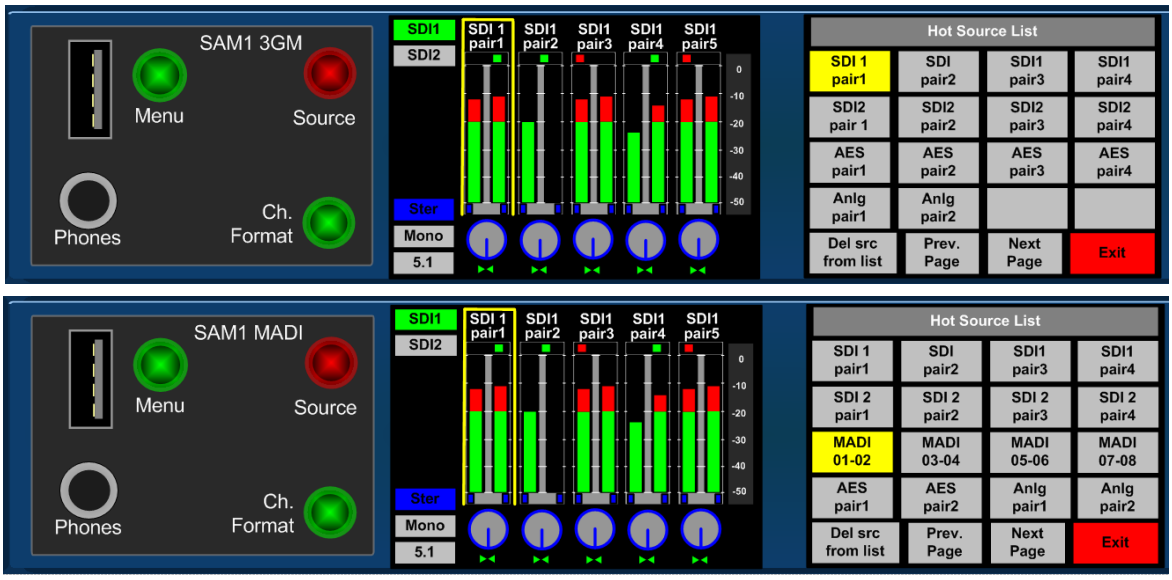
Key to the ease of operation of SAM1 is the simplicity by which audio may be monitored and/or mixed. SAM1 is equipped with a 10 pair / 20 channel mixer/monitor system that can be configured with an entirely bespoke user setup and can be used in many diverse applications.

Setting up the monitor for use is simple and intuitive yet incredibly powerful. The SAM1 boasts several means to route audio to the bargraph pairs with a quick and simple configuration tool called **Hot Source List** designed for hands-on fast track use and **Main Sources Menu** intended for more complex setup processes.

2.6.1 Input selection using the Hot Source List

The **Hot Source** selector menu is a user configurable list of the most commonly used inputs associated with a specific application – perhaps a TV Show or Production. The entire total of 54 SDI, MADI, AES or analogue signal pairs may be contained within the **Hot Source List** however it is the ability to restrict the list to just those relevant to the operator that makes this function unique.

Use the **Scroll / Select** encoder to choose the bargraph pair you wish to configure; Access to the **Hot Source List** is made by a single short press of the 'Source' button to the left of the left hand display.

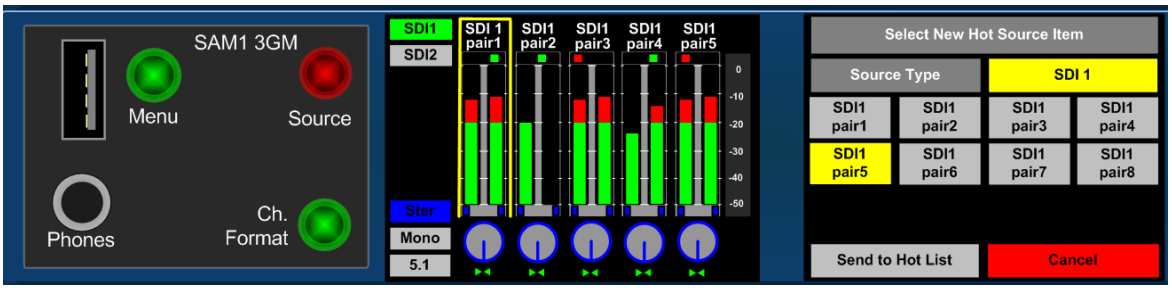


The default **Hot Source List** displayed on the right hand screen is configured as shown with a subtle variation between SAM1 3GM and SAM1 MADI. Now use the encoder to highlight the required source and it will be routed automatically to the chosen bargraph channel pair.

2.6.2 Configuring the Hot Source List

The Hot Source List can be configured from the Hot Source List itself or from the **Main Sources Menu** (described later). If the user wishes to change or add an input to a Hot Source button this can be done by simply highlighting the button using the **Scroll / Select** encoder and then pushing and holding the encoder until the following menu **Select New Hot Source** appears as can be seen below.

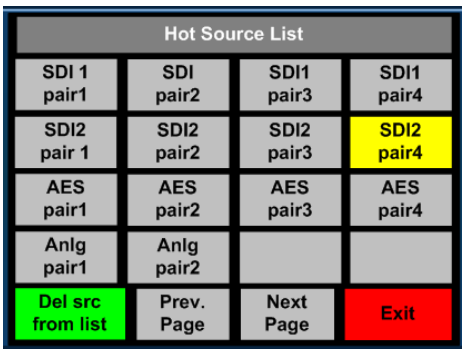
Select the desired source type and pair and then select the **Send to Hot List** button to add the choice to the **Hot Source List**



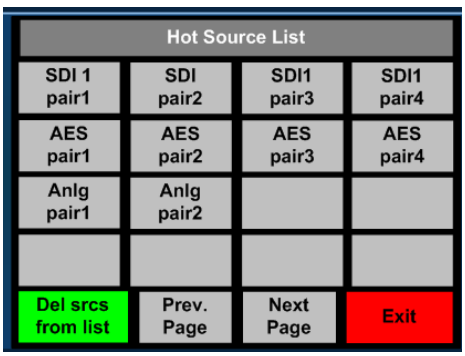
2.6.3 Deleting from the Hot Source List

Sources can easily be deleted from the **Hot Source List** if they are no longer required for a particular configuration. If the **'Del Src from List'** button is highlighted within the **Hot Source List** menu then any inputs selected via the encoder will be deleted from the list.

The **Del Source** button has two operational states. When highlighted as shown below the selection of a single unwanted input will delete it from the **Hot Source List** and the **Del Source** button will then become inactive

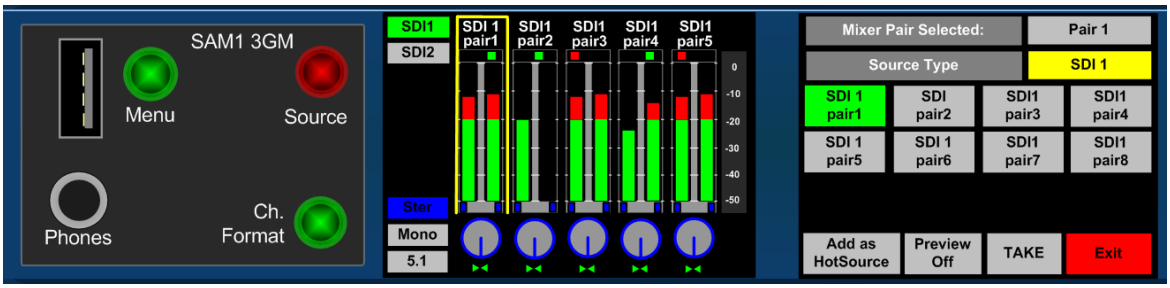


By pushing and holding the encoder selection on the **Del Source** button the mode changes to allow multiple deletions of inputs from the **Hot Source List**. The example below shows that all of the default input buttons for SDI2 have been deleted from the **Hot Source List** using and the list has automatically concatenated by moving the active sources to the left of the deleted buttons.

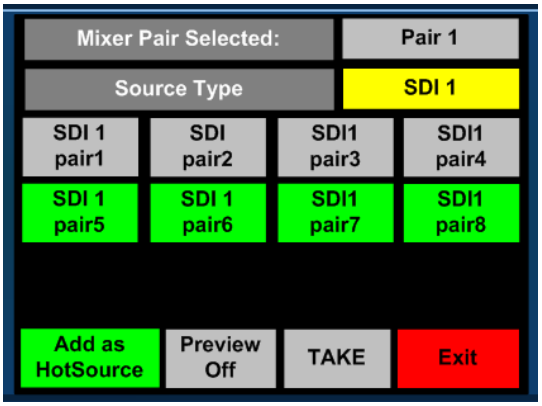


2.6.4 Configuring the Hot Source List Using Mixer Pair Select

The **Hot Source List** can also be configured using the **Mixer Pair Select** menu. Press and hold the **Source** button to the left of the left hand display and the **Mixer Pair Select** menu appears as shown below.



Individual or multiple sources can be selected by highlighting any or all of the input types the user wishes to add to the **Hot Source List** as shown in the example below where SDI1 pairs 5 to 8 have been added.

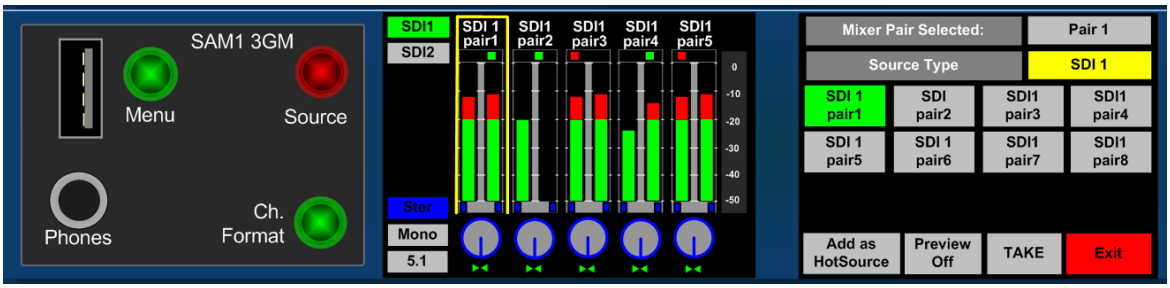


The selection will automatically appear on the **Hot Source List**

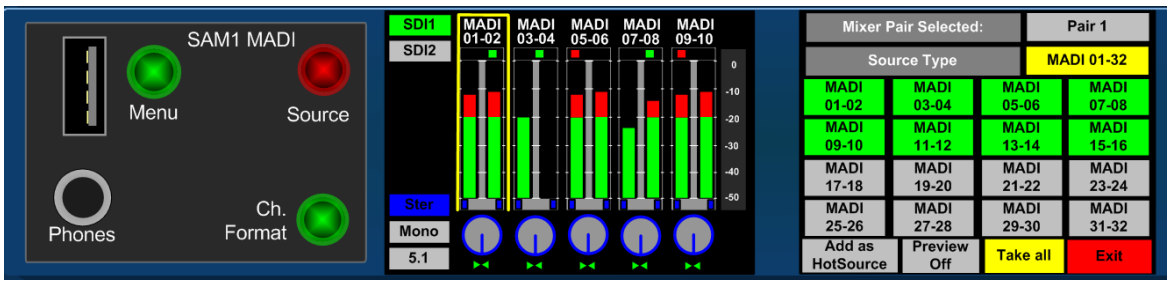
2.6.5 Input selection using the Mixer Pair Select Menu

The **Mixer Pair Select** menu can be used to route single or multiple selections to the bargraph pairs as an alternative to using the **Hot Source Menu**. It can also be used to audibly preview any available source without adding it to the input bargraph screen and to add selections to the **Hot Source List** as described elsewhere.

Press and hold the **Source** button to the left of the left hand display and the **Mixer Pair Select** menu appears as shown below.

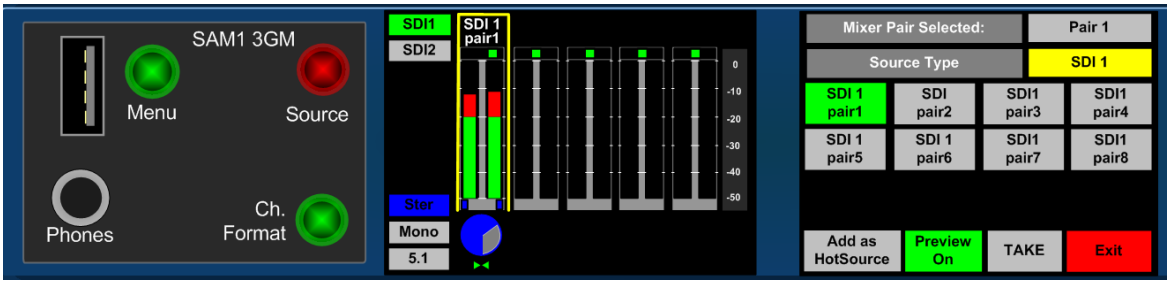


In the example below, a group of 8 MADI input pairs has been selected using the **Mixer Pair Select** menu and the **Take All** button pressed to route them to eight adjacent bargraphs as depicted on the left hand screen. The **TAKE** button auto configures to 'Take All' whenever more than one source is selected.



When the **Preview** button is switched to **Preview On** any channel selected will automatically be routed to the SAM1 loudspeakers system and so that it can be heard before being routed to the **Input Bargraph Display** or **Hot Source List**. This unique feature enables operators to double check they are choosing the correct audio signal before selecting it.

In the example below, the operator is previewing the audio embedded on SDI1 Pair1 and the left hand display depicts the incoming audio level against the bargraph scale.



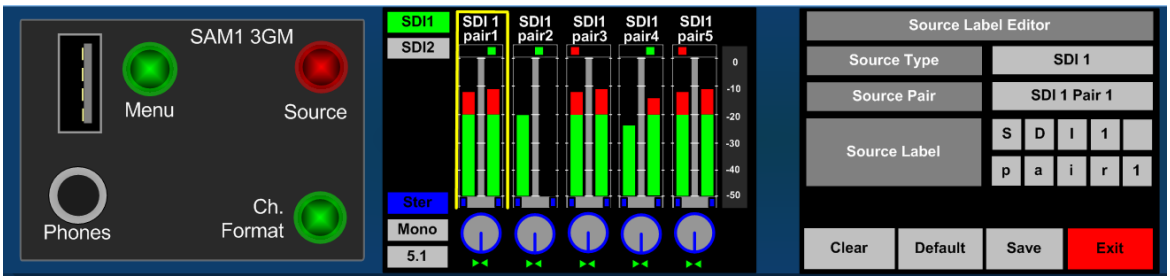
2.7 Configuring and Naming Input Channels – User Alias Labels

Any audio input channel can be given a user alias label which will be shown in the 'virtual scribble strip' area above the input bargraph pair. A 10 character label is permitted enabling the user to create a label which provides clear and easy recognition of any or all bargraph pairs however the system will automatically truncate any entries that include multiple block capitals that will not fit within the text field provided.

The Source Label Editor can be accessed by pushing and holding the encoder over any of the input channel selectors represented within the **Hot Source List** or **Mixer Pair Select** menu. It can also be accessed via the setup menu using hard and soft button selection as follows;

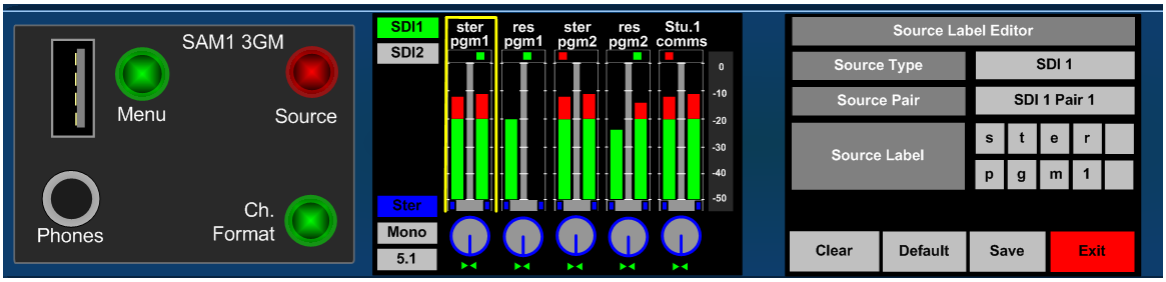
2.7.1 Menu/Setup/Source Label Editor

The Source Label Editor is shown below



To assign a Source Label simply use 'Clear' to wipe the text boxes of the default label, select the box you wish to label and rotate the encoder to scroll through the available alphabet, numbers and punctuation marks – remember to press 'Save' to assign the new label or use 'Default' to retrieve the system label

The example below shows a configured label and a bargraph display that has been programmed to show a typical SAM1 3GM setup



2.8 User Presets and Snapshot Management

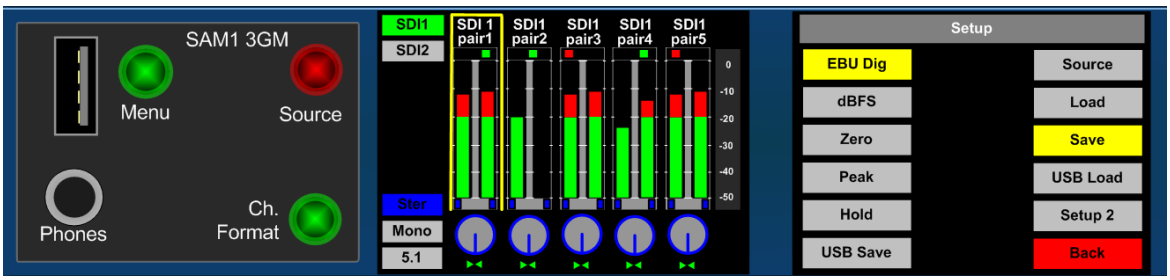
SAM1 3GM and SAM1 MADI both use internal and external **User Preset** memories to enhance usability; there are a total of 18 User Presets stored in local memory which can then be backed up to an external device via the USB slot.

A **User Preset** is defined as a **Snapshot** of a state of operation and includes the following parameters;

Channel Source Selection
Channel Output 'Send' Levels
Channel Pan/Balance
Channel Format Selection
Input User Names
Bargraph Configuration (including Scale, Ref, Zero etc.)
GPI Mode
Internal LS Mute Status
External LS Mute Status
User Preset Name

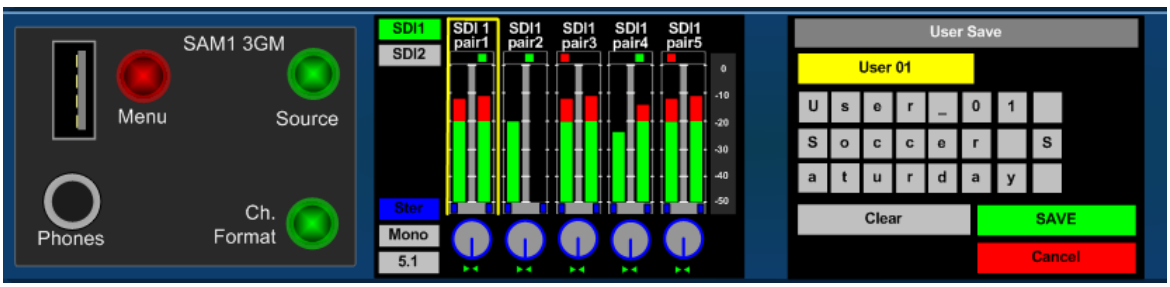
SAM1 holds a total of 18 Internal Memories that can be backed up to a **USB** memory stick (front panel port) or **SD Card** (rear panel slot). Access to the **USER PRESET** menus is via the front panel **Menu** button followed by the **Save / Load** functions

The Setup menu is shown below with the **Save** button highlighted



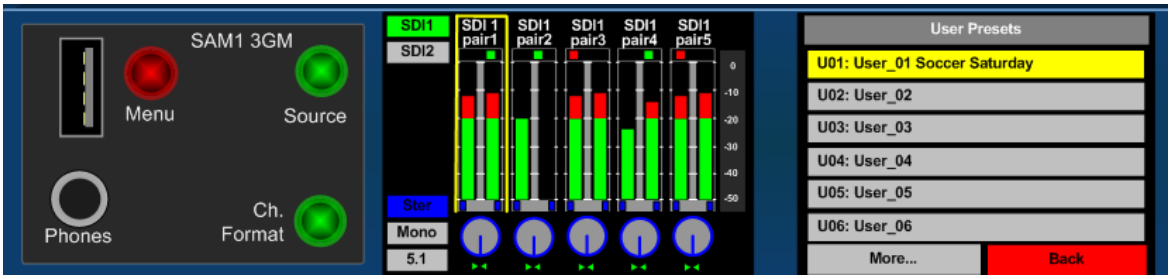
2.8.1 Saving and Naming User Presets

Pressing **Save** enters the **User Save** Management screen which enables the user to back up the current system snapshot to any of 18 preset locations, chosen by clicking and turning the encoder to select the appropriate number preset and then entering a name of their choice.



2.8.2 Loading User Presets

Pressing **Load** enters the **User Presets** directory where the user can select to recall any other 18 user presets to be the active snapshot. In the example below the User Preset 'Soccer Saturday' is recalled from location '01'.

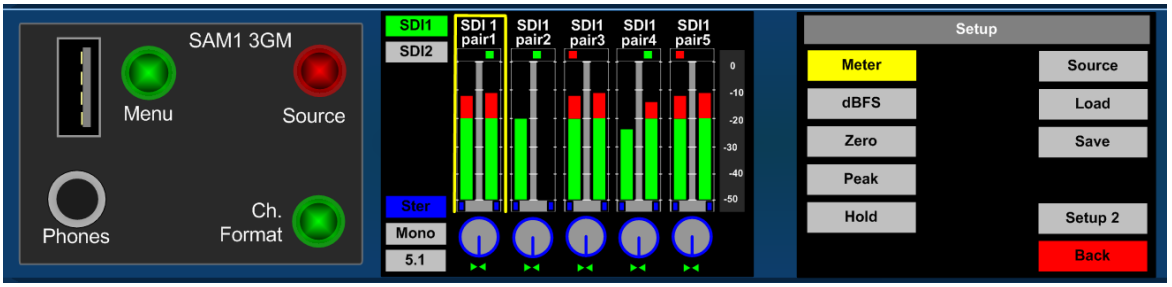


The entire collection of 18 user preset can be backed up to or recalled from an external storage device such as a USB stick (thumb drive) or SD card providing that card has been prepared with a top level folder named 'SAM1-3GM' or 'SAM1-MDI'.

When a storage device is inserted into the SAM1, it will be recognised and the **USB Load** and **USB Save** buttons will appear on Setup menu as shown previously. Select either button to store or recall the system snapshot cache. SAM1 asks the operator to confirm if a USB Save command is required to overwrite an existing stored memory cache.

2.9 Setup Menu 1 – SAM1 3GM and SAM1 MADI

Setup Menu includes options for different **Scales**, **Reference Levels**, **Peak Hold, Input Naming** and access to **the Setup 2 Menu**. By clicking to select the appropriate button, individual sub menus are selected and options chosen via rotation of the encoder.



2.9.1 Meter Menu – Selecting Scale Type

Pressing the **Meter** button and turning the encoder accesses the bargraph scale options. **SAM1** is able to accurately replicate EBU Digital, EBU PPM, BBC PPM, DIN PPM, Nordic PPM and VU scales and ballistics. Please note that the selection of a scale type within the **Meter** screen will only be remembered by **SAM1** as a preset once the selection has been saved to internal memory using the **User Preset** commands described previously. This restriction enables the user to save preset conditions which work using different bargraph scales.

2.9.2 dBFs Menu

The **dBFs** parameter selection can be used to alter the 0dBu reference level from between -12 and -24 dBFs.

2.9.3 Meter Peak Menu

The **Peak** parameter selects the offset level between the **Reference dBFS** setting and the onset of **Peak** indication (the point where the bargraph changes colour to red) from between +1dB and +18dB.

2.9.4 Meter Zero and Block Menu

The **Meter Peak** selects between two modes of peak indication displayed on the channel bargraphs. The **Bar Mode** illuminates the bargraph as red once the audio level exceeds the peak value. In **Block Mode** the bargraph illuminates in yellow when the audio level exceeds the reference value and then red when it exceeds peak

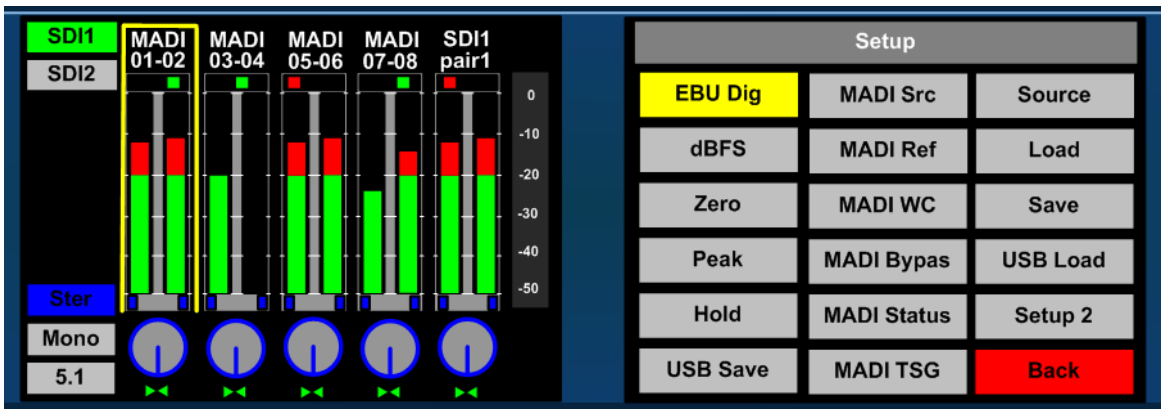
2.9.5 Meter Hold Menu

SAM1 features a simple **Peak Hold** indicator which may be turned on and off using the **Meter Hold Menu**.

2.10 Setup Menu 1 – SAM1 MADI Only

2.10.1 SAM1 MADI unique setup menu

SAM1 MADI features a number of unique menus relating specifically to MADI operation that are do not appear within the setup menus of the SAM1 3GM. When the **Menu** button on SAM1 MADI is pressed the following screen appears on the right hand LCD display.



2.10.2 MADI Source Select

The **MADI Src** button is used to select which MADI source is active and effectively toggles between the Coaxial (BNC) or Optical input port. The active input signal will be ‘reclocked’ out of both Coaxial and Optical output connections regardless of the chosen input format.

2.10.3 MADI Reference Select

The **MADI Ref** button is used to select whether the MADI input is referenced to the internal clock or ‘Coax Reference’ provided by the Wordclock connection. SAM1 MADI is resilient to clocking issues however it is strongly advised that all digital input connections to SAM1 3GM and SAM1 MADI are referenced to the same timing system.

2.10.4 MADI Wordclock Termination

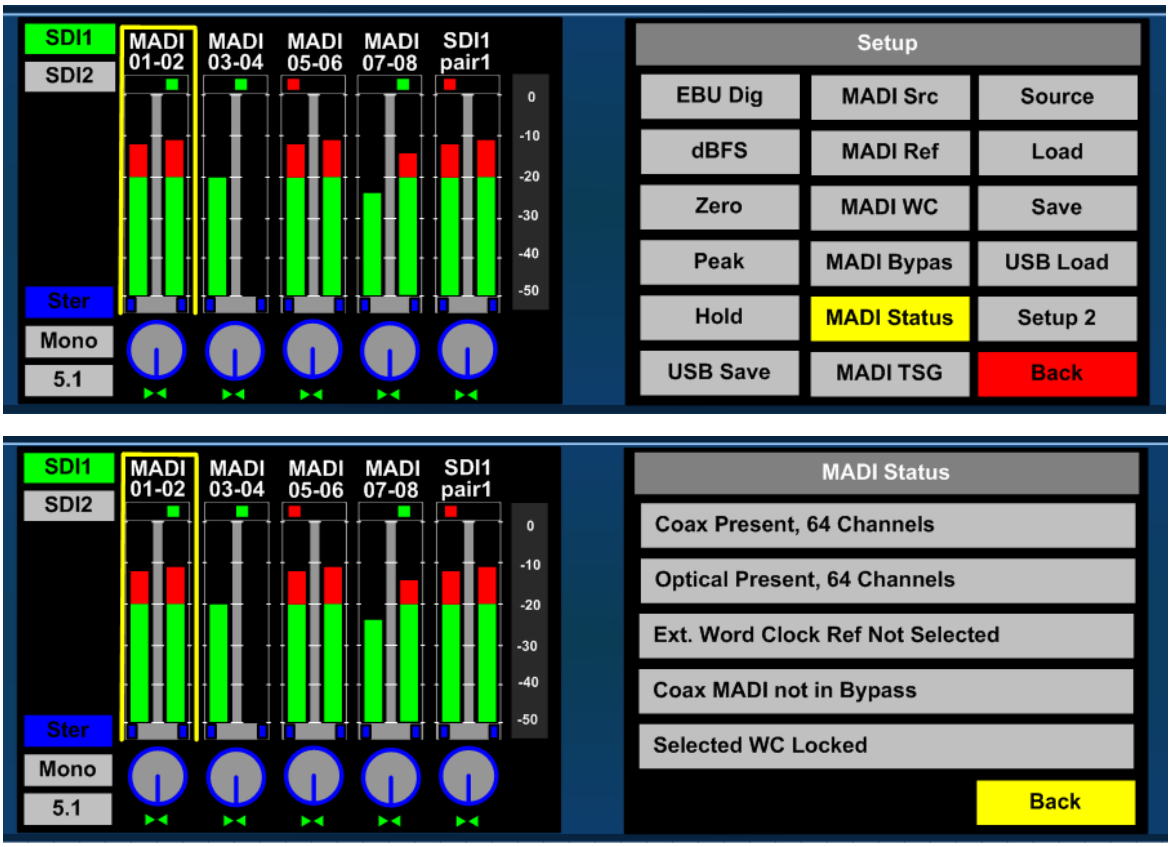
The **MADI WC** button is used to turn the 75 ohm termination of the Wordclock reference connector on and off

2.10.5 MADI Bypass

SAM1 MADI features a relay which is wired across the **Coax Input** and the **Coax Loop** output connectors. In default, this relay is switched out of circuit and the Coax Input fed to the MADI receiver circuitry whist the reclocked output is fed to both Coax outputs simultaneously. If SAM1 MADI is wired in series with other devices using the loop connection then the **MADI Bypass** relay can be activated via the setup menu to divert MADI away from the SAM1. The relay will also switch to bypass mode in the event that SAM1 power should fail thus maintaining MADI connectivity to any serially connected downstream MADI devices.

2.11 MADI Status – SAM1 MADI Only

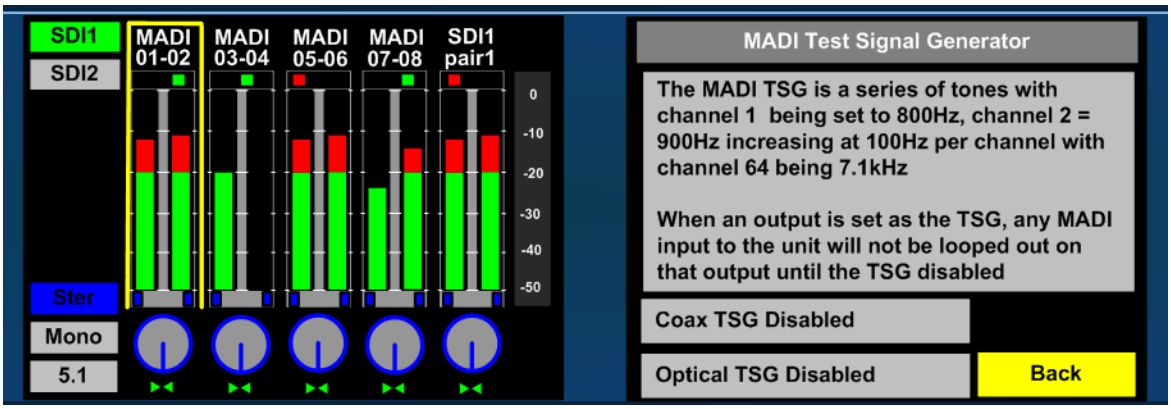
The **MADI Status** button is used to access a secondary menu that provides visual feedback of connected MADI and reference signals.



- **Coax Present** – Shows presence and channel counts of a connected coax source
- **Optical Present** – Shows presence and channel counts of a connected optical source
- **Ext Word Clock Ref** – Displays the presence of a connected Wordclock reference source
- **Coax Madi Bypass** – Highlights if the coax bypass relay is active
- **Selected WC Locked** – Describes whether the selected reference is locked or not

2.12 MADI Test Signal Generator – SAM1 MADI Only

The **SAM1 MADI** features a 64 channel test signal generator that outputs test tones onto the coax and optical MADI output connections when activated. This useful feature can be used to help setup MADI systems or to check downstream MADI equipment.

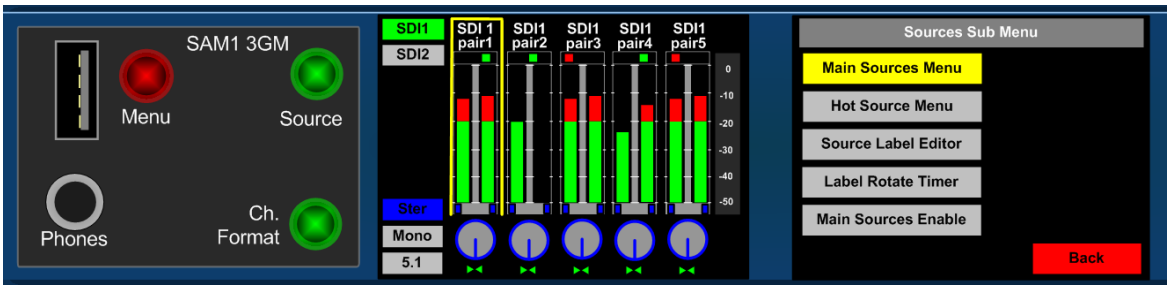


As described on the Test Signal Generator page, the test tones increment in 100Hz intervals from 800Hz at channel 1 up to 7.1kHz at channel 64.

MADI Ch.	Freq. (Hz)	MADI Ch.	Freq. (Hz)	MADI Ch.	Freq. (Hz)	MADI Ch.	Freq. (Hz)
1	800	17	2400	33	4000	49	5600
2	900	18	2500	34	4100	50	5700
3	1000	19	2600	35	4200	51	5800
4	1100	20	2700	36	4300	52	5900
5	1200	21	2800	37	4400	53	6000
6	1300	22	2900	38	4500	54	6100
7	1400	23	3000	39	4600	55	6200
8	1500	24	3100	40	4700	56	6300
9	1600	25	3200	41	4800	57	6400
10	1700	26	3300	42	4900	58	6500
11	1800	27	3400	43	5000	59	6600
12	1900	28	3500	44	5100	60	6700
13	2000	29	3600	45	5200	61	6800
14	2100	30	3700	46	5300	62	6900
15	2200	31	3800	47	5400	63	7000
16	2300	32	3900	48	5500	64	7100

2.13 Source Menu

The **Source** button is a shortcut means for operators to access the collected **SAM1 3GM and SAM1 MADI** input routing and associated function menus. Selecting **Source** opens the **Sources Sub Menu**



The **Main Sources, Hot Source** and **Source Label Editor** menus are described elsewhere in this document, the remaining two are unique to the **Sources Sub Menu**

2.13.1 Label Rotate Timer

The Label Rotate Timer button sets the time coefficient at which rate the source names shown within the **Hot Source** and **Main Source** menus toggle between their default and aliases. The range can be set between 0.25 secs and 5 secs in quarter second steps

2.13.2 Main Sources Enable

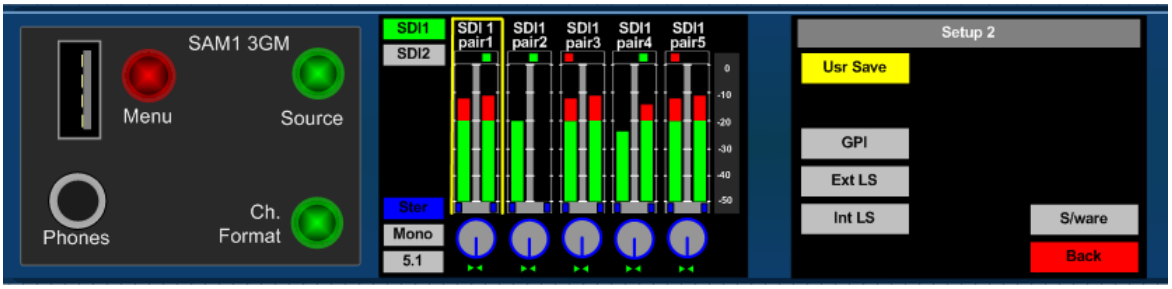
The Main Sources Enable button is a selection which can be made to restrict access to the **Main Source Menu** from the front panel **Source** button so that operators can only change the input selection via the **Hot Source** option set up by a Tech Supervisor or Manager.

2.14 Setup Menu 2

Accessed via Setup, **Setup Menu 2** includes additional functions used to tailor **SAM1 3GM** to meet customer's specific operational needs.

Setup 2 Menu includes options to protect **User Presets, GPI Action, External and Internal Loudspeaker Mute,** and to access the **Software Management Menu**.

Setup Menu 2 looks like this



2.14.1 User Save Menu

The **User Save Menu** enables an Engineer or Technician to **Lock** or **Unlock** the **User Preset** management system onboard **SAM1**. In **Locked** mode a user is able to recall the **Home Preset** but unable to save or recall memories from internal or external (USB or SD Card) locations.

2.14.2 GPI Menu

The **GPI Menu** enables an Engineer or Technician to select whether GPI inputs respond to Latching or Momentary closures from external devices. The GPI connector can be used to Cut/Dim the internal and external Loudspeakers, and to recall **User** presets 1 to 5. The pin-out is described in Section 3.

In **Momentary Mode**, **Dim** and **Cut** GPI's 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 **'Latching'** mode are mutually exclusive.

2.14.3 Internal / External Loudspeaker Mute

The **SAM1** is designed to be used with either **Internal** or **External Loudspeaker Systems**. Users may wish to define **User Preset** conditions which associate the operation of the unit with internal speakers for in one state and external speakers in another. To facilitate this kind of hybrid operation the **SAM1** is equipped with individual **Loudspeaker Mute** buttons which can be configured with different functionality dependant upon their desired use and then saved to individual presets.

In the event that **SAM1** is installed for use with external speakers only with the intention to mute the internal speakers, a **DIP** switch on the rear panel can be used to override the **Internal LS Mute** button in **Setup 2 Menu**.

2.15 Software Menu

TSL is committed to providing customers with free life of product software updates as the features of **SAM1** evolve and any bugs are addressed. New code is made available via our reseller distribution channels and as a download from the TSL website.

www.tslproducts.com

System Software may be updated by the owner via either the front panel **USB Port** (using a USB memory stick) or the rear panel **SD Slot**. Accessing the path **Setup/ Setup2/ SWare** the **SAM1 3GM/MADI** will enter a menu page which reports the current software versions of the onboard Front Panel driver board (FP6), FPGA and PIC devices on the upper three information fields. If a memory device is inserted containing a software revision the three update fields will be displayed as illustrated below;

In order to commence the upload sequence, simply press the **UPDATE** button and the **FP6, FPGA, MADI card** and **PIC** code will be loaded in order. Progress in indicated via the 0-100% scale.

Once complete, **SAM1** will display a message confirming that the process has been successfully concluded.

Although an updated **SAM1** will function without performing a factory reset the user may wish to do so in order to remove any residual data such as stored memories or settings. To perform a factory reset it is necessary to remove power from the unit and then re-apply power whilst pressing the **Menu** button until a message appears to confirm that **Factory Default** has been reloaded. Press **Menu** once more and you will be able to operate **SAM1** with the new firmware active.

The action of restoring Factory Default status will remove any stored memories from the SAM1. Please backup and restore memories from an external device if required.

Please note that the UPGRADE sequence may take several minutes and may appear to 'stall' – it is important not to interrupt the process or to remove power from the device during a software upload as this may render the AMU unusable.

3.0 Connectivity and pin-out details

SAM1-3GM/MADI uses industry standard connectivity wherever possible. The D25 connectivity used for analogue and AES I/O adopts a pinning convention commonly used for Yamaha Commercial Audio equipment and breakout cables are readily available at low cost from companies such as www.cpc.farnell.com www.hosatech.com and many others.

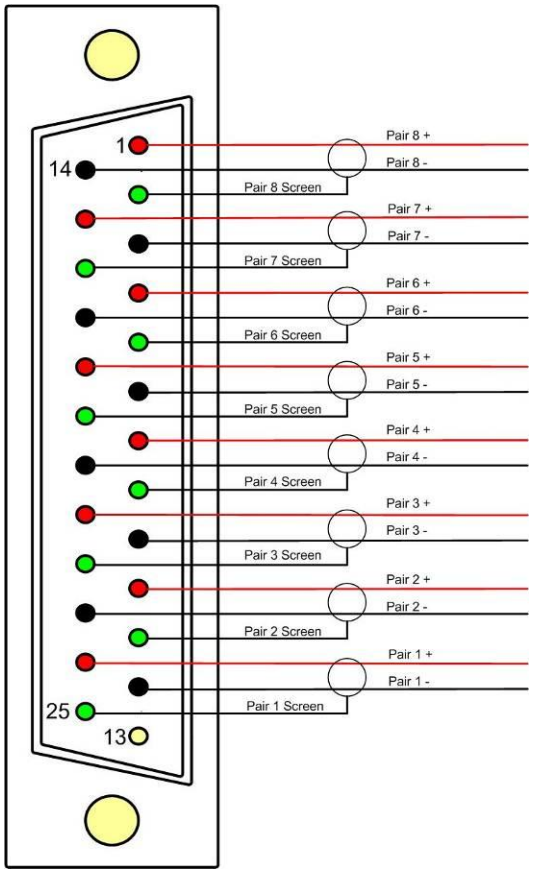
For unbalanced AES I/O connectivity an optional BNC breakout cable, CAB-D25-BNC, is available from TSL or your local reseller. When used in conjunction with **SAM1**, DIP switch 2 (AES Impedance) must be switched to the 75 ohm position.

3.1 Analogue XLR Connectors – Stereo Variable Output (Monitor Buss)

CONN	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-

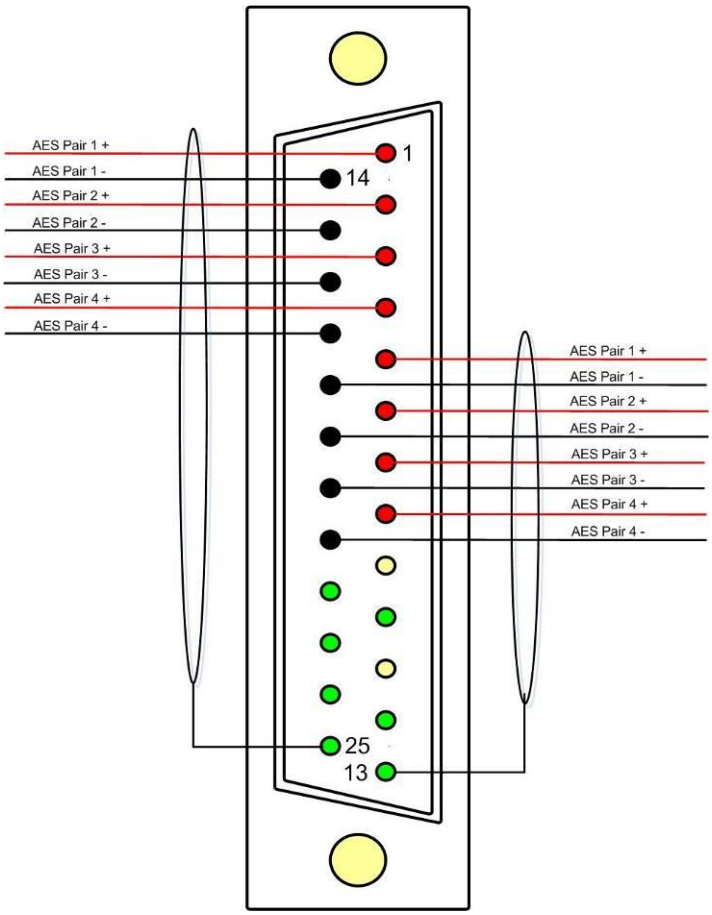
3.2 Analogue Output Connector – D25 Socket Pinout on unit, Plug (shown) on mating cable.

D 25 SOCKET ON AMU	AUDIO OUT
PIN NO	**FUNCTION**
1	A8+ (Var. Mon R)
14	A8- (Var. Mon R)
2	Ground
15	A7+ (Var. Mon L)
3	A7- (Var. Mon L)
16	Ground
4	A6+ (Fixed Mon R)
17	A6- (Fixed Mon R)
5	Ground
18	A5+ (Fixed Mon L)
6	A5- (Fixed Mon L)
19	Ground
7	A4+ Unused
20	A4- Unused
8	Ground
21	A3+ Unused
9	A3- Unused
22	Ground
10	A2+ (Fixed Mix 1R)
23	A2- (Fixed Mix 1R)
11	Ground
24	A1+ (Fixed Mix 1L)
12	A1- (Fixed Mix 1L)
25	Ground
13	N/C



3.3 AES Input/Output Connectors 1-4– D25 Socket Pinout, Plug (shown) on mating cable.

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



AES connectors may be wired using unbalanced terminations for SPDIF and 75R coaxial systems.

Optional AES breakout cable CAB-D25-BNC-2 is available from TSL Sales (+44 1628 676200) and provides BNC Socket to D25 connectivity.

Please note that when using SAM1 with unbalanced AES audio connections that the 75/110 ohm DIP Switch must be selected prior to use.

When using the D25 for unbalanced AES, AES XLR connectors 1 and 2 may not be used for balanced AES connectivity.

3.4 GPI Connector – D9 Socket.

Not defined: Contact TSL Products Support for details

3.5 Remote Control Connector/ RS 422 - D9 Socket

This is wired for RS422 slave operation.

D9	CONTROL
1	0V
6	0V
2	TX-
7	TX+
3	RX+
8	RX-
4	0V
9	0V
5	N/C

3.6 DIP switch configuration functions – To be confirmed

SWITCH	FUNCTION
1	tbc
2	AES Impedance (75R Up/110R Dn)
3	Internal LS Mute (Mute Up/On Dn)
4	tbc
5	tbc
6	Analogue (XLR) Output (Fixed/Variable)
7	tbc
8	tbc

4.0 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 SAM1 - Technical Specifications

Power Supply

Supply Voltage	12V DC
Power Consumption	tbc.

Physical Dimensions

Height	44mm (1RU)
Width	483mm (19")
Depth	2500mm
Weight	>3100g (to be confirmed)

Inputs AES 1 to 4 AES I/O, 25 way D type (See elsewhere for details)

Input, HD/SDV 1 &2 (where fitted)

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.

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 elsewhere for details)
Impedance	110/75 Ohm

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

Loudspeaker Response	60Hz to 18 kHz +/- 5dB
Electrical Distortion	Better than 0.1%
Hum and noise	Better than -80dB
SPL	>98dB at 0.6 m
Amplifier Output	25 watts total power output
Digital Sample Rate	32 to 48 kHz auto select

7.0 Installed HDC-2T Audio Monitor Module Specification (including 'add on' expansion board).

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:	75Ω, return loss ≥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:	≥300m of high quality cable at 270Mbit (eg Belden 1694) ≥100m of high quality cable at 1.5Gbit

AES 3 or AES 3id

Connector type:	Inputs 1 & 2, XLR 3 pin. (can be wired for unbalanced BNC input)
Inputs 1, 2, 3 & 4.	25way D-type 4 stereo pairs, pin-out as per Yamaha
Impedance:	75Ω unbalanced or 110Ω 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:	75Ω
Amplitude:	800mV p-p ±10%
Output 2	Composite SD (Downconverted when input is HD not available on SAM1 3GM)
Format:	PAL or NTSC according to standard on SDI input
Impedance:	75Ω
Amplitude:	1V p-p ±5%
Output 3 - Optional	*SDI version of image on composite output*
Impedance:	*75Ω*

Amplitude: *800mV p-p ±10%*

AES

Four AES (8 channels) may be output from analogue audio, embedded audio.
Connector type: 25way D-type 4 AES pairs (In and Out), pin-out as per Yamaha Standard
Impedance: 75Ω unbalanced or 110Ω 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 75Ω or >2V into 110Ω

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 (4Ω) per channel into depending on input power supply

GPI inputs

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

Control

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

8.0 Installed HDI-4 MADI card

Overview

The HDI-4 MADI module has been especially designed for use with the HDC-2 audio monitor module and provides bi-directional interconnectivity between the two devices.

HDI-4 supports the AES10 Multichannel Audio Digital Interface format defined in 1991 by the Audio Engineering Society and updated to AES10-2003 twelve years later .

Coaxial Input

75R BNC supporting 56 / 64 channel MADI at 48kHz

Fibre Input

Single Mode SC format connection supporting 56 / 64 channel MADI at 48kHz

Coaxial Output Loop and 'Reclocked'

75R BNC supporting 56 / 64 channel MADI at 48kHz up to 200 metres (factory tested using cable clone) depending on cable and connector quality

Fibre Output

Single Mode SC format connection supporting 56 / 64 channel MADI at 48kHz.
Wavelength defined as 1300nm, maximum transmission length guaranteed to 2km.